Senate Finance Committee

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Written Testimony of
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Mr. Chairman and members of the Committee, I am John Krenicki, President and CEO of GE Energy ("GE"). In response to the committee's interest in renewable policies in place overseas, I appreciate the opportunity today to offer an overview of European and Asian programs currently driving the deployment of renewable energy technologies.

GE is a power generation technology leader and has been in the energy industry for over 100 years. We currently have over 700 sites operating in more than 100 countries, and a team of 36,000 employees. Our diverse product portfolio consists of steam turbines, gasification systems, gas turbines, civilian nuclear, solar, biomass and wind technology.

We commend the Subcommittee for holding this hearing today to examine the advantages and disadvantages of renewable policies in the EU and Asia. We also appreciate the Committee's early attention to mechanisms – such as the Production Tax Credit (PTC) – that are effectively driving further growth in the use of renewable energy resources in the United States.

Overview

The renewable energy industry is truly a global industry, and there are varying programs in place around the world to require or encourage greater use of renewable energy. Because GE's business is global, we have first-hand experience with programs in Europe and Asia. In preparation for this hearing, we reviewed programs in the EU and several of its member states and in the leading Asian markets – China, India and Japan. Our objective was to share with the Committee information that may help you to identify what, if any, of the approaches adopted overseas might be applied in this country.

Our conclusion is this: the increase in renewable generation in Europe and Asia demonstrates that government incentive programs do work. However, there is no "silver bullet" to be found in these programs that could be easily replicated in the United States. We believe that Congress has already identified an efficient and effective incentive for the growth of renewable generation: the renewable energy production tax credit.

One issue to bear in mind when comparing incentive systems is that the structure of the U.S. electricity market differs from the electricity sector in other countries. In Europe and Asia, many utilities are owned by the national or state governments, which can set the price for power. The U.S., in contrast, features a wholesale market in which power generators compete for power sales, and this competition in turn enables retail electricity providers to offer the lowest prices to their customers. While wholesale market issues are subject to Federal jurisdiction, states have jurisdiction over retail prices, and some power suppliers are regulated in several different states. The federal Production Tax Credit (PTC) works well in this system because it is broadly available for new generation.

There are, however, certain aspects of other systems that can help to improve the US PTC approach. One very important lesson that we can take from the European experience is the importance of long-term and consistent incentives. This is one area in which U.S. policy has not been optimal, as the 'on again, off again' nature of the PTC demonstrates.

Another lesson to be learned is that an incentive must be set high enough to be effective. While the "feed-in tariff" mechanism that is in place in Europe has been successful in spurring new renewable generation, it has been less effective in China, which we believe is in part a factor of the level at which the tariff is set. Here again, the U.S. has gotten it about right with the production tax credit. The credit has been high enough to stimulate substantial investment while not putting an undue burden on electricity users.

For financial incentives to work, they must also be paired with sufficiently mature technology. Most of the experience we have with successful incentive programs relates to wind technology. For solar power generation to be price competitive with traditional power generation technologies, technology innovations and even

breakthroughs must continue. GE believes that for this technology to realize its maximum potential, long term material science advancements in cell thickness and efficiency, as well as energy yield must take place. Therefore, we believe that for solar incentive programs to be successful at this point in the technology development cycle, they should be investment based rather than production-based. Also, we recommend they be coupled with government sponsored research and development programs until this technology reaches sufficient maturity to be near price competitive with traditional technologies.

Finally, because this is a global market, we believe it is appropriate for the Committee to consider the effect of tariff barriers on the growth of the renewable energy industry. This type of policy, as well as preferences for particular technologies that are built into some incentive programs, can have the effect of limiting the growth in renewable energy generation.

European Union Renewable Energy Drivers

In 2006, GE estimates the EU led the world with 71 gigawatts (GW) of installed renewable capacity, of which wind energy represented 48GW. By comparison, we also estimate the US had 26 GW of installed renewable capacity in 2006, of which wind energy represented 12 GW. To put this in perspective, one gigawatt of wind is enough energy to power nearly 300,000 average U.S. homes.

