Article

The Great China Carbon Trading: Political Economy Aspects of Climate Change Governance

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Wahyu Indriyadi[1]

Abstract

This study aims to analyze the political economy aspect of carbon trading markets in China and how it will influence climate change governance. It is essential to understand the underpinning political economy aspects of emerging carbon trading markets in China because China will operate the world's largest carbon market. China's work on carbon trading represents higher requirements for China's national industries and a higher commitment to addressing climate change. This study uses an exploratory qualitative approach to examine the history of carbon trading in China, its political economy aspects, and how China's carbon trading can significantly contribute to climate change. When China launched its national carbon trading scheme in 2021, the size of China's carbon trading became the world's most extensive climate policy scheme. This study shows that China's rigorous environmental policy experimentations to gradually establish carbon trading by implementing the CDM projects, setting up regional carbon trading pilots in six cities, finalizing regulations, and establishing a mechanism for national carbon trading have been successful. The prospect and potential of China's carbon trading are enormous, considering the size of the CDM projects in China, China's position as one of the largest emitters in the world, and the scale of industries included in the national carbon trading scheme in China. However, there are still uncertainties in the prospect of carbon trading in China, historically weak climate policy enforcement, and misreporting of data that can affect the integrity of China's calculation.

Keywords

china; carbon trading; climate change; political economy

Introduction

It is impossible to start this essay without mentioning The Kyoto Protocols, the landmark climate policy that kick-started a new currency in the global political economy. The carbon credits in the carbon trading. Carbon trading represents the sharp shift from command-and-control regulation on climate policy into the market-based approach. Market forces are to determine prices for polluting permits in a volatile trading environment. Carbon trading aims to turn pollution into profit, moving environmental policy into the heart of the world economy (Weeks, 2008).

In 1992, countries successfully signed the United Nations Framework Convention on Climate Change (UNFCCC) and cooperatively considered what needed to be done to limit average global temperature increases and the resulting climate change and ways to cope with the inevitable impacts of climate change were to happen. Four years later, in 1995, UNFCCC countries realized that emission reductions

Corresponding author:

[1] Wahyu Indriyadi, Badan Nasional Penanggulangan Bencana, Jakarta, Indonesia. Email: wahyu.indriyadi@gmail.com

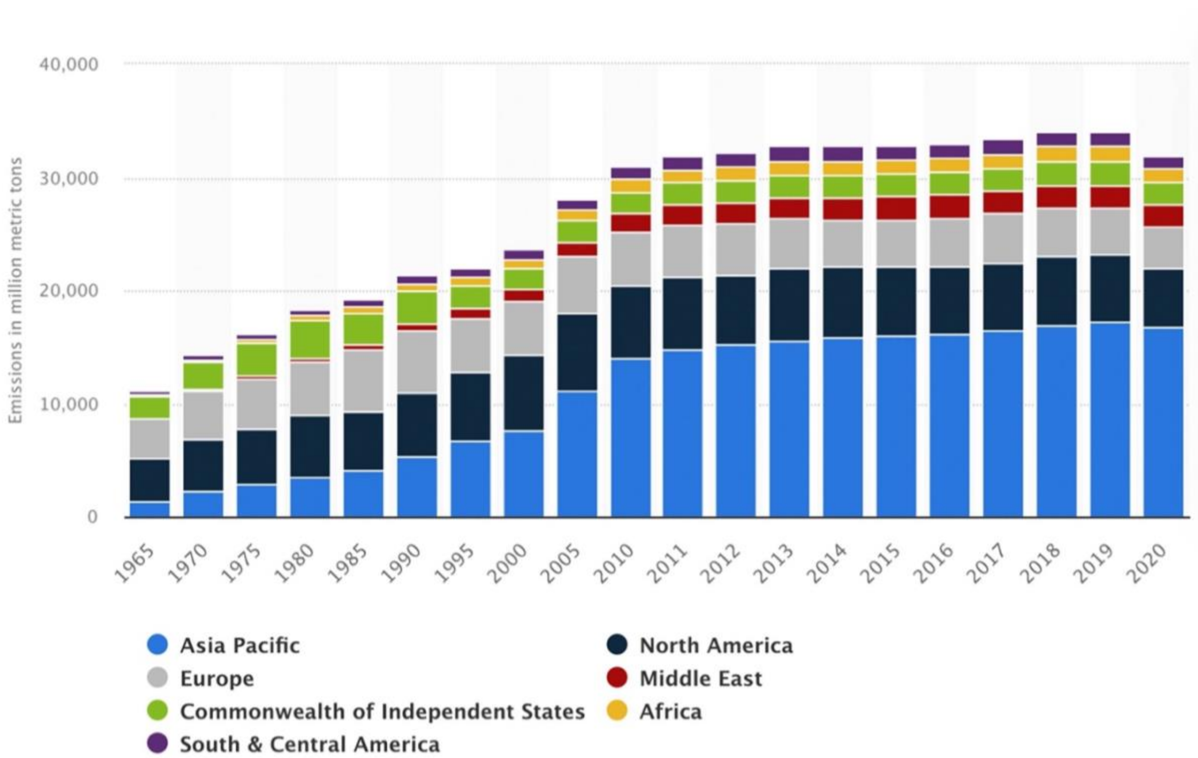
provisions in the Convention were inadequate.

