U.S. Wind Industry Annual Market Report

YEAR ENDING 2009

AWEA
AMERICAN WIND ENERGY ASSOCIATION

AWEA sincerely thanks its member companies and other organizations for their input on industry data.
AWEA strives to provide the best information for the wind industry by the wind industry, and welcomes your comments.

AWEA conducted the research for this report primarily by collecting information from AWEA business members.
When other data sources are used, they are noted. Data should not be used without permission from AWEA.

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Photo Credit: Christine Alicino, Christine Alicino Photograph

Right photo: Al Zeitz Wind Technology training classroom at Iowa Lakes Community College.
Photo Credit: Angela Rose, Iowa Lakes Community College


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AWEA is the national trade association of America's wind industry, with more than 2,500 member companies, including global leaders in wind power and energy development, wind turbine manufacturing, component and service suppliers, and the world's largest wind power trade show. AWEA is the voice of wind energy in the U.S., promoting renewable energy to power a cleaner, stronger America. More information about AWEA can be found at our web site **www.awea.org** and industry issues can be found at AWEA's blog Into the Wind.

"The U.S. wind energy industry shattered all installation records in 2009 installing over 10,000 MW, despite a struggling economy. Looking ahead, we need to set hard targets to diversify our energy mix, in the form of a national Renewable Electricity Standard (RES), in order to provide the necessary stability for manufacturers to expand their U.S. operations and to seize the historic opportunity we have today to build up a thriving renewable energy industry."
Denise Bode, Chief Executive Officer of the American Wind Energy Association

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INTRODUCTION

Despite the sputtering U.S. economy, 2009 turned out to be a record-setting year for the U.S. wind industry, which installed over 10,000 MW in new capacity. That surprising growth pushed the total U.S. wind capacity past the 35,000-MW mark, keeping the United States in first place on the list of global wind-producing countries. Second-place China is coming on strong, however, having installed more wind in 2009 than any other country. To stay competitive in this global footrace, and continue growing, the U.S. industry will need strong policy support from the U.S. Congress in the form of a renewable electricity standard.

The U.S. wind capacity installed in 2009 alone is sufficient to power the equivalent of about 2.4 million American homes. The total installed wind in the United States has the potential to power 9.7 million homes. Wind was responsible for 39% of all the new electric generating capacity added in 2009, second only to natural gas. Measured by carbon emissions avoided, America's wind power fleet will avoid an estimated 62 million tons of carbon dioxide annually, equivalent to taking 10.5 million cars off the road, and will conserve approximately 20 billion gallons of water annually, which would otherwise be consumed for steam or cooling in conventional power plants. The strong 2009 results carried the industry past a number of important milestones. The number of states with installed utility-size wind projects grew to 36 with the addition of Arizona, which installed its first project in 2009. The number of states with 1,000 MW of wind or more reached 14 with the addition of Illinois, Indiana, Kansas, North Dakota, New York, Oklahoma, and Wyoming.. And turbine size continues its upward trajectory—the average is now 1.75-MW, compared to 1.67 for turbines installed in 2008.

Growth came to the U.S. small wind market as well in 2009, with a 15% increase–20 megawatts (MW) of new installed capacity–pushing the industry past the milestone of 100 MW in total capacity. The number of Americans generating their own electricity with small-scale wind turbines (those with rated capacities of 100 kilowatts and under) increased by 10,000 last year, despite the economic downturn.

The year's growth in the U.S. wind industry was the continuation of an upward trajectory that began earlier in the decade. Over the last 10 years, cumulative U.S. wind capacity has soared from about 2,500 MW to over 35,000 at the end of 2009—an increase of 1,300%. Growth in the past five years has averaged 39% annually.

The 2009 growth was also boosted by incentives included in the American Recovery and Reinvestment Act. (ARRA), which included provisions that converted the production tax credit–the traditional incentive for wind developers–into an investment tax that could be used during an economic downturn. In 2009, the convertible tax credit was distributed to at least 37 projects, which were responsible for almost 3,000 MW in new capacity. The Recovery Act also included incentives for renewable energy manufacturing and research and, for small wind projects, removed the $4,000 cap on the small wind investment tax credit. In the end, all of these incentives helped the wind industry sustain forward momentum in an otherwise hostile economic climate.

The economic benefits of the Recovery Act incentives will continue to be felt in 2010 because wind projects that are under construction through the end of the year will be eligible for convertible tax credits.

An estimated 85,000 Americans are employed in the wind industry and related fields. In 2009, at least 39 wind manufacturing plants were expanded, announced or opened. This was a 33% drop from 2008, when 58 new or expanded plants were announced. But the fact that manufacturing activity continued in 2009, even at reduced levels, in the midst of a sharp recession suggests the huge job potential for the wind sector, given the right policies.

Beyond short-term incentives such as the production tax credit and those included in the American Recovery and Reinvestment Act, a clear long-term national commitment to renewable energy will be needed to create the demand that will keep the U.S. industry competitive in the global race to attract wind manufacturing and jobs. Greater certainty about the long-range U.S. market is crucial if turbine manufacturers are to commit to investing the sums required to build more U.S. plants. For the United States to be the global leader in wind manufacturing, the country will need a long-term and stable market, investments from companies from around the world, and a backlog of product orders.

One sure way to create the market certainty is for the United States to adopt binding renewable energy targets, as 36 countries have already done. Efforts are underway in Congress to enact those targets as part of a renewable electricity standard. The United States also needs to build new, high-voltage transmission lines to connect remote wind farms to populated areas where the power is needed. These are daunting tasks. But the progress made in 2009 suggests an industry that is at the cusp of new growth, and new opportunity.

