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Bitcoin and Economic Incentives for Renewable Energy

Bitcoin just might be the greatest financial development of the current century. Within the past year alone, Bitcoin has achieved several significant milestones: its value surpassed $100,000 for a single Bitcoin (Wiles), it became part of the world's largest asset manager BlackRock's portfolio through the iShares Bitcoin Trust (IBIT) ETF[1] ("iShares Bitcoin Trust ETF | IBIT"), and it was designated as a U.S. government strategic reserve asset (The White House). From this, it's clear that large governments and corporations are taking a serious interest in Bitcoin; however, the true significance of these events is that of a stepping stone to a much greater stage. This argument will be highlighted in much greater detail in the following sections about Bitcoin economics. Whether the world likes it or not, Bitcoin is now perceived as a key asset powerful players have their eyes on rather than some internet novelty or a PayPal for drugs and dirty deeds. As such, it also becomes even more paramount to discuss the impact on the environment that Bitcoin has as global demand for Bitcoin rises. There are two camps on the issue of Bitcoin and climate change. Popular opinion is that Bitcoin, more specifically Bitcoin mining, is a complete waste of power so as a result, greenhouse emissions become needlessly higher. However my opinion is that rather than "...a program to wipe out the gains of several long, hard

[1] Exchange Traded Fund. Usually used to "own" multiple stocks while buying one. Think S&P 500 (SPY)

generations of green energy innovation," (Wells 34), Bitcoin might be one of the key incentives for pursuing carbon neutrality.

This paper will largely focus on Bitcoin but not other entities within the CryptoSphere[2]. This paragraph can be summarized with a pithy maxim: Bitcoin is not Crypto. I'll repeat myself again: Bitcoin is not Crypto! To be more specific about this point, there will be no mention of Non-fungible Tokens (NFTS) or other cryptocurrencies, especially those that fall under the alt-coin[3] category with the exception of Ethereum which as a cryptocurrency occupies the most comparable niche. Many of these are understood as being no better than scams, even by those in the crypto community. The reason for not including these in the discussion of Bitcoin and the environment is that they are completely unrelated to the issue. Bitcoin, while being the progenitor of cryptocurrencies, has evolved into something that competes with gold and real estate rather than other crypto currencies. Consequently, Bitcoin faces categorically different pressures than other cryptocurrencies leading it to be fundamentally different from these other Web3[4] technologies. Concisely, it's in a league of its own. As such, the discussion around Bitcoin would be better framed if people thought of Bitcoin as an asset like a stock. Nevertheless, that is not to say other Web3 technologies have no merit such as stablecoins and other decentralized finance (DeFi). This paper will also skirt away from more technical details insofar as they do not pertain to climate issues or counter argument claims. More specific discussions about this issue will be outlined in the following section about the economics of Bitcoin.

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[2] Broad category: cryptocurrencies, blockchain technology as well as supporting infrastructure such as wallets and exchanges
[3] Also called "*meme-coins*"; coins used with the sole purpose of making money with no utility
[4] Internet that is based on decentralized protocols as opposed to Web2 which is based on centralized processes

1. Why Bitcoin is Important

1a. Why Care?

Bitcoin is becoming more important day by day because governments and institutions are seeing it as a viable prospective market that could rival that of gold. They want to get a piece of the proverbial pie before its growth stabilizes where gains are only incremental. We can see this