The Kyoto Protocol came into existence as it was the first legally binding mandatory emission reduction target for developed countries. Around 195 parties are already assigned to the UNFCCC, and 192 are committed to the Kyoto Protocol. The first commitment to Kyoto Protocol started in 2008 and ended in 2012. The second commitment period was discussed during the UNFCCC Conference of Parties (COP) in Durban, South Africa, in 2011, and it was agreed to begin on 1 January 2013 and end in 2020 (United Nations Climate Change, 2022).

Kyoto Protocol is one of the most significant achievements of the UNFCCC. The protocol essentially mandated 2 (two) important things. First is the commitment of developed countries to reduce the average emission rate by 5.2% compared to 1990 emission levels. The second is to regulate GHG emission reduction mechanisms implemented by developed countries, namely: (1) Joint Implementation, (2) Emission Trading, and (3) Clean Development Mechanism (CDM).

Joint Implementation (JI) is an emission reduction mechanism whereby developed countries can transfer emission reductions through joint projects to reduce GHG emissions. Emission Trading (ET/ETS) is an emission trading mechanism between industrialized countries, where industrial countries whose GHG emissions are below the permitted limit can sell their excess emission allotment to other industrial countries that cannot fulfill their obligations. The CDM is a mechanism for reducing GHG emissions in cooperation between industrialized countries and developing countries. This mechanism enables developed countries to achieve emission reduction targets through GHG emission reduction programs in developing countries (Böhringer, 2003).

Figure 1. Carbon Dioxide Emissions (in Million Metric Tons) by Region Worldwide from 1965-2020



Source: Statista 2021

Even though China, as a developing country at one time, did not subject to an obligated amount of emission cuts in the Kyoto Protocols, China has started to create its carbon market The emergence of China's carbon trading is an extended and complex process, both domestically and internationally

(Carlson, Robinson, Blair, & McDonough, 2021). After such a long process, on 1 February 2021, China officially launched its carbon trading (ETS) scheme, hailed as the world's most prominent climate policy scheme. Covering a colossal scale with more than 2.225 coal and gas power plants and other facilities, China will tally and report its carbon emissions throughout 2019-2020 and conduct its largest emissions trading scheme in Shanghai (Carpenter, 2021).

Emission cut in China has become a pressing concern because China's emissions increased by +1.2 % on average during the ten years, dominating the global trend, followed by India's emissions, while emissions decreased in the EU and the US in the same period (Friedlingstein et al., 2020; Wardhani, Hamrun, & Putra, 2021). Figure 1 shows that the Asia-Pacific region combined produced more emissions than all other regions in 2020. From around 16.75 billion metric tons of CO2 produced in the Asia Pacific, China alone accounted for almost 60% of CO2 emissions in the region, which is also 31% of the global total. The North American region comes second, emitting 5.3 billion metrics of CO2 in 2020, around 12% lower than 2019 levels.

Considering how dependent China's industry is on coal or fossil fuel which contributes to GHG emission, It is intriguing to examine what has made carbon trading a climate policy of choice in China and what is the prospect of such policy in the climate change governance considering China is one of the biggest polluters in the world. This study aims to analyze the political economy aspect of carbon trading markets in China and how it will influence climate change governance in the world. It is essential to understand the underpinning political economy aspects of emerging carbon trading markets in China because China will operate the world’s largest carbon market. China’s work on carbon trading represents higher requirements for China’s national industries and a higher commitment to addressing climate change. The success of carbon trading in China will significantly contribute to climate change globally.

