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China on Preserving Energy Resilience: An Analysis of China's Carbon Market System

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ABSTRACT

The urgency of energy transition continuously presents itself in various conditions and situations. Within this article, the background used to visualize the problem is of how the energy transition could be achieved whilst still preserving energy resilience. The way to do so is through the implementation of an accurate and effective carbon market system. China, as one of the biggest contributors of energy and carbon emissions, has the urgency to implement said system. This article tries to analyze using the method of qualitative research through the carbon market effectivity—particularly within China's Carbon Market System—that is purposefully one of the most significant efforts to urge energy transition, the issues that are disruptive and harmful towards the projection of results are analyzed. This article seeks to find the core problem and reasonings behind the ineffectiveness of China's carbon market.

Keywords: *Energy transition, energy resilience, carbon market, China, foreign affairs*

ABSTRAK

Urgensi transisi energi terus muncul dalam berbagai kondisi dan situasi. Dalam artikel ini, latar belakang yang digunakan untuk memvisualisasikan masalah adalah bagaimana transisi energi dapat dicapai sambil tetap mempertahankan ketahanan energi. Cara untuk melakukannya adalah melalui implementasi sistem pasar karbon yang akurat dan efektif. Tiongkok, sebagai salah satu kontributor terbesar emisi energi dan karbon, memiliki urgensi untuk menerapkan sistem tersebut. Artikel ini berusaha menganalisa dengan menggunakan metode penelitian kualitatif melalui efektivitas pasar karbon - khususnya dalam Sistem Pasar Karbon Tiongkok - yang ditujukan sebagai salah satu upaya terpenting untuk mendorong transisi energi, masalah-masalah yang mengganggu dan berbahaya terhadap proyeksi hasil dianalisis. Artikel ini bertujuan untuk menemukan masalah utama dan alasan di balik ketidakberhasilan pasar karbon Tiongkok.

Kata Kunci: Transisi Energi, ketahanan energi, pasar karbon, Tiongkok, hubungan luar negeri

Introduction

The energy industry has become one of the most significantly harmful industries in the world. The production of energy is dominated by using fossil fuels, particularly coal and gas, which also produces carbon emissions that harm the environment and the well-being of the planet. The dangers of fossil-based energy has become a global concern, particularly in the midst of the energy crisis. The burning of fossil fuels is damaging the environment, such as intensifying global warming due to the

greenhouse gas effect and severe climate disasters due to the change of the global temperature.[1] Furthermore, carbon emissions are also harmful towards the livelihoods of people, particularly within the health sector. There are severe health impacts due to carbon emissions, such as respiratory illnesses, and even neurological and developmental damage in humans.[2]

Even with these problems and projections identified, fossil-based energy is still used dominantly due to its effectiveness and norm within the industry. In 2022, the global demand for coal was still increasing and it even hit a new record with the demands of 8 billion tonnes of coal all around the world.[3] It has risen up by 1.2% compared to the year before.[4] The demand increase for coal indicates that the industry is still struggling to transition towards a more sustainable resource. While these problems exist, the urgency for countries to focus on transitioning towards a more sustainable alternative to fossil is very high. There are countries who have been successful in intensifying their energy transition, especially European countries. In 2021, only 2 countries of the European Union (EU) are still producing hard coal as their main source of fuel.[5] While countries in the EU are dependent on fossil fuels by generating them from other countries,[6] fossil fuels demands in Europe are continuously decreasing year by year. As of 2023, European countries are the least carbon emitting countries in the world. One of the ways that European countries are able to control their carbon emissions and minimize the usage of fossil fuels is through the implementation of an effective carbon market system. The system will serve as an instrument for countries to control their carbon emissions, and in the long-run, it can become the tool to eliminate carbon emissions for good.

The carbon market system, if implemented collectively and collaboratively, can become the solution to the global energy transition that is urgently needed. Countries with big significance in the energy industry should identify their capabilities and be aware of the impacts that they could create. In the Copenhagen Climate Summit, 2009, China was blamed for being the destroyer of the world commitments in reducing carbon emissions. This brought China into a more dilemma situation because of its rising economic development.[7] Back then in 2011, China was seen to be serious by implementing a domestic policy known as the Pilot Carbon Market. The Paris Summit known as the Paris Agreement showed the emphasizing of China's role as a leader to energy transition commitment, supported by the Pilot Carbon Market System implemented in 2011. The proof of China's commitment to reduce carbon emissions was also shown in 2016 when they claimed to implement a new strategy of its economic development called the new normal as they try to decrease the carbon emissions with the

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[1] Rebecca Lindsey, "Climate Change: Atmospheric Carbon Dioxide | NOAA Climate.gov," www.climate.gov, June 23, 2022, https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide#:~:text=Without%20carbon%20dioxide%2C%20Earth.

