

Research on the Current Situation, Challenges and Path of Green Finance Development in China under the Background of "Double Carbon"

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Abstract. As the world's largest carbon emission country, China has put forward the "double carbon" goal in order to better respond to climate change, and the development of green finance is an important measure to implement sustainable development and achieve the "double carbon" goal. This paper takes green finance under the background of "double carbon" as the research object, combines the current development of green finance in China, and summarizes the challenges faced by green finance in China from five aspects: institutional system, product innovation, carbon trading market mechanism, information disclosure, and risk assessment. Finally, according to the internal requirements of the "double carbon" goal and the basic national conditions of China, we propose solutions from the four dimensions of establishing a restraint and incentive mechanism, promoting product innovation, attaching importance to talent cultivation, and strengthening international cooperation, aiming at providing suggestions for the development of green finance in China.

Keywords: Green Finance; "Double Carbon" Target; Carbon Trading Market; Green Credit.

1. Introduction

At present, global climate change and other environmental problems are becoming increasingly prominent. In order to better cope with global climate change, we should actively promote the green transformation of economic development. In 2020, the President Xi promised the world at the 75th session of the United Nations General Assembly that "China's carbon dioxide emissions will strive to peak before 2030 and strive to achieve carbon neutrality before 2060 [1]". Under the "double carbon" goal, the development of green finance plays an important role in promoting the green and low-carbon transformation of China's economy, and how to reasonably layout green financial policies and green financial products is the key issue to further develop green finance. Therefore, it is of great significance to deeply study the opportunities and challenges faced by China's green finance and give full play to the positive role of green finance in absorbing social capital for the realization of China's "double carbon" goal.

2. Development Status of Green Finance in China

2.1 The Construction of Green Financial System has Achieved Remarkable Results

Green finance refers to economic activities to support environmental improvement, respond to climate change and save and efficiently use resources, that is, financial services provided for project investment and financing, project operation, risk management, etc. in the fields of environmental protection, energy conservation, clean energy, green transportation, green buildings, etc.

At this stage, compared with Germany, the United States and other developed countries, the development of green finance in China is still in its infancy, but in recent years, China's green finance has developed very rapidly, and has initially formed a relatively sound top-level design of green finance, and gradually promoted the construction of a "top-down" green finance policy system [2]. First of all, in green finance business, China's green credit balance reached 1.8 trillion US dollars by 2021, ranking first in the world [3]. In addition, the vigorous development of green bonds, green development funds, green insurance and other businesses has gradually enriched the green financial

business system; Secondly, China's green finance related policies are increasingly improved. At the G20 Summit in 2016, China, as the rotating presidency, incorporated green finance into the core topic of the meeting and established the G20 Green Finance Research Group [4]. Under the influence of the research group, many countries including China have achieved remarkable results in building a green finance policy system. In 2018, the People's Bank of China led the establishment of the Green Finance Standards Working Group of the National Financial Standardization Technical Committee to promote the construction of the green finance standards system in accordance with the principle of "domestic unification, international integration, and clear and enforceable". In 2018-2021, China's three standards for green finance, namely the Catalogue of Green Bond Support Projects (2021 Edition), the Guidelines for Environmental Information Disclosure by Financial Institutions and the Environmental Equity Financing Instruments, have been officially released; The 15 standards have entered the process of project approval or consultation, involving many key areas such as environment, society and carbon accounting, and are of great significance to the construction and sustainable development of the domestic green financial market environment.

Table 1. Sorting of China's main green finance policies

time	name	primary coverage
August 2016	Guiding Opinions on Building a Green Financial System	Define the definition, incentive mechanism and development direction of green finance in China, and establish the top-level framework system of green finance in China
November 2018	Green Investment Guidelines (Trial)	Define the connotation, objectives, principles and basic methods of green investment, guide the design of green investment information disclosure system and the quantification and design of green indicators
October 2020	Guiding Opinions on Promoting Investment and Financing in Response to Climate Change	Define the definition and support scope of climate change investment and financing, and promote it from five aspects: policy, standard, social capital, local practice and international cooperation.
February 2021	Guiding Opinions on Accelerating the Establishment and Improvement of a Green and Low-Carbon Circular Development Economic System	Vigorously develop green finance and green trading market mechanism, improve green standards, and ensure the realization of the dual-carbon goal
September 2021	Opinions on Completely, Accurately and Completely Implementing the New Development Concept and Doing a Good Job of Carbon Peak and Carbon Neutralization	Take green finance as an important starting point of the "double carbon" strategy, promote the development of green and low carbon financial products and services, and guide financial institutions to invest and finance green and low carbon projects
December 2021	Notice on Carrying out Climate Investment and Financing Pilot Work	The declaration of local pilot projects for climate investment and financing in China has been officially launched to guide market funds to invest in the climate field and achieve the goal of "double carbon"

