



Focus on the development of offshore wind power in China: Has the golden period come?



Xin-gang Zhao*, Ling-zhi Ren

School of Economics and Management, North China Electric Power Univ., Beijing 102206, China

ARTICLE INFO

Article history:

Received 13 February 2014

Accepted 30 March 2015

Available online 11 April 2015

Keywords:

China
Offshore wind power
Policy
SWOT

ABSTRACT

In recent years, Chinese Government paid more attention to the exploitation of offshore wind power, and it became an important trend in the development of wind power industry. However, the development of offshore wind power in China was still in the initial stage. Compared with land-based wind power, the development of off-shore wind power had not only weaknesses and uncertainties, but also strengths and opportunities. In order to research the development of offshore wind power, this paper summarized the aspects on policy, market, technology and development planning of offshore wind power in China, and then adopted SWOT method to analyze the influencing factors, which impact on the development of China's offshore wind power. At last, this article analyzed the internal and external factors that affect the golden period of offshore wind power development, and drew a conclusion that the golden period of offshore wind power in China will come in the future, and most likely around 2020.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

1.1. Background

Over the past decades, wind power, as an important technology of renewable energy generation, experienced a sustained and rapid development in the globe. However, the development has focused almost entirely on onshore wind power. Due to technical bottleneck, high construction costs and other reasons, installed capacity of offshore wind power grew slowly before 2008. As many countries attached more importance to it, especially in Europe, the installations grew rapidly after 2008. In general, offshore wind development in Europe was tending to be mature. Before 2000, all of the offshore wind power farms were distributed in Europe, mainly in Denmark and the Netherlands. Moreover, single turbine capacity was below 1 MW [1]. From 2000 onwards, offshore wind power in UK started to develop rapidly and surpassed other European countries gradually, ranking the first in the world in terms of development speed and installed capacity. At present, more than 90% of global near-shore wind power installed capacity is concentrated in Europe.

Besides, offshore wind power in North America and Asia was being received increasing attention. For examples, in North America, America started to accelerate the exploitation of offshore wind farms, and the capacity would reach 10 GW by 2020 and 54 GW by 2030 respectively, based on its planning. In Asia, in addition to China, South Korea and Japan also showed great interest in offshore wind power. The South Korean Government was urging domestic enterprises to carry out the research and development (R&D) of offshore wind power equipment, and planned to develop 400 MW offshore wind demonstration projects by 2016. And then the installed capacity reached more than 2 GW by 2020 [2].

Wind power industry in China has made significant achievements over the past decade. By the end of 2013, the cumulative installed capacity reached to 91423 MW, accounting for 28.7% of the global total capacity. Unlike onshore wind power, offshore wind power in China began to develop in 2007 and was still in its infancy. In “twelfth five-year plan” of wind power, the Chinese government proposed an ambitious plan that the installed capacity of offshore wind power reaches 5 GW by 2015 and 30 GW by 2020 respectively. Besides, most of coastal provinces and cities have completed the planning of offshore wind farm, and acquired examination and approval of National Energy Administration (NEA). However, the growth of offshore wind installed capacity was much slower than that expected. The installations were only 428.6 MW and less than 10% of the 2015 plan objectives. In August 2014, National Development and Reform Commission (NDRC) imposed “offshore wind

* Corresponding author. Tel.: +86 10 51963571, +86 130 41157885 (mobile).
E-mail address: rainman319@sina.com (X.-g. Zhao).

power feed-in tariff policy”, and supported the development of offshore wind power. It may be a good start. But when will the rapid development of offshore wind power in China be realized? This paper will give analysis and solutions to the question.

1.2. Literature review

As an impotent trend of wind power, offshore wind power was paid attention by large numbers of scholars. Rehana Perveen et al. (2014) [3] elaborated the present scenario, challenges and opportunities in development of offshore wind power. M. Dicorato et al. (2011) [4] studied the economic issues on costs in the pre-investment and investment periods of off-shore wind projects. As for the development of offshore wind generation, many scholars put forward their own viewpoint. Hilde M et al. (2015) [5] argued that the effects of onshore wind power on offshore wind power had a dual character: on the one hand, the former development could provide technical support for the development of off-shore wind power; on the other hand, the dominant discourse in the former development would hinder the development of offshore wind power. Xiaojing Sun et al. (2012) [6] believed that offshore wind generation would lead technology advances in the wind power industry in the future. Bob van der Zwaan et al. (2011) [7] found that the learning rates of offshore wind generation were only 3%–5%, and relatively low compared with those observed for other technologies. Besides, scholars also researched on the GHG emissions issues concerning offshore wind generation, and some investigators believed it had good reduction benefits. Hanne Lerche Raadal et al. (2014) [8] point out that the platform/foundation steel masses were main source of the overall GHG emissions of offshore wind generation. Britta Reimers et al. (2014) [9] held that offshore wind power was a promising option for the GHG emissions reduction and could help to make the GHG reduction goals into reality. M. Dolores Esteban et al. (2011) [10] argued that it was necessary to promote the development of offshore wind power to achieve the emission reduction targets established in the Kyoto Protocol.

