Frontiers in Economics and Management Volume 7 Issue 11, 2026
ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

Analysis of the Motivations and Performance of Green Mergers and Acquisitions by PowerChina from a Resource Orchestration Perspective

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Abstract

Under China's "dual-carbon" goals, this study applies resource orchestration theory to examine POWERCHINA's 2022 asset swap-a green-oriented restructuring exchanging real-estate assets for power-grid ancillary assets-across three stages: resource structuring, bundling, and leveraging. The transaction was driven jointly by external institutional pressures (the dual-carbon strategy, state-owned enterprise reform, and real-estate financing constraints) and internal resource-reconfiguration needs. Based on indicators from 2019 to 2025, the transaction strategically realigned the resource portfolio: new-energy capacity, green patents, and carbon-emission reductions expanded substantially. However, the revenue share of new energy remained low, leverage increased, and profitability declined after an initial rise, indicating incomplete conversion of green resources into sustainable financial returns. Implications are offered for green asset restructuring and resource orchestration in similar enterprises.

Keywords

Green Mergers and Acquisitions; Resource Orchestration; Asset Swap; Dual-carbon Goals; M&A Performance; Green Transformation.

1. Introduction

With the intensification of global climate change, resource constraints, and pressure on the ecological environment, green development has become a major strategic priority for China. In particular, following China's announcement of its carbon peaking and carbon neutrality goals, green industries, green finance, and green mergers and acquisitions (M&A) have all entered a phase of accelerated development. Against the backdrop of accelerating M&A integration in green industries, domestic M&A activity has shown a clear upward trend. As national policies continue to be introduced and capital-market instruments continue to improve, has become an important direction for industrial restructuring under carbon-neutrality constraints[1].

Therefore, research into the green M&A of Power Construction Corporation of China, Ltd. (POWERCHINA)-particularly an investigation of its motivations and resource-orchestration actions from the perspective of resource orchestration, together with a comprehensive evaluation of its M&A performance. At a time when green M&A remains at the intersection of institutional development and market evolution, systematic analysis can provide new perspectives for academic research and actionable approaches for practitioners[2].

2. Case Overview of POWERCHINA's Green M&A

2.1. Basic Information on POWERCHINA

Basic Information on POWERCHINA

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

Power Construction Corporation of China, Ltd. was established on November 30, 2009, and was listed on the Shanghai Stock Exchange on October 18, 2011. Its controlling shareholder is Power Construction Corporation of China Group Co., Ltd. (POWERCHINA Group), while its ultimate controller is the State-owned Assets Supervision and Administration Commission of the State Council (SASAC). POWERCHINA Group is a mega-sized centrally administered state-owned enterprise established with the approval of the Central Committee of the Communist Party of China and the State Council. It operates in such fields as clean and low-carbon energy, water resources and environmental protection, infrastructure, and building construction. POWERCHINA's core positioning is to "understand water, be familiar with electricity, excel in planning and design, and specialize in project operations." It possesses significant technological advantages in water conservancy and hydropower, new energy, power-grid engineering, ecological protection, and environmental protection.

In 2022, POWERCHINA carried out a major asset swap, transferring its real-estate-segment assets to its controlling shareholder, POWERCHINA Group, while simultaneously acquiring high-quality assets related to the group's power-grid auxiliary businesses. This swap was an important measure through which the company responded to the reform requirements for central state-owned enterprises to "focus on their primary responsibilities and core businesses and divest non-core businesses," as well as to the national "dual-carbon" strategy. It marked a further shift in the company's business structure toward clean energy and green infrastructure and laid a solid foundation for its green transformation and upgrading.

2.2. The Process of POWERCHINA's Green M&A

POWERCHINA's green M&A in this case took the special form of an asset swap under common control. Specifically, its real-estate-segment assets were exchanged in their entirety for high-quality assets related to the power-grid auxiliary businesses held by its controlling shareholder, POWERCHINA Group, with the difference settled in cash by POWERCHINA Group.

Table 1. Summary of POWERCHINA's Green M&A Events

Time	Major Event
August 2014	POWERCHINA Group issued the Statement on the Commitment to Inject Businesses Related to Power-Grid Auxiliary Enterprises.
December 2014	POWERCHINA Group issued the Letter of Commitment on Avoiding Horizontal Competition.
August 2021	The valuation reference date for the asset swap was determined.
January 2022	The 51st meeting of the Third Board of Directors was convened, the asset-swap proposal was reviewed and approved, and the Asset Swap Agreement was signed with POWERCHINA Group.
During 2022	Following approval by an extraordinary general meeting of shareholders, the asset transfer was completed and the relevant assets were consolidated into the company's financial statements.
2022–2024	Shanghai Electric Power Design Institute entered the performance-commitment compensation period.

