

# BITCOIN AND THE PLANET

Will Peck — Head of Strategy & Emerging Technologies

03/22/2021

There was some snark thrown around in February when Elon Musk's Tesla announced its purchase of \$1.5 billion of bitcoin out of their corporate treasury. Musk has been outspoken on the role of fossil fuels in causing climate change. The businesses Musk leads explicitly are tackling this challenge. To cite the company's website: "Tesla's mission is to accelerate the world's transition to sustainable energy."

Not long after this announcement, the BBC ran a story on the significant energy usage of the Bitcoin network, as estimated by The Cambridge Centre for Alternative Finance. The Cambridge researchers calculated Bitcoin's energy usage to be 121.26 terawatt-hours per year, which, without being energy experts, we take to be significant consumption on par with mid-size countries. The article's headline: "Bitcoin consumes 'more electricity than Argentina.'"

The implication of the article is that Bitcoin consumes a lot of energy. Naturally, people question if this large amount of energy causes humans to burn more fossil fuels, emit more greenhouse gases and otherwise accelerate climate change. Can one square Musk's embrace of bitcoin with the Bitcoin network's energy consumption? And, for readers of this piece, should investors who are concerned about [ESG](#) issues invest in bitcoin?

## Why Does Bitcoin Consume Energy?

The Bitcoin network consumes energy. This is undeniable. The Bitcoin [blockchain](#) relies on a *proof-of-work* method for achieving consensus on the ledger. This method of consensus requires Bitcoin miners to use specialized computers to constantly compete to solve a puzzle to propose a new block (a group of transactions) to the blockchain. The computers competing to propose a new block—and earn their bitcoin reward—are consuming electricity this whole time. This competition, and the requisite work, are intrinsic to the functioning of the Bitcoin network. Through that lens, energy consumption is not really an externality of Bitcoin. In a way, it's the point.

## Is Bitcoin Mining Inherently Bad for the Environment? (No)

If energy consumption is unavoidable, the cost of that energy becomes very important to Bitcoin miners as profit-maximizing firms in a perfectly competitive market. To maximize profits, miners must constantly keep down their largest variable cost (electricity). This is not a hypothetical. Riot Blockchain, a publicly traded cryptocurrency miner, filed an annual report with the SEC (10-K) that contains interesting language:

The operation of a bitcoin or other [cryptocurrency](#) mine can require massive amounts of electrical power. Further, our mining operations can only be successful and ultimately profitable if the costs, including electrical power costs, associated with mining a bitcoin are lower than the price of a bitcoin. As a result, any mine we establish can only be successful if we can obtain sufficient electrical power for that mine on a cost-effective basis, and our establishment of new mines requires us to find locations where that is the case.<sup>2</sup>

Somewhat ironically, given the global, intangible nature of Bitcoin, geographic location is critical for miners. While we often speak about energy on a global basis, the delivery of energy is a local problem, and, as Riot Blockchain points out, miners will locate as physically close to cheap energy sources as they can to lower their variable costs. To illustrate this phenomenon, we only need to look at the February 2021 blackouts in Texas in the U.S. The U.S. as a country did not lack in energy at this point in time, but, as many first learned, much of Texas operates on a separate power grid than the eastern and western regions of the U.S. Delivering energy from one point to another is a costly process—it is not freely fungible around the globe or even within a country, as this crisis has illustrated. The local nature of delivery is even more salient for renewable energy like wind or hydroelectric, which cannot be stored in barrels on a tanker (a problem Tesla is working to solve with new battery technology). If energy cannot be distributed and would otherwise be wasted, a supplier would be incentivized to sell it cheaply to a user nearby.

So, what is a Bitcoin miner to do? Locate yourself next to energy that is produced cheaply and would otherwise be wasted. While we do not have perfect data, observed patterns indicate this is what happens. Many analysts point out that China's central planning has overbuilt hydroelectric dams in certain regions such as Sichuan. These dams produce more

energy than local users consume and grids can store. Sichuan is also one of the largest sources of Bitcoin mining, suggesting that miners, smartly, have been turning clean energy that might otherwise be wasted into, effectively, the Bitcoin network. Analysts will point to numerous other examples like this. Unlike physical materials miners, Bitcoin miners are much more mobile and able to quickly relocate to the nearest electricity source regardless of the environment. In a sense, Bitcoin has, impressively, shown a way to convert wasted energy into a global asset with utility.<sup>4</sup>

Again, we do not have complete data here. Our review of the research has not shown that one can affirmatively state that a certain percentage of Bitcoin's energy consumption is from renewable energy, for example. The burning of coal—still common in China—is undoubtedly a source of energy for Bitcoin miners. So long as it remains a source of energy cheaper than the price of bitcoin for miners in China, we suspect it will continue to be. Like most environmental problems, if society does not like the result of a firm's profit-maximizing decision, it is incumbent on society to enforce costs commensurate with the negative externalities of that decision. And, if mining pools in Western countries take share away from China, you'd expect Bitcoin's energy mix to shift toward less-polluting sources.

