



ELSEVIER

Contents lists available at ScienceDirect

## Renewable and Sustainable Energy Reviews

journal homepage: [www.elsevier.com/locate/rser](http://www.elsevier.com/locate/rser)

# Analysis on investment strategies in China: the case of biomass direct combustion power generation sector



Zhao Xin-Gang, Feng Tian-Tian\*, Ma Yu, Yang Yi-Sheng, Pan Xue-Fu

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

## ARTICLE INFO

## Article history:

Received 25 December 2013

Received in revised form

20 July 2014

Accepted 21 October 2014

## Keywords:

Biomass

Direct combustion power generation

Investment

Strategy

## ABSTRACT

To adjust the energy structure, protect the environment and deal with climate change, China has proposed that non-fossil energy would constitute 15 percent of the total energy consumption at the end of the “13th Five-Year Plan” period (2016–2020), and the use of biomass would account for 4 percent of primary energy consumption. Firstly, the current situation, the internal environment and the external environment of the biomass direct combustion power generation are analyzed. Then, the financial model of biomass direct combustion power generation project is established, and contrasts with other major new energy projects are carried out in terms of operation models, opportunities and risks so as to explore the investment features of this project in depth. Finally, appropriate investment strategies are proposed with respect of the investors, and policy recommendations for the development of the industry are attempted as well.

© 2014 Elsevier Ltd. All rights reserved.

## Contents

1. Introduction	760
2. The current situation of biomass direct combustion power generation in China	761
2.1. The current situation of power generation	761
2.2. Internal environment	762
2.2.1. Investment entities	762
2.2.2. Technology	762
2.2.3. Resource and market	763
2.2.4. Operation model	763
2.3. External environment	763
2.3.1. Industrial policy	763
2.3.2. Opportunity and risk	764
2.3.3. Energy crop	764
3. Investment features of biomass direct combustion power generation project in China	764
3.1. Industry life cycle	764
3.2. Project financial model	766
3.3. Comparison of operation models	768
3.4. Comparison of opportunities and risks	769
4. Investment strategies and policy recommendations	769
4.1. Investors analysis	769
4.2. Investment strategies	770
4.3. Policies recommendations	770
5. Conclusion	771
Acknowledgment	771
References	771

\* Corresponding author. Tel.: +15810232713.

E-mail address: [fengtiantian89@163.com](mailto:fengtiantian89@163.com) (F. Tian-Tian).

## 1. Introduction

In 2011, China's total GDP was 47 trillion Yuan, which accounted for 10.48 percent of the world. In the same year, China's total power generation was about 4.7 trillion kWh, accounting for 21 percent of the world's, which for the first time was greater than the United States whose total power generation was 4.3 trillion kWh and ranked first in the world [1]. China's energy consumption per unit of GDP is about twice than the world average. Given national energy security, global environmental crisis and international pressure on China, China should promote tasks on energy conservation and emission reduction, and also increase investment in renewable energy [2]. To adjust the energy structure, protect the environment and deal with climate change, China has proposed that non-fossil energy would constitute 15 percent of the total energy consumption at the end of the "13<sup>th</sup> Five-Year Plan (2016–2020)" period (European Union has proposed that by 2020, the renewable energy consumption would account for 20% of total energy consumption and the renewable generation would account for 30% of total electricity generation) and CO<sub>2</sub> emissions per unit of GDP would decrease 40%–50% from 2005 levels [3]. Thus the renewable energy has become an important factor for strategic and emerging industries. Currently, including the five major power groups, China Guangdong Nuclear Power Group and China Energy Conservation & Environmental Protection Group, the large state-owned energy investors focus their renewable investments mainly on the wind power projects and solar energy projects. However, their actions involve few or even no practical cases in the biomass direct combustion power generation, waste-fired power generation, biomass gasification, biomass solidification, biomass liquefaction, geothermal power generation and so forth. This investment strategy which relies too much on wind power faces enormous risks of single renewable energy [4].

