



Research on the carbon finance innovation to promote high-quality development of green buildings

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Abstract. On September 22, 2020, China made a solemn commitment to achieve carbon peak by 2030 and carbon neutrality by 2060. As one of the three major areas of energy consumption, the building sector is one of the main areas of responsibility for direct and indirect carbon emissions. According to relevant data, in 2020, 17% of global carbon emissions come from the construction industry, and China's construction industry accounts for about 20% of the total energy use of the whole society. The energy saving and emission reduction potential of the construction industry is huge, and it is an important part of the whole society's energy consumption and carbon emissions, and it is the focus of China's energy saving and emission reduction and energy consumption reform.

Advancing green building is the inevitable choice in the urbanization construction for sustainable economic development. Introduction of carbon emissions trading in the low carbon concept, and carbon finance combined with green building, improve the investment and financing mechanism of green building. The innovation of carbon finance that green building investment and financing mode operable, attract social capital, financial capital into the area of green building, will provide sufficient source of funding for green building.

Keywords: Carbon Finance, Green Buildings, Innovation.

1 Introduction

In November 2009, the Chinese government made a commitment to reduce China's carbon dioxide emissions per unit of GDP by 40 to 45 percent from the 2005 level by 2020. To this end, China has implemented a number of energy-saving and emission reduction measures. This also makes our country the largest supplier of CERs (Certification Emission Reduction) in international carbon trading. In the field of carbon emission reduction, the construction industry is the key industry of carbon emission reduction, and is an important guarantee for achieving the double carbon goal. According to the "China Building Energy Consumption and Carbon Emission Research Report (2021)" released by China Building Energy Efficiency Association on December 23, 2021, the total carbon emission of the whole process of construction in 2019 was 4.997 billion tCO₂, accounting for 50.6% of the national carbon emission. The carbon emission of building materials in the production stage is 2.77 billion tCO₂,

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accounting for 28.0% of the national carbon emission. The carbon emissions in the construction stage and operation stage were 100 million tCO₂ and 2.13 billion tCO₂, accounting for 1.0% and 21.6% of the national carbon emissions, respectively. From the trend point of view, the carbon emission of the whole process of construction in China increased from 2.234 billion tCO₂ in 2005 to 4.997 billion tCO₂ in 2019, an increase of 2.24 times, with an average annual growth of 5.92%. In this regard, whether it is from the basic functional needs of buildings -- health and comfort, or from the perspective of harmonious coexistence between buildings and nature, it is found that in the whole life cycle, it can save resources (energy saving, land saving, water saving, material saving), protect the environment and reduce pollution to the maximum extent, and provide people with healthy and efficient use of space. Green buildings in harmony with nature will be an important means for the green transformation of the construction industry and the reduction of carbon emissions. However, due to the lack of property rights system, unclear responsibilities of environmental subjects, low market identification and inadequate disclosure of environmental information, in the field of carbon emission reduction in green buildings, there is still a significant externality problem that the cost of technological transformation and innovation is greater than the expected market benefit after carbon emission reduction. Therefore, only by using the basic logic of financial value exchange across time and space, through financial policy regulation, financial system supervision and financial transaction mechanism design, pricing of assets, Equity and risk based on carbon emission rights and carbon emission reduction credits in the construction industry, in order to achieve the goal of net zero carbon emission in the construction industry, the construction enterprises should combine the related behaviors of environmental protection and energy saving and emission reduction with economic benefits.^[1]

2 Green building and its development

Green buildings are buildings that maximize energy saving, land saving, water saving, material saving and other resources, environmental protection and clean, provide people with green, healthy, comfortable and convenient activity space, and coexist harmoniously with nature throughout the life cycle.^[2] Foreign practice shows that green buildings with good environmental protection, energy saving and emission reduction will effectively solve the environmental deterioration and resource bottleneck, and realize the low-carbon green sustainable development of buildings. The United States Green Building Council (USGBC) estimates that green buildings use 32% less electricity than normal buildings, reducing total energy consumption by 36%. Developed countries promoted green buildings as early as the 1980s. However, green building started late in China, China in June 2006 officially implemented the "green building evaluation" standards, the first batch of "green building design evaluation signs" was officially announced in August 2008. By the end of 2011, there were 323 green building projects nationwide, including 144 public buildings and 179 residential buildings. To guide urbanization construction with green, ecological and low-carbon concepts, the development of green buildings fully respect and adapt to nature,

