Statement of Alex Flint
Senior Vice President, Governmental Affairs
Nuclear Energy Institute

before the

Select Committee on Energy Independence and Global Warming

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Chairman Markey, Ranking Member Sensenbrenner, Members of the Committee, thank you for the opportunity to testify on nuclear energy's significant role in reducing greenhouse gas emissions in today's electricity generation portfolio and the expanded role that it can play in the future.

The Nuclear Energy Institute is responsible for developing policy for the U.S. nuclear industry on generic technical, regulatory, business and other matters of industry-wide importance. More than 300 corporate and other members of NEI represent a broad spectrum of interests, including every U.S. electric utility that operates a nuclear power plant. 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.

NEI's policy statement on climate change begins with the statement that "reducing carbon emissions, while fostering sustainable development, will be a major global challenge of the 21st century."

The scope of that challenge was reinforced last week when the Administrator of the Energy Information Administration testified before Congress on the EIA's 2008 Annual Energy Outlook. The EIA forecasts growth in US electricity demand of 30 percent between 2006 and 2030. In large part, because the forecast also predicts the construction and operation of 16.4 gigawatts of new nuclear capacity, CO2 emissions are predicted to increase by a smaller, yet still challenging, 16 percent from 2006 levels.

The global forecast is even more challenging. In 2030, world population is expected to be 8.3 billion people, an increase of 23 percent from today's estimated population. In addition, strong economic growth is forecast in the developing nations. To quote EIA, "total electricity demand in the non-OECD nations is expected to grow from 2004 to 2030 at an annual rate that is nearly triple the rate of growth for electricity demand in the OECD."

Because of this rapid population and economic growth, EIA forecasts global electricity demand to nearly double between 2004 and 2030 from 16.4 trillion kilowatt-hours in 2004 to 30.4 trillion kilowatt-hours in 2030.

It is extraordinarily challenging to imagine credible scenarios by which electricity production can double in the coming decades while reducing significantly the emission of greenhouse gases from electricity generation. To do so will take the successful implementation of a wide range of solutions, as Princeton Professors Stephen Pacala and David Socolow made clear in their wedge analysis.

A credible program will require a portfolio of technologies and approaches, including the widespread use of nuclear energy, renewables, conservation, efficiency, and carbon sequestration from the use of fossil fuels. The magnitude of this challenge should not be underestimated.

That conclusion is shared by leaders and governments around the world including Yvo de Boer, Executive Secretary of the United Nations Framework Convention on Climate Change, who, in July 2007 said he had never seen a credible scenario for reducing emissions that did not include nuclear energy. Similar conclusions have been reached by the G-8 in its declaration on "Growth and Responsibility in the World Economy" issued after the June 2007 G-8 summit.

In addition to global policy leaders, the world's scientific community agrees that nuclear energy must play a significant role in meeting the dual challenges of electricity production and greenhouse gas reduction. The most recent UN scientific report on climate change, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change identifies nuclear energy as one of the "key mitigation technologies." The IPCC report says that a "robust mix" of energy sources, including nuclear energy, "will almost certainly be required to meet the growing demand for energy services, particularly in many developing countries."

Business leaders concur. The World Energy Council's 2007 Energy and Climate Change Study found that "countries with high proportions of nuclear in their systems (such as Sweden and France) had GHG emissions per head significantly lower (30-50%) than those of comparable nations, demonstrating the contribution nuclear could potentially make to dealing with climate change globally." The report recommends that "all governments should give serious consideration to the potential of nuclear power for reducing GHG emissions."

Similarly, the World Business Council for Sustainable Development's, in its *Powering a Sustainable Future,* report found that existing carbon-free technologies like nuclear energy and promising technologies including advanced nuclear energy, "…have the potential to contribute to the substantial decarbonization of the [electric] sector at acceptable cost by 2050."

In the United States, Dr. Jeffrey Sachs, the director of the Earth Institute at Columbia University has said "low-emission electricity generation will be achieved in part through niche sources such as wind and bio-fuels. Larger-scale solutions will come from nuclear and solar power."

The Progressive Policy Institute in its Progressive Energy Platform concluded "nuclear power holds great potential to be an integral part of the diversified portfolio for America. It produces no greenhouse gases, so it can help clean up the air and combat climate change. And new plant designs promise to produce power more safely and economically."

