

Nuclear Energy

The following program descriptions are offered to provide more in-depth information on scientific and technical areas of interest to Nuclear Energy:

Program Website <https://www.energy.gov/ne/office-nuclear-energy>

The Nuclear Energy mission encourages the development and exploration of advanced nuclear science and technology. NE promotes nuclear energy as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving scientific, technical, and regulatory challenges through research, development, and demonstration. The challenge of accelerating innovation and concept development in applied nuclear technologies requires the development and deployment of advanced modeling and simulation capabilities that are more predictive, and can be fully integrated into applied R&D in a manner that significantly improves the ability to achieve new insights and applications. A critical element in achieving such transformation in NE's applied R&D is to develop new scientific understanding by employing new methods for improving physical models and advancing the computational tools in which these models are used. Another primary goal of such collaboration are the concomitant advancements in the relevant areas of math, physics, and computational science, with a focus on multiscale or multiphysics modeling, which will help build the foundation new advancements not otherwise possible and for future collaboration both within DOE and industry.

Research Priority Areas:

Thermal-hydraulics

Multiscale modeling of thermal fluidic behavior in nuclear reactor environments, including non-LWR advanced reactors

Neutronics modeling

Advanced reactor physics modeling of nuclear reactors during steady state and transient operation, including neutron transport and depletion.

Microstructural material behavior, which could include chemical interaction

Multiscale simulations of the evolution of materials response during nuclear reactor operation, including fuel performance (including liquid fuels) and structural materials behavior.