THE CASE FOR CRYPTOCURRENCY FIRMS' IMPLEMENTATION OF VOLUNTARY CLIMATE-RELATED FINANCIAL DISCLOSURE FRAMEWORKS

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Abstract

Since the development of Bitcoin in 2009, cryptocurrency has experienced an explosive surge in popularity and is now a viable form of investment and currency. While crypto has certainly contributed positively to the global economy and has grown to be a prominent digital asset, these successes are overshadowed by the currency's adverse effects on the environment. Specifically, mining of cryptocurrency results in vast expenditures of energy which contributes immensely to the cryptocurrency industry's increasing carbon footprint. Resultingly, many have called for reform in the crypto industry and seek to decrease the environmental degradation imposed by cryptocurrencies. Most of this discussion has centered around the regulation of cryptocurrency, however, presently there is no single, existing regulatory authority that has complete jurisdiction over every type of cryptocurrency. In the absence of a novel authority tasked with the regulation of cryptocurrency, the solution to the negative environmental impacts of cryptocurrency must be found elsewhere. This note argues that cryptocurrency firms should implement voluntary disclosure frameworks as a means of mitigating the digital asset's environmental effects. Using the Task Force on Climate-related Financial Disclosures and the Sustainability Accounting Standards Board as model frameworks, this note recommends that crypto firms design their financial and environmental disclosure frameworks after these structures.

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I. Introduction

Cryptocurrency (or crypto) has recently taken the world by storm with many mining and investing in the digital currency. However, this rising popularity comes with a drastic effect on the environment. As a decentralized form of currency, cryptocurrency lacks proper regulatory bodies to enact laws and regulations aimed at reducing the crypto industry's carbon footprint. This note will argue that in the absence of a governing authority, cryptocurrency firms should implement a climate change financial disclosure framework to combat the adverse effects crypto has on the climate.

Part II will begin with a brief explanation of cryptocurrency, including a discussion of its decentralized nature and the lack of regulation of this virtual currency. It will also explain the recent rise of cryptocurrency and its prevalence today. Part III will then explore the negative effects cryptocurrency has on the climate. It will discuss the vast amount of energy consumed through the mining of cryptocurrency, including two trends in mining that have proven to be energy intensive.

Part IV of this note will recommend mitigating the environmental impacts of cryptocurrency via voluntary climate-related financial disclosure frameworks by cryptocurrency firms. It will first introduce the Securities and Exchange Commission's (SEC) recent consideration of mandatory corporate disclosures of the environmental impacts of cryptocurrencies. However, certain cryptocurrencies, such as Bitcoin, fall outside of the SEC regulations, making this potential mandate ineffective on a large scale.

Part IV will continue with an examination of two voluntary financial disclosure frameworks: the Task Force on Climate-related Financial Disclosures (TCFD) and the Sustainability Accounting Standards Board (SASB). A discussion of each of these frameworks will follow, explaining the benefits and drawbacks of each. This part will conclude with an analysis into the shortcomings of voluntary disclosure frameworks contrasted with the benefits. Finally, Part V of this note will conclude by analyzing the potential effectiveness of adhering to these financial disclosure guidelines.

II. Background

A. What is Cryptocurrency?

Cryptocurrency is digital or virtual money that "uses cryptography[1] to validate and secure transactions that are digitally recorded on a distributed ledger (such as a blockchain)."[2] Cryptocurrency is based on blockchain technology, meaning that every transaction involving this digital asset is verified and recorded on what is known as a blockchain.[3] A blockchain is essentially a digital ledger that keeps track of all the transactions by recording individual cryptocurrency transactions in separate "blocks" and then connecting each one in a "chain" with all the prior transaction blocks—hence the name "blockchain."[4] The ledger, which can be either public or private, is held by every crypto owner and is maintained on thousands of computers, all interconnected through the internet.[5] A blockchain can be understood as a checkbook filled

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[1] *What is Cryptography?*, COINBASE, https://www.coinbase.com/learn/crypto-basics/what-is-cryptography [https://perma.cc/E2A9-EU8G] ("Cryptography is the study and practice of sending secure, encrypted messages between two or more parties. Cryptography allows digital currency transactions to be pseudonymous, secure, and 'trustless' – with no bank or other intermediary required.").

[2] *Virtual Currencies*, I.R.S., https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currencies [https://perma.cc/AYQ3-92DR] ("Cryptocurrency is a type of digital asset that uses cryptography to validate and secure transactions that are digitally recorded on a distributed ledger, such as a blockchain."); Kate Ashford, *What is Cryptocurrency?*, FORBES ADVISOR (Dec. 18, 2020, 12:27 AM), https://www.forbes.com/advisor/investing/what-is-cryptocurrency/ [https://perma.cc/Y3RU-WNAU] ("A cryptocurrency is a digital, encrypted, and decentralized medium of exchange.").

[3] Ashford, *supra* note 2 ("Cryptocurrency is decentralized digital money that's based on blockchain technology . . . [t]hat cryptographic proof comes in the form of transactions that are verified and recorded on a blockchain.").

[4] *Id.* ("A blockchain is an open, distributed ledger that records transactions in code . . . [t]ransactions are recorded in "blocks" that are then linked together on a "chain" of previous cryptocurrency transactions.").

[5] Killian Steer, *Cryptocurrency Mining: The Challenges it Faces and How New Regulations Can Help*, N.C. J.L. & TECH. 301, 306 (2019) ("A blockchain is considered decentralized because instead of a central authority holding and maintaining the ledger, the blockchain ledger is stored on

with every purchase, sale, acquisition, and transfer of that cryptocurrency, and every holder of crypto has access to this checkbook to log their own transactions and maintain a complete record.[6] It is essentially a chain of recorded information which allows individuals to trade directly with one another, instead of through a bank or other financial institution.[7] Accordingly, the blockchain technology replaces the role typically performed by a bank or other central authority in what we have come to regard as more conventional forms of electronic payments (e.g. credit cards, digital wallets, and bank transfers).[8]

Unlike the United States dollar, cryptocurrency is not controlled or maintained by any centralized government or regulating body; it is a decentralized form of currency.[9] Without any managing

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thousands of computers (called nodes) running a common software protocol that are connected to each other via the internet.").

[6] Ashford, *supra* note 2 (comparing a blockchain to a checkbook and stating that, "'[e]ach page is similar to a block, and the entire book, a group of pages, is a blockchain.'").

[7] Samantha T. Edgell, *TOTO, I'VE A FEELING THE ENVIRONMENT ISN'T SAFE FROM CRYPTOCURRENCY ANYMORE: THE DEGRADING ECOLOGICAL EFFECTS OF BITCOIN AND DIGITIAL* CURRENCIES, 32 VILL. ENV'T L.J. 69, 71 (2021) ("Unlike centralized banking, cryptocurrency allows users to easily transfer funds between one another."); *What is cryptocurrency and how does it work?*, KASPERKSY, https://www.kaspersky.com/resource-center/definitions/what-is-cryptocurrency [https://perma.cc/LQD9-4FS2] ("Cryptocurrency is a . . . peer-to-peer system that can enable anyone anywhere to send and receive payments. Instead of being physical money carried around and exchanged in the real world, cryptocurrency payments exist purely as digital entries to an online database describing specific transactions.").

[8] Rani Shulman, *ARE CENTRALIZED CRYPTOCURRENCY REGULATIONS THE ANSWER? THREE COUNTRIES; THREE DIFFERENT DIRECTIONS*, 54 BROOK. J. INT'L L. 835, 839–40 (2020) ("Blockchain technology is about decentralizing this 'middleman,' allowing individuals who transact using the Blockchain to build a trust network among themselves without going through a centralized verification process, such as the bank.").

[9] Audrey Carroll, *THE OTHER SIDE OF THE (BIT)COIN: SOLUTIONS FOR THE UNITED STATES TO MITIGATE THE ENERGY CONSUMPTION OF CRYPTOCURRENCY,* 12 GEO. WASH. J. ENERGY & ENV'T L. 53, 55 (2021) ("A major distinction between cryptocurrency and the United States Dollar ("USD") is that the USD is a fiat currency, meaning that it has no intrinsic value but derives its value from the government

central authority, participants engage in a peer-to-peer network in which every holder of crypto has access to this blockchain (i.e. "ledger") to confirm and verify each transaction.[10] Cryptocurrency, therefore, "does not rely on a bank or other third-party to validate the transaction" and enables users to transfer money back and forth without incurring any additional third-party fees.[11] Resultingly, cryptocurrency has a lot fewer transaction fees than banks, credit cards, and other financial institutions and instruments.[12] This absence in fees, enabled by blockchain technology, makes the decentralized nature of cryptocurrency an extremely attractive feature.[13]

In addition to the circumvention of third-party fees, the decentralized nature of cryptocurrencies provides many more advantages to users of the virtual currency. For example, the blockchain technology enables cryptocurrency users to remain anonymous[14] and generally increases crypto's level of security.[15] This technology gives crypto users access to the ledger of transactions on

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which distributes it. Cryptocurrency is a non-fiat currency because no centralized government backs it or directly controls its value. Cryptocurrency is also unique in that it is decentralized and, therefore, does not rely on a bank or other third-party to validate the transaction.").

[10] Ashford, *supra* note 2 (analogizing blockchain technology to a checkbook and stating that "with a blockchain, everyone who uses a cryptocurrency has their own copy of this book to create a unified transaction record."); Steer, *supra* note 5, at 306 ("A blockchain is essentially 'a decentralized peer-to-peer network that maintains a public, or private, ledger of transactions . . . [w]orking together under the common protocol, the nodes are able reach a consensus about whether a set of transactions are correct, and then they are able to combine a group of transactions into a block and add the block blockchain ledger.").

[11] Carroll, *supra* note 9, at 55.

[12] *Can The Government Regulate Cryptocurrency?*, THE NYU DISPATCH, https://wp.nyu.edu/dispatch/can-the-government-regulate-cryptocurrency/ [https://perma.cc/JUS3-49L6] (detailing that an advantage of cryptocurrency are the reduced transaction fees in comparison to credit cards and major financial instruments).

[13] Carroll, *supra* note 9, at 55 ("The blockchain platform allows users of Bitcoin to directly transfer money from one person to another, which makes Bitcoin alluring to many users because it allows them to avoid third party fees.").

[14] THE NYU DISPATCH, *supra* note 12, at 3 ("With online go URL platforms, users retain anonymity until they cash out or exchange their tokens").

[15] *Id.* (explaining that cryptocurrency "transactions can't be reversed or counterfeited").

their own computers, and each transaction is verified by other users in the respective crypto network.[16] This verification by peer users makes it extremely difficult to counterfeit, reverse, and duplicate transactions, further providing security.[17] Additionally, unlike investing in shares, investing in crypto does not require filling out any paperwork, which may be tedious, confusing, and time consuming.[18] Finally, there is a set supply of cryptocurrency that exists in the world, meaning that to maintain an alignment of supply and demand of crypto, crypto will be harder to mine in the future and fewer coins will be rewarded to successful miners.[19] This, in turn, will minimize the inflation of cryptocurrency and keep the value of the coins steady and stabilized.[20]

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[16] Matthew Barrack, *Current Regulators Overseeing Cryptocurrencies Are Restricting Access to This Innovative New Technology*, 26 NO. 3 PIABA BAR J. 453, 456-57 (2019) (explaining that individuals with access to ledgers of transactions verify these transactions "through review, ensuring that the proper conditions have been fulfilled. If the conditions are met, the transaction will be verified and added to the ledger. If the conditions are not met, the users will not verify the transaction.").

[17] *Id.* at 457 ("Two of the key benefits of this form of peer verification are that it makes counterfeiting and double spending extremely difficult. Counterfeit coins would be identified because they would not appear on peer ledgers. Double spending is prevented by the users, as they can see on their ledgers that the coins have already been transferred and that the individual trying to trade them no longer has ownership."); THE NYU DISPATCH, *supra* note 12, at 3 ("Transactions can't be reversed or counterfeited.").

[18] THE NYU DISPATCH, *supra* note 12, at 3 ("No paperwork for investing in a token, unlike a share.").

[19] Gina Jurva, *Five Questions About the Environmental Impact of Crypto-Mining*, 25 NO. 2 FINTECH L. REP. NL 5, 5 (2022) ("Baked into the code is a reduction of the reward over time, and there is a fixed supply of Bitcoin that will ever exist, so the mining becomes likely more difficult over time depending on how many computers are competing at any given moment.").

[20] THE NYU DISPATCH, *supra* note 12, at 3 ("Most currencies have a set supply, which will cool inflation as mining more currency become harder."); Nicole Lapin, *Explaining Crypto's Volatility*, FORBES (Dec. 23, 2021) https://www.forbes.com/sites/nicolelapin/2021/12/23/explaining-cryptos-volatility/?sh=112143ba7b54 [https://perma.cc/Y6GV-AD99] (explaining that some investors use cryptocurrency as a hedge against inflation instead of as a currency).

While one of the main attractive properties of cryptocurrency is its decentralized nature, its decentralization actually presents an issue regarding the regulation of this currency.[21] Currently, no single authority regulates cryptocurrency since different cryptocurrencies function in different ways. Cryptocurrencies can be grouped into three categories based on their function: "currency tokens, investment tokens, and utility tokens."[22] Currency tokens, such as Bitcoin, can be used as a form of payment, but only if people and businesses are actually prepared to accept the tokens in exchange for goods and services.[23] Investment tokens can be likened to owning shares in a company, but instead, the user receives tokens of that particular cryptocurrency.[24] Finally, utility tokens afford holders of the digital coins with access to the services of that specific crypto company.[25] It is important to note, however, that these categories of functions are not mutually exclusive and a token can have functions from multiple categories.[26] Cryptocurrencies can have multiple functions and thus fall into more than one of these categories.[27]

Because different cryptocurrencies function so differently from one another, existing agencies are unsure how to identify the crypto and in turn how to regulate it. The Internal Revenue Service (IRS), the body responsible for the collection of taxes, classifies

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[21] Amanda Gulli, *[Un] Sustainability of Bitcoin Mining*, 47 RUTGERS COMPUT. & TECH. L.J. 95, 119 (2020) ("The issue is how to regulate a decentralized entity that uses a peer-to-peer network to verify its transactions.").

