TESTIMONY FOR THE RECORD

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Chairman Hobson, Ranking Member Visclosky and members of the subcommittee, I am retired Admiral Skip Bowman, president and chief executive officer at the Nuclear Energy Institute (NEI). I appreciate the opportunity to provide this testimony for the record on the future of nuclear energy in the United States. I want to begin by thanking both of you and the entire subcommittee for your support of nuclear energy, and specifically for fully funding the Yucca Mountain project and for your leadership on the issue of interim storage.

NEI is responsible for developing policy for the U.S. nuclear industry. Our organization's 270 member companies represent a broad spectrum of interests, including every company that operates a nuclear power plant in the United States. NEI's membership also includes nuclear fuel cycle companies, suppliers, engineering and consulting firms, national research laboratories, manufacturers of radiopharmaceuticals, universities, labor unions, and law firms.

America's 103 nuclear power plants are the most efficient and reliable in the world. Nuclear energy is the largest source of emission-free electricity in the United States and our nation's second largest source of electricity after coal. Nuclear power plants in 31 states provide electricity for one of every five U.S. homes and businesses.

Given these facts and the strategic importance of nuclear energy to our nation's energy security and economic growth, NEI encourages the Congress to maintain policies that ensure continued operation of our nation's operating plants, and to provide the stimulus required to expand emission-free nuclear energy in the future.

As the subcommittee requested, my testimony for the record will address three major areas:

1. The future of nuclear energy in this country, and the challenges facing the industry as it prepares to license, finance and build the next generation of nuclear power plants in the United States;

2. The extent to which interim storage of used nuclear fuel may be needed in the short-term to support the growth of nuclear energy, and
3. The extent to which used fuel recycling may be needed in the long term, to support the growth of nuclear energy.

The Strategic Value Of Nuclear Power:
Platform for the Future

Any discussion of the future of nuclear energy must begin with a factual understanding of the status of nuclear energy in the United States today. The operating performance and strategic value of America's 103 operating nuclear power plants is the platform from which the next generation of nuclear power will be launched.

Nuclear power represents 20 percent of U.S. electricity supply today—precisely the same percentage as 10 years ago, even though there are six fewer reactors than a decade ago and even though total U.S. electricity supply has increased by 25 percent in that period. Nuclear power has maintained its market share thanks to dramatic improvements in the reliability, safety, productivity and management of U.S. nuclear plants. On average, U.S. nuclear plants operate at around 90 percent capacity factors, year in and year out—the highest level of any form of electricity generation. Improved productivity at our nuclear plants satisfied 20 percent of the growth in electricity demand over the last decade.

Nuclear power serves a number of important national needs.

First, nuclear power plants contribute to the fuel and technology diversity that is the core strength of the U.S. electric supply system. This diversity is at risk because today's business environment and market conditions in the electric sector do not encourage investment in large, new capital-intensive technologies, particularly the advanced nuclear power plants and advanced coal-fired power plants best-suited to supply baseload electricity.

Second, nuclear power plants provide future price stability that is not available from electric generating plants fueled with natural gas. 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 volatility and supply disruptions. Volatility in natural gas prices over the last several years is likely to continue, thanks partly to unsustainable demand for natural gas from the electric sector. This volatility subjects the U.S. economy to potential damage. Because the operating costs of nuclear power plants are stable, they dampen price volatility in the electricity and natural gas markets. Nuclear power plants also reduce the pressure on natural gas supply, thereby relieving cost pressures on other users of natural gas that have no alternative fuel source.

Third, nuclear power plants play a strategic role in meeting U.S. clean air goals and the nation's goal of reducing greenhouse gas emissions. New nuclear power plants produce electricity that otherwise would be supplied by oil-, gas- or coal-fired generating capacity, and thus avoid the emissions associated with that fossil-fueled capacity.

The emissions avoided by U.S. nuclear power plants are essential in meeting clean air requirements. For perspective, the Clean Air Interstate Rule will reduce SO_2 emissions in 2010 by 4.3 million tons below 2003 levels and NOx emissions in 2009 by 1.7 million tons. In 2005 alone, operating nuclear power plants prevented the emission of 3.3 million tons of SO_2 and 1.0 million tons of NOx. Nuclear energy is equally important in reducing carbon dioxide emissions. The 682 million metric tons of CO_2 prevented by nuclear energy in 2005 is equal to the annual emissions from 96 percent of the country's passenger cars. Without our nuclear power plants, CO_2 emissions from the electric power sector (which represents approximately one-third of U.S. greenhouse gas emissions) would be approximately 30 percent higher

Finally, nuclear energy is a secure domestic source of energy, and the United States is not alone in recognizing its importance to national security. The decision to employ nuclear power as a major energy source in countries such as France and Japan was based on energy security. The governments of both countries recognize that nuclear energy protects their nations' energy supplies from disruptions due to political instability, and protects consumers from price fluctuations resulting from market volatility. Today, France depends on nuclear energy for more than three-quarters of its electricity needs, and Japan for more than one-third.

