

Nuclear Energy Research Advisory Committee (NERAC) Recommendations Goals for Nuclear Energy

Background

Nuclear energy currently provides approximately 20 percent of the electricity for the U.S. The primary alternative for power generation is fossil fuels. Though still controversial, evidence continues to mount about the negative health and environmental effects of carbon emissions. Nuclear power is the most significant technology available for meeting anticipated energy needs while reducing emissions to the environment.

Nuclear energy is an essential component to a secure and prosperous future for the U.S. and the world. The reliance on fossil fuels for the growing energy usage of an expanding world population will bring about enormous global environmental problems. Nuclear energy is the single largest tool for reducing carbon emissions from electric power generation.

The Current Dilemma

Federal support of nuclear energy, including facilities and research in universities, national laboratories, and industry, declined precipitously in the 1990's. A small recovery at the end of the decade took place in the U.S. Department of Energy's (DOE) Office of Nuclear Energy, Science and Technology (NE) program; however, many university research facilities and research reactors as well as test facilities at the national laboratories have been shut down. In 1992, the nuclear research and development (R&D) budget was \$192 million. In 2001, it is \$92 million, nearly a 50 percent decrease not even counting the effects of inflation, which makes the decrease even more striking. Current funding levels are inadequate to maintain the necessary program. The U.S. influence on the international community in areas such as safety and nonproliferation also has waned in recent years. Most significantly, without restoration of adequate federal support of nuclear energy research and education, the U.S. is in jeopardy of losing the nuclear option.

NERAC Position

Bright young people are attracted to new frontiers. The federal government through the DOE NE program must strengthen its commitment to position nuclear energy as a viable and acceptable element in the portfolio to meet energy needs in the 21st century. A strong research and development program that supports nuclear power generation that is focused on improved safety, reliability, cost, proliferation resistance, and waste disposal must be established and maintained. A healthy infrastructure including research and teaching facilities at universities must be sustained. Support for the broader application of nuclear science to medicine, biology, and space exploration should be provided to the appropriate federal agencies, universities, and industry.

Should the DOE NE budget be expanded?

Yes, it is essential that the U.S. assure a sustainable, reliable and diverse U.S. electricity supply by developing economical nuclear energy systems which meet stringent safety, environmental, and non-proliferation standards. Basic and applied research and development will continue to improve the performance of current nuclear power generating plants, and will be essential in developing improvements in current designs and for a new generation of power reactors. Focus must be on improved safety, reliability, cost, non-proliferation issues, and waste disposal. Research and development and the training of engineers and scientists are essential to meet national needs and regain U.S. leadership in the world on issues of nuclear energy, particularly on international safety and waste management, nuclear arms control, and energy and environmental sustainability.

What should DOE do for broader applications of nuclear science?

DOE should continue to provide information to other government agencies and to industry for applications of nuclear science. In addition to nuclear power for electricity generation, appli-

cations of nuclear science include cleanup of nuclear "legacies" in the DOE complex, stockpile stewardship, non-proliferation initiatives, national security, and advanced nuclear medicine R&D, including medical isotopes for diagnosis and therapy, industrial applications in manufacturing, food processing, and commercial applications, and the use of nuclear energy for space exploration. Although nuclear power is commonly seen as the prime use of nuclear energy, other applications are increasing in critical importance to society. Using the integrated capabilities of the Federal government, universities, and commercial and international sources, DOE should ensure the availability of the needed non-commercial isotopes for research use in medicine, biology, and other sciences, as well as for medical and industrial applications. DOE must continue to provide resources that will help fulfill NASA's needs and goals.

[What should DOE do with respect to nuclear energy research facilities?](#)

The U.S. faces a crisis relative to its own internal capabilities in nuclear science and engineering. Without strong, decisive action, within ten years this nation will find it increasingly difficult to effectively complete the cleanup of its nuclear complex; prevent proliferation of nuclear materials; guarantee nuclear stockpile stewardship; support nuclear-related national security requirements; realize the potential and meet the demand for isotopes and radiochemical materials in medical, industrial, and space-power applications; or sustain the pool of workers needed to operate and maintain the U.S. commercial reactors.

It is hard to imagine a revitalization powered by utilization of 40 to 50 year old infrastructure. We must reinvigorate and then maintain the human, physical, and industrial infrastructure required to support all nuclear aspects of DOE's specific missions. This endeavor will involve evaluating the status of the human (education/ training), physical (research and test reactors, hot cells, accelerators), and industrial (specialized nuclear design, testing, and manufacturing capabilities) infrastructure; determining the necessary amount of such infrastructure at universities and the national labs to maintain the nuclear option under a range of potential nuclear futures; and

establishing a balanced program to maintain such infrastructure. Special attention must be given to education and training of personnel.

Strong support for educational programs at colleges and universities is essential and must include scholarships and fellowships, direct support of university reactors for training and research, and support for the research programs and forefront facilities that bring vitality to the educational programs.

DOE must be a steward of the national nuclear energy infrastructure. Over the past decade, six university reactors have been shut down and another definitely will shut down next year, with more to be closed. DOE should move swiftly to evaluate the loss from the pending decommissioning of research reactors at universities. Numerous other reactors and processing facilities are utilized at the national laboratories for the functions of DOE/NE. These facilities have been entrusted to the care of NE and must be maintained in good, safe, and up-to-date operating condition, requiring additions, upgrades, and decommissioning be done within a long-term vision.

The U.S. once was the world leader in nuclear technology and applications. It no longer is. But it can be, if the vision outlined here is combined with verbal and financial support from the administration and should be, if the U.S. is to have a secure and sustainable energy future while simultaneously retaining the expertise to support its national security interests. The NERAC recommends that the U.S. proceed expeditiously with implementing "America's Nuclear Technology Future," the Department of Energy's strategic plan for U.S. nuclear energy research and development. Restoring the nation's capabilities in nuclear science and engineering will require a new infrastructure of research and teaching facilities at universities, coupled with a new partnership for research and capability stewardship among the Federal agencies and industries whose missions and success require these key capabilities. Failure to acknowledge this crisis and to take bold action to correct decades of national neglect would lead to unacceptable consequences.

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