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Liaoning province wind power project comprehensive benefit evaluation

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ABSTRACT

Because wind energy has the wind instability, persistent many poor natural attributes, and wind farm construction also exists a wide area, large investment costs, high maintenance costs, a variety of adverse factors, such as power generation rate is unstable, so the wind power project evaluation and research has important practical significance. Based on the wind power project in Tieling tigers comprehensive evaluation, can provide the basis for the planning and construction of the project, the investment decision-making process in order to reduce the subjectivity and blindness, reduce investment risk and optimize the allocation of resources. But also for comprehensive evaluation of wind power projects theory of an exploration. By studying the comprehensive evaluation of Tieling tigers wind power projects in order to establish a comprehensive evaluation system of wind power projects, to provide a reference for the future construction of similar projects.

KEYWORDS

Social evaluation; Economic evaluation; Environmental benefit assessment; Wind power project.

INTRODUCTION

Background

Currently, the ecological environment has been on the planet for human consumption can not afford to existing fuel energy. According to experts, statistics, currently the world's proven oil reserves have only enough for 44 years of human use, enough for 62 years of natural gas, coal 230 years. The wind has on the earth is greater than the sum of the solid fuel and liquid fuel energy, but also much higher than the flow of energy. International Energy Agency statistics, wind energy resources on Earth is about 200 trillion kwh per year, ten times the Earth's water. Only l% of the ground will be able to meet the needs of wind energy in the world. After years of world exploration and development in all aspects of wind power technology is relatively mature, but it has also become a huge development potential of the emerging industry. Since the construction investment and reduce operating costs, the upfront investment is also getting closer to the thermal power and hydropower. Currently, the average annual output value of wind power in the world has already reached $ 5 billion. Due to our abundant wind energy resource reserves in the world are living in the first place, land resources from the ground 10 meters height, the technology can be developed 297 million kilowatts, the annual generating capacity of 600 billion dry watts; offshore resources from the depth of not more than 25 meters offshore area, wind energy reserves of 1 billion kilowatts, the annual generating capacity of 2.4 trillion kwh. In all kinds of new energy power, because wind power technology is relatively mature, the most large-scale commercial development conditions, relatively low cost, has great advantages[1].

Purpose and significance

(a) Purpose

With the increasingly prominent, wind power is becoming a 21st century global energy growth hotspots, and quickly became one of the world's sunrise industry consume a lot of energy and environmental issues. This is not only because the wind is a clean and renewable energy, but also because it is rich in resources and with relatively convenient. Liaoning's wind power industry is still in its early stages of development, but the important role of wind power in the province's economy is increasingly apparent, the advantages of wind power has been more and more awareness and attention, along with the whole of society to the development of clean energy awareness general improvement and attention, support increases, Liaoning Province, wind power industry is also showing a momentum of vigorous development. However, the development of practice proved that the development of wind power projects in Liaoning also faces a series of obstacles and problems, including both policy issues, there are technical problems; both mechanisms, but also understanding. This study will focus on the comprehensive evaluation of wind power projects, the use of social, economic and environmental benefits of comprehensive evaluation methods of scientific analysis of wind power projects of great significance to promote the development of wind power projects[2].

(1) Theoretical significance

Comprehensive benefit analysis of the project in terms of early has formed a relatively mature theory and methods. Various financial indicators, performance indicators, economic indicators are more perfect. Because wind power technology is only in recent years rapid development, the relevant theoretical research lags behind the practice, few studies on the overall efficiency of the wind power project area. For the overall efficiency of the wind power project analysis, we can say there is no theoretical maturity and systems. This paper uses economic theory and related technical analysis method to build a comprehensive evaluation index system of wind power projects, enrich, improve the comprehensive evaluation index system.