[22] Barrack, *supra* note 16, at 458.

[23] *Id.* ("In the United States, there are many online and brick-and-mortar stores that accept Bitcoin as payment. Because Bitcoin is not backed by the dollar or the government, there is no guarantee that those who accept Bitcoin as payment will ever get to exchange it for any fiat currency. They can only do so only as long as there is a market for Bitcoin.").

[24] *Id.* at 459 ("Investment tokens are used in a way similar to stock in a company, but instead of receiving a stock to represent the buyer's share in the company, users receive a token.").

[25] *Id.* at 459–60 ("Utility tokens 'offer a wide variety of benefits to the owner. The most common provide access to particular services offered by the company, such as the use of storage space (Filecoin).' The value of these tokens is necessarily linked to the value of the services an owner would be entitled to.").

[26] *Id.* at 460 ("These categories are not exclusive.").

[27] *Id.* (explaining that a hybrid token has multiple features and functions, and can, for example, be used as a form of payment and also give the owner access to services).

cryptocurrency as assets or property and, as a result, applies capital gains taxes to the sale and use of crypto.[28] The SEC considers some types of cryptocurrency to be securities and attempts to apply the securities laws to them.[29] The Commodity Futures Trading Commission (CFTC) views some forms of cryptocurrency as commodities.[30] This distinction in the different classifications of cryptocurrency is important because there are different rules and requirements placed on assets versus securities versus commodities.[31] For example, "securities are regulated significantly more stringently than commodities, including, among other requirements, restrictions on price fixing." [32] Failing to settle on one classification, cryptocurrency falls into these regulatory gaps and is left as a decentralized form of currency.

B. Cryptocurrency Mining

Cryptocurrency is "mined," and digital coins are created, from digital locations after miners have successfully solved complex coding problems.[33] Once cryptocurrency is successfully mined, a new block of transactions is added to the already existing blockchain, and

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[28] *Cryptocurrency Rules & Regulations You Should Know*, SOFI (Dec. 4, 2019), https://www.sofi.com/learn/content/cryptocurrency-rules-regulations/ [https://perma.cc/CTL2-4WGC] ("Cryptocurrencies are currently viewed by the IRS as assets or property, which means that capital gains taxes apply.").

[29] *Id.* ("The SEC currently views some cryptocurrencies as securities.").

[30] *Id.* ("Unlike the SEC, the Commodity Futures Trading Commission (CFTC) considers Ether, the second-most traded cryptocurrency, as a commodity.").

[31] Thomas Wade, *The Five Things to Consider Before Regulating Cryptocurrency,* AM. ACTION F. (Feb. 9, 2022) https://www.americanactionforum.org/insight/the-five-things-to-consider-before-regulating-cryptocurrency/#:~:text=Push%20the%20balance%20too%20far,protect%20both%20consumers%20and%20investors [https://perma.cc/5TWH-JBDZ] ("This distinction matters, because securities are regulated significantly more stringently than commodities . . . .").

[32] *Id.*

[33] Edgell, *supra* note 7, at 69 ("Cryptocurrencies are traded forms of digital assets that are extracted from digital locations after high-powered computers run complex algorithms.").

the miner is rewarded with coins.[34] Because cryptocurrency is decentralized in nature, there is no central, regulatory authority to verify that the same cryptocurrency is not being used more than once.[35] As a result, consensus mechanisms are used to confirm which transactions are valid and which are not.[36] These algorithms are used to authenticate new transactions (i.e. a new block in the blockchain), add these transactions into the existing blockchain, and finally create tokens of cryptocurrency to reward successful miners (this is what the miners are mining for).[37] Multiple consensus algorithms are used by cryptocurrency firms and the algorithm used depends on the specific digital asset.[38] A majority of cryptocurrency companies use what is known as a Proof-of-Work (PoW) incentive structure instead of a Proof-of-Stake (PoS) or even a Proof-of-Authority (PoA) consensus model.[39]

PoW uses mining to secure transactions on the blockchain and produce tokens, whereas PoS uses something known as "staking."[40] In a PoW consensus model, there is essentially a race to

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[34] Steer, *supra* note 5, at 308 ("Mining is the last step in the four-step transaction process in which the nodes add a new block of transactions to the existing chain.").

[35] *What is "Proof of Work" or "Proof of Stake"?,* COINBASE, https://www.coinbase.com/learn/crypto-basics/what-is-proof-of-work-or-proof-of-stake [https://perma.cc/UP9V-Z5U3] ("Decentralized cryptocurrency networks need to make sure that nobody spends the same money twice without a central authority like Visa or PayPal in the middle.").

[36] *Id.* (explaining that the verification of cryptocurrency is accomplished with the use of consensus mechanisms, "which is a system that allows all the computers in a crypto network to agree about which transactions are legitimate.").

[37] *Id.* ("'Proof of work' and 'proof of stake' are the two major consensus mechanisms cryptocurrencies use to verify new transactions, add them to the blockchain, and create new tokens.").

[38] Carroll, *supra* note 9, at 56 ("There are many different consensus method algorithms that cryptocurrency companies use . . . [e]ach cryptocurrency company typically uses one algorithm and existing cryptocurrency companies are capable of switching their algorithms.").

[39] *Id.* ("The PoW consensus algorithm, which is used by the cryptocurrency giant Bitcoin, is the most common and energy-intensive consensus mechanism.").

[40] COINBASE, *supra* note 34 ("[P]roof of stake blockchains employ a network of 'validators' to contribute—or 'stake'—their own crypto in exchange for a chance of getting to validate new transaction, update the blockchain, and earn a reward."); Carrol, *supra* note 9, at 57 (explaining that the PoS system

the finish and only the first miner to successfully solve the complex coding problem collects the cryptocurrency.[41] Miners from all across the world use computers to decode an advanced algorithm in the hopes of being the first to find the solution.[42] Practically speaking, "the winner gets to update the blockchain with the latest verified transactions and is rewarded by the network with a predetermined amount of crypto."[43] Taking Bitcoin as an example, approximately 10,000 computer systems located across the globe compete in the race to solve the complex mathematical algorithm.[44] If one of these computer systems successfully solves the problem before the rest, that miner receives 6.25 Bitcoin tokens[45] (converted to U.S. dollars, this holds a current value of approximately $120,355.94).[46] This race to decode the algorithm and collect Bitcoin tokens repeats itself approximately every ten minutes.[47]

The PoW algorithm is likely the most popular form of consensus models because it is powerful, secure, and highly effective

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rewards individuals with cryptocurrency "based off how much of the user's own currency the user is willing to invest in the currency").

[41] Carroll, *supra* note 9, at 56 ("The PoW system can be represented by athletes at a track meet. Once the gun fires, all the runners are working as hard as possible to cross the finish line first, but only one person can win. Likewise, the PoW algorithm requires that miners use computers to compete to solve a difficult mathematical equation and then receive cryptocurrency. Only the first miner to solve the problem "wins" the race by receiving cryptocurrency.").

[42] *Id.* ("Only the first miner to solve the problem 'wins' the race.").

[43] COINBASE, *supra* note 35.

[44] Jurva, *supra* note 19, at 5 ("In the Bitcoin example, more than 100,000 nodes (computer groupings) all over the world are competing to win the race, and if they do, they earn 6.25 Bitcoin (valued today around $237,500) for the ability to add the grouping of transactions to the next block on the chain.").

[45] *Id.* ("[A]nd if [the computer systems] do, they earn 6.25 Bitcoin.").

[46] *6.25 BTC to USD (Bitcoin to Dollar)*, BITCOINS PRICE, https://bitcoinsprice.org/price/btc/usd/6.25 [https://perma.cc/F96L-NVPQ] (providing Bitcoin to USD price chart as of Oct. 2, 2022).

[47] Jurva, *supra* note 19, at 5 ("This happens roughly every 10 minutes."); Jeff Benson, *Mining Bitcoin for Profit is Getting Harder. Here's Why*, DECRYPT (Oct. 19, 2021), https://decrypt.co/83834/mining-bitcoin-profit-getting-harder-why [https://perma.cc/S8DM-JVL7] ("Bitcoin mining difficulty adjusts in order to keep blocks processing at a rate of one every 10 minutes.").

at maintaining a decentralized blockchain.[48] It is important to keep in mind that the decentralized nature of cryptocurrency is one of its most attractive features. However, while the PoW structure is advantageous in securing a decentralized blockchain, it has also proven to be extremely energy-intensive and is a major contributor to the crypto industry's carbon footprint.[49] Thus, despite a multitude of miners participating in this mining race, many ultimately lose and expend copious amounts of energy for nothing in return. While the PoW consensus algorithm is exceptionally energy-intensive and effectively a waste of energy by many miners, it is unfortunately the most prevalent model in the cryptocurrency industry.[50] For simplicity purposes, this paper will focus solely on the PoW consensus model, since that is what a majority of cryptocurrencies use.

C. The Rise and Prevalence of Cryptocurrency

Some of the most well-known forms of cryptocurrency are Bitcoin and Ether, but today over 20,000 different cryptocurrencies exist, and new forms of this digital asset are constantly being created and made available to the public.[51] While cryptocurrency has suddenly surged in popularity over the past couple of years, virtual currency has existed for over a decade, dating back to Bitcoin's

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[48] E. Napoletano & Benjamin Curry, *Proof of Work Explained*, FORBES (Apr. 8, 2022), https://www.forbes.com/advisor/investing/cryptocurrency/proof-of-work/ [https://perma.cc/493F-6K7A] ("It's a consensus mechanism that allows anonymous entities in decentralized networks to trust one another . . . [w]ith cryptocurrencies, there are no bankers or financial institutions to ensure trust. Instead, miners and proof of work guarantee transparent, accurate transactions.").

[49] COINBASE, *supra* note 35 (stating that proof of work is "an energy-intensive process that can have trouble scaling to accommodate the vast number of transactions smart-contract compatible blockchains like Ethereum can generate.").

[50] Napoletano & Curry, *supra* note 48 ("Approximately 64% of the total market capitalization of the universe of cryptocurrencies use proof of work for validation.").

[51] Kat Tretina, *Top 10 Cryptocurrencies of 2022*, FORBES (Oct. 1, 2022, 11:38 AM), https://www.forbes.com/advisor/investing/cryptocurrency/top-10-cryptocurrencies/ [https://perma.cc/5ZD3-FRYC] ("To date, there are more than 20,000 cryptocurrency projects out there that represent the entire $952 billion crypto market.").

development and public release in 2009.[52] In fact, many features of the cryptocurrencies we are familiar with today were actually suggested in the 1990s, but did not come to fruition until the development of Bitcoin decades later.[53] In fact, the idea for cryptocurrency came from the idea for a "currency that could be sent untraceably and in a manner that did not require centralized entities . . . ."[54]

Since its release over a decade ago, Bitcoin has garnered over seven million users around the world.[55] In 2017, the number of places accepting Bitcoin as payment increased, enhancing the popularity of the cryptocurrency even further.[56] As a result, more and more money began to flow into the crypto industry, making it a highly lucrative and dominant industry in the financial sector.[57] As of 2022, there are an estimated 320 million users of cryptocurrency around the world, and an incredible 18,000 businesses accept crypto

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[52] Bernard Marr, *A Short History of Bitcoin and Crypto Currency Everyone Should Read*, FORBES (Dec. 6, 2017, 12:28 AM), https://www.forbes.com/sites/bernardmarr/2017/12/06/a-short-history-of-bitcoin-and-crypto-currency-everyone-should-read/?sh=517144d23f27 [https://perma.cc/AWM6-NFEK] (stating that in 2009 "[t]he Bitcoin software is made available to the public for the first time . . . .").

[53] Guardian Nigeria, *The Idea and a Brief History of Cryptocurrency*, THE GUARDIAN (Dec. 26. 2021, 5:20 PM), https://guardian.ng/technology/tech/the-idea-and-a-brief-history-of-cryptocurrencies/ [https://perma.cc/N4UV-F8CE] ("The cryptocurrency was first mentioned in 1989 . . . [b]ut it was only in the early 1990s that cryptographic protocols and software began to be developed that would make possible the creation of a truly decentralized digital currency.").

[54] Evan Jones, *A Brief History of Cryptocurrency*, CRYPTOVANTAGE (Sep. 21, 2022), https://www.cryptovantage.com/guides/a-brief-history-of-cryptocurrency/#:~:text=The%20idea%20for%20cryptocurrency%20first,cryptographic%20electronic%20money%20called%20Digicash [https://perma.cc/85KJ-FWL4] (explaining that in 1995, cryptographer David Chaum invented DigiCash, an anonymous, cryptograph form of digital money).

[55] Steer, *supra* note 5, at 312 ("In the first two months of 2019, Bitcoin alone has averaged over 300,000 transactions per day, and there are over 7.1 million active bitcoin users.").

[56] Marr, *supra* note 52 ("A gradual increase in the places where Bitcoin could be spent contributed to its continued growth in popularity, during a period where it's value remained below previous peaks.").

