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Analysis of the Financial Effects of Corporate Green Bond Issuance

-- A Case Study of China Yangtze Power

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Abstract

As a key financing instrument for driving corporate green transformation, green bonds play a crucial role in achieving the "dual carbon" goals. This paper examines the multidimensional financial effects of green bonds by analyzing the financial data of China Yangtze Power from 2019 to 2024. The study finds that green bond issuance initially increased the company's debt-to-asset ratio and weakened short-term solvency, but optimized the debt structure in the long run. Profitability exhibited a "U-shaped" trend, with early-stage pressure from project investments followed by significant long-term gains. Operational efficiency temporarily declined due to lengthy project cycles but gradually improved through supply chain optimization. Meanwhile, growth potential experienced a substantial leap, as green projects injected new momentum into sustainable development. The findings suggest that green bonds can effectively support the green transition of capital-intensive enterprises but require sound financial management and strategic planning. This study provides practical insights for power industry companies seeking to harmonize environmental and economic benefits through green bonds.

Keywords

Green Bonds; Financial Effects; China Yangtze Power.

1. Introduction

Against the backdrop of accelerated global industrialization, issues of environmental pollution and resource constraints have become increasingly severe. Air pollution, water scarcity, and ecological degradation have emerged as critical bottlenecks restricting sustainable economic development. To address these challenges, major global economies have incorporated green and low-carbon transitions into their national strategies, with green finance playing an irreplaceable role as a core tool linking industry and environmental protection.

In response to environmental challenges, the Chinese government has intensively introduced a series of policy measures in recent years. In 2015, the "Overall Plan for the Reform of the Ecological Civilization System" incorporated green finance into the national strategy for the first time. In 2016, the People's Bank of China and six other ministries and commissions jointly issued the "Guidelines on Building a Green Finance System," explicitly identifying green bonds as a key focus. The proposal of the "dual carbon" goals in 2020 further accelerated the development of the green bond market. In 2022, incentive policies such as fiscal discounts were implemented, driving a rapid increase in the issuance scale of green bonds in China. Data shows that the issuance volume of domestic green bonds exceeded RMB 1.5 trillion in 2023, with corporate issuance accounting for 67.3%. Green bonds have become a crucial financing tool for corporate green transitions.

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However, existing research has primarily focused on the market expansion or macro-policy effects of green bonds, with insufficient attention to their micro-financial impacts. As a global leader in the hydropower industry, China Yangtze Power's issuance of green bonds is both representative of the sector and innovative in practice: the company has financed hydropower upgrades and new energy projects through green bonds, achieving a coordinated transition toward "low-carbon traditional operations" and "green emerging businesses." This paper takes China Yangtze Power as a case study to conduct an in-depth analysis of the financial effects of its green bond issuance, aiming to provide theoretical foundations and practical references for the financial decision-making of asset-intensive enterprises undergoing green transitions.

2. Definition and Characteristics of Green Bonds

2.1. Definition of Green Bonds

Green bonds represent an innovative debt financing instrument introduced by the international financial market to address environmental challenges. Essentially, they are specialized financial products that link bond financing with sustainable development goals. According to the "Green Bond Supported Project Catalogue" issued by the People's Bank of China, the eligible investment areas for these bonds must align with the strategic orientation of national ecological civilization construction, covering a diverse range of environmental issues such as climate adaptation, resource recycling, and biodiversity conservation. The issuance of green bonds adheres to a closed-loop management mechanism encompassing "fundraising—investment—disclosure." This is achieved through the establishment of dedicated accounts and the implementation of fund tracking to ensure precise alignment between financing and green projects. This mechanism design positions green bonds as a crucial link connecting financial capital with environmental governance, embodying an innovative practice in which financial markets serve the green transition of the real economy.

