

Study on Sustainable Development of China's New Energy Industry under the Background of Carbon Neutrality

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Abstract. The latest McKenzie Global Energy Outlook predicts that by 2030, new energy prices will be lower than existing coal and natural gas prices in most regions; by 2035, new energy sources (solar energy and wind energy) will account for more than 50% of the world's electricity generation. The global new energy industry will continue to accelerate in the future after years of its rapid development. Compared to the past, China's new energy industry has become an important industry leader instead of industry followers a decade ago. However, under the past achievements and carbon neutral constraints, China's new energy industry still needs to be strengthened and completed in the policies and regulations, absorption mechanism, technical research and development to promote the sustainable development of China's new energy industry.

1 Introduction

The global new energy industry has achieved rapid development in the past decade. The new energy capacity has reached 4 times the capacity of 2010. During that period, global investment in solar power reached \$1.3 trillion, accounting for half of the total global investment in new energy. By the end of 2019, global solar capacity was expected to be 26 times what it was a decade ago. It can be seen that the new energy industry has been paid attention by various countries around the world and has achieved rapid and fruitful development. Among them, the development of China's new energy industry has attracted worldwide attention. In a short period of more than ten years, China's new energy industry has achieved a qualitative leap from an industrial follower to an industrial leader. Looking back at the development process of China's new energy industry, it has overcome the problems of unadvanced technology and unclear development mode in the early stage of industrial development, and the industrial development is not limited to short-term difficulties. With the cost advantage of large-scale production as the entry point of industrial development, China's new energy industry has successfully realized the corner overtaking. On September 22, 2020, the Chinese government put forward at the 75th session of the UN General Assembly that "China will increase its nationally determined contributions, adopt more effective policies and measures, strive to peak its carbon dioxide emissions by 2030, and strive to achieve carbon neutrality by 2060." In this context, when the development of China's new energy industry has achieved great success, it is necessary to recognize the carbon neutral target that the industry is facing in the new stage of development, face up to the difficulties and

solve them, so as to consolidate the foundation of industrial development and lay a solid foundation for the long-term and sustainable development of China's new energy industry.

2 The development status quo of China's new energy industry

From the current situation of the development of China's new energy industry, China's new energy development and utilization represented by solar photovoltaic power generation and wind power generation have made remarkable progress. These advances and achievements are not limited to the existing new energy installed capacity and power generation but cover multiple dimensions of the development of the new energy industry.

In terms of solar photovoltaic power generation, by the end of 2018, China's cumulative installed capacity of photovoltaic power generation had exceeded 170 GW, and distributed photovoltaic installed capacity accounted for about 29%. The cost of photovoltaic power generation continues to decrease, with the cost of photovoltaic modules falling by nearly 90% in 2018 compared with a decade ago. And industry insiders predict that 35 percent of new PV projects from 2020 will achieve grid parity or low cost. In addition, from the perspective of photovoltaic equipment manufacturing, the technical level of photovoltaic materials and products continues to improve, the efficiency of single crystal and polycrystalline cell industrialization constantly grows, the industrialization scale of components and materials gradually expands, and the concentration degree of industry also increases.

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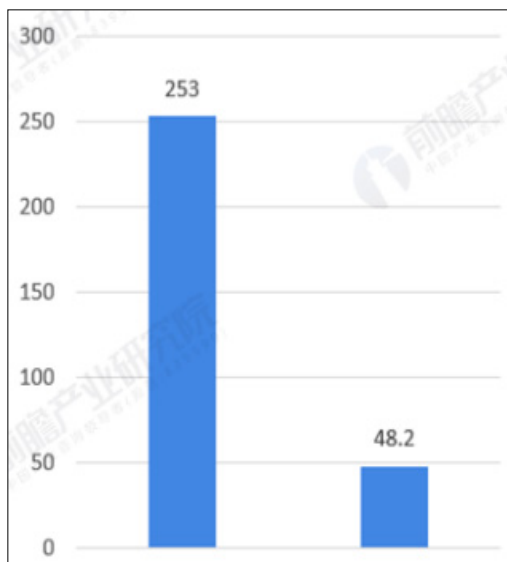


Fig. 1. China's Photovoltaic Market in 2020 (GW, KWH)
Data Source Foresight Industrial Research Institute

As for wind power generation, by the beginning of 2018, China's cumulative grid-connected capacity of wind power has reached about 164 million kW, an increase of 10% year on year. The cumulative grid-connected capacity of offshore wind power has reached 102 million kW, an increase of 37% year on year. The cost of onshore wind power has fallen year after year and is down about 46% from a decade ago. From the perspective of wind power equipment manufacturing, the industry competition is increasingly fierce and the market concentration continues to rise. The market share of the TOP5 wind turbine manufacturers has reached 67%. Among them, large capacity wind power generating units have been rapidly developed, hoisting technology and offshore wind power manufacturing has made a breakthrough, and wind power service industry has quietly emerged.

