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Study on the multilateral management of spent fuel according to Korea's power supply plan

Through the 6th power supply plan at 2013, Korean government announced nuclear power plants(NPP) reaches 34 units at 2024. In 2014, it announced through the 2nd energy basic plan that the 43GW of the power supply will be from the NPP. Just like this, although the operating NPP unit is increasing, there isn't a specific plan on the management or disposal of the spent fuel produced by the nuclear power generation. Recently in November, Public Engagement Commission on Spent Nuclear Fuel Management suggested the establishment of permanent disposal facility around 2055.
According to the technological assessment, it is predicted that the spent fuel storage amount at NPP site will be started to be saturated from 2025. Normally, it suggests temporal expansion of storage facility in the plant or operation intermediary storage facility as the alternative before the permanent disposal. However, there are more diverse ideas such as overseas reprocessing or domestic reprocessing. This study analyzed the pros and cons and the possibility to be realized of each alternatives through multilateral analysis.
The interrelation between the spent fuel production amount and management plans among the time difference and system dynamics methodology for the analysis of the pros and cons and feasibility study of each interrelation was used for the management plan assessment. For the interpretation of the system dynamics methodology the analysis tool was made using the Goldsim program to calculate the yearly spent fuel production amount and disposal of each management plans and storage and disposable amount.
The main assumption of the assessment is as following.
• Operating nuclear power plant units : 34 units (light water reactor 30 units, heavy water reactor 4 units)
• Calculation of the spent fuel production amount: The actual and forecast yearly production amount of each nuclear power plant unit.
• The Cooling Time in NPP : 6 ~7 years
• Cooling Time before permanent disposal: 40 years
• Yearly reprocessing amount: overseas- 360 ton/year, domestic- max. 600ton/year
• Yearly permanent disposal amount: 660 ton/year

In case of the overseas reprocessing, as the amount of the spent fuel is more than the reprocessing amount it is not easy to be the alternative. Also in case of the domestic reprocessing, the time that the technology is completely developed and the amount to be reprocessing can be a problem. Therefore, the temporal expansion of storage facility in the plant or operation intermediary storage facility is thought to be necessary.

Country/ int. organization

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