



Tesla's Decisions on Bitcoin and Eco-Friendly Mining Cryptocurrency in Clean Energy Regime

Christella J. Theacornelia¹ Gabriella D. Priambodo¹ Andriko Sandria^{1,*}

¹International Relations Department, Universitas Sebelas Maret, Indonesia

*Corresponding author. Email: andrikosandria.ma@staff.uns.ac.id

ABSTRACT

The trend of cryptocurrency mining was increasing electrical energy consumption in the world which had an impact on the environment. Tesla, a United States automotive company, had policies that affect the dynamics of cryptocurrency exchange rates. This study aims to analyze Tesla's reasons for not accepting Bitcoin payment and consider using eco-friendly cryptocurrencies. The Green Theory approach is used to describe the company's decision-making process that the Bitcoin mining process has increased the use of fossil fuels, especially coal for electricity needs, in the use of Bitcoin as a cryptocurrency. Awareness of this environmental impact will be seen in the process of emergence of discourse and communication in the public sphere that affect Tesla's awareness. The involvement of state governments in the world and the start of regulating the use of cryptocurrencies in the United States are also seen as actors involved in Green Theory. This research data was collected through statements of actors in the clean energy regime, research publications, news media and movements that appear on social media. The results of this study indicate that there are several reasons Tesla should stop transactions using Bitcoin; 1. Increased research publications that calculate the impact of Bitcoin mining activities contributing to increased gas emissions, 2. There is a Greenpeace campaign that voices that Bitcoin accelerates the climate crisis, 3. The rejoining of the United States in the Paris Agreement affected the clean energy industry policy which also promotes the use of renewable energy resources, so Tesla should also consider clean energy sources. The conclusion of this study showed that Tesla's awareness of the need to make it eco-friendly in the cryptocurrency mining process was an awareness that arose from the influence of the thoughts of various actors in the clean energy regime. This research contributes to the study of renewable energy considering that cryptocurrency has become an asset that has an impact on the environment.

Keywords: *Clean Energy Regime, Cryptocurrency, Eco-Friendly Mining, Green Theory, Tesla*

1. INTRODUCTION

Cryptocurrency has been developing rapidly for the last decade. The most popular type of cryptocurrency is Bitcoin. Bitcoin has been developed into the type of currency with highest value for financial transactions and attracted much attention. Investment in cryptocurrency had been simulated by economists that the market is fluctuating and different from other assets like gold and stocks. In the United States, The Federal and State Government had been paying close attention to Bitcoin. The United States recognized and accepted Bitcoin for financial transactions while setting appropriate regulations [1]. In January 2021, Elon Musk decided to buy Bitcoin worth \$1.5 Billion. Some analysts said that Tesla investment on Bitcoin set a high increase for its value in history. By the end of March that year, Elon

Musk announced on his twitter account that Bitcoin was accepted to purchase Tesla cars. Surprisingly, two month later, Elon Musk said Tesla will stop accepting Bitcoin for car purchases due to climate concerns. "Tesla has suspended vehicle purchases using Bitcoin. We are concerned about the rapidly increasing use of fossil fuels for Bitcoin mining and transactions, especially coal, which has the worst emissions of any fuel. Cryptocurrency is a good idea on many levels and we believe it has a promising future, but this cannot come at great cost to the environment. Tesla will not be selling any Bitcoin and we intend to use it for transactions as soon as mining transitions to more sustainable energy. We are also looking at other cryptocurrencies that use <1% of Bitcoin's energy/transaction."

This paper analyzed Elon Musk's decisions to stop using Bitcoin and require an Eco-friendly cryptocurrency mining. Elon Musk Involvement in the cryptocurrency world was an event that made a big impact on renewable energy regimes. This paper elaborates how Tesla manages and positions their role in renewable industries which also contribute to the United States rejoining the Paris Agreement.

2. METHOD

This paper adopted the approach of the private sector in transitioning governance of the renewable energy regime. Private increasing power in governance system is affecting the speed and scale of governance capacity. Dauvergne explained how “Big Brand” transnational corporations adapted to environmental issues that were addressed to them. These company were not only integrating environmental goals into their strategies, but also gaining support for their global governance efforts [2]. Through this approach, we conducted the same approach to analyze Tesla's decision on Bitcoin as an effort to gain support in renewable energy governance. This research is designed to analyse multiple sources of data emerging around Elon Musk statement keywords. The data collected to various articles and narratives from conference video, proceedings, media, and literature from academic, governmental, communities, advocacy groups, activists and nongovernmental organizations.

