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Assessing China's Energy and Climate Goals

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Contents

Introduction and summary

China is the world's largest greenhouse gas producer.[1] As such, the world needs the Chinese government to take ambitious, urgent action to reduce emissions. In September 2020 at the United Nations, and again at the recent Leaders Summit on Climate convened by U.S. President Joe Biden, Chinese President Xi Jinping committed China to aiming to have carbon dioxide (CO2) emissions peak before 2030 and achieve carbon neutrality before 2060.[2] These long-term commitments are a positive step. They move China into the group of nations putting forward long-term targets that aim to support the global effort to reach carbon neutrality. However, the near-term climate and energy targets released in the Chinese government's 14th Five-Year Plan in March 2021 are far more modest, calling into question China's climate trajectory in the near term and whether its policies will align with global climate stabilization goals.

As outlined in this report, these climate targets for the next five years center on incremental improvements in energy intensity—energy consumed per unit of gross domestic product (GDP)—and carbon intensity, or carbon emissions per unit of GDP. While the 14th Five-Year Plan (FYP) makes reference to promoting action on crucial energy programs and technologies that will facilitate energy transition, there are many remaining questions related to implementation. If China maintains GDP growth at rates similar to those it achieved prior to the COVID-19 pandemic, as the government has indicated it intends to do for 2021, these intensity targets will do little to curb emissions growth in the near term.[3] Beijing's preview of its revised 2030 goals has also fallen short of expectations for increased ambition, instead signaling modest, incremental improvements to China's current nationally determined contribution (NDC)—self-determined climate actions to reduce emissions under the Paris Agreement.[4]

According to the 2018 special report by the Intergovernmental Panel on Climate Change, achieving a warming scenario of 1.5 degrees Celsius will require that global CO2 emissions decline by about 45 percent from 2010 levels by 2030, reaching net zero around 2050, while achieving a warming scenario of 2 degrees Celsius will require that CO2 emissions decline by about 25 percent by 2030 and reach net zero around 2070.[5] If China waits until after 2030 to take more ambitious action, meeting global emissions goals will require unprecedented and costly shifts.

This report provides an assessment of China's recent energy and emissions trends in key sectors to give context for Beijing's recent and forthcoming climate announcements. In addition, it analyzes China's progress toward meeting existing energy and climate goals, and where the relative ambition of China's new climate and energy goals will place the country in coming years. Finally, this report examines the challenges and opportunities for the Biden administration in engaging with China on climate as the United States shores up its own climate policies and charts its domestic transition to a low-carbon economy. Specifically, the report recommends that the United States should engage China on climate change in the coming months in three key areas: increasing near-term ambition; ending financing for coal projects abroad; and accelerating the transition to carbon neutrality.

President Biden's promise to hold a leader's climate summit in his first 100 days always meant that one of the earliest U.S.-China presidential meetings for the new U.S. administration would be focused on climate. As the Biden administration brings the United States back into the international arena to combat climate change, China's energy and climate actions will once again be a key focus of U.S. policymakers. The U.S.-China joint statement on climate released in April 2021 signaled that climate remains an important area of engagement for both countries and that Beijing may be willing to raise its near-term climate ambitions.[6] It is in the interest of both the United States and China to chart a pathway to meeting high climate standards in both the near and long terms, as well as build understanding of the real challenges both countries face in continued decarbonization.

China's energy and emissions trends

China's CO2 emissions are climbing, increasing by approximately 1.7 percent per year on average between 2015 and 2020.[7] Despite the economic impacts of the COVID-19 pandemic, China's emissions continued to increase by about 1.5 percent in 2020.[8] A major reason for this trend is that China's fossil fuel usage continues to grow. Overall, in 2020, fossil fuel power generation increased by 2.5 percent compared with 2019.[9] While there have been some promising developments in renewable energy, the share of wind and solar in China's total power generation is still below 10 percent.[10] In addition, Beijing's economic recovery strategy has been carbon-heavy, leading to increases in power generation from fossil fuels, industrial coal consumption, and coal mining output.[11] Transitioning away from this current energy structure and curbing CO2 emissions presents a huge challenge for China as it charts a path toward carbon neutrality.

Coal trends

China's 2020 coal consumption reached a new high of 2,829 million tons of coal equivalent[12]—exceeding what was thought to be the previous peak in 2014 and contradicting many expert predictions that China's economic growth had already decoupled from coal consumption.[13] Coal consumption appears to again be on the rise, driven by increasing coal use in China's power and industrial sectors.

Coal-fired power is expanding in China's energy mix, a deeply concerning development that runs counter to a low-carbon energy transition. The government has justified these moves by making incremental gains in reducing emissions from coal. Chinese leaders thus far have relied on two key levers to reduce coal emissions as the country continues to grow its coal plant fleet: efficiency regulations that force existing plants to reduce coal consumption and restrictions on new coal-fired power capacity.

