

Building something

Korea's nuclear indu

South Korea is the world's 6th largest nuclear energy operation country with an installed nuclear generation capacity of 18,675 MW (as of 2011. 03, WNA) and the world's 6th nuclear power plant exporting country. The country operates 21 commercial nuclear power units, has five more currently under construction, and plans to build an additional 6 units by 2030. Jung Min Lee from Nuclear Exchange's Asia office travelled to Korea to meet Mr. Jae-Kyu Lee from KEPCO E&C to find out more about the country's nuclear history, its growing presence on the global nuclear market, and KEPCO E&C, a globally operating EPC company which is taking a leading role in the technological development in both nuclear and fossil fuel power plants for South Korea.

By Jung Min Lee, South Korea

Mr. Jae-Kyu (JK) Lee is Senior Vice President in charge of the Marketing Department of KEPCO Engineering & Construction Company, Inc. The company was established in 1975 as a public enterprise to realize independence in Korea's nuclear power design technology. The company attained technological independence in the nuclear and thermal power plant design field, and succeeded in independently developing a domestically

designed Korean nuclear reactor. The quality of KEPCO E&C's technology developed since then is contributing to reinforce Korea's energy industry competitiveness.

"KEPCO E&C engages in designing, engineering, and constructing nuclear and fossil power plants both within Korea and internationally," begins Mr. Lee "Before joining the company I worked for Samsung Corp & Engineering. Later I accepted a position at KEPCO E&C as

an engineer. My 25 years of experience in the energy industry has given me a solid back ground in the general energy business, and I was involved in the development of the OPR 1000 reactor (formerly known as the Korea Standard Nuclear Power Plant: KSNP).

The Korean nuclear program

"The history of the Korean nuclear industry is one of creating something from nothing," says Mr. Lee. "We did not have



from nothing;

stry blossoms

any technology to start with but through the sheer will power of the Korean people, we have gradually developed a successful industry." Korea's nuclear power generation history dates back to 1957 when the country became a member State of the International Atomic Energy Agency (IAEA). KEPCO E&C was established in 1975 and by 1978 the Kori Unit 1 came on line as the country's first operational



Mr. Jae-Kyu Lee: "Korea has followed the example of France and Japan in adopting a similar State-owned model".

nuclear power plant. The age of nuclear power generation had arrived for Korea. Throughout the 1990s the company focused on the architect engineering and development of reactor technology to achieve technological independence. Strategic partnerships with companies such as Westinghouse Electric Co. allowed it to pursue the development of indigenous Light Water Reactor (LWR) technology, resulting in the Optimized Power Reactor (OPR) 1000. This was designed as an integral part of Korea's nuclear power plant standardization program which had been initiated in 1984. The design incorporated the latest technologies and the company's wealth of experience gained in designing, constructing and operating nuclear power plants in the domestic market. Ulchin Unit 3 was the first OPR 1000 it came on line in 1998 and has so far had an excellent operational record for safety and reliability. The design was improved upon to take into account advanced technology, optimized equipment and the experience

gained from the repeated construction and operation of the units over the country. From the year of 1998 to date, eight OPR 1000 units are in operation: Yonggwang Units 3, 4, 5 & 6 and Ulchin 3, 4, 5, & 6 producing a total of 8,000 MWe of power. 4 new improved OPR from the original reactor, also designed by KEPCO E&C are either in operation or under construction: Shin-Kori Units 1 in operation and Shin-Kori Units 2 and Shin - Wolsong Unit 1 & 2 under construction: which will be connected to the national grid by 2013. Since 2001, Korea has developed the Advanced Power Reactor, the APR1400. The APR1400, the Korean indigenous model, 1,400 MW reactor, featuring remarkably improved safety, high profile technology, operational convenience and economy has many kinds of design characteristic including simplified design, increased design margin, and human engineering, all of which are geared towards enhancing accident mitigation. The multiple safety injection and safe shutdown systems and four-train





Mr. Kim Hak Chul, General Manager of Public Relations, Mr. Jae-Kyu Lee, Senior VP Marketing at KEPCO E&C, and Ms JungMin Lee, Nuclear Exchange.

arrangement technology reduced the possibility of core damage. The reactor is equipped with the facility to prevent and mitigate severe accidents. Along with this advanced model, KEPCO E&C is trying to better develop its design technology to apply the design concept of shortened construction period, reinforced seismic design criteria (SSE: 0.3 g) and a 60-year design life to the design. This design is competitive at an international level and has been exported to the United Arab Emirates. Today the development continues with the APR+1500 LWR currently under development.

UAE contract awarded

“In December 2009, KEPCO (Korea Electrical Power Corporation) was awarded the USD 40 billion contract with the United Arab Emirates to construct four APR1400 light water reactors,” explains Mr. Lee. “These will be constructed at Al Braka, and when they come on-line in 2020 will together produce 5,600 MWe. Winning this contact was a major milestone in the nuclear industry as it marks the first time that Korean reactors have been exported. It has validated the efforts of KEPCO and is proof of our capabilities.” The announcement came as a surprise to many in the industry who had believed that the Korean company had only an outsider’s chance against the larger, big-name vendors who were also vying for the project. “As with any project of this magnitude, when it comes to international clients we need to address political issues between

the countries. Of course we must be able to meet the conditions imposed by the client and fulfill the three prerequisites which are quality, price, and after sales service. However in addition to these basic factors, we also had to successfully navigate the governmental negotiations. In order to achieve the smooth global flow of nuclear construction, Korea followed the example of France and Japan and adopted a similar State-owned model.” In May 2009, Mohammed bin Zayed Al Nahyan, the Crown Prince of Abu Dhabi (UAE) and his delegation visited Korea to visit the Shin-Kori 3 Generation III nuclear reactor construction site. Scheduled to come online in 2014, the design is similar to the reactors that will be built in the UAE. In addition to designing power plants and reactors, today KEPCO E&C engages in all fields in the nuclear chain including design, construction, operation, maintenance and dismantling of nuclear plants and the handling of spent fuel. Internationally it provides feasibility studies, architectural engineering, maintenance and operations services in the USA, China, Taiwan, Canada, Romania, Vietnam, Indonesia and other countries.

Open recruitment policy

“We provide an open opportunity for the people who want to work at KEPCO E&C,” continues Mr. Lee. “The open recruitment strategy has been put in place in order to provide a fair chance to all applicants. We are proud of our highly qualified workforce which has been built up and maintained for decades. In the past we have been involved in the recruitment of skilled personnel for large scale projects in Korea such as the KTX (Korean Train Express), and Incheon International Airport. Of our 2062 employees, 1561 are qualified engineers and 208 are researchers.” Looking to the future, Mr. Lee reveals that KEPCO E&C has ambitions to become one of the five top EPC companies in the global power sector by 2020. In 2010 turnover reached USD 509 million. “Our aim is to become a one-stop-shop providing a full range of services to expand our global business.” In response to the Fukushima incident, he remains optimistic. “Due to previous incidents in nuclear industry safety levels inside the nuclear power plants have been developed rapidly. We can expect more upgraded nuclear power plants, and the implementation of Generation IV plants can turn the misfortune into an advantage. In the cases of Germany and Switzerland, those countries may have declared they will not build any new nuclear power plants, but it is difficult to imagine how they can afford to meet their future energy demands through other types of power.”

Sources
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Mr. Jae-Kyu is one of the Keynote speakers at Nuclear Exchange 2011, the conference & networking event focusing on flow control and corrosion issues in Maastricht, the Netherlands, 29 & 30 November. For information visit www.nuclear-exchange.com

