



Does Bitcoin have any intrinsic value?

One of the most common questions people ask about Bitcoin is whether it has any intrinsic value - especially when some currencies aren't even worth the paper (or metal) used to mint them. Gold-bugs often cite that their favorite rock is at least used for jewelry and electronics - whereas "Bitcoin isn't used for anything at all!" Without detracting from gold's value proposition (I like shiny objects too), answering this question requires a little bit of objectivity regarding the concept of "value," and a deeper understanding of one of the most important things in society: Energy.

Let's begin with the concept of value: A general definition states that it's something that holds some kind of importance, worth, or usefulness. What makes understanding value difficult is that there is an inherent subjectivity to it. In economics, we measure value primarily by observing and

recording various interactions and exchanges. It's transactions that help us understand value; interactions debate it and exchanges determine it. We understand value as a "thing" that can be exchanged for another "thing" - exactly how much of each "thing" is exchanged is up to the parties involved and, after the settlement of said trade, a "value" is derived for each "thing." If we agree to exchange your one coconut for my five bananas, then we've just established a value for each item - which we can now use as a reference to trade with other people. A more modern example might be trading a digital image of a cartoon ape for 250,000 "notes of legal tender for all debts, public and private" - whatever that means.

Using this interpretation of value as a foundation, it seems that Bitcoin's "intrinsic value" essentially comes from energy, and, in some sense, time and attention (or "meme power").

The case for Bitcoin's meme power is rooted in a much less tangible rationale – a similar rationale used for the US dollar by the way. The concept of “full faith and credit” rests on a foundation of belief, something that's almost impossible to measure. For now though, I will focus on the logic behind Bitcoin's intrinsic value as it is derived from energy.

In order to process transactions, protect itself from bad actors, and generate new coins, the Bitcoin network uses what's called “proof of work” mining. The short explanation of Bitcoin mining is that computers must race to solve a math problem and, when one computer successfully solves it, they are awarded new Bitcoin and some transaction fees paid by users. Successfully solving the math problem creates a new “block” of transactions, which is then added to the end of the “block”-chain - a new math problem is introduced, and the cycle repeats. Of course, computers run on electricity, so therefore the “input” is electricity and the “output” is Bitcoin.

In the early days, anyone could mine Bitcoin on a basic laptop - since Bitcoin had little or no public value or traction at that point - and the “race” to solve the math problem was comparatively easy. As Bitcoin garnered more attention from enthusiasts and speculators, its price rose as a result, and more computers joined the network hoping to capture some of the potential upside (and profit) of Bitcoin. In 2013, when I first entered the industry, Bitcoin miners saw the launch of specialized computers, called ASICs, whose sole purpose was to mine for Bitcoin. I recall my first ASIC, the Antminer S1, that I had running in my dorm room at NYU, and was amazed that it was 40-50x faster than my computer at mining Bitcoin! In those days, Bitcoin was between \$60-200, and having loud ASIC fans on 24/7 to mine 0.01 Bitcoin every 1-2 days was (reasonably) annoying to my roommates. So I did what any rational person would do, and moved the miner to my friend's dorm room - but I digress.

The way the Bitcoin network accounts for these newer, faster machines is quite clever: Difficulty adjustment. Put simply, the more computing power there is competing to solve the math problem for that Bitcoin reward, the harder it is to actually solve the math problem. Every 2,016 blocks, the network adjusts the difficulty of the math problem, such that the average “solve” time is around 10 minutes per block. This was installed to avoid a hardware manufacturer from developing an ASIC, using it to mine Bitcoin faster than everyone else, and co-opting the network. As software developers and hardware manufacturers began dedicating themselves to this new industry exclusively, Bitcoin developed “value” over time as new users poured in - much like the early days of the internet.

So how does this give Bitcoin any value? By way of a growing number of economically rational actors dedicating time, energy, and resources to it. While this may sound unsatisfyingly obvious, it is the allocation of resources to an endeavor that gives it a lower bound, or “minimum,” value. There are plenty of models that suggest a minimum price for Bitcoin at a certain electricity rate, given the efficiency of the most common or advanced mining computers – some of these models are more thorough than others. These projections often don't account for miner profit, network effect and growth, or various other intangible upside catalysts for Bitcoin – but those are topics for another day. Back to energy: Since we have found a possible minimum value for Bitcoin based upon its inputs, what is another factor that might cause Bitcoin's value to exceed this lower bound? Not to sound repetitive, but, well, energy! Or perhaps more specifically, energy production.