2.2. Characteristics of Green Bonds

Green bonds are debt financing instruments specifically designed to support projects with environmental benefits. The funds raised must be invested in eligible green sectors such as renewable energy, pollution control, and energy conservation and environmental protection[1]. Unlike ordinary bonds, the core characteristic of green bonds lies in their strict specificity of fund usage, requiring clear disclosure of fund flows and ensuring quantifiable environmental benefits. Issuers are required to adhere to international standards and undergo dual certification by third-party institutions regarding fund usage and the environmental performance of projects, thereby mitigating the risk of "greenwashing[2][3][4]." Additionally, green bonds typically enjoy cost advantages in financing, with issuance interest rates generally lower than those of ordinary bonds of the same credit rating due to policy support and market preferences. Moreover, given the long-term nature of green projects, the maturity structure of green bonds often leans towards medium to long terms to match the funding needs of the projects[5]. Transparency, mandatory certification, and quantifiable environmental benefits are prominent features of green bonds.

2.3. Development Status of China's Green Bond Market

China's green bond market began in 2015 and has evolved through three stages:

The first stage is the pilot exploration phase (2015-2016): The People's Bank of China released the "Green Bond Supported Project Catalogue," initiating green bond pilot programs.

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The second stage is the rapid growth phase (2017-2020): Following the proposal of the "dual carbon" goals, the issuance scale of green bonds expanded rapidly.

The third stage is the standardized development phase (2021 to present): With unified standards and strengthened supervision, the market is moving towards maturity.

Currently, China's green bond market exhibits the following characteristics:

Continuous expansion in issuance scale: The issuance volume of domestic green bonds exceeded RMB 1.5 trillion in 2023.Diversification of issuers: From central state-owned enterprises to local state-owned enterprises, private enterprises, and foreign-invested enterprises.Accelerated innovation in bond types: Innovative products such as carbon neutrality bonds and sustainability-linked bonds continue to emerge.Increased policy support: Incentive measures such as fiscal discounts and preferential risk weights have been introduced.

However, China's green bond market still faces several challenges:Incomplete alignment with international standards.

Insufficient liquidity in the secondary market.The need to improve the quality of environmental information disclosure.The persistent risk of "greenwashing."

3. The Impact Mechanism of Green Bonds on Financial Performance

Green bonds, as innovative financial instruments that combine environmental benefits with financing functions, have their impact on corporate financial performance theoretically analyzable through the following four dimensions:

Firstly, in terms of solvency, based on the maturity matching theory, green bonds optimize a company's debt maturity structure by providing long-term stable funding (typically with maturities exceeding five years). According to Myers' (1977) maturity matching hypothesis, this alignment between long-term financing and the investment cycles of green projects effectively reduces refinancing risks. However, concurrently, due to the specific usage requirements of green bond funds, Jensen's (1986) free cash flow theory suggests that they may somewhat limit a company's short-term financial flexibility. This contradiction will be reflected in changes in indicators such as the debt-to-asset ratio, current ratio, and quick ratio.

Secondly, regarding profitability, based on capital budgeting theory, the unique characteristics of green projects-high initial investment, long development cycles, and stable returns-result in an initial decline followed by a subsequent rise in indicators such as basic earnings per share, return on equity, and return on total assets. This phenomenon aligns with Hirshleifer's (1958) intertemporal investment decision theory, which posits that while high-quality long-term assets may offer lower initial returns, they generate sustained and stable cash flows as projects enter stable operational phases.

Thirdly, in terms of operational efficiency, according to working capital management theory, the utilization of green bond funds systematically affects a company's operational efficiency. On one hand, based on transaction cost theory (Williamson, 1985), the long-cycle nature of green projects may temporarily decrease accounts receivable turnover. On the other hand, based on supply chain finance theory, optimized supply chain management may enhance accounts payable turnover efficiency. Changes in total asset turnover comprehensively reflect the deep impact of green investments on a company's asset allocation efficiency, corroborating the core tenets of the DuPont analysis system.

Lastly, concerning growth capacity, based on enterprise growth theory (Penrose, 1959), green bonds significantly improve indicators such as total asset growth rate, revenue growth rate,

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and net profit growth rate by supporting corporate transformation and upgrading. These improvements not only reflect the expansion of corporate scale but also signify an enhancement in development quality, serving as crucial indicators of a company's sustainable development. This aligns with the core assertions of the resource-based view (Barney, 1991).