let the city integrate into nature, and make people's life more comfortable. The development of green buildings will promote the application of a variety of new technologies such as comprehensive integration of environmental protection and energy conservation, promote the transformation of building production methods, and stimulate the development of related industries such as new energy-saving and environmental protection building materials and new energy. In the process of urbanization, the development of green buildings is of great significance to the optimization and upgrading of industrial structure and the promotion of sustainable economic and social development.

By 2020, China's carbon dioxide emissions per unit of GDP will be reduced by 40 to 45 percent from the 2005 level. Therefore, we must advocate low-carbon life and the development of low-carbon economy, urbanization will certainly carry out low-carbon city construction, which will provide a broader space for the development of green buildings. At present, the key to the development of green buildings is to perfect the investment and financing mechanism of green buildings and correctly evaluate their economic benefits. Energy saving and emission reduction benefits are considered when evaluating the economic benefits of green buildings. Introduce carbon finance and clean development mechanism to improve the investment and financing mechanism of green buildings, make the investment and financing mode of green buildings operable, attract social capital and financial capital to enter the field of green buildings, will provide sufficient and stable sources of funds for green buildings, and promote the healthy development of green buildings.

3 Carbon finance and its functions

Carbon finance grew out of changes in international climate policy in the 1970s. Early scholars mainly focused on the relationship between carbon emissions and the environment and proposed that the government should limit carbon emissions through political rights. From the end of the 19th century to the beginning of the 20th century, as governments recognized the importance of environmental protection, with the signing of the international Equator Treaty and the Kyoto Protocol, the international Environment and climate Conference also promoted the formation of carbon finance. Carbon finance refers to all financial activities that deal with climate change, such as carbon emission trading and investment and financing related to limiting carbon emissions. A well-functioning carbon finance system can help reduce greenhouse gas emissions, help green and low-carbon businesses reap economic benefits, and save costs for high-emission businesses. It also provides a variety of financial services to those involved in the carbon market.^[3] The international carbon finance system consists of three systems: low-carbon project investment, carbon fund and carbon bond, including carbon finance policy support system, carbon finance organization service system and carbon finance market system. In 2013, China started to launch eight regional carbon trading markets in Beijing, Shanghai, Shenzhen, Tianjin, Guangdong, Hubei, Chongqing and Fujian. In December 2017, China launched the national carbon

emission trading system for the power generation industry, which will be simulated in 2019 and continuously improved in 2020.

At the beginning of 2015, voluntary Emission Reduction trading entities across the country began to use the national voluntary emission reduction trading registration system for account registration, and CCER (Chinses Certified Emission Reduction) transaction was officially launched. Subsequently, various regional carbon trading pilots have also begun to deploy CCER related work. As of January 23, 2020, the statistical data of China Carbon Trading Network shows that the accumulated CCER turnover of carbon emission exchanges is shown in the figure 1 below: Among them, Hubei 64.016 million tons, Guangdong 56.098 million tons, Shenzhen 26.414 million tons, Shanghai 15.109 million tons, Beijing 13.297 million tons, Chongqing 8.457 million tons, Fujian 8.034 million tons, Tianjin 3.054 million tons.