The willingness of individuals and organizations that would not otherwise be so inclined to consider and now support the deployment of new nuclear power plants, is due in part to the need to identify all credible ways to reduce greenhouse gas emissions. However, this reconsideration also is made possible by the extraordinarily safe and efficient operation of the existing nuclear fleet.

In 2007, the 104 reactors in the U.S. nuclear fleet operated at 92 percent of capacity. That was accomplished because of high management standards, a focus on reliability and safety, and fewer and shorter outages. It enabled nuclear power plants, which are 12 percent of installed US generation capacity, to produce 807 billion kilowatt-hours of electricity or nearly 20 percent of the electricity generated in the United States last year.

Concurrently, production costs continued to fall, last year to 1.68 cents per kilowatt-hour, a record low. 2007 marked the ninth straight year that the industry's average electricity production cost has been below 2.0 cents per kilowatt-hour and the seventh straight year that nuclear plants have had the lowest production costs of any major source of electricity, including coal- and natural gas-fired power plants.

We also saw capacity increase in 2007, in large part due to the restart of TVA's Browns Ferry Unit 1 last May. That 5-year, $1.8 billion project was completed on schedule and within the cost estimate.

The environmental benefit of this nuclear generation is substantial.

Nuclear power plants generate over 70 percent of all carbon-free electricity in the United States. By using nuclear power instead of fossil fuel-based plants, the US nuclear energy industry prevented 681 million metric tons of carbon dioxide emissions in 2006. For perspective, the volume of greenhouse gas emissions prevented at the nation's 104 nuclear power plants is equivalent to taking 96 percent of all passenger cars off America's roadways.

Our nuclear power plants are also extraordinarily safe places to work. In 2006, our lost-time accident rate was 0.12 accidents per 200,000 worker hours. Statistics from other industries as compiled by the Bureau of Labor Statistics show a comparable accident rate in the manufacturing sector to be 3.5 accidents per 200,000 worker hours and that it is even safer to work at a nuclear power plant that it is to work at a bank.

The nuclear industry is also one of the most heavily regulated commercial enterprises. The NRC implements a reactor oversight process for all nuclear plants that encompasses its inspection, assessment and enforcement programs. The NRC maintains at least two resident inspectors at every US nuclear power plant. These inspectors, with support from NRC regional offices and headquarters, conduct a minimum of more than 2,000 hours of baseline inspections at each site per year. Additional direct inspection is based on plant performance.

At a global level, 439 nuclear plants produce 16 percent of the world's electricity while avoiding the emission of 2.6 billion metric tons of CO_2 each year—and a new build renaissance is underway.

There are 34 nuclear units under construction worldwide including seven in Russian, six in India, and five in China. In the United States, we have one, the 5-year, $2.5 billion completion of TVA's Watts Bar 2 underway.

In the United States, 17 companies or groups of companies are preparing license applications for as many as 31 new reactors. Five complete or partial applications for construction/operating licenses (COLs) were filed with the NRC in 2007. Another 11 to 15 are expected in 2008.

Of the reactor designs being considered for deployment, two have already been certified by the NRC. An additional two were submitted to the NRC last year, and an additional one has been submitted this year. Certification means that the advanced reactor design meets all federal safety standards.

We expect the NRC's review of the new reactor COL applications to take approximately 40 months and for the first COLs to be approved in late 2010 or early 2011.

As a result, the industry expects four to eight new U.S. nuclear plants in operation by 2016 or so. The exact number will depend on many factors – forward prices in electricity markets, capital costs of all base-load electric generation technologies, commodities costs, environmental compliance costs for fossil-fueled generating capacity, natural gas prices, growth in electricity demand, availability of federal and state support for financial investment and recovery and more.

If those first plants are working to schedule, within budget estimates and without licensing difficulties, a second wave could be well under construction as the first wave reaches commercial operation.

Every source of electricity has benefits and challenges. The Members of this Committee are well aware that, although nuclear power enjoys low and stable costs of operation and is the only expandable large-scale source of emission-free electricity, capital costs for new nuclear plants are significant. However, when both operating and capital costs are considered, nuclear power will be competitive with other new sources of electricity. Further, large base-load power options are limited.