Next, we present evidence of the emerging trend of Tesla among influencing conditions, factors, business value within discourses emerging about zero carbon. We evaluate how Tesla is capturing this value, and how it is contributing to rising its legitimacy and environmental governance authority.

3. RESULTS AND DISCUSSION

There is a vast number of studies related to Cryptocurrency. The recent studies revolved around how the impact of the Bitcoin mining process has on the environment. Cryptocurrency uses blockchain and public ledger to continuously record transactions. This indeed energy consumption in the mining process and raises concerns about energy consumption along with power demand. Money movements derived from Bitcoin trading volumes are related to energy consumption. It will require more energy consumption, especially if there is a crash. This is because Bitcoin produces more carbon due to the negative blockchain. Because the Cryptocurrency mining process can be accomplished anywhere as long as it has a power supply and appropriate hardware, there are many researchers who believe that the effects of mining are dependent on the primary energy source being used [3].

3.1. China Cryptocurrency Mining and Emissions

Cryptomining can contribute 3–15 million tonnes CO₂ emitted, with the largest distributor being Bitcoin. Based on these data, there are already several countries that are taking this issue seriously. China, as the previous largest cryptocurrency user country, also finally decided to ban this technology-based financial mining activity due to counter ‘financial risk’ in 2021. The Chinese government has strict capital controls. They rule Chinese citizens to place annual limits \$50,000 for foreign purchase. The decentralized and blockchain-based nature of cryptocurrencies drives cryptocurrency users in China to avoid domestic capital-control regulations.

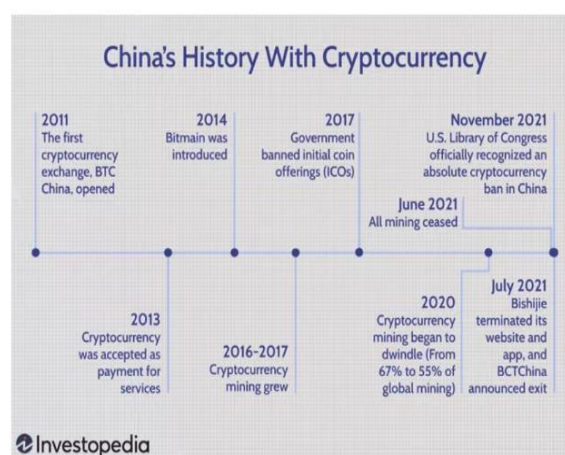


Figure 1 China Timeline in Cryptocurrency 2011-2021 (Source : Investopedia, 2021)

China began to give concern to the issue of Bitcoin in 2013. The first Cryptocurrency Exchange in BTC China began trading and accepted Bitcoin as payment of services in early 2013. However, in December 2013, the People Bank of China (PBOC), Financial Watchdogs Department and their IT Department noticed the risk of Bitcoin regarding money laundering and prohibited their domestic bank from Bitcoin Business due to national economic stability. After the Chinese government issued the ban, the price of Bitcoin had dropped from ¥7,395 to ¥2,630. This also affects global prices such as in the United States, Bitcoin plummets from USD 1242 to USD 480. In 2017, the Initial Coin Offering (ICO) platform was increased. ICO is the component from cryptocurrency with allowing the entrepreneurs and developers to raise funds and token transactions. Seeing this phenomenon, the PBOC investigated this phenomenon and has investigated as many as 60 platforms. As a result, on September 4, 2017, the Chinese Government release the "Announcement of the People's Bank of China's Central Internet Information Office, the Ministry of Industry and Information Technology, the State Administration for Industry and Commerce, the

Banking Regulatory Commission, the Securities Regulatory Commission, and the Insurance Regulatory Commission on Preventing Token Issuance Financing Risks," which states that all types of token issuance and financing activities should be avoided[4][5].

