

# Analysis of How Green Finance Helps Enterprises Achieve Low-Carbon Transformation

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## Abstract

Against the backdrop of global efforts to address climate change and China's "dual carbon" goals, enterprises characterized by high energy consumption and high emissions are facing urgent pressure to transition to low-carbon practices. Green finance, as a key tool for guiding capital flows to green and low-carbon sectors, plays an irreplaceable role in alleviating the financing gap for transformation and driving green innovation in enterprises. This article aims to systematically elucidate the intrinsic mechanism and practical path of green finance in helping Chinese enterprises achieve low-carbon transformation. The study first outlines the concept and types of green finance, as well as the evolution of China's green finance policy system. Furthermore, the paper delves into the three core mechanisms of capital allocation, risk management, and incentive constraints to analyze how tools such as green credit, green bonds, ESG ratings, and carbon pricing can promote corporate emission reduction and green technology innovation. Finally, considering the current challenges such as inconsistent standards, information asymmetry, and inadequate tools, policy recommendations are proposed to improve the standards system, accelerate product innovation, and cultivate professional talent. This article argues that green finance, through market mechanisms, effectively empowers enterprises to achieve low-carbon transformation and is an important financial guarantee for promoting systemic economic and social changes and achieving carbon neutrality goals.

## Keywords

green finance, dual carbon targets, low-carbon transition, carbon neutrality

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## 1. Introduction

Climate change is a severe challenge facing the Earth's ecosystem since global industrialization. The World Meteorological Organization (WMO) report, *State of the Global Climate 2024*, released on March 19, 2025, points out that extreme weather events continue to have devastating impacts globally, causing enormous economic losses. In today's globalized world, climate change requires the joint efforts of all humanity to address. At the 2019 UN Climate Action Summit, some countries first proposed the goal of achieving carbon neutrality. China announced in 2020 its goal of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060 [1]. Chinese enterprises, characterized by high energy consumption and high emissions, are the main contributors to carbon emissions. They face strong energy demand, significant pressure to transform their economies, and an urgent need for such transformation. It is estimated that achieving carbon neutrality will require investments exceeding 10 billion yuan. The vast majority of funding for carbon neutrality must be

provided through capital markets, primarily commercial banks. However, the financing required for carbon neutrality is characterized by long investment periods and low returns, which the traditional financial system cannot adequately meet [2]. Traditional financial systems tend to favor short-term, high-return projects in resource allocation. They lack effective incentive and risk assessment mechanisms for projects requiring long investment periods and low returns, making it difficult to provide commensurate financial support. Therefore, green finance has emerged as a crucial tool for guiding capital towards low-carbon industries.

Green finance, with its advantages in price discovery, asset allocation, and risk management, plays a vital role in achieving carbon neutrality goals. Green finance precisely directs funds from bank loans, bonds, and equity investments to these key areas by defining and identifying green projects". Its "leverage effect" is crucial when public funds are limited, as it can attract several times the amount of private social capital into green industries. Green finance reshapes the logic of capital allocation, transforming the national strategic goal of "carbon neutrality" into price signals and investment decisions in the financial market, thereby systematically and market-orientedly driving the transformation of technology, industry, and the entire economic structure toward a green and low-carbon direction.

Therefore, this paper will study how green finance promotes the low-carbon transformation of enterprises, what help and significance it has, and will review the development of green finance, the low-carbon transformation of enterprises, and practical cases of companies to illustrate the positive impact of green finance in helping enterprises achieve carbon neutrality.

## **2. The meaning of Green Finance**

### **2.1 The concept and Types of Green Finance**

Green finance refers to financial services such as investment and financing, insurance, and industry funds that support economic activities beneficial to environmental protection, including projects in areas such as environmental protection, clean energy, and green transportation [3]. Simply put, green finance guides funds to specific industrial projects that are green, low-carbon, and sustainable. Its core purpose is to solve the environmental problems of enterprise development by using financial instruments to support projects that are beneficial to environmental protection. Green finance is not a concept divorced from industrial practice. Starting from the real needs of enterprises' green transformation, it is a financial system designed to systematically guide capital flows toward low-carbon, clean, and sustainable economic activities by using market-based financial instruments to identify, price, incentivize, and manage environmental risks and opportunities, ultimately providing comprehensive "financing + intellectual support" for enterprise transformation.