Methods

This research will use an exploratory qualitative approach. The definition of qualitative research is a research approach that seeks to explore and explore a central problem or phenomenon to understand it (Creswell, Goodchild, & Turner, 1996). The exploratory qualitative research approach was chosen because the emergence of carbon trading in China requires case mapping from various sources and data analysis to produce a narrative conclusion by describing symptoms from cases provided and then generating hypotheses with the aspects and causal arguments.

The steps taken by Author to conduct exploratory qualitative research are case selection, data collection, data analysis, and writing the final report in narrative form. At the data analysis stage, analysis is carried out from the analysis framework, concluding political economy aspects of cutting emissions in China. The author will explore the history of climate change policy in China, using data from books, journals, newspapers, and other sources of publication from 2008 to 2020, covering the development of carbon trading in China during the 11th, 12th, and 13th Five-Year Plan periods in China. The final step is writing a research report where the author is chronologically and thematically presents an in-depth essay about the emergence of the carbon trading system in China.

Discussion and Results

Before carbon trading, CDM projects are China’s shiny new toy. Kyoto Protocol is famous for a breakthrough in managing Global warming called The Flexible Mechanisms or The Kyoto Mechanisms. These mechanisms refer to the CDM, the Joint Implementation (JI), and the Emission Trading (ETS). The CDM and JI are two project-based mechanisms designed to help developed countries to reduce their emission by financing emission friendly projects in developing countries, which will, in turn, create CERs or Certified Emissions Reductions which is carbon credits issued about emissions reductions achieved by CDM Projects (Koh, Lye, & Lin, 2010).

In April 2011, more than 2000 of the 4200 CDM projects registered globally took place in China. CDM projects work in a way that it allows for the transfer and exchange of capital between unrelated locations to manage future emissions that would have been produced. Most carbon offsets acquired through the CDM mechanism are purchased by and through International exchanges by organizations based in developed countries (Europe and the US) from developing countries such as China and India. Standards and requirements for such transactions are credited and regulated by International entities operating out of the sovereign authority of the developing countries that produce and maintain the carbon emissions.

A total sum of 7468 CDM projects submitted to the CDM Executive Board (EB) at UNFCCC is expected to produce 1084 million CERs between 2008-2012 and 5515 million CERs after 2012. As of the end of June 2007, the registered CDM projects hosted by China and India were producing 58% of the expected average annual CERs, and at the end of 2012, 70% of the world's CERs were issued in China (UNEP DTU Partnership, 2022). It is estimated that China will not have to import any carbon credits for the next two decades since the CERs amount created from China's CDM projects is already in abundance (Carr, 2013).

The CDM and JI projects operate as direct mechanisms of transferring climate funds from developed to developing countries and act as a part of paying ecological debts. The term Ecological Debt has been used to describe the consumption of resources from within an ecosystem that exceeds the system's regenerative capacity (Simms, 2013). These project-based mechanisms also encourage developed countries to invest in or create low emission projects in developing countries where environmentally friendly technology is widely used instead of focusing on reducing emissions domestically. Finally, the CER created from the CDM and JI are traded in Emission Trading (ETS). It also includes excess CER resulting from successful low emission projects managed in any country, for example, the surplus of CER from industries in China that have succeeded in squeezing their pollution under the allocated quota (Sorrell & Sijm, 2003).

This paper will focus on carbon emission trading as the primary type of GHG produced by human industrial activities and therefore emphasize the numbers of CER produced. Carbon emission is one of the GHG that currently constitutes the majority of emissions trading until recently in 2008 European Union Emission Trading Scheme included other GHG such as nitrous oxide and perfluorocarbons (Springer, Evans, Lin, & Roland-Holst, 2019). The creation of this free-trade pollution market is replacing the classic command-and-control approach in climate policy, which is giving sanctions and penalties to polluters. In carbon trading, the talk about securing the environment now can involve all kinds of liquid market transaction terms, like complex carbon derivatives, carbon spot trading, short-selling carbon price, or even securities, which is one of the often identified reasons for global carbon market collapse in 2008 (Y. Wang & Wang, 2016).