China has a large demand for coal and electricity. In 2020, China's energy demand rose 2,1%, energy consumption rose 6,9%, while carbon emission rose by 0,6%, and its share in the world's total carbon emission rose to 31%. Xi Jinping, President of China in the UN General Assembly, September 2020 announced the Chinese Government commitment to its NDC to have a carbon emission peak before 2030 and achieve carbon neutrality in 2060. It indicates the Chinese Government's effort to reduce carbon emissions by its domestic policy, including cryptocurrency ban.

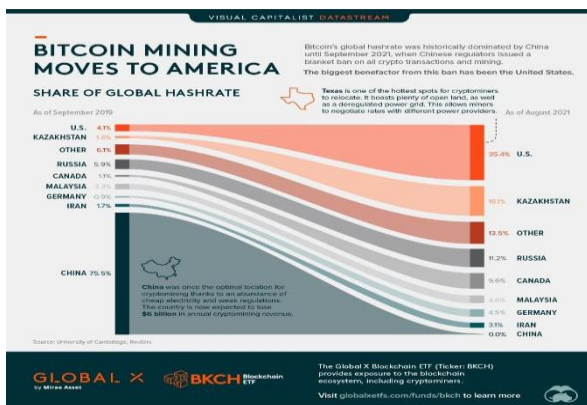


Figure 2 Bitcoin Mining movement after China's Crypto Ban (Source: University of Cambridge)

Chinese steps to ban cryptocurrency have an impact on other countries. Action from China has also become a pioneer for other countries to take action on this mining case. In January 2022, Russian Central Bank willing to ban crypto trading, mining and transactional activity. Nonetheless, many countries have legally prohibited cryptocurrency activities, such as Turkey, where the Central Bank of Turkey (CBRT) confirmed that it could not use Crypto as a transaction medium due to transaction insecurity in April 2021. As shown in the picture 1.2, the mining graph in China decreased in 2021, coinciding with the issuance of a cryptocurrency ban in the country. In contrast to other countries, such as the United States, where the number of miners has increased dramatically and has surpassed China as the country with the most cryptocurrency miners. Reporting from the BBC, these Chinese miners began migrating to Kazakhstan, Russia and North America. These miners are known as 'Bitcoin Refugees'. Chinese cryptocurrency mining company, Pooling, relocated to Texas, South America due to political considerations as well as energy costs. The first

Governor of Texas, Gregg Abbot is a supporter of cryptocurrencies. Then second Texas is the region with the lowest energy costs due their electric grid. The migration that occurs is not like a migration, but the only thing that moves is a crypto mining tool. The tool moves to another area and will consume the energy in that area. This explains why the Bitcoin Miners US graph increased when the China ban was released.

3.2. Campaigns against Crypto Mining

As previously explained, we can see that mining Bitcoin has a bad impact on the environment, especially for the climate. Many researchers have conveyed how bad the effects of mining are on climate change, but even though mining Bitcoin has existed for several years, people are new to realize that in 2021, starting after 2021 people began to carry out campaigns to voice how dangerous mining Bitcoin was. Why mining Bitcoin can be dangerous? According to the data, the electrical energy or energy consumption needed to mine is very large, so if the energy consumption is large, it will also require a lot of fossil fuels as an energy source.

One who voiced about the dangers of Bitcoin mining to the environment was an article journal written by prof Benjamin Jones from the university of New Mexico in 2020 entitled 'Cryptodamages: Monetary value estimates of the air pollution and human health impacts of cryptocurrency mining'[6]. In this research, Benjamin shows data on how much energy is consumed by crypto miners and how much emissions are generated from these mining activities.

After this research article was read by the public, and also quoted by The Guardians in 2021, then people who were aware of the dangers of this crypto mining activity became more and more and they began to emerge campaign campaigns to make mining more environmentally friendly and even demanded to ban crypto mining activities.

Some of the biggest campaigns that criticize Bitcoin mining for environmental impacts are Greenpeace. Although previously, in 2014, Greenpeace issued a statement that they accepted donations in the form of Bitcoin without knowing that the Bitcoin mining process actually had a bad impact on the environment. And then in 2021 Greenpeace stopped accepting donations in the form of crypto, including Bitcoin for environmental reasons. This proves that before 2021 there are still few people who are aware of the impact of crypto mining on the environment, even Greenpeace did not realize it before it 'booming' in 2021.

