

Research on the optimization of carbon emission trading market mechanism in the context of low carbon

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ABSTRACT

The goal of "double carbon" is an important strategy for China to deal with climate change and build a global environmental governance system. In recent years, China's carbon emission rights market has gradually matured, trading regulations are perfect, and operation is stable. However, compared with the international mature market, there are still many challenges, such as incomplete industry coverage, insufficient initial paid distribution, low information transparency, and weak market liquidity. In view of these problems, the paper puts forward optimization suggestions to strengthen the institutional construction of carbon emission right market, broaden industry coverage, improve distribution mechanism, enhance information transparency and enhance market liquidity. It will help promote the development of China's carbon emission rights market in a more mature and sound direction, and provide strong support to achieve the "double carbon" goal.

KEYWORDS

"Dual Carbon" Targets; Carbon Rights; Carbon Trading; Carbon Markets

1 Introduction

Since the 12th Five-Year Plan, the government of China has repeatedly emphasized the strategic goals of "carbon peak" by 2030 and "carbon neutrality" by 2060. In 2015, the promulgation of the "Overall Plan for the Reform of the Ecological Civilization System" requires deepening the pilot of carbon emission trading, accelerating the establishment of a systematic and complete ecological civilization system, accelerating the construction of ecological civilization, and gradually establishing a national carbon emission trading market. In 2016, the National Development and Reform Commission (NDRC) issued the Notice on Effectively Launching the National Carbon Emission Trading Market, which clarified the eight industries participating in the national carbon market, requiring MRV (greenhouse gas emissions to be monitored, reportable, and verifiable) of the historical carbon emissions of the enterprises to be included, and at the same time proposing supplementary information accounting reports on carbon emissions of enterprises. In 2021, the unified carbon emission trading market was officially launched at the Shanghai Environment and Energy Exchange, covering more than 2,000 major enterprises in the power generation industry. It involves more than 4 billion tons of carbon emissions^[1]. In October 2023, the National Development and Reform Commission (NDRC) issued the National Carbon Peak Pilot Construction Plan, which identified 25 cities and 10 industrial parks including Hebei, Shanxi, Liaoning and Jiangsu as the first batch of pilot cities for carbon peaking. Under the background of the continuous development and growth of the carbon emission trading market, it is of great practical significance to deeply explore the current status and problems of China's carbon emission allowance market mechanism, and put forward a feasible optimization path for its development.

2 The current situation of the market mechanism of carbon emission rights

Compared with the research on the carbon emission market in Europe and the United States, China started relatively late, and the inspiration basically comes from the study of international conventions and existing systems. According to the trading principle of the carbon emission decentralization market and the provisions of relevant international treaties such as the Kyoto Protocol and the Paris Agreement, China mainly uses CDM (Clean Development Mechanism (CDM) and CCER (National Certified Voluntary Emission Reduction Project)^[2-6].

In 2005, the Kyoto Protocol began to implement the Clean Development Mechanism (CDM) project globally, and the birth of this mechanism marked an important step for the international community to combat global climate change and promote sustainable development. The original intention is to promote the provision of technical assistance and innovation from developed countries to developing countries in the field of clean technology, so as to achieve mutually beneficial cooperation and common development.

As the largest developing country in the world, China has shown great potential and broad prospects in CDM projects, and occupies a pivotal position in global CDM projects. As the world's leading introducer of CDM projects, China has

demonstrated the diversity and richness of project types, among which renewable energy and new energy projects are particularly prominent. Wind power generation (Guizhou, Gansu, Shandong, etc.) and hydropower (Xinjiang, Liaoning, Sichuan, etc.) are widely distributed in China, providing a steady stream of clean energy for China. However, the regional distribution of these projects shows large differences, and most of them are in the central and western regions, which does reflect the regional characteristics of China's energy structure. In order to further optimize the energy structure and balance regional development, China has actively introduced a series of policies and measures to regulate. Among them, the formulation and implementation of the "Measures for the Management of the Operation of Clean Development Mechanism Projects" and the "Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading" provide a strong institutional guarantee for the operation of CDM projects. These management measures clarify the requirements and processes of the project declaration, approval, monitoring, verification and other links, and ensure the standardized operation and effective implementation of the project.