2.3. An Integration Analysis of POWERCHINA's Green M&A from the Perspective of Resource Orchestration

2.3.1. Constructing the Resource Portfolio

Within the resource orchestration framework, firms structure their resource portfolios, bundle resources into capabilities, and leverage capabilities to create value in transforming resources into outputs and primarily addresses the sources of enterprise resources[3,4]. At this stage, the structure of a firm's existing resource base is reconfigured through three approaches: acquiring

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

resources externally, deploying internal resources, and divesting inefficient resources. The asset swap between POWERCHINA and POWERCHINA Group in 2022, valued at tens of billions of yuan, was not merely a simple purchase and sale of assets. Rather, it was a strategic reconfiguration of the company's resource base guided by green transformation. The transaction involved two core actions-divesting non-core resources and acquiring strategic resources-and was also coordinated with the establishment of a new-energy group.

2.3.2. Resource Bundling

Resource bundling is the intermediate stage in the resource-orchestration process and addresses the transformation of resources into capabilities. In M&A integration, resource bundling involves effectively integrating the external resources acquired through M&A with the firm's internal resources and transforming dispersed and static resource elements into systematic and dynamic organizational capabilities.

Resource bundling first requires the integration of organizational platforms. Although the 18 power-grid auxiliary enterprises were affiliated with POWERCHINA in terms of ownership, there was a certain institutional distance between their management and control models, systems and procedures, business routines, and the management system of the listed company. In response, POWERCHINA launched multiple rounds of organizational-structure integration. In terms of reducing the number of subsidiaries and streamlining management levels, the company nearly halved the number of its subsidiaries through systematic organizational optimization[6].

The company also reorganized its international business and adopted a group-based development model. It established regional headquarters to integrate group-level and regional resources, thereby breaking down resource silos defined by subsidiary boundaries. As a result, design, construction, and operation resources held by different legal entities within the same region could work in concert under the unified coordination of the regional headquarters.

2.3.3. Resource Leveraging

Resource leveraging is the final stage of resource orchestration and addresses the utilization of resources. In M&A integration, enterprises leverage market opportunities through the capabilities formed by the prior combination of internal and external resources, thereby creating value and improving performance. After completing the asset swap, POWERCHINA leveraged its resources in several dimensions-including full-industrial-chain synergies, the export of green operating capabilities, multi-level market expansion, and capital-platform operations-on the basis of the integrated "investment–construction–operation" capabilities of the entire industrial chain and the systematic capabilities formed through the specialized integration of its new-energy business.

3. Analysis of the Motivations for POWERCHINA's Green M&A from the Perspective of Resource Orchestration

3.1. External-Environment Drivers

Corporate strategic decisions are deeply embedded in the institutional environment and market structure in which a firm operates. Profound changes in the external environment not only constitute the initial driving force for the reconfiguration of corporate resources, but also provide a basis for the legitimacy of M&A activities. According to sustainable development theory, enterprises must pursue economic benefits while proactively responding to ecological constraints and institutional changes, seeking long-term sustainable development through green transformation[1]. In conjunction with synergy theory, the combined effects of policy pressure and opportunities arising from industrial transformation will further motivate

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

enterprises to integrate resources through M&A and create synergies in strategic fields that exceed what the parties could achieve through independent operations[5,6].

The policy impetus generated by the "dual-carbon" strategic goals, the institutional constraints arising from the reform of state-owned enterprises and its emphasis on "refocusing on core businesses," the regulatory pressure created by the increasingly stringent "exit-from-real-estate" directive, and the forcing effect of restrictions on real-estate-related financing interacted and reinforced one another. Together, these four external forces provided sufficient strategic rationale and practical urgency for POWERCHINA's 2022 green M&A in the form of an asset swap from the perspective of the broader institutional environment.

These external forces jointly prompted the company to withdraw resources from non-core businesses and concentrate them in green core businesses. From the perspective of resource orchestration, they generated the following external-environment-driven logic: "divest inefficient assets to release capital and inject complementary resources to strengthen the core business." This constitutes the primary analytical dimension for understanding the motivations behind POWERCHINA's green M&A.

3.2. Competitive-Advantage Drivers

The endogenous motivation for corporate M&A is largely rooted in a clear assessment of the firm's competitive position and a reassessment of its resource and capability structure. The resource-based view holds that a firm's core competitiveness includes not only tangible assets such as technical patents and market share, but also intangible strategic resources such as full-industrial-chain integration capabilities and policy-coordination advantages[7]. Reconfiguring these resources through M&A can significantly enhance a firm's overall competitive advantages and value-creation capabilities.