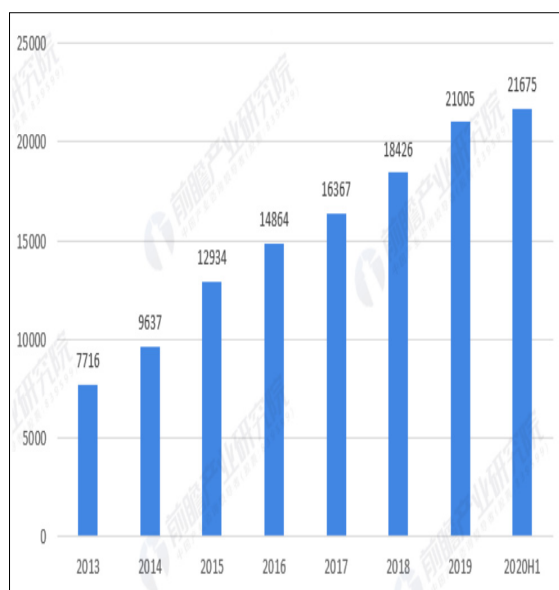


Fig. 2. China's Cumulative Grid-connected Installed Capacity of Wind Power from 2013 to 2020 (10MW)
Data Source Foresight Industrial Research Institute

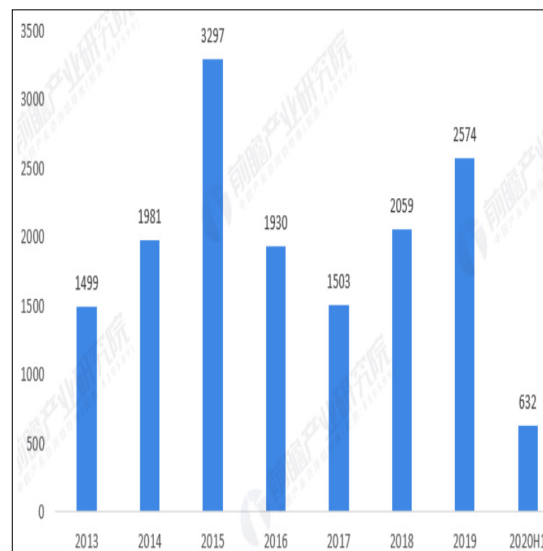


Fig. 3. China's New Grid-connected Installed Capacity of Wind Power from 2013 to 2020 (10MW)
Data Source Foresight Industrial Research Institute

In terms of the absorption of new energy, the problem of wind and light abandonment has drawn attention in recent years, and the market has improved the absorption of new energy power. In 2017, the average utilization hours of photovoltaic power stations in China increased by 74 hours compared with the same period last year. The national light abandoning power decreased by 20 million kW compared with the same period last year to 7.3 billion kW, and the light abandoning rate decreased by 7%. China's wind-curved power generation decreased by 7.5 million kilowatts year-on-year to 42.2 billion kilowatts. According to the data, the power quantity of wind and light abandoning has decreased, the consumption of new energy has increased, and the problem of wind and light abandoning has been alleviated to a certain extent. However, due to the influence of grid connection difficulties and other factors, the improvement degree is not very ideal.

Table 1. Biomass Energy Availability in China (Tons of standard coal)

Project	2010	2030	2050
Existing biomass energy	5.0	5.0	5.0
Increased biomass energy	0.3	4.7	5.8
Summation	5.3	9.7	10.8
Actual availability	3.3	8.2	9.8

In terms of policies and regulations for the development of new energy industry, the relevant systems and policies have been continuously supplemented. The normative documents successively issued by the National Development and Reform

Commission and the National Energy Administration have formed the institutional framework for industrial development. This is reflected in the setting of goals for the development and utilization of new energy, the promulgation of normative documents related to new energy power generation, the guarantee of institutional Internet access for new energy power generation, and the solution to the problem of wind and power abandonment. On the basis of existing policies and regulations and relevant documents to be issued soon, the initial framework of policies and regulations for the development of China's new energy industry has been basically completed.

