Research on grid investment management system under transmission and distribution price reform

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Abstract. With the gradual deepening of transmission and distribution price reform, the production and operation, profit model and investment decisions of power grid companies have been greatly affected. As one of the most important operational activities of enterprises, the efficiency and management level of investment are related to the safety integrity of power grid assets and the ability to maintain and increase value. Based on policy and its influence on the electric power enterprise investment management, this paper puts forward the existing investment management under new electricity change form exposed problems, and puts forward corresponding strategies, in order to improve the efficiency of power grid enterprise investment management, the sustainable development of power grid enterprise, finally to the whole electric power industry reform and development to provide reference and enlightenment.

1. Introduction
After the transmission price reform, grid investment is included in the transmission and distribution price and subject to government regulation. The government will control grid investment on the premise of meeting basic power supply demand. For power grid enterprises, more attention will be paid to whether new investment can form effective assets. Therefore, based on the background of transmission and distribution price reform, power grid enterprises should further optimize the power grid investment management.

At present, many scholars at home and abroad have studied the power grid investment management [1-4]. Literature [5] analyzes the reasons why the cost of fixed assets in the whole cycle is difficult to control and introduces the concept of whole life cycle cost management of fixed assets, and put forward the suggestions of fixed asset cost management of power grid enterprise. Literature [6] analyzes the power system reform plan, studies the investment decision-making, investment execution and investment evaluation methods at home and abroad, and puts forward the investment strategy, operation concept transformation mode and new power system reform countermeasures for power grid enterprises.

This paper starts from the whole process closed-loop management of power grid enterprises' investment projects, including planning and early management, investment decision-making and project approval, plan management, project implementation, investment effect evaluation, investment supervision and assessment, etc., to construct the power grid enterprises' investment management system under the reform of transmission and distribution price.
2. The main influence of transmission and distribution price reform on investment management

2.1. The profit model has changed
The new round of electricity reform to a large extent broke the original pattern of interests, power generation enterprises, power grid enterprises, end customers will be affected to varying degrees. Among them, power grid enterprises suffer the biggest impact in this round of power reform. The implementation of the transmission and distribution price reform has changed the profit model of the power grid relying on the "purchase and sale price difference", and promoted the transformation of the power grid from profit-making unit to public utility unit.

2.2. The market monopoly was broken
A new round of electricity reform will completely break the grid enterprises a sole sales of electricity pattern. On the one hand, allow social capital to invest in incremental power distribution business; On the other hand, access to electricity selling companies is almost market-oriented, power generation companies and other social capital can set up power selling companies. In this context, a large amount of social capital will enter the electricity selling side, and the electricity selling business market will form a perfect competition pattern. In terms of power sales, although power grid companies have first-mover advantages, they also need to make efforts on business models and marketing channels to meet the challenges of latecomers.

2.3. Put forward higher requirement to investment management
Effective assets are the key factor to check and approve the permitted income. Only the assets that are included in the scope of effective assets can accrue the income and get the return and the operating cost compensation. Therefore, it is of great significance to enlarge and strengthen effective assets and the pricing model of "permitted cost plus reasonable income". On the one hand, the investment area of the main network is saturated, and the technical transformation of effective assets of the stock can extend the life of assets and give better play to asset benefits. On the other hand, make an issue of incremental effective assets, and realize accurate investment under the premise that the investment scale approved within power grid enterprises conforms to power planning.

3. Problems existing in investment management of power grid companies

3.1. Lack of scientific investment efficiency evaluation system
At present, the evaluation system of investment projects tends to focus on the planning effect, safety, reliability and other aspects. The feasibility study report of distribution network projects only focuses on the demonstration of the necessity and feasibility of the project, and lacks the demonstration of the investment benefit of the project. This extensive evaluation index is difficult to meet the various requirements in the development of power grid.

3.2. Technological innovation needs to be strengthened
Under the background of continuous development of science and technology, technological innovation is closely related to the development of enterprises, and the same is true for power grid enterprises. Therefore, a new round of power system reform and energy and power technology innovation will reshape the power industry system. Power grid enterprises must spontaneously promote technological innovation, strengthen technological innovation, research and development of new technologies to improve power grid functions, and promote the construction of energy Internet.

3.3. Traditional marketing model faces challenges
For a long time, the power grid enterprises sell electricity business in a monopoly position, this makes the grid enterprise is affected by ideas, causing widespread power marketing in the process of market development staff quality is low, competition consciousness is not high, means relatively backward and
old concepts in service and so on many issues, thus preventing electric power marketing market development. Under the new electricity reform, the electricity selling side market introduces the competition mechanism, which means that other electricity selling companies will enter the electricity selling side market to participate in the competition. The existing "buy and sell" model is also likely to become a thing of the past, and as users have more choices, the seller's market will become a buyer's market. Therefore, under the background of the new electricity reform, the traditional power marketing mode will be greatly challenged.

