On Financial Management of Construction Enterprises in New Energy Power Generation Projects

Qinglin Zheng
Libao (Sichuan) Construction Engineering Co., Ltd., Chengdu, Sichuan, China

Abstract: In recent years, the rapid expansion of new energy power generation projects has witnessed numerous construction enterprises actively engaging in their construction. This paper examines the unique attributes of new energy power generation endeavors alongside the financial management challenges confronted by construction enterprises—such as cash flow mismatch, difficulties in cost control, and elevated financial risks. Building upon this analysis, it proposes strategic measures: enhancing capital control through the establishment of multi-tiered financing frameworks; advancing the business-finance integration by constructing intelligent, end-to-end management platforms; and augmenting value creation capabilities via comprehensive life-cycle value management systems. These strategies aim to refine financial governance, bolster project profitability, and foster the sustainable progression of construction entities within the new energy sector.

Keywords: New Energy Power Generation; Construction Enterprises; Financial Management; Capital Control; Business-Finance Integration

1. Introduction

1.1 Background of the New Energy Power Generation Industry

At present, in a determined effort to implement the nation's new energy security strategy, optimize the energy structure, and strive for early achievement of the "carbon peak" and "carbon neutrality" targets, China has vigorously promoted the large-scale and high-quality development of renewable energy sources. New energy power generation encompasses hydropower, wind power, biomass power, solar power, geothermal energy, and ocean energy.

According to data released by the National Energy Administration, by the third quarter of 2025, the nationwide installed capacity of new energy power generation reached 2.198 billion kilowatts, marking a 27% year-over-year increase and accounting for approximately 59.1% of the country's total installed power capacity (see Table 1). The cumulative growth of new energy power generation capacity from 2021 to the third quarter of 2025 is detailed in Table 1 and illustrated in Figure 1:

Table 1. Cumulative Installed Capacity of New Energy Power Generation from 2021 to Q3 2025

Indicator (Unit: 100 million kW)	2021	2022	2023	2024	Q1, Q2 and Q3 2025
Cumulative Installed Capacity	10.63	12.12	15.16	18.90	21.99
Of which: Hydropower (including pumped storage)	3.91	4.13	4.22	4.36	4.43
Of which: Wind Power	3.28	3.65	4.41	5.21	5.82
Of which: Solar Power	3.06	3.93	6.09	8.87	11.27
Of which: Biomass Power	0.3798	0.4132	0.44	0.46	0.47
Proportion of Total Installed Power	44.80%	47.30%	52%	56.40%	59.10%

The rapid surge in total installed capacity of new energy power generation is driven by continuous investments in new energy projects. In 2023 and 2024 alone, newly installed capacities reached 305 million kW and 375 million kW respectively, corresponding to an aggregate construction scale exceeding 3.5 trillion yuan, with the cumulative industry-wide construction scale surpassing 12 trillion yuan. Through years of concentrated growth, the construction sector for new energy power generation projects has evolved into a diversified landscape characterized by a leading role of state-backed entities, collaboration from private enterprises, and participation by foreign investors. Among them, China Power

Construction and China Energy Engineering stand out as the industry's "dual champions", leveraging their integrated industrial chain capabilities alongside capital and technical advantages to dominate the market. Private enterprises such as Tebian Electric Apparatus and Goldwind excel in specialized segments, while traditional state-owned power giants like State Power Investment Corporation and Huaneng are accelerating their transformation, becoming pivotal forces in new energy project construction. Moreover, as investments in real estate and infrastructure decelerate, a considerable number of construction enterprises are actively redirecting their efforts toward new energy power construction. Consequently, the new energy power project construction arena is becoming intensely competitive, akin to a fierce "red ocean".

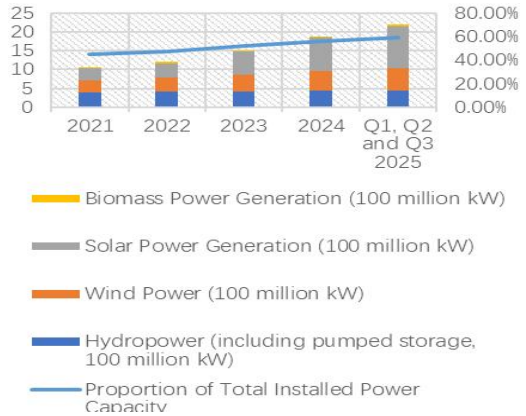

Figure 1. Growth Chart of Cumulative Installed Capacity of New Energy Power Generation from 2021 to Q3 2025