[57] *Id.* ("Gradually as more and more uses emerged, it became clear that more money was flowing into the Bitcoin and cryptocoin ecosystem.").

as a form of payment.[58] "Today total digital assets are estimated to be worth about $1.6 trillion"[59] and the current market capitalization of all combined cryptocurrencies sits at about two trillion dollars.[60]

III. Environmental Effects of Cryptocurrency

A. Consumption of Energy

Mining of cryptocurrency requires large amounts of electrical energy to power the computer systems needed to solve these algorithms.[61] Miners strive to use as much computational power as possible because it helps them solve the algorithms faster.[62] Increased computing power and speed are especially useful in cryptocurrencies with PoW incentive structures because they increase the likelihood that the miner will be the first to solve the algorithm and be rewarded.[63] The winner-take-all structure implicit in the PoW algorithm results in huge exertions of energy by multiple mining contenders for zero reward.[64] Many miners compete to solve

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[58] *Cryptocurrency Across the World*, TRIPLE A, https://triple-a.io/crypto-ownership-data/ [https://perma.cc/RVR8-4KHY] (data demonstrates that there are approximately 46 million cryptocurrency users in the United States alone).

[59] Soyoung Ho, *SEC Contemplating Corporate Disclosure of Crypto Currencies for Environmental Impact*, 15 Acct. & Compliance Alert 149, 149 (2021).

[60] *Global Charts: Total Market Capitalization*, COINMARKETCAP, https://coinmarketcap.com/charts/ [https://perma.cc/KMR2-4GB8] (showing data from chart which demonstrates that the market capitalization (value of a public company traded on the stock market) of all cryptocurrencies fluctuates on a daily basis and is currently hovering just above $2 trillion, as of 2022).

[61] Jeffrey C. Thomson, *Tragedy of the Energy Commons: How Government Regulation Can Help Mitigate the Environmental and Public Health Consequences of Cryptocurrency Mining*, 11 SEATTLE J. TECH., ENVTL. & INNOVATION L. 77, 84 ("[T]he amount of energy a cryptocurrency system uses is a 'side effect of relying on the ever-increasing computing power of competing miners to validate transactions through PoW.'").

[62] Steer, *supra* note 5, at 309 ("Computational power is important to miners because the more computation power being used, the faster the nonce can be solved, and the more likely they are to receive the reward for verifying a block of transactions.").

[63] *Id.*

[64] Carroll, *supra* note 9, at 56 ("[M]odeling an entire cryptocurrency based on the concept of a race can only be described as inefficient because miners

the algorithm and expend large amounts of energy yet receive nothing in return.[65]

To make matters worse, there is a finite supply of cryptocurrency that exists and is available.[66] Resultingly, the algorithm and mining both become increasingly difficult over time and the amount of crypto tokens rewarded to the successful miner decreases.[67] As these coding problems become more and more difficult, increasingly complex computer systems are needed to solve the problems, further increasing the consumption of energy used in the mining process.[68] This increased difficulty and reduced reward causes miners to not only increase their computer processing power, but also to increase the frequency with which they mine.[69] If a miner receives less in crypto for their mining efforts than they did before, then they are likely to mine more frequently to make up for the reduction in rewards reaped. This dynamic of increased difficulty and reduced reward will continue as cryptocurrency becomes more

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who ultimately do not 'win' the race expend large quantities of resources in exchange for nothing.").

[65] *Id.* (explaining that with regard to the PoW incentive structure, "modeling an entire cryptocurrency based on the concept of a race can only be described as inefficient because miners who ultimately do not 'win' the race expend large quantities of resources in exchange for nothing.").

[66] Jurva, *supra* note 19, at 5 (stating that there is a "fixed supply of Bitcoin that will *ever* exist…"); Chris Meuse, *History of Bitcoin*, 2018 TX. ADVANCED FAM. L. 28-II (2018) ("Satoshi created a limited quantity of Bitcoin—only 21 million will ever be mined.").

[67] *Id.* (stating that because of the fixed supply of cryptocurrency, "mining becomes likely more difficult over time depending on how many computers are competing at any given moment."); Meuse, *supra* note 66 ("With each reward, the difficulty of generating the next bundle - solving the computational code to add a block to the blockchain—intentionally gets more difficult.").

[68] Thomson, *supra* note 61, at 84 ("As the difficulty in solving the puzzle increases with each block added to the chain, the energy that is required to power the computers of miners to solve those puzzles also increases."); Carroll, *supra* note 9, at 56 (explaining that while now sophisticated computers are needed to mine crypto, "[i]n the past, cryptocurrency mining could occur in a college dorm room on a normal laptop.").

[69] Carroll, *supra* note 9, at 56 (explaining that "during 2018, the computing power required to solve a Bitcoin puzzle increased more than threefold" and that miners have now been forced to join "mining pools" as a result of the increased difficulty).

popular and more people begin to invest and mine in the digital currency.

Just Bitcoin alone, the first and one of the most popular forms of cryptocurrency[70], has "an annual carbon footprint [that] would range between that of Portugal and Bolivia."[71] Bitcoin has an estimated annual consumption of energy of 66.7 terawatt-hours (TWh), which is roughly the amount of energy consumed by the 10.6 million inhabitants of the Czech Republic.[72] To further put this energy consumption into perspective, compare the *entire* United States' annual consumption of approximately 3,820 TWh of electricity in 2017.[73] Mining for Bitcoin alone accounts for approximately 1% of the world's energy consumption.[74] While 1% may not seem like a lot, it is important to recognize that Bitcoin is only one of thousands of different types of cryptocurrencies. Of course, mining cryptocurrency did not always require state-levels of energy; its sudden increase in popularity created a spike in electrical consumption patterns. Because of cryptocurrency's increased popularity and increased level of mining difficulty, energy consumption by cryptocurrency is very likely to increase in the future.[75] This abhorrent level of energy use will have disastrous effects on our climate.

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[70] *Examining Regulatory Frameworks for Digital Currencies and Blockchain: Hearing Before the S. Comm. on Banking, Hous., & Urban Affairs,* 116th Cong. 6 (2019) ("In 2009, Bitcoin was launched as the first cryptocurrency.").

[71] Carroll, *supra* note 9, at 53.

[72] Umair Irfan, *Bitcoin is an Energy Hog. Where is All That Electricity Coming From?*, VOX (June 18, 2019), https://www.vox.com/2019/6/18/18642645/bitcoin-energy-price-renewable-china [https://perma.cc/96E8-5L7H] ("According to the bitcoin energy consumption tracker at Digiconomist, bitcoin currently consumes 66.7 terawatt-hours per year. That's comparable to the total energy consumption of the Czech Republic, a country of 10.6 million people.").

[73] Gulli, *supra* note 21, at 106–07 ("In 2017, the United States consumed about 3820 TWh of electricity.").

[74] Steer, *supra* note 5, at 314 ("In fact, Bitcoin mining now accounts for about 1% of the world's total electricity consumption and now takes as much energy as mining for gold.").

[75] Carroll, *supra* note 9, at 57 ("The energy consumption of cryptocurrency would not be as concerning if this number was predicted to decrease in the near future. However, due to increasing difficulty of mining cryptocurrency, the energy consumption figures are predicted to increase in upcoming years.").

B. The Rise of Two Disastrous Mining Trends in the Crypto Industry

Two recent trends in crypto mining have exacerbated the environmental impacts associated with the cryptocurrency industry. The first trend is the congregation of miners in locations rich with cheap sources of energy, including coal, oil, and natural gas.[76] The second trend is the increased participation of miners in what have become known as "mining pools"—a group of crypto miners that combine their computational resources to increase their probability of solving algorithms.[77] Both trends result in huge expenditures of energy, further increasing the crypto industry's carbon footprint, and have extremely harmful effects on the environment.[78]

1. Migration Trends in Cryptocurrency Mining

As for the first mining trend, today's miners have a tendency to gather in areas laden with cheap energy sources.[79] Accordingly,

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[76] Karin Rives, *Power-guzzling crypto miners racing to find cheaper energy sources*, S&P GLOBAL (Aug. 11, 2021), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/power-guzzling-crypto-miners-racing-to-find-cheaper-energy-sources-65948976 [https://perma.cc/2YT8-SKLG] ("Such heavy power consumption explains why operators of the sprawling and lucrative data centers used to verify, process and record transactions of cryptocurrencies are racing to find inexpensive energy to keep their costs down.").

[77] Steer, *supra* note 5, at 310 ("[M]ost miners now participate in 'mining pools' in which the resources of many miners are combined, and miners are then rewarded an amount based upon their contribution to the pool in terms of computing power.").

[78] Kelly Derham, *Environmental Impacts of Cryptocurrency*, SIERRA CLUB (2021), https://www.sierraclub.org/pennsylvania/blog/2021/03/environmental-impacts-cryptocurrency [https://perma.cc/8LQ9-USBE] ("Bitcoin produces 36.95 megatons of carbon dioxide (CO2) annually (comparable to New Zealand) and it is estimated that in 30 years Bitcoin could alone increase global temperatures 2 degrees Celsius.").

[79] *Id.* ("About 65 percent of cryptocurrency mining occurs in China, where electricity is cheaper."); Thomson, *supra* note 61, at 91 ("China's bullish attitude towards coal as a power source has attracted many cryptocurrency mining operations to consider China because it provides access to cheap power.").

miners are actively deciding against congregating at hubs of clean and renewable (but more expensive) energy sources.[80] For example, prior to March 2021, a very large amount of mining was performed in Inner Mongolia, as this was a location where cryptocurrency mining could be powered by the many coal-operated power plants located there.[81] The increased number of miners in one location depletes the cheap energy surplus, requiring governments to fill this energy gap by erecting new power plants dependent on cheap, non-renewables to keep up with the heightened demand.[82] As the algorithms become increasingly complex and cryptocurrency becomes progressively difficult to mine, more and more miners congregate at these cheap energy havens and deplete these sources of

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[80] Renee Cho, *Bitcoin's Impact on Climate and the Environment*, COLUM. CLIMATE SCH. (Sept. 20, 2021), https://news.climate.columbia.edu/2021/09/20/bitcoins-impacts-on-climate-and-the-environment/ [https://perma.cc/WZ7X-MNS6] ("[M]any Chinese bitcoin miners are trying to move operations to other countries, like Kazakhstan, which relies mainly on fossil fuels for electricity, and the U.S.").

[81] Paul A. Davies et al., LATHAM & WATKINS LLP, *ESG and Cryptocurrency: Considerations for Market Participants*, LATHAM & WATKINS LLP (Apr. 12, 2021), https://www.globalfinregblog.com/2021/04/esg-and-cryptocurrency-considerations-for-market-participants/ [https://perma.cc/LCL7-UVRJ] ("[I]n March 2021 the provincial government of Inner Mongolia announced that it would ban all cryptocurrency mining operations in a bid to achieve carbon-reduction targets set by the central government.").

[82] Carroll, *supra* note 9, at 58 ("[B]ecause miners flock in large numbers to areas with cheap sources of energy (often due to a surplus from a dam), the miners often quickly increase the demand for energy well beyond the existing surplus, which forces the local government to either build new facilities that typically rely on non-renewable resources or buy from other counties which typically use non-renewable resources.").

energy.[83] This results in heightened energy consumption, which in turn increases the crypto industry's carbon footprint.[84]

Proponents of cryptocurrency mining argue that miners seek out renewable sources of energy in an attempt to reduce the energy consumption expenses associated with mining.[85] They posit that once miners have purchased their computers and processing machines, their predominant expense is in the form of energy consumption.[86] An estimated 60–80% of a miner's profits are allocated to the payment of electricity used in the crypto mining process.[87] Therefore, proponents argue that miners are incentivized to be energetically efficient and pursue renewables to minimize their energy expenditures.[88] This is especially true where rewards for mining are continually decreased, making it economically unsustainable to continue mining without any reduction in an individual's energy costs.[89]

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[83] *Id.* ("[B]ecause Bitcoin is becoming increasingly more difficult to mine, resulting in higher energy consumption, miners that flock to areas with low energy costs will more rapidly exhaust surplus energy resources and require those areas to fill the gap with non-renewable resources."); Cho, *supra* note 80 ("[B]ecause rewards are continually cut in half, to make mining financially worthwhile, miners have to process more transactions or reduce the amount of electricity they use. As a result, miners need to seek out the cheapest electricity and upgrade to faster, more energy-intensive computers.").

[84] Cho, *supra* note 80.

[85] Jurva, *supra* note 19, at 5 ("Miners seek out the cheapest places in the world to plug their rigs into the electrical grid. They pursue renewables—solar, wind, and hydro power—and have used the blow-off captured from natural gas, which would have been lost or burned as waste."); Derham, *supra* note 78 ("A study done by Coinshares, claims that Bitcoin gets 74.1 percent of its energy from renewable sources, however, many people are skeptical of this finding and say it does not match other calculations that have been done.").

[86] Jurva, *supra* note 19, at 5 ("[C]rypto-miners' intrinsic interest lies in being as electrically efficient as possible because energy consumption is their principal expense after the hardware investment of fast computers and processors, which are also called mining rigs.").

[87] Irfan, *supra* note 72 ("Between 60 and 80 percent of bitcoin mining revenue goes straight back into paying for electricity.").

[88] Jurva, *supra* note 19, at 5 (explaining that that "crypto-miners' intrinsic interest lies in being as electrically efficient as possible").

[89] *Id.* ("Baked into the code is a reduction of the reward over time . . . so the mining likely becomes more difficulty over time . . . .").

