

China's Net Zero Goal: Mapping the Decarbonization Path of Asia's Superpower

China committed to net zero by 2060 but what will it take to reach that goal for the world's biggest energy consumer?

















- In the process of becoming an economic superpower, China has rapidly increased its CO2 emissions; it aims to peak emission in 2030
- To achieve carbon neutrality, CO2 emissions must be drastically cut by reducing dependence on fossil fuels, and pivoting away from heavy industries
- CO2 emissions trading systems and green finance have a significant role to play in meeting the enormous funding needs for low carbon

China has made ambitious commitments to the twin goals of CO2 emissions peaking in 2030 and carbon neutrality by 2060, the tightest timetable of any major nation. To get there, the world's biggest energy consumer will need to harness green technologies to shift its power mix away from fossil fuels while transforming its industrial mix away from heavy manufacturing.

The impact of global warming has not only affected climate and ecosystems but it's also threatening to reach various aspects of humans' social and economic lives. The Intergovernmental Panel on Climate Change cited risks that threaten mankind's prosperity and survival if temperature levels continue to rise at the current pace including: flood damage to large cities, food security threatened by rising temperatures and drought.

The 2015 Paris Agreement, which serves as an international framework for climate change, calls for keeping the rise in the average global temperature well below 2 degrees Celsius while making efforts to limit the rise to 1.5 degrees Celsius compared with pre-industrial levels. Secondly, it aims to achieve net zero carbon emissions by offsetting greenhouse gas emissions from human activities via natural carbon sinks, and negative emission technology.

Countries including Japan, the United States and the continent of Europe, have announced policies for achieving carbon neutrality, mostly by 2050. China, as the world's largest emitter, has committed itself to the twin goals of CO2 emission peaking and carbon neutrality.

	 Japan	 EU	 UK	 US	 China
2020				 Decided to return to the Paris Agreement in January 2021	
2030	Reduce emissions by 46% (and strive to achieve 50% reduction) from its FY2013 level (pledged by Prime Minister Suga at the Leaders Summit on Climate)	Reduce emissions at least 55% compared with 1990 (NDC)	Reduce emissions at least 68% compared with 1990 (NDC)	Reduce emissions 50-52% compared with 2005 (NDC)	Start reducing CO ₂ emissions by 2030 (a speech at the U.N.)
2040					
2050	Carbon neutrality (legislation)	Carbon neutrality (long-term strategy)	Carbon neutrality (legislation)	Carbon neutrality (pledged by the president)	
2060					Carbon neutrality (a speech at the U.N.)

Source: Agency for Natural Resources and Energy, Energy White Paper 2021.

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Table 1: Carbon Neutrality Commitments by Japan, EU, UK, US, and China

AMBITIOUS GOALS

China has demonstrated to the international community its deepening commitment to the fight against global warming even as it increased its CO2 emissions during the process of developing into an economic superpower.

Under the 1997 Kyoto Protocol, China was designated as a non-Annex I country or developing country and was exempted from the obligation to reduce greenhouse gas emissions. In 2015, for its commitment to the Nationally Determined Contribution under the Paris Agreement, the Chinese government announced several goals including to ensure that CO2 emissions peak by around 2030.

In 2020, President Xi Jinping, in a video speech at a U.N. General Assembly session announced a new policy of achieving carbon neutrality by 2060. China also upgraded several targets from 2015: (i) reducing the CO2 intensity of GDP by more than 65% compared to 2005; (ii) increasing the share of non-fossil energy in the consumption of primary energy to around 25%; (3) increasing the forest stock volume by around 6.0 billion cubic meters compared with 2005; and (iv) expanding the capacities of wind and photovoltaic power generation facilities to more than 1.2 billion kW.

These more ambitious goals are expected to promote domestic structural reforms by adding external pressure while also encouraging international cooperation to combat global warming.

CO2 EMISSIONS IN CHINA

Since China opened up its economy, energy consumption and CO2 emissions have increased steeply against the backdrop of rapid economic growth. China's CO2 emissions have grown 6.7-fold since the 1980s, while its share in global emissions jumped from 7.9% to 30.7%. China is not only the largest energy consumer but also the largest CO2 emitter in the world. By comparison, in 2020 the United States, the second largest emitter, had a share of 15.8% in global energy consumption and a share of 13.8% in global CO2 emissions.

