

**Nuclear Energy's Role in Reducing Demand for Natural Gas
Through Diversification of Energy Sources
Used for Electricity Generation**

**A Paper Submitted by
The Nuclear Energy Institute**

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ABSTRACT

High prices for natural gas and the intense, recurring periods of price volatility experienced over the last four years is caused partly by unsustainable demand for natural gas in the electric generation sector. Electric sector demand for natural gas is being driven by the large amounts of new gas-fired electric generating capacity built in the United States during the last decade. More than 90 percent of all new electric generating capacity added over the past five years is fueled with natural gas.

Diversity of fuel and technology is the core strength of the U.S. electric supply system. A diverse, balanced portfolio of fuels and technologies is a hedge against supply disruptions caused by geopolitical events or simple commodity shortages.

This diversity is at risk because today's business environment and market conditions inhibit investment in large, new capital-intensive technologies, notably the advanced nuclear power plants and advanced coal-fired power plants best suited to supply baseload electricity.

The United States faces a critical need for investment in energy infrastructure, particularly the capital-intensive, long-lead-time advanced nuclear and coal-fired power plants that represent the backbone of the U.S. electricity supply system. Finding ways to stimulate investment in these technologies is in the national interest because advanced coal and nuclear power plants will (1) preserve the fuel and technology diversity that is the core strength of the U.S. electric power system; (2) help to address the environmental challenges (criteria pollutants and greenhouse gases) that face the U.S. electric sector; (3) strengthen U.S. energy security.

The Nuclear Energy Institute (NEI), the U.S. commercial nuclear energy industry's Washington-based policy organization, appreciates the opportunity to respond to questions posed by the Senate Energy and Natural Resource Committee for its Natural Gas Supply and Demand Conference. Nuclear energy can play a strategic role, in the short-term and the long-term, in reducing pressure on natural gas supply and price.

High prices for natural gas and the intense, recurring periods of price volatility experienced over the last four years are caused partly by unsustainable demand for natural gas in the electric generation sector. Electric sector demand for natural gas is being driven by the large amounts of new gas-fired electric generating capacity built in the United States during the last decade. More than 90 percent of all new electric generating capacity added over the past five years is fueled with natural gas. Natural gas has many desirable characteristics and should be part of our fuel mix, but “over-reliance on any one fuel source leaves consumers vulnerable to price spikes and supply disruptions.”¹

Diversity of fuel and technology is the core strength of the U.S. electric supply system. A diverse, balanced portfolio of fuels and technologies is a hedge against supply disruptions caused by geopolitical events or simple commodity shortages.

This diversity is at risk because today's business environment and market conditions inhibit investment in large, new capital-intensive technologies, notably the advanced nuclear power plants and advanced coal-fired power plants best suited to supply baseload electricity. Construction of massive amounts of gas-fired generating capacity over the last 12 years reflects the fact that gas-fired capacity represents the lowest investment risk at a time when the U.S. electric power sector faces a large number of significant business risks and uncertainties. These uncertainties include:

- 1) future environmental requirements, including the potential for controls on carbon;
- 2) market design;
- 3) the status, scope and timing of electric sector restructuring and deregulation, and
- 4) the expectations, plans and procedures associated with resource planning and investment recovery.

These uncertainties inhibit capital investment in the long-lead-time, capital-intensive new technologies (notably advanced nuclear power plants and advanced “clean coal” technologies like integrated gasification combined cycle [IGCC]) that provide the highest degree of forward price stability.

The United States faces a critical need for investment in energy infrastructure, particularly the capital-intensive, long-lead-time advanced nuclear and coal-fired power plants that represent the backbone of the U.S. electricity supply system. These two technologies represent approximately 70 percent of U.S. electricity supply, and they provide the highest degree of price stability, but investment in new nuclear and coal-fired power plants has dwindled in the last 10-15 years. In

¹ Report of the President's National Energy Policy Development Group, May 2001, page xiii.

the 12 years since the U.S. last enacted major energy policy legislation (the Energy Policy Act of 1992), the United States has built approximately 270,000 megawatts of new gas-fired generating capacity. Only 4,355 megawatts of new nuclear capacity (all of it planned and under construction long before 1992) and 9,560 megawatts of new coal-fired generating capacity have entered service since 1992.