Earlier this year, the EU Heads of State adopted a binding target of obtaining 20% of primary energy from renewables by 2020. This represents a sizeable increase from the EU's already challenging 2010 target of 12.5%. The European Renewable Energy Council predicts that reaching the new renewables target in 2020 in the electricity sector would require an installed base of 180GW of wind, 35GW of solar and 54GW of biomass generation.

While the 20% by 2020 and 12.5% by 2010 targets for renewable energy are EU-wide, they are implemented via differentiated national targets for each of the EU member nations. Each member state adopts its own system for achieving its target.

Frameworks being used by the EU member states include the following:

1. Feed-in Tariff

As of April 2007, 16 out of the 27 EU countries utilized a Feed-in-Tariff (FIT) system, under which the electricity supplier or the utility is required to pay a fixed price per kwh for renewable electricity directly to the generator. The leading countries in the EU in terms of wind installations -- Germany, Spain and Denmark -- have used this scheme consistently and successfully for more than eight years to accelerate investments in wind energy capacity.

In Germany, the FIT is worth approximately 8.2 Eurocents per kWh to a generator, which would translate into a payment of approximately 10.25 US cents per kWh. In Spain, the incentive is worth 6.8 €c/kWh ($0.085 US); in Denmark, the FIT is approximately 5 €c ($.0625US). Compare this to the PTC, which is currently $0.019 per kWh. Because the US incentive is provided in the form of a tax credit, rather than a payment from an electric supplier, the PTC does not impose as large a burden on electricity consumers as the FIT system does.

The benefits of utilizing a FIT system include the fixed price, which increases certainty for investors and has increased Independent Power Producer ownership of generation. The FIT generally is set well above the otherwise applicable market price. The additional costs of the FIT vs. the power pool price are distributed among all electricity consumers.

At the end of 2006, approximately 55% of global wind installations benefited from the FIT system. This is a relatively simple system, which clearly has been successful in promoting technologies that range from those still far from being competitive with fossil fuel, such as solar, to those that are approaching mainstream status. One of the real benefits of the FIT is its predictability and long-term duration. Because of this, manufacturers are able to invest in their production capacity. This stable market at home has enabled European companies to become major players, for example, in the global wind energy market. With the EU agreement on extension of the renewable mandate to 2020, suppliers have the additional certainty they need to be able to make investments in production capacity.

While the fixed price is a benefit that helps foster growth, it has a potential drawback that the FIT price may not keep pace with rising equipment costs in the scenario of an inflating raw material market. On the other end of the spectrum, FIT prices can sometimes be set at higher levels than required to meet policy objectives, and this can impose unnecessary additional costs on all energy users. The balance is difficult to strike and European policymakers have tended to err on the side of higher prices in order to ensure expansion of their domestic renewable capacity. European governments generally review their FIT levels on a regular basis and adjust them on a prospective basis to reflect changes in technology and costs.

2. Renewable Obligation Credit

Instead of a financial incentive to encourage market penetration of renewable technologies, other European nations have adopted an approach that uses technology mandates to create a market. The main countries in Europe utilizing a Renewable Obligation Credit (ROC) program are the UK, Poland and Italy. These renewable portfolio standard or RPS programs generally require utilities to purchase or generate a certain percentage of their portfolio from renewable energy, and provide for trading among covered entities.

The RPS system has several potential advantages. It has resulted in increased commitments from utilities to incorporate more renewables into their energy portfolios and the approach uses market mechanisms to achieve policy goals at a reduced cost.

However, from the standpoint of a technology provider, there is a concern that the RPS system can also result in market pricing favoring the least expensive technology. In general, the ROC approach has been slower to emerge as a strong driver of renewable deployment, though countries such as the UK remain committed to using and refining this approach.