2.2 Green Financial Products Tend to Diversify

At present, China's green financial products mainly include green credit, green bonds and green insurance. Among them, green credit is the most important financing channel, and in recent years, the scale of green credit and its proportion in China's total loans have shown an upward trend. As shown in Figure 1, by the end of 2021, China's green loan balance reached 15.9 trillion-yuan, accounting for 8.25%, and its loan scale has been among the top in the world for many years; In addition, green bonds and green insurance have also been further developed in recent years. Green bonds refer to the bonds that use the raised funds for projects that can bring positive environmental benefits. They have the characteristics of low risk, long term and low issuance cost. See Figure 1. By the end of 2021, China's total issuance of green bonds reached 706.3 billion yuan. The total issuance of green bonds in 2016-2021 showed an overall upward trend, becoming the second largest green financial product in China after green credit; Green insurance keeps innovating in insurance business, regulatory evaluation, liability system, etc. According to the survey and statistics of the Insurance Industry Association, from 2018 to 2021, the insurance industry has provided 70.03 trillion yuan of

green insurance services, covering green energy, green resources, environmental pollution and other fields. By the end of June 2021, the book balance of insurance funds invested in carbon neutral, carbon peak and green development-related industries through bonds, stocks, asset management products and other means exceeded 900 billion yuan. Its service scope was gradually expanded and insurance products were increasingly enriched.

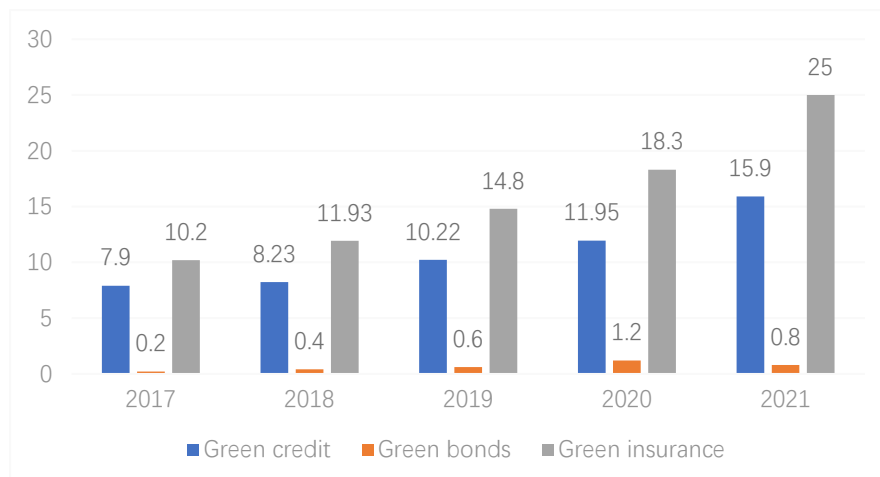


Figure 1. China's main green financial products in 2017-2021 Unit: trillion yuan

In addition to the above three types of financial products, the introduction of green index, green trust, green fund and other investment products has further expanded the green financial product system. First, the green index product system has gradually improved. Green index is a special product that guides the flow of funds to environmental protection enterprises and projects through public fund-raising, including green stock index products and green bond index products. Secondly, green trust has developed rapidly. By the end of 2021, the existing scale of green trust assets was 331.8 billion yuan, and more than 60% of green trust funds were invested in clean production and infrastructure green industry upgrading. Finally, the scale of green fund investment expanded. Green funds mainly invest in green industries and green securities. By 2021, the number of public and private funds in green, sustainable, ESG and other directions will be close to 1000, with a total scale of more than 790 billion yuan, entering the fast lane of development.

