

Research on the application mode and effect of green finance engineering in carbon emission reduction project financing

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ABSTRACT

In the global effort to combat climate change and pursue a low-carbon transformation, advancing carbon reduction projects is crucial. However, financing challenges pose a significant bottleneck to their development. Green finance initiatives, as innovative financial tools, offer new avenues for financing carbon reduction projects. This article delves into various application models, including green credit, green bonds, and innovations in carbon financial products. It examines their practical applications in financing carbon reduction projects through real-world cases, highlighting how they effectively alleviate financial pressures, drive technological innovation, and achieve significant environmental benefits. The article also addresses the policy, market, corporate awareness, and talent issues encountered during implementation and proposes targeted solutions to support the deepening development of green finance in the financing of carbon reduction projects.

KEYWORDS

Green finance project; Carbon emission reduction project; Financing mode; Application effect

I Introduction

As the issue of global climate change becomes increasingly severe, carbon reduction has become a consensus and action goal for the international community. The implementation of carbon reduction projects is crucial for reducing greenhouse gas emissions and promoting green and sustainable economic development [1]. However, these projects are often characterized by large investment scales, long capital recovery periods, and relatively high risks, making financing challenges a key factor that hinders their smooth progress.

As an innovative financial tool, the green finance project integrates financial resources with environmental protection and sustainable development, offering new ideas and solutions for financing carbon reduction projects. By utilizing a variety of financial instruments and innovative mechanisms, the green finance project can effectively direct funds towards carbon reduction efforts, facilitating the implementation of these projects[2]. Therefore, a thorough examination of the application models and effects of green finance in carbon reduction project financing is crucial for advancing the carbon reduction cause and achieving the harmonious coexistence of economic and environmental goals, both theoretically and practically.

2 Application mode of green finance project in carbon emission reduction project financing

2.1 Green credit model

Green credit is a specialized loan designed by financial institutions for companies involved in the construction and operation of carbon reduction projects. By establishing clear green credit policies, these institutions offer a range of preferential measures to eligible carbon reduction projects, including favorable interest rates, extended loan terms, and expedited approval processes.

Taking the Chongqing branch of Bank of Communications as an example, the bank is actively exploring innovative models for green credit. For a carbon emission rights pledge loan, the Chongqing branch of Bank of Communications collaborated with the Chongqing United Property Rights Exchange Group to provide 10 million yuan in financing to a large power investment group's Hechuan power station. This innovative method of using carbon emission rights pledges effectively revitalized the company's carbon assets and alleviated its working capital shortage. Additionally, the bank provided a 115 million yuan credit line for a high-water sludge treatment project by a Chongqing environmental technology company, supporting the smooth progress of the project. The project employs advanced sludge treatment technology, which can effectively reduce environmental pollution from sludge and achieve carbon reduction goals.

2.2 Green bond model

Green bonds refer to securities that raise funds specifically to support green industries, green projects or green economic activities that meet the prescribed conditions. Enterprises can raise a large amount of funds through the issuance of green bonds for the construction of carbon emission reduction projects[3].

The Hunan Branch of the Bank of China has been actively involved in the green bond sector. As the lead underwriter, it underwrote the first phase of a green bond for a steel group in 2022, with a bond issuance scale of 1 billion yuan. The funds raised were entirely used for upgrading environmental protection technologies and the comprehensive utilization of waste heat resources for power generation. By introducing advanced environmental protection technologies and equipment, the project comprehensively treats and utilizes exhaust gas, wastewater, and waste residue from the steel production process. This not only reduces pollutant emissions but also recovers and utilizes waste heat resources, enhancing energy efficiency and reducing carbon emission intensity.

2.3 Innovation mode of carbon financial products

2.3.1 Carbon quota pledge loan

Companies can use their carbon quotas as collateral to secure loans from financial institutions. Chongqing Hechuan Power Generation Co., Ltd., a subsidiary of State Power Investment Corporation, successfully secured 10 million yuan in carbon quota financing from financial institutions by leveraging its carbon quotas. This innovative financing method not only provides a new financing channel for companies but also activates their carbon assets, enhancing the efficiency of carbon asset utilization.

2.3.2 Forestry carbon sink expected income pledge loan

By using the expected income from forestry carbon sinks as collateral, Chongqing Three Gorges Bank provided a 50 million yuan special loan to an agricultural enterprise in Wulong District, addressing the project's financing challenges. Through afforestation and forest management, forestry carbon sink projects absorb and lock in carbon dioxide, achieving significant carbon reduction. The pledge of expected income from forestry carbon sinks provides financial security for enterprises to undertake such projects, thereby promoting the development of the forestry carbon sink industry.

