Nuclear Energy Enabling Technologies

The U.S. Department of Energy's Office of Nuclear Energy

The Nuclear Energy Enabling Technologies (NEET) program will focus on innovative research relevant to multiple reactor and fuel cycle concepts that offer the promise of dramatically improved performance.

The Nuclear Energy Enabling Technologies (NEET) program will develop crosscutting technologies that directly support and complement the Office of Nuclear Energy's (NE) development of new and advanced reactor concepts and fuel cycle technologies. It will encourage the development of transformative, "outside-the-box" solutions across the full range of nuclear energy technology issues. In the FY 2012 budget request, the National Science User Facility is included with the NEET program elements.

BENEFITS OF THE INITIATIVE

Pursuing crosscutting and transformative nuclear technologies and capabilities for incorporation into advanced reactor and fuel cycle concepts offers the promise of revolutionary improvements in safety, performance, reliability, economics, and proliferation risk reduction. It promotes creative solutions to the broad array of nuclear energy problems related to reactor and fuel cycle development. The activities undertaken in this program complement those within the Reactor Concepts Research, Development, and Deployment (RD&D) and Fuel Cycle Research and Development (FCR&D) programs by providing a mechanism for pursuing broadly applicable research and development (R&D) in areas that may ultimately benefit specific reactor and fuel cycle technology development.

PROGRAM ELEMENTS

The NEET program consists of the following elements:

- Crosscutting Technology Development,
- Transformative Nuclear Energy Concepts R&D,
- Energy Innovation Hub for Modeling and Simulation, and
- National Science User Facility.

Crosscutting Technology Development — will provide R&D support for the various nuclear energy concepts (existing and future) in areas such as reactor materials, advanced methods for manufacturing, new sensor technologies for monitoring material and equipment conditions in reactors, and creative approaches to further reduce proliferation risks. In FY 2012, the crosscutting area will include advanced modeling and simulation tools.

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Program Budget
Nuclear Energy Enabling Technologies ($ in Millions)
Crosscutting Technology Development
FY 2012 Request $41.2
Transformative Nuclear Concepts R&D
FY 2012 Request $14.6
Energy Innovation Hub for Modeling and Simulation
FY 2012 Request $24.3
National Science User Facility
FY 2012 Request $14.6
Small Business Innovation Research (SBIR)/ Small Business Technology Transfer Program (STTR)
FY 2012 Request $2.7
Total, Nuclear Energy Enabling Technologies
FY 2012 Request $97.4

Transformative Nuclear Concepts R&D — will support, via an open, competitive solicitation process, investigator-initiated projects that relate to any aspect of nuclear energy generation—reactor and power conversion technologies, fuels and fuel management, waste disposal, nonproliferation, and so forth—ensuring that good ideas have sufficient outlet for exploration. The research on transformative nuclear concepts will pursue non-traditional nuclear energy ideas that offer the potential for improved system performance and may radically alter nuclear system configuration and development needs. This could include the development of specialized nuclear fuels, revolutionary materials, tailored coolants, new techniques for energy conversion, or other innovations.

Energy Innovation Hub for Modeling and Simulation — will create a "virtual" reactor user environment using existing modeling and simulation capabilities for engineers to simulate a currently operating reactor. A separate fact sheet is available for the Energy Innovation Hub for Modeling and Simulation.

National Science User Facility — will promote the use of unique nuclear research facilities for science-based experiments to encourage active university, industry, and laboratory collaboration in relevant nuclear scientific research. It will provide a mechanism for research organizations to collaborate, conduct experiments, and conduct post-experiment analysis at facilities not normally accessible.

