

## Case #6. NGO Pressure on Bitcoin to Lower Energy Use

Consortium launches effort advocating changes to the cryptocurrency's code

**This case contains a lot of background information about the Bitcoin industry that is not essential reading to answer the case questions, but is provided for those unfamiliar with cryptocurrencies**



**A worker installs a row of Bitcoin mining machines at the Whinstone U.S. bitcoin mining facility in Rockdale, Texas.** Photo: mark felix/Agence France-Presse/Getty Images

By [Paul Vigna](#) Wall Street Journal, March 29, 2022

A **Consortium of Environmental Groups** launched a campaign in late March 2022 seeking to change bitcoin's code to decrease its energy use, which has grown substantially in the past few years.

Bitcoin is popular among some investors, but its energy use has riled **environmental groups**, alarmed some lawmakers, and put the cryptocurrency at odds with a green movement that has some supporters on Wall Street. The new campaign aims to persuade people involved with the cryptocurrency, from mining companies to investors to software developers, that a change is better for the environment and bitcoin's reputation and support.

**Greenpeace USA, Environmental Working Group and others** will run ads in media outlets such as the New York Times, Politico and The Wall Street Journal highlighting bitcoin's environmental impact and advocating for change. The campaign is funded by Ripple co-founder Chris Larsen, who isn't representing the cryptocurrency firm in this endeavor. Mr. Larsen said he provided \$5 million.

Some of the ads are aimed at **prominent bitcoin backers**, such as Tesla Inc. Chief Executive Elon Musk, Block Inc. founder Jack Dorsey and Fidelity Investments Chief Executive Abby Johnson.

There have been attempts to lower bitcoin's energy footprint. A consortium of about 250 companies, including miners such as Hut 8 Mining Corp., support the ***Crypto Climate Accord***, which aims to switch the industry over to renewable energy sources. Some miners, like Easton, Md.-based TeraWulf Inc. , are working to create a zero-emissions operation.

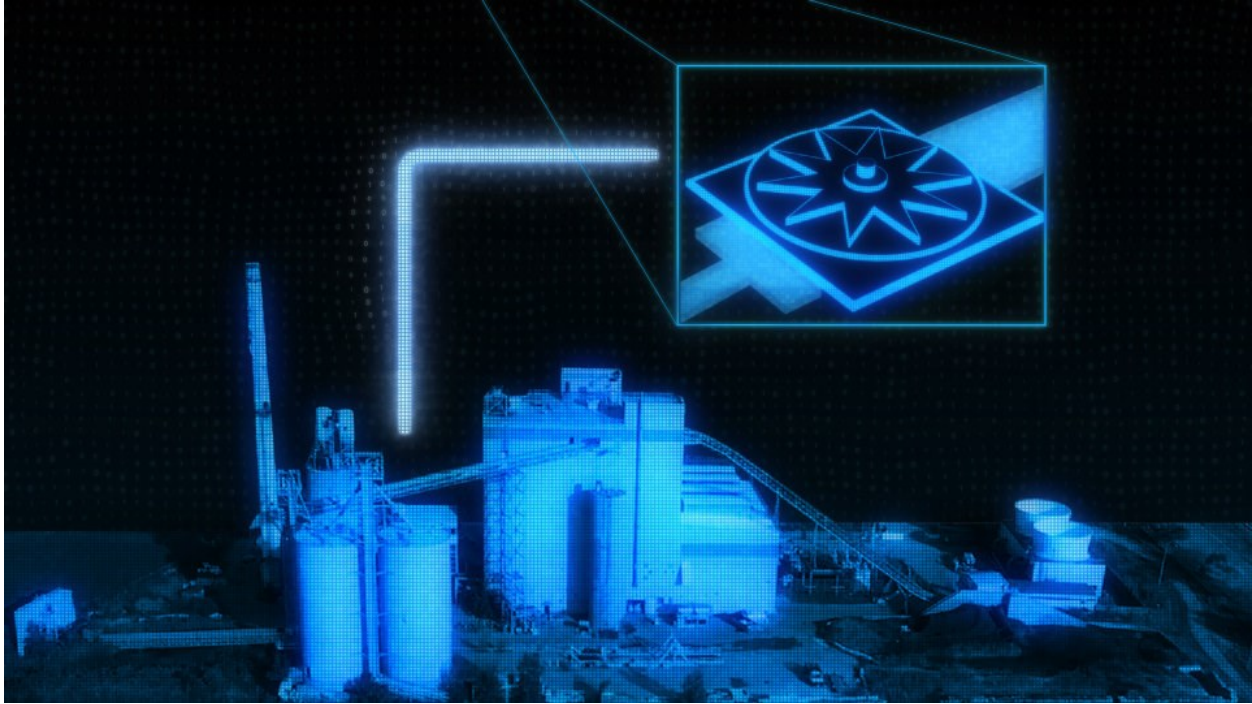
The new campaign isn't anti-bitcoin, said Michael Brune, the former executive director of the Sierra Club who is advising the campaign. Rather, he said, it argues that climate change has reached a critical point, and bitcoin, the most valuable cryptocurrency in terms of market capitalization, is contributing too much to global warming.

