US DEPARTMENT OF ENERGY
NUCLEAR ENERGY RESEARCH INITIATIVE


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Abstract

This paper describes the Department of Energy's (DOE's) Nuclear Energy Research Initiative (NERI) that has been established to address and help overcome the principal technical and scientific issues affecting the future use of nuclear energy in the United States.

1. BACKGROUND

In January 1997 the President tasked his Committee of Advisors on Science and Technology (PCAST) to evaluate the current national energy R&D portfolio and provide a strategy to ensure the USA 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 (NERI). This new initiative should fund research based on competitive selection of proposals from the national laboratories, universities and industry.

The 1999 PCAST report on International Cooperation on Energy Innovation recommended that an international component to NERI be created to promote bilateral and multilateral research focused on advanced technologies for improving the cost, safety, waste management, and proliferation resistance of nuclear fission energy systems.

The Department endorsed the PCAST recommendation and received appropriations for NERI beginning in FY 1999, to sponsor new and innovative scientific and engineering R&D. In addition to the established NERI program, the Department proposed in FY 2001 to launch a new initiative within NERI, the International Nuclear Energy Research Initiative (I-NERI), to provide for cooperative international research and development of new technologies to address the key issues affecting the future of nuclear energy. I-NERI will give the United States and DOE greater credibility and influence in international discussions regarding the future implementation of nuclear technologies. It will allow us to leverage international resources, foster international cooperation, and work with countries on research already underway on a variety of advanced reactor types and proliferation-resistant fuel cycles. To achieve this long-range goal, the following objectives have been established:

- 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 US nuclear technology to maintain a competitive position in overseas markets and a future domestic market;
- Promote and maintain a nuclear science and engineering infrastructure to meet future technical challenges.

NERI sponsors innovative scientific and engineering research and development in the following areas:

- Proliferation-resistant reactors and fuel cycles;
- New reactor designs with higher efficiency, lower-cost, and improved safety to compete in the global market; low output power reactors for use where large reactors are not attractive;
- Advanced nuclear fuels;
- New technologies for management of nuclear waste; and
- Fundamental nuclear science.

The NERI/I-NERI programs feature a *competitive, peer-reviewed R&D selection process to fund researcher initiated R&D proposals* from universities, national laboratories and industry.

The NERI research areas are also of critical importance to foreign countries with civilian nuclear programs. I-NERI encourages foreign participation with US institutions to help maintain the nuclear option worldwide and to leverage scarce research dollars.

Finally, the Department established an independent Nuclear Energy Research Advisory Committee to provide advice and recommendations to assist the Department on the direction and focus of its energy R&D activities.

2. FY 1999 ACCOMPLISHMENTS:

- The initial NERI procurement was completed with the award and issuance of grants and laboratory cooperative agreements for 47 R&D projects involving research participants from 45 US universities, laboratories and industrial organizations, and 11 foreign collaborating organizations.

- Initiated innovative scientific and engineering R&D for 46 NERI projects to enhance the performance, efficiency, reliability, proliferation resistance, and economics of future nuclear power systems.

3. FY 2000 ACCOMPLISHMENTS:

- Advanced the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance, safety and economics in the design and development of advanced reactor and nuclear fuel systems through the award of ten new R&D projects.

- Continued the second phase of research for 45 continuing R&D projects awarded in FY 1999 to improve the scientific and technical understanding of new reactor and fuel cycle concepts and nuclear waste technologies, and the underlying fundamental science.

4. FY 2001 PLANNED ACCOMPLISHMENTS:

- Complete the first three-year round of NERI research and development by identifying feasible and important reactor and fuel cycle concepts for continued development.

- Establish the International Nuclear Energy Research Initiative (I-NERI) to promote bilateral research to improve the cost, enhance the safety, non-proliferation and waste of future nuclear energy systems.

5. PROGRAM BUDGET (in millions)

FY 1999	FY 2000	FY 2001
Appropriation	**Appropriation**	**Appropriation**
$19.0	$22.5	$35.0 (includes $7M for I-NERI)