This trend must be reversed or the United States will place unsustainable pressure on natural gas supply and price. Reversing this trend will require federal government actions and initiatives to stimulate investment in new baseload generating capacity, including advanced coal-fired technologies and new nuclear power plants.

Finding ways to stimulate investment in these technologies is in the national interest because advanced coal and nuclear power plants will (1) preserve the fuel and technology diversity that is the core strength of the U.S. electric power system; (2) help to address the environmental challenges (criteria pollutants and greenhouse gases) that face the U.S. electric sector; (3) strengthen U.S. energy security.

The nuclear energy sector has recorded dramatic efficiency gains over the last 15 years. The industry is uprating capacity, and increasing output, at its plants—over 2,000 megawatts of power uprates authorized by the Nuclear Regulatory Commission over the last three years, and another 2,000 megawatts expected over the next several years. In addition, nuclear generating companies are pursuing license renewal. This option allows today's operating plants to extend their lives for 20 additional years—from 40 to 60 years. The NRC has approved renewed licenses for 30 reactors and 43 reactors have either already filed their renewal applications, or indicated formally to NRC that they intend to do so. The industry has also implemented systematic programs to manage the systems and components in these plants for their entire expected lifetime. Without all these steps in the short-term, today's natural gas situation would be significantly worse.

There are obvious limits, however, on how much additional electricity output can be produced at the existing 103 nuclear power plants. Meeting the nation's growing demand for electricity—which will require as much as an additional 400,000 MW by 2025, depending on assumptions about electricity demand growth—will require construction of new nuclear power plants in the years ahead.

The nuclear energy industry is committed to construction of new nuclear plants, and the industry has been working for several years on regulatory, legislative and financial policy initiatives that will allow companies to invest in new nuclear capacity. Three companies (Dominion Resources, Entergy and Exelon) are obtaining early site permits, part of the new licensing regime created by the 1992 Energy Policy Act. Two industry consortia are preparing applications for combined construction/operating licenses (COLs). All this work, designed to validate the new licensing process, is cost-shared with the Department of Energy.

The overall objective for this industry initiative is to ensure new nuclear plants can be operational by early in the next decade. In order for this undertaking to be successful, continued funding of pre-commercial activities under the Department of Energy's Nuclear Power 2010 program is essential. This program, cost-shared between industry and the federal government,

would (1) validate the new licensing process created by the 1992 Energy Policy Act, and establish a well-defined, predictable and stable process; (2) support sufficient detailed design and engineering on advanced reactor designs to provide cost and schedule certainty; and (3) demonstrate the early site permit and COL processes.

Construction of new nuclear generating capacity also requires limited financial support and investment stimulus to offset the higher risks associated with new nuclear plant construction in the minds of debt and equity investors. The financial stimulus must address the investment risks and issues that make it difficult for companies to undertake capital-intensive projects (*i.e.*, risk of regulatory or judicial actions causing delays in plant construction or operation; earnings dilution during construction and no accretion to earnings during first years of operation; long period for recovery of capital investment under existing tax depreciation rules, etc.).

Electricity generated by America's nuclear power plants over the past half century has played a key part in our nation's growth and prosperity. Nuclear power produces over 20 percent of the electricity used in the United States today without producing air pollution. As our energy demands continue to grow in years to come, nuclear power should play an even greater role in meeting those needs.

Over the past 30 years, nuclear energy played a strategic role in reducing dependence on oil for electricity generation. At the time of the first oil crisis in 1973, oil represented approximately 20 percent of U.S. electricity supply; nuclear power, less than five percent. Thanks to construction of new nuclear generating capacity in the 1970s and 1980s, oil now represents only approximately 3 percent of U.S. electricity supply; nuclear energy, approximately 20 percent.

What nuclear energy did for U.S. electricity supply in the 1970s and 1980s with respect to oil, it can do for natural gas over the next 10-20 years. To produce the same amount of yearly electricity as a single 1,000-megawatt nuclear plant operating at 90 percent capacity factor requires approximately 54 billion cubic feet of natural gas. This is equivalent to the usage of approximately 660,000 residential gas customers, or about one percent of the total residential customers in the U.S. Clearly, improving nuclear production—through efficiency gains and building new nuclear power plants—relieves pressure on the natural gas supply and enhances the nation's energy diversity.