Green finance is not a concept that is far removed from industrial practice. Based on the practical needs of enterprises' green transformation, it is a financial system designed to identify, price, incentivize and manage environmental risks and opportunities through market-based financial instruments, guide funds to invest in specific green, low-carbon and sustainable development industrial projects, and systematically solve the environmental problems faced by enterprises in their development. Its core purpose is to support economic activities in the fields of environmental protection, clean energy and green transportation. Corporate green transformation is a systematic project encompassing technological upgrades, equipment renewal, process improvement, supply chain restructuring, and even business model innovation. This process faces core bottlenecks such as long investment cycles, high technological risks, and uncertain short-term economic returns. Traditional financial systems often face information asymmetry and difficulties in risk pricing when evaluating such projects, leading to insufficient capital supply or excessively high costs. Green finance emerged precisely to correct this market failure.

The main forms of green finance include green credit, green bonds, carbon finance, and green trusts. Among them, green credit mainly addresses the issue of huge initial investments in transformation, reducing financing costs and financial pressure on enterprises. Green credit provides long-term, cost-stable funding for large-scale transformation projects, optimizing corporate debt structure and primarily locking in long-term transformation capital. Green insurance provides a risk buffer for enterprises to try new technologies and models, enhancing their willingness and ability to transform. Carbon finance financializes and monetizes enterprises' emission

reduction achievements, creating new economic benefits and financing sources. It revitalizes carbon assets and realizes the monetization of environmental benefits.

Therefore, the concept and tools of green finance can only be fully understood within the context of serving the green transformation of the real economy. Through a series of combined measures, including cost reduction, provision of long-term capital, risk management, and incentive creation, it systematically responds to the comprehensive needs of enterprises from strategic planning to project implementation, becoming a key market force driving enterprises from passive compliance to proactive innovation.

## 2.2 The Construction of China's Green Finance System

Green development has become a consensus in China's economic development. Green development guides the market to allocate green finance and economic resources through financial means, thereby promoting regional economic transformation. The release of the "Green Credit Guidelines" in 2012 marked the first time that China systematically put forward requirements for green credit by banks. At this time, China's green finance as a whole is still in its infancy, with different financial institutions promoting it in a decentralized manner. In 2016, the People's Bank of China and seven other ministries issued the "Guiding Opinions on Building a Green Financial System," marking China as the world's first economy to establish a relatively complete green finance policy system. It has clearly defined a five-pillar instrument system comprising green bonds, green credit, green insurance, green funds, and the carbon market, forming an institutional framework that combines regulation with these instruments. This aims to support ecological civilization construction through financial means, providing crucial institutional guarantees for the green transformation of the economy. At this time, China's green finance is in the stage of system construction. Green credit exceeded 10 trillion yuan in 2019 and is showing a steady development trend. After setting the "dual carbon" target, green finance has become a key driver for the transformation of energy and corporate industries. Since 2021, the market size has experienced explosive growth, and China's outstanding balance of green loans in both local and foreign currencies ranks first in the world. China's green finance policy is in a stage of deepening development [4]. In addition, China's financial regulators are actively guiding financial institutions to conduct "climate risk stress tests" to identify and manage transition and physical risks, and to apply the results to credit decisions and portfolio management. At the international level, China has transformed from a participant into an important leader. Not only did it spearhead the advancement of the G20 sustainable finance agenda, but it also actively promoted the alignment of domestic standards with international standards through initiatives such as the publication of the Common Multilateral Classification of Sustainable Finance, significantly enhancing its international influence and voice [5].

In conclusion, the development of China's green finance system has now moved beyond simple growth in scale and entered a high-quality, in-depth development stage characterized by "unified standards, balanced incentives and constraints, embedded risk control, and domestic and international collaboration." This systematic institutional evolution not only provides more precise allocation of financial resources for the green transformation of the real economy, but also contributes an important Chinese solution to global green finance governance.

## 2.3 ESG

The development of green finance is inseparable from a sound corporate evaluation system. ESG, as a brand-new corporate evaluation system, plays an important role in promoting the low-carbon transformation of enterprises through green finance.

