

The BWord

How Institutions
Can Embrace Bitcoin

Presentation Template

Agenda

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Track #1

Demystifying Bitcoin

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Track #2

Supporting the Developer
Ecosystem

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Track #3

Securing The Bitcoin Network

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Track #4

Regulating Bitcoin

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Track #5

Preserving the Bitcoin Ethos

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Live Session

Bitcoin As A Tool For Economic Empowerment

Demystifying Bitcoin

Bitcoin's Energy Usage

Nic Carter

General Partner, Castle Island Ventures



As a neutral, global monetary network, Bitcoin has a valid claim on some of society's resources

Why does Bitcoin consume energy, again?

- 1. To ensure the continued functionality of a public, shared transactional ledger which processes \$10b-\$20b/day and stores ~\$600B in wealth**
- 2. To fairly and without intermediaries distribute units of a synthetic commodity to the world**

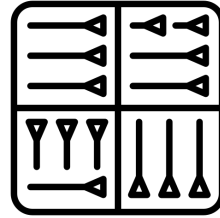
Bitcoin's security and reliability derives from Proof of Work

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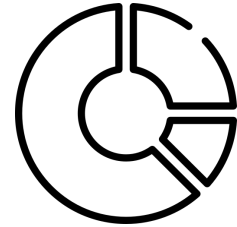
The ledger costliness is what links the digital database to the physical world and gives it weight and substance

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Like clay tablets drying in the sun, energy input gives bitcoin its hardness and immutability – giving users confidence that transactions will settle

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PoS and other such privileged validator-type 'fixes' to the energy consumption question just return us to the pre-bitcoin status quo

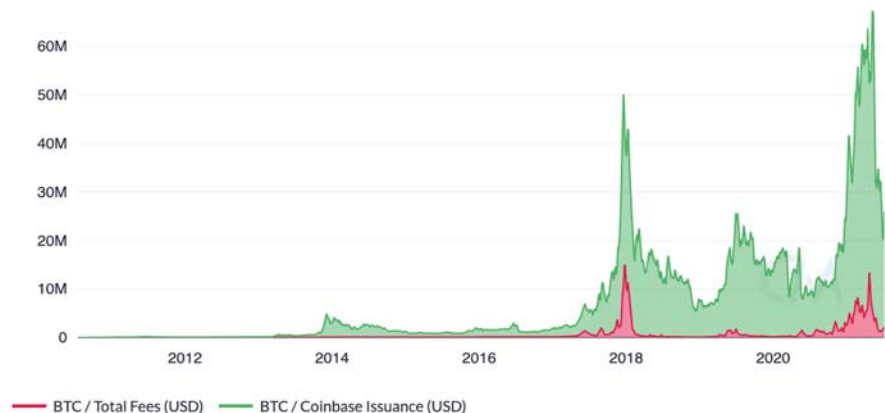
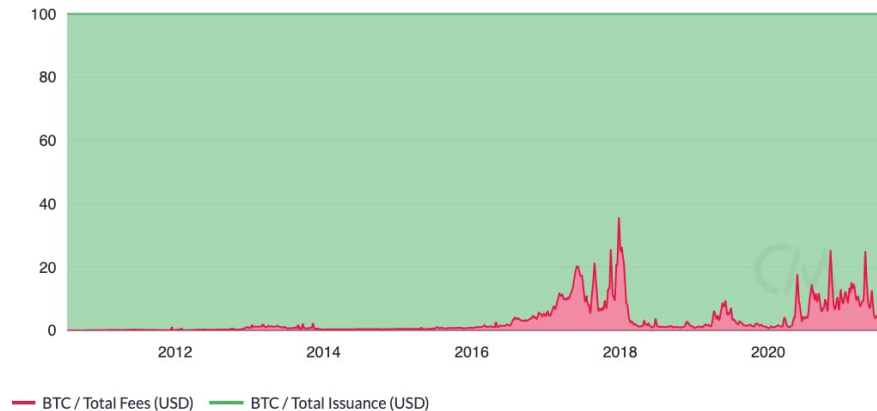
Most of Bitcoin's energy spend derives from **initial issuance**

This is the same with gold – most of its energy output is **due to extraction**, rather than transfers

Transaction-based fees account for 10.5% of miner revenue in the last year, and 7.5% historically

Subsidy-based revenue **is trailing off** (89% complete and halving every 4 years)

Fee revenue will likely increase long term (and ultimately support security), but as it increases, that means Bitcoin's energy use is proportional to its use in fee-bearing commerce



Bitcoin mining by the numbers

Bitcoin miners consume 0.26% of the world's electricity production [1] and 0.11% of its energy production [2]

Bitcoin mining energy inputs are variously estimated at 39% renewable (2020) [3], 34% sustainable [4], and 46% sustainable [5]

Bitcoin is responsible for an annualized 50 MtCO₂e, or 0.1% of the world's CO₂e emissions [4]