Then this issue became crowded, of course Tesla will not accept anymore, Bitcoin especially. Tesla is a company that focuses on developing environmentally

friendly vehicles and renewable energy, so if Tesla doesn't take immediate action against their policies, this could backfire. Even though they announced they were accepting Bitcoin payments in March 2021, it's only been two months and then Tesla said they no longer accept Bitcoin payments due to environmental reasons. After Tesla stopped using Bitcoin as a means of payment, Tesla looked for ways to keep using crypto as payment but environmentally friendly, and then in May 2022 Elon Musk made a statement that Tesla and SpaceX will accept payments using Dogecoin. This is because Tesla considers that mining or transactions with Dogecoin require less energy and lower carbon emissions, making it more environmentally friendly.

Greenpeace and several groups also continue to campaign against mining activities until 2022, the latest campaign is "Change the Code Not the Climate". The campaigns that the brand carries out are in the form of digital advertisements on Wall Street, then in the New York Times, Marketwatch and on social media such as Facebook, Twitter, Instagram. This campaign was funded by five million USD from a billionaire named Chris Larse. In this campaign they are trying to encourage Bitcoin to change its software code, they believe by changing the Bitcoin software code later it will make less energy use and produce less carbon dioxide so it can reduce its impact on the environment. Greenpeace's 'change the code' campaign was trending on Twitter with the hashtag #CleanUpBitcoin. Netizens in these trending hashtags express their concern over Bitcoin's impact on the climate.

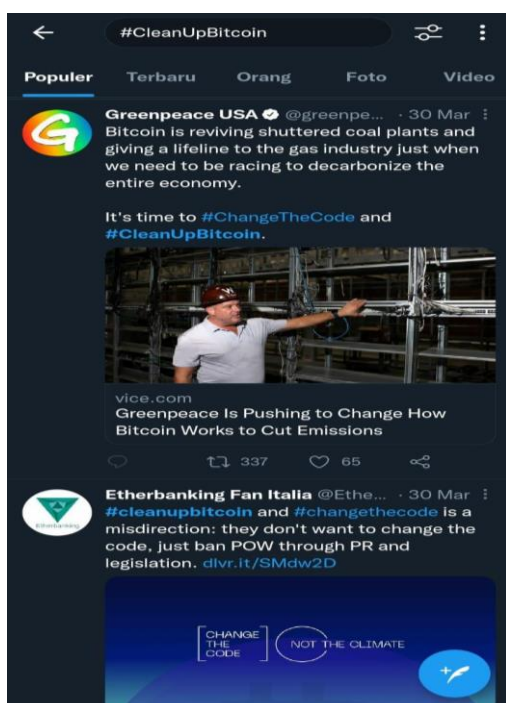


Figure 3 Campaign change the code not the climate at Twitter (Source : Twitter)

In this campaign, Greenpeace supports proof of stake in its use in blockchain, Proof-of-Stake is claimed to be a better model and can reduce energy consumption of Bitcoin mining. Greenpeace asks prominent figures in the crypto world such as Elon Musk to stop transacting or using Bitcoin and also change the software code because Elon Musk has a very influential power in the world of crypto currencies and is responsible for cleaning up Bitcoin.

3.3. US and Paris Agreement

In 2017 Trump in his election campaign said that if he became president of America, he would withdraw America from the Paris Agreement, and it is true that when he became president he announced America was leaving the Paris Agreement on June 1, 2017. However, according to Article 28 of the Paris Agreement, America can't leave the Paris Agreement before 4 November 2020 and after that date the Americas officially leave the Paris Agreement. What is the reason Trump really wants America out of the Paris Agreement? In his speech, Trump said that the Paris Agreement only causes losses to the American economy and benefits other countries. According to Trump, the Paris Agreement has reduced job opportunities and decreased production especially in the coal industry, and the Paris Agreement made America spend a lot of money.