Concerning the research on China's wind power, many scholars held optimistic views. Dong Jiang et al. (2013) [11] held that the developing potential was great. Xi Lu et al. (2013) [12] pointed out that approximately 28% of the overall off-shore wind potential could be developed to replace thermal power in China's coastal areas. Lixuan Hong and Bernd Moller (2011) [13] confirmed that the economic potential of off-shore wind energy in China could contribute to 56%, 46% and 42% of the coastal region's total electricity demands in 2010, 2020 and 2030. James Yu and Jie Zheng (2011) [14] believed that offshore wind generation in China played a critical role in meeting the renewable energy goals. In order to promote the offshore wind power development, Chinese Government proposed an ambitious development target for offshore wind power in “twelfth five-year plan” of wind power, and the installations of offshore wind power reached 5 GW by 2015 and 20 GW by 2020. However, some investigators were pessimistic about the development goal. For example, James Yu and Jie Zheng (2011) [14] considered that the installations of offshore wind power reached approximately 2000 MW by 2015, much less than the planning goals of China. In terms of the lack of detailed energy policy, network constraints, offshore wind installation difficulties and quality issues in the manufacture of turbines. Lixuan Hong and Bernd Möller (2012) [15] implied that only 40–70% of the development goal could be achieved under significant progresses of offshore wind turbine technologies.

With regard to the development of China's off-shore wind power, many scholars presented suggestions for the development of China's offshore wind power from different perspectives. Lixuan

Hong and Bernd Möller (2012) [15] suggested that a stable provincial feed-in-tariff system for offshore wind power and long-term policies contributing for technological learning should be launched in order to achieve the ambitious plan. Jinjin Chen (2011) [16] studied the development of offshore wind power in China comprehensively, and pointed out that Chinese government formulate economic policies, including offshore wind power price policy, tax policies and loan policies etc., to promote offshore wind power development. Zhang Da et al. (2011) [17] suggested that Chinese government pay more efforts in the coordination between central and local government, better mechanisms for concession and SOEs' (State-owned Enterprise, SOE) participation, the size and quality of turbine, grid connection and RPS (renewable portfolio standard), internalization of coal-fired power's external cost, and international cooperation. Wang Zhixin et al. (2009) [18] pointed out that the development of offshore wind power must be related to economic movement, and China should strengthen the basal theory investigation, exploitation, demonstration and training in the development of offshore wind power. Both Ye Tao et al. (2013) and Haiping Sun et al. (2013) indicated that China should formulate and implement a benchmark price, and provided the reference prices for offshore wind power [19,20].

In addition, Jie Wu et al. (2014) [21] analyzed the existing issues and obstacles in the construction process of China's offshore wind farms based technical, economic, and national policies. Although there were a few literature to research offshore wind power in China, the analysis of these relevant literature did not involve the golden period of offshore wind power in China. Based on the existing literature, we comprehensively reviewed the status quo and development planning of offshore wind power in China, and wish to give an answer whether golden period of offshore wind power development in China is coming or not. This paper was organized as follows: Section 2 elaborated the development situation of offshore wind power policies, market and technology. Section 3 summarized the planning roadmap of offshore wind power in China. Section 4 adopted SWOT model to analyze China's offshore wind power. Section 5 discussed the issues on the golden period of offshore wind power and provided conclusions.

2. Status quo

2.1. Policies

Appropriate policies play a critical role in the development of offshore wind power. The Chinese government has enacted a series of policies to support its development since 2005. These mainly include the supports for R&D (2005–2013), projects planning (2009–2014), construction management (2010–2011), and the most recent prices — franchise bidding price (2010) and benchmark price (2014).

2.1.1. The supports for research and development (R&D)

The NDRC and Ministry of Industry and Information Technology (MIIT) enacted some policies to support the R&D of offshore wind power from 2005 to 2013 (See Table 1). In 2005, the NDRC made the development guidance catalog of renewable energy industry, and the technology R&D of offshore wind power turbines was listed in the guide catalog, it indicated that Chinese government start to focus on the offshore wind power. In the “Eleventh Five-Year” period, China started to develop the technology R&D, experiment and pilot demonstration of offshore wind power in the coastal wind power bases. In recent years, Chinese government has been encouraging developing the technology and manufacturing of offshore wind power turbines.

Download English Version:

<https://daneshyari.com/en/article/6767324>

Download Persian Version:

<https://daneshyari.com/article/6767324>

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