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**Oversight Hearing on Renewable Energy Opportunities
and Issues on Federal Lands
Before the
Energy and Minerals Subcommittee
House Natural Resources Committee
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Chairman Costa and members of the subcommittee, thank you for the opportunity to address you today. My name is Randall Swisher and I serve as Executive Director for the American Wind Energy Association (AWEA), the national trade association for the U.S. wind energy industry, based here in Washington, D.C.

My testimony will cover four major topics:

1. The current status of the wind industry in the U.S.;
2. The potential contribution of the wind industry to U.S. electricity needs over the next few decades;
3. The major barriers to achieving that potential, and
4. The role of federal lands in achieving that potential, as well as the experience of the wind industry in working with agencies under this Committee's jurisdiction.

Current Status of the Wind Industry

The wind industry is one of the fastest growing sources of electricity generation in the world, with global manufacturing capacity for wind turbines having expanded from annual production of 368 megawatts (MW) in 1994 to 11,200 MW in 2005. This worldwide average annual growth rate of 36 percent shows no sign of diminishing in the foreseeable future, and has been driven by a number of factors, especially competitive economics, the environmental benefits of wind, and utility interest in being able to rely upon a diverse mix of electric generating options.

After many years of limited growth through the 1990s, the wind industry has begun to come of age in this country, and U.S. wind electric generation has more than quadrupled in the last six years. In fact, in the last two years, more new wind generating capacity (4,885 MW) was installed than in the industry's first 20 years (1981-2000).

The U.S. wind energy industry enjoyed a record year in 2006, installing 2,454 megawatts (MW) of new generating capacity, making wind one of the largest sources of new power generation in the country and a mainstream option with which to meet growing electricity demand. Last year the industry grew 27 percent in the U.S., bringing the industry to a total installed capacity of 11,603 MW at the end of 2006, with commercial-scale projects spread over two dozen states. Energy production will vary from site to site based upon the strength of the wind resource, but on average, one megawatt of wind power produces enough electricity to serve 250 to 300 homes each day.

This year will be another record, with approximately 3,500 MW of new wind capacity going on line. In fact, since 2005, the U.S. has held the status of being the largest single annual market in the world for new wind generating capacity.

Despite the rapid growth in the market for wind, we have not taken full advantage of the economic development potential of this technology. A lack of consistent policy support in the U.S. has been a much greater deterrent to investment in manufacturing than in project development. Because of the policy uncertainty, manufacturers have been slow to invest in U.S.-based turbine manufacturing capacity, and only one of the top ten wind turbine manufacturers in the world is based in this country. Although the U.S. was a pioneer in wind technology, establishing the world's first wind farms in California in 1981, tax incentives for wind power were suddenly dropped in 1986, and most of our nascent manufacturing capability disappeared at that time. We largely ceded policy leadership and market dominance to European countries. Today, about 70 percent of the world's installed wind capacity is to be found in Europe, and seven of the ten leading global turbine manufacturers are based in the three countries of Denmark, Germany and Spain.

But last year's extension of the wind production tax credit through the end of 2008 provided an important signal to the market, and because of a strong interest among U.S. electric utilities in wind, and this country's almost unlimited wind potential, there is movement to establish manufacturing facilities in the U.S. The potential for U.S. jobs is enormous. In fact, last week, before the Senate Finance Committee, Jon Krenicki, President of GE Energy stated: "We believe wind and solar energy are likely to be among the largest sources of new manufacturing jobs worldwide during the 21st Century."

New jobs can be expected from other sources besides major turbine manufacturers such as GE. Manufacturers of components such as wind turbine towers, blades and generators, for example, will also provide an enormous number of jobs. In addition, rural America will be rewarded with a steady number of stable, well-paid jobs in operations and maintenance from the wind power plants popping up throughout the Great Plains and other rural areas.

As the U.S. market for wind has expanded, it has attracted well-capitalized global energy and financial companies with the capability to continue driving the industry's growth – manufacturing companies such as General Electric, Siemens and Mitsubishi; project developers or owners such as FPL Energy, Shell, BP, American Electric Power and AES; and international companies such as Babcock & Brown, Iberdrola and Electricite de France.