However, this is not the case. In fact, this reasoning further demonstrates the trend towards cheap sources of energy for mining—i.e. coal, oil, and gas. Miners want to keep their energy expenses at a minimum, and thus search for locations with the cheapest energy, wherever in the world they may be.[90] The surplus of cheap fossil fuels available globally entices miners to flock to locations with a glut in cheap energy.[91] Additionally, even if renewable energy sources are being used increasingly by miners, this does not always provide the full picture of energy consumption. For example, hydropower and solar power are renewable sources of energy but they "often need to be supplemented by non-renewable sources,"[92] leading to a further spike in energy usage.[93] However, there is hope that as renewable sources of energy become less expensive, crypto miners will transition towards cleaner energy.[94]

2. Increased Participation in Mining Pools

A second trend in mining prevalent in the cryptocurrency industry is the increased participation of miners in mining pools.[95]

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[90] *Id.* ("Miners seek out the cheapest places in the world to plug their rigs into the electrical grid."); Irfan, *supra* note 72 ("The quest for the cheapest kilowatt has led miners to set up shop in remote regions of China and Mongolia. It's sent miners to the sulfurous rock in Iceland to harvest geothermal power. Bitcoin mines have gone up in rural Washington state. The hunt for cheap power has even led to cases of electricity theft.").

[91] Carroll, *supra* note 9, at 58 ("In addition, because miners flock in large numbers to areas with cheap sources of energy (often due to a surplus from a dam), the miners often quickly increase the demand for energy well beyond the existing surplus, which forces the local government to either build new facilities that typically rely on non-renewable resources or buy from other countries which typically use non-renewable resources.").

[92] *Id.* (describing the environmental repercussions of Bitcoin).

[93] *Id.* ("However, the claim the cryptocurrency mining is 'green' is not entirely accurate. Renewable resources like hydro-power and solar are weather-dependent and often need to be supplemented by non-renewable sources.").

[94] *Id.* (reasoning that because "miners flock in large numbers to areas with cheap sources of energy," miners will use cleaner energy as it becomes cheaper).

[95] Steer, *supra* note 5, at 310 ("In order to ensure this pace is kept no matter the increases in computing power, the level of difficulty of solving the nonce is periodically made more difficult. As a result, it has become almost impossible for any individual miner to be the first to successfully complete a

Many cryptocurrencies, including those with a PoW incentive structure, have a time limit under which the mining must take place.[96] With increases in computing power, the difficulty of the algorithms has also had to increase to maintain the pace of the predetermined mining time limit.[97] This increased level of difficulty over the years has made it nearly impossible for any single miner to win the PoW "race" for tokens by being the first to solve the complex algorithm.[98] Resultingly, many miners have ceased mining solo and have instead moved towards combining their resources and participating in mining pools.[99] With this communal setup, each miner is rewarded a number of tokens based on the amount of computational power they expended in (and therefore contributed to) the resolution of the algorithm.[100]

While in theory it may seem that mining pools would result in less energy consumption because miners are coming together and combining their resources, this may not be the case. Because the reward system in mining pools is based on each miner's individual contribution to the pool, each miner has an incentive to contribute more computational power as the more they contribute the more they

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block. Therefore, most miners now participate in "mining pools" in which the resources of many miners are combined, and miners are then rewarded an amount based upon their contribution to the pool in terms of computing power.").

[96] *Id.* ("in many cryptocurrencies, such as Bitcoin, there is a predetermined amount of time or pace for each block to be mined.").

[97] Shawn S. Amuial, Josias N. Dewey & Jeffrey R. Seul, *§ 1.6. Incentive Structures: Proof-of-Work (Mining) Vs. Proof-of-Stake*, THE BLOCKCHAIN: A GUIDE FOR LEGAL & BUS. PROF'LS (2016) ("This pace of mining is ensured because the protocol dynamically adjusts the level of difficulty in solving the mathematical problem based on the combined computing power mining at any given time. As the aggregate amount of computational power increases, so does the difficulty."); Benson *supra* note 47 ("Bitcoin mining difficulty adjusts in order to keep blocks processing at a rate of one every 10 minutes.").

[98] Amuial et al., *supra* note 97 ("Today, all but the very largest mining operations have little chance of being the successful miner of a block.").

[99] *Id.* ("As a result, almost all miners now participate in a mining pool.").

[100] *Id.* ("A mining pool is an operator who aggregates the computational power of hundreds or thousands of individual miners. Miners are then compensated based on their contribution to the pool in terms of computational power.").

earn if their communal pool successfully solves the algorithm first.[101] But remember, in a PoW incentive system only the *first* miner (or collective mining pool) to solve the algorithm is rewarded tokens.[102] Thus, members of mining pools may contribute copious amounts of computational energy in the hopes of their pool being the first to crack the code, only to solve the problem too slowly and receive nothing in return.[103] This increased incentive to expend as much computational energy as a miner is capable of will naturally increase the crypto industry's carbon footprint.

IV. The Implementation of Financial Disclosure Frameworks

A. Why the Regulation of Cryptocurrency is not a Viable Solution Right Now

In reaction to high levels of energy consumption by miners, cryptocurrency firms have shown an interest in sustainability and carbon offset programs.[104] For example, Energy Web Chain, a cryptocurrency firm, has been a big player in the launch of the Crypto Climate Accord (CCA).[105] The CCA is a Paris Agreement-inspired initiative focused on the decarbonization of the crypto industry and ultimately achieving net-zero emissions.[106] However, even with initiatives like this, the cryptocurrency industry

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[101] *See* Amuial, *supra* note 97 (explaining that "[m]iners are then compensated based on their contribution to the pool in terms of computational power," therefore having incentive to contribute more").

[102] Carroll, *supra* note 9, at 56 (explaining "[o]nly the first miner to solve the problem . . . receive[es] cryptocurrency.").

[103] *See id.*

[104] DAVIES ET AL., *supra* note 81 ("While the focus has primarily been on the ESG performance of cryptocurrency miners (given their role in the creation of cryptocurrencies and the energy requirements associated with that process), the ESG performance of the broader cryptocurrency industry will increasingly need to be considered, particularly as institutional investment in this space is accelerating.").

[105] *Id.* ("Energy Web has also recently partnered in the launch of the Crypto Climate Accord . . . .").

[106] *Read the Accord*, CRYPTO CLIMATE ACCORD (2021), https://cryptoclimate.org/accord/ [https://perma.cc/8JUY-GEJ2] ("Inspired by the Paris Climate Agreement, the CCA is a private sector-led initiative for the entire crypto community focused on decarbonizing the cryptocurrency and blockchain industry in record time.").

has not made a complete shift to renewable sources of energy and instead continues to steadily increases its carbon footprint.[107] The problem lies within one of the most desirable characteristics of cryptocurrency: its decentralized nature.

Lacking governance by a central government or regulatory body, cryptocurrency firms and miners have evaded mandates aimed at reducing their carbon footprint. Given the highly desirable decentralized nature of cryptocurrency, it is unlikely that this virtual currency will be subjected to the governance of a single central government or existing regulatory body anytime soon. These firms and miners also lack the incentive to cut down on their emissions because of the lucrative profits tied to the use of cheap energy sources in the mining process. Without this incentive, cryptocurrency firms hold their ground and continue to employ cheap and "dirty" energy sources derived from fossil fuels.

In the absence of a single federal regulator of cryptocurrency[108], there is a current lack of consensus as to *who* should regulate cryptocurrency. The current approach to the regulation of cryptocurrency is to fit crypto into one of the already existing regulators' jurisdictions and apply that respective form of regulation.[109] However, not all cryptocurrencies are identical in function, and thus cannot all be regulated by the same laws.[110] Multi-faceted in its nature, the regulation of cryptocurrency concerns the SEC as a security, the CFTC as a commodity, the IRS as an asset

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[107] Press Release, The White House, FACT SHEET: Climate and Energy Implications of Crypto-Assets in the United States (Sept. 8, 2022) [hereinafter Crypto Climate Press Release](“From 2018 to 2022, the annualized electricity usage from global crypto-assets grew rapidly, with estimates of electricity usage doubling to quadrupling. As of August 2022, published estimates of the total global electricity usage for crypto-assets are between 120 and 240 billion kilowatt-hours per year, a range that exceeds the total annual electricity usage of many individual countries, such as Argentina or Australia.”).

[108] Barrack, *supra* note 16, at 454 (“There is currently no federal regulation specifically designed to regulate cryptocurrencies . . . .”).

[109] *Id.* (“The current approach for regulating cryptocurrencies has been to apply current law and regulations.”).

[110] *Id.* (finding that a review on a case-by-case basis is necessary in the regulation of cryptocurrency because of the various functions of these coins).

or property, and the Federal Reserve and Treasury as a currency.[111] However, none of these financial regulators, nor Congress on a larger scale, have made any efforts to regulate crypto or taken a stand as to the identification of this digital currency.[112]

Federal regulation of cryptocurrency by today's agencies and organizations may inadvertently stifle innovation in this industry. Because no sole agency, statute, or law regulating every single cryptocurrency exists, individuals may find it difficult to try and comply with the "law" and may even be discouraged from using or investing in crypto.[113] Should the SEC, CFTC, IRS, Federal Reserve, and Treasury *all* regulate different types of cryptocurrencies uniquely, individuals may be confused as to which (if any or all) regulations they must adhere to.[114] If, for example, the IRS were to regulate cryptocurrencies, crypto holders would be required to report their earnings from crypto and ultimately sacrifice their anonymity.[115] Again, this loss of anonymity has the potential to discourage people from holding crypto and may even discourage innovation in the crypto industry. Additionally, lacking the appropriate expertise and resources, current agencies may find it difficult to regulate cryptocurrency because of its high volatility.[116] Cryptocurrency

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[111] Wade, *supra* note 31 ("The currency aspects of cryptocurrency concern the Federal Reserve and Treasury; the commodity aspects the CFTC; and the securities aspects the SEC.").

[112] Barrack, *supra* note 16, at 461 ("There is no singular statute, law, rule, or case, etc., that regulates all cryptocurrencies."); Wade, *supra* note 31 (highlighting that no administration nor Congress has identified precisely what is cryptocurrency).

[113] *Id.* ("If users fear violating some vague regulation, cryptocurrencies will be under-utilized as a result of that fear, despite that they may have great utility.").

[114] *See id.* at 454 (highlighting that, under current regulations, regulation of particular cryptocurrencies depends on a multitude of factors which could be fixed by reforming current legislation or implementing new legislation).

[115] *Id.* at 473 ("The IRS has applied the capital gains tax to cryptocurrency holders, requiring them to report their earnings from appreciation of cryptocurrency assets. The problem with this regulation is that it nullifies what many perceive to be a key benefit of cryptocurrencies, anonymity. In order to pay capital gains taxes, users must disclose their cryptocurrency purchases and sales on their tax forms, which necessarily links the assets to the individuals or institutions.").

[116] Wade, *supra* note 31 (defining the volatility of cryptocurrency as "technically a measure of dispersion around the mean value of a security,

behaves erratically on the market and is prone to intense fluctuations in its value.[117] Like the U.S. dollar, crypto itself is not intrinsically valuable, making its price extremely sensitive and highly reactive to minor changes in the expectations of market players.[118] This incredulous volatility may make it difficult for existing financial agencies to regulate crypto.

Given its novel nature, it may not even be practical to try to regulate cryptocurrencies based on existing categories of financial instrumentalities (securities, commodities, assets, property, currency, etc.).[119] Cryptocurrency does not fit neatly into any one of the federal regulators' jurisdictions and thus is unlikely to be successfully regulated by a singular, existing financial regulatory agency. While some cryptocurrencies may be subjected to the regulation of certain federal agencies, it is not probable that a single, present agency will regulate *all* crypto in the future. However, that is not to say that cryptocurrency will *never* be regulated in the future. On the contrary, on June 7, 2022, Senators Cynthia Lummis and Kirsten Gillibrand introduced the Responsible Financial Innovation Act, a comprehensive bill that proposes dividing regulation of digital assets between the CFTC and SEC.[120] Senator Lummis asserts that the bill, "creates regulatory clarity for agencies charged with supervising

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but more generally rapid or significant fluctuations as defined by the market.").

[117] Lapin, *supra* note 20 (recounting that Bitcoin's value dropped by 30% in the span of a single day).

[118] *Id.* ("[T]he investment's value isn't very grounded, which makes its price incredibly sensitive to even slight changes in investors' expectations or perceptions.").

[119] Nicholas Anthony, *The Trap of the Trilemma of Cryptocurrency Regulation: Government Control is Not the Default* (Dec. 20, 2021), https://www.cato.org/blog/trap-trilemma-cryptocurrency-regulation-government-control-not-default [https://perma.cc/2PA9-VZ5Y] ("[R]egulation-by-design is not as simple as putting bitcoin under existing currency regulations. Because bitcoin is decentralized (it has "no trusted third party"), many existing currency regulations would fail . . . .").

[120] Bill Flook, *Sens. Lummis, Gillibrand Roll out Long-Awaited Crypto Framework*, THOMSON REUTERS (June 7, 2022), https://tax.thomsonreuters.com/news/sens-lummis-gillibrand-roll-out-long-awaited-crypto-framework/ [https://perma.cc/V3KS-RBYE] ("Sen. Cynthia Lummis, a Wyoming Republican, and Kirsten Gillibrand, a New York Democrat, on June 7, 2022, introduced a sweeping cryptocurrency framework that divides oversight of the market between the SEC and Commodity Futures Trading Commission (CFTC).").

digital asset markets, provides a strong, tailored regulatory framework for stablecoins, and integrates digital assets into our existing tax and banking laws."[121] This bipartisan bill seeks to create a comprehensive regulatory scheme for digital assets like cryptocurrency, however, it does not come without its opponents and obstacles.[122]

Critics argue that the bill skews regulatory oversight of crypto heavily towards the CFTC because of its definition of certain cryptocurrencies as "non-security ancillary assets."[123] The Lummis-Gillibrand bill uses the concept of an ancillary asset to distinguish between the classification of a crypto token as a security or a commodity.[124] The bill expands the CFTC's jurisdiction by providing it exclusive authority over digital assets (including ancillary assets that are also digital assets by definition), while preserving the SEC's control over the disclosure requirements of ancillary assets.[125] Moreover, while Senators Lummis and Gillibrand have successfully proposed the bill, there is no guarantee it will

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[121] *Id.*

[122] Press Release, Kirsten Gillibrand, Senator, Senate, Lummis, Gillibrand Introduce Landmark Legislation To Create Regulatory Framework For Digital Assets (June 7, 2022), https://www.gillibrand.senate.gov/news/press/release/-lummis-gillibrand-introduce-landmark-legislation-to-create-regulatory-framework-for-digital-assets [https://perma.cc/XJ7D-H52C] (highlighting that the Responsible Financial Innovation Act aims to "create a complete regulatory framework for digital assets that encourages responsible financial innovation, flexibility, transparency and robust consumer protections while integrating digital assets into existing law.").

