



## China: Making the Nuclear Renaissance a Reality

The term “nuclear renaissance” is widely used to articulate the growing interest expressed by countries around the world to develop and increase the use of nuclear power to meet energy demand and reduce carbon emissions. This interest has been conveyed not only by countries with well established nuclear energy programs, but also by countries without any experience in the field. In some places, the nuclear renaissance is based on concrete actions, and in others it is based more on intentions for future development. Despite this interest, most countries still need to take several steps and face many challenges to realize their nuclear power goals. Nevertheless, there is one country in which the term nuclear renaissance is a full blown reality, and that is China.

With eleven reactors in operation, seventeen under construction, and up to 50 more planned, China is now the focus of the world's nuclear industry. Nowhere else in the world are there such aggressive plans for nuclear energy development. This dramatic Chinese reactor growth will also be associated with demand for reactor components and fuel cycle services, and so China's plans have the potential to benefit nuclear suppliers of all sizes and all sectors. In this respect, in an op-ed piece in Monday's edition of The Wall Street Journal, Dr. Aris Candris, president and CEO of Westinghouse said that Westinghouse's work on new nuclear power plants in China would create or result in the retention of 5,000 jobs in the United States.

UxC has long been closely monitoring nuclear energy developments in China with an initial assessment of the country's nuclear energy program published in our report on The Changing Geopolitics of the Nuclear Energy Market: China in December 2006, and a very detailed recent update to this report in September 2009. As part of our in-depth research and analysis on China, UxC also attended the recent Nuclear Industry Congress 2009 (NIC 2009), which took place in Shanghai on October 28-29.

The NIC 2009 brought together Chinese and international companies involved in a wide variety of sectors of the nuclear industry, including, among others, manufacturers (e.g. pumps and valves), consulting companies (e.g. fuel cycle, human resources, project management), steel producers, logistics companies, safety experts, back-end experts, fuel suppliers (e.g., uranium, conversion, and enrichment), R&D institutions, etc. While some of the participating companies have long histories working in the nuclear energy sector in China, others were looking for business opportunities in the country's booming nuclear future.

This mix of company participants represented very well what China means for the world's nuclear industry: a market with a bright future and the potential to provide business opportunities for companies from nearly every nuclear-related sector around the globe. Also, as evidence that everyone wants to “know what's happening in China,” NIC 2009 had the participation of companies that are not yet involved in the Chinese nuclear energy program. Moreover, the discussions during the conference demonstrated that although China has achieved a certain level of independence in some key sectors (e.g. manufacture of some reactor components), the country still needs foreign strategic partnerships, joint ventures, and external fuel cycle services to implement its nuclear energy plans. Clearly, foreign companies will benefit greatly over the coming years from China's rapidly expanding nuclear energy program.

Just last week, it was reported that China is expected to reach 70 GWe of nuclear installed capacity by 2020 (the previous announced target was around 86 GWe). According to our latest forecast, China should reach 63 GWe nuclear capacity by 2020 (our base case), which nevertheless represents an impressive nuclear energy development (see UxC's reactor forecast for China through 2030 above).

There are several positive signs that support our analysis for further expansion of nuclear energy in China. For example, the Chinese government has invested heavily in reactor projects as part of its overall strategy to face the financial crisis. Also, several stakeholders (e.g. provincial governments, regional non-nuclear utilities, etc.) are participating in financing reactor projects, which means that even more financial resources are supporting reactor projects. Moreover, the Chinese nuclear industry has made important progress in the construction and design of its CPR-1000 reactor design, which is expected to be a key part of future reactor projects and has allowed for the development of a domestic manufacturing base. Besides, the Chinese manufacturing base has strengthened its position and expanded its capacity through the use of joint ventures and additional investments. The international nuclear industry is also contributing to the country's nuclear energy plans. Finally, AREVA and Westinghouse have committed to help China acquire knowledge related to the AP1000 and EPR reactor designs.

Despite these positive signs, China still faces a number of challenges that need to be addressed in order to facilitate a successful nuclear energy future. Although there have not been major safety issues in China, Chinese government officials have warned that the pace of country's nuclear energy program should not come at the cost of ensuring safety. For instance, the tremendous construction workloads may stretch the availability of human resources for other key tasks (e.g. EPC management, plant operations and maintenance, etc). Moreover, the fact that China is pursuing different reactor designs may pose a problem for purposes of standardization of reactor construction. In this regard, design capability is still incomplete. Furthermore, although domestic manufacturing capacity has increased, it is not clear whether localization targets will be met. Finally, it is possible that recent developments concerning AP1000 and EPR reactor designs will impact China's current construction plans.

The recent NIC 2009 conference was an occasion in which some of the mentioned opportunities and challenges of the Chinese nuclear energy program were discussed. It also provided a clear example of the wide variety of companies that are involved and hope to be involved in the country's nuclear energy program. Overall, the atmosphere was positive and participants were confident about the country's nuclear future.

China recently had to lower its very ambitious nuclear generation target for 2020 and still may fall a little short of that, but still has a remarkable expansion underway that should persist for many years. Moreover, any serious progress towards this goal is a success in itself, not only for China, but also the global nuclear industry. Safety must be the top priority for nuclear energy development in China. In this regard, recent developments concerning the EPR and AP1000 designs should be considered as positive because they help set a stronger safety framework for the future of China's nuclear energy program. Ultimately, there will be no better illustration of the global nuclear renaissance than what is happening in China.

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