

# Risks and Prevention Methods in Green Finance

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**Abstract.** With the increasingly severe global environmental issues, green finance, as an important tool for promoting sustainable development and environmental protection, has experienced rapid growth in recent years. However, while green finance brings significant opportunities, it is also accompanied by various risks, including market risk, technological risk, policy risk, and credit risk. This article systematically reviews the definition, framework, and risk types of green finance, and through case studies of CATL and BlackRock, demonstrates the specific practices of different enterprises in green finance risk management. CATL effectively addresses market and technological risks through data-driven risk assessment and forward-looking policy analysis, while BlackRock integrates ESG factors into its investment decision-making process, promotes the development of the green bond market, and enhances the transparency and credibility of green finance. The article also proposes recommendations for addressing green finance risks from both governmental and corporate perspectives, emphasizing the importance of policy refinement, international cooperation, and corporate risk management. Although green finance currently faces numerous challenges, with strengthened policy support, accelerated technological advancements, and deepened international cooperation, green finance is expected to achieve higher-quality development on a global scale. Future research should further explore the long-term impacts of green finance risks, develop more precise risk assessment models, and improve the market liquidity of green finance products, thereby enhancing the green finance market.

## 1 Introduction

As the global population grows and the economy rapidly develops, energy consumption has significantly increased, posing serious challenges to the ecological environment. For example, excessive greenhouse gas emissions have led to rising global temperatures, resulting in extreme weather events. Overexploitation and pollution have caused freshwater shortages, while industrial wastewater and agricultural fertilizers have contaminated water bodies. With increasing societal attention to environmental issues, green finance has also developed rapidly. Investors, consumers, and other stakeholders are increasingly demanding green financial products and services, driving financial institutions to transition into the green finance sector [1]. The financial industry itself is motivated to innovate in green finance to

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expand business areas, reduce risks, and enhance competitiveness by developing financial products and services tailored to the needs of green industries and projects.

Although green finance is an emerging industry, many companies and investors are still in the early stages of understanding and applying it. Most importantly, many people only see the benefits of green finance while overlooking the risks it entails, such as market risk, technological risk, and policy risk. Risk management and assessment systems are still underdeveloped, lacking unified standards and norms. Government policy enforcement and regulatory frameworks need improvement, and technological and talent shortages also hinder the development of green finance.

Currently, regulatory policies for green finance are incomplete, lacking unified international standards and mandatory disclosure requirements. Investors and companies have insufficient awareness of green finance risks and lack proactive risk management practices. Some investors, in pursuit of high returns, overlook the climate risks associated with high-carbon assets. Additionally, international cooperation and coordination in green finance are inadequate, with differences in standards and policies across countries making it difficult to effectively manage cross-border green finance risks, thereby increasing compliance costs for investors. This article systematically analyzes the causes, types, and solutions to green finance risks, supported by case studies. Formatting the title, authors and affiliations

## **2 Definition and types of green finance**

### **2.1 Definition of green finance**

Green finance, also known as sustainable finance or environmental finance, refers to financial activities where financial institutions integrate environmental factors such as environmental protection, climate change response, and resource efficiency into their decision-making, product design, and risk management processes. It aims to guide social capital toward green industries and projects, promoting sustainable economic and social development.

### **2.2 Green finance system**

The green finance market is currently divided into three main sectors: the green credit market, the green bond market, and the green investment market.

The green credit market refers to the market where banks and other financial institutions provide credit services to green projects, such as offering large long-term loans for new energy projects. However, risks arise if borrowing companies face financial difficulties due to poor management or market competition, leading to an inability to repay the green loans on time. Additionally, if the green technology innovation projects supported by these loans fail due to technological setbacks or rapid obsolescence, it could affect loan recovery and increase risks.

The green bond market involves companies and governments issuing green bonds to raise funds for environmental protection, clean energy, and other related fields, such as special green bonds for wind power projects. However, this market faces risks such as changes in green bond standards and related policies, which may affect the green label certification and fundraising. Interest rate fluctuations can also cause green bond prices to fall, impacting investor returns. Furthermore, macroeconomic changes may reduce market demand for green bonds [2].

The green investment market refers to the act of investing in economically viable projects that have environmental benefits and promote sustainable development. However, some

emerging green industries, such as hydrogen energy, are in their early stages and face technological bottlenecks and low market acceptance, leading to uncertain returns. If green projects are exposed for false environmental claims, it can damage investors' reputations and affect their market image and future investments.

