# *NUCLEAR ENERGY RESEARCH INITIATIVE*

## Uncertainty Analyses of Advanced Fuel Cycles

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Collaborators: Argonne National Laboratory

Related Program: AFCI

**Project Description**

In order for nuclear power to make a significant long-term contribution to the supply of high-quality energy, it is essential to deploy breeder reactors and other advanced nuclear fuel cycles. Using advanced systems with conversion ratios that are above unity essentially provides an infinite fuel supply. Given that many alternative fuel cycles appear to be attractive, it is important to evaluate their costs and sustainability. The quality of the results should also be evaluated based on understanding the uncertainty associated with these assessments. Results from this study will enable DOE to better understand implications of fuel cycle options relative to sustainability of energy production and of costs imputed through utilization of advanced fuel cycles.

To perform this work, researchers will conduct a detailed assessment of fuel cycles considered to be viable for relatively near-term implementation and thoroughly assess the uncertainties of information associated with these fuel cycles. The objective is to understand the issues that influence the sustainability of power generated by nuclear energy. One result of this research is expected to include an information tool that consists of a set of nuclear energy development scenarios that would allow policy-makers to explore different planning options through a data mining application.

**Work Scope**

- Design and analyze advanced LWR fuel cycles.
- Evaluate effect of data and technological uncertainties on advanced fuel cycles.
- Assess repository benefits, including effect of uncertainties, and optimize key resources.
- Conduct dynamic fuel cycle scenario studies considering fast and accelerator-driven reactors, and evaluate their optimal use from technological and market perspectives.