Research Status and Development Trend of New Energy Generation

Xu Yujie [a]

Hebei Baoding third middle school, 071003

[a] Corresponding author: 809892878@qq.com

Abstract. Since 2005, great efforts have been made to develop new energy generation, which have significant results. However, there are still lots of problems in the research of new energy generation. In this paper, we discuss and enumerate some problems and their methods. In addition, development ideas are also shown.

1. Introduction

With the influence of oil crisis happened in the 1970s, a new energy revolution should be promoted nowadays. New energy is beneficial to the harmonious coexistence of human and nature for the superior characteristics such as great potential, good environmental protection and sustainable utilization. In order to meet the requirements of sustainable development of society and gradually replace the fossil energy structure with serious pollution and limited resources, it is particularly important to build a clean renewable energy structure. Since 2005, Chinese new energy has developed rapidly. The report, *2017 released by the national energy administration* from National Energy Administration，shows that the installed capacity of the national renewable energy generation is 650 million kW at the end of 2017 and accounting for 36.6% of the total electric power installed capacity. What's more, the capacity will continue growing rapidly in the future.

2. Research status of new energy generation

This chapter introduces two common types of new energy. And in the section, we discuss the difficulties in the future of new energy. Of course, I give my own ideas in the following. So let us know the view of my own about the research status of new energy generation.

2.1 The kind of new energy

2.1.1 The wind energy

A.The prospects of wind power

According to the market research and investment forecast analysis report of Chinese offshore wind power industry from 2016 to 2021, non-fossil energy will account for 15% of primary energy by the end of the 13th five-year. The industry expects wind power will rise to between 250 million and 280 million kilowatts by 2020. Both the policy orientation and the market forecast have given positive expectations, and there is still great room for further development of the wind power industry.

B.The basic characteristics of the wind power industry

Chinese wind power industry has rapidly developed in a large scale , but there are still many problems in development process. One of them is the uncertain technical standard. China's wind turbines also do not have an independent authoritative testing system and certification system. The other problem is short of independent research, development of fan equipment and the rapid development of wind

power industry. However, some manufactures of many domestic fan equipment need to be purchased from foreign industry. The second is instability. Affected by wind power, wind power industry is relatively unstable, and power grid enterprises have little enthusiasm for wind power. The next shortcoming is user confusion. Consumers wonder if extra money that they spent on new energy development and whether they are using real wind power. Moreover, the problem of grid connection is quite prominent. Due to the backward distribution of wind power resources and Chinese power market, the transmission capacity of the power grid is insufficient, and it is difficult for the power system to make reasonable planning in the future.

2.1.2 The solar energy

A. The prospects of photovoltaic power generation

Photovoltaic technology has made remarkable achievements all over the world and has been widely used in various regions. In the field of photovoltaic power generation, Chinese research institutes which has formed the industry standard have been in the leading position in the world, especially in the production capacity of solar cell components and other aspects of remarkable achievements. In recent years, the research and development of photovoltaic power generation technology mainly focus on the research of key technologies in photovoltaic power generation systems such as photovoltaic panels and application systems. The effect of these efforts lays a foundation for further promoting the comprehensive application of photovoltaic power generation technology. In China, a very successful photovoltaic power generation case has been formed. A megawatt low-voltage grid-connected photovoltaic power station and a 100kW high-voltage grid-connected power station have been built in Shenzhen and Lhasa. The successful operation of the photovoltaic power station has accumulated rich experience for further large-scale development and promotion of photovoltaic power generation technology [1].

B. Feasibility analysis of photovoltaic power generation technology

The grid-connected solar PV power generation system is composed of photovoltaic cell square array, controller and grid-connected inverter. It does not store energy through the battery. After choosing grid-connected inverter mode, the design of battery square array and grid-connected access point, the grid-connected function can be realized through low-voltage power grid access [2].

2.2 The main problems existing in China's new energy generation

2.2.1 Special plans at all levels cannot be effectively linked

A. The idea of new energy planning mainly focuses on the national macro-level, which is not consistent with the local planning. As a result, the new energy development planning in some places is much larger than the national plan.

