



By David Sandalow

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## CHINA'S RESPONSE TO CLIMATE CHANGE: A STUDY IN CONTRASTS AND A POLICY AT A CROSSROADS

### ABOUT THE AUTHOR

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### ABOUT THE ASIA SOCIETY POLICY INSTITUTE

With a solution-oriented mandate, the Asia Society Policy Institute (ASPI) tackles major policy challenges confronting the Asia-Pacific in security, prosperity, sustainability, and the development of common norms and values for the region.

### SUMMARY

China is the world's leading emitter of heat-trapping gases, by far. In 2019, Chinese emissions were greater than emissions from the United States, the European Union, and Japan combined. There is no solution to climate change without China.

China's response to climate change is a study in contrasts. China leads the world in solar power, wind power, and electric vehicle deployment, but also in coal consumption. The Chinese government has adopted some of the world's most ambitious energy efficiency and forest conservation policies, but is financing a significant expansion of coal-fired power plant capacity at home and abroad. China's leaders are strongly committed to the Paris Agreement, but appear to attach less priority to climate change than in years past.

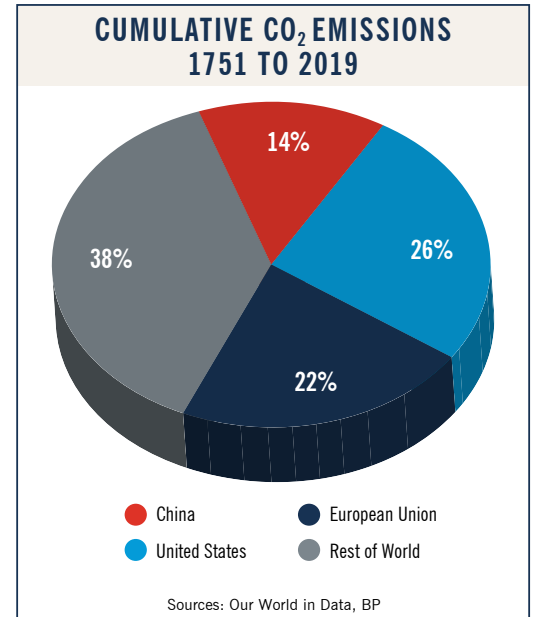
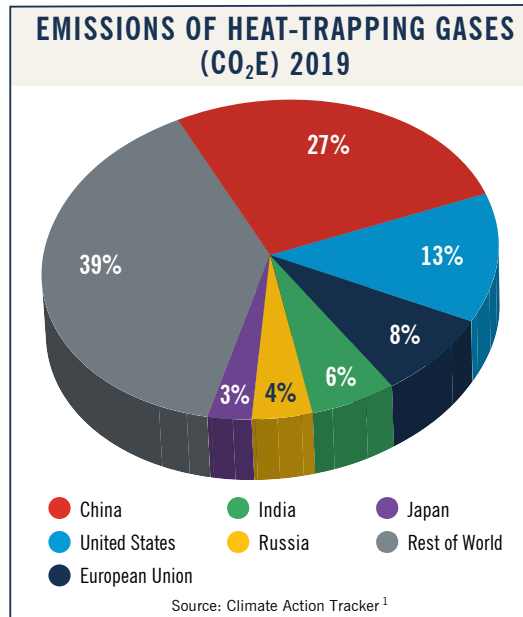
This Issue Paper explores these contrasts. It does so at an important time in Chinese climate change policy. During the next 18 months, the Chinese government will spend heavily on economic stimulus measures, release its 14th Five-Year Plan (for 2021–2025), and develop short- and long-term climate action plans (known as its “updated nationally-determined contributions” and “mid-century strategy” in the terminology of the global U.N. climate process). Decisions by the Chinese government will reverberate globally, including in the United States. A Biden administration's ambition in addressing climate change would be reinforced by ambition in China.

This Issue Paper provides an up-to-date snapshot of China's climate policies, drawing on data from 2019 and the beginning of 2020 (during the height of the COVID-19 economic lockdown), as well as recent remarks by Chinese leaders. It starts by examining Chinese emissions of heat-trapping gases. It then discusses China's principal climate policies, explaining the main tools the Chinese government uses to address climate change and related topics. The Issue Paper concludes with a discussion of processes that will shape Chinese climate change policy in the years ahead.

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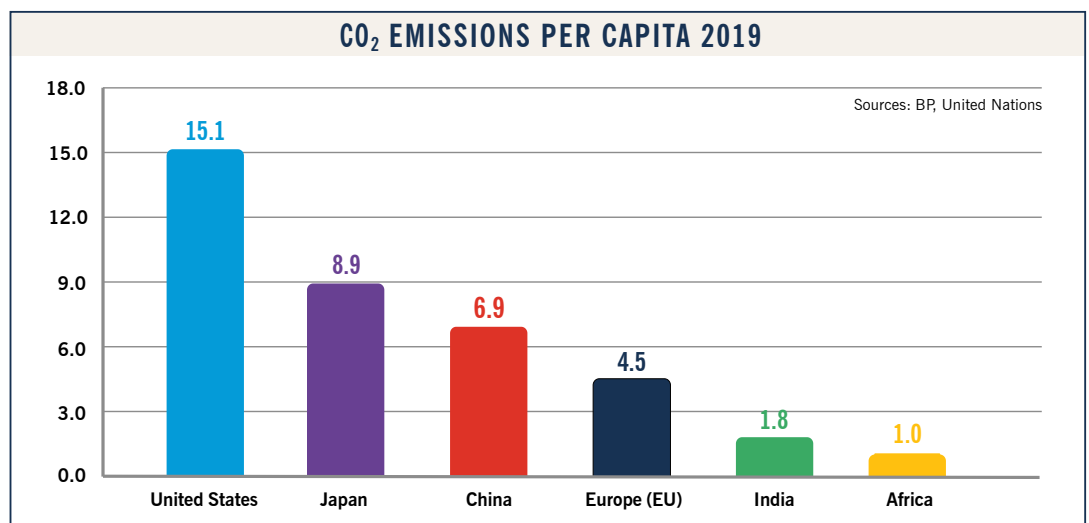
### BACKGROUND: CHINA'S EMISSIONS OF HEAT-TRAPPING GASES\*

In 2019, roughly 27 percent of the heat-trapping gases emitted globally came from China—far more than from any other nation. The United States was second, with approximately 13 percent of global emissions. China’s share of global emissions has been in the range of 24 percent—27 percent, trending mostly upward, for the past decade.<sup>2</sup>

However, annual emissions are not the only way to measure contributions to climate change. China’s cumulative emissions of CO<sub>2</sub> during the past several centuries are 14 percent of the global total—roughly half those of the United States. (CO<sub>2</sub> often stays in the atmosphere for centuries after being emitted.)<sup>3</sup>

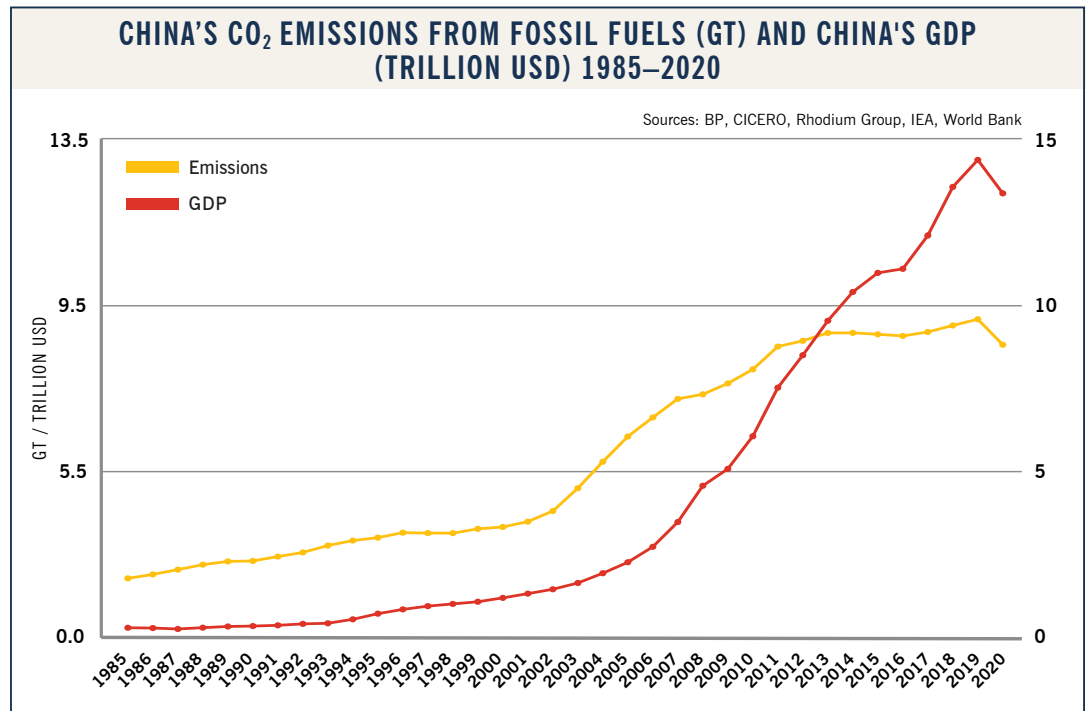
China’s per capita CO<sub>2</sub> emissions today are also less than half those of the United States (though more than Europe’s).<sup>4</sup>

\*The principal heat-trapping gases—also commonly referred to as “greenhouse gases”—are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (NO<sub>x</sub>) and fluorinated gases (such as HFCs). Of these, CO<sub>2</sub> is by far the most important, with roughly 76 percent of the total warming impact of these gases globally. See Intergovernmental Panel on Climate Change (IPCC) Working Group III, *Climate Change 2014: Mitigation of Climate Change—Summary for Policymakers (Fifth Assessment Report)* at p. 6.





