

House Select Committee on  
Energy Independence and Global Warming

Hearing on “The Renewable Energy Economy: A New Path to  
Investment, Jobs, and Growth”

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Written Testimony of  
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Mr. Chairman and members of the Committee, I am Victor Abate, Vice President of Renewables at GE Energy. I appreciate the opportunity to testify on the renewable energy economy, its potential to stimulate investment and job creation, and the critical importance of government policy in realizing this potential.

GE Energy is a power generation technology leader with more than 100 years of industry experience. Our global team of 36,000 employees operates in over 700 sites in more than 100 countries. Our power generation business is a diverse portfolio consisting of thermal, gasification, nuclear, and renewable energy technologies such as wind, solar, and biomass.

With energy demand increasing dramatically and growing worldwide pressure to address greenhouse gas emissions, GE believes that renewable energy must become an integral part of the 21<sup>st</sup>-century energy mix. GE Energy contributes the largest number of products to GE’s ecomagination initiative, a company-wide environmental commitment that includes an increase in “green” technology R&D from \$700M in 2004 to \$1.5B by 2010. This testimony will focus on wind, currently the most commercially viable renewable energy technology.

### **Renewable Energy Industry Growth**

The United States, with its abundant domestic renewable energy resources, is well positioned to take advantage of this growing

industry. A supportive policy environment has enabled the US to become the global leader in new wind power installations. Last year the US added 5,244 MW—over 25% of the world total. The US installed base of wind power grew 45% and totals 16.8 GW in 34 states, accounting for over 1% of the nation's electricity supply and powering over 4.5 million homes. Wind power accounted for 30% of all nameplate generation capacity added in the United States last year, second only to natural gas. The US is on pace to surpass Germany and become the nation with the largest installed base of wind power by the end of 2009.

The growth of wind energy is creating real economic, energy security, and environmental benefits, according to studies by the American Wind Energy Association. Last year the industry spurred \$9B in investment and created more than 50,000 jobs. Much of this job growth has occurred in areas hardest hit by manufacturing job losses. The installed base of wind power also displaces 3% of natural gas consumption and avoids the emissions of 28 million tons of carbon dioxide from traditional power plants—equal to taking 6 million cars off the road.

The solar industry is also expanding rapidly. According to the Solar Energy Industries Association, the US grew by 125%, adding 314 MW of solar power in 2007, stimulating some \$2B in investment and creating over 6,000 new jobs—not only in sunny states of California and Arizona but also in the less sun-endowed states of Massachusetts and Michigan.

## **GE and Renewable Energy**

The policy-driven growth of wind in the US has helped GE expand its wind business revenues from less than \$1B in 2004 to more than \$6B this year. Over 8,000 of GE's 1.5-megawatt wind turbines have been installed worldwide, a number expected to reach 10,000 by the end of this year.

Since entering the wind industry in 2002, GE has invested over \$700M in technology, increased its wind turbine production 6-fold, and tripled its US wind turbine assembly sites. Renewable jobs at

GE have grown to more than 2,500. These include manufacturing jobs in Pensacola, FL; Greenville, SC; Salem, VA; Erie, PA and Tehachapi, CA as well as non-manufacturing professional jobs at our headquarters in Schenectady, NY. Last October we announced plans to add 500 more jobs in Schenectady in Wind Engineering, Project Management, and Services.

GE has also tripled the number of its suppliers, who now account for 2,000 US jobs and cover 15 states. These suppliers provide wind components and subcomponents such as blades, towers, bedplates, nacelles, gearboxes, generators, pitch and yaw bearings, hub castings, and cables.

GE's presence in the US wind segment gives us insight into its future growth, and we see significant job creation potential over the next five years. We estimate that sustaining a 30% growth rate over the next five years would triple the size of the U.S. wind industry and associated jobs.

### **Technological Advances and Challenges**

To realize the potential of wind power, we must meet the three challenges of technology, supply chain, and policy. Technological advances have been central to the growth of wind. Innovations in turbine design have lowered wind's cost of electricity by more than 80% since 1985, primarily through increases in power output and rotor size to optimize energy capture. In 1985, the average US wind turbine was 100 kW with a 17-meter rotor diameter. When GE entered the wind industry in 2002, we inherited a 1.5-megawatt turbine with a 70.5-meter rotor.

