

## INTRODUCTION OF U.S. FUEL CYCLE OPTIONS AND SCREENING STUDIES

T K. KIM  
Argonne National Laboratory  
Argonne, United States of America  
Email: [tkkim@anl.gov](mailto:tkkim@anl.gov)

### Abstract

The U.S. Department of Energy, Office of Nuclear Energy (DOE-NE) chartered a study on the evaluation and screening of nuclear fuel cycle options, referred to as the Evaluation and Screening (E&S) study. The Charter specified that the evaluation and screening consider the entire fuel cycles from mining to disposal, including once-through, limited recycling, or continuous recycling fuel cycles, to identify a relatively small number of promising fuel cycle options with the potential for achieving substantial improvements compared to the current nuclear fuel cycle in the United States.

The Charter specified nine evaluation criteria representing broadly defined economic, environmental, safety, non-proliferation, security, and sustainability goals to identify promising fuel cycle options and measure improvements compared to the current nuclear fuel cycle in the United States.

The E&S study identified multiple thousands of fuel cycle options depending on the fuel cycle strategies and applied technologies. For effective evaluation and screening, the study team developed a set of comprehensive fuel cycle options using the fundamental characteristics of nuclear fuel cycles and grouped them into 40 Evaluation Groups based on similar physics-based performance.

Utilizing multiple evaluation metrics and screening criteria, the E&S study noted that the following fuel cycle groups consistently provided the highest performance of the nine goals specified in the Charter,

- Continuous recycle of U/Pu with new natural U fuel in fast or both fast and thermal critical reactors, or
- Continuous recycle of U/TRU with new natural U fuel in fast or both fast and thermal critical reactors.

The observations obtained from the U.S. E&S study and the taxonomies on the nuclear fuel cycle options will be introduced and discussed in the joint IAEA-NEA-EC/JRC workshop.