Recently, foreign biomass power industry has realized scale production and industrialization. For example, in the United States and the European Union, biomass power generation has been extensively used and become a basic generation form of the existing distribution systems. China has many kinds of biomass resources contain 50 million tons which are about four times of China's current total energy consumption. According to the major development goals defined by China's "medium-and-long-term renewable energy development plan", by 2020, the annual use of biomass will have accounted for 4% of primary energy consumption and biomass power generation capacity will have reached 30 gigawatts [5]. At present, China's biomass power industry is at a critical stage of development. On one hand, the internal demand of China's economic and social development and the external strategic opportunities brought by the world economic development urgently require the full and accelerated development of biomass power generation industry; on the other hand, the fact that China's biomass power generation companies generally endure loss or even little profits severely restricts the industry's own development and the dynamic evolution [6]. First, it is because the current pricing policy fails to effectively promote biomass power generation industry which still stays in the introduction period. Although the renewable energy cost-sharing policy has been implemented, the current fixed price and premium price is hard to compensate for the companies' production costs. Second, although a competitive market between the supplying and purchasing parties of straw has already initially formed, due to the current introduction period, market growth and the economic behavior of market economy actors, the government should make relevant industrial development policies (pricing policy and incentive policy) to give effective guidance and strong support. Thus, this article analyzes the situation of biomass direct combustion power generation as well as the internal and external environment

of this industry in China, explores the characteristics of the investment of this project in depth to establish a financial model, analyzes opportunities and risks of the project and then proposes appropriate investment strategies and policy recommendations.

## 2. The current situation of biomass direct combustion power generation in China

### 2.1. The current situation of power generation

With the exception of its feedstock, the principle of direct biomass combustion power generation is same as conventional thermal power generation. Biomass fuels involve corn stalks, wheat straw, rice stem, bark, sawdust, branches and other agricultural and forestry wastes. Biomass resources have been in widely used in China and many other countries around the world. In 2010, the global installed capacity of biomass-fired power plants was about 50 GW and kept increasing 4%–5% annually, among which the installed capacity was less than 100 MW in most of the biomass-fired power plants. In 2012, the installed capacity of China's biomass-fired power plants (bagasse power generation not included) was up to 3.37 GW [7]. As is shown in Fig. 1, the new capacity of biomass power plants has maintained at a relatively stable level for nearly six years. Fig. 2 is based on China's medium-and-long-term plan of biomass energy and the actual development situation of biomass industry this year: it shows that by 2015, the capacity of agriculture and forestry biomass direct combustion power generation may reach 4.5 GW, and 7.5 GW till 2020 [8]. In 2010, new capacity was up to 650 MW while it remained 360 MW–500 MW in the other five years.

Through literature review on industrial analytic theories and models, such as strategy management theory, PEST model, Porter model and SWOT analysis model, the environment analysis of a company includes the internal environment analysis and external environment analysis. The internal environment analysis focuses on the company's own conditions, while the external environment analysis on the general environment and industry environment. Likewise, the environment analysis of an industry can also follow this way. The internal environment of an industry includes factors that exist within the bounds and control of the industry, which will directly

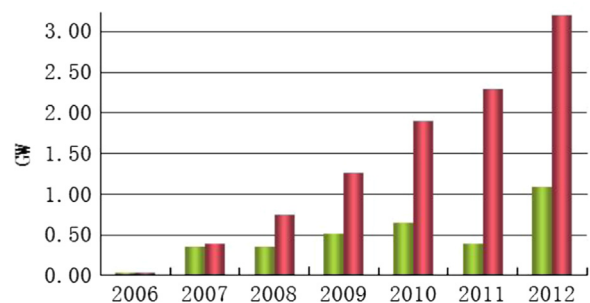


Fig. 1. New (green color) and cumulative (red color) installed capacity of China's biomass power generation from 2006 to 2012.

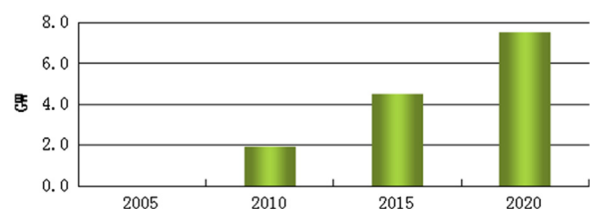


Fig. 2. Installed capacity planning and expectations of the biomass direct combustion power generation in China.

Download English Version:

<https://daneshyari.com/en/article/8117975>

Download Persian Version:

<https://daneshyari.com/article/8117975>

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