

CENTRALIZED FACILITY FOR SPENT FUEL AND WASTE MANAGEMENT

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In semi-isolated Nordic regions, the lack of a stable energy grid and reliance on fossil fuels create significant challenges for reliable and sustainable power. Floating Nuclear Power Plants (FNPPs) offer a viable solution by providing a consistent, low-carbon energy source for off-grid and grid-scale infrastructures. These mobile, modular units can be deployed in coastal areas, reducing dependency on imported fossil fuels while ensuring energy security in harsh climatic conditions. This project assesses the viability of a Centralized Spent Fuel & Waste Management facility to support FNPP deployment. Both open and closed fuel cycles are evaluated, considering political, economic, and technological factors influencing fuel management strategies. A critical component of the study is the analysis of reprocessing options to determine the most effective method for managing spent fuel. Given the specific characteristics of FNPP fuel, a comparative analysis is conducted between Mixed-Oxide (MOX) fuel and Enriched Reprocessed Uranium (ERU). This evaluation considers technical feasibility, resource availability, fuel cycle economics, proliferation risks, and regulatory constraints to identify the most viable reprocessing strategy. Additionally, the project examines the impact of centralized storage on long-term waste disposal strategies, including interim storage and deep geological repositories. Effective coordination among national and international regulatory bodies will be crucial to ensuring the safety, security, economic viability, and environmental sustainability of spent fuel management. By addressing these critical factors, this study aims to develop a sustainable, efficient, and secure nuclear fuel management framework suited to the unique demands of FNPPs in remote Nordic regions.

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