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BEFORE THE
UNITED STATES SENATE FOREIGN RELATIONS COMMITTEE

ON
GLOBAL CLIMATE CHANGE: U.S. LEADERSHIP FOR A
NEW GLOBAL AGREEMENT
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Good morning, Mr. Chairman and Members of the Committee:

Thank you for the opportunity to share Siemens' perspective on technology transfer and deployment as it relates to the challenges of climate change.

I am Paul Camuti, President and Chief Executive Officer of Siemens Corporate Research. I am based at our principal U.S. R&D facility in Princeton, New Jersey, where more than 350 employees work on leading edge technologies for the energy, healthcare and industrial sectors. Siemens' U.S. revenues exceeded $22 billion in FY 2008. We employ approximately 68,000 people across all 50 states, boosting America's economy with over $5 billion in payroll to our United States employees, and over $6.5 billion in exports last year. We hold almost 12,000 patents in the United States, and our U.S. R&D spend is $1.6 billion annually.

One of the most valuable contributions we can make in the fight against global warming is providing innovative, energy-saving solutions. Of particular interest to the hearing today, Siemens' energy solutions help to meet one-third of America's total electric power generation needs every day. This includes power

from renewable wind technologies, where Siemens has invested in blade manufacturing in Iowa, gear manufacturing in Illinois, an R&D Center in Colorado, and a service team headquartered in Texas. We are also the number one provider of light rail vehicles in North America, we are an industry leader in Smart Grid technology, and we are an innovator of emerging clean coal technologies, including carbon capture and sequestration**.** We have applied strict criteria to our worldwide product offerings to identify a $25 billion environmental portfolio that will help our customers reduce their impacts on the environment. Audited, independently-certified results show that Siemens' environmental portfolio helped our customers save approximately 148 million tons of carbon dioxide emissions in 2008 alone.

My testimony will focus primarily on two areas I believe are of critical importance to America's position in the upcoming global climate negotiations. These include some of the impediments to the diffusion and deployment of existing climate change technologies as well as mechanisms needed to foster future innovation and its diffusion. I will emphasize the importance of ensuring intellectual property protection, and establishing clear pricing signals via a carbon market—elements that are key to both innovation and diffusion.

As is evident from my opening comments, there are many technologies available around the world today at various stages of commercialization which can be deployed to reduce the emissions of greenhouse gases. Industrialized countries and, increasingly, high-growth emerging economies have invested heavily in clean technologies. The U.S., Europe, Japan and other industrialized

countries have led the field in investing in climate change technologies. But China, India, Brazil, and other emerging economies also invest heavily in R&D, much of which is dedicated to clean technology. Yet there is a significant variance around the globe in the commercial availability of technologies across sectors such as power generation, building technologies and transportation. To succeed, technology transfer policy must actively facilitate the diffusion of technologies across geographies and economies with widely varying needs and absorptive capabilities, a particular challenge in the least developed countries. The success of any innovation and deployment strategy depends on how well it responds to the needs of the target market or locale. Transfer of existing, commercially available off-the-shelf technologies may be insufficient where basic infrastructure, skilled labor and on-the-ground operational know-how is lacking. Transfer of more advanced technologies will be even more problematic for the same reasons. In order to match a variety of available technologies to local conditions, detailed needs assessments can be valuable tools for identifying targeted, case-by-case solutions to unique or unanticipated problems in technology dissemination.

Mechanisms to stimulate market-based climate change projects and technology deployment and dissemination must be improved and expanded. For example, the Clean Development Mechanism (CDM), under the aegis of the United Nations Framework Convention on Climate Change (UNFCCC), offers promise as a conduit of finance and technology. The experience of the Siemens lighting company OSRAM with the CDM highlights its potential and challenges. OSRAM is currently implementing three CDM projects in India together with the