2.3.3 "Carbon-linked" loans

Linking loan interest rates to a project's carbon emissions can incentivize companies to reduce their carbon footprint. The Chongqing branch of Industrial Bank has provided a 'carbon-linked' loan to Chongqing Tian Tai Thermal Power Co., Ltd., with the interest rate tied to the project's carbon emissions. If the company reduces its carbon emissions through technological upgrades and management improvements, it will benefit from a lower interest rate; conversely, if carbon emissions rise, the interest rate will increase accordingly. This loan model effectively encourages companies to actively implement carbon reduction measures, achieving a win-win in economic and environmental benefits.

3 Application effect of green finance project in carbon emission reduction project financing

3.1 Effectively relieve the pressure of project funds

The green finance project offers a variety of financing options for carbon reduction projects, effectively alleviating the financial pressure on these projects. Through green credit and green bonds, companies can secure sufficient funds for project construction and technological research and development, ensuring the smooth implementation of the projects. For instance, the carbon emission rights pledge loan provided by the Chongqing branch of Bank of Communications to the Hechuan Power Station promptly addressed the company's working capital shortage, ensuring the power station's normal operation and providing strong financial support for the company's carbon reduction efforts.

3.2 Promoting technological upgrading and innovation

The support from green finance projects encourages companies to increase their investment in R&D for carbon reduction technologies, driving technological upgrades and innovation. To secure green finance funds, companies actively adopt advanced carbon reduction technologies, improve energy efficiency, and reduce carbon intensity. A steel group raised funds by issuing green bonds to upgrade its environmental protection technologies, introducing advanced energy-saving and emission-reduction equipment and technologies, and optimizing its production processes. This not only reduced pollutant emissions but also improved production efficiency and product quality, thereby enhancing the company's market competitiveness.

3.3 Achieve significant environmental benefits

The application of green finance projects in financing carbon reduction initiatives has facilitated the implementation

of these projects, achieving significant environmental benefits. By supporting projects in clean energy, energy conservation, and environmental protection, these initiatives have reduced greenhouse gas emissions and improved the quality of the ecological environment. After the completion of Chongqing Tian Tai Thermal Power Co., Ltd. 's' upgrading large-scale projects to reduce small-scale ones' combined heat and power project, advanced combustion technologies and energy-saving equipment have significantly reduced coal consumption and carbon dioxide emissions. Additionally, the project has achieved combined heat and power generation, enhancing the efficiency of energy utilization, reducing energy waste, and positively impacting local air quality and the ecological environment.

3.4 Enhance corporate image and competitiveness

Companies involved in green finance projects excel in environmental protection and social responsibility, which enhances their image and competitiveness. Consumers and investors are more likely to support companies that actively fulfill their environmental responsibilities, thus creating more market opportunities and development space for these companies. Companies that issue green bonds establish a positive environmental image in the market, attracting more investor attention. Moreover, companies' efforts in carbon reduction align with national policy directions and social trends, helping them gain policy support and market recognition, thereby enhancing their brand value and market competitiveness.

4 Problems existing in the application of green finance project in carbon emission reduction project financing

4.1 Policy support and precision need to be strengthened

Although the government has introduced a series of policies to support the development of green finance, the policies need to be more targeted and practical in financing carbon reduction projects. Currently, the criteria for identifying and evaluating carbon reduction projects are not well-established, lacking unified and clear standards and guidelines. This makes it difficult for financial institutions to accurately assess the carbon reduction effects and potential risks of projects, leading to difficulties in project screening and risk assessment, which in turn affects their support for carbon reduction projects. Moreover, the incentive measures are not sufficiently robust, failing to attract financial institutions and enterprises, thus hindering the full mobilization of all parties' enthusiasm for participating in green finance initiatives.

4.2 The carbon financial market mechanism is not perfect

The carbon financial market is not yet fully developed, with significant price volatility in carbon quota trading and insufficient market liquidity. This makes it challenging to accurately assess the value of carbon financial products, thereby increasing the risks for financial institutions in promoting and applying these products. For instance, the value of collateral for carbon quota pledge loans is unstable, and a significant drop in carbon quota prices could jeopardize the safety of these loans. Additionally, the carbon financial market faces significant information asymmetry, with a lack of effective communication channels between enterprises and financial institutions, which hinders the healthy development of the carbon financial market.