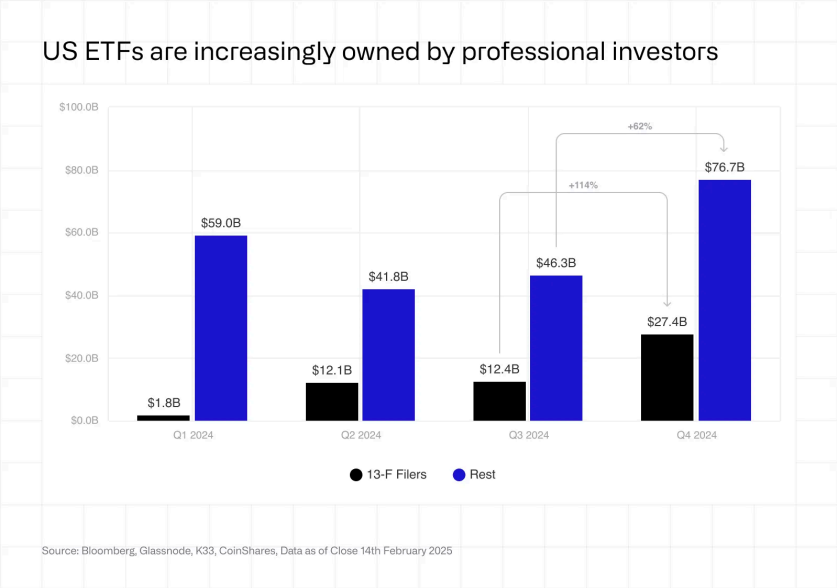
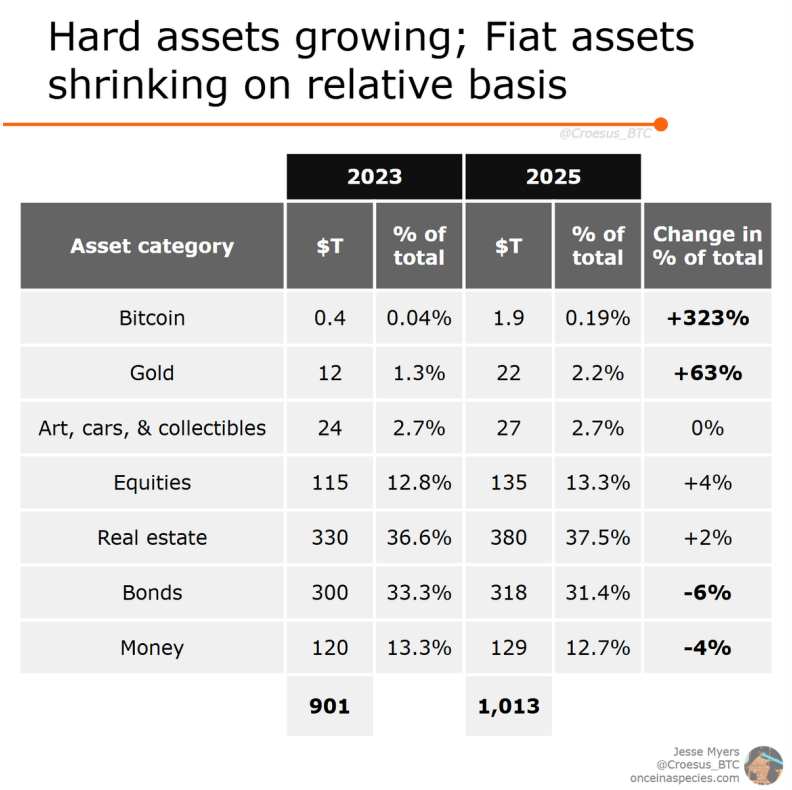


Figure 1: The black bars represent large institutional investors (Blackrock, Fidelity, pension funds etc). The blue bars show the rest of the market (individual investors etc, smaller institutions etc.)

increase in attention by large institutions as seen in figure 1. In late 2024, institutions had $27.4 billion in Bitcoin ETFs which is double what they had in the previous quarter (Kimmell). This move is quite significant as many of the larger institutions such as Fidelity and Blackrock are more conservative yet are moving towards Bitcoin in spite of the fact that in the past, they have openly denounced Bitcoin (Imbert).

According to Stanford MBA Jesse Myers (see figure 2), Bitcoin has a market cap of 1.9 trillion dollars as of May 2025, growing from 0.4 trillion dollars in 2023. In relative terms to all



	2023		2025		
Asset category	**$T**	**% of total**	**$T**	**% of total**	**Change in % of total**
Bitcoin	0.4	0.04%	1.9	0.19%	**+323%**
Gold	12	1.3%	22	2.2%	**+63%**
Art, cars, & collectibles	24	2.7%	27	2.7%	0%
Equities	115	12.8%	135	13.3%	+4%
Real estate	330	36.6%	380	37.5%	+2%
Bonds	300	33.3%	318	31.4%	**-6%**
Money	120	13.3%	129	12.7%	**-4%**
	901		**1,013**		

Figure 2: Chart by Jesse Myers detailing difference in absolute and relative quantity for different asset types