2.3 The Scope of China's Green Financial Reform Pilot Zone has Gradually Expanded

Since the State Council decided to select some places in Zhejiang, Jiangxi and other five provinces in 2017 to build green finance reform and innovation pilot zones with different emphasis and characteristics, the scope of China's green finance reform pilot zones has gradually expanded [5]. The State Council has successively approved the establishment of green finance reform and innovation pilot projects in seven provinces, namely, Zhejiang, Jiangxi, Guangdong, Guizhou, Gansu, Xinjiang and Chongqing. Under the background of global competition to develop green economy and seek the path of sustainable economic development, it has become a consensus to establish and improve the green financial system. By the end of 2021, the balance of green loans in the seven provinces had reached 4.7 trillion yuan, and regional green financial products with regional characteristics had been continuously innovated and launched, and the exploration in the field of green finance had achieved remarkable results. At this stage, the continuous expansion of the green finance reform pilot is of great significance to the construction of a regional green finance development model.

3. Challenges to the Development of Green Finance in the Context of "Double Carbon"

3.1 The Green Financial System and Evaluation Criteria are not Perfect, and the Incentive and Restraint Mechanism Needs to be Improved

First, China's green financial system is not sound. China's green finance started late, and the relevant laws and regulations are not mature enough, lacking some pertinence and operability. At this stage, China's rules and regulations related to green finance are mostly broad and vague methods and opinions, the subject of power and responsibility is not clear, the legal binding force is small, and there is a lack of substantive legal documents and implementation rules.

Second, the assessment criteria for green finance are not uniform. This is manifested in two dimensions. One is the inconsistency between China's green finance standards and international mainstream standards in the identification of green projects. The other is that China has not yet formed a unified green finance evaluation standard nationwide. The former is mainly due to the inconsistency between China's green finance development stage and the overall international development level. China is still in the initial stage of green finance development, while many countries in the world have relatively mature green finance development. This inconsistency of evaluation standards caused by the difference in development level seems to be justified, but it is not conducive to the identification of international green projects to some extent. The domestic evaluation standards are not uniform, which are mainly reflected in the difficulty in identifying green projects and the different identification criteria. For example, for the same green financial product, the identification criteria of different departments are different. The "development and utilization of nuclear energy" is a green project in the Green Bond Guidance issued by the National Development and Reform Commission, but it is not recognized as a green project in the Green Bond Announcement issued by the Central Bank [6]. The disunity of this caliber has led to many green projects not being accurately supported by financial institutions and investors, which is not conducive to the development of green projects.

Third, there is a lack of certain incentive and restraint mechanisms. On the one hand, green finance-related businesses have the characteristics of high investment cost, long cycle and high risk, while China's incentive and subsidy mechanism for green projects has not yet been established, resulting in many financial institutions and investors' low enthusiasm for green projects. On the other hand, the insufficient supervision and restriction of the green financial market has led to the unclear boundaries of rights and obligations between different subjects, and the imperfect punishment mechanism in the market, which has hindered the development of green finance to a certain extent.

3.2 The Development of Green Financial Products is Uneven and the Product Innovation is Insufficient

In terms of scale, at present, green credit accounts for more than 90% of China's green financial products, followed by green bonds, and the scale of green index, green insurance and other products accounts for a very low proportion. From the perspective of business structure, taking green credit as an example, green credit mainly focuses on infrastructure and national energy conservation and emission reduction, accounting for 48.2%, with uneven industry distribution; From the perspective of space, green credit business is mainly concentrated in the eastern region, accounting for 51.78%, while the central and western regions account for a relatively small proportion. On the other hand, China's green financial products lack certain innovation. Investors' demand for the diversity of financial products is increasing, while China's green insurance, green funds, green bonds and other financial products account for a relatively small proportion, and carbon futures, carbon swaps, carbon options and other financial derivatives are scarce in the market; In addition, the business structure of various green finance products is relatively simple, and high-quality products are seriously insufficient. It is difficult to give full play to the complementary effects of various financial products, which leads to the difficulty in dispersing some risks, and thus does not rely on green low-carbon enterprise financing.

