Statement of Secretary Steven Chu
U.S. Department of Energy
Before the
Senate Committee on Appropriations
Subcommittee on Energy and Water Development

April 28, 2010

Chairman Dorgan, Ranking Member Bennett, and Members of the Committee, thank you for the opportunity to appear before you to discuss our nation's energy policy.

We are driven to change our energy habits by several serious challenges. America is highly dependent on oil. Our climate is changing as a result of our carbon emissions. In order to mitigate the considerable risks of climate change, the world must transition to a sustainable energy future, which will require nothing short of a new industrial revolution. America's future jobs and prosperity may well depend on whether we lead or follow in this transformation.

The leaders in China now recognize that if the world continues on its current path, climate change will be devastating to China and to the rest of the world. They acknowledge that China's growth in carbon emissions is environmentally unsustainable and are working hard to lessen their emissions growth. They also see the economic opportunity that clean energy represents. China is investing $44 billion by 2012 and $88 billion by 2020 in Ultra High Voltage transmission lines. These lines will allow China to transmit power from huge wind and solar farms far from its cities. While every country's transmission needs are different, this is a clear sign of China's commitment to developing renewable energy. They also currently have 20 nuclear power plants under construction and more construction starts are expected soon. China largely missed out on the IT revolution, but it is playing to win in the clean energy race. For the sake of our economy, our security, and our environment, America must develop decisive policies that will allow us not only to compete in this clean energy race, but to become the leader in providing clean energy technology to the world.

The American Recovery and Reinvestment Act made a down payment on our clean energy future, while creating jobs and putting Americans back to work. For example, we are on track to double our renewable energy generation capacity by 2012.

But for the longer term, we will need a comprehensive energy and climate policy. Before becoming Energy Secretary, I was a member, along with three Assistant Secretaries now serving in the Department of Energy, of the National Academies committee that issued a comprehensive and authoritative report, *America's Energy Future*. That report stated: "The United States has never implemented a truly comprehensive set of national policies for obtaining and using energy to meet national goals for sustainability, economic prosperity, security, and environmental quality."[1]

America's competitiveness is inseparable from our energy policy. With the right policies and a sustained national commitment, we can mobilize America to lead the world in the

[1] *America's Energy Future*, Summary Edition, 2009, page 26.

transition to a sustainable energy future and guarantee prosperity for ourselves, our children and our grandchildren. What will be required is non-partisan leadership and collaboration between Congress and the Administration.

In addition to the *America's Energy Future* report, several studies have examined the feasibility of achieving President Obama's 2020 and 2050 greenhouse gas reduction targets, including analyses by the Environmental Protection Agency (EPA) and the Energy Information Administration (EIA) of comprehensive energy and climate legislation. These studies concluded that aggressive deployment and evolutionary advances in technology will help us achieve our goals at an affordable cost. With a robust R&D effort and the right policy signals, I believe we will be able to achieve our goals even more economically.

As we have seen many times in history – for example with catalytic converters, the Acid Rain Program, the phase-out of chlorofluorocarbons, and appliance efficiencies – once a problem is taken away from the lobbyists and given to the scientists, engineers, and American businesses it can often be solved much more quickly and cheaply than anticipated. For example, while compliance costs for EPA's acid rain program were originally estimated in 1990 to be $750 per ton of sulfur emitted, by 1996 the cost was $70 per ton of sulfur.

Let me be clear, however, that our success is not inevitable. We need a policy framework that emphasizes two priorities: policies that will accelerate innovation and policies that will drive private sector investment in clean energy. We must harness America's entrepreneurial spirit and leverage private sector imagination and ingenuity to transform the way we produce and use energy. Part of those policies must promote the research and development of key technologies needed in the coming decades without crowding out private investment. As stated in *America's Energy Future*: "Actions taken between now and 2020 to develop and demonstrate the viability of several key technologies will, to a large extent, determine the nation's energy options for many decades to come."

Here are a few of the steps we need to take:

- *We need to accelerate efforts in energy efficiency – our cleanest, cheapest energy resource – to save money and create jobs.* Energy efficiency and conservation will remain the lowest hanging fruit for reducing carbon emissions for the next few decades. The National Academies report states that "Technology exists today, or is expected to be developed over the normal course of business between now and 2030 that could save about 30 percent of the energy used annually in the buildings, transportation and industrial sectors. These savings could easily repay, with substantial dividends, the investments involved."[2] This estimate was based on only those investments that could provide a minimum 10 percent rate-of-return on investments based on net present value.

