POLICY BRIEF

FIVE STRATEGIES TO ACHIEVE CHINA'S 2060 CARBON NEUTRALITY GOAL

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China's pledge of carbon neutrality by 2060 will generate major and sustained benefits, including reduced air pollution, economic leadership in new technologies, and an improved global environment. It is also a critical contribution to catalyze increased international climate ambition. This net-zero pledge can be achieved with a combination of five strategies: sustainable demand, decarbonizing electricity, electrification, fuel switching, and approaches to achieve negative emissions. Achieving this goal will be challenging but will also generate significant benefits, both domestic and global—not only enhancing societal welfare, but also generating opportunities to build China's technological and economic leadership in the new, climate-friendly economy. In implementing these five strategies to get to net zero, early action will be critical, and near-term opportunities with significant benefits include an immediate halt to new coal-fired power plant construction and peaking of emissions as early as possible.

Because China is the world's largest emitter of greenhouse gases, a global economic and industrial powerhouse, and a key international leader, its national energy and economic development strategies are critically important—not only for its own economic development, environment, and public health, but also for the global climate and international efforts to chart a more sustainable approach to development. In this context, Chinese President Xi Jinping's recent announcement of China's clean energy and climate goals also gives a significant boost to current international discussions to raise global climate ambition. President Xi's announcement, delivered at the U.N. General Assembly, contained two elements: achieving a peak in carbon emissions before 2030 and overall national carbon neutrality before 2060.

This policy was nationally determined and clearly articulates and advances China's domestic priorities. In addition, it supports increased global ambition in several ways. First, the decision to deliver a long-term target of carbon neutrality before 2060 represents a new and major commitment by China to align its emissions with the levels of rapid and deep decarbonization needed to reduce the risks of climate change in line with our best scientific understanding. Second, the announcement not only clarifies for China's domestic economic sectors and policymaking bodies the high priority given to human health, lives, and environment, it also illuminates the broad outlines of the pathway of decarbonization that will require rebalancing of economic activity away from more polluting industries on clear timelines. Third, the timing of the announcement comes at an important moment to support discussions in other key countries about their own goals. China's long-term target has the important effect of signaling to the international community both the importance and the feasibility of complete decarbonization by mid-century—and thus serves to encourage similar ambition in other countries.

Achieving decarbonization by 2060 will require a significant and rapid shift from China's current economic structure and energy system. Importantly, because of the long lead times within some economic sectors, the 2060 decarbonization target also embodies not only the endpoint in itself, but implies specific pathways of change starting today. **While the exact pathway and policies remain to be developed in China, we present here an initial exploration of potential opportunities and pathways for achieving the 2060 target.** While a limited amount of flexibility exists, these pathways represent a reasonable estimation of the most effective approaches to reaching this challenging target.

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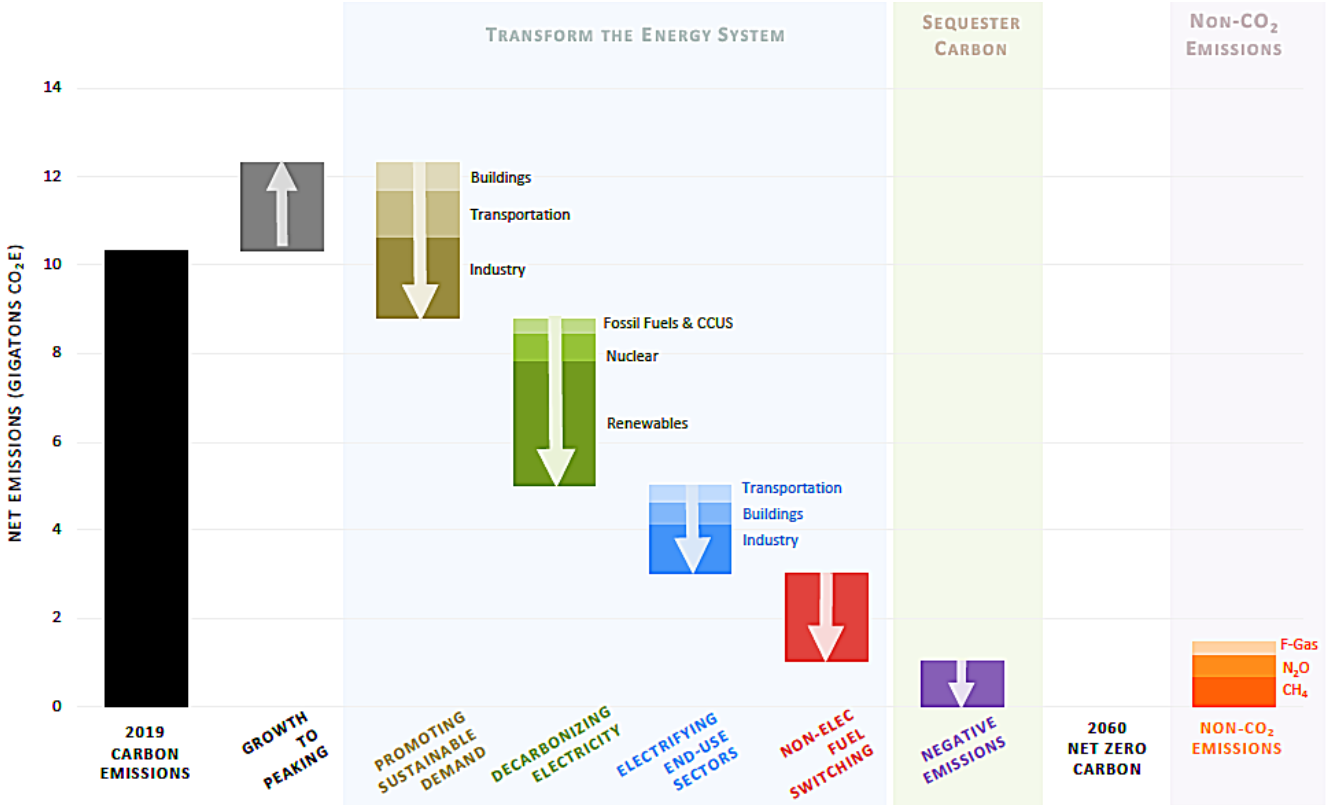
Figure: Emission Reductions to Net-Zero Carbon through Five Key Strategies [1]