In summary, nuclear energy represents a unique value proposition. Nuclear power plants provide large volumes of electricity—cleanly, reliably, safely and affordably. They provide price stability and serve as a hedge against fossil fuel price and supply volatility. Nuclear plants have valuable environmental attributes. And they help preserve our nation's energy security. These characteristics demonstrate why nuclear power has such strategic importance in U.S. energy policy.

Industry Initiatives to Increase Nuclear Energy Production
And to Prepare for New Nuclear Power Plant Construction

The 103 operating nuclear plants are such valuable assets that virtually all companies are planning to renew the operating licenses for these plants, as allowed by law and Nuclear Regulatory Commission regulations, and operate for an additional 20 years beyond their initial 40-year license terms. Seventy-eight U.S. reactors have now renewed their licenses, filed license renewal applications, or indicated to the Nuclear Regulatory Commission that they intend to do so. NEI believes that virtually all U.S. nuclear plants will renew their licenses and operate for an additional 20 years.

In order to maintain safety and reliability, and to prepare the plants for an additional 20 years of operation, the industry is investing substantial sums in large capital improvement projects, including installation of new steam generators, new reactor vessel heads and other modifications to increase plant generating capacity. These capital improvement projects position the plants for many years of operation in the future at high levels of reliability and safety, and they demonstrate the industry's commitment to safety and reliability.

Although it has not yet started to build new nuclear plants, the industry continues to achieve small but steady increases in generating capability—either through power uprates or the restart

of shutdown nuclear capacity. An uprate increases the flow of steam from the nuclear reactor to the turbine-generator so that the plant can produce more electricity. Uprates can increase a plant's capacity by 2-20 percent, depending on plant design and how much capital a company is prepared to invest. Since 2000, the NRC has authorized more than 60 power uprates, yielding a cumulative capacity increase of almost 2,800 megawatts. The NRC is currently reviewing eight applications for uprates, totaling approximately 700 megawatts of capacity. Over the next five years, the NRC anticipates that companies will apply for power uprates that will add an additional 1,300 megawatts of new capacity.

In addition, the Tennessee Valley Authority is restarting Unit 1 at its Browns Ferry site in northern Alabama. This is a very complex project—fully as challenging as building a new nuclear plant—and it is on schedule and within budget. The project is about 85 percent complete. The project cost is $1.8 billion, of which approximately $1.5 billion has been spent to date. Start-up is scheduled for May 2007, and will bring the number of operating nuclear plants in the United States to 104.

The Future of Nuclear Energy in the United States
And the Challenges Facing Nuclear Energy Expansion

Obviously, there are limits on how much additional electricity output can be produced at the existing 103 nuclear power plants.

According to the annual forecast from the Energy Information Administration, the nation's demand for electricity is expected to increase by 45 percent by 2030, requiring an additional 331,000 megawatts of generating capacity. To meet this demand, and to maintain fuel and technology diversity, the United States must build new nuclear power plants in the years ahead. Simply maintaining nuclear energy at 20 percent of U.S. electricity supply will require construction of an additional 50,000 megawatts of new nuclear generating capacity over the next 25 years.

The process of licensing and building a new nuclear power facility is expected to take approximately nine years: Approximately two years to prepare an application to the NRC for a construction/operating license (COL); approximately three years for NRC review and approval of the COL, and approximately four years for construction. Given these time frames, the industry is moving as aggressively as is prudent to ensure new nuclear generating capacity will be available when the nation needs it.

The industry is investing well over $1.5 billion in design and engineering work, licensing and procurement of long-lead equipment like reactor pressure vessels and steam generators. (This figure includes the industry's share of funding under the Nuclear Power 2010 program, but does not include the Department of Energy's share.) Two advanced reactor designs (the Westinghouse AP1000 and the General Electric ABWR) have been certified by the Nuclear Regulatory Commission (NRC). The General Electric ESBWR is undergoing certification review by the NRC, and the AREVA U.S. EPR is being prepared for certification.

In the supply chain, there are early signs of a revival in U.S. manufacturing capability for nuclear components and fuel: BWXT recently renewed its "N-Stamp" accreditation. BWXT and AREVA have formed a joint venture to manufacture heavy components. And LES has broken ground for a new $1.5-billion uranium enrichment facility in New Mexico.