"It's important for anyone in a position to act, to act," he said. "You can't ignore that we are in a climate emergency."

The goal is to persuade **bitcoin's community of investors and backers** to change the network's code, removing the "proof of work" mechanism that requires bitcoin "miners" to expend a certain amount of energy while processing transactions to earn rewards in newly created bitcoin. The change could drastically reduce bitcoin's energy use, Mr. Brune said.

Bitcoin's energy usage is a defense mechanism designed to protect the network. Because it is an open-source project, anybody can run the bitcoin software. But the network requires miners to expend vast amounts of computing power to make it prohibitively expensive for somebody to take over the network, which could allow them to create counterfeit bitcoins or erase transactions.

The **Cambridge Centre for Alternative Finance** estimates that the bitcoin network uses slightly more energy a year, 134.9 terawatt hours, than Norway, at 124.3 terawatt hours. The research institute said, however, that bitcoin uses less energy than is lost in the U.S. during electricity transmission.



Bitcoin Miners Tap Hydropower as Environmental Criticism GrowsPlay video: Bitcoin Miners Tap Hydropower as Environmental Criticism Grows

A bitcoin mining facility in upstate New York is using electricity from a local hydroelectric plant powered by the Niagara River. The company is part of a group of miners attempting to make the industry more sustainable, both environmentally and financially. Illustration: Alex Kuzoian/WSJ

Some bitcoin miners have addressed the issue by using more renewable energy sources to power their computers, but Messrs. Brune and Larsen think that isn't enough.

Bitcoin's environmental effects have been an issue for years, but the people in control of it have rejected the kinds of changes being proposed. Moreover, because bitcoin isn't owned by a company, changing the code requires nearly all of the parties involved in its maintenance—something on the order of 90% or more—to agree on a change.

The Ethereum network also uses proof of work, but is changing to a model called proof of stake, which essentially swaps energy for cryptocurrency. That change, the implementation of which has been delayed several times for technical reasons, is expected to reduce Ethereum's electricity usage by 99%. The campaign is hoping to effect a similar switch for bitcoin.

### **Location, Location and Location**

In the summer of 2021, the **Chinese government** instituted a succession of restrictive regulations and outright bans that severely reduced the size of the Chinese cryptocurrency mining industry, at the time the largest in the world. (See [Appendix A for an explanation of bitcoin mining and Mining Pools.](#)) As a result, some one million mining computers were stranded in China, and miners were faced with a logistical dilemma. Do they ship machines to new

locations? If so, where? And to whom? The United States, specifically Texas, Kazakhstan, Canada, and Iran, energy rich states, were possible options.

The large drop in active machines also reduced the energy consumption of the mining network, from a range of 25-50%, depending on the relative age and power efficiency of the machines taken out of use. If these mostly belong to the latest most power-efficient generation of Bitcoin mining machines, then the respective energy consumption could represent a lot less than 50% of the total network's energy demand, closer to the 25% level.

