Nuclear Energy — An Overview

The U.S. Department of Energy's Office of Nuclear Energy

A plentiful, reliable, and affordable supply of energy is the cornerstone of sustained economic growth and prosperity.

The demand for energy in the United States is expected to rise in the coming decades. By the year 2030, demand for electricity is expected to grow 16 to 30 percent higher than 2010 levels.

Today, 104 nuclear reactors provide low-cost, carbon-free electricity to help drive the American economy and preserve the environment. Nuclear energy provides about 20 percent of total U.S. electricity, but 70 percent of its carbon-free electricity. In addition, nuclear power plants do not release air pollutants, providing an important option for improving air quality.

Globally, nuclear energy is undergoing renewed growth, with 65 new reactors under construction in 15 countries. In the United States, a renewed interest in nuclear energy has resulted in blueprints for the first new nuclear power plants in over 30 years. License applications have been submitted to construct 26 new nuclear reactors in the United States.

The Department of Energy's (DOE) Office of Nuclear Energy (NE) conducts research and technology development that will enable nuclear energy to continue to deliver large quantities of safe, reliable electricity to the marketplace well into the future. DOE-NE is also researching options to address used nuclear fuel management and nonproliferation challenges.

A RECORD OF DISTINCTION

Over the past 15 years, consolidation of plant ownership to a smaller number of operators has made U.S. nuclear reactors:

- Safer,
- More cost-effective, and
- More reliable.

Efficiency improvements and power uprates have allowed existing U.S. nuclear plants to produce more energy than in previous decades, adding the equivalent of nearly 5 to 6 new nuclear reactors to the electrical grid. U.S. nuclear plants were available to produce energy approximately 70 percent of the time on average in the early 1990s, but are now producing power closer to 90 percent of the time. As a result of this success, nearly all U.S. nuclear plants are expected to apply for renewed licenses that will keep most plants in operation well into the middle of the century.

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Program Budget	
Nuclear Energy ($ in Millions)	
	FY 2012 Request
	$852.5

DOE'S ROLE

NE's primary mission is to advance nuclear power as a resource capable of making major contributions in meeting our Nation's energy supply, environmental, and energy security needs by resolving technical, cost, safety, security and regulatory issues through research, development and demonstration. By focusing on the development of advanced nuclear technologies, NE supports the Administration's goals of providing domestic sources of secure energy, reducing greenhouse gases, and enhancing national security.

NE's research is guided by the four research objectives detailed in its Nuclear Energy Research and Development Roadmap:

1. Develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors.
2. Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals.
3. Develop sustainable fuel cycles.
4. Understand and minimize the risks of nuclear proliferation and terrorism.

NE serves present and future U.S. energy needs by developing critical technologies for the future and helping to train tomorrow's workforce. The benefits of nuclear power as a safe, low-carbon, reliable, and secure source of energy make it an essential element in our Nation's energy and environmental future.