How does global sustainable Policy influence Nation Policy -- A case Study of China

Xinyu Wang

University of Southern California, USA

Abstract. In the face of increasing pressure to reduce emissions, China, as a major developing country in terms of emission reduction, is obliged to establish a carbon trading market. At present, there are constraints in China's carbon trading market, such as insufficient financial participation, obvious regional segmentation of emission reduction, lack of pricing power in the international carbon trading market, lack of intermediary service capacity, and institutional irregularities. Drawing on the development experience of carbon trading markets in developed countries, this paper clarifies the idea of establishing China's carbon trading market, recognizes the current international environment, analyzes the constraints to the development of the carbon trading market, designs the carbon trading market system, and discusses the required legal, policy, and regulatory safeguards. Finally, nine suggestions are put forward to improve the legal and regulatory system of carbon trading.

Keywords: carbon trading market; development; constraints; measures.

1. Introduction

1.1 Serious consequences of CO_2

At present, global warming is an indisputable fact, and carbon dioxide, as the culprit of climate warming, has been included on the blacklist of countries to control emissions. This is because ground-level ozone is produced as a result of carbon dioxide's ability to trap radiation. As a result, the earth doesn't cool at night and stays warm. The emission of carbon dioxide is not only an economic problem but also an environmental problem and a social problem. Large emissions of carbon dioxide directly contribute to global warming and global climate warming. Affects public health and safety. It will deprive humans of shelter and threaten human life. According to scientists, 20–30% of species could go extinct if the average global temperature rises by more than 1.5–2.5 degrees. Global warming affects the ecological balance of the oceans and the diversity of marine flora and fauna and causes changes in the thermal structure and water quality of seawater.

1.2 The need for a trading market in China

China's economy has continued to grow quickly over the past 40 years of reform and opening-up. China overtook Europe as the global leader in carbon emissions in 2005. In 2015, Chinese carbon emissions accounted for 29.5% of global carbon emissions. The Chinese government has actively promoted industrial upgrading, modifying the energy structure, and encouraging the use of new energy in recent years. China's carbon emissions will peak and then start to drop as energy-saving and emission-reduction technologies are developed and put into use.

China officially submitted to the UNFCCC its carbon neutrality “before 2060” target ahead of COP26 in November 2021, China's international targets are supported by its "Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality" and "Action Plan For Carbon Dioxide Peaking Before 2030," as well as the "14th Five Year Plan (FYP)," which includes energy and carbon intensity reduction targets, as well as energy targets such as non-fossil shares for energy and electricity. In March 2022, both China's "Two Sessions", the annual plenary sessions of two of China's major political bodies and the newly issued 14th FYP for the energy sector emphasized the country's sustained short and medium-term reliance on coal and fossil fuels. To meet its FYP and NDC commitments, China has to increase non-fossil energy by roughly 13 percent by 2025 and 52 percent by 2030. The UNFCCC was given China's Long-Term Low Greenhouse Gas Emission Development

Strategy in October 2021, and it strongly suggests that the carbon neutrality goal solely relates to carbon dioxide. This difference might result in up to 0.1°C more (CO_2) or less warming in 2100, depending on the number of China's emissions. China still has a lot of things to do.

This paper will talk more about this policy, and how it influences China and the world from an economic perspective.

2. Carbon credit policy

2.1 The basic introduction of carbon credit policy

Carbon credits are based on the "cap-and-trade" strategy that was used to reduce sulfur pollution in the 1990s and allow the owner to emit a specific amount of carbon dioxide or other greenhouse gases.

One credit equals one ton of CO_2 or the equivalent of other greenhouse gases. As a result, carbon credits provide enterprises with a monetary incentive to reduce their carbon emissions. If their emissions exceed the cap, they must spend money on additional credits. They can profit by lowering their emissions and selling the excess credits they have. Those that are unable to cut emissions need to undertake a higher financial expense. The permit cost increases every year, so the goal is to gradually restrict the number of credits available, incentivizing businesses to come up with new strategies to minimize greenhouse gas emissions.

2.2 Basic types of carbon trading

Regarding the basic types of carbon trading, the theoretical debate mainly focuses on the choice of total trading or benchmark trading, and the efficiency of the two different trading methods is the focus of the debate. At present, there are three major international views on the principle of initial emission rights allocation. The first option is the population-based allocation, which is supported by developed nations and is based on the current emission situation and the convergence of per capita emissions under the long-term global emission reduction target, reflecting the idea of equal sharing of environmental rights and obligations. This principle is mainly advocated by developing countries and takes into account historical responsibility and is based on cumulative emission per capita. This means that countries that have emitted large amounts of greenhouse gases in the past should bear the primary responsibility for reducing emissions in the present. The third is the grandfathering principle, which advocates maintaining the status quo, for example, allocating emission rights to existing emitters.

2.3 The price of carbon emission rights

The public is responsible for covering the cost of emissions from harmed crops, medical expenses associated with heat waves and droughts, property damage associated with floods, and rising sea levels. Carbon pricing is a tool for measuring the external cost of greenhouse gas (GHG) emissions. Better carbon allocation and emission control are made possible by it. There are two primary methods of pricing. Systems that use a cap or absolute limit on emissions within the ETS and distribute emissions allowances—typically for free or through auctions—for the number of emissions required to reach the cap.