TOP FACTS FROM THIS REPORT

- Over 10,000 MW of wind installed in 2009, the largest year in U.S. history, keeping the U.S. as the global leader in wind power.
- Current U.S. wind power capacity is over 35,000 MW
- The U.S. wind industry grew 39% in 2009, and 39% annually over the past 5 years.
- 14 states are in the “Gigawatt Club” with more than 1,000 MW of wind capacity installed 36 states now have utility-scale wind projects
- Top Wind Power Owner – NextEra Energy Resources
- Utility With Most Wind Power on System – Xcel Energy
- Top U.S. Wind Turbine Supplier – GE Energy
- Total Direct Jobs in the Wind Industry today – over 85,000
- The small wind market grew 15% in 2009 bringing total small wind sales to 100 MW.
- Wind energy provides 1.8% of U.S. power
- The wind industry supported 85,000 jobs across all 50 states in 2009
- There were 39 new, announced or expanded manufacturing facilities in 2009 and the total number of online facilities is well over 200.
- There are now nine different turbine manufacturers with manufacturing facilities in the U.S.

U.S. WIND ENERGY INDUSTRY GROWTH IN 2009

The U.S. wind industry broke all previous records by installing over 10,000 megawatts (MW) of new generating capacity in 2009. Early in the year, before passage of the American Reinvestment and Recovery Act (ARRA), the industry anticipated that wind power installations might drop by as much as 50% from 2008 levels, with equivalent job losses. The clear commitment by the President to create clean energy jobs and the swift implementation of ARRA incentives by the Administration in mid-summer reversed the situation. Once funding started flowing, the economy-wide bonus depreciation incentive (which expired December 31) encouraged completion of wind projects by year's end.

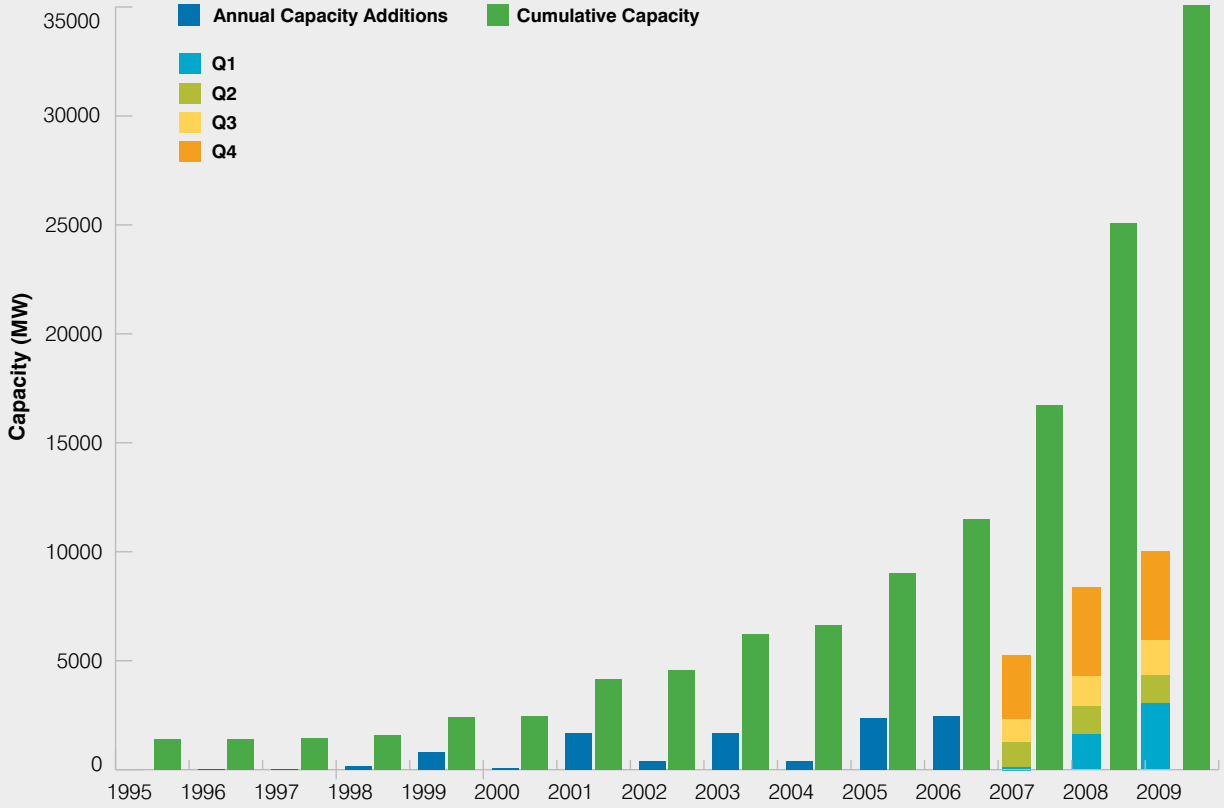
The 10,010 MW installed last year expanded the nation's wind plant fleet by 39% and brought total wind power generating capacity in the U.S to over 35,000 MW. U.S. wind projects today generate enough to power the equivalent of 9.7 million homes, protecting consumers from fuel price volatility and strengthening our energy security.

The modern wind industry got its start in the late 1970s, after Congress enacted policies aimed at reducing America's dependence on foreign oil. During the world oil glut of the late eighties and early nineties, the U.S. industry saw most government support dissolve and most of the design work to improve the technology moved to Europe, where governments were offering a stable commitment to the growing industry.