The changes in financial indicators across these four dimensions collectively form a comprehensive analytical framework for evaluating the financial effects of green bonds. Solvency and profitability primarily reflect short-term financial impacts, while operational efficiency and growth capacity better demonstrate long-term value creation. These four aspects are interconnected and mutually complementary, comprehensively revealing the mechanism by which green bonds influence corporate financial performance. This analytical framework not only integrates traditional financial theories but also incorporates the core ideas of sustainability theory (Elkington, 1997), providing systematic theoretical support for understanding the economic value of green financial instruments.

4. Introduction to the Case Study of China Yangtze Power

4.1. Company Overview

China Yangtze Power Co. Ltd. (hereinafter referred to as "China Yangtze Power") was established in 2002 and successfully listed in 2003. As the world's largest listed hydropower company and China's largest listed power enterprise, China Yangtze Power operates both domestically and internationally. Domestically, it owns six large-scale cascade hydropower stations along the Yangtze River mainstream: Wudongde, Baihetan, Xiluodu, Xiangjiaba, Three Gorges, and Gezhouba. Additionally, the company has expanded its business to multiple countries, including Peru, Brazil, and Pakistan. The total installed capacity of these six domestic hydropower stations reaches 71,795 MW, with an annual power generation capacity of approximately 300 billion kilowatt-hours, contributing significantly to energy conservation and emission reduction and establishing the world's largest clean energy corridor.

In recent years, in response to China's national "dual carbon" strategy (achieving peak carbon emissions by 2030 and carbon neutrality by 2060), China Yangtze Power has been consolidating its core hydropower business while accelerating its (strategic deployment) in new energy sectors such as pumped storage, wind power, and photovoltaics. The company has also participated in multiple power and energy enterprises through equity investments. However, clean energy projects are characterized by long construction cycles and substantial capital requirements, making traditional financing methods insufficient to meet the company's green transformation needs.Against this backdrop, in 2021, China Yangtze Power successfully issued green bonds, raising funds specifically for the development and operation of clean energy projects such as hydropower. This move not only effectively broadened the company's financing channels and optimized its debt structure but also provided stable financial support for its green and low-carbon transformation.

4.2. Green Bond Issuance Details

As of 2024, China Yangtze Power has issued a total of five tranches of green bonds, comprising four tranches of green corporate bonds and one tranche of green debt financing instruments, raising a cumulative total of 6.5 billion yuan. The specific issuance details are outlined in Table 1 below:

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Table 1. Specific Details of Green Bonds Issued by China Yangtze Power

Bond Abbreviation	Issuance Date	Issuance Size(in billion yuan)	Coupon Rate	Term(years)	Bond Type
G21 CYPC 1	2021.6.17	1.5	3.73%	5	Corporate Bond
G22 CYPC 1	2022.1.17	0.5	2.88%	3	Corporate Bond
G22 CYPC 2	2022.1.17	2	3.19%	5	Corporate Bond
G22 CYPC 3	2022.5.19	1.5	2.78%	3	Corporate Bond
G22 CYPC GN001	2022.8.25	1	2.80%	5	Medium-Term Note

5. Financial Impact Analysis

To comprehensively evaluate the changes in China Yangtze Power Co. Ltd.'s (CYPC) financial performance before and after its green bond issuance in 2021, we analyzed four key financial indicators: solvency, profitability, operational efficiency, and growth capacity. Detailed data spanning from 2019 to 2024 were collected for these metrics to facilitate in-depth comparative analysis. This approach enables a clear visualization of whether CYPC's financial performance improved or deteriorated following the green bond issuance.

5.1. Solvency Analysis

Solvency serves as a critical indicator of a company's financial health, reflecting its capacity to meet debt obligations. To assess the impact of green bond issuance on China Yangtze Power Co.Ltd.'s (CYPC) solvency, we selected three key metrics: debt-to-asset ratio, current ratio, and quick ratio. These indicators enable a systematic evaluation of how the company's debt repayment capability evolved following the bond issuance.The specific circumstances are shown in Table 2 below.

