

ChinaFAQs

The Network for Climate and Energy Information



Nuclear Energy in China

CURRENT STATUS

China is counting on nuclear power to help reduce its reliance on burning coal for electricity – and curb its emissions of greenhouse gases.ⁱ The nation's nuclear program is growing so fast, in fact, that China is expected to soon become the world's second largest producer of atomic energy, after the United States.

China first began developing nuclear power in the 1970s, but didn't switch on its first power plant until 1991.ⁱⁱ Since then, it has added 10 more plants. All are clustered at three sites along China's southeastern coast: Qinshan, Daya Bay and Tianwan. The plants are built, owned and operated by a collection of government agencies and state-owned enterprises directed by China's State Council of Ministers.

In total, these plants have the capacity to generate about 9.1 gigawatts of electricity, or about 2% of China's total. In 2008, the plants generated power equivalent to 15.5 million tons of oil, up 9.8% from 2007 (in contrast, in 2008 the United States generated about 12 times more nuclear power, equivalent to 192 million tons of oil).ⁱⁱⁱ

FUTURE PLANS

Current government plans call for at least quadrupling nuclear capacity – to 40 gigawatts – by 2020, although reports suggest officials may raise that target to 60 or even 80 gigawatts.

In March 2008, China's State Energy Bureau suggested a target of producing 5% of the nation's electricity from nuclear by 2020, which would require at least 50 gigawatts of capacity.^{iv} Other reports suggest officials are considering a nuclear power goal of 16% by 2030.^v

To increase capacity, the government has already begun construction of – or developed firm plans for – a new generation of nuclear power plants. Its current goal is to have 20 new plants operating by 2020. If that rate of growth continues, by 2030 China is expected to become world's second largest producer of nuclear power, behind the United States.

Many of the new plants are slated to be built along China's eastern coast near growing cities, which are far from coalfields and hydropower projects. In late 2009, however, the government announced plans to build three nuclear stations in inland areas, in part to spur development.^{vi}

Estimating how these new plants might slow China's greenhouse gas emissions is difficult. In the past, Chinese officials have calculated that producing 4% of China's electricity from nuclear power could cut carbon dioxide emissions by 50 million metric tons by 2010 (less than 1% of estimated current emissions).^{vii} Future reductions could be greater, but would depend on China's total energy consumption, and how much of its electricity comes from renewable and nuclear sources.

Key Points

- China currently uses nuclear power plants to produce about 2% of its electricity, and 1% of its total energy.
- By 2020, China wants to generate at least 5% of electricity with nuclear power.
- China has 11 operating nuclear plants at three sites; the government plans to build 20 more plants by 2020.
- By 2030, China's nuclear power program is expected to become the world's second largest, behind the United States.
- Cooperation between the United States and China could be critical to efforts to develop a new generation of safe, reliable nuclear power plants that could help curb emissions of greenhouse gases.

CHALLENGES

China faces a number of challenges in growing its nuclear program. They include:

- **A potential shortage of experienced workers.** By one estimate, just one of China's three major power plant operators – the China Guangdong Nuclear Power Company – will need 13,500 engineers, technicians and operators to carry out near-term plans. Few universities have programs to train these workers, and pay scales in the nuclear industry are often too low to attract the best students.
- **Public concerns.** A recent survey found that most Chinese know little about nuclear power. When asked to rank which forms of energy they found most acceptable, nuclear came in fourth out of six, behind solar, hydropower and natural gas – but ahead of coal. Safety was a major concern, as was nuclear's potential environmental impact.
- **A weak supply chain.** Ramping up nuclear construction could strain China's engineering and heavy equipment manufacturing sectors.
- **Quality and safety.** Ensuring the reliability and safety of Chinese built plants could pose a challenge if there is a shortage to trained, experienced operators and regulators.
- **International Collaboration.** International collaboration – particularly between the United States and China – could

help address some of these challenges. Other nuclear nations are interested in ensuring that China's nuclear program is safe, and China could benefit from foreign technologies and expertise. China, in turn, represents a vast potential market for foreign companies that make nuclear technologies. All nations share an interest in developing safer, less expensive nuclear plants that could be useful in combating climate change.

International collaboration, however, will be complicated by the sensitivity of the national security concerns raised by nuclear technologies, which can also be used to create weapons. Obtaining visas and other documents, for instance, can be difficult and time-consuming. Intellectual property, regulatory and technology-transfer rules may raise other obstacles.

Nuclear power is a controversial topic, complicated further by the specter of climatic change. Although nuclear power could reduce some of China's greenhouse gas emissions, it remains to be seen whether the economic, environmental, and technical obstacles to wide-scale deployment will be overcome in time for nuclear power to substantially offset growth in coal-fired electricity.

This fact sheet is a product of ChinaFAQs, a joint project of the World Resources Institute and experts from leading American universities, think tanks and government laboratories. Find out more about the ChinaFAQs Project at: <http://www.ChinaFAQs.org/>.

Notes

ⁱ Except where noted, all information in this fact sheet is drawn from: Lyons, BJ et al. *United States-China Cooperation on Nuclear Power: An Opportunity for Fostering Sustainable Energy Security*. Atlantic Council, 2009. Based on a dialogue sponsored by the Atlantic Council and the U.S./China Energy and Environment Technology Center, March 4-6, 2009, Washington D.C.

ⁱⁱ World Nuclear Association. *Nuclear Power in China*. Updated 20 October 2009. See: <http://www.world-nuclear.org/info/inf63.html>.

ⁱⁱⁱ BP. *BP Statistical Review of World Energy*. June 2009. Page 36. See: http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/2009_downloads/nuclear_energy_section_2009.pdf.

^{iv} World Nuclear Association, 2009.

^v Leggett, J. *China's Greenhouse Gas Emissions and Mitigation Policies*. Congressional Research Service, September 10, 2008.

^{vi} The new sites are Xian'ning City in the central Hubei Province, Taohuajiang City in the central Hunan Province and Pengze City in the eastern Jiangxi Province. See: Chinaview. *China to build inland nuclear power stations*. November 4, 2009. See: <http://www.chinaview.cn>.

^{vii} Leggett, J. 2008.

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