

Study on the Improvement of China's Carbon Emission Trading System under the Goal of "Double Carbon".

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Abstract: September 2020, China announced to the world that it would achieve carbon peak by 2030 and carbon neutrality by 2060, and since then, China has formally stepped into the "dual-carbon" era. Against the background of the "dual-carbon" goal, carbon emissions trading is facing major adjustments in system functions, development goals, development stages, implementation levels, trading rules, scarcity creation, and safeguard mechanisms, as well as major opportunities for market-based development. In this regard, China not only needs to reform and improve the carbon trading system on the basis of the original immature carbon trading system, but also needs to cover more subjects to participate in the carbon emissions trading market, to achieve emission reduction, pollution reduction and synergistic governance through the market mechanism, and to grasp the key opportunity to transform the carbon market from a "policy market" to a "commodity market". The carbon market from "policy market" to "commodity market" to grasp the key opportunity to change, to achieve carbon trading energy saving and emission reduction benefits significantly enhance.

Keywords: "Double carbon" target; carbon emissions trading system; system improvement.

1. Challenges to China's Carbon Trading System in The Context of "Dual Carbon"

1.1. The significance of China's "dual-carbon" goal

Since the Industrial Revolution, fossil energy has been used in far greater quantities than ever before, and the greenhouse gases produced during this period have accelerated global warming. 1992 saw the signing of the United Nations Framework Convention on Climate Change (UNFCCC) by the United Nations Organisation (UNO), which establishes the "common but differentiated responsibilities" of all countries in mitigating climate change. In 1997, the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) set greenhouse gas (GHG) emission control targets and mandated parties to reduce emissions, and in 2015, the Paris Agreement was formally adopted, which sets out the global agenda for action on climate change beyond 2020. [1] Under the trend of global climate action, China has gradually promoted energy conservation and emission reduction, and proposed a "double carbon" target in 2020, i.e., to reach the peak of carbon dioxide emissions by 2030 and to achieve carbon neutrality by 2060. This goal demonstrates China's role as a major country in addressing global climate change and is a key initiative for China to achieve sustainable development.

Achieving carbon peak performance and carbon neutrality is a broad and profound economic and social systemic change. The "dual-carbon" goal will lead China's green and low-carbon development, bringing multiple effects of ecological improvement and industrial transformation. Practising the "dual-carbon" goal is a powerful way to promote the green transformation of the economic structure and achieve high-quality development; it is a practical innovation in the synergistic management of environmental pollution and climate change; and it is a planning guideline for promoting a green and low-carbon life and realising pollution reduction

and carbon reduction.

1.2. Major Challenges Facing China's Carbon Trading System

1.2.1. Carbon trading carries new policy mission

The carbon trading system operates in a market-based manner, i.e., the initial allocation of emission reduction responsibilities to high energy-consuming, high-polluting and high-emission enterprises, the purchase of carbon emission rights by excess-emission enterprises with the help of the carbon trading platform, and the sale of surplus carbon emission rights by surplus-emission enterprises through the market. The trading process is the flow of rated carbon emission allowances, which is intended to stimulate enterprises to move from resource dependence to technology dependence and to achieve energy saving and emission reduction through capital means. The process takes "carbon reduction" as its core objective, which is far from the idea of a carbon-neutral "zero-carbon" society.

1.2.2. Difficulty in connecting the mission of the carbon trading policy with the objectives of the carbon trading system

The Opinions of the State Council of the Central Committee of the Communist Party of China on the Complete and Accurate Comprehensive Implementation of the New Development Idea and Doing a Good Job in Carbon Peak and Carbon Neutrality in 2021 put forward the three phases for the realisation of the vision of carbon neutrality and the expected outcomes, reaffirming the stage-by-stage nature of the practice process and the urgency of the process. However, in the area of carbon trading, no specific total carbon emission control targets have been established, and there is a lack of quantitative carbon emission reduction targets at stages relative to the base year. Before the carbon peak, the emphasis on total carbon emission control is of little significance, and the pursuit of a relative decline in carbon intensity alone cannot meet the essential needs of carbon trading, and the decomposition and implementation of the total control target is even more remote.

