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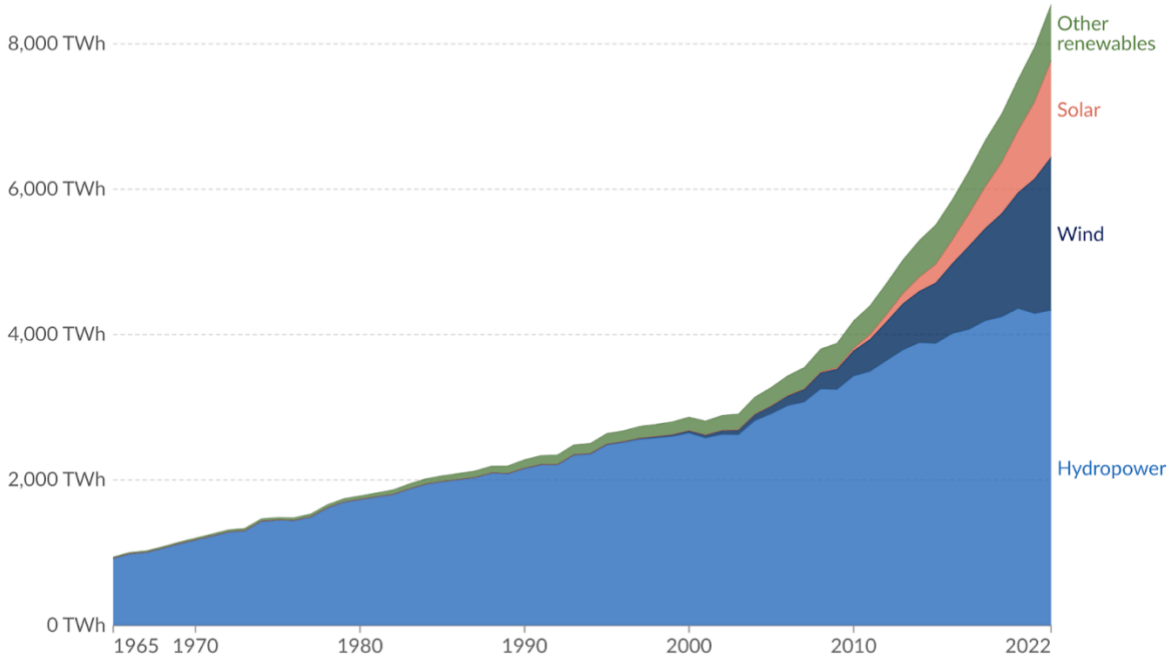
**market notes: Markets Seek Truth – Turning Bitcoin Green (Again)
2/9/24 – Marcel Kasumovich, Deputy CIO, Coinbase Asset Management**

1. Rich debate. It's the truth highway. And truth can be unkind, less elegant than fiction, and not caring of your story. The survival of crypto through all weather conditions is built on open, harsh, and revealing discourse. Some of those are gone, but not forgotten. "Bitcoin minting is thermodynamically perverse," read the [2010 Reddit](#) thread. Satoshi changed people's minds with logic, patience, and persistence – like a scholar to a student striving to be a peer.
2. "It's the same situation as gold and gold mining," Satoshi offered. "The marginal cost of gold tends to stay near the price of gold. Gold mining is a waste. But that waste is far less than the utility of having gold available as a medium of exchange. I think the case will be the same for Bitcoin. The utility of exchanges made possible by Bitcoin will far exceed the cost of the electricity used. Therefore, *not* having Bitcoin would be a net waste."
3. Markets are the ultimate truth-seekers. And they proved Satoshi right. Computational power dedicated to Bitcoin is 2.7×10^{11} multiples [greater](#) than at the print of its analyses. Bitcoin mining is institutional now, hunting for efficiency gains based only on market incentives. Surprise attacks have proved futile. China's share of computational power was the ultimate stress test, forced to [zero](#) in 2021. Machines grew feet, walked away, and the network marched on.
4. Bitcoin is a commodity. Even the exchange-traded products classify it as such. Despite commodities being seemingly brute, their production is the tip of the innovation spear. Producing to your marginal cost, as markets are supposed to, leads the hunt for cost efficiency. In Bitcoin mining, energy is the edge. Computational efficiency in machines is shared by all. Finding the lowest cost of energy is not. Winners and losers are defined by their power feedstock.
5. Bitcoin's degree of energy consumption can alarm investors. MIT researchers provided the academic [foundation](#), showing that Bitcoin's electricity usage was equivalent to a small country. Mapping the sources of power to the location of miners illustrated Bitcoin's carbon emissions. It urged policymakers to find the "right rules" to safeguard society from the costs of bitcoin versus its benefits. Only, policy doesn't have the capacity to answer those issues – the market does.
6. Searching for a carbon solution to your bitcoin holdings? We built it.
7. We've been running a bitcoin carbon solution for nearly two years. It's agreeable to the MIT research, though not by design. The solution was built to shine a spotlight on Bitcoin's carbon issue, documented with careful detail. Each quarter, an independent provider curates data. Each quarter, we estimate carbon emissions to our bitcoin holdings. And each quarter we retire digital carbon offsets to neutralize its footprint, printed to the blockchain.

