Prospects for Sino-Indian Cooperation in PV and Wind Energy Industries in the Post-COVID-19 Era

Zhen Cheng

Master Degree Candidate, School of Foreign Languages and Literatures, Lanzhou University, Gansu Province, 730000 ,China.

jane_zhencheng@foxmail.com

Keywords: COVID-19; Sino-India Relation; PV; Wind Energy; Cooperation

Abstract: After the outbreak of COVID-19 pandemic, India changed its strategy toward China, and the bilateral relationship was severely deteriorated. At present, positive developments have been made in the border standoff between China and India, which would help improve the bilateral relations. As there were substantial divergences of cooperation in traditional areas between China and India, it is very likely that they will seek new areas to achieve an all-win result in the future. By comparing the characteristics of solar energy and wind energy industries in China and India, this paper finds that on the basis of good cooperation in photovoltaic (short for PV) industry between the two countries, there is still a large space for cooperation in PV manufacturing in the future. Both countries are facing the dilemma of lack of independent research capability of core wind power technologies, so there is also potential for cooperation in the field of wind power technology.

1 Introduction

The Paris Agreement passed in 2015 has made the optimization of energy structure and low-carbon economy a global energy development trend. Moreover, the reform has changed the world power pattern gradually. Accidentally, the Covid-19 epidemic has accelerated the changes of the international landscape, shrunk the global economy drastically, and caused a sharp decline in Sion-India relations. And cooperation between India and China in many fields has been impacted, such as India's ban on a number of Chinese Apps and the prohibition of Chinese enterprises from bidding for Indian infrastructure projects. Recently, however, there have been some good signs, such as an agreement to disengage troops along the border, and according to Al Jazeera, China and India will take part in joint naval exercises with Iran and Russia. Although the trend of Sino Indian relations is still affected by many factors, it appears that the situation is tending to ease [1].

Due to the declining willingness of the two countries to cooperate in traditional areas such as trade, they are likely to cooperate in new areas in the future. Furthermore, both of them are faced with common problems such as energy security, technology monopoly and western hegemony. Thus, it is crucial that the two developing countries cooperate in the field of new energy for the global climate governance, stimulating economic recovery and improving Sino-Indian relations. This paper compares the development of wind energy and PV between China and India, and explores the cooperation mode in the post epidemic era.

2 The Trend of Sino-India Cooperation in PV and Wind Energy Industries in the Post-COVID-19 Era

Cooperation between China and India has brought tangible benefits to the two countries. Bilateral trade has increased by about 32 times in the past 20 years and reached $100 billion in 2019. However, in recent years, India has pushed ahead with " Make in India " strategy, imposing tariffs on Chinese imports. After the outbreak of COVID-19 pandemic, India began to decouple from China's economy, promote De-Sinicization of the global industrial chain, and accelerate the pace of anti-dumping investigation against China. In order to counterbalance China,

India actively promoted the Quadrilateral Security Dialogue with the United States, Australia and Japan to accelerate Indo-Pacific Strategy. The current Sino-Indian relations hinder the economic circulation between the two countries, and, to a certain extent, also affect the cooperation of PV and wind power industries between them. In order to protect the local PV manufacturing industry, India imposed a 25% safeguard tariff on China's PV products in July 2018, which led to a 27% year-on-year decrease in China's PV module exports to India in the same year [2]. But this protective policy failed to improve the market competitiveness of India's PV manufacturing industry, increased the cost of the development of the industry and delayed the completion of the Nehru National Solar Energy Programme (short for JNNSM).

A sharp economic contraction, resulting from successive lockdown for controlling the epidemic, is a top priority for India. Playing an irreplaceable role in the international industrial chain, China is indispensable for India's economic recovery. Moreover, the two major developing countries have been in close contact with each other for many years. With similar energy structure, they also have similar demands in the field of new energy. Therefore, there are challenges as well as opportunities for the cooperation between China and India in PV and wind power industries.

3 Cooperation Potential in PV Industry between China and India

3.1 Development of PV industry in China and India

After Modi came to power, India's government promoted the renewable energy development plan and seek international influence in this field, establishing the International Solar Alliance with France in 2015. India's PV industry has made great progress, as shown in Table.1, the cumulative installed PV capacity of India increased to 3,673MW in 2014, with a year-on-year growth rate of over 300%. From 2008 to 2018, India's cumulative installed PV capacity grew at an average annual rate of 101.3%, and the capacity exceeded 35GW in 2019.