### **3 Types of risks**

With the rapid development of the green finance market, the risks associated with green finance investments have become apparent. Compared to traditional financial investments, green finance faces similar risks such as market risk, technological risk, and credit risk. However, due to the unique nature of green finance projects, it also involves special risks like policy risk.

#### **3.1 Market risk:**

In the green finance market, market risk manifests as price volatility risk and liquidity risk for green assets. Price volatility risk arises when the prices of green financial products are affected by market supply and demand or policy changes [3]. For example, the EU Emissions Trading System (EU ETS), one of the largest carbon markets globally, directly impacts the returns of green financial products through carbon prices. After the 2008 financial crisis, reduced industrial activity led to a drop in demand for carbon emission allowances, causing carbon prices to plummet from €30/ton in 2008 to less than €5/ton in 2013. This sharp decline left many companies and projects reliant on carbon trading revenues in financial distress, shaking investor confidence in the carbon market. Liquidity risk occurs when green financial products lack sufficient market liquidity, making it difficult for investors to quickly liquidate their assets. For instance, during the COVID-19 pandemic in 2020, global financial markets experienced liquidity shortages, leading to a significant drop in green bond trading volumes. Investors faced difficulties in liquidating green bonds, resulting in substantial price declines and losses.

#### **3.2 Technological risk**

Due to the rapid development of green technologies, investments in green projects may underperform if the technologies they rely on become obsolete. For example, after 2010, the widespread adoption of high-efficiency photovoltaic technology rendered traditional photovoltaic technologies obsolete, causing many companies to struggle due to their inability to upgrade in time. Technological obsolescence reduced their competitiveness, and financial institutions became reluctant to finance photovoltaic projects. Rapid technological advancements and substitutions can significantly impact green finance projects. Financial institutions and investors must thoroughly assess technological risks, choose mature and reliable technological pathways, and implement effective risk management measures to mitigate potential losses.

#### **3.3 Policy risk**

Changes in government support policies for green industries can significantly impact green finance investments [3]. For example, China's photovoltaic industry experienced rapid growth under government subsidies and policy support, becoming the largest photovoltaic market globally. However, in 2018, the Chinese government introduced the "531 New Policy," which drastically cut photovoltaic subsidies and limited new installations. This led

to a sharp decline in market demand, causing many companies to face operational difficulties and increasing financial institutions' concerns about financing photovoltaic projects.

### **3.4 Credit risk**

Credit risk in green finance primarily involves borrowers or project parties failing to repay loans or fulfil contractual obligations due to various reasons, leading to losses for financial institutions or investors. For instance, the bankruptcy of Solyndra, a U.S.-based solar company, exemplifies this risk. Solyndra, which produced innovative cylindrical solar panels, received a \$535 million loan guarantee from the U.S. Department of Energy. However, due to a flawed technological approach (its products could not compete with mainstream photovoltaic technologies) and insufficient market demand, Solyndra declared bankruptcy in 2011. This resulted in the U.S. Department of Energy being unable to recover the loan, causing losses for taxpayers and increasing financial institutions' concerns about credit risks in solar projects. Project failures, policy changes, and other factors can lead to borrowers defaulting on repayments, triggering credit risks. Financial institutions and investors must comprehensively assess credit risks and implement effective risk management measures to mitigate potential losses [4].

## **4 Case studies**

### **4.1 Contemporary Amperex Technology Co. Limited (CATL)**

Contemporary Amperex Technology Co. Limited (CATL) is a global leader in new energy innovation, specializing in the research, development, production, and sales of power battery systems, energy storage systems, and related solutions. Founded in 2011 and headquartered in Ningde, Fujian Province, China, CATL is one of the world's largest power battery manufacturers. As a leading provider of power battery systems, CATL's risk measurement and management practices offer valuable insights for the industry.

#### *4.1.1 Risk measurement practices*

Data-Driven Market and Technology Risk Assessment: CATL has established a comprehensive market and technology intelligence database, tracking global new energy vehicle market sales, penetration rates, competitor dynamics, and battery technology trends in real-time. By analyzing this data, CATL predicts future market demand changes and assesses the competitive landscape and technological iteration risks of different technological pathways. During investment decision-making, CATL uses internally developed market and technology risk models to quantify the market acceptance, technological leadership, and technological substitution risks of potential investments, determining appropriate investment scales and timing [5]. For example, when considering an investment in a new battery material R&D company, CATL analyzes the market's potential demand for the material, its technological maturity, and the R&D team's capabilities to assess the investment's risk-return profile.