(2) Practical significance

Through the construction of wind power projects in Liaoning Province, the situation analysis, to measure the overall efficiency of Liaoning Province to develop wind power projects. In this paper, correlation analysis techniques for social economics Tieling, Liaoning Province, tigers wind power projects, economic and environmental benefits of a comprehensive evaluation. The use of scientific methods for evaluating the overall efficiency of the wind power project objective assessment, to achieve an orderly and healthy development of local wind power projects and provide data to support the theory. And conclusions extend to the wider region, to provide a reference for the current Liaoning wind power project development and even Chinese wind power project development, to improve the current Chinese wind energy resource-rich regions to develop wind power awareness, a comprehensive understanding of the construction of meaning wind power projects, the firm develop wind telecommunications heart has very important practical significance.

DEVELOPMENT OF WIND POWER IN LIAONING PROVINCE

Wind Power Development in Liaoning Province

Liaoning Province based on the abundant wind energy resources, make full use of the preferential policies the state, increase investment, to promote the development of wind power industry. As of September 2013, Liaoning Province has introduced Guodian Longyuan, China Huaneng, Huadian, Shenhua, Datang International, Shandong Luneng, Beijing Energy Investment, China Power Investment, Tokyo Electric Power Maolin, CGNPC and Honiton, Concord and other domestic and foreign large companies in Hong Kong more than 50 areas, cooperative development and construction of wind farms. Has

started expansion, new Changtu Tieling and Dandong marine red, Shenyang Faku, Kohei, Fuxin Zhangwu, Adventist Anshan, Benxi Huanren, Dalian Changshan, small long hill, Changxing Island, Yingkou Xiongyue, Gaizhou , Chaoyang North tickets more than 30 wind farms. Expected by the end of 2014, Liaoning power grid wind farms will reach 81, the cumulative wind power generating capacity will exceed 60 billion kwh[3].

"Wind power development in Liaoning Province," second five "plan" clearly states that, in the future, Liaoning Province will continue to strengthen the wind farm unified planning, strengthening the grid and the power to coordinate development; strengthen incentives for wind power development, strengthening of the grid quota system, the compensation system research ; synchronous approved wind farm construction projects, prompting grid planning and construction of wind power and other new energy development together. To further adapt to wind power development, Liaoning Province is also actively exploring the development of wind power energy storage technologies, currently in Huaneng and Guodian two 49,500 kilowatts of wind power each conducted five megawatt wind power energy storage pilot project. To reduce the cost of wind power energy storage projects, and actively communicate and coordinate with the storage manufacturers, to reduce the unit cost of energy storage devices.

Liaoning wind power project development problems

Development and utilization of wind energy resources in Liaoning Province momentum is good, but there are some worthy of further analysis and discussion of the issues. These issues include both the common problems faced by the country's development of wind power projects, including the development of wind energy resources in Liaoning Province during their own problems, summed up, including the following aspects:

(1) wind energy resource development and the development of wind power industry low degree of matching. Mainly in the wind energy resource-rich areas, the development of wind energy resources utilization is not high. Liao South Africa, western Liaoning and the Liaodong Peninsula in Liaoning Province, the region is rich in wind resources area and relatively rich region, located in western Liaoning Fuxin and Chaoyang, located in Panjin Liaohe Plain, south to the mouth of the Bohai Sea, these areas are the most abundant wind energy resources in Liaoning area, in the "Twelfth Five-Year" period, Fuxin, Chaoyang and Panjin province should become a key area of wind energy resource development. But from now built in wind farm construction and plans to build a distribution point of view, the prevalence of wind energy resources in the region have not yet fully exploited the situation.

(2) wind farm on the urgent need to scale and large-scale operation of wind farms in our province is mainly characterized by a decentralized, small-scale development. Seen from the development and utilization of wind energy resources in Liaoning Province, Liaoning Province has formed a common scale wind farm is small, low average field capacity, and the development of dispersed. Most of the installed capacity of wind farms currently under construction, is still more than ten million KW or less. Due to the small scale wind farm installed capacity, the development is not concentrated in one area scattered distribution, which is bound to increase the construction costs, resulting in a waste of resources. On the one hand can not scale operational efficiency, on the other hand can not be the nearest layout, can not form the province of large-scale low-energy carbon-based new energy base and industrial base.

