Cost management and control in the context of new energy development

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Abstract. The development of new energy industry has become one of the important means to solve resource shortages and environmental problems. The development of new energy enterprises has received more and more attention. However, the International Energy Agency's research on international electricity demand in 2000-2030 shows that one of the main reasons hindering the development of new energy sources is the high cost of new energy, especially the high-tech solar energy and wind energy. The cost issue is the bottleneck for large-scale replacement of traditional energy by new energy sources.

1. Introduction
In recent years, the rapid development of China’s new energy has contributed more and more to the adjustment of energy structure. As of the end of 2017, the cumulative installed capacity of wind power has made it the third largest power source after coal power and hydropower. The cumulative installed capacity of photovoltaic power generation accounts for 15% of the total installed capacity of the country. In the first half of 2018, new energy sources maintained a rapid development momentum. While making great achievements in the development of new energy, it also needs to solve some problems: on the one hand, how to enhance the endogenous power of the new energy industry and enhance the competitiveness of the market; on the other hand, although the existing subsidy policy promotes the rapid development of the industry, it also faces difficulties in rising costs and increasing subsidy fund losses year by year.

2. Historical changes and future trends of China’s new energy costs
2.1. Changes in new energy generation cost
In recent years, China's wind power industry chain has gradually achieved localization, and the technical level and reliability of wind power equipment have been continuously improved. The overall cost of wind farms has been declining year by year.

Table 1. Wind cost from 2013 to 2017 in China

| Region          | 2013  | 2014  | 2015  | 2016  | 2017  |
|-----------------|-------|-------|-------|-------|-------|
| Central China   | 9062  | 9001  | 8241  | 7836  | 7533  |
| The northeast   | 8942  | 8852  | 8632  | 8201  | 7932  |
| The south       | 9654  | 9325  | 9125  | 8532  | 8123  |
| East China      | 9123  | 8765  | 8365  | 8251  | 8021  |
| The north China | 9023  | 8654  | 8457  | 8211  | 8023  |
From the perspective of regional differences, the average unit cost of wind power in the northern region is lower than that in the eastern and central regions. The main reasons are as follows: first, the difference is the construction condition. Wind power in the central and eastern regions is mainly built in mountainous areas and coastal areas, with poor geological conditions and transportation infrastructure. Wind turbine infrastructure and the road transportation cost is relatively high; the second is the difference in land cost, the land resources in the eastern region are tight, and the wind power land use index is difficult to obtain and the cost is high.

With the technological advancement of photovoltaic power generation, industrial upgrading and market scale expansion, the cost of photovoltaic power generation in China continues to decline. The cost of production is also declining.

Table 2. PV cost from 2013 to 2017 in China

| Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|
| The unit cost (RMB·kW⁻¹) | 21235 | 15623 | 10234 | 8562 | 7564 |

2.2. New energy future cost development trend

The future cost reduction of wind power projects will mainly depend on the decline of key equipment costs and non-technical costs. The former mainly relies on technological progress, while the latter mainly relies on land costs and taxes. The unit cost of photovoltaic power generation still has a large potential for decline in the near-term, mainly because the non-technical costs such as PV modules, inverters, land fees, taxes and fees are declining. Among them, the cost reduction of photovoltaic modules mainly depends on the decline of silicon material cost and the improvement of silicon utilization rate.

In order to facilitate comparison with the benchmark electricity price, the concept of leveling the cost of power generation is also often referred to as the cost of electricity. The leveling power generation cost refers to the comprehensive cost of the unit power generation generated by the power generation project during the whole operation period to the total power generation. The calculation formula is

$$LCOE = \frac{E_0 + \sum_{t=1}^{N} \frac{A_t}{(1+i)^t}}{\sum_{t=1}^{N} \frac{M_{t,el}}{(1+i)^t}}$$

LCOE is the leveling power generation cost; $A_t$ is the operating expenditure of the t-year; $E_0$ is the initial investment of the project; $i$ is the investment yield; $M_{t,el}$ is the power generation of the year; $n$ is the project life considered in the financial analysis; $t$ is the year in which the project was run (1, 2, 3, ..., n). The calculation results are shown in the following table:

Table 3. Wind and PV LCOE in China during year 2020

| Region          | Wind power | Photovoltaic power generation |
|-----------------|------------|-------------------------------|
| The north China | 0.35       | 0.45                          |
| The northeast   | 0.33       | 0.53                          |
| The northwest   | 0.31       | 0.42                          |
| Central China   | 0.46       | 0.68                          |
| The south       | 0.53       | 0.65                          |

Based on the above content analysis, the following two points are drawn:

First, the cost of wind power and photovoltaic power generation still has a large room for decline. In 2020, the cost optimization of wind power generation in the northern region and photovoltaic power generation in the central and eastern regions will be basically realized.
Second, in the medium and long term, the cost of photovoltaic power generation is much lower than the cost of wind power. The average electricity cost of photovoltaic power generation in 2030 is expected to be lower than that of wind power. With the cost control at a reasonable level, wind power and photovoltaic power generation in the northern region are sent to the eastern and central regions across the region, which is more economical than the development and consumption of new energy in the eastern and central regions. The medium and long-term goal of realizing new energy development depends on the northern region and the western region.