In the first quarter of 2020, as much of China was locked down due to COVID-19, China's CO<sub>2</sub> emissions fell roughly 8 percent.



From 1985 through 2011, Chinese GDP and CO<sub>2</sub> emissions tracked closely.<sup>†</sup> Starting in 2011, GDP and CO<sub>2</sub> emissions started to decouple, with GDP rising an average of 7.5 percent per year and CO<sub>2</sub> emissions rising an average of 1.5 percent per year.<sup>5</sup>

In the first quarter of 2020, as much of China was locked down due to COVID-19, China's CO<sub>2</sub> emissions fell roughly 8 percent. China's GDP fell roughly 6.8 percent during the same period—the first quarterly drop in GDP in at least 40 years.<sup>6</sup>

### CHINA'S CLIMATE POLICIES TODAY

President Xi Jinping and other Chinese leaders have often sent the message that they are serious about addressing climate change. In 2014, President Xi said, “addressing climate change and implementation of sustainable development is not what we are asked to do, but what we really want to do and will do well.” In 2017, President Xi said

that China would “tak[e] the driving seat in international cooperation to respond to climate change.” There are no known climate deniers in the Chinese leadership—and none with any observable influence on policy.<sup>7</sup>

However, the priority Chinese leaders attach to climate change appears to have receded in the past year. On several occasions, top leaders have called for development of China's coal resources (which could significantly increase emissions) without mentioning low-carbon development or climate change. Examples include remarks by Premier Li Keqiang at an October 2019 meeting of the National Energy Commission and the May 2020 National People's Congress. The latter may be especially notable, since Premier Li had referred to climate change in his remarks to the National People's Congress in years past. Approvals of new coal plant construction have increased in 2020, as discussed later.<sup>8</sup>

<sup>†</sup> The two data sets have a correlation coefficient of .95.



In March 2020, the Chinese government approved the construction of 8 GW of new coal-fired power plant capacity—more approvals than in all of 2019.

Observers have pointed to a number of factors to explain this shift, including slowing economic growth, a focus on energy security (in part due to the U.S.-China trade war), and then COVID-19. They have also noted that renewable energy, electric vehicles, and other low-carbon technologies continue to receive attention from Chinese leaders. Several policy processes in the year ahead will provide important signals about the priority China’s leaders attach to low-carbon development and climate change.<sup>9</sup>

The sections below discuss Chinese policies most directly related to climate change. (For a more detailed discussion of these policies and others, see the *Guide to Chinese Climate Policy*.)

### Climate Goals

The Chinese government has announced four principal climate change goals:

- I. to achieve the peaking of carbon dioxide emissions around 2030, making best efforts to peak early;
- II. to lower carbon dioxide emissions per unit of GDP by 60 percent–65 percent from the 2005 level by 2030;
- III. to increase the share of non-fossil fuels in primary energy to around 20 percent by 2030; and
- IV. to increase the forest stock volume by around 4.5 billion cubic meters from 2005 levels by 2030.

These goals were set out in the Nationally Determined Contributions (NDCs) China submitted to the UN Framework Convention on Climate Change (UNFCCC) in June 2015 and have been highlighted in many official documents since.<sup>10</sup>

China is on track to meet all these goals. In fact, many analysts project that China is likely to achieve the first goal—to peak CO<sub>2</sub> emissions—well before 2030. The second and third goals both appear to be achievable based on current trends.<sup>‡</sup> And the fourth goal was met in 2019—11 years ahead of schedule.<sup>11</sup>

These goals are pursued through a policy infrastructure that includes Five-Year Plans, regulations, guidance documents, and financial support. One common tool is to allocate targets to provinces. China’s National Development and Reform Commission (NDRC) and National Bureau of Statistics report annually on progress toward these goals.<sup>12</sup>

### Coal

In 2019, China consumed more coal than the rest of the world combined. More than 20 percent of global CO<sub>2</sub> emissions were from Chinese combustion of coal. China’s coal policies are central to the global fight against climate change.<sup>13</sup>

Coal consumption as a share of primary energy consumption has declined steadily in China for many years, falling most recently from 62.0 percent in 2016 to 60.4 percent in 2017 to 59.0 percent in 2018 to 57.7 percent in 2019, according to official statistics.<sup>14</sup>

Substantial construction of new coal-fired power plant capacity continues in China, with 30 GW–37 GW of net new capacity added in 2019 and another 100 GW under construction as of March 2020. In March 2020, the Chinese government approved the construction of 8 GW of new coal-fired power plant capacity—more approvals than in all of 2019.<sup>15</sup>

The Chinese government has a number of policies that discourage coal consumption.

<sup>‡</sup> As of the end of 2019, China’s CO<sub>2</sub> emissions per unit of GDP were roughly 52 percent below 2005 levels and non-fossil fuels accounted for 14.9 percent of primary energy.



The 14th Five-Year Plan targets with respect to coal-fired power plant capacity will be one of the most closely watched indicators of the Chinese government’s commitment to fighting climate change.

These include:

- Five-Year Plan targets to reduce coal as a share of primary energy;
- massive investment in switching from coal to natural gas for heating in northern China;
- CO<sub>2</sub> emissions standards for power plants; and
- a central government “stoplight system” to regulate new coal plant approvals.

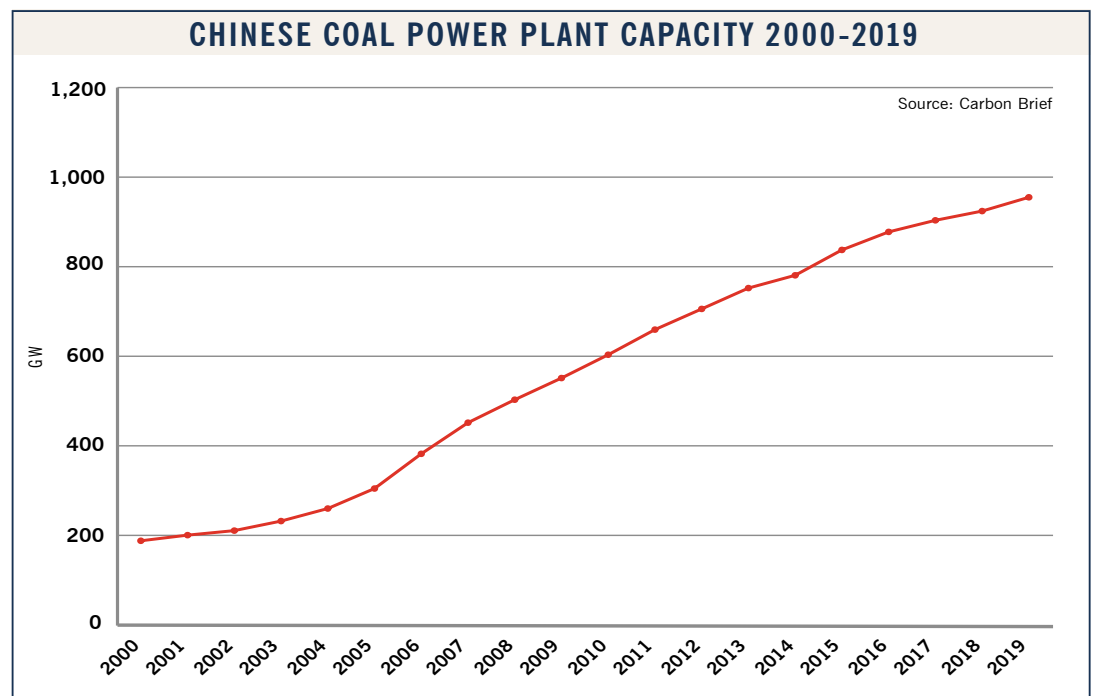
At the same time, the Chinese government also has a number of policies that encourage coal consumption. These include:

- guaranteed operating hours for coal plants;
- cheap capital for coal power plants from state-owned banks; and
- traditional promotion criteria for provincial officials, which weight short-term GDP growth over environmental

targets, often giving an incentive to approve coal-fired power plants with limited long-term value.