Apart from the economic side, there are also political reasons why America decided to leave the Paris Agreement, because many members of parliament are businessmen and will benefit from the energy mining industry if America leaves the Paris Agreement. If America leaves the Paris Agreement, then they can freely run the energy mining business. The group that supports this policy is from the Republican Party, while the Democratic Party wants America to remain in the Paris Agreement. Conservative parties continue to urge America to withdraw from the Paris agreement, they also refuse to support the development of alternative energy because it will kill their mining energy business. Parties who oppose this policy are those from the democratic party, they want America to be more aware of climate problems, they don't want America to continue to carry out energy mining uncontrolled because it has a bad impact on the environment, they support developing renewable energy, but unfortunately Trump stays on the side of the republican party.

As we can see that Trump and his party members are very pro-fossil energy sources, we can know this from looking at some of Trump's projects related to fossil energy sources like drilling for oil and gas in national forests. Trump's next project is to approve the Keystone XL oil pipeline in Canada, then Trump also plans to open the coastal plains of the Arctic National Wildlife Refuge

for drilling. All these projects are carried out by Trump to continue to produce and run the fossil fuel business. From here we can see that there is a political and business interest in this policy decision.

Previously, it was explained about the influence of mining in politics during the Trump era, so this had an effect on American carbon emission at that time. According to the US Energy Information Administration (EIA), there was an increase in State energy-related carbon dioxide emissions reaching 5.29 Bmt. This is an increase from 2017 which was only 5.14 Bmt. The following years did not reach the 2018 record, where 2019 reached 5.15 Bmt, 2020 was a record low with 4.6 Bmt and 2021 with 4.9 Bmt.

Joe Biden beat Trump in the 2020 election by 273, making him the 46th President of the United States. Unlike the previous administration, Biden has a different direction of government. Previously, the previous administration in the Trump era was concerned with focusing on the fuel business. Biden took a different route. As previously campaigned, Biden has ambitious plans to advance wind, solar, transmission, and other clean energy projects across the country in order to create high-quality jobs and provide affordable, carbon-free electricity. The Biden Government's commitment also can be seen to the issue of Climate Change can be seen from the rejoining of the United States into the Paris Agreement.

On February 19, 2021, the US Department of State officially issued a press statement regarding this rejoin and the US commitment to actively participate in the April 22nd Leaders' Climate Summit and COP 26. Biden himself has formed a team that specifically focuses on environmental issues.

This climate team has established “The Long-Term Strategy of The United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050” in November 2021. The strategy is ready for the COP 26 series and includes transformation points as well as the government's strategy to achieve that goal. The Long Term Strategy also gives the timeline target from US commitment to achieve net zero emissions in 2050. Biden's concern in his climate change project is how the US national effort can launch a system to create jobs by developing modern buildings with sustainable infrastructure to boost clean energy in the future.

3.4. Tesla in Renewable Energy Governance

Tesla has a high demand for employees every year. Tesla produced approximately 306,000 vehicles in the fourth quarter of 2021 and the demand for electric vehicles is growing, with the global market expected to exceed one trillion US dollars in revenue by 2026. With

the need for a large workforce, and in line with the Biden administration's desire to create clean energy jobs, Tesla is one of the companies that can be invited to collaborate to make this Biden's Vision a success.

One of the giant companies that is a centre for the development and use of renewable and environmentally friendly energy is Tesla. Elon Musk has succeeded in making Tesla an inspiring, contemporary and modern company. The inherent characteristic of this company is 'eco-friendly' which can be seen from their Tesla electric car products. Tesla's electric car immediately became the dream vehicle of many people because it did not need fossil energy because it used electric batteries, and then did not produce carbon emissions that pollute the air. However, there is one Tesla policy that contradicts Tesla's "eco-friendly" motto, that is when Elon Musk says that Tesla will accept Bitcoin as a means of payment. This becomes a problem because Bitcoin is considered a crypto currency that has a bad impact on the environment, the Bitcoin mining process requires a lot of electricity as energy, then the mining process produces a lot of carbon emissions.

So how did the public react when Tesla announced that it would accept Bitcoin as a means of payment? Most people are happy with this Tesla's policy, because after Elon issued a statement accepting Bitcoin as payment and stocking up to \$1.5 billion of Bitcoin, the price of Bitcoin immediately increased, because the price of Bitcoin increases drastically automatically people who have Bitcoin will benefit because the selling price increases. Besides increasing the price of Bitcoin, another reason why they support this policy is because they consider this policy a step towards modernization because they started using crypto money.