3. Problems in cost control in the process of new energy development

First, there is not enough awareness of cost control. Enterprises are an important subject of new energy cost control and the key to economic efficiency control. New energy companies have more people and departments involved in design and development, and the management system is complex. The enterprise control costs need to decompose the work objectives and work tasks of the responsibility centers of the operation centers and management departments, and improve the efficiency of cost control. However, in actual work, due to the lack of interaction and communication between departments, the single view that cost control work is limited to the department, ignoring the control of the overall cost, making it difficult to achieve corporate goals. The internal staff and management personnel are not aware of the importance of cost control, and the cost management awareness is not strong. It is expected to complete the single department cost target to control the overall goal of the enterprise, and the work efficiency is not high, and the cost control has no practical significance.

Second, the company's complete operation process includes production, sales and benefit recovery. In this series of processes, it also includes R&D, design, procurement, manufacturing, sales, and post-service. Therefore, enterprise cost control needs to be carried out throughout. In the development of new energy enterprises, energy development and sales and utilization are required. The operating costs of different links are quite different, and the scope of cost control is also expanding. Practice has found that the control costs of new energy companies are mainly concentrated in the energy production process, because energy production costs are the most expensive, and this cost control concept is too extreme and one-sided. In the market economy competition, if enterprises want to enhance their strength and expand their scale, they must realize cost control in all aspects such as manpower and material resources, strictly control the flow of funds, maximize the utilization of funds, and provide basic economics for the survival and development of enterprises and the growth of scale guarantee.

Third, cost management is inefficient. While the social and economic level is constantly improving, modern technology is also constantly improving. The market prospects for new energy development and utilization are broad. To improve market competitiveness in operations, enterprises need to do pre-, post-, and post-control in cost control. The repetition rate of departmental operations is high, which causes waste of human resources and reduces work efficiency. At the same time, in asset management, the management objectives of flow cost, fixed cost and variable cost are not clear. The allocation of enterprise funds is unreasonable, and the support conditions for employees in energy design and product promotion are insufficient, which indirectly affects the efficiency of new energy cost control.

4. Proposals to promote new energy cost control and management

4.1. Enterprise-implementable optimization measures
First, in terms of personnel selection, personnel should have the necessary capabilities for the corresponding positions in the industry and not waste human resources. In view of the particularity of the new energy industry, it is more dependent on technological innovation to create enterprise value to develop the development prospects of enterprises. Therefore, when selecting R & D personnel, we should pay more attention to the ability of the corresponding personnel to innovate.

Second, the new energy industry has broad prospects for development. However, in the process of replacing old energy with new energy at this stage, it will inevitably encounter some setbacks and
uncertainties. Therefore, we must pay attention to cultivating employees’ confidence and form a positive culture in the enterprise.

Third, enterprises should combine the relationship between labor cost input and output.

Fourth, new energy enterprises should broaden their loan channels, make full use of various preferential treatments such as subsidies granted by the state and the government, and minimize the expenditure on borrowing costs. At the same time, they should strengthen the management of loans and repay loans in a timely manner to reduce unnecessary losses. Secondly, new energy companies should pay attention to the management of borrowed funds, and establish a special fund and wealth management department to be responsible for the investment and management of funds, so as to fully play the role of funds. For the government and relevant banking departments, it is necessary to formulate a preferential loan policy to encourage the development of new energy enterprises.

4.2. Nationally achievable optimization measures
First, increase the frequency of electricity price retreats, reduce the intensity of subsidies; strengthen the supervision and management of additional collection of renewable energy, achieve the collection of receivables, expand the scale of funds; determine the scale of development according to the total amount of funds collected, optimize the layout To regulate annual increments, reduce losses, and continuously improve the quality of new energy development.

Secondly, through the improvement of policies to reduce non-technical costs such as land costs, taxes and fees. Reducing the cost of new energy generation and sharing the benefits with conventional power. At the same time, making good use of market means to promote new energy consumption.

In the planning, it should ensure the system capacity is sufficient. In the future, the reduction of the utilization hours of power supply such as coal power is a general trend, and it needs to be compensated by market means; Further introduce policies, break the inter-provincial barriers, achieve a wider range of green card transactions, and promote greater resource allocation.

5. Conclusion
The sustainable development of new energy still needs to stimulate the endogenous driving force of the industry, promote technological progress and cost reduction, reduce subsidy dependence, and reduce development costs. It is necessary to establish a forcing mechanism to achieve the expected goal of new energy development and integrate it into the large power grid. We will guide industrial upgrading and improve the quality of new energy development by improving the mechanism for reducing electricity prices, optimizing the scale and distribution, reducing non-technical costs, and raising the technical threshold.

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