1.2.3. Carbon Trading Mechanisms Face Major Adjustments

The path to achieving the "dual carbon" goal limits the subjects of carbon trading. The subject of carbon trading rights is the person who obtains carbon emission rights under legal procedures with the permission of the Government, and possesses, uses and gains from them. [2] Generally speaking, greenhouse gases such as carbon dioxide emitted by enterprises in their production activities are the main factor contributing to climate change; therefore, at the initial stage of the construction of the carbon trading system in China, only enterprises were regarded as the main subjects of carbon emission rights, and through the Carbon Peak Programme, the main subjects were limited to high-energy-consuming industries such as energy, iron and steel, non-ferrous metals, petrochemicals and chemicals, building materials, transportation, construction and so on.

The path to achieving the "dual-carbon" goal will lead to adjustments in carbon market trading methods and rules. To expand the trading scale of the carbon market, a hierarchical carbon trading market system should be constructed, distinguishing between the spot market, the futures market and the derivatives market, carrying out on- and off-site derivatives and financial product innovations, upgrading the carbon asset pledge financing and sale and buyback services, exploring brand-new trading methods, and constructing a new type of carbon market trading system.

The pathway to achieving the "double carbon" goal is deeply linked to the voluntary trading mechanism. Voluntary certified emission reductions (CCERs) are an important part of the carbon market and have two main roles in the development of the carbon market. Firstly, with the in-depth operation of the national carbon market, the market demand for CCER offset value increases; secondly, with the help of CCERs to enrich carbon financial products, stimulate the vitality of the carbon market trading, which is mainly based on spot trading. [3] Therefore, to realise the vision of "carbon neutrality", it is imperative to restart the CCER market.

The path to the realisation of the "dual carbon" goal calls for the improvement of the liability mechanism. The provisions of the carbon market on trading entities, trading products and trading methods are bound to undergo a process of cautious expansion. The design of the liability mechanism of the national carbon market should be in line with the stage of market development, gradually expanding the liable parties and strengthening the mode of liability. At the same time, legal means should be used to characterise new types of responsibilities, formulate specific responsibility allocation and accountability mechanisms, and guard against the risk of failure of the relevant departments.

1.2.4. Low integration of carbon sink projects into carbon markets

The trading of quotas among emission-control enterprises is only a transfer of the ownership of carbon emission rights and does not involve the absolute elimination of rights, so it is impossible to achieve neutrality, but the carbon neutral service provided by carbon sinks can play a role in capturing and fixing carbon. At present, the offset ratio of forestry carbon sinks to carbon emissions from emission-control enterprises is limited to less than 10 per cent, which is far less effective than expected.

2. Overview of the Development of Carbon Trading in China in The Context of "Dual Carbon".

2.1. Development effectiveness of carbon trading in China

(1) Institutional mechanisms

China's carbon trading market has preliminarily established a framework of market elements, including industry access, quota allocation, emissions measurement, reporting and verification, offset mechanisms and penalties for non-compliance. Thanks to the accumulation of experience in local carbon trading markets, China's global carbon trading market mechanism has been preliminarily established. [4]

(2) Market operation

The compliance rate is a concentrated reflection of the efficiency of the carbon market in reducing emissions, and maintaining a steady progress in the compliance rate is the key to controlling the total amount of carbon emissions. From the perspective of compliance rate, although the compliance rate of each carbon market has declined compared with the initial period, it is still at a high level in general. In terms of default rate, the default rate of each carbon market has been kept at a low level and has a tendency to continue to decline. So far, the operational data of the carbon markets have given positive feedback to the carbon trading mechanism.

2.2. Problems of China's carbon trading system under the "dual-carbon" objective

2.2.1. The total amount of carbon allowances is set unreasonably

The total amount of carbon market is mainly divided into two categories: first, quantity-based total carbon amount setting, where the emission reduction target has a direct correlation with the total amount of carbon emissions in the cycle; and second, intensity-based total carbon amount setting, where carbon intensity measured by emissions per unit of output is taken as the benchmark, and the total amount of allowances is determined according to the actual amount of output in the cycle. [5] China's carbon market has adopted the latter as the way to set the total amount of carbon market. After the introduction of the carbon peak and carbon neutral targets, the disadvantage of adopting this total amount setting method in China is more obvious, namely, the contradiction between the stage-by-stage specific emission reduction requirements of the "dual carbon" target and the uncertainty of the emission reduction effect under the existing setting method.