[123] Flook, *supra* note 120 ("Americans for Financial Reform (AFR), warned that [defining tokens as non-security ancilliary assets] 'would cede more regulatory power to the Commodity Futures Trading Commission while undermining existing securities law and oversight by the Securities and Exchange Commission.'").

[124] *Id.* (defining an ancillary asset as, "an intangible, fungible asset that is offered, sold, or otherwise provided to a person in connection with the purchase and sale of a security through an arrangement or scheme that constitutes an investment contract.").

[125] Melissa Bender et al., *Lummis-Gillibrand Digital Asset Bill—Key Takeaways*, WESTLAW TODAY (July 1, 2022) ("The CFTC generally has jurisdiction over ancillary assets that fall within the definition of digital asset. However, disclosure requirements that the Bill imposes on issuers of such ancillary assets will remain subject to the SEC's jurisdiction.").

become codified law in the future.[126] There is hope, however, that this bill will shape what cryptocurrency laws should look like.[127] In the meantime, and in the present absence of a regulatory agency, another solution is needed to tackle the adverse effects of the crypto industry on the environment.

This note will recommend mitigating the environmental impacts of cryptocurrency through the use of financial disclosure frameworks, as opposed to some form of regulation or central regulatory body. Specifically, cryptocurrency firms should implement voluntary disclosure requirements modeled after those of the TCFD and the SASB. Disclosures not only enable consumers and investors to make informed decisions and evaluate the risks associated with cryptocurrencies, they also create a degree of accountability for the crypto firm's adverse actions.[128] Moreover, disclosures make cryptocurrencies more widely accessible to the public by making pertinent information about crypto easily available and understandable.[129]

B. The Securities and Exchange Committee (SEC) as a Case Study

Recently, the SEC has contemplated adopting a strict disclosure rule for the environmental impacts of cryptocurrencies.[130]

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[126] *Id.* (speculating that the likelihood of the bill progressing to codification into law is "remote").

[127] *Id.* ("[The bill] represents a welcome first step in the development of bipartisan digital asset legislation.").

[128] *See* Hana V. Vizcarra, *The Reasonable Investor and Climate-Related Information: Changing Expectations for Financial Disclosures*, 50 ENV'T L. REP. 10106, 10107 (2020) (explaining that climate-related disclosures are now material in mind of investors and therefore provides a way for regulators to hold crypto firms accountable if they lie about environmental impact).

[129] *See* Crypto Climate Press Release, *supra* note 107 ("The Lummis-Gillibrand disclosure requirements . . . will ensure that consumers understand the products they're purchasing, their rights, as well as the associated risks of engaging in digital assets, including source code version changes and digital asset landing.").

[130] Soyoung Ho, *supra* note 59, at 149 ("Public companies that hold bitcoins or other crypto currencies might have to disclose the carbon footprint related to their holdings in the future. This is if the SEC adopts a more stringent climate change risk disclosure rule.").

While the rule has not yet been put into effect, the SEC is currently drafting a proposal which was to be reviewed at the end of 2021.[131] The SEC uses the "*Howey* test," a test laid out by the U.S. Supreme Court's decision in *SEC v. W.J. Howey Co.*, to determine whether certain cryptocurrencies are considered securities and therefore fall under the regulation of the SEC.[132] Section 77b of the Securities Act of 1993 defines a security as including, among other things, an "investment contract."[133] The *Howey* case found that "an 'investment contract' exists when there is the investment of money in a common enterprise with a reasonable expectation of profits to be derived from the efforts of others."[134] The SEC frequently analyzes whether digital assets, such as cryptocurrencies, are investment contracts, and subsequently a security subject to SEC regulation.[135]

While the *Howey* test applies this investment contract analysis, it is important to note that a cryptocurrency's status (as either a security or not) is fluid and is subject to change depending on the manner and circumstances in which it is resold.[136] Taking

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[131] *Id.* ("Currently, the commission has yet to propose any prescriptive climate disclosure rule, but the staff is drafting a proposal that the five commissioners will consider by the end of the year.").

[132] Jonathan L. Marcus, Charles R. Mills, & Kathryn M. Trkla, *Recent Cryptocurrency Regulatory Developments*, BANKING & FIN. SERV. POL'Y REP., Sept. 2019, at 1, 1 ("[T]he SEC will apply the traditional investment contract analysis laid out in the U.S. Supreme Court's 1946 decision in *SEC v. W.J. Howey Co*. (the '*Howey* test') to digital assets that exist or are recorded on systems using distributed ledger or blockchain technology . . . ."); Ethan D. Trotz, *The Times They Are A'Changin: Surveying How the* Howey *Test Applies to Various Cryptocurrencies*, 11 ELON L. REV. 201, 210 (2019) ("The SEC conducted a *Howey* analysis, finding that the DAO (an unincorporated organization) issued securities in the form of a cryptocurrency.").

[133] 15 U.S.C. § 77b (2018) ("The term 'security' means any note, stock, treasury stock, . . . [or] investment contract.").

[134] *Framework For "Investment Contract" Analysis of Digital Assets*, SEC https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets [https://perma.cc/2WNH-CJUT].

[135] *Id.* ("The term 'security' includes an 'investment contract,' . . . [a] digital asset should be analyzed to determine whether it has the characteristics of any product that meets the definition of 'security' under the federal securities laws.").

[136] Marcus et al., *supra* note 132, at 1 ("[A] digital asset that initially is an investment contract may change to a non-security as the facts and circumstances surrounding how it is subsequently resold may change.").

Ethereum as an example, while the crypto initially fell under the definition of a security during its initial coin offering (ICO), it has since fallen out of this definition and is not classified as a security.[137] Thus, a cryptocurrency can fall within the definition of a security (per 15 U.S.C. § 77b) and later fall outside of this category and outside of the regulation of the SEC.[138] This is because the *Howey* test does not just focus statically on the type of financial instrument in question; it also analyzes how transactions involving crypto are carried out (i.e. how they are offered, purchased, sold, transferred, etc.).[139]

The *Howey* test sets out four prongs to determine the status of digital assets. To be considered a security, there must be: "(1) an investment of money, (2) in a common enterprise, (3) with a reasonable expectation of profits, (4) where the expectation of profits is based on the efforts of others." [140] Under this test, it is critical to look at the last two prongs and determine whether there is a present third party that can reasonably generate profits.[141] This test can be better understood through its application to a specific cryptocurrency,

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[137] Trotz, *supra* note 132, at 213 ("[W]hile ETH may have been a security at the time of its ICO, ETH is no longer a security. So, when analyzing whether a cryptocurrency is a security, the inquiry must focus on the current state of affairs, and not on whether the initial offering was a securities offering.").

[138] *Id.* ("[A] cryptocurrency can be a security at one point in time, only to fall out of the definition later.").

[139] SEC, *supra* note 134 ("The focus of the Howey analysis is not only on the form and terms of the instrument itself [in this case, the digital asset] but also on the circumstances surrounding the digital asset and the manner in which it is offered, sold, or resold [which includes secondary market sales].").

[140] Marcus et al., *supra* note 132, at 1.

[141] Sean McLeod, *Bitcoin: The Utopia or Nightmare of Reguation.*, 9 ELON L. REV. 553, 572 (2017) (analyzing the four prongs of the *Howey* test, the author notes that, "[c]urrently, any person can invest their money in Bitcoin by purchasing the currency at any exchange and may even acquire it by 'transforming' other cryptocurrencies into Bitcoin. Third-parties that generate profits from a traditional transaction are removed.").

so a discussion of the *Howey* test's application to the DAO[142] tokens and Bitcoin follows.

In 2017 the SEC released the DAO Report, detailing the Commission's first determination that a company's issuance and sale of digital crypto tokens amounted to an unregistered security offering in violation of U.S. securities law.[143] The first DAO, or "decentralized autonomous organization," was denoted "The DAO" and was the subject of the SEC's 2017 report.[144] Like many other forms of digital assets, the DAO was a decentralized, digitally-simulated organization operating through blockchain technology.[145] The DAO was initially formed as a "crowdfunding contract," raising funds for projects selected by The DAO token holders and members in exchange for earnings generated from these

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[142] David Shuttleworth, *What is a DAO and How Do They Work?*, CONSENSYS (Oct. 7, 2021), https://consensys.net/blog/blockchain-explained/what-is-a-dao-and-how-do-they-work/ [https://perma.cc/946G-MZUP] ("A DAO, or 'Decentralized Autonomous Organization,' is a community-led entity with no central authority.").

[143] Trotz, *supra* note 132, at 210 ("The most extensive guidance from the SEC on whether cryptocurrencies are securities is found in the SEC's report on the DAO ("The DAO Report"), where the SEC determined for the first time that the issuance of a cryptocurrency constituted an unlawful securities offering."); M. Todd Henderson, & Max Raskin, *A Regulatory Classification of Digital Assets: Toward an Operational Howey Test For Cryptocurrencies, ICOs, and Other Digital Assets*, 2019 COLUM. BUS. L. REV. 443, 457 (2019) (stating that the DAO Report "declared the sale of shares in a company run by computer code a security offering, even though there were no employees or human issuers of the security other than the code that created the autonomous corporation.").

[144] Kayleigh Barber, *WTF is a Decentralized Autonomous Org. (DAO)*, DIGIDAY (Feb. 25, 2022), https://digiday.com/media/wtf-is-a-dao/ [ttps://perma.cc/EES9-RRFB] ("The first DAO—simply called The DAO—was created by a company called Slock.it, a German-based developer that was built on top of the Ethereum blockchain . . . .").

[145] David Gardos, *SEC Issues Report—Declares DAO Tokens to be Securities*, CASSELS (July 25, 2017), https://cassels.com/insights/sec-issues-report-declares-dao-tokens-to-be-securities/ [https://perma.cc/W44F-2ET8] ("[W]as an example of a decentralized autonomous organization – that is, a 'virtual' organization not existing in a physical form, but rather embodied in computer code and executed on a distributed ledger or blockchain.").

projects.[146] The SEC concluded that, "the tokens offered by [T]he DAO were investment contracts, and therefore were securities under the United States Securities Act of 1933 and the Securities Exchange Act of 1934."[147]

The SEC's determination that The DAO tokens constitute unlawful securities offerings is based upon its satisfaction of the four prongs of the *Howey* test. First, The DAO investors' exchange of Ether cryptocurrency for The DAO tokens satisfied the investment of money prong.[148] The second prong requiring a common enterprise is satisfied because all of The DAO investors' individual funds were combined for the financing of projects, splitting the risks of the pooled investment amongst all the investors.[149] Third, The DAO investors and token holders had a reasonable expectation of profits because The DAO is a for-profit organization and the token holders voted on the projects to fund, fully expecting a return on investment.[150] Finally, the last prong regarding the expectation of profits being based on the efforts of others is satisfied because investors of The DAO rely on The DAO token holders to manage

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[146] *See generally* Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, Exchange Act Release No. 81207 (July 25, 2017) ("The DAO was created by Slock.it and Slock.it's co-founders, with the objective of operating as a for-profit entity that would create and hold a corpus of assets through the sale of DAO tokens to investors, which assets would then be used to fund 'projects.'").

[147] Gardos, *supra* note 145.

[148] Trotz, *supra* note 132, at 211 (explaining that the exchange of Ether for DAO tokens is "the type of contribution of value that can create an investment contract under *Howey*.").

[149] *Id.* ("This prong was satisfied in the DAO because promoters pooled investors' funds together to fund projects to be selected by those in charge of the DAO organization. Thus, investors' fortunes were linked together and they shared in the risks, leading to a finding of a common enterprise.").

[150] SEA Investigation Report, *supra* note 146, at 1 ("The holders of DAO Tokens stood to share in the anticipated earnings from these projects as a return on their investment in DAO Tokens."); Trotz, *supra* note 132, at 211 ("The holders of DAO Tokens voted on whether the organization would fund specific projects, and holders stood to share in potential profits from the contracts. 'Thus, a reasonable investor would have been motivated, at least in part, by the prospect of profits on their investment' in the DAO.").

(via vote) which projects are funded, and, in turn, the profits received as earnings from these investments.[151]

While the SEC was successful in determining that DAO tokens constitute securities, this does not mean that all cryptocurrencies meet the *Howey* test and are subject to SEC regulation. For example, two of the biggest and most popular forms of cryptocurrency — Bitcoin and Ether — are *not* considered securities under the *Howey* test.[152] Following the DAO report, William Hinman, the director of the SEC Division of Corporate Finance, confirmed the *Howey* test as the necessary analytical framework for the determination of a digital asset's status as a security.[153] Mr. Hinman also reaffirmed that neither Bitcoin nor Ether constitute securities under the guidelines set forth by the *Howey* test.[154]

Looking at Bitcoin specifically, this cryptocurrency fails the third and fourth prongs of the *Howey* test.[155] The third-party 'middlemen' common in more typical transactions (such as banks validating a deposit or withdrawal) are essentially absent in Bitcoin.[156] This ties back to the decentralized nature of

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[151] Trotz, *supra* note 132, at 212 ("Investors in [T]he DAO relied on the managerial and entrepreneurial efforts of Curators [token holders] to put forth proposals of projects that could generate profits.").

