

# Review of Decommissioning Risks

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## 1. Introduction

Risk management is a series of process to minimize the impact of unfortunate events or to maximize the realization of economic values such as identification, evaluation, prioritization and coordination. Thus it is necessary to consider the integrated approach to maximize risk reduction (ISO 31000). In this article, we extract universal risks which can be bring about in the course of decommissioning process and suggest how to resolve those risks.

## 2. Decommissioning Process

Generally decommissioning consists of four periods: Preparation for decommissioning activities, Safe Storage, Decontamination and Dismantlement (D&D), and Site Restoration before final operation termination. There are so many risks in each period.

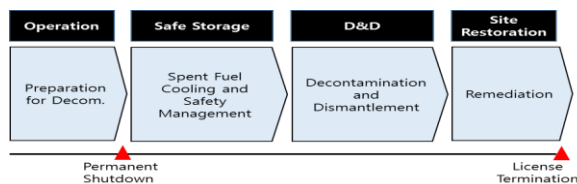


Fig. 1. Example of Major Activities of process.

## 3. Universal Decommissioning Risks

### 3.1 Irreversible risks

- A country needs capacities to be replaced for the

plant decommissioned which could cause economic hardships

- Big gaps between the estimated costs and the financing allocated by EU and each country are demonstrated.
- Long-term radioactive waste facilities are the major challenges e.g. Lithuania with interim storage for spent fuel assemblies, Bulgaria with national disposal facility for low/intermediate-level waste, Slovakia with decontamination of the primary circuit
- Work on potential final disposal solutions for high-level waste and spent nuclear fuel still is at conceptual stages.

### 3.2 Radiological risk

Each plant has its specific physical and radiological characteristics which results in different types of contamination in the SSCs and the site it has been operated. Hence, before commencing the decommissioning in earnest, the owner of the plant to be decommissioned has to scrutinize SSCs and site. From the radiological perspective, workers could be exposed directly to the decay of radioactive materials that produces radiation in the decommissioning stage. Minimize the personnel dose as low as possible is a major issue during the decommissioning stage.

### 3.3 Financial risk

Decommissioning cost has been levied with the electricity selling price and accumulated until the

commencement of decommissioning. However, in reality, it is not easy to estimate the appropriate costs for decommissioning in the early stage of the project. The decommissioning costs spent in the future are influenced by the change of interest rate, material and equipment costs, staffing costs, schedule overruns, unexpected events and the like. In addition, it is important how to manage money accumulated since commencement

### *3.4 Regulatory risks*

Each country differs in involvement of the state and its regulatory body to supervision and management of the decommissioning. The regulation with regard to decommissioning is, so called, plant or country specific; there are largely two guidelines; some countries follow US NRC rules, the others refer the IAEA guidance. Furthermore, the decommissioning projects across the world are still in the early stage, each country has to prepare its own regulation with regard to its specific political and environmental situation. On top of that, it should be responsive to change of the regulatory guidelines which have been revised to consider the current decommissioning situation and technology readiness. In addition to the risks delineated above, there are human resource risks and other risks brought up by many events happening in the process of decommissioning.

### *3.5 Electricity rate risks*

Decommissioning a nuclear power plant provides other generating resources such as LNG, Coal, and renewable energy to produce the capacities. Accordingly electricity rate is likely to be higher than that using nuclear power plants since electricity prices had become entirely dictated by natural gas and other costly electricity sources, causing rates to

go up substantially. Without viable low-cost options like coal and hydroelectric power, and with rising operating costs of plants and demand for energy, electric rates would continue to rise.

## **4. Conclusion**

We demonstrate the risks normally arouse in the decommissioning site in this article. It is, however, made up with the economic assessment to show how much impact those risks or uncertainties can impact on the decommissioning itself as well as the whole life cycle of nuclear power plant.

## **REFERENCES**

- [1] IAEA, "Risk management: A tool for improving nuclear power plant performance, IAEA-TECDOC-1209, April 2001