B. New energy generation is disconnected from other power generation planning. In some regions, the power generation planning of new energy takes into account the power structure of the system and the power supply planning of peak frequency modulated power. Because of the insufficient peak capacity of the power grid, with large-scale new energy power generation projects being connected to the grid, the power generation capacity of new energy is limited.

C. New energy generation is disconnected from grid planning. The new energy generation planning does not explicitly take on the power grid projects connected to the power system. At the same time, the construction period of new energy projects is shorter than that of the power grid, which makes it difficult to connect the new energy projects with the supporting power grid projects due to the unsynchronized operation.

D. New energy generation is out of touch with the consumption market. Chinese new energy generation planning focuses on the development of resources and lacks a solution to the problem.

2.2.2 Lack of first-class core technologies

New energy generation is a technology-intensive industry. At present, Chinese wind power core technology mainly depends on western European countries. The core technology of solar PV is to refine crystalline silicon. The common technology for producing crystalline silicon in China is reserved by Japanese enterprises. The lack of first-class core technology has restrictive effect on the development of Chinese new energy generation industry.

2.2.3 Short of strong basic work's support

The basic work of the new energy generation industry has not been improved, mainly in the following aspects.

(1) The resource assessment error is large. The survey and evaluation of wind energy resources mainly rely on the observation records of weather stations and wind towers in a limited period of time, which are obtained by means of statistical analysis, resulting in a large gap between the wind energy assessment results and the actual situation.

(2) It is difficult to manage the power grid scheduling plan. The randomness, intermittency and fluctuation of the power generation capacity of new energy make it difficult to predict the power generation output of new energy, the accuracy is low, and the power grid scheduling management is difficult.

(3) The ability of testing and certification needs to be strengthened. Limited by equipment and conditions, there is a certain gap between Chinese wind power testing and certification level and the international advanced level.

(4) The statistical standard of wind power's installed capacity is not clear, and it is difficult to make statistics on off-grid new energy. Because the statistical standard of wind power installed capacity is not clear, the statistical caliber of hoisting capacity, grid-connected capacity and other data is different, which is easy to cause confusion and misunderstanding in practical use. Limited by statistical means, it is very difficult to calculate the generation capacity of off-grid new energy sources.

2.3 Measures to deal with the development of new energy industry

2.3.1 Measures to be taken by the state

(1) Nowadays, with the rapid development of science and technology, the development of new energy generation industry can only be truly promoted if we have mastered the core technology. The state should formulate a series of policies to support the idea and increase investment in new energy generation technology innovation. What other step they should take is strengthening cooperation between scientific research institutions and relevant universities, so we can gradually crack down on all difficulties.

(2) The government should strive to balance the uneven distribution of concentrated areas of energy infrastructure and new energy resources, actively build infrastructure in new energy distribution areas, intensify construction of key projects. Last but not least ,it can also improve the management standard of grid connection.

(3) People need change their awareness of energy consumption. The development of the new energy generation industry cannot be completed by the state alone.

2.3.2 The measures what relevant enterprises should do

(1) The enterprise should strengthen the management to ensure the smooth and effective operation of the power supply system.

(2) The enterprise should strengthen the connection and coordination of infrastructure construction, energy development, power transmission and power supply to avoid the occurrence of disconnection.

(3) The enterprise should get people respond to the national call, realize green and pollution-free, and actively participant in the environmental recovery camp.

3.The ideas of new energy development

Our responsibility to develop new energy sources is arduous. But the difficulty is not lack of thought. To get it, I learned a lot of references. The authors have their own points. And I summarize the ideas in the following. Let's get them now.

3.1 DC transmission technology

DC power transmission technology is the earliest and mature technology of power electronics technology in the field of power system transmission. For the large scale new energy DC technology, various degrees of researches have been carried out at home and abroad from different aspects of DC power network configuration structure, key equipment development, operation control and fault protection. References [13] studies a parallel DC collecting system for offshore wind power plants, and analyzes its network architecture, system control, high voltage DC/DC converter and other technical problems. References [14] studies a DC voltage rating sequence determination method that takes into account various technical and economic factors, such as the current limit value of DC power grid and the cost of running loss equipment. Literature [15] and literature [16] study the all-dc wind power plant scheme with booster station. The scheme can be further divided into parallel structure, serial - parallel structure, parallel - series structure and matrix structure.