1.2 The Significance and Distinctiveness of Financial Management for New Energy Power Generation Project Construction Enterprises

In contrast to the well-established construction methodologies prevalent in conventional engineering projects—particularly residential buildings and municipal infrastructure—the construction of new energy power generation projects exhibits several unique characteristics: (1) The pre-construction phase entails comprehensive data observation, site selection, and regulatory approvals, accompanied by protracted application cycles and substantial upfront capital investment [1]; (2) The grid connection points in new energy projects constitute rigid constraints, rendering construction schedules exceptionally stringent once full-scale implementation commences; (3) These projects are frequently situated in remote areas such as deserts, plateaus, and offshore sites, characterized by dispersed locations lacking mature supporting infrastructure [2]. Consequently, modular and prefabricated construction techniques are employed—for instance, photovoltaic panels are preassembled in factories, requiring only on-site installation and linkage, while wind turbine towers are transported in sections and assembled with bolted joints at the site; (4) The essence of new energy power generation construction lies in integrating equipment into a fully operational power-generating system, with core technical complexities centered around equipment compatibility, electrical integration, and intelligent control systems [3], indicating a high degree of technological intensiveness.

Such distinctive features impose novel challenges on the financial management of construction enterprises engaged in new energy projects, chiefly: (1) Capital control is complicated by heavy initial sunk costs, concentrated mid-term expenditures, and protracted receivables, resulting in severe cash flow mismatches and substantial difficulties in maintaining cash flow balance; (2) Cost control and accounting are rendered complex due to significant technological investments, a high proportion of expensive equipment, and geographically dispersed cost structures, increasing the dimensions of cost control and elevating the risk of budget deviations [3]; (3) Financial risk management is challenged by the volatility of industry policies related to grid integration, consumption mechanisms, and pricing systems, compounded by supply chain fluctuations and rapid technological iterations [4], dispersing risk points and rendering their impacts direct and significant.

1.3 Research Objectives and Significance

Grounded in the perspective of construction enterprises and cognizant of the distinctive attributes inherent to new energy power generation projects, this paper delineates the key focal points and essential aspects of financial management specific to construction enterprises operating within this sector. It endeavors to refine and optimize financial management strategies tailored to these enterprises, with the ultimate aim of enhancing capital utilization efficiency and elevating project profitability. Through these

advancements, the study aspires to foster the sustainable development and long-term viability of construction entities engaged in new energy power generation projects.

2. Current Status Analysis of Financial Management in New Energy Power Generation Project Construction Enterprises

2.1 The Unique Challenges Faced by Financial Management in New Energy Power Generation Project Construction Enterprises

2.1.1 The Substantial Difficulty in Achieving Cash Flow Equilibrium and Managing Capital

New energy power generation projects demand significant upfront capital commitment; mid-term pressures concentrate on equipment procurement funds, complicating payment scheduling; and delayed receivables prolong the capital recovery cycle, with elevated financing costs detrimentally impacting project profitability.

In the pre-construction phase, expenditures encompass data monitoring fees (including wind speed and solar irradiance equipment rental and data acquisition), site investigation costs (topographical surveys, ecological assessments), and regulatory application expenses (environmental impact assessments, energy evaluation, grid connectivity applications), which collectively constitute approximately 3% to 8% of total project investment. The application process typically extends between six to eighteen months, during which the investor lacks the requisite regulatory approvals to robustly advance internal project initiation and funding. Consequently, it is common practice in the market to secure these costs through contractor deposits or require construction enterprises to prepay such funds, which are subsequently incorporated into the overall contract amount. For instance, a 100 MW photovoltaic project entails an upfront investment near 20 million yuan; advancing multiple projects concurrently may precipitate cumulative capital lock-up amounting to several hundred million yuan.

Upon commencement of full-scale construction, stringent timelines render schedule adherence paramount. To ensure punctuality, procurement of critical components—including photovoltaic modules, wind turbines, and inverters—is often secured in advance, representing over 60% of total project costs. Equipment suppliers usually mandate a prepayment of no less than 30% of the purchase price, concentrating financial outlays within the mid-term construction phase. However, as these payments occur prior to accrued project settlements, a pronounced cash flow deficit frequently emerges—characterized by "high expenditures, minimal immediate returns".

Because project capital is ultimately recuperated exclusively through progressive construction payments, and with no operating cash inflows during preliminary stages, insufficient reserves within construction enterprises expose them to cash flow interruptions across the "initial investment – mid-term construction – final receivable" timeline. Additionally, the typical remoteness of project sites exacerbates these challenges; limited or absent banking infrastructure in remote areas impedes payment processing and settlement, further complicating effective capital control.