For new nuclear reactors, the licensing work now underway includes four companies (Exelon, Dominion, Entergy, Southern Nuclear) seeking early site permits from the NRC; the first three expect approval of their ESPs in 2007. In addition, 12 companies or groups of companies are developing applications for construction/operating licenses (COL) and intend to file those applications with the NRC over the next few years, with the first scheduled to be filed next year. Those applications could encompass as many as 30 new nuclear reactors, representing in the range of 40,000 megawatts of new nuclear generating capacity.

The first wave of these plants could start site preparation activities by the end of 2008, move into full-scale construction in 2010 when they receive their construction and operating licenses, and be ready for commercial operation in the 2014 to 2015 time frame. By that time, three factors—growth in electricity demand, increasingly stringent environmental controls on coal-fired and gas-fired generating capacity, and continued pressure on natural gas supply and prices—will make construction of new nuclear generation a national imperative.

This emerging nuclear revival faces significant challenges, however. These challenges include:

1. Timely completion of the detailed design and engineering work necessary before companies can order new nuclear power plants with a high degree of confidence in the capital cost;
2. The stability and certainty of the licensing process for new nuclear plants;
3. The industry's ability to finance new nuclear plants.; and
4. Addressing legitimate public questions regarding the U.S. government's stewardship of used nuclear fuel.

Failure to address these challenges could delay, or conceivably derail, the construction of the new nuclear plants that will be needed to meet U.S. electricity needs in the years ahead.

Design and Engineering. The design, engineering and licensing work that must be completed before new nuclear plants can be ordered and built is a substantial investment. The industry shares that cost with the federal government under DOE's Nuclear Power 2010 (NP 2010) program. This program supports preparation of COL applications by two industry consortia, and the detailed design and engineering work necessary to prepare a COL application. NP 2010 supports design and engineering for two advanced light water reactors—the Westinghouse AP1000 and the General Electric ESBWR.

The NP 2010 program is essential: Without its successful completion, companies will not have the detailed design and engineering work necessary to develop a firm estimate of capital cost. And without a firm estimate of capital cost, companies cannot seek approval for plant construction from corporate boards of directors or from state public service commissions. NP 2010 is the cornerstone on which much of the nuclear renaissance rests. In fact, industry is

accelerating its spending on this program, requiring a similar government increase. The AP1000 or the ESBWR is the technology of choice for 21 of the 30 new reactors under consideration. Failure to provide adequate funding for the NP 2010 program could result in delays for a significant number of the new reactors planned.

In order to maintain current schedules for filing COLs, it is critically important, therefore, that the government provides adequate funding for its share of the NP 2010 program. In fact, it may be necessary to accelerate the program, and increase the funding necessary to execute it, in order to complete the design work and develop the firm cost estimates necessary to support decisions to build.

The Licensing Process. The next generation of nuclear plants should benefit from an improved licensing process, which was completely overhauled by the Energy Policy Act of 1992. The new process allows the NRC to pre-approve a prospective site for a new nuclear plant, issue a single license to build and operate a new nuclear plant, and certify that a new design meets all safety requirements. The new licensing process moves all regulatory and licensing approvals to the front end of the process, before significant capital expenditures are made. The new licensing process is codified in Part 52 of the NRC's regulations.

Although the new licensing process was designed to reduce licensing risk, the NRC's implementation is a source of concern. The NRC ignored industry comments, and is making extensive, substantive changes to its Part 52 rule. Industry hopes to see a final rule later this year. At the same time, the NRC is developing the supporting regulatory guides and standard review plans that will provide guidance to project developers as they prepare license applications for new plants, and will govern NRC staff review of those applications. This approach places the industry in a difficult situation: Attempting to develop new plant license applications while NRC is rewriting the rules and regulatory guidance governing those applications.

Here, too, active and continuing oversight by the committees of Congress will be essential to ensure that the NRC and industry maintain schedules, and produce timely high-quality regulations and regulatory guidance and similarly high-quality license applications. The industry commends this subcommittee for including, in its report on the Fiscal Year 2006 energy and water appropriations bill, a requirement for NRC to provide Congress with a report on the actions and tasks that must be completed prior to and during the new plant licensing process, detailed schedules for NRC review of key licensing activities, and plans to improve the efficiency and timeliness of the NRC's licensing reviews. This type of proactive oversight should pay substantial dividends as we move forward with new nuclear plant licensing.

