IS WIND POWER ABUNDANT IN CHINA?

March 2020

GLOBAL X
by **Mirae Asset**

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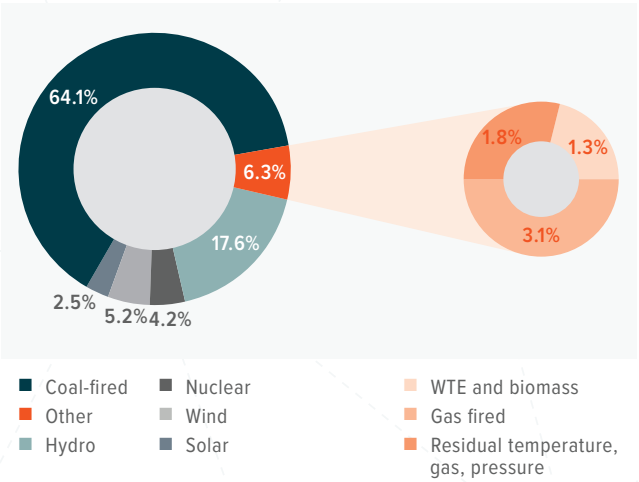
IS WIND POWER RESOURCE ABUNDANT IN CHINA?

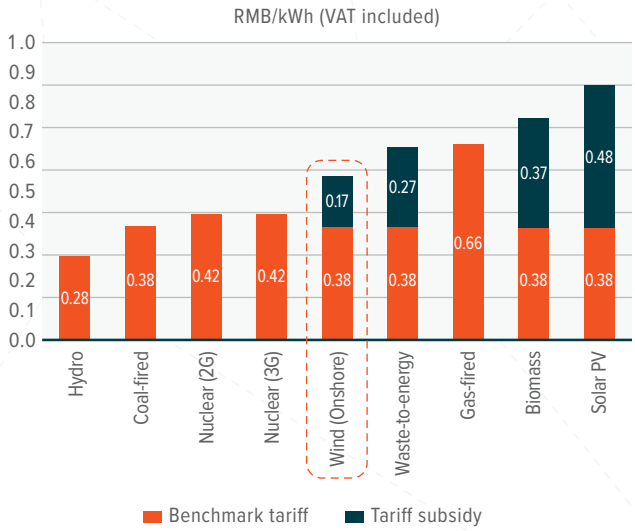
At the end of 2018, China's total power capacity reached 1,900 gigawatts ("GW"), including thermal power of 1,147GW (60.4%), hydropower of 350GW (18.4%), wind power of 184GW (9.7%), solar power of 175GW (9.2%), and nuclear power of 45GW (2.3%). Total electricity generation in 2018 was 6,990bn Kilowatt (kWh), of which non-fossil fuel generation accounted for 30.9%, contributed mainly by hydropower, wind, nuclear, and solar at 17.9%, 5.2%, 4.2%, and 2.5%, respectively.

FIG 1. POWER GENERATION MIX IN CHINA (2018)



Source: NDRC, CLSA, 2019

FIG 2. ON-GRID TARIFF OF POWER SOURCES IN CHINA (2018)



Source: NDRC, CLSA, 2019

FIG 3. COMPARISON OF MAJOR POWER SOURCES IN CHINA

	Renewables	Carbon Emission	Availability/ stability/ seasonality	Boost income for farmers	Air pollutant emission control	Postive environmental impact	Building time
Biomass	Yes	Yes	High	Yes	Basic coal-fired emission control	Reduce air pollution from straw burning	1-2 years
Waste-to-energy	—	Yes	High	—	Ultra-low emission standard	Solving problems from MSW	1-2 years
Coal-fired	—	A lot	High	—	Ultra-low emission standard	—	1-2 years
Gas-fired	—	Yes	High	—	Lower emission than coal	Cleanest-burning fossil fuel	1-2 years
Hydro	Yes	Low	Seasonal	—	No need	—	Long
Nuclear	—	Low	High	—	No need	—	>5 years
Wind	Yes	Low	Low to medium	—	No need	—	<12 months
Solar PV	Yes	Low	Low to medium	—	No need	—	<12 months