In his remarks at the May 2020 National People’s Congress, Premier Li Keqiang said, “We will promote cleaner and more efficient use of coal.” He did not mention cutting overcapacity in coal or reducing coal’s share of primary energy consumption, two goals that have received attention in government policy pronouncements in years past.<sup>16</sup>

Coal-fired power plant capacity in China today is roughly 1040 GW. The cap under the 13th Five-Year Plan, which runs through the end of 2020, is 1100 GW. The China Electricity Council and China State Grid have both proposed allowing up to 1300 GW of coal-fired power plant capacity by 2030. The 14th Five-Year Plan targets with respect to coal-fired power plant capacity will be one of the most closely watched indicators of the Chinese





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government's commitment to fighting climate change.<sup>17</sup>

### Renewable Power

China leads the world in deployment of renewable power, with almost three times as much capacity as any other nation. In 2019, 36 percent of the renewable power capacity added globally was in China (down from 42 percent in 2018 and the lowest this figure has been in several years).<sup>18</sup>

Hydropower has been a significant electricity source in China for decades. Wind and solar power have grown dramatically in the past decade. In 2019, renewables provided roughly a quarter of the electricity in China—18 percent from hydropower, 5.5 percent from wind, and 3 percent from solar. This was almost the same share as in 2018.<sup>19</sup>

The Chinese government is in the process of significantly changing its renewable power policies. Feed-in tariffs—which have been central to the Chinese wind and solar industries for the past decade—are being phased out and replaced with auctions and “renewable electricity consumption quotas” (which require grid companies to purchase minimum amounts of renewable electricity).

Premier Li Keqiang called for development of China's renewable energy resources in his October 2019 remarks to the National Energy Commissions and May 2020 speech to the National People's Congress.<sup>20</sup>

#### Hydropower

As of the end of 2019, China had roughly 356 GW of hydropower capacity—more than three times as much as any other nation.<sup>21</sup>

The Chinese government has a long-standing commitment to expanding the

nation's hydropower capacity. Work on the Three Gorges Dam—the world's largest hydropower project—began in the 1980s. The dam became fully operational in 2012, with a capacity of 22.5 GW.<sup>22</sup>

#### Wind Power

As of the end of 2019, China had 210 GW of wind power capacity—more than twice as much as any other nation. In recent years, China has consistently led the world in new wind power installations. In 2019, 26 GW of new wind power capacity was added in China—a 28 percent increase in new installations from the year before.<sup>23</sup>

Curtailed is a challenge for the Chinese wind power industry, although the situation has improved significantly in recent years. In 2019, China's wind power curtailment rate was 4 percent nationally (down significantly from 15 percent in 2015).<sup>24</sup>

#### Solar Power

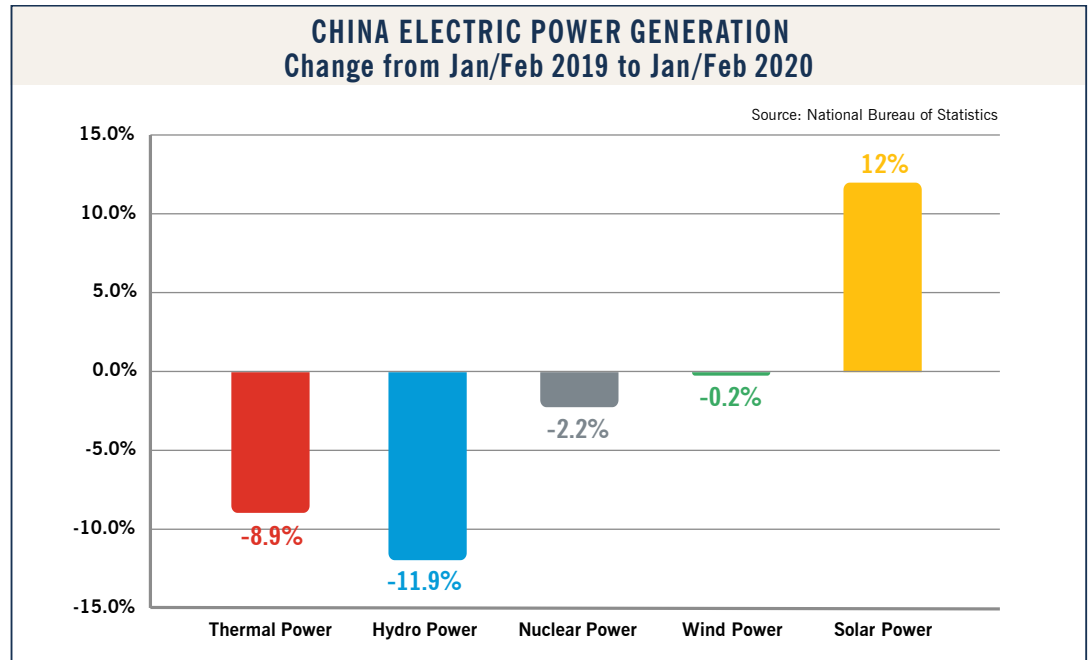
As of the end of 2019, China had roughly 205 GW of solar power capacity—more than three times as much as any other nation. In recent years, China has consistently led the world in new solar power deployment. In 2019, 30 GW of new solar power capacity was added in China—a 32 percent decrease in new installations from the year before.<sup>25</sup>

China also leads the world in solar manufacturing, as it has for each of the past 10 years. In 2019, Chinese firms shipped roughly 80 percent of the solar cells and modules shipped by the world's top 10 suppliers.<sup>26</sup>

In 2019, solar power curtailment in China was roughly 2 percent nationally.<sup>27</sup>



In the first quarter of 2020, as Chinese power generation fell roughly 8 percent year-over-year due to the coronavirus, solar generation in China increased by 12 percent.



In the first quarter of 2020, as Chinese power generation fell roughly 8 percent year-over-year due to the coronavirus, solar generation in China increased by 12 percent. This was due to the 30 GW of new solar capacity added in 2019 as well as renewable energy electricity quotas.<sup>28</sup>

### CO<sub>2</sub> Emissions Trading Program

The Chinese central government is in the process of launching a national CO<sub>2</sub> emissions trading program, building on pilot projects in eight Chinese cities and provinces. The first phase of this program will cover the power sector. When fully implemented, the national program will cover approximately 5 Gt of annual emissions—far more than any other emissions trading program in the world. However, the extent to which emissions trading will reduce China’s emissions of heat-trapping gases is unclear.<sup>29</sup>

The Chinese government first announced plans to develop a domestic CO<sub>2</sub> emissions trading program in 2011. Over the next several years, pilot programs were

launched in Beijing, Shanghai, Chongqing, Shenzhen, Hubei, Tianjin, Guangdong, and Fujian. In September 2015, President Xi Jinping announced plans to launch a national CO<sub>2</sub> emissions trading program.

Implementation of China’s national CO<sub>2</sub> emissions trading program has proceeded slowly. Delays have been due to data availability challenges, government reorganization, the inherent complexity of emissions trading programs and—most recently—COVID-19.<sup>30</sup> As of today, central elements of the program remain unclear. Those elements include the CO<sub>2</sub> emissions levels that will be allowed under the program, enforcement mechanisms, and the relationship between the program and power sector reform. Decisions on these and other items will determine the impact of emissions trading on China’s CO<sub>2</sub> emissions in the years ahead.<sup>31</sup>

### Urban Air Pollution

Severe air pollution chokes many Chinese cities. Soot and smog levels exceed national



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and international health standards, often by wide margins. In recent years, these air pollution levels have been falling steadily. According to official statistics, average PM2.5 levels in many large Chinese cities have fallen by a third to a half since 2013.<sup>32</sup>

During the first quarter of 2020, as much of China was shut down due to the coronavirus, emissions of some air pollutants dropped sharply. Average SO<sub>2</sub> concentrations fell 21 percent as compared to the first quarter of 2019. However, other air pollutants fell less sharply, in part because many major industrial facilities continued to operate during the lockdown. The number of days with good and above air quality in China's largest cities increased 7 percent during the first quarter of 2020 as compared to the same period in 2019.<sup>33</sup>

Air pollution is a top concern of many Chinese citizens and China's leaders. President Xi Jinping promises to "make China's skies blue again" and identifies cutting pollution as one of three priority "tough battles" for China in the years ahead. China's 13th Five-Year Plan (2016–2020) gives priority to fighting air pollution, setting quantitative goals for air pollution reduction.

