A Preliminary study on support policies of oversea competitors to enhance competitiveness NPPs technologies exports in Korea

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1. Introduction

In Korea, Energy conversion policy is in progress starting with the permanent shutdown of Kori Unit 1 in 2017. In this process, it has become difficult to create new markets for the domestic nuclear power industry, and in order to maintain the domestic nuclear power industry, it is necessary to technology secure world-class nuclear technology through participation in overseas NPPs projects. However, in the case of overseas large-scale nuclear power plant construction projects, there have been no additional project orders since the UAE received orders for four nuclear power plants in 2009. And since the Fukushima accident, the construction of new nuclear power plants has been delayed and decreased worldwide, making it more difficult to obtain orders for new projects. Therefore, in order to maintain the domestic NPPs industry, it is necessary to actively support the export of equipment and components and the entry into the operation and maintenance service market so that each company can enter the overseas market.

2. Method and Results

2.1. Global NPPs status and policies

According to the 2016 WNA report, the number of new NPPs in the world is slightly decreasing to 167 units (2016), 156 units (2017), and 146 units (2018). In the global nuclear power market, Russia obtains 22 of the 66 new NPPs projects worldwide between 2010 and 2016, and China's orders continue to be strong. Competition for order for NPPs through strategic alliances between major nuclear power companies such as France and China, and the US and Japan is getting fierce. More than 60% of the 448 operating NPPs around the world have been in operation for more than 30 years. The demand for efficiency evaluation, life extension, and equipment replacement for such old NPPs is increasing, and accordingly, the market is expected to expand.

2.2. Market of NPPs material and equipment

Assuming that the market for domestic NPPs material and equipment makers to enter is the ‘expected NPPs market', it is estimated to be about KRW 208 trillion won based on the cost of construction according to the amount of power generated by each nuclear power plant and the proportion of equipment during construction. Maintenance costs are USD 350 million/1 unit, and this cost consists of 50% of equipment replacement, 30% of design and engineering, and 20% of other (construction/inspection/commissioning, etc.). Of the equipment replacement costs, when classified into main equipment and auxiliary equipment, they account for 60% and 40%, respectively. For each nuclear power plant, the main equipment accounts for about USD 105 million and the auxiliary equipment accounts for about USD 70 million. During the operation, the market for auxiliary equipment related to nuclear power plant maintenance is about USD 31 billion, while the market for nuclear power plants under construction is USD 4 billion and USD 10 billion for planned nuclear power plants.

2.3. Global status and policy of NPPs

In the global NPPs market, only certain countries with technological skills, such as the United States, France, China, Russia, Korea, and Japan, can supply NPPs. However, the technological gap between countries is closing, and as a result, orders for new projects are limited only by technological skills and price. The influence of the country, the dynamics between countries, and the synergy of cooperation with other industries are comprehensively evaluated, and a business operator is selected. Accordingly, NPPs suppliers are competing fiercely for orders in the global NPPs market, but cooperation between competitors is often made to secure order competitiveness. Nuclear power plants in the United States, France, and Japan have already established joint ventures through their respective investments in order to jointly promote their business, and are promoting overseas projects by developing joint reactor model.

3. Conclusion

Suppliers of nuclear power plants are limited to the United States, France, Canada, and Russia only countries with source technology that can export third-generation NPPs, and in the case of Japan is pursued an active global market entry strategy through equity acquisitions and M&As over the past two to three years. the mainstream of the global NPPs market is PWR, and global demand for NPPs is on a rapid expansion trend, and China and India are focusing on enhance original technology and making intensive efforts on localization.

Table I. Estimation of the market size of nuclear power plant equipment according to construction unit cost per generation amount

Current status of global NPPs generation capacity					
Operating NPPs		Under construction NPPs		To be construction NPPs	
Unit	Capacity	Unit	Capacity	Unit	Capacity
443	391,358	52	54,695	157	163,287
NPPs Construction Market ($ BN)					
Operating NPPs		Under construction NPPs		To be construction NPPs	
1,670		262		694	
NPPs material and equipment Market					
Operating NPPs		Under construction NPPs		To be construction NPPs	
468		73		194	

It can be seen that Korea is the only country that has a high localization rate of more than 95% that is capable of exporting nuclear power plants, has a unique nuclear power plant type, and has an export output, except for the existing NPPs countries. From this point of view, Korea will high entry barriers to when targeting countries with source/original technology, but in other markets, even though it is in a competitive relationship with major NPPs suppliers, it depends on various strategic approaches through Market Segmentation. The possibility of exporting nuclear power plants remains open despite both opportunities and competition. First of all, in markets that require source technology based on the ability to manufacture major equipment such as SeAH Besteel and Doosan Heavy Industries, and globally recognized construction and construction capabilities such as Hyundai Construction, you can participate in overseas nuclear power plant projects in a cooperative manner with source technology supplier countries Construct a strategy. In addition, for Southeast Asia and developing countries where power supply is urgent, a strategic approach to transplanting Korean-type NPPs price competitiveness and success stories is needed. Cooperation strategies such as manpower participation, efficient operation service technology, and maintenance engineering participation should be promoted for advanced countries with experience in operating nuclear power plants.

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