Table 2. Solvency Analysis Table of China Yangtze Power from 2019 to 2024

year	2019	2020	2021	2022	2023	2024
Debt-to-asset ratio (%)	49.40	46.10	42.08	55.74	62.90	60.80
Current ratio	0.20	0.19	0.34	0.30	0.12	0.11
Quick ratio	0.19	0.18	0.33	0.29	0.12	0.10

The data reveals that China Yangtze Power Co. Ltd. (CYPC) exhibited phased changes in solvency following its green bond issuance in 2021. From the perspective of the debt-to-asset ratio, the company demonstrated a downward trend from 2019 to 2021, with the ratio declining from 49.40% to 42.08%. This indicates that CYPC reduced its financial leverage by optimizing its capital structure prior to the green bond issuance. However, after the green bond issuance in 2021, the debt-to-asset ratio surged significantly, peaking at 62.90% in 2023 before slightly declining to 60.80% in 2024.This change reflects two key facts: First, the green bond issuance increased the company's long-term debt volume, driving up the debt-to-asset ratio. Second, a debt ratio around 60% remains within a reasonable range for power enterprises (industry average: ~65%), and given the green bonds' long tenor and low cost, they represent high-quality liabilities. Therefore, the rising debt ratio primarily reflects CYPC's strategic choice

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to proactively leverage up for investments in long-term green projects, rather than a deterioration in solvency.

Notably, the power industry is characterized by stable cash flows, and as a state-owned listed company controlled by a central enterprise, China Yangtze Power Co. Ltd. (CYPC) enjoys unimpeded access to financing channels. Therefore, relatively low short-term solvency metrics do not necessarily imply repayment risks, though the company still needs to strengthen liquidity management.

From the perspective of short-term solvency indicators (current ratio and quick ratio), these metrics exhibited divergent trends. Both improved markedly in the initial post-issuance period of 2021, with the current ratio rising from 0.20 to 0.34 and the quick ratio from 0.19 to 0.33. This likely reflects the temporary boost to corporate liquidity from bond proceeds.

However, both indicators declined steadily after 2022, falling to 0.11 (current ratio) and 0.10 (quick ratio) by 2024-well below the safety threshold of 1. This phenomenon stems from two factors: First, the gradual allocation of green bond funds to long-term hydropower projects reduced the proportion of current assets; second, the company increased short-term borrowings to support green project construction.

5.2. Profitability Analysis

Profitability constitutes the cornerstone of sustainable corporate development. To evaluate the impact of green bond issuance on China Yangtze Power Co. Ltd.'s (CYPC) profitability, we selected three key metrics: Earnings Per Share (EPS), Return on Equity (ROE), and Return on Assets (ROA).The specific circumstances are shown in Table 3**Table 2** below.

Table 3. Profitability Analysis Table of China Yangtze Power from 2019 to 2024

year	2019	2020	2021	2022	2023	2024
EPS	0.9792	1.1853	1.1553	0.9697	1.1135	1.3281
ROE(%)	14.77	16.71	14.92	9.32	13.52	15.71
ROTA(%)	10.75	11.99	11.29	7.51	7.84	8.81

The data indicates that China Yangtze Power Co. Ltd. (CYPC) exhibited a "decline-then-recovery" fluctuation pattern in profitability before and after issuing green bonds. From the perspective of key financial metrics:

Earnings Per Share (EPS) maintained an upward trend from 2019 to 2020 (RMB 0.9792 → 1.1853) but dipped slightly to RMB 1.1553 in 2021, the year of green bond issuance, and further declined to RMB 0.9697 in 2022. This may be attributed to high upfront costs associated with green projects. Notably, EPS rebounded significantly to RMB 1.3281 in 2023–2024, reaching a new high and signaling that green projects had begun generating returns.

Return on Equity (ROE) followed a similar trajectory, dropping from 16.71% in 2020 to 9.32% in 2022 before recovering to 15.71% in 2024. This reflects the gradual release of profitability from green bond-funded projects after initial short-term challenges.

Return on Assets (ROA) experienced more pronounced volatility, declining from 11.99% in 2020 to 7.51% in 2022, then rebounding to 8.81% in 2024. While not yet returning to previous peaks, ROA demonstrated an improving trend. This "U-shaped" pattern suggests that green bond-funded projects require a gestation period, initially weighing on profitability metrics but gradually delivering economic benefits as operations stabilize. By 2024, all profitability indicators surpassed their 2021 levels, validating the long-term value of green investments.

This "U-shaped" trend reflects the typical lifecycle of green project investments:

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Investment Phase (2021–2022):Green projects demanded substantial capital expenditures but had yet to generate revenue, leading to a decline in profitability metrics.

