Exploring the analysis of key factors of new energy consumption and measures to solve them

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Abstract. In order to achieve sustainable and healthy development, power companies must gradually abandon traditional energy sources and actively develop new energy sources, which could achieve green energy-saving and environmental protection effects. This requires an analysis of the key factors of new energy consumption, to clarify the causes of this problem and to take effective countermeasures to solve it. The application of new energy generation technology in power grids is a reasonable solution to the problem of new energy consumption, ensuring a continuous and sufficient supply of electricity resources to meet demand. This paper focuses on the key factors for the consumption of new energy and the measures to address them.

1 Introduction

Now that the country's favourable economic environment has created opportunities for all sectors to develop rapidly, electricity resources have become even more important. The massive use of electrical equipment in various fields has led to higher requirements for electrical energy. For power companies, facing the continuous increase in demand for electricity, they have to take effective measures to cope with it. At this time, if the traditional technology is still used for power generation, the transmission mode of electrical energy is not updated in time, it will not be able to meet the demand. This not only consumes a lot of energy, but also releases many toxic substances that seriously pollute the environment, and it is very detrimental to the future development of the power industry. At present, industrial enterprises are showing new development trends, the innovation process is also accelerating, people's quality of life is gradually improving, a large amount of electrical energy consumption, electricity consumption is also significantly increased. If power companies do not update their equipment and technology in the process of supplying electricity to customers， and use traditional models and traditional power generation technologies, the power companies will not be able to fully meet the current increasing demand for electricity. This can lead to a situation where the supply of energy is not in harmony with the environment and contradictions are becoming increasingly apparent, which can lead to a large amount of energy not being fully utilized and serious environmental pollution. With the emergence of new energy technologies, the rationalization of new energy generation technologies, and the efficient application of clean energy, it is possible to make full use of energy and its advantages, thus improving energy utilization and keeping energy consumption to a minimum, considering the green development of enterprises [1]. No pollutants are emitted during the application of new energy sources and environmental pollution can be effectively avoided. However, However, from the current application of new energy technologies, there are still some problems due to various factors. Especially in northern China, northeast China and northwest China, where new energy is commonly used due to the specificity of the geographical environment, there will be problems with the consumption of new energy. To effectively address the above issues, all aspects must be taken into account when analyzing the key factors in order to respond accordingly and improve the efficiency of the solution.

2 New energy generation technologies

Among the new energy generation technologies, the more common applications are solar power technology and energy generation technology, as follows:

2.1 Solar power technology

The most widely used new energy source in all areas of aggregation is solar energy, which is the ability to collect and convert solar radiation into electrical energy and can achieve good results in power generation technology. Compared to other energy sources, solar energy can be accepted because of its excellent stability in the process of application and, most importantly, its easy availability, inexhaustible trend and inexhaustible use. In the process of solar power technology, sunlight is shone on the connected application panels and converted into

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electricity, which can then be transmitted to the user side for use [2]. In order to obtain the maximum output power, concentrated solar power generation technology has gradually become a research hotspot [13]. However, no matter which industry is involved, there are drawbacks in the use of solar energy, which means that there are limitations when it comes to the use of energy. In order to effectively remedy this, it is necessary to actively research and develop this technology from a practical application point of view, in order that solar energy has a high energy utilization rate.

For example, when designing an intelligent control system for solar street lights, the flow chart is mainly for the charging part and the discharging part. Among them, the charging part makes clear its charging situation by detecting the light intensity and voltage level, and the discharging situation by monitoring the light intensity to control the switch of the street light part. The core of the controller is the microcontrollers, for which the system is initialized and then the internal resource module registers and the relevant flag bits are set. During the day, the solar cells can be collected periodically and the terminal voltage of the batteries can be obtained at the same time; the control process will vary depending on the state of the voltage combination. When it comes to night time, collecting the terminal voltage of the battery can be done periodically while obtaining the power supply current on the LED lamp side to reasonably control the different power of the street light and to protect the battery discharge situation.

2.2 Wind power technology

Among the new energy sources, in addition to solar energy, the use of wind power technology is also very common. The application of this technology has certain environmental requirements, namely the abundance of wind resources and the ability to convert wind energy into mechanical energy and later into electrical energy in specific applications. From the point of view of the utilization of wind energy in various regions of the world, the technical development varies. Western European countries are relatively mature in wind energy technology and mainly use the energy for agricultural and industrial production, making full use of local resources while also reducing traditional energy consumption. Windmills are essential for the collection and use of wind energy, which is transformed into electricity to meet people's production and living needs. In the process of applying wind power technology, wind power generation equipment is installed in the building structure, which transmits the collected wind energy into it and converts it into electrical energy to supply the various electrical equipment installed on the building, thus improving the functional efficiency of the building and making full use of natural wind energy resources. The use of wind energy in the operation of power systems has resulted in a continuous increase in the amount of electricity supplied [3].