Asian Renewable Energy Drivers

Together, China, India and Japan had 56 GW of renewable capacity on line in 2005. However, each country uses different mechanisms to foster renewable energy growth:

1. China

In 2005, the National People's Congress (NPC) of China passed the Renewable Energy Law. That law went into effect on January 1, 2006. It sets a goal of 10GW of renewables by 2010, and 50GW by 2020. Wind is expected to comprise over 50% of the new additions.

At present, China utilizes a feed-in-tariff, combined with a government concession, to facilitate renewable growth. The government concession is intended to leap-frog the siting issues that often pose a challenge for renewable energy projects in the United States, by identifying government-approved project sites and then requesting bids for project development.

China faces major challenges with its renewable energy scheme. At present, the feed-in-tariffs for wind projects are too low to effectively incentivize the widespread adoption of renewable energy on the desired scale. The current concession approach of awarding wind projects to the lowest bidder makes it difficult to bring more efficient turbine technology to the market, thus reducing the efficiency and total output of renewable energy generation. Most wind turbines supplied in China today are manufactured by local Chinese firms, but the Chinese renewable energy industry itself is calling for improvements in concession/feed-in tariff system to drive more rapid deployment.

2. Japan

In 2003, the Japanese Diet passed legislation creating a Renewable Portfolio Standard ("RPS Law"). The RPS Law set a target that electric power producers should use " New Energy" for 1.35% of total power generation by FY 2010.[1] New Energy includes wind, solar, biomass, geothermal power and small hydraulic power (less than 1,000 kW). As a point of reference, utilization of New Energy in FY 2005 was 0.44 %.

In 2007, the Ministry of Economy, Trade and Industry ("METI") raised the target for electric power producers to use renewable and other New Energy for 1.6 % of total power generation by FY 2014, a 30 % increase

[1] "New Energy" is generally energy technology which is at or near the technically practical stage, but which is not widely used, and which is especially necessary for introducing alternatives to oil.

over the 2003 target. A penalty is levied on power producers for non-compliance, which provides a significant incentive for companies to use New Energy.

Solar energy receives double credit in meeting the energy usage requirement. METI has a target that wind power and solar power have approximately 50 % and 10 % shares, respectively, for the usage of New Energy in 2014.

In addition to the RPS law, METI provides a subsidy to power producers using New Energy/renewable energy. The subsidy covers a maximum of one-third of all initial costs to build a power generation plant using New Energy, excluding costs for land, buildings and operation.

In the Japanese wind power equipment market, foreign companies had an approximately 80% market share in 2006 because the combination of incentives allows buyers to take into account the advantages of high technology equipment. GE and other global wind turbine suppliers strongly support a level playing field both for all wind power equipment suppliers.

3. India

The current regulatory environment for renewables in India is characterized by three interventions - tax incentives (investment tax credit and tax holiday for power generation), Renewable Portfolio Standards (RPS) and preferential tariffs. The combination of these programs and policies has led to the fourth largest installed base of wind power in the world, although the system has its imperfections.

The dominant renewable incentive in India today is an Investment Tax Credit system. Additionally, there is a 5-year income tax holiday on power generation from renewables. The investment tax credit system rewards initial investments in a project rather than energy production. Because the tax credits are applied at the time of investment, many of the wind farms that have been constructed with the benefit of the investment tax credit are out of commission or under-performing as compared with their electricity output potential. This illustrates an incentive that is not having the desired result of actually increasing the amount of renewable energy used to produce electricity. The system does not encourage manufacturers to advance the reliability and

efficiency of wind technologies. However, a production-based incentive that appropriately rewards advancements in technology and capability, such as the US PTC, is more appropriate for a more mature technology such as wind.

The Indian government is considering a policy shift from an investment tax credit to generation-based incentives, similar to a production credit. This has the potential, if done in the right manner, to incentivize higher quality, higher efficiency wind turbines and larger scale wind power development and pave the way for consolidated growth in the independent power production sector in India.

