



ELSEVIER

Contents lists available at ScienceDirect

Renewable and Sustainable Energy Reviews

journal homepage: www.elsevier.com/locate/rser

Overall review of distributed energy development in China: Status quo, barriers and solutions

Zeng Ming^a, Ouyang Shaojie^{a,*}, Shi Hui^b, Ge Yujian^a, Qian Qiqi^a^a School of Economics and Management, North China Electric Power University, Beijing 102206, China^b Shenzhen Power Supply Co. Ltd., Shenzhen 518001, China

ARTICLE INFO

Article history:

Received 8 October 2013

Received in revised form

6 April 2015

Accepted 19 May 2015

Keywords:

Distributed energy
Development status
Policy suggestions
China

ABSTRACT

As a good power supplement form of super power and large-scale energy base, distributed energy has the characteristics of less investment and flexible power generation. Facing with the double pressure of the sustainable development of energy use and environmental protection, it has become an efficient solution to meet the demand of load growth, reduce environmental pollution and improve the comprehensive utilization of energy and the reliability of power supply. However, the development of distributed energy starts relatively late in China and confronts many difficulties. So this paper analyzes the present development situation and existing problems of the distributed energy in China. Then it elaborates from the aspects of policies and regulations, technical specifications, price policy and grid-interconnection codes. At last, this paper puts forward relevant policy suggestions of the guarantee mechanism of distributed energy. This paper argues that, with the attention of the development of distributed energy increasing, a series of policies to promote the construction and interconnection of distributed energy will be introduced, and distributed energy will get scaled development in China.

© 2015 Elsevier Ltd. All rights reserved.

Contents

1. Introduction	1227
2. The development energy development present situation in China	1227
2.1. The construction situation	1227
2.1.1. Natural gas distributed energy	1227
2.1.2. Distributed photovoltaic	1228
2.1.3. Distributed wind generation	1229
2.1.4. Small hydropower	1230
2.2. The development trend	1230
2.2.1. Natural gas distributed energy	1230
2.2.2. Distributed photovoltaic	1230
2.2.3. Distributed wind generation	1231
2.2.4. Small hydropower	1231
2.3. Policies and regulations	1231
3. Existing problems and analysis of distributed energy development in China	1231
3.1. The policies and regulations	1231
3.1.1. Distributed natural gas	1231
3.1.2. Distributed photovoltaic	1231
3.1.3. Distributed wind power	1232
3.1.4. Small hydropower	1232
3.2. The technical aspect	1233
3.2.1. Distributed natural gas	1233
3.2.2. Distributed photovoltaic	1233

* Corresponding author. Tel.: +86 13426197078; fax: +86 10 61773140.

E-mail address: oysj0216@163.com (O. Shaojie).

3.2.3.	Distributed wind power	1233
3.2.4.	Small hydropower	1233
3.3.	Electricity prices	1233
3.3.1.	Distributed natural gas	1233
3.3.2.	Distributed photovoltaic	1234
3.3.3.	Distributed wind power	1234
3.3.4.	Small hydropower	1234
3.4.	Grid-connected	1234
3.4.1.	Distributed natural gas	1234
3.4.2.	Distributed photovoltaic	1234
3.4.3.	Distributed wind power	1234
3.4.4.	Small hydropower	1234
4.	Relevant policies recommendations	1235
4.1.	Policy guarantee mechanism	1235
4.1.1.	Strengthen the overall planning	1235
4.1.2.	Improve the relevant laws and regulations	1235
4.2.	Technical equipments safeguard mechanism	1235
4.2.1.	Build the technical standards	1235
4.2.2.	Enhance the technological innovation	1235
4.3.	The supporting price mechanism	1236
4.3.1.	Improve the mechanism of feed-in tariff	1236
4.3.2.	Perfect the subsidy mechanism of grid connection	1236
4.4.	Grid-connected mechanism	1236
4.4.1.	Improve the quality of grid connection service	1236
4.4.2.	Speed up the matched grid construction	1237
5.	Conclusion	1237
	Acknowledgment	1237
	References	1237

1. Introduction

Distributed energy has advantages of high energy efficiency, clean and green, safety and flexible operation mode. As the fossil energy continuous depletion, environmental problem and the climate change have become increasingly prominent. The development of distributed energy has become a basic consensus and core strategy in many countries around the world [1,2]. Distributed energy refers to the distribution in the client-side energy comprehensive utilization system. It is an energy cascade utilization system which uses renewable energy or fossil fuels for energy supply to meet a variety demand of the users. Distributed energy combines electricity, heating and refrigeration technology, so that each level of the energy can give play to its most effectiveness [3,4].

With the rapid growth of China's economic, energy security has risen to national security. In 2009, China's energy utilization rate was only 33%, about 10% lower than the developed countries, and the energy consumption per unit of mainly products is 40% more than the world average level [5]. According to experts predict, China's installed generation capacity is 1 billion kW, and annual energy production is 4.6 trillion kW h in 2020 [6]. If still using the traditional generation mode, it will cause great threat to China's energy supply. Meanwhile fossil energy consumption will cause serious environmental pollution and greenhouse gas emissions [7,8]. In conclusion, the energy development in China is facing energy mix, energy utilization efficiency, energy supply security, environmental pollution and so on [9]. Distributed energy system realizes the cascade reasonable and comprehensive utilization of energy, improve the energy efficiency [10]. What is more, because of using clean natural gas and renewable energy generation, the distributed energy system has low pollution emissions and the effects of energy saving and emission reduction are very obvious. So the system greatly reduces the environmental cost of economic operation [11–13]. Distributed generation operation flexibly, facing

the user directly. In the event of large power grid emergencies caused by natural disasters, distributed generation can help ensure the safety of local small power supply, reduce the power supply rely too much on the centralized power system, improve the ability to resist natural disasters and unexpected events [14]. Therefore, developing distributed generation is the inevitable requirement to improve the energy efficiency, and to promote of energy conservation and emissions reduction [15].

This paper expounds on the current situation of the development of distributed energy in China, seeks the problems existing in the development of distributed energy, and analyzes the causes of the problems. And it gives the relevant suggestions about promote the development of distributed energy combining with the actual situation in China.

2. The distributed energy development present situation in China

Distributed energy in China mainly includes: natural gas distributed energy, distributed photovoltaic, distributed wind power, and other forms of power supply. In some remote mountainous area, there are a number of small hydropower stations, which are also a kind of distributed energy in the broad sense. In this section, the construction situation, development trend, and the related policies and regulations are analyzed based on the various types of distributed energy respectively.

2.1. The construction situation

2.1.1. Natural gas distributed energy

The development of natural gas distributed energy in China is in its infancy. In recent years, under the support of government and enterprises, China's natural gas distributed energy gets preliminary development, mainly in Beijing, Shanghai, Guangdong, Sichuan, etc.

Download English Version:

<https://daneshyari.com/en/article/8116372>

Download Persian Version:

<https://daneshyari.com/article/8116372>

[Daneshyari.com](https://daneshyari.com)