

U.S. Needs New Nuclear Plants to Meet Energy Demand, Maintain Supply Diversity

June 2009

Key Points

- Nuclear energy plays a vital role in meeting our nation's electricity needs, protecting the environment and preserving the fuel and technology diversity that is the strength of the U.S. electric supply system.
- The 104 nuclear power plants in 31 states operate 24/7, producing nearly 20 percent of U.S. electricity while emitting no carbon dioxide, sulfur dioxide or nitrogen oxide (a precursor to ground-level ozone). Nuclear energy produces more electricity than any other source in Connecticut, New Hampshire, New York, New Jersey, South Carolina and Vermont. Nationwide, nuclear plants generated 806 billion kilowatt-hours of electricity in 2008.
- Only 27 percent of U.S. electricity comes from carbon-free sources, and nuclear power plants generate almost three-fourths of it.
- The U.S. Department of Energy projects that U.S. electricity demand will rise 21 percent by 2030. Even with conservation and efficiency measures, the U.S. will need hundreds of new power plants from a diverse portfolio of fuel sources to supply electricity for a high standard of living and to promote domestic economic growth.
- The energy industry is planning to build new, advanced nuclear plants to meet growing electricity demand while enhancing U.S. energy independence and reducing greenhouse gases.

Nuclear Energy Is Vital to Curbing Climate Change

Nuclear plants are essential to protect the nation's air quality and stem global climate change. Without nuclear power plants, levels of harmful emissions released into the atmosphere would increase significantly—particularly those that contribute to acid rain (sulfur dioxide) and urban smog (nitrogen dioxide).

Nuclear power plants do not produce any greenhouse gases during the electricity production process and have among the lowest total "life-cycle" carbon emissions. This reflects all plant-related activities, from uranium mining to construction and decommissioning of the plant are considered. The life-cycle carbon footprint of a nuclear power plant is comparable to wind and hydropower plants, yet nuclear is a 24/7 large-scale power producer.

The U.S. Department of Energy forecasts that the United States will need 21 percent more electricity by 2030. To meet the expected increase in electricity demand by 2030, the electric power sector must invest an estimated \$1.5 trillion to \$2 trillion in new power plants, transmission and distribution systems, and environmental controls. The industry faces a significant challenge in financing this investment.

U.S. government policies and practices support the development of nuclear energy and other clean energy technologies through limited financial incentives made available by the Energy Policy Act of 2005. The law sustains a long-standing government tradition of



SUITE 400
1776 I STREET, NW
WASHINGTON, DC
20006-3708
202.739.8000
www.nei.org

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providing limited financial backing for energy projects vital to the nation's infrastructure.

Maintaining Supply Diversity

A diverse mix of energy sources enables America to balance the cost of electricity production, availability and environmental impacts to its best advantage. Coal-fired power plants generate nearly half of our nation's electricity. Natural gas-fired plants generate 21 percent and nuclear plants, 19.6 percent. The rest comes from hydroelectric dams and small amounts of renewable energy.

Fuel diversity is one of the great strengths of the U.S. electric supply system. Each source of electricity has unique advantages and disadvantages, and each has its place in a balanced electricity supply portfolio.

Natural gas-fired electricity generation has more than doubled since 1990. Nearly all power plants built over the past 15 years are fueled by natural gas. However, natural gas is subject to significant price fluctuations because it also is used as a heating fuel and in industrial processes.

The uranium fuel for U.S. nuclear plants is abundant, readily available from reliable allies, such as Canada and Australia, and low in cost. Coupled with industry success over the past 20 years in reducing operating costs, the low fuel cost makes America's 104 nuclear energy plants among the lowest-cost sources of electricity available.

Once built, new nuclear power plants would provide the same degree of price stability for consumers. Prudent energy planning demands a balanced approach—one in which all fuels play an appropriate role. These include coal, nuclear energy, natural gas, hydro and renewables such as solar and wind power.

Growing Significance of Clean-Air Benefits

Clean-air energy sources—nuclear power plants, hydroelectric power and renewables (specifically, wind, geothermal and solar)—help minimize the production of greenhouse gases and pollutants because they generate electricity that otherwise would have to come from burning fossil fuels. The more electricity each source generates, the more it helps meet the nation's clean-air goals. Nuclear energy is by far the largest of the clean-air sources, producing nearly 20 percent of our nation's total electricity. Hydroelectric power provides 6 percent of our nation's electricity; renewables, less than 2 percent.

Thus, 27 percent of U.S. electricity comes from clean-air sources, and nuclear energy provides nearly three-fourths of that. The electricity produced by nuclear power plants displaces electricity that otherwise would be supplied by oil-, gas- or coal-fired generating capacity. Hence, nuclear energy plays a vital role in our national air-quality compliance programs.

In 2008, nuclear power plants prevented the emission of about 2.7 million tons of sulfur dioxide and 1 million tons of smog-causing nitrogen oxide—pollutants controlled by the Clean Air Act.

Nuclear plants also prevented the discharge of 689 million metric tons of carbon dioxide into the atmosphere in 2008. This amount equals the carbon dioxide released from nearly all U.S. passenger cars.

In 2005, a Polestar Applied Technology study, commissioned by the Nuclear Energy Institute, concluded that the nine northeastern states cooperating on the Regional Greenhouse Gas Initiative would be incapable of meeting their ambitious goals to cap carbon emissions without the help of the region's

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15 nuclear power plants. Without those plants, the region would be forced to generate about 50 percent of its electricity from natural gas in order to meet its carbon-cap goals.

Future Challenge: Linking Energy, Environmental Policy

Looking to the future, the United States must maintain at least the current 30 percent share of non-emitting electric generating capacity if it is to meet its clean-air goals. Even with conservative assumptions about increases in electricity demand and assuming a doubling of renewable energy production, the United States will be challenged to maintain the current proportion of emission-free electricity production without a substantial increase in nuclear energy.

Comprehensive energy policy legislation enacted in 2005 provides limited incentives to jump-start new reactor construction, just as similar legislation has done for wind and other power technologies. These include loan guarantees for clean energy technologies, including nuclear and renewables; production tax credits; and federal insurance that would protect a company building a new plant in the event of unforeseen regulatory delays.

The bill also authorizes almost \$3 billion for nuclear energy research, including funding for a new demonstration hydrogen reactor, as well as hydrogen demonstration projects at existing reactors.

The nuclear energy industry has partnered with DOE to design, license and build the next generation of nuclear energy technology. Under the partnership, companies are testing an improved U.S. Nuclear Regulatory Commission process for licensing new nuclear plants. Companies also are testing an early site permit process, which allows a company to gain advance approval for a new reactor

site so the location is ready when and if a company decides to build.

Clean Energy for the Future

Transforming the U.S. electric power sector is both a daunting challenge and a tremendous opportunity. If America rises to the challenge, it will create a 21st century electricity system, produce millions of green jobs, rebuild the nation's manufacturing base, and generate economic growth and opportunity.

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