German utility company RWE aimed at supplying high-quality, energy efficient lighting that responds to low market penetration of energy-saving compact fluorescent lamps (CFLs) in the region. In this 10-year project, RWE and OSRAM share up-front costs and RWE is contractually bound to purchase the credits eventually earned through the project at a stipulated price. Conceived in 2004, the first two and a half years of the project were devoted to establishing a (large-scale) methodology that proved impractical due to amendments requested by the UNFCCC and a further one and a half years on a small-scale methodology required by the UNFCCC. At the end of 2008, OSRAM began distributing CFLs to householders in exchange for their inefficient incandescent bulbs. The project participants, Indian citizens mainly in rural areas, pay only a small fee comparable to the price of a conventional incandescent lamp. A sample population will have meters installed in their homes so that the energy savings can be measured, verified by an independent auditor, and reported to the UNFCCC. Credits will be calculated using this data. CDM credits can be earned once the lamps and meters are installed and the project is officially registered with the UNFCCC. In the first three projects, up to two million lamps will be distributed in India.

Significant administrative time and initial financial investment were required for this CDM project. One of the most time-intensive aspects of the project was development and approval of the methodology, the cost of which was borne by OSRAM and RWE. Now, any subsequent projects may use this approved methodology. To avoid delay and reduce initial investment, others may choose to deploy technology for which there is an approved CDM methodology rather than

navigating the time-consuming process of creating a new methodology for new innovation. Our experience shows that a more streamlined administrative process and a full-time CDM staff will be critical to the success of the CDM process.

Private capital plays a critical role. It is crucial to put into place a framework that will stimulate the private investment required to continue to pioneer new technologies. The private sector accounts for the majority of green research and development expenditures today and remains the most cost-effective source of new technology development. Private trade and investment typically involves local partners, local stakeholders and local workers. Private investment can help to train local workers and facilitate development of local supply chains.

Siemens, for example, makes this investment on a global scale, investing some $6 billion annually on new technology R&D as well as some $900 million in venture investments. Our corporate technology teams operate in open innovation networks with universities, government labs and supplier resources in diverse, collaborative teams that are located in technology hotspots around the world including Germany, Austria, Russia, India, China, Japan and multiple locations here in the U.S. This global approach gives us access to world class talent and, additionally, a firsthand look into the regional needs of our customers. We identify promising new technologies through a technology road-mapping process. We then incubate these technologies and develop proof of principles, prototypes, followed by scale-up and deployment strategies which are essential to moving innovation from the lab to the commercial market.

A good example of the process in action is our Technology To Business (TTB) center in Berkeley, California. Since TTB's founding in 1999, we have worked with many new technologies, hired innovators and transferred new ideas to our businesses. The work of TTB has led to the founding of 12 new companies in which Siemens maintains a minority investment. As an example, Sensys Networks, Inc. is a leader in wireless vehicle detection technology. Working closely with innovators at the University of California at Berkeley, our team developed wireless sensor technology to simplify the detection of vehicles. These sensors, now deployed in 30 states and 20 countries, are a key element in intelligent transportation systems, resulting in reduced congestion, travel times and greenhouse gas emissions.

The deployment and lifecycle of many of these technologies is often 20 to 30 years or more. Policy measures that create clear, predictable, long-term economic incentives are critical to stimulating private investment and to enabling the provision of capital and technology in both the developed and developing world. Public policy can help manage the technical risks through large scale demonstration projects and loan guarantees.

An example of Siemens' cross-border R&D collaboration is in the area of high performance, low-energy buildings. It is estimated that buildings account for some 38% of greenhouse gas emissions. Research conducted by the Intergovernmental Panel on Climate Change (IPCC) estimated that approximately 30% of the baseline of carbon dioxide emissions in buildings could be mitigated in a cost effective way. (See *Sectoral Trends in Global Energy Use and Greenhouse*

Gas Emissions, Price, L, *et al,* Lawrence Berkeley National Lab 2006, and IPCC 2007 Assessment Report, Working Group 3, Mitigation). Building performance currently varies by more than 50% from best-in-class to average. At Siemens, we have been involved in a substantial research project with partners in Switzerland, the University of California at Berkeley, Tshingua University (China) and our own labs on several continents. This global project team has developed a high performance building concept. The challenge now is to prove the concept and make it commercially viable. Here, multinational public funding could provide the necessary resources for a demonstration project and ultimately widespread implementation.