The first U.S. federal production tax credit (PTC) was passed in the Energy Policy Act of 1992, but did not have a significant impact until it neared expiration in 1999. The early 2000s were characterized by a roller coaster of annual installations, as the PTC was allowed to lapse three times. Since 2005, the tax policy has remained in existence, providing the platform for the huge growth in installations that we have seen in that time frame. Although short-term tax policy has been effective at driving installations, it provides little certainty for manufacturing investment.

Based on its history of needing to complete projects by year's end to meet the PTC completion deadline, the wind industry has typically had low installation numbers in the first quarter of the year. One of the factors that led to 2009's high numbers was a strong first quarter, as well as the typically high fourth quarter. Most of these first-quarter installations were projects that were conceived of in 2008 before the financial crisis hit.

Fig. 1 U.S. ANNUAL AND CUMULATIVE WIND POWER CAPACITY GROWTH



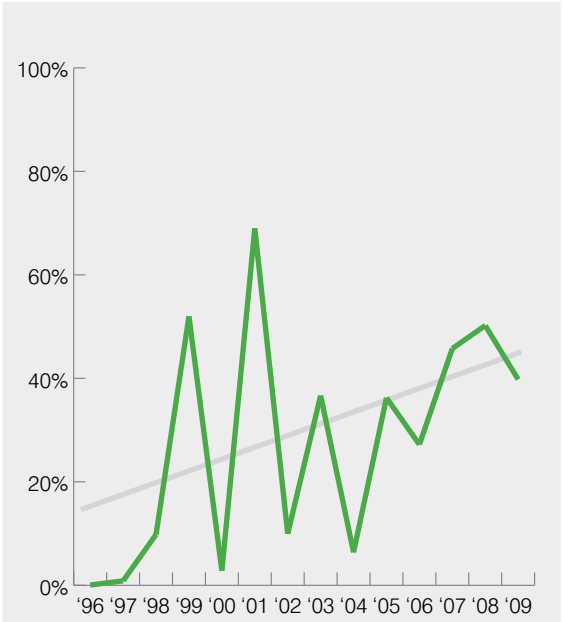
Year	Annual Capacity Additions (MW)	Cumulative Capacity (MW)
Through end 1995		1416
1996	1	1417
1997	17	1434
1998	140	1574
1999	819	2394
2000	67	2460
2001	1691	4151
2002	412	4563
2003	1670	6233
2004	397	6629
2005	2385	9014
2006	2462	11476
2007	5258	16725
2008	8366	25076
2009	10010	35086

Installation figures for years 2006 - 2009 (annual and cumulative) include capacity for installed turbines under 100 kW, whereas earlier years may not. The small wind report tracks sales of wind turbines 100-kW and below. The utility scale wind power projects database tracks turbine installations 100-kW and above. 100-kW turbine sales were subtracted from the small wind report total to avoid double counting. Data has changed slightly from the 2008 Wind Industry Report due to small decommissionings, changes in how the data was reported and other changes provided by companies.

The five-year average annual growth rate for the industry (2005-2009) is now 39%, up from 32% between 2004 and 2008. AWEA calculates growth as the growth of the entire installed base, meaning the annual installations divided by the previous year's installed base. As the installed base gets bigger, one would expect to see the growth rate go down, but as annual installations have doubled twice in the last three years, the five-year annual growth rate continues to increase. The volatility in this chart in the early 2000s reflects the strong effect that on-again, off-again tax policy had on the market.

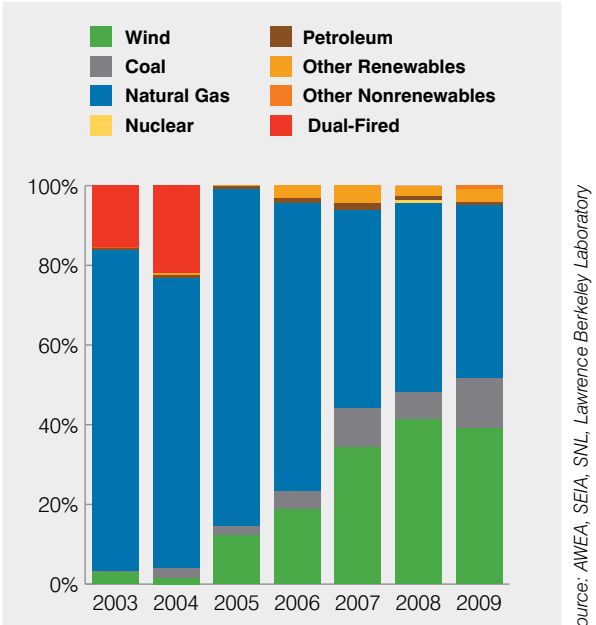
For the past five years, wind power has been one of the largest new sources for electricity generating capacity, second only to new natural gas units. In 2009, wind power provided 39% of all new generating capacity installed, second to roughly 43% of new capacity for natural gas. Taking all new renewable energy capacity together (wind, solar, biomass, geothermal and hydropower), renewable energy sources also provided a similar percentage of new capacity, at roughly 42%, of all new capacity installed in 2009.