[152] Marcus et al., *supra* note 132, at 1 ("[B]itcoin and Ether are not securities under the *Howey* test . . . .").

[153] *Id.* (explaining William Hinman reaffirmed that "The DAO report, as the guidance has come to be known, confirmed that the SEC will apply the traditional investment contract analysis laid out in the U.S. Supreme Court's 1946 decision in SEC v. W.J. Howey Co. (the "Howey test") to digital assets that exist or are recorded on systems using distributed ledger or blockchain technology ("digital assets" or "tokens").").

[154] *Id.* ("The speech is notable for Mr. Hinman's acknowledgement that bitcoin and Ether are not securities under the *Howey* test . . . .").

[155] Henderson & Raskin, *supra* note 143, at 455 (Mr. Hinman mentions cryptocurrencies that may not be securities in his speech stating, "[i]f the network on which the token or coin is to function is sufficiently decentralized . . . . the assets may not represent an investment contract. Moreover, when the efforts of the third party are no longer a key factor for determining the enterprise's success, material information asymmetries recede.").

[156] McLeod, *supra* note 141, at 572 ("For example, in a Bitcoin exchange, there is no tangible third party.").

cryptocurrency and the circumvention of third-party players.[157] Lacking any form of third parties or a central regulatory body, Bitcoin is a "sufficiently decentralized"[158] form of cryptocurrency. As a result, investors of the digital asset do not reasonably expect that any individual or group will execute managerial efforts, on the behalf of all the investors, for the realization of profits.[159] Thus, Bitcoin does not constitute an investment contract under the *Howey* test and is not a security subject to regulation by the SEC.[160] Therefore, even if the SEC does implement an environmental impact disclosure rule, some of the largest, if not the largest, forms of cryptocurrencies will not even be subjected to these mandates.

The SEC's proposed climate change risk disclosure rule could be a step towards the mitigation of adverse environmental effects associated with cryptocurrency.[161] However, without the inclusion of Bitcoin and Ether, the SEC's proposed rule may not have the large impact it intends to have.[162] To successfully reduce the crypto industry's carbon footprint, a disclosure framework must encompass a majority, if not the entirety, of the cryptocurrency market. Therefore, to successfully mitigate the environmental impacts of cryptocurrency, this note recommends that cryptocurrency firms disclose their environmental and financial records through newly implemented voluntary disclosure frameworks modeled after the TCFD and the SASB.

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[157] Carroll, *supra* note 9, at 55 ("Cryptocurrency . . . is decentralized and, therefore, does not rely on a bank or other third-party to validate the transaction.").

[158] Henderson & Raskin, *supra* note 143, at 455 ("Recognizing that such 'sufficiently decentralized' digital assets may not be securities is an important foundational principle.").

[159] *Id.* at 458 (explaining that the SEC's *Howey* analysis of The Dao "focused on (i) the reasonable expectation of profits by purchasers and (ii) the entrepreneurial and managerial efforts . . . .").

[160] *See* Marcus et al., *supra* note 132, at 1 (emphasizing the most notable part of Mr. William Hinman's speech was his acknowledgement that neither Bitcoin nor Ether are securities).

[161] *See* Soyoung Ho, *supra* note 59, at 149 (discussing the SEC's proposal of a climate disclosure rule that would require public companies holding Bitcoin or other cryptos to disclose the carbon footprint related to their holdings).

[162] *See* Marcus et al., *supra* note 132, at 1 (reiterating that Bitcoin and Ether are not securities and do not fall under SEC purview).

C. The Solution: Cryptocurrency Firms' Implementation of a Voluntary Financial Disclosure Framework

More and more businesses and firms have taken strides towards resolving environmental, social, and governance (ESG) issues and implementing solutions to these prevailing issues.[163] Among the ESG issues that firms deal with today are the adverse effects cryptocurrency has on the environment.[164] As corporations' carbon footprints become more closely intertwined with their financial standing, investors begin to demand companies' financial disclosures to understand the risks and opportunities associated with this ESG issue.[165] Four emerging trends demonstrate investors' increasing belief that climate-related information is material and of consequence to them.[166]

First, investors are increasingly voicing their interest in both the dissemination of and their receipt of climate-related information.[167] For example, in 2016, BlackRock, a leading investment management company, issued a report recommending the creation of an international framework to cultivate consistent ESG standards, and a year later the TCFD published a set of disclosure recommendations to improve corporate reporting of climate-related information.[168] Second, investors are actively using and engaging

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[163] Vizcarra, *supra* note 128, at 10110 (showcasing the strides taken by firms with evidence of action such as climate-change related shareholder resolutions and partnering with climate data and risk analysis companies).

[164] *See* Davies et al., *supra* note 81 (discussing the ESG-related issues that market participants are dealing with).

[165] Madison Condon, *Market Myopia's Climate Bubble*, 2022 UTAH L. REV. 63, 66–69 (commenting on shareholders' climate concerns that have resulted in their pressing for voluntary disclosure from their companies).

[166] Vizcarra, *supra* note 128, at 10107 ("Four trends in the corporate-investor disclosure dance indicate that today's reasonable investor considers more and more climate-related information material . . . .").

[167] *Id.* (noting the first trend relates to "the growing, consistent vocal interest by mainstream investors in climate-related information").

[168] *Id.* at 10109 ("In June 2016, BlackRock published a document calling for 'a consistent global framework that enables stakeholders and market participants to develop detailed ESG standards and best practice guidelines.' In June 2017, the TCFD released recommendations for climate-related disclosure."); *see* EXPLORING ESG: A PRACTITIONER'S PERSPECTIVE, BLACKROCK (2016),

with climate-related information provided by corporations in their decision-making process, and are continuously requesting additional information from corporations.[169] A 2018 study found that when making investment decisions, a majority of investors take into account information about ESG issues because "they believe it is financially material to investment performance."[170]

Third, corporations are releasing more climate-related information in response to investors' continuous demands for additional disclosures.[171] Today, an increasing amount of companies are making ESG disclosures as compared to prior decades: per the TCFD's 2021 report, over 2,600 corporations are committed to providing climate-related disclosures.[172] Finally, the past years have witnessed the general investment decision-making process (and the subsequent responsibility) concentrate around just a handful of prominent fund managers like BlackRock and Vanguard.[173] As fund

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https://nordsip.com/wp-content/uploads/2016/11/viewpoint-exploring-esg-a-practitioners-perspective-june-2016.pdf; FINAL REPORT: RECOMMENDATIONS OF THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES, TCFD (June 29, 2017), https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf [hereinafter TCFD 2017 Report].

[169] Vizcarra, *supra* note 128, at 10107 ("[R]ecent indications that investors use the climate information they get from companies and are seeking out and incorporating additional information").

[170] *Id.* at 10109 (stating that 63 percent of investors who consider ESG information do so because they consider it financially material); *see* Amir Amel-Zadeh & George Serafeim, *Why and How Investors Use ESG Information: Evidence From a Global Survey,* 74 FIN. ANALYSTS J. 87, 90 (2018).

[171] Vizcarra, *supra* note 128, at 10110 ("The position of mainstream investors that climate-related information, in at least some form, is increasingly important to their decisionmaking has already had an effect on companies' disclosure practices. The number of companies disclosing ESG data has dramatically increased from the early 1990s to recent years.").

[172] *Id.* ("The number of companies disclosing ESG data has dramatically increased from the early 1990s to recent years."); TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, 2021 STATUS REPORT 14 (2021) [hereinafter TCFD 2021 Report] (stating a total of 2,616 TCFD supporters, including financial institutions").

[173] Vizcarra, *supra* note 128, at 10107 ("[T]he consolidation of investment decisionmaking in the hands of a smaller number of fund managers, increasing the importance of their views on climate information and incentivizing them to portfolio-level climate impacts.").

managers take ESG issues and climate disclosures more heavily into consideration, "the importance of their views on climate information" becomes much more prominent.[174] As noted earlier, BlackRock has called for improved ESG standards; so with more decision-making power placed into this fund manager's hands, there is increased demand for climate-related disclosures.[175]

With an increasing number of investors relying on climate-related disclosures in their investment decisions, it seems like an obvious choice to implement these disclosures in the cryptocurrency industry.[176] Cryptocurrency firms should adopt voluntary climate-related financial disclosure frameworks to provide both investors and general consumers with more complete, material information about the relevant risks and opportunities of certain cryptocurrencies.[177] These voluntary disclosure frameworks should be modeled after those of the TCFD[178] and the SASB[179]—two successful organizations developing frameworks for climate disclosures and sustainability accounting standards.

1. The Task Force on Climate-related Financial Disclosures (TCFD)

The TCFD is a climate-related voluntary disclosure framework which provides the financial sector with a comprehensive

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[174] *Id.*

[175] *Id.* at 10109 (In June 2016, BlackRock published a document calling for "a consistent global framework that enables stakeholders and market participants to develop detailed ESG standards and best practice guidelines.").

[176] *Id.* at 10107 (identifying that today's reasonable investor considers climate-related information material); DAVIES ET AL., *supra* note 81, at 1 ("[T]he ESG performance of the broader cryptocurrency industry will increasingly need to be considered, particularly as institutional investment in this space is accelerating.").

[177] *See generally* DAVIES ET AL., *supra* note 81, at 1 (explaining that companies should adopt these frameworks because "companies that put cryptoassets on their balance sheets must now weigh the potential for increased returns against the possible negative impact on their ESG credentials.").

[178] *See generally* TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, https://www.fsb-tcfd.org/ [https://perma.cc/4NK3-WVQ2].

[179] *See generally* SUSTAINABILITY ACCT. STANDARDS BD., https://www.sasb.org/ [https://perma.cc/7QZA-M2EE].

understanding of the material risks associated with environmental issues and with the type of information increasingly sought out by investors.[180] The Financial Stability Board (FSB) created the TCFD to both increase the quantity of climate-related financial disclosures made to the public and investors and improve the quality of these disclosures.[181]The FSB is an international body created by the G20 in direct response to financial crisis of 2008.[182] This board advances financial stability by monitoring international market developments and recommending regulatory policies and standards.[183]

The TCFD's voluntary financial disclosures aim to "enable a variety of stakeholders to understand the concentration of carbon-related assets in the financial sector and the financial system's exposures to climate-related risk."[184]As the impacts of climate change begin to manifest at an accelerated rate, companies face increasing risks posed by these environmental effects.[185] This in turn

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[180] Colin Myers, *Financing Our Future's Health: Why the United States Must Establish Mandatory Climate-Related Financial Disclosure Requirements Aligned with the TCFD Recommendations*, 37 PACE ENV'T L. REV. 415, 433 (2020) (highlighting that the goal of the TCFD was to "develop a voluntary climate-related disclosure framework that those in the business and financial industry can use to better understand material risks.").

[181] TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, *supra* note 178 ("The Financial Stability Board created the Task Force on Climate-related Financial Disclosures (TCFD) to improve and increase reporting of climate-related financial information.").

[182] Stavros Gadinis, *The Financial Stability Board: The New Politics of International Financial Regulation*, 48 TEX. INT'L L.J. 157, 157 (2013) ("In response to the 2007-08 financial crisis, the G20 forged the Financial Stability Board, a new international body dedicated to promoting regulatory standards that best ensure the stability and soundness of the financial system.").

[183] *About the FSB*, FIN. STABILITY BD., https://www.fsb.org/about/ [https://perma.cc/CAY9-J6GJ] ("The FSB promotes international financial stability; it does so by coordinating national financial authorities and international standard-setting bodies as they work toward developing strong regulatory, supervisory and other financial sector policies.").

[184] Robyn Bishop, *Investing in The Future: Why the SEC Should Require a Uniform Climate Change Disclosure Framework to Protect Investors and Mitigate U.S. Financial Instability,* 48 ENV'T L. 491, 505 (2018).

[185] TCFD 2017 Report, *supra* note 168, at ii ("[C]limate-related risks and the expected transition to a lower-carbon economy affect most economic sectors and industries.").

creates challenges for investors who either already have a stake in or are looking to invest in a company.[186] However, it also creates a new type of opportunity for investors: an annual investment of approximately $1 trillion is required to finance a steady transition into a more sustainable economy with net-zero emissions.[187] This economic transition will further generate new opportunities for investment.[188] Thus, the TCFD also serves to assist financial markets in accurately pricing these climate-related risks and opportunities.[189]

At the core of the TCFD's goals is increased transparency through disclosures, which in turn should increase the efficiency of the economy.[190] To better assess potential investment opportunities, investors, lenders, insurance underwriters, and other market participants need to be sufficiently informed of the depth of environmental risks faced by organizations.[191] Climate-related risks

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[186] *Id.* ("For many investors, climate change poses significant financial challenges and opportunities, now and in the future.").

[187] *Id.* ("The expected transition to a lower-carbon economy is estimated to require around $1 trillion of investments a year for the foreseeable future, generating new investment opportunities."); INTERNATIONAL ENERGY AGENCY, WORLD ENERGY OUTLOOK 2021 22 (2021) ("In the NZE [net-zero emissions], there is an annual market opportunity that rises well above USD 1 trillion by 2050 for manufacturers of wind turbines, solar panels, lithium-ion batteries, electrolysers and fuel cells.").

[188] TCFD 2017 Report, *supra* note 168, at ii (explaining that the transition to a low-carbon economy will generate "new investment opportunities").

[189] *Id.* at iii ("To help identify the information needed . . . to appropriately assess and price climate-related risks and opportunities, the Financial Stability Board established . . . the Task Force on Climate-related Financial Disclosures (Task Force).").

