Literature Review on Overcapacity of Photovoltaic Industry from the Perspective of Supply-side Reform

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Abstract: In recent years, overcapacity restricts the healthy and sustainable development of photovoltaic industry, which has a serious impact on China's economic growth and stable operation. Supply-side structural reform is imminent. This paper focuses on the causes and solutions of photovoltaic overcapacity. It is found that the current academic research mainly focuses on the formation mechanism and resolution strategies of Chinese photovoltaic overcapacity. Therefore, this paper further discusses the limitations of the existing research and the future research direction, in order to provide a useful reference for deepening the supply side reform and the high-quality development of photovoltaic industry.

1. Introduction

At present, China is in the crucial period of economic transformation and upgrading. Affected by the macroeconomic environment, such as the rising cost of resource elements, the adjustment of energy structure, the slowdown of economic growth and the lack of global growth momentum, the problem of overcapacity has become increasingly prominent.Data shows that the capacity utilization rate of traditional industries is between 70% and 75%, far lower than the internationally recognized reasonable level of 80% to 85%.Photovoltaic industry as the main thrust of healthy and sustainable economic development, its capacity utilization rate is even less than 60%. With the rapid development of the industry, it is facing a serious overcapacity crisis.If the developing strategic emerging industries can not resolve the excess crisis in time, it will inevitably lead to a series of problems, such as vicious market competition, low economic efficiency, excessive blind investment, distorted resource allocation, imbalance of market supply and demand (Yifu Lin et al., 2010; Junjie Cheng , Zhibiao Liu , 2015;zonglai Kou et al., 2017)[1-3]. In the long run, it will not be conducive to the transformation and promotion of industrial structureIt and it is not conducive to the healthy development.

Therefore, on the one hand, combing the basic point of view of photovoltaic overcapacity will help to clarify the dilemma and state of the current overcapacity; on the other hand, analyzing the policy path to solve the overcapacity will also help look for suitable photovoltaic policy and early warning mechanism in line with national conditions. In order to prevent a new round of overcapacity in strategic emerging industries, we should formulate overcapacity governance policies with Chinese characteristics, expand ideas and provide suggestions.

2. The Controversy of Photovoltaic Overcapacity

At present, there are different opinions on whether overall photovoltaic industry chain is surplus or not, but the view that there is structural surplus in photovoltaic industry in our country is accepted by many mathematicians.Resource endowment is one of the determinants of structural surplus. The status quo of raw materials, technology and products in photovoltaic industry leads to structural surplus in the whole industrial chain (Bai Xuejie, Yan Wenkai, 2017)[5].The lack of innovation ability of enterprises is the key factor leading to the "three ends out" of photovoltaic industry, and also the root cause of structural overcapacity, which restricts the healthy and sustainable development of Chinese photovoltaic industry (Jianxing Yu, Yin Wang, 2017)[6].

The central government's ineffective intervention and local government's excessive intervention also constitute the overcapacity of the photovoltaic industry, and the degree of overcapacity of the whole industry and each link is closely related to the degree of government intervention in different links. The greater the degree of government intervention, the more serious the degree of overcapacity (Donghua Yu, Yinan Lv, 2015)[7].At the same time, local government intervention may weaken the effective allocation of resources to resolve overcapacity.In addition to excessive government subsidies, some government officials'optimistic expectations of the development prospects of strategic emerging industries will also lead to a large number of factor investment and investment boom, resulting in factor price distortion, resource mismatch, etc., resulting in overcapacity.(Manfeng Liu,Xi Li et al., 2019)[8].For the enterprises themselves, the technology gap at different stages of economic development makes the enterprises in the technology latecomer countries increasingly identify with investment opportunities, leading to the "surge phenomenon" of investment, and causing excess capacity that may be independent of the external conditions of the industry or the impact of economic cycle fluctuations (Yifu Lin, Hemao Wu, et al., 2010)[1].