POWERCHINA possesses systematic competitive advantages in the global energy and power construction sector, jointly formed by its market position, technological capabilities, full-industrial-chain layout, and policy coordination. These advantages constitute the fundamental force drawing resources toward its core businesses in the asset swap. In terms of market position, POWERCHINA is the world's largest power engineering contractor and design enterprise. It has undertaken and designed more than 80% of China's large hydropower stations and more than 65% of the planning and design projects for wind and photovoltaic power generation. It also holds more than 50% of the global market for medium- and large-scale water conservancy and hydropower construction.

POWERCHINA is one of the principal organizations responsible for drafting and revising China's technical standards, codes, and specifications for water conservancy and hydropower, wind power, and photovoltaic construction. Through major projects such as research on key technologies for integrated "hydro–wind–solar–storage" development across cascaded river basins, the company has continuously consolidated its position as a source of original technologies for clean-energy development. In the field of electrochemical energy storage, the company's achievement in the Research on Key Technologies for Large-Scale Lithium-Battery Energy-Storage Stations at the 100-MWh Scale has reached an internationally advanced level. The company has accumulated substantial technological expertise and possesses formidable R&D barriers.

3.3. Resource-Reconfiguration Drivers

Resource orchestration theory emphasizes that the dynamic management of a firm's strategic resource portfolio begins with the continuous assessment of the efficiency of its existing resource portfolio[3,4]. When substantial resource redundancy exists within a company, and assets formally remain part of the firm but are unable in substance to create value for its core strategy, a strong demand for the structural reconfiguration of resources emerges.

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

One of the core propositions of resource orchestration theory is that the strategic value of resources lies not in their scale, but in the degree to which they fit the firm's core capabilities and the efficiency with which they can be transformed into competitive advantages. A structural examination of POWERCHINA's existing resource portfolio shows that its real-estate business had occupied substantial capital for an extended period without generating commensurate strategic returns, clearly reflecting a structural mismatch in its internal resources.

The severity of this resource mismatch and the comparability of the asset scales provided the preconditions for the asset swap. High leverage constraints closed off the financial route of a cash-funded acquisition, bottlenecks in real-estate-related financing blocked the institutional route of a phased exit, and the urgency of the transformation window left no time for gradual adjustment. From the perspective of resource orchestration, the asset swap was not merely a simple purchase and sale of assets. Rather, it was the most efficient mechanism for achieving the "disruptive reconstruction" of the resource portfolio under multiple constraints, thereby laying a structural foundation for the company's subsequent resource bundling and resource leveraging.

4. Performance Analysis of POWERCHINA's Green M&A from the Perspective of Resource Orchestration

4.1. Performance Analysis of the Resource Portfolio Construction Stage of POWERCHINA's Green M&A

The resource portfolio construction stage primarily examines the company's investment in environmental protection and R&D, its attention to employees, and its solvency.

First, with respect to investment in environmental protection and R&D, one of the core objectives of green M&A is to enhance a firm's capacity for green technological innovation. From 2019 to 2025, POWERCHINA's R&D investment ratio increased from 3.25% to 3.69%, reaching 3.83% in 2024 and remaining at a relatively high level overall. This indicates that the company has continued to attach importance to green technology R&D and the accumulation of innovation resources. However, during the same period, the environmental-protection investment ratio fluctuated only slightly between 0.16% and 0.19%, with no significant increase after the M&A. This suggests that POWERCHINA's investment in R&D resources has remained relatively stable, while there is still room for further investment in energy-saving and emissions-reduction upgrades, pollution control, and ecological restoration.

Table 2. Changes in POWERCHINA's Environmental-Protection and R&D Investment Indicators

Item / Year	2019	2020	2021	2022	2023	2024	2025
Share of R&D personnel (%)	18.8	18.39	15.54	13.32	13.52	13.97	14.42
R&D investment ratio (%)	3.25	3.81	3.59	3.64	3.82	3.83	3.69
Environmental-protection investment ratio (%)	0.19	0.17	0.18	0.16	0.17	0.18	0.17

Second, in terms of employee care, the share of employee compensation remained generally stable before and after the M&A. It was 8.36% in 2019, 7.95% in 2022-the year in which the M&A was completed-and 7.62% in 2025. The slight decline in this indicator was mainly attributable to the fact that operating revenue grew faster than total employee compensation; it does not indicate an absolute reduction in employee compensation. A relatively stable

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

compensation system helps safeguard the rights and interests of employees in the acquired businesses and promotes a smooth transition of human resources.