(3) large-scale wind power generation equipment production and supply capacity of key components is relatively weak, high failure rate of wind power to run. On the one hand, the fan device key components, such as large bearings, blades and permanent magnet motor, the province with the production capacity of few, production and supply capacity is relatively weak, although there are companies producing province, but the product quality is difficult to guarantee . In addition, the purchase of spare parts from abroad, because it is based on local wind resources and design, not necessarily suitable for the climatic conditions in Liaoning Province and the "style" and the purchase price is high, for example, fans bearing equipment imports price to be higher than 30% of domestic prices. Based on the above two reasons, resulting in a higher cost of production in our province blower machine, the high failure rate of wind farm operation, there is a more serious safety problems, wind power equipment manufacturing enterprises basically at the fan assembly stage, manufacturing wind turbines upstream supply of industrial development retardation, Liaoning wind power industry has not yet entered a virtuous cycle of development[4].

(4) Wind Power Equipment lack of independent core technology, mainly dependent on foreign imported. Since 1993 the province began to develop wind power industry, foreign trade with the earliest start in 1930, the earliest provinces such as Inner Mongolia began in the early 1980s, the development of wind power industry in our province late start, lack of basic research accumulation and related technologies R & D capabilities talent, wind power equipment is weak, on the whole is still in the track and the introduction of foreign advanced technology stage. Although the province to achieve localization of wind power equipment R & D companies and research institutes, such as Dalian Heavy Industry Group, Shenyang University of wind energy are, but most enterprises are still at the core of technology introduction stage, the wind turbine control system and grid technology, mainly rely on from abroad, the degree of localization of wind power equipment is not high. In particular, and network technology, and how safe and stable wind power input to the entire grid system, the development of wind power industry is the province of a technical bottleneck.

(5) of wind power industry talent to become the bottleneck of the wind power industry in our province. Wind power professional and technical personnel, design and development of talent, industry management talent, sale and management talent and so relatively scarce. Particularly wind farms and wind turbine manufacturer frontline staff technology, however, the actual impact of the fan efficiency. At present, wind power industry frontline technicians, mostly from other industries, the lack of basic knowledge of professional wind power. Especially in the front line of wind farm operation and maintenance

personnel, mostly from the locally recruited staff, after a short training, work on the posts. Because they do not have the expertise, skill level in general, a lack of practical experience, there is a problem when the fan is running, the technician can not properly diagnose the fault and take effective treatment methods, so that the wind turbine operating life severely affected. At the same time due to the fan-site personnel can not put the fan in operation by the problems and accurate feedback to the fan design, thus impeding the further transformation of the wind turbine equipment.

Liaoning proposal to develop wind power projects

For wind energy resource development and the wind power industry development appears Liaoning regional issues, make a few suggestions in the wind power industry development layout, wind resource assessment, wind power industry development plan, the wind power industry, technological innovation, government policy support, wind power industry personnel training:

(1) unified planning of wind power industry development and achieve rational distribution of industry. Realization of wind energy resource development in Liaoning Province and the wind power industry development plan objectives depends reasonable wind resource development and utilization, rational distribution depends on the wind power industry development space, it all depends on the development of wind energy resources in Liaoning Province and the wind power industry development priorities OK. Fuxin wind energy resource-rich region, until now, a total of six Fuxin wind farms and power generation has been achieved, with a total installed capacity of 575,000 kilowatts, ranking first in the province's cities. Nevertheless, Fuxin's wind resources has not been fully developed, should continue to increase investment. And Fuxin, like other wind energy resource-rich province rich regions and areas for further development. Under the country to vigorously develop renewable energy in the background, more and more foreign investors to enter the Chinese wind power equipment manufacturing, international wind power manufacturing giants have set up production bases in the country. Province must seize this favorable opportunity to actively seek foreign manufacturers in China is rich in wind energy resources and build factories, while the full development of wind energy resources in the province, but also the introduction of foreign advanced wind turbine equipment manufacturing technology.

