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Audit Recommendations for Final Accounts of Photovoltaic Power Generation Projects

Jigang Jia*

CHD Power Plant Operation Co., Ltd., Beijing 100031, China

***Corresponding author:** Jigang Jia, jjig.526@163.com

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Abstract: With the continuous adjustment of the energy structure, photovoltaic (PV) power generation projects are increasing, playing a crucial role in promoting the application of clean energy. However, the current audit of completed final accounts for photovoltaic power generation projects faces many challenges, such as incomplete institutional processes, scattered archive management materials, inadequate digital intelligence systems, and insufficient analysis of final account amounts. Based on this, this article aims to deeply analyze these issues and propose targeted audit suggestions to standardize the construction and audit work of photovoltaic power generation projects and promote the sustainable and healthy development of the photovoltaic power generation business.

Keywords: Photovoltaic power generation engineering; Audit of completion final accounts; Project management; Audit strategy

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1. Introduction

In the current era of pursuing green and sustainable development, photovoltaic power generation, as a clean and renewable energy utilization method, has shown a steady growth in the number of its engineering projects. The audit of completed final accounts for photovoltaic power generation projects is crucial, as it is closely related to the two key aspects of the completion of financial final accounts and asset accounting management [1]. However, in practical operations, there are often delays in the completion of financial final accounts and asset accounting, which significantly reduce the timeliness of financial information and prevent it from accurately reflecting the true financial status of the project on time. Additionally, the accuracy of the completion financial final account value is difficult to guarantee, and deviations can easily occur, affecting the subsequent evaluation and related decision-making of the entire project. If these risks are not effectively controlled, they will not only be detrimental to the good operation of the project itself but will also hinder the overall healthy development of the photovoltaic power generation business. Therefore, it is of great practical significance to strengthen research on the audit of the completion of final accounts for photovoltaic power generation projects and explore effective solution strategies.

2. Current status and trends of the photovoltaic industry in 2024

2.1. Fierce competition and price bottoming out in the photovoltaic industry

In 2024, the domestic photovoltaic industry has entered a stage of intense competition, with the level of competitiveness becoming evident. Observing from the key perspective of bidding and winning bid data, there has been a significant decrease of 56% in the cumulative bidding volume compared to the same period last year. In contrast, the cumulative winning bid volume has increased sharply by 87% year-on-year. This decrease and increase in data vividly outline the tense situation where many companies are fiercely competing for a "place" in the limited market share. This situation reflects the current market prices that are in a trend of continuous exploration and gradual bottoming out [2]. Such changes in the market environment have also raised new requirements for the audit of the completion of final accounts of photovoltaic power generation projects. For example, more precise control over the impact of price fluctuations is needed in cost accounting to ensure that audit results align with actual market conditions.

2.2. Increasing ground-based proportion and steady development of distributed PV

From 2011 to 2020, the global installed capacity of new photovoltaic power showed an upward trend (**Figure 1**). In the context of such industry development, notable changes have emerged in the proportion of photovoltaic power station types in the first quarter of 2024. Specifically, the newly installed capacity of ground-based power stations reached 21.93 GW, accounting for 47.9% of the total newly installed capacity in the current quarter. Commercial and industrial distributed PV and household distributed PV achieved newly installed capacities of 6.92 GW and 16.89 GW, respectively. With the decline in photovoltaic module prices, the proportion of ground-based power stations has further increased, now approaching 50%, showing a good development momentum. At the same time, distributed photovoltaic power has maintained a relatively stable development trend. The two complement each other and have jointly become important forces driving the continuous expansion of China's photovoltaic installed capacity. In auditing, changes in the proportion of different types of power stations mean that there will be differences in corresponding project construction models and cost structures. Auditors need to review the final accounts of each project in a targeted manner to ensure the comprehensiveness and accuracy of the audit [3].