At the same time, POWERCHINA continuously increased its investment in work safety. Work-safety expenditure as a proportion of net profit increased from 57.26% in 2019 to 60.25% in 2022 and further to 83.50% in 2025. The increase in work-safety investment reflects the company's emphasis on employees' lives and health as well as on the production environment. It also helps enhance employees' sense of belonging and reduce the risk of employee turnover during the M&A integration process.

Table 3. Changes in POWERCHINA's Employee Compensation and Work-Safety Investment Indicators, 2019–2025

Item / Year	2019	2020	2021	2022	2023	2024	2025
Employee compensation ratio (%)	8.36	7.88	7.95	7.95	7.93	7.89	7.62
Work-safety expenditure as a percentage of net profit (%)	57.26	50.22	57.96	60.25	56.09	68.11	83.5

Finally, with respect to solvency, the green M&A placed some pressure on POWERCHINA's financial position. The current ratio declined from 1.04 in 2021 to 0.88 in 2022 and further to 0.84 in 2023, after which it remained at approximately 0.88, indicating a weakening of the company's short-term solvency. This was mainly because the M&A required the payment of substantial cash consideration. In addition, hydropower and new-energy projects generally have long construction cycles and tie up significant amounts of capital, while short-term borrowings and accounts payable continued to increase.

Nevertheless, the quick ratio gradually increased from 0.61 in 2019 to 0.85 in 2024–2025, indicating that the company improved the structure of its current assets to some extent by strengthening the management of inventories and construction materials. In the longer term, the asset-liability ratio increased from 75.09% in 2021 to 79.59% in 2025, while the debt-to-equity ratio rose from 301.45% to 389.96%. This indicates that the pace of debt expansion exceeded the rate of accumulation of owners' equity, and that the company's long-term financial risk increased.

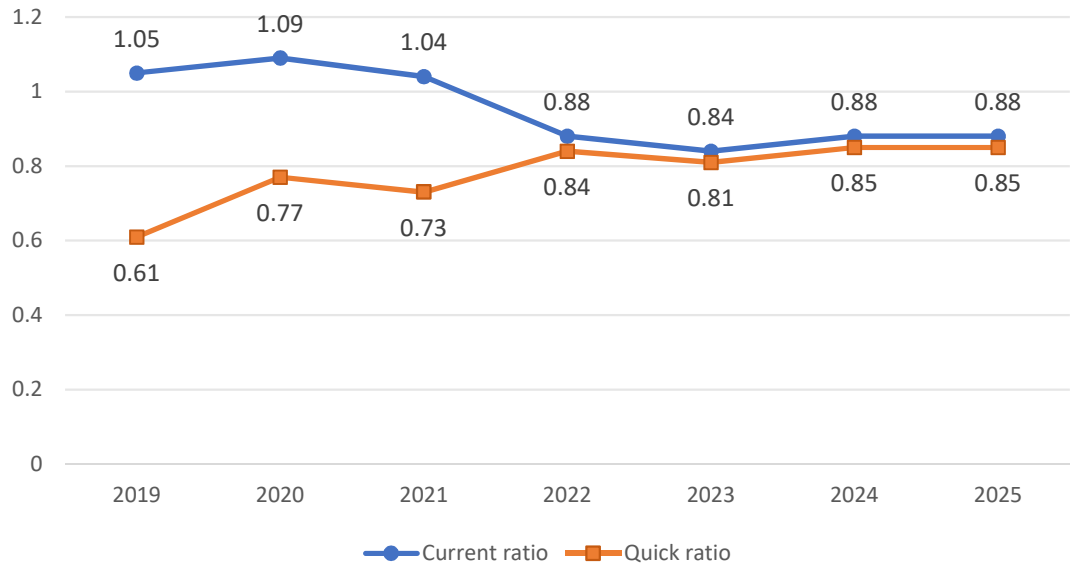


Figure 1. Changes in China Power Construction's short-term debt-paying ability

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

4.2. Performance Analysis of the Resource Bundling Stage of POWERCHINA's Green M&A

The resource bundling stage focuses on transforming the resources of both parties into green business capabilities. Its main areas of analysis are the efficiency of new-energy resource utilization and the company's operating capability.

With respect to the development of the new-energy business, POWERCHINA's installed new-energy capacity increased from 6.1782 million kW in 2019 to 7.7361 million kW in 2021, reached 10.368 million kW in 2022-the year in which the M&A was completed-and reached 27.35 million kW in 2025, approximately 3.5 times the 2021 level before the M&A. Clean-energy electricity generation also increased from 30.468 billion kWh in 2019 to 62.984 billion kWh in 2025. This indicates that the acquired businesses' new-energy projects and operating resources were effectively absorbed and utilized, and that green resources were initially transformed into the company's business capabilities.

