



Analysis on Profitability Prospects of Wind Power Projects in China

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Abstract. With the continuous development of China's market economy, the market competition of wind power industry is becoming more and more fierce, which not only provides many opportunities for the development of wind power, but also brings many challenges. In order to cope with global warming, China's energy use has gradually changed from non-renewable energy to renewable energy and clean energy. Therefore, the importance of wind power generation is self-evident. Wind energy is a typical representative of clean energy, and it is widely used in power generation. This paper analyzes the profit opportunities and risks of wind power generation, so as to explore the healthy development of wind power industry.

Keywords: Wind power projects; Risk management; Clean energy.

1.Profitability conclusion of wind power operation

China's wind farms have different profit levels, and some of them are even polarized seriously. Some companies (such as Dongdian Maolin Wind Energy Development Co., Ltd.) have a net profit rate as high as 30%, while others (such as Aerospace Minjian New Energy Company) have a net profit rate as low as -50%.^[1]

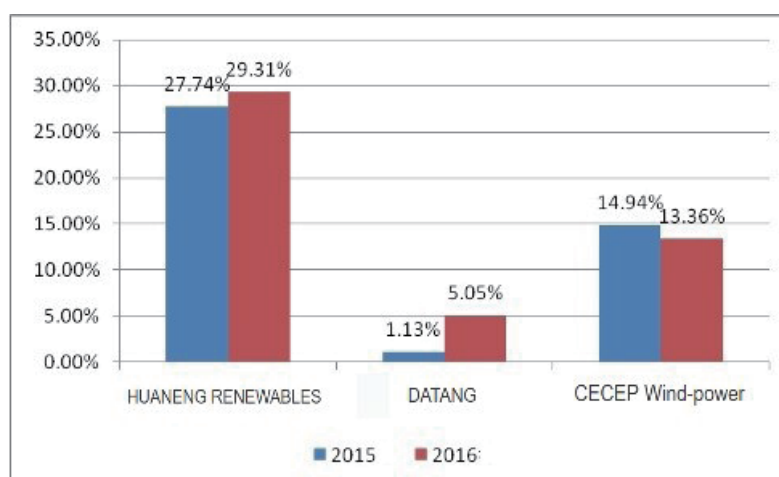
2.Basic cost analysis of wind power generation

The main cost of wind power generation construction is equipment procurement, engineering construction and land expropriation compensation. The main cost in power generation is the depreciation of wind turbines and other equipment.

3.Profit Analysis of Wind Power Related Enterprises

4%, which is the proportion of wind power generation in China's total power generation in 2016 announced by the National Energy Administration recently, and this simple figure reflects the industry's vigorous progress in a year. Under the background of strong support from the state and increasing public awareness of environmental protection, it can be said that China's wind power industry has achieved rapid development in mid-2016, and the profit and loss situation of enterprises has gradually become one of the focuses of the industry.^[2]

Net profit margin of major wind power enterprises in China in 2015-2016



Although the profit margin of enterprises has decreased, it should not be overlooked that the wind power industry also made progress in stages in 2016. According to the data released by the National Energy Administration recently, in 2016, the national wind power maintained a healthy development momentum, with 19.3 million kilowatts of new wind power installed throughout the year, and the cumulative grid-connected installed capacity reached 149 million kilowatts, accounting for 9% of the total installed power generation capacity, with wind power generating capacity of 241 billion kilowatt hours.

4. Analysis of profit opportunities in wind power industry

As one of the new renewable energy sources with convenient use and rapid development, wind power has been widely used in the world. With the increasing global consensus on low-carbon clean energy utilization, wind power will play a more important role in the future energy system and become an important choice for sustainable energy development. Since 2007, 33% of newly installed power generation in the United States comes from wind power, and nearly 30% of newly installed power generation in Europe since 2000 comes from wind power.

