

Nuclear Energy's Importance In Reaching Clean Air Act Goals

February 2008

Key Points

■ Clean-air energy sources—nuclear power plants, hydroelectric power and renewables—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 7 percent of our nation's electricity; renewables, 3 percent.

■ The Clean Air Act of 1970 set standards to improve the nation's air quality. The legislation established limits on the emission of certain pollutants for states and regions of the country. These pollutants include nitrogen oxides (NO_x) and sulfur dioxide (SO₂). States that fail to meet federal clean-air standards face economic consequences that can affect economic growth and jobs.

■ In 1970, nuclear energy produced only 1 percent of our nation's electricity, while oil—now little used for electricity—provided 12 percent. The Clean Air Act and the concerns it addressed were among the reasons electric companies built nuclear plants in the 1970s and early 1980s. Clean air is an even bigger concern today, and nuclear energy's environmental benefits are a key reason that companies are turning once again to new nuclear generation. Increased use of clean-air nuclear energy will give states additional flexibility for economic expansion and reduce the overall cost of clean-air compliance.

Clean Air Act Goals: Improved Air Quality and Healthier Environment

The Clean Air Act of 1970 and federal regulations set standards to improve the nation's air quality. Clean air helps people breathe more easily and curbs air-related health impacts. The Clean Air Act and regulations established by the U.S. Environmental Protection Agency set limits on the emission of certain pollutants for states and regions of the country. These pollutants include NO_x, a precursor of ground-level ozone and smog; SO₂, which produces acid rain; particulate matter, such as smoke and dust; and mercury. The emissions come from several sources, such as industry, fossil fuel power plants and automobiles. They are not produced by nuclear power plants.

Besides the health impacts of elevated emissions, states that do not meet federal clean air standards face economic consequences. The federal government can penalize states that do not meet federal emissions standards in ways that could affect the economy and jobs. For instance, the EPA could restrict environmental permits for new industrial activities, which could cause businesses to locate elsewhere.

Alternatively, the EPA could withhold environmental permits for new coal- or gas-fired power plants to meet growing electricity demand, which could result in less reliable electricity supply and higher electricity rates. That, in turn, could cause businesses to locate elsewhere. Further, the federal government could limit funds for highways and other important services, which could result in the need to increase state and local taxes.



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Nuclear Energy Helps Meet Electricity Demand While Keeping the Air Clean

Nuclear energy has played an important role by reducing air pollution while meeting increased demand for electricity. Since 1990, nuclear power generation has increased by more than 35 percent and has helped meet demand for more electricity by consumers in dozens of states.

The nuclear energy industry achieved this rise in electrical output mostly by increasing the efficiency of existing plants. The additional electricity generated is the equivalent of adding 27 new nuclear power plants to our nation's grid. However, these plants are operating at record efficiency levels and additional increases would be difficult. To achieve further significant reductions in air pollutants, the operating licenses for these plants must be renewed and new nuclear power plants must be built.

Since 2000, the U.S. Nuclear Regulatory Commission has renewed the operating licenses for nearly half of the nation's reactors. In addition, more than a dozen consortia and companies have announced plans to seek licenses for more than 30 new reactors.

The Nuclear Energy Institute estimates that because of increased demand for electricity, it would take 35,000 megawatts of new nuclear power by 2030 to maintain nuclear's current 20 percent share of total generation. The United States may need even more to meet increasingly stringent clean-air requirements. Congress and other policymakers should consider the environmental benefits of nuclear energy in future clean-air legislation in view of its critical role in keeping emissions low today and in meeting new requirements. This is essential to the health of the nation's cities and citizens.

Nuclear Energy Helps Cut Emission Of Nitrogen Oxides, Sulfur Dioxide

Nuclear energy has played a key role in America's clean-air program for decades. Like hydroelectric power and renewables, nuclear power plants are considered a clean-air energy source because they do not burn anything or

emit criteria pollutants regulated by the Clean Air Act. Nearly one-third of total U.S. electricity—30 percent—comes from clean-air sources, and nuclear energy accounts for a large part of that. Because nuclear plants are major contributors to our nation's electricity supply—generating nearly 20 percent—they also are major contributors to improving our air quality. Only 10 percent of clean-air electricity in the United States comes from sources other than nuclear energy.

