



Nuclear Energy — an Overview

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

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



- Nuclear power is the second-largest source of electric power generation in the United States, and existing plants are among the most economic on the grid today.
- The demand for energy in the United States is rising much faster than the projected increase in domestic energy production. By 2030, domestic energy demand is projected to grow almost 50 percent, according to the Energy Information Administration (EIA). Global energy demand is expected to almost double by 2030, according to EIA's *International Energy Outlook*.
- There are only three ways to overcome this projected shortfall:
 - Import more energy,
 - Improve energy conservation and efficiency, and/or
 - Increase domestic supply.
- The Administration considered these options when developing its National Energy Policy of 2001 (NEP). It concluded that increased dependence on oil imports from volatile regions of the world would jeopardize our national and economic security. As imports rise, so does our vulnerability to price shocks, shortages, and disruptions. For that reason, the Administration resolved to:
 - Take steps to improve energy conservation and efficiency,
 - Increase domestic energy production, and
 - Increase the reliability and security of imports.

Consistent with the priorities set forth in the NEP, the President signed the *Energy Policy Act (EPAAct)* into law in August 2005. This law was the first comprehensive energy plan in more than a decade. EPAAct 2005:

- Encourages energy efficiency and conservation,
- Promotes alternative and renewable energy sources, and
- Encourages the expansion of nuclear energy in the United States.

Over the past 15 years, U.S. utilities have become the best operators of nuclear power plants in the world. Consolidation of plant ownership to a fewer number of excellent operators has made the operation of U.S. plants:

- Safer,
- More cost-effective, and
- More reliable than ever before.

More efficient operation has allowed nuclear plant operators to produce more energy than ever before, adding the equivalent of nearly 10 new nuclear plants to the U.S. grid through efficiency improvements. American plants, which were available to produce energy only 70 percent of the time on average 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.

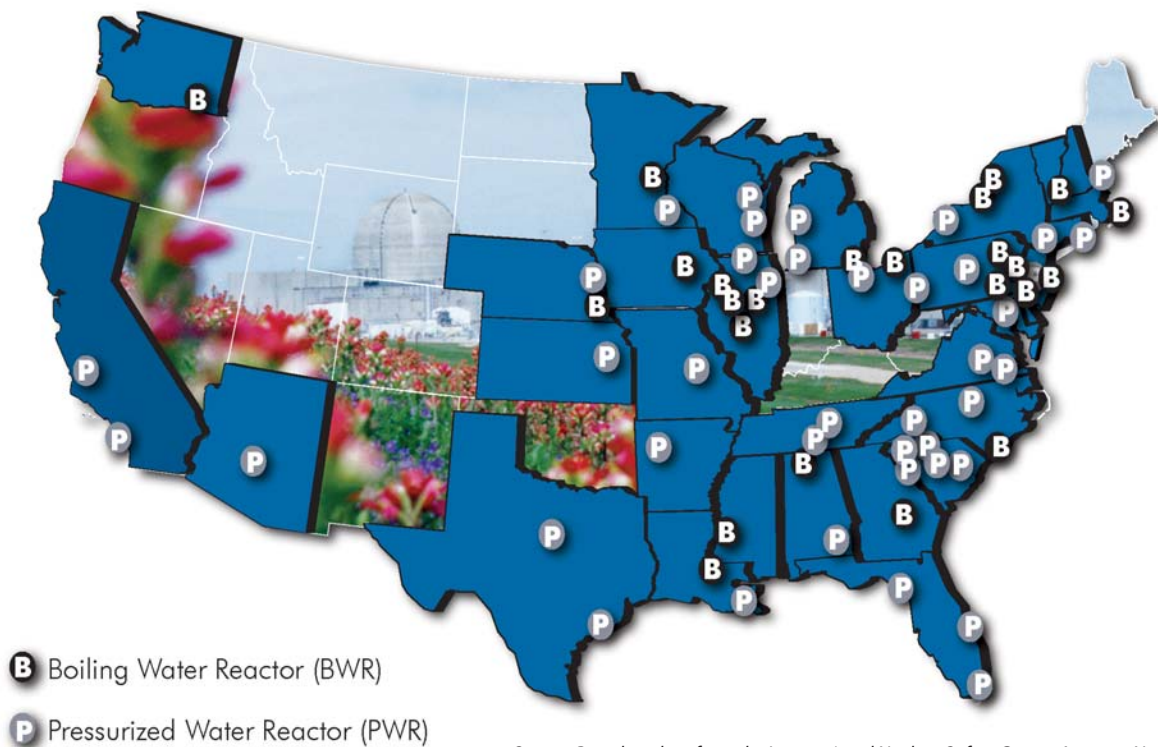
As a result of this success, essentially all U.S. nuclear plants are expected to apply for renewed licenses that will keep most plants in operation into the middle of the century. The Tennessee Valley Authority (TVA) is going a step further and refurbishing a plant that was shut down in 1985. TVA invested \$1.8 billion in Brown's Ferry Unit 1, a 1,200-megawatt boiling water reactor,