Baseline-and-credit systems, in which credits are given to entities that have reduced their emissions below the baseline emissions levels established for each regulated entity. Other entities who emit more than their baseline levels can purchase these credits.

Prices for carbon range from less than $1 to US$140/tCO_2e. About 75 percent of covered emissions are still priced at less than US$10/$tCO_2e$, which is significantly less than the price ranges the High-Level Commission on Carbon Prices determined to be necessary to meet the Paris Agreement's temperature goal of US$40–80/$tCO_2e$ in 2020 and US$50–100/$tCO_2e$ by 2030.

Initiatives for carbon pricing will continue to be adjusted, Many organizations, including the World Bank's Partnership for Market Readiness, the European Commission, the UN Global Compact, and

the World Resources Institute have published research to assist governments and businesses develop effective and affordable tools to put a price on The Social Cost of Emissions in order to adapt to new situations and learn lessons.

The situation in China is even more unique, as China's emission reduction projects rely entirely on trading platforms in Europe and the US, and the carbon trading market is at the lower end of the international carbon market and carbon value chain, so the Chinese carbon trading market has no decision-making power in terms of trading prices, trading methods, trading procedures, or even trading process formalities, and the price of carbon trading in China is subject to the trading price set by foreign carbon trading institutions, which is lower than the international level.

3. The impact of the carbon trading market on the global economy

3.1 Low carbon technology innovation

Without the assurance of low carbon technology, the creation of a low carbon economy would remain a pipe dream. Low carbon technology innovation is necessary for the development of a low carbon economy. The low carbon economy is reflected in the economic structure, which requires greening, informatization, low carbonization, and lightening of the economic structure, requiring countries around the world to increase investment in low carbon technology research and development, actively adjust the industrial structure, and obtain maximum economic and social benefits with minimum resource consumption and environmental costs. The growth of a low carbon economy with little energy use, pollution, and emissions have received attention during the period of heavy industrialization. In the process of heavy industrialization, emphasis is placed on the lightening of input factors, production processes, and production products, reducing the proportion of material cycles in the industrialization process and realizing the transformation and upgrading of traditional heavy industries.

3.2 Energy structure will leave the "high carbon" era

It is vital to decrease fossil energy consumption and demand, lower the proportion of fossil and coal energy in human primary energy consumption, and raise the development and use of new energy sources if we are to aggressively combat climate change and cut greenhouse gas emissions. Increasing the development of renewable energy technologies such as wind, solar, nuclear, and bioenergy in order to change the current high-carbon energy consumption structure of the world's reliance on coal, oil, and other car-based fuels. Strengthen scientific research and development on energy conservation and clean energy technologies in the fields of transportation and construction, which are closely linked to human production. In particular, the research and development of renewable energy technologies should be stepped up to change the current high carbon energy consumption structure of the world. The efficient use of new energy and the proportion of total energy consumption is an important feature of the low carbon economy. The global ocean water energy, and wind energy resources are extremely rich, 70% of the earth consists of the ocean, ocean with speed, and the use of ocean wind energy potential is also large, with great prospects for development.

3.3 Intensify the competition in the international carbon game

A low-carbon economy's emergence coincided with the stealthy emergence of international competitiveness and competition. The redistribution of interests is the nature of the climate issue. The game between developed and emerging nations, as well as within developed nations, becomes more competitive due to the allocation of interests associated with carbon emission rights. Developed countries have industrialized and modernized, and the incentive to cut global carbon emissions is stronger. And for developing countries to present on the reduction of capital, technology transfer, and capacity building, the developed countries show the negative attitude or trying to avoid, because want to master advanced technology of developed countries in the process of the global climate, through

the paid transfer of technology to benefit from them and to block the intentions of the economic development of emerging economies.

In addition, carbon neutrality has created a fierce global game. The international community lacks consensus on the formulation of standards for emerging green and low-carbon industries. For example, it is difficult for China and the US to unify the information disclosure mechanism between green projects and enterprises. The emerging green industry and technology research and development has also become an international competition, and whoever leads industrial technology innovation is likely to lead the next round of great power rise. Many developed countries have completed technology research and development ahead of time, but developing countries still need to continue to intensify research and development on a number of technologies. China must be heard in the global discussion of sustainable and low-carbon development since it is both the largest developing nation and the largest emitter of carbon. The amount of "hidden carbon" causes China's overall carbon emissions to be overestimated. International organizations typically exaggerated China's carbon emissions compared to the Chinese Academy of Sciences, against the opinions of the majority of the global public. However, compared with 71 years for the EU and 45 years for the US to achieve net zero emissions, China only has 30 years to achieve the target. Different from the old road of "pollution first, treatment later" of European and American countries, China has chosen a bumpy road of self-restraint development.

4. The basic idea of building China's carbon trading market

4.1 International environment for the establishment of carbon trading market

4.1.1 International industrial environment

China has the opportunity to develop a carbon emission trading market because of the favorable external environment and the fact that the global carbon emission trading market is still in its early stages of development. At this point, there is not much of a gap between China's carbon emission trading market and the advanced carbon emission trading system. At present, except for the EU countries, some developed countries have not built their carbon emission trading market or have not formed a national unified carbon emission trading market. This gives China and developed countries stand on a unified starting line in market construction.