Wind power has gradually become an important part of power systems in some countries and regions. The United States has proposed that 20% of power supply should be provided by wind power by 2030. Countries such as Germany and Denmark also regard the development and utilization of wind power as the core of high-proportion renewable energy development in 2050. On the other hand, the technology of wind energy utilization has been continuously improved worldwide, and the cost of development and utilization has dropped rapidly. The bidding price of wind power in Brazil, South Africa, Egypt and other countries has been lower than the on-grid price of local traditional fossil energy, and the long-term agreement price of wind power in the United States has dropped to the same level as that of fossil energy.^[3]

Wind power technology is relatively mature, and its cost is declining. It is the largest new energy power generation method in application scale at present. Developing wind power has become the core content of promoting energy transformation and an important way to deal with climate change in many countries, and it is also an important means to further promote the revolution of energy production and consumption and promote the prevention and control of air pollution in China. The "Thirteenth Five-Year Plan" period is an important period for China to promote the "four revolutions, one cooperation" energy development strategy. In order to achieve the goal that non-fossil energy accounts for 15% and 20% of primary energy consumption in 2020 and 2030, respectively, the energy structure will be promoted. Transformation and upgrading to promote the sustained and healthy development of the wind power industry, in accordance with the requirements of the Renewable Energy Law, according to the "Thirteenth Five-Year Plan for Energy Development" and ", In November 2016, the National Energy Administration formulated and issued the "Thirteenth

Five-Year Plan for Wind Power Development", which clarified that China's wind power development should implement the development concept of innovation, coordination, green, openness and sharing from 2016 to 2020, adhere to the clean, low-carbon, safe and efficient development policy, conform to the general trend of global energy transformation, and constantly improve policies and measures to promote the development of wind power industry. Establish the system and mechanism to adapt to the large-scale development and efficient utilization of wind power as soon as possible, strengthen the supervision of the full guaranteed acquisition of wind power, actively promote technological progress, continuously improve the economy of wind power, continuously increase the proportion of wind power in energy consumption, and realize the transformation of wind power from supplementary energy to alternative energy. The "Thirteenth Five-Year Plan for Wind Power Development" clarifies the wind power development goals during the "Thirteenth Five-Year Plan" period: by the end of 2020, the cumulative installed capacity of wind power connected to the grid will reach more than 210 million kilowatts, of which the installed capacity of offshore wind power connected to the grid will reach 5 million kilowatts. Above; The annual power generation of wind power is guaranteed to reach 420 billion kWh, accounting for about 6% of the total power generation in the country; By 2020, the problem of abandoning the wind will be effectively solved, and the "Three North" region will fully meet the requirements of the minimum guaranteed acquisition and utilization hours; The manufacturing level and R&D capability of wind power equipment have been continuously improved, and 3-5 equipment manufacturing enterprises have reached the international advanced level in an all-round way, and their market share has increased significantly.^[4]

According to the resource characteristics of China's wind power development and construction and the current situation of grid-connected operation, the main layout principles of wind power during the "Thirteenth Five-Year Plan" period are as follows: (1) Accelerate the development of onshore wind energy resources in the central and eastern regions, and by 2020, the onshore wind power in the central and eastern regions will increase the grid-connected installed capacity by more than 42 million kilowatts, and the cumulative grid-connected installed capacity will reach more than 70 million kilowatts; (2) Promote the local consumption and utilization of wind power in the "Three North" areas in an orderly manner. By 2020, on the basis of basically solving the problem of wind abandonment, the "Three North" areas will increase the installed capacity of wind power grid-connected by about 35 million kilowatts, and the cumulative grid-connected capacity will reach about 135 million kilowatts; (3) Optimize resource allocation by using cross-provincial and cross-regional transmission channels. During the "Thirteenth Five-Year Plan" period, orderly promote the inter-provincial consumption of 40 million kilowatts of wind power in the "Three North" areas (including stock projects); (4) Actively and steadily promote offshore wind power construction, focusing on promoting offshore wind power construction in Jiangsu, Zhejiang, Fujian, Guangdong and other provinces. By 2020, the scale of offshore wind power construction in the four provinces will reach more than one million kilowatts. Actively promote offshore wind power construction in Tianjin, Hebei, Shanghai, Hainan and other provinces (cities). Exploratively promote offshore wind power projects in Liaoning, Shandong, Guangxi and other provinces (regions). By 2020, the scale of offshore wind power construction in China will reach 10 million kilowatts, and strive to achieve a cumulative grid-connected capacity of more than 5 million kilowatts.