Most measures to fight urban air pollution in China also help fight climate change. Policies that promote solar, wind, hydro, and nuclear power as alternatives to coal reduce both local air pollutants and heat-trapping gases. So do policies that promote energy efficiency. Policies that promote natural gas as an alternative to coal help reduce local air pollution by 90 percent or more and CO<sub>2</sub> emissions by roughly 50 percent, provided the natural gas does not leak. Policies to promote electric vehicles provide significant local air pollution benefits and are essential

to long-term decarbonization of the transport sector.

Some technologies for controlling urban air pollution are counterproductive when it comes to global warming. Scrubbers on coal plants have important local air pollution benefits but increase CO<sub>2</sub> emissions slightly since scrubbers require energy to operate. More significantly, synthetic natural gas can help reduce urban air pollution by moving coal combustion from urban to rural areas but significantly increases CO<sub>2</sub> emissions.

### Vehicles

Vehicles produce roughly 8 percent of the heat-trapping gases emitted in China each year. Vehicles also contribute significantly to urban air pollution in China (although less than coal combustion in most cities).<sup>34</sup>

In 2019, 25.8 million new motor vehicles were sold in China—more than in any other country by far. Sales fell 8 percent year-over-year. The average fuel economy of new passenger cars sold in China in 2019 was roughly 5.8 liters per 100 kilometers (equivalent to roughly 40.5 miles per gallon). This is better average fuel economy than in the United States and Australia, but worse than in Europe and Japan.<sup>35</sup>

In 2019, 1.2 million plug-in electric vehicles (EVs) were sold in China—more than in the rest of the world combined. Sales increased 7 percent year-over-year. More than 98 percent of the roughly 500,000 electric buses in the world are in China.<sup>36</sup>

As China reopens from COVID-19 lockdowns, commuting patterns have shifted sharply. For example, in April 2020, urban mass transit use in China was down 50 percent from April 2019. Meanwhile traffic in some Chinese cities increased 10





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percent—50 percent from the same period last year. Whether this shift will persist is unclear. In May 2020, sales of new motor vehicles in China showed a monthly year-over-year increase for the first time in two years.<sup>37</sup>

The Chinese government's principal policies with respect to vehicle emissions include fuel efficiency standards and support for "new energy vehicles." Almost all new energy vehicles in China today are plug-in electric vehicles with batteries, although fuel cell electric vehicles are receiving growing attention from policymakers.

All vehicle manufacturers in China must meet fuel efficiency standards; however, enforcement of the standards is uneven. Some experts report that manufacturers face few penalties for failing to comply.<sup>38</sup>

The Chinese government strongly supports plug-in EVs. Central government policies include a target of 5 million electric vehicles on China's roads by 2020, EV quotas for vehicle manufacturers and importers, manufacturing subsidies, bonus credits to auto manufacturers in meeting fuel efficiency standards, tax exemptions, government procurement, and support for the construction of electric vehicle charging stations. Many provincial and municipal governments also support electric vehicles, with preferential access to license plates and other incentives.<sup>39</sup>

In the first half of 2020, the central government and many provinces adopted policies to promote EVs, including extended purchase subsidies and additional license plate quotas. In his May 2020 speech to the National People's Congress, Premier Li Keqiang identified investment in EV charging infrastructure and promoting greater use of new energy vehicles as eco-

nomic stimulus priorities of the Chinese government.<sup>40</sup>

### Nuclear Power

China has 48 nuclear power plants—the third-largest fleet in the world, behind only the United States and France. Of the 13 nuclear power plants in the world opened in 2018 and 2019, 9 were in China. In 2019, nuclear power provided roughly 4.6 percent of China's electricity, up from 4.0 percent in 2018 and 3.8 percent in 2017.<sup>41</sup>

The Chinese government has ambitious plans to expand China's nuclear-generating capacity. However, construction has not kept pace with the goals in the 13th Five-Year Plan (2016–2020), which calls for 58 GW of installed nuclear power capacity and an additional 30 GW under construction by 2020. As of June 2020, China had 48 GW of installed nuclear power capacity and roughly 12 GW under construction.<sup>42</sup>

The Chinese government supports the development of nuclear power with a number of policy tools. These include:

- favorable prices and allocations of operating hours for electricity sales;
- cheap debt capital for the large state-owned enterprises (SOEs) that operate China's nuclear power plants; and
- help assembling land and arranging for transmission connections at new nuclear power plant sites.<sup>43</sup>

In building its nuclear power fleet, China has imported technology from the United States (AP1000), Canada (CANDU), Russia (VVER), and France (M310 and EPR). The Chinese government aims to localize these technologies and become self-sufficient in reactor design and construction.



**PBoC's Green Bond Endorsed Project Catalogue includes "clean utilization of coal" as an eligible project category.**

If each nuclear plant in China displaces a coal-fired power plant that might have been built in its place, then avoided emissions from China's nuclear fleet in 2019 would be roughly 336 million tons of CO<sub>2</sub> per year—roughly 3 percent of China's CO<sub>2</sub> emissions and almost 1 percent of global CO<sub>2</sub> emissions.<sup>44</sup>

### HFCs

Hydrofluorocarbons (HFCs) are human-made chemicals used in refrigeration and air conditioning. They were introduced in the late 1980s to replace chlorofluorocarbons (CFCs) and other chemicals that were damaging the ozone layer. HFCs do not damage the ozone layer; however, both HFCs and CFCs are powerful heat-trapping gases.

China is the world's largest producer and consumer of HFCs, as well as the largest producer of refrigerators and air conditioners. Under the 13th Five-Year Plan, the Chinese government is working to reduce HFC production capacity and promoting HFC alternatives including R290 for refrigeration and space cooling.<sup>45</sup>

In 2016, China joined 196 other countries in adopting the Kigali Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, agreeing to peak production and consumption of HFCs by 2028, with reductions ultimately reaching 85 percent by 2045.<sup>46</sup>

CFC production is illegal in China. Nevertheless, several recent studies suggest that new CFC production continues in several provinces. Chinese authorities stress their determination to stop this illegal production.<sup>47</sup>

### Green Finance

The Chinese government strongly promotes "green finance," which China's central

bank (the People's Bank of China or PBoC) defines as "financial services provided for economic activities that are supportive of environmental improvement, climate change mitigation and more efficient resource utilization." In September 2016, PBoC promulgated *Guidelines for Establishing the Green Financial System*—the first central bank to issue green finance guidelines.<sup>48</sup>

China's green finance policies promote investment in a wide range of assets, including renewable energy projects, water treatment plants, recycling facilities, and mass transit. In 2019, China's green finance policies helped mobilize in the range of RMB 240 billion to RMB 280 billion (\$34 billion to \$40 billion) of green bonds for qualifying projects.<sup>49</sup>

PBoC's *Green Bond Endorsed Project Catalogue* includes "clean utilization of coal" as an eligible project category. During the first half of 2019, according to one report, Chinese financial institutions provided more than \$1 billion to coal projects that qualified as green financing under Chinese standards. International standards for green bond investments do not include coal projects among the eligible categories.<sup>50</sup>

### Forestry

Forests cover large parts of southern China, from Fujian Province in the east to Sichuan and Yunnan Provinces in the west. Forests also cover much of China's far northeast. Roughly 23 percent of China's territory is covered with forests.<sup>51</sup>

China's forest cover has expanded in recent decades, according to a number of sources (although at least one source finds net forest loss). Forest stock density may be increasing in China as well.<sup>52</sup>



China’s forest programs sequester significant amounts of carbon. Estimates vary, with different studies suggesting figures in the range of 5 percent–11 percent of annual CO<sub>2</sub> emissions.



China’s Natural Forest Conservation Program is the largest forest conservation program in the world. It includes massive tree-planting programs, an expansion of forest reserves, and a ban on logging in primary forests. The Chinese government spends heavily on these forest programs—more than either the United States or Europe and more than three times the global average per hectare.<sup>53</sup>

China’s Nationally Determined Contributions gives high prominence to a forest goal—“to increase the forest stock volume by around 4.5 billion cubic meters from 2005 levels by 2030.” In July 2019, Premier Li Keqiang announced that China had met this goal 11 years ahead of schedule.<sup>54</sup>

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Some of China’s forest policies and consumption patterns may exacerbate deforestation in other countries, offsetting the climate benefits of the carbon sequestered in China’s forests. Although the Chinese government has expanded forest reserves and banned logging in China’s primary forests, China’s timber demand is large and growing. The combination of forest conservation and growing timber demand within China has meant more logging and deforestation in countries that sell timber to China, including Russia, Indonesia, Vietnam, and Myanmar. This may substantially offset the climate benefits of China’s domestic forest conservation policies.<sup>56</sup>



Shanghai has already built 520 kilometers of seawalls that stretch from Hangzhou Bay to the top of the border with Jiangsu province.