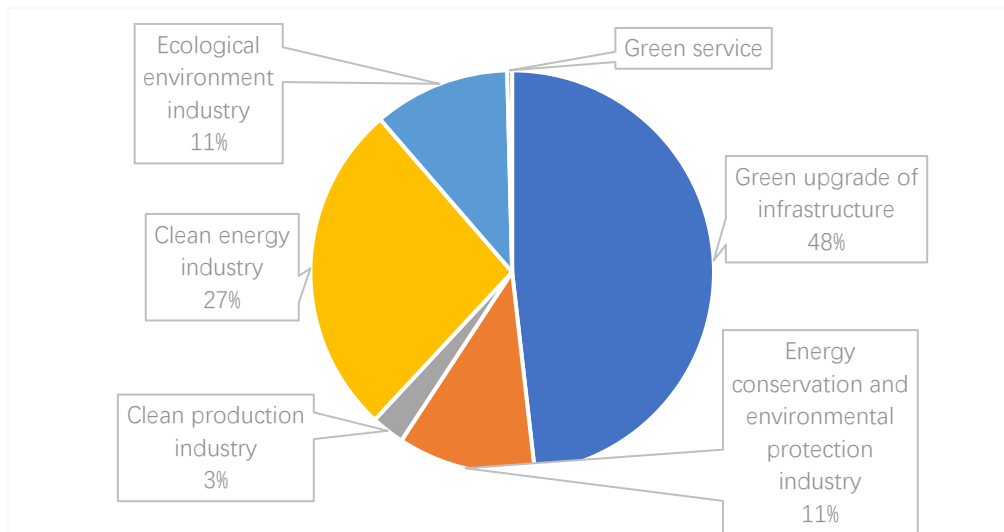


Figure 2. Proportion of green credit balance by industry

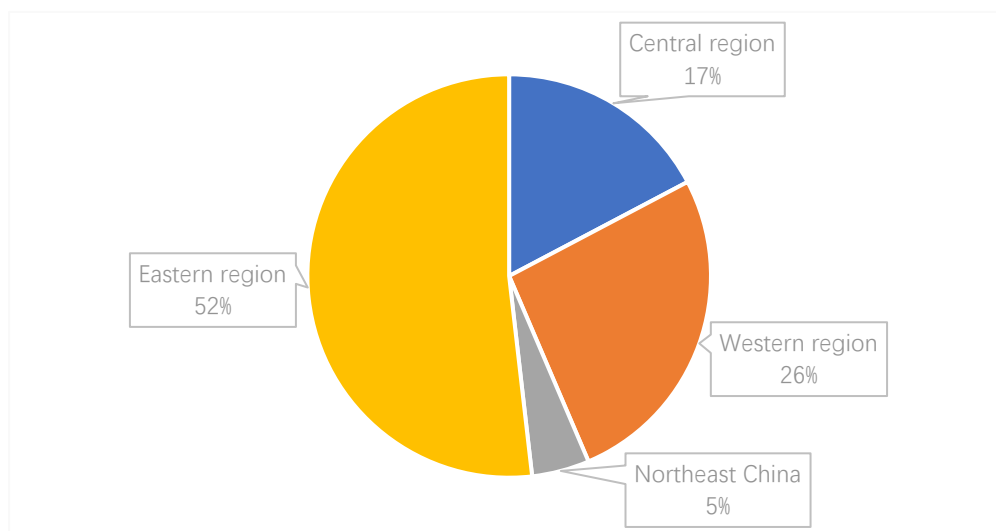


Figure 3. Proportion of green credit balance by region

3.3 Carbon Trading Market Mechanism Needs to be Strengthened

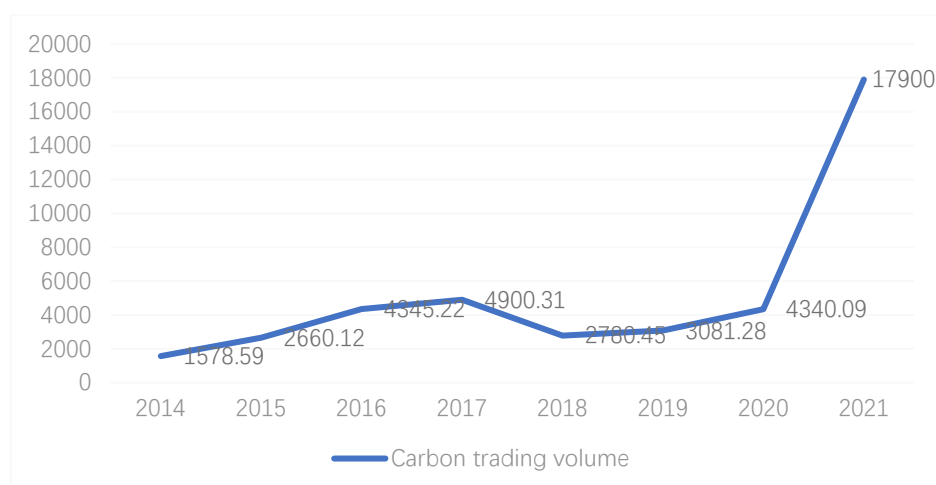


Figure 4. Trading volume of China's carbon trading market in 2014-2021 Unit: 10000 tons