### Compared to What?

There is a temptation for certain environmental analysts to argue that Bitcoin is merely something "extra" or "unnecessary" by comparing Bitcoin to traditional financial networks and institutions. They may argue the incremental CO2 emission from a Visa transaction is significantly lower than that of a Bitcoin transaction, so Bitcoin is not justifiable from an environmental perspective.<sup>5</sup>

We struggle with these comparisons. Even the most enthusiastic Bitcoin advocates would admit that the Bitcoin network has its limits as a network for small-value payments, for which Visa—a centralized network—has proven well-suited. Other decentralized ledgers operate on a much more energy-efficient basis for transactions such as these than Bitcoin. We do not think a [bullish](#) perspective on bitcoin requires one to believe that the Bitcoin network is going to replace Visa. In our view, that is highly unlikely.

Instead, bitcoin investors can simply believe the asset class will continue to have worth as a decentralized, censorship-resistant, scarce and structurally [deflationary](#) asset. None of these characteristics are contingent on Bitcoin replacing Visa or the global financial system.

Even if you do not share this view and are looking for a way to compare Bitcoin's energy consumption to existing systems, we think this needs to be done on an "apples to apples" basis. The energy consumed by the Bitcoin network isn't just to process the transactions but also to secure and reconcile the state of the ledger. In the traditional space, Visa processes the transaction, but it is reliant on the banking system to maintain accounts and reconcile holdings to ensure the system functions. This activity requires computers, people and office buildings, all of which require energy.

### So How Should Investors Think About It?

One day, maybe we will have the data to provide a framework for investors to answer this question for themselves mathematically. But today, we do not.

Bitcoin—like gold, art, homes—requires energy to produce. By its nature, Bitcoin is well-suited to consume renewable and sustainable energy, more so than other scarce assets. There is nothing inherently anti-environmental about Bitcoin. As renewable energy sources get cheaper and costs of "dirty" energy sources continue to rise, Bitcoin's energy mix will further adjust toward sustainability.

As a more general thought, it's rare that a major technological advancement results in a lower overall energy requirement than the state of the world that preceded it. The advent of the Internet and smartphones increased the energy the average person consumes as a result of the hardware everyone now has. There is no reason to think that this trend will change, but it does frame the environmental issue: How do we serve an ever-increasing energy demand without destroying the planet? This question needs to be solved urgently, but it is distinct from Bitcoin.

As such, we do not believe Tesla and Musk are inherently hypocritical for their adoption of bitcoin.

In fact, we think those who are inclined to embrace both environmental issues and bitcoin can take some comfort in their decision, as Tesla has an advanced understanding of energy supply and distribution.

Likewise, we believe investors can continue to invest in the asset class without feeling like they are abandoning ESG principles, although some investors may find the lack of data unsatisfying. There will continue to be research on this topic, and we will update our views as the research evolves.

<sup>1</sup>[Cambridge Bitcoin Electricity Consumption Index \(CBECI\)](#)

<sup>2</sup>Cristina Criddle, "Bitcoin consumes 'more electricity than Argentina,'" BBC News, 2/10/21.

<sup>3</sup>[https://www.sec.gov/Archives/edgar/data/1167419/000107997320000216/riot\\_10k-123119.htm](https://www.sec.gov/Archives/edgar/data/1167419/000107997320000216/riot_10k-123119.htm)

<sup>4</sup>Nic Carter, "The Last Word on Bitcoin's Energy Consumption," CoinDesk, 5/19/20.

<sup>5</sup>[Bitcoin Energy Consumption Index – Digiconomist](#)

