

# Nuclear Renaissance: Atoms to Power the Future

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*How will America meet its future energy needs? Rising demand for electricity, possible greenhouse gas legislation and U.S. dependence on foreign oil are some of the reasons for concern. These factors, combined with the high cost and relative unreliability of various other alternative energy sources, have forced policymakers to consider nuclear energy once again.*



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Nuclear power could be critical in sustaining the growth of our economy, as it is relatively inexpensive and can be tapped domestically. It is also clean, reliable and recyclable.

**The Demand for Electricity Is Growing.** According to the Energy Information Administration (EIA), electricity use will increase 39 percent by 2030, to 5,089 billion kilowatt-hours. The rising demand for electricity is directly attributable to population growth and higher disposable incomes. More people and higher living standards will lead to an increased demand for products, services and construction, all of which require electricity. In addition, the EIA says that due to a general population shift to warmer regions, there will be increased demand for cooling.

**Nuclear Power Is Reliable.** Another EIA report notes that if greenhouse gas emissions are limited, a dramatic shift from fossil fuels to alternative energies will be required. In that case, the EIA recommends that the United States add approximately 268 gigawatts of new nuclear power, or approximately 200 additional reactors.

Why does the EIA specifically recommend nuclear energy? Today, coal- and natural gas-fired generators provide critical baseload power — the constant current required to keep electricity flowing day and night with little or no down-time. In a CO<sub>2</sub>-constrained world,

coal and natural gas use will be reduced because they emit greenhouse gases. Unlike many other forms of alternative energy, nuclear power is reliable and can serve as baseload power.

**Nuclear Power Output Can Be Expanded.** While nuclear power plants are more expensive to build than most other types of electric power-generating facilities, the operating costs are much lower and the cost of fuel (uranium) is less variable. Furthermore, the output of existing reactors can be increased through so-called uprating, or upgrades.

By design, every nuclear plant in the United States can be upgraded, according to the U.S. Nuclear Regulatory Commission. Upgrades range from improved instrumentation to major modifications of key pieces of non-nuclear equipment such as high-pressure turbines, pumps and motors. By increasing the efficiency of the plant, upgrades can increase a reactor's power output by 10 percent to 20 percent.

**Nuclear Power Uses Secure Fuel Sources.** Nuclear power can reduce America's dependency on foreign fuels. High gas prices have already encouraged the development of hybrids and electric plug-in vehicles. If these vehicles are adopted in significant numbers, nuclear-generated electricity could displace some of the imported oil currently used to power American cars. This would improve national security, as the United States would depend less on oil rich countries that have interests opposed to our own. Furthermore, America has an abundant domestic supply of uranium fuel.

**Nuclear Power Is Clean.** Compared to other significant sources of electricity, nuclear power has many environmental

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benefits. For instance, nuclear plants produce virtually no air pollution. [See Figure I.] By contrast:

- Coal-fired power plants produce 13 pounds of sulfur dioxide and 6 pounds of nitrogen oxide per million watt-hours (MWh) of electricity produced.
- Oil-fired power plants produce 12 pounds of sulfur dioxide and 4 pounds of nitrogen oxide per MWh.

Furthermore, nuclear power is a CO<sub>2</sub>-free energy option whereas, for every MWh of electricity produced, coal-fired power plants produce 2,249 pounds of CO<sub>2</sub>, oil-fired plants produce 1,672 pounds, and gas-fired generators produce 1,135 pounds.

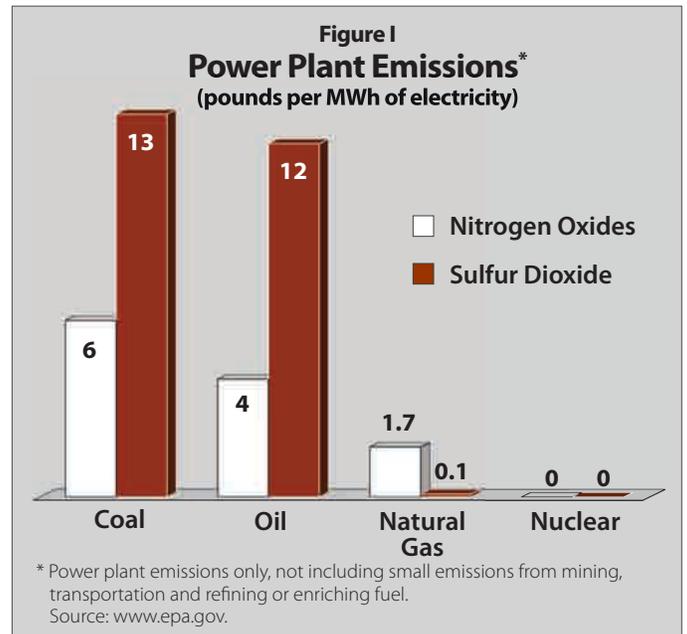
### Nuclear Fuel Is Recyclable.

Traditionally, nuclear power critics have focused on two potential threats to human health: 1) the risk that dangerous levels of radiation will escape from a plant due to equipment failure or human error, and 2) the risk posed to human health from nuclear waste. Yet, in more than 50 years of experience with nuclear power in the United States, no deaths or negative health effects have been conclusively linked to radiation leaks from nuclear plants or from spent fuel. In addition,

the U.S. Navy has operated nuclear-powered vessels for 50 years. Despite the fact that hundreds of thousands of navy personnel have served in close quarters with nuclear power plants and radioactive material, there have been no radiation-caused deaths.

The main impediment to an expanded nuclear power sector has been the disposal problem of spent uranium fuel rods. The public tends to refer to this used uranium as “nuclear waste.” Yucca Mountain, the government’s designated repository in Nevada, has yet to open because some claim that it is not safe to store nuclear waste there. Consequently, commercial reactors have accumulated more than 50,000 tons of spent nuclear fuel rods at more than 130 sites in 40 states — including operating nuclear power stations, laboratories and military bases.

A uranium rod’s mass actually changes very little during the energy



generation process. Nothing is burned or oxidized; 97 percent of the rod is still intact after use in a conventional reactor. Recycling fuel rods, called reprocessing, maximizes the power output from a given amount of uranium and reduces the amount of waste. Indeed, France and Japan have used and reused fuel rods for years. With the help of reprocessing, nuclear energy meets around 77 percent of France’s electricity needs, and almost 30 percent of Japan’s. By contrast, the United States uses nuclear energy for less than 20 percent of our electric power. [See Figure II.]

**Conclusion.** American energy demand is expected to keep growing. This growth is necessary if the economy is to prosper. With greenhouse gas regulation on the horizon, and Americans demanding energy independence, nuclear power can help keep the lights on. Nuclear energy has many benefits: It is reliable, recyclable, clean, sustainable and domestically produced. As such, it uniquely satisfies the otherwise conflicting demands burdening the American power industry.

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