

WIND ENERGY OUTLOOK 2002



122 C Street, N.W., Suite 380
Washington, DC 20001

voice: (202) 383-2500 fax: (202) 383-2505
www.AWEA.org, windmail@awea.org

POWERING UP

U.S. Wind Industry Roars Past Records, Faces New Challenges

The U.S. wind energy industry achieved unprecedented success in 2001, installing a record amount of new generating equipment across 16 states. At year's end, the future looked bright, and there was a huge and growing interest in wind power within the U.S. electric industry. But the wind industry was briefly thrown off its game by yet another lurch in U.S. government policy as the federal wind energy production tax credit (PTC) was allowed to expire at the end of December 2001 due to Congressional gridlock.

Prospects for 2002-2003 soared again when, in March 2002, after several months of uncertainty, the PTC was extended to December 31, 2003. In the interim, however, the costs of the boom-and-bust cycles caused by the PTC's expiration were dramatically highlighted as some \$3 billion worth of proposed projects were put on hold and hundreds of workers were furloughed. This sequence of events vividly illustrates the importance of a consistent energy policy.



Rewriting the Record Books

The U.S. wind energy industry left previous records in the dust with a blowout year in 2001, installing nearly 1,700 megawatts (MW) or \$1.7 billion worth of new generating capacity, more than double the previous record year of 1999, when 732 MW was installed.

The final tally of 1,695 MW boosted the industry's total generating capacity by approximately 66% over the amount in place a year earlier. Current installed capacity in the US is now 4,261 MW, and there are utility-scale wind turbine installations in 26 states. "2001 was an astonishing year for our industry in the U.S.," commented AWEA executive director Randall Swisher. "More new wind generation was installed in a single state—Texas (915 MW)—than had ever been installed before in the entire country in a single year. We are finally beginning to tap into wind energy's enormous potential."

The new wind farms installed in 2001 will produce as much electricity annually as 475,000 average American households use, and will displace emissions of three million tons of carbon dioxide (the leading greenhouse gas) and more than 27,000 tons of noxious air pollutants each year. They will also generate approximately \$5 million in payments to landowners annually and create some 200 skilled, long-term jobs in areas where such employment is scarce.

The new construction included the world's two largest wind farms, the 278-MW King Mountain Wind Ranch in Texas and the 261-MW Stateline Wind Farm straddling the boundary between Oregon and Washington states, and several other 100-MW-plus wind plants.