The Politics of Carbon Trading in China

It has been a well-exercised strategy of the Chinese government to raise their country's status as a developing country to confound demand for emission cuts. For most of the first commitment period of the Kyoto Protocol, the country has chosen to be evasive, to ignore the reality that their industry is one of the major polluters in the world. Even according to IEA, China overtook the USA in CO2 emissions and became the world's largest country in carbon emissions in 2006, and by 2010, China's emissions amounted to 6.55 billion tons, about 22% of the world's total emissions (Yang & Yang, 2012).

China also underlines the principle of Common But Differentiated Responsibilities (CBDR) for developing countries tackling climate change. The CBDR principle is one of the vital principles in the Climate Convention of UNFCCC, ordaining that developing countries are specifically dismissed from legally binding emissions reductions while the developed countries will take a leading role in addressing climate change (Xuetong, 2018). Yang & Yang (2012) explains that the creation of the CBDR principle is grounded in historical responsibility and current world order fairness that developed countries are the ones who have much more opportunity and capacity to act.

This evasive strategy is, however, debatable. As the biggest polluter in developing countries, China is expected and pressured to contribute approximately 45% of global energy-related carbon dioxide emissions by 2030 and increase up to 60% by 2100. Relying on the rest of the developing countries alone, without actions from China to rein their industry to a more sustainable route, the Kyoto Protocol will not work effectively due to China, the US, and the EU as the three largest GHG producers (Z. Liu et al., 2021). Combined, they contribute half of the global GHG in the world with China (30%), the US (15%), and the EU (10%), respectively (Schreurs, 2016).

Accusing China of not caring about the environment by disregarding their industry contribution to climate change is simply not true. In 2007, President Hu Jintao, during the G8 meetings in Germany, underlined that setting up an environmental policy has become a priority in China. However, how China acts to tackle climate change may be different from what the International community is expecting. Hu Jintao was quoted saying: "…for developing countries, achieving economic growth and improving the lives of our people are top priorities. At the same time, we also need to make every effort to pursue sustainable development following our national conditions." (MoFA China, 2007).

It can be argued that instead of having no regard for the environment, China was more concerned with more significant problems at home, air and water pollution from industrial waste, and not yet putting enough focus on developing policies for carbon emission. However, in 2009 Chinese prime minister Wen Jiabao announced at the Copenhagen conference that China would no longer compete with other developing countries over a share of climate assistance coming from the developed world like the CDM projects, implying a much larger plan for climate change is already in motion in China.

China's effort toward a market-based mechanism for carbon emissions was already started in 2004 when The NDRC (National Development and Reform Commission) endorsed the implementation of CDM in China, and one year after that, China introduced the ambitious 11th FYP (Five Year Plan) which is a government command and control measure plan to ensure 20% reduction in energy use. The success of the 11th FYP led to a preliminary plan for a nationwide emission-trading scheme (ETS) in 2006, and by 2007 the NDRC issued China's first National Climate Change Program, which was a first draft arrangement of policy and program to be done in order to cope with climate change impacts. These policies pave the way for creating a carbon market in China.

Only three years following the issuance of the National Climate Change Program, the 12th FYP was published in 2010, this time emphasizing carbon trading. Therefore, creating a carbon market is one of the primary strategies to increase energy efficiency and lower carbon emissions in China. In 2011, NDRC announced the establishment of four city municipalities: Beijing, Chongqing, Shanghai, and Tianjin, and two of its provinces, Guangdong and Hubei, and the special economic zone of Shenzen, as carbon trading pilot regions (Deng, Li, Pang, & Duan, 2018). Department of Climate Change in NDRC also issued the Interim Regulation on Voluntary Trading Greenhouse Gas Emissions to local Development and Reform Commissions on June 13, 2012, to manage the establishment of carbon trading pilot regions. Several voluntary emissions trading projects have been conducted in China, and emission trading exchanges are already set up in multiple cities, such as Beijing, Shanghai, and Tianjin (X. Wang, Zhu, & Fan, 2018). Though limited in numbers, the pilot projects involved more than 1900 companies, with a total amount of carbon emissions allocation of approximately 1.2 billion tons at the end of 2014. By 2015, the pilots accumulated nearly 80 million tons worth more than 2.5 billion CNY (Weng & Xu, 2018).