However, despite the remarkable achievements of the CDM project, China also faces some challenges and problems. First of all, the Kyoto Protocol has been questioned and controversial internationally, resulting in an unstable international environment for CDM projects. To a certain extent, this has affected the sustainable development and in-depth promotion of CDM projects in China. Secondly, the application and approval process of CDM projects in China is relatively cumbersome and slow, which also brings certain difficulties to the promotion of the project. In addition, the problem of low filing rate and issuance rate of CDM projects also needs to be solved urgently.

At the same time, China officially launched the National Certified Voluntary Emission Reduction Project (CCER) at the end of 2013 as a useful supplement to the carbon emission trading market. The CCER project encourages all sectors of society to actively participate in emission reduction actions and contribute to the fight against climate change through the implementation of voluntary emission reduction projects. In voluntary emission reduction projects, relevant units can take the initiative to apply for CCER projects and declare the amount of carbon sequestration at the same time. The relevant departments shall conduct strict quantitative evaluation and verification of the project in accordance with certain standards. Once approved, the corresponding voluntary emission reduction certification will be obtained, which can be circulated and traded in the carbon market. The proposal and promotion of voluntary emission reduction projects have undoubtedly added new vitality to China's carbon emission trading market and promoted the diversified development of the market.

However, due to challenges such as difficult supervision and lack of credibility, the NDRC decided to suspend the CCER project and its filing application in 2017, bringing the project to a standstill. However, after a period of silence, in 2022, the Ministry of Ecology and Environment (MEE) said that key emitting enterprises could use CCER to offset no more than 5% of their paid allowances, and the CCER market ushered in new development opportunities. With the recovery of the CCER market, both trading volume and price have risen significantly, and in the first compliance cycle, CCER inventories have plummeted, and the price has even exceeded carbon allowances^[11].

As an important supplement to the carbon trading market, China is actively preparing to restart the relevant issuance and filing work, which will also more effectively help achieve the dual carbon goals. Looking forward to the future, with the continuous improvement of policies and the gradual maturity of the market, China's carbon emission trading market will usher in a broader development prospect.

3 Problems in China's carbon emission trading market

Due to the late start of the construction of the carbon emission trading market mechanism, the pilot of the local carbon emission trading market is also in the initial stage, and at present, there are still some problems in the construction of the national unified carbon emission trading system.

3.1 Limited industry coverage and trading varieties

On the one hand, the national carbon market has limited industry coverage, and the trading entities mainly focus on key emitting enterprises and a small number of small carbon asset companies, with a single type and insufficient number of participants. Most of these entities take the primary goal of meeting the compliance requirements and lack the motivation to actively participate in carbon market trading. In order to reduce carbon emissions more effectively, it is necessary to accelerate the expansion of the national carbon market to play a central role in tackling the greenhouse effect. This means that whenever an industry matures, it should be included in the carbon trading market and continue to promote the expansion of the industry.

On the other hand, the trading varieties in the national carbon trading market are relatively simple, mainly focusing on carbon emission allowance spot (CEA). In order to enrich the market trading, it is necessary to further develop new trading varieties. However, the participation of more industries in the ETS and the development of more trading varieties

can significantly reduce regional carbon emissions, but also inevitably lead to higher transaction costs and operating costs. Therefore, when introducing new industries and new varieties, it is necessary to fully consider the stage of social and economic development to ensure that the key carbon emission information of the new industries can be reliably measured. In the early stage of its establishment, given that the carbon emission information accounting system is not yet perfect, the core challenge is how to find the best balance between the pursuit of market efficiency and the control of transaction costs.