2.2.2. Inadequate development of carbon trading rules

After the scale of the carbon trading market expands, the degree of carbon monetisation continues to go up, and carbon emission rights derive financial products with investment value and liquidity, and carbon finance comes into being. The active carbon market inevitably requires the addition of carbon finance. Although domestic banks are improving the relevant standards, systems and processes in the field of green finance, there is still a lack of carbon finance entry standards and trading rules in the carbon market.

Carbon offsets are mainly achieved through market trading mechanisms, and the main offset programmes include carbon quotas and carbon credits, which are one of the necessary ways to achieve carbon neutrality. [6] The integrity of China's carbon offset mechanism is not high, and a carbon credit

trading system covering project access, accounting and measurement, pricing standards, and offset ratios has yet to be built, and CCER projects have now been suspended, and only issued CCER projects can be traded at present.

2.2.3. Carbon Trading Dispute Handling Mechanism

Rigid

The "dual-carbon" goal is a basic element of China's ecological civilization construction at this stage. Under this plan, the functions of carbon trading have been expanded to cover energy conservation and emission reduction, green production, energy structure transformation, ecological restoration, climate improvement and other aspects. With the expected influx of financial institutions, compliance enterprises, carbon sink project owners, third-party organisations and even individuals, the carbon trading market is facing further expansion. Along with the diversification of policy tasks undertaken by carbon trading and the phased introduction of market participants, the incidence and aggravation of market disputes have risen, showing a diversified trend.

2.2.4. Ineffectiveness of carbon trading remedies

The Administrative Measures for Carbon Emission Trading (for Trial Implementation) has a special chapter on penalties, which sets out the penalties for the regulation of carbon emission trading and related activities, and the penalties for non-compliance, which are mainly fines and "equivalent reductions in carbon emission allowances for the following year". This set up a more reasonable penalty gradient and appropriately raise the default cost of emission control enterprises, but in practice, it is difficult to avoid the bad behaviour of enterprises that choose to default after weighing their interests, and it does not achieve the "optimal deterrent" effect. In addition, the Interim Regulations on the Administration of Carbon Emission Trading specify that the purpose of legal liability is not to pursue responsibility, but to make enterprises aware of the cost of violating the law, and then consciously reduce emissions to ensure that carbon trading to achieve the purpose of compliance, and ultimately to achieve the overall goal of carbon peak, carbon neutral. [7] The imposition of a single property penalty cannot achieve comprehensive compensation for social interests, i.e., it only focuses on the breach of contract of not being able to pay, and ignores the ecological nature of compliance and payment.

2.2.5. Carbon trading is not sufficiently supportive of achieving the "dual carbon" objective

The products traded in China's carbon trading pilot market are generally based on carbon quotas and CCERs. China's carbon quotas are generated in a single way, with two main types of specific sources: carbon quotas allocated by local ecological and environmental departments, and carbon quotas obtained through trading in the national carbon market. Of the 2,891 CCER projects that have been developed, the types of project development, such as clean energy generation, methane utilisation, waste incineration, and afforestation and reforestation, account for a relatively large proportion of the total number of projects, with a fixed source of CCERs.

Influenced by the Government's unified allocation, an effective market transmission mechanism between the supply and demand of carbon emission rights and the price has not been formed. The local carbon markets mostly adopt a free quota allocation method, which tends to reduce the flexibility of the market and is not conducive to the formation of the price mechanism. The allocation of quotas is too loose, and

some emission-control enterprises have enough carbon quotas to offset their carbon emissions, or even have a surplus of quotas, which leads to stagnant sales of carbon quotas in the market, and the price of carbon continues to be low, making it difficult to reflect the scarcity value of carbon emission rights.

