Testimony for the Record
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Mr. Chairman, ranking members, and distinguished members of the committee, I am Maureen Koetz, director of environmental policy and programs for the Nuclear Energy Institute (NEI). As with other air quality issues we have faced, the potential for climate change is challenging our ingenuity and our markets to devise, enhance and support technologies that avoid or mitigate man-made emissions of greenhouse gases. Foremost among these is a robust, safe nuclear energy industry, able to prevent these emissions while preserving the affordable electricity system that is the foundation for America's commercial success and future economic growth.

On behalf of its more than 270 members, NEI acknowledges and appreciates congressional support for the industry, which has helped bring nuclear energy to the renaissance we see today. In developing public policy for the nuclear industry, NEI represents a broad spectrum of interests from every U.S. utility that operates a nuclear power plant, nuclear fuel cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, universities, labor unions and law firms. The jobs, tax base and economic value the industry represents comprise a vital segment of our energy infrastructure, as well as American communities and families whose welfare and well-being derive from the construction, maintenance and operation of this nation's commercial nuclear power plants.

I am pleased to testify before this committee regarding the role of our country's 103 nuclear electric generating units in protecting the environment from many potential adverse effects—including climate change—while providing 20 percent of our nation's electricity. The unique ability of nuclear-generated electricity to provide both energy security and protect the environment makes it one of the most important risk management tools available to minimize the adverse economic and environmental impacts from foreign fuel supply limitations and disruptions, energy price fluctuations, or environmental dispatch limits that can threaten U.S. growth and prosperity.

The growing importance of an adequate climate change response is causing energy supply and emission control issues to again converge as they did in the 1960s and 1970s. Effective climate change action will require a comprehensive energy policy that uses all forms of energy, particularly electricity generation, to their full potential and advantage. The national energy policy formulated by President Bush provides a positive framework to accomplish this goal by supporting the expansion of emission–free technologies—including nuclear electricity—to ensure adequate electricity supplies while mitigating the potential for climate change. Additionally, Sens. Bingaman and Murkowski this year have sponsored separate comprehensive energy bills that call for an expanded nuclear energy industry. Sen. Domenici has sponsored stand-alone legislation intended not merely to protect nuclear energy's vital role in our nation's energy portfolio, but to ensure that role continues to grow to help meet the nation's increasing electricity demand—and doing so while avoiding the emission of harmful greenhouse gases.

Emission Avoidance: A Key Policy Tool

In his recent address on climate change, President Bush made a critical observation regarding the path forward on climate change, stating: "There are only two ways to stabilize concentration of greenhouse gases. One is to avoid emitting them in the first

place; the other is to try to capture them after they're created." This framework builds on our historical success with combining pollution avoidance and end-of-the-pipe controls in addressing other potentially harmful air emissions from power generation.

As early as 1969, the Department of the Interior listed increased use of nuclear energy as one of 11 methods to control sulfur dioxide emissions. Since then, the advent of nuclear energy has been a major component of achieving domestic air quality goals. For example, from 1975 to 1990, making electricity in nuclear plants instead of fossil-fueled alternatives avoided more tons of nitrogen oxide than were eliminated through controls under the Clean Air Act. In 2000 alone, nuclear plants avoided more than 4 million tons of sulfur dioxide, nearly 2 million tons of nitrogen oxides, and 174 million metric tons of carbon equivalent. In the absence of current nuclear production, the difference between current U.S. greenhouse gas emission levels and our 1990 baseline established in the Framework Convention on Climate Change would double.

As the president correctly points out, future efforts to control greenhouse gases will require our continued investment in emission-free technologies of all kinds, but particularly nuclear plants because of their sizable electric output, minimal environmental impact and siting capability near load demand. To fully understand the vital role of emission avoidance, one need only look at the success of voluntary emission reduction programs to date. With approximately half the units reporting so far, nuclear plants are the single largest contributor to voluntary greenhouse gas emission reductions (40 percent of the program) under the Department of Energy's 1605(b) program (established under the 1992 Energy Policy Act).

