Business Environment of Nuclear Power Industry in Korea

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In Korea, there are total of 18 Nuclear Power Plants in operation as of the end of 2002 and 6 more plants are under construction. The first project for the Advanced Power Reactor (APR) 1400 nuclear power plant is being launched to provide reliable electricity with economical competitiveness in Korea. The competitive business environment both globally and in Korea, where the power industry is undergoing significant restructuring, is requiring the Korean nuclear industry to continually improve the economics associated with nuclear power. Introduction of the APR 1400 design and continued improvement of local capabilities are two of the ways that the industry is responding to the challenge.

I. Introduction

Good morning, gentlemen.

I am honored to have the opportunity to address you today in the GENES4/ANP2003 Business Climate Plenary and to describe for you the current business environment of the Nuclear Power Industry in Korea.

I am confident that this conference will enable us all to improve our insight into the business environments of the various represented nations and will serve to further enhance global cooperation. Please allow me start with an overview of business environment of Nuclear Power Industry in Korea.

II. Status of Nuclear Power Industry in Korea

Since the introduction of commercial nuclear power in Korea with the commissioning of Kori Unit 1 in 1978, eighteen (18) nuclear power plants have been placed in operation. Total installed nuclear capacity is 15,710 MW, which represents 29.2% of the total installed generating capacity in Korea. In 2002, nuclear power plants generated in excess of 119 billion kWh, which represents 38.9% of the total generation in Korea. Under the current long term power plan, nuclear power plants will continue to be built in Korea and the nuclear contribution will continue to increase.

In addition to the 18 operating plants, six (6) additional 1,000 MW class units are currently under various stages of construction. The first two 1,400 MW class nuclear power plants are in the contracting phase and will be in operation by 2012.

Two significant factors combine to make nuclear power a very important strategic consideration for Korea. First, the Korea has very limited indigenous energy resources, with more than 97% of the energy derived from imported fuels. Second, the political situation on the peninsula is unique. Under such circumstances, nuclear power is a very important option both economically and strategically.

There are environmental considerations as well. In order to meet Kyoto Protocol of December 1997, Korea has decided to expand the share of nuclear power generation to 46% by 2015 to help reduce green house gas emission.

III. Recent Changes & Challenge

In 1999, the ROK launched a 3-phase plan to restructure and privatize the electric power industry. Phase 1 of the plan calls for the Korea Electric Power Company (KEPCO) to spin off all generating assets into subsidiary companies and to initiate privatization of those companies. Phase 2 calls for KEPCO to restructure its distribution business into subsidiary companies with intent to eventually privatize. Phase 3 calls for removal of territorial distribution restrictions and introduction of full competition into the distribution sector.

Phase 1 of the restructuring is in progress with creation of 6 new subsidiary generating companies (GENCOs). Five of the GENCOs include consist of thermal power plants and are scheduled for eventual privatization. The sixth GENCO, Korea Hydro & Nuclear Power Company (KHNP) includes all of the nuclear and hydro generating facilities and is not currently slated for privatization. Instead, KHNP may remain a government owned company.

Creation of the new generating companies and a competitive situation has significantly increased the transparency of generating costs for the various fuel types. Although the GENCOs are currently all still owned by KEPCO, generating priority for existing power plants is based upon operating costs. Robust competition has developed between the GENCOs to reduce unnecessary operating costs. While nuclear continues to be a major contributor to energy stability and security in Korea, the industry must also show that it can compete economically with the other fuel sources. Thus, KHNP is also under strong pressure to find ways to reduce operating costs without adversely impacting safety and reliability, which remain as top priority.

Lowest cost options at this time are nuclear and coal. While construction costs for new nuclear plants in Korea are substantially higher than for coal plants, they have a significant advantage in fuel costs. To maintain and improve the competitiveness of the nuclear option,
KHNP continues to focus on reduction of new plant costs, and this has been a driver for the move from 1,000 MW plants to 1,400 MW plants. This will continue to be a priority, but maintaining economic competitiveness in the future will also require continual improvements in technology and capabilities. This is the challenge facing the Korean nuclear power industry these days.

IV. Response to the Change & Challenge

With 18 operating units and more under construction and planned, the nuclear industry in Korea is mature. The foresight to introduce a standard nuclear power plant design in the late 1980’s and to build a series of these plants provided a mechanism for continual improvement and cost reduction on subsequent units. The experience and know-how gained through this period has prepared KHNP and the Korean nuclear industry well for the challenges they currently face. In Korea there is a very strong cooperation between the nuclear industry and the nuclear academia with KHNP at the center. This strong cooperation creates an environment whereby the industry can benefit from new technologies and ideas. The APR 1400 program is a culmination of the experience and know-how gained through the past decade. The basic design is evolved from the 1,000 MW plants currently being built and operated, providing a strong foundation of provenness and reliability. The design also incorporates a number of new design features to further improve plant safety and reliability and includes state-of-the-art I&C systems and man-machine interface. Increasing the output to 1,400 MW significantly reduces the cost per kWh through economies of scale.

Despite economic advantages of the APR 1400, KHNP will continue to focus efforts on improved competitiveness of it’s nuclear fleet and will continue to compete primarily with coal for the foreseeable future. Constructors and equipment suppliers, in turn, will be expected to find ways to reduce costs and/or schedules.

In the near term, we don’t expect the market situation to lead to change influence Korean nuclear industry’s contract scheme or market structure. And, by active involvement into a series of new projects, Korean nuclear industry’s competitiveness will be reinforced in the right direction.

V. Vendor Organization and Roles of Doosan

While the power industry in Korea is undergoing change and the new competitive environment is placing significant pressure on generating costs, we don’t expect any major near term changes in the way nuclear construction projects are contracted and implemented. The following chart shows the contract structure of the current Shin Kori 1&2 project. These units are the latest of the Korea Standard Nuclear Plant (KSNP) series of plants, which are rated at 1,000 MW. This organizational scheme has evolved through the very successful series of KSNP projects implemented over the past 15 years. The same structure to be applied to the future APR 1400 projects.
As you can see from the vendor organization:

- KOPEC (Korea Power Engineering Company) is the architect-engineer;
- Doosan is the main contractor for NSSS, Turbine Generator;
- Construction and Installation (Civil and Erection) and various BOP items are competitively bid;
- Fuel is supplied solely by KNFC (Korea Nuclear Fuel Company).

Doosan’s selection as the nominated main contractor for NSSS and Turbine Generator demonstrates its comprehensive capability in project management, design, manufacturing and construction technology in the nuclear power plant business. The history of Doosan’s nuclear power plants business symbolizes the history of Korean nuclear industry. Doosan was the first Korean company to participate in Kori unit #3&4 nuclear power plant as an equipment manufacturer and since then has been involved almost all projects including Kori, Yonggwang, Uljin etc.

With experience and expertise accumulated through project implementation, Doosan is participating in various technology development programs such as SMART (System-Integrated Modular Advanced Reactor) and many others.

VI. Conclusion

The nuclear industry in Korea is undergoing change and is facing new challenges. To meet those challenges, the industry is taking bold steps to improve economic competitiveness and is investing heavily in development and introduction of new and advanced technologies. We don’t expect this to be a short term effort. Instead, we view it as the way we will have to continue to do business in the future to maintain our competitive edge and to assure safe and reliable nuclear power plant options for the future.

Thank you all for listening.