In terms of compliance performance, there is a significant problem in all carbon trading markets, namely that trading is concentrated in the month before the compliance period. Constrained by factors such as unclear policy orientation, imperfect carbon pricing mechanism and low market transparency, emission-control enterprises do not have a strong subjective willingness to participate in carbon trading, and most of them only regard carbon trading as a task to be completed passively, which leads to a clear distinction between low and peak periods in the carbon market. China's carbon market is in the construction stage, with high policy concern, large rule changes, unstable market trading environment, cautious wait-and-see attitude of traders, and low degree of participation in trading, resulting in small and slow flow of quotas in the market.

During the critical period of carbon market expansion, the driving force of third-party trading auxiliary institutions has shown weakness. On the one hand, the potential of China's financial institutions to promote trading dynamics has been limited by development policies and market demand, and the development of auxiliary institutions such as carbon trading consulting institutions and technology development and transfer institutions has been slow, which is not only reflected in the limited number of institutions available in the market, but also in the fact that no efficient system has been formed within the institutions in terms of data acquisition and analysis, personnel management, and process development. On the other hand, as a new industry, carbon trading industry has a high degree of specialisation and a wide range of interdisciplinary expertise, and China has not yet constructed a system of professional theoretical knowledge of carbon trading and a programme for the training of complex talents, which results in a lack of capacity of the auxiliary trading institutions in promoting the development of the carbon market.

3. Improvement Path of China's Carbon Trading System under the Goal of "Dual Carbon"

3.1. Improving the top-level design of carbon trading

Establishing the concept of "market first". From an economic point of view, carbon emission rights become scarce only after carbon emissions are controlled, thus acquiring exchange value and the attributes of a commodity under legal constraints. Carbon allowances and resources such as low-carbon buildings with negative carbon output, carbon capture and carbon sequestration methods will further become new assets with commodity and financial characteristics and be included in the concept of carbon assets. [8] Carbon assets are an important resource for enterprises to seize development opportunities in the future under the background of carbon neutrality, which is a powerful guarantee for enterprises to occupy a competitive advantage in the low-carbon economy. At present, the positioning of carbon assets should be clarified, asset valuation should be

promoted to participate in carbon asset business, carbon inventory and carbon accounting should be explored, and a marketable and standardised carbon asset management system should be formed to connect with the carbon trading market, capital market and financial market. [9]

Adhering to the concept of "ecological orientation". The use of rigorous accounting methods to put a "price tag" on ecosystem services, the inclusion of ecological products in the market by means of legal instruments, the promotion of the trading of ecological resource rights and interests, and the play of market mechanisms to innovate the ecological protection compensation model. At present, China's ecological sector has already established an equity trading system that includes carbon emission rights, water rights, forest rights, energy rights and sewage rights, and it is also necessary to include the value of ecological products in the value of regulating services in a certain proportion in the carbon trading list.

Establishing a "people-centred" concept. Carbon trading is a process of reshaping the economic system and changing the social system, involving a wide range of subjects, including governments at all levels and relevant departments, emission-control enterprises, relevant enterprises and institutions, and micro-entities. In the process of formulating policies, the administrative authorities should have a sense of planning and a holistic concept, i.e. combining the time point of carbon peak and carbon neutrality, measuring the carrying capacity of the regional economy and the environment, formulating a stage-by-stage carbon emission reduction plan, evaluating the economic fluctuations and social repercussions that may be caused by the government's actions, and incorporating the changes in the interests of the carbon market subjects into the scope of policy formulation.

Adhere to the concept of "integrated development". The proposal of the "dual-carbon" goal is an indispensable way to cope with global warming, an effective way to promote ecological restoration, and a wide-ranging and profound systemic change in industry and economy. In order to achieve carbon neutrality, it is necessary to comprehensively link the demand for greenhouse gas emission reduction with environmental protection objectives, give full play to the role of pollution reduction and carbon reduction as a source of ecological and environmental improvement, and make use of the existing environmental institutional system to promote low-carbon development in a concerted manner, leading to economic and social transformation and global climate governance, and ultimately embarking on the road to high-quality development.