Fig. 2 GROWTH OF U.S. WIND POWER CAPACITY



Over the past five years, wind power and other renewable energy technologies, combined with natural gas, have provided over 90% of all new generating capacity in the U.S. This increased investment in new wind power, renewable and natural gas capacity is reflected in the

Fig. 3 PERCENTAGE OF NEW CAPACITY ADDITIONS



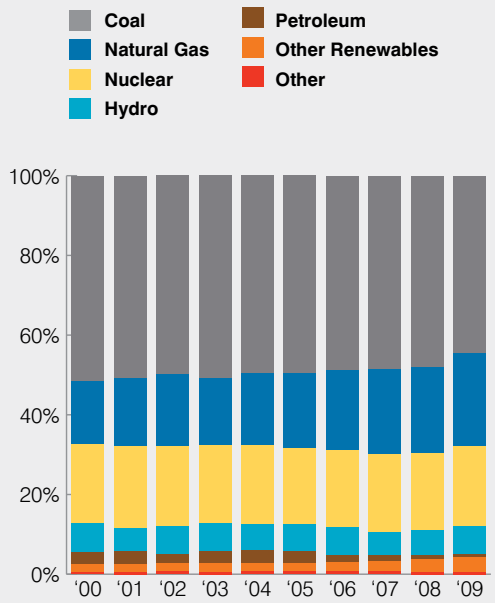
Source: AWEA, SEIA, SNL, Lawrence Berkeley Laboratory

change in the U.S. generation mix over the past five years, with wind and natural gas gaining generation market share of 1.4 and 4.8 percentage points, respectively.

According to the Department of Energy's Energy Information Administration, wind power provided 70.8 million megawatt-hours (MWh) of generation Energy Information Administration, wind power provided 70.8 million megawatt-hours (MWh) of generation in 2009, which is the equivalent of powering over 6.5 million American homes. New wind projects were installed throughout all four quarters of 2009 meaning some projects were not online for the entire year. When wind power projects installed throughout 2009 produce power for a full year in 2010, the entire U.S. wind fleet could provide over 100 million MWh, powering the equivalent more than 9.7 million American homes.

As seen in Figure 5, wind generation is approaching the two percent mark of the U.S. power mix, reaching 1.8% of U.S. generation in 2009. This is an increase from 1.3% of generation at the end of 2008. All renewable energy sources provided 10.5% of the U.S. power mix in 2009. Non-hydro renewable energy provided 3.6% of the U.S. power mix while conventional hydro power provided 6.9%. Discussed later in the report, the state level percent generation for wind is as high as 14%.

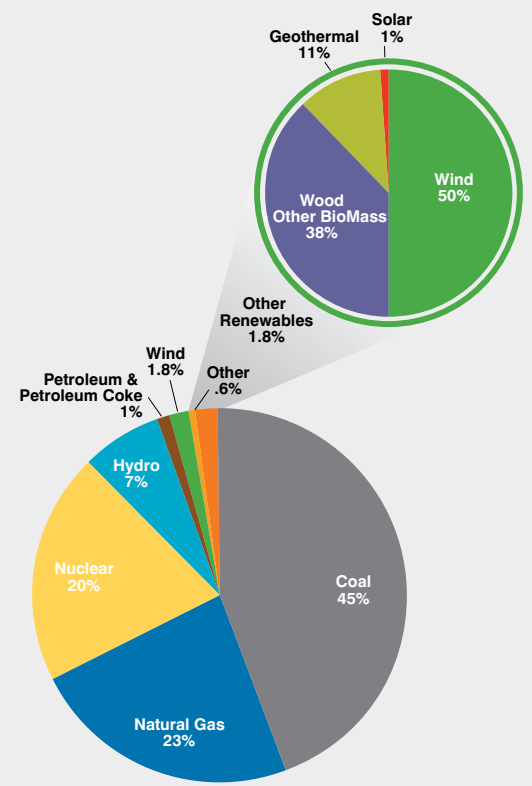
Fig. 4 CHANGE IN U.S. GENERATION MIX



Data Source: Energy Information Administration

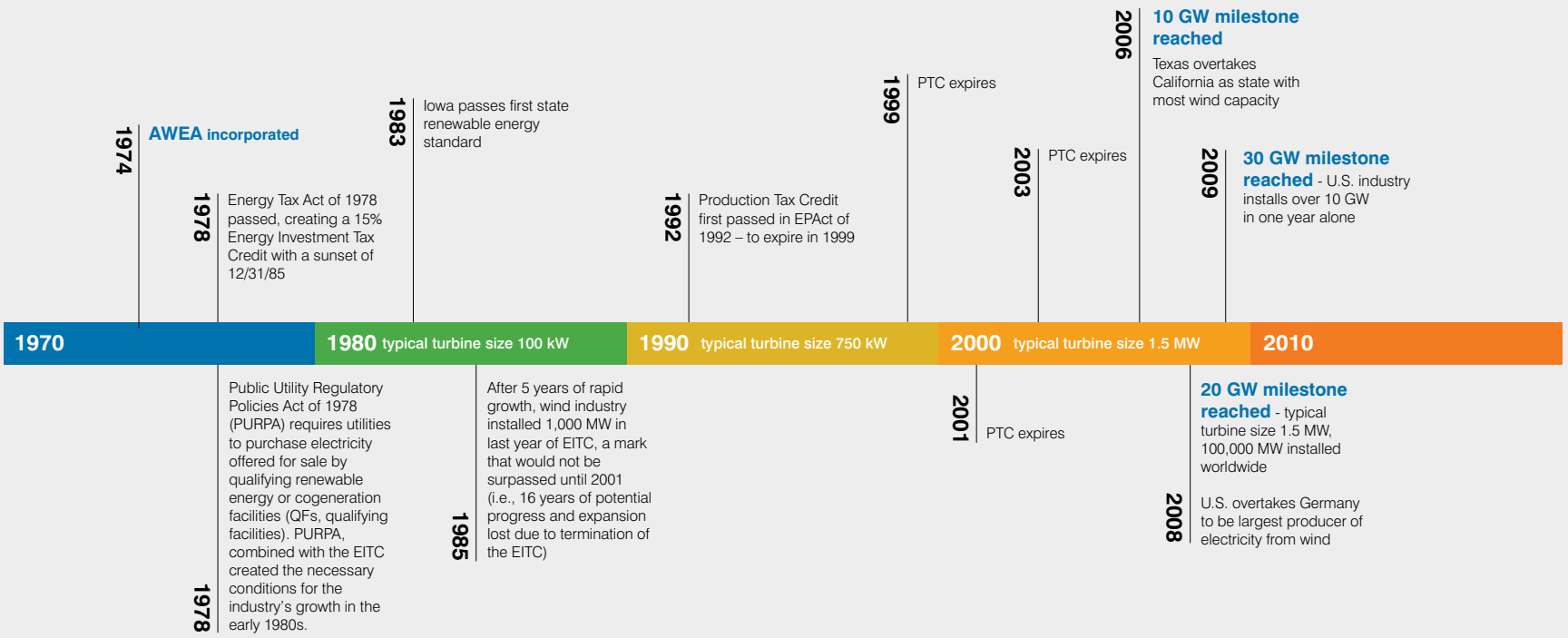
With the significant increase in renewable energy capacity over the past several years, the power mix is reflecting a shift toward renewable energy. Figure 4 shows that non-hydro renewable generation has increased from 2.1% to 3.6% over the past 5 years. In 2009, coal-fired generation was 45%, a drop from 48% in 2008. Natural gas generation gained market share with 23% generation in 2009, up from 20% in 2008.