Table 1. The cumulative installed solar and wind power in China and India (GW) [3]

Year	Solar		Wind	
	China	India	China	India
2009	0.415	0.028	17.599	10.925
2010	1.022	0.039	29.633	13.184
2011	3.108	0.065	46.355	16.179
2012	6.719	0.566	61.597	17.3
2013	17.759	0.926	76.737	18.42
2014	28.399	3.673	96.819	22.465
2015	43.549	5.593	131.048	25.088
2016	77.809	9.879	148.517	28.7
2017	130.822	18.152	164.374	32.848
2018	175.237	27.355	184.665	35.288
2019	205.493	35.06	210.478	37.505

China issued several opinions on promoting the development of PV industry in 2013, and National Energy Administration issued "the 13th Five-Year Planning for Solar Energy Development" in 2016. China not only accelerated the development of local PV industry, but also committed to the sustainable development of global energy. In 2014, China established APEC Sustainable Energy Center. China's PV industry has made great progress, as shown in Table.1, the newly added installed capacity of PV was 1,040MW in 2013, ranking first in the world for the first time. In 2019, China's installed PV capacity reached 206GW, and the newly added installed capacity of PV exceeded 30GW, ranking the first in the world for seven consecutive years.

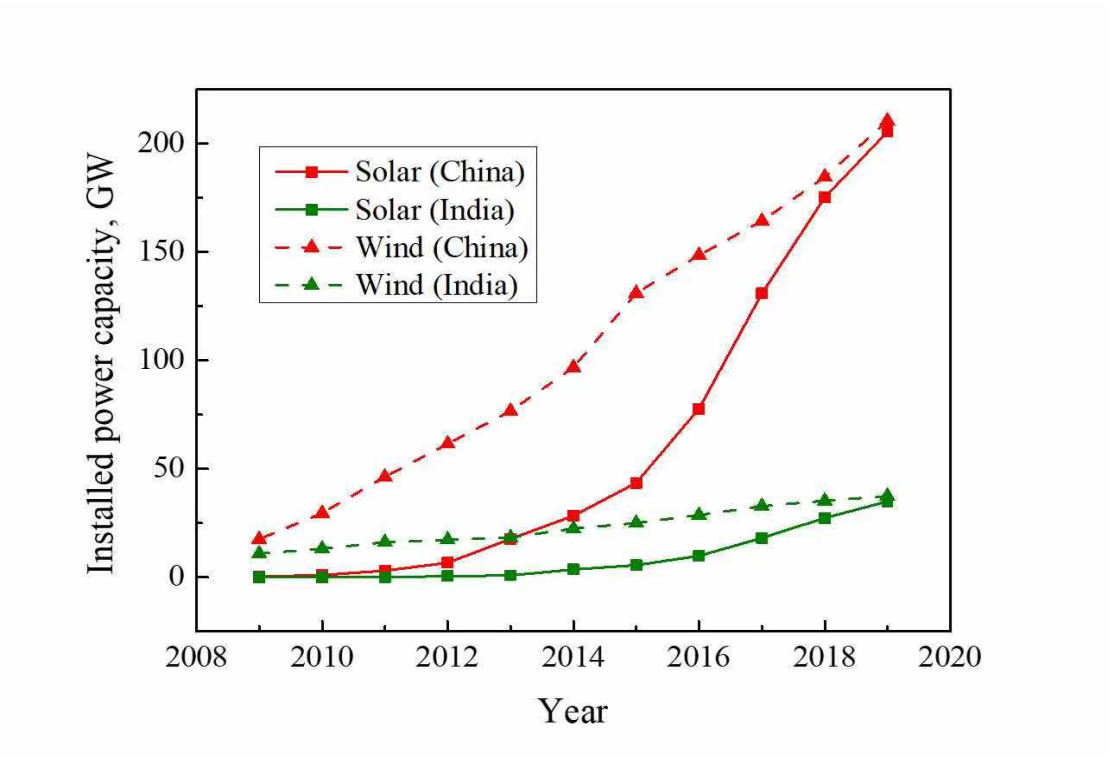

Figure 1. Development trend of solar and wind energy in India and China [3]

3.2 Characteristics of PV Industry in China and India

3.2.1 The Weakness of PV Industry in India

The lack of manufacturing capacity in India hindered the development of its PV industry, and the problem is further exposed in the post-COVID-19 era. In 2009, India launched the " Jawaharlal Nehru National Solar Mission " , which expects that the solar grid connected power generation capacity will increase to 100GW in 2022. The capacity of Indian PV cell and module manufacturing was only 3.2GW and 8.4 GW in 2017, respectively [4]. Affected by the COVID-19, the capacity of its installed PV in the first half of 2020 was 1.3GW, which caused a 60% decrease compared with the 3.2GW installed PV capacity in the first half of 2019.

