



SUSTAINABLE CRYPTO?

A PRACTICAL GUIDE FOR CANADIAN BUSINESSES, INVESTORS, AND INSTITUTIONS



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Introduction

Cryptocurrency, on balance, is bad for the environment. At least that's the case at this time, and so this report should not be understood as an endorsement of cryptocurrency, or otherwise suggesting that our firm is 'pro-crypto'. But all cryptocurrencies are not equally unsustainable. On the contrary, their sustainability profiles differ enormously, just as the sustainability profiles of energy sources (*e.g.*, gas, oil, wind, solar, etc.) differ enormously. This report intends to clarify how, why, and to some extent which cryptocurrencies are more sustainable than others.

What Are Cryptocurrencies?

Cryptocurrencies are digital currencies using cryptography to secure transactions. Notable examples include Bitcoin, Ethereum, and (*sigh*) Dogecoin. As their trading value attests, many people attribute high worth to cryptocurrencies due to their ability to function as reliable, decentralized, and accessible stores of value.¹

Unlike fiat currencies, cryptocurrencies ostensibly have no central issuing or regulating authority.² Instead, cryptocurrencies verify transaction by means of a "blockchain": a distributed digital public ledger recording all transactions by cryptocurrency network participants.

To prevent fraudulent transactions (*e.g.*, double counting), transactions are verified by blockchain network participants acting as "nodes". Nodes are rewarded for verifying correct (*i.e.*, consensus) "blocks" of transactions - rather than supporting incorrect versions - with a small payment of the applicable cryptocurrency. This incentivizes accurate verification among decentralized and disparate parties. The verified blocks are linked together with previous blocks to form a "chain". And the two most common blockchain verification protocols are Proof of Work and Proof of Stake.

Proof of Work

The original and most common blockchain validation protocol is Proof of Work (PoW), which requires computers to solve complicated mathematical equations to verify new transactions.³ This process is often referred to as “mining”, and those who engage in it are “miners”.⁴ Miners compete to solve the mathematical problems presented. The first miner to solve the problem and complete a block of verified transactions is rewarded with cryptocurrency for their efforts.

Over time, the mathematical problems become more complex, requiring more and more energy-intensive computing power to solve them. This has incentivized miners to build ever-growing computer systems, often filling entire warehouses, requiring astonishing levels of electricity to operate.⁵ Because this electricity imposes a large operating cost upon miners, they’re constantly searching for cheap sources of energy. Though this energy is sometimes supplied by renewables, particularly in the case of mining operations in low-carbon energy jurisdictions like Quebec or Iceland,⁶ more often it results in the use of carbon-intensive energy sources, such as coal.⁷

This aspect of cryptocurrency has attracted intense criticism for its negative environmental impact.⁸ To mine Bitcoin, the largest cryptocurrency by market capitalization which exclusively uses PoW to validate transactions, network miners consume roughly 91 terawatt-hours of electricity annually - more than the entire nation of Finland.⁹ And according to the energy research journal Joule, even as more renewables come online worldwide, the share of renewable energy used for Bitcoin mining actually fell from 42% in 2020 to 25% in August 2021.¹⁰

Proof of Stake

Proof of Stake (PoS) is a blockchain validation protocol that requires cryptocurrency holders to “stake” their holdings as collateral for the opportunity to validate transactions. Those possessing designated minimum amounts of “staked” cryptocurrency can operate nodes that will be algorithmically selected to validate cryptocurrency transactions. For example, Ethereum, the second largest cryptocurrency by market cap, is currently operating parallel PoW and PoS chains as it works to transition from PoW to PoS this year.¹¹ The Ethereum PoS chain requires a minimum stake of 32 ETH (roughly USD\$112,000 at time of writing) for one to act as a validator node.¹² The odds of being selected to verify transactions on a PoS chain increase in accordance with the amount of one’s staked cryptocurrency holdings.¹³

While an individual’s holdings are staked, they are temporarily inaccessible.¹⁴ As a reward for staking and confirming legitimate transactions, validators get a small payment in the applicable cryptocurrency. Unlike PoW validators, this protocol does not require competition among validators, and those staking holdings can expect to earn a small percentage return on their staked holdings that functions like interest. Persons holding too little PoS cryptocurrency to run a node can pool their stake with others to meet the applicable threshold through programs run by certain exchanges, allowing them to earn a return on holdings as well.¹⁵

To dissuade fraud, validators lose a portion of staked holdings for supporting incorrect (*i.e.*, non-consensus) blocks.¹⁶ In this respect, validators’ stakes serve as collateral to ensure they accurately verify transactions.

