Standardisation, serialisation and international development of third generation nuclear power

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In China, the important role of nuclear power is not only demonstrated in optimising energy structure, ensuring energy supply, and combating climate change, but also in accelerating technological innovation, promoting industrial modernisation and stimulation of economic growth. After the Fukushima accident, the Chinese government continues to adhere to the principle of "efficient development of nuclear power on the basis of ensuring safety." Following nuclear safety inspections, research and studies for a year and a half, in 2012 the Chinese government issued a national plan for nuclear power safety development and clarified the future size, safety standards and technology choice of China's nuclear power programme. The plan has three key points. First, by 2020 China will have 58 GW capacity installed and another 30 GW under construction. Second, new nuclear power projects will comply with the world's highest safety standards. All new-build needs to meet 'Gen III' nuclear power safety standards. Third, on the basis of the introduced AP1000 technology, the main technology choice for new nuclear power projects should be passive safety Gen III nuclear power technology.

China's endeavour to develop safe and efficient nuclear power is important for world nuclear power development at large. The State Nuclear Power Technology Corporation (SNPTC), as the main entity responsible for introducing, assimilating and re-innovating Gen III nuclear power technology, would like to share with the world three messages on China's Gen III nuclear power development model:

First, we will adhere to standardisation. Standardisation is an effective way to improve nuclear safety and economics. In China's nuclear power construction process, the government nuclear safety regulators, owners and operators, equipment suppliers, construction and installation businesses and operation service providers generally want to have a standardised design model.

On the basis of the introduction of AP1000 technology and construction of self-reliance supporting projects (Sanmen Unit 1&2, Haiyang Unit 1&2), China's domestic AP1000 standard design has been formed. The follow-on development will be continuously upgrading and the level of standardisation will be constantly improved following the principle of "develop one updated design after building a number of projects, and develop another updated design after building another batch of projects."

The Chinese government department in charge of nuclear power and nuclear safety regulators gives policy support for nuclear power projects adopting a uniform standard design. China's nuclear power industry will build a unified standard Gen III passive nuclear power plant design platform to share standard design results and improve standard design jointly.

Second, we will adhere to nuclear power development in series. On the basis of the introduction of AP1000 technology and the construction of domestic AP1000 units, China will also provide "large" (LPP) and "small" (SMR) models to meet different customer needs and different nuclear power plant site conditions.

Development of large passive nuclear models is mainly based on the following considerations: quality nuclear power plant resources are becoming scarce; development of new nuclear power plant sites will be under increasing public pressure; large nuclear power plant units boast lower construction cost and better economics. Currently, development of large Gen III passive nuclear power plants (CAP1400/CAP1700) has been listed in China's national major science and technology programme. Development of small passive modular reactors (SMRs) is mainly based on flexibility and mobility of the layout, construction, transportation of this model, as well as the special needs for small-capacity power grid in remote areas.

Third, we will adhere to international development. China's self reliant development of nuclear power is an open, cooperative, inclusive and win-win system. Continuous and lasting cooperation with the technology originator is a business concept that SNPTC always upholds.

China's AP1000 self-reliance supporting projects and CAP1400 demonstration project is a cooperative project for multiple parties, including Sino-US companies and enterprises in South Korea, Japan, Italy, Spain, Germany and other countries. Currently, on the basis of existing cooperation, the parties are expanding cooperation in joint research and development of nuclear power technology, joint development of international market and building global supply chain, promoting nuclear power industrial standards. These partnerships will provide opportunities for international partners' in-depth and continuous participation in the Chinese market and common upgrading of the competitiveness in the global market.

Meanwhile, the SNPTC will continue to share its industrialisation experience, to strengthen technical and marketing cooperation and to realise common development of nuclear power with global peers and developing countries. ❑