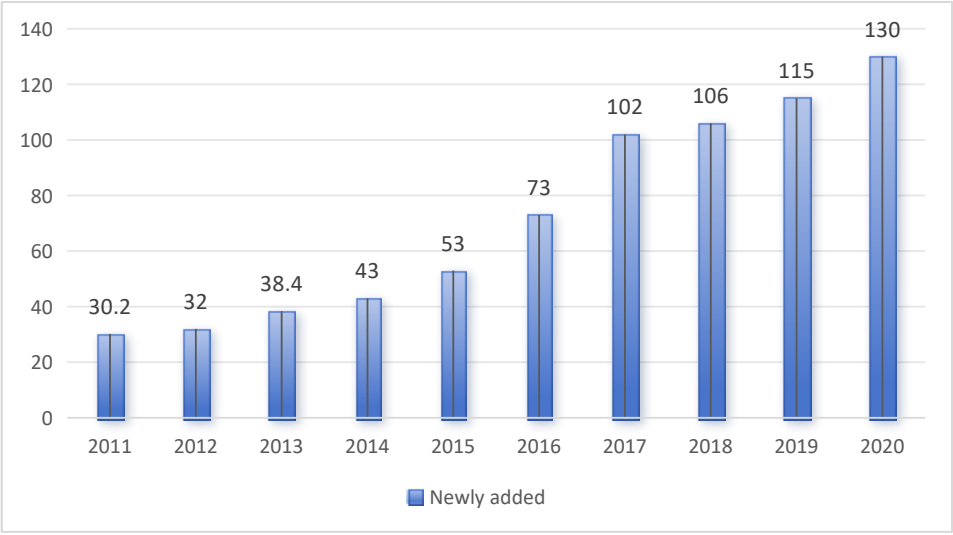

Figure 1. Global newly installed photovoltaic capacity from 2011 to 2020 (Unit in GW) (data source: China Photovoltaic Industry Association (CPIA), April 2021)

As of March 2024, distributed photovoltaic (PV) installations accounted for 42.6% of the total PV installed capacity in China. It is worth noting that in many provinces, the proportion of distributed generation has surpassed that of centralized generation, highlighting the significant role of distributed PV in China's PV industry layout. However, the entry of distributed PV into the market has not been smooth, facing various disturbing factors. For instance, distributed PV projects in some regions encounter uncertainties in grid connection and subsidy policy implementation. These intertwined factors have caused market demand to stagnate in the short term, hindering the rapid development of distributed PV and becoming one of the critical factors restricting its growth rate. For completion of final accounting audits, these uncertainties increase audit complexity, requiring auditors to carefully sort out various situations and assess their impact on project costs and benefits to avoid audit deviations due to external factors.

With the steady increase in China's PV installed capacity, its share in the country's energy mix has also shown a positive upward trend, rising from 3% in 2020 to 6.2% in 2023. Based on current trends, this share is expected to reach 9.5% in 2024. However, as the proportion of PV installations increases, the volatile nature of PV power generation increasingly affects the grid, leading to growing pressure on grid integration and consumption. In the short term, this pressure may hinder the grid connection of PV projects, becoming a key issue that needs attention and active resolution in China's PV industry development. From the perspective of completing final accounting audits, it is necessary to focus on the impact of grid-related issues on project investment returns and subsequent operation and maintenance costs and include them in the audit considerations to ensure that audits provide a valid basis for projects to address such challenges.

2.3. Recent installation status and future development of China's photovoltaic industry

From January to May 2024, China's photovoltaic industry showed strong development momentum, with newly installed capacity reaching 79.15 GW, representing a significant year-on-year increase of 29.3%. Based on the current development trend, it is reasonably estimated that the nationwide newly installed capacity in 2024 will reach 240 GW, an increase of 11% compared to the previous year. Furthermore, looking ahead to 2025, China's photovoltaic installed capacity is expected to further increase to 260 GW, with a year-on-year growth rate of 8%. These data fully indicate that China's photovoltaic industry will maintain a high development speed in the coming period, continuously contributing to the optimization and transformation of China's energy structure and playing a key role in promoting the green and sustainable development of China's energy sector. In the face of rapid industrial development, the audit process for completion of final accounting should continuously optimize audit procedures and methods, proactively addressing audit pressures arising from scale expansion and project increases, to facilitate the healthy and orderly development of the photovoltaic industry.