The surging interest in wind power among electric utilities has been sparked in part by increasingly strong technical performance by modern wind turbines. Technology has been steadily improving, including rotor blade airfoils specially designed for wind turbines, variable-speed generators, power electronics and sophisticated computer modeling of design changes. The scale and efficiency of wind turbines has progressed markedly, and new, larger turbines (1 MW to 3 MW each) generate 120 times as much electricity as 1980s models at one-fifth the cost per unit of output. Performance data from almost 5,000 MW of operating wind turbines in the Midwest shows energy production per turbine almost 50 percent higher in 2005 than from turbines deployed in the years prior to 1999.

Owing to land constraints, Europe has been the leader in regard to offshore wind development. We expect offshore wind development to play a role in the U.S., but because it is more expensive compared to land-based development, offshore wind, outside of a few pioneering projects, won't see significant development here until after 2010. Nonetheless, the Department of Energy estimates 900,000 MW of wind energy potential is located off the east coast of the U.S., strategically located near many population centers.

Potential for the Wind Industry in the U.S.

The growth in the wind industry in the last few years has led to a more robust vision of the potential role wind could play in the U.S. electric industry.

The wind resource in the U.S. is almost unlimited, with endless expanses of plains and agricultural land well suited for wind development. In fact, U.S. winds could generate more electricity in 15 years than all of Saudi Arabia's oil, *without being depleted*.

For a number of years, AWEA has had an established goal of 100,000 MW of wind developed in the U.S. by 2020. That would represent about 6 percent of the nation's electricity. We believe that with proper policy support that this is a realistic and achievable goal, building upon the current installed capacity in this country of about 12,000 MW.

Over the last six months, the American Wind Energy Association has been working in cooperation with a number of other entities – the U.S. Department of Energy, the National Renewable Energy Laboratory, Black & Veatch, and other organizations – to develop a more thorough understanding of how much of America's electricity could be generated from the wind within the next few decades.

Specifically, the organizations are evaluating the costs and benefits of wind providing 20 percent of America's electricity by 2030, as well as the major barriers that would need to be overcome. The analysis is yet to be completed, but it is clear at this point that there are no technical barriers to wind energy providing as much as 20 percent of the nation's electric power, which is how much wind is currently providing to meet Danish electricity needs.

The environmental payoff would be huge. The existing U.S. wind turbine fleet (11,603 MW) displaces more than 19 million tons of carbon dioxide each year, based on the current average U.S. utility fuel mix. Robert Socolow and his colleagues at Princeton have already identified wind as one of the invaluable "wedges" that will together be required to achieve climate stabilization. According to our preliminary analysis, if wind were to provide 20 percent of U.S. power generation in 2030, it would avoid over 15 percent of expected power generation CO2 emissions.

Major Challenges Facing the Wind Industry

The wind industry's future in this country is bright, but the U.S. will have to address the following major barriers to achieve its wind energy potential:

1. **Lack of consistent policy support** - The wind industry, and especially the manufacturing sector, has been constrained by the lack of consistent federal policy support. The on-again, off-again nature of the federal production tax credit, which has been allowed to expire three times, has been a significant disincentive to investment. **Long-term, stable policy, such as a ten year extension of the wind production tax credit and a federal renewable portfolio standard, will be essential to establish the U.S. as a manufacturing center for the rapidly growing global wind energy industry.**
2. **Worldwide turbine shortage** - Record growth in the wind industry has led to turbine shortages on a worldwide basis. More stable federal policies will help assure the creation of a robust global supply chain to meet the growing demand.
3. **Transmission constraints - The need for transmission infrastructure serving major wind resource areas on the Great Plains is the most significant long-term constraint on the growth of the wind industry.** The electric industry as a whole has substantially underinvested in transmission relative to the needs of our wholesale electric markets, so lack of transmission is not an issue that the wind industry faces alone. But transmission constraints are particularly critical to a resource such as wind that is distant from major cities. Despite the level of transmission investment required, the cost is modest relative to the value of cost-competitive, clean and renewable electricity that would be made available.
4. **Balkanized electric markets** - Electric utilities have grown up relatively isolated and their operations have been designed to reflect the characteristics of conventional generating technologies such as coal or gas-fired generation. For wind to achieve its potential, it is important that the Federal Energy Regulatory Commission (FERC), regional transmission organizations, and individual electric utilities begin to operate more as regional pools, in which variable resources such as wind can flourish. Strong progress has been made in this area in recent years, such as the introduction of the Midwest ISO covering 15 states, but other regions have a much longer way to go.
5. **Environmental costs of fossil fuels not recognized in market cost** - Wind power produces no air emissions and makes no contribution to problems associated with air pollution or global warming. For wind to receive a level playing field in the market, the environmental costs of conventional electricity must be fully internalized.
6. **Need to continue reducing the cost of wind power** - In the end, wind energy's market share will be determined to a significant extent by economics. The cost of wind has declined by about 90 percent since the mid-80s, but in the last few years, wind turbine prices have increased due to turbine shortages and increases in the costs of materials such as steel and fiberglass (as they have with conventional resources). The industry must focus on continuing to reduce the cost of wind-generated electricity, and there are opportunities to do that as the industry scales up.
7. **Lack of a predictable permitting regime** - Siting, regulatory and permitting agencies at the state and federal level are still learning how to deal with wind development, and some permitting processes take considerably more time than