and brought it back online in June 2007.

The role of the Department of Energy (DOE) is to work with the private sector, our 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, the Office of Nuclear Energy supports the Department's goal to develop new generation capacity while making improvements in environmental quality.

A robust expansion of nuclear energy in the United States goes hand-in-hand with the Global Nuclear Energy Partnership (GNEP), established by the President in February 2006, to promote a significant, wide-scale use of nuclear energy in a safe and secure manner while decreasing the risk of

Location of 104 U.S. Nuclear Power Reactors



Source: Based on data from the International Nuclear Safety Center, Argonne National Laboratory, GE Nuclear Energy, and other sources.

*Map indicates locations only, some sites have more than one reactor.

nuclear weapons proliferation and effectively addressing the challenge of nuclear waste disposal. The core of the GNEP vision is strengthening nuclear nonproliferation and improving safety, security, and safeguards.

The global aspect of GNEP is manifested through a voluntary international partnership consisting of like-minded nations that share the common vision of the necessity for the expansion of nuclear energy for peaceful purposes worldwide in a safe and secure manner. With the expansion of this ground-breaking partnership, GNEP now represents every region of the world. Its Statement of Principles has been adopted by 20 Partner nations. The Partnership also includes 18 additional countries that participate in an observer capacity, as well as three multinational organizations that serve as permanent observers. GNEP is unique based on its comprehensive vision for realizing the safe and secure expansion of civilian nuclear energy, its respect for each Partner's unique energy needs, and its potential, represented by Partners from all stages of the nuclear fuel cycle and all geographic regions of the world.

Bilateral cooperation that benefits GNEP in its international technical development efforts includes arrangements between the United States and Russia, Japan, China, Australia, Jordan, and Italy. As an example, the U.S.-Russian Bilateral Action Plan outlines national strategies in nuclear power and identifies the common basis for U.S.-Russian cooperation in advanced recycling reactors, exportable small and medium reactors, nuclear fuel cycle technologies, and nonproliferation—all tenets of GNEP. Similarly, under the U.S.-Japan Bilateral Program Plan, working groups are now conducting joint research and development.

NE leads the development of new nuclear energy generation technologies to meet energy and climate change goals and advanced, proliferation-resistant nuclear fuel technologies that maximize energy from nuclear fuel, while maintaining and enhancing the national nuclear infrastructure. These activities build on important work started over the last three years

to deploy new nuclear plants in the United States by early in the next decade, and to develop advanced, next-generation nuclear technology.

The benefits of nuclear power as a safe, reliable, and affordable source of energy are an essential element in the Nation's energy and environment future. A broadly diverse energy supply has sustained the country in the past, and it must be available for the future. Nuclear energy is part of that diverse portfolio. It can serve us well, as we require more energy to supply our growing economy, work to protect the environment, and enhance America's energy security.

Program Budget

Nuclear Energy (\$ in Millions)	FY 2008 Request	FY2008 Actual	FY 2009 Request
	Nuclear Energy	\$874.6	\$1,033.9