2.1.2 Challenges in Cost Control and Complexity in Financial Accounting

The initial expenditures of new energy power generation projects encompass a variety of detailed categories—such as surveys, regulatory applications, and deposits—often resulting in blurred cost categorization and frequent budget overruns. Furthermore, pre-construction expenses vary significantly between projects, rendering comparability difficult and impeding the establishment of effective budgetary control benchmarks during practical implementation. Typically situated in remote areas such as deserts, plateaus, or offshore locations, these projects incur disparate increments in multiple cost areas, including temporary facilities, transportation, and equipment maintenance, thereby complicating strict adherence to project budgets. The imperative of meeting tight grid connection deadlines compels accelerated construction tactics—elevating labor expenses, equipment rental fees, and material wastage through expanded work crews, extended working hours, and the hiring of premium machinery. Such rush-related costs frequently exceed pre-approved budgets. Additionally, failures during the commissioning and trial operation phases of installed equipment can generate costly rework and corrective expenditures.

Given the technically intensive nature of new

energy power generation projects, core assets—namely wind turbines, photovoltaic modules, and energy storage systems—constitute over 60% of total costs [5]. Construction enterprises must allocate substantial resources towards research and development as well as technological investments to guarantee the project's successful delivery. This necessitates a clear delineation of criteria for capitalizing R&D expenses and the separate accounting of technical services and personnel remuneration. Meanwhile, technological investments, including software and equipment, must be apportioned according to beneficiary projects, taking into account factors such as expected lifespan and project scale, thereby distributing cost burdens equitably and mitigating financial pressure on individual projects. Ultimately, these measures serve to achieve precise and transparent cost accounting that faithfully reflects the true returns of the project.

2.1.3 Rapid Technological Advancements and Frequent Policy Changes Complicate Financial Risk Management

On one hand, the pivotal equipment in new energy power generation projects undergoes swift technological evolution [6]; protracted construction timelines or erroneous technology selections may render procured assets technologically obsolete, precipitating asset impairment losses. On the other hand, the sector is subject to frequent and significant policy fluctuations, where grid connection milestones and subsidy eligibility are intricately linked to strict deadlines and generation targets. Contracts often stipulate substantial penalties or indemnities for delays or lost generation opportunities—such as missing optimal power-producing periods. These factors collectively disperse financial risk across multiple facets of the project, amplifying their direct and profound impact on the financial stability of new energy power construction undertakings.

2.2 Overview of the Current Financial Management Status and Existing Issues in New Energy Power Generation Construction Enterprises

2.2.1 Substantial and Prolonged Capital Occupancy Amid Financing Challenges

The distinctive financial pattern of new energy power generation projects—characterized by heavy upfront capital outlays, concentrated mid-phase payments, and protracted receivables in later stages—often places immense strain on the capital chain of construction enterprises. Concurrently, tightening credit conditions within the financial sector have exacerbated the difficulties in securing adequate financing for these enterprises. Except for a limited number of fully state-owned enterprises able to obtain sufficient funds at market-aligned costs, the majority, particularly private enterprises, struggle to access timely and adequate capital. This predicament primarily stems from stringent collateral requirements, restrictive loan quotas, and prolonged approval processes imposed on private entities, while financing costs remain exorbitant. Statistics reveal that at least 30% of small and medium-sized private construction enterprises engaged in new energy projects confront capital chain risks, with poor cash flow management often culminating in project stagnation.

2.2.2 Imperfect Budgeting Systems Hinder Refined Financial Control

Construction enterprises in the new energy sector predominantly operate under rudimentary budgeting frameworks, resulting in final expenditures deviating from budgeted figures by 15% to 20%, thereby intensifying capital management risks. Additional costs related to remote site conditions—such as temporary facilities, long-distance logistics, and special allowances—often surpass 5% of total expenses, further complicating cost control efforts. An excessive focus on short-term financial metrics, coupled with the neglect of comprehensive economic evaluations regarding equipment selection and technological pathways, frequently leads to escalated project costs. Moreover, lagging financial informatization and the disconnect between operational and financial departments render the financial management systems inadequate for supporting the inherently complex, high-technology, high-investment, and high-risk nature of new energy construction enterprises [7,8].