4.3 Enterprises have insufficient awareness of green finance projects

Some enterprises have a low awareness of green finance projects and lack the initiative to actively participate. Some companies believe that the financing costs for green financial products are high and the procedures are cumbersome, leading to doubts about the application of green finance projects. Moreover, due to their limited scale and strength, some small and medium-sized enterprises have limited exposure to green financial products and lack the capability and conditions to engage in green finance projects. The insufficient understanding of green finance projects by enterprises results in a lack of market demand, which in turn affects its effectiveness in financing carbon reduction projects[5].

4.4 Shortage of professional personnel restricts development

Green finance engineering involves knowledge from multiple fields, including finance, environment, and energy, requiring professionals with interdisciplinary backgrounds. However, the current market is relatively short of such professionals, which hinders the application and development of green finance engineering in financing carbon reduction projects. Financial institutions lack the necessary expertise in carbon asset evaluation and management, making it difficult to accurately assess the value and risks of carbon financial products. When companies apply for green

finance funds, they often lack professional guidance and support, which affects the efficiency and success rate of project financing.

5 Countermeasures and suggestions

5.1 Strengthening policy support and guidance

The government should further refine the green finance policy framework, establishing clearer and more detailed criteria for identifying and evaluating carbon reduction projects. It should define the scope of these projects, their technical requirements, and methods for assessing their effectiveness, providing clear policy guidance to financial institutions. Additionally, the government should increase fiscal subsidies and tax incentives for green finance initiatives, reducing financing costs for businesses and boosting the enthusiasm of financial institutions. For example, it could offer interest subsidies to companies issuing green bonds and provide risk compensation to financial institutions that engage in green credit activities. Furthermore, the government should enhance oversight of green finance projects, standardize market practices, and protect the rights and interests of all market participants.

5.2 Improve the carbon financial market mechanism

Accelerate the development of the carbon finance market, refine the carbon quota trading mechanism, and enhance market liquidity and price stability. Establish and improve the infrastructure for registering, custodial, and settling carbon financial products to ensure their smooth trading and circulation. Enhance the construction of carbon sink trading platforms, standardize the procedures for forestry carbon sink expected income rights pledge loans, and boost transaction efficiency and transparency[4]. Additionally, strengthen the disclosure and supervision of the carbon finance market to enhance information symmetry and reduce market risks.

5.3 Improve the recognition and participation of enterprises

Enhance the promotion and publicity of green finance initiatives to increase corporate awareness and acceptance of green financial products. By organizing training sessions, seminars, and other events, introduce companies to the policies, products, and case studies of green finance initiatives, helping them understand the benefits and roles of these initiatives. Financial institutions should enhance communication and collaboration with businesses, offering tailored green finance solutions to reduce financing costs and streamline procedures. Additionally, encourage industry associations and intermediaries to act as bridges and facilitators, providing professional consulting and services to encourage active participation in green finance initiatives.

5.4 Strengthening personnel training and introduction

Universities and vocational colleges should enhance the development of green finance-related programs, optimize course offerings, and cultivate professionals with interdisciplinary expertise. They should also strengthen practical training to boost students' hands-on skills and innovation capabilities. Financial institutions and companies should enhance employee training to improve their proficiency in green finance and overall competence. Additionally, they should actively recruit top-tier green finance professionals from both domestic and international markets to bolster their talent pool. Furthermore, it is crucial to establish and refine talent incentive mechanisms to attract and retain top talent, ensuring a steady supply of skilled professionals for the application and advancement of green finance in carbon reduction project financing.

6 Conclusion

Green finance projects play a crucial role in financing carbon reduction initiatives. By utilizing various models such as green credit, green bonds, and innovative carbon financial products, these projects receive effective financial support, which alleviates funding pressures, promotes technological upgrades, achieves environmental benefits, and enhances corporate image and competitiveness. However, the implementation of green finance projects faces challenges such as insufficient policy support, an underdeveloped market mechanism, low corporate awareness, and a shortage of specialized talent. To further advance green finance projects in carbon reduction financing, it is essential for the government, financial institutions, enterprises, and society to collaborate. This collaboration should focus on enhancing policy support, improving market mechanisms, raising corporate awareness, strengthening talent development, and ensuring the smooth execution of carbon reduction projects, thereby contributing positively to achieving the goals of

carbon peak and carbon neutrality. As green finance projects continue to evolve and improve, their potential applications in carbon reduction financing will expand, potentially playing a more significant role in global climate change mitigation and sustainable development.

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