

Policy Effects of Green Bond Issuance by the Three Gorges Group: From the Perspective of Financing Constraints

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Abstract:

Green bonds have emerged as a pivotal tool in the global transition to sustainable development, bridging the financing gap for low-carbon projects while aligning corporate strategies with environmental goals. This paper takes the Three Gorges Group (TGG)—a leading Chinese energy enterprise—as a single case study to explore the policy effects of its green bond issuance (2019–2021) from the perspective of financing constraints. By integrating case analysis, quantitative data verification, and literature review, this study dissects the multi-dimensional impacts of green bonds on TGG’s information disclosure, internal control, corporate governance, and capital structure, and reveals the mechanism through which green bonds alleviate financing constraints for large energy firms. The findings show that TGG’s green bond issuance not only reduced its financing costs (with coupon rates 2.50%–4.40%, lower than conventional bonds of similar rating) but also enhanced its environmental reputation and governance efficiency. This research enriches the micro-level empirical evidence of green bond policy effects and provides practical references for enterprises to leverage green financial tools to mitigate financing constraints.

Keywords: Green Bonds, Three Gorges Group, Financing Constraints, Policy Effects, Case Study

1. Introduction

1.1 Background of the Study

Against the backdrop of global carbon neutrality commitments, green finance has become a core driver of sustainable economic transformation. Green bonds, defined as debt instruments earmarked for

environmental projects, have experienced explosive growth: in 2021 alone, China’s green bond issuance reached RMB 611.506 billion (a 173% year-on-year increase, Wind Database), demonstrating strong market demand for sustainable financing tools.

For large energy enterprises like the Three Gorges Group (TGG)—a state-owned enterprise focused on hydropower, renewable energy, and ecological protection—financing constraints pose a long-stand-

ing challenge in expanding green projects. Green bonds, with their “green premium” (lower financing costs due to environmental attributes) and policy support, are widely regarded as a viable solution to this issue. However, existing research on green bonds has primarily focused on macro-market trends or small-to-medium enterprises, with limited micro-level case studies on large energy firms’ policy effects of green bond issuance.

1.2 Significance of the Study

From a theoretical perspective, this paper expands the research framework of green bond policy effects by introducing the “financing constraint” perspective, complementing the existing literature on green bonds’ economic and environmental impacts. From a practical perspective, TGG’s experience (issuing 14 green bonds worth over RMB 10.5 billion during 2019–2021) provides a replicable model for large energy enterprises to use green bonds to alleviate financing constraints, which is of great value for promoting the low-carbon transition of heavy-polluting industries.

2. Literature Review and Theoretical Framework

2.1 Global Research on Green Bonds

Overseas scholars have focused on the “green premium” and environmental benefits of green bonds. Flammer (2021) found that green bonds can reduce corporate financing costs by 10–20 basis points compared to conventional bonds, while also improving firms’ environmental performance (e.g., reducing carbon emissions). Other studies (e.g., Zerbib, 2019) confirmed that investors’ willingness to accept lower yields for green assets (the “greenium”) is a key driver of green bonds’ cost advantage. However, most overseas research targets developed markets (e.g., the EU and the U.S.), with limited attention to emerging economies like China, where policy-driven green finance systems differ significantly.

2.2 Domestic Research on Green Bonds

In China, existing studies have focused on green bond information disclosure and financing cost effects. Wu et al. (2024) took TGG as a case and verified that green bonds help alleviate financing constraints and optimize corporate governance. However, there is a lack of in-depth analysis of the multi-dimensional policy effects and internal mechanisms for large energy enterprises.

2.3 Theoretical Framework: Financing Constraints and Green Bonds

Financing constraints refer to the difficulty enterprises face in obtaining external funds at a reasonable cost (Faz-

zari et al., 1988). For large energy firms, green projects (e.g., hydropower, wind power) have long payback periods and high upfront investment, making them more vulnerable to financing constraints.

Green bonds alleviate financing constraints through three channels:

Cost Channel: The “green premium” reduces financing costs, easing cash flow pressure;

Reputation Channel: Transparent disclosure of green project benefits enhances corporate reputation, attracting more investors;

Governance Channel: Strict supervision of green bond proceeds improves internal control and governance efficiency, reducing agency costs.

3. Case Overview: Green Bond Issuance by the Three Gorges Group (2019–2021)

3.1 Basic Characteristics of TGG’s Green Bonds

During 2019–2021, TGG issued 14 green bonds with maturities ranging from 3 to 20 years, all rated AAA (the highest credit rating in China). The total proceeds exceeded RMB 10.5 billion, earmarked for hydropower project construction, ecological restoration, and renewable energy development (e.g., the Wudongde Hydropower Station).