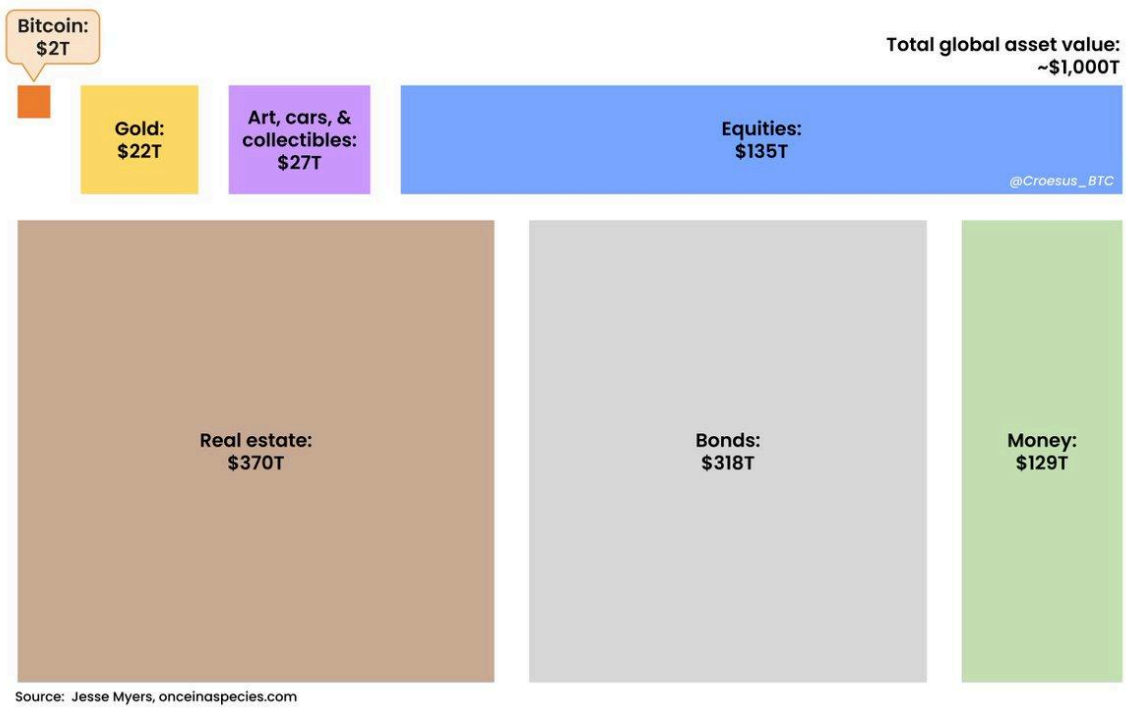
real assets, in 2023 Bitcoin was only 0.04% of total assets whereas in 2025, Bitcoin was 0.19% of the total. This was an increase of 323% in relative terms, showing the growth that Bitcoin has displayed in years past (Myers). Gold has done similarly well in the past two years, largely due gold and Bitcoin sharing common pressures as will be discussed in greater detail in the future. We can also see that bonds[5] which are worth 300 trillion–34% of assets–shrank in relative proportion by 6% (Myers). As bonds are used by large risk-averse corporations such as pension funds and the like, I believe this shows how even traditional finance (TradFi)[6] is undergoing a paradigm shift. Shifts in the economic landscape are sparse yet major events. Therefore it becomes increasingly important in all industries, especially climate and green energy to monitor, understand and act with these changes instead of against them.

[5] Loan where companies give money to the U.S Gov. in exchange for a low but guaranteed return. The U.S Gov. never defaults as they can simply print money to pay the lender back.
[6] Banking, stock market, bond market, hedge funds, venture capital etc.

While figure 2 gives valuable data, taken in isolation it leaves several important questions unanswered: What is driving gold's growth? Why does real estate occupy such a significant portion of the market compared to other assets like gold? And is the rising valuation of Bitcoin merely speculation? These questions will be answered in due time and likely in less than minute detail as entire papers could be written about these subjects. Despite this herculean task, I believe these topics are integral to understanding fundamentally why Bitcoin is such a big deal as opposed to the simpler argument that "the market is getting too big to ignore" which could be refuted with a tulip mania[7] argument (Hayes). In the following section, we will attempt to answer the above questions by first investigating how gold gained its importance in antiquity and subsequently how its role has shifted in the modern economy. We will then explore other assets analyzing their advantages and disadvantages with respect to gold. To conclude, we will discuss how Bitcoin will become a key player in the broader economic landscape due to its emergent properties followed by some potential rebuttals. Again, these arguments are made to convince you that Bitcoin is not only important but going to become an inevitable part of the global financial landscape. Thus, arguments about simply stopping using Bitcoin would not hold any merit as it would be as difficult as convincing people not to use gold or to not invest in real estate or buy government bonds. Since it will be made an immutable portion of the financial system, it is best to pragmatically shape policies to account for this future shift.