3. Optimization Strategies for Financial Management of Construction Enterprises in New Energy Power Generation Projects

3.1 Strengthening Capital Control and Establishing a Multi-Tiered Financing Framework

In response to the unique capital demands of new energy power generation construction

enterprises, stringent financial control mechanisms must be instituted. Enterprises should cultivate a project-level capital self-balancing system with granular monthly controls to ensure the efficient deployment of funds, while reserving a contingency pool amounting to 5%-10% to address unforeseen exigencies. Concurrently, a diversified, multi-layered financing architecture should be developed, leveraging various funding instruments including operational credit lines, mortgage-backed loans, trust financing, and factoring. Of particular significance is the strategic utilization of supply chain finance vigorously promoted by financial institutions, enabling enterprises to promptly secure funding through upstream and downstream partnerships, thereby mitigating overall financing costs and enhancing financial resilience.

3.2 Advancing the Business-Finance Integration through an Intelligent, End-to-End Management Platform

Construction enterprises in the new energy sector ought to unify business processes, capital flows, and information streams by developing a comprehensive financial information system spanning the entire project lifecycle. This system should break down data silos across design, procurement, construction, and commissioning phases to realize the bidirectional transformation of operational and financial data—enabling "financialization of business data" and "business validation of financial data". By establishing real-time monitoring of cash flow and schedule synchrony, the platform can proactively flag cost anomalies. Furthermore, leveraging technological empowerment—such as deploying drones for topographic surveys and applying artificial intelligence for design optimization—and increasing modular, factory-prefabricated construction to minimize onsite labor and reduce expenses in remote areas [9], complemented by meticulous end-to-end management, will significantly enhance risk mitigation and elevate management efficiency.

3.3 Enhancing Value Creation Capabilities through Comprehensive Life-Cycle Value Management

Financial management within new energy power construction entities should transition from a narrow focus on short-term project profitability toward embracing the comprehensive total value of projects [10]. This entails active participation in decisions throughout the project's entire life cycle, particularly providing detailed and reliable economic analyses during critical phases such as equipment selection and technological pathway determination. Moving beyond isolated project oversight toward managing value along the entire industry chain, enterprises must integrate capital, technology, and human resources to establish a life-cycle value management framework that optimizes sustained value creation.

4. Conclusion and Prospects

With ongoing technological advancements and managerial innovations, the financial management of construction enterprises in the new energy power generation sector is poised to evolve from a posture of passive response to one of proactive leadership. By harnessing digital intelligence, these enterprises will achieve profound business-finance integration [11], forging a more resilient and innovative financial system that robustly underpins their operations. Amidst the sweeping tide of the "dual carbon" strategy and the broader energy revolution, only those construction enterprises that actively embrace transformation—establishing a novel financial management paradigm characterized by technological empowerment, policy adaptability, diversified financing, and precise control—will thrive amid fierce market competition. Ultimately, they will emerge as pivotal pillars driving China's energy transition and sustainable green development.

References

[1] Liu Che. Risk Assessment Study of Onshore Wind Power Construction Projects Based on the Whole Project Process. Yunnan University, 2023.
[2] Wang Yu. Risk Management Study of SN Electric Power Group's New Energy Power Generation Projects. Xi'an University of Technology, 2024.
[3] Zhan Chao. Research on Cost Control Strategies and Efficiency Improvement of Large Construction-type Energy Enterprises. Enterprise Management, 2025(6): 226-228.
[4] Ruan Jian. Discussion on the Role of Balanced Scorecard in Financial Management of Energy Construction

Enterprises. Modern Economic Information, 2025(3): 142-143.
[5] Zhou Yue, Liu Jia. Research on Enterprise Cost Control under Comprehensive Budget Management. China Collective Economy, 2023(3): 51-53.
[6] Li Pei. Exploration of Engineering Construction and Control Strategies of New Energy Power Generation Projects. China Plant Engineering, 2025(05): 245-247.
[7] Wei Yiran. Financial Competitiveness Evaluation of S New Energy Power Generation Enterprise Based on Sustainable Development. North China Electric Power University, 2022.
[8] Li Yiming. Financial Risk Early Warning Study of Construction Enterprises Based on Factor Analysis Method. Bohai Economic Outlook - Industrial Economy, 2024(3): 65-67.
[9] Yin Xiaohu. Analysis of New Energy Engineering Construction Technology and Its Development Trend. Construction Technology, 2024(3): 129-131.
[10] Ma Li. Analysis on the Impact of Changes in Financial Management Functions to Enterprise Value. Journal of Shaanxi Administrative Institute, 2015(1).
[11] Rui Wenyao. Research on the Optimization of Business-Finance Integration Management of New Energy Power Generation Enterprise YN under Digital Intelligence Empowerment. Yunnan University, 2024.