Table 4. Changes in POWERCHINA's Non-Nuclear New-Energy Business

Item / Year	2019	2020	2021	2022	2023	2024	2025
New-energy installed capacity (10,000 kW)	617.82	657.5	773.61	1036.8	1613.99	2207.72	2735
Clean-energy electricity generation (100 million kWh)	304.68	352.61	367.13	396.53	442.96	539.3	629.84

However, the share of revenue from the new-energy business increased only slightly, from 1.59% in 2019 to 1.73% in 2025, and even declined to 1.51% in 2022. This was mainly because POWERCHINA's traditional engineering contracting business is relatively large, while the revenue base of its new-energy business is relatively small. In addition, new-energy projects generally have long investment cycles, meaning that the expansion of installed capacity had not yet been promptly translated into revenue and profits. Therefore, the transformation of the company's green resources into business results continued to exhibit a certain lag.

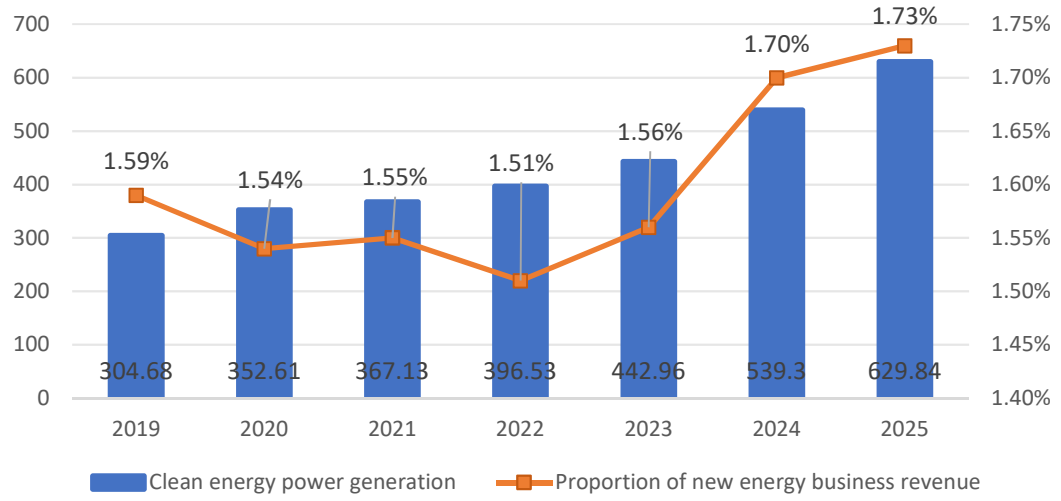


Figure 2. Changes in power generation of China Power Construction's clean energy

In terms of operating capability, the inventory turnover ratio increased from 3.14 times in 2021 to 6.67 times in 2022 and further to 31.15 times in 2023, after which it remained at approximately 30 times. This indicates that, after the M&A, the company strengthened its management of construction materials and inventories, resulting in a significant improvement

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

in resource operating efficiency. However, following the implementation of the new revenue-recognition standard, some inventories were reclassified as contract assets, which also amplified the increase in the inventory turnover ratio to some extent.