China's ambitious 2060 decarbonization goal is achievable through a combination of actions to promote sustainable demand, decarbonize electricity, electrify and switch fuels, and absorb excess CO2. Early actions including immediate stop of new coal construction and peaking emissions early are critical to achieve this 2060 goal.

FIVE KEY STRATEGIES

Regardless of the exact breakdown, all pathways towards net-zero emission in China rest on five key strategies:

1. **Promoting sustainable demand** in all end-use sectors while maintaining high living standards through more efficient use of energy, structural change, urban planning, and lifestyle changes.
2. **Decarbonizing electricity generation** by phasing out unabated coal power generation and rapidly increasing generation from a diverse portfolio of technologies dominated by renewables and supplemented by nuclear, and carbon capture, utilization, and storage.
3. **Electrifying end-use sectors** by increasing electric vehicles, using electricity for industrial heat production wherever possible (e.g. iron and steel, chemicals, and glass), and transitioning to electric space and water heating in buildings.
4. **Switching to low-carbon fuels** like hydrogen and biofuels in industry (as fuel or feedstock) and transportation (e.g. long-haul trucking, shipping, and aviation) when electrification is not feasible or economically viable.
5. **Sequestering carbon** in natural systems (e.g. forest and soil) or through CO2 removal technologies to offset residual emissions mainly from transportation and industry.

In addition to these five strategies to reduce CO2, in order to avoid the worst risks of climate change, China will need to incorporate substantial efforts to reduce non-CO2 emissions. A large fraction of methane emissions can be reduced through reduced fossil fuel consumption embedded in China's existing goals, but other opportunities exist for reducing Nitrous oxide and F-gases through targeted interventions in agriculture and buildings.

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This transition towards carbon neutrality will require new policies and coordinated efforts across the entire value chain of energy production and consumption. For example, power market reform and a modernized electricity grid can enable a cleaner power system with high shares of renewables. The transition will require improved coordination between electricity policies and policies for buildings, transportation, and industry. Rapid electrification in end-use sectors will require enhanced demand response to contribute to a more flexible power system.

Cross-sectoral, cross-institutional coordination should extend beyond energy and environmental systems to encompass fiscal and financial policies. China's low-carbon transition will catalyze a significant shift in investment into clean technologies from fossil fuel technologies. This needs coordination between energy and financial policies to provide market certainty. It also needs changes in fiscal policies to align public investment with more ambitious climate targets. The financial system also needs to evolve to facilitate low-carbon transitions and prepare for possible financial risks associated with climate change.

Finally, the aggregate challenge of full economic decarbonization by 2060 means that early action is absolutely critical. Starting now, every step counts. Fortunately, there are several near-term options of "low hanging fruit." The 14th five-year plan (2021-2025) will be an essential roadmap toward these actions, during which China can set forth a good path towards net-zero emission by 2060. Peaking of emissions as early as possible can help lower the challenges and costs of future actions by avoiding locking into polluting energy infrastructure and reducing the risk of stranded assets. Taking immediate action to implement a "No New Coal" strategy is essential to make a high-ambition coal phaseout economically and socially viable. With 98 GW of new coal fleets currently under construction and another 53 GW permitted, continued build of new, large, and expensive coal power plants designed to operate over several decades will not only cause the new investments to be stranded but will also force existing plants to retire even more rapidly to achieve the net-zero emission goal. [2]

CONCLUSION

China's 2060 carbon neutrality target is a major contribution and a critical step supporting enhanced global action on climate. Indeed, all countries will need to bring their emissions to net zero between roughly 2045 and 2060 in order to meet the global 1.5°C goal. The goal can be achieved with sustained effort across the five strategies, starting with concrete near-term actions can make the goal significantly more tractable—including an immediate halt to new coal-fired power plant construction and peaking of emissions as early as possible. While achieving mid-century net-zero goals will be challenging for China and other countries, they are not only an essential for substantially reducing the risks of climate change—but also for creating substantial domestic near- and long-term benefits of economic growth, competitiveness, health, and new industries.

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[1] Preliminary results based on GCAM-China analysis in Yu et al, 2020. "1.5˚C and 2˚C consistent transitions in China."Center for Global Sustainability: College Park, Maryland (forthcoming).

[2] Cui et al, 2020. "Implications of Continued Coal Builds in the 14th FYP of China." Center for Global Sustainability: College Park, Maryland

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