American Nuclear Society Issue Paper on Nuclear Technology Education and Research Infrastructure

Summary

Nuclear facilities and nuclear-trained professionals are essential to U.S. energy, manufacturing, medical, and other industries, as well as to the conduct of major government programs run by the Departments of Defense, Energy, and State, the Nuclear Regulatory Commission, and other agencies. The American Nuclear Society believes the U.S. government should ensure an adequate supply of these people and facilities by increasing its support for nuclear technology education, research, and infrastructure.

Why are Nuclear Technology Professionals and Nuclear Facilities Important?

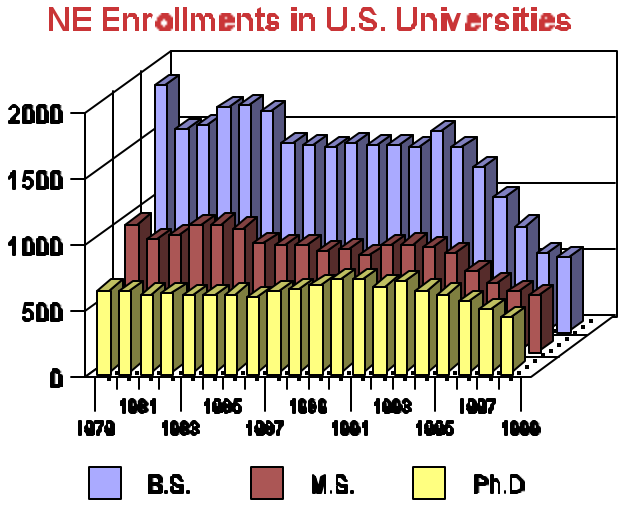
It is a well-kept secret that nuclear technologies play an increasingly important role in our everyday lives (see box). Nuclear technologies are also a key component of many critical national security, energy, and medical research programs sponsored by the U.S. government.

It is obvious that, if the U.S. is going to continue to benefit from nuclear technologies, we are going to need properly trained professionals to work in these areas. Unfortunately, ill-informed predictions of doom for the nuclear power industry, drastic reductions in federal support for nuclear technology research and infrastructure, and a less than full appreciation by the public of nuclear technology's beneficial applications have led to drastically declining enrollments in university-based nuclear engineering programs. This, in turn, has led to the closure of many of these programs.

How are Nuclear Technologies Used in the US?

Just a few of the many applications include:

- Medical applications - over 10 million patients per year in the U.S. undergo nuclear-based procedures; irradiation is used for sterilization of surgical supplies
- Industrial applications - process monitoring is used to reduce energy use and waste generation; food irradiation is used to protect human health and reduce spoilage
- Energy - nuclear power is used for electricity generation
- National defense - nuclear weapons stockpile management and Naval nuclear propulsion rely on nuclear technology
- Space exploration - nuclear-powered heat and electricity sources have been used in NASA missions for more than 30 years
- Environmental - nuclear-based technologies are used to detect contaminants in the environment, and to determine migration rates and pathways for pollutants
- Other applications - isotopes are used in smoke detectors, and for educational and research use



These university programs are a critical element of the U.S. nuclear technology infrastructure. U.S. universities are the best in the world at educating young nuclear professionals. Our universities are also fertile ground for new ideas in the advancement of nuclear technology. Despite the opportunities for

intellectually and financially rewarding careers in nuclear technology, enrollments in U.S. nuclear programs have shrunk at an alarming rate.

