

## Enhancement of Public Understanding on Recycling Spent Nuclear Fuel

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### 1. Introduction

The generation mass of spent nuclear fuel in Korea considerably goes on increasing year by year and it is anticipated that the cumulative mass reaches up to 30,000 tons by the year of 2030. For the present, Korea's spent nuclear fuels are temporary stored in pool and the insufficient storage space is solved by the construction of dry storage facility, installation of high density storage rack, and on-site transportation of spent nuclear fuel. However, the storage space would reach a saturation point by 2016 so that the storage will be no longer possible. Ministry of Education, Science and Technology (MEST) in Korea announced future nuclear comprehensive road map on December, 2007 in order to expand the nuclear utilization and to promote the export industrialization of nuclear energy as one of national growth sources. Future nuclear comprehensive road map presents mutual connection between operating PWRs and Gen IV reactors including milestone and schedule of large sized reactor and SMR (small and medium sized reactor), high-level and low-level radioactive waste facilities, sodium-cooled fast reactor (SFR) and pyroprocessing. In the past, Korea experienced the unsuccessful policy on radioactive waste through compulsory push, not by public deliberation. We learned that social conflict was not settled down by one-sided decision making of government and experts. Therefore, a public undertaking for the recycling of spent nuclear fuel needs public deliberation process to lead out the participation of the public and to draw public agreement.

### 2. Methods and Results

#### 2.1 Technology element of spent fuel recycling

Sodium-cooled fast reactor (SFR) has a high performance and probability of commercialization among fast reactors chosen by GIF [1,2,3,4]. Closed fuel cycle is necessary for the management of actinide and effective utilization of spent fuel. Metallic fuel can be recycled through SRF and transuranic elements can be retrieved from existing PWRs' fuel through pre-processing stage where actinium oxides are converted to metallic forms.

#### 2.2 Public issues of future nuclear comprehensive road map

Generally, environmental communities hold a positive position of public deliberation to itself although they have a negative viewpoint for nuclear power. So, recycling of spent nuclear fuel should be promoted through thorough public deliberation in order

to improve public understanding. Presently, reprocessing of spent fuel and enrichment of uranium are strongly prohibited in Korea from the declaration of the denuclearization of the Korean Peninsula and the ROK-U.S. Atomic Energy Agreement. Therefore, international society's cooperation and revision of ROK-U.S. Atomic Energy Agreement are necessary for the successful promotion of future nuclear comprehensive road map. In order to hold a dominant position at the time of revision of ROK-U.S. Atomic Energy Agreement in 2014, Korea should have clearly defined road map of nuclear policy such as future nuclear comprehensive road map.

#### 2.3 Conflict factors due to spent fuel recycling technology development

In case of recycling spent fuel, there is much room for adverse criticism to the nonproliferation of pyroprocessing technology. Another different spread of plutonium technology to the world and associated proliferation of nuclear weapons can arouse strong criticism. However, pyroprocessing has a technically unique merit in terms that it is impossible to retrieve high-purity plutonium due to its inherent characteristics. Adverse criticism is anticipated from enormous investment on research/development and economical efficiency of MOX fuel itself. However, making the best use of uranium can decrease the rate of dependence on uranium's imports so the economical efficiency will be improved. Moreover, scale of high-level radioactive waste disposal can be downsized so that its construction costs will be greatly reduced and economical efficiency can be surely guaranteed. Another new site for the demonstration of pyroprocessing and SFR can impose a heavy burden on spent fuel recycling. Therefore, the government should keep transparent and democratic process of public deliberation and formulate a thorough plan and drive forward consistent policy to enhance public understanding.

#### 2.4 Public deliberation of foreign spent fuel

The followings are derived from the case study on public deliberation of foreign spent fuel. They tried to find an alternative plan out which could be accepted in public not only in terms of technology and safety. They established an independent organization and/or committee and gave it an independent authority and responsibility for the public deliberation. They formulated a systematic communication strategy to draw participation of the public and to improve the public receptiveness. Public deliberation came into effect by the support of politics.

### *2.5 Public understanding improvement plan for spent fuel recycling*

National consensus and/or social sympathy through mutual understanding between government and the public is a matter of the highest priority in the nuclear policy. For improving the public understanding, it would be important to find the way of delivering nuclear knowledge enjoyably and easily to the public who are more interested in negative and sensational news. For improving the receptiveness of the public, the comprehensive national discussion is necessary to include not only a few experts but also various stakeholders from the early stage, although it would take time more or less. Winning the public confidence to the nuclear industry is essential for enhancing the public understanding on spent fuel recycling. It is necessary to build the public confidence in the area of not only nuclear power but also radioactive waste by safely constructing and operating Wolsung disposal facility. More positive supporting policy should be presented to the local area where recycling facility of spent fuel would be built. People watch the development of events during the public deliberation and they may take various opinion or information or leave it at their pleasure. It is necessary to develop logic and prepare response during the public deliberation. More publicity activities are needed to inform the public that government has tried to win the international community's confidence for many years and that foreign countries put trust in Korea's nuclear technology.

- [2] US DOE, GNEP Technology Development Plan, 2007.
- [3] IAEA, Nuclear Power and Sustainable Development, 2006.
- [4] US DOE and GIF, A Technology Roadmap for Generation IV Nuclear Energy System, 2002.

### **3. Conclusions**

This study can help the policy decision-making of radioactive waste management in Korea and promote the future nuclear comprehensive road map. Development of pyroprocessing technology can contribute the foundation of domestic independent establishment of back-end nuclear fuel cycle and Gen-IV reactor so that export of nuclear technology is anticipated in the near future. Improving the public understanding and sympathy in the decision-making of radioactive waste management can mitigate the distrust of public and enhance the receptiveness of public to the nuclear energy. This study can be used as basic data in the process of public deliberation for radioactive waste management.

### **Acknowledgements**

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### **REFERENCES**

- [1] Nuclear Energy Agency, Nuclear Energy Outlook 2008, NEA No.6348, 2008.