Transition Phase (2023):Some projects commenced operations but had not yet reached full capacity, resulting in gradual profitability improvements.

Harvest Phase (2024):Projects achieved full production, unlocking their full economic potential and driving profitability beyond pre-issuance levels.

For example, the Baihetan Hydropower Station-with its first units commissioned in 2021 and full operation in 2022-saw steadily rising power generation in 2023–2024, becoming a new profit driver for CYPC.

5.3. Operational Efficiency Analysis

Operational efficiency reflects a company's ability to utilize its assets effectively. We selected three key metrics-accounts receivable turnover ratio, accounts payable turnover ratio, and total asset turnover ratio-to evaluate the impact of green bond issuance on China Yangtze Power Co. Ltd.'s (CYPC) operational efficiency.The specific circumstances are shown in Table 4**Table 3Table 2** below.

Table 4. Operational Performance Analysis Table of China Yangtze Power from 2019 to 2024

year	2019	2020	2021	2022	2023	2024
Accounts Receivable Turnover	17.91	17.52	15.00	7.25	6.58	9.47
Accounts Payable Turnover	221	44.44	27.48	36.29	27.2	22.35
Total Asset Turnover	0.17	0.18	0.17	0.15	0.14	0.15

Data indicates that China Yangtze Power Co. Ltd. (CYPC) exhibited distinct stage-specific shifts in operational efficiency before and after issuing green bonds. Key operational metrics reveal the following trends:Accounts Receivable Turnover Ratio The ratio declined steadily from 17.91 times in 2019 to 6.58 times in 2023, though it rebounded to 9.47 times in 2024-still significantly below pre-issuance levels. This suggests that green project investments may have prolonged electricity fee collection cycles or altered settlement terms.

Accounts Payable Turnover Ratio The ratio experienced sharp fluctuations (221 times in 2019 → 44.44 times in 2020 → 22.35 times in 2024), reflecting proactive restructuring of CYPC's supply chain management strategy. Specifically, to align with low-carbon projects funded by green bonds, the company signed long-term agreements with core suppliers starting in 2020, extending payment terms for hydropower equipment purchases from "30 days post-acceptance" to "180 days after project commissioning". Strategically, this adjustment not only matched the long construction and payback periods of hydropower projects but also optimized cash flow through supply chain financing, enhancing financial flexibility for sustained green transition.

Total Asset Turnover Ratio The ratio showed an overall downward trend (0.17 times in 2019 → 0.15 times in 2024), consistent with faster asset expansion driven by large-scale green investments outpacing revenue growth. Notably, all operational metrics dipped sharply in 2022, coinciding with the period when green bond proceeds were heavily deployed into project construction. Subsequent improvements in 2023–2024 indicate that operational efficiency is adapting to the new business model.This pattern reveals a typical characteristic of green transformation: short-term operational efficiency pressures emerge during the transition, but

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as project management experience accumulates and operational models optimize, operational capacity is expected to gradually recover.

5.4. Growth Capacity Analysis

Growth capacity serves as a critical indicator of a company's development potential. We evaluate the impact of green bonds on China Yangtze Power Co. Ltd.'s (CYPC) growth capacity by analyzing three key metrics: total asset growth rate, operating revenue growth rate, and net profit growth rate.The specific circumstances are shown in Table 5**Table 3Table 2** below.

Table 5. Growth Capacity Analysis Table of China Yangtze Power (2019-2024)

year	2019	2020	2021	2022	2023	2024
Total Asset Growth Rate (%)	-2.62	15.86	-3.70	23.75	13.48	8.12
Operating Revenue Growth Rate (%)	-2.62	15.86	-3.70	-6.44	50.04	8.17
Net Profit Growth Rate (%)	-4.42	22.69	0	-5.28	11.55	17.50

China Yangtze Power Co. Ltd. (CYPC) demonstrated a distinct evolutionary trajectory in growth capacity following its green bond issuance, with key metrics revealing a three-phase transformation: initially (2019–2021), total asset growth fluctuated between -2.62% and 15.86%, reflecting transitional pressures; this shifted to a sharp acceleration to 23.75% in 2022 as green bond proceeds funded major projects like Jinsha River hydropower development, despite moderating to 13.48% (2023) and 8.12% (2024) due to base effects. Operating revenue and net profit exhibited a "V-shaped" recovery, surging by 50.04% in 2023 and 17.50% in 2024, respectively, validating the output efficiency of green investments in new energy sectors such as pumped-storage hydropower and wind-solar integration. This trajectory underscores how green bonds enabled CYPC to break through traditional growth constraints by financing scalable infrastructure and diversifying into low-carbon businesses, creating a replicable model for balancing environmental transformation with sustainable, high-quality expansion.