On the efficiency front (the amount of coal consumed per kilowatt-hour of power produced), China is moving in a positive direction. Year-end 2020 was the deadline for any existing coal-fired units that did not meet an efficiency standard of 310 grams of coal equivalent per kilowatt-hour (gce/kWh) to be retired.[14] The average coal consumption of newly built coal-fired power-generating units must be less than 300 gce/kWh.[15]

Some of China's least efficient coal plants have been shut down, even in the wake of the COVID-19 pandemic. In July 2020, China's National Energy Administration issued a notice flagging 7.34 gigawatts (GW) of inefficient coal-fired power capacity for shutdown.[16] The notice also admonished provinces to "attach great importance" to shutting down outdated production capacity and stated that all units flagged for shutdown must be demolished by December 2020.[17]

As a result of these policies, China's coal fleet has been getting more efficient. At the end of 2012, average coal consumption per kilowatt-hour of electricity produced by coal-fired power plants was 325 gce/kWh.[18] By 2019, China's coal-fired power units consumed an average of 308 grams of coal equivalent.[19] However, incremental gains in coal plant efficiency are not enough to significantly change China's emissions trajectory.

China will need to stop building new coal plants and begin to cut coal-fired power generation capacity. Yet the government is instead easing limitations on new coal power. In addition, Beijing has made exceptions to its shutdown policy for existing, less efficient coal plants that are designated as backup power generators, cases where provinces have successfully petitioned to keep inefficient plants running, and instances where retired coal plants have been brought back online to address heating shortages.[20] In recent years, Beijing has loosened its policies restricting development of new coal plants in three phases.

The first phase occurred in December 2017 in response to winter heating shortages. Year-end 2017 was a major deadline to shut down older coal-fired power units and replace coal with gas for more than 3 million households under the central government clean air action plan.[21] Shutdowns in December 2017 triggered a massive natural gas shortage, as natural gas consumption increased 17 percent compared with the prior year.[22] The consequent winter heating shortage angered Chinese citizens.[23] In response, Beijing ordered local officials to prioritize securing heating supply, including reverting to previous coal-fired heating methods.[24]

The second phase of coal resurgence was triggered by economic deceleration. In 2018, China had 72.7 GW of coal plants in preconstruction development. Then, in 2019, China's reported GDP growth dropped to 6.1 percent, down from 6.6 percent in 2018.[25] That year, the coal plant development pipeline jumped to 106.2 GW—a 46 percent increase. Also in 2019, China added 48.9 GW of commissioned coal-fired capacity to its energy mix and retired 7.1 GW of coal capacity for a net increase of 41.8 GW.[26] According to official government statistics, China's total thermal power capacity increased 4.1 percent in 2019 and 4.7 percent in 2020.[27]

Premier Li Keqiang has emphasized coal utilization to safeguard China's energy security on several important occasions. As he chaired a meeting of the National Energy Commission in October 2019, Premier Li spoke of speeding up construction of large-scale coal transportation and electricity transmission infrastructure, promoting "clean and efficient development of coal-fired power" while downplaying the role of renewables.[28] When presenting the government work report at the Two Sessions plenary meetings in March 2021, China's most important annual political meetings, Li again praised fossil fuel development as a source of energy security and called for promoting "clean and efficient coal" during the 14th Five-Year Plan.[29]

New coal plants are justified in part as providing redundant, backup power capacity; if they are not actually used, this could mitigate their overall impact on emissions.[30] Yet it makes little sense to build new coal plants in China because there is already significant overcapacity in the sector, with more than half of coal power firms already running at less than 50 percent of their capacity.[31] With loosening coal restrictions, provinces are poised to continue building new coal-fired plants, albeit with incremental gains in energy efficiency. The National Energy Administration has continually relaxed its coal power planning and construction early-risk warning index for new coal plants over the years, allowing for more provinces to build new plants, as illustrated in Figure 1.

The third wave of coal plant construction came in response to the COVID-19 pandemic. In April 2020, Chinese leaders rolled out a COVID-19 response strategy that aimed to maintain economic growth, production, and employment at any cost.[32] The Politburo of the Chinese Communist Party outlined "six guarantees" for achieving economic stability, with energy security making the list as a top priority.[33] That plan effectively elevates energy supply security above environmental protection, climate change, or the transition toward a clean energy economy. As part of the implementation of the six guarantees, the government explicitly called for ensuring the supply of coal.[34]

In May 2020, after the annual Two Sessions convenings of the National People's Congress and the Chinese People's Political Consultative Conference, Zhang Jianhua, director of the National Energy Administration, gave an interview on energy security with state media. He emphasized securing supplies of fossil fuels in order to safeguard energy security, calling coal-fired power a "ballast stone" of energy security.[35] That approach further accelerated the uptick in coal-fired power construction. In 2020, the country added another 39 GW of new coal power capacity.[36] An additional 53.2 GW in new coal power capacity has been permitted, with another 88.13 GW currently under construction.[37] For comparison, the entire coal power fleet of Germany totals 42.5 GW.[38]

FIGURE 1

National Energy Administration coal power planning and construction early risk warning index, by release year

* Note: The Chinese government does not plan to develop coal power in Tibet in the future and has not included it in the risk warning calculation for coal power planning and construction.