    - *Strong efficiency standards and the enforcement of those standards will be of the highest importance.* For example, the improvement in the efficiency of refrigerators alone since the 1970s is responsible for energy savings today greater than all non-hydro renewable power generation. During that time, the inflation adjusted cost of

[2] *America's Energy Future*, Summary Edition, 2009, page 82.

refrigerators dropped by about half while energy consumption was simultaneously reduced by more than 75 percent. There are many opportunities to make our buildings, vehicles, and appliances more efficient and save money. Appliance standards issued in the last 16 months alone will save American consumers more than $250 billion over the next 20 years.

- *We need new models to overcome information, financing and other barriers to rapid, widespread adoption of cost-effective home energy efficiency technologies.* The Administration is working with Congress to establish the HOMESTAR program, which has the potential to jumpstart our economic recovery by boosting demand for energy efficiency products and installation services. For middle-class families, this program will help them save hundreds of dollars a year in energy costs while improving the comfort and value of their most important investment – their homes. In addition, the program would help reduce our economy's dependence on oil and support the development of an energy efficiency services sector in our economy. In addition, DOE is also trying new approaches to promoting energy efficiency through our Retrofit Ramp-Up initiative. Communities, governments, private sector companies and non-profit organizations will work together on innovative programs to enable retrofits of entire neighborhoods and towns. These programs are expected to save households and businesses about $100 million annually in utility bills, while leveraging private sector resources to create an estimated 30,000 jobs during the next three years.

- *We need to develop and deploy cleaner technologies for electricity generation.*

  - *We need to provide a "market draw" for renewable energy sources.* In April of 2009, EIA updated its "reference case" to account for the anticipated impacts of the Recovery Act. One the most striking changes is a significant increase in renewable electricity generation. In the preliminary 2010 report, EIA projects that non-hydro renewables will account for more than 10 percent of electricity sales in 2020 without any additional federal or state policies. Implementing new market-based policies, such as pricing carbon and a strong national renewable electricity standard can create new demand for renewable energy and its upstream manufacturing activity. I note that RES proposals often exempt some smaller generating sources, such as a cogeneration plant at a university, which reduces the effective target several percentage points below the nominal target. For example, last April, EIA found that a nominal share of 25 percent results in only about 13 percent of electricity coming from non-hydroelectric renewable sources in 2025. This 12 point gap is due to exemptions for small retailers, exemptions for hydroelectric facilities, and energy efficiency credits.

  - *We need to reinvigorate America's nuclear power industry.* Earlier this year, DOE made a conditional commitment to finance construction of what will be the first nuclear reactor to break ground in the U.S. in decades. In FY 2011, the Department is requesting an additional $36 billion in loan guarantee authority for nuclear power. With this authority and the $18.5 billion in existing authority, DOE estimates we

could support 6 to 9 new reactors in the next few years. We're also pursuing new technologies, such as Small Modular Reactors, which could serve as drop-in replacements at utility sites too small to accommodate the large present-day nuclear reactors. We see the possibility of significant new American export opportunities.

- *Barriers to CCS deployment must be addressed. While CCS technology available today is costly, the technical potential for CCS is considerable.* As *America's Energy Future* states: "Coal-fired plants with carbon capture (CCS) could provide as much as 1200 TWh of electricity per year by 2035 through repowering and retrofits of existing plants and as much as 1800 TWh per year by 2035 through new plant construction. In combination, the entire existing coal power fleet could be replaced by CCS coal power by 2035."[3] To help realize the potential of CCS technologies, President Obama has established an Interagency Task Force on Carbon Capture and Storage, co-chaired by the Department of Energy and the Environmental Protection Agency. The task force is looking at overcoming barriers to the widespread, cost-effective deployment of CCS within 10 years, with a goal of bringing 5 to 10 commercial demonstration projects online by 2016. The plan should address any financial, economic, technological, legal, institutional, social, or other barriers to deployment. In addition, the Department of Energy is completing an R&D roadmap beyond 2016 to further reduce the costs of carbon capture and sequestration in both coal and gas plants.

- *We need to modernize our electric grid.*

  - *Smart metering technologies can save money for consumers and reduce the need to build new power plants to meet peak load requirements*. An analysis by the Electric Power Research Institute estimates that implementation of smart grid technologies could reduce electricity use by more than 4 percent per year by 2030. That would mean annual savings in 2030 of more than $20 billion for businesses and consumers around the country.