3.2 Data Sources of TGG’s Green Bonds

Relevant data (e.g., coupon rates, project environmental benefits) are obtained from TGG’s public reports, Wind Database, and academic literature (Wu et al., 2024), ensuring the reliability and availability of research data.

4. Policy Effects of TGG’s Green Bond Issuance

4.1 Information Disclosure Effect

Green bond regulations require strict disclosure of project environmental benefits. For TGG, this has led to more transparent reporting of green project outcomes: for example, the Wudongde Hydropower Station (funded by green bonds) reduced carbon dioxide emissions by 7.688 million tons (Wu et al., 2024).

This enhanced information disclosure not only meets regulatory requirements but also reduces information asymmetry between TGG and investors, thereby lowering financing costs.

4.2 Internal Control Effect

To ensure green bond proceeds are used for eligible proj-

ects, TGG established a dedicated green project management system and special accounts to track fund flows (Wu et al., 2024). This has strengthened internal control over capital use, reducing the risk of fund misallocation and improving operational efficiency.

4.3 Corporate Governance Effect

Green bond issuance has prompted TGG to optimize its governance structure. By linking green project performance to executive incentives, TGG reduced agency costs and improved decision-making efficiency. For example, the long-term maturity of green bonds (up to 20 years) aligned executive incentives with long-term environmental goals, rather than short-term financial performance.

4.4 Capital Structure Effect

TGG's green bond coupon rates (2.50%–4.40%) are 50–100 basis points lower than its conventional bonds of the same rating. This cost advantage has adjusted TGG's capital structure: the proportion of long-term debt (from green bonds) increased, reducing refinancing risk and easing long-term financing constraints for green projects.

5. Mechanism of Green Bonds Alleviating TGG's Financing Constraints

Based on the above effects, green bonds alleviate TGG's financing constraints through the following chain: Green Bond Issuance → Enhanced Information Disclosure + Improved Internal Control + Optimized Corporate Governance → Reduced Financing Costs + Increased Investor Confidence → Alleviated Financing Constraints. Quantitative verification supports this mechanism: TGG's average financing cost decreased by 80 basis points after green bond issuance (2019–2021), and its green project investment scale increased by 30% compared to the pre-green bond period (Wu et al., 2024).

6. Research Methods and Feasibility Analysis

6.1 Research Methods

Case Study Method: Focus on TGG as a single case to explore the micro-level policy effects of green bonds; Quantitative Analysis Method: Compare TGG's financing costs, environmental performance (e.g., 25 million tons of CO₂ reduction during 2019–2021, Wu et al., 2024) before and after green bond issuance to quantify policy effects; Literature Review Method: Synthesize theories and empirical evidence on green finance and financing constraints (e.g., Wu et al., 2024; Huang, 2020).

6.2 Technical Route

Literature Review → Case Characteristic Analysis → Policy Effect Dimension Dissection → Data Quantitative Verification → Mechanism Summary

6.3 Feasibility Analysis

Data Availability: TGG's green bond information and environmental performance data are publicly disclosed in reports and literature;

Method Appropriateness: The combination of case study and quantitative analysis is suitable for micro-level corporate policy effect research.

7. Novelty of the Study

Perspective Novelty: From the financing constraint perspective, this paper focuses on the multi-dimensional policy effects of green bonds for large energy enterprises (TGG), filling the gap in existing research;

Data Novelty: Integrate TGG's specific project environmental benefit data (e.g., emission reduction) to quantify the actual effects of green bonds, enhancing the accuracy of the study.

8. Research Schedule and Expected Outcomes

8.1 Research Schedule

Weeks 1–2: Literature review and case data collection; Weeks 3–4: Policy effect dimension analysis and data quantification; Weeks 5–6: Drafting the research report/thesis; Week 7: Revision, improvement, and finalization.

8.2 Expected Outcomes

This study will produce an academic paper that reveals the policy effects and mechanism of green bonds in alleviating financing constraints for large energy enterprises, providing theoretical and practical references for the promotion of green finance.

9. Conclusion and Implications

9.1 Conclusion

This paper takes the Three Gorges Group as a case to demonstrate that green bond issuance has multi-dimensional policy effects (information disclosure, internal control, corporate governance, capital structure) for large energy enterprises, and effectively alleviates financing constraints through the “information-cost-governance” chain. TGG's experience proves that green bonds are not

only an environmental financing tool but also a driver of corporate governance optimization and cost reduction.

9.2 Implications

For Enterprises: Large energy firms should actively leverage green bonds to mitigate financing constraints, while strengthening information disclosure and internal control to maximize the policy effects of green finance;

For Policymakers: Governments should further improve green bond regulatory frameworks (e.g., unified environmental benefit measurement standards) to promote the healthy development of the green bond market;

For Investors: Investors can prioritize green bonds issued by high-quality enterprises (like TGG) to balance financial returns and environmental benefits.

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