Source: P.R.C. National Energy Administration, "Guojia nengyuan ju guanyu fabu 2023 nian mei dian guihua jianshe fengxian yujing de tongzhi guo neng fa dianli (2020) 12 hao" ("National Energy Administration on the release of coal power planning and construction in 2023 Risk warning notice National Energy Development Electric Power (2020) No. 12"), February 26, 2020, available in Chinese at http://www.nea.gov.cn/2020-02/26/c_138820419.htm; P.R.C. National Energy Administration, "Guojia nengyuan ju guanyu fabu 2022 nian mei dian guihua jianshe fengxian yujing de tongzhi guo neng fa dianli (2019) 31 hao" ("Notice of the National Energy Administration on Issuing the Risk Early Warning of Coal Power Planning and Construction in 2022 National Energy Development Electric Power (2019) No. 31"), March 27, 2019, available in Chinese at http://zfxxgk.nea.gov.cn/auto84/201904/t20190419_3655.htm; P.R.C. National Energy Administration, "Guojia nengyuan ju guanyu fabu 2021 nian mei dian guihua jianshe fengxian yujing de tongzhi guo neng fa dianli (2018) 44 hao" ("Notice of the National Energy Administration on Issuing the Early Warning of Risks in the Planning and Construction of Coal Power Plants in 2021, National Energy Development Electric Power (2018) No. 44"), May 14, 2018, available in Chinese at http://zfxxgk.nea.gov.cn/auto84/201805/t20180524_3186.htm; P.R.C. National Energy Administration, "Guojia nengyuan ju guanyu fabu 2020 nian mei dian guihua jianshe fengxian yujing de tongzhi guo neng dianli (2017)]106 hao" ("Notice of the National Energy Administration on Issuing the Risk Warning of Coal Power Planning and Construction in 2020, National Energy Development Electric Power [2017] No. 106"), April 20, 2017, available in Chinese at http://zfxxgk.nea.gov.cn/auto84/201705/t20170510_2785.htm; P.R.C. National Energy Administration, "Guojia fazhan gaige wei guojia nengyuan ju guanyu cujin woguo mei dian you xu fazhan de tongzhi fa gai nengyuan (2016) 565 hao" ("National Development and Reform Commission, National Energy Administration Notice on Promoting the Orderly Development of Coal and Electricity in my country Development and Reform Energy [2016] No. 565"), March 17, 2016, available in Chinese at http://www.gov.cn/xinwen/2016-04/25/content_5067562.htm. See also Feng Hao, "How China plans to curb new coal-fired power," China Dialogue, June 22, 2016, available at https://chinadialogue.net/en/energy/9011-how-china-plans-to-curb-new-coal-fired-power/.

Industrial sector trends

Industrial production accounts for 66 percent of China's total energy consumption and about 50 percent of its total emissions.[39] Industrial emissions are currently trending upward, with steel and cement being particularly challenging. Steel and cement production is estimated to have increased by as much as 7 percent in 2019 (after an 8.4 percent drop in 2018), and noncombustion process-related CO2 emissions increased by 5.6 percent.[40] Reducing excess steel and concrete production capacity was a key goal in 2018, resulting in an estimated 8.4 percent drop in cement production in 2018.[41] This trend reversed in 2019. According to China's National Energy Administration, industrial electricity consumption increased by 2.9 percent in 2019[42] and 2.5 percent in 2020 as steel and cement production rebounded.[43]

The construction industry is a key focus for economic stimulus post-pandemic, which doesn't bode well for reducing industrial emissions. By the end of March 2020, the central government increased funding for central infrastructure 12.6 percent over the same period in 2019.[44] The government issued more than $38.4 billion (RMB 250 billion) in advance car purchase tax funds, more than $1.1 billion (RMB 7 billion) in port construction funds, and more than $3.7 billion (RMB 24 billion) in civil aviation development funds.[45] All of these funds are used to support road infrastructure construction such as highways, ports, waterways, and airports.[46] Overall, China's Ministry of Finance has issued around $153.7 billion (RMB 1 trillion) in bonds to provincial governments to support new infrastructure projects, including railways, roads, and municipal and industrial parks.[47] The National Development and Reform Commission and 15 other ministries followed by issuing further detailed guidelines on promoting the development of the sand and stone industries to guarantee the successful recovery of construction projects after the coronavirus crisis.[48]

Renewable energy trends

2020 was poised to be a challenging year for renewables in China, as it marked the target year for Beijing to end several of its renewable electricity subsidies for wind and solar power.[49] This subsidy phaseout began in 2018 when the central government announced that it had accumulated a renewable energy subsidy budget shortfall of $17.3 billion (RMB 112.7 billion), and declared the continued subsidization of renewables unsustainable.[50] Rapid additions to renewable capacity had outpaced surcharge funding; problems with collecting surcharge fees and distributing correlating subsidy payments were reported as well.[51] Subsequently, 2019 was a rocky year for renewable development, particularly solar. New solar capacity additions dropped to 30.11 GW in

2019, a 31.6 percent decrease in added capacity compared with 2018.[52] Growth also slowed in wind power in 2019, with a 22 percent increase in newly installed capacity—down 6 percent from the 28 percent growth the year prior.[53]

Despite the difficult transition away from subsidies, renewables growth has since rebounded. Construction of onshore and offshore wind power projects in China nearly tripled in 2020 over the previous year, hitting a new record of 71.67 GW.[54] This amount is more than the 60.4 GW of wind added globally in 2019.[55] Solar power also had a strong year after two years of decline, with 48.2 GW installed in 2020.[56] During the early months of the COVID-19 outbreak, clean energy fared better than other power sources. Renewable energy was more competitive than thermal and hydroelectric projects in the first quarter of 2020 compared with the first quarter of 2019.[57] By the end of 2020, China had 281.5 GW of total installed wind generation capacity and 253.4 GW of solar generation capacity.[58] Nevertheless, China still has a long way to go.