Source: CLSA, 2019

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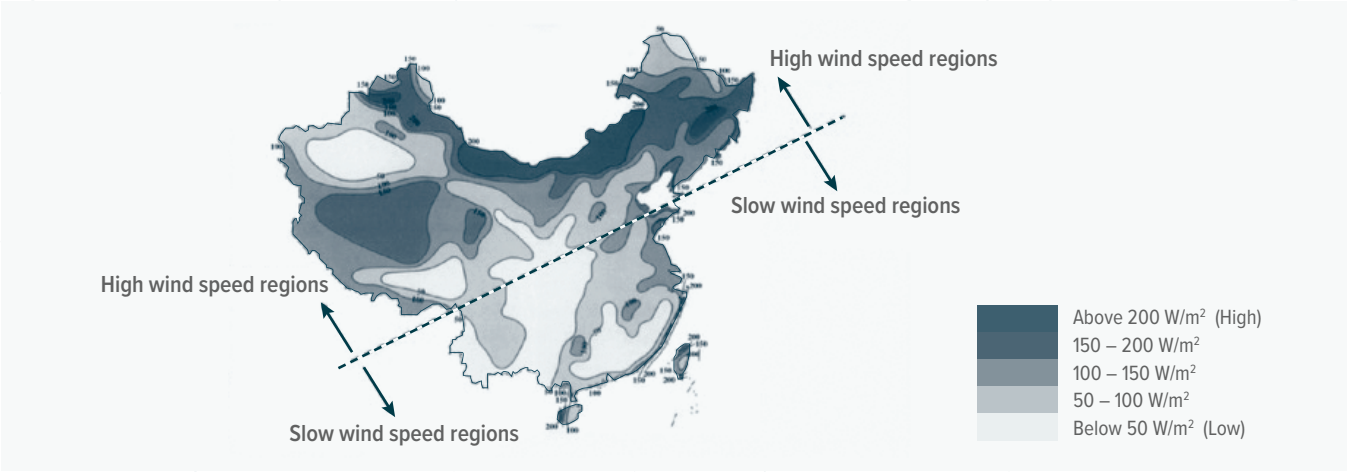
CHINA'S CLOUT IN THE GLOBAL WIND POWER LANDSCAPE

China is one of the world leaders' in wind power generation, with the largest installed capacity of any nation and continued rapid growth in new wind facilities. With its large land mass and long coastline, China has exceptional wind power resources, it is estimated China has about 2,500GW of exploitable capacity on land and 200GW at sea. China is forecasted to have 250GW of wind capacity by 2020 as part of the government's pledge to produce 15 percent of all electricity from renewable resources by year end. The Chinese government has planned a wind power road map leading up to year 2050. Wind power capacity goals aim to reach 400GW by 2030 and 1,000GW by 2050 respectively.

In China, the Northern region has a large potential for wind capacity and in the Southeast, offshore wind energy is abundant. The Inner Mongolia base located in North China makes a great contribution to wind power as well as having vast potential for wind power development with a probable capacity of 1,300GW.

FIG 4. ONSHORE WIND RESOURCES IN CHINA



Source: CREIA, 2019

The China National Energy Administration originally set a goal for the installation of 5GW offshore wind capacity by 2015 as well as 30GW by 2020. However, this goal developed slower than expected resulting from a lack of experience with domestic turbine manufacturers. Offshore projects are around 2-3 times more expensive than onshore ones to build but generate more power due to better wind resources and more powerful turbines. Many industry analysts also believe costs of offshore wind power can come down significantly over the next few years, becoming comparable with solar and onshore wind facilities. Many local governments in China have been expanding installation capacity of offshore wind power in recent years, as part of the country's efforts to tackle pollution and further boost the share of clean energy in the country's energy mix. The key offshore wind regions in China are Jiangsu and Guangdong province. Jiangsu is expected to achieve 10GW of offshore wind power by 2020 known as 'Three Gorges on Sea' while Guangdong is expected to have 12GW offshore wind capacity by the end of 2020.

GOVERNMENT-LED DISRUPTIONS

The Chinese government has committed to reducing the portion of fossil fuel consumption and further aims to increase the generation of non-fossil fuel to 50% by 2030. This is in accordance with "The revolution strategy of energy production and consumption (2016-2030)" that was announced in December 2016. We expect China to continue to cut new thermal power capacity during 2021-30, and add more wind and solar capacity, which is more economical and flexible, also less controversial than developing hydropower and nuclear power.