[2] EIA, "Coal and the Environment - U.S. Energy Information Administration (EIA)," www.eia.gov, December 1, 2020, https://www.eia.gov/energyexplained/coal/coal-and-the-environment.php#:~:text=Several%20principal%20emissions%20result%20from.

[3] IEA, "The World's Coal Consumption Is Set to Reach a New High in 2022 as the Energy Crisis Shakes Markets - News," IEA, December 16, 2022, https://www.iea.org/news/the-world-s-coal-consumption-is-set-to-reach-a-new-high-in-2022-as-the-energy-crisis-shakes-markets.

[4] International Energy Agency, "Coal," 2022, https://iea.blob.core.windows.net/assets/91982b4e-26dc-41d5-88b1-4c47ea436882/Coal2022.pdf.

[5] Eurostat, "Coal Production and Consumption Statistics - Statistics Explained," Europa.eu, 2014, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Coal_production_and_consumption_statistics.

[6] Ibid.

[7] Gørild Heggelund et al., "China's Development of ETS as a GHG Mitigating Policy Tool: A Case of Policy Diffusion or Domestic Drivers?," *Review of Policy Research* 36, no. 2 (January 23, 2019): 1, https://doi.org/10.1111/ropr.12328.

implementation of China's Carbon Market System.[8]

Within this paper, the country in mention is China, as China is one of the biggest contributors of carbon emissions. Therefore, the urgency for China to systemize their carbon market is big. China has the tremendous potential of becoming the frontrunner in implementing an effective carbon market system because of its gigantic carbon emission—China is one of the biggest carbon emitters in the world. A working paper exploring China's total accumulation of carbon emissions in 2021 has raised into 25.7% of the world total which claims its position to be the world's largest emitter, on the other hand the EU which consist of 27 states existed only for about 7,8% of world totals.[9] If China is able to control their carbon emissions, the energy transition towards a more sustainable option will be boosted. The impacts that carbon emission produce can be controlled and mitigated as much as possible.

As if knowing the problems that occur, China has tried to implement their systems of carbon market. Since 2017, up to seven carbon markets have been introduced locally.[10] In 2019, the government of China has proposed the national system of carbon market.[11] However, such projected impacts that China should have are still untenable. China's energy consumption on coal was increased by 2.7% up until 2022.[12] This condition proves that the system that China implemented has not come to an effective result.

In the attempt to find **Why China's carbon market is ineffective in preserving energy resilience,** this paper will explore the effectiveness of China's efforts on implementing a carbon market which theoretically would control the gas emissions that are produced by companies. Furthermore, this paper will analyze the contradiction between China's interest in achieving energy resilience but at the same still increasing coal consumption that builds up carbon gas emission. In support, this paper will also seek recommendations of how the carbon market in China can be implemented.

Theoretical Framework

This paper explores the issued matter using a qualitative method that answers the proposed question descriptively. The research will revolve around comparison of countries who have efficiently implemented a carbon market that affects their energy resilience in the industry and China's condition on their carbon market system. This method will see the effectiveness of carbon markets by correlating it with the gas emission reduction that a country is able to perceive. For the case study of China, this paper will explore systems that have been implemented and seeing the obstacles create difficulties for the system. The needed data will be retrieved using internet-based research, exploring archives, and document-based research through printed and online books, scientific journals, reports from official institutions which then will be analyzed to answer the proposed research question.

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[8] Ibid., 2.

[9] FONDAZIONE ENI ENRICO MATTEI WORKING PAPERS,
"Comparison between China, the EU and the USA's climate and energy governance: How policies are made and implemented at different levels.", https://services.bepress.com/cgi/viewcontent.cgi?article=2369&context=feem

[10] Ankita Kumari, "How Can Carbon Markets Accelerate Singapore's Energy Transition?," www.arup.com, accessed May 18, 2023, https://www.arup.com/perspectives/how-can-carbon-markets-accelerate-singapores-energy-transition.

[11] Ibid.

[12] Niu Yuhan, "China's Energy Use in 2022," China Dialogue, March 2, 2023, https://chinadialogue.net/en/digest/chinas-energy-use-in-2022/.

The perspective of Domestic Politics on Foreign Affairs can be used to analyze reasonings of why China's carbon market is still stagnating. James Fearon identified that the scope where the heads of government authority are responsible for is heavily defined by the political system.[13] James Fearon differentiates the terminology of systemic theories explained by Waltz and the function of Domestic Politics in order to achieve foreign policies. Fearon describes states as a non-unitary system that includes a lot of variables that explain Why country X makes a Y move in terms of foreign affairs unlike the systemic theory which defines state as a unitary actor. In conclusion, the attempts of Fearon propose an idea of political reasonings thus explaining why China is still unable to preserve energy resilience regarding carbon market implementation.[14]

There are some indicators that practically explain the reasons why the carbon market in China is still unable to strive in achieving energy resilience including rationality, and acceptability in the domestic system. Seeing the political system where China's head of state and government is focused under the Communist Party of China, the development of the carbon market will be heavily dependent on the values that the Party is striving upon. Furthermore, the goal of China's policies is on preserving independence, sovereignty, and territorial integrity which makes it hard for western values and activities, such as the carbon market, to strive, especially when using the western model.