3.2.2 The Advantages of PV Industry in China

The advantages of China's PV manufacturing industry are high quality, large output and low prices, which can meet the demand of India's PV industry. In 2019, PV modules in China are 15%-20% cheaper than those in India. In the first quarter of 2018, the average unit price of PV modules exported from China to India was US$0.34/W, which is close to the cost price including shipping costs. In 2020, the conversion rate of a solar cell developed by a China's company JinkoSolar reached 24.79%, setting a world record [7]. In the first half of 2020, 56% of string inverters in India came from China. Under the 15% protective tariff imposed by India, Chinese manufacturers still have a profit advantage. From a cost perspective, manufacturers of India still prefer to purchase Chinese PV products.

3.3 Prospects for Sino-India Cooperation in PV Manufacturing Industry

There is a good foundation for cooperation in the PV manufacturing industry between China and India. According to a survey from Mercom India Research, in the first half of 2020,the largest module suppliers in the Indian PV industry are all Chinese companies. In 2018, a plant in India invested by a China's PV company was officially put into production. The progress of the two countries' PV industry joint ventures has been slow down by the impact of the COVID-19. With the emergence of covid-19 vaccine and signs of recovery in bilateral relations, China and India have great potential for cooperation in PV manufacturing industry. The trend will be to build PV

companies jointly by the two countries in India.

The advantage of China's PV industry reflects in manufacturing technology, research capabilities and abundant capital, which makes up for the shortcomings of India's PV industry. As China's major overseas PV markets, India has cheap labor and abundant solar resources. In the future, China's PV companies can establish joint ventures with India in the form of technology transfer,helping India establish a mature PV manufacturing industry. This will not only solve the problems of incomplete PV industry chain, slow technological development and insufficient manufacturing capacity in India, but also give full play to their respective market competitiveness and technological innovation advantages in the PV field, and jointly expand the PV market of the two countries through exchanges and cooperation. India can also gradually liberalize the market, introduce Chinese PV companies, and stimulate local companies to work hard to develop technology and enhance their competitiveness in continuous cooperation and competition.

4 Cooperation Potential in Wind Energy Industry between China and India

4.1 Development and Current Situation of Wind Energy Industry in China and India

China and India have become indispensable forces in the development of global wind energy. In recent years, India has successively introduced relevant policies to promote the development of the wind energy industry. In 2003, India promulgated the Electricity Act, and the Ministry of New Energy and Renewable Energy implemented generation-based incentive in the 2009-2010 fiscal years [5]. In 2109, India's installed wind power capacity was 37.5GW, ranking fourth in the world, and the electricity price was 2.81 rupees/kWh, and nearly 35% lower than traditional fuels [8].

China's wind power industry has achieved remarkable results in the past ten years. In 2003, the National Development and Reform Commission (short for NDRC) issued a wind power resource concession plan, and in 2014, the NDRC issued the ''Notice on Offshore Wind Power Feed-in Tariff Policy''. As shown in Table.1, in 2011, China's total installed wind power capacity was 46,355MW, surpassing the US. And becoming the world's first for the first time. The capacity in China has grown steadily. In 2019, the number reached 210,478MW, an increase of approximately 14% year-on-year.

4.2 Characteristics of Wind Energy Industry in China and India

4.2.1 Innovative Characteristics of Wind Energy in China and India

The characteristics of wind energy innovation in China and India are low cost, uneven quality of turbines, and lack of core wind energy technologies. European companies have core intellectual property rights, their wind power technology is in a leading position in the world, and wind energy innovation is characterized by high quality, high cost, and the use of large wind turbines. Wind power companies in China and India have jointly developed technologies with European companies. China's wind power companies have obtained technologies from Europe through technology transfer and technical cooperation. China's Goldwind Technology Co., Ltd. obtained a direct-drive permanent magnet synchronous wind turbine (PMDD) through a cooperation with Germney's Vensys. Indian wind energy companies, including Suzlon, prefer mergers and acquisitions, acquisitions of European wind power companies' R&D departments and development of joint ventures, so India's reliance on foreign technology licenses is lower than China's [6].