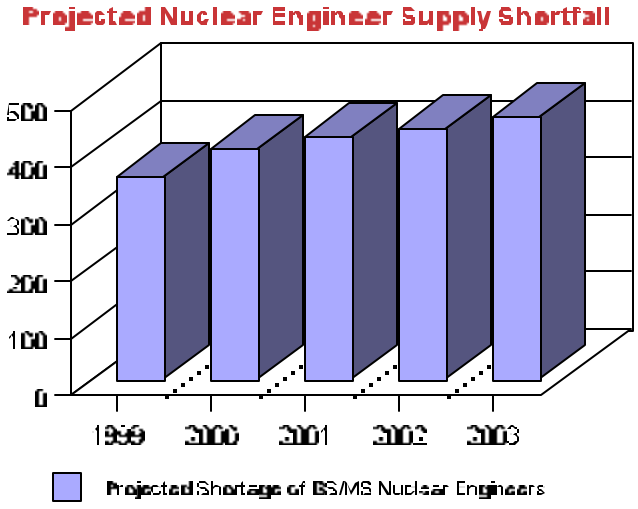
The U.S. nuclear research infrastructure has undergone a similar retraction in recent years. For example, the number of research reactors on university campuses has fallen from nearly 70 to under 30 as utilization rates for the reactors have plummeted. The facilities and people at the Department of Energy's (DOE's) national laboratories, which represent the core of the government's capability to conduct nuclear technology research and medical isotope production, have also suffered. At the beginning of the 1990's, DOE operated five large test reactors. Now, only two are operating. DOE is considering restarting a third reactor, the Fast Flux Test Facility in Washington state; recent actions by DOE point to a pending decision to permanently close the reactor, but no final decision has been made. The ability of the U.S. to conduct important nuclear R&D, including that needed to provide future energy options, explore space, and find new, cost-effective treatments for cancer, is being permanently eroded by the closure of these facilities.

Universities with Nuclear Engineering Programs or Nuclear Research Reactors

NE Program-and-Reactor	Univ. of MO-Columbia
Cornell University	Univ. of MO-Rolla
Idaho State University	Univ. of New Mexico
Kansas State University	Univ. of Texas
MIT	Univ. of Utah
North Carolina St. Univ.	Univ. of Wisconsin
Ohio State University	Washington State Univ.
Oregon State University	
Pennsylvania State Univ.	NE Program Only
Purdue University	Georgia Tech
Reed College	Iowa State University
Rensselaer Poly. Inst.	Louisiana State Univ.
Texas A&M University	Univ. of CA-Berkeley
Univ. of Arizona	Univ. of CA-Davis
Univ. of CA-Irvine	Univ. of Cincinnati
Univ. of Florida	Univ. of Idaho
Univ. of Maryland	Univ. of Illinois
Univ. of Mass.-Lowell	Univ. of Rhode Island
Univ. of Michigan	Univ. of Tennessee

What Should the U.S. Do to Support the Nuclear Technology Education and Research Infrastructure?

The next ten years are crucial for the nuclear technology education and research infrastructure in the U.S. For example, breakthroughs in cancer therapy using radioactive isotopes are being made at the same time the U.S. capability to produce these isotopes is eroding. And while nuclear energy has become a preferred electricity generation investment with greatly improved economic performance and essentially no air emissions, funding for nuclear energy R&D and the nuclear infrastructure is increasingly scarce. The following are the key steps that should be taken to restore the state of nuclear technology education and research infrastructure in the U.S.:



1. As recommended by the education subcommittee of the independent, Federally-chartered Nuclear Energy Research Advisory Committee, **increase funding for university nuclear engineering programs to $45 million per year, including $15 million per year to improve university research reactors.** Funding for university nuclear program support is $12 million for FY 2001, and is used to support university-based research, purchase fuel and equipment for

university reactors, and provide scholarships and fellowships for outstanding students. These programs are all worthwhile, but need to be funded at a higher level to ensure an adequate supply of nuclear-trained professionals.

2. **Restart the Fast Flux Test Facility (FFTF).** The FFTF is the most modern test reactor in the DOE complex. It was shut down in 1992 after only 10 years of operation because it was underutilized, but many new needs for the reactor have developed over the past few years. Restart of the FFTF will greatly enhance the nuclear technology research infrastructure in the U.S., will add significantly to our medical and research isotope production capability, and will help the U.S. reassert its position as world leader in nuclear energy technology development. **The Bush Administration should ask that the Clinton Administration not make a final decision on the future of FFTF, which will allow the new Administration a chance to review all options**.

3. **Assure that other facilities for reactor technology research, test and development are ready.** Take action to increase funding for the High Flux Isotope Reactor, and to create user facilities at the Advanced Test Reactor and Transient Reactor Test Facility for fuel testing and evaluation. **An increase in funding of $15M per year is needed.**