Financing. Financing the next nuclear power plants will be a formidable challenge. Financing is not solely a nuclear sector challenge, however. It applies broadly to the U.S. electric sector and to other capital-intensive technologies, like advanced coal-based systems, in addition to new nuclear plants.

The electric power sector has not invested in capital-intensive baseload generating technologies for the last 15 years. This lack of investment was an inevitable result of chronic uncertainty in the electricity business, caused by industry restructuring, attempts to develop workable

competitive markets, and questions about companies' ability to recover large capital investments. As a result, investment in new coal and nuclear generating capacity all but disappeared, even though these two fuel sources represent 70 percent of U.S. electricity supply and provide the greatest price stability.

Between 1992 (when the Energy Policy Act mandated competition at the wholesale level and open access to the transmission system) and 2005, the United States commissioned a mere 8,000 megawatts of new coal-fired capacity and 2,500 megawatts of nuclear capacity. During that same period, however, generating companies built approximately 290,000 megawatts of new gas-fired capacity. Gas-fired capacity was preferred because it could be built quickly and, because of its low capital cost, it represented the lowest possible investment risk.

It is now clear, however, that the construction of massive amounts of gas-fired capacity placed unsustainable demand on natural gas supply, and subjected consumers of electricity and natural gas to punishing price volatility. It is equally clear that U.S. electricity markets need new baseload generating capacity in the near term, and that the U.S. electric industry is on the threshold of a major long-term construction cycle for new baseload generating capacity and new electric transmission. Consensus estimates suggest that the industry, over the next 15-20 years, must invest $400-500 billion in new nuclear plants, new coal-fired plants and new transmission lines, and an additional $40-60 billion for environmental controls on existing coal-fired capacity.

This new capital spending is a challenge to the electric power industry, which is already stressed financially. In 2005, the electric power industry's operating cash flow was not sufficient to cover capital expenditures and operating costs, according to a recent report by The Brattle Group, an economic consulting firm.[1] The Brattle Group report also noted a significant deterioration in credit quality in recent years. At the end of 1999, 75 percent of regulated utilities were rated BBB+ or higher; at the end of end of 2005, only 45 percent were rated BBB+. Among unregulated companies, 15 percent were rated below investment grade in 2000; at the end of last year, 40 percent had slipped below investment grade.

In a recent report, Lehman Brothers warned of increasing financial stress in the electric sector. Stress on cash flows (largely due to substantial increases in natural gas, coal, and emission allowance costs) has two negative impacts: lower bond ratings and thus higher cost of debt, and lower returns on equity, which make the stock less attractive to equity investors. According to Lehman Brothers: "Infrastructure investments and high fuel costs spell rate shock, demand destruction, and regulatory risk for traditional utilities. The projected 10 percent-plus [rate] increases through the next four years could pain consumers, pressure politicians, and harden regulators …. Historically, electric utility under-earning coincides with free cash flow turning negative (which happened in late 2005). …Our free cash estimates imply that earned returns could drop to the nine percent ROE [return on equity] area in the coming years, a deficit of over 250 basis points versus projected allowed levels."[2]

The challenges associated with financing new high-capital-cost baseload technologies is particularly acute in restructured electricity markets, which represent one-half of all the states.

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[1] *Why Are Electricity Prices Increasing?,* The Brattle Group, June 2006.

[2] Lehman Brothers, *Capital Lessons*, Global Equity Research/North America, March 15, 2006.

Cambridge Energy Research Associates expressed concern over this issue in a recent report (*U.S. Power Sector: In the Swing*, July 2006): "[S]ome markets still lack the financial incentives necessary for new plants to be built …. Most competitive regions have a 'missing money' problem: energy market margins typically pay for only a fraction of fixed costs for new power plants …. Although many regions will need new power plants in two to six years, building new power plants to sell into competitive markets does not appear to be an attractive strategy …. Only a fraction of [a new plant's] fixed costs [capital, and operation and maintenance] can be recovered through selling energy alone in all markets .... Capacity market payments generally don't make up the shortfall."

The financing challenge is somewhat more acute for companies interested in investing in new nuclear power plants, because the size of the investment (typically $3 billion to $4 billion for a single nuclear power plant, including interest during construction) is large relative to the size of the companies that will build them. The electric power companies that have announced interest in new nuclear power plants have market values ranging from approximately $30 billion to below $10 billion. Even for a $30-billion company, financing one or two $3-4 billion nuclear facilities will strain its financing capability.

The Energy Policy Act of 2005 recognized this financing challenge to a limited extent, and provided some investment stimulus for construction of new baseload power plants, including new nuclear plants. The Energy Policy Act also provided an innovative form of federal insurance (called Standby Support) to protect project developers against delays in commercial operation of a new nuclear plant due to factors beyond the project developer's control—including regulatory delays and litigation.