China has very rich wind resources, but in the process of applying wind power generation there is a problem that different regions have different geographical environments and different resource conditions, and the distribution of wind energy lacks uniformity. In China's northwest and offshore, windy weather is frequent and windy, and wind power resources are sufficient, while other areas are clearly lacking in this respect, especially in the inland plains, where there is hardly any strong wind and wind power resources are seriously lacking. If power generation company uses wind power, it needs to invest a lot of resources but can't recycle effectively, which results in a waste of resources. Therefore, regional environmental conditions should be taken into account in the application of wind power systems. In the case of a lack of resources, there are certain restrictions on wind power systems. Without good conditions and sufficient resources, even if wind power technology is used, it cannot be implemented effectively, and even if wind power generation can be carried out, good results cannot be obtained, the stability of wind energy use cannot be achieved and its proper value cannot be brought into play [4]. Therefore, there are limitations to wind energy compared to solar energy, and wind power consumption has become one of the urgent problem of new energy sources [14]. In order to effectively manage the wind power generation system and give full play to the value of wind power generation technology, it is also necessary to make full use of modern technology, such as the reasonable adoption of information technology and the combined use of intelligent technology, including the application of information technology to the wind power generation system, the implementation of information management and intelligent operation of various functions, which can achieve unified supervision and control. In view of the instability in the application of wind power generation technology, it is necessary to invest costs for maintenance management, which has become a key research topic in the current new energy. Many regions are now using distributed power sources in their wind energy discoveries and have established connections with the power generation system, which inevitably makes scheduling more difficult, in order that the system cannot be effectively controlled. When the grid is in operation, its security is not guaranteed and it is not possible to maintain a safe and reliable operation, which is a shortcoming of wind energy generation technology [5]. Currently, the application process of wind power discovery technology uses distributed power generation. Due to the complex geographical environment in some areas, if wind power technology is used, higher requirements are placed on the communication data acquisition system, such as smooth information transmission. And the need to maintain the stability of the power to ensure better performance can lead to higher operation and maintenance costs. For the operation and maintenance of distributed generation equipment, the above-mentioned problems can be a great challenge, which has higher technical requirements for the operation of the control system, to improve the technical level, but also to achieve high quality and efficient management.

3 New energy consumption in China

China's abandoned wind and light are mainly in North China, Northeast China and Northwest China, but most of the regions do not have the problem of abandoned wind and light. The total installed capacity of new energy in Jiangsu and Shandong provinces is very large, which can reach 8.34 MW and 8.54 MW, and the new energy is basically for full consumption [6]. In terms of time distribution, when entering the heating period, wind power abandonment is very high, with over 66% nationwide and over 90% in the northeast alone, and when in the low load phase, the proportion of wind power abandoned in the total amount of wind abandoned is very high, with over 80%. Compared to other countries, China's wind and light abandonment is more geographically concentrated, and there is a certain concentration in terms of seasons and also very concentrated periods.

When discussing the problem of new energy consumption in China, an analysis of the abandonment of wind and light in China reveals that the main reason for this phenomenon is the distribution of new energy installations, which has a certain correlation with the load [7]. The distribution of new energy installations in China is not homogeneous due to the geographical environment, which is inverse to the load distribution. The proportion of abandoned wind and light loads in North China, Northeast China and Northwest China is not very high, at 36% of the total load, while these three regions already account for more than 75% of the country's installed new energy capacity. Among them, Gansu, the Inner Mongolia East Region, Xinjiang and Ningxia have a very high penetration of new energy and reach 100%, which is already far more than economically developed countries. As the local load size is not very large, there are high requirements for new energy consumption, requiring power supply regulation performance to match the prescribed requirements and also grid interconnection [8].

In terms of electricity regulation performance, the proportion of electricity flexible regulation in China is not very high. In North China, Northeast and Northwest China, the proportion of electric power flexible regulation in new energy installations is 17.9%. Among them, the Northeast region accounts for 7% of the proportion of electric power flexible regulation in new energy installations and the Northwest region accounts for 2.4% of the proportion of electric power flexible regulation in new energy installations. Economically developed countries, such as Spain, Germany and the United States, account for 30%, 18% and 47% respectively of new energy installations with flexible electricity supply regulation. Among them, the US can reach 8.5 times of the new energy installations for electricity supply regulation and Spain can reach 1.5 times of the flexible electricity regulation. In terms of the level of interconnection of the Chinese grid, the demand for new energy exports from northern, north-eastern and north-western China cannot be met.

Overall, factors related to new energy consumption in China include load size, grid interconnection and electricity regulation. Due to the lack of sufficient conditions for new energy consumption in Northern, Northeastern and Northwestern China, there is room for consumption in the central and eastern regions. But the utilization of grid interconnections is not fully utilized, leading to the problem of abandoned wind and sun. In addition, China has yet to establish a peak regulation compensation mechanism and price response mechanism in the construction of a national electricity market. Local governments have set up generation plans and each region has no willingness to accept new energy sources. Barriers exist between provinces, making it difficult to consume new energy [9].

