

# **NUCLEAR ENERGY RESEARCH INITIATIVE**

## **2. BACKGROUND**

In January 1997 the President tasked his Committee of Advisors on Science and Technology (PCAST) to review the current national energy research and development (R&D) portfolio and provide a strategy to ensure that the U.S. has a program to address the nation's energy and environmental needs for the next century.

In its November 1997 report, the PCAST Panel on Energy Research and Development determined that establishing nuclear energy as a viable and expandable option was important and that a properly focused R&D effort to address the potential long-term barriers to expanded use of nuclear power (e.g., nuclear waste, proliferation, safety and economics) was appropriate. The PCAST panel further recommended that DOE reinvigorate its nuclear energy research and development activities in an R&D effort to address these potential barriers with a new nuclear energy research initiative. This new initiative would fund research based on competitive selection of proposals from the national laboratories, universities and industry.

The Department endorsed the PCAST recommendations and received Congressional appropriations in FY1999 for NERI to sponsor innovative scientific and engineering R&D to address the key issues affecting the future use of nuclear energy and to preserve our nations nuclear science and technology leadership.

To achieve these long-range goals, NERI has the following objectives:

- Develop advanced reactor and fuel cycle concepts and scientific breakthroughs in nuclear technology to overcome the principal scientific and technical obstacles to expand future use of nuclear energy in the United States, including issues involving nuclear material proliferation, unfavorable economics, and nuclear waste disposition.
- Advance the state of U.S. nuclear technology to maintain a viable nuclear power options for the near and long-term.
- Promote and maintain a nuclear science and engineering infrastructure to meet future technical challenges.

In order to determine the initial focus of the NERI research areas, DOE convened a workshop in April 1998 of nuclear community stakeholders, including national laboratory, university, and industry representatives. As a result of this NERI workshop, DOE focused its initial scientific and engineering R&D on the following:

- Proliferation resistant reactors and fuel technology.
- New reactor designs to achieve improved performance, higher efficiency, and reduced cost, including low-output power reactors for use where large reactors are not attractive.

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- Advanced nuclear fuels.
- New technologies for management of nuclear waste.
- Fundamental nuclear science.

The Department also changed the method by which it selected R&D projects to support. The Department solicited researcher-initiated R&D proposals from universities, national laboratories, and industry in very broad R&D areas.

The researchers selected research topics of interest and defined the scope and extent of the R&D in their proposals. The Department employed an independent, expert peer review process to judge the scientific and technical merit of the R&D proposals. For those proposals judged to have the highest scientific and technical merit, the Department conducted a programmatic review to ensure conformance of selected projects with DOE policy and programmatic requirements. The two reviews resulted in award selection recommendations to the Department's Selection Official.

To help guide this R&D effort and shape the future direction of nuclear energy R&D, the Secretary of the Department of Energy established an independent advisory committee, the Nuclear Energy Research Advisory Committee (NERAC). A NERAC chartered subcommittee developed a *Long-Term Nuclear Energy Science and Technology Research Plan* to guide nuclear energy research out to the year 2020. In addition, NERAC issued a report on *Technology Opportunities for Increasing the Proliferation Resistance of Global Nuclear Power Systems (TOPS)*. The Department intends to use this long-term R&D Plan and TOPS report to guide future NERI research activities.