Literature Review

In order to achieve global development, the international society jointly admitted sustainable energy as one of the most important instruments to end the energy crisis. The use of fossil fuels has always been a problem during the energy crisis. The inability to reconcile the energy demand and push the usage of renewable energy result in a policy to reduce carbon footprints which is the carbon market. The Carbon Markets work by implementing a monetary value on carbon emissions, and enforcing companies to own Carbon Permits with a high tax. It also fulfills a policy that appreciates companies who implement renewable energy as their main sources. [15]

The Carbon Market has been spotlighted by the EU as the main instrument of energy transition. The EU under the order of Ursula Von der Leyen as the new president commission enforces the usage of Carbon Market by both strengthening the price of Carbon Permits and reducing the quantity of carbon emission cap.[16] As an example, The European Union Emissions Trading System (EU ETS) is the biggest Carbon Market in the world and has been operating since 2005. The Carbon Market's mechanism covers over 11.000 power plants and industrial installations across 31 countries, including all 27 EU member states. According to a report by the European Commission, the EU ETS has reduced emissions by over 1 billion tonnes of CO2-equivalent since its inception. It substantially decreased the usage of fossil fuels and increased the implementation of renewable energy.[17]

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[13] Ibid.

[14] James D. Fearon, "Domestic Politics, Foreign Policy, and Theories of International Relations," *Annual Review of Political Science* 1, no. 1 (June 1998): 289–313.

[15] Majid Mirzaee Ghazani and Mohammad Ali Jafari, "The Efficiency of CO2 Market in the Phase III EU ETS: Analyzing in the Context of a Dynamic Approach," Environmental Science and Pollution Research 28, no. 61080–61095 (June 24, 2021), https://doi.org/10.1007/s11356-021-15044-5.

[16] Badr Eddine Lebrouhi et al., "Energy Transition in France," Sustainability 14, no. 10 (May 11, 2022): 5818, https://doi.org/10.3390/su14105818.

[17] European Commission, "Market Stability Reserve," climate.ec.europa.eu, n.d., https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/market-stability-reserve_en.

Another great mark happened in South Korea where they implemented The Korean Emission Trading Scheme back in 2015. Based on the environment ministry, the Korean Emission Trading Scheme has achieved a decline of carbon footprints.[18] The cap mostly covered two-thirds of South Korea carbon footprints. By implementing the program, in 2015 South Korea achieved about 3,2% carbon footprints reduction, 2,6% reduction in 2016, and 1,1% reduction in 2017 which represent a few increases of renewable energy usage.[19] In New Zealand, ETS has succeeded in reducing the usage of fossil fuels and replacing it with electricity generators based on New Zealand's emission target.[20]

In a few countries, there are several cases of Carbon Market Failures. The failures include the damage on the local citizens and environmental damages caused by the fossil fuel extraction which is supported by a lot of carbon license provisions. On the other hand, the implementation of the ETS system will decrease the value of companies with low productivity because the ETS System will increase its production cost and decrease the quantity of the products. In China, The carbon market license led companies to choose either to invest in the new technology of renewable energy or buy the carbon license to legalize the usage of fossil fuels. A lot of studies have concluded that there is a negative relationship between the Carbon Market policy and enterprise's output. An article called "Effects of Carbon Emission Trading on Companies' Market Value: Evidence from Listed Companies in China" claimed that enterprises could possibly face additional costs which can ruin enterprises' cashflow. Enterprises with a high level of income will pass the dilemma because they have enough cash flow to increase the additional cost.[21]

As China now holds the position as the biggest industrial country in the world, China also holds the position as the biggest greenhouse gas emitter in the world.[22] The title makes China's action in transitioning to clean energy impactful to other countries, such as the United States of America.[23] In 2011, Jane A. Leggett highlighted in the article "China's Greenhouse Gas Emissions and Mitigation Policies" that in slowing the effects of climate change, China's actions of emissions reduction are significant.[24] The responsibility that China has in tackling climate change is big, especially because the implications of their actions will affect various countries all over the world.[25]

In the article of "Spatial Heterogeneity of Factors Influencing CO_2 Emissions in China's High-Energy-Intensive Industries," Shijie and colleagues dove into the factors that indicate the rising demand for energy in China which is directly linked to the rising gas emissions in China.[26] This phenomenon is

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[18] Asian Development Bank, "THE KOREA EMISSIONS TRADING SCHEME Challenges and Emerging Opportunities NOVEMBER," November 2018, https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf.

