

## Testimony before the U.S.-China Economic and Security Review Commission

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Henry Lee, Harvard University

Members of the Commission, it is a privilege to be invited to testify at this hearing on China's energy and climate ambitions. I have been asked to address five areas, but first I would like to deviate slightly to put China's energy initiatives into perspective.

Let me make four initial points.

Since the Paris COP in 2015, climate has been one of several drivers of China's energy policy, but it has not been the only focus, nor the primary focus in many cases. China's energy policies are shaped by a variety of concerns including economic development, jobs, abatement of conventional air pollution, and energy security. China's push for electric cars, for example, has been driven more by energy security and conventional air pollution goals than by climate.

Second, China has depended on imports for access to primary fuels. It is the largest importer of oil, and it is rapidly becoming a major importer of natural gas. While it has large coal reserves, the marginal ton of coal in southern China—until very recently—came from Australia. Last September, China faced a perfect storm of decreasing hydroelectric capacity due to a drought in the south, coal shortages in the north, and rapid growth in demand as the economy began to recover from the pandemic. Electric generators curtailed their output. Over 20 provinces were blacked out for measurable periods. These events reinforced the importance of energy security, forcing the government to directly intervene and temporarily sideline ongoing climate mitigation efforts.

China is acutely aware of its dependence on imported fuels. It is this awareness that led China to pursue partnerships with Russia to produce and transport natural gas and with Saudi Arabia to construct and operate large refineries. Energy security concerns have created a contradictory scenario in which China is simultaneously reinforcing the transition to renewable energy while working to ensure and enhance the availability of fossil fuels.

Third, in order to address the supply shortages that threatened China's economic development efforts in the 1990s, China provided new generators guarantees that their power would be bought, stimulating the construction of hundreds of coal-fired power generators and unlocking 25 years of unprecedented industrial growth. This system—which worked so well 20 years ago—is not the system needed to meet China's new goal of carbon neutrality. To put this problem into perspective, if China moves to a market dispatch protocol instead of its equal share protocol, about 40% of its coal fleet could be uncompetitive within eight years.

Under the equal share dispatch rule, generators are guaranteed a roughly equal number of operating hours, regardless of the costs. This rule has also contributed to over-investment by municipalities and provinces in coal-fired facilities, particularly smaller and less efficient plants. Recently, the central government has intervened to cancel the construction of new coal plants, but until the incentives are changed provinces are likely to keep trying to build additional coal plants.

Fourth, China's energy system is dominated by large state-owned companies with extraordinary market power. Just two electric grid companies wholesale, retail, transmit, and market almost all of the country's electricity. Three companies dominate the oil industry. Despite the rhetoric, the future of both supply and

demand is not determined by markets but rather administratively by government officials. For large supply projects, this system works well, but it struggles with smaller projects, intermittent supplies, and demand-side initiatives. Predicting China's energy consumption and production in 2030 requires one to predict the direction and success of government policies and programs as opposed to markets—a much more inexact exercise.

What are the indicators of a successful energy policy? Is it the megawatts of solar and wind energy installed? Is it the rate at which coal as a percent of primary energy declines? Is it the number of high voltage transmission lines that China builds? I would argue that while these indicators are important, they cannot tell us whether China will be able to meet its 2060 goal of carbon neutrality.

In our recent book, my team of Harvard scholars argued that China must initiate key institutional reforms to position itself to rapidly deploy clean technologies in the three decades between 2030 and 2060. I will focus on two of these reforms.

**Governance:** In a system where the key segments of the power industry are owned and operated by the state and investment decisions are made by the state, how the governance system operates makes a big difference. Ideally, you want clear lines of responsibilities between agencies and, where relevant, within agencies. You would also want the incentives for local, provincial, and central government officials to be symmetrical. Such is rarely the case in China. To manage ongoing rivalries between agencies, China relies heavily on committees of senior officials that report to the State Council—the central policy-making body of the Chinese government.

The relationship between provincial governments and the central government is also changing. Frustrated by insufficient responses by provincial officials to central government directives, China has established more specific guidelines. For example, in 2005, the Politburo announced a mandatory goal of reducing energy intensity. Provincial officials were responsible for designing and implementing policies and programs to meet those goals. Initially, compliance was low and the data exaggerated. In response, the central government introduced a “Target Responsibility System” that evaluates local official performance in meeting the directive. The process is very detailed and assesses the performance of local officials against nine criteria. Measures like this indicate a willingness by Beijing to intervene in provincial energy initiatives at a more granular level.

While this system has met with some success, the basic flaws with the intensity targets remain. In an excellent article, Kevin Lo of Hong Kong University pointed out that improvements in energy intensity do not necessarily lead to a reduction in energy consumption, as local officials can meet their targets by growing the local economy at ever faster rates. Further, developed provinces in the east met their targets by persuading energy intensive industries to relocate to poorer western provinces, who could then use the subsequent increase in their GDP to meet their targets. I am not implying that China has not made great strides in reducing its energy intensity, rather I am saying that the success may be less than the government claims.

Second, provinces obtain revenue from local power generators and thus there is a strong incentive to use local power sources even though less expensive, cleaner power may be available in a neighboring province. The NDRC announced in October that these disincentives to power trading must be eliminated. However, this is not the first time that Beijing has ordered this practice stopped and past efforts have met with limited success.

Third, China has periodically allowed its provinces to make some energy investment decisions, particularly for new generating plants. The result has been skyrocketing debt and over-investment in

energy facilities. These periods are often followed by centrally imposed restrictions on the ability of provinces to unilaterally invest in power facilities and incur debt. But eventually, these restrictions are lifted and the cycle repeats itself. Today, Beijing has established provincial debt limits that can constrain investments, particularly in new coal-powered facilities. It has also recently put a halt to many of the newly proposed power plants that were still in the planning stage.

All of these examples indicate that Beijing is giving the provinces less autonomy in the implementation of energy directives. Over time, this assertion of central control will facilitate China's ability to transport renewable energy, accelerate the deployment of the infrastructure needed to support clean energy technologies, and overcome provincial barriers to a cleaner energy mix. However, the transition to net zero carbon will also require more flexibility, greater emphasis on distributed technologies, and millions of small decisions by consumers, industries, and local governments—all of which require the development of more capacity and more discretion at the provincial and local levels. How China manages this tension will have a major impact on its energy future.

**Transition Dislocations:** Let me start with a few facts to provide a snapshot of the social challenges inherent in the transition. In the last ten years, more than a million jobs have been lost in the coal industry. For every one million dollars invested in China, the coal industry produces 68 jobs, while the renewable industry produces only 30. Finally, China's fossil fuel industries are disproportionately located in a few provinces and the social safety net for dislocated workers is provided by the employer rather than the government. One might argue that in many cases, the companies involved are state-owned and thus backed by the government. However, neither provincial nor central government institutions presently have the capacity to meet this challenge. Unless growing human dislocations caused by the energy transition are more effectively addressed, political forces will slow the transition to carbon neutrality.

**What would I recommend to the U.S. Congress?** I would make two recommendations. First, China announced in its latest five-year plan that it would increase its energy R&D budget by 7% per year for the next five years and its Basic Science budget by 10.6% per year. If the United States is to remain competitive, it must be willing to significantly increase its energy R&D budgets. Otherwise, the world may be purchasing the energy technologies of tomorrow from China. Second, the cooperation and coordination between China and the United States, which seemed so promising in 2014, is fading. Climate and energy may be an area where the benefits of greater coordination and cooperation may outweigh the costs.