One of the most significant issues plaguing wind and solar development in China is curtailment, or the restriction on the amount of clean energy that can enter the grid. Recently, there have been signs that curtailment rates are declining. In 2019, the Chinese government began to apply administrative penalties based on quotas for curtailment, implementing targets to keep curtailment below 5 percent by 2020.[59] In late 2019, the government issued a further clarification requiring mandatory purchase of renewables and requiring grid companies to pay for curtailed wind and solar.[60] As a result, more renewable energy power plants have connected to the grid and curtailment rates have decreased. In 2020, solar curtailment rates in northwest China dropped to 4.8 percent, a year-on-year decrease of 1.1 percent.[61] The three provinces that contribute more than 80 percent of China's wind power—Xinjiang, Gansu, and Inner Mongolia—all showed marked improvements in curtailment rates in both 2019 and 2020. In 2020, Xinjiang had a wind power curtailment rate of 10.3 percent, Gansu was at 6.3 percent, and Inner Mongolia was at 5.2 percent.[62] The national average wind power curtailment rate was 3 percent for wind and 2 percent for solar in 2020.[63]

Improvements in curtailment rates have led to an increase in total power generated by renewable sources. As a result, the overall outlook for potential nonfossil energy growth is positive, albeit with modest gains in the near term, driven in part by the increasing national targets in the 14th Five-Year Plan and enhanced 2030 goals. Combined, wind and solar in China accounted for 9.5 percent of total power generation in 2020, up from 8.6 percent in 2019.[64] Nuclear power made up 5 percent of the power mix in 2020, compared with 4.8 percent in 2019.[65] Hydropower remained at 17.8 percent in both 2019 and 2020.[66] However, China will need to drastically increase these numbers to reach its carbon neutrality targets.

China's near-term and long-term climate and energy goals

The 13th and 14th Five-Year Plans

China was able to meet or exceed most of the goals it put forth in the 13th Five-Year Plan (2016–2020), but not all. Beijing had pledged to increase the share of nonfossil fuels (renewables and nuclear power) in its primary energy consumption to 15 percent by 2020, up from 12.3 percent in 2015.[67] China was able to surpass this target, achieving a 15.9 percent nonfossil share by 2020.[68] Installed capacity targets for wind, solar, and hydropower were all surpassed, while nuclear power capacity fell short, as detailed in Table 1 below.

China also achieved its carbon intensity target of an 18 percent reduction from 2015 levels, with an 18.8 percent decrease. However, the energy intensity target of a 15 percent decrease from 2015 levels was not met; energy intensity experienced an approximately 13.7 percent decline from 2016 through 2020.[69] This is likely due to slower than expected economic growth in 2020 as a result of the COVID-19 pandemic. As a result, the Chinese government has released lower targets than expected in the 14th FYP. (see Table 1)

The government's 14th FYP (2021–2025) indicates that China will begin slowly aligning itself with a 2060 carbon neutrality target, while still relying on fossil fuels as the bedrock of energy security in the near future. Unlike in prior years, no five-year GDP growth target has been announced and no target to limit total energy consumption has been set. This means there are fewer potential constraints on emissions growth. Beijing did set a GDP growth target of 6 percent or more for 2021.[70] If this rate continues throughout the 14th FYP period, China could meet its carbon intensity target while still growing overall emissions—a concern for global climate efforts. However, if growth slows, then the intensity goal will be more challenging to meet. Without a five-year GDP target or total emissions cap, it is difficult to determine how much China will allow its emissions to rise over the next five years.

TABLE 1

China met most of its 2020 climate and energy targets and has outlined several new targets for 2025 and 2030

Key climate and energy targets for the 13th Five Year Plan (FYP), 14th Five Year Plan, and 2030

Target type	13th FYP (2016–2020)	Actual achievement by 2020	14th FYP (2021–2025)*	Original 2030 targets	Updated 2030 targets
Carbon intensity	18% decrease from 2015	18.8%	18% decrease from 2020	60%–65% decrease from 2005	At least 65% decrease from 2005
Energy intensity	15% decrease from 2015	13.7%	13.5% decrease from 2020	-	-
Nonfossil share of primary energy consumption	15%	15.9%	20%	20%	25%
Hydropower	350 gigawatts	370.16 gigawatts	-	-	-
Wind power	200 gigawatts	281.53 gigawatts	-	-	1,200 gigawatts of combined wind and solar capacity
Solar power	100 gigawatts (increased to 150 gigawatts during 13th FYP period)	253.43 gigawatts	-	-	1,200 gigawatts of combined wind and solar capacity
Nuclear power	58 gigawatts	49.89 gigawatts	70 gigawatts	-	-

* Note: There may be additional targets announced in the sectoral plans to be released later this year.