[7] Tulip Mania in the 17th-century Netherlands saw tulip bulb prices soar due to pure speculation, with no basis in fundamental value, leading to a sudden market crash. This will be compared and contrasted with Bitcoin in the counterarguments paragraph.

Figure 3: 2025 chart by Myers to better visualize relative size of different asset classes



1b. Why Gold?

There is the adage that Bitcoin is digital gold. While I do agree with this comparison, I believe that not many people talk about how different sides of the coin interpret this statement. The pro-Bitcoin side would interpret this statement as Bitcoin is as valid of an asset as gold, just digital. In contrast, the general public would read this as Bitcoin is "fake" gold and therefore has no real value. This is because the word "digital" means not having a physical form. Then since Bitcoin is "just ones and zeros" it is not real and therefore has no value since to be "valuable", an asset must be a physical, tangible thing. This section will hopefully correct this flawed logic. In summary, gold's value is not tied directly to the fact that it is physical as "value" itself is an abstract concept. Gold has particular characteristics which make it "valuable". These characteristics are isolated from the physical form, distilled and enhanced into a digital asset we

call Bitcoin. This idea is described quite eloquently using Aristotle's essential[8] and accidental[9] properties. Gold being physical is an accidental property, but its value is a product of its essential properties. Bitcoin being digital is an accidental property, but its enhanced essential properties multiply to produce greater value than that of gold. Therefore to understand why Bitcoin is valuable, we need to understand what makes gold valuable and how that came about. To do this, we need to examine the concept of a "store of value" as this is the position Bitcoin and gold compete for.

A store of value is an asset that does not depreciate, meaning that its value does not decrease over time. In practical terms, a store of value is a way to preserve or even magnify your money's buying power throughout time. To quantify this, say you earned $1000 in 1970. Then, because you had some financial sense, you saved it for a rainy day in a bank. For simplicity let's assume this bank offers no interest, though interest from banks is so low that the argument remains the same. 55 years later in 2025 you need that money. Unluckily or perhaps imprudently, you stored it as cash in a bank instead of 1000 dollars worth of some store of value like gold. Now that $1000 is worth 8 times less according to historical data (Federal Reserve Bank of Minneapolis). Spending that $1000 in 1970 would have been equivalent to $8000 worth of goods in 2025 but now it only buys you $1000 worth of goods in 2025, markedly less than what you could have gotten by spending the money immediately. By simply doing nothing, you are losing money. In contrast, if you instead invested the $1000 even into an asset like gold which compared to real estate underperformed, the value would have increased by 10 times accounting

[8] Properties that make the "essence" of a thing. If changed, change what the thing is. Eg. Bachelors being single is an essential property for a bachelor. If changed, the person in question is not a bachelor anymore.

[9] Properties that are independent of the "essence" of a thing. Changing these does not change the essence. Eg. A Bachelors height or hair color. Changing these does not make the Bachelor anything else, just a different form of a bachelor.

for inflation (Macrotrends). In other words, it would be around $80000 worth of goods in 2025 and around $10000 worth of goods in 1970.

From this, it's clear that without a long term store of value, money is incentivized to be spent as savings are eaten away by the maw of time. For an individual consumer, having little to no savings would beget misfortune, but for a large corporation worth billions, having these same conditions is asking for a disaster. The amount of money lost is astronomical and the fallout for not having enough funds is devastating. Though nowadays there are better stores of value for a company than gold such as real estate and bonds which will be explained in following sections, the principle of a store of value remains the same. Gold can be seen as the baseline to which different assets can be compared to. This reinforces the need to truly understand gold. For most of history, this narrative of preserving wealth also applied to governments; however, as we will see in future paragraphs, the modern reason governments hold gold is more of a sign of trust to other governments to signal that they have "value".

Despite these caveats which will be discussed later, gold, for most of history since at least the ancient Egyptians, was humanity's foremost way of displaying and preserving wealth across generations (Provident Metals). This is because gold was seen as precious as it was rare throughout the world. This is in contrast to seashells which were only considered precious far from the ocean. Gold was also used as a store of value because it is durable meaning that it does not degrade over time nor is it easily destroyed unlike something like iron which rusts over time. From this we can glean some essential properties of a store of value: durability and preciousness..