As Environmental, Social, and Governance (or “ESG”) advocates like to remind us: The amount of energy used to power Bitcoin mining each year is enormous – currently greater than Norway's annual electricity use. Why would anyone spend so much energy on something that ostensibly provides no value? To answer this, we must dig deeper into what kind of energy Bitcoin miners are using and how it benefits society outside of crypto.

Over the past few years, Bitcoin miners have been steadily migrating from coal energy to gas, hydro, and nuclear energy sources. Not only for environmental purposes – coal, for example, has become increasingly more expensive as an energy source, and Bitcoin miners seek to maximize profits. Per the International Renewable Energy Agency, renewables are the cheapest forms of electricity generation, so it's both an altruistic and profitable proposition for Bitcoin miners to transition to green energy. Additionally, nuclear energy is another (technically non-renewable) zero-emissions power source that Bitcoin miners are exploring as a cheaper alternative to coal. Why does this matter? Well, a report by the United Nations Economic Commission for Europe suggests that the carbon-emissions targets set by the Paris Agreement will not be met without nuclear energy production.

How does this all relate to Bitcoin's value? Well, Bitcoin mining has created an economic equation that is very simple: Use electricity as efficiently as possible to mine Bitcoin. The ESG critiques point to the energy Bitcoin uses today, but not the energy subsidies it creates for the future. Bitcoin miners are, perhaps, the most incentivized for-profit players behind the buildout of cheap and efficient energy sources. As a result, Bitcoin miners assist in the

development, construction, and subsidizing of renewable and zero-carbon energy production sites. This is evidenced by the fact that Bitcoin miners are contributing to projects across the US, such as:

1. Talen Energy's nuclear capacity data center in Berwick, Pennsylvania (\$175m)
2. Energy Funder's natural gas mining farm in Texas (\$43m)
3. Compute North's grid-expansion project in Kearney, Nebraska (\$385m)
4. CleanSpark's carbon-neutral project in Norcross, Georgia (\$145m)

Even around the world, such as the German-Russian joint venture Cyberian Mine, that taps into hydro-energy generated in Siberia and uses the cold ambient temperatures to cut costs on cooling for the machines - or Kryptovault's 100% renewable-run data centers in Norway.

Would those projects have proceeded without Bitcoin? Maybe. But, either way, because of Bitcoin, those projects have become more economically viable - especially for the ones that necessitated infrastructure buildout where there may not be a market to support such a huge capital expenditure. Bitcoin mining requires relatively little human participation once operating, so mining farms are comfortably situated off the beaten path - such as near oil production sites that need to flare natural gas, or hydroelectric dams and nuclear plants that have excess power capacity. In some cases, these

production sites can't efficiently (or even physically) provide the energy they generate to any other use case. As a result, Bitcoin miners are setting up agreements with those sites and both parties can enjoy a wider profit margin from the energy that might have otherwise been wasted.

In summary, Bitcoin uses a lot of energy. But it also subsidizes and accelerates the development of renewable and low-emission energy production sites. It also creates jobs for those infrastructure projects and for the Bitcoin mining farms they would eventually harbor. As the world struggles to commit to "net-zero by 2050," Bitcoin incentivizes a shift to sustainably lower cost energy production, which currently means renewable or zero-emission production sources. That certainly has value.

In some ways, Bitcoin acts as a battery for ESG ideals. In this piece, I explored how Bitcoin miners' need for cheap, consistent electricity pushes them to zero carbon energy production sites. By making these sites profitable today (because miners can contract cheap electricity that is otherwise wasted), it increases penetration in markets that are unconvinced as to whether or not they can monetize a new renewable energy production site. Bitcoin is a store of value for clean energy with nowhere to go and subsidizes energy grid curtailment, which primes it for growth as clean energy becomes an increasingly necessary part of society. Enabling the transfer of value for ventures that might not otherwise be profitable is just one part of the Bitcoin battery, but how does Bitcoin affect the "social" or "governance" aspects of Environmental, Social, and Governance investing? Well, be sure to keep reading Nick Halaris's Profit to find out! □