(2) Of the province's wind power resources thoroughly. Active use of existing wind energy survey methods and tools for the scientific assessment of wind energy resources in the province. With the development of the wind power industry, the country has introduced a more advanced international wind energy assessment methods, while some domestic research institutes have developed wind energy assessment software, the relevant departments of the province should make full use of existing wind energy assessment tool, the province wind energy resources scientifically and accurately assess and provide the necessary preconditions for the development of wind power industry in our province.

(3) the establishment of independent innovation industry development strategy. Wind power industry in the province, "five-second" period should establish independent innovation as the core, the path of development of both technology transfer and localization, to achieve a virtuous cycle of development formats. Wind power enterprises should actively strengthen technological exchanges with foreign countries, to learn foreign advanced wind power equipment design, combined with China's wind resources, China's actual situation designed for wind turbines. Because of China's topography, climatic conditions, changes in wind direction, wind speed, size and the actual situation in Europe and the Americas are different, if you simply copy foreign technology, design a wind turbine can not fully meet the local requirements of the actual wind conditions, in wind power will be on the road gets narrower. As the old industrial bases in the province, in the field of wind power equipment manufacturing has inherent advantages, the province's wind power companies should take this opportunity to achieve absorption and innovation, improve R & D capability in the introduction of foreign advanced technology, based on by mastering more multi-core technology of wind turbines, wind power equipment to improve the degree of localization, to make our province in the country's wind power equipment manufacturing to get a place, which led to the great development of the province's wind power equipment manufacturing industry. The province's wind power companies should also be soberly aware that, although the country for clean energy investment is large, but because of the support and guidance of national policy making clean technology industry competition intensifies, the funds become very scattered, if fully follow the policy guidance , does not make long-term development of enterprises, which may last from a sunrise business into an overcapacity of enterprises, especially just to get involved in this field of business. Therefore, relying on technological innovation, the development of the core technology is the last word in the field of wind power enterprise development.

(4) government support and market discipline combined wind power industry for the province to pave the way for sustainable development. First of all, the state issued a series of preferential policies to support the development of wind power industry, to promote wind power technology innovation, in this background, some companies invest a lot of money and manpower into the wind power industry, with a certain blindness. At present, wind power industry into a fully competitive basic stage, the lack of core competitiveness of some companies will inevitably face closure crisis, so I provincial government and related agencies should improve the access threshold functions of the wind energy industry, wind power industry market norms. Secondly, the province's wind power companies are already assessed for wind power equipment manufacturing do not have the ability of small businesses should be given some preferential policies to encourage small businesses reorganized or fan machine manufacturing capacity and have a business combination; for scattered small wind farms, as close as possible consolidation, centralized grid. In this way, both to avoid the waste of resources, but also improve the ability of technological innovation province of wind power equipment manufacturing enterprises. Furthermore, the government should increase foreign propaganda, actively seek the introduction of large foreign enterprises have settled in

Liaoning wind power, which led into the wind power industry in Liaoning rapid development. 2010 onwards, the clean development mechanism and carbon emissions trading market will provide financial and technical support for China's wind power development, the province should actively seek support from the developed countries in this regard. Furthermore, for a certain innovation capacity of small enterprises, should actively support, financial investment and take a combination of tax breaks to encourage and assist SMEs to seek funds to support renewable energy and the introduction of some venture capital funds at the national level, for SMEs provide a way to solve the funding problem. On the technical side, it should support SMEs in cooperation with universities and research institutes, and take the road of research cooperation, so that the rapid growth of small and medium enterprises, and gradually become the backbone of the development of the wind energy industry in our province.