For example, it only takes around 727,000 of **Bitmain's** (the world's largest manufacturer of Bitcoin mining devices which was also headquartered in China) Antminer S19 Pro devices to generate 80 "exahashes" ("*hashes*" are what miners generate. An exahash is a quintillion hashes [See Appendix A for an explanation of hashes](#)), per second. These machines would consume around 25 terawatt-hours (trillion watts) of electrical energy annually, which is only a fifth of the network's total estimated power requirement before China banned Bitcoin mining.

While this may not be the same "hashrate" as the network had prior to the Chinese mining ban, the energy consumption of the network could be a lot closer to making a complete recovery. A Bitcoin miner can have different performance settings and can be "overclocked" to further boost performance. As a result, the overall impact of the Chinese Bitcoin mining ban on the network's energy consumption might not be severely reduced.

## **Crypto Infrastructure**

Cryptocurrency brokers provide speculative contracts on the price of digital currencies. As a crypto trader you have a crypto wallet with broker where you will own the right to buy or sell the contracts as prices shift, not the digital currency. In addition to these Crypto asset custodians (brokers), there is a substantial crypto media made up of brokers like Coinbase, Crypto.com, and Coindesk that advocate for the crypto industry.

## **Bitcoin's Carbon Footprint**

The **carbon footprint** of bitcoin mining is measured by Cambridge University's *Bitcoin Energy Consumption Index*. If China's bitcoin mining moved to another country where it used petroleum-based energy, its carbon footprint would be greater, since a significant percentage of Chinese mining used hydropower. See <https://digiconomist.net/how-chinas-bitcoin-mining-ban-affects-energy-consumption-estimates/> July 2, 2021

Energy consumption has become one focus of cryptocurrency critics. One such critic, [Digiconomist](#) founder Alex de Vries, said he's "never seen anything that is as inefficient as bitcoin."

Cryptocurrency defenders claim the Bitcoin ecosystem consumes less than 10% of the energy required for the traditional banking system. De Vries argues that if energy-conscious regulators "took all possible actions against Bitcoin, it's unlikely you'd get all governments to go along

with that” mining regulation. “Ideally, change comes from within,” de Vries said, adding he hopes Bitcoin Core developers will alter the software to require less computational energy.

According to *Bitcoin Energy Consumption Index*, bitcoin miners are expected to consume roughly 130 Terawatt-hours of energy (TWh), which is roughly 0.6% of global electricity consumption in 2021. This puts the bitcoin economy on par with the carbon dioxide emissions of a small, developing nation like Sri Lanka or Jordan.

1 million bitcoin addresses are active, daily, out of up to 106 million accounts active in the past decade, as tallied by the exchange **Crypto.com**.

All of the top five **bitcoin mining pools**, consortiums for miners to cooperate for better profit margins, rely heavily on hydropower. Renewable energy makes up 39% of miners’ total energy consumption.

Before the Chinese government pulled back on bitcoin mining operations, Chinese bitcoin mining operations represent around 65% of the network’s power, i.e., “hashrate.” North American miners make up roughly 8% of the global hashrate, followed closely by miners in Russia, Kazakhstan, Malaysia and Iran.

Bitcoin mining will proliferate in those nations and organizations that offer the least restrictions on energy use and most profitable mining regulations. Until recently, the Chinese subsidized the mining industry with incentives to use under-utilized hydropower sources.

The best way to make cryptocurrency mining more eco-friendly is to support lawmakers that want to encourage mining in regions that already have underutilized energy sources.

## **PoS vs. PoW**

Within the cryptocurrency industry there are many people who dislike how power-intensive bitcoin mining is and are experimenting with different mining methods. For example, the Ethereum community is switching to a “proof-of-stake” (PoS) mining model, powering the network with locked up coins instead of Bitcoin’s intensive “proof-of-work” (PoW) model.

(See Appendix B for a detailed comparison of PoW and PoS.)