The investment stimulus includes loan guarantees for up to 80 percent of total project cost, and a production tax credit of $18 per megawatt-hour for 6,000 megawatts of new nuclear capacity. The Standby Support insurance will cover debt service for the first six nuclear plants if commercial operation is delayed. This coverage is capped at $500 million for the first two reactors, and $250 million for the next four reactors.

It is important, however, to maintain a financially realistic perspective on these incentives: Two of these three provisions do not address the challenges associated with construction financing.

The Standby Support insurance covers only debt service. It would not compensate a company for other delay costs incurred while a completed plant sits idle, awaiting the completion of licensing proceedings or litigation. These delay costs, which include staffing costs, fuel costs and lost earnings, could easily reach hundreds of millions of dollars. And although the Standby Support insurance covers the first six reactors, the first two $500-million insurance contracts have the most value, because they cover 100 percent of debt service with no delay period. The four $250-million insurance contracts cover only 50 percent of debt service and a company must endure six months of delay before it can file a claim even for that.

Although widely advertised as risk insurance for project developers designed to protect them against licensing or litigation delays over which they have no control, the Standby Support

insurance leaves the project sponsor with substantial risk. The Standby Support insurance provides limited *investment protection*; it does not provide *investment stimulus*.

The production tax credit enhances the financial attractiveness of a project after it is built and in commercial operation, but the production tax credit does not address the financing challenges before and during construction. It does not assure access to capital on acceptable terms. It does not provide companies the ability to use the most efficient capital structure. And it does not address the issue of earnings-per-share (EPS) dilution during construction. A $3-4 billion nuclear project financed with a 50/50 debt/equity capital structure would require $1.5-2 billion in new equity. That translates to 5-7% EPS dilution for a $30-billion company, or 10-13% EPS dilution for a $15-billion company. Equity investors have a predictable response when companies dilute their earnings per share: They sell their shares, which drives down the stock price.

In terms of facilitating construction financing and access to capital, the most valuable form of investment stimulus in the Energy Policy Act is the authority to provide loan guarantees conferred on the Secretary of Energy by Title XVII. The Secretary is authorized to guarantee up to 80 percent of project cost. This permits a more highly leveraged capital structure—e.g., 80% debt/20% equity rather than 50% debt/50% equity typical of regulated electric utility financing.

Loan guarantees allow companies to employ project financing on a non-recourse basis. They allow a more efficient, leveraged capital structure. They reduce project cost by reducing the weighted average cost of capital, and thus provide a substantial consumer benefit in the form of lower electricity prices. They reduce the equity requirement and earnings per share dilution. And they mitigate the impact on the balance sheet and challenge to credit quality and bond ratings. The ability to use project finance (non-recourse, higher leverage) offsets the most significant financing challenge facing new nuclear plant construction: The cost of nuclear projects relative to the size, market value and financing capability of companies that will build them.

NEI believes loan guarantees are critically important to new nuclear plant financing. Unregulated companies will be hard-pressed to build nuclear projects except on a project finance basis with the debt financing secured by the federal government. Regulated companies may be limited in their ability to build multiple nuclear projects without project finance capability because of significant earnings-per-share dilution, and substantial pressure on credit quality and debt ratings due to the additional debt on their balance sheets.

It is important to note that the loan guarantee program is not a subsidy. Under the terms of the statute, the project developer would pay the credit subsidy cost of the loan guarantee, pursuant to Federal Credit Reform Act protocols. Given a rational approach to implementation, in which projects are selected based on a high likelihood of commercial success with the loan guarantees, there will be trivial risk to the taxpayer and minimal risk of default. The loan guarantee program is a financing tool, modeled on the successful financing techniques already employed by the federal government (through such agencies as the Export-Import Bank and the Overseas Private Investment Corp.). It is designed to stimulate investment in high-capital-cost projects that are in the national interest, and to correct the market imperfections described above that would

otherwise preclude those investments. Properly managed and implemented, this program represents a source of revenue to the federal government in the years ahead, in the form of investment banking fees.

The Department of Energy recently published initial guidelines, developed jointly with the Office of Management and Budget, under which it will implement the loan guarantee program, with an initial solicitation for projects, subject to a $2-billion cap on the initial round of loan guarantees. Nuclear projects were not included in the initial solicitation; large coal-fired projects, using advanced technologies like integrated gasification combined cycle, are also effectively excluded by the $2-billion cap. The Department has indicated that nuclear projects will be covered by formal regulations to be developed over the next year.