Since 2002, we have made major technology and supply chain investments to further improve turbine efficiency by increasing the rotor diameter of our 1.5-megawatt turbine to 77 and 82 meters. This has increased capacity factor, or turbine efficiency, by 9 points. As a point of reference, a one-point increase in capacity factor over the US wind installed base could produce enough electricity to support 150,000 average US households.

GE has also invested to improve the reliability of our turbines. In 2002, availability of then state-of-the-art wind turbines was less than 85 percent. Technology advances in remote monitoring and diagnostics and the utilization of GE reliability modeling have increased the reliability of our wind turbines by 12 points of reliability. A one percent increase in availability over the US wind installed base could produce enough electricity to support 50,000 average US households.

GE is focusing on a variety of technology challenges to continue improving the competitiveness of wind. Examples include blade designs incorporating lightweight materials such as carbon fiber; grid integration technologies that enable wind projects to behave like a conventional power plant; and software to optimize the siting of our turbines to maximize energy capture.

GE has also focused on technology advances in solar energy since entering the industry in 2004. Cell efficiency improvements, molded wafer design, and thin-film technology are among the innovations currently being pursued. GE is also heading an alliance under the Department of Energy's "Solar America" program to further drive down the cost of solar electricity.

## **Manufacturing Challenges**

Meeting growing demand for renewable energy presents enormous challenges and opportunities for manufacturers. The American Wind Energy Association and Department of Energy have identified a long-term target of 20% wind power by 2030. Yet even a 10% penetration by this date would require a five-fold increase from 2006 annual capacity of key components such as turbines, blades, and towers.

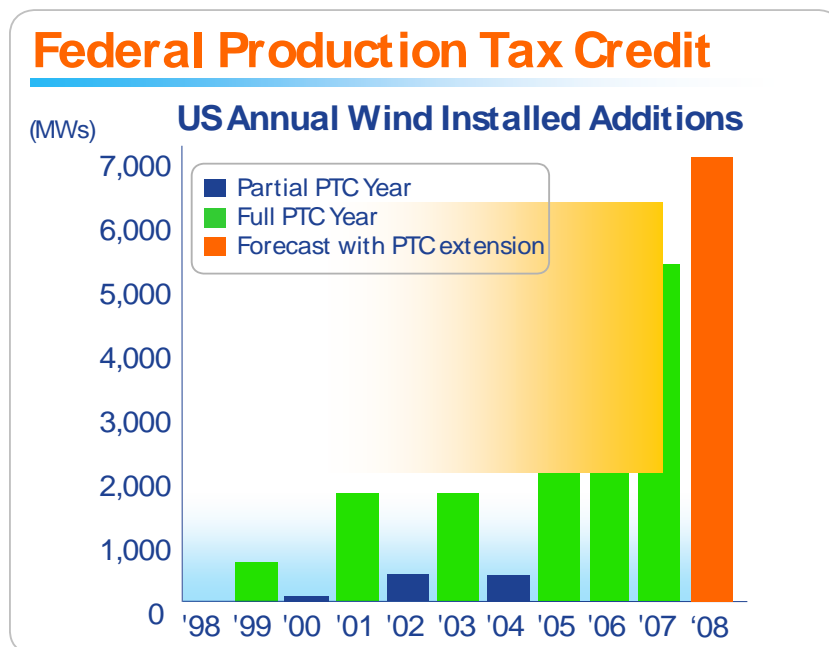
The challenge for industry will be to expand capacity while mitigating the supply chain bottlenecks that have previously impacted the industry. At GE, we are driving quality fulfillment by applying our Lean Manufacturing and Six Sigma expertise, a fully integrated master production schedule, and a rigorous process of auditing and certifying our suppliers. Last November, we celebrated with our suppliers the opening of two new blade supplier

manufacturing facilities for our 1.5-megawatt turbine in North Dakota and Iowa, which will create approximately 1,250 jobs.

## Policy Challenges

The most critical challenge facing the US wind industry is policy uncertainty. Long-term, stable, predictable incentives encourage innovation and give technology manufacturers and suppliers the confidence to invest in expanding capacity to meet demand. Unpredictable policy, conversely, stunts technology investment and demand forecasting, limiting innovation and contributing to supply chain constraints.

A clear illustration of the importance of stable, long-term, predictable policy is the historical “boom-bust” pattern of the US wind segment resulting from the “on-again, off-again” nature of the production tax credit. When the production tax credit expired at the end of 1999, 2001, and 2003, wind power installations declined by 73-93%. By contrast, the repeated extensions in 2005 and 2006 have stabilized the policy environment, establishing the United States as the world leader in annual wind power installations and stimulating investment and jobs.