#### *4.1.2 Policy and environmental risk forward-looking analysis*

Given the high sensitivity of the new energy industry to policy changes, CATL has established a dedicated policy research team to study various governments' new energy industry policies, subsidy policies, carbon emission regulations, and environmental standards.

By building a policy risk early warning system, CATL anticipates the impact of policy changes on its business and investments [6]. For instance, as European carbon emission standards become stricter, CATL has increased its production capacity and R&D investments in the European market. Simultaneously, the company closely monitors the pace of subsidy reductions for new energy vehicles in China, planning cost control and product pricing strategies in advance to mitigate policy risks.

#### *4.1.3 Risk measurement effectiveness and investment decision optimization*

Through its risk measurement system, CATL has achieved significant success in green finance investments. During periods of high market volatility, the company's precise market risk assessments have enabled timely adjustments to its investment portfolio, avoiding losses from declining market demand [7]. For example, in 2019, when global new energy vehicle market growth slowed, CATL used its risk models to issue early warnings, reducing equity investments in battery production equipment manufacturers with uncertain market prospects and focusing resources on core technology R&D and strengthening supply chains for high-quality customers.

## **4.2 BlackRock**

BlackRock, the world's largest asset management company, is a leader in green finance and ESG (Environmental, Social, and Governance) investing. To effectively manage green finance risks, BlackRock has implemented a series of measures and promoted green finance development through practical cases. BlackRock has made sustainability a core strategy, committed to driving the global transition to a low-carbon economy through green finance.

#### *4.2.1 Integrating ESG risks into Investment decision-making*

Integrating ESG risks into investment decision-making is a core strategy for BlackRock to reduce green finance risks. ESG risks are an essential component of financial risks and must be incorporated into investment analysis and decision-making. By systematically integrating ESG factors, BlackRock can more comprehensively assess investment risks, identify potential environmental and social issues, and optimize investment portfolios to promote sustainable development. For example, BlackRock uses the ESG data analysis capabilities of its Aladdin platform to score companies in its investment portfolio based on ESG criteria. Through this analysis, BlackRock identified that certain high-carbon industries, such as coal and oil, had low ESG scores and gradually reduced investments in these sectors. Additionally, BlackRock has launched several ESG-themed funds, focusing on companies with high ESG scores. For instance, BlackRock's iShares Global Clean Energy ETF invests in global clean energy companies, such as solar and wind energy firms, including Enphase Energy and Vestas Wind Systems.

#### *4.2.2 Promoting green bond market development and information disclosure*

As the largest asset management company of the world, BlackRock plays a significant role in promoting the development of the green bond market. Green bonds are financial instruments specifically designed to fund environmentally friendly projects, such as renewable energy, energy efficiency, sustainable transportation, and climate change adaptation. For example, BlackRock invested in French government green bonds, which fund renewable energy and energy efficiency projects in France. BlackRock also promotes transparency and information

disclosure in the green bond market, ensuring investors have access to accurate and timely information. For instance, BlackRock requires green bond issuers to disclose how the raised funds are used, adopting the TCFD (Task Force on Climate-related Financial Disclosures) framework [3]. BlackRock collaborates with regulators and industry organizations to develop and implement green bond standards, ensuring transparency and credibility in the eyes of investors, thereby reducing green finance risks. For example, BlackRock participated in the International Capital Market Association's (ICMA) Green Bond Principles (GBP), which provide a global framework for green bond issuance and disclosure [6].

### **4.3 Comparison between BlackRock and CATL**

Both BlackRock and CATL have achieved significant results in managing green finance risks, but their approaches differ due to their distinct industries, business models, and roles in global green finance.

#### *4.3.1 Different company backgrounds and industry positions*

BlackRock primarily focuses on asset management, promoting global green finance development through ESG integration, green bond investments, and climate risk management. In contrast, CATL is a manufacturer of new energy batteries, reducing its operational environmental risks through technological innovation, green supply chain management, and low-carbon production.