Today, almost half of India's 28 states have either a RPS or preferential tariff program in place; six states have implemented both. These measures have helped to maintain the momentum for growth in the renewable energy industry. Preferential tariffs range from US$0.050-$0.088/kwh for wind power. Currently, these policies yield project opportunities in specific states where the political will for wind is strongest.

The Link Between Technology Maturity And The Effectiveness Of Incentives

The wind production tax credit has been effective and efficient in this country because wind energy technology has matured sufficiently to make its widespread commercial deployment practical. While it might look like it to some, wind is far from an "overnight success." It has taken approximately 25 years to move down the wind energy technology curve.

Today, wind and solar energy technologies are not equally mature. Similar to the wind industry two decades ago, solar is at the beginning of the technology life cycle. Major technology advancements are needed to drive down the cost of electricity significantly to help make solar energy competitive with other power generation technologies. In order for federal and state incentives to become most effective for solar energy, we believe breakthroughs in solar technology and enhancement of the supply chain are needed first.

The solar industry is investing in new plant and equipment as the technology changes and markets grow. It is important to continue

incentives for this investment. As I have testified previously, GE supports S.590 and S.550 and recommends that Congress extend the 30% Federal investment tax credit through 2016 for residential and commercial solar installations. GE also supports changes to the credit as proposed in S. 590, which we believe will make the credit an even more effective incentive for deployment of the technologies that are ready now.

Trade Measures

As the Committee looks for ways to accelerate the deployment of cleaner energy technologies, one mechanism immediately available to governments is to eliminate customs duties on cleaner energy power generation equipment. The United States Trade Representative has supported this initiative in the World Trade Organization, and the European Union has also endorsed the idea in general terms. Applied tariffs on wind turbines and components in most countries are in the 2.5 to 10 percent range. The United States is at 2.5 percent. These tariffs represent an additional cost that governments impose on the types of projects on which they are simultaneously offering incentives to support. In addition to renewable products, GE would support tariff elimination covering all our ecomagination energy products, including gas turbines, wind turbines, biogas solutions, solar and Cleaner Coal IGCC.

While many energy products are manufactured close to final destinations, it is not practical to manufacture in all countries. Tariff elimination in all of those countries will help to cut project costs and improve the rate of technology deployment. We recommend that the Committee support this initiative.

Renewable Energy and Job Growth in the United States

GE foresees that one of the benefits of increasing the use of renewable energy in the United States will be growth in good quality jobs in technology development, engineering and services. Additionally, we believe that growth in the U.S. supply chain could open opportunities for suppliers to provide component parts globally.

The wind industry contributes directly to the economies of 46 states, with power plants and manufacturing facilities that produce wind

turbines, blades, electronic components, gearboxes, generators, and a wide range of other equipment.

In 2004, the Renewable Energy Policy Project (REPP) released a study that suggested boosting U.S. wind energy installations to approximately eight times today's levels could create 150,000 manufacturing jobs nationwide. The REPP also states that some 90 companies in 25 states currently manufacture wind turbine components, and over 16,000 companies in all 50 states have the technical potential to enter the wind turbine market.

The increasing public policy focus on renewable energy has spurred growing demand for wind power. To meet this demand, GE has manufacturing facilities in Tehachapi, CA, Pensacola, FL, and Greenville, SC. We also plan to add a new service center at our facility in Schenectady, New York. This new service center alone will create approximately 70 – 100 new management positions in product strategy and customer service. As demand for wind continues to grow, we expect to explore other opportunities. We believe wind and solar energy are likely to be among the largest sources of new manufacturing jobs worldwide during the 21st Century.

Conclusion

There is strong, global demand for renewable energy technology. Approximately 38 countries have renewable targets and various programs in place to foster further investments in renewable energy.

We believe U.S. Renewable Energy Production Tax Credit is a cost-effective approach that should be maintained to stimulate use of renewable energy in our country. However, we believe a long-term focus and stable policy environment are still needed and support the WTO initiative to eliminate tariffs for renewable products.

Thank you again for the opportunity to testify. I would be pleased to answer any questions.