Because PoS does not entail energy-intensive computing (and associated emissions) to solve mathematical equations, it is significantly better for the environment than PoW. The Ethereum Foundation, for example, claims Ethereum’s full transition to PoS should decrease the network’s cumulative energy usage by 99.95%.¹⁷

ESG Implications

Though Bitcoin was generally viewed as an internet culture curiosity upon its introduction in 2009,¹⁸ in recent years investors have sought to capitalize on cryptocurrencies' economic potential. However, as investors also increasingly factor environmental, social, and corporate governance (ESG) considerations into capital placements, commentators have noted that cryptocurrencies like Bitcoin do not meet ESG criteria due to their energy-intensive nature and resulting climate impact.¹⁹ David Sneyd, analyst and Vice President of Responsible Investment at BMO Global Asset Management, states that Bitcoin and similar cryptocurrencies are viewed as “net negative from an ESG standpoint.”²⁰

The ESG implications of cryptocurrency, and Bitcoin in particular, were most strikingly brought to bear in 2021 by “Person of the Year” Elon Musk.²¹ In February 2021, Tesla announced that it purchased \$1.5 billion worth of Bitcoin and would accept the cryptocurrency as payment for vehicles.²² The price of Bitcoin consequently surged.²³ Public outcry ensued, with many noting the hypocrisy of the electric carmaker, whose stated mission is “to accelerate the world’s transition to sustainable energy”,²⁴ massively incentivizing Bitcoin mining and associated emissions by its actions.²⁵ In May, Tesla reneged and stopped accepting Bitcoin expressly due to its negative environmental impact, causing Bitcoin’s value to fall dramatically.²⁶

Conversely, the price of PoS cryptocurrencies like Cardano rose substantially following Tesla’s Bitcoin reversal.²⁷ Commentators point to this as demonstrating the potential ESG value of PoS “green coins”, since without the energy consumption issues associated with PoW mining, PoS cryptocurrencies may reasonably be regarded as environmentally unproblematic, with the emission profile of a “small village, rather than an entire nation.”²⁸

Sustainable Shift

Though broadly thought of as digital money, the various cryptocurrencies now in existence have built significantly on the crypto fundamentals Bitcoin established in 2009.²⁹ Following Ethereum's launch in 2015, cryptocurrencies could be, and often are, programmable for use with "smart contracts" and decentralized applications (dApps).³⁰ Various other crypto-oriented innovations have since emerged and grown popular, most notably Non-Fungible Tokens (NFTs) and Decentralized Autonomous Organizations (DAOs).³¹

Just as utility innovations became relatively commonplace among new cryptocurrencies, so too have more environmentally-friendly validation protocols. This is clear upon examination of the twelve most popular cryptocurrencies as of March 2022.³²

1. **Bitcoin** (est. 2009)
2. **Ethereum** (est. 2015)
3. **Tether** (est. 2014)
4. **Binance Coin** (est. 2017)
5. **USD Coin** (est. 2018)
6. **Ripple (XRP)** (est. 2012)
7. **Terra (LUNA)** (est. 2019)
8. **Cardano (ADA)** (est. 2017)
9. **Solana** (est. 2020)
10. **Avalanche** (est. 2020)
11. **Polkadot** (est. 2020)
12. **Binance USD** (est. 2019)

Of the cryptocurrencies listed above operating on their own native blockchain, *only* Bitcoin uses PoW with no plan of transitioning. By contrast, the Terra,³³ Cardano,³⁴ Solana,³⁵ Avalanche,³⁶ and Polkadot blockchains (all launched within the last five years) utilize some version of PoS validation protocol.³⁷ Ethereum is transitioning to PoS, Binance Coin uses a similar energy-efficient protocol called Proof of Authority,³⁸ and Ripple uses a consensus mechanism formerly

known as the Ripple Protocol Consensus Algorithm (which appears similar to Proof of Authority).³⁹ Tether and USD Coin are hosted on other blockchains.⁴⁰

It may therefore make sense to think of cryptocurrencies as roughly falling within one of two generations with different characteristics:

- **Crypto 1.0:** Proof of Work, Digital Money (*e.g.*, Bitcoin)
- **Crypto 2.0:** Proof of Stake or Authority, Programmable Money (*e.g.*, Cardano)

Ethereum falls in the middle of the two generations. It introduced programmability, but started as PoW, and is now transitioning to PoS. It serves as an interesting case study. Its still-in-the-works transition to PoS required long, intense work by community developers, and risks harming the cryptocurrency's value if anything along the transition path goes awry.⁴¹ But the work and transition risk involved may suggest that Ethereum sees PoS as essential to its survival in a world of increasingly energy efficient and ESG-friendly cryptocurrencies.