Fig. 5 U.S. GENERATION MIX



Data Source: Energy Information Administration

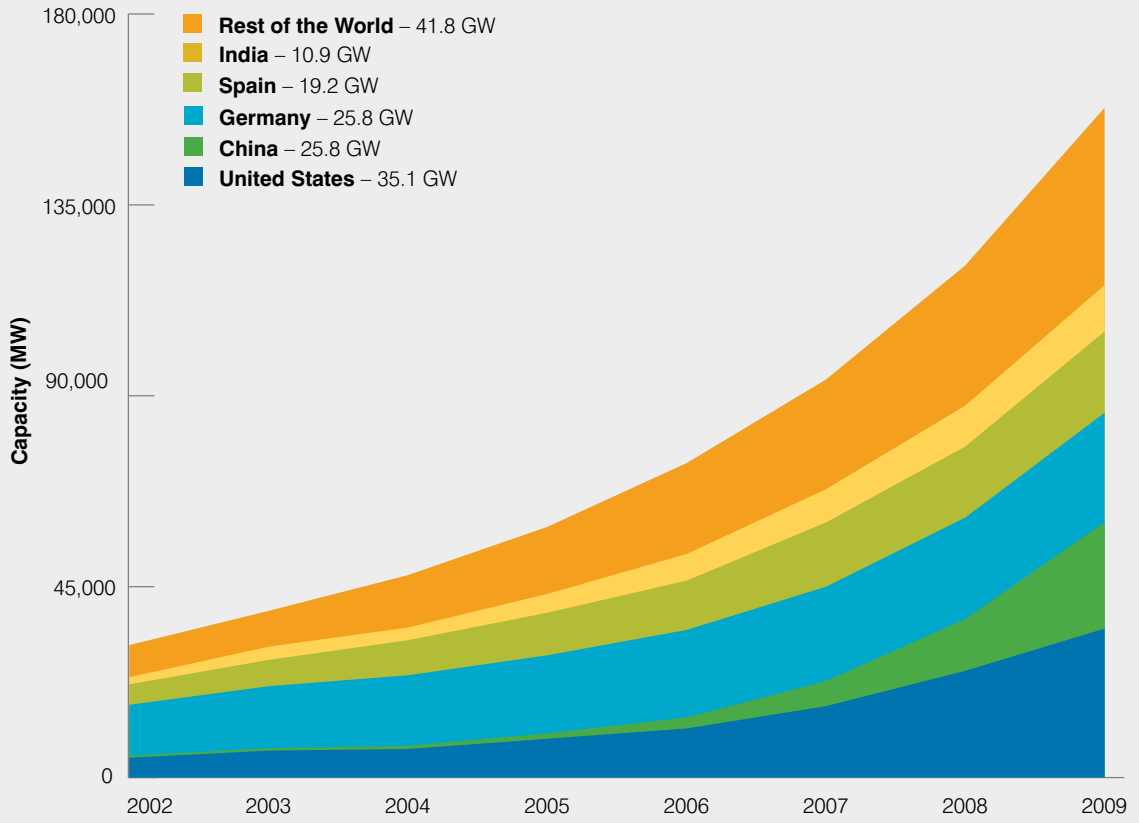
Fig. 6 U.S. WIND POWER INDUSTRY TIMELINE



GLOBAL CAPACITY GROWTH

Global wind power capacity growth was remarkable over the past decade. Between 2000 and 2009, global capacity increased more than nine-fold, growing from 17.4 GW to 158.6 GW. This 141.5 GW increase was driven by markets around the world, though the U.S. added more capacity than any other nation. The U.S. became the world leader in cumulative wind capacity in 2008 with 25.1 GW installed, overtaking Germany, which had been the leader since 2001. The U.S. maintained its position as global leader in installed capacity in 2009, growing to over 35 GW. China added the most new capacity in 2009, slightly edging out Germany to become the nation with the second most installed wind capacity. Both nations now have 25.8 GW, though China has slightly more capacity, making Germany third in installed capacity, followed by Spain and India. Reporting standards may vary among nations. While the U.S. number includes only capacity additions that are connected to the grid, some countries may report projects that were installed by year end but not necessarily grid-connected.