Sources: P.R.C. National Energy Administration, "Dian li fa zhan "Shi san wu" gui hua (2016-2020 nian)" ("13th Five-Year Development Plan for the Electricity Sector (2016-2020)"), January 23, 2017, available in Chinese at http://cape.ndrc.gov.cn/zcfg/201701/P020170112341246054484.pdf; Xinhua Net, "(The two sessions are authorized to issue) The Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Long-Term Goals for 2035," March 13, 2021, available at http://www.xinhuanet.com/2021-03/13/c_1127205564_2.htm; Lauri Myllyvirta, "China's five-year plan: baby steps towards carbon neutrality," Center for Research on Energy and Clean Air, March 5, 2021, available at https://energyandcleanair.org/china-14th-five-year-plan-carbon-neutrality/; P.R.C. National Energy Administration, "Guojia nengyuan ju fabu 2020 nian quanguo dianli gongye tongji shuju" ("National Energy Administration releases 2020 national power industry statistics"), January 20, 2021, available in Chinese at http://www.nea.gov.cn/2021-01/20/c_139683739.htm; P.R.C. Ministry of Ecology and Environment, "Shengtai huanjing bu fabu 2020 nian quanguo shengtai huanjing zhi liang jiankuang" ("Ministry of Ecology and Environment releases 2020 national ecological environment quality profile"), March 2, 2021, available in Chinese at http://www.mee.gov.cn/xxgk2018/xxgk/xxgk15/202103/t20210302_823100.html; ZHOU Xiao Bo, "Shu du nengyuan jingji xin liangdian: Woguo danwei GDP neng hao shixian lianxu dijian" ("Digital reading of new highlights of energy economy: my country's energy consumption per unit of GDP has achieved continuous decline"), China Electric Power News, January 19, 2021, available in Chinese at http://www.cpnn.com.cn/shouye/yaowen/202101/t20210119_1334997.html; XING Peng and TONG Kenan, "Ducha guojia nengyuan ju, dai laile naxie qishi?" ("What enlightenment did the inspection of the National Energy Administration bring?"), February 4, 2021, available at http://www.eco.gov.cn/protection/energy/42540.html.

The Chinese government also has not indicated an increase in ambition with its new intensity targets. The 14th FYP carbon intensity target is once again set at an 18 percent decrease, the same as the previous five-year goal, despite the fact that the 13th FYP target was surpassed. The new energy intensity target is also less ambitious than in the prior five-year period, with only a 13.5 percent reduction target, compared with a 15 percent reduction target in the 13th FYP. This more conservative goal is likely the result of China's failure to meet its energy intensity target during the 13th FYP period, and the need for reinvigorated economic growth coming out of the pandemic.

The 14th Five-Year Plan's carbon and energy intensity reduction targets are also out of line with the targets that recent modeling analyses suggest would be required for climate scenarios below 2 degrees Celsius. For example, a 2020 report from Tsinghua University's Institute of Climate Change and Sustainable Development on China's low carbon development strategy indicates that energy intensity would need to be reduced by 14 percent to 15 percent and that carbon intensity would need to decrease by 19 percent to 20 percent during the 14th FYP period under a 1.5-degree scenario.[71]

China's new target of 20 percent nonfossil energy consumption by 2025 aligns with previous trends. The actual share of nonfossil energy increased from 12.3 percent in 2015 to 15.9 percent in 2020 (a 3.6 percent increase in share over five years),[72] so a 4.1 percent increase from 2021 through 2025 is slightly more aggressive.

While not a formal 14th Five-Year Plan target, the China National Coal Association recently announced a 2025 coal consumption target of 4.2 billion tons, signaling essentially a stabilization in coal consumption but not necessarily in coal power production.[73] However, coal use in China needs to decline to counteract growing oil and gas emissions and allow total CO2 emissions to decrease. Any new coal development, and even a coal plateau, is at odds with emissions reduction goals.

The 14th FYP includes some language on controlling total energy consumption; curbing high-emissions, energy-intensive projects; promoting hydropower and renewable energy, as well as new energy and intelligent vehicles; and establishing national industrial innovation centers in strategic fields, including new energy. Detailed targets for these initiatives, however, have not yet been released, and it is unclear what role they might play in the near term. Pending updates in the sector-specific energy plans that will be published later this year, current policy signals indicate that Beijing is planning for modest changes in the next five years.