The nuclear industry believes that the initial loan guarantee guidelines produced by DOE and OMB compromise the legislative intent of Title XVII and significantly erode the value of the loan guarantees. The procedures outlined in the guidelines are so restrictive and so conditional that they would not support financing of a nuclear power plant.

The nuclear industry urges the Congress to exercise the oversight necessary to ensure this essential program operates with credible, workable regulations. These regulations must be developed cooperatively—in consultation with the financial institutions that will provide the financing, with the other government agencies that have extensive experience in managing a guaranteed loan portfolio, and with the project developers that, even with the federal guarantee of the debt, will be investing hundreds of millions of dollars of equity in these large power projects, and thus have a large vested interest in project success.

The nuclear industry also urges the Congress to provide the modest level of funding (approximately $2.7 million during this fiscal year) necessary to establish the Loan Guarantee Office within DOE, thereby providing the resources necessary to attract qualified personnel.

Used Nuclear Fuel Management
And the Importance of Interim Storage of Used Nuclear Fuel

In order to fully realize the benefits of nuclear power, and to address legitimate questions about the government's used fuel stewardship, the United States must have a credible, long-term program to manage used nuclear fuel. This program should integrate a number of essential components, including:

1. the centralized disposal facility at Yucca Mountain, NV;
2. advanced fuel processing and fuel fabrication facilities and advanced reactors designed to extract the maximum possible energy from used nuclear fuel, and reduce the radiotoxicity and volume of the waste by-products requiring permanent isolation in the repository, and
3. centralized interim storage facilities until the disposal facility is operational, co-located with the advanced fuel processing and recycling facilities.

The consumers of electricity produced by U.S. nuclear power plants have a legitimate right to expect such a program: Since the enactment of the Nuclear Waste Policy Act of 1982, electricity

consumers across America have paid over $28 billion into the Nuclear Waste Fund, and continue to pay approximately $750 million each year. Despite this ongoing financial commitment, no used fuel has been removed from reactor sites, and those same consumers have had to finance additional on-site storage facilities. The federal government fell into arrears on its statutory obligation on January 31, 1998.

The federal government's failure to remove used fuel from nuclear plant sites was not caused by lack of authorizing legislation, but by inability to implement existing legislation. Although new legislation is important to place the used fuel program on a path to success, it is equally critical that the federal government recommit itself to the implementation of existing law.

The nuclear industry is encouraged by the fact that DOE has recently developed a new schedule for licensing and construction of the Yucca Mountain project, after several years without a timetable. The schedule announced by DOE on July 19, 2006, is ambitious: It includes submission of the Yucca Mountain license application by June 30, 2008, and a "best achievable" construction schedule that could have the repository begin receipt of used fuel in March 2017. The industry encourages DOE to submit the license application as soon as possible, preferably before the end of 2007, so NRC review can begin. And we encourage Congress to enact the legislative reforms proposed by the Administration because, by the Department's own admission, the 2017 date for receipt of used nuclear fuel cannot be met absent these reforms.

In the letter inviting our testimony at this hearing, Chairman Hobson requested the nuclear industry's view on the extent to which interim storage of used nuclear fuel may be needed in the short-term to support the growth of nuclear energy.

Used nuclear fuel is stored safely today at nuclear plant sites, either in pool storage or in dry casks. It could remain in storage at nuclear plant sites, posing no threat to the public health and safety or to the environment, for an indefinite period of time. From an operational and technical perspective, and from a health and safety perspective, there is no immediate need to move used nuclear fuel to centralized interim storage facilities.

That said, however, it is absolutely essential to public and state policymaker confidence that the federal government identify and develop sites for centralized interim storage, ideally linked to future reprocessing facilities, and begin the process of moving used nuclear fuel to these interim storage facilities, in order to demonstrate its ability and willingness to meet its statutory and contractual obligation to move used fuel away from operating nuclear plants and decommissioned reactors. While DOE moves forward to license, construct and operate the Yucca Mountain repository, the government must take title to used fuel and move it to centralized federal facilities as soon as practical. The government is already eight years in arrears in meeting this obligation, and it will be more than 10 years before the repository is completed, under the best of circumstances. Movement of used nuclear fuel to interim storage is, therefore, a political imperative to retrieve some measure of confidence in the federal government's waste management program.

In addition to the political necessity associated with interim storage of used fuel, there is a companion economic necessity. DOE's failure to meet its obligation to begin transportation of

used nuclear fuel is already the subject of more than 60 lawsuits. These lawsuits could expose the federal government to billions of dollars in judgments and settlement costs. Further delays in federal receipt and movement of used nuclear fuel will only add to damage claims and increase taxpayer liability.