#### *4.3.2 Different green finance risk management measures*

BlackRock integrates ESG factors into its investment decision-making process, assessing the environmental, social, and governance performance of investee companies. It also actively invests in green bonds, supporting renewable energy and sustainable development projects, and participates in the development of global green finance standards, promoting ESG information disclosure and green bond market development. CATL places greater emphasis on leveraging data models to estimate risks and mitigates its operational environmental risks through technological innovation, green supply chain management, and low-carbon production.

Both companies' practices provide valuable green finance risk management experiences for different industries.

## **5 Recommendations**

Although green finance currently faces numerous risks, it also presents significant opportunities. Green finance not only helps address climate change and promote environmental protection but also offers long-term stable returns for investors. However, effectively measuring and managing green finance risks remains challenging.

### **5.1 Government**

From a governmental perspective, governments should continue to refine and stabilize green finance policies, reducing policy uncertainties. They should develop green finance risk management guidelines, clarifying green project definitions, environmental benefit assessment methods, and risk identification and assessment processes to provide operational frameworks for financial institutions. Additionally, governments should define regulatory

responsibilities, clarifying the roles of different departments in green finance oversight to avoid regulatory gaps or overlaps. Governments should also collaborate with international organizations and other countries to address cross-border green finance risks [8].

## 5.2 Enterprises

From a corporate perspective, companies should integrate green finance into their strategies, setting clear green finance goals and implementation paths. They should incorporate environmental factors into decision-making processes and strengthen green finance risk management by using tools such as environmental risk stress testing and scenario analysis to assess potential risks and develop mitigation measures. For example, when evaluating a green building project, companies should consider not only traditional financial risks but also risks related to whether building materials meet environmental standards [9, 10].

## 6 Conclusion

This article explores the risks and prevention methods in green finance, listing risk types such as market risk, technological risk, policy risk, and credit risk. Through case studies of CATL and BlackRock, it demonstrates specific practices in green finance risk management, including data-driven risk assessment, forward-looking policy risk analysis, ESG integration, and green bond investments.

However, while this article lists various risks in green finance, it does not delve deeply into their impacts and harms. Additionally, it lacks discussion on the long-term effects of green finance risks, such as systemic risks to the financial system from climate change, and lacks data support. Therefore, future research should further explore data, models, policies, and international comparisons to address new challenges in green finance development. Future studies should focus on managing green finance risks in cross-border investments, particularly compliance risks arising from differences in policies, laws, and market environments. They should also develop more precise green finance risk assessment models, such as quantitative analysis tools for long-term risks like climate change and technological iterations. Research should also explore ways to improve the market liquidity of green finance products, such as green bonds and green funds, to reduce investors' liquidation risks. With policy improvements and technological advancements, green finance is expected to achieve higher-quality development globally.

## 7 References

1. T. Muganyi, L. Yan, H. Sun, Green Finance, Fintech, and Environmental Protection: Evidence from China. *KeAi*. **7**, 100107-100107 (2021)
2. B. Sarah, Green bond market practices: exploring the moral 'balance' of environmental and financial values. *Routledge*. **17**, 279-296 (2024)
3. K. Lü, Research on Green Finance Risk Prevention. *I&C*. **7**, 16-18 (2024)
4. J. Tang, M. Liu, Research on the Types and Prevention Measures of Green Finance Risks—Based on the Perspective of Financial Supply-Side Structural Reform. *TET*. **12**, 71-73(2024)
5. S. Wan, Y. Lee, V. Sarma, Is Fintech Good for Green Finance? Empirical Evidence from Listed Banks in China. *Elsevier*. **80**, 1273-1291 (2023)
6. Y. Liang, Research on Green Finance Risk Management in Commercial Banks Under the "Dual Carbon" Goals. *THBM*. **19**, 61-63 (2024)

7. Y. Chai, Research on Credit Risk Prevention in CATL's Supply Chain Finance. Master Thesis. Harbin University of Commerce (2024)
8. M. Zhang, Y. Wu, H. Su, The Influence of Green Finance on “Dual Carbon” Goals: Analyzing the Functions of Government and Market. *MDPI*. **17**, 1122-1122 (2025)
9. H. Chen, X. Zhao, Green Financial Risk Management Based on Intelligence Service. Elsevier. **364**, 83 (2022)
10. A. Kwilinski, O. Lyulyov, T. Pimonenko, The role of green finance in attaining environmental sustainability within a country's ESG performance. Elsevier. **10**, 100674-100674 (2025)