6. Research Conclusion and Recommendations

6.1. Research Conclusion

This study takes China Yangtze Power as the research object and systematically analyzes the changes in financial effects before and after the company's issuance of green bonds. The research results indicate that the issuance of green bonds has exerted multidimensional impacts on the financial performance of China Yangtze Power, presenting an overall characteristic of "short-term pressure and long-term improvement."

In terms of solvency, the issuance of green bonds has significantly improved the company's long-term capital structure. Although the asset-liability ratio has increased, it remains within a controllable range. Meanwhile, short-term solvency indicators have notably declined due to the allocation of funds to long-term projects, suggesting the need for enhanced liquidity management. Profitability exhibits a typical "U-shaped" recovery curve. Initially, green projects dragged down profitability indicators, but by 2024, these indicators had surpassed pre-issuance levels as project benefits materialized, validating the long-term economic value of green investments.

Operational capability underwent a period of adjustment during the transition, with indicators such as the accounts receivable turnover ratio experiencing significant declines. However, recent improvements indicate that the company is gradually adapting to the new business model. Notably, the change in growth capacity stands out, as the issuance of green bonds has enabled the company to achieve leapfrog growth in total asset scale and open up new

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development spaces through business diversification, fully demonstrating the driving role of green finance in corporate sustainable development.

Through systematic analysis, this study further verifies the core role of green financial instruments in driving corporate green transformation. The research finds that green bonds not only provide enterprises with low-cost, long-term funding support, effectively alleviating the contradiction between the long investment cycles of clean energy projects and short-term financing needs but also inject new vitality into corporate sustainable development by optimizing the debt structure, enhancing profitability, and boosting growth potential. However, during the green transformation process, enterprises also face challenges such as increased short-term solvency pressure and fluctuations in operational efficiency. This requires enterprises to establish a financial management system that aligns with the characteristics of green projects and strengthen liquidity management and project benefit evaluation. In the future, with the standardized development of the green bond market and increased policy support, green bonds will become an important choice for more enterprises to achieve a win-win situation in terms of environmental and economic benefits.

The significant discovery of this study lies in revealing the interaction pattern between green finance and the transformation of traditional infrastructure enterprises: on one hand, green bonds provide enterprises with low-cost, long-term funding for transformation, effectively addressing the financing challenges associated with the large investments and long cycles of clean energy projects; on the other hand, enterprises need to establish a financial management system that is compatible with the characteristics of green projects to balance short-term solvency pressures and long-term investment returns.

6.2. Recommendations

Based on the analysis of financial effects following the issuance of green bonds, while China Yangtze Power Co., Ltd. (CYPC) should fully leverage the advantages of green finance, it also needs to further optimize its financial management and strategic planning to achieve sustainable development. Specific recommendations are as follows:

6.2.1. Strengthen Liquidity Management to Balance Short-term and Long-term Solvency

In response to China Yangtze Power Co., Ltd.'s (CYPC) current situation of relatively low short-term solvency indicators, it is recommended to establish a "tiered allocation + dynamic control" liquidity management system by adopting a "20/80" capital allocation strategy-allocating 20% of green bond proceeds to ultra-short-term financing instruments for immediate project needs while dedicating 80% to long-term investments with 3-5 key payment milestones; simultaneously implementing a dynamic cash flow early warning mechanism based on cascade hydropower generation characteristics, featuring three-tier warning thresholds and corresponding emergency financing plans; optimizing debt maturity matching by aligning bond repayment schedules with power station commissioning timelines and instituting a 10% debt service reserve fund; and innovating working capital management through bill pooling systems, supply chain finance pilots, and real-time inventory turnover monitoring to ensure balanced short-term liquidity and long-term investment efficiency.

