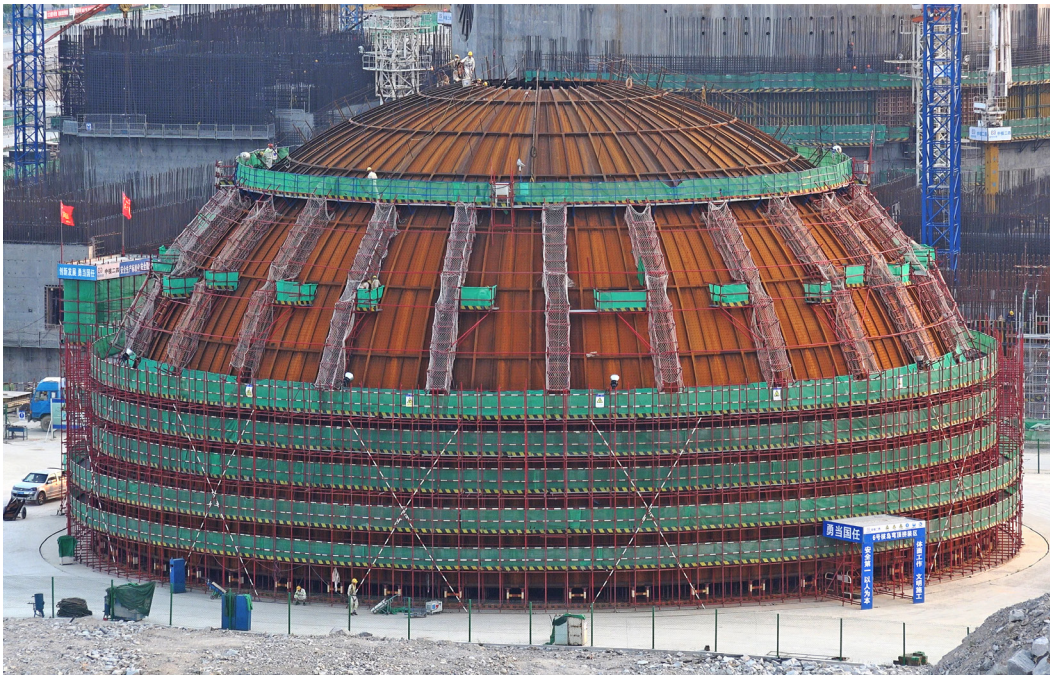
How China has become the world's fastest expanding nuclear power producer

By Laura Gil



This huge round structure, called 'the dome', is only one piece in China's Fuqing Nuclear Power Plant, which is currently under construction.
(Photo: M. Klingenboeck/IAEA)

"We have a well-established, complete system in place, not only from the point of view of design, but also manufacturing, quality assurance, safety and construction."

— Zheng Mingguang, President, Shanghai Nuclear Engineering Research and Design Institute

It has 38 nuclear power reactors in operation and 19 under construction[1]. It has increased its number of operating reactors by more than ten times since 2000 and plans to bring five units into commercial operation this year alone. It is China, the fastest expanding nuclear power generator in the world.

"China is a big country. We have higher energy demand than other countries, but also more room for nuclear power," said Zheng Mingguang, President of the Shanghai Nuclear Engineering Research and Design Institute (SNERDI).

In the list of 'expanding countries' in the world, China stands at the very top, followed by Russia with seven reactors under construction, India six and the Republic of Korea three. Currently, the countries with most reactors in operation are the United States, France, Japan and China.

Trying to curb its reliance on coal, which pollutes the air and is hard to transport from the coal mines in the west and north of the country to the economically developed southeast coast, China is building most of its reactors along this coast. With nuclear, it plans to increase energy security, lower its reliance on coal and oil and limit CO_2 emissions while keeping up with its economic growth.

A test for the world

China's 19 reactors under construction include several advanced models. "The nuclear industry is watching China put the first AP1000 reactors in Sanmen and Hiayang in operation," said Nesimi Kilic, nuclear engineer at the IAEA. Out of these, Sanmen-1 is expected to be finished by 2018. The EPR reactor in Taishan is also expected to enter commercial operation in 2018. With the commissioning of Sanmen-1, more of such reactors could be built in other countries, according to Kilic. "China has become a pilot for the world," he remarked.

[1] *These figures do not include six units in operation and two units under construction in Taiwan, China.*

The economics of nuclear

China's energy regulator, the National Energy Administration, is expected to set the country's nuclear capacity target to 120-150 gigawatts by 2030, up from about 38 in 2017. Thanks to this scale, nuclear is economically competitive, Chinese experts have said.

"We have a well-established, complete system in place," Zheng said. "Not only from the point of view of design, but also manufacturing, quality assurance, safety and construction. This is why nuclear power in China is economically feasible."

Localizing the technology — design and manufacturing in China — is what is giving the Chinese an advantage and making this expansion possible, Kilic said. China has the facilities, the technology and the human capability.

Expansion abroad

China's ambitions are also global as it plans to export nuclear power reactors in the future.

"With technological development, the economy of nuclear power could be better in the future," Zheng said, adding that countries need to support each other. China is already sharing best practices from its experience, using the IAEA as a platform.

WOMEN IN NUCLEAR

Rong Fang

Chief Economist, State Nuclear Power Technology Corporation (SNPTC)

For the past 32 years, Ms. Rong has devoted herself to the development of China's nuclear industry and has assumed executive positions in nuclear research and design institutes, nuclear power plants, nuclear equipment manufacturers and national nuclear corporations. She completed the design of several major nuclear engineering projects, contributed to the planning of nuclear industry expansion in China and facilitated the establishment of several professional nuclear enterprises, including engineering, operation and fuel management for AP1000 nuclear power projects. She is the first woman from mainland China to receive the Women in Nuclear award in 2017.

"China's efforts to develop nuclear energy are necessary to safeguard energy security, improve energy structure and combat climate change. I believe China will continue to adhere to the three-step strategy, i.e. pressurized water reactor, fast reactor and fusion reactor in the path of nuclear energy development. Moreover, the advanced GEN III passive pressurized water reactor technology will be the mainstream model in mainland China for decades to come."

Staff receive instructions at China's Fuqing Nuclear Power Plant.

(Photo: China National Nuclear Corporation, Fuqing Nuclear Power Company)