The nuclear industry believes that the optimal site for interim storage of used fuel would be in close proximity to the planned repository in Nevada If that cannot be achieved, as the Congress evaluates alternatives, it should consider the following principles:

> The number of sites should be minimized to reduce costs and achieve the logistical efficiencies associated with consolidation at a limited number of storage sites;
> Sites willing to host interim storage should receive benefits, ideally linking interim storage to recycling and reprocessing technology development, as an incentive for voluntary participation; and
> It is appropriate to use the Nuclear Waste fund to pay for interim storage, but not for development of advanced fuel processing technologies, advanced fuel fabrication technologies and advanced reactors capable of consuming the fissile materials in used nuclear fuel.

The industry believes that one or two interim storage sites that provide benefits desired by the host state and community is the appropriate approach. We are encouraged that the Department of Energy recognizes, in its solicitation for prospective sites for nuclear fuel recycling facilities, that some interim storage of used nuclear fuel will be involved. A number of communities have expressed initial interest in participating in such a project. We believe Congress should work with DOE, industry and potential host sites to determine what steps will best facilitate the movement of used fuel from nuclear plant sites, and incorporate the necessary provisions into legislation.

Regardless of the interim storage strategy, however, it is critical that preparations for interim storage do not divert attention and resources from repository development at Yucca Mountain.

In Addition to Interim Storage, Other Near-Term Requirements. Beginning the process of moving used nuclear fuel from nuclear plants sites to a few centralized storage facilities would reaffirm political and public confidence that the federal government will meet its statutory and contractual obligations. Two other steps are equally essential to ensure new nuclear power plant development is not hamstrung by used fuel issues.

It is both prudent and appropriate for Congress to enact a statutory finding of “waste confidence”—an unequivocal declaration that the United States government will honor its statutory obligation, including developing interim storage facilities and a permanent disposal facility for the long-lived waste by-products of commercial nuclear power. This “waste confidence” determination is currently embodied in an NRC regulation that supports various licensing actions. Waste confidence can be viewed as a narrow technical finding, but it is more broadly a public policy determination under the purview of Congress. The issue demands the certainty associated with a statutory finding that U.S. government policy is permanent disposal

of nuclear waste by-products in a geologic repository, consistent with longstanding international scientific consensus.

The statutory determination of waste confidence should be accompanied by a companion step—removal of the 70,000-metric-ton limitation on the capacity of the Yucca Mountain repository. This limitation, imposed by the Nuclear Waste Policy Act, is arbitrary and artificial. Scientific investigation and engineering analysis conducted since the Nuclear Waste Policy Act was passed have demonstrated that a repository at Yucca Mountain can safely isolate significantly more used fuel than 70,000 metric tons.

A statutory finding of waste confidence could prevent potential intervention and delay in nuclear plant licensing proceedings over DOE's historical inability to discharge its responsibilities under the Nuclear Waste Policy Act. Issues involving the timing and certainty of DOE's performance should be resolved in licensing proceedings on the repository, or in Congress. Litigation of such issues in individual plant licensing proceedings is neither efficient nor appropriate. NRC has long recognized that individual plant licensing proceedings should not be burdened with debate over DOE's development of the repository. Congress should codify waste confidence, so that the NRC need not address this broad public policy matter in more narrow, specific nuclear plant licensing proceedings.

Equally important, as utilities prepare to license and build new nuclear power plants, it is essential that appropriate changes be made in the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, originally established by rulemaking (10 CFR, Part 961), to reflect developments since these contracts were originally drafted in the 1980s. While the language in both the NWPA and disposal contracts allows for an existing contract to be amended in order to add new plants, DOE's failure to perform, and subsequent litigation, has created a situation where this option may be difficult to execute. The preferred path forward would be to enact legislation directing DOE to enter into new disposal contracts for new nuclear plants that are consistent in form and substance with the existing disposal contracts, but which take into account the schedule for the operation of new plants. For example, the 1998 acceptance date in the existing contracts should be revised in contracts executed for new plants, and the new contracts should specify a number of years after each new plant begins power operations after which the federal government must start moving used fuel.

The Role of Advanced Fuel Cycles and Recycling

Nuclear companies in the United States and around the world are making plans to build significant numbers of new nuclear plants to meet baseload electricity needs after 2015. According to data compiled by NEI, the International Atomic Energy Agency and the World Nuclear Association, 169 power reactors, totaling approximately 136,000 megawatts of capacity, are currently under construction, in development, planned or proposed around the world. The International Atomic Energy Agency's most recent forecast projects nuclear energy capacity worldwide could nearly double by 2030—from 370,000 megawatts in 2005 to 679,000 megawatts in 2030.