While we strongly believe in the role of the private sector in the development and deployment of technologies related to climate change, it is clear that the role of the public sector is also extremely important, particularly in providing substantial government and multi-lateral funding. The transfer, development and deployment of technology is not painless, automatic, nor without cost. From Siemens' perspective, technology deployment is based on the cost attractiveness of the technology in relation to the alternatives as well as mitigating the risks. The Stern Review has concluded that funding towards deployment alone should increase two to five times globally from current levels of around $33 billion per year. (*The Economics of Climate Change: The Stern Review,* Nicholas Herbert Stern, 2007).

To this must be added substantial funding increases necessary to support basic research and innovation at the speed required to meet goals for reduction in

greenhouse gas emissions and to make sure that research takes place even in those situations where a particular technology may not be commercially viable. Public-private partnerships, technology cooperation, and funding for joint research institutes can all contribute to meeting the demand for technology innovation, deployment and transfer. Major infrastructure investments must be made, for instance, to facilitate the deployment of renewable electricity and Smart Grid technology. Price signals in the market need to be stable and predictable over the long term in order to spur investment in these and other clean technologies. Fiscal incentives also play an important role, but need the same long term focus to enable transfer of technologies with 20 to 30-year lifecycles to the developed and developing world.

I would also like to direct the Committee's attention to the fundamental role of intellectual property (IP) rights as they relate to technology transfer and deployment as this has become an area of increasing discussion lately. IP is a proven means of incentivizing the R&D needed to generate not only technological breakthroughs but also the continuous stream of innovation that builds upon and improves existing ideas. By allowing innovators to realize the value of their R&D investments, IP stimulates investment in innovation that otherwise might not occur. Importantly, IP provides a legal framework coupled with economic incentives that encourages companies and individual innovators to share and exchange their technology and know-how, rather than guarding their inventions and innovations closely as trade secrets for fear of the risk of misappropriation via compulsory licensing or unauthorized use. Intellectual property protection has helped foster

not only technology development, but robust competition in deploying climate change solutions in developed and developing countries. There is no better system to incentivize innovation globally than the guarantee provided by robust IP protection.

Finally, I would like to emphasize the role of a well-designed carbon market. Such a market will play a crucial role in providing incentives for all businesses and households to become energy efficient. The United States, and in fact the world, needs a framework that includes a mix of short-term goals and incentives for immediate action, as well as mid and long-term goals and incentives to provide certainty for investment. Innovation is driven not only by smart ideas but also by a market hungry for technology.

Siemens joined the United States Climate Action Partnership (USCAP), a coalition comprised of our business competitors, customers in various sectors and friends in the environmental community to develop recommendations for a carbon market framework. Within the recommendations contained in USCAP's *Blueprint for Legislative Action* released in January of this year is a set of International Principles relevant to the hearing today.

First, USCAP believes that the U.S. demonstrating its leadership by adopting mandatory U.S. climate policy is essential for establishing an equitable and effective international policy framework for action by all emitting countries. In addition, the mechanisms that Congress establishes as part of domestic legislation can play a crucial role in encouraging broad international action, and thus, creating markets for technology. For instance, provisions and criteria for linkage of U.S.

systems to other cap and trade systems can facilitate a strong incentive for emerging economies to adopt measurable and verifiable commitments to cap and reduce their emissions in order to gain access to the U.S. greenhouse gas market.

In conclusion, I would like to underscore that the establishment of technology transfer provisions related to climate change are critical to addressing these challenges. Siemens' focus on our environmental portfolio of products, services and technologies and our experience as part of the U.S. scientific and engineering community also makes us believe strongly that America can enhance its technology leadership by supporting the innovation engine here at home. We are in a global competition; the emerging, high-growth economies have been and are continuing to invest aggressively in their technological infrastructure. In addition to a global agreement on climate change, spurring investment in--and reducing the risk of--technology development, as well as the deployment of existing environmentally-friendly technologies, will help new businesses to grow and thrive here in the United States.