China’s big leap towards renewables

Coal has been a major player in China’s energy generation with the country possessing about half of the world’s installed coal-fired capacity, according to the International Energy Agency (IEA). The country is also considered to be the world’s biggest emitter of carbon.

In 2018, 44% of the world’s total CO2 emissions came from fossil-fuel combustions, with two-thirds emitted by coal power plants alone.

During the United Nations General Assembly in September, China pledged to be carbon neutral by 2060. President Xi Jinping said that China would “scale up its intended nationally determined contributions by adopting more vigorous policies and measures.”

However, IEA notes that it will take time for it to shake off dependence and adapt to cleaner energy.

Coal power boom in China

Through increasing demand for power and heat, China’s coal-fired power capacity almost quadrupled from 222GW in 2000 to 1,007GW in 2018.

IEA’s report added that power and heat generation from coal power plants increased faster than renewables.

In 2018, coal-fired power plants generated 70% of China’s power and heat and emitted 97% of China’s CO2 emissions from power and heat generation.

With China’s reliance on coal power, it poses a huge hurdle for the Beautiful China Initiative, which aims for the sustainable development of China as well as to fulfill the United Nations’ 2030 Agenda for Sustainable Development. Still, with China’s Five-Year Plan (2016-2020) capping the installed coal-fired power capacity to 1,100GW, China should stay below the plan target by the end of the year.

Rise of alternative energy

Even before China’s commitment to be carbon neutral by 2060, they have already begun to strengthen their other sources of energy. A noticeable growth was seen in China’s solar and wind in the first half of 2020, with the photovoltaic generation capacity increased by 20% year-on-year at about 127.8 billion kWh, whilst wind power generation climbed to 10.9% at 237.9 billion kWh from the same period last year.

During the first six months of 2020, the new installed capacity of photovoltaic generation in China also totaled 11.52 million kWh, whilst that of wind generation totaled 6.32 million kWh. The country’s renewable energy generation is estimated to reach 1.9 trillion kWh, or 27% of the country’s total power generation by the end of this year.

China is also relying on nuclear power as an energy source and is one other key component in their bid to reduce carbon emissions and lessen pollution.

China’s solar power reliance poses a huge hurdle for the sustainable development of the country.

China’s State Council approved the developments for four nuclear reactors in two different plants as part of the government’s aim to construct six to eight reactors a year from 2021 to 2030.

Nuclear projects account for 30% of the total value of power projects in China at the planning and construction stages, according to Fitch Solutions.

“The latest round of nuclear project approvals by the government bodes well for growth of the power sector, which we forecast to expand at an annual average of 2.5% in real terms from 2021 to 2029,” said Fitch Solutions.

Fitch Solutions also predicts that China’s nuclear capacity will double from 48GW in 2019 to 99GW by 2021 that will account for approximately around 7% of China’s total power generation.

Integration of UHV

Another factor that contributes to China’s reliance on coal is the locations of most hydropower, solar and wind farms. These are located along west and northern parts of the country, whilst most of the demand is around the east coast.
The traditional transmission technology is not very efficient in transmitting power from these farms, so most provincial governments built thermal power plants, mostly coal, close to demand centres.

The advent of ultra-high voltage (UHV) transmissions technology is the solution that China is now looking to invest in. It will link power generation facilities in far-flung regions to demand centres with reduced transmission losses.

UHV is one of the key investments for infrastructure in the working report of the 2020 National People’s Congress, the government’s commitment to decarbonise. The projects are led by the two largest state-owned utilities, the State Grid Corporation of China (SGCC) and China Southern Power Grid (CSG).

The total value of investments made by these two companies in 2020 alone is valued at US$26.8b. With these investments, the demand for industrial metals such as steel and copper, which are used to manufacture cables and transmission towers, will soar.

Fitch Solutions believes that there will be a greater integration of renewables once the network of UHV transmission reaches critical mass that could potentially improve profitability of clean energy plants that will replace thermal energy sources such as coal.