(5) increase the industrial training, training a solid knowledge base and practical skills of technical staff to provide technical personnel for the development of the wind turbine industry in our province. Human resources are the basis of an industrial development, especially for the fan industry professional and technical personnel need such large equipment manufacturing industry. On the one hand, the fan industry chain in the upstream business, which is the fan equipment manufacturing, need to understand technology, researchers are willing to delve into, on the other hand, the downstream industry chain, which is a wind farm, you need not only understands the mechanical structure, but also have power line technicians and technical knowledge, timely maintenance can be carried out when the fan fails, you can also carry out routine maintenance on the turbine equipment. Areas of the province is the lack of technical personnel fan, no reserve personnel and training related aspects. However, with the wind industry in our province to enter a rapid development period, the province established a number of colleges and universities related professions, such as Shenyang Institute of Engineering, has been in 2008 began to recruit wind power technology and professional students, training for front-line technicians wind farm. Shenyang University of Technology Institute of wind energy electrical College campus, Mechanical Engineering cooperation, joint training of graduate and doctoral students, for wind turbine equipment manufacturing companies transport a large number of technical personnel. School of Electrical Engineering and the school has been approved to set wind undergraduate programs, this will solve the problem at the source of the wind energy industry is largely talent. Relevant departments of education in our province should encourage more schools to train wind have professional qualifications, the establishment of wind-related professions, wind energy has been established for professional school, give support in terms of policy, so that the wind power industry development and technical personnel training in our province to achieve complementarity common development. In addition, the current in the post of wind power technology staff and new recruits, through cooperation with universities and companies conduct regular training, learning the wind power-related knowledge and practical skills training, to understand the industrial development front, through the accumulation of knowledge and applied in practice, as I provide technical support wind power industry province.

CONCLUSIONS AND PROSPECTS

Conclusion

China's development of wind power industry has great potential, China's wind farms have short construction period, power generation technology is mature, market prospects characteristics. But there are also wind power project development is difficult, the amount of investment is high, the risk of large projects disadvantage, so before doing a comprehensive evaluation of the feasibility of the project is necessary. For comprehensive evaluation of Tieling tigers wind power projects, the paper made the following research:

(1)This paper fully studied abroad on a comprehensive evaluation of the current situation, trends, problems, and a comprehensive research study to understand wind power projects.

(2)According to the basis of comprehensive study of wind power projects theory, under the circumstances, Liaoning Province of wind power, combined with the Tieling tigers wind power projects the actual situation, to build a comprehensive evaluation index system Tieling tigers wind power projects, including Tieling tigers wind power project on the community , economic and environmental impacts of the three aspects of the evaluation system.

(3)Analytical Hierarchy Process to determine the wind power project in Tieling tigers social, economic and environmental benefits of three aspects of evaluation index weights.

For wind power projects comprehensive evaluation theory and methods currently not perfect, the paper tigers of wind power projects in Tieling study hopes to provide a reference methods and ideas for the comprehensive evaluation of wind power. Comprehensive evaluation process in this article, to face index types, weights and evaluation methods to determine the many kinds of difficult to draw level indicator system and other issues. I hope this way of solving these problems can provide a reference for future projects[5].

Prospects

Wind energy development in resource-rich regions of wind power is the solution to local energy issues, responding to national policy, cost-effective way of non-renewable energy sources. Development and utilization of new energy sources to achieve full economic, environmental, ecological, social, and compared with the situation of non-renewable energy damage to the environment, with a better economy. Gradual depletion of energy reserves, but the human demand for energy has continued to grow, governments only advocate the development and utilization of new energy sources, new energy research and development to increase investment in order to face the current situation of energy depletion, environmental

destruction of. Large-scale development of renewable energy to face competition in the market is weak, development difficulties, in the early stages of industrial development, the limited ability of beneficiaries of economic and other issues, therefore, the development of wind power projects also need to be given support and protection from the government policy, and funding methods, such as increased financial assistance and investment; expand the size of credit, providing low-interest loans; development tax incentives, price subsidies and incentives policies. Hope that through a series of government support, be able to accelerate the pace of development of wind power, so that the new energy in overall energy consumption gradually increase the proportion of promoting economic, social and environmental sustainable and coordinated development.

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