3.2 The paid distribution of initial carbon emission rights is uneven

In the unified carbon emission trading market, all initial allowances are allocated free of charge, which reduces the economic burden of emission control entities, but also weakens the motivation of enterprises to take the initiative to reduce carbon emissions, which has a certain impact on the realization of carbon reduction goals. In the pilot local markets, although some areas have adopted a combination of free and auction quota allocation, the auction ratio is generally low, and the proportion of paid allocation is far from achieving the expected results. In order to more effectively motivate enterprises to reduce carbon emissions and promote the healthy development of the carbon trading market, a paid allocation mechanism for allowances should be introduced as soon as possible, and the proportion of paid allocation should be gradually increased. This method helps to play a price discovery function and deal with the risk of price fluctuations, so as to ensure the stable operation of the carbon trading market. In the distribution process, although the historical method currently used is simple, it also has significant unfairness. This approach often results in units with higher carbon emissions in the past receiving more carbon allowances, while companies that have actively implemented energy conservation and carbon reduction measures have received relatively fewer allowances due to their lower historical carbon base.

3.3 The quality and transparency of information need to be improved

The quality of information is crucial to the stable operation of the carbon emission trading market, however, China's supervision and management in this field still need to be strengthened. On the one hand, the online monitoring of greenhouse gases, system development, and basic accounting computing power need to be improved. On the other hand, the national carbon market also has deficiencies in information disclosure, and key data such as the total annual allowance and actual trading volume are not published in a timely and incomplete manner, which reduces information transparency. As a result, emitters and investors are exposed to higher risks, reducing their willingness to participate in the carbon market, which in turn affects the liquidity and activity of the market.

3.4 Market liquidity is not strong

The turnover rate of the carbon market is currently in a sluggish trend, with the first compliance period only around 2%, and the average turnover rate of the carbon market in the pilot area for many years is only about 5%, which is far from the 758% turnover rate of the mature carbon trading market in the European Union. At present, China's carbon market liquidity is obviously insufficient. As the participants in the carbon trading market are still mainly concentrated in emission control enterprises, the lack of a wide and diversified investor participation has inhibited the vitality of the market. At the same time, the trading varieties in the market are relatively simple, and the innovation and development of carbon financial products lag behind, which is difficult to meet the needs of different investors, which further limits the liquidity of the market. In addition, some enterprises do not standardize the management of carbon allowances, which affects the financial processing and transaction process, and weakens the enthusiasm of enterprises to participate and the overall liquidity of the market.

4 Suggestions for further improving the carbon emission trading system

4.1 Inclusion of more industries and the development of new trading varieties

In the national carbon trading market, carbon emission trading is mainly concentrated in high-emission industries such as electricity, steel, and cement^[7], which are undoubtedly the main sources of carbon emissions in China. However, in order to more comprehensively and accurately reflect the carbon emissions of the whole society, and to encourage more industries to actively take emission reduction measures, it is necessary to consider further expanding the carbon trading system to other areas.

First, sectors such as transport, construction and agriculture should also be included in the ETS as important sources of carbon emissions. Vehicle emissions from the transportation industry, carbon emissions from construction and the

production of building materials in the construction industry, as well as the use of fertilizers and livestock in agricultural activities are all sources of carbon emissions that cannot be ignored. Bringing these sectors into the ETS will not only allow for more comprehensive monitoring and management of carbon emissions, but also incentivize them to achieve low-carbon development through technological innovation and green transformation. Secondly, in terms of trading varieties, on the basis of the existing carbon allowance spot trading, we will further develop new trading varieties such as carbon emission futures trading, carbon credit trading, green bonds and green funds. The launch of these new products can not only provide investors with more investment options and risk management tools, but also promote the in-depth development of the carbon market and improve the liquidity and vitality of the market. By expanding the industry coverage of the carbon trading system and enriching the trading varieties, a more comprehensive and efficient carbon trading market will be built.

4.2 Improve the carbon quota allocation system

The accuracy of carbon allocation is the basis for the effective operation of the carbon trading market. Allowances are directly related to carbon prices, which affects the enthusiasm of enterprises to reduce emissions. In addition, some external factors, such as new energy technology innovation, will also affect the demand for carbon allowances, thus affecting the carbon price. In order to set carbon quotas reasonably, the Ministry of Ecology and Environment needs to establish a total carbon emission control model based on the current situation of the industry pilot, broaden the coverage of the carbon market industry, comprehensively consider the affordability of enterprises, reduce the use of historical methods, and adopt an allocation method based on the baseline method, supplemented by the carbon intensity reduction method. Establish a mechanism for reducing quotas year by year by using methods such as dynamic industry benchmark values and emission control coefficients to ensure the steady realization of carbon emission reduction targets. At the same time, the actual economic development of each region in China and the characteristics of each industry should be fully considered, and the carbon emission control coefficient should be refined to ensure fairness and effectiveness.