But if cryptocurrencies must decarbonize to survive, should Bitcoin be expected to transition to PoS? Greenpeace and other environmental organizations recently began a campaign pushing for something along those lines,⁴² but it's not clear how that transition would come about given the lack of a primary authority to lead the transition charge among decentralized Bitcoin developers. Whereas Ethereum has an official foundation and vocal founder figure in Vitalik Buterin, Bitcoin has no official backing group and its primary authority figure, the pseudonymous founder Satoshi Nakamoto, remains unknown and unheard from since 2010.⁴³

This might make Bitcoin the more *truly* decentralized cryptocurrency, but as Signal app founder Moxie Marlinspike recently wrote in a highly-publicized blog post about Web3, “[i]f something is truly decentralized, it becomes very difficult to change, and often remains stuck in time. That is a problem for technology, because the rest of the ecosystem is moving very quickly, and if you don't keep up you will fail.”⁴⁴

Cryptocurrency Regulation

In January 2022, Erik Thedéen, the Vice Chair of the European Securities and Markets Authority (ESMA) proposed that the European Union ban PoW mining to force the crypto industry to adopt PoS as a universal validation protocol.⁴⁵ The EU does not currently host much PoW mining, but some speculate that more miners may move to the EU following China's ongoing crypto mining crackdown.⁴⁶ While Thedéen's comments do not necessarily indicate forthcoming regulations, it suggests that high-ranking EU officials are beginning to consider policies by which government could incentivize crypto's decarbonization.

Meanwhile in the US, last summer the Senate worked to advance a bipartisan infrastructure bill which included a provision requiring "brokers" of cryptocurrency transactions to report customers to the Internal Revenue Service for potential audit.⁴⁷ Cryptocurrency advocates argued that the definition of "broker" was too broad and would encompass miners, validators, and application developers who often lack any means of identifying blockchain ecosystem users, thus rendering their operations effectively illegal.⁴⁸ The White House then backed an amendment, immediately regarded as "disastrous" by many in the crypto community, that would have explicitly exempted PoW miners, but not PoS validators, from the definition of "broker."⁴⁹

The Senate ultimately passed the bill without the proposed amendment (passage in the House of Representatives followed in November),⁵⁰ but the Biden administration's position was seen as perplexing given its express commitment to addressing climate change.⁵¹ Its paradoxical position should presumably be viewed as highlighting government officials' lack of familiarity with PoS and cryptocurrencies more generally, rather than any commitment to PoW or Bitcoin Maximalism.⁵²

Securities Regulation

Unlike most other industrialized nations, Canada does not have a federal securities law or agency. The Supreme Court of Canada established that securities law is primarily within provinces' constitutional jurisdiction, rather than the federal government's.⁵³ Each province and territory regulates securities by means of its own securities law, though jurisdictions often work together through the Canadian Securities Administrators (CSA) to streamline regulation across Canada. Nonetheless, the CSA is not technically a lawmaking body. As such, because Ontario is home to Canada's largest securities market,⁵⁴ its securities law and the Ontario Securities Commission (OSC) often establish Canada's *de facto* national securities law.

With respect to cryptocurrencies, both the OSC and CSA have waded into the conversation without either ultimately clarifying definitively whether all cryptocurrencies are securities or not, or where the line gets drawn between when one is or is not a security.⁵⁵ What appears clear though is that Canadian securities regulators are approaching the question through the lens of whether a cryptocurrency qualifies as an investment contract per s. 1 of the Ontario *Securities Act*.⁵⁶

The Supreme Court of Canada established the applicable criteria in *Pacific Coast Coin Exchange v. Ontario Securities Commission* (1978), where it applied a modified American *Howey* test to determine whether a particular instrument qualified as an investment contract, and therefore a security per s. 1.⁵⁷ The test established that an item qualifies where:

- (1) there is an investment of money;
- (2) in a "common enterprise";
- (3) with an intention of profit; and
- (4) success or failure is significantly affected by persons other than the investor.

Most cryptocurrency assets regardless of validation protocol would appear to qualify as investment contracts under this test.⁵⁸ The first and third portions are clearly satisfied, as crypto investors typically seek to profit by investing money in cryptocurrencies. The second and fourth prongs are also likely satisfied, as a common enterprise is defined as "one in which the fortunes of the investor

are interwoven with and dependent upon the efforts and success of those seeking the investment or of third parties,”⁵⁹ and all cryptocurrencies depend on network members accurately verifying transactions on an ongoing basis, not to mention community developers constantly tweaking the blockchain technology to improve transaction speeds, reduce gas fees, and fix bugs.

Where there is clearly a single individual, company, organization, or institution expecting to profit from a cryptocurrency offering – as is the case with practically every cryptocurrency other than Bitcoin – the common enterprise prong is even more clearly satisfied. In August 2017, the CSA effectively confirmed this view in a report on how Canadian securities law applies to Initial Coin Offerings (ICOs), Initial Token Offerings (ITOs), and crypto investment funds.⁶⁰

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