3.2. Pathway Options for Improving Carbon Trading

After comprehensively considering the market capacity, the national carbon neutrality strategy and the overall economic development goals, the national carbon market has adopted a phased-in programme for industry coverage. At present, China's carbon market covers only the secondary industry, which has a large total volume and high intensity of emissions, i.e., the "eight major industries" including petrochemicals, chemicals, building materials, and so on. In order to ensure the smooth realisation of the "carbon neutral" strategy, the coverage of carbon trading should be expanded in phases by dividing it into industry standards. In the first stage, all key emission-control enterprises will gradually be included in the industry coverage, in the second stage, the

tertiary industry will be covered gradually, and in the third stage, combined with the experience of the previous industry coverage, the coverage will be gradually extended to the whole industry. [10]

A complete regulatory system for carbon trading encompasses a number of elements such as content systems, institutional settings, means and methods. In order to respond to the policy mission of carbon trading, the main body of carbon trading supervision should be expanded to include climate change authorities, ecological and environmental departments, financial management departments and the public, and include verification agencies, trading organisations and other main bodies as the supervisory objects, and formulate targeted supervisory rules according to the differences of supervisory bodies and objects. [11] Improve as soon as possible the multi-regulatory pattern with government regulators as the core, internal corporate regulators as the key, and social supervision as the auxiliary. Innovate a national carbon trading regulatory technology system based on information technology means and the comprehensive use of emission reporting systems, registration systems, trading systems and information disclosure websites.

4. Suggestions for Improving China's Carbon Trading System under the "Dual Carbon" Goal

4.1. Optimising the way in which total carbon allowances are set

The total quantity setting programme based on carbon intensity is a reasonable way of balancing economic growth and emission reduction targets in the light of China's national conditions. On the basis of the total amount setting programme, the total amount of carbon quotas in China is determined by a combination of "top-down" and "bottom-up" approaches. The former is the process of decomposition of the total amount of carbon allowances in each province and industry according to the greenhouse gas emission reduction target, which is the key stage of total control, and the achievement of specific phased emission reduction tasks should reflect the change from equal setting to linear reduction in this step; the latter is the upper limit of the total amount of allowances determined according to the sum of allowances obtained by the target of emission control under the rules of allocation of allowances, which is a double constraint between total amount of certainty of emissions and uniformity of policy objectives. In this process, faced with the double constraints of deterministic emission totals and uniform policy objectives, the total amount set in advance should take into account the emission reality and policy objectives, and be as "precise" as possible. [12]

4.2. Further standardisation of carbon market trading rules

The first is to improve the risk warning system and abnormal trading monitoring system to provide timely warnings for such situations as one-way pending orders, abnormal prices and continuous pending orders, so as to stabilise the trading environment and prevent trading risks. The second is to enrich the policy toolbox for carbon price regulation, iron out high-frequency price fluctuations through timely trading operations of national quota reserves in the

market, and introduce financial instruments such as carbon futures and options to give full play to their hedging role. [13] Thirdly, the operation of the national CER mechanism should be resumed as soon as possible, the mechanism for generating and reviewing carbon rights should be formulated, and the rules for trading carbon credits should be improved.

4.3. Building a staged carbon trading dispute handling mechanism

Implementing favoured dispute resolution solutions for carbon trading disputes in response to the stage-by-stage priorities of carbon trading. Specifically, in the first phase, it focuses on disputes over basic issues such as access to the main body, allocation of quotas, registration of rights, and corporate transactions, and recognises the time invested by enterprises in the process of green transformation, giving priority to safeguarding the legitimate interests of enterprises in administrative disputes. In the second phase, it increased its efforts to resolve disputes over the registration and trading of financial institutions and the registration and trading of various types of carbon products, reaffirmed the value of "fairness" in dispute handling, and emphasised the balance of interests of the disputing parties. In the third phase, emphasis will be placed on the resolution of new types of disputes in the carbon-related field, such as the registration and trading of third-party organisations, individual trading, and environmental protection tax, with strict accountability for ecological responsibilities.

4.4. Innovative relief mechanisms for carbon emissions trading

Strengthening data quality management, establishing a long-term mechanism for carbon emission data quality management, building a system of technical specifications for carbon verification, and improving the mechanism for daily supervision of data quality, so as to prevent carbon leakage.