### Adaptation

The Chinese government released its *National Strategy for Climate Change Adaptation* in 2013. The *Strategy* also sets out goals, including to

- significantly reduce the vulnerability of climate-sensitive areas, regions, and populations;
- significantly strengthen monitoring, early warning capability, disaster prevention, and mitigation capacity for extreme weather events;
- significantly improve climate change fundamental research, observation, and forecasting capability; and
- significantly enhance public awareness of climate change.

The *Strategy* was released by NDRC along with eight ministries and bureaus.<sup>57</sup>

The Chinese government has dozens of pilot projects underway to help improve approaches for adapting to climate change. *The National Strategy for Climate Change Adaptation* identified 14 pilot projects to improve climate resilience, including projects on urban infrastructure in Shanghai, soil conservation in Jilin Province, and emergency response in Hainan Province. Other adaptation initiatives include building seawalls to protect vulnerable cities. Shanghai has already built 520 kilometers of seawalls that stretch from Hangzhou Bay to the top of the border with Jiangsu province.<sup>58</sup>

### Belt and Road

The Belt and Road Initiative (BRI) is the largest infrastructure initiative ever. As part of BRI, Chinese entities will provide financing, goods, and services to thousands of projects in dozens of countries. The

Chinese government reports entering into bilateral cooperation agreements with more than 120 countries in connection with BRI.<sup>59</sup>

The climate change impacts of the Belt and Road Initiative are enormous. The climate impacts of coal-fired power plants built under BRI are especially significant.

The Chinese government identifies green development as a goal of the Belt and Road Initiative. The *Guidance on Promoting Green Belt and Road*, issued in May 2017 by NDRC, Ministry of Environmental Protection (MEP), Ministry of Commerce (MOFCOM), and Ministry of Foreign Affairs (MFA), provides nonbinding guidance for companies participating in BRI. It says:

*We will encourage enterprises to prioritize low-carbon, energy-saving, environment-friendly and green materials and technical processes. ... We will also guide the businesses to tighten their R&D efforts on key technologies to address climate change.*<sup>60</sup>

At the Second Belt and Road Forum in April 2019, the Chinese government announced new initiatives in green lighting, green cooling, and green finance. The joint communiqué adopted by dozens of heads of state at the Second Belt and Road Forum says, “We underline the importance of promoting green development and addressing the challenges of environmental protection and climate change including by enhancing our cooperation to implement the Paris Agreement.”<sup>61</sup>

Energy sector projects are a significant part of the Belt and Road Initiative. The overwhelming majority of these projects are in coal, oil, and gas, although the number of renewable energy projects is growing.

<sup>57</sup> The bureaus are the Ministry of Finance, the Ministry of Housing and Urban and Rural Development, the Ministry of Transportation, the Ministry of Water Resources, the Ministry of Agriculture, the State Forestry Administration, the Bureau of Meteorology, and the Maritime Bureau.



Recent studies have found a Chinese role in more than 100 GW of coal-fired power plants under construction globally.

Chinese companies play a significant role in the development, construction, and financing of coal-fired power plants around the world. Recent studies have found a Chinese role in more than 100 GW of coal-fired power plants under construction globally. In 2019, media outlets reported on Chinese support for new coal power plants in countries including the Philippines, Vietnam, Indonesia, Bangladesh, Pakistan, Kenya, Mozambique, Malawi, South Africa, Zimbabwe, and Serbia.<sup>62</sup>

The choices made under the Belt and Road Initiative will have a significant impact on the world's ability to meet the goals set forth in the Paris Agreement. The “lock-in effect” of BRI infrastructure may have especial significance. Coal-fired power plants built as part of the Belt and Road Initiative may last for decades, even as costs for lower-carbon power sources such as solar and wind power with energy storage continue to fall. Once built and placed in service, coal-fired power plants can be very difficult to retire.<sup>63</sup>

The Belt and Road Initiative has tremendous potential to help mitigate climate change and contribute to low-carbon development. Mobilizing the networks and connectivity developed through the BRI toward low-carbon development goals more broadly could have very high impact. To date, most development under BRI has been on a higher-carbon path, but there is considerable potential for dramatically improved results.<sup>64</sup>

### AT THE CROSSROADS: CRITICAL DECISIONS AHEAD

The next 18 months will be an important time in Chinese policymaking with respect to climate change. Decisions made during

this period will have implications for the next decade and beyond. Four interrelated policy processes will be especially important.

### Stimulus Spending

The Chinese government has announced plans to spend trillions of RMB to stimulate the economy in response to the COVID-19 pandemic. These plans provide opportunities to invest in clean energy infrastructure, helping accelerate low-carbon development. At the same time, these plans might also increase investments in coal plants and other energy-intensive infrastructure, slowing low-carbon development.

In 2008–2009, the Chinese government responded to the global financial crisis with massive expenditures on roads, bridges, and other conventional infrastructure. This spending helped prevent widespread job loss in China and stabilize the global economy. Although there was some investment in clean energy during this period, including solar manufacturing, the vast majority of spending was on energy-intensive construction projects and industries heavily dependent on fossil fuels.

Chinese stimulus spending during the current recession will be more modest than in 2008–2009, in part because of the high debt. Spending will still be significant. That will include investments in “new infrastructure,” a term used to describe twenty-first-century technologies including 5G networks, cloud computing, and block chain.

Early signals from the Chinese government suggest some stimulus spending will go into low-carbon infrastructure. In his May 2020 speech to the National People's Congress, Premier Li Keqiang called out electric vehicle charging infrastructure as a type of “new infrastructure” that



There are many opportunities for the Chinese government to promote economic recovery with spending that promotes low-carbon development.

would receive government support. He also pledged support for electric vehicle deployment more broadly, as well as for railways and long-distance high-voltage transmission lines. In addition, some provincial governments have included low-carbon development projects in their stimulus plans. However, as of this writing the Chinese government has not identified “green” or “low-carbon” spending as a central theme of its stimulus spending.<sup>65</sup>

There are many opportunities for the Chinese government to promote economic recovery with spending that promotes low-carbon development. Areas already identified for spending in central government documents, including electric vehicle charging networks, have great promise. Other areas with considerable potential include renewable power, clean hydrogen, and carbon capture and storage. In each of these areas, spending by the central or provincial governments could create jobs and help cut emissions in the short and long term.

### 14th Five-Year Plan

Five-Year Plans play a central role in Chinese policymaking. These plans set goals that guide Chinese officials in shaping detailed policies and regulations. Recent Five-Year Plans have included goals for reducing the carbon intensity of the Chinese economy (CO<sub>2</sub> emissions per unit of GDP), reducing coal’s share of primary energy consumption, and increasing deployment of renewable energy. Recent plans have also included caps on the amount of coal-fired power plant capacity in China.

The Chinese government is currently in the process of preparing its 14th Five-Year Plan, which will guide policymaking from 2021 to 2025. Analysis is underway by

China’s State Council, central government ministries, and experts in China’s universities and other research organizations. The government-wide 14th Five-Year Plan will likely be finalized and approved in early 2021, with detailed sectoral plans such as the 14th Five-Year Plan for energy released in late 2021 or early 2022. Decisions made as part of this planning process will have profound and long-lasting impacts.

The decision on coal-fired power plant capacity will be among the most important in China’s 14th Five-Year Plan. The China Electricity Council has urged Chinese policymakers to increase the cap on coal-fired power plant capacity to 1300 GW by 2030, which would authorize a massive wave of new coal power plant capacity in China in the years ahead. The implications for global efforts to fight climate change would be very negative.

Other important topics in China’s 14th Five-Year Plan include goals for CO<sub>2</sub> intensity and coal’s share of primary energy. Key decisions on natural gas, renewable power, nuclear power, and other issues will likely be made in the 14th Five-Year Plan as well.

### Updated Climate Action Plan for UNFCCC

China ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, one year after it was adopted at the Rio Earth Summit. Chinese delegates have participated in all annual Conferences of the Parties (COPs) to the UNFCCC and many related meetings since, with a steadily growing role.

President Xi Jinping joined the opening ceremonies of the Paris Climate Conference in late 2015, declaring, “tackling climate change is a shared mission of all mankind.”



China's mid-century strategy will be closely watched around world, in part because few if any governments have the Chinese government's demonstrated capacity for long-term planning.

