

Another Aspect of Nuclear Expansion in Nationwide Long-term Energy Plan

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1. Introduction

There is no doubt that energy is essential of everyday life in human being and without a secure, clean and reliable energy our society would not be able to work economically and normally. Korea has met most of its energy needs from foreign countries due to the lack of domestic resources. In addition climate change has given warning a significant risk to our sustainable life as well as global environment. Korea has faced two major challenges of energy security and climate change.

In August 2008, Korean government gave a public notice of 'Nationwide Long-term Energy Plan' based on the national vision of 'Green Growth'. This plan toward the 'Balance 3E: Energy Security, Environmental Protection, and Energy Efficiency' is about to launch an aggressive new programme of renewable energy and nuclear power station. Meanwhile this statement of government can give the bright future to the nuclear industry, several debates are being continued related to spent fuel management policy or feasibility of energy mix portfolio. This paper aims to go over what problems are expected in the course of expansion of nuclear installation and suggest the quantitative countermeasures and future area to be analyzed.

2. Discussions

In this section some of the issues regarding nuclear power are listed and show that all perspective on nuclear are not positive of nuclear power, which can be helpful to continue the nuclear program steadily overcoming obstacles.

2.1 Needs to Consider the Future Role of Nuclear

Nuclear power has been the main electric resource of the Korea's energy mix since the first commercial operation of Kori station and currently it provides about 16% of the primary energy supply [1]. In Korea, one third of national emissions of carbon dioxide come from electricity sector and generation portfolio is needed to replace the carbon intensive fossil power generation into nuclear power. Recently oil price hike has threatened the households as well as national economy. Nuclear power is a currently cheap, carbon free and reliable resource, however, we don't rule out the possibility that at some point in the future new nuclear build might face with difficulties in changes of

investment at the beginning of construction due to the long lead time, nuclear wastes management to be resolved or public acceptance of building site for new station. Therefore, it needs to consider the future role of nuclear power.

2.2 Increase of Investment Cost

The cost of a new nuclear build could weaken the credit metrics of an electric utility and its potential credit ratings according to a new report from Moody's investors Service [2]. Building new nuclear plants are very costly and complex, and long duration of construction is exposed to various risk such as political, regulatory, economic and commodity price environments. Moody's said that the potential reactors could cost about \$6,000/kW of capacity to build and it may double compared with initial estimate of \$3,000 ~ \$4,000/kW of capacity. That said rapidly rising costs for steel and concrete could change things considerably over time [3]. Fig.1 shows the sum of overnight cost and interest during construction and this increase of investment cost would play a role of one of the negative perspective of 2nd nuclear renaissance.

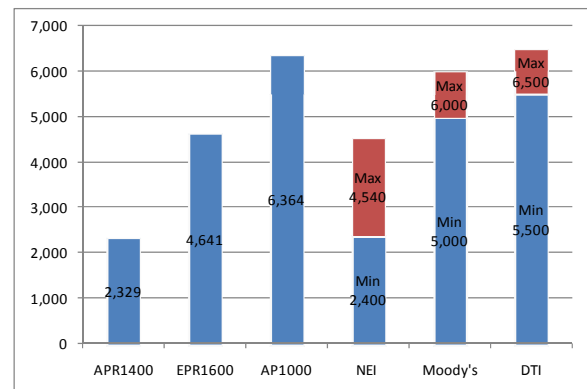


Fig. 1. Cost Estimation of New Nuclear Build [kW]

2.3 Financial Risk of Investment

Statement of Korean government on 'Nationwide Long-term Energy Plan' can be understood to launch an aggressive new program of nuclear power. Nobody knows, however, how the future environments for new nuclear build are changed. Any investment in a large new power station is economically risky. The large scale of the investment makes a new build very fragile

under the assumption of delay of construction period, time for selecting a site of new plant, regulatory uncertainty and so on. These risks should be borne by someone and if the cost of a new plant would be higher than expected, the additional cost should be paid. For example, construction of the Olkiluto 3 nuclear power plant in Finland is reported to be two years behind schedule and it results in losses of at least 1.5 billion from the energy not produced [4]. Some commentators suggest that this economic risk can be dealt with kinds of insurance and financial instrument. However, using the financial instruments unlikely to be the method for disappear the risk and it can be another problem what is the adequate insurance level and who bears the risk. Unfortunately the cost bearing that risk has to be paid by either consumers or government for expanding the nuclear capacity.

2.4 Spent Fuel Management and Waste Cost

Arguments on the construction of new nuclear plants can be easily expected. In August 2008, Government announced that the procedure for public agreement with spent fuel and waste management policy will be started coming September and the strategy of interim storage will be decided by end of 2009. Storage capacity of spent fuel at reactor is currently expected to be saturated around 2016. From the past experience that low level interim storage facility took about 20 years to select the facility site with public agreement, only 6 years of buffer to fix the further spent fuel management option give the pressure of time to the nuclear industry and government. In case of United Kingdom, its government has announced that private sector companies will be allowed to build a new generation of nuclear power stations. UK government's approach is based upon the premise that new nuclear generation should be steadily viable and operators will be expected to bear risks including waste management and decommissioning. The Energy Act 2008 was introduced in January 2008 including waste management plans, funding arrangement plan, and nuclear liability financing assurance board as shown Fig. 2 [5].

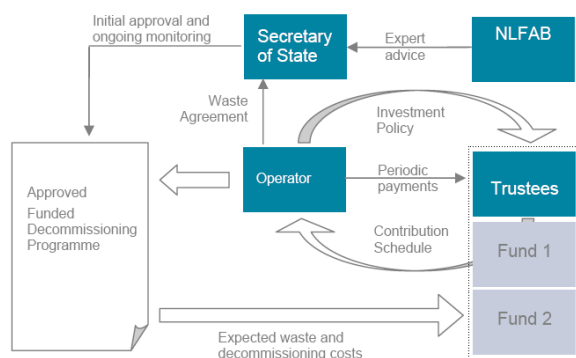


Fig. 2. Funded Decommissioning Proposals in UK

This proposal has the significant fact that government has expressed its willingness to be responsible for the costs of dealing with radioactive waste management.

In Korea, it needs to be kept in mind that the spent fuel management policy would be urgent to prevent from trouble about recent government statement of nuclear capacity expansion through 2030.

2.5 Nuclear as Solution of High Oil Price and Carbon Abatement

One of the reasons why the world has interested in nuclear is due to the alert of climate change to energy sector. Government has proposed to increase the nuclear portion in primary energy resources from 16% ('06) to 19.5% ('30). Decrease of 9.6%p oil demand in primary energy would be replaced with increase of 5.4%p renewable and 3.3%p nuclear. However, because nuclear has been contributed to only electric sector, the significant increase of nuclear portion may be limited unless the electric demand would be rapidly increased. Increasing demand of electricity can be available through the electrification and EPRI suggested that increase of electricity portion in the final energy can mitigate the global warming and improve the human welfare for the people who don't have benefits from the electricity [6]. Suggestion and public relationship on nuclear role through electrification can be the firm support of a new build.

3. Conclusions

The world is paying attention to the secure and clean energy source and nuclear power is in the spotlight. However, at the same time, the expert and policy makers need to consider the second renaissance or boom of new nuclear constructions carefully like 'Is it always positive and possible to expand the nuclear capacity by 2030 or can this planning keep going on steadily in the future?' It needs to expect the future problems and prepare the measurement for the long term development of nuclear program by this paper.

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