Fig. 7 WORLD WIND POWER CAPACITY GROWTH



Source: AWEA, GWEC

Fig. 8 TOP COUNTRIES IN ANNUAL WIND ADDITIONS

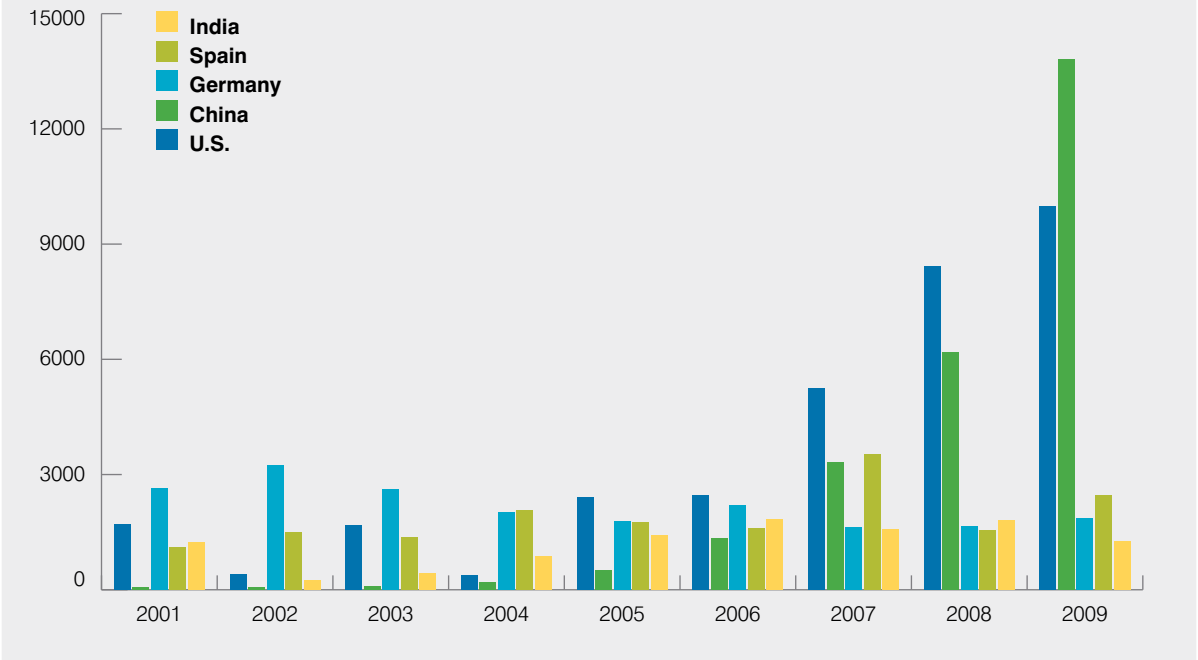
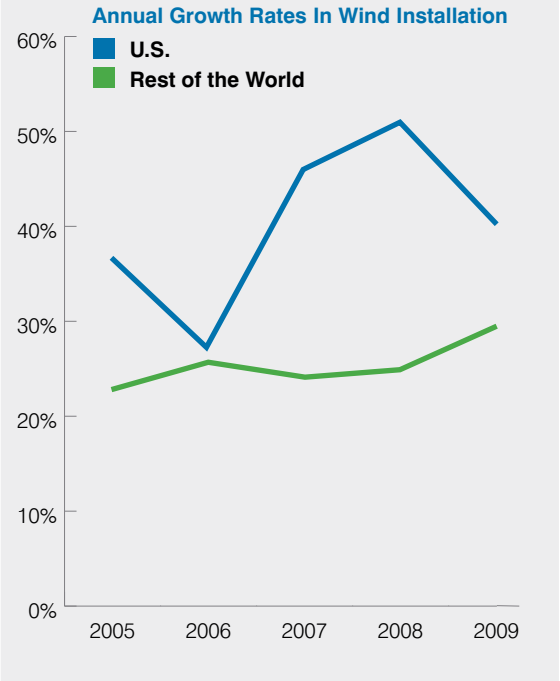


Fig. 9 ANNUAL GROWTH RATES



The first half of the decade saw unstable policies in the U.S., resulting in annual fluctuations in installed capacity. At the same time, stable policies in Germany and Spain resulted in consistently impressive installations. The relative policy stability of the second half of the decade propelled the growth of the U.S. market, which became the largest for new wind power capacity additions for four years, from 2005 to 2008. Beginning mid-decade, Chinese policies began to grow the Chinese market, which has doubled every year for the past five. This growth, attributable to strong national targets for wind power and other renewables, saw China overtake the U.S. in 2009 in new capacity additions. While the U.S. set a new capacity record in 2009, adding 10 GW of capacity, the Chinese market added nearly 14 GW. The U.S. remained the largest cumulative market in the world, however, with more than 9 GW more than the total installation in China.

Overall, the U.S. growth rate for wind power has exceeded the growth rate for the rest of the world for the past four years. In 2008, the US growth rate was more than double that of all other markets.

STATE AND REGIONAL

State-by-state, the U.S. continued to see strong growth in Texas and the Northwest. One up-and-coming area of growth in 2009 were the Midwest states of Indiana and Illinois.