Durability is a direct consequence of the physical properties of gold as such, is a moot point of discussion less the fact that durability can apply to an intangible asset in ways that will

be discussed later. Preciousness, on the other hand, is an abstract, subjective thing. Scarcity can certainly be a reason why something is precious yet it does not imply preciousness. Preciousness also needs demand. A probable reason people started to use gold as value was jewelry as it was alluring. (Bhatia). Then eventually as many civilizations (Provident Metals) used gold for thousands of years, suddenly people covet gold simply because it can be exchanged for actual goods and others value it. Coming back to bartering, you couldn't really use gold for anything besides showing off, especially back in the ancient times. Even now, the total amount of gold for industrial use is around 8% ("Gold Market Structure and Flows") which makes up an even smaller fraction of the total market cap of gold. Here we see some departure from a "physical" aspect to a figurative one. Gold's intrinsic properties, which are given by its unique physical properties, help support a figurative notion of value and preciousness.

To show why gold being physical is not truly the reason why it's valuable, consider platinum. Platinum is even rarer than gold and shares the same physical properties that makes gold a store of value; however, today there is no market around platinum besides for industrial use and occasional jewelry (Pistilli). This is because platinum is not considered as "precious" as it can't be used for anything. This is especially important as the use of a store of value is to be redeemed at a later date for goods and services as was possible with gold. In other words, the preciousness of gold comes less from its physical properties such as rarity and durability as platinum has those but rather from human beliefs and financial systems. Put bluntly, there is no network for platinum so it has no value; there is an immense network for gold so it is valuable.

To elaborate on this point gold belongs to the one of the world's foremost trusted, traded and mature financial networks. This is because as seen from above paragraphs, gold has the essential properties for a successful store of value not only in concept but in creating a system

around it as well. With respect to creating a worldwide financial system, an advantage that gold has is that it is largely equally distributed around the world as well as highly demanded by every party. This can be summed up in another essential property: being apolitical. The financial network is made up of, in a somewhat relative order, central banks, ETFs, over-the-counter[10] (OTC) markets, futures exchanges and mining companies. This network is what sustains and – more importantly – multiplies gold's "intrinsic value". The value of the network itself is much greater than that of "physical gold". One of the quantitative metrics that can be used to demonstrate this is to compare the daily transaction volume of physical gold to that of its financial derivatives. Physical gold, through ETFs, has a trading volume of $2.92 billion per day whereas gold OTC derivatives have a trading volume of $127.69 billion daily ("Gold Trading Volume | Gold Daily Volume"). In relative terms, derivatives are almost "worth" more than 44 times that of actual gold. When people refer to the "value of gold", what they really are referencing is the value of the network in which gold belongs. This is what makes gold "precious".

1c. Cracks in Gold's Throne

Gold, despite being apolitical, trusted, durable and precious, does have some key issues as a store of value that do need to be addressed. Addressing these concerns will give a greater insight into why assets are worth their weight. The most pressing issue is that gold is inflexible. That is, it is difficult, time consuming and risky to transport in large quantities. This necessitates layers of financial institutions such as fiat currency like the dollar to supplement monetary velocity[11]. To cut a long story short, each of these gold derivatives can be partially backed by

[10]Deals that are between two parties, not using a centralized exchange (NASDAQ, NYSE etc)
[11]How fast money is transacted between people

some gold which allows for a greater amount of money to come into existence without creating an equivalent amount of gold. The eventual culmination of this making currency fiat, ie. not backed by the gold standard. For the United States, this came out of what many economists would call a necessity. In the case of a financial crisis, the government can be a lender of last resort, giving money to banks to prevent the bank from falling when people want to withdraw their money fearing devaluation of currency (Bhatia). Eventually due to Bretton Woods, all countries would evaluate their currency based on the dollar. Though the specifics and reasons why are far beyond the scope of this discussion, the end effect was the dollar became the hottest commodity in place of gold. It was more advantageous for many countries to have large dollar reserves, keeping gold as a strategic reserve asset in the case that other countries do not trust fiat. This gave the United States a key financial position as they can control and freely create with little consequence the world's most sought after asset (Bhatia). Power without restraint is dangerous. The United States has created more money than ever before as the dollar is not backed by any true store of value. Excess spending has caused inflation to rise and the dollar to be trusted less day by day. As a result, governments and people are coming back to assets with "harder" fundamentals. As discussed heavily in prior paragraphs, gold as a store of value has a long history because it works well since it has many of the essential properties of a store of value. This finally answers why gold has performed exceptionally within the past two years (see figure 3). Gold's strong fundamentals combined with current political/financial instability built on the system of fiat currency are the main catalysts behind gold's growth among governments and retail consumers.