Nuclear power plants have helped states meet air-quality standards. Federal air-quality regulations limit pollution through emission "caps" and "permits," which set a fixed amount of emissions allowed for a range of activities, including electricity production.

As the economy and population grow, electricity demand increases as well. Emissions, however, are not allowed to increase. In fact, the long-term goal is to decrease the emission of criteria pollutants, not just prevent them from increasing. A state or region can more easily remain within its emission caps and still meet its electricity needs when clean-air energy sources are used as much as possible. Improved nuclear plant performance through increased efficiency has helped states reduce air pollution to a greater degree and at a lower cost than expected.

The government has developed extensive regulations to reduce various emissions, including NO_x, associated with ground-level ozone. The EPA created the Ozone Transport Commission and the NO_x Budget Program under the Clean Air Act amendments of 1990 to help reduce ground-level ozone in the northeast and mid-Atlantic states.

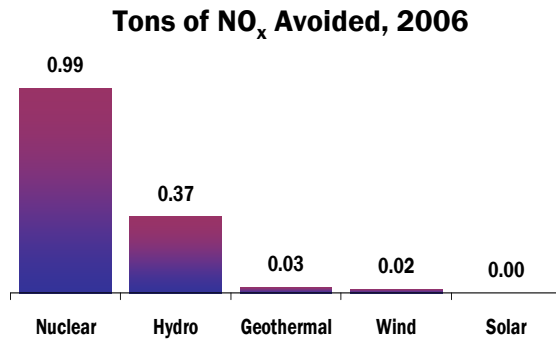
This program requires a phased, state-based approach to reduce emissions significantly. Its market-based cap-and-trade program has been effective.

Under this program, NO_x emissions were 4.4 million tons lower in 2005 than the base year of

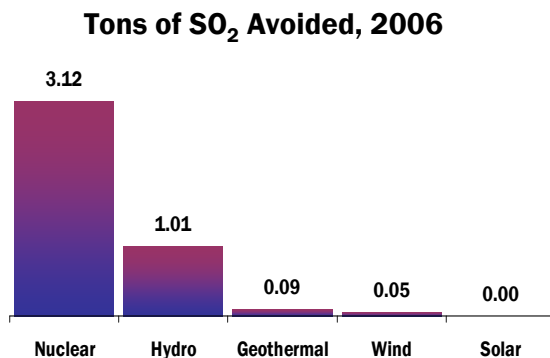
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1990.¹ For perspective, nuclear energy prevented the emission of nearly 1 million tons of NO_x in the year 2006. In addition, NO_x emissions prevented by nuclear energy were double those prevented by all other renewable energy sources in 2006.²



The federal government also created regulations to reduce SO₂, associated with acid rain. Nuclear power plants help to meet the SO₂ restrictions imposed by Title IV of the Clean Air Act amendments of 1990.



Under this program, SO₂ emissions were 5.68 million tons lower than the base year of 1990. Nuclear energy avoided the emission of 3.12 million tons in 2006. In addition, the SO₂ emissions prevented by nuclear energy in 2006 were nearly three times those prevented by all other renewables.

New Clean Air Standards Will Increase Competitiveness of New Reactors

EPA established the Clean Air Interstate Rule and the Clean Air Mercury Rule in 2005 to dramatically reduce nitrogen oxides, sulfur dioxide, ozone, particulates and mercury. These regulations will require coal plants, which meet about half of U.S. electricity demand, to invest as much as \$50 billion in pollution-control equipment, but it may not be cost-effective to retrofit these controls on older fossil plants.

Regional electric system operators, public utility commissions and electric company executives are jointly responsible for meeting electric demands that are projected to increase by 30 percent by 2030. To do so, new baseload generation, both coal and nuclear, is in the planning stage.

Faced with increased coal-plant compliance costs to meet EPA's tough new clean-air rules and future costs to meet likely carbon constraints, policymakers and electric companies may look increasingly to nuclear energy to meet a larger percentage of expected baseload demand growth.

This policy brief also is available at www.nei.org, where it is updated periodically.

¹ Contributions of 1990 Clean Air Act measured as changes from the 1990 baseline emissions. Data provided by the Energy Information Administration.

² Emissions avoided are calculated using regional and national fossil fuel emissions rates from the Environmental Protection Agency and plant generation data from the Energy Information Administration. Updated: 4/07