The Chinese government initiated the four-tier Feed-in-Tariff (FiT) mechanism for onshore wind in 2009, and the setting of the tariff tier is mainly based on wind resources. The general principle is that the better the wind resource, the lower the FiT. The difference between the FiT and the local coal-fired benchmark tariff is called the renewable energy subsidy and is compensated by the renewable energy fund under administration by the Ministry of Finance.

THREE NORTH REGIONS

The Three North Regions are the provinces in North and West China which have good wind resources and plenty of land resources, while the renewable energy subsidy is higher in those regions owing to a lower coal power benchmark tariff and slower power demand growth.

The regions with low wind speed are those provinces in central, coastal, and Southern China, which have relatively lower wind speed and land scarcity. Local economic development and power demand are better in those provinces. Lower renewable energy subsidies are given relative to the higher the coal benchmark tariff.

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As a result of a mismatch between grid infrastructure construction and wind farm installation, there has been a serious wind curtailment issue in a few Three North Regions provinces. Much of the newly installed wind turbines either could not be connected to the grid or were unable to be used in full capacity. The issue gradually emerged towards the end of 2010 and as a result, the number of China's new wind connections fell in 2012, mainly in the Three North Regions. To take advantage of business opportunities in the wind equipment industry, a lot of small wind turbine manufacturers competed aggressively on price in 2010 and reduced wind turbine tender prices.

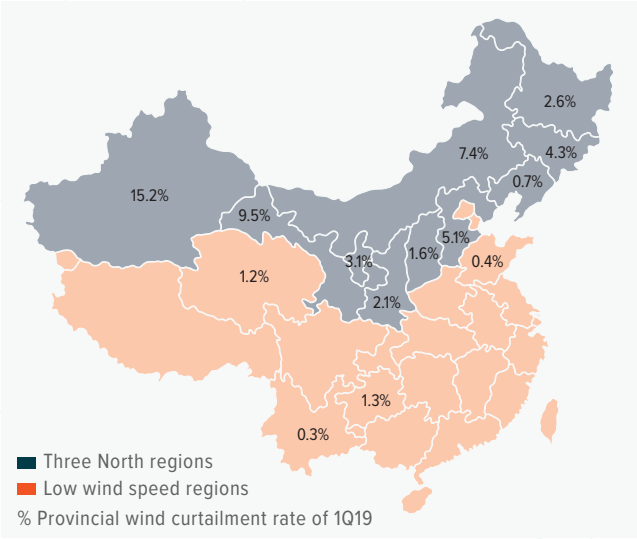
RECENT HURDLES

A proposal for onshore wind tariff adjustments was announced in October 2014 by the National Development Reform Commission (NDRC), and the final tariff adjustment was officially announced in December 2014.

From 2016, wind operators shifted more of their investment focus to regions with low wind speed, facilitated by fast-developing wind turbine technology appropriate for regions with lower wind speed and high altitude. As a result of the severe wind curtailment issue, the National Energy Administration (NEA) banned development in six provinces within the Three North Regions. The ban led to new capacity in the Three North Regions to fall sharply in 2016 due to overinvestment in 2015 and the halt of new capacity in 2017.

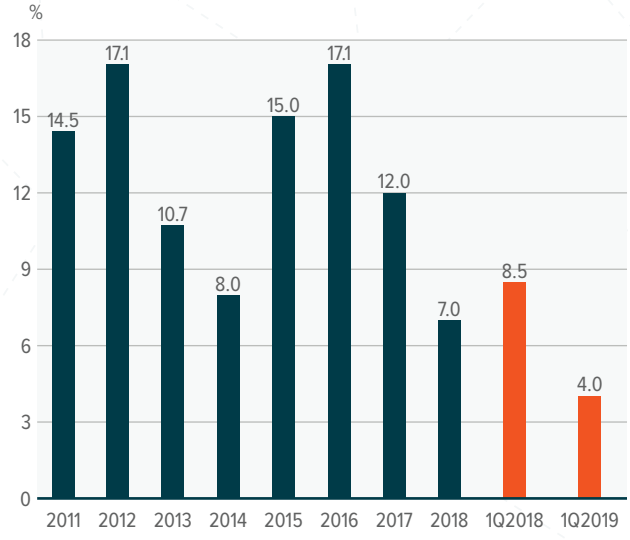
However, with the improvement in curtailment rates due to policies such as the expansion and improvement of the transmission infrastructure, guaranteed minimum purchases, monitoring and warning mechanisms etc., the average wind curtailment rate in China dipped below 5% in 1Q19, which is generally considered a healthy level.