China's 12th Five Year Plan is also instructing to "*gradually develop a carbon trading market,*" and one of the gradual aspects mentioned in the establishment of carbon market pilot regions after the success of the CDM projects. Interestingly, even before the CDM projects and the resulted CERs are officially registered, the domestic carbon tradings have been in development in China since 2008. The initial first domestic exchanges were set up voluntarily by private parties to encourage a national carbon trading market. They were the China Beijing Environment Exchange (CBEEX), the Tianjin Climate Exchange (TCX), and the Shanghai Environment and Energy Exchange (SEEE) (L. Liu, Chen, Zhao, & Zhao, 2015). PRC central government was eyeing the development of domestic carbon trading cautiously, putting brakes on the progress several times in the past years. Xie Zhenghua, a Vice-Chairman of the NDRC, said in September 2010 that the time is still not ripe for China to start mandatory cap-and-trade. In October 2010, the PRC government declared its intention to build and improve a carbon emissions trading system and proceeded to ratify the 12th Five-year Plan in March 2011. In the 13th Five Year Plan (Weng & Xu, 2018), which lasts from 2016 to 2020, the trajectory of China's carbon trading scheme is further established. The Plan emphasizes targets to curb pollution, reduce emission and energy use, promote renewable energy, and chart essential requirements and goals on environmental quality and energy consumption up to 2020.

Gradualism or policy experimentation in dealing with domestic reform and institutional development in China is characteristic of the PRC government (Huang, 2013). Even at first, China was reluctant to develop its CDM market despite its enormous potential for producing CERs to be exported to Europe, Japan, and other developed countries. It was not until late 2006 that the PRC government saw that CDM benefited them in the form of attracting foreign investments, transfer of industrial technology that produce lower emission, and also in term of international expertise and assistance from a developed country in creating, monitoring, and benefiting from CER and other emission reductions (Scotney, Chapman, Hepburn, & Jie, 2012).

In order to aid the development of CDM projects in China, NDRC 2005 quickly establish measures for the operation and management of CDM Projects in China. China also established national coordinating groups for climate change, CDM Designated National Authorities, and projects auditing boards responsible for projects application, auditing, and management. The government also formulated a series of policies and regulations for the CDM market. The PRC government kept tight control over the implementation of CDM projects, and all CERs resulted from them. PRC regulators have kept tight regulations concerning how CDM projects can be carried out and how the CERs resulting from it are traded. Some of the regulations mentioned that CDM project owners must be controlled by the PRC, which means only industries owned by PRC citizens or companies in which PRC entities are primary stakeholders of the interest can engage in the CDM projects with foreign parties. NDRC also imposes price restrictions on CERs, establishing a floor price within the agreed terms for trading CERs produced by every CDM project (B. Wang, 2010).

Interestingly, China's market-based approach to overcoming pollution is not an entirely novel idea. China’s Pollution Charge System (PCS), introduced in 1982, was also issued and implemented to discourage polluters by adopting a market-based incentive of the "polluter pays principle." It is not the same with the CDM or emission tradings/ETS, but the fundamental approach of paying more for any pollution created above the allowed level is similar. Almost China cities have adopted the PCS system, aiming to reduce the water, air, noise, and hazardous waste pollution from China growing industries (Sitaraman, 2007). However, the PCS system has its problems as it is deemed inefficient, inconsistent, easily manipulated, and the fines charged for over-polluting are much lower than the cost of adopting environmentally friendly technology. Thus companies opt to pay fines rather than adjust their technology to be more environmentally friendly.

Learning from PCS experience, the central government carefully considers how to ensure good environmental policy integration at the local level. According to Shen (2011), in China, policy success is not guaranteed until local governments agree to partake in the process. Although the reform in China relied on a centralistic top-down economy, lately, it has been ebbing into a more market-oriented approach, where local politicians heavily influence local companies' policy.

The term ‘local state corporatism’ or ‘clientelism’ refers to how the local leaders in China are treated like the CEO of the industries and how the local governments act as patrons for companies in their administrative area. Given that local government in China has been granted broader autonomy to rule their economic affairs, they tend to put lifting economic metrics as their primary objective. China has to do much groundwork in socializing what carbon is, how it is traded, teaching companies about cutting emissions and reporting the cut, and creating regulations and setting up basic infrastructure for carbon trading.

The CDM projects offer a lot more economic incentives than PCS in China. The central government carefully introduced CDM as an environmentally friendly mechanism to benefit the industry instead of stripping its profits. The CDM attracts China's central government to enter the carbon market as early as possible, and as soon as local governments are convinced of CDM's benefits, they can effectively drive the local industries to participate. However, the collapse of the carbon market's price in 2008 made CDM not as attractive as before.