[19] Sung-Hyun Jun, Jee Young Kim, and Hyungna Oh, "Evaluating the Impact of the KETS on GHG Reduction in the First Phase," *Environmental Economics and Policy Studies* 23, no. 3 (March 6, 2021): 613–38, https://doi.org/10.1007/s10018-021-00302-0.

[20] Ministry for the Environment New Zealand, "Proposed Changes to New Zealand Emissions Trading Scheme Limit and Price Control Settings for Units 2022," December 2022, https://environment.govt.nz/assets/publications/ets-unit-settings-summary-of-submissions.pdf.

[21] Maogang Tang et al., "Effects of Carbon Emission Trading on Companies' Market Value: Evidence from Listed Companies in China," *Atmosphere* 13, no. 2 (January 30, 2022): 240, https://doi.org/10.3390/atmos13020240.

[22] Jane A Leggett, *China's Greenhouse Gas Emissions and Mitigation Policies* (Hauppauge, 2011), p. 534.

[23] Ibid., p. 535.

[24] Ibid., p. 536.

[25] Ibid., p. 537.

[26] Shijie Yang et al., "Spatial Heterogeneity of Factors Influencing CO2 Emissions in China's High-Energy-Intensive Industries," *Sustainability* 13, no. 15 (July 25, 2021): 8304, https://doi.org/10.3390/su13158304, p. 2.

supported by the fact that 80% of China's economy is filled by high-energy-intensive (HEI) industries, such as petroleum refining and coking, mining industries, and others.[27] Shijie and colleagues mentioned different efforts that China needs to take in order to tackle the rising amount of energy demand to reduce the CO_2 emissions in achieving the 2015 Paris Agreement target of Net-Zero.[28]

China has the capacity to influence all nations in the implementation of an effective carbon market system. The introduction of a nationwide carbon market system—so-called, Emissions Trading Schemes (ETS) could accelerate China's capability on a clean energy revolution that will have global implications.[29] China's ETS should become a major climate policy tool in executing the low-carbon strategy as mentioned in China's Nationally Determined Contributions (NDCs)—of the 2015 Paris Agreement—in achieving the Net-Zero target of 2050.[30] According to the International Energy Agency's report, China's ETS could also co-exist with current policies that will not harm the energy industry significantly.[31] The specific goal of China's ETS implementation is to reduce overcapacity and minimize the environmental footprint of coal usage in the energy industry.[32]

An effective carbon market could enhance liquidity of carbon credits and even contribute to the excitement of enterprises to participate in the market.[33] The problem that China faces in implementing the carbon system varies, but it stems from the fact that there is no standardized system to implement nationally.[34] In China, due to the absence of the national system as a guidance on the implementation, different local legislations of different local offices become an obstacle in executing an efficient carbon market system.[35] This problem occurs specifically when there are different market proposals coming from different regions of China that only submit to the local rules and regulations, as mentioned by Yifei and Dong in "China's Carbon Market Development and Carbon Market Condition.[36]

As China has introduced its national carbon market system in 2020, there are still difficulties which China suffers from in implementing the system efficiently. Haiqing and Xue highlighted several problems of this process in "China's Carbon Market in the Context of Carbon Neutrality: Legal and Policy Perspectives." Firstly, not all enterprises are deemed fit to participate in the market which makes them immune to the policies and regulations set of this system.[37] Secondly, China's process of allowance allocation is regionally imbalanced that leads to unfair quota transactions between

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[27] Ibid.

[28] Ibid., p. 21.

[29] IEA, "China's Emissions Trading Designing Efficient Allowance Allocation," n.d., https://iea.blob.core.windows.net/assets/d21bfabc-ac8a-4c41-bba7-e792cf29945c/China_Emissions_Trading_Scheme.pdf, p. 5.

[30] Ibid.

[31] Ibid., p. 7.

[32] Ibid.

[33] Yifei Hua and Feng Dong, "China's Carbon Market Development and Carbon Market Connection: A Literature Review," *Energies* 12, no. 9 (May 1, 2019): 1663, https://doi.org/10.3390/en12091663, p. 1.

[34] Ibid., p. 4.

[35] Ibid.

[36] Ibid., p. 10.