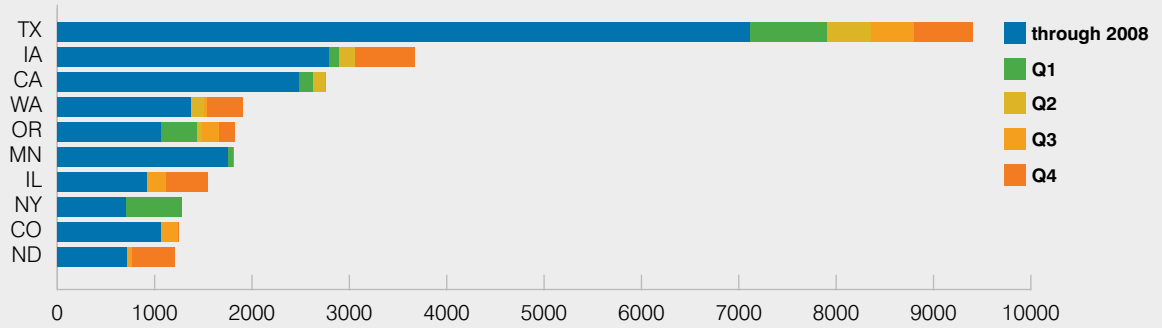
Texas again installed the largest amount of new capacity, driving it past the 9,000-MW mark in total installations. As in 2008, if it were a country, it would have the world's sixth-largest level of wind capacity, behind only the world leaders. The Lone Star State has enjoyed a strong combination of good policy and market conditions. Over the past few years, Texas has put fundamentally good policy in place, then allowed market conditions to work. The most important elements to Texas's success have been a strong renewable electricity standard to ensure a certain level of demand, renewable energy credits to encourage voluntary green markets, and the competitive renewable energy zones (CREZ) plan to proactively plan for new transmission capacity. Because of the large percentage of the state's power supplied by natural gas, high and fluctuating natural gas prices have made wind prices competitive.

Iowa now has a total of 3,670 MW installed, consolidating its position as #2, behind Texas and ahead of California. With several large wind farms added, Washington and Oregon pulled ahead of Minnesota to round out the top five states. The five states that had the most installations in 2009 in terms of new capacity were Texas, Indiana, Iowa, Oregon and Illinois. Windy sites in Indiana and Illinois were overlooked for years in favor of windier ones to the west, but are now looking more favorable as wind resource potential is being reassessed and taller turbines have reached the market. Illinois and Indiana also enjoy a proximity to Chicago, which has a large demand for electricity.

Indiana was also on the list of states with the fastest percentage growth, which are those that added a significant amount of new capacity to a small initial base.

In addition to the Midwest, states that grew the fastest were in the Southwest and the Northeast–states that haven't traditionally been seen as strong (land-based) wind states, but do have some developable potential. Arizona saw its first utility-scale project in 2009 and Utah also added one large project. Rhode Island is becoming a leader in community wind projects, and added a number of one- and two-turbine projects across the state.

