



American Nuclear Society Issue Paper on Nuclear Reactor Research and Development

Summary

The American Nuclear Society believes the U.S. government should promote a balanced portfolio of energy options that is stable, secure, and affordable, with minimal impact on the environment. That portfolio should include a robust program of nuclear reactor research, development, and demonstration to ensure that nuclear power remains a viable resource to meet future U.S. energy needs.

Why Should the U.S. Government Support Nuclear Energy R&D?

We are all proud of the fact that the U.S. economy is the strongest in the world. One of the principal reasons for this strength is the availability of reliable, diverse, and affordable supplies of energy. Our continued economic strength and our national security depend on maintaining the availability of abundant energy supplies to fuel our economy, yet disparate issues are conspiring to undermine the security of these supplies. The major issues include:

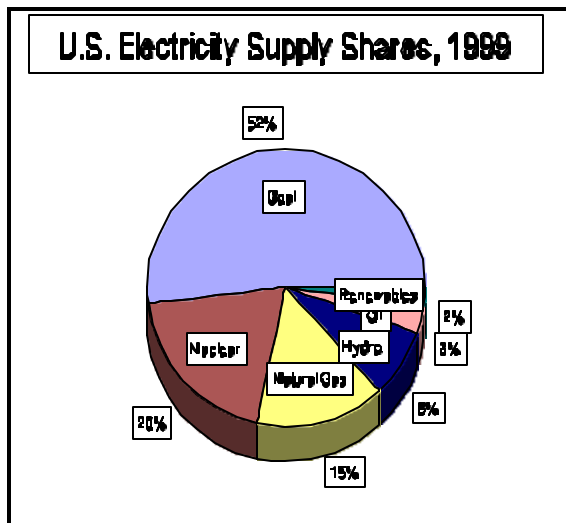
- environmental issues, including Clean Air Act regulations, concerns over global warming, and restrictions on the development of domestic oil and gas resources;
- increasing reliance on unstable regions of the world for energy imports, which has contributed to rising oil and gas prices;
- uncertainty regarding the deregulation of electricity markets; and
- an unwillingness by the Clinton Administration to resolve the spent nuclear fuel disposal issue.

How Does the U.S. Use Energy?
 U.S. energy use can be divided up into three categories, each of which account for roughly one third of our primary energy consumption.

- electricity generation - the major resources used are coal, nuclear power, natural gas, and hydroelectric power;
- industrial and home use - primarily oil and natural gas; and
- transportation - dominated by oil.

In responding to these issues, the U.S. government can and should do all it can to preserve a broad portfolio of energy supply options. These options must allow us to meet our present and future energy needs and sustain our position as world leaders in energy technology. The U.S can do this in a way that preserves our economic

strength and our environment by supporting both the continued operation of our existing nuclear power plants and the development and deployment of a new generation of advanced nuclear power plants.



The 103 operating commercial nuclear power plants in the U.S. supply about 20 percent of our electricity each year, and are the nation's largest source of emissions-free electricity. These plants have proven to be economically competitive sources of electricity generation. For example, in 1998, the operations, maintenance, and fuel costs for U.S. nuclear power plants averaged 2.13 cents per kilowatt-hour (kWh). This is only marginally higher than for coal (2.07 cents/kWh), and is considerably less expensive than natural gas (3.30 cents/kWh) and oil (3.24 cents/kWh).

Clearly, we will continue to rely on fossil fuels for the bulk of our energy production into the foreseeable future. However, the deployment of new nuclear power plants, coupled with greater development of our other domestic energy resources, could allow us to significantly reduce our reliance on foreign sources of oil and gas while maintaining the reliability, diversity, and affordability of energy supplies that have helped keep our economy strong.

How Should the Government Support Nuclear Energy R&D?

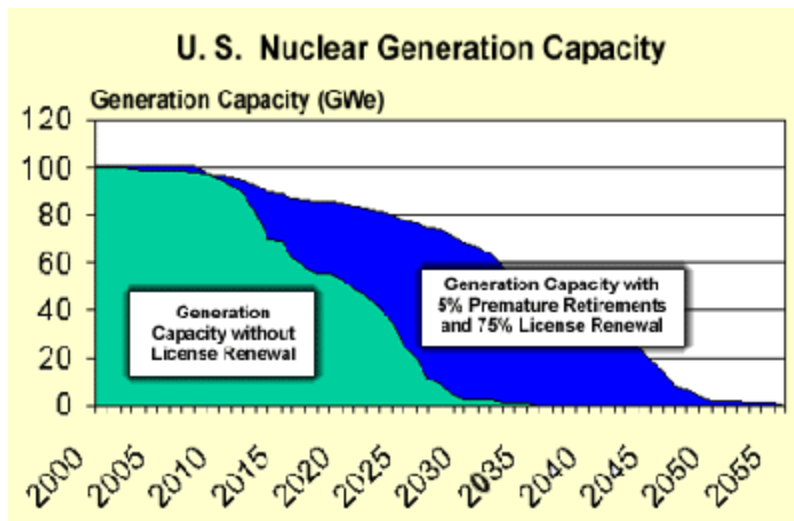
The U.S. government should take a more balanced approach to investing in energy R&D alternatives. In 1997-98, U.S. government R&D investment per thousand kWh generated was \$0.05 for nuclear and coal, \$0.58 for oil, \$0.41 for gas, \$4,769 for wind, and \$17,006 for photovoltaics. Clearly, a more balanced approach is warranted.

Nuclear energy R&D is focused on addressing the four primary issues facing the future use of nuclear power: 1) Economics - this includes reducing the cost to construct and operate new plants, and improving the reliability of those plants; 2) Safety - while the safety record of the current fleet of plants is exemplary, further improvements can likely be made; 3) Waste - we may be able to reduce waste generation rates in existing and new plants; and 4) Proliferation Potential- we must continue to ensure that materials from nuclear power plants are not diverted for weapons use.

To address these issues, two major categories of nuclear energy R&D are being conducted in the U.S. The U.S. Department of Energy (DOE) is funding small research efforts in both areas:

1. *Development of “Generation IV” reactors for future deployment.* This research is conducted under the Nuclear Energy Research Initiative, which is funded at \$35 million in FY 2001. Research is focused not just on the development of central-station power plants to feed electricity into the existing grid, but also potential uses of nuclear power like hydrogen production, desalination, and process heat supply that fit with a forward-looking vision of future energy production and use. Congress, prompted by the leadership of Senator Pete Domenici, has directed DOE to prepare a “technology roadmap” to guide the development of these next-generation nuclear power systems. **Once the roadmap is completed, DOE should fund a next-generation R&D program starting at \$50 million per year. This program should include plans for the construction of needed R&D facilities and prototypes. DOE should also continue to fund the NERI and International NERI programs at a total of \$40 million per year, to serve as a “seed bed” to develop innovative ideas for new nuclear power systems.**

2. *Improvements to existing nuclear power plants.* This activity is funded by the government at \$5 million in FY 2001 under the Nuclear Energy Plant Optimization program, a joint DOE/industry initiative. The object of this research is to increase the efficiency and reliability of existing nuclear power plants up to and beyond their initial 40-year operating license terms. This is important because the operating licenses for the fleet of existing plants



begin to expire in about 2010. If we can help make these plants more economic, we can increase the incentive for the operating utilities to pursue license extension for the plants, and thus increase the contribution these plants make to our economy and to preserving our environment. **Funding for the NEPO program should be increased to at least \$10 million per year.**