is in the public interest. Without a more predictable and comprehensive permitting or regulatory regime, it will be difficult to move from the current pace of about 3,500 MW annually and achieve installation rates of 10,000 MW or more per year, which is the level required for wind to fully contribute to our national effort to reduce the impacts of global warming.

Wind Energy Development on Public Lands

The U.S. is blessed with a huge expanse of public lands in many parts of this country. Many of those lands, especially in the western U.S., are appropriate for wind development and have a significant wind resource, as do the offshore areas of the northeast coast.

The wind energy industry has a long relationship with the Bureau of Land Management, going back to the 1980s when some of the nation's first wind projects were developed in the Palm Springs and Tehachapi areas of southern California. BLM managers in that region generally took the time to understand the industry and how best to oversee the development process on BLM land, but wind development presents some unique issues to land managers, and in the last five years, as development began to spread around the country, it quickly became clear that an effort was needed to systematically share lessons learned in California, Wyoming and a few other pioneering areas with public lands managers that had little or no experience with wind development.

As a tool to ensure each office didn't have to "reinvent the wheel," BLM initiated a Programmatic Environmental Impact Statement (PEIS) in 2004 that was intended to address many of the issues that were generic to wind development but not always familiar to agency personnel. The objective was to analyze many of wind energy's impacts broadly so that site-specific Environmental Assessments could deal with the particular issues at a site. The wind industry was consulted through the public process and the end result was a document that many in the industry and elsewhere support. Best Management Practices (BMPs) were established as part of the process, and involved extensive consultation with a wide range of interests. Approximately 5,000 people participated in the scoping process, which addressed BLM lands in eleven states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

As a brief overview, the conclusion of the PEIS reads as follows: "it appears that the proposed action would present the best approach for managing wind energy development on BLM-administered lands. The proposed Wind Energy Development Program is likely to result in the greatest amount of wind energy development over the next 20 years, at the lowest potential cost to industry. Simultaneously, the proposed action would provide the most comprehensive approach for ensuring that potential adverse impacts are minimized to the greatest extent possible. And, finally, the proposed action is likely to provide the greatest economic benefits to local communities and the region as a whole. As a result, the proposed action appears to best meet the objectives of the National Energy Policy recommendations to increase renewable energy production on federal lands."

At the conclusion of the process, in January 2006, the Department of Interior issued its decision, and AWEA stated the following:

"The U.S. wind energy industry welcomes the Department of Interior's record of decision on the final wind energy Programmatic Environmental Impact Statement, both for the inclusive manner in which it was developed, and for the end result: a process that encourages the responsible development on BLM land of a clean, domestic, and strategic energy source."

As of June 2005, approximately 500 MW of wind capacity was installed under Right Of Way authorizations administered by the BLM. We are conservatively expecting around 2,000 MW of additional wind development on BLM lands over the next decade. The potential is considerably larger, as the projected economically developable wind resources on BLM-administered lands in these eleven states is 160,100 acres.

We applaud BLM for their consultative approach, and wish other agencies were as open to public input. It clearly provides for the best outcome for all parties involved, and most certainly the interests of the public at large.