3. Problems in the final accounting management of photovoltaic power generation projects

3.1. Inadequate system and processes

Photovoltaic power generation projects involve multiple stages and numerous participants. From project planning, and construction to acceptance, a clear, rigorous, and comprehensive system and process are needed to provide guidance. However, some photovoltaic power generation projects currently have significant shortcomings in system development, and the process setup is not reasonable enough. For example, in the project cost accounting process, the criteria for listing some special expenses are not clear enough, leading to inconsistent accounting

standards across different projects. In the project change approval process, the procedures are cumbersome and lack timeliness requirements, making it impossible to process some necessary changes on time. This affects project progress and brings difficulties to the completion final accounting audit because irregular changes may make it difficult to trace and verify related cost changes during the audit.

3.2. Decentralized project archive management

Project archive management materials are an important basis for the completion of final accounting audits, and their completeness and accessibility directly affect audit efficiency and quality. In photovoltaic power generation projects, the problem of decentralized archive materials is prominent. Due to the long construction period and the involvement of multiple units, there is a lack of unified coordination in the process of data collection, organization, and archiving, resulting in materials being stored in different departments or even different locations. When auditing data, completion final accounting auditors often need to spend a lot of time and effort searching for information from multiple sources, which seriously affects audit efficiency. Especially in the current context of numerous fixed asset investment projects and relatively few auditors, this decentralized information situation further exacerbates the tension of audit resources and becomes one of the important factors restricting the efficient implementation of the completion of final accounting audits.

3.3. Inadequate digital intelligence system

With the rapid development of information technology, digital intelligence systems have become increasingly important in project management and audit work. However, in the field of photovoltaic power generation projects, there are still many deficiencies in the construction of corresponding digital intelligence systems. On the one hand, some projects lack effective data connectivity and collaboration between their financial management systems and project construction management systems. This results in a failure to synchronize and update financial data with actual project construction progress data in real-time, making it difficult to obtain accurate and complete real-time data for comparative analysis during the completion final accounting audit. On the other hand, the data analysis function is relatively weak, unable to conduct deep mining and analysis of massive project data. It is difficult for the system to automatically identify potential audit risk points, such as deficiencies in cost overrun warnings and abnormal expense change monitoring, which increases the workload and difficulty of manual audits.

3.4. Inaccurate final accounting amount and insufficient analysis of differences between final accounting and approved estimates

The accuracy of the completion final accounting amount of photovoltaic power generation projects is crucial for accurately measuring project investment benefits and properly recording assets. In practical work, there are often cases of inaccurate final accounting amount calculations. For example, in the equipment procurement process of some projects, due to failures to timely adjust contract prices in response to market price fluctuations or errors in engineering quantity measurements, the final accounting amount may deviate from the actual situation. Simultaneously, the analysis of differences between the final accounting amount and the approved estimates is not thorough or detailed enough. Often, it only involves a simple comparison of numerical differences, lacking an in-depth examination of the reasons for these differences from the perspective of the entire project construction process. For instance, whether the differences are caused by design changes, adjustments to construction techniques, or force majeure factors is not fully explored. This makes it impossible to learn from these differences,

which is not conducive to cost control and budget management for subsequent projects.

4. Audit strategy for completion of final accounting of photovoltaic power generation projects

4.1. Optimizing the entire process of construction management for photovoltaic power generation projects

In response to the many issues identified during audits, it is highly significant to propose a series of practical measures to optimize the entire process of construction management for later-stage photovoltaic power generation projects. This not only helps to further enhance the scientific decision-making and management level of investment projects but also effectively improves asset utilization efficiency and investment returns. For example, in the early project planning stage, the depth and breadth of feasibility studies should be strengthened, fully considering the impact of various potential factors on project costs and benefits to develop more reasonable and accurate estimates. During the construction process, strict control over project change approval should be implemented, clarifying the necessary conditions for changes, the approval process, and the impact evaluation mechanism on costs and schedules to ensure that changes are reasonable and traceable. Meanwhile, for project cost accounting, it is necessary to unify accounting standards, standardize the scope and calculation methods of various expenses, and avoid cost accounting confusion. It is worth noting that some special situations in practical operations may affect the authenticity of cost accounting. For instance, using surplus photovoltaic modules for other projects while still including their costs in the original photovoltaic power generation project cost leads to inaccuracies in project investment cost accounting.