3.2 Aggressive, orderly development of wind power

Firstly , eight gigawatts of wind power will be built in an orderly manner. Secondly, we will actively promote the use of inland wind energy resources. We will guide inland areas with relatively rich wind energy resources, such as hills and valleys. What we will do is giving full play to the advantages of being close to power load and having good access to power grids in order to develop off-grid wind power in light of local conditions. Thirdly, develop offshore wind power projects according to local conditions. After preparing for the evaluation of Marine resources and geological survey, the development experience of offshore wind power is summarized. It could be learned from the construction and operation of demonstration projects. The aim is to promote the progress of offshore wind power technology.

3.3 Solar photovoltaic power generation development

The development of solar photovoltaic power generation is in line with the idea of "large-scale centralized development, medium and high voltage transmission" and "decentralized development, low voltage local consumption". Construction of large-scale grid-connected solar PV power station projects in Dunhuang of Gansu province, Qaidam basin and Tibet. We will give full play to the advantages that solar photovoltaic power generation is suitable for decentralized power supply, and promote the use of photovoltaic power generation systems or the construction of small photovoltaic power stations in remote areas such as Tibet, Qinghai, Inner Mongolia, Xinjiang, Ningxia, Gansu and Yunnan to solve the power supply problem of the population without electricity.

3.4 The measures to develop biomass energy generation

In the main grain-cotton producing areas with abundant straw residue resources, large per capita and large cultivated land area, straw biomass energy are developed in an orderly way to generate electricity. In the key forest areas and areas where forest product processing is concentrated, in combination with the ecological construction of forestry, the forest residue and forest product are processed for the orderly development of forest biomass direct combustion power generation. In the area of "three north areas", the shrubbery planting base is constructed in combination with the construction of anti-sand and anti-sand ecological environment to develop the direct combustion power generation project of the residue of flat stubble of shrubby in an orderly manner. Direct combustion of sugarcane residue has been developed in the main sugarcane planting areas and the sugarcane processing areas.

3.5 Pilot studies on geothermal energy and Marine energy generation

Although China's geothermal power generation has a certain technical basis and production capacity, it can only be developed according to local conditions due to other development and utilization value of geothermal energy. We will actively promote pilot research and development of ocean energy.

4.Conclusion

With the continuous growth of load, increasing energy demand, aging power system structure, environmental protection problems, energy utilization bottleneck and high demand of power quality from users, new energy generation has become an irreversible trend. New energy generation looks promising on the surface, but as far as it is concerned, every new energy cannot completely replaced fossil energy. Therefore, it is more important for us to actively explore the future of new energy.

Reference

[1] ZHAO Jing, ZHAO Zheng-ming, ZHOU De-jia. Electrical applications. 2007(10).
[2] SU Zhong-e, SHI Rui. Electronic manufacture.
[3] ZHOU Xiao-xin, LU Zong-xiang, LIU Ying-mei, et al. Proceedings of the CSEE, 2014, 34(29):4999-5008.
[4] KANG Chong-qin, YAO Liang-zhong. Automation of Electric Power System, 2017,41(9):1-11.
[5] YANG Xiu-min. Electricity technology in Hebei province, 2012-12-25.
[6] State grid energy research institute, Beijing: China electric developing trends[J]. Eletric Power, 2011,44(1):83-85.
[7] GUO Ji-wei, LI Qiong-hui, ZHOU Yuan-bing. Energy Technology and Economics, 2010, 22(1):11-14.
[8] HUANG Dong-feng. Energy engineering, 2008(2):24-27.
[9] State grid energy research institute. Beijing: Electric Power, 2011.
[10] LIU Jia-long, CAI Jing-jing, WANG Wei-qing. Electric Power, 2011, 44(4):11-15.
[11] WANG Xin-ying, et al. Ching journal electrical engineering, 2016, 37(3):837-847.
[12] AN Ting et al. China journal electric engineering, 2016, 36(11):2871-2879.
[13] SHI Gang, WANG Zhi-bing, CAO Yuan-zhi, et al. The grid technology, 2014, 38(11):3059-3064.
[14] YAO Liang-zhong, SHI Gang, CAO Yuan-zhi, et al. The grid technology, 2014, 38(9):2410-2415