#### Important Risks Related to this Article

There are risks associated with investing, including the possible loss of principal. Crypto assets, such as bitcoin and ether, are complex, generally exhibit extreme price volatility and unpredictability and should be viewed as highly speculative assets. Crypto assets are frequently referred to as crypto "currencies," but they typically operate without central authority or banks, are not backed by any government or issuing entity (i.e., no right of recourse), have no government or insurance protections, are not legal tender and have limited or no usability as compared to fiat currencies. Federal, state or foreign governments may restrict the use, transfer, exchange and value of crypto assets, and regulation in the U.S. and worldwide is still developing. Crypto asset exchanges and/or settlement facilities may stop operating, permanently shut down or experience issues due to security breaches, fraud, insolvency, market manipulation, market surveillance, KYC/AML (know your customer/anti-money laundering) procedures, noncompliance with applicable rules and regulations, technical glitches, hackers, malware or other reasons, which could negatively impact the price of any cryptocurrency traded on such exchanges or reliant on a settlement facility or otherwise may prevent access or use of the crypto asset. Crypto assets can experience unique events, such as forks or airdrops, which can impact the value and functionality of the crypto asset. Crypto asset transactions are generally irreversible, which means that a crypto asset may be unrecoverable in instances where: (i) it is sent to an incorrect address, (ii) the incorrect amount is sent or (iii) transactions are made fraudulently from an account. A crypto asset may decline in popularity, acceptance or use, thereby impairing its price, and the price of a crypto asset may also be impacted by the transactions of a small number of holders of such crypto asset. Crypto assets may be difficult to value, and valuations, even for the same crypto asset, may differ significantly by pricing source or otherwise be suspect due to market fragmentation, illiquidity, volatility and the potential for manipulation. Crypto assets generally rely on blockchain technology, and blockchain technology is a relatively new and untested technology that operates as a distributed ledger. Blockchain systems could be subject to internet connectivity disruptions, consensus failures or cybersecurity attacks, and the date or time that you initiate a transaction may be different than when it is recorded on the blockchain. Access to a given blockchain requires an individualized key, which, if compromised, could result in loss due to theft, destruction or inaccessibility. In addition, different crypto assets exhibit different characteristics, use cases and risk profiles. Information provided by WisdomTree regarding digital assets, crypto assets or blockchain networks should not be considered or relied upon as investment or other advice, as a recommendation from WisdomTree, including regarding the use or suitability of any particular digital asset, crypto asset, blockchain network or strategy. WisdomTree is not acting and has not agreed to act in an investment advisory, fiduciary or quasi-fiduciary capacity to any advisor, end client or investor, and has no responsibility in connection therewith, with respect to any digital assets, crypto assets or blockchain networks.

#### Related Blogs

- + [Could the ETF Wrapper Democratize Crypto Investing?](#)
- + [Balance Sheets to the Moon?](#)
- + [Bitcoin for Investors in Three Ways](#)

For more investing insights, check out our [Economic & Market Outlook](#)

View the online version of this article [here](#).

## **IMPORTANT INFORMATION**

**U.S. investors only: Click [here](#) to obtain a WisdomTree ETF prospectus which contains investment objectives, risks, charges, expenses, and other information; read and consider carefully before investing.**

There are risks involved with investing, including possible loss of principal. Foreign investing involves currency, political and economic risk. Funds focusing on a single country, sector and/or funds that emphasize investments in smaller companies may experience greater price volatility. Investments in emerging markets, currency, fixed income and alternative investments include additional risks. Please see prospectus for discussion of risks.

Past performance is not indicative of future results. This material contains the opinions of the author, which are subject to change, and should not to be considered or interpreted as a recommendation to participate in any particular trading strategy, or deemed to be an offer or sale of any investment product and it should not be relied on as such. There is no guarantee that any strategies discussed will work under all market conditions. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast of future events or a guarantee of future results. This material should not be relied upon as research or investment advice regarding any security in particular. The user of this information assumes the entire risk of any use made of the information provided herein. Neither WisdomTree nor its affiliates, nor Foreside Fund Services, LLC, or its affiliates provide tax or legal advice. Investors seeking tax or legal advice should consult their tax or legal advisor. Unless expressly stated otherwise the opinions, interpretations or findings expressed herein do not necessarily represent the views of WisdomTree or any of its affiliates.

The MSCI information may only be used for your internal use, may not be reproduced or re-disseminated in any form and may not be used as a basis for or component of any financial instruments or products or indexes. None of the MSCI information is intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Historical data and analysis should not be taken as an indication or guarantee of any future performance analysis, forecast or prediction. The MSCI information is provided on an "as is" basis and the user of this information assumes the entire risk of any use made of this information. MSCI, each of its affiliates and each entity involved in compiling, computing or creating any MSCI information (collectively, the "MSCI Parties") expressly disclaims all warranties. With respect to this information, in no event shall any MSCI Party have any liability for any direct, indirect, special, incidental, punitive, consequential (including loss profits) or any other damages ([www.msci.com](http://www.msci.com))

Jonathan Steinberg, Jeremy Schwartz, Rick Harper, Christopher Gannatti, Bradley Krom, Tripp Zimmerman, Michael Barrer, Anita Rausch, Kevin Flanagan, Brendan Loftus, Joseph Tenaglia, Jeff Weniger, Matt Wagner, Alejandro Saltiel, Ryan Krystopowicz, Kara Marciscano, Jianing Wu and Brian Manby are registered representatives of Foreside Fund Services, LLC.

WisdomTree Funds are distributed by Foreside Fund Services, LLC, in the U.S. only.

You cannot invest directly in an index.

## DEFINITIONS

**Blockchain** : a distributed ledger system in which a record of transactions made in cryptocurrencies are maintained across computers linked in a peer-to-peer network

**Cryptocurrency** : a digital or virtual currency that is secured by cryptography, which makes it nearly impossible to counterfeit or double-spend.

**Bullish** : a position that benefits when asset prices rise.

**Deflation** : The opposite of inflation, characterized by falling price levels.