Yifu Lin and others believe that the initial development of developing countries is often driven by investment, so the occasional overcapacity in developed countries may continue to appear in a series of industries in developing countries with rapid development, and the situation is serious. However, some scholars are opposed to this view. They think that the current predicament of photovoltaic industry is not caused by the industry life cycle movement, but because the "photovoltaic New Deal" avoids the essence of overcapacity and cannot fundamentally prevent and solve overcapacity (Dinghuan Shi, 2009)[9]. It is considered that Chinese new energy surplus problem is only a short-term periodic excess problem with the characteristics of industry cultivation stage, that is, the rising and falling trend of overcapacity in photovoltaic industry is in line with the characteristics of emerging industry development stage, and it is not a real sense of excess (Hui Wang, Yueyou Zhang, 2015)[10]. This kind of scholars believe that some or several uncertain factors make the photovoltaic industry temporarily surplus. It is wise to treat the "photovoltaic surplus theory" rationally and improve the new energy market through the visible hands of the government, rather than blindly suspend or excessively slow down the development process of new energy.

Only a few scholars believe that there is no overcapacity crisis in China.Chunping Zhong and Li Pan (2014) [4]believe that due to the lack of scientific and reliable measurement methods and statistical data, the problem of overcapacity in China has been overemphasized, and the capacity utilization rate of most industries is still within a reasonable range.According to this kind of scholars'point of views, the actual capacity of photovoltaic enterprises is not excess, but due to the data deviation caused by the non-uniform standard, the fact is distorted.

3. Policy Choice

In recent years, with the rapid expansion of the production scale of domestic photovoltaic industry and the double negative survey of European and American countries, the supply-side reform is facing a severe test. In order to speed up the implementation of the "Three go, one drop, one supplement" of emerging industries, provinces and cities have issued relevant policies in combination with their own actual situation, providing relevant reference for the high-quality and high-efficiency development of photovoltaic industry.

department	The realization path of addressing overcapacity
Jiangsu	In August of 2019, the Jiangsu Provincial Department of industry and information technology issued
	the notice on improving the differentiated electricity price policy to strictly implement the
	differentiated electricity price policy; in March 2020, the provincial development and Reform
	Commission issued the opinions of the provincial government on promoting the development of green
	industry to put forward opinions on the transformation and upgrading of photovoltaic manufacturing.
Guangdong	actively promoting the large-scale application demonstration of distributed photovoltaic power
	generation in the industrial park; building ground photovoltaic power generation projects according to

Table 2 Realization Path Of Addressing Photovoltaic Overcapacity in Some Provinces

	local conditions; improving the photovoltaic power generation research talent system and grid connection management and service system and starting the construction of green financial reform
	and innovation pilot zone.
Shandong	issuing land policies for photovoltaic to strictly control the construction scale of centralized photovoltaic power stations; reducing the proportion of abandoned photovoltaic power and limiting electricity;organizing the preparation and implementation of three-year plan for poverty alleviation by taking counties as units and expanding the scope of solar power consumption in the "Three North" areas by combining local consumption and expanding external transmission.
Qinghai	Having invested 13.6 billion yuan in the construction of energy consumption projects and successively constructed 17 new energy collection and transmission projects and 10 main power transmission and transformation projects which are directly serving new energy consumption; standardizing market-oriented transaction operation and providing simple and efficient grid operation services; actively developing the export market and carrying out export transaction by using the mechanism of aid to Qinghai.
Inner	In 2021, the Dalate photovoltaic power generation project will be completed, and the development
Mongolia	focus will be shifted from silicon crystal industry to the construction of photovoltaic power station.
	governance will be put forward.

4. Conclusion

The existing research literature on the overcapacity of photovoltaic industry in China has made a more perfect discussion and analysis on the concept, formation mechanism, resolution strategy and industrial policy of overcapacity, and formed a representative point of view. However, domestic research in the overcapacity measurement and early warning research of photovoltaic industry is slightly weak, it not only lacks of the use of statistical data or logical reasoning models, but also lacks of quantitative empirical research. Therefore, the establishment of measurement standards and empirical research with Chinese characteristics need to step up.

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