As the Ethereum community using PoS expands, the proliferation of Proof of Work (PoW) is slowing. As evidence, the stock of Ethereum (ETH) which is actively converting from PoW to PoS, is up +1,100%!

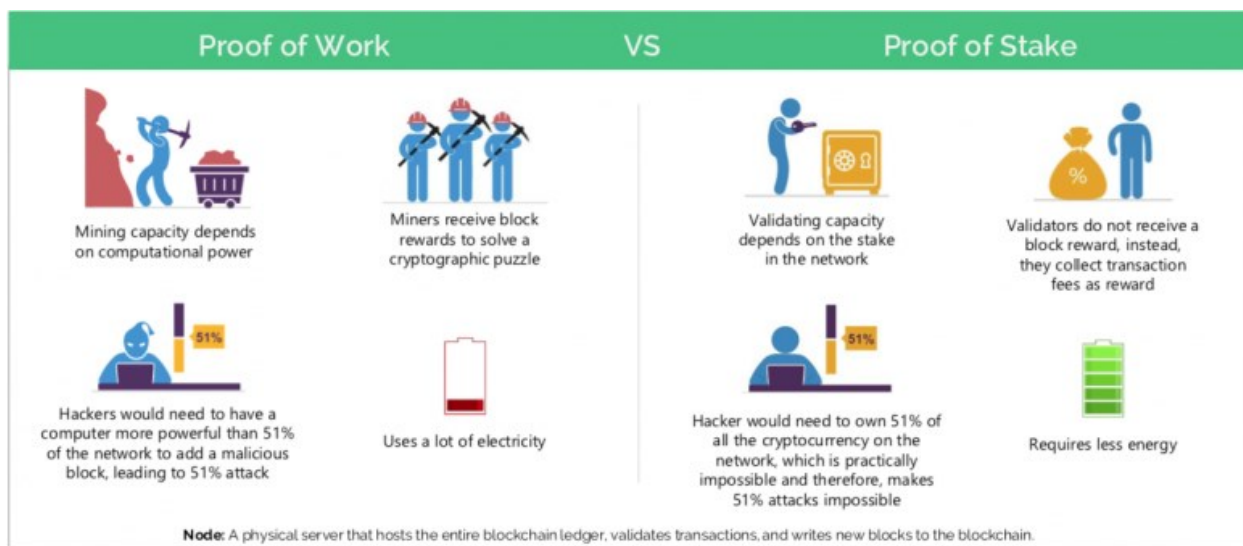
## **Incentivizing the right things**

While PoW might have been the best tool available in the foundational 2008-2009 period, it is by comparison very expensive to generate.



PoW mining requires the purchase of specialized computers that depreciate rapidly in value as they are typically run continuously and are regularly overtaken by faster mining devices, making them non-competitive.

With PoS mining you purchase digital assets then “stake” them in order to set up and operate nodes. PoS has very attractive gross margins and the underlying digital asset has the potential to appreciate in value as opposed to owning a specialized computer that has no appreciation potential whatsoever.”



This last step – essentially putting staking capacity up on the cloud for others to buy at the retail level – might prove to be the bold move that will spell the beginning of the end of PoW.

## The Spectre of Government Regulation

the [University of Cambridge Bitcoin Electricity Consumption Index](#), according to which the global bitcoin network currently consumes about 80 terawatt-hours of electricity annually, roughly equal to the annual output of 23 coal-fired power plants, or close to what is consumed by the nation of Finland.

Bitcoin advocates argue that all industries use a lot energy, pointing out that bitcoin currently consumes a lot less electricity than the ATMs and data centers of traditional banks.

This is a function of time (and electricity) consuming crypto mining, but also the need to log every transaction on countless different computers, making crypto networks into a climate threat. According to Digiconomist, Bitcoin and Ethereum together consume as much electric energy annually as Indonesia.

Initially, EU and US regulation of bitcoin industry focused on financial regulation, but recently it has also turned to the industry's energy consumption.