China ratified the Paris Agreement in September 2016, in a joint ceremony with the United States. In June 2017, following U.S. President Donald Trump's announcement that the United States would withdraw from the Paris Agreement, the Chinese government strongly reaffirmed its commitment to the agreement and has reiterated that position on many occasions since.<sup>66</sup>

As part of the Paris Agreement process, countries are expected to update or resubmit their climate action plans by the time of the UNFCCC Conference of the Parties to be held in Glasgow, Scotland, in November 2021 (COP26). (These climate action plans are known as "Nationally-Determined Contributions" or NDCs.) The Chinese government's decision about the content of its climate action plan will have important implications for the global climate and Paris Agreement process. If the Chinese government submits a climate action plan widely perceived to be ambitious and consistent with the Paris Agreement goals, that will inject momentum into global efforts to address climate change and help validate President Xi Jinping's strong words in support of the Paris Agreement. If the Chinese government submits a climate action plan widely perceived to be weak, that will slow the Paris Agreement process and lead many observers to question President Xi's words in support of the Paris Agreement.

### Mid-Century Strategy

Under the Paris Agreement, all countries are encouraged to submit "long-term low greenhouse gas emission development strategies" (often called "mid-century strategies") by the end of 2020. Such strat-

egies guide national policymakers and help identify key innovation needs in the decades ahead. The United States (under the Obama administration), Canada, and Mexico submitted their mid-century strategies in November 2016.<sup>67</sup>

The Chinese government is expected to submit its mid-century strategy to the UNFCCC in 2020 or 2021. Preparatory work is currently underway. China's mid-century strategy will be closely watched around world, in part because few if any governments have the Chinese government's demonstrated capacity for long-term planning. Indeed the Chinese government already has a long-standing 2049 goal—to achieve a "prosperous, strong, democratic, culturally advanced and harmonious country."<sup>\*\*</sup> Far more than many countries, China has policy tools and traditions that make long-term goals set by its government especially meaningful.

The emissions goal adopted by the Chinese government in its mid-century strategy will be especially important. According to the Intergovernmental Panel on Climate Change, global emissions of heat-trapping gases need to reach "net zero" by around 2050 to limit global warming to 1.5°C (2.7°F) above preindustrial levels.<sup>68</sup> To the extent that China's mid-century strategy envisions continuing emissions from China after 2050, other countries would need to compensate with negative emissions for the world to reach net zero. In light of the size of China's economy, that could be extremely difficult. The goals and plans for achieving them set forth in China's mid-century strategy will have significant implications for the global climate in the decades ahead.

<sup>\*\*</sup> The year 2049 is the 100th anniversary of the founding of the People's Republic of China.



**As nations gear up for COP26 and other major climate meetings in 2021, Chinese policies will have enormous impacts globally.**

## CONCLUSION

May 2020 was the hottest May ever recorded. July 2019 was the hottest July ever recorded. The hottest five years ever recorded were the past five years.<sup>69</sup>

In June 2015, the Chinese government wrote, “China is among those countries most severely affected by the adverse impacts of climate change.” The next month, the temperature reached 50.3°C (122.5°F) near Ayding Lake in Xinjiang Province—the highest temperature ever recorded in China. In August and September 2018, record rains fell in parts of Guangdong Province, requiring the evacuation of more than 200,000 people. In the first months of 2020, Yunnan Province suffered its worst drought in many years. Hundreds of millions of people are vulnerable to sea level rise in China’s coastal provinces—one of the most densely populated areas on Earth.<sup>70</sup>

As the world’s largest emitter of heat-trapping gases, China plays a central role in

the global response to climate change. Its climate change policies have enormous impacts at home and abroad. As nations gear up for COP26 and other major climate meetings in 2021, Chinese policies will have enormous impacts globally. In the United States (where a Biden administration would dramatically change the federal government’s climate change policies), in Europe (where climate issues have especially high profile), in many poor developing countries (where vulnerability to climate change is most acute), and everywhere policymakers focus on climate change, Chinese policies will receive significant attention.

Today, China’s climate policies are a study in contrasts—promoting low-carbon development and high-carbon infrastructure at the same time. The next 18 months are a critical time in Chinese climate change policy. Decisions by China’s leaders will have significant impacts on the global climate for years to come.





## ENDNOTES

- <sup>1</sup> [Climate Action Tracker—Countries](#) (accessed June 17, 2020). See also [BP Statistical Review of World Energy 2020](#) (June 2020) (for similar figures with respect to CO<sub>2</sub> emissions from fossil fuels).
- <sup>2</sup> Using CO<sub>2</sub>e values of non-CO<sub>2</sub> gases, excluding land use change. [Climate Action Tracker—Countries](#) (accessed June 17, 2020); PBL Netherlands Environmental Assessment Agency, [Trends in Global CO<sub>2</sub> and Total Greenhouse Gas Emissions: 2019 Report](#) (March 2, 2020) (data tables). See [BP Statistical Review of World Energy 2020](#) (June 2020) (with similar figures for CO<sub>2</sub> emissions from fossil fuels).
- <sup>3</sup> Hannah Ritchie and Max Roser, [“CO<sub>2</sub> and Other Greenhouse Gas Emissions—Cumulative CO<sub>2</sub> Emissions,”](#) Our World in Data (accessed June 13, 2020); [BP Statistical Review of World Energy 2020](#) (June 2020).
- <sup>4</sup> [BP Statistical Review of World Energy 2020](#) (June 2020); United Nations Department of Economic and Social Affairs, [“World Population Prospects 2019”](#) (accessed June 17, 2020).
- <sup>5</sup> [BP Statistical Review of World Energy 2020](#) (June 2020); IEA; World Bank, [Data-China](#) (accessed June 17, 2020).
- <sup>6</sup> IEA, [Global Energy Review 2020](#) (April 2020); National Bureau of Statistics, [“Decline of Major Economic Indicators Significantly Narrowed Down in March”](#) (April 17, 2020).
- <sup>7</sup> [“State Council Information Office Briefing on Climate Change,”](#) China.org.cn (September 19, 2014); [“Xi Jinping’s Report at 19th CPC National Congress”](#) (October 18, 2017). See Geoff Dembecki, [“The Convenient Disappearance of Climate Denial in China,”](#) Foreign Policy (May 31, 2017).
- <sup>8</sup> [“Li Keqiang Chaired the National Energy Commission Meeting,”](#) China Government Network (October 11, 2019); Premier Li Keqiang, [“Government Work Report”](#) (May 22, 2020).
- <sup>9</sup> See, e.g., Kevin Tu, [“COVID-19 Pandemic’s Impacts on China’s Energy Sector: A Preliminary Analysis,”](#) Center on Global Energy Policy, Columbia University (June 4, 2020).
- <sup>10</sup> People’s Republic of China, [Enhanced Actions on Climate Change: China’s Intended Nationally Determined Contributions](#) (June 2015) at p. 5.
- <sup>11</sup> See Qi Ye et al., [China’s Peaking Emissions and the Future of Global Climate Policy,](#) Brookings (September 2018); Dabo Guan et al., [“Structural Decline in China’s CO<sub>2</sub> Emissions through Transitions in Industry and Energy Systems,”](#) Nature Geoscience (July 2018); Ministry of Ecology and Environment, [China’s Policies and Actions for Addressing Climate Change](#) (November 2019) at p. 1 (45.8 percent reduction in CO<sub>2</sub> per unit of GDP 2005–2018); National Bureau of Statistics, [“Statistical Bulletin on National Economic and Social Development in 2019”](#) (February 28, 2020) at part XII (4.1 percent reduction in CO<sub>2</sub> per unit of GDP in 2019); Mikhail Grant and Kate Larsen, [“Preliminary China Emissions Estimates in 2019,”](#) Rhodium Group (March 18, 2020) (14.9 percent non-fossil in primary energy at end of 2019); [“Li Keqiang Presided over the National Leading Group Meeting on Climate Change, Energy Conservation and Emissions Reduction,”](#) Chinese Government Network (July 11, 2019) (forest goal achieved in 2019).
- <sup>12</sup> See, e.g., Ministry of Ecology and Environment, [China’s Policies and Actions for Addressing Climate Change](#) (November 2019). See also National Bureau of Statistics, [“Statistical Bulletin on National Economic and Social Development in 2019”](#) (February 28, 2020) at part XII.
- <sup>13</sup> [BP Statistical Review of World Energy 2020](#) (June 2020) at p. 47; Global Carbon Project, [Global Carbon Budget 2019](#) (December 4, 2019) at slide 11, 24 (7.3 Gt CO<sub>2</sub> emissions from coal in China, 36.8 Gt global CO<sub>2</sub> emissions).
- <sup>14</sup> National Bureau of Statistics, [“Statistical Communique on 2019 National Economic and Social Development”](#) (February 28, 2020) at Part 12; NDRC, [Policies and Actions for Addressing Climate Change 2018](#) (November 2018) at p.8
- <sup>15</sup> China Electricity Council, [2019–2020 National Power Supply and Demand Situation Analysis and Forecast Report](#) (January 21, 2020) (30 GW new coal-fired capacity 2019); Christine Shearer et al., [Boom and Bust 2020: Tracking the Global Coal Plant Pipeline](#) at p. 14 (36.8 GW new coal-fired capacity in 2019); Christine Shearer, [“COVID19 Update,”](#) EndCoalNow.org (March 25, 2020) (8 GW new approvals in March 2020).
- <sup>16</sup> Premier Li Keqiang, [“Government Work Report”](#) (May 22, 2020).
- <sup>17</sup> China Electricity Council, [2019–2020 National Power Supply and Demand Situation Analysis and Forecast Report](#) (January 21, 2020); Lauri Myllyvirta, [“Will China Build Hundreds of New Coal Plants in the 2020s?,”](#) Carbon Brief (March 24, 2020). See also [Carbon Brief Infographics: Global Coal Power.](#)