ESG is a new corporate evaluation system that assesses a company's performance across three non-financial dimensions: Environment, Social Responsibility, and Governance. Specifically, E (Environment) focuses on the impact of a company's operations on the natural environment, and is central to addressing climate change. S (Social) refers to the relationship between the company and people. G (Corporate Governance) refers to the company's internal rules and regulations. For businesses, more and more banks are offering "green loans" with interest rates linked to ESG performance. Companies with high ESG ratings are also more likely to issue "green bonds," attracting ESG investment funds. Furthermore, to address environmental and social challenges, companies will proactively develop more energy-efficient and environmentally friendly products and technologies, thereby opening up new markets. This will guide capital flows towards greener and

more equitable sectors, contributing to the achievement of national strategies such as the “dual carbon” target. Today, ESG reporting by A-share listed companies has become mainstream practice. As of June 6, 2025, 45.67% of listed companies had disclosed independent ESG-related reports. Among companies with a market capitalization of over 100 billion yuan, the disclosure rate reached 99%, indicating that leading companies have adopted ESG disclosure as standard practice.

### **3. The Mechanism by which Green Finance Helps Enterprises Achieve Low-Carbon Transformation**

#### **3.1 Mechanism of Capital Allocation**

Green finance, as a core tool, promotes the transformation of enterprises towards a low-carbon economy by providing financial support, incentive mechanisms, and risk management. These tools help enterprises invest in green technologies, optimize resource allocation, reduce carbon emissions, and improve overall sustainability. Empirical research shows that green finance can correct capital misallocation, promote technological innovation, and optimize industrial structure, thereby accelerating the low-carbon transition. It can also further improve the utilization rate of funds [6].

Green credit supports businesses' energy transition and renewable investments by channeling funds to green industries, and encourages businesses to reduce carbon emissions and adopt clean technologies. Optimize financing structures, reduce emissions, and enhance competitiveness. Green credit policies can significantly reduce corporate carbon intensity, promote a low-carbon economy, and help companies meet emission targets. With preferential funding, companies can invest in energy-saving technologies and green innovations to reduce emissions.

Green bonds are bonds issued by companies for environmental projects, with funds specifically earmarked for low-carbon initiatives such as renewable energy development and carbon capture technologies. Issuing green bonds can significantly reduce a company's carbon intensity; for example, every 1% increase in issuance can reduce carbon intensity by 0.306%-0.331%, achieved through increased investment in green R&D and innovation pathways [7]. Green bonds have a signaling effect, reducing corporate credit risk, supporting the transition of high-carbon industries such as manufacturing to low-carbon models, and attracting more investors. As a green debt instrument, green bonds effectively reduce emissions and promote the low-carbon transformation of enterprises.

Green funds, through portfolios focused on environmental and low-carbon projects, help companies access equity financing, improve sustainable performance, and mitigate the risks of low-carbon innovation. Combined with overall green investment, these funds can correct capital mismatches, promote technological innovation, optimize industrial structures, and support companies' low-carbon pathways. As a pillar of green finance, green funds positively impact regional carbon emission reduction and promote companies' transition to low-carbon models. The allocation mechanism provides financial support for enterprises' low-carbon transformation in various ways. However, enterprises also face various risks in the process of low-carbon transformation, which requires the risk management mechanism to play a role. The risk management mechanism of green finance will be introduced in detail below.

#### **3.2 Risk Management Mechanism**

Environmental risk assessment is becoming an important tool for financial institutions to achieve green transformation and asset stability. The core of green finance risk management is translating climate risks (such as transition risks due to policy changes and physical risks caused by extreme weather) into traditional financial risks (such as credit risk) and taking corresponding countermeasures. Applications can be made using green insurance as a tool. Green insurance is not only an insurance product that provides risk protection for green industries, but also encompasses all economic activities of the insurance industry in supporting environmental and social governance, green industry development, and green living. Together, they constitute the security system of “risk identification + risk sharing” in the green finance system.