  - *A smarter grid can facilitate a more efficient and effective use of intermittent energy from renewable sources like solar and wind power as well as enable plug-in vehicles to buy and sell power to the grid at optimal times*. We also need better batteries to provide grid-scale storage. Modernizing our transmission and energy storage systems is largely still an unsolved problem and an opportunity for America's international leadership in a key technology area.

- *We need transportation policies and technologies that cut emissions and reduce our dependence on oil.* Transforming the transportation sector is one of our most difficult tasks. Oil has a very high energy density that makes it a particularly good transportation fuel. In order to decrease our dependency on government-controlled oil supplies from the most politically fragile parts of the world, we should embark on a three part strategy:

[3] *America's Energy Future*, Summary Edition, 2009, page 51.

- *Fuel efficiency is critical.* The best near-term option for reducing dependence on imported petroleum is through greater vehicle efficiency. The Administration recently announced vehicle standards that will ultimately require an average fuel economy standard of 35.5 mpg in 2016, but we can do even better in subsequent years. The first improvements could come from improved internal combustion engines and from lighter weighting of cars.

- *We also need to develop better batteries and address other barriers to electrification of vehicles*. A battery that can last for 5,000 deep discharges and has 4 -5 times higher storage capacity and lower cost will lead to large scale penetration of hybrid electric and all-electric vehicles.

- *Biofuels, particularly advanced biofuels that can be generated from agricultural residues, can be a significant addition to our transportation fuel supply*. The Renewable Fuels Standard recently put into place requires that 36 billion gallons of renewable fuel be blended into gasoline by 2022. Of this requirement, 58 percent is to be met by advanced biofuels that achieve at least a 50 percent reduction in greenhouse gas emissions over conventional petroleum-based fuel. The National Academies study also pointed out that there are a number of potentially viable technologies which can add to our energy security and have negative CO_2 equivalent emissions. That is to say, the production and use of these fuels will not add to CO_2 pollution, but rather have the potential to provide a net ***removal*** of CO_2 from the atmosphere. All of these technologies require the capture and sequestration of carbon in the fuel making process. Plants capture CO_2 from the atmosphere, and enough carbon can be sequestered to more than compensate for the carbon released when the fuel is used.[4]

- *We need a sustained commitment to research and development.* Only R&D can yield game-changing technologies to lower costs, accelerate innovation, and drive new American industries and jobs.

  - *It is imperative that government support R&D investment*, especially at the front end when private investments would not recoup the full value of the shared social good or when a new technology would displace an embedded way of doing business. As the National Economic Council recently stated: "Certain fundamental investments and regulations are necessary to promote the social good. This is particularly true in the case of investments for research and development, where knowledge spillovers and other externalities ensure that the private sector will under-invest – especially in the most basic of research." Through a continued commitment to efforts like DOE's Energy Innovation Hubs and ARPA-E, we can marshal the nation's brightest minds to accelerate the development of new technologies.

All of these efforts will be vital to our energy future, but even these steps will not be enough in the end. To truly drive the changes we need – and create the jobs of the future – we need a policy that matches the scale of this problem and that will guide investments over a

[4] *America's Energy Future*, Summary Edition, 2009, page 71 -73 and Figure 2.16.

generation: we need to put a long-term cap on carbon that ratchets down over time. Only a cap on carbon will give industry the direction and certainty it needs.

For example, suppose you operate a utility company and have an old coal plant that is near the end of its life. A new coal plant will cost billions of dollars. If you knew there would be a cost to emitting carbon, you would have to think hard about whether the next plant should run on coal that captures the carbon emissions, or gas, or nuclear power or wind or solar energy. Eventually, there will be a cost, but if you didn't know when, you would try to limp along with the old coal plant until you knew what the costs would be and how they would be structured.

Providing certainty will drive investment and job creation today as well as the changes we need in our energy mix over the long term.

Finally, I want to mention that, as we continue our examination of energy and climate policy options, independent and impartial data and analysis, particularly from the Energy Information Administration, will become increasingly important. EIA provides vital information about where we are and where we are going, and, if we are to make sound, data-driven decisions, we must make sure EIA has the tools it needs to do this work.

Thank you again for the opportunity to testify and for holding this hearing. America still has the opportunity to lead the world in the new industrial revolution that we need but only if we make wise choices today.