[37] Haiqing Hao and Xue Yang, "China's Carbon Market in the Context of Carbon Neutrality: Legal and Policy Perspectives," *Sustainability* 14, no. 18 (September 11, 2022): 11399, https://doi.org/10.3390/su141811399, p. 11.

enterprises.[38] In addition, the consequences of not submitting to the carbon market system are relatively light in that it does not produce pressure for enterprises to fulfill their compliance.[39]

As mentioned by Haiqing and Xue, China has previously introduced the carbon market nationally. However, the problem there still needs to be addressed is the policy and regulation in regards to implementing an effective carbon market system. Through the article "Does China's Pilot Carbon Market Cause Carbon Leakage? New Evidence from the Chemical, Building Material, and Metal Industries," Cong and colleagues identified that China still has various contradicting policies of implementing the carbon market system. There are still various problems that China's government fails to address, such as the possibility of carbon leakage.[40] Carbon leakage is a condition where enterprises could transfer production to other countries and/or regions with less discipline of executing their carbon regulations[41] which means that the effect of emissions reduction cannot be achieved.[42] This problem is due to an imbalance in environmental policies of China.[43]

This paper argues that the problem within China's carbon market lies heavily on domestic issues that are yet to be addressed. Although China has undergone a trial session with the pilot carbon market systems since 2014 until the national carbon market system was conducted in 2017, there is still a lack of integration between domestic values, systems, and policies that makes coordination in the market hard to be controlled and monitored. The domestic issues that China faces will be explored thoroughly while also projecting the impacts of carbon market system implementations.

Analysis

Carbon market serves as a governmental instrument to control carbon emissions by making them a part of the economical market.[44] Through the carbon market, the government sets the limit of how much carbon an enterprise can produce by using the carbon licenses, which then becomes their physical right to produce a particular amount of carbon. There are two types of systems for enterprises to obtain said carbon licenses. The first one is where the government is allocating a quota of carbon licenses to participating enterprises. The quota allocation comes from activities of avoidant, reduction, and/or removal of carbon emissions that are done by enterprises, such as renewable energy technology installations, clean cooking stoves, and many more. While the other system is where an enterprise is able to purchase carbon licenses from another enterprise—an enterprise is able to sell their carbon license when their carbon production is less than the amount of right they attain through their carbon license. Through this system, the national carbon production will be controlled and managed and the end goal of this system is to reduce the amount of carbon produced by enterprises. This way of carbon control is inline with the Kyoto Protocol target of Net-Zero because when there is no more production

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[38] Ibid., p. 13.

[39] Ibid.

[40] Jianhui Cong et al., "Does China's Pilot Carbon Market Cause Carbon Leakage? New Evidence from the Chemical, Building Material, and Metal Industries," *International Journal of Environmental Research and Public Health* 20, no. 3 (January 19, 2023): 1853–53, https://doi.org/10.3390/ijerph20031853, p. 2.

[41] European Commission, "Carbon Leakage," climate.ec.europa.eu, accessed May 19, 2023, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage_en#:~:text=Carbon%20leakage%20refers%20to%20the.

[42] Cong, et al., "Does China's Pilot Carbon Market Cause Carbon Leakage?" p. 2.

[43] Ibid., p. 3.

[44] Charlotte Owen-Burge, "Carbon Credits and the Energy Transition: An Investor Perspective," Climate Champions, November 7, 2022, https://climatechampions.unfccc.int/carbon-credits-and-the-energy-transition-an-investor-perspective/.

of carbon, industries no longer use carbon technology and the energy transition towards sustainability has been achieved.

Furthermore, carbon markets can also encourage innovations for new and modern technologies that use renewable resources. The carbon market serves as a limitation of movement for enterprises to produce carbon emissions.[45] The more an enterprise is able to reduce their carbon emissions, the more flexibility they have to gain economical benefits through the carbon license trading which is the result of the carbon markets becoming incentives for companies to create new innovations on achieving energy resilience.

a. China's Current Carbon Market System

Since 2013, China has gradually built and implemented their pilot carbon market systems, starting from the Shenzhen Carbon Market—also called the Shenzhen Carbon Emissions Trading Pilot— followed by seven other pilot systems, Shanghai system, Beijing System, Guangdong System, Tianjin System, Hubei System, Chongqing System, and Fujian System.[46] The Shenzhen System has achieved a major development in China which is identified as a great start to shape the national carbon market system.[47] Each pilot system has been able to strive in controlling enterprises in the carbon production within their region of implementation.

In the first periode, Shenzhen System ordered any enterprises to report the amount of carbon emissions that they have created while also including the National Third Party in the system to verify the reports.[48] The implementation of the system within the Shenzhen System is very similar to the ideal carbon market with some enterprises with lower emissions production regarding their allowances could get emission surplus in the next year, or sell the rest of allowances to other enterprises. By the end of 2016, the Shenzhen System successfully controlled 635 enterprises with 18% reduction rates compared to 2010.[49] The Shenzhen System also uses policy instruments to prevent any objections such as implementing the Shenzhen Special Economic Zone on Carbon Emission.[50] In addition, the Shenzhen System has achieved around 2.173 billion yuan of accumulative transactions with 133.09 million tons of carbon trading by 2017.[51] Due to these massive developments and results, in 2017, China gradually released several pilot carbon market systems as a new sequel of the Shenzhen System.[52] These pilot systems were also the lead to the creation of a national system that supersedes other pilot systems, which means that a centralized system that overlooks other pilot systems. The national carbon market included allowances allocations based on plant generation output that is also supported by the release of a new

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[45] "How Can Carbon Markets Accelerate Singapore's Energy Transition?," www.arup.com, n.d., https://www.arup.com/perspectives/how-can-carbon-markets-accelerate-singapores-energy-transition.