The local government in China has always been a firm advocate of carbon trading in carbon markets. Before the PRC central government considered a nationwide cap and trade, all the domestic climate exchanges mentioned above have involved local governmental agencies. Several city governments have been particularly active in supporting institutional development and encouraging participation: the Environmental Protection Regulations of the Shenzhen Special Economic Zone were amended in 2009, requiring the establishment of emissions trading and authorizing the city government of Shenzhen to make specific rules. Similarly, in Wuhan, the city government also invites private sectors to join the Wuhan Alliance of Voluntary Emissions Reduction and promises to provide incentives for the Alliance's members (Huang, 2013).

It can be argued that carbon trading in China arose as a policy of choice because of the financial benefits it can bring and the lobbying effort of private sectors and International community demands. Compared to how CDM Projects operates (priced, regulated, and decided by International entities and operates outside of China's sovereign area), regulating its national carbon trading can lessen complications and assert more power over China. The PRC central government has played a leading role in popularizing carbon trading by exerting top-down influence. Huang (2013) emphasizes that a nationwide pro-carbon-trading policy environment endorsed by PRC central government was the essential requirement for local governments to follow suit and support domestic carbon trading.

After launching seven pilot CET programs in 2011 and pledges to establish a nationwide mechanism for carbon emission trading, in 2014, China, one of the largest carbon emitters in the world, finally pledged to lower its carbon emissions by 60-65% below the 2005 levels. President Xi Jinping's of China made this statement in a joint press statement with President Obama, where the US promised to cut carbon emissions by 26-28% below the 2005 levels (Schreurs, 2016). The joint announcement has also officially kicked off China's national carbon emissions trading (CET) scheme.

The Economy of Carbon Trading in China

China being one of the largest polluters globally means that whatever China's intervention in its environmental policy can have overnight impacts on the planet. This decision includes building carbon trading (Kusmer, 2021). Looking from an economic perspective, in China, carbon trading has been seen as a liberal-based market instrument that the state can harness to mitigate emissions. How carbon credits are traded and marketed from developing to developed countries also shows how it tends to be privatized, commodified, and marketed as environmental goods.

China offers carbon trading as a new mechanism for economic growth, where capital accumulation is done by extracting profits from efforts to limit emissions. It is something impossible to be done by industries or the government alone. It is not enough that carbon trading provides profit opportunities to be successful. It needs to be supported by exemplary policy architecture.

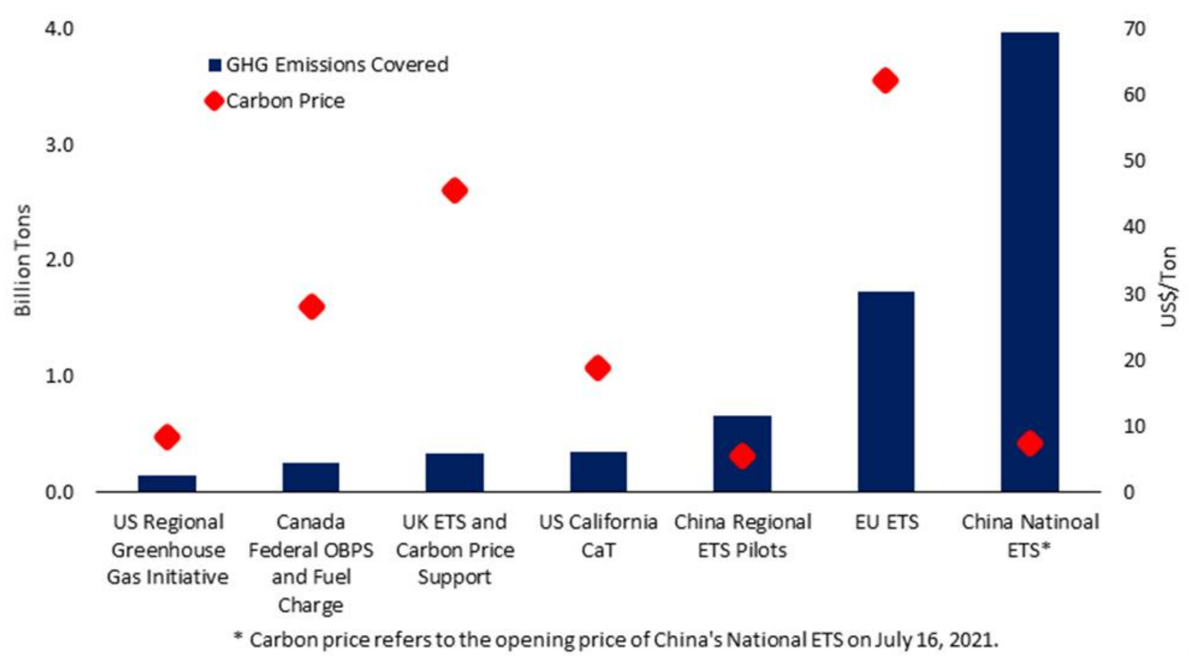
In 2008, the size of the carbon credit market was already doubled in size with around $700 million worth, and many predict it will grow into a multi-billion dollars industry over the next few years. However, the fluctuation of price for each registered CERs was very volatile. In 2003, each CERs price was around US$4.88.5 in 2003. In 2006, the average price for the rights to CERs purchased from a CDM project developer was between US$8 to US$10.6, with even a higher price being paid for CERs. That has already been issued or guaranteed by a seller (Ellerman & Buchner, 2007).