Introducing a graded progressive system to increase the level of penalties for non-compliant subjects in the fulfilment of carbon control targets step by step, based on such factors as the amount of over-emissions, the number of times of non-compliance, and the attitude of assuming responsibility. [14] Responding to the environmental value of performance clearance, for overdue payment of fines, if there is a huge difference between the amount of fictitious carbon emissions of the controlling enterprise and the actual performance data, the controlling enterprise should be required to make up for the shortfall in performance clearance in accordance with the price of carbon market quotas. [15] For enterprises with serious over-emissions, ecological damage remediation by way of subscription to carbon sinks may be permitted.

4.5. Enhancing the support of carbon trading for the achievement of the "double carbon" objective

The issuance of carbon quotas is an important tool for the government to control carbon emissions, so carbon quotas should mainly come from the distribution of administrative organs, and the source of carbon quotas should not be expanded arbitrarily. In terms of CCER projects, firstly, restart the approval of CCER projects as soon as possible, improve the trading rules to prepare for the later expansion of market capacity; secondly, optimise the approval process of the government, streamline the filing matters, shorten the

filing time, and provide a more open threshold criterion for entering the market, so as to stimulate the participation of all kinds of main bodies to broaden the sources of trading products in the CCER market. At the same time, innovate the types of carbon market trading products, enrich ecological products, incorporate non-emission-control enterprises, individuals and other multi-party subjects as suppliers of carbon credits, and promote the diversification of the sources of carbon market trading products.

Tighten carbon quotas, reduce the total supply of quotas in the carbon market, ensure that the drop in demand for quotas by enterprises is lower than the drop in carbon supply, and guide the relationship between the supply and demand of carbon quotas in the market to shift to a situation where the supply is less than the demand, so as to generate a high price of carbon and enhance the scarcity of carbon quotas. Improve the carbon quota storage and lending mechanism, strengthen the inter-period mobilisation capacity of carbon quotas held by trading institutions, and use market mechanisms to adjust the stock and trading volume of carbon quotas in the carbon market during the period of compliance, so as to avoid drastic fluctuations in the price of carbon.

Actively guiding financial institutions and private investors to enter the carbon market, and promoting commercial banks, investment banks and international financial organisations to become the main players in the carbon financial derivatives market. Continue to improve the spot and futures markets, promote the development and application of carbon financial derivatives such as over-the-counter forwards and swaps in a balanced manner, integrate the development of both on-market and off-market transactions in the financial market, actively develop financial products linked to carbon footprints, and further promote carbon financial products and services such as financing, bonding, factoring, asset management, etc., and provide key emission-control enterprises with carbon asset pledge financing and structured deposits of carbon emission right income, services such as carbon asset sale and repurchase. [16]

Give full play to the policy interpretation role of carbon consulting and the technical guidance role of carbon asset management agencies, formulate specific plans for carbon market service providers to set up, operate and connect to the market, and build a carbon service management system. Give full play to the two modes of carbon consulting, namely, gain-sharing and pure consulting, and encourage professional carbon consulting and carbon asset management companies to gradually establish their own core digital analysis and decision-making models to assist in effective carbon trading.

Increase the cultivation of carbon trading professionals, adopt differentiated cultivation programmes based on job types, and create a targeted cultivation model for carbon trading talents.

5. Conclusion

Carbon trading has become a market mechanism and policy tool for the effective control of greenhouse gas emissions in China since the carbon neutral target was proposed. Carbon trading has been subject to increased policy pressure, but the existing carbon emissions trading system is out of line with the policy objectives, and significant problems have been exposed in the quota allocation mechanism, trading rules, dispute handling mechanism, relief mechanism and other aspects. In the next phase, China should focus on the combination of "top-down" and "bottom-up" emission caps,

reflecting the trend of linear reduction in the total amount set. Improve the monitoring capacity of the carbon market and use policy tools to slow down the fluctuation of carbon price and stabilise the market trading environment. Focusing on the subject of disputes and the focus of disputes at different stages, weighing the value relationship between different periods, and taking into account the interests of both parties. Strengthen the management of carbon emission data, introduce a graded progressive system, increase the penalty for non-payment, and innovate the penalty for non-compliance, so as to effectively repair the damaged ecological environment. China should take the "dual carbon" goal as a guide to improve the carbon trading system, make full use of the market mechanism to give full play to the economic value of ecological protection, and promote the dual development of environmental protection and economic transformation.

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