[190] *Id.* at ii ("Without the right information, investors and others may incorrectly price or value assets, leading to a misallocation of capital."); Robert F. Brammer & Preetha Chakrabarti, *SciTech and the Task Force on Climate-Related Financial Disclosures*, 15 SCITECH LAW. 14, 16 (2019) (observing that TCFD chair, Michael Bloomberg, stated that "[i]ncreasing transparency makes markets more efficient, and economies more stable and resilient.").

[191] TCFD 2017 Report, *supra* note 168, at iii ("As part of its review, the Financial Stability Board identified the need for better information to support informed investment, lending, and insurance underwriting decisions and improve understanding and analysis of climate-related risks and opportunities.").

include policy risks,[192] legal risks,[193] transition risks,[194] technology risks,[195] market risks,[196] reputation risks,[197] and even physical risks.[198] Shareholders and investors would be hurt by the mispricing of companies' climate-related risks, so the TCFD's recommendations are aimed specifically at enhancing transparency through the use of voluntary disclosures.[199]

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[192] *Id.* at 5 ("Policy actions around climate change continue to evolve. Their objectives generally fall into two categories—policy actions that attempt to constrain actions that contribute to the adverse effects of climate change or policy actions that seek to promote adaptation to climate change . . . . [t]he risk associated with and financial impact of policy changes depend on the nature and timing of the policy change.").

[193] *Id.* ("Recent years have seen an increase in climate-related litigation claims being brought . . . As the value of
loss and damage arising from climate change grows, litigation risk is also likely to increase.").

[194] *Id.* ("Transitioning to a lower-carbon economy may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organizations.").

[195] *Id.* at 6 ("Technological improvements or innovations that support the transition to a lower-carbon, energy-efficient economic system can have a significant impact on organizations . . . . The timing of technology development and deployment, however, is a key uncertainty in assessing technology risk.").

[196] *Id.* ("While the ways in which markets could be affected by climate change are varied and complex, one of the major ways is through shifts in supply and demand for certain commodities, products, and services as climate-related risks and opportunities are increasingly taken into account.").

[197] *Id.* ("Climate change has been identified as a potential source of reputational risk tied to changing customer or community perceptions of an organization's contribution to or detraction from the transition to a lower-carbon economy.").

[198] *Id.* ("Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns. Physical risks may have financial implications for organizations, such as direct damage to assets and indirect impacts from supply chain disruption.").

[199] *Id.* at ii ("Without the right information, investors and others may incorrectly price or value assets, leading to a misallocation of capital.").

These disclosures can be made by companies in their annual reports, filings with the SEC, or even sustainability reports.[200] However, because not all forms of cryptocurrencies are classified as securities, and thus the SEC does not govern all cryptocurrencies,[201] this note will not focus on disclosures made via companies' SEC filings. In many countries, disclosures of material information via financial filings are legally required by companies holding public equity or debt.[202] The TCFD works under the premise that climate-related information falls within the realm of material information and subsequently recommends that companies disclose this information in their public annual financial filings.[203]

While this note will not focus on SEC filings specifically (because of the lack of cryptocurrencies within the regulatory jurisdiction of the SEC), it is important to note that this premise of material information is similar to the materiality requirement in U.S. securities laws. The 1976 Supreme Court decision in *TSC Industries, Inc. v. Northway, Inc.* defined the materiality standard applicable in U.S. securities law regulations.[204] The *TSC Industries* court held that,

> [a]n omitted fact is material if there is a substantial likelihood that a reasonable shareholder would consider it important in deciding how to vote . . . . It

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[200] Brammer & Chakrabarti, *supra* note 190, at 16-17 ("The TCFD organized its recommendations into four areas, for their internal analysis as well as for public disclosures in annual reports, SEC filings, and sustainability reports . . . .").

[201] *See* SEC, *supra* note 134 (detailing SEC's approach to regulating cryptocurrencies).

[202] TCFD 2017 Report, *supra* note 168, at iv ("In most G20 jurisdictions, companies with public debt or equity have a legal obligation to disclose material information in their financial filings—including material climate-related information."); OECD, OECD SECRETARY-GENERAL'S SECOND REPORT TO G20 FINANCE MINISTERS AND CENTRAL BANK GOVERNORS ON THE REVIEW OF THE G20/OECD PRINCIPLES OF CORPORATE GOVERNANCE 15 (2022) ("corporate disclosure is 'financially material' if it could reasonably be expected to influence an investor or a lender's analysis of a company's future cash flows.").

[203] TCFD 2017 Report, *supra* note 168, at iv ("The Task Force believes climate-related issues are or could be material for many organizations, and its recommendations should be useful to organizations in complying more effectively with existing disclosure obligations.").

[204] *See generally* TSC Indus., Inc. v. Northway, Inc., 426 U.S. 438 (1976) (setting materiality standard applicable to U.S. securities laws).

> does not require proof of a substantial likelihood that disclosure of the omitted fact would have caused the reasonable investor to change his vote, but contemplates a showing of a substantial likelihood that, under all the circumstances, the omitted fact would have assumed actual significance in the reasonable shareholder's deliberations.[205]

In today's context, many investors and consumers consider climate-related financial disclosures material to their investment decisions.[206] Whether or not this increased reliance on disclosures fits into the Supreme Court's definition of materiality within SEC Rule 10b-5 is outside of the scope of this note. What is of importance is the increasing demand of climate disclosures and investors' reliance on these disclosures in making their investment decisions.

The TCFD has disclosure recommendations centered around four "core elements of how companies operate: governance, strategy, risk management, and metrics and targets."[207] The governance element is pretty self-explanatory and targets the methods and processes by which an entity governs its climate-related risks and opportunities.[208] The TCFD recommends that organizations disclose the management of these risks and opportunities as well as the oversight efforts by the Board of Directors.[209] The strategy element deals with, "the actual and potential impacts of climate-related risks and opportunities and on the organization's business, strategy, and financial planning."[210] The TCFD recommends disclosing any climate-related opportunities and risks recognized by the

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[205] *Id.* at 439.

[206] TCFD 2017 Report, *supra* note 168, at ii ("For many investors, climate change poses significant financial challenges and opportunities now and in the future.").

[207] *About*, TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, https://www.fsb-tcfd.org/about/ [https://perma.cc/Z8DR-FL76].

[208] TCFD 2017 Report, *supra* note 168, at v ("The organization's governance around climate-related risks and opportunities").

[209] *Id.* at 14 (noting that the TCFD recommends that organizations "[d]escribe the board's oversight of climate-related risks and opportunities" and "[d]escribe management's role in assessing and managing climate-related risks and opportunities.").

[210] *Id.* at iv.

organization along with their impact.[211] Additionally, the TCFD recommends releasing information about the strength and efficacy of the organization's implemented strategy under varying circumstances and scenarios.[212]

The risk management element refers to organizations' varying processes aimed at identifying, assessing, and managing these risks.[213] Under this element, the TCFD recommends describing the organization's risk identification, assessment, and management procedures and disclosing the size, scope, and relative significance of each identified climate-related risk.[214] Finally, the metrics and targets element looks at the "metrics and targets used to assess and manage relevant climate-related risks and opportunities."[215] The TCFD recommends detailing metrics (including those related to energy, water, land use, carbon pricing, and waste management) and targets to measure and manage climate-related risks, wherever such information is deemed material.[216]

2. The Sustainability Accounting Standards Board (SASB)

The SASB is a non-profit organization that provides guidelines for the disclosure of "financially material sustainability information by companies to their investors."[217] In 2017, the SASB released its conceptual framework, outlining the organization's key

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[211] *Id.* at 14 ("Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.").
[212] *Id.* ("Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.").
[213] *Id.* at 21 ("Investors and other stakeholders need to understand how an organization's climate-related risks are identified, assessed, and managed and whether those processes are integrated into existing risk management processes.").
[214] *Id.* (describing a risk management outline for recommended disclosures relating to the organization's processes for identifying and managing climate-related risks.).
[215] *Id.* at 14.
[216] *Id.* at 14, 22 ("Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.").
[217] *About Us*, SUSTAINABILITY ACCT. STANDARDS BD., https://www.sasb.org/about/ [https://perma.cc/CY8H-G6GE].

concepts and objectives regarding sustainability accounting.[218] This framework of sustainability accounting standards is meant to aid public companies in their voluntary disclosure of information relevant to the decision-making process of investors and other market participants.[219] Sustainability accounting refers to a corporation's identification, management, and disclosure of "corporate activities that maintain or enhance the ability of the company to create value over the long term."[220]

The SASB arranges its sustainability standards under five distinct categories: environment, social capital, human capital, business model and innovation, and leadership and governance.[221] Looking specifically at the environmental classification, the SASB analyzes corporations' adverse effects on the environment by examining (among other things) their respective greenhouse gas emissions, energy consumption, and fuel management.[222] The SASB standards provide companies with a comprehensive disclosure framework aimed at enhancing investors' understanding of firms'

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[218] *Conceptual Framework*, SUSTAINABILITY ACCT. STANDARDS BD., https://www.sasb.org/standards/conceptual-framework/ [https://perma.cc/624A-X72T] ("The SASB Conceptual Framework set out the basic concepts, principles, definitions, and objectives that guided the SASB Standards Board in its approach to setting standards for sustainability accounting; it provided an overview of sustainability accounting, describing its objectives and audience.").

[219] SUSTAINABILITY ACCT. STANDARDS BD., SASB CONCEPTUAL FRAMEWORK 1 (2017), https://www.sasb.org/wp-content/uploads/2020/02/SASB_Conceptual-Framework_WATERMARK.pdf [https://perma.cc/J4LW-EF9Z] [hereinafter SASB Conceptual Framework] ("SASB's mission is to develop and disseminate sustainability accounting standards that help public corporations disclose material, decision-useful information to investors.").

[220] *Id.* at 2 ("For the purposes of SASB standards, sustainability refers to corporate activities that maintain or enhance the ability of the company to create value over the long term.").

[221] *Id.* at 2–3 ("SASB's sustainability topics are organized under five broad sustainability dimensions.").

[222] *Id.* at 2, 4 ("This dimension includes corporate impacts on the environment, either through the use of nonrenewable, natural resources as inputs to the factors of production (e.g., water, minerals, ecosystems, and biodiversity) or through harmful releases into the environment (such as air, land, and water) that may negatively affect natural resources and result in impacts to the company's financial condition or operating performance.").

material, climate-related information and ESG data.[223] To date, the SASB has a wide array of standards strategically tailored to seventy seven different industries, all designed to identify financially material information related to sustainability and environmental issues.[224]

SASB standards are specifically formulated to be used by public companies as voluntary disclosures in their already-required SEC filings.[225] While the guidelines are technically devised for use in SEC filings, this aspect is not relevant for the purpose of this note because of the SEC's lack of regulation over all types of cryptocurrencies. The key point about the SASB standards are their voluntary nature. Under securities law, public corporations are legally required to file annual reports (such as 10-K, 10-Q, and 20-F forms) with the SEC,[226] however not all cryptocurrencies are securities and resultingly do not fall into the reach of securities law. Thus, it is important to distinguish between the voluntary framework

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[223] *About Us, supra* note 217 ("SASB Standards guide the disclosure of financially material sustainability information by companies to their investors. Available for 77 industries, the Standards identify the subset of environmental, social, and governance issues most relevant to financial performance in each industry.").

[224] *Standards Overview*, SUSTAINABILITY ACCT. STANDARDS BD., https://www.sasb.org/standards/ [https://perma.cc/CV6K-ZRD5] ("SASB Standards identify the subset of environmental, social and governance issues most relevant to financial performance and enterprise value for 77 industries.").

[225] SASB Conceptual Framework, *supra* note 219, at 1 ("SASB standards are designed for voluntary use in disclosures required by existing U.S. regulation in filings with the Securities and Exchange Commission (SEC), such as Forms 10-K and 20-F.").

[226] *Exchange Act Reporting and Registration*, SEC (Apr. 28, 2022), https://www.sec.gov/education/smallbusiness/goingpublic/exchangeactreporting#:~:text=SEC%20rules%20require%20your%20company,statement%20for%20a%20public%20offering [https://perma.cc/56RE-3XXY] ("SEC rules require your company to file annual reports on Form 10-K and quarterly reports on Form 10-Q with the SEC on an ongoing basis. These reports require much of the same information about the company as is required in a registration statement for a public offering."); *What is Form 20-F?*, TOPPAN MERRILL, https://www.toppanmerrill.com/glossary/form-20f/ [https://perma.cc/6K55-LTUL] ("Form 20-F is the primary disclosure document required of foreign private issuers listing equity shares on exchanges in the United States. It's most often filed with the Securities and Exchange Commission (SEC) as an annual report but is also used to register classes of securities.").

of the SASB standards and the method through which these voluntary disclosures must be made (i.e. through mandatory SEC filings). For the purpose of analyzing SASB standards, this note will not focus on the fact that disclosures of information are designed to be made through SEC filings. This note will only examine the actual standards set out by the SASB and the voluntary nature of this disclosure framework.

The SASB acknowledges that traditional financial accounting does not factor in human, environmental, or social capital, and therefore does not fully capture a corporation's sustainability or accurately reflect a companies' true financial standing.[227] SASB standards help companies measure nonfinancial resources and impacts, allowing them to more effectively and comprehensively report climate-related risks and opportunities.[228] Additionally, sustainability accounting is not solely retrospective in its assessment of a corporation's performance, it is also helpful in evaluating future value-creation which can in turn inform investment decisions.[229] This inclusion of climate-related disclosures advanced by the SASB provides investors' and decision-makers' with knowledge of the actual (not just financial) value of corporations and enables them to make more fully informed investment decisions.[230]

D. Shortcomings of Voluntary Financial Disclosure Frameworks

One drawback presented by voluntary disclosure frameworks such as the TCFD and SASB is the lack of enforcement or

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[227] SASB Conceptual Framework, *supra* note 219, at 5 ("While environmental, human, and social capitals can be understood conceptually as economic assets and liabilities, the lack of comparable data makes accounting for these sustainability factors challenging—a deficiency SASB standards are built to address.").