[46] International Carbon Action Partnership, "China National ETS | International Carbon Action Partnership," icapcarbonaction.com, 2021, https://icapcarbonaction.com/en/ets/china-national-ets.

[47] Ibid.

[48] Lu Li, Jie Dong, and Yan Song, "Impact and Acting Path of Carbon Emission Trading on Carbon Emission Intensity of Construction Land: Evidence from Pilot Areas in China," *Sustainability* 12, no. 19 (September 23, 2020): 7843, https://doi.org/10.3390/su12197843.

[49] Ibid.

[50] Ibid.

[51] Ibid.

[52] Ibid.

regulation in 2021 on the implementation of a new transparent system which is the online market transaction of Emission Allowances.[53]

While the pilot carbon market systems were practically succeeding in efforts to control enterprises on submitting to the carbon emissions regulation regionally, the effort of centralizing the control of carbon emissions are still reluctant to happen. The implementation of different carbon market systems in each region creates uneven regional development and imbalance of industrial structures. Each pilot carbon market system has their own economic power and geographical locations with different characterizations for every region. In the end, the implementation of the national carbon market often neglects differences in the economic, social, energy, and environmental aspects of China's provinces and cities.[54] In addition, due to the pattern and habit of enterprises to submit within the regional pilot carbon systems, the national carbon market system is having a hard time to push countries in submitting towards the centralized one.

In the centralized national carbon market system, the proposed system is a mandatory carbon market where the regulatory authorities issue annual emission quotas that are redacted year per year. If an enterprise produces more carbon emissions than their right to produce, they have to purchase extra quotas from other participating enterprises that creates a surplus in their quota.[55] In addition to the mandatory carbon market, China's national carbon market system also proposed a voluntary carbon market where enterprises are able to receive additional economic and corporate social responsibility benefits when they sell China-approved self-reduction carbon technologies.[56] The problem that occurs within these two systems is that it may not be attainable for developing enterprises that need support in getting resources and technology that sometimes supersedes the system of carbon market. Only enterprises within the Shenzhen and Beijing Systems are able to fulfill the national requirement of the carbon market because the national system is supplemented by local rules and regulations. However, the other six pilot systems do not have similar rules and regulations which makes it hard for them to adapt towards the national system. As a result of this issue, enterprises overlook the national carbon market system, rather continuing to follow the simpler system within the regional carbon market.

The lack of voluntary submission towards the national carbon market system is also complemented by the absence of national guidelines in proceeding with the carbon market. The only national legislation that is ratified to serve as a guideline and regulation is the Interim Measures for the Administration of Carbon Emission Trading.[57] While only serving as an interim measure, it is the only regulatory framework of the central government that lacks a regulatory framework and a legal supervisory system.[58] Therefore, no practice of management and supervision is delegated by the government which results in the indiscipline of participating parties. As a result of these conditions, the proposal of a national carbon market cannot be fulfilled to the maximum potential and is left to the

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[53] Cheng Wang et al., "The Policy Effects and Influence Mechanism of China's Carbon Emissions Trading Scheme" 14, no. 12 (August 30, 2021): 2101–14, https://doi.org/10.1007/s11869-021-01081-z.

[54] Yifei Hua and Feng Dong, "China's Carbon Market Development and Carbon Market Connection: A Literature Review," *Energies* 12, no. 9 (May 1, 2019): 1663, https://doi.org/10.3390/en12091663.

[55] Haiyun Song, Xiaoxuan Zhang, and Gao Zhang, "The Development and Problems of China's Carbon Market," *IOP Conference Series: Earth and Environmental Science* 440, no. 4 (February 1, 2020): 042100, https://doi.org/10.1088/1755-1315/440/4/042100.

[56] Ibid.

[57] Ibid.

[58] Ibid.

uninterested parties which makes the system irrelevant on achieving the global commitment of Net-Zero that China has submitted into.