Another problem with gold is that it is not a productive asset. Gold doesn't actively generate revenue, rather, it stays relatively still, only increasing in monetary value because each

unit of currency is decreasing. Compared to governments who are more interested in long term stability, companies are more interested in putting money to work. One of the main ways companies store value is in government bonds, where companies loan money to the government and the government pays them back adjusted for inflation a set amount some time in the future. Here it actively produces a gain and also has many essential properties of a store of value. Bonds, despite not being physical but a contract between a company and the government, is durable. Bonds cannot be destroyed unless the U.S government is destroyed nor does the government default on these. It is more beneficial for the government to print money to fund these glorified IOUs than to default as it would erode trust, thus making bonds less precious. Bonds are precious because they offer a risk free way to store and gain money over time which can be used to transact later. Like gold, there is also a bond market where people buy and sell these bonds, adding to the overall network and making bonds more important. A major caveat to this is trust in the dollar. As mentioned in the previous paragraph, the dollar's trust has wavered. If it comes to the point where governments and institutions do not desire dollars as strongly, bonds will be viewed as less precious. A smaller yet important caveat is that the returns from bonds are very low as that is exchange to be made for having a guaranteed return.

Real estate is another store of value many companies use. This not only includes apartments but also large skyscrapers used for office use. According to figure 3, real estate accounts for 370 trillion dollars out of 1000 trillion dollars of global assets. There are several reasons for this. The main advantage of real estate over gold is the ability to earn passive income through rent and leveraging. Leveraging is using tenants' money to buy more property to increase gains. The main reason why real estate is such a large part of global assets is a result of the system built around it by the government which inflates its "preciousness". In light detail as

the causes of the housing market bubble can be an entire series of papers, the real estate market is held up by multiple government incentives such as tax breaks, subsidies, low interest rates, mortgage practices and government bailouts. These practices incentivise speculation and are overall unsustainable (Scharlemann and van Straelen; Dehan; Reynolds; Wallheimer). Similar pressures and incentives can be found world wide, especially in China. (The Global Treasurer). The housing market in China causes cities to be built, properties are bought, then the city is destroyed. The overall real estate market produces 407 million tons of CO2 as of 2020 which rose from 2000 by 4 times (Huang et al.). As a result, though real estate does offer real advantages compared to gold, the current evaluation is inflated and the negative externalities are commonly ignored. Real estate also has the problem of not being liquid, that is a building cannot be sold quickly nor can a small portion of a building can be easily sold. There is also a high barrier to entry compared to buying gold through an ETF and even greater financial risk as it incentivises going into debt.

Despite these developments, gold is still used as the only “neutral” money used by governments as a reserve. The other assets mentioned above are not liquid nor are they not decentralized like how gold is spread throughout the world. However, gold is hard to transport and difficult to verify without destroying a portion of it. This is why nations had to agree to store enough gold in one place such that any transactions that are to be made in gold can happen without risk of transport. Nations lock up some gold in a vault in New York where utmost safety measures have to be taken in order to move gold from one shelf to another. (“Gold Vault - FEDERAL RESERVE BANK of NEW YORK”). This leaves open the possibility for a new apolitical asset that not only retains the same essential properties as gold that make it a store of value but also accommodate for its weaknesses.

1d. Why Not Bitcoin?

Bitcoin has the essential properties of a store of value. It is durable as Bitcoin is stored in its network. Trying to erase a Bitcoin is similar to trying to erase the internet. One would have to wipe out all the computers that store the Bitcoin network. Similar to how gold is scarce and equally distributed, Bitcoin mining has started out equally distributed. Everyone could mine Bitcoin with a computer. As a consequence, Bitcoin was distributed throughout the world which adds to its apolitical nature.

For security, which is one of Bitcoin's main selling points, it does not need a regulatory agency as security is baked into each transaction through the block chain which can be thought of as a public list of transactions combined with a validator. Every new transaction needs to be approved by a majority of validators. Validators pour in their own resources to get randomly chosen to incentivize competition and fair play since validators (miners) are only rewarded in Bitcoin given a valid transaction. Having multiple miners from around the world decreases the risk that the system can be attacked in one place. Gold has this issue since to achieve transportability, gold needs to be stored in one place which leads to a single attack vector. This system also can be used to validate if a person has the assets they claim to have and to remove counterfeiting. Gold can be faked by mixing in higher density metals and the methods to check for this kind of counterfeit are unreliable without destructive methods. For Bitcoin, it's as simple as checking a bank account statement. Bitcoin can be transacted at a constant fee, regardless of value as the price is solely a product of network demand. Transactions happen only on the block chain, which means that every transaction is valid and secure regardless of distance.