Currently, financial institutions mainly manage corporate climate risks quantitatively through two methods: building data infrastructure and applying analytical tools. Currently, financial institutions mainly manage

corporate climate risks quantitatively through two methods: building data infrastructure and applying analytical tools. The results of quantitative assessments will be directly applied to financial decision-making, enabling “risk pricing.” This will be achieved through carbon accounting [8]. And tools for building a carbon account system to systematically record and manage corporate carbon emission data. By connecting with government data and collecting data from enterprises, a unified and digital corporate “carbon account” is being established. Currently, financial institutions are collaborating with the government to lead the construction of the “corporate carbon account” system. This account integrates data on enterprises’ carbon emissions, carbon reductions, and energy consumption, and is directly connected to banks’ credit systems. This is equivalent to establishing a “carbon credit report” for each enterprise, providing an objective basis for risk identification and pricing, and ultimately forming a closed-loop management system of “data collection - risk assessment - financial application”. Relying solely on individual financial institutions to assess the risks of green investments is insufficient to realize the full potential of green finance.

### 3.3 Reward Constraint Mechanism

This mechanism establishes a “clearly defined reward and punishment” market rule by creating direct financial benefits or costs, guiding enterprises to proactively choose green paths.

ESG ratings have become a key link between a company’s sustainable development performance and its financial market value. Research shows that higher ESG ratings can typically curb corporate carbon intensity, promote green innovation and resource optimization, thereby driving companies toward a low-carbon economy [9]. Moreover, capital markets will prioritize investing in companies with high ESG ratings. ESG ratings can increase low-carbon investment (LCI), which encourages companies to shift to renewable energy and sustainable practices by alleviating financing constraints, government subsidies, and reducing internal control risks. Multiple empirical studies have confirmed that improved ESG ratings can significantly reduce corporate carbon emission intensity. For example, among a sample of A-share listed companies in China, improved ESG performance can directly reduce carbon emissions and support low-carbon transformation through green technology innovation and operational efficiency improvements [10].

Carbon pricing, by setting a price for carbon emissions (such as a carbon tax or allowance price), enables companies to incorporate carbon costs into their decision-making process, thereby promoting a low-carbon transition. Higher carbon prices can effectively drive companies to engage in low-carbon innovation, such as developing clean energy technologies and efficiency improvement measures. Empirical studies show that carbon pricing has a positive impact on the technological transformation of decarbonization across all energy sources, but its effects need to be realized through innovative investments. In developing countries, carbon pricing mechanisms (such as carbon taxes and ETS) can help businesses reduce emissions and achieve deep decarbonization through policy optimization. Businesses can incorporate carbon costs into their long-term planning to mitigate the risks of climate transition. For example, by assessing carbon prices, businesses can better invest in sustainable assets and enhance their competitiveness.

The effective functioning of the above mechanisms depends on specific financial practices and also faces many real-world challenges.

## 4. Conclusion

In the process of promoting the low-carbon transformation of enterprises through green finance, there are often different green finance standards and certification assessment systems, which may prevent enterprises from obtaining green credit or lead to unreasonable green loans. Information disclosure regarding green projects is incomplete, creating information gaps and the risk of “greenwashing.” Furthermore, the costs and time involved in low-carbon transformation for enterprises are high, and some financing processes are complex and lengthy, making it difficult to guarantee the effective progress of green projects. The assessment system for green projects by financial institutions is not yet perfect, resulting in inconsistent assessments of enterprises by financial institutions, making it difficult to assess the greenness of projects and affecting the risk control of financial institutions.

Improve the green finance standards and certification system, unify the definition of “green projects” by relevant departments, build a national carbon information database, and unify the assessment standards and procedures of relevant financial assessment institutions.

Accelerate the innovation of financial products. Promote the development of innovative green financial instruments such as green REITs and carbon-neutral bonds. AI can also be used to achieve the most accurate tracking and monitoring of carbon footprints. Corporate low-carbon transformation is one of the necessary measures to achieve dual carbon goals, and green finance is a driving force for corporate low-carbon transformation. Green finance has provided tremendous help to enterprises in terms of capital turnover and technological innovation for green projects. It can also use ESG indicators to evaluate corporate low-carbon projects and provide financial assistance. At the same time, we should cultivate a talent pool for green finance, promote active exchanges between universities and financial institutions, and establish a green finance curriculum and certification system to solidify the foundation of green finance talent. China should also actively participate in international green finance governance and standards development, promoting the transformation of its green finance practices into global governance solutions, and contributing Chinese wisdom to building a fair, inclusive, and efficient international green finance cooperation mechanism. Therefore, the development and regulation of green finance instruments are indispensable in the future.

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