Carbon trading is a market mechanism in which the emission rights of carbon dioxide are traded by all emission entities on the premise of controlling the total amount. In July 2021, the national

carbon emission trading market was officially launched, covering a total of 4.5 billion tons of carbon dioxide emissions.

However, at present, China's carbon trading market is still in its infancy, and problems such as low market access standards, uneven regional distribution of trading items, single trading form, inconsistent pricing mechanism [7], lax supervision, and poor information transparency [8] seriously restrict the development of the carbon trading market. Some problems have existed in the carbon trading pilot period. For example, China's carbon trading pilot areas have not put forward clear emission intensity reduction targets in addition to the "13th Five-Year Plan", nor have they clearly defined the total emission reduction targets, nor have they clearly defined the total emission limit that will decrease year by year [9], which makes it difficult to guarantee the effect of carbon emission reduction in China. In addition, the imperfection of the relevant rules and regulations of China's carbon trading market makes the carbon trading market chaotic and unclear, which further affects the monitoring of the carbon trading market and the reliability of the relevant trading data, and is not conducive to the play of the intrinsic value of the carbon trading market under the "double carbon" goal.

3.4 Asymmetric Information in Green Financial Market

The information asymmetry between supply and demand caused by incomplete information disclosure in China's green financial market makes it difficult for many financial institutions to correctly evaluate green projects, resulting in increased transaction risk. The opacity of information makes it difficult for many investors to fully understand the development of green projects and make correct predictions of their future trends, thus reducing their enthusiasm for investment. At this stage, industrial enterprises are the industry with the largest carbon emissions in China, and the characteristics of industrial enterprises' various production activities and strong professionalism make the information disclosure content of different industrial enterprises vary greatly, and it is difficult to formulate a unified evaluation standard. Taking green bonds as an example, the survey shows that more than 20% of the bonds use the summary method to disclose the environmental benefit information, which is difficult to reflect the specific environmental benefits of different projects [10]. This makes it difficult for financial institutions and investors to have a comprehensive understanding of green projects and products, thus reducing the activity of the trading market.

3.5 Incomplete Non-market Risk Detection and Evaluation System

In addition to market risks, it is inevitable to encounter non-market risks such as environmental risks and competition risks in the process of green finance development. The establishment of the "double carbon" goal makes industrial enterprises with high carbon emissions face more stringent carbon emission standards and pressure of transformation. In this process, many potential non-market risks are difficult to predict. At this stage, the risk detection and assessment of financial institutions are not perfect, and there is no reliable risk response plan, so that they may bear certain economic losses, which will affect the stability of the green financial system.

4. Research on the Development Strategies and Paths of Green Finance

4.1 Establish Incentive and Restraint Mechanism based on the "Double Carbon" Goal, and Improve the Green Financial System

First, improve the legal and regulatory system of green finance and clarify the specific implementation plan. China should formulate and promulgate programmatic laws and regulations on green finance as soon as possible, clarify the rights and obligations of various financial entities, establish a punishment mechanism, and improve the green finance system and mechanism from the legal level. At the same time, all departments should jointly introduce a set of systematic and operational green finance implementation plan to guide financial institutions to carry out relevant businesses more efficiently.

Secondly, establish a unified green finance evaluation standard. China should fully learn from the experience and lessons of foreign countries on the exploration of green finance, actively integrate with international standards while based on its own national conditions, and close to international mainstream standards such as the Equator Principles, the Green Bond Principles, and the Climate Bond Standards; In addition, it is also necessary for the CBRC and other departments to jointly negotiate to unify the domestic green financial evaluation standards, clarify the scope and identification standards of green projects and financial products, and resolutely put an end to "green" behavior.

