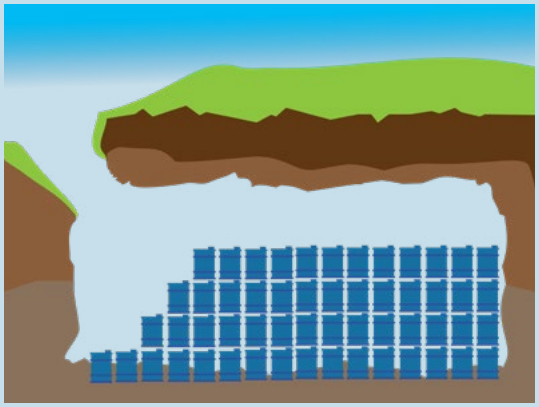
UTAH OFFICE OF ENERGY DEVELOPMENT

Nuclear Spent Fuel Recovery and Recycling

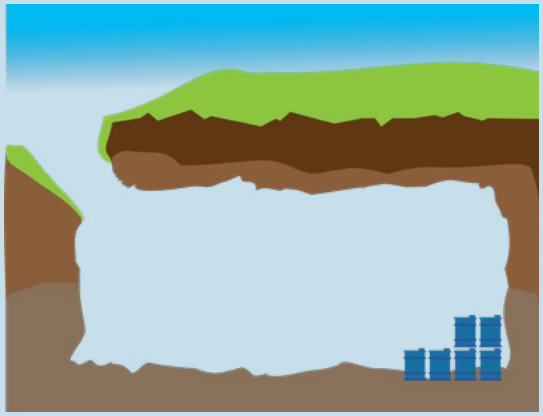
Nuclear Spent Fuel Recovery and Recycling (NSFRR) refers to processes to recover usable materials from spent nuclear fuel for energy production or other applications.

NSFRR reduces the necessary storage space by 90% and decreases storage time from thousands to just hundreds of years. It reduces mining waste and land use and lowers long-term radioactivity of residual waste.

Nuclear waste storage without recycling



Nuclear waste storage with recycling



Spent nuclear fuel retains over 90% of its energy potential even after five years of reactor use. Through recycling, this material can be reprocessed into fresh fuel and valuable byproducts, unlocking its remaining energy and reducing waste.

97% of nuclear waste—mostly uranium (94%) can be repurposed. Current recycling focuses on extracting plutonium and uranium, which are combined with fresh uranium to create new fuel rods (e.g., MOX fuel) for conventional reactors.

In the United States, NSFRR remains underdeveloped due to historical policy and economic barriers. While the country currently treats spent fuel as waste—storing it at over 70 reactor sites in dry casks or pools—recent legislative and industrial efforts aim to revitalize recycling initiatives.

Other countries such as France, Japan and Russia are currently leveraging NSFRR to reduce waste volume, enhance energy security and optimize uranium use.

NSFRR represents a growing technical sector capable of creating thousands of jobs. By significantly reducing spent fuel storage needs, it could prevent $80 billion in national costs while injecting $1 billion into Utah's economy through infrastructure and workforce development.

ENERGY INSIGHTS

Globally, about 30% of all used nuclear fuel has been reprocessed, with France leading large-scale commercial recycling since the 1970s.