The emission trading scheme
Back in 2017, China implemented a national emission trading scheme (ETS) to limit and reduce CO2 emissions in a cost-effective way. It has initially covered coal and gas-fired power plants and has then moved to expand to seven other sectors. This was set to start early this year, and was expected to act as an initial test to further its development.

“The initial years of operation will be crucial to test the ETS’s design and establish trust. Given the dominance of coal power in China’s power sector and in its overall CO2 emissions, how the country’s fleet of coal-fired power plants is managed will be essential for China to meet its climate goals and other sustainable energy goals,” said IEA.

In IEAs study of China’s ETS, the energy agency pointed out a need to improve the current benchmark for coal-fired power plant CO2 emissions to better reflect the expected policy ambitions regarding the existing coal plant fleet and to avoid significant overallocation of allowances, which would jeopardise the functioning of the ETS.

IEA suggests to collect unit-level data and encourage units to monitor their CO2 fuel factors. China must also adjust and strengthen its benchmark values by taking into consideration the 2020 data, including the changes in monitored units for the next compliance period, whilst integrating auctioning to create a useful revenue stream, as well as using targeted measures to address distributional issues and to guarantee power and heat security and affordability.

China also needs to define the ETS role, and develop a roadmap and timeline for a multi-step approach to merge benchmarks including other power technologies (CCUS, low-carbon and renewables); define CO2 absolute cap trajectory; and integrate more advanced ETS flexibility mechanisms, IEA added.

Recovering power demand
In the first half of 2020, China’s power demand recovered slowly due to weak manufacturing activities.

“Income pressures and hygiene concerns of Chinese households will also weigh on the prospect of consumption recovery from the service sectors, including retail and catering, which will continue to operate at output levels below normal,” said Fitch Solutions.

In 2020, power demand grows at less than 1% and is only expected to recover by late 2021. In Q1, China’s power demand contracted by 6.5% YoY, posting the first negative quarterly growth since 2009 due to economic activities severely subdued amid the nationwide lockdown.

Industrial power consumption also recovered in March with the easing of travel restrictions along with the gradual resumption of industrial production, although the growth recovery was held back by further demand compression in the service sector in the same month, as the government continues to encourage social distancing.

Residential and agricultural power usage rose by 3.5% and 4% YoY for the Q1, but was too small in scale to overturn the overall decline. Inland provinces saw lower demand compression than in the east.

China’s power generation narrowed by 6.8% YoY in the first quarter, restrained by the demand compression.

Wind and solar power utilisation hours jumped by 10.4% and 20.3%, respectively, given the robust capacity installations in 2019 and the support from implementing the renewable consumption share target for each province.

Fitch Solutions predicts that hydropower supply may pick up further from its recovery in March, as the flood season began four days earlier than its historical average.

The utilisation rate of thermal power, which serves as the key fuel for load dynamic adjustment in China, will come under further pressure if hydropower generation rebounds. Coal-fired power utilisation hours declined by 153 hours YoY in Q1, against an overall decline by 104 hours.

New installations were 24% lower YoY in the first quarter, as lockdowns delayed equipment procurement and halted progress in construction.

The largest decline comes from wind whose capacity addition was down by 51% YoY, but Fitch Solutions agreed that China’s wind capacity growth is strong in this year.

“We also expect solar power installations to rebound in H2, as the deadlines to lock in subsidies for the subsidised solar projects approved in 2019 but not yet connected to the grid before end of 2019, will be extended from end-Q2. Correspondingly, the solar connection rush normally recorded in the second quarter is likely to be prolonged into third quarter,” Fitch Solutions added.

In recent years, coal power generation is resurging due to a ramp up in power demand by China’s heavy industry sector, however with China’s decarbonisation commitment as well as increased outputs of greener alternative energy, support for coal power generation is predicted to wane in the coming years.