The European Union and the United States have provided China with experience in building and operating markets, and NGOs such as the World Bank and the World Energy Institute and foreign carbon emission trading institutions have provided guidance and assistance to China in building its market, all of which greatly help China build its carbon emission trading market.

4.1.2 International political environment

At present, the international carbon emissions trading market is mainly based on the Kyoto Protocol, but the first phase of the Kyoto Protocol ended at the end of 2012, and no consensus has been reached by various countries on the environmental policy of the subsequent carbon emissions trading market, and the uncertainty of this environmental policy makes the future development of the international carbon emissions trading market uncertain.

The developed nations, led by the United States, are continuously criticizing Chinese public sentiment and harping on the fact that China is the world's largest producer of carbon dioxide in an effort to pressure China into expanding its commitments to reduce greenhouse gas emissions. This will result in a significant reduction in China's demand for carbon credits in the global CDM market, which will be detrimental to China's future carbon emissions trading market.

4.1.3 International carbon emission trading market environment

The absence of a mandatory trading market and a unified trading standard will hinder the future growth of China's voluntary carbon emissions trading market. From the perspective of the major voluntary trading markets worldwide, China's carbon emissions trading market does not have a

mandatory trading market. The existing carbon emission trading market will evolve into a carbon financing market, and the expansion of China's carbon emission trading market will face significant challenges from the futures and options markets for carbon emission trading.

While the opportunities and challenges primarily come from the global carbon emissions trading market, China's strengths and weaknesses in developing its carbon emissions trading market are primarily focused on China's elements(Zhao, 2016). In general, the issue of greenhouse gas emission reduction must be addressed, and it is essential to build a carbon emissions trading market before finding better policy tools to reduce emissions. China is still in a position where its advantages outweigh its disadvantages in building a carbon emissions trading market, despite the threats of uncertainty in the future carbon emissions trading market.

4.2 Constraints to the development of the carbon trading market

4.2.1 Institutional constraints

The national carbon market has been officially launched, but the current market is not active enough, the liquidity is too low, and the transactions are concentrated before the expiration of the compliance period, which is not conducive to price discovery and market development. It is imperative to improve the system rules and accelerate the top-level design. The MEE (Ministry of Ecology and Environment) is currently in charge of the CEA allocation. Regarding the construction of the carbon market, the CBRC has also made several statements, emphasizing the strengthening of the financial attributes of carbon trading and the positive use of financial institutions, financial products, and financial markets. It should strengthen multi-sectoral coordination, reasonably determine the total amount of quotas and the allocation system, consider the total amount of national quotas in conjunction with the "dual carbon" target, adopt a more reasonable quota allocation method as far as possible, and introduce a mechanism for reimbursement of quotas in due course. The core issue of how effective the carbon market can be is how to determine the price of carbon. The effectiveness, liquidity, and stability of the carbon market depend on a reasonable pricing mechanism so that the price can reflect the true marginal cost of carbon emission reduction, comprehensive social cost, and externality cost. The price of carbon is significantly influenced by how closely the government issues the allowances, even though the entire number of carbon emission allowances is provided by the government for free. On the surface, carbon prices are set by market supply and demand; if the allowances are tight, the carbon price will rise; if the allowances are issued loosely, the carbon price will remain at a lower level(Lv & Wang, 2019).

4.2.2 Economic Development Stage Constraints

At the beginning of 2020, the new pneumonia epidemic, centered in Wuhan, swept through the country, and the central government took decisive measures to protect the health of the people, shutting down enterprises and isolating people at home. The joint prevention and control mechanism that lasted for several months had a great impact on the market economy, and many enterprises suffered huge losses. With the improvement of the epidemic situation in China, all parts of the country have resumed work and production, except for a very few areas. According to statistics, China's economy is gradually rebounding on the macro level, but the impact of the epidemic has not yet passed, and the micro-level data are not optimistic. In accordance with data from the National Bureau of Statistics published in June, the scale of social financing decreased by 2.31 trillion yuan year-on-year, compared to the same period in 2019, the scale of shrinkage amounted to 489.6 billion yuan, and only 289.63 billion yuan was financed in June 2020. With the support of the central bank's monetary policy, the increase in RMB loans in June 2020 decreased by 269.5 billion yuan year-on-year and increased by only 412.6 billion yuan, a figure that doubly surprised the market. All these figures indicate that the downside risk of China's economy is further increasing.

4.2.3 Energy Structure Hard Constraints

The scale of energy consumption has been expanding in the course of rapid economic development, and it can be said that one of the major reasons for the rapid economic development is the energy

drive. Since the formation of New China, there has been a 9.3-fold rise in global energy consumption, with an average annual growth rate of above 10%. To curb this rapid growth and to protect the environment, energy substitution is proceeding in an orderly manner, and production capacity that is not adapted to the new era is gradually retreating from the stage of history. Since the 13th Five-Year Plan, provinces and municipalities have focused their efforts on transforming the coal structure and tackling air pollution, both in tandem, gradually slowing the growth rate of energy consumption. In the 20 years from 1980 to 2009, coal's percentage of total energy consumption increased from 70.7 percent to 71.6 percent, marking a turning point. After 2009, coal's share of consumption began to decline gradually, and by 2019 it had fallen to a comparable level of 81.6% in 1980. Recently, there has been a significant effort made to optimize the country's energy consumption structure in an effort to reduce carbon emissions. This includes getting rid of coal-fired boilers and other similar energy-intensive equipment and supporting the switch from a lot of coal to clean energy. As a result of energy conservation efforts, clean energy, represented by natural gas, has grown significantly, rising 2.5 times over 1978, and accounting for 23.4% of total energy consumption. China's energy consumption structure is changing dramatically and is gradually shifting to a cleaner energy mix.