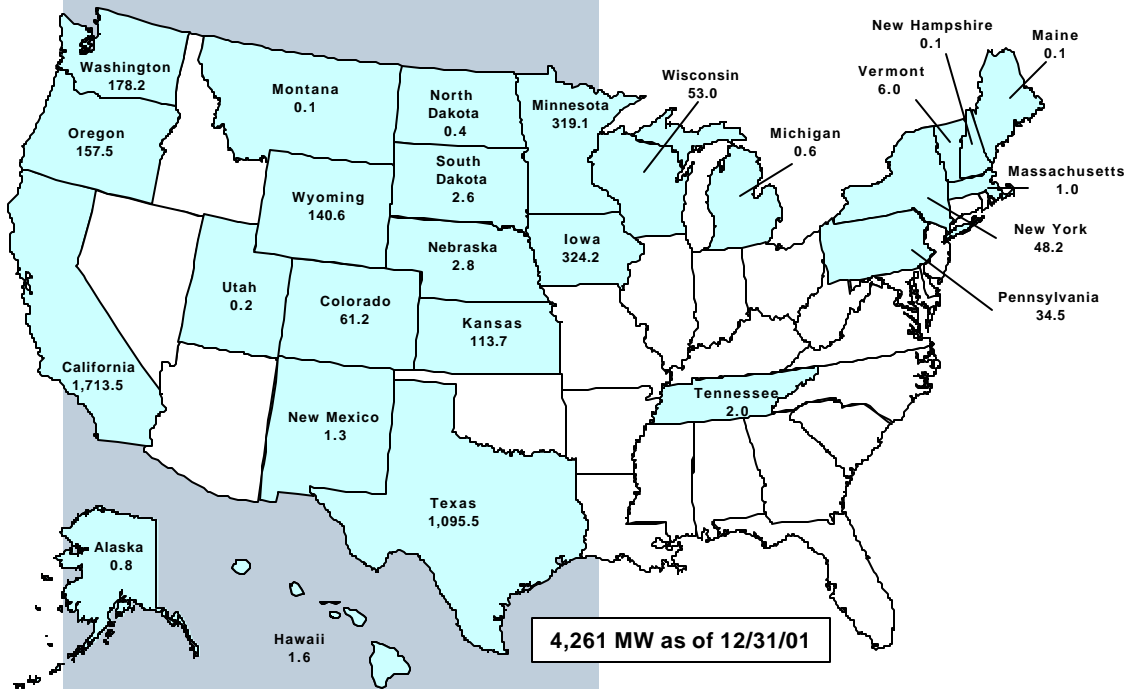


Texas Experience Proves Value of RPS

The remarkable 2001 construction total for wind in Texas resulted from the successful conjunction of that state's Renewables Portfolio Standard (RPS) with the PTC. The Texas RPS was passed in 1999 after "deliberative polling" by utilities revealed widespread support for renewable energy throughout the state and from all consumer types (including commercial and industrial customers). It requires the state's utilities to acquire 400 MW of new renewable generating capacity by January 1, 2003. Instead, 915 MW of wind alone—more than double the required amount for all renewable energy technologies—was in place a year early. Bids to supply new renewable energy projects proved to be cost-competitive with other utility resource options and voluntary "overcompliance" resulted.

"In 2001, Texas showed us what an effective RPS can do when it is combined with a PTC," said AWEA executive director Randall Swisher. "The result of those two policies was explosive growth in wind, far surpassing anything this country has previously seen in the over 20 years since wind energy got its start. Clearly, we have found a policy combination that works incredibly well and should be expanded to the national level with a federal RPS."

United States Wind Power Capacity (MW)



PTC Extension Restores Market Momentum

In March 2002 the federal wind energy Production Tax Credit (PTC)—an important factor in financing new wind power installations—was extended for two years through December 31, 2003. This action by Congress and President Bush put the industry back on track to produce a significant increase in new wind power capacity in the U.S. over the next year. Continuing this regained momentum requires strong and consistent policy support. With that support, wind could provide about six percent of our nation's electricity, or as much as is used by 25 million households annually—by the year 2020.

Extension of the tax credit, which had expired December 31, 2001, had been delayed for about three months as Congress wrestled with larger economic policy issues affecting tax policy. During that time many projects were put on hold, thus delaying millions of dollars in economic development. The PTC provides a 1.5 cent-per-kilowatt-hour tax credit (adjusted annually for inflation) for electricity generated using wind technology.

Passage of the credit allowed the industry to bring hundreds of workers – who plan, build, install, and operate new wind power projects – back to full-time status. This new burst of activity is expected to generate millions of dollars of economic activity in states including Montana, Oregon, North Dakota, South Dakota, Iowa, and West Virginia. The industry continues pressing for a full five-year extension of the tax credit as well as changes aimed at making this incentive available to a larger pool of investors.

Institutional Challenges: Transmission Penalties

As the wind industry expands, it increasingly faces a challenge in gaining access to the utility transmission system for wind-generated electricity at a reasonable price, so that it can be profitably sold in the wholesale electricity market.

In the past, most wind projects sold their output directly to the local utility. But as restructuring “unbundles” the vertically-integrated monopoly electric utility industry, utilities are required to make their transmission facilities available to all generators under “open access” fee structures, or “tariffs,” that presume generators will precisely schedule their transmission usage in advance and precisely control their output to match those schedules.

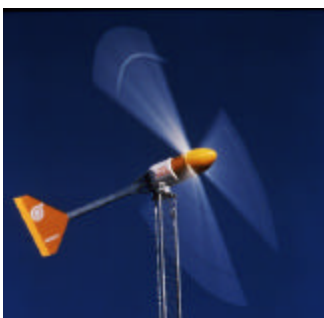
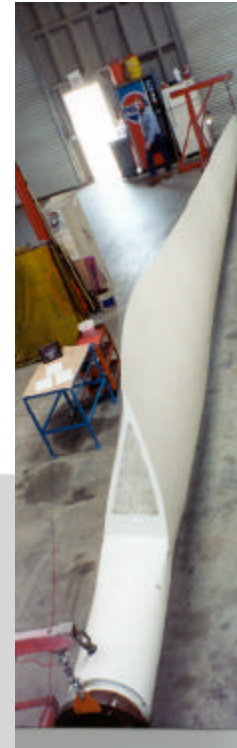
These open access tariffs impose penalties of as much as 2.5 to 3.5 cents per kilowatt-hour (kWh) on wind generators for use of the transmission system in addition to normal transmission access fees. Such a penalty can double the wholesale cost of wind-generated electricity. The high penalties are exacted because of wind's variable nature and the fact that a wind plant cannot guarantee delivery of a certain amount of electricity at a given scheduled time and date. The penalties are not based on actual costs that a failure to deliver may impose on the system, but are self-described punitive penalties to enforce “good behavior” on large generators who *can* precisely control their output and have been known to do so in ways designed to raise their own profits at the expense of others.