Nationally determined contribution

China's initial nationally determined contribution included key commitments to increase the share of nonfossil energy consumption to around 20 percent by 2030, reduce carbon intensity by 60 percent to 65 percent below 2005 levels by 2030, and peak CO2 emissions by 2030.[74] The world was eagerly awaiting China's new NDC along with increased ambition before COP26 (the U.N. Climate Change Conference), originally scheduled at the end of 2020.[75] When COP26 was postponed, many countries including China delayed announcing official updates to their NDCs. However, President Xi spoke at the U.N. Climate Ambition Summit on December 12, 2020, and announced several key new climate goals for 2030: 1) China's carbon dioxide emissions per unit of gross domestic product will be reduced by more than 65 percent compared with 2005; 2) nonfossil energy will account for about 25 percent of primary energy consumption; and 3) the total installed capacity of wind power and solar power will reach more than 1,200 gigawatts.[76]

These goals represent modest, incremental improvements on China's current NDC goals. The carbon intensity reduction target of 65 percent by 2030 was the high end of the original NDC, which had a more conservative 60 percent to 65 percent goal. The updated nonfossil goal of 25 percent by 2030 is a 5 percent increase from the 20 percent target in the first NDC,[77] likely reflecting current trends of nonfossil energy's share increasing in total energy consumption. Even more rapid development in wind and solar will likely be needed to achieve the new NDC nonfossil target of 25 percent. According to current Tsinghua University modeling studies, a 25 percent nonfossil energy consumption target puts China on a transition pathway consistent with a 2-degrees Celsius target.[78]

The 1,200 GW installed capacity target for wind and solar is new and ambitious, but capacity targets are somewhat problematic because they only target installations—projects built—as opposed to actual power generated, which is what matters for reducing emissions. These targets also do little to address the generation and distribution structure or the problems with curtailment discussed previously. A February 2021 National Energy Administration proposal suggests that even more stringent nonfossil targets are under consideration; the proposal outlines plans for increasing the share of nonfossil energy to 40 percent of electric power consumption by 2030.[79]

However, three important elements were notably missing from President Xi's announcement of China's revised NDC goals. First, he did not explicitly commit China to an earlier peak year for CO2 emissions. This provides the possibility of less ambitious action in the near term. Second, he did not introduce an emissions cap, which could have quelled fears that China's emissions growth over the next decade could derail the possibility of keeping global warming below a 1.5-degree target. Finally, there was no mention of China's overseas lending or investments in coal and other fossil fuel projects. Given the size of China's foreign lending and investment, this is a major omission, particularly as other large investors such as Japan and South Korea have signaled divestments from fossil fuel projects abroad.[80]

Carbon neutrality goal

On September 22, 2020, President Xi stated that China will "aim to have CO2 emissions peak before 2030 and achieve carbon neutrality before 2060."[81] That announcement positioned China to begin transitioning toward a low-carbon economy. However, there are several open questions regarding China's new carbon neutrality goal.

First, it is not clear that a 2060 carbon neutrality target will be consistent with a 1.5-degree pathway. The parties to the Paris Agreement agreed to limit warming to well below 2 degrees Celsius compared with preindustrial levels and to make best efforts to stay beneath 1.5 degrees Celsius.[82] The 2018 Intergovernmental Panel on Climate Change special report emphasized the importance of meeting the 1.5-degree goal and taking immediate action to make that possible by reducing net CO2 emissions to about 45 percent of 2010 levels by 2030.[83] However, President Xi stated that China will aim to have emissions peak by 2030—not reduced by 2030—and he did not elaborate on whether China's long-term emissions pathway will be consistent with a 1.5-degree target. According to modeling from Tsinghua' University's Institute of Climate Change and Sustainable Development (led by the former vice chairman of the National Development and Reform Commission (NDRC) and China's lead climate negotiator for the Paris Agreement, Minister Xie Zhenhua, until he was appointed as China's special envoy for climate change in February 2021), the 2060 target could align with a 1.5-degree goal if China's total greenhouse gas emissions begin falling gradually between 2020 and 2030—net emissions would have to be 130.7 million metric tons of carbon dioxide equivalent in 2020 and 130.4 million metric tons in 2030—then decline by 8 percent to 10 percent per year after 2030, achieving a 90 percent reduction of all greenhouse gas emissions from peak levels by 2050.[84] A recent study published in *Science* reaffirms that a global 1.5-degree goal would require China to reduce its emissions by somewhere between 90 percent and 112 percent, with such a reduction requiring substantial deployment of carbon capture and negative emissions technologies.[85]

Such a rapid reduction in emissions would be unprecedented, and costly. As a comparison, the largest annual reduction in greenhouse gas emissions observed by the European Union in the past decade was a 3.6 percent decrease in emissions between 2018 and 2019.[86] The European Union adopted a greenhouse gas emissions reduction target of at least 55 percent by 2030 to set itself on a realistic path to achieve climate neutrality by 2050 and align with the 1.5-degree target.[87]

Second, China has yet to clarify the assumptions behind its carbon neutrality goal, including if it covers all greenhouse gases and if it includes the use of "negative emissions" technologies, or offsets. Based on several modeling studies released thus far by researchers at Tsinghua University,[88] North China Electric Power University,[89] and the China Electric Power Planning and Engineering Institute,[90] Beijing appears to be planning to maintain a business-as-usual strategy between now and 2030 or even 2035—a time frame that Chinese leaders view as a critical period for the nation's economic growth.[91]

Yet the next decade is a critical period in which to make structural changes to the energy system and avoid backloading necessary emissions reductions. Under these models, fossil fuels remain China's primary energy source, with net greenhouse gas emissions increasing by about 4 percent by 2030 under a 2-degree scenario or decreasing by less than 1 percent under a 1.5-degree scenario.[92] At some point in the mid-2030s, current modeling studies assume that China will pivot its approach and jump from a less ambitious to a more ambitious emission reduction pathway, putting the nation on track to support ambitious climate stabilization goals. That approach—putting off major changes until 10 years to 15 years from now—is unlikely to work. Moreover, the Chinese government does not appear to have identified or committed to a domestic policy program and implementation strategy that would make such a rapid shift feasible.