4.2.4 Industrial Structure Pressure

From 2007 to 2019, the carbon emission intensity and the advanced level of the industrial structure of 30 provinces, autonomous regions, and municipalities in China show an obvious spatial and temporal evolution pattern. From a temporal perspective, most provinces, autonomous regions, and municipalities' carbon emission intensity decreased in 2019 compared to 2007; this indicates that China has made progress in reducing carbon emissions. Additionally, all provinces, autonomous regions, and municipalities' industrial structures advanced levels rose, showing that China has made significant progress in industrial transformation. From the spatial perspective, the carbon emission intensity and industrial structure advanced index show significant heterogeneity among provinces and municipalities in China, with the provinces and municipalities with higher carbon emission intensity mainly concentrated in the central and western regions and those with higher industrial structure advanced level mainly concentrated in the eastern regions. It is clear that China is making considerable progress in terms of its advanced industrial structure and carbon emission intensity, but there is still a significant disparity between its central and western regions and its eastern regions.

4.3 System Design of Carbon Trading Market

4.3.1 Government, Enterprises, and Market

From the three elements of the trading mechanism proposed by the property rights theorem, the primary market of carbon trading is mainly for initial power allocation, and different allocation rules will form different resource allocation results, and the allocation method is highly policy-oriented, depending on which type of enterprises the government wants to benefit and which type of enterprises are discouraged. The initial allocation criteria for carbon quotas generally include the historical total method, the historical intensity method, and the baseline method. The historical intensity technique and the baseline method are adopted by China's current initial allocation method, which mostly draws on the experience of European carbon trading market development. The secondary market of carbon trading mainly involves the definition of property rights. Enterprises will sell their surplus carbon emission allowances as a commodity in this market, so how to define the ownership and disposal rights of enterprises to the free allowance balance is the key to giving the commodity attributes of carbon emission rights. The carbon credit market, which involves the reduction of transaction costs in the whole carbon market, the promotion and expansion of carbon credit trading, and the increase of certified varieties can, on the one hand, drive the growth of financial derivatives and provide greater liquidity for carbon trading, and on the other hand, grow the volume, making carbon emission rights have financial attributes and asset characteristics(Zhang, Sun, & Xing, 2018).

The role of the carbon trading mechanism is that the carbon trading market forms incentives and penalties for enterprises that incorporate emission control through quota signals, price signals, and

liquidity signals, making carbon emission rights have policy attributes, commodity attributes, and financial attributes.

4.3.2 Carbon Property Rights, Environmental Property Rights, and Resource Prices

Therefore, the essence of carbon sink property rights is the distribution of carbon sink property rights, and the final realization of carbon sink property rights is also reflected in the carbon sink property rights income. Investors in carbon sink forest land, operators of carbon sink forest land, labor inputters in carbon sink forest land, etc. are among the subjects involved in the revenue distribution. They are all independent property rights subjects who want to pursue the maximization of their interests, which is in line with the assumption of economic man. Economic man refers to man as the actor who pursues the maximization of his interests. In terms of behavior motivation, each person is selfish, but in terms of behavior, he or she is rational and can choose the most convenient action plan that can satisfy his or her interests under the constraints of the environment and his or her conditions(Wei & Zong, 2016). Therefore, the above property rights subjects enjoy and will demand the allocation of carbon sink property rights among themselves.

People have the legal right to develop and make use of natural resources in a reasonable manner under the property right of resources and the environment. The property right of resources and environment belongs to the property right in a broad sense, which is different from the traditional property right. The "resources" here refer to the resources that can have positive and negative impacts on the natural environment, not all-natural resources. The "property rights" here are not pure, but rights with obligations. From the perspective of rights, the property rights of resources and environment include the rights of possession, use, benefit, disposal, and the obligation of reasonable utilization; from the perspective of the content of rights, the property rights of resources and environment include water rights, fishery rights, mining rights, hunting rights, forestry rights, sewage rights, etc.

As the basic price, resource price has two characteristics. First, in the long-term trend, resource price has upward rigidity. Second, is the incompleteness of the composition of resource prices. It is easy to see from the two characteristics of resource prices that leaving the market to determine the cost price of resources or the price composition, will often lead to overexploitation and disorderly exploitation of resources, accelerating the depletion of resources, and at the same time, bringing huge public risks, and deriving even greater other public risks, such as economic insecurity, economic vulnerability, and unsustainability of development. Therefore, the cost price of resources should be intervened by the government. The reform of resource prices in China is not to eliminate government intervention, but to change the composition and formation mechanism of prices. For the market price of resources formed by market supply and demand, its formation process and formation mechanism should be returned to the market, and the government should not intervene; while for the cost price of resources, or the composition of the price of resources, the government should intervene through appropriate means and ways to avoid the spontaneous determination of the cost price of resources by market players.

