



## New Summits

# Carbon Neutrality with Chinese Characteristics

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EVANSTON – China’s commitment to achieving carbon neutrality by 2060, now enshrined in its 14th Five-Year Plan (5YP), has been met with international enthusiasm. If China succeeds, it could singlehandedly reduce global temperatures by 0.25° Celsius, relative to their expected rise. But is its plan realistic?

Getting to carbon neutrality is a formidable challenge for any country, especially one with a large and developing economy. There are two dimensions to the problem: reducing economic activities that produce greenhouse-gas (GHG) emissions, and producing fewer emissions either through offsets such as reforestation or by substituting renewable energy sources for fossil fuels.

In China’s case, GHG-emitting economic activities are unlikely to decline. China is a middle-income country with 1.4 billion people, around half of whom live on incomes equal to or lower than those of Sub-Saharan Africa. Even if China can develop its high-tech sectors (as the new 5YP aims to do), there will still be hundreds of millions of people who will need jobs in energy-intensive sectors like manufacturing.

Moreover, although China’s economic growth will be slower than in the early 2000s, household energy consumption will continue to increase, owing to rising demand for cars and other household appliances typical for middle-income earners. In 2020, there were 281 million cars (204 per 1,000 people) in China, compared to 279 million (816 per 1,000 people) in the United States and 78.9 million (649 per 1,000 people) in Japan. If China’s car-

ownership rate reaches the same level as that of the US or Japan, the number of cars there will triple.

To be sure, China's population is predicted to decline to less than 1.2 billion by 2065. Nonetheless, its total energy consumption will remain high. For comparison, in 2019, Americans consumed 26,291 terawatt-hours (TWh) per year with a population of 328.2 million, while the Japanese consumed a total of 5,187 TWh per year with a population of 126.3 million. If the 1.2 billion Chinese of 2065 were to engage in the same activities as their richer counterparts do today, they would consume anywhere from 48,050 TWh (behaving like the Japanese) to 93,725 TWh (behaving like Americans) per year.

China's ability to phase in renewable energy sources is more promising. The country has already made enormous investments in building a public transportation system that does not rely on fossil fuels, and it is quickly forging ahead in the burgeoning field of electric vehicles. The big unknown is whether China will be able to generate enough energy for all its household and industrial needs without fossil fuels.

There are positive signs that it can. The new 5YP aims to increase the contribution of wind, hydroelectric, and solar power to 25% of the electricity mix by 2030, up from 15% in the previous 5YP. Although this is an ambitious target, recent technological advances have made it eminently achievable.

For example, because China's solar, wind, and hydroelectric resources are concentrated in its western provinces while most of its electricity usage is concentrated in its eastern coastal areas, highly inefficient long-distance electricity transmission previously limited the potential for renewables. But after investing heavily in resolving this issue, China has mastered ultra-high-voltage electricity transmission, which allows electricity to move across the country at low cost. This advanced technology is now central to the government's new infrastructure plan, which aims to transform the structure of China's energy sector over the next five years.

Another source of renewable energy is nuclear power. China currently has 50 operable reactors that account for 4% of its total electricity generation. Another 18 are under construction, promising to increase the share to around 6%. Since 2016, Chinese authorities have been approving 6-8 new reactors per year, a rate that would bring the total to around 350 by 2060.

For nuclear power alone to replace coal, which accounts for 66% of the electricity mix, China will need to build more than 500 reactors by 2060. And if its energy needs double, it will need around 1,000 more reactors, giving it a reactor-to-population ratio similar to that of France, where 56 plants produce 70% of the power used by its 67 million people.

Building 1,000 more reactors in the next 40 years would seem financially and logistically

impossible. But probably not for China, which has already transformed other forms of infrastructure over a similar period. For example, between 1988 and 2019, it extended its national highway system from around 35,000 kilometers (22,000 miles) to 161,000 kilometers, surpassing the US.

China is also less constrained by the key challenge facing most other countries when it comes to building nuclear reactors: public fear. After Japan's Fukushima disaster in 2011, Germany decided to abandon nuclear power, even though it accounted for 29% of its energy mix (as of 2014). Similarly, after the partial meltdown at Three Mile Island in 1979, the construction of new nuclear plants in the US nearly came to a halt. Nuclear power now accounts for 20% of the US electricity mix, and continues to face staunch resistance from an unusual alliance of fossil-fuel interests and environmental organizations.

And yet, there is a consensus in the scientific community that nuclear power is both cost effective and environmentally friendly. New third-generation reactors are much safer and more efficient than the first-generation reactors that came to be associated with incidents like Chernobyl. Now, the consequences of an accident or a terrorist attack would be comparable to those of many other common risks that we simply take for granted. In pursuing its decarbonization targets, China can follow the data, rather than special interests.

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Yes, China's domestic politics could still create some hurdles, particularly if instability in its Western regions frustrates the growth of wind, hydroelectric, and solar power. But the Chinese government has more political leeway than others when it comes to imposing its preferences.

If China can build 350-1,000 nuclear reactors safely, it will have established a mass-production supply chain capable of providing other countries – particularly middle-income economies such as India, Indonesia, and Mexico – with the same technologies at lower cost.

All told, the facts favor China's ambitious goal of reaching carbon neutrality by 2060. The whole world stands to benefit from its success.

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