

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 rising. By the year 2030, domestic demand for electrical energy is expected to grow to levels of 16 to 36 percent higher than 2007 levels.

Nuclear energy today provides about 20 percent of U.S. electricity, and 70 percent of its carbon-free electricity. It does not produce greenhouse gases, and so does not contribute to climate change. Nuclear energy produces large quantities of continuous, affordable electricity.

Today in the United States, 104 nuclear reactors provide carbon-free electricity to help drive the American economy.

Globally, nuclear energy is undergoing renewed growth, with 13 countries constructing 53 new nuclear power units and 27 countries in the planning stages for an additional 142 units. 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. Combined Construction and Operating license applications have been submitted for 28 new U.S. nuclear power plants, with 8 more expected.

Despite the advantages of nuclear energy, the question of how to deal safely and securely with nuclear waste over the long term remains a concern. The Department of Energy's (DOE) Office of Nuclear Energy (NE) is sponsoring the research and technology development that will allow nuclear energy to continue to deliver large quantities of safe, reliable electricity to the marketplace, while developing options to address waste disposal and non-proliferation concerns.

A RECORD OF DISTINCTION

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

- 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, which were available to produce energy only 70 percent of the time on average



Program Budget

Nuclear Energy
(\$ in Millions)

FY 2010 Actual	FY 2011 Request
\$870.0	\$912.3

in the early 1990s, are now producing power around 92 percent of the time. Nuclear power plants do not release air pollutants or carbon dioxide in the production of electricity, providing an important option for improving air and environmental quality.

As a result of this success, essentially all U.S. nuclear plants are expected to apply for renewed licenses that will keep most plants in operation into the middle of the century.

DOE'S ROLE

The role of DOE is to work with the private sector, overseas partners, and other agencies to assure that the benefits of nuclear technology continue to contribute to the security and quality of life for Americans — and other citizens of the world — now and into the future. 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 is focused on five goals:

- Extend the life, improve the performance, and maintain the safety of the current fleet of nuclear power plants.
- Enable new plant builds for electricity production and improve the affordability of nuclear energy.
- Enable the transition away from fossil fuels by producing process heat for use in the transportation and industrial sectors. Process heat — now produced by greenhouse gas-emitting fossil fuels — is required to refine oil into gasoline and to produce glass, plastics, steel, and many other materials.
- Enable sustainable fuel cycles. This includes research to make used nuclear fuel less toxic, recycle it, and create widely acceptable solutions to the challenges of nuclear waste.
- Understand and minimize proliferation risk.

NE serves present and future U.S. energy needs by providing the critical nuclear research infrastructure that will help regain U.S. technology leadership and train tomorrow's workforce. These capabilities and technologies will help meet the needs of a growing economy and address climate change by reducing greenhouse gas emissions.

The benefits of nuclear power as a safe, low-carbon, reliable, and secure source of energy make it an essential element in the Nation's energy and environmental future.