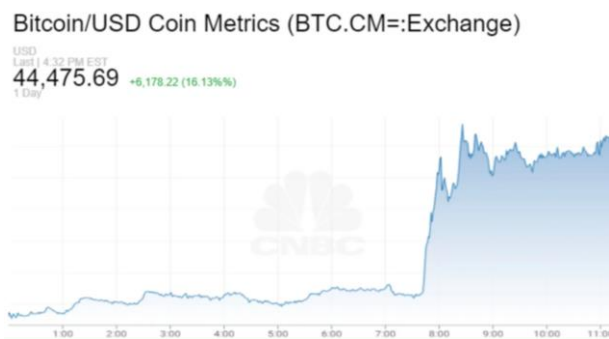


Figure 4 Bitcoin price jumps after Elon's Statement (Source : CNBC)

But there are also people who oppose or disagree with Tesla's policy towards Bitcoin, we can see a lot of people protesting on Elon Musk's tweet when he says 'you can buy Tesla cars using Bitcoin' and the biggest reason why they refuse is because of environmental reasons. This immediately went viral because as we all know Tesla is an environmentally friendly company, but why does Tesla suddenly seem to support Bitcoin? This invites

debate. As mentioned that Bitcoin requires a lot of electricity, electric power comes from fossil fuels, so it can be concluded that Bitcoin consumes a lot of fossil fuels and it is an activity that is not environmentally friendly, moreover Bitcoin produces a lot of carbon emissions which is where increasing carbon emissions will increase the earth's temperature, rising earth temperature causes problems in the climate, one of which is the greenhouse effect. That's the main reason they reject Tesla's policy of accepting Bitcoin as payment, all because of environmental reasons.

In addition to criticism of Bitcoin's impact on the environment, there are also those who criticize why Bitcoin is difficult to stop and continues to grow even to the point of being used as a means of payment by Tesla, according to him, because rich people make money from Bitcoin and cryptocurrency, and that's actually what Elon Musk did.



Figure 5 Protest against Tesla accepting Bitcoin (Source : Twitter)

But this policy only worked for 2 months and then Tesla announced it no longer accepts Bitcoin for environmental reasons. From Elon Musk's statement, what does Elon Musk really want? What Elon Musk really wants is to make Tesla an environmentally friendly company that looks to the future as much as possible, including its transactions. Transactions with cryptocurrencies are considered more environmentally friendly than using money or bank, that's why Tesla announced that it accepts payments with Bitcoin, but there was one mistake that Elon made, that he doesn't know that Bitcoin isn't that eco-friendly. Then after Elon

realized and many are doing campaigns, he no longer accepted Bitcoin. From this we can conclude that what Elon wants is an 'environmentally friendly crypto currency', how to make crypto that is environmentally friendly? by 'Eco-friendly mining'. Eco-friendly mining is crypto mining that does not use energy from fossil fuels but with renewable energy such as sunlight, besides that it produces fewer carbon emissions. Well, this is Elon Musk's target, that is developing eco-friendly mining and when eco-friendly mining has developed, Bitcoin mining no longer requires large fossil energy, so the reason not to use Bitcoin will disappear because it uses renewable energy and Bitcoin that has been in stock by Tesla previously can be played back on the crypto market.

Tesla Cumulative Net Energy Impact
2012-2021 (TWh)

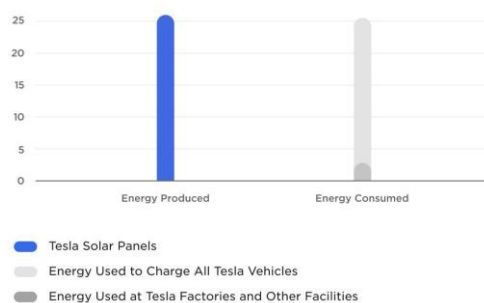


Figure 6 Tesla Energy Produced and Consumed in 2020-2021 (Source: Tesla)

Tesla is intensively developing renewable energy sources, this can later be used for mining crypto including Bitcoin because it uses renewable energy so it's no longer a problem. You could say that the Tesla project to develop this renewable energy source is an investment because it will bring huge profits to Tesla if Bitcoin mining is able to use renewable energy, the excuse for not using bitcoin is gone, as we all know Tesla has a lot of Bitcoin in stock. Tesla's investment project for the development of renewable energy sources is called Megapack. Megapack is a battery that has a super large energy storage capacity and its source comes from renewable energy such as solar light. Megapack can briefly be called a provider of environmentally friendly electrical energy, so it doesn't matter if the electrical energy is used for Bitcoin mining because the source is renewable energy so it's eco-friendly. Where has the Megapack been built? Tesla has implemented projects in Australia, Texas, and Alaska. With the rapid development of renewable energy projects, Bitcoin mining will no longer be a problem.

