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Chinese nuclear firms eye UK market

By Cecily Liu(China Daily Europe)

Chinese investment in UK power plants gives British companies much more than a chance to make money

Chinese nuclear power companies are fast making inroads into investing in the UK's nuclear programs as a key step for the internationalization of Chinese nuclear technology.

No formal investment has yet being made, but Chinese nuclear firms are in discussions with various companies, research centers and organizations in the United Kingdom to explore details on how to localize its technology for the UK market.

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These discussions are exciting from the perspective of firms in the UK nuclear supply chain because not only can they win more contracts from the UK's nuclear plant building program, they may also potentially become involved as a part of the Chinese nuclear technology supply chain in other markets internationally.

From the perspective of the Chinese firms, gaining a foothold in the UK nuclear market means added credibility for their technology. The ability to build a local supply chain in the UK can also reduce the costs of its nuclear exports to Britain.

China has the world's largest nuclear plant building program, with 21 nuclear power reactors operating at eight separate sites and a further 28 under construction.

The extensive project experience of Chinese firms has led them to expand abroad, and the initiatives have been strongly supported by Beijing this year, as the National Development and Reform Commission has made nuclear internationalization a strategy.

One major milestone for the export of Chinese nuclear technology happened in December, when China National Nuclear Company's ACP1000 nuclear power reactor passed the Generic Reactor Safety Review by the International Atomic Energy Agency.



A worker at Guangxi Fangchenggang Nuclear Power Plant, which uses Hualong One technology. Provided to China Daily

Receiving this safety review recognition from IAEA puts ACP1000 on a level playing field with other third-generation nuclear technology globally, and adds to its credibility in the export process.

The ACP1000 forms the core technology of the Hualong One, a third-generation nuclear reactor design jointly developed by CNNC and the China General Nuclear Power Group. Hualong One was created last year in a government initiative as part of a coherent nuclear technology policy in China, and also for export purposes.

Talks about Chinese nuclear firms investing in the UK started with the Hinkley Point C project, led by Electricite de France SA. EDF is a major electrical producer largely owned by the French government.

While this project was already in advanced stages of planning, a major development occurred in 2013 when the British energy firm Centrica decided to withdraw its 20 percent stake from the project due to escalating cost estimates and delays.

To plug the funding gap, EDF opened negotiations with Chinese nuclear firms. Last year, EDF announced its intention to take on board China General Nuclear Power Group and CNNC as equity partners for Hinkley Point C, which already had an established supply chain using French technology. But EDF also said it would support the Chinese companies on another nuclear project using indigenous Chinese technology.

In a statement to China Daily, EDF says it has built a good relationship with CGN and CNNC through 30 years of partnership in China's domestic market, including a joint venture involving EDF Group and CGN using European pressurized reactor units, a third-generation technology, at Taishan in China's Guangdong province.

"The UK will benefit from this longstanding cooperation and the extensive and proven capability of CGN and CNNC in the construction and operation of nuclear plants," EDF says.

Charlotte Morgan, infrastructure partner at global firm Linklaters, says infrastructure projects in the UK are attractive to Asian investors because of their long-term revenue opportunities given political and regulatory stability.

She says the UK government has introduced a new regulatory regime, known as electricity market reform, to attract investment in nuclear projects.

Morgan says the UK's infrastructure projects typically require large capital investments, though operating expenditures are considered lower than with other technologies, making them attractive long term for Chinese investors.

"The operational design life of a nuclear plant is typically longer than other types of plants. This type of investment may suit long-term investors looking for returns over a longer operational period, or strategic investors looking to gain experience and operational know-how in the nuclear sector for their own domestic nuclear programs," Morgan says.

CGN and CNNC are likely to invest in Hinkley Point C financially, but they also recognize more benefits can be realized long term as technology investors, which effectively means bringing China's Hualong technology to the UK.

Because much of the construction must be done in the UK, many British nuclear sector companies are hoping to enter the supply chain of Chinese nuclear technology and remain a part of this supply chain as its global exports grow.

One company aiming to help Chinese firms in the UK is Amec Foster Wheeler, which assists nuclear projects around the world. It has deals in place with the two Chinese nuclear investors in Hinkley Point C to collaborate in a range of potential markets in reactor design, operation and decommissioning.

Samir Brikho, chief executive of Amec Foster Wheeler, says a key advantage it has is flexibility. "Our expertise is not limited to any type of nuclear technology," he says.

Brikho says he thinks Chinese nuclear technology quality is improving, particularly because China has accumulated experience building stations based on designs from abroad. "Now Chinese indigenous designs can be applied in international nuclear programs."

Brikho says the important criteria to evaluate nuclear programs include schedule, price, adaptability of plan and waste treatment. He says Chinese nuclear technology has a key advantage, especially in keeping projects on budget and on schedule, and the challenge is to replicate this success in the UK market.

James McNamara, nuclear strategy and development director at Hayward Tyler, says he hopes a lot of the processes Hayward Tyler specializes in will be implemented in the Chinese nuclear design for the UK, particularly processes relating to motor and pump applications.

Another opportunity he sees is his company's ability to help Chinese firms manufacture some of their technology and components at Hayward Tyler's plant. "We can use our facility and workforce to produce components for Chinese nuclear technology. We can also help with the assembly and testing of their components," he says.

Hayward Tyler has worked with Chinese companies for 40 years, mostly in power generation, and McNamara says that would help establish a good relationship with Chinese nuclear firms in the UK.