4 Effective measures to solve the problem of new energy consumption

For the effective solution of the new energy consumption problem and the reasonable use of solar and wind energy, the wind-light-storage-hydrogen-ammonia integration is used to build a power supply of 600,000 kilowatts of new energy, including 400,000 kilowatts of wind power, 200,000 kilowatts of photovoltaic, 90 megawatts/360 megawatt-hours of electrochemical energy storage, in line with the efficient coupling of the side supporting 300,000 kilowatts of point solution water hydrogen production system and 120,000 standard cubic meters of hydrogen storage system. Specific efforts include improving power conditioning capabilities, improving grid interconnection and strengthening demand-side management, as follows:

4.1 Improved power conditioning

For some regions of China, due to the backwardness of the economy, power equipment is not updated in a timely manner and the phenomenon of significant aging occurs, which not only affects the quality and efficiency of power generation, but also leads to high input costs and the emission of various pollutants. For example, in the northeast and northwest regions, when renovating the power grid thermal power, without actively introducing advanced technology, it will lead to the renovation can not achieve the expected results [10]. This work is carried out in accordance with the design requirements, with the minimum technical output of the thermal units operating at a low level of 55% and the minimum technical output of the condensing units operating at the same time, already at 30%. At the same time, the use of new energy technologies in the North-east has led to an accelerated pace of construction of pumped storage power stations, which have reached 4.1 MW in terms of current installed capacity, and a much higher power regulation capacity [5].

4.2 Improving grid interconnection

The use of new energy technologies for electricity has led to a corresponding increase in the level of grid interconnection. Cross-regional and cross-provincial transmission channels have now been established. In order to expand capacity, construction is also being

increased, which makes the AC grid at the sending and receiving ends operate efficiently. The generation capacity is significantly increased, which makes the DC power in full power state and ensures the electric energy public [11]. Taking the new energy grid in the Northeast and Northwest regions as an example, from the situation of the new cross-regional DC outgoing channel, it is clear that the application of electric power new energy technology is very good, not only covering a wide area, but also the good effect of electric energy transmission. According to the relevant statistics, the capacity of the electricity from Zalut to Qingzhou is 8 MW, which can last for 6,000 hours and transmit up to 48 (TW-h); the capacity of the electricity from Jiuquan to Hunan is 8 MW, which can last for 6,000 hours and transmit up to 48 (TW-h); the capacity of the electricity from the east Junggar basin to the south of Anhui province is 12 MW, which can be utilized for 6,000 hours and deliver 72 (TW-h); the capacity of the electricity from Shanghaimiao to Shandong is 10 MW, which can be utilized for 6,000 hours and deliver 60 (TW-h); the capacity of the electricity from Ningdong to Zhejiang is 8 MW, which can be utilized for 6,000 hours and deliver; the capacity from Ningdong to Zhejiang is 8 MW, which can be utilized for 6,000 hours and deliver up to 48 (TW-h).North-east has led to an accelerated pace of construction of pumped storage power stations, which have reached 4.1 MW in terms of current installed capacity, and a much higher power regulation capacity [5].

4.3 Enhanced demand-side management

To improve the efficiency of the use of new energy must vigorously promote the replacement of traditional electricity by new energy, which requires strengthening demand-side management according to the actual electricity needs. During the operation of the power grid in the Northeast and Northwest regions, where traditional energy is the main source, if new energy generation is used to replace traditional energy, the new increase in electricity consumption will be significantly increased, even up to 80TW. Good results are obtained for the grid operation in the Northeast and Northwest regions until 2020. The number of electric vehicles is estimated by investigating the use of new energy sources. In comparison with conventional energy sources, new energy sources can supply energy for more than 600,000 electric vehicles. In carrying out this work, demand-side response mechanisms can be introduced into the mix to implement new energy technology management from a demand perspective, where 10% of the total load can be involved in the response [12].

5 Conclusion

It is clear from the above study that traditional energy sources consume a lot of energy and pollute the environment compared to new energy sources. New energy, as a renewable energy source, replaces traditional energy sources and can effectively alleviate the energy crisis. Moreover, new energy can ensure the continuity of electricity supply and generate sufficient electricity to meet the growing demand for electricity, which includes maintaining people's normal production and life, while the cost of energy use is reduced accordingly. This can create higher economic benefits, while obtaining good social and environmental benefits. However, there are disadvantages in the application of new energy. In the face of the existence of the problem of consumption, it is necessary to increase the financial investment in new energy generation technology, from a practical point of view to effectively solve this aspect of the problem, in order to promote the sustainable and healthy development of the industry.

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