FIG 5. WIND PROJECTS IN THE THREE NORTH REGIONS ARE MORE INVESTABLE THANKS TO CURTAILMENT RELIEF



Source: NEA, MS, 2019

FIG 6. CHINA'S AVERAGE WIND CURTAILMENT ISSUE IS ALMOST RESOLVED



Source: NEA, MS, 2019

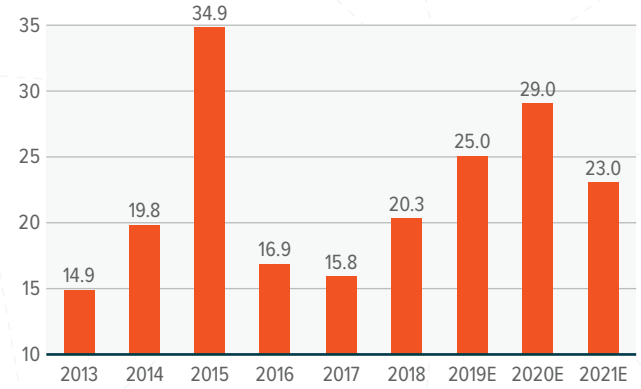
For 2021-30, we expect Chinese power plant developers to force a shift in coal-fired power stations investment to renewables, and accept the relatively lower return under grid parity; given the Chinese government's aggressive goal of an increase in non-fossil fuel generation to 50% in 2030, up from 30% in 2020.

TAILWINDS FOR WIND POWER IN CHINA

Wind power provides many benefits towards energy independence from China's perspective. Emission from wind is negligible vs coal or gas while the time required to build is relatively faster than other forms of power generation at fewer than 12 months. While cost of generation ranks on the high side among other forms of renewable energy, it is also coming down fairly quickly. Wind turbines installation began to boom in 2008, with the majority of new turbines installed being 1.5-2MW. Nowadays, new installations are likely to be 2-2.5MW, while offshore wind turbines have a capacity of 4-5MW.

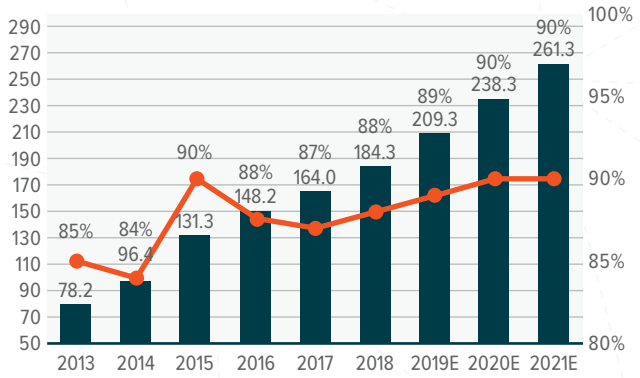
PRC wind farm installations with grid connections are expected to rise to 25GW in 2019E and 29GW in 2020E, from 20.3GW in 2018. Wind farms approved for construction before end-2018 have to be completed with grid connection before end-2020 to be entitled to tariff subsidies. Those approved in 2019-20 have to be completed before end-2021. So far, PRC wind power capex was up 79.4% year on year to Rmb70.8bn in October 2019 while public bidding prices of 2.5-3.0MW and 3.0MW wind turbine generator units were up 13-17% in September 2019.

FIG 7. PRC WIND CAPACITY WITH GRID CONNECTION – NEWLY ADDED (GW)



Source: BTM, Citi, CWEA, NEA, 2019

FIG 8. PRC WIND CAPACITY WITH GRID CONNECTION – CUMULATIVE (GW)



Source: BTM, Citi, CWEA, NEA, 2019

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