Bitcoin is also a productive asset as it is still in its infancy as seen in figure 2 as well as grows in the long term at a predictable rate based on a power law[12] (Santostasi). I'd like to clarify this point as many only know the presence of Bitcoin through its bubbles which happen on a four year cycle. While there are crashes, there is a bottom line that Bitcoin almost never dips below. This bottom line is modeled to surprising accuracy over 10 years since its initial proposal showing a linear growth in a log-log[13] graph. Bitcoin is one of the only assets to have an accurate model to measure its growth. The reasons for this growth far exceed the scope of this paper but to guide further reading and inquisition, it is similar to how a network grows. A network starts with one person who recommends other people, sharing a link between them. Then those people start recommending other people until a certain point where the number of links explodes. See Metcalfe's law for more details about network theory and power laws being related to network effects. (Santostasi)

The only thing missing is that system built around it to capitalize on its value. Just like how gold's derivative markets have a much greater value than that of physical gold, corporations and governments are taking advantage of this unexploited niche which explains the recent events detailed in the introduction. This is the main reason why I think that a Bitcoin revolution is inevitable as the main market makers of the world are starting to take seriously Bitcoin's potential to rival or even surpass gold as the chief store of value. That is why I think that is paramount to adapt to this rapidly developing paradigm shift with respect to the climate.

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[12] Model of a y = x^a where a is any number. For example y = x^2 or y = x^0.5 etc.
[13] Both x and y axes are a logarithmic scale. Each unit is "a" times greater. For example in log 10, 2 is 10 times greater than 1, 3 is 10 times greater than 2 etc.

2. Current Environmental Impacts

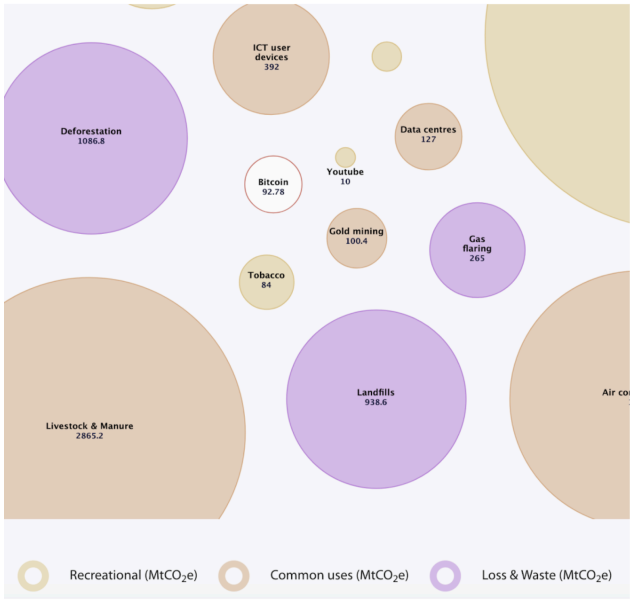

Figure 1: Shows sized representations of the carbon emissions caused by various industries

There is no denying the fact that Bitcoin uses an extreme amount of energy. In fact, this is largely by design. However, there is a clarification point to be made. Bitcoin itself doesn't produce greenhouse emissions. It instead uses electricity. Greenhouse emissions associated with Bitcoin are only due to the power generation associated with Bitcoin. Therefore it is an oversimplification to say that Bitcoin produces greenhouse emissions only if the energy used is non-renewable (MicroStrategy et al. 1). According to the CCAF, as of the most recent data, bitcoin mining is attributed to 91.98 Megatons of CO2 equivalent (MTCO2e). There are many comparisons which compare this to a "small country" however it's not exactly fair to compare this figure to a country. A country's carbon footprint is simply dependent on different pressures than Bitcoin. The most apt comparison would be the carbon footprint of gold mining as Bitcoin is a competitor to gold.

Again from the CCAF, Gold mining actually produces 100.4 MTCO2e which is greater than that of Bitcoin. What's even worse is that waste such as gas flares, gas emissions from landfills and deforestation produce 265.0 MTCO2e, 938.6 MTCO2e and 1086.8 MTCO2e respectively. These problems are not even theoretically trivial. As mentioned earlier, Bitcoin emissions are only contingent on the source of energy so in theory, there is an easy solution to the emissions caused by Bitcoin in stark contrast to the theoretical nightmare deforestation and landfills have when solving their problems. That's not to say that practically switching Bitcoin to 100% renewable energy will be easy, but what it does say is that there is a model path we can follow to achieve a goal that will work.