Compared to the EU Emission Trading Scheme, there are several factors that emphasize the ineffectiveness of China's pilot trading scheme. The factors are the lack of advancement on quota assignment policy, as an example The EU ETS has accurately collected emission volume of enterprises, while on the other hand China with the pilot carbon market system is still unable to collect accurate emission volume.[59] Second, the implementation of China's Pilot Carbon Market System created a distinction level for each region. The Hubei Carbon Market and Guang Dong Carbon market created an improved development referring to active transactions and more strict regulations, on the other hand Shenzhen, ShangHai, and BeiJing stand on the intermediate level in terms of transactions and strict regulations. Most importantly, reports indicate that China's Pilot Carbon Market System is still in an early stage which most likely faces several troubles compared to the EU such as lack of quota assignment, lack of market determination, and ineffective policy support.[60] Most importantly, unlike The EU ETS, China's Pilot Carbon Market is still unable to encourage the enterprises to fulfill the urgency of carbon trading mechanisms. These factors also have its interconnections to the improvement of market liquidity, lack of effective regulations, and accurate emissions that affected the improvement of transactions.[61]

Seeing such challenges that occur within the implementation of China's national carbon market that focuses on the absence of sense of belonging and urgency coming from the national government, indicators within the theoretical framework of Domestic Politics on Foreign Affairs—Rationality; and Acceptability in the Domestic System.

b. Rationality of State Leader

As the largest carbon emitter, China's dependence on coal is one of the fundamental issues that has to be ended. In 2017, it was noted that China's Dependence on Coals has reached 67%. At the same time, it indicates that coal is still the main source of energy including most of the electricity power generation, chemical industries, and commercial activities that have their own interconnection to economic growth. China's coal dependence also creates a lot of detrimental effects to the environment, specifically contributing to the increase of carbon emissions. On the other hand, after Deng Xiao Ping economic policy reformation, China highly increased its economic growth. Without the existence of coal, China promptly will lose its chance to develop its economic growth through the degradation of industrial productivity. As research stated, the more dependent China is on coal, the higher China's GDP increases.[62] Coal dependence is also identified as one of the common challenges of carbon market implementation. Another research has explained that the Chinese government targeted to decline its national emission growth and make sure that the emissions is no more than 1%. However, the Chinese industrial sector needs a great energy supply which is dominated by coal. The potential degradation of

[59] Zhang Fang, Hongyuan Fang, and Wenyan Song, "Carbon Market Maturity Analysis with an Integrated Multi-Criteria Decision Making Method: A Case Study of EU and China," *Journal of Cleaner Production* 241 (December 1, 2019): 118296–96, https://doi.org/10.1016/j.jclepro.2019.118296.

[60] Ibid., 12.

[61] Ibid., 12.

[62] Miroslava Zavadska, Lucia Morales, and Bernadette Andreosso-O'Callaghan, "Is China's Dependency on Coal a Threat to Its Economic Development?," February 24, 2020, 23–44, https://doi.org/10.1002/9781119705222.ch2.

its economic growth becomes one of the considerations that needs rational action to take. It must also become an important part that influences the implementation of the shenzhen emission trading scheme as the beginning formulation of China's national Carbon Market.[63] The condition above is also explained by the moment when Xi Jin Ping emphasized that China will not stop the usage of fossil fuels until clean energy implementation is guaranteed to supply the whole nation. Assumptions reported that Xi's motivation of climate change reduction is driven not only by environmental concerns, but also by a behaviour called Green Washing.[64]

Acceptability in the Domestic System

China's domestic system played a big role in the acceptance of the China Emission Trading Scheme. China's constitution arranged the legal framework as "Law of Regional Ethnic Economy" or usually known as LREA. Under the LREA, China constructed five autonomous regions, thirty autonomous prefectures, and about one hundred and twenty counties. The formulations of these regional constructions were built to represent the minority voices in order of policy formulations. The LREA under the Constitution of China regulates two kinds of power distribution for each autonomous area, which is the normal local legislative power and the autonomous legislative power. Basically the local legislative power is held by the Local People Congress known as the LPC and the autonomous legislative power is held by the Local People's Government known as the LPG.[65]

China's domestic regulatory system also affected the implementation of the China Emission Trading Scheme. In 2011-2012 as explained in the introduction part, China announced the existence of seven pilot carbon markets that are proposed to introduce each region to the China Carbon Emission Trading Scheme. The implementation of the China Carbon Market created a lot of contradictions referring to the emission reductions. The trading policy adopted a few types of carbon emissions including rules of grandfathering and benchmarking methods in terms of fitting carbon quota allocations. Under the grandfathering system, carbon market's allowances are determined by the emissions produced by enterprises in the base year. Meanwhile, under the benchmarking system, the amount of emissions is determined by the governments in the compliance period based on industrial benchmark emission intensity and the total of enterprises' outputs. Both methods have their own implications to the enterprises. In the case of China, carbon market pilots involved inconsistent methods of emission quota allocation. The inconsistent methods that are implemented by the Chinese government create inefficiency outcomes on both how enterprises could reduce the carbon emissions and fulfill social requirements on achieving maximum benefits in the context of products. A few findings measuring the effectiveness of benchmarking methods indicate the rise of enterprises' awareness to pay more attention to the emissions and consider renewable energy to be the future of its sustainability energy usage that increases the long term effects of revenue. However, based on the Pilot Carbon Market, the Chinese government has managed to implement benchmarking methods on a few

[63]Feng Dong, Yifei Hua, and Bolin Yu, "Peak Carbon Emissions in China: Status, Key Factors and Countermeasures—a Literature Review," *Sustainability* 10, no. 8 (August 15, 2018): 2895, https://doi.org/10.3390/su10082895.