8. Our carbon solution was built to die. Aren't we all? It's what we do in between that matters! How? Go back to the basics of commodity producers. Bitcoin miners are constantly hunting for the cheapest energy feedstock – that's their edge. The cheapest input is energy being wasted. And that energy is green. Turbines and solar may generate plenty of power – but it can't be easily stored. It's a use-it-or-lose-it model – and the world loses a lot.
9. Green energy sources are on the rise. Latest estimates put green energy at ~30% share of total production. And ~10% of that energy is wasted. That translates to nearly 900 TWh a year, enough to power 6-times today's Bitcoin network. It's only natural for bitcoin miners to migrate to green energy. Bitcoin data centers can be run effectively from anywhere, in any size, and intermittently, evident in remote African villages. It's a flexibility no other data centers can offer.
10. Surveys covering more than half of bitcoin mining show a rapid move to renewables. Policy is taking notice. Norway and Texas see Bitcoin as part of the solution, designing programs for mining to deploy unused green energy, adding revenues, and incentivizing desperately needed power infrastructure. Not all agree. Last month, the US issued an emergency data request for crypto energy usage, casting a doubtful eye on bitcoin mining.
11. Let the market speak. If all commit to neutralizing Bitcoin's carbon externality, one of two things will happen. Either the cost will surge and make bitcoin a wholly unattractive investment. Or it will become irrelevant as bitcoin mining migrates to green energy sources. Skepticism in the transition is only natural for a nascent technology. Its benefits may not be immediately obvious. But micro investments into green mining get us closer to the truth. And it's happening.

Figure 1: Wasted Energy? Bitcoin will use it, no source too small.

Renewable electricity generation, World



Data source: Energy Institute - Statistical Review of World Energy (2023)

OurWorldInData.org/renewable-energy | CC BY

Note: 'Other renewables' refers to renewable sources including geothermal, biomass, waste, wave and tidal. Traditional biomass is not included.

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There is no assurance that carbon capture credits and trading markets will continue to exist, or that they will prove to be an effective method of reducing greenhouse gas emissions. New technologies may arise that may diminish or eliminate the need for cap and trade markets. Ultimately, the cost of emissions credits is determined by the cost of actually reducing emissions levels. If the price of credits becomes too high, it will be more economical for companies to develop or invest in green technologies, thereby suppressing the demand for credits.

Bitcoin mining poses unique risks that could lead to loss of capital investment. Risk factors include the inability to grow hash rate as a function of limited computing power, the cost of acquiring new miners as affected by global supply chain issues, the value of bitcoin mined not exceeding associated mining costs, market volatility of the asset, and the reduced generation of revenue due to bitcoin "halving". Bitcoin mining may also be impacted by increasing compliance and legal costs as the industry is subject to emerging regulation.

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