Under the influence of the EU's mature EU-ETS market, China can take carbon quota adjustment and reserve measures. The EU has successfully solved the problem of excess allowances encountered by foreign countries in the early stage of the carbon emission market by changing the method of determining allowances, adjusting the cap control strategy, and establishing a market stability mechanism (MSR). According to the actual situation of the development of the carbon market, China can gradually increase the proportion of paid allocation of carbon emission allowances, and at the same time study and judge its potential impact on the international competitiveness of various industries to ensure the steady development of the carbon market^[12].

4.3 Improve the quality of information and improve the information disclosure system

In terms of improving the quality of carbon emission information, it is imperative to improve accounting methods and MRV management. When revising greenhouse gas accounting methods and guidelines, it is necessary to ensure the consistency of the overall carbon emission accounting, reporting and certification rules, deeply consider the particularities and differences of various industries, and formulate and introduce more targeted accounting and reporting standards for different industries. In order to ensure the quality of carbon emission information, the supervision of the whole cycle plays a pivotal role. First of all, strengthen the testing equipment infrastructure of key emission control enterprises, and build a comprehensive carbon emission information management system to ensure the accuracy and reliability of data. Second, establish a strict carbon emission information verification and supervision system, and enterprises conduct self-regulatory supervision and third-party annual assessment to ensure that they maintain a high degree of fairness and justice, thereby improving the accuracy and credibility of carbon emission information. Finally, accelerate the establishment and improvement of the third-party access system. It is necessary to set up a clear system of access, verification, rewards and punishments, and at the same time implement record supervision for third parties to form a standardized management system. It can not only enhance the professionalism and authority of verification, but also effectively prevent and crack down on false verification. The improvement of the information disclosure system is crucial to improve the transparency and influence of carbon emission information.

At present, in terms of environmental information disclosure regulations, China's focus is mostly on the supervision of general pollutant emissions, while in contrast, the attention to greenhouse gas emissions is relatively insufficient. Therefore, it is urgent to build a unified carbon emission information disclosure system. It is necessary to establish the mandatory and normative status of carbon emission information disclosure through legal means, and at the same time formulate detailed rules and regulations, clarify the content of disclosure, and provide a code of conduct, so that regulators can have a basis to follow to ensure accurate, transparent and timely disclosure of information. In addition, the establishment of an information disclosure platform or system is an effective means to improve the efficiency and quality

of disclosure. Enterprises can register on this system or platform, and regularly disclose detailed information including emission reduction targets, annual carbon emissions and quotas, carbon emission trading volume and frequency, emission reduction technical means, etc. This not only helps companies to self-monitor and manage, but also provides the public and regulators with more comprehensive and accurate information on carbon emissions.

4.4 Enhance the liquidity of the carbon emission rights market

First, through policy incentives and market mechanisms, more key emission source enterprises should be encouraged to participate in carbon emission trading, which can not only increase market supply and demand, but also attract more emission control enterprises to join. At the same time, the participation of financial institutions such as banks, insurance companies, funds, etc., which can provide professional trading services and risk management tools, inject more vitality into the market. On the premise of ensuring market stability and risk control, the carbon emission trading market can also be gradually opened to individual investors to increase market participation and activity. Second, through technical means and institutional design, the process of carbon emission trading will be simplified, transaction costs will be reduced, and trading efficiency will be improved. Introduce a market maker system in the carbon emission market to provide continuous bilateral quotations to meet the trading needs of market participants and improve market liquidity. Third, formulate and improve the regulatory system of the carbon emission market, clarify the responsibilities and authority of supervision, and ensure the fairness, impartiality and transparency of the market; We will crack down on violations of market rules, maintain market order and stability, and protect the legitimate rights and interests of market participants. Fourth, actively participate in the international carbon emission trading mechanism, learn from international advanced experience and technology, and promote the international development of China's carbon emission market; Strengthen exchanges and cooperation with the international carbon emission trading market, and jointly promote the process of global response to climate change.

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