Ultimately, the continued increases in coal consumption and coal-fired power capacity will result in emissions increases that undercut the Chinese government's stated carbon neutrality goal. Therefore, more aggressive near-term targets are needed to ensure that China gets on a sufficiently ambitious low-carbon pathway well before midcentury.

Opportunities to engage China on climate

This review of China's stated carbon emissions goals demonstrates that China is making progress in some areas but regressing in others. This leaves room for China to do more, including in the context of bilateral and multilateral conversations with the United States and other countries in the coming months. The United States should engage China on climate change in three key areas: 1) increasing near-term ambition; 2) ending financing for coal projects abroad; and 3) accelerating the transition to carbon neutrality.

Increasing near-term ambition

In the lead-up to the Paris Agreement in 2015, Presidents Barack Obama and Xi Jinping worked together to lay the groundwork for ambitious global climate action with their joint climate announcement in 2014. The agreement is widely credited with having catalyzed similar commitments from other countries and the ultimate adoption of a new global climate deal.[93] However, much has changed since then.

Under the Trump administration, global climate action stalled. From withdrawing the United States from the Paris Agreement to rolling back domestic climate policies, Trump robbed the United States of its leverage to hold other high-emitting countries accountable. Now, President Biden has signaled a new path forward, which includes ambitious domestic action and re-engagement with the international community on climate.

With rejoining the Paris Agreement,[94] hosting the Leaders Summit on Climate,[95] reconvening the Major Economies Forum on Energy and Climate Change,[96] and making climate a pillar of U.S. foreign policy, Biden has once again made the United States a major player in global climate efforts. U.S. leadership on climate change allows the administration to align with allies in discussions on China's climate actions, as well as engage directly with China on its nationally determined contribution under the Paris Agreement and other near-term goals. With the meeting between Special Presidential Envoy for Climate John Kerry and his Chinese counterpart, Special Envoy for Climate

Xie Zhenhua, and the subsequent joint statement, both countries signaled willingness to continue dialogue and engagement on climate.[97] Importantly, the statement indicated that China may consider increasing its climate ambitions in the near term. All of this can play a key role in mobilizing international action, and potentially even further action from China.

The first order of business in the United States is domestic economic recovery and green stimulus. To spur high-quality jobs and improve the nation's infrastructure, the Biden administration's Build Back Better initiative invests heavily in clean, resilient, and climate-smart infrastructure and manufacturing.[98] With an ambitious updated 2030 target to reduce emissions by 50 percent to 52 percent from 2005 levels, the Biden administration is demonstrating a strong recommitment to the goals of the Paris Agreement, with the backing of a domestic framework for climate action to support these high-level objectives.[99]

By establishing a climate-centric framework for its own domestic policies and priorities, the Biden administration will be able to build needed credibility, enabling it to encourage and work with other major emitters to take more aggressive action in the near term and build momentum ahead of COP26. As the Biden administration continues to show and act on its commitment to domestic action, it will also have more leverage to apply pressure on other countries, including China, should they fail to ratchet up good-faith ambitions and meet them in earnest.

Ending financing for coal projects abroad

The United States should work with leaders of the Global South to meet rising energy demand with low-carbon solutions. China's Belt and Road Initiative (BRI), first announced in 2013, marks perhaps the single-most important shift in China's economic and foreign policy in the past decade. The BRI also poses one of the most significant threats to climate mitigation.[100] Research has shown that the BRI has created strong political and financial incentives for Chinese state-owned companies and banks to engage in coal power development.[101] If current trends continue, this initiative has the potential to be an unchecked pathway for China to finance carbon-emitting development and lock in carbon emissions abroad for years to come.

China is financing far less efficient coal plants abroad than it is using at home. It is primarily investing in less efficient subcritical coal plants in other countries, despite shifting to more efficient supercritical and ultra-supercritical coal power plants domestically.[102]