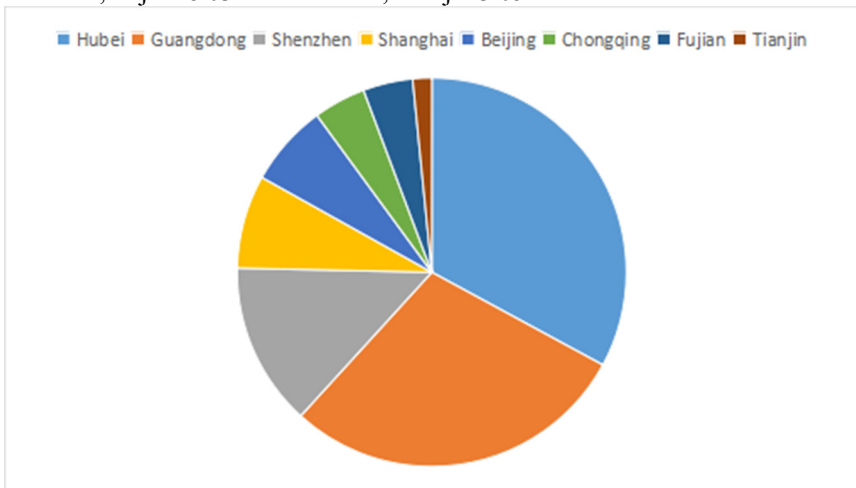


Fig. 1. Cumulative CCER trading volume of each carbon emission exchange.

With the gradual maturity of the carbon trading market system, the carbon finance activities and services of funds, banks and other institutions are becoming more and more perfect, and the function of carbon finance is gradually playing a role. The function of carbon finance is a variety of financial institutional arrangements and financial transactions for emission reduction. Including carbon emission rights, carbon emission rights futures, options market trading, carbon emissions international trade, carbon insurance, carbon funds and other derivatives trading, low-carbon project development investment and financing, including the more common CDM (clean development mechanism) project loans and other financing methods. With the environmental protection and system design and implementation in various countries, carbon finance has gradually emerged and played a role. It uses financial instruments and services to transfer environmental risks and optimize the environment, while reducing financial risks and increasing social benefits.^[4]

4 Research on carbon finance innovation to promote the development path of green buildings

Carbon finance innovation should establish a carbon finance system supported by a series of innovative financial instruments, including carbon funds, low-carbon loans, low-carbon insurance, carbon financial markets, carbon trading mechanisms, and CDM project financing. According to the project loan principle of judging, evaluating and managing the environmental and social risks of project financing, namely the "equator principle", low-carbon indirect financing is carried out, and low-carbon direct financing is carried out by venture capital funds and private equity funds. The innovation of carbon financial products and services in China is not in line with the potential of carbon market. Therefore, it is necessary to learn from the successful experience of carbon finance development in developed countries and combine with the reality of China, establish a diversified carbon finance product and service system and a multi-level carbon finance system, provide low-cost financing solutions for the realization of China's low-carbon goals, provide a wide range of financing channels for green buildings and disperse risks, and improve the investment and financing mechanism for the development of green building CDM projects.^[5]

In order to realize the integrated development of carbon finance and green building, the financial nature of carbon financial products and services should be organically combined with the development characteristics of green building industry. On the one hand, enhance the availability of financial products and services throughout the life cycle of green buildings, so that all links of green buildings can have finance to "escort" their abundant funds and resolve risks; on the other hand, promote the innovation of carbon financial product and service categories and mechanisms, so that carbon finance is no longer a "remote" game for the rich, but an essential trading tool for the "grounded" real economy. In the process of the construction industry gradually being included in the carbon emission rights trading market, promote the use of financial market-oriented means of green building carbon allowances, from the free allocation under administrative guidance to the "free allocation + auction sale" mode, and further give play to the function of financial mechanism price discovery. Restart the CCER trading market as soon as possible, appropriately simplify the CCER project approval process, shorten the project declaration cycle, and encourage the development of high-quality CCER projects. Further improve the CCER transaction offset management rules and transaction processes, break through regional boundaries, and implement a unified national transaction and supervision method.^[6] Under the premise of vigorously developing green credit, deepen the exploration of financial products such as carbon bonds, carbon forwards, carbon options, carbon funds, cross-border carbon asset repurchase and carbon emission right collateral financing in support of the development of the green building industry, and actively promote the attempt to standardize carbon insurance contracts and futures varieties related to carbon emission rights.

5 Conclusion

At present, the incentive mechanism of green building investment and financing in our country is not perfect, and the incentive measures of financial subsidy, tax and finance are limited. It is of great significance to develop green building CDM projects based on carbon finance. In the development process, involving development enterprises, commercial banks, securities institutions, social capital, insurance companies and other participants. There should be incentives for these institutions to actively participate and work together to secure carbon reduction purchase agreements and carbon trading, in order to solve the problem of insufficient fund and low efficiency of green building project, and promote the sustainable and healthy development of green building.

Fund project

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