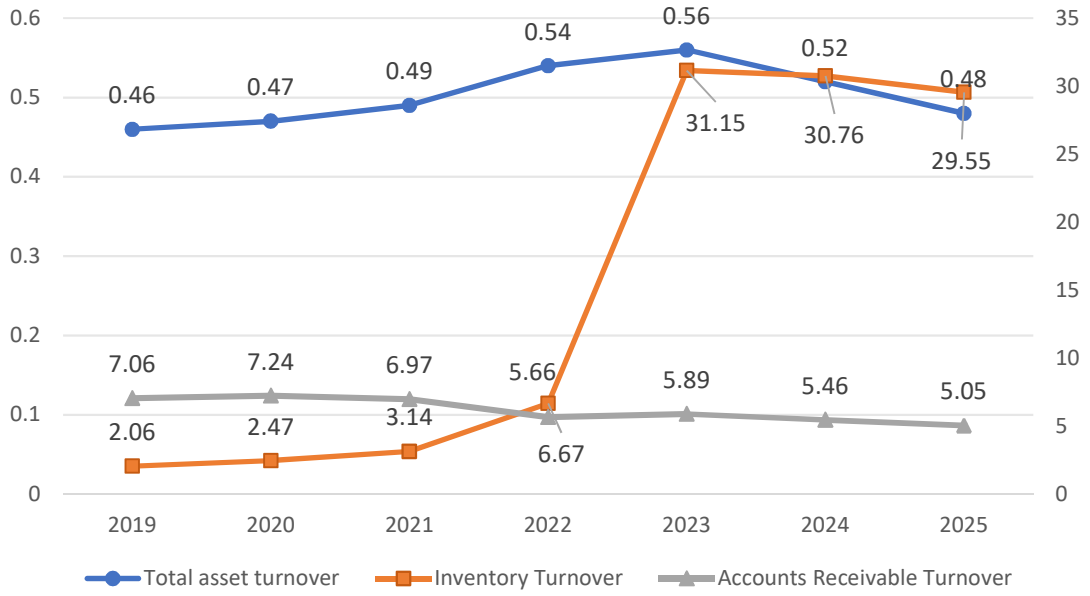


Figure 3. Comparison of China Power Construction's Operating Capability Metrics

The total asset turnover ratio increased from 0.46 times in 2019 to 0.56 times in 2023, but declined to 0.48 times in 2025. This was mainly because the company continued to expand its investment in new-energy projects after the M&A. The expansion of its asset base outpaced the growth of operating revenue, resulting in some dilution of asset-utilization efficiency.

4.3. Performance Analysis of the Resource Leveraging Stage of POWERCHINA's Green M&A

The original Chinese heading repeats "resource bundling stage," but the content of this section discusses the resource leveraging stage. The heading has been rendered according to the content.

The resource leveraging stage is the key stage in which previous resource investments and capability integration are transformed into corporate performance. It primarily examines green innovation, environmental governance, and profitability, while also taking into account the company's social contribution and growth performance.

In terms of green innovation, the number of green patents granted to POWERCHINA increased from 482 in 2019 to 1,372 in 2021, reached 2,594 in 2022-the year in which the M&A was completed-and further increased to 3,193 in 2024. In 2025, the number remained high at 2,949, approximately 6.6 times the 2019 level. The rapid growth in green patents was attributable both to earlier R&D investment and the company's reserve of technical personnel, and to the integration of knowledge and technological synergies between the two parties in areas such as hydropower, wind power, photovoltaic power, and energy storage. This indicates that resource portfolio construction and resource bundling generated relatively significant knowledge spillover effects[4].

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Table 5. Changes in POWERCHINA's Green Innovation Output Indicators

Item / Year	2019	2020	2021	2022	2023	2024	2025
Number of green patents granted	482	504	1372	2594	2567	3193	2949

In terms of environmental governance, carbon-emission reductions generated by POWERCHINA's clean-energy projects increased from 18.2206 million tonnes of CO_2 in 2019 to 37.6657 million tonnes in 2025, approximately 1.7 times the 2021 level. After reaching 20,110 tonnes in 2022, emissions of major pollutants gradually declined to 17,940 tonnes in 2025, a decrease of 10.79% from the peak. Meanwhile, the number of green engineering projects increased from 38 in 2019 to 127 in 2024. Although the number fell to 118 in 2025, it remained at a relatively high level.

These changes indicate that, after the M&A, the company continuously improved its environmental governance capabilities by expanding its clean-energy business, promoting green construction techniques, and improving its green-project certification system. Its social and ecological contributions were therefore relatively significant.

Table 6. Reductions in POWERCHINA's Pollutant Emissions

Item / Year	2019	2020	2021	2022	2023	2024	2025
Carbon-emission reductions (10,000 tonnes of CO_2)	1822.06	2108.7	2195.49	2371.36	2649	3225.16	3766.57

In terms of profitability, the company exhibited a pattern of "an initial increase followed by a decline." Return on equity increased from approximately 7.89% in 2021 to 9.95% in 2022 and remained at 9.54% in 2023, but declined to 8.14% in 2024 and further to 6.40% in 2025. Earnings per share increased from RMB 0.4979 in 2021 to more than RMB 0.68 in 2022–2023, before declining to RMB 0.5276 in 2025. The net profit margin decreased from approximately 3% to 2.03% in 2025.

During the initial stage after the M&A, the expansion of new-energy resources, government subsidies, and tax and fee incentives led to a short-term improvement in profitability. However, as capital expenditure expanded, depreciation and amortization, finance costs, and interest expenses increased. In addition, intensifying competition in the construction industry placed pressure on engineering-project gross margins. Consequently, the green business has not yet developed a stable and sustainable profitability advantage.

Overall, POWERCHINA's green M&A achieved significant growth in green patents, carbon-emission reductions, and green engineering projects during the resource leveraging stage. Its ecological and innovation performance was relatively strong, but the efficiency with which new-energy resources were converted into revenue and profits remained insufficient. In the future, the company should further optimize its capital structure, control debt risks, improve the operating efficiency of its new-energy business, and promote the transformation of its green-resource advantages into long-term profitability.