The UK nuclear regulator is one of the strictest in the world, if Chinese firms successfully pass their design through the UK's Generic Design Assessment, they will be in a good position to export to other countries, McNamara says.

He says the stringent approval process in the UK also helps to drive technology advancement. "With EDF, Westinghouse, Hitachi, and other nuclear firms, the GDA process can sometimes identify issues that may not have been considered previously, giving an opportunity to improve safety and technology."

He says an example is when the UK regulator decided that one reactor design had insufficient diversity between its safety protection systems, meaning that if its control systems fail, its backup safety systems could also fail due to the same fault because they were too similar. So a more diverse backup system was developed that led to an improvement in the reactor's safety technology.

David Orr, executive vice-president of business development for nuclear at Rolls-Royce, says his company has the capability to support Chinese firms throughout the lifecycle of a UK nuclear project.

In June last year, Rolls-Royce signed memoranda of understanding with all three of China's major nuclear companies - CGN, CNNC and State Nuclear Power Technology Corp - in which the parties agreed to work more closely together in the UK and China.

The agreements addressed possible collaboration in areas such as engineering support, provision of components and systems, emergency diesel generators, supply chain management, and instrumentation and control technology.

Orr says Rolls-Royce has significant investment in the Chinese market and has been working with Chinese nuclear firms such as CGN and CNNC for 30 years.

Rolls-Royce supplies safety-critical instrumentation and control technology to more than 70 percent of nuclear reactors in operation or under construction in China, and emergency diesel generators to almost 40 percent.

He says the company entered the Chinese market as a part of the supply chain of Western nuclear technology that China was using, but over time it gained familiarity with the Chinese market and now hopes to work more closely with China's indigenous nuclear technology.

Orr says Rolls-Royce aims to enter the supply chain of Hualong technology in China's domestic market with safety instrumentation and control systems, as well as helping to improve the design of mechanical systems. However, support they could provide to Chinese nuclear firms internationally would be far greater.

"How the entire nuclear industry is managed in China has impressed me," Orr says, adding that it would benefit Chinese firms to work in consortiums for the UK market.

He says it makes commercial sense for Chinese nuclear firms to localize some of their supply chain in the UK because of the need for local capability and responsiveness throughout the life cycle.

Centronic is another UK firm closely eyeing opportunities to work with Chinese firms in the UK as an extension of its partnerships in China. Centronic, specializing in the design, manufacture, testing and development of radiation detectors, has provided a large amount of equipment to the Chinese nuclear market.

"Centronic has had a close relationship with our Chinese distributor for many years, and we provide a large product range to China outside of our reactor detectors, including Geiger Muller tubes and radiation tolerant cameras," says Craig Skillicorn, commercial director.

Another contender is Delta Controls, specializing in control instruments and sensors used in nuclear projects. Delta Controls initially entered the Chinese market through a partnership with French contractor Framatome (now Areva) and Alstom. It has supplied both the Ling Ao and Daya Bay nuclear power plants.

Chris Webborn, sales director, says his company is looking for opportunities to help Chinese firms in such areas as language, specifications, technical requirements, logistics and understanding UK nuclear investment processes. The company has met with Chinese suppliers to discuss such cooperation.

Mark Tomlinson, group development director of Sheffield Forgemasters, says the UK's nuclear supply chain has great competitive strength in making components to a high level of precision and accuracy, which also reduces costs.

Forgemasters has been supplying some key components that require a high level of precision in Chinese nuclear projects, while less sophisticated components for nuclear projects are more likely to be supplied by Chinese firms, he says.

"Those components that were relatively straightforward can be made in China, and we make very complicated things," Tomlinson says.

Forgemasters initially entered the Chinese market due to China's importation of Westinghouse designs. As Chinese firms started to develop their own nuclear projects, the company's track record in China provided new opportunities.

Forgemasters has already supplied parts like valve bodies and pump castings to China, and Tomlinson says his team regards China as a key market because the firm has overseas offices in just a few places.

He says a significant proportion of exports to China is still done through the supply chain of Western nuclear designs, but he hopes to increase direct exports to China, and building a good relationship with Chinese nuclear firms in the UK will be an important step toward that goal.

The Chinese nuclear firms' UK expansion has also attracted great interest for collaboration from the National Nuclear Laboratory, a UK government-owned and operated nuclear services technology provider covering the whole nuclear fuel cycle. Run as a business, the NNL is looking at both helping Chinese nuclear technology to enter the UK market and also developing joint research with them to improve nuclear technology for Chinese firms.

The NNL has assembled a team of UK firms with expertise across the nuclear supply chain to help Chinese firms understand the processes and key strategy of localizing its nuclear technology, though details are still under negotiation, says Ian Jackson, strategic business development manager.

NNL is also offering some of its research expertise to Chinese firms, and one example is its modeling and simulation expertise.

"It may be good to simulate reactor systems on a computer system so a company can project what the performance is like in the future. We would like to do this for Chinese technology, so we can together move away from simply the physical tests to very advanced observations," Jackson says.

This could be attractive for Chinese nuclear investors, both in terms of improving technology and gaining approval in the UK.

Simulation technology can be used to predict operational lifetime and maintenance periods, and simulate different kinds of fuel, leading to the creation of an integrated design, which are advantages unavailable to the current nuclear technology.

"This advanced simulation technology has significant implications for nuclear projects because it would help to persuade the investors that their investment is justified, and would help the regulators to understand the quality of a foreign nuclear technology without having to go through the actual physical tests in a reactor system," Jackson says.

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