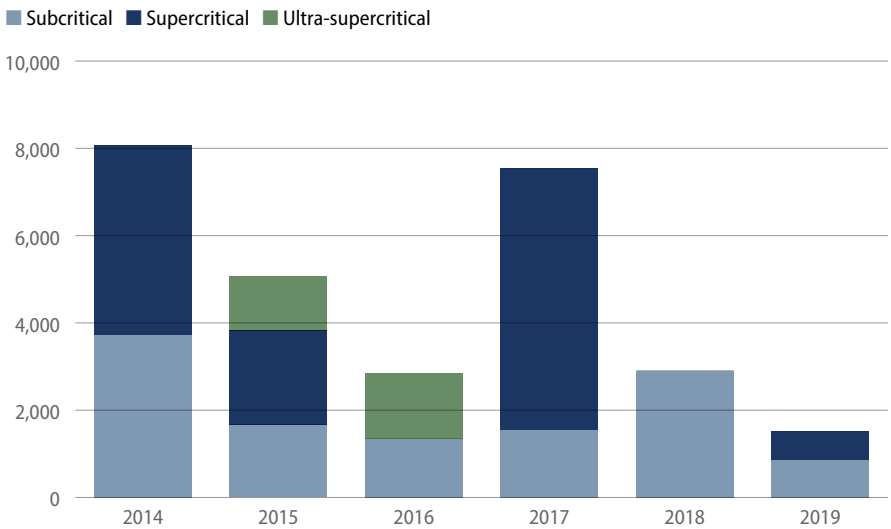
Supercritical power plants can reduce carbon emissions by as much as 20 percent compared with older subcritical plants per megawatt-hour of electricity produced.[103]

Chinese officials claim that China's coal technology export and financing choices are driven by the recipient countries.[104] However, China funds more subcritical coal plants than investors from Japan or South Korea, even within the same host nations. A 2019 Princeton University study estimated that from 2011 to 2017, 58 percent of China's greenfield investment in coal-fired power plants in Cambodia, Indonesia, Pakistan, Vietnam, and India used supercritical technology, and the other 42 percent used subcritical technology.[105] The authors estimate that 87 percent of overseas coal plants financed by Chinese development banks or Chinese foreign direct investment from 2014 to 2019 used either subcritical or supercritical technology, and only 13 percent used ultra-supercritical technology. (see Figure 2)

FIGURE 2

The majority of overseas coal plants financed by Chinese development banks or Chinese foreign direct investment (FDI) between 2014 and 2019 used subcritical or supercritical technology

Global coal plants in operation using Chinese government financing or FDI, by total capacity installed in megawatts (MW)



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In contrast, China is only building supercritical and ultra-supercritical coal plants domestically. The Global Energy Monitor shows that as of January 2021, 55 percent of China's operating domestic coal power fleet was either supercritical or ultra-supercritical and 95 percent of China's newly permitted domestic coal plants were supercritical or ultra-supercritical.[106] China is also out of step with other major energy financiers that have moved to end financing for overseas coal plants. The Japanese government announced in 2020 that it would restrict state funding for overseas coal plants, with several major private Japanese funders doing the same.[107] Several of South Korea's largest energy funders pledged to end investments in coal at home and abroad, and at the Leaders Summit on Climate, President Moon Jae-in announced South Korea would end government financing for overseas coal projects.[108]

There is a tremendous opportunity for the United States to leverage current energy investment efforts and build partnerships with other countries to provide low-carbon alternatives to fossil fuel. This could include working with private and public entities within third countries to provide clean energy solutions and offer expertise to make green energy sources more accessible. The United States should also increase bilateral efforts to discuss energy demand and infrastructure needs with other countries and devise alternative solutions tailored to localized challenges.[109] In addition, the United States could engage with China on redirecting its foreign investments and development financing toward clean energy options. This would also involve setting clear definitions of green investment and agreeing on environmental best practices and benchmarks. These types of engagements with third countries and with China would allow the United States to provide assistance in the global green transition efforts without shouldering all of the costs.

Accelerating the transition to carbon neutrality

In 2018, the Intergovernmental Panel on Climate Change released a report making it clear that to avert climate disaster, global greenhouse gas emissions must reach net zero by 2050 and keep global temperatures from rising beyond 1.5 degrees Celsius. However, Xi Jinping has pledged that China, the world's largest emitter, will not achieve carbon neutrality until a full decade later, significantly straining the global carbon budget.

The United States should engage China in discussions about its carbon neutrality goal, including clearly defining and formalizing the goal, and possibly accelerating the goal to 2050. However, a long-term target is only meaningful if it catalyzes near-term action.

Currently, China's emissions are continuing to increase, calling even the feasibility of a 2030 peak into question. In addition, Beijing's current plans for carbon neutrality rely on China achieving an unprecedented drop in emissions after 2030. This will be a colossal challenge if significant actions to transition away from a carbon-intensive economy are delayed for another decade.

The U.S. government should reengage with China on decarbonization to facilitate greater ambition in both countries.[110] The U.S.-China Climate Change Working Group and the domestic policy dialogue established during the Obama administration provide models for engagement focused on key technologies and sectors that could be adapted to address current issues. A new mechanism for engagement should be established to provide a space for productive exchange between climate leaders in both the United States and China, as well as a platform for coordination and dialogue at the subnational leadership level. The U.S.-China joint statement on climate did not include any mention of such a mechanism, yet this approach would allow for crucial engagement to occur on topics such as transparency and data monitoring, as well as for the establishment of independent benchmarks by which to measure progress toward climate goals.

Conclusion

The world is entering the crucial decade for climate change, when climate and energy policy decisions will either put it on a new, low-carbon trajectory or rule out its ability to avoid the most dangerous climate impacts. While China has made many strides toward decarbonization, its recent energy and emissions trends and its near-term targets demonstrate that it still has a long way to go.

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