Growth Through Efficiency and Safety

In the face of public opposition to alternative fossil options that would have increased air pollution, construction of the first commercial nuclear reactor began at Shippingport, Pa., near Pittsburgh, in 1955. Since that first plant, nuclear energy has evolved into a reliable, affordable and essential baseload electricity technology with an unparalleled safety record.

In 2000, nuclear plants generated a record 754 billion kilowatt-hours of electricity, 25 billion kilowatt-hours more than the previous year and 178 billion kilowatt-hours more than in 1990. Last year's record performance capped the best decade in the industry's history. The average production cost of electricity generated by nuclear power plants during 1999 was 1.83 cents per kilowatt-hour, the lowest of all fuel sources. And improved production was matched with ever-improving safety.

The dramatic increase in electricity generation by America's nuclear plants is also one of the most successful energy efficiency programs of the past decade. Output increases are equivalent to adding 22, 1000-megawatt power plants to our nation's electricity grid, without the environmental disruptions and impacts that would have occurred if new facilities had been brought on line to meet these needs. Although the lack of new nuclear construction since the 1980s often is identified as a sign of industry stagnation, in fact, the more efficient operation of existing nuclear electric generating facilities has been an environmentally beneficial alternative for making additional electricity.

Plant uprates, improved maintenance, reduced outage times and safety improvements will continue to provide higher operating efficiency and additional electricity output from existing power plants. But these increases are finite, limited to the maximum capacity of each reactor. To meet future demands of an electricity-hungry digital economy—especially if carbon mitigation efforts limit some options—some electric companies are beginning to examine the market for new nuclear plants. Advances in renewable generation, distributed sources such as fuel cells, and continued conservation will all improve our competitive energy/environmental position. But these advances will not displace the continued need for baseload sources as part of providing secure energy supplies that meet the 99.9999 percent reliability rating needed in the future.

In addition, bulk users will continue to need bulk electricity supply that mitigates environmental impact, a product these alternative sources may not be able to provide. For example, the New York City subway uses 1.8 billion kilowatt-hours of electricity annually. Mass transit is necessary to mitigate air quality impacts, including increased greenhouse gas emissions, from carbon-based mobile sources. Other environmental protection systems, such as wastewater treatment and water purification, also require bulk electricity to serve the large, urban populations where 80 percent of Americans now live—not to mention to help meet electrical demands of a concentrated population. Continued use and expansion of nuclear electricity works in tandem with other advanced technologies to meet the range of market needs for energy that can also avoid or mitigate impacts such as global warming.

An Unrivaled Waste Management Record

Nuclear energy facilities, like other electricity sources, have waste streams and byproducts that must be managed safely. The environmental policies and practices at nuclear energy plants are unique in having avoided or prevented significant harmful impacts on the environment since the start of the commercial nuclear industry more than 40 years ago. Effective waste avoidance, minimization and management practices have successfully prevented or mitigated adverse impacts on water, land, habitat, species and air from releases or emissions in the production of nuclear electricity, some of which have already been discussed in detail above. Throughout the nuclear electricity production process, the small volumes of waste byproducts actually created are treated and released, or carefully contained, packaged and safely stored.

The safe handling and storage of used nuclear fuel is one of the most successful solid waste management programs in the industrial sector. Used fuel rods are stored in contained, steel-lined pools or in robust stainless steel containers at limited-access reactor sites.

As a result of improved process efficiencies, the average volume of waste generated at nuclear energy plants has decreased significantly in the past two decades. The high-level radioactive material in used fuel rods totals less than 20 metric tons per nuclear plant each year. The trillions of kilowatt-hours of nuclear electricity generated over more than 40 years have produced about 38,000 metric tons of used fuel rods. These rods, if stacked together, would fill a football field to a depth of a little more than four yards. Although this is an astonishingly small residual volume of used fuel from the production of all of the

nation's nuclear electricity over the past 40 years, and although it is fully accounted for and very safely separated from the environment, its removal to a central repository has caused considerable angst. It is helpful to keep this very small disposal issue in perspective. For each one ton of this used fuel, 345,000 metric tons of greenhouse gas, dispersed to the atmosphere, were avoided. Surely, seen in this light, the completion of Congress' resolve for the disposal of used fuel enacted in 1982 is clearly in the nation's environmental interest and will encourage expanded use of nuclear energy.