By comparison, the U.S. grid is 40% sustainable [6], the Chinese grid is 31% sustainable [7], and the global grid is 36.7% sustainable [8]

[1] July 2021 figures from the Cambridge Bitcoin Energy Consumption Index, cbeaci.org

[2] 2021 [Q2 disclosures](#) from the Bitcoin Mining Council

[3] [3rd Global Cryptoasset Benchmarking Study](#), Cambridge Center for Alternative Finance (2020)

[4] Oliver Wyman estimates

[5] Carter estimates, supplementing [BMC disclosures](#) with average global energy mix for out of sample data

[6] [Source of U.S. Electricity Generation](#), U.S. Energy Information Administration, 2020

[7] [Electricity Mix in China](#) (2020), International Energy Agency

[8] [Electricity Mix](#) (2020), Our World in Data

Bitcoin mining **by the numbers** (cont.)

Bitcoin's energy spend is analogous to the energy consumption of Venezuela or Austria – but only 0.7% of China or 1.7% of the U.S. [1]

Bitcoin's energy consumption is:

- 12x smaller than that of always-on electrical devices in U.S. households [2]
- 15x less than global electricity lost in transit every year [3]

Bitcoin's CO₂e emissions compare to:

- Domestic tumble driers (1.6x BTC) [4]
- Copper production (1.9x BTC) [4]
- Zinc production (2.8x BTC) [4]
- Gold mining & production (3.4x BTC) [4]
- Bank branches and ATMs (4.7x BTC) [2]
- The U.S. military (7x BTC) [5]
- Domestic refrigeration (10x BTC) [4]
- Aluminum production (16.3x BTC) [4]
- The financial sector (27x BTC) [6]

[1] July 2021 figures from the Cambridge Bitcoin Energy Consumption Index, cbeaci.org

[2] [On Bitcoin's Energy Consumption](#), Galaxy Digital (2021)

[3] [World Bank Data](#)

[4] Oliver Wyman estimates

[5] [Hass McCook estimates](#) (2021)

[6] [Hass McCook estimates](#) (2021)

**The perceived merit of an
application's energy
consumption is a function of
one's subjective view of that
application's utility**

Bitcoin mining is **fully synthetic** and can be rendered as green as its electricity inputs

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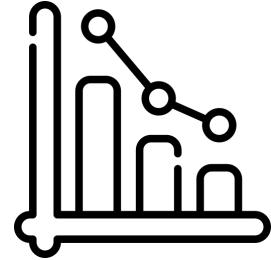
Gold mining, for instance, cannot ever be fully green as it relies on the physical sifting of ore

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Bitcoin mining can be rendered as green as its electricity inputs permit – perfectly so, if miners are able to secure exclusively sustainable power

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Miners can benefit from the long-term greening of the grid, as carbon intensity declines with time

Bitcoin's energy consumption is highly flexible and **location-independent**

This is unlike most other energy consumers where **generation must be collocated with load**, limiting the permissible set of energy inputs

Location independence means that Bitcoin can exploit **otherwise untapped** sources of energy, especially **sustainable and nonrival** ones

- + Excess hydro
- + Wind and solar
- + Otherwise-flared natural gas



Flared gas mining in Canada. Photo courtesy of Upstream Data

Bitcoin miners are **synergistic with increasingly renewable grids**

Bitcoin miners represent interruptible load and can spin up and down on short notice

This makes them perfect for **demand response programs** such as that which exists in ERCOT

Highly-mobile and modularized miners can serve as short term buyers renewables are being built and integrated into the grid – **improving financials** for renewable construction

As grids become less predictable due to more wind/solar, DR programs become more relevant

Bitcoin is a **buyer of first resort** for the energy produced by novel sustainable energy buildouts

**Bitcoin miners are making
rapid progress towards
sustainability**



Hashrate leaving China

Hashrate has deserted China, where the largely coal-based regions of Inner Mongolia and Xinjiang dominated mining in the dry season with 45% of global HR in Q1 2020 [1]



More transparency

32% of hashrate has already signed on to the Bitcoin Mining Council, which is 67.6% sustainable (in sample) as of Q2 [2], and has begun making quarterly disclosures



Capital markets matter

50-60% of Bitcoin's total hashrate was based in China and has now left [3], onshoring to more property-rights preserving locations. U.S. influence will dramatically increase



Miners are ESG sensitive

Miners are increasingly concerned with political risk, rather than just mere cheap power



Western miners are more proactive

Strong evidence western miners are cleaner, more transparent, and more sustainability-focused

[1] July 2021 figures from the Cambridge Bitcoin Energy Consumption Index, cbeeci.org

[2] 2021 [Q2 disclosures](#) from the Bitcoin Mining Council

[3] Judging by peak to trough hashrate declines since May 2021 of around 55 percent

Thank you!