4.3.3 Carbon Credit, Carbon Securities, and Carbon Finance

At present, the international market based on International Emission Trading Mechanism (IET), Clean Development Mechanism (CDM), and Joint Implementation Mechanism (JI) has formed the quota-based market and the project-based market. Among them, CDM and JI are project-based markets, where the emission reductions generated by JI projects are called emission reduction units (ERUs) and the emission reductions generated by CDM projects are called certified emission reductions (CERs). Under this type of project-based trading, projects below baseline emission levels or carbon sequestration projects are certified to receive emission reduction units, such as ERUs and CERs; countries or companies subject to emission allowances can purchase such units to adjust the emission constraints they face(Zhang, 2019). IET is an allowance-based market. Unlike the project-based mechanism for trading GHG emissions, in the allowance mechanism, the purchaser buys emission allowances that are The allowances purchased by purchasers are determined and allocated

by the regulator under the cap-and-trade mechanism. The two types of markets, project-based, and allowance-based provide the basic framework for carbon trading and based on this, related secondary markets, underlying products (carbon credits) and derivatives trading have been developed.

The design of carbon bonds should take into account the technical and economic excellence of the issuing country and the world's mainstream society, and the energy-saving and emission reduction projects that can undergo effective certification and emission reduction procedures. The terms and conditions of the bonds are determined by the project's actual income, payback period, project assets and their depreciation, and cash flow. By relying on favorable projects, we can promote project construction, operation, and expansion while expanding the market and influence of carbon bonds, which has many benefits.

Both the domestic pilot carbon market and the national carbon market are based on spot trading, and a true carbon finance system has not yet been formed. In the pilot carbon market, some banking financial institutions have carried out a series of carbon financial products and services exploration with carbon emission reduction targets and carbon quotas as the underlying. However, most of the carbon financial innovations are still at the demonstration stage, i.e. at the stage of "PPT products", and not many of them have formed large-scale transactions, nor have they formed a standardized trading system. These carbon finance products mainly include carbon bonds, quota pledge loans, CCER pledge loans, carbon quota escrow, carbon asset management, green structured deposits, etc.

4.4 System Assurance of Carbon Trading Market

4.4.1 Legal Assurance

The National Development and Reform Commission created the Interim Measures for the Management of Carbon Emissions Trading legal regulation, which China enacted in 2014. Since then, seven provincial and municipal pilot regions have also formulated relevant emission trading management measures applicable to their regions.

At its business meeting on December 25, 2020, the Ministry of Ecology and Environment discussed and approved the 2021 "Carbon Emission Trading Management Measures (for Trial Implementation)," which will go into effect on February 1st. The implementation of the working mechanism of "central coordination, provincial responsibility, and city and county implementation" requires that the construction of a national carbon trading market be clearly defined at the national level in the form of ministerial regulations, but the regulations for supervision are still imperfect and unsound.

The "Carbon Emission Registration Management Rules (for trial implementation)," "Carbon Emission Trading Management Rules (for trial implementation)," and "Carbon Emission Settlement Management Rules (for trial implementation)" were three documents on carbon emission management rules that the Ministry of Ecology and Environment released in May 2021. Establish a market regulation and protection mechanism to ensure the smooth operation of the carbon trading market. Focus on the oversight of the entire trading process and the management of potential hazards. Clarify the carbon trading subjects, trading products, and trading techniques.

China now only has a departmental rule called "Measures for the Administration of Carbon Emission Trading (for Trial Implementation)," also known as the "Measures for Administration," which is not a law or administrative regulations on carbon trading at the legislative level. It offers the guidelines and limitations for the management of the national carbon emissions trading system as well as market supervision. The current Administrative Measures are more like a macroscopic guidebook, and the regulatory provisions are relatively loose and need to be further refined to better supervise and manage the operation of the carbon trading market.

4.4.2 Policy Assurance

Carbon credits are rights created by the government to emit greenhouse gases into the atmosphere by greenhouse gas control targets. Therefore, the government's policy pilot system is key external support for the effect of the carbon trading mechanism.

(1) The MRV system of the national carbon market has been established, and the work of the national industry and enterprise-level basic emission database has been launched.

The responsible authorities have effectively released rules for reporting carbon emission accounting that includes 24 industries and 13 national standards for carbon emission accounting. In January 2019, the MEE issued the Notice on the Preparation of the 2018 Annual Carbon Emission Reporting and Verification and Emission Monitoring Plan, organizing the MRV work of carbon emission data of critical emission units in each region, including thermal power, iron, and steel, cement, chemical to develop a carbon emission data MRV program suitable for China's national conditions.

(2) Formulate a pilot carbon emission policy with a quota allocation scheme suitable for China's national conditions.

Based on the principles of moderate tightness of the total amount and balance of science and fairness, the first baseline-based allowance allocation scheme for power generation enterprises was developed, which takes into account the current technical level of thermal power units, fuel type, and characteristics of the power market in China. At the same time, the technical guidelines for the allocation of allowances in the power generation industry were further developed, followed by a trial "stress" test for the allocation of allowances to thermal power enterprises, which will facilitate the revision and improvement of the allocation method at a later stage.

(3) Steadily push forward the construction of the national carbon market policy pilot infrastructure system.

In May 2019, MEE published a notice on the submission of the list of key emission units in the power generation industry and related materials for the national carbon emission trading market, coordinated the submission of the list of key emission units in the power industry by the provincial environmental authorities and their related materials, and identified a full-time provincial docking officer for the registration system.