[228] *Id.* at 4 ("[C]orporate reporting must extend beyond financial statements to facilitate the measurement and reporting of sustainability information that will enhance a decision maker's understanding of all material risks and opportunities.").

[229] *Id.* ("Like financial accounting, sustainability accounting has both confirmatory and predictive value, so it can be used to evaluate past performance and be used for future planning and decision support.").

[230] *Id.* at 6 ("SASB standards are intended to help issuers identify and more effectively disclose the information today's investors need to make informed decisions.").

standardization stemming from the absence of a central governing authority or regulatory body.[231] Thus, even if a voluntary disclosure framework *is* implemented, cryptocurrency firms are free to choose what information to disclose and what information not to disclose.[232] The TCFD provides eleven recommended disclosures categorized under their four core themes: governance, strategy, risk management, and metrics and targets.[233] If a disclosure framework is modeled specifically after that of the TCFD, cryptocurrency firms are at liberty to cherry-pick which climate-related risks they want to disclose to the public.[234] Additionally, the environmental impact of cryptocurrency has created both climate-related risks and opportunities. With a voluntary disclosure framework in place, cryptocurrency firms might be tempted to skew their disclosures towards opportunities as opposed to the disclosure of risks faced by the companies.[235] This freedom of disclosure enables firms to report only the information aligned with the maintenance of their public reputation and corporate value.[ES: no changes]

The TCFD's 2019 Status Report revealed that only a quarter of voluntarily complying companies disclosed information falling

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[231] Condon, *supra* note 165, at 108 ("Voluntary reporting frameworks, however, are an imperfect solution to the problem of inadequate climate risk disclosures.").

[232] *Id.* ("Without enforcement and standardization, companies can pick and choose which reporting frameworks, or categories of risk within those frameworks, they disclose."); Esther Whieldon, *SEC Acting Head Explains Why Voluntary ESG Disclosure Regime is Not Enough*, S&P GLOBAL MARKET INTELLIGENCE (Mar. 1, 2021), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/sec-acting-head-explains-why-voluntary-esg-disclosure-regime-is-not-enough-62934422 [https://perma.cc/PEP4-GBX9] (explaining that one company "might choose different things to disclose at different times.").

[233] TCFD 2017 Report, *supra* note 168, at 14 (chart depicting the 11 recommended disclosures advanced by the TCFD).

[234] Condon, *supra* note 165, at 108 ("[C]ompanies can pick and choose which reporting frameworks, or categories of risk within those frameworks, they disclose.").

[235] *Id.* (explaining that "in the voluntary disclosure of fossil fuel companies to CDP" there was an evident reporting of "more opportunities than risks from climate change"); Virginia Harper Ho, *"Comply or Explain" And the Future of Nonfinancial Reporting*, 21 LEWIS & CLARK L. REV. 317, 326 (2017) ("[V]oluntary reporting has tended to be heavily qualitative and focused on positive rather than negative indicators.").

under "more than five of the 11 recommended disclosures."[236] Moreover, a meager 4% of the companies voluntarily disclosed information pertaining to at least ten of these eleven disclosure categories.[237] This means that a vast majority of disclosing companies provided information for less than half of the TCFD's recommended categories of climate-related risk factors, and only a miniscule portion even came close to disclosing information for all the categories.[238] While the TCFD has noted an increase in company disclosures from 2019 to 2021, further cooperation is evidently needed with only half of the complying issuers disclosing information in three or more of the 11 recommended disclosures.[239]

Another drawback inherent in voluntary disclosure frameworks is the reduced level of scrutiny and lack of third-party verification inherent in these frameworks. As opposed to mandatory financial disclosures such as SEC-mandated filings, voluntary climate-related disclosures are not independently reviewed by a central regulatory body.[240] This reduced scrutiny diminishes the quality of the disclosures because the released information is more susceptible to errors and inconsistencies.[241] Moreover, audits by third parties are used sparingly in voluntary, climate-related disclosures and lack the standardization implicit in financial audits.[242] This lack of external assurances present in environmental sustainability disclosures could potentially discourage investors, and even the

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[236] TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, 2019 STATUS REPORT 7 (2019) ("[O]nly around 25% of companies disclosed information aligned with more than five of the 11 recommended disclosures . . . .").

[237] *Id.* ("[O]nly 4% of companies disclosed information aligned with at least 10 of the recommended disclosures.").

[238] *See id.*

[239] TCFD 2021 Report, *supra* note 172, at 31 ("Disclosure increased more between 2019 and 2020 than in any previous year assessed, consistent with global momentum around climate-related reporting . . . . [h]owever, progress is still needed, with only 50% of companies reviewed disclosing in alignment with at least three recommended disclosures.").

[240] Condon, *supra* note 165, at 109 ("Further, voluntary climate reporting is subject to a lower level of scrutiny than mandatory financial disclosure, which may impact the quality of the information provided.").

[241] *Id.* (explaining the implications of voluntary climate disclosures as compared to mandated and reviewed disclosures).

[242] *Id.* ("Among the S&P 500 companies, most sustainability and environmental disclosures lack external assurance, and the vast majority of external assurance is done on only a fraction of the information provided.").

public at large, from believing and relying on the information disclosed.[243]

A final shortcoming of voluntary disclosure frameworks is the difficulty in accurately measuring and reporting climate-related risks and opportunities because of the qualitative nature inherent in ESG data.[244] To date, climate-related metrics and ESG measures have yet to be standardized.[245] As a result, there is a lack of comparative value among voluntary disclosures.[246] For example, without a standard metric, it is difficult to compare environmental/financial disclosures between gas and oil companies.[247] Additionally, these frameworks exhibit a lack of standardization amongst companies—some companies may choose to disclose certain information while others may choose to abstain from disclosure.[248]

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[243] Virginia Harper Ho, *supra* note 235, at 327 ("[T]he reliability of voluntary reporting and its power to influence corporate practice depends largely on private auditing or "assurance" systems that attest to the integrity of the disclosure process. However, since companies also determine whether or not to seek third-party assurance or auditing, the level of assurance is uneven.").

[244] Brammer & Chakrabarti, *supra* note 190, at 16 ("[T]he Task Force also recognized the challenges associated with measuring and disclosing information on risks related to climate change . . . .").

[245] TASK FORCE ON CLIMATE-RELATED FIN. DISCLOSURES, 2018 STATUS REPORT 67 (2018), https://www.fsb-tcfd.org/publications/tcfd-2018-status-report/ [https://perma.cc/UY8X-WRNE] [hereinafter TCFD 2018 Report] ("Climate-related metrics are currently not standardized."); Virginia Harper Ho, *supra* note 235, at 327 ("And unlike financial auditing, there are, as yet, no uniform standards for ESG assurance providers.").

[246] Virginia Harper Ho, *supra* note 235, at 327 ("Finally, the timing and consistency of firm voluntary reporting varies widely, with many firms reporting on varying time periods and on a less-than-annual basis. Integrating voluntary reporting with analysis from the financial statements is difficult because voluntary disclosures are often released at different times than periodic reporting.").

[247] TCFD 2018 Report, *supra* note 245, at 67 ("To support comparability among oil and gas companies, standardized methodologies and a common level of disclosure could be developed.").

[248] Virginia Harper Ho, *supra* note 235, at 327 ("[T]he timing and consistency of firm voluntary reporting varies widely, with many firms reporting on varying time periods and on a less-than-annual basis."); Whieldon, *supra* note 232 ("When you have a voluntary framework, not everyone discloses, and that means significant gaps. It can mean an unlevel

These inconsistencies make it difficult for investors to compare environmental/financial disclosures amongst different industries, markets, and economic sectors; between different individual companies; and even within a single corporation over time.[249]

However, even with the lack of enforcement, reduced level of scrutiny, and the difficulty in comparing disclosures, voluntary disclosure frameworks can prove effective in the mitigation of adverse environmental effects. Although these voluntary frameworks allow firms to pick and choose what they want to disclose, this ultimately creates an accountability mechanism for shareholders, investors, and the general public. If companies purposely omit certain information from their disclosures, market participants can see these gaps and question why corporations are failing to disclose certain things. For example, if a crypto firm fails to disclose data on its periodic energy consumption, investors may see this omission and change their investment decision accordingly.

Moreover, corporations actually benefit from voluntarily disclosing financial and climate-related information. By voluntarily disclosing information, corporations can effectively reduce investor uncertainty and increase investment in their company.[250] This increased investment is evidenced by the reduction of capital and transaction costs and the increase in "demand for a company's shares."[251] By increasing transparency and reducing information asymmetries between the corporate management and investors, investors will be more inclined to invest in the company because they

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playing field for many businesses and it also means inconsistencies among those who do disclose . . . .").

[249] Whieldon, *supra* note 232 ("[I]nvestors can't really compare across businesses, across the industries ... and sometimes they can't even compare with respect to a single business that might choose different things to disclose at different times.").

[250] Abdallah Al-Mahdy Hawashe, *Voluntary Disclosures in the Annual Report: Benefits and Costs, Preparers' Views*, INT'L J. RSCH. IN BUS. STUD. & MGMT. 1, 1 ("The capital need theory predicts that increased voluntary disclosure of information by the company's managers will enable them to lower the company's cost of capital through reducing investor uncertainty.").

[251] *Id.* at 5 ("[A]dditional information disclosure enhances stock market liquidity thereby decreasing costs of equity capital either through reduced transactions cost or increased demand for a company's shares.").

are now better informed and equipped with relevant data about the risks and opportunities of the firm.[252]

V. Conclusion

Cryptocurrency is a prevalent form of digital currency that has taken the world by storm and continues to increase in popularity around the globe. However, as cryptocurrency becomes more widespread, the adverse environmental effects it produces increase as well. Mining for cryptocurrency leads to large expenditures of energy and often leads to the depletion of cheap energy sources, which are non-renewable for the most part.[253] As algorithms become more complex, increased energy is required for mining and energy sources are further exhausted.[254] This in turn increases the crypto industry's carbon footprint.[255] To mitigate this abhorrent use of energy, cryptocurrency firms should implement voluntary, climate-related financial disclosure frameworks.

Increasing climate-centric reform over the years, including the Paris Climate Agreement, is indicative of a worldwide crusade towards a more sustainable, carbon-neutral economy.[256] More and more companies are realizing the advantages associated with improving transparency via climate-related disclosures.[257] Without

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[252] *Id.* at 5 ("[R]evealing greater information in annual reports helps to attract new investors thereby helping to maintain a healthy demand for the company's shares and the share price in the market will more accurately reflect its intrinsic value.").

[253] *See supra* Part III-B (explaining how the usage of cheap energy sources by cryptocurrency miners leads to further new production of such resources).

[254] Thomson, *supra* note 61, at 79 ("As the difficulty in solving the puzzle increases . . . the energy that is required to power the computers of miners to solve those puzzles also increases.").

[255] *See supra* Part III-B (postulating large energy expenditures on nonrenewable sources contribute largely to the growth of cryptocurrency's carbon footprint).

[256] Bishop, *supra* note 184, at 506 ("[A] clear movement towards a low-carbon economy exists both in the United States and worldwide, evidenced by the Paris Climate Agreement and increasing climate-related legislation.").

[257] *See* Vizcarra, *supra* note 128, at 10110 ("The position of mainstream investors that climate-related information, in at least some form, is increasingly important to their decisionmaking has already had an effect on

disclosures of climate-related risks and opportunities, investors are misinformed about the actual value of companies and cannot make fully informed decisions to the detriment of the economy.[258] Moreover, there is currently no single, existing authority with regulatory jurisdiction over every type of cryptocurrency.[259] Lacking a central governing authority to mandate these disclosures, the solution lies in cryptocurrency firms' voluntary adoption of voluntary climate-related disclosures.

Cryptocurrency firms should model their voluntary disclosure frameworks after those of the TCFD and SASB and align them with the recommendations presented by these two existing frameworks. Currently there are approximately 400 climate-related disclosure frameworks around the world, presenting an abundance of options for corporations to choose from.[260] Of these vast options, however, the TCFD and SASB are considered "the two most prominent, widely accepted, and supported" disclosure frameworks in the United States.[261] An implemented voluntary climate disclosure framework will not act as a financial institution or governmental organization and will thereby allow cryptocurrency to remain decentralized.

Although voluntary disclosure frameworks lack enforcement, standardization, independent verification, and comparative value, a voluntary framework is still the best choice for the cryptocurrency industry. The adoption of a voluntary disclosure framework by cryptocurrency firms will increase transparency of these firms' climate-related issues and, as a result, enable investors and other market participants to make more informed and environmentally conscious decisions. Therefore, cryptocurrency firms should adopt a

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companies' disclosure practices. The number of companies disclosing ESG data has dramatically increased from the early 1990s to recent years.").

[258] *See* Brammer & Chakrabarti, *supra* note 190, at 16 (explaining that TCFD chair, Michael Bloomberg, stated that "increasing transparency makes markets more efficient, and economies more stable and resilient").

[259] *See* Carroll, *supra* note 9, at 55 ("Cryptocurrency is also unique in that it is decentralized and, therefore, does not rely on a bank or other third-party to validate the transaction.").

[260] Bishop, *supra* note 184, at 506 ("While nearly 400 climate or sustainability disclosure regimes exist worldwide, SASB and TCFD are two of the most prominent, widely accepted, and supported systems in the United States.").

[261] *Id*.

voluntary, climate-related financial disclosure framework to help mitigate the negative effects cryptocurrency has on the environment.