## EU Parliamentarians Push to Limit Bitcoin Use Over Energy Concerns

<https://www.coindesk.com/policy/2022/02/24/eu-parliamentarians-push-to-limit-bitcoin-use-over-energy-concerns/>

European Union (EU) lawmakers are preparing for inter-institutional discussions on proposed regulations for governing crypto assets, and may be set to ban energy-intensive cryptocurrencies like bitcoin.

The **Markets in Crypto Assets (MiCA)** regulatory package up for discussion includes a provision that could limit the use of the consensus mechanism known as proof-of-work (PoW) across the union's 27 member states, according to a draft seen by CoinDesk.

Various lawmakers and regulators in the EU have been calling for a ban on cryptocurrency mining since at least November of last year.

"However, nobody expected it to become a deal breaker and to make it into the final report," said Patrick Hansen, the head of growth at Unstoppable Finance and a contributor for RegTrax, Stanford University's working database on fintech policy.

One proposed provision seeks to prohibit crypto services that rely on environmentally unsustainable consensus mechanisms starting in January 2025. The provision specifically refers to PoW, used to mint popular cryptocurrencies like bitcoin and ether.

PoW cryptocurrency mining is under the microscope of regulators worldwide over energy concerns. Debates over energy consumption started after electricity use in creating bitcoin was compared with the annual energy consumption of some sovereign nations. After China banned crypto mining in May 2021 citing energy concerns, mining activities moved to countries such as the U.S., Russia and Kazakhstan.

EU lawmakers began focusing on energy concerns following an open letter from Swedish regulators in November 2021, which called for a bloc-wide ban on cryptocurrency mining. The call gained momentum, winning support from politicians in Germany, Spain and Norway. Crypto advocates pushed back, saying regulators might be rushing into a ban when regulation would suffice.

EU parliamentarian Stefan Berger, the lawmaker responsible for handling the procedure and content of the MiCA legislative package, said debate on the energy issue has escalated.

"The Greens and Socialists, as you can imagine, are criticizing the proof-of-work concept and criticizing the energy use, saying that bitcoin needs more energy than the Netherlands," Berger said in an interview last week, referring to the political parties pushing the energy argument.

Berger said he does not feel MiCA is the place for settling technological or energy-related rules, as the package seeks to regulate crypto as assets.

Introduced in 2020, the framework seeks to establish oversight of the crypto industry at the EU level. The proposal, introduced by the union's executive arm, the European Commission, lays out rules for cryptocurrency issuers and service providers, and even specifies rules for stablecoins (cryptocurrencies pegged to the value of real assets like the U.S. dollar). More ambitiously, the framework seeks to establish a licensing system so that crypto firms can expand through member states with greater ease.

According to the proposed rule, an exception is likely to be made if these cryptocurrencies are operated at a small scale, in a manner that does not undermine the bloc's ability to reach its [renewable energy goals](#). It is unclear how lawmakers intend to distinguish between small and large-scale operations.

Another provision, supported by Berger, requires white papers of PoW crypto assets to include an independent assessment of the network's potential energy usage.

"What I want is that in the white paper, in the philosophy, we should make clear if it's a validation process which needs more energy or not ... I hope that we can make a compromise," Berger said last week.

**Three-way discussions between the European Commission, Council and Parliament on finalizing MiCA are set to begin at the end of February,** Berger said.

"I still hope and expect that this amendment will be dropped or drastically weakened in the upcoming trilogue negotiations," Hansen said, adding that banning bitcoin goes against MiCA's goals of promoting technology and fostering consumer protection.

MiCA will apply directly across the European Union (EU) without any need for national implementation laws. This approach is in keeping with consumer protection and ensuring effective and harmonised access to the innovative crypto-asset markets across the single market.

## **EU Approval of MiCA, June 2022**

In June 2022, the European Council presidency and the European Parliament reached a provisional agreement on the **MiCA** proposal which covers issuers of unbacked crypto-assets, and so-called "stablecoins", as well as the trading venues and the wallets where crypto-assets are held.