The wind industry likewise has a long history with the U.S. Fish & Wildlife Service, although the Service has not always been as effective at achieving the agency's objectives. Nonetheless, the wind energy industry is pleased that the Department of the Interior has finally announced the Wind Turbine Guidelines Federal Advisory Committee. This effort has real potential to revise the ineffective 2003 Interim Guidelines on wind and wildlife that were developed essentially without wind industry or other stakeholder input, and to move the issue forward in a collaborative fashion. We applaud the Department and look forward to the Secretary naming a constructive group to this important committee.

The wind industry's relationship with the Minerals Management Service (MMS) is relatively new. MMS was given oversight for offshore wind development as part of the Energy Policy Act of 2005, assuming responsibilities for which the U.S. Army Corps of Engineers had previously been the lead. Although there are no major offshore wind development projects that have been built in U.S. waters (in contrast to Europe, where offshore is a major focus for the industry), two significant projects off the coasts of Massachusetts and Long Island had spent months in the permitting process, only to have jurisdiction transferred to MMS midway through the process. One of those projects, Cape Wind, proposed off the Massachusetts coast, had filed its original permits in 2001, and a 4,000 page draft Environmental Impact Statement had been completed by the Corps with 16 federal and state agencies involved. Although AWEA supported the transfer of jurisdiction to MMS, we were lead to believe that already proposed projects would be treated with more fairness, in part because the legislation included a 270 day timeline for implementation of the offshore provisions of EAct (which would have resulted in action by May, 2006). Therefore we were disheartened to learn that MMS recently announced that the release of their final rule would once again be delayed, this time until the fall of 2008.

How is the wind industry applying some of the lessons learned in the development process? What are some of the most effective means of identifying and institutionalizing wind development best practices?

- **AWEA Siting Committee's Wind/Wildlife Initiative** – The wind industry has worked collaboratively with government agencies and non-governmental

organizations on a number of levels - locally, state-wide, regionally or nationally - to develop ways to minimize wind energy's biological impacts. AWEA's Siting Committee is looking to replicate this model on a bigger scale by proactively meeting with NGOs and government agencies to determine how to work together most effectively as the industry continues to scale up. Many of the questions surrounding wind energy's impacts are evolving, and more research is often needed. The best model we have identified is collaboration which provides the credible scientific work that all parties require, and we are part of some effective public/private partnerships today:

- **Bats & Wind Energy Cooperative** – This collaborative was set up immediately after the industry discovered higher-than-expected bat mortality at a wind project in West Virginia. AWEA, Bat Conservation International, the U.S. Fish & Wildlife Service, and the National Renewable Energy Laboratory partnered to determine what research is needed to address this issue, and then raised the funds necessary to get it done. Collaboration among diverse parties is challenging, but we are seeing tremendous progress on an important issue.
- The **Grassland/Shrub-Steppe Species Collaborative** is set up in a similar way, with industry, conservation organizations and government agencies. In this instance, the collaborative is attempting to find out if prairie chickens, an important grassland species in the Plains, are adversely affected by the presence of wind turbines. Again, it is only through the partnership of wind companies, The Nature Conservancy, NREL, and a state wildlife agency that we are able to fund the necessary research to answer this question.

Based upon years of work with BLM, and the more recent experience of developing the PEIS, what are some of the wind industry's potential concerns moving forward?

- The wind industry would like to ensure that as BLM's policy is carried out in the field, the important analytic work underlying the PEIS is systematically relied upon and used as means of speeding project approvals to the extent feasible and in the public interest.
- The wind industry is a dynamic industry. It is important to establish best management practices (BMPs) but there must be recognition that this is still a relatively young industry, and as it grows, management practices and scientific research are still evolving, and there should be a way of ensuring that agency BMPs can keep pace.
- Agency personnel can be competent and collaborative, but overwhelming workloads on limited budgets can be detrimental to timely decision-making. As the wind industry strives to maximize its contribution to our nation's energy and environmental needs, a more predictable and comprehensive permitting or regulatory regime is needed at the state and federal levels, cutting across multiple agencies. Without such a consistent framework, it will be difficult to move from the current pace of about 3,500 MW annually and achieve the desired installation of 10,000 MW or more per year.

I appreciate the opportunity to be with you today, and welcome any questions you might have.