Finally, improve the incentive and restraint mechanism of green finance. For projects that are conducive to ecological environment protection and sustainable development, we should take incentives and give appropriate policy preferences or subsidies, such as reducing taxes, giving investors appropriate risk compensation, reducing the entry threshold of green projects in the financial market, and so on, to promote the development of green projects and improve the enthusiasm of relevant institutions and individuals for investment. Some behaviors that are not conducive to the development of the green financial market should be restrained. In the process of green financial transactions, strictly resist the entry of "pseudo green" products into the market, improve the market information disclosure system, achieve information transparency, and realize the transformation from "partial disclosure" to "full disclosure". The traditional enterprises with high carbon emissions should be restricted to establish a sound green financial system and mechanism.

4.2 Promote the Innovation of Green Financial Products and Stimulate the Vitality of Green Financial Market

We should strengthen the research and development of green financial products, give full play to the complementary effects of green bonds, green insurance and green funds while giving full play to the advantages of the current large-scale green credit products, gradually expand the scale and business models of green bonds, green insurance and green funds, and give full play to the positive role of new businesses such as blue bonds, energy efficiency credit and credit asset securitization. On the other hand, we should also increase the development of other green financial products, especially carbon finance business. Further standardize the system and mechanism of China's carbon trading market, such as the appropriate collection of carbon emissions tax, the establishment of carbon emissions licensing system [11], the development of carbon trading specific laws, and on this basis, develop carbon futures, carbon options, carbon swaps and other financial derivatives to stimulate the vitality of the carbon trading market. We should also accelerate the development of other green financial products, such as green index, green trust, contract energy management, so that the investment and financing risks of green projects can be dispersed, so as to improve the investment enthusiasm of financial institutions and investors, and stimulate the vitality of the green financial market.

4.3 Pay Attention to the Cultivation of Green Finance Talents and Promote the Combination of Technology and Green Finance

High-quality human resources are one of the essential elements for the development of green finance. At present, there is a shortage of green finance talents, and it is particularly urgent to train professionals in this field. First of all, colleges and universities can set up green finance-related majors, focusing on training professionals who master the theories of finance, green economic development, and resources and environment, to provide talent protection for the development of national green finance; Secondly, optimize the green finance talent training system. Learn from the excellent experience of talents training in this field at home and abroad, and apply it to the cultivation of green finance talents in China according to the national conditions. At the same time, we should further implement the phased training plan, combine professional training with vocational training, attach importance to the induction training and on-the-job training, and keep pace with the times. Finally,

all departments can cooperate with relevant universities and training institutions to jointly promote the cultivation of green finance talents.

On the other hand, promote the application of science and technology in the field of green finance, set up green finance science and technology innovation fund, and increase the input of scientific and technological elements. For example, it is possible to monitor the carbon dioxide emissions of enterprises more accurately through scientific and technological means, calculate and predict the value and trend of green financial products more accurately, and monitor the implementation of green projects systematically. Therefore, it is of great significance to invest scientific and technological elements in the field of green finance for the development of this field.

4.4 Optimize the Green Financial Risk Prevention and Control Mechanism and Actively Deal with Various Financial Risks

Many risks in the development of green finance are difficult to predict and estimate. These risks include both market risks and non-market risks including climate risks and environmental risks. Among them, climate change has become an adverse factor for countries to develop green finance because of its difficulty in prediction and estimation. How to deal with climate change risks has become a major problem to be solved urgently.

First of all, financial institutions should regularly monitor the state of the climate environment, conduct climate change risk analysis, and improve risk prevention awareness [12]. Secondly, strengthen international cooperation, actively carry out green finance transnational projects, and develop diversified green finance business, so that the risk of green finance can be dispersed as much as possible; At the same time, through international cooperation and exchange, we should fully learn from the experience and lessons of foreign countries in dealing with climate change risks to optimize our risk prevention and control mechanism. Finally, improve the green financial risk management ability. Strengthen the communication and cooperation of potential risk information among various departments, use big data, cloud computing and other technologies to manage and calculate climate and environmental data, regularly carry out scenario practice to deal with climate change, and effectively improve the ability to deal with climate change risks.

5. Conclusion

The realization of the "double carbon" goal is of great significance to China's response to global climate change, and the full use of green finance related businesses has a significant role in promoting the realization of carbon neutrality. At this stage, China's green finance development is still in its infancy and will face more opportunities and challenges in the future. Therefore, we urgently need to accelerate the construction of the green finance system, stimulate the vitality of the green finance market, strengthen international multilateral cooperation, boost the transformation of the green low-carbon economy, and provide strong support for achieving the "double carbon" goal.

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