In their approval, the EU entities summarized the Markets in Crypto-Assets regulation's four essential objectives:

- Ensuring legal certainty by establishing a sound legal framework for crypto-assets in its scope that are not covered by existing financial services legislation;



- Supporting innovation and fair competition in order to promote the development of crypto-assets by instituting a safe and proportionate framework;
- Protecting consumers, investors and market integrity in consideration of the risks associated with crypto-assets; and
- Ensuring financial stability, with the inclusion of safeguards to address potential risks to financial stability.

The “entry into application,” i.e., implementation, of the MiCA regulation was initially expected by mid-2023. It is however likely to be delayed to 2024 as an 18-month period is foreseen to allow level 2 measures to be adopted prior to the application of MiCA.

## **White House To Craft Bitcoin Mining Policy Addressing Energy Use: Report**

<https://bitcoinmagazine.com/business/white-house-to-reduce-bitcoin-energy-use-report>

In March 2022, the **Biden Administration** announced that it is drafting policy to address bitcoin mining as it seeks to lessen energy consumption and emissions as part of a “whole of government” approach to regulate the broader cryptocurrency market. **Per the executive order’s timeline, a report was expected to be released in August 2022 detailing climate impact and other governing concerns.**

The Biden administration’s policy recommendations are expected to aim at lessening the energy consumption and emissions footprint of Bitcoin and other proof-of-work (PoW) cryptocurrencies.

The publication said it spoke to the principal assistant director for energy for the White House Office of Science and Technology Policy, Costa Samaras, who offered some insight into the impending policy attempts.

“It’s important, if this is going to be part of our financial system in any meaningful way, that it’s developed responsibly and minimizes total emissions,” Samaras reportedly said. “When we think about digital assets, it has to be a climate and energy conversation.”

### **ACTORS IN THE CASE**

#### **Government Actors**

**European Commission**

**European Parliament**

**Financial Action Task Force**

**U.S. Congress**

**Biden Administration**

**Chinese Government**

**Crypto Industry Actors**

**Crypto Miners**

**Crypto Infrastructure: Crypto asset custodians (brokers) and crypto media like Coinbase, Crypto.com, and Coindesk**

**Ethereum**

**Greenpeace USA, Environmental Working Group and others**

**bitcoin's community of investors and backers, especially prominent bitcoin backers**

**NGOs: Greenpeace USA, Environmental Working Group and others**

**bitcoin's community of investors and backers, especially prominent bitcoin backers**

**CASE QUESTIONS:**

1. (3) How do the following actors define the social contract of the bitcoin industry?
  - a. Crypto Climate Accord
  - b. European Environment Agency (EEA)
  - c. Consortium of Environmental Groups

**Answer should be in the form:**

\_\_\_\_\_ believes the social contract of the bitcoin industry to be \_\_\_\_\_.

**(maximum words: 30 words each.**

**Reminder: the bitcoin industry is composed of for-profit companies!)**

2. (2) What would be your response to the Consortium of Environmental Groups critique? Would you agree to invite them to join the *Crypto Climate Accord* **(40 words maximum)**
3. (3) Given NGO pressures and the potential for EU and US government agencies to intervene in the bitcoin industry's energy use, as the bitcoin industry, what would be your response to the European Commission and the Biden Administration before they finalize implementation of their proposals? **(maximum words: 80)**

## Appendix A

### Bitcoin Mining

Bitcoin mining is the process by which new bitcoins are entered into circulation, but it is also a critical component of the maintenance and development of the blockchain ledger. It is performed using very sophisticated computers that solve extremely complex computational math problems.

Although early on in Bitcoin's history individuals may have been able to compete for blocks with a regular at-home computer, this is no longer the case. The reason for this is that the difficulty of mining Bitcoin changes over time.