4. Network investment management system under transmission and distribution price reform

4.1. Planning and early management

Grid planning should be based on special planning, and overall balance of special planning. Company planning is the program of each unit's planning, and each unit's planning should implement the state grid corporation's planning. The planning cycle of power grid is generally 5 years, which corresponds to the five-year development plan of national economy, and the rolling optimization and adjustment of power grid planning are carried out. According to the planning results, establish the planning project database. Among them, large industrial projects with a high degree of marketization and influenced by economic situation and policy environment may not build planning project database. The planned project shall specify such information as the role of the project, construction scale, investment estimation and production period, etc., and shall be arranged according to the "priority" of the project.

The project feasibility study report is the basis for preparing the project (approval) application report. All units should select investment projects in the company's planning project database and carry out preliminary work. In principle, no preliminary work shall be carried out for projects not included in the planning database. The feasibility study report of the investment project shall include the necessity of the project construction, the construction place, the construction scale, the technical plan, the investment estimation, the economic evaluation, the financing plan and the letter of intent for loan of the financial institution, etc., and the letter of intent for investment shall be issued if other investors contribute capital. After the completion of the feasibility study and the approval of the company and the government (including approval and filing), the project will be transferred from the planning database to the storage database, and the storage database will be further optimized according to the preliminary situation. The project reserve shall be dynamically managed. For projects that have been included in the annual investment plan and have completed the project amount with investment, they shall be transferred out of the reserve project warehouse in time.

4.2. Investment decision and project approval

In the process of investment decision and project examination and approval, should take the initiative to meet the requirements of electricity price reform and external supervision and to consider both the government and society to the power supply and the reliability of the request, also want to the price of both companies invest in the construction and user to bear ability, reasonable investment scale and the new asset in the right proportion among various professional investment; We should attach importance to and refine the classification of projects, ensure that grid investment can be included in the range of effective assets for power transmission and distribution pricing, and actively promote grid investment to form effective assets.

4.3. Program management

Plan management refers to the optimization of project scheduling and the dynamic maintenance of warehousing projects. For the annual rolling plan and five-year plan, it is necessary to carry out in-depth research on the construction necessity and realization effect of projects one by one, attach importance to the establishment of project database, and strictly check the project entry. Sort in the project plan, combined with the company investment strategy classification grading principle, considering project investment, project effect to solve existing problems and improve the utilization efficiency of power
transmission and transformation equipment assets, project can optimize the space factors, further deepening and refining project classified, in order to facilitate the follow-up project of outbound investment decisions.

4.4. Project implementation
The company implements the examination and approval system of new construction plan for power grid infrastructure projects. For new and alternative projects incorporated into the comprehensive plan, each unit shall submit the application for starting up after implementing the starting conditions, and release the project starting up plan in batches after the examination and approval of the company. Construction may begin only after the new construction plan is given; No unit may start construction without authorization for a project that has not been given a new construction plan. For investment projects, project legal person responsibility system, capital system, bidding system, project supervision system and contract management system shall be implemented. According to the special investment plan for power grid infrastructure, the infrastructure department shall work out the construction schedule plan. Each unit shall be responsible for the specific construction management of the invested projects, and strengthen quality, investment, progress control and safety management. Upon completion of the project, it shall organize acceptance inspection in a timely manner and complete the contract signing and fee settlement of the unfinished items. Within half a year after the project is completed and put into operation, the final accounts of the project are completed and the assets are added in the same month.

4.5. Investment effect evaluation
Define the category of effective assets, maximize the historical cost base, improve the operation and maintenance level of equipment assets, strengthen the whole life cycle management of assets, and reduce the operation and maintenance cost; Attach importance to project investment effect and benefit evaluation; Solve the problems of power grid by the holistic view system, improve the comprehensive benefit of power grid investment and construction; Within the permitted cost framework of power transmission and distribution price approval, develop business control strategies such as investment and assets, make good cost planning, optimize cost structure and improve cost utilization efficiency. In order to optimize the investment structure, grasp the key points of investment, improve the investment efficiency and avoid the investment risk, the company implements the evaluation system for the investment effect of each unit.

4.6. Investment supervision and assessment
Power grid companies implement the evaluation mechanism of linking investment and benefit, and strengthen the input-output analysis of projects. The investment income of the newly added fixed assets should be linked to the assets operating targets of each unit in the next year to ensure the maintenance and increase of state-owned assets. After the equity investment project is put into operation, the investment income determined in the feasibility study report shall be included in the assessment of each unit's income index. Investment projects of power grid companies shall strictly implement audit system. Audit departments at all levels shall be responsible for the audit of investment projects within the scope of division of labor, and all units shall conscientiously correct and rectify the problems found, and major problems related to investment projects shall be reported to the authorities in time. Investment projects of power grid companies shall strictly implement the company's statistical system and monthly analysis system, and all units shall timely report the implementation of project investment plans on a regular basis. The company has gradually established an accountability system for investment decisions. For those who violate these provisions or decision-making procedures and cause great economic losses to the company, the relevant personnel will be investigated for responsibility except for criticizing the company.
5. Conclusions
Transmission and distribution price reform puts forward new requirements for the investment and development of power grid enterprises and has a far-reaching impact on the profit model and market monopoly of power grid enterprises. This paper analyzes the impacts of transmission and distribution price reform on investment management, studies the existing problems in the investment management of power grid companies, and puts forward the power grid investment management system in order to improve the management efficiency of power grid investment and help power grid enterprises to develop continuously.

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