The carbon offsets generated in China had offered low-cost compliance options for emitters when European Union allowances traded at above $25. It is difficult to compare the prices of CERs over time because the price can be influenced by many factors, including what price-driving models are used. The rising trend of project-based CERs is one of the most crucial reasons behind the interest in investing in the carbon market. However, a slowdown in EU industry caused emission levels to drop, creating a colossal oversupply of tradable carbon permits. In 2014, while contract values of CERs for China credits were still in the $10-$20 range, CERs in the EU crashed and were valued just at 23 cents, resulting in investors reluctantly completing transactions (Reklev, Stian Chen, 2014).

China's national carbon trading first day is opened with a trading volume of around 4 billion tons of CO2, equal to 12% of the global CO2 emissions in total. The price for each ton of CO2 traded in China's national carbon trading is around $7 per ton of CO2. Even though China's national carbon price at first is opened at a price higher than the global average, which is about 2$ per ton, the price is much lower than the EU's market carbon price.

Hongqiao (2021) highlights that in 2013-2021, China's carbon trading pilots in six cities that involved nearly 3,000 entities/companies have traded a cumulative 440MtCO2 of allowances. However, that many allowances were only worth 10.47bn yuan ($1.6bn) in China's carbon trading pilots, which is pale to the EU's €19.2bn (around 150bn yuan) revenue from carbon credit in 2020 alone. Figure 2 compares China's regional carbon trading pilots with other major carbon markets in the world. Looking at the figure, China will need to tighten the carbon prices to avoid a large volume of trading with low prices that may hinder the national carbon trading scheme as a practical policy tool for climate change (Raiser, Eckardt, & Ruta, 2021).

Figure 2. Emission Coverage and Carbon Prices in Comparison to China's Regional ETS Pilots



Source: Raiser et al., (2021)

Another critical factor to consider about the emergence of carbon trading in China is 'efficiency gains'. This assumption works just like how business is being run by turning GHG into a global market commodity. China has become a crucial player because the Kyoto Protocol has underlined that it does not matter where the emission cuts were made in the world, as long as the cuts are done. For example, in terms of efficiency cost, China has been considered cheaper in labor costs than the US, which has contributed to the concentration of CDM projects in China (Böhm & Dabhi, 2009).

Nevertheless, the significance of China's emerging carbon trading in the world's economy is not only about making efficient emission cuts. It also has to address whether the ecological debt from developed countries to developing countries has been paid and what is the most effective method of transferring the money from North to South.

In the 13th UNFCCC COP in 2011 in Durban, South Africa, the Convention has agreed to adopt the governing instrument in raising and managing $100 billion a year in 2020 from developed countries to help developing countries adopt environmentally friendly technology and reduce emissions. The Green Climate Fund (GCF) initiative might serve as another potential method of transferring funds from North to South. It refers to the classic debate that the cause of climate change is the developed countries' industrialization era in the past or the ecological debts—making demands to pay $100 billion because ecological debts are considered nothing compared to what developed countries spent on fossil fuel subsidies that can reach $500 billion per year.

Other large developing countries like India, Brazil, and the rest felt the urgent need to institutionalize the loss and damage compensation as part of the GCF initiative, bearing in mind that developing countries always suffer the most from climate change impact. However, the direct transfer method without the active involvement of private partnerships will take years to conceptualize before it comes into reality.