In order to ensure the smooth functioning of the blockchain and its ability to process and verify transactions, the Bitcoin network aims to have one block produced every 10 minutes or so. However, if there are one million mining rigs competing to solve the hash problem, they'll likely reach a solution faster than a scenario in which 10 mining rigs are working on the same problem. For that reason, Bitcoin is designed to evaluate and adjust the difficulty of mining every 2,016 blocks, or roughly every two weeks.

When there is more computing power collectively working to mine for bitcoins, the difficulty level of mining increases in order to keep block production at a stable rate. Less computing power means the difficulty level decreases. To get a sense of just how much computing power is involved, when Bitcoin launched in 2009 the initial difficulty level was one. As of Nov. 2019, it is more than 13 trillion.

### Mining Pools

Mining pools are groups of cooperating miners who agree to share block rewards in proportion to their contributed mining hash power. While mining pools are desirable to the average miner as they smooth out rewards and make them more predictable, they unfortunately concentrate power to the mining pool's owner.

Most mining pools are in China. Many only have Chinese websites and support. Mining centralization in China is one of Bitcoin's biggest issues at the moment.

There are about 20 major mining pools. Broken down by the percent of hash power controlled by a pool, and the location of that pool's company, Chinese pools control ~65% of the network hash rate. 3% are in the U.S. and 3% in the Czech Republic.

# Hash

A **Hash** or also called **hash function** is any **algorithm** that maps data of arbitrary length to data of a fixed length.

To be considered effective a hash function has to have following properties:

- Computational efficiency - it shouldn't take a long time to compute a hash from a given input.
- Collision resistance - it should be hard to find two distinct inputs that would result in the same hash after the application of the hash function.
- Ability to hide information - it should be hard to derive anything useful about the input from the hash whether it be the whole input data or as simple info about it as whether it is an odd or an even number.
- Random-looking hash - the hash should look like it was a result of several random events, like flipping a coin. There shouldn't be an apparent particular transformation protocol.

## Bitcoin Hash function

Bitcoin uses the [SHA-256](#) hash **algorithm** to generate verifiably "random" numbers in a way that requires a predictable amount of CPU effort. Generating a **SHA-256** hash with a value less than the current target solves a block and wins you some coins.

# Blockchain

- Blockchain is a specific type of database.
- It differs from a typical database in the way it stores information; blockchains store data in blocks that are then chained together.
- As new data comes in it is entered into a fresh block. Once the block is filled with data it is chained onto the previous block, which makes the data chained together in chronological order.
- Different types of information can be stored on a blockchain but the most common use so far has been as a ledger for transactions.
- In Bitcoin's case, blockchain is used in a decentralized way so that no single person or group has control—rather, all users collectively retain control.
- Decentralized blockchains are immutable, which means that the data entered is irreversible. For Bitcoin, this means that transactions are permanently recorded and viewable to anyone.

## Cryptocurrency Brokers

Cryptocurrency brokers provide speculative contracts on the price of digital currencies. You own the right to buy or sell the contracts as prices shift, not the digital currency.

## Crypto Wallet

A cryptocurrency wallet is **an app that allows cryptocurrency users to store and retrieve their digital assets**. ... When a user acquires cryptocurrency, such as bitcoins, she can store it in a cryptocurrency wallet and from there use it to make transactions.



## Appendix B. "proof of work" or "proof of stake"?

<https://www.coinbase.com/tr/learn/crypto-basics/what-is-proof-of-work-or-proof-of-stake/.lk/>

“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.

Proof of work, first pioneered by Bitcoin, uses “mining” to achieve those goals. Proof of stake — which is employed by Cardano, the ETH2 blockchain, and others — uses “staking” to achieve the same things.

Cryptocurrency networks need to make sure that nobody spends the same money twice without a central authority like Visa or PayPal in the middle. To accomplish this, networks use something called a “consensus mechanism,” which is a system that allows all the computers in a crypto network to agree about which transactions are legitimate.

To understand proof of stake, it’s helpful to first understand proof of work, so we’ve paired them in this explainer.