4.4.3 Market Regulation

The supervision and management of the initial allocation of carbon emission rights, the exercise of rights, the trading of rights, and other carbon emission trading-related issues by the regulatory body using legal, economic, and administrative means is referred to as the regulation of the carbon trading market. The carbon trading market must be carefully supervised as a new type of market, and an ideal regulatory framework must be created(Yi & Lu, 2016). First, the carbon market is an emerging market. Since carbon is a unique commodity, typical trading regulations and systems cannot be adjusted to meet the requirements of carbon market regulation. The carbon trading market is more speculative because of its high level of risk and the flaws in the system of laws and regulations governing it. At present, the carbon trading market in Europe and some other countries has experienced some abnormal fluctuations, such as theft of indicators and damage to the trading system. Second, the carbon trading market is more professional and there is information asymmetry. The information asymmetry in the carbon trading market is mainly in the generation, issuance, and listing of carbon products, trading and policy changes, etc. Information asymmetry exists at all levels and aspects of the carbon trading market. Thirdly, the carbon market is a credit market, and the legitimacy of carbon credit generation and trading comes from the strict and fair supervision of each link. Various policies of carbon trading market regulation, such as emission monitoring, information disclosure, indicator tracking, and liability for breach of contract, have a direct impact on the development of the carbon trading market. Fourth, the carbon trading market has diverse attributes, diversified subjects, many trading links, and diverse and technical carbon products. These market behaviors need to be regulated in any society. Building a carbon trading market thereby serves the proper purpose of properly regulating the carbon trading market(Sun & Guo, 2018).

5. Policy Suggestions for Improving the Carbon Trading Market

5.1 Speed up the establishment and improvement of the national carbon market system

Further, strengthen the top-level design of the national carbon market, formulate and introduce as soon as possible the upper-level legal system with the national regulations on carbon emissions trading as the core, and clarify and improve the legal system and policy orientation of the lower-level carbon market. For example, Korea has taken advantage of its political system to introduce a legal system related to carbon trading. The Korean carbon market legal system consists of the basic law with the Low Carbon Green Growth Basic Law as the core, the Greenhouse Gas Emission Allowance Allocation and Trading Act as a general law (a special law system), the Greenhouse Gas Emission Allowance Allocation and Trading Act Implementation Act as a general regulation, which is a further refinement of the administrative regulations, and other related supporting laws. With the support of the basic laws related to the carbon market, it is possible to coordinate the construction of the national carbon market, the construction of the market management and supervision system, and the financial security of the market construction. The authority and universality of the supreme law of the carbon market can be used to further clarify the respective tasks and responsibilities of the central government, local governments, industries, and enterprises. Implement the construction tasks of various basic systems with the help of special regulations related to the carbon market, and jointly promote the construction of the national carbon market

5.2 Improve government intervention mechanism in the carbon market

For the carbon market to be effective, it must run smoothly on its own. If the market price of carbon fluctuates too frequently, the emission control enterprises cannot effectively manage their carbon assets, and the market investment institutions will be significantly less motivated to participate due to the limitation of risk control, which will also increase or decrease the cost of supervision. Therefore, the scientific design of government intervention mechanisms is very important. Similar to the role of a central bank in regulating market liquidity. When the carbon price is lower than the target price set by the regulator, the regulator will buy back carbon quotas from the secondary market, and when the carbon price is higher than the target price, the regulator will put a certain amount of carbon quotas into the market. In short, the regulator exercises a dynamic regulating role in the operation of the carbon market, maintaining the stability of the overall carbon price trend and promoting the formation of medium- and long-term carbon price expectations among market participants.

5.3 Make a good relationship between energy market reform and national carbon trading market policy pilot promotion

The pilot carbon market has not only accumulated valuable experience for the construction of the national carbon market but also laid a solid legal foundation for the national carbon market in terms of mechanism design, market construction, technological innovation, and talent training. In the early stage of carbon market construction, the primary goal is to ensure the sustainable and stable operation of the carbon market, and from the perspective of reducing regulatory costs, the direct control of medium and large emitters or facilities is generally adopted, so the downstream coverage method becomes the only choice. Combined with the experience of carbon markets in other countries or regions, the upstream energy production and even sales sectors must be brought under the control of the carbon market to substantially play the role of market-based emission reduction, which can promote the low-carbon transformation of the energy supply side on the one hand, and improve the energy demand structure on the other. One of the prerequisites for the upstream coverage model is to require a high degree of energy marketization, upstream manufacturers can pass on costs through the energy market, we have been steadily promoting energy market reform over the years, including the implementation of the ladder energy price policy, the implementation of competitive power plant feed-in tariffs, but this is still a significant distance from the real effective degree of energy marketization. The future direction of China's energy market reform includes allowing power plants

broader pricing autonomy,... The development of a more flexible end-use energy price adjustment mechanism, weakening the pricing power of the national grid, etc.