3 Policy suggestions for sustainable development of new energy industry

3.1 Put in place a sound legal system and make timely changes to subsidy policies

In order to realize the sustainable development of China's new energy industry, relevant policies and regulations need to be further improved and a relatively complete policy framework system should be formed. On the one hand, in view of the changes in the development situation of the energy industry at home and abroad, China has formulated basic legal documents to coordinate the energy industry, economic development and environmental protection, so as to form programmatic laws for the development of China's new energy industry. On the other hand, we should improve the new energy development and utilization of the security system, such as new energy consumption laws and regulations, new energy utilization laws and regulations and the development of FIT system law; At the same time, in the case of the continuous development of the new energy industry, it is necessary to consider the addition of laws and regulations to cover the emergence of new business forms.

Over the years, the cumulative subsidies for new energy have continued to grow, and the burden generated by the subsidies has become increasingly heavy, leading to the unsustainable subsidy policy. Combined with the status quo of electricity market in China in recent years, the subsidies policy can reverse transmission of new energy power generation enterprises and industrial chain manufacturer at each end are more focused on the production decline in operating costs, make a more economic development of new energy projects are preferred, to promote coordinated development of new energy power generation and power consumption, ensure new energy project profitability. The abolition of subsidies will also further ease the consumption problems arising from new energy projects after they are put into operation. Under the current environmental constraints and carbon emission constraints, the imposition of carbon transaction tax and environmental tax on traditional energy generation can promote the competition of multiple power generation, which is conducive to the allocation of power resources

and the improvement of the efficiency of the power industry.

3.2 Solve the grid-connection problem, and constantly improve the absorption mechanism

In view of the current grid problems existing in China's new energy industry, the government departments can take measures to support the implementation of winter clean heating plan in the "three north" areas with severe wind and light abandonment, so as to promote the consumption of new energy and further eliminate the abandonment and waste of new energy power; On the other hand, through the development and construction of the UHV power grid, the government departments can also realize the external transmission of new energy power to areas with surplus power, and transfer the excess new energy power to areas with high power demand such as the eastern coast, so as to achieve the balance between the production and consumption of new energy power, and curb the generation of wind and power abandonment from the root.

With the rapid development of new energy all over the world, the exploration and establishment of new energy power consumption mechanism in many countries benefit from the application of new energy quota system. According to the practical experience of foreign countries, the implementation of new energy quota system can encourage power generation enterprises to develop new energy at the lowest cost by means of marketization and transmit the additional cost to the consumer end. According to the reality of our country, we can rely on the reform of China's electricity market to change the supporting policy of new energy from the feed-in tariff policy to the quota system. The implementation of quota system can strengthen the competence of new energy in traditional energy and effectively alleviate the phenomenon of local wind and light abandonment. Compared with the previous feed-in tariff, the quota system can more directly encourage power generation enterprises to develop new energy, power grid enterprises to cooperate with the guarantee purchase, and local governments to properly solve the problem of new energy power consumption. improvement of the efficiency of the power industry.

3.3 Stimulate the vitality of independent innovation and strengthen the integration of relevant technologies

Attention should be paid to the research and development of core technologies in China's new energy industry, and to actively promoting industry-university-research cooperation. With the support of abundant capital investment, the independent research and development and breakthrough of core technologies in China's new energy industry can be realized. First of all, it is necessary to strengthen the communication and cooperation among the technical subjects, and build the cooperation between industry, university and research of new energy. Secondly, through the guidance and

incentive policies to encourage all kinds of scientific research subjects of technology research and development and innovation experiments, accelerate the transformation of new energy technology, from the demand and supply of technology to promote the development and utilization of new energy core technology, truly stimulate the vitality of the technology market; Finally, strengthen the research on new energy core technologies, improve the incentive mechanism for researchers, and promote independent breakthroughs in key technologies of the new energy industry.

In addition, the combination of new energy industry and related technology application should be strengthened, which is conducive to the leapfrog development of the industry. For example, the emergence of energy storage technology in recent years can effectively avoid the intermittent problems faced by new energy power when it is connected to the grid; The combination of new energy power generation technology and energy storage technology can integrate new energy and energy storage into an independent combined system, thus enhancing the flexibility of the power system, reducing fluctuations and making the output controllable. Vigorously promoting the combination of relevant technologies and new energy generation will help the wide application of new energy generation in the future.

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