4.2.2 The Same Factors Hindering the Development of Wind Power in China and India

Although both China and India have certain capabilities in wind turbine manufacturing, installation, operation and maintenance, as well as technological research and development, there is still a big gap between the core technologies of wind power and European countries. Both the two countries have weak wind power research and development capabilities, relying on European technology for a long time, and their competitiveness in the wind power market is limited. Technological innovation capabilities have become a key factor restricting the development of wind power of them.

4.3 Prospects for Sino-India Cooperation in Wind Energy Industry

Manufacturing technology is one of the key competitiveness of the wind power industry. China and India could strengthen cooperation in scientific research and development in the wind energy manufacturing industry. If the core technology of wind power manufacturing is mastered and the capacity of a single wind power unit is increased, the number of installed wind turbines and the initial capital investment of wind power construction can be reduced. Besides, the installation workload and later operating costs also can be decreased. Therefore, manufacturing technology plays a vital role in the overall development of the wind energy industry. In 2017, the world's new wind power unit capacity was 2.525MW, while China's new wind power unit capacity was only 2.111MW, slightly higher than India but lower than the world level. The newly added wind power unit capacity can reflect the level of wind power manufacturing to a certain extent. At present, China and India lack independent intellectual property rights in wind turbine manufacturing technology, and their R&D level is limited. In the future, the two countries can conduct experience exchange and technical cooperation in the wind turbine manufacturing industry to improve the manufacturing technology level of wind turbine bearings, turbines, and fan blades.

China and India can strengthen cooperation in the field of fan intelligence. At this stage, wind power has entered the stage of large-scale equipment. The development of high-power units needs to be considered in more complex conditions, and the operation of wind turbines also needs to be controlled by intelligent software. Chinese wind farms use European WT and Windpro software, which cannot solve the design errors caused by terrain conditions. Therefore, China needs to develop wind power software suitable for local geographical conditions. India's information technology industry is globally competitive, with 75% of the world's digital talents, and about 200 IT Indian companies located in more than 80 countries around the world [9]. Hence, China can take advantage of India's information technology industry to jointly build a wind power data platform and develop wind turbine software with India.

5 Conclusions

After the outbreak of COVID-19 pandemic, the relationship between China and India deteriorated severely. At present, a severe economic situation is led by India's successive lockdown for controlling the epidemic. Whist China plays a considerable role in the global industrial chain, which is difficultly replaced by other countries in a short time. In addition, China and India are facing the optimization of energy structure simultaneously,and they both put the development of renewable energy in the first place. Thus, India is likely to explore new ways to cooperate with China in this field. After comparing and analyzing the PV and wind energy industries in China and India in this report, the author found that the advantages of China's PV manufacturing industry can make up for the deficiencies of Indian PV industry. Due to both countries lacking the innovation capability of core technologies in the wind power industry,they may cooperate in the felid of wind turbine intelligence. Consequently, the international competitiveness of their respective PV and wind energy industries would be enhanced.

There are still uncertain factors in the development of Sino-India relations,and also many difficulties to overcome in the cooperation in the field of renewable energy. However, once the two countries reach a consensus, a broad platform can be built for the cooperation between the two countries. Moreover, cooperation and technical exchanges in the fields of PV and wind energy will become a significant link to maintain friendly relations between China and India.

References

[1] Urban, F., Zhou, Y., Nordensvard, J., & Narain, A.. (2015). Firm-level technology transfer and technology cooperation for wind energy between europe, china and india: from north–south to south-north cooperation?. Energy for Sustainable Development, 28, 29-40.

[2] China Chamber of Commerce for Import & Export of Machinery & Electronic Products. (2019).

Import and export analysis of Chinese photovoltaic products in 2018. China Electrical Equipment Industry. 2019(06):24-32.

[3].Data Sources:Statistical Review of World Energy 2020 | 69th edition.

[4]. Hayashi, D.. (2020). Harnessing innovation policy for industrial decarbonization: capabilities and manufacturing in the wind and solar power sectors of china and india. Energy Research & Social Science, 70, 101644.

[5]. China Chamber of Commerce for Import & Export of Machinery & Electronic Products. (2019). Analysis of Chinese photovoltaic cell product exports in the first quarter of 2018. China Electrical Equipment Industry. 2018(08):50-53.

[6].Jiang Hua, Jin Yanmei and Ye Xing. (2020). Review of China's PV industry in the first half of 2020 and outlook in the second half of 2020. Solar Energy. (09):5-13.

[7].Global Wind Energy Council. (2020). India Wind Outlook Towards 2022. P.13.

[8].Shijie Zhang. et al. (2020). China in Global Wind Power Development: Role, Status and Impact. Renewable and Sustainable Energy Reviews. 127, 109881.