5.4 Appropriately guide financial institutions to develop carbon financial products

There are two important conditions for carbon markets to be able to play their role in reducing emissions: maintaining an appropriate level of carbon prices and adequate market liquidity. An excessively low carbon price will undoubtedly greatly discourage emission control entities from investing in low carbon. The carbon price is the result of a full game between the two sides of the market transaction, and it is not appropriate and should not be directly interfered with by the regulator. Therefore, to maintain a reasonable carbon price level, it is necessary to allocate quotas in a moderately tight way and continuously increase the proportion of quota auctions on the one hand, and guide different types of investors into carbon market transactions on the other hand. Then the market liquidity problem is also fundamentally solved with the entry of a wide range of investors. To introduce diversified market participants, it is also necessary to cooperate with the creation of diversified carbon financial products, including but not limited to carbon futures, carbon options, carbon bonds, and other products. Of course, regulators should maintain a prudent attitude toward the development and design of various types of carbon financial derivatives, to prevent the overdevelopment of carbon financial derivatives and the formation of potential risk points for the future outbreak of the crisis. This part is bound to work closely with China's financial regulators to jointly supervise and manage, to block the outbreak and spread of risks in time.

5.5 Improve the quota allocation mechanism

Whether between countries, between provinces and cities in China, or between industries, there is a need to share the responsibility of emission reduction by differentiation. The national unified carbon market should take full account of regional differences when designing the quota allocation mechanism, and set regional adjustment factors to reflect the regional differences of industries under the premise of taking into account fairness and targeting when calculating the industry quota allocation method. The regional adjustment factor is based on the development status of the industry in the region, the credibility of emission reduction technology, and the cost of emission reduction. For example, when using the benchmarking method to allocate quotas to cement enterprises in different regions, the regional adjustment factor can be used to set a higher baseline for regions that are relatively backward in terms of economic development, while a lower baseline is set for more economically developed regions. This essentially reflects a disease disguised as a subsidy for industries in developed regions to industries in less developed regions. Of course, to maintain the fairness of quota allocation, the regional adjustment factor should be designed as a dynamic factor, and the adjustment factor should be reduced in parallel when the gap between industries in different regions is gradually reduced. In terms of MRV methodology, MRV rules can be arranged for enterprises of different

5.6 Optimize market-based trading rules

After the initial smooth operation of the national carbon trading system, it is also possible to enrich the compliance methods of enterprises by introducing CCER trading, so that enterprises can complete their compliance responsibilities independently and flexibly in accordance with their actual conditions, which can marginal reduce the cost of emission reduction and compliance of enterprises and enhance the vitality of the carbon market. Improve the legal system of the primary market of carbon emission trading and establish a sound system of controlling the total amount of carbon emission. The control of total carbon emissions should be integrated with various factors such as historical data of carbon emissions, greenhouse gas emission reduction targets, emission reduction capacity of industry enterprises, and economic and social development planning. Improving the secondary market for carbon emissions trading requires the following aspects: first, the legal attributes of carbon emission allowances and certified voluntary emission reductions should be

clearly stipulated in the regulations governing carbon emissions trading; second, anti-unfair competition and anti-monopoly rules for trading carbon emission allowances and certified voluntary emission reductions should be formulated to promote the orderliness and liquidity of carbon emissions trading.

5.7 Improve the legal and regulatory system of carbon trading

Before the carbon trading market opened, the European Union and South Korea finished their legislation. At present, the existing carbon trading-related laws and regulations in China only include the Management Measures and the management measures for carbon emission trading promulgated and implemented by pilot provinces and cities. It is recommended that a law with a higher level of effectiveness be enacted as the higher law to clarify the functions and responsibilities of each participating entity, and to put forward general framework requirements for rules such as total emission limits, coverage, allowance allocation, compliance system, trading rules, risk management, MRV system, supervision and management, and legal liability. Then, administrative regulations, ordinances, and measures with lower levels of effectiveness will be introduced as subordinate laws, providing detailed descriptions and explanations of various policy elements under the framework of the carbon trading mechanism, fully considering all kinds of situations that may arise in the course of market operation, and stipulating specific implementation rules and measures.

5.8 Exploring new modes of CCER development

First, accelerate the restart of CCER project issuance. At present, the filing application for CCER projects has been suspended, and the flow of emission reductions on the trading market is only 53 million tons. According to the "Management Measures", key emission units can use CCERs to offset no more than 5% of their emissions each year, which is expected to generate up to 200 million tons of CCER demand. In the face of the large demand gap, we will consider restarting the issuance of CCER projects as soon as possible. Second, break the barriers to CCER trading. Each region should abolish the preferential policies for local CCER projects and restrictions on foreign CCER projects so that subjects from different regions can enjoy fair treatment in the process of participating in the market and promote the free flow of market factors. Third, promote the offsetting of carbon border tax by CCERs. We will open up the interface system between CCER and international standards, establish a mutual recognition mechanism with EU CER, encourage foreign investors to participate in domestic CCER project investment, and explore the low-carbon cooperation mechanism of exempting EU carbon border tax for export products subscribing to CCER. Fourth, promote the development of a digital carbon sink model. Promote the digital carbon sink model of Ant Forest developed by Beijing Green Exchange in cooperation with Ant Gold, establish personal carbon accounts, define effective low-carbon behavior, establish a monitoring system, quantify carbon emission reduction, and enter the carbon market for trading after being certified by CCER, to guide low-carbon green lifestyles.