[64] Tingfa Zhang, Huaying Qin, and Weishuang Xu, "Environmental Regulation, Greenwashing Behaviour, and Green Governance of High-Pollution Enterprises in China," *International Journal of Environmental Research and Public Health* 19, no. 19 (October 1, 2022): 12539, https://doi.org/10.3390/ijerph191912539.

[65] Chunli Xia, "Autonomous Legislative Power in Regional Ethnic Autonomy of the People's Republic of China: The Law and the Reality," *One Country, Two Systems, Three Legal Orders - Perspectives of Evolution*, 2009, 541–63, https://doi.org/10.1007/978-3-540-68572-2_33.

cities that required suitable conditions referring to the EU ETS model. As an example, Guang Dong determined a policy that required all the enterprises to buy at least 3% of carbon permits in 2013. On the other hand, Beijing implemented grandfathering methods to expand diversification for the enterprises to step up in the early phase of the Carbon Market which indicates the discrepancy of the domestic conditions to the benchmarking system.[66]

Recommendations

Seeing the amount of issues that China is facing in implementing an effective national carbon market system, the dominant point that China needs to acknowledge in doing so is to create a strict, standardized, and structural system of execution.

1. Improving the **legal structural framework** for the carbon market system. As mentioned, one of the problems that is occuring is the lack of legal support to serve as a guideline on how the participating countries should submit towards the carbon market system. The importance of the framework is to be used as a base for each region on setting a national standard carbon market system.
2. Implementation of **a standardized quota allocation** towards all of the regional carbon market systems. A standard on quota allocation will create a more equal opportunity and fair market for all participating enterprises which then will result in the improvement of participation. In addition, the usage of industrial benchmarks, rather than the historical benchmark, will make the system more adaptive towards the condition of each enterprise within the system.
3. Emphasizing **the incentives for participating enterprises**, particularly for the voluntary carbon market. The national carbon market system needs all relevant parties to comply within the system. When there are still enterprises who are still reluctant to submit within the system, the goal of implementing the carbon market—control over the carbon emission that eventually leads to the reduction of carbon—cannot be achieved.
4. Making a stricter mechanism in the upholding of **punitive measures**. In accordance with the previous recommendation, a punitive measure serves as an instrument to prevent and repress companies who are reluctant to submit towards the system. The measures themselves can only be upheld when a system of supervision is also implemented. This also means that a designated authority should be appointed in supervising and managing over the dynamics of the carbon market system.

Conclusion

While seeing the emergence of energy transition that continues to accelerate, the carbon market becomes one of the most significant ways of transitioning the energy industry whilst still preserving the resilience of energy. Particularly in China's case as one of the biggest carbon emitters globally, the effort to implement an effective carbon market system of China represents how much the government of China is trying to commit towards the goal itself. Contrary to the commitment of Net-Zero that China has submitted to under the 1997 Kyoto Protocol, efforts to control carbon emissions that are

[66] Yue-Jun Zhang, Ao-Dong Wang, and Weiping Tan, "The Impact of China's Carbon Allowance Allocation Rules on the Product Prices and Emission Reduction Behaviors of ETS-Covered Enterprises," *Energy Policy* 86 (November 2015): 176–85, https://doi.org/10.1016/j.enpol.2015.07.004.

standardized all across the country have not been able to meet the projected target. By using the framework of Domestic Politics on Foreign Affairs, particularly within the indicators of rationality, and acceptability in the domestic system, issues in the carbon market system can be identified into two big groups, distrust of enterprises onto the national carbon market system and the absence of a legal framework on the implementation of the carbon market system. Such problems occur due to the amount of domestic issues that have not been released from the system, especially in the alignment of common interest of a successful carbon market all across the country. Different regional carbon market systems are still dominant, while the national system is left unbothered. Without a clear guidance and standardized legal framework coming from the national government, participating enterprises are not willing to submit to the national system and are only compliant towards the regional carbon market system.

Therefore, amends of those issues need to be addressed and overcome through four pieces of recommendations that this paper offers. Implementation of a legal structural framework to serve as a guidance for the national and regional carbon market, implementation of a standardized quota allocation all across the available carbon market systems, emphasis on the incentives for participating enterprises within the system, and a stricter mechanism of punitive measures in accordance with the legal framework. When China is able to address and overcome said problems and issues, China could then fulfill the position of being the global leader on boosting energy transition while still preserving energy resilience to protect the environment and the society.

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