There are also many misconceptions about what mining is. Mining is not like actual gold mining. It is just an analogy to gold. "Miners" are really transaction validators who, in exchange for the power used to validate a transaction, get a reward in Bitcoin where the reward is halved every period in an event called the halving to increase scarcity. Eventually when all Bitcoins are mined, it is thought that miners will subsist off of transaction fees though this event is predicted to happen around 2140. There is valid concern about miner e waste since miners are incentivized to compete by solving problems quicker however there is little concern for this. Academic papers such as those by De Vries and Stoll "...is a chimera derived from an idle academic fantasy which failed to incorporate any relevant industry data." (MicroStrategy et al.). The main argument for this point was that the study assumed that all miners junk old models as soon as new ones come out, rendering them worthless. In reality, these older computational tools still have retail value even though they cannot do anything other than mine Bitcoin.

3. Problems in Renewable Energy

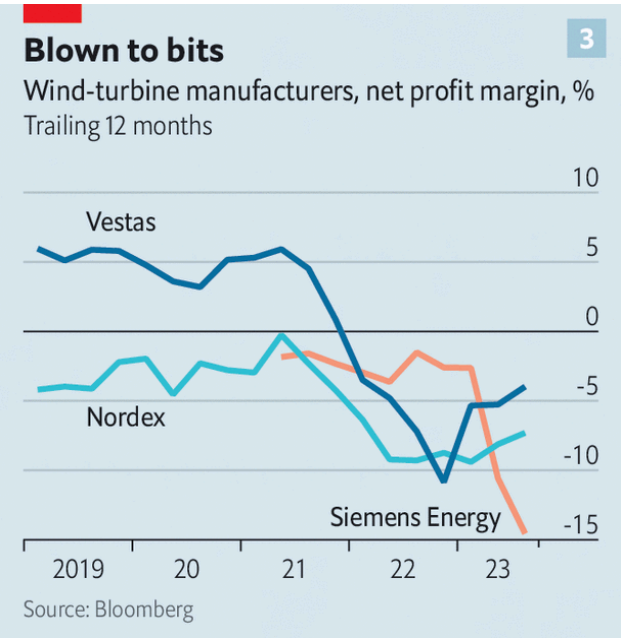

Figure 2: From the economist showing losses for renewable energy industry

It's no secret that the renewable energy industry is heavily dependent on subsidies from governments. An indirect way we can see this is from figure 2 which shows that all major manufacturers are having net losses year after year with the losses only increasing. More directly, between 2010 and 2023, U.S. federal subsidies for solar energy totaled $76 billion and for wind energy $65 billion, far outpacing the $33 billion for oil and gas and $20 billion for coal in the same period (Staff). Nearly half (46%) of all federal energy subsidies in the U.S. from 2016 to 2022 were allocated to renewable energy sources (EIA). These subsidies are the reason for the relatively rapid expansion of renewable energy despite not making but losing money in the process. Fossil fuels are simply more attractive to run in the long term because as soon as subsidy money dries up, there will be little incentive to make renewable energy due to the challenges renewable energy has involving supply chain issues, stranded energy and lack of existing infrastructure.

Supply chain issues are one of the largest challenges associated with clean energy as many of the technologies required for clean energy often use resources such as rare earth metals and lithium which are mined unsustainably in developing countries. Increased demand in these industries could cause more damage to the environment and human well being than the positive contribution clean energy has to the planet. As a result, if a company wants to have these ethically sourced, more money needs to be spent in spite of the declining negative profit margins. This is simply impossible without other forms of revenue generation besides selling power.

Stranded energy is energy generated from clean sources that is not used. Since there are no good energy storage facilities and mediums on the market this energy is wasted not doing anything productive such as earning revenue. In addition, renewable energy sources need to be overbuilt to accommodate for peak strain on the power grid during extreme weather conditions or even just peak daily usage for appliances such as A/C. This overbuilding leads to even more upfront cost, maintenance costs and stranded power.

In conclusion, economics and renewable energy are deeply intertwined as seen in the previous paragraphs of renewable energy and profit margins. We've also seen that Bitcoin is an up and coming financial institution that relies heavily on energy and how it is produced. The more demand for Bitcoin there is, the higher demand for energy as a result. Therefore it is important to understand that Bitcoin will become integral to world finance and as a result, renewable energies need to be the predominant source of energy worldwide. Otherwise, there will be necessarily a negative impact as Bitcoin will use fossil fuels as its source of energy since Bitcoin will need to pull energy from somewhere regardless of whether it is clean or not.

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