Although U.S. policy originally envisioned recycling reactor fuel to separate out small volumes of waste and reuse the remaining fuel, prior administrations chose instead to dispose of the fuel after only one use in a deep geologic repository, leading to the site characterization project at Yucca Mountain. Research continues to develop improved processes for recycling used fuel—a policy option that will provide strategic fuel reserves that can increase the future contribution of nuclear electricity to sustainable development—but it is imperative that the United States keep its program for a federal repository program on track toward a presidential decision in 2001. The Yucca Mountain program is key to effective climate policy for two reasons. First, cost-effective operation of nuclear plants requires a centralized, permanent site to continue the environmentally preferable practice of isolated storage for used fuel. Second, nations around the world will use emission-free electricity from nuclear plants as part of their climate change mitigation strategies. As the world leader in nuclear technology, the United States must also be the world leader in effective, long-term management of used fuel.

The Future

U.S. electricity demand grew by 2.2 percent a year on average during the 1990s and by 2.6 percent in 2000. Even if demand grows by a modest 1.8 percent annually over the next two decades, the nation will need nearly 400,000 megawatts of new electric generating capacity, according to the U.S. Energy Information Administration. That figure takes into account replacement of retired capacity. This capacity is the equivalent of building about 800 new mid-size (500-megawatt) power plants in the next 20 years, which amounts to roughly 40 plants per year.

Currently, more than one-third of U.S. electricity production is from emission-free sources. In order simply to maintain that percentage—and the contribution to air quality and greenhouse gas abatement it represents—the current nuclear fleet must increase by 50 percent. To meet that challenge, the nuclear industry has established a goal of 50,000 megawatts of new nuclear power plant construction by the year 2020.

Meeting this goal will require effective energy policies that promote adequate supply, a balanced fuel portfolio, and the advancement of clean technologies. We believe those policies should include the following actions:

- Preserve U.S. Global Leadership in Nuclear Science and Technology Through Adequate R&D Funding

The President's Council of Advisors on Science and Technology (PCAST) has said that the government is not doing all it can in nuclear energy research and development. The reason, said the council, is that "the public has been lulled into a sense of complacency by a combination of low energy prices and little sense of the connection between energy and the larger economic, environmental and security issues that people do care very much about."[1] In its 1999 report, PCAST noted that its recommendation for nuclear R&D funding by the year 2003 ($120 million) would merely return the U.S. level of effort to that of 1995.[2]

The Nuclear Energy Research Initiative (NERI) and Nuclear Energy Plant Optimization (NEPO) research programs should be funded at levels double the administration's 2001 budget request. These programs are designed to produce generic improvements that reduce capital and operating costs for both current reactors and advanced reactor designs available for new nuclear plant construction. Funding also is important for the Energy Department's University Support Program, which helps maintain research reactors and enhances educational programs in nuclear science and technology at our nation's colleges and universities, thereby encouraging a steady stream of new entrants into the nuclear industry workforce.

In comparison to other electricity-generating sources, nuclear energy unequivocally is the most economical federal research and development investment. In 2000, the federal government spent six cents on nuclear energy R&D for every megawatt-hour ($.06/MWh) of electricity generated at nuclear power plants. By comparison, solar photovoltaics received more than 1,300 times that amount per megawatt-hour ($81.79/MWh). Obtaining a fair share of R&D funding is essential for the expanded use of nuclear energy.

- Level the Electricity Competition Playing Field

In recent years, state and federal initiatives have accelerated the transition to a competitive electricity market. As companies prepare to do business in this new market, the unbundling of their products and services will require a re-examination of costs and allocation of value to activities that previously were not valued. Congress can enact several legislative initiatives that remove unnecessary impediments to nuclear power and pave the way for sensible, market-based business decisions that will preserve and extend the operation of today's nuclear power plants.