5. Profit Risk Analysis of Wind Power Industry

5.1 Policy and market risk

5.1.1 the risk of changes in the relevant policies of the state supporting the wind power industry

The rapid development of the domestic wind power industry has benefited greatly from the state's strong support to the renewable energy industry, especially the wind power industry in the protection of on-grid tariff, compulsory grid connection, compulsory power purchase and various preferential tax policies. If the relevant national policies supporting the wind power industry are weakened in the future, the income of wind power projects will probably decrease.

5.1.2 Risk of wind power project approval

The design of wind power projects, construction of wind farms, grid-connected power generation and on-grid electricity prices need the approval and permission of different government departments. The construction of a wind power project needs to be approved by the local government investment department, and other approvals and permits from the local government where the project is located, including the approval of the project construction land, environmental assessment and other approvals or permits. If the examination and approval standards for future wind power projects are stricter, or the time required for examination and approval is prolonged, the company may lose the best opportunity for project development due to the delay of application procedures in the future, or the investment payback period of the project may be adversely affected due to the extension of construction period.^[5]

5.1.3 Market competition risk

To a great extent, the development of wind power projects is limited by the wind energy resources in limited areas and specific locations and the transmission capacity of local power grids. At present, the competition in the wind power industry mainly lies in the development of new wind farms. Through consultation with local governments, wind power operators agree in the form of agreements to obtain the right to develop wind power projects in specific periods and areas. Therefore, the competition among wind power operators to develop new wind power projects in geographical areas with superior wind energy resources and sufficient power transmission capacity is fierce.

China's renewable energy sources, including wind energy, solar energy, hydro energy, biomass, geothermal energy and marine energy, all enjoy relevant government incentive policies, including subsidies for on-grid electricity prices and priority of power grid access. If the country continues to increase policy support for other renewable energy sources in the future, it may also face fierce competition from other renewable energy power generation companies. The wind power industry is also facing competition from traditional energy power generation industries including coal, natural gas and fuel oil. If traditional energy mining technology is innovated or a large number of energy deposits are explored, the cost of traditional energy power generation companies may be reduced due to its price decline, thus affecting the wind power industry.^[6]

5.1.4 Risks brought by price changes of wind turbine equipment

Operating cost mainly refers to depreciation expense of fixed assets of wind farm. Among them, the procurement cost of wind turbine equipment accounts for the largest proportion of the total investment of wind farm, which is about 50% to 60%, so the change of wind turbine price will directly affect the future operating cost. If the price of wind turbines rises greatly in the future, the investment cost of new projects will increase, which may have a significant adverse impact on future business performance.

5.1.5 Macroeconomic fluctuation risk

The power generation industry is a basic industry that provides energy power for the national economy, and its market demand is closely related to the national macroeconomic development. Changes in the economic cycle will affect the demand for electricity. If the overall demand for electricity in the national economy declines, it will directly affect the sales of electricity. The development cycle of macro economy and the change of economic development cycle in the region where the company's wind farm is located will have a certain impact on production and operation.^[7]

5.2 Natural condition risk

5.2.1 Risks caused by changes in climatic conditions

The wind power industry relies heavily on weather conditions, and any unforeseen weather changes may adversely affect the company's power production, revenue and business performance. Before starting to build wind power projects, we will conduct on-the-spot investigation on each wind power project, carry out targeted continuous wind test for at least one year, including measuring wind speed, wind direction, temperature, air pressure, etc., and prepare feasibility study report. However, the wind resources in actual operation will still fluctuate due to local climate change, resulting in a certain gap between the wind resources level and the forecast level every year, which will affect the power generation of wind farms, and then make the profitability fluctuate.

5.2.2 Risks caused by major natural disasters

At present, most wind farms are located in north and northwest China, including Xinjiang, Gansu, Inner Mongolia and Hebei. The local climatic conditions are harsh, and natural disasters caused by climatic conditions such as severe cold and instantaneous gale that exceed the forecast may have an impact on the wind farm of the company, including the damage to wind turbine equipment, wind farm operating facilities and the damage to transmission lines. In this case, the production level of the wind farm may be greatly reduced or even suspended, and the power generation capacity of the wind farm will be seriously affected, thus adversely affecting the power generation and operating income.^[8]

5.3 Operational risks and management risks

5.3.1 the risk of relatively concentrated customers

The wind power project needs the permission of the power grid company in the project area to connect the wind farm to the local power grid, and sign the Purchase and Sale Agreement with the local power grid company for power sales, but can not directly sell the power to the end users, so the local power grid company is the power purchase customer. In the future, if the power grid company fails to fulfill its contractual responsibilities in accordance with the terms and conditions of the signed Agreement on the Purchase and Sale of Electricity, it will lead to the loss of accounts receivable and adversely affect the business performance.