Emissions (million tonnes)							Global Share (share, %)						
	1970	1980	1990	2000	2010	2020		1970	1980	1990	2000	2010	2020
China	748.5	1471.2	2323.8	3360.9	8145.8	9899.3	China	5.2	7.9	10.8	14.1	26.0	30.7
US	4271.5	4749.3	4978.9	5745.8	5495.0	4457.2	US	29.9	25.4	23.1	24.1	17.6	13.8
EU	3332.4	3939.8	3754.0	3514.0	3386.4	2550.9	EU	23.3	21.0	17.4	14.7	10.8	7.9
India	189.9	310.3	613.1	961.3	1652.1	2302.3	India	1.3	1.7	2.8	4.0	5.3	7.1
Russia	n/a	n/a	2233.9	1452.8	1526.6	1482.2	Russia	-	-	10.4	6.1	4.9	4.6
Japan	810.5	920.7	1087.0	1233.2	1197.9	1027.0	Japan	5.7	4.9	5.0	5.2	3.8	3.2
World	14291.7	18719.3	21548.9	23847.9	31291.4	32284.1	World	100.0	100.0	100.0	100.0	100.0	100.0

Source: BP, Statistical Review of World Energy 2021. © 2022 Nomura. All Rights Reserved.

Table 2: Changes in CO2 Emissions in Major Countries

In 2020, China's share of global CO2 emissions (30.7%) was significantly higher than its share of global GDP (17.4%). This reflects the facts that China has a very large heavy-industry sector, and that coal is its main source of energy.

The largest CO2 emission sources in China are energy-intensive industry sectors, namely, power generation, manufacturing, and transportation. In the manufacturing sector, heavy industries are the main sources of emissions, with steelmaking in particular accounting for around half of the total.

In 2020, coal accounted for 56.6% of the total primary energy consumption in China, significantly higher than its shares in the United States (10.5%) and the EU (10.6%).

Global Share (share, %)								Fuel Type Mix (share, %)							
	Oil	Natural Gas	Coal	Nuclear Energy	Hydro Power	Renew. Energy	Total		Oil	Natural Gas	Coal	Nuclear Energy	Hydro Power	Renew. Energy	Total
China	16.4	8.6	54.3	13.6	30.8	24.6	26.1	China	19.6	8.2	56.6	2.2	8.1	5.4	100.0
US	18.7	21.8	6.1	30.8	6.7	19.4	15.8	US	37.1	34.1	10.5	8.4	2.9	7.0	100.0
EU	11.5	9.9	3.9	25.5	8.0	22.0	10.0	EU	35.9	24.5	10.6	11.0	5.5	12.5	100.0
India	5.2	1.6	11.6	1.7	3.8	4.5	5.7	India	28.2	6.7	54.8	1.2	4.5	4.5	100.0
Russia	3.7	10.8	2.2	8.0	4.9	0.1	5.1	Russia	22.6	52.3	11.6	6.8	6.7	0.1	100.0
Japan	3.7	2.7	3.0	1.6	1.8	3.6	3.1	Japan	38.1	22.1	26.9	2.2	4.0	6.6	100.0
World	100.0	100.0	100.0	100.0	100.0	100.0	100.0	World	31.2	24.7	27.2	4.3	6.9	5.7	100.0

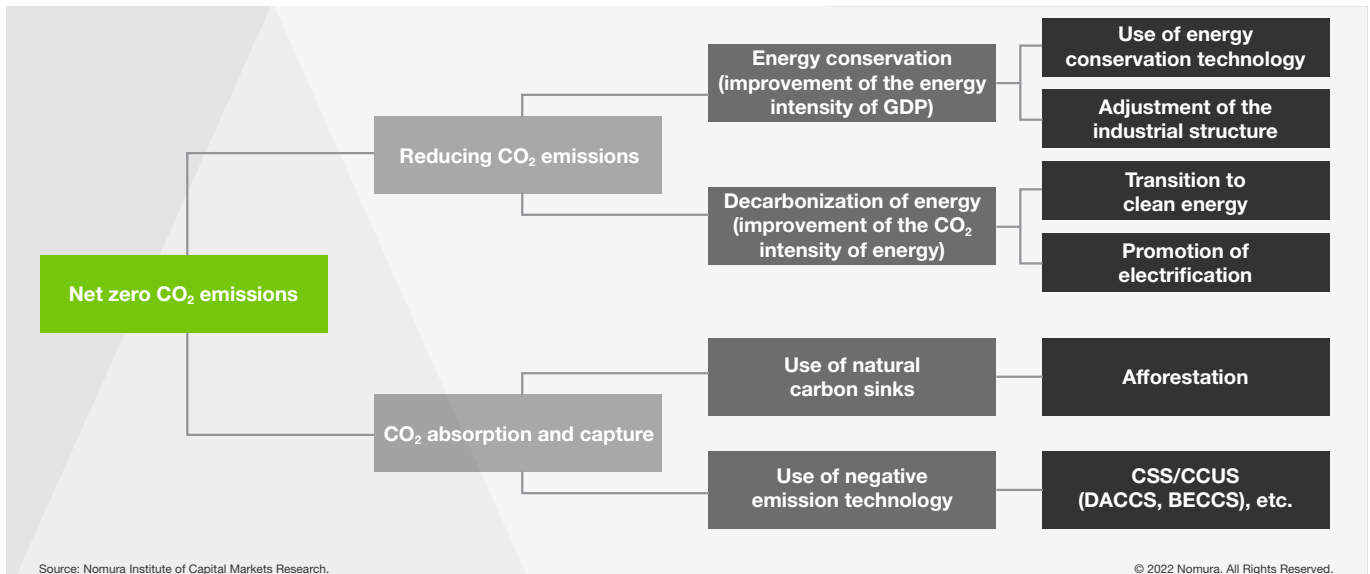
Source: BP, Statistical Review of World Energy 2021. Note: Renewable energy does not include hydro power.