First, Congress should eliminate unnecessary requirements that may prevent effective ownership transactions in a competitive market. Consolidated ownership of nuclear plants allows for economies of scale in operations, maintenance, outage planning and administration. These transactions can further improve safety because ownership and operating responsibility will be consolidated in the hands of large companies with the financial and management resources to operate the plant at the highest possible levels of safety and reliability. Resulting cost savings encourage continued plant operation by reducing the operating costs of plants when operated as part of a larger nuclear

[1] *Federal Energy Research and Development for the Challenges of the 21st Century*, Report of the Energy Research and Development Panel of the President's Council of Advisors on Science and Technology, Page ES-31, November 1997.
[2] November 1997 PCAST Report, Page ES-5.

organization. Policy changes are important to remove potential barriers to permitting otherwise economical plant consolidations, including revision of Section 468A of the Internal Revenue Code, which addresses the tax treatment of nuclear decommissioning trust funds.

In addition, public policy incentives to encourage carbon abatement or avoidance technologies must be equally applied, whether they are production and/or investment tax credits to address climate change, access to market-based pollution control mechanisms, or access to favorable financing and other funding mechanisms. The importance of nuclear energy to clean air and carbon abatement is one of the previously unvalued services that must be recognized to prevent competitive disadvantage and position nuclear power plants to continue their crucial environmental contribution.

Any plausible strategy to mitigate greenhouse gas emissions will require an expanded use of nuclear energy in the United States and around the world. Equal treatment in these market and incentive programs will allow new nuclear plants to effectively compete with alternative forms of generation, extending nuclear energy's unique ability to provide energy security and environmental protection.

- Assure Adequate Funding for the Repository Program at Yucca Mountain

Since 1983, consumers of nuclear-generated electricity have paid one-tenth of a cent per kilowatt-hour into the Nuclear Waste Fund—a fund solely intended to finance the federal government's used fuel management program. The fund, which has collected about $17 billion, has a balance of about $10 billion—and it's growing at about a $1 billion a year. Still, obtaining appropriations from the fund for the Yucca Mountain project between now and 2010—the year it is estimated the facility would be ready for operation—could be significantly challenging because of budgetary rules. The fund initially was intended as an off-budget account, but subsequent congressional laws introduced appropriations caps and other budgetary restrictions. The result has been a perennial failure by Congress to appropriate enough money from the Nuclear Waste Fund to meet the Energy Department's annual budget request, undercutting the Yucca Mountain project.

DOE has requested $445 million for fiscal year 2002 work on the Yucca Mountain project. The House of Representatives endorsed the recommendation of its Appropriations Committee, approving $443 million. We encourage the members of this committee and the Senate to do the same, facilitating the opening of the Yucca Mountain repository in 2010.

- Extend Self-Insurance Pooling Under the Price-Anderson Act

The public has $9.5 billion of insurance protection in the event of a nuclear reactor accident. The nuclear reactor operators—not the public or the federal government—pay for this insurance. This utility self-insurance pool was first established in 1957, when Congress passed the Price-Anderson Act. The act provides an umbrella of no-fault insurance protection for the public and ensures that money will be immediately available to pay liability claims that could result from a major nuclear accident. Price-Anderson most recently was amended in 1988, and the deadline for reauthorization is 2002.

In a 1998 report to Congress, the NRC recommended that the act be extended for an additional 10 years. DOE also has recommended that Congress approve an extension of the Price-Anderson law. Both agencies recommended reauthorization with minimal change. The nuclear industry strongly supports the reauthorization of the Price-Anderson Act for an indefinite period.

Conclusion

One of the most prominent environmental protection advancements in the industrial sector has been the increased reliance on domestically available nuclear energy to power our fast-growing digital economy while improving air quality. The United States leads the world in the development and application of nuclear technology. The economic value of this export market is substantial, bringing high-paying jobs and revenues to many areas around the country that participate in nuclear power production.

Congress should not lose sight of this important energy security and clean air resource, and policymakers should employ a strategy that maximizes nuclear energy's potential to power our economy and address climate change. Working together for national security and public sector needs, the nuclear energy industry and the federal government can ensure that emission-free electricity will continue to help meet our nation's public policy goals regarding energy production and environmental protection for workers, consumers, businesses, and urban dwellers looking to protect their quality of life and their environment.

Thank you for giving me this opportunity to share the industry's perspective on climate change and technological development issues the committee is focusing on at this hearing.