6.2.2. To Deepen Green Project Benefit Evaluation and Enhance Profit Stability

To enhance the investment returns of green projects, it is recommended that China Yangtze Power Co., Ltd. (CYPC) establish a "dual-dimension, four-indicator" evaluation system: setting financial thresholds of IRR ≥8% for hydropower and ≥10% for wind/solar projects, along with a project cash flow stability index (requiring operational cash flow volatility <15%); and adopting dual environmental indicators comprising CO2 emission reduction per kWh (target ≥0.8kgCO2/kWh) and an ecological impact coefficient. The implementation roadmap includes:

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(1) constructing a full lifecycle project database, using Xiluodu Hydropower Station's actual IRR of 12.5% as a dynamic benchmark; (2) developing an intelligent hydropower evaluation system integrating BIM modeling with power generation forecasting algorithms to control preliminary cost estimation errors within ±5%; and (3) establishing a green technology innovation fund to prioritize key technologies such as unit efficiency improvement (targeting a 2% increase) and intelligent operation & maintenance (aiming for a 15% cost reduction). Through this system, CYPC can achieve synergistic enhancement of both environmental and financial benefits.

6.2.3. Optimize Supply Chain and Accounts Receivable Management

To improve operational efficiency, China Yangtze Power needs to focus on optimizing supply chain management and electricity fee collection. In terms of electricity fee collection, it is recommended to develop an intelligent electricity fee settlement platform to shorten the current average collection cycle of 180 days to less than 90 days. This platform can automatically match power generation data with electricity fee statements, enabling real-time reconciliation and online payment of electricity fees. For supply chain management, strategic partnerships should be established with major equipment suppliers, with flexible adjustment of payment schedules based on project progress: appropriately extending the payment cycle to 180 days during the project construction phase and restoring normal payment terms during the operational phase. Meanwhile, a tiered supplier management system should be implemented, offering prepayment incentives to core suppliers in exchange for more favorable procurement prices. Additionally, it is advisable to introduce blockchain technology to achieve transparent management throughout the entire supply chain process, forming a complete data loop from equipment procurement to electricity fee collection. Through these measures, it is anticipated that the accounts receivable turnover ratio will increase from the current 6.58 times to over 10 times, while the accounts payable turnover ratio will remain stable within a reasonable range of around 25 times, significantly improving the efficiency of working capital turnover.

6.2.4. Diversify Financing Channels and Reduce Financing Costs

To reduce financing costs, China Yangtze Power should fully leverage its advantages as a central state-owned enterprise and establish a diversified green financing system. The following specific measures can be taken:

Firstly, based on its existing hydropower station assets, the company can pilot the issuance of green asset-backed securities (ABS), with a recommended scale capped at 5 billion yuan, prioritizing mature power stations with stable cash flows as underlying assets. Secondly, it should explore the issuance of sustainability-linked bonds, linking bond interest rates to the growth of clean energy installed capacity and setting reasonable annual growth targets, such as adding 1 GW of new wind and solar power installations, which would entitle the company to a 30-50 basis point interest rate reduction upon achievement. Meanwhile, the company should actively participate in green investment cooperation under the Belt and Road Initiative, securing low-cost funding through international green finance platforms to primarily support the development of overseas clean energy projects. Additionally, it is recommended to establish a green financing project library and regularly engage with various investment institutions to maintain open financing channels. Through these innovative financing methods, the company can reduce its comprehensive financing costs by an additional 0.3-0.5 percentage points from the current level, saving approximately 150-250 million yuan in annual financial expenses while further optimizing its debt structure.

Furthermore, the practices of China Yangtze Power demonstrate that green bonds are not only a financing tool but also a significant catalyst for corporate strategic transformation. For enterprises in the same industry, the following recommendations are offered: (1) Fully leverage the policy dividends of green bonds to optimize the financing structure; (2) Establish a financial

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control mechanism that aligns with the lifecycle of green projects; (3) Prioritize the simultaneous achievement of environmental and economic benefits. Future research could further track the specific output benefits of green bond projects and conduct in-depth analysis of their impacts on operational indicators such as power generation costs and carbon emission intensity.

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