4.2. Strengthening archives management for photovoltaic power generation projects

To address the issue of scattered archive management materials, it is imperative to reinforce archives management for photovoltaic power generation projects. Firstly, a unified archive management system should be established, clarifying the responsibilities and time nodes of each participant in the process of data collection, organization, and archiving to ensure timely and complete centralized management of materials. For example, it can be stipulated that after completing each key construction node, the construction unit needs to submit relevant materials to the archive management department specified by the construction unit within a prescribed time, while the supervision unit is responsible for reviewing the completeness and accuracy of the materials. Secondly, modern information technology means should be employed to build a digital archive management platform, enabling electronic storage and retrieval of archive materials.

4.3. Optimizing digital intelligence information systems

Optimizing digital intelligence information systems is crucial for improving the quality and efficiency of the completion of final accounting audits for photovoltaic power generation projects. On the one hand, it is necessary to break down the data barriers between the financial management system and the project construction management system and establish a data sharing and interaction mechanism, so that financial data can be updated in real time with the progress of the project construction. Simultaneously, various actual occurrence data during the project construction process can also be timely fed back into the financial system, ensuring that accurate, complete, and synchronized financial and business data can be obtained for comprehensive analysis during the completion final accounting audit. On the other hand, the data analysis function of the system should be strengthened, utilizing

techniques such as big data analysis and artificial intelligence to conduct real-time monitoring and deep mining of key indicator data such as project cost, schedule, and quality. By setting reasonable risk warning indicators like cost overrun ratios and schedule delay days, the system can automatically identify potential audit risk points and promptly alert auditors to focus on them, assisting auditors in carrying out audit work more efficiently and improving the accuracy and comprehensiveness of audits.

4.4. Comprehensive review of transaction payments surrounding project-related contracts

During the completion final accounting audit process, a comprehensive review of transaction payments related to project contracts is a critical step to ensure audit accuracy. Transaction payments must be carefully checked and cleared in strict accordance with financial regulations and the actual project situation. It is stipulated that the following expenses shall not be included in the project construction costs: expenses without invoices or with incomplete invoice items, expenses without approval procedures, expenses without the signature of the responsible person, and other expenses that should not be borne by the project. Auditors should carefully verify the payment basis, payment amount, and corresponding business content of each transaction payment based on the contract terms, ensuring that the payments are reasonable and compliant. For disputed or non-compliant transaction payments, auditors should conduct in-depth investigations to verify the reasons, make timely adjustments and handle them, and avoid falsely increasing or decreasing project construction costs, thus ensuring the accuracy of the completion final accounting amount and the reasonableness of asset accounting.

5. Conclusion and outlook

In summary, the completion of final accounting audit work for photovoltaic power generation projects faces many problems and challenges. However, by optimizing the entire process of project construction management, strengthening archive management, improving digital intelligence systems, and strictly reviewing transaction payments through a series of targeted audit strategies, the current situation can be effectively improved, and the quality and efficiency of completion final accounting audits can be enhanced, supporting the healthy and sustainable development of photovoltaic power generation projects. Nevertheless, with the continuous development of the photovoltaic power generation industry and the emergence of new technologies and situations, the completion of final accounting audit work also needs to keep pace with the times, continuously explore innovative audit methods and means, further enhance the adaptability and effectiveness of audits, to better serve the long-term development of photovoltaic power generation business and contribute to the prosperity of China's clean energy industry.

Disclosure statement

The author declares no conflict of interest.

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