5.3.2 Risks caused by fan quality problems

The quality of wind turbine equipment is very important to the sustainability and stability of power generation in wind power projects. Especially for some new wind turbines, the poor operation of wind turbines caused by equipment quality problems will affect the power generation business of wind farms. Although a quality assurance agreement will be signed with the supplier of wind turbine equipment when purchasing wind turbine equipment, the quality assurance period is usually two to five years after the continuous trial operation of wind turbine is completed. In case of quality problems of the wind turbine during the operation warranty period, the wind turbine supplier shall pay a certain proportion of compensation according to the agreement, which is a certain proportion of the total purchase amount of the wind turbine set by both parties in advance according to the specific quality problems, and the losses exceeding the compensation ceiling will be borne by the operating company. In case of quality problems of fans outside the warranty period, the losses incurred shall be borne by the operating company. Therefore, the failure or poor operation of wind turbines caused by the quality problems of wind turbine equipment will have an adverse impact on the operation of wind farms.^[9]

5.3.3 Project grid-connected risks

To build a wind power project, it is necessary to obtain the grid-connected permission from the grid company where the project belongs. If the grid-connected permission of the relevant grid company cannot be obtained in time for the newly developed wind power project in the future, the construction of the project will be delayed, and it will be impossible to generate electricity and sell electricity, thus affecting the income of the wind power project.

5.3.4 Risk of "abandoning wind and limiting electricity"

The wind power projects that have been put into operation need to implement the unified power grid dispatching, and adjusting the power generation according to the power grid dispatching instructions is a prerequisite for the grid-connected operation of various power generation enterprises. When the demand for electricity is less than the power supply capacity, the power generation enterprise obeys the dispatching requirements, so that the power generation is lower than the rated capacity of the power generation equipment. Because the wind energy resources can not be stored, the "power cut" makes part of the wind energy resources of wind power enterprises not fully utilized, which is called "wind abandonment".

Whether full grid-connected power generation can be realized depends on many factors, such as whether the local power grid has enough transmission capacity and local power consumption capacity. Therefore, for the wind power projects that have been put into production, if the related grid companies restrict the power of the company's wind power

projects due to the change of the overall load of the regional power grid, it will have an adverse impact on the income of the wind power projects.

5.3.5 Project construction risks

There are many risks involved in the construction of wind farms, including bad weather conditions, shortage of equipment, materials and labor, interference from local residents, unforeseen delays and other problems, all of which may lead to delays in project construction or cost overruns.

Usually, all kinds of professional contractors are employed to build each sub-project of wind farm. If each contractor fails to complete the project according to the plan or there are quality problems in the project construction, the overall power generation efficiency and operating cost will be affected.

5.3.6 Risks caused by changes in wind farms and surrounding environment

The operation of the wind farm project depends on the wind speed and other climatic conditions at the project location. Urban expansion, shelter forest construction and other new wind farms near the wind farm project will affect the wind speed and climate conditions at the project site, and then affect the wind resources. If the land adjacent to the project is developed by other parties, it may have a negative impact on the wind farm project, thus adversely affecting the business performance.

5.3.7 Risk of core management team change and brain drain

As a strategic emerging industry strongly encouraged by the national policy, the wind power industry is highly dependent on senior talents with knowledge and skills related to wind power generation, and the senior managers of the company have made indispensable contributions to the rapid development of the company in recent years. Due to the rapid development of renewable energy industry, especially wind power industry, the competition among wind power companies for domestic talents with relevant professional knowledge and skills is becoming increasingly fierce, especially for management talents with long-term working experience in wind power industry. If the core management team changes greatly or professional talents are lost in the future, it will have an adverse impact on the future operation management and business expansion.

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