Source: American Wind Energy Association 2007.

Expiration of the tax credit would have a devastating impact on the US domestic wind industry. A recent report estimates failure to extend the wind production tax credit would cause a 90% drop in wind power installations, resulting in \$11.5 billion of lost investment and a lost employment opportunity of 76,000 jobs in 17 states in 2009 alone.<sup>1</sup>

Wind Employment Impacts	
State	Lost Employment Opportunity Without PTC
Texas	23,139
Colorado	10,625
Illinois	8,938
Oregon	7,297
Minnesota	6,304
Washington	4,744
Iowa	5,254
North Dakota	2,343
Oklahoma	2,468
Pennsylvania	1,617
California	809
Missouri	976
New York	696
South Dakota	978
Maine	472
Hawaii	196
Massachusetts	24

Source: Navigant Consulting.

At a time when the United States is seeking to stimulate its economy, investment and jobs that might have been created in the United States could instead shift overseas to Europe and China, which are strengthening their wind policies. The European Union is developing a Binding Directive of 20% renewable energy by 2020. China, the third-largest wind segment in 2007, has established an aggressive national renewable energy standard that, if met, could

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<sup>1</sup> Navigant Consulting, *Economic Impacts of the Tax Credit Expiration*, Final Report, Prepared for the American Wind Energy Association (AWEA) and the Solar Energy Research and Education Foundation (SEREF), February 13, 2008.

surpass the United States in wind power by the middle of the next decade.

Failure to extend the renewable tax incentives would also cause the US to forgo long-term export opportunities. The connection between a stable domestic policy and a vibrant export sector for renewables is exemplified by Germany, whose incentive system has created the world's leading installed base in a country with a moderate wind resource. Wind power technology is the country's second-leading export industry after automobiles—a fact that US policymakers might consider as they explore options for increased job growth in depressed manufacturing regions.

While this testimony focuses on renewable tax incentives, it is important to draw attention to other forms of national and state policies that can sustain the growth of this industry. More than half (29) of the United States now have a Renewable Portfolio Standard, which requires utilities to devote an increasing percentage of their retail sales to renewable energy. These state policies have been the “fuel” to complement the wind PTC “spark”: RPS states accounted for 95% of the wind power installed in 2007. GE has shared its views with several state governments that are considering the adoption of an RPS. In addition, a number of states and regions are beginning to develop climate change programs, some incorporating cap-and-trade policies.

## **Conclusion**

In summary, GE believes that the United States is well positioned to benefit from the growth of the renewable energy industry. However, continued growth of this industry is dependent on a stable, predictable policy environment. We urge the US Congress to act immediately to extend the existing production tax credit for wind energy. While the focus of this testimony has been the wind energy industry, we also strongly support the extension of investment tax credits for solar energy, which are also set to expire at the end of 2008.

Thank you for the opportunity to present this testimony. I look forward to your questions.



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Victor Abate is vice president of GE Energy's Renewables business, a leading global provider of wind and solar energy products and support services. He assumed this position in November 2005, and he is based Schenectady, New York.

GE Energy is one of the world's leading suppliers of renewable energy technology. With manufacturing and assembly facilities in Germany, Spain, China, Canada and the United States, the company's current renewable product portfolio includes wind turbines with rated capacities ranging from 1.5 to 3.6 megawatts, and solar electric power systems for on and off grid applications. The company's renewable installed base also exceeds 10 GW.

Prior to his current role, Mr. Abate was vice president of technology for GE Energy's power-generation segment, which includes gas, steam, wind, solar and hydro-turbine generators, gasification technologies and integrated gasification combined cycle.

Mr. Abate began his GE career in 1990 and has held several management roles in engineering, services, production and quality. In 1996, he led the large turbine generator business as the quality leader and was soon appointed general manager of generator technology. In 1999, Mr. Abate assumed responsibility in leading the gas turbine volume ramp in GE's power generation segment and in late 2000, he was appointed general manager of steam turbine technology. Mr. Abate became an officer of GE in 2003.

Prior to joining GE, Mr. Abate worked for Allied Signal and Zurn Industries and was responsible for mechanical drive technology and new product development.

Originally from Williamstown, Massachusetts, Mr. Abate holds bachelor's and master's degrees in mechanical engineering from Rensselaer Polytechnic Institute and Union College respectively, he also holds an M.B.A. from Rensselaer Polytechnic Institute.