This expansion in nuclear power capacity is driven by economic and environmental imperatives—the need to supply sufficient electricity to serve growing population and to enable economic growth, and to minimize the environmental impacts of electricity production.

This worldwide nuclear expansion also suggests that the once-through or "throw-away" nuclear fuel cycle now used in the United States is not a prudent or sustainable course for the long-term future. Closing the nuclear fuel cycle—reprocessing used nuclear fuel, recovering the fissile materials that can produce more energy, fabricating those fissile materials into fresh fuel, and recycling that fuel into advanced nuclear reactors designed to handle these fuels without creating concerns about the proliferation of weapons of mass destruction—is a global imperative in the long term. This vision underpins the President's Global Nuclear Energy Partnership, which combines nuclear fuel supply, used nuclear fuel management and non-proliferation policies into a single, integrated initiative.

The U.S. nuclear energy industry strongly supports research and development of advanced fuel cycle technologies, like those incorporated in the Advanced Fuel Cycle Initiative (AFCI). Given the prospect of major expansion of nuclear power in the United States and globally, it is appropriate to continue the long-term research and technology development necessary to realize this longer-term vision of a nuclear fuel cycle optimized to extract maximum value from nuclear fuel and reduce the radiotoxicity and volume of the waste products requiring long-term isolation.

Any such program must, however, have at least two defining characteristics.

First, a reprocessing/recycle program must be sustainable over the relatively long period of time necessary to develop advanced fuel processing technologies and advanced reactor systems. Continuity is essential. In order to be sustainable, any such program must enjoy broad-based, bipartisan support and endorsement within the policy community and among our nation's political leaders. That policy and political support must proceed from a clear-eyed and realistic understanding of the investment and time required to develop advanced fuel cycle technologies, which is measured in tens of billions of dollars and decades. It is not clear to the U.S. nuclear industry that the President's Global Nuclear Energy Partnership, or other similar initiatives now being discussed, have achieved the degree of sustainable support necessary to ensure long-term continuity and success.

Second, a reprocessing/recycle program must be flexible enough to accommodate technological successes and failures (and there will be both), with clearly-defined success criteria, decision points and exit strategies.

The nuclear energy industry fully supports an aggressive, continuing effort to define, develop and finance the technology development program necessary to close the nuclear fuel cycle, including deployment of appropriate technologies that meet policy goals, in order to position nuclear energy as a sustainable source of energy. But, again, regardless of reprocessing technologies and the fuel cycle selected, Yucca Mountain is needed for the waste by-product.

The industry's major priority, however, is the immediate imperative to address the significant challenges facing construction of the next nuclear power plants in the United States. The

nuclear energy renaissance depends on the industry's success in working with the U.S. Congress, the Executive Branch and state governments to address the significant challenges described above. These challenges include timely completion of the joint government-industry NP 2010 program to develop detailed designs and firm cost estimates for advanced reactors; ensuring an efficient, stable licensing process, and demonstrating our ability to finance these capital-intensive projects, including workable implementation of the loan guarantee program created by the 2005 Energy Policy Act.

Addressing these near-term challenges to new nuclear plant construction is, and must remain, job one. If we do not succeed with this near-term task, discussions of longer-term reprocessing and recycle strategies are largely irrelevant. If the United States does not build new nuclear power plants, the policy basis and technological rationale for a reprocessing and recycle program quickly erodes, because a single repository at Yucca Mountain is clearly capable of handling all the used nuclear fuel that will be produced by all existing U.S. nuclear reactors.

Conclusion

Nuclear power is a crucial part of America's diverse energy portfolio, producing over 20 percent of the electricity used in the United States today, but without producing the air pollutants associated with acid rain and urban smog, and the CO_2 associated with global warming. As U.S. energy demands continue to grow in years to come, nuclear power should play an even greater role in meeting our energy and environmental needs.

The nuclear energy industry is operating its reactors safely and efficiently. The industry is striving to produce more electricity from existing plants. The industry is also developing more efficient, next-generation reactors and exploring ways to build them more cost-effectively.

The federal government, including the committees of the U.S. Congress, can help maintain the conditions that ensure Americans will continue to reap the benefits of our operating plants, and create the conditions that will spur investment in America's energy infrastructure, including new nuclear power plants.

Mr. Chairman, on behalf of NEI, I thank you for the opportunity to discuss nuclear energy's significant role in providing electricity to our nation today, and its vital importance as a clean, reliable and safe energy source for the future.

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