5. Conclusion and Implications

5.1. Research Conclusion

This study examines the 2022 major asset swap and related-party transaction of Power Construction Corporation of China, Ltd. (POWERCHINA) from the perspective of resource orchestration. Strictly speaking, the transaction was not a conventional share acquisition. It was an asset swap among entities under common control, through which POWERCHINA transferred real-estate-related assets to its controlling shareholder and acquired power-grid ancillary

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

assets, with the cash difference settled by POWERCHINA Group. In this study, the transaction is therefore referred to as a green-oriented asset restructuring rather than an ordinary green M&A, because the direction of resource reallocation was toward power-grid, clean-energy-related, and green-infrastructure businesses.

Drawing on resource orchestration theory, this study analyzes the transaction in terms of resource structuring, resource bundling, and resource leveraging. The performance analysis is based on disclosed financial, operational, innovation, and environmental indicators before and after the transaction. Accordingly, the findings should be interpreted as descriptive associations rather than definitive evidence that the asset swap alone caused all of the observed changes.

First, the transaction was jointly motivated by external institutional pressures and internal resource-reconfiguration needs. The "dual-carbon" strategy, the reform requirement for central state-owned enterprises to focus on their main businesses, and increasingly stringent financing conditions in the real-estate sector created an external basis for the transaction. Internally, the transaction enabled POWERCHINA to transfer out real-estate-related assets and acquire power-grid ancillary assets that were more closely related to its power-engineering and clean-energy development strategy. This indicates that the transaction improved the strategic alignment of the company's resource portfolio. However, the available evidence does not support an unconditional conclusion that the transferred real-estate assets were continuously loss-making or that government recognition and employees' green-development awareness necessarily improved. The more defensible conclusion is that POWERCHINA attempted to reduce its exposure to non-core real-estate resources and strengthen its strategic focus on power infrastructure and clean-energy-related businesses.

The resource-structuring effects were mixed from a performance perspective. POWERCHINA's R&D investment ratio remained relatively stable at a comparatively high level, whereas its environmental-protection investment ratio fluctuated within a narrow range. The employee-compensation ratio remained generally stable, while reported work-safety expenditure increased. These indicators suggest that the company maintained its investment in technological development and employee protection, but they do not demonstrate a significant expansion of environmental-protection expenditure or establish a direct improvement in employee satisfaction. In addition, the deterioration in the current ratio and the increase in leverage indicate greater financial pressure during the period. However, this pressure should not be attributed solely to the payment of transaction consideration, because the cash difference in the asset swap was settled by POWERCHINA Group rather than by the listed company. The changes in financial risk may also have reflected post-transaction capital expenditure, long project cycles, working-capital requirements, and the company's financing structure.

Second, during the resource-bundling stage, POWERCHINA strengthened the integration of organizational and operational resources. The company reduced the number of subsidiaries, streamlined management levels, and promoted the integration of regional and international business platforms. These measures helped reduce organizational fragmentation and facilitated coordination among design, construction, investment, and operation activities.

The company's new-energy operating scale expanded considerably during the observation period. Non-nuclear new-energy installed capacity increased from 7.7361 million kW in 2021 to 10.368 million kW in 2022 and further to 27.35 million kW in 2025. Clean-energy electricity generation increased from 36.713 billion kWh in 2021 to 62.984 billion kWh in 2025. These changes are consistent with an improvement in the scale and utilization of green-energy resources. Nevertheless, they do not by themselves prove that the growth was caused entirely by the asset swap, because the expansion was also affected by pre-existing investment plans, government policies, market demand, and subsequent capital expenditures.

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

The conversion of green resources into operating and financial results remained incomplete. Although the inventory turnover ratio increased substantially, changes in the presentation of contract-related balances following the implementation of the new revenue-recognition standard may have affected the comparability of this indicator. Meanwhile, total asset turnover declined after 2023, and the proportion of revenue generated by the new-energy business remained relatively low. These findings suggest that the expansion of new-energy assets and operating capabilities proceeded faster than the conversion of those resources into revenue and cash flow. The available evidence therefore supports the conclusion that resource bundling improved operational capacity, but that the monetization of this capacity continued to lag.

Third, during the resource-leveraging stage, POWERCHINA achieved relatively strong results in green innovation and reported environmental outputs. The number of green patents granted increased from 482 in 2019 to 2,594 in 2022 and reached 3,193 in 2024, remaining at 2,949 in 2025. Reported carbon-emission reductions from clean-energy projects increased from 18.2206 million tonnes of CO_2 in 2019 to 37.6657 million tonnes in 2025. The number of reported green engineering projects also increased through 2024 and remained relatively high in 2025 . These changes indicate that POWERCHINA's green innovation and environmental-output capacity expanded during the observation period.