### What is proof of work?

Proof of work is the original crypto consensus mechanism, first used by Bitcoin. Proof of work and “[mining](#)” are closely related ideas. The reason it’s called “proof of work” is because the network requires a huge amount of processing power. Proof-of-work “[blockchains](#)” are secured and verified by virtual miners around the world racing to be the first to solve a math puzzle. The winner gets to update the blockchain with the latest verified transactions and is rewarded by the network with a predetermined amount of crypto.

Proof of work has some powerful advantages, especially for a relatively simple but hugely valuable cryptocurrency like Bitcoin. It’s a proven, robust way of maintaining a secure decentralized blockchain. As the value of a cryptocurrency grows, more miners are incentivized to join the network, increasing its power and security. Because of the amount of processing power involved, it becomes impractical for any individual or group to meddle with a valuable cryptocurrency’s blockchain.

On the flip side, it’s an energy-intensive process that can have trouble scaling to accommodate the vast number of transactions [smart-contract](#) compatible blockchains like Ethereum can generate. And so alternatives have been developed, the most popular of which is called proof of stake.

### What is proof of stake?

Ethereum’s developers understood from the beginning that proof of work would present limitations in scalability that would eventually need to be overcome — and, indeed, as Ethereum-powered [decentralized finance \(or DeFi\)](#) protocols have surged in popularity, the blockchain has struggled to keep up, causing fees to spike.

While the Bitcoin blockchain mostly just has to process incoming and outgoing bitcoin transactions, much like a vast checkbook, Ethereum’s blockchain also has to process a vast array of DeFi transactions, [stablecoin](#) smart contracts, [NFT](#) minting and sales, and whatever innovations developers come up with in the future.

Their solution has been to build an entirely new [ETH2](#) blockchain — which began rolling out in December 2020 and should be finished in 2022. The upgraded version of Ethereum will employ a faster and less resource intensive consensus mechanism called “proof of stake.” Cryptocurrencies including [Cardano](#), Tezos, and Atmos all use proof-of-stake consensus mechanisms — with the goal being to maximize speed and efficiency while lowering fees.

In a proof of stake system, staking serves a similar function to proof of work’s mining, in that it’s the process by which a network participant gets selected to add the latest batch of transactions to the blockchain and earn some crypto in exchange.

The exact details vary by project, but in general proof of stake blockchains employ a network of “validators” who contribute — or “stake” — their own crypto in exchange for a chance of getting to validate new transaction, update the blockchain, and earn a reward.

- The network selects a winner based on the amount of crypto each validator has in the pool and the length of time they’ve had it there — literally rewarding the most invested participants.
- Once the winner has validated the latest block of transactions, other validators can attest that the block is accurate. When a threshold number of attestations have been made, the network updates the blockchain.
- All participating validators receive a reward in the native cryptocurrency, which is generally distributed by the network in proportion to each validator’s stake.

Becoming a validator is a major responsibility and requires a fairly high level of technical knowledge. The minimum amount of crypto that validators are required to stake is often relatively high (for ETH2, for example, it’s 32 ETH) and validators can lose some of their stake via a process called slashing if their node goes offline or if they validate a “bad” block of transactions.

But even if that sounds like too much responsibility, you can still participate in staking by joining a staking pool run by someone else — and earn rewards for crypto that would otherwise be sitting around. This process is often referred to as delegating, and tools offered by exchanges by Coinbase can make it simple and seamless.

## **What are some differences between proof of work and proof of stake?**

**Energy consumption is one major difference between the two consensus mechanisms.**

Because proof-of-stake blockchains don't require miners to spend electricity on duplicative processes (competing to solve the same puzzle), proof of stake allows networks to operate with substantially lower resource consumption.

Both consensus mechanisms have economic consequences that penalize network disruptions and thwart malicious actors. In proof of work, the penalty for miners submitting invalid information, or blocks, is the sunk cost of computing power, energy, and time. In proof of stake, the validators' staked crypto funds serve as an economic incentive to act in the network's best interests. In the case that a validator accepts a bad block, a portion of their staked funds will be "slashed" as a penalty. The amount that a validator can be slashed depends on the network.

