



Nuclear Energy in Decarbonizing China's Energy System: Loosening Constraints, Managing Risks

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“What role could nuclear energy play in more or less completely decarbonizing the energy system in China?” To play a significant role (say, providing 15-50% of total energy), Matt Bunn, HKS Professor of Practice and Co-Principal Investigator of the Managing the Atom Project, speaking in the HKS Energy Policy Seminar, said nuclear in China would need to see “huge” growth by the second half of the century—an expansion to 15 -50 times its current capacity.

What are the constraints on such growth, and what would be the risks? Bunn reviewed ten key constraints: cost, safety risks, security risks, siting and public acceptance, nuclear waste management, limited government and industry capacity, regulatory delays, challenges of integration into a future renewables-heavy energy system, proliferation risks, and uranium supply, and discussed how policy and/or technology might help to address these constraints.

In two cases, nuclear waste management and uranium supply, Bunn noted that the actual challenges posed may be less thorny than they might seem—in both cases, the nature of nuclear power is such that, even with a large quantity of generation, there would be a relatively small quantity of fuel used and waste generated.

In the case of some other potential constraints, Bunn noted, the challenges faced and resources available may depend on whether China pursues a steady growth path, ramping up to something like twice the current rate of construction and maintaining that growth rate for decades, or whether China chooses to pursue a path that would start relatively slowly and accelerate as new technologies became more available. Waiting for the development of new technologies potentially might make some problems easier to handle (for example, siting could be easier for plants that do not require water for cooling), but might make other challenges more difficult, Bunn observed—in particular, challenges associated with ramping up capacity after a long period of minimal activity.

In the near term, Bunn suggested, there are a number of choices China can make “to maximize long-term nuclear options,” including investing in safety and security to avoid major incidents that could undermine nuclear energy, maintaining and expanding industry and government capacity, working steadily towards a nuclear waste repository, prioritizing RD&D (research, development, and demonstration) of advanced systems, avoiding locking in to expensive and risky technologies such as plutonium reprocessing, and investing in building public confidence.

While successful navigation of all the important constraints to achieve tremendous nuclear growth by the second half of the century may seem unlikely, Bunn observed, it may be even more unlikely that China will be able to achieve total or near-total clean energy without nuclear providing a significant share of its energy needs. Furthermore, Bunn said, if China, which is currently building more reactors than any other countries, cannot increase nuclear enough to allow it to play a major role in decarbonization, there is little hope that nuclear will play a major role globally.



Bunn spoke as part of the Kennedy School's Energy Policy Seminar Series, which is sponsored by the Consortium for Energy Policy Research of the Mossavar-Rahmani Center on Business and Government and by the Belfer Center for Science and International Affairs. ([Link to presentation](#))