However, the increase in green patents and environmental outputs cannot be attributed exclusively to the 2022 transaction. Part of the growth had already begun before the asset swap and was also influenced by earlier R&D investment, existing technical personnel, national green-development policies, and the company's continuing investment in clean-energy projects. The appropriate conclusion is therefore that the transaction was consistent with, and may have supported, the company's green innovation and environmental-development trajectory, rather than that it was the sole cause of these improvements.

The financial performance results were mixed. Return on equity increased from 7.89% in 2021 to 9.95% in 2022 and remained at 9.54% in 2023, but declined to 8.14% in 2024 and 6.40% in 2025. Earnings per share also increased during the initial post-transaction period before declining in 2025. This pattern indicates that the transaction and the associated expansion of clean-energy activities may have generated short-term strategic and financial benefits, but the company has not yet established a stable and sustainable profitability advantage. The continuing expansion of assets, depreciation and amortization, financing costs, and competitive pressure in the engineering-construction industry may have weakened the conversion of green capabilities into financial returns.

Overall, POWERCHINA's 2022 transaction achieved a strategic reorientation of its resource portfolio and coincided with improvements in green-energy deployment, green innovation, and reported environmental outputs. However, its financial consequences were mixed. The company's green-resource base expanded substantially, while the conversion of those resources into stable revenue, operating cash flow, and long-term profitability remained incomplete. Therefore, it is more accurate to describe the transaction as the reallocation of real-estate-related resources toward power-grid ancillary and clean-energy-related businesses than simply as "exchanging real estate for green power." The transaction demonstrated significant strategic value, but its long-term financial value-creation effects have not yet been fully realized.

5.2. Research Implications

First, enterprises should design green-oriented asset restructurings on the basis of strategic fit, asset quality, and financial sustainability. In related-party asset swaps under common control, firms should conduct comprehensive due diligence on the profitability, cash-flow quality, debt obligations, environmental liabilities, and future capital requirements of both the transferred and acquired assets. Independent appraisal, fair pricing, transparent information disclosure,

ISSN: 2692-7608 DOI: 10.6981/FEM.202611_7(11).0001

and clearly defined performance commitments are particularly important for reducing concerns about improper benefit transfers and asset-quality asymmetry. At the same time, financial analysis should distinguish between the transaction consideration, post-transaction capital expenditure, working-capital occupation, and changes in the consolidated financing structure. The fact that the cash difference was settled by the controlling shareholder does not eliminate the listed company's subsequent liquidity and leverage risks.

Second, enterprises should strengthen resource bundling and the conversion of green capabilities into operating cash flow. Organizational integration should not be limited to reducing subsidiaries or streamlining management levels. It should also include the integration of project-management systems, technical standards, procurement platforms, financial information, customer resources, and regional operating capabilities. After an asset restructuring, enterprises should monitor not only installed capacity and electricity generation, but also new-energy revenue, operating cash flow, accounts receivable, subsidy-recovery periods, contract assets, inventory turnover, and total asset turnover. For projects with high credit or collection risks, enterprises may adopt differentiated credit policies, advance-payment arrangements, factoring, and asset securitization, subject to appropriate legal and financial-risk assessments. They should also participate prudently in green-power trading and green-certificate trading to reduce excessive dependence on subsidy income.

Third, enterprises should shift the focus of resource leveraging from scale expansion to quality and value creation. Green-energy projects should be evaluated using project-level indicators such as net present value, return on invested capital, economic value added, and weighted average cost of capita. Investment decisions should consider not only the growth of installed capacity and the number of green patents, but also the commercialization of technological achievements, incremental revenue, operating cash flow, carbon-reduction efficiency, and the long-term contribution of each project to enterprise value. Where environmental-protection investment remains stable but does not increase in line with business expansion, enterprises should direct additional resources toward energy-efficiency improvements, pollution control, ecological restoration, and low-carbon construction technologies. This approach would help the company move from extensive growth based on asset expansion toward selective growth based on profitability and value creation.

Finally, the conclusions of this study should be interpreted with appropriate caution. This is a single-case study based primarily on publicly disclosed data and a before-and-after comparison. It does not establish a counterfactual scenario or fully separate the effects of the asset swap from those of national policy, market conditions, pre-existing investments, and subsequent financing decisions. In addition, differences in accounting classifications and disclosure standards may affect the comparability of some indicators, particularly inventory, contract assets, and environmental-performance measures. The present analysis therefore focuses on individual-indicator trends rather than claiming a comprehensive performance score. If principal component analysis and the entropy-weighting method are retained, the paper should provide the indicator system, data normalization process, weighting procedure, and composite scores in detail. Otherwise, the relevant statement should be removed and the analysis should be described as a descriptive indicator-based evaluation.

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