- <sup>18</sup> IRENA, [Renewable Capacity Statistics 2020](#) at p. 2.
- <sup>19</sup> National Bureau of Statistics, [“Statistical Communiqué on 2019 Economic and Social Development”](#) (February 28, 2020) at part 3.
- <sup>20</sup> [“Li Keqiang Chaired the National Energy Commission Meeting,”](#) China Government Network (October 11, 2019); Premier Li Keqiang, [“Government Work Report”](#) (May 22, 2020).
- <sup>21</sup> As of year-end 2019, the top countries for hydropower capacity were China (356 GW), Brazil (109 GW), the United States (103 GW), and Canada (81 GW). IRENA, [Renewable Capacity Statistics 2020](#) at pp. 6–8.
- <sup>22</sup> [“Three Gorges Dam,”](#) Encyclopedia Britannica (accessed June 15, 2020).
- <sup>23</sup> IRENA, [Renewable Capacity Statistics 2020](#) at pp. 13–20.
- <sup>24</sup> China Energy Portal, [“2019 Wind Power Installations and Production by Province”](#) (February 28, 2020); China Energy Portal, [“2015 Wind Power Installations and Production by Province”](#) (February 4, 2016).
- <sup>25</sup> IRENA, [Renewable Capacity Statistics 2020](#) at pp. 21–24; National Energy Administration, [“Grid-Connected Operation of Photovoltaic Power Generation in 2019”](#) (February 28, 2020).
- <sup>26</sup> REN21, [“Renewables 2020 Global Status Report”](#) (June 2020) at Chapter 3 note 223.
- <sup>27</sup> China Energy Portal, [“2019 PV Installations Utility and Distributed by Province”](#) (February 28, 2020).
- <sup>28</sup> National Bureau of Statistics, [“Energy Production in the First Two Months of 2020”](#) (March 17, 2020)
- <sup>29</sup> See, generally, Noah Kaufman and Jonathan Elkind, [“Can CO<sub>2</sub> Trading System Avoid the Pitfalls of Other Emissions Trading Schemes?”](#) Columbia Center on Global Energy Policy (February 2018); Robert Stavins, [“What Should We Make of China’s Announcement of a National CO<sub>2</sub> Trading System?”](#) (January 7, 2018).
- <sup>30</sup> Patrick Temple-West, [“China’s Carbon Trading Scheme Struggles to Take Off,”](#) Financial Times (June 4, 2020); [“China Is Dawdling on Carbon Trading,”](#) Bloomberg (May 7, 2019).
- <sup>31</sup> See, generally, Alistair Ritchie and Jackson Ewing, [“National Emissions Trading System Is Key to China’s Green Recovery,”](#) China Dialogue (July 3, 2020).
- <sup>32</sup> Ministry of Ecology and Environment, [China Air Quality Improvement Report \(2013–2018\)](#) (June 6, 2019); Ministry of Ecology and Environment, [Quality of the Environment 2019](#) (May 7, 2020). See also Centre for Research on Energy and Clean Air, [Air Pollution in China 2019](#) (January 2020).
- <sup>33</sup> Ministry of Ecology and Environment, [Status of Surface Water and Air Quality January to March](#) (April 14, 2020)
- <sup>34</sup> IEA, [CO<sub>2</sub> Emissions from Fuel Combustion 2018](#) at pp. 15 and 81 (in 2016, China’s transport emissions = 0.8 Gt CO<sub>2</sub> and China’s total CO<sub>2</sub> emissions from fossil fuel combustion = 9.1 Gt); People’s Republic of China, [Second Biennial Update Report on Climate Change](#) (December 2018) at pp. 16, 19 (in 2014, transport emissions = 9.0 percent CO<sub>2</sub> emissions and CO<sub>2</sub> emissions = 81.6 percent of total greenhouse gas emissions).
- <sup>35</sup> Marklines, [“China—Flash Report, Sales Volume, 2019”](#) (January 9, 2020); Cui Dongshu, [“2019 Passenger Car Companies’ Fuel Consumption,”](#) Sohu.com (April 13, 2020); Ministry of Industry and Information Technology, [“Average Fuel Consumption of Passenger Car Companies in 2019”](#) (April 10, 2020); IEA, [Fuel Economy in Major Car Markets](#) (March 20, 2019) at figure KF1 and data sets.
- <sup>36</sup> Mark Kane, [“Close to 1.18 Million Plug-In Electric Cars Were Sold in China in 2019,”](#) Inside EV News (January 22, 2020); IEA, [Global EV Outlook 2020](#) (June 2020) at p. 14.
- <sup>37</sup> Ministry of Transport, [“Economic Operation of Transport in April”](#) (May 27, 2020); [“Chinese Oil Demand Is Almost Back to Pre-Virus Crisis Levels,”](#) Bloomberg News (May 18, 2020)
- <sup>38</sup> [“Nearly 50 Passenger Car Companies Failed to Meet Fuel Consumption in 2018,”](#) Beijing Daily (April 10, 2019); [“工信部公示2016年度汽车企业平均油耗 43家未达标”](#) [43 Companies Failed to Meet the Standards in 2016] (April 14, 2017); Feng Hao, [“China’s EV Push Hurting Fuel Economy Standards,”](#) China Dialogue (November 21, 2016).