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Table 3: Primary Energy Consumption in Major Countries (2020)

PATH TO CARBON NEUTRALITY

Carbon neutrality can be achieved through the reduction of CO2 emissions combined with offsets such as carbon capture for hard to remove emissions.



Source: Nomura Institute of Capital Markets Research.

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Figure 1: Measures to Achieve Carbon Neutrality

In 2020, China's Financial and Economic Affairs Commission outlined initiatives to peak emissions and reach carbon neutrality.

Energy systems	Establish clean, low-carbon, safe and efficient energy systems. Curb the total amount of fossil fuel consumption, devote efforts to improving usage efficiency and introducing alternative renewable energy, deepen the reform of the electricity system, and establish a new electricity system centering on new energy.
Major industries	Reduce pollution and CO2 emissions in major sectors. Promote green manufacturing in the industrial sector, raise energy conservation standards in the construction sector, and accelerate the development of green and low-carbon transportation.
Green and low-carbon technologies	Accelerate R&D on low-carbon frontier technology, disseminate technologies to reduce pollution and CO2 emissions, and establish evaluation and trading systems for green and low-carbon technologies and science and technology innovation service platforms.
Green and low-carbon policies and market systems	Make active efforts to reduce energy consumption and the energy intensity of GDP, develop policies related to fiscal measures, taxation, pricing, financial affairs, land and government procurement that contribute to green and low-carbon growth, accelerate CO2 emissions trading, and promote green finance.
Lifestyles	Oppose luxury and profligacy, advocate green travel, and create green and low-carbon lifestyles.
Carbon sinks	Increase the carbon sink capacity of ecosystems and strengthen spatial plans for national land and regulations on the use of the land. Ensure that natural resources including forests, grasslands, wetlands, marine water, soil and permafrost maintain and increase their capacity to act as carbon sinks.
International cooperation	Strengthen international cooperation regarding responses to climate change, promote the development of international rules and standards, and build a "Green Silkroad."

Source: 9th meeting of the Central Financial and Economic Affairs Commission, March 15, 2021. © 2022 Nomura. All Rights Reserved.

Table 4: China's Initiatives to Achieve the Emission Peak and Carbon Neutrality

LOOKING AHEAD

Decarbonization is set to bring many opportunities and challenges to China. Decarbonization will act as a catalyst for innovation and create investment demand not just in the energy field but across all industries. Governor Yi Gang of the People's Bank of China forecast that the value of annual investments necessary for reducing CO2 emissions in China will be 2.2 trillion yuan (\$346.7 billion) in the 2020s and 3.9 trillion yuan in 2030 through 2060. CO2 emissions trading systems and green finance have a significant role to play in meeting these enormous funding needs.

Most carbon neutrality initiatives will also help to remedy China's worsening air quality as air pollutants such as sulfur oxides and particulate matter are derived from fossil fuel combustion. A further key benefit is energy security. China depends heavily on oil and natural gas imports while domestically it produces clean energy.

In terms of challenges, China faces the difficult task of curbing emissions while increasing energy consumption due to its high economic growth rate. And as China's industrial structure is skewed toward heavy industries with massive CO2 emissions, China must drastically change its energy and industrial structures at the same time. That process will trigger bankruptcies and job cuts will be inevitable in declining industries.

China will also have to go from peak CO2 emissions to carbon neutrality faster than any developed country, according to a BP report. The planned timeframe for the EU is 71 years (1979 to 2050), for the United States it's 43 years (2007 to 2050) and for Japan it's 42 years (2008 to 2050). China is giving itself only 30 years (2030 to 2060).

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