As control of the interstate transmission grid evolves toward transmission-specific entities called “ISOs” (Independent System Operators), and the Federal Energy Regulatory Commission (FERC) works to update its early version of an industry standard tariff, the impacts of these penalties is being reassessed. The New York ISO and ERCOT (Texas) ISO have special rules for “as-available” resources like wind that exempt them from these penalties. The PJM ISO (Mid-Atlantic states) has a different, penalty-free market design that can accommodate the variable output of wind projects without penalties. More recently, an agreement has also been reached that will reduce penalties for wind plants on the California ISO system. However, penalties are still a problem in important and windy areas of the country such as the Pacific Northwest and the Midwest. In the Northwest, for example, the Bonneville Power Administration (BPA) has said it hopes to add 830 MW of wind to its system, but development of those projects (\$800 million worth) is stalled by the penalty issue.

Institutional Challenges: California Wind on Hold

Another issue for the industry is the chaos in the California electricity market and the failure of state government agencies in California during the state's recent electricity crisis to sign contracts with wind developers for new capacity.

What at first looked like a potential bonanza for wind, a resource that is abundant in California and neighboring states, quickly turned into a roadblock as electricity prices soared and state agencies frantically began signing high-cost long-term contracts for new natural gas generation, while refusing to buy electricity from lower-cost "nonfirm" (variable) generators like wind plants. The California Energy Commission has been proceeding for some time on a track of inviting proposals and awarding cash incentives for new wind and other renewable projects, using funds collected from a charge on ratepayers. But because of California utilities' financial problems and the gridlock in new state procurements that is occurring while California swallows the long-term contracts bought at the peak of the crisis, the vast majority of proposed wind projects—now totaling over 1,500 MW in capacity—have never been built, and there is no indication when they will be. Only a few wind projects are moving forward in the state.



Vibrant Market for Small Wind Systems

Consumer interest in small wind systems surged following concerns about high rates and brownouts during California's electricity crisis in early 2001, and resulted in healthy sales even as the crisis abated later in the year.

The market for small wind systems, that is, turbines under 100 kW in nameplate capacity, is also expanding as a result of policies adopted in a growing number of states. California and Illinois run a well-established rebate program that helps bring down the high up-front cost of a wind system, and New York, New Jersey, Delaware, and Rhode Island have followed suit. Also in California, the small wind turbine industry welcomed a law enacted in 2001 providing relief from overly restrictive local zoning ordinances on tower height and installations. Net metering, a policy under which the owner of a small wind or other renewable energy system is allowed to spin his or her electricity meter backwards if the system is generating more power than is being consumed, has been adopted in over 30 states. Such policies, along with simplified, standardized interconnection rules, reduce the expense and time that can be incurred by consumers installing a small wind or photovoltaic system for their home or business.

Prospects for a nationwide incentive for small wind systems were boosted with the introduction by U.S. Rep. J.C. Watts (R-Okla.) of a bill (H.R. 2322) to provide a federal 30% investment tax credit per unit. A companion bill (S. 1810) was introduced in the Senate by Senator Richard Durbin (D-Ill.). The current cost of residential wind turbines is hindering their sales, according to Watts, and a tax incentive to lower the up-front cost of the machines would increase sales, help manufacturers to increase their volume, and thus lower costs even further.

Exports have declined in recent years due to the strong U.S. dollar, reductions in support from the US Agency for International Development (USAID) for renewable energy project activity, and increased bilateral aid by competing export countries.

Major Power Systems Manufacturer Rejoins Industry

Prospects for the U.S. industry received a boost in mid-February when it was announced that energy giant GE Power Systems, which had projected revenues for 2001 of more than \$20 billion, is acquiring Enron Wind Corp., the largest remaining domestic manufacturer of commercial utility-scale wind turbines.

“The acquisition of Enron Wind represents GE Power Systems’ initial investment into renewable wind power, one of the fastest-growing energy sectors,” said John Rice, president and CEO of GE Power Systems. The wind energy industry, the firm said, is expected to grow at an annual rate of about 20%, with principal markets in Europe, the U.S., and Latin America. For the parent company, General Electric, the move was a return to the wind business after an absence of nearly 20 years. GE’s aerospace division was a major contractor of research-oriented wind turbines for the U.S. Department of Energy in the early 1980s.