In addition to cost, new coal-fired capacity has its own challenges. Generating companies announced 28,500 megawatts of coal-fired capacity in 2006 and 2007; but 22,300 megawatts of coal-fired capacity was postponed or cancelled, largely over CO_2 emission concerns.

Natural gas supply and price volatility also limits its use as a base-load generation source. For example, Florida Power & Light Company asked the Florida Public Service Commission in October for a "determination of need" to allow the company to move forward with the development of two new reactors at its Turkey Point power plant site. In its petition, the company stated that it "has conducted an extensive review of information currently available with the industry on the expected costs of new-generation units."

The company weighed the proposed nuclear project against other alternatives. Its conclusion: "the addition of new nuclear capacity is economically superior versus the corresponding addition of new [gas-fired combined cycle] units required to provide the same power output, yielding large economic benefits to customers... Based on all the information available today, it is clearly desirable to take the steps and make the expenditures necessary to retain the option of new nuclear capacity coming on line in 2018."

The construction of those plants in the United States will have benefits beyond low-cost, clean electricity. At the peak of construction, a nuclear plant will employ 2300 skilled workers. Upon completion, approximately 700 workers will be required to operate and maintain the plant. Those workers receive excellent benefits and earn pay that is, on average, 40 percent above the wages earned by workers doing similar work in non-nuclear facilities. The plants bring increased tax revenue, economic stability, and prosperity.

Training of skilled technicians and craft personnel — such as operators, technicians, electricians, welders, pipe-fitters and other maintenance workers—is essential to sustain the highly qualified work force needed to continue efficient, reliable electricity production. To attract workers to skilled craft careers and provide appropriate training and education, the industry has participated in the formation of 10 state-based consortia and other collaborative arrangements among state governments, industry and academia. In the areas of radiation protection, operations, and maintenance, 17 industry-community college collaborative training programs have been launched in 14 states, most within the past three years, to bring younger workers into these fields.

The industry also is working with organized labor to develop training and other programs to provide the cadre of highly skilled workers that our future requires. NEI supports the application of federal prevailing wage requirements, contained in the Davis-Bacon Act of 1931 as amended, to loan guarantees authorized by Title XVII of the Energy Policy Act of 2005.

In addition, NEI is working aggressively to revitalize the United States' nuclear manufacturing infrastructure. The global nuclear renaissance will require additional capacity for a range of products from very small components to ultra-heavy steel forgings and castings. To the extent possible, we are working to see that additional global capacity established in the United States.

The potential contribution nuclear power can make to reducing forecast greenhouse gas emissions in the electricity sector in the coming decades is extraordinary. But even as we work to build the next fleet of advanced reactors for electricity production, we also are developing reactors that will provide energy security and environmental benefits well beyond the traditional electric sector role.

One promising next generation technology is the high temperature gas reactor. Its unique design is well suited to meet a wide variety of future needs such as the production of economical hydrogen, clean drinking water, industrial process heat, municipal district heating, or to generate grid appropriate electricity for the developing world.

Hydrogen can also be a valuable replacement feedstock for natural gas used in the petrochemical sector. Almost all near-term scenarios for meeting electricity demand and reducing greenhouse gas emissions in the electricity sector forecast increased use of natural gas which will drive prices even higher. Those price increases will be felt by residential consumers who will have little choice but to pay higher energy bills and also by agricultural and commercial users who we predict will increasingly move overseas in pursuit of cheaper feedstock.

While plug-in electric hybrid vehicles powered from an increasingly green grid will reduce our dependence on foreign oil in the near-term, clean, domestically produced hydrogen from advanced nuclear systems could help meet our future transportation needs.

In addition, process heat from these future reactors holds the potential to further reduce our foreign energy dependence by reducing the cost and environmental consequences of extracting oil from non-conventional sources such as tar sands and oil shale. With the availability of low cost process heat, we can once again attract investment in large energy intensive manufacturing and secure the associated, high-paying jobs for American workers.

In closing, nuclear energy is the single largest source of non-carbon emitting generation. It is a mature technology, operated at high standards by an experienced industry that is committed to safety. It is the only energy option available today that can provide large-scale electricity 24/7 at a competitive cost without emitting greenhouse gases.