When China's carbon trading fully auctions the allocation of carbon credits to companies, all industries covered by the Chinese emission trading are predicted to suffer higher profit losses. Hübler, Voigt, & Löschel (2014) pointed out that model simulations for climate policy-induced welfare loss in China for 2020 are about 1% in 2020 if the emissions cut per GDP in 2020 is set to be 45% lower than 2005 emissions level. The welfare loss will climb to about 2% in 2030 if China requires the emissions target fixed at the 2020 level.

The considerable impact includes losses in net export values decline in exports for China's commodities because climate policy is bound to make China's commodities more expensive than foreign commodities. It implements full auctioning of carbon credits becomes more complicated than regulating the free allocation of carbon credits. China's climate policy is fragile, and the economic consequences of such a climate mechanism in the future are unpredictable (Hübler et al., 2014).

Another climate policy option that is being considered is creating the International carbon market. European Union has spoken about the importance of designing the International carbon market, as it will increase financial flow to developing countries and cover much of the portion in paying ecological debts. The potential of the global carbon market is expected to reach more than 138 billion dollars a year. Despite the potential, the EU also criticized its inaccurate damage estimates in adapting to climate change. The EU Environment Commissioner observes the requirements of only $125 billion to fund adaptation by 2020, while Beijing estimates a massive $438 billion annually in 2030 to fund China's mitigation and adaptation to climate change (Böhm & Dabhi, 2009).

Moreover, the creation of carbon trading in China or other highly industrialized countries like India has unique challenges. Some has expressed their concern that China does not have the adequate monitoring equipment and system to accurately detect and monitor what pollutants and in what amount being released from each factory or company, lack of transparency, or conveniently exclude emission data from China's overseas development (Li & Gallagher, 2019). China also has historically weak environmental enforcement systems, and thus the assessment of which parties comply with environmental requirements can be deemed less plausible (Bell, 2015; Kusmer, 2021).

Other obstacles may be prevalent misreporting of data, accuracy in emissions count from carbon trading pilot projects. The pressure for local officials in China to increase GDP has sometimes become a negative incentive that leads to underreporting or overreporting specific economic metrics. Some of them may only be miscalculating, but the underlying administration problems need to be addressed to fix the legitimacy of carbon trading reporting in China (Carpenter, 2021). However, these can be regarded as part of the process because even countries more experienced in climate policy, measuring emissions, and regulating trading schemes like the EU, also had trouble calculating emissions when they started carbon trading.

It is worth mentioning that China has created a three-tiered governance structure to oversee China's emission trading. The national authority to set the rules and oversee the system is the Ministry of Ecology and Environment (MEE), which jointly supervises the trading together with other regulators. MEE has subsidiaries at the provincial level and at the municipal level to manage and oversee the implementation of MEE regulations. Based on historical emissions data, China has also created a Monitoring, reporting, and verification (MRV) framework and guidelines in 2020 to further integrate the carbon market into the existing environmental governance structure and mechanisms (International Carbon Action Partnership, 2021).

Conclusion

China's rigorous policy experimentations to gradually establish carbon trading by allowing the CDM projects to be implemented, setting up domestic carbon trading, finalizing regulations, establishing a mechanism for carbon trading pilot projects, and many more, have proven successful. The prospect and potential of China's carbon trading are enormous, considering the size of the CDM projects in China, China's position as one of the largest emitters in the world, and the scale of industries included in the national carbon trading scheme in China. However, there are still uncertainties about the prospect of carbon trading in China. Internal obstacles such as a historically weak environmental enforcement system, prevalent misreporting of data, and accuracy in emissions count from carbon trading pilot projects can hamper the integrity of carbon emission reporting in China.

Even if carbon markets are currently one of the essential financing mechanisms to cut emissions already in existence, the effectiveness of carbon trading as a method of transferring funds from North to South is still questionable in the future. There is too much speculation about the carbon credits and all the derivatives resulting from trading them and how they will benefit in the long term for China or if they will lessen climate change impact. Despite all the uncertainties and speculations about the volatility of carbon pricing and carbon trading in China, it should be clear that China is serious about achieving its emission reduction target. Research is still ongoing about how precisely is carbon market scheme in China will work steadily, but it can be argued that China has managed to gradually build policy and regulatory infrastructure to support the establishment of the largest carbon trading in the world.

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