Green Power Markets

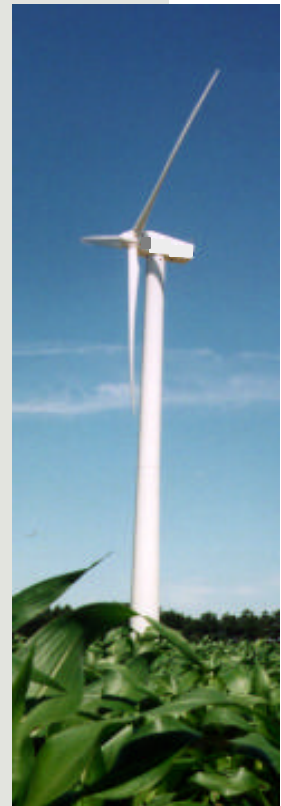
For green power markets, 2001 was a year of mixed signals. The “green power market” is used to describe a number of different ways to label, market, and sell the unique benefits of renewable sources like wind. While some states with competitive electricity markets are having success, much of the growth in green power last year occurred in regulated states. Several states that put the brakes on moving toward competition because of California’s widely-publicized problems looked toward utility “green pricing” programs to offer customers some choice in their electricity products.

Competitive Markets

In September, California officially ended its experiment with green power and competition, returning thousands of customers who had switched to renewable power suppliers to their monopoly utility. In Pennsylvania, however, marketers wowed the green power industry with some of the largest purchases to date—six university, business, and government customers will buy output from more than 20 MW of wind power. Over 460 MW of wind power has been added to serve the competitive market, and there are plans to add 175 MW more in 2002 in New York, Pennsylvania, and West Virginia.

Regulated Markets

Oregon passed a restructuring law in 2001 that requires the state’s three investor-owned utilities to offer a green power product, giving 1.2 million customers a green power option. Over 175 MW of wind power has been added nationally to serve utility green pricing programs, and another 70 MW of wind is planned, with over 90 programs in 31 states (more than 150 retail utilities participate in these programs). More than 210,000 customers are currently choosing to purchase renewable power from utilities; about 1/3 of the power is sold to large power users, like businesses or governments. The Los Angeles Department of Water and Power’s program ranks first in customers with 87,000 participants (about half low-income customers signed up at no cost). Moorhead Public Service of Minnesota has the largest percentage participation, with 7% of its customers signed up.



Optimistic long-term outlook, at home and abroad

On balance, although the institutional issues noted above remain of concern, with the PTC extension now in place, there is strong optimism about the wind industry's long-term future.

2001 was an eventful year, and there were numerous additional developments that deserve at least brief mention here:

- ◆ The past several months have seen a series of business deals that strongly suggest that major energy corporations are becoming more interested in wind. Shell WindEnergy, a division of the Anglo-Dutch oil giant, now owns two wind farms in the U.S. Entergy, a large American utility, recently bought a majority stake in the 80-MW Top of Iowa wind plant, while TXU, a utility based in Texas that is already one of the largest purchasers of wind power in the U.S., bought interests in two new wind projects in Spain. American Electric Power (AEP), a large utility that is positioning itself as a major player in the market, has developed a 150-MW wind farm and purchased another, both in Texas. PacifiCorp Power Marketing, a subsidiary of PacifiCorp, is purchasing and marketing power from three wind plants in the West, including the 261-MW Stateline Project, and has said it plans to add substantial wind capacity to its portfolio over the next few years.
- ◆ The federal Department of Energy's Wind Powering America program and a growing number of projects in the Great Plains are making farmers and other rural landowners more interested in wind energy. That, in turn, is leading to increased political support for wind across the Midwest and West.
- ◆ New York and Pennsylvania are using state purchases of renewable electricity as a means of boosting clean power sources. New York Gov. George Pataki (R) has ordered state agencies to buy 10% of their electricity from green sources by 2005, 20% by 2010, while Pennsylvania's state government is currently purchasing green power for 5% of its supply.
- ◆ Emerging research on actual grid integration costs indicates that these are minimal, and has begun to turn the tide on the onerous non-cost-based penalties discussed above.

It remains to be seen what the balance of 2002 will bring, but the momentum that was so evident in 2001 has now been restored by passage of the PTC extension. If a long-term PTC is adopted and other favorable steps are taken at the federal and state levels, the outlook for the U.S. wind energy market beyond 2003 will be extremely promising.

Internationally, some 6,500 new megawatts (MW) of new wind energy generating capacity were installed worldwide in 2001, amounting to annual sales of about \$7 billion. This is the largest increase ever in global wind energy installations, well above the capacity added in 2000 (3,800 MW) and 1999 (3,900 MW). The world's wind energy generating capacity at the close of 2001 stood at about 24,000 MW, a 37% increase over the amount in place a year earlier.

Germany alone set a world and national record of more than 2,600 MW of new generating capacity installed during the year. Wind is reliably providing 10% to 25% and more of electricity supply in several regions of Germany and Spain, and meets over 15% of Denmark's current power needs.