As a pioneer electricity vehicle company that produces clean energy engines, Tesla already has Solar Panels that have generated more electricity than has been consumed by our vehicles and factories between 2020

and 2021 (See Figure 6). As the largest vehicle electricity company, Tesla is the right field for Biden to cooperate in running the climate change project. The Biden Administration is preparing the U.S. The Renewable Fuel Standard (RFS) to make it a tool for electrifying the nation's automobile fleet is one of Biden's priorities in the fight against climate change, which Tesla, a major clean energy company, has been contacted for guidance on developing this policy. Additionally, Tesla has won a contract with NASA for a \$2.9 billion contract to build a spacecraft through SpaceX. SpaceX is a satellite and space manufacturing company founded by Elon Musk in 2002. Responding to Tesla and Musk's Clean Energy stances, SpaceX is starting a program to take CO₂ out of the atmosphere and turn it into rocket fuel. With the presence of several work plans that the US government is ogling, Tesla has an important contribution to make in the formulation of US policy.

4. CONCLUSION

Since Elon Musk tweeted that Tesla stopped using Bitcoin as a transaction due to the company's vision of Clean Energy, cryptocurrency has become a topic of discussion and research. However, several countries previously prohibited the use of Bitcoin, both for transactions and mining. The ban was enacted due to the high energy demand for cryptocurrency mining machines. Energy demand has an impact on the environment because it requires a lot of resources. This is, of course, a threat to a country. With the Biden administration's emphasis on environmental issues, Tesla is a promising option for several US power plans. Tesla, which has a longer track record in the field of electric vehicles, is currently developing solar-powered technology to provide more environmentally friendly energy. There is a possibility that in the future, Elon Musk and Tesla can dominate the global green vehicle demand

REFERENCES

- [1] Y. Song, J. Sun, S. Zheng, W. Zou, Whether Cryptocurrency is a Tool of Investment?, in *Advances in Economics, Business and Management Research*, Proceedings of the 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022), vol. 648, 2022, pp. 1398 DOI: <https://doi.org/10.2991/aebmr.k.220307.229>
- [2] P. Dauvergne, J. Lister, Big brand sustainability: Governance prospects and environmental limits, Liu Institute for Global Issues, University of British Columbia, 6476 NW Marine, Vancouver, BC V6T 1Z2, Canada, 2012, pp. 36-45 Doi: <https://doi.org/10.1016/j.gloenvcha.2011.10.007>
- [3] B. A. Jones, et al., Cryptodamages: Monetary value estimates of the air pollution and human health impacts of cryptocurrency mining, *Energy Research & Social Science*, vol. 59, 2020, pp. 786-789, <https://doi.org/10.1016/j.erss.2019.101281>
- [4] A. N. Q. Huynh, D. Duong, Tobias Burggraf, Hien Thi T. Luong, and Nam H. Bui, Energy Consumption and Bitcoin Market. *Asia-Pacific Financial Markets* vol. 29, 2021, pp. 79-93. DOI:10.1007/s10690-021-09338-4.
- [5] M. J. Krause, and Thabet Tolaymat, Quantification of energy and carbon costs for mining cryptocurrencies. *Nature Sustainability* vol. 1 (2) 2018, pp. 711–718. DOI: <https://doi.org/10.1038/s41893-018-0152-7>.
- [6] Jones, A. Benjamin, L. Andrew, Goodkind, and Robert P. Berrens, Cryptodamages: Monetary value estimates of the air pollution and human health impacts of cryptocurrency mining. *Energy Research & Social Science* vol. 59, 2018, pp. 786-789. DOI: <https://doi.org/10.1016/j.erss.2019.101281>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