- <sup>39</sup> See State Council, “[节能与新能源汽车产业发展规划\(2012–2020\)](#)” [Energy Saving and New Energy Auto Industry Development Plan (2012–2020)] (June 28, 2012); Jack Gao and Diana Zhou, “[Driving the Future of Future Driving: Scaling Up Adoption of Electric Vehicles in China](#),” Kennedy School Review (August 10, 2016); Anders Hove, “[These Four Lessons Will Help China Win the Electric Vehicle Market](#)” (May 9, 2017).
- <sup>40</sup> “[China Is Trying to Salvage Its Bruised Electric-Car Industry](#),” Bloomberg (May 31, 2020); Premier Li Keqiang, “[Government Work Report](#)” (May 22, 2020).
- <sup>41</sup> IAEA, [Power Reactor Information System](#) (World Statistics/Under Construction and Country Statistics tabs) (accessed June 15, 2020); National Bureau of Statistics, [Statistical Communiqué on 2019 Economic and Social Development](#) (February 28, 2020) at table 3; National Bureau of Statistics, [Statistical Bulletin of National Economic and Social Development 2019](#) (February 28, 2019) at table 3; National Bureau of Statistics, [Statistical Communiqué on National Economic and Social Development](#) (February 28, 2018) at table 3.
- <sup>42</sup> NDRC, [Energy Development Strategy Action Plan 2014–2020](#) (June 7, 2014) (Chinese); NDRC, [Energy Development Strategy Action Plan 2014–2020](#) (June 7, 2014) (English); IAEA, “[Power Reactor Information System](#)” (World Statistics/Under Construction and Country Statistics tabs) (accessed June 15, 2020);
- <sup>43</sup> See, generally, Mark Hibbs, [The Future of Nuclear Power in China](#) (Carnegie Endowment for International Peace, 2018).
- <sup>44</sup> For assumptions behind the calculation see David Sandalow, [Guide to Chinese Climate Policy 2019](#) at p. 79. See also <http://en.people.cn/n3/2020/0117/c90000-9649630.html> (estimating that Chinese nuclear power plants avoided 966 million tons of CO<sub>2</sub> emissions in 2019).
- <sup>45</sup> See Feng Hao, “[Chinese Manufacturers under Pressure to Phase Out HFCs](#),” China Dialogue (November 28, 2016) (60 percent of global CO<sub>2</sub> production is in China); NDRC et al., [Green and High-Efficiency Cooling Action Plan](#) (June 13, 2019); Xiaopu Sun and Tad Ferris, “[The Kigali Amendments and China’s Critical Roles in Evolving the Montreal Protocol](#),” Trends (September/October 2018).
- <sup>46</sup> Ezra Klein and Sonja Wagner, “[The Kigali Amendment to the Montreal Protocol: HFC Phase-down](#)” (November 1, 2016).
- <sup>47</sup> M. Rigby et al., “[Increase in CFC-11 Emissions from Eastern China Based on Atmospheric Observations](#),” Nature (May 22, 2019); “[Ministry of Ecology and Environment: Resolutely Crack Down on the Illegal Production, Sale and Use of CFC-11 by Enterprises](#),” People’s Daily (July 26, 2018).
- <sup>48</sup> People’s Bank of China, [Guidelines for Establishing the Green Financial System](#) (September 2, 2016) at 1(1).
- <sup>49</sup> [Emerging Market Green Bond Market Report 2019](#) (Spring 2020) at p. 13; “[2019 China Green Bond Market Development Review](#),” Xinhua Finance (January 10, 2020).
- <sup>50</sup> David Stanway, “[China Provides \\$1 Billion in ‘Green’ Finance to Coal Projects in First Half of the Year](#),” Reuters (August 19, 2019); International Capital Markets Association, [Green Bond Principles](#) (June 2018 update) (accessed August 25, 2019); Climate Bonds Initiative, [Climate Bonds Standards v.2.1](#) at p. 15; Weihui Dai, Sean Kidney, and Beate Sonerud, [Roadmap for China: Green Bond Guidelines for the Next Stage of Market Growth](#), Climate Bonds Initiative (April 2016) at pp. 8, 23.
- <sup>51</sup> See Ministry of Ecology and Environment, [China’s Policies and Actions for Addressing Climate Change 2019](#) (October 2019) at p. 10.
- <sup>52</sup> See Ministry of Ecology and Environment, [China’s Policies and Actions for Addressing Climate Change 2019](#) (October 2019) at p. 10 and same annual reports from prior years; National Bureau of Statistics, “[Statistical Communiqué on 2019 National Economic and Social Development](#)” (February 28, 2020) at Part 12 and same NBS annual communiqué from prior years; [Global Forest Watch—China Country Summary](#), World Resources Institute (finding net forest loss) (accessed June 15, 2020); Lei Shi et al., “[The Changes in China’s Forests: An Analysis Using the Forest Identity](#),” PLOS ONE (June 9, 2011).
- <sup>53</sup> Andrés Viña, William J. McConnell, Hongbo Yang, Zhenci Xu, and Jianguo Liu, “[Effects of Conservation Policy on China’s Forest Recovery](#),” Science Advances (March 2016).
- <sup>54</sup> People’s Republic of China, [Enhanced Action on Climate Change: China’s Intended Nationally Determined Contributions](#) (June 2015) at p. 5; “[Li Keqiang Presided over the National Leading Group Meeting on Climate Change, Energy Conservation and Emissions Reduction](#),” Chinese Government Network (July 11, 2019).
- <sup>55</sup> Jingyun Fang et al., “[Climate Change, Human Impacts, and Carbon Sequestration in China](#),” Proceedings of the National Academy of Sciences of the United States, April 17, 2018 (163.4 TgC/year of carbon sequestration for the past decade), 1 Tg = 1 Mt; 1 Mt C = 3.67 Mt CO<sub>2</sub>; 163.4 TgC = 598 Mt CO<sub>2</sub>. People’s Republic of China, [Second Biennial Update Report on Climate Change](#) (December 2018) at p. 16.



- <sup>56</sup> See Bo Li, “[2 Ways for China to Play a Bigger Role in Protecting Global Forests](#),” World Resources Institute (April 17, 2018).
- <sup>57</sup> NDRC et al., [National Strategy for Climate Change Adaptation](#) (November 18, 2013).
- <sup>58</sup> “[Shanghai Takes Measures against Rising Sea Levels](#),” Global Times (Accessed December 2, 2019).
- <sup>59</sup> Zhu Wenqian, “[China Has Signed 171 B&R Cooperation Documents](#),” China Daily (March 7, 2019); Cui Can, “[Green Belt and Road Initiative Powered by New Energy Projects](#),” China.org.cn (April 28, 2019).
- <sup>60</sup> NDRC, MEP, MOFCOM, and MFA, [Guidance on Promoting Green Belt and Road](#) (May 8, 2017).
- <sup>61</sup> “[Xi Tells Summit That China’s ‘Belt and Road’ Initiative Must Be Green and Sustainable](#),” Reuters/Japan Times (April 26, 2019); “[Xi Jinping Chairs and Addresses the Leaders’ Roundtable](#),” Second Belt and Road Forum for International Cooperation website (accessed August 7, 2019); [Joint Communiqué of the Leaders’ Roundtable of the 2nd Belt and Road Forum for International Cooperation](#), Ministry of Foreign Affairs, People’s Republic of China (April 27, 2019).
- <sup>62</sup> Christine Shearer et al., “[China at a Crossroads](#),” Institute for Energy Economics and Financial Analysis (January 2019); “[Lanao Kauswagan Power Station](#),” SourceWatch (July 19, 2019); “[Congratulations Pakistan: Thar Coal Plant Starts Producing Electricity](#),” Global Village Space (March 19, 2019); “[GCM and POWERCHINA Inks US\\$4bn Power Deal](#),” GCM Resources (January 17, 2019); “[Construction Resumes on \\$1.5 Billion Zimbabwe Power Project](#),” POWER Magazine (March 3, 2019); Ashfaq Ahmed, “[Pakistan Opens Its First Coal Power Plant in the Most Backward Area of Thar](#),” Gulf News (April 10, 2019); Dana Ullman, “[When Coal Comes to Paradise](#),” Foreign Policy (June 9, 2019); Dusan Stojanovic, “[China’s Spending Influence in Eastern Europe Worries West](#),” AP News (April 10, 2019); Gary Sands, “[How China’s Belt and Road Initiative Could Lead Vietnam Away from Renewable Energy](#),” South China Morning Post (June 11, 2019); Jonathan Watts, “[Belt and Road Summit Puts Spotlight on Chinese Coal Funding](#),” The Guardian (April 25, 2019); Karl Mathiesen, “[China Scrubs Its Coal Projects from ‘World Heritage in Danger’ in Decision](#),” Climate Home News (May 7, 2019); Oliver Griffin, “[Ncondezi Energy Shares Rise on Agreement With CMEC, General Electric’s Swiss Unit](#),” Morningstar (July 23, 2019); Rangga Prakoso, “[Lontar Extension PLTU Operates in September](#),” Berita Satu (March 29, 2019); Michael Lelyveld, “[China’s Belt and Road Initiative Blackened by Coal](#),” Eurasia Review (February 1, 2019).
- <sup>63</sup> See Isabel Hilton, “[How China’s Big Overseas Initiative Threatens Global Climate Progress](#),” Yale Environment 360 (January 3, 2019); Kelly Sims Gallagher, “[China’s Belt and Road Is a Conduit for Polluting Investments](#),” Financial Times (August 9, 2018).
- <sup>64</sup> See Helena Wright, “[Why China Should Green Its Overseas Finance](#),” China Dialogue (May 14, 2019); Simon Zadek, “[The Critical Frontier: Reducing Emissions from China’s Belt and Road Initiative](#),” Brookings (April 25, 2019).
- <sup>65</sup> Premier Li Keqiang, “[Government Work Report](#)” (May 22, 2020); David Sandalow and Xu Qinhua, “[Green Stimulus Proposals in the United States and China](#),” Center on Global Energy Policy (July 2020).
- <sup>66</sup> “[President Xi’s Speech at Opening Ceremony of Paris Climate Summit](#),” China Daily (December 1, 2015).
- <sup>67</sup> Paris Agreement Article 4.19 and Decision 1/CP.21, paragraph 35.
- <sup>68</sup> Intergovernmental Panel on Climate Change, [Global Warming of 1.5°C](#) (2018) at p.14
- <sup>69</sup> NOAA, “[May 2020 Tied for Hottest May on Record](#)” (June 12, 2020); Climate Central, “[Top 10 Warmest Years on Record](#)” (January 15, 2020).
- <sup>70</sup> People’s Republic of China, [Enhanced Actions on Climate Change: China’s Intended Nationally Determined Contributions](#) (June 2015) at p. 2; “[50.3°C 新疆吐鲁番市艾丁湖刷新“中国热极”记录](#) [50.3°C Xinjiang Turpan Ayding Lake Sets China Temperature Record], Asia Heart Network (July 29, 2015); Li You, “[Fall Semester Delayed at 120 Schools in Flood-Ravaged City](#),” Sixth Tone (September 5, 2018); “[Drought Affects over 1 Million People in SW China Province](#),” Xinhua (April 3, 2020).