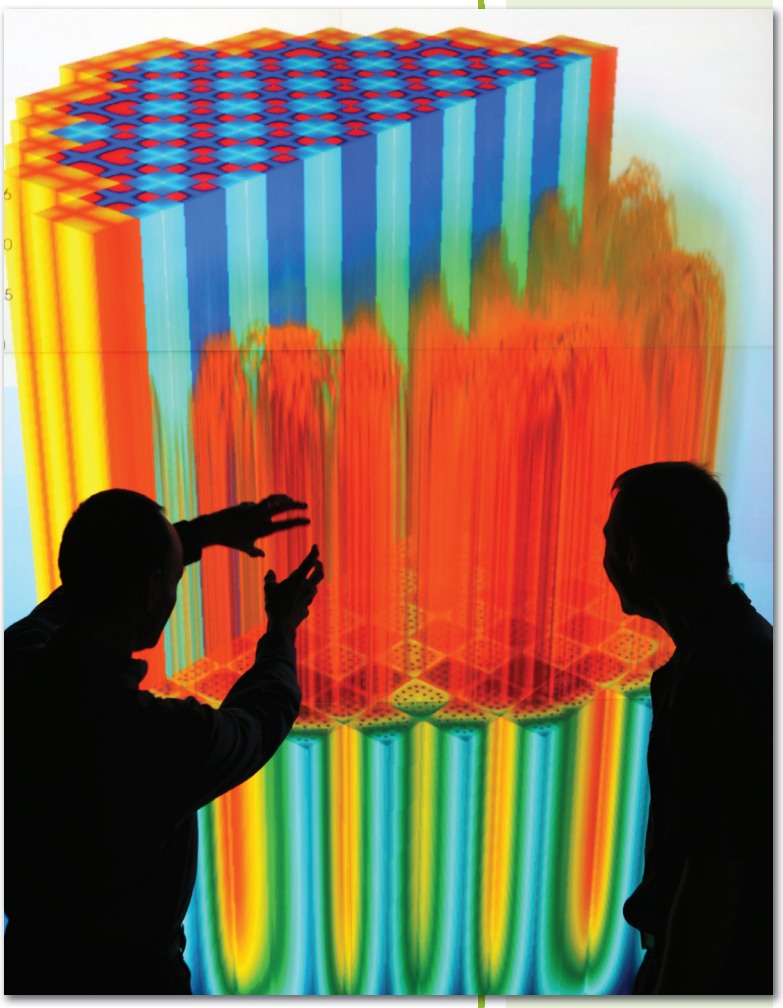
PLANNED PROGRAM ACCOMPLISHMENTS [a]

FY 2011

- Evaluate and prioritize innovative structural materials for use in radiation environments and high-temperature applications.
- Consider approaches such as the use of ion beams to simulate accelerated aging of materials.
- Develop a detailed project plan for quantification of proliferation risk and initiate studies on current risk assessment methodologies.
- Complete the advanced manufacturing and technology study and research roadmap.
- Initiate competitively selected high-potential R&D activities that improve nuclear plant manufacturing and field installation efficiency.
- Perform research to develop advanced sensors to improve physical measurement accuracy and reduce uncertainty.
- Perform research on digital monitoring and control technology, fiber optic and wireless digital instruments and highly integrated control systems to improve performance and reliability.
- Solicit, competitively select, and initiate R&D project awards from national laboratories, universities, research institutions, and industry proposals.

FY 2012

- Use experimental and modeling and simulation capabilities and initiate research to identify dominant physical mechanisms limiting behavior in materials for use in current and future nuclear reactors.
- Apply improved proliferation and security risk assessment methods to high-priority nuclear energy options under the framework of the Generation IV International Forum to build and sustain international consensus on proliferation assessment methods and applications.
- Complete and issue the Advanced Manufacturing Technology Roadmap.
- Continue research on advanced sensors, adaptive digital monitoring and control technology, fiber optic and wireless digital instrument communication systems, and highly integrated control system architectures to address unique conditions inherent to new nuclear energy systems.
- Within the Advanced Modeling and Simulation under the crosscutting element in FY 2012, consolidate code and methods development work previously spread throughout the NE R&D portfolio, which is modernizing the design tools available to nuclear engineers and scientists in government, academia, and industry.
- Within the National Science User Facility, support the use of unique nuclear research facilities for science-based experiments to encourage active university, industry, and laboratory collaboration in relevant nuclear scientific research.



Researchers in the Everest Visualization Facility at Oak Ridge National Laboratory.

[a] *See separate fact sheet for FY 2011 accomplishments associated with the Energy Innovation Hub for Modeling and Simulation.*