5.9 Strengthen the supervision and verification of carbon emissions of enterprises

First, strengthen the supervision. Strengthen the frequency of inspection of enterprises under control, implement the whole process of supervision and dynamic monitoring of enterprises with irregularities and violations, and make public the monitoring reports of enterprises and verification reports of third-party institutions. Second, increase the penalty. To increase the efforts to pursue violations, control enterprises that falsely report or conceal carbon emissions and third-party institutions that falsify verification reports are subject to high fines and are included in the "blacklist" of defaulting enterprises, disqualified from verification, and confiscate their illegal income. Third, is the combination of online monitoring and accounting methods. Install a carbon emission monitoring system to control enterprises, monitor their carbon emission online in real-time, and send the data to the supervisory department. The supervisory department adopts a carbon emission accounting

methodology and regularly randomly checks the carbon emission data of enterprises to ensure that the monitoring data are true and reliable.

6. Conclusion

This paper focuses on the construction of China's carbon market policy system, and discusses the basic ideas of building China's carbon trading market, as well as the policy status quo, shortcomings and improvement suggestions.

First of all, although China has actively introduced policies and regulations related to the improvement and construction of the carbon market, including various regulations, local regulations and technical implementation documents, from the state, ministries and commissions to local administrative departments, there are still some shortcomings, such as the legislative process of the upper law is not expected in a hurry, The implementation of technical regulations lacks sufficient pertinence and integrity, and the connection between the pilot areas and the national unified market lags behind.

Secondly, based on the above-mentioned shortcomings, this chapter finally puts forward relevant policy suggestions from several aspects, including: accelerating the establishment and improvement of the national carbon market system, improving the carbon market government intervention mechanism, handling the relationship between the energy market reform and the national carbon trading market policy pilot promotion, appropriately guiding financial institutions to develop carbon financial products, improving the quota allocation mechanism, optimizing the market-oriented trading rules Improve the legal and regulatory system of carbon trading, explore new models of CCER development, and strengthen the supervision and verification of enterprise carbon emissions.

References

[1] An energy sector roadmap to carbon neutrality in China Chinese. (n.d.). Retrieved July 4, 2022, from https://iea.blob.core.windows.net/assets/bb8dcbbc-4655-4d49-904d-4b780abf3d6b/AnenergysectorroadmaptocarbonneutralityinChina_Chinese.pdf

[2] China. (n.d.). Retrieved July 4, 2022, from https://climateactiontracker.org/countries/china/

[3] China has submitted the latest report of the national independent emission reduction contribution plan to the United Nations, striving to reach the carbon peak by 2030. (n.d.). Retrieved July 4, 2022, from https://www.reuters.com/article/china-un-emission-report-1029-idCNKBS2HJ04F

[4] Global energy review 2021. (n.d.). Retrieved July 4, 2022, from https://iea.blob.core.windows.net/assets/58e589ad-2aaa-49f4-abfec46b85dba6bf/GlobalEnergyReview2021_Chinese.pdf

[5] Global game of low carbon transformation. (n.d.). Retrieved July 6, 2022, from https://finance.sina.com.cn/china/2021-04-06/doc-ikmyaawa7677182.shtml

[6] Lv Jingye & Wang Tengfei. (2019). Research on long-term memory and leverage effect of price fluctuation in China's carbon emission rights market -- Taking Hubei carbon emission rights trading center as an example. Price monthly, 10, 29-36.

[7] Sun Zheng & Guo Tingzhen. (2018). Strengthen the construction of the carbon market regulatory mechanism to ensure the healthy and effective operation of the carbon market. China Economic and trade guide. 29, 67-69.

[8] This is How Climate Change Could Impact The Global Economy. (n.d.). Retrieved July 4, 2022, from https://www.weforum.org/agenda/2021/06/impact-climate-change-global-gdp/

[9] Wei Suhao & Zong Gang. (2016). Research on the trading price fluctuation characteristics of

[10] China's carbon emission rights market. Price monthly. 3, 1-5.

[11] What Is a Carbon Credit? (n.d.). Retrieved July 24, 2022, from https://www.investopedia.com/terms/c/carbon_credit.asp#toc-understanding-a-carbon-credithttps://corporatefinanceinstitute.com/resources/knowledge/other/carbon-credit/

[12] What is Carbon Pricing? | Carbon Pricing Dashboard.(n.d.).Retrieved July 4, 2022, from https://carbonpricingdashboard.worldbank.org/what-carbon-pricing#:~:text=About%20three%20quarters%20of%20covered,e%20in%202020%20and%20US

[13] Why the world needs the SDGs. (n.d.). Retrieved July 4, 2022, from

[14] https://sdgessentials.org/zh/why-the-world-needs-the-sdgs.html

[15] Yi Lan & Lu Yao. (2016). Research on the regulatory mechanism of China's pilot carbon market and international experience. China population, resources and environment. 26.12, 77-86.

[16] Zhang Jie, Sun Lihong, & Xing Zhencheng. (2018). Research on the price volatility of China's carbon emission trading market - based on the data analysis of the trading prices of the pilot carbon emission markets in Shenzhen, Beijing and Shanghai. Price theory and practice. 1, 57-60.

[17] Zhang Yipei. (2019). Research on the correlation between the price fluctuations of carbon emission rights trading in Beijing and Shenzhen. China Civil and commercial. 82-83.

[18] Zhao Shengyu. (2016). Comparative analysis of price fluctuations between China's carbon emission rights market and the European market. China market. 13, 86-94.