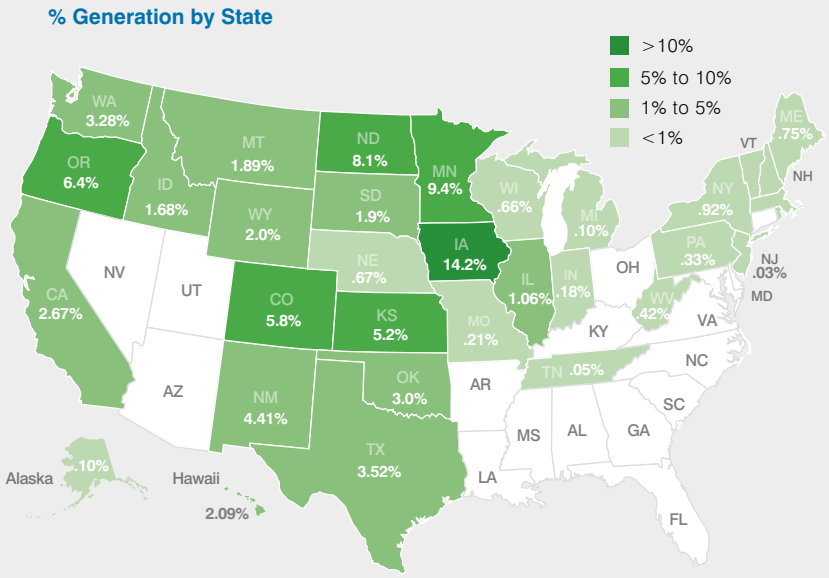
Fig. 12 U.S. WIND POWER CAPACITY INSTALLATIONS BY STATE

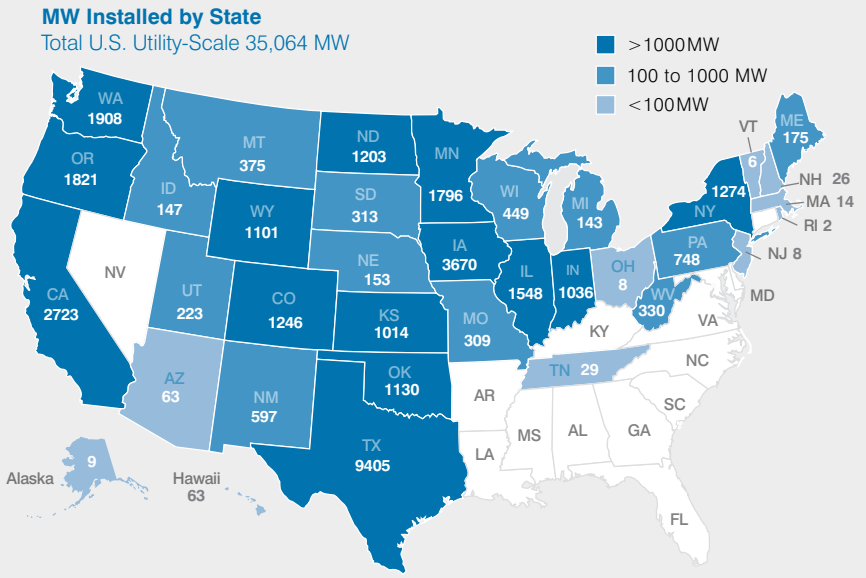


Most Capacity Additions	Capacity (MW)
Texas	2292 MW
Indiana	905 MW
Iowa	879 MW
Oregon	754 MW
Illinois	632 MW

Fastest Growing	Growth
Arizona	first utility-scale project
Utah	1000%
Indiana	700%
Maine	275%
Rhode Island	250%

Fig. 13, 14 PERCENTAGE OF GENERATION AND WIND POWER CAPACITY INSTALLED BY STATE





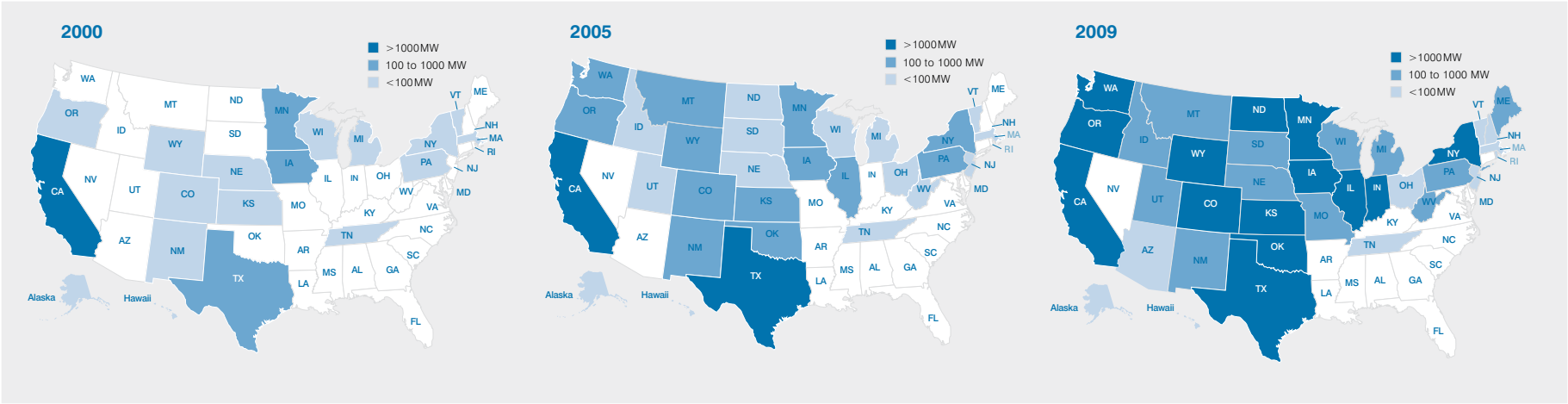
% Source: Actual Generation as Reported in DOE EIA Electric Power Monthly
MW Source: AWEA Wind Power Projects Database

While, wind generation in 2009 was 1.8% of the U.S. energy mix, the state generation for wind ranged from no wind generation to over 14% wind generation. As seen in Figure 13, there are now 6 states that receive more than 5% of their electricity from wind. Iowa is the first state to exceed 10% wind energy generation on an annual basis, reaching 14.2% wind energy generation in 2009, as reported by the Energy Information Agency.

TOP 5 STATES IN TERMS OF GENERATION

State	Generation
IA	14% (up from 7% in 2008)
MN	9% (up from 8%)
ND	8% (up from 5)
OR	6% (up from 4)
CO	(6% from 6%)

Fig. 15 CHANGE IN CAPACITY DISTRIBUTION OVER TIME, BY STATE



As Figure 15 shows, wind power installations are becoming diversified across the country from California, which had virtually all the country's wind power capacity until the late 1990s. Thirty-six states, including Arizona for the first time, now have utility-scale wind installations and 14 have more than 1,000 MW of wind power capacity.

The legislative districts with most wind power installed are in Texas, Oregon, Minnesota, and Colorado. Rep. Randy Neugebauer (R) has the largest amount of wind power in his district, not much less than the entire state of California. These rankings are for House Congressional districts. The Senators from the state with most wind power installed are, as previously indicated in the state rankings, from Texas, Iowa, California, Washington and Oregon.

Table 1 U.S. LEGISLATIVE DISTRICTS WITH MOST WIND POWER INSTALLED

Legislative District	Wind Power Capacity Installed (MW)
Texas-19 Rep. Randy Neugebauer (R)	2,399
Texas-11 Rep. Mike Conaway (R)	1,206
Oregon-2 Greg Walden (R)	882
Minnesota-1 Timothy Walz (D)	858
Colorado-4 Betsy Markey (D)	766

Note: If wind farms overlapped legislative districts, they are split equally between the two.

Wind projects boost local tax bases, helping to pay for schools, roads and hospitals. Wind projects also revitalize the economy of rural communities by providing steady income to farmers and others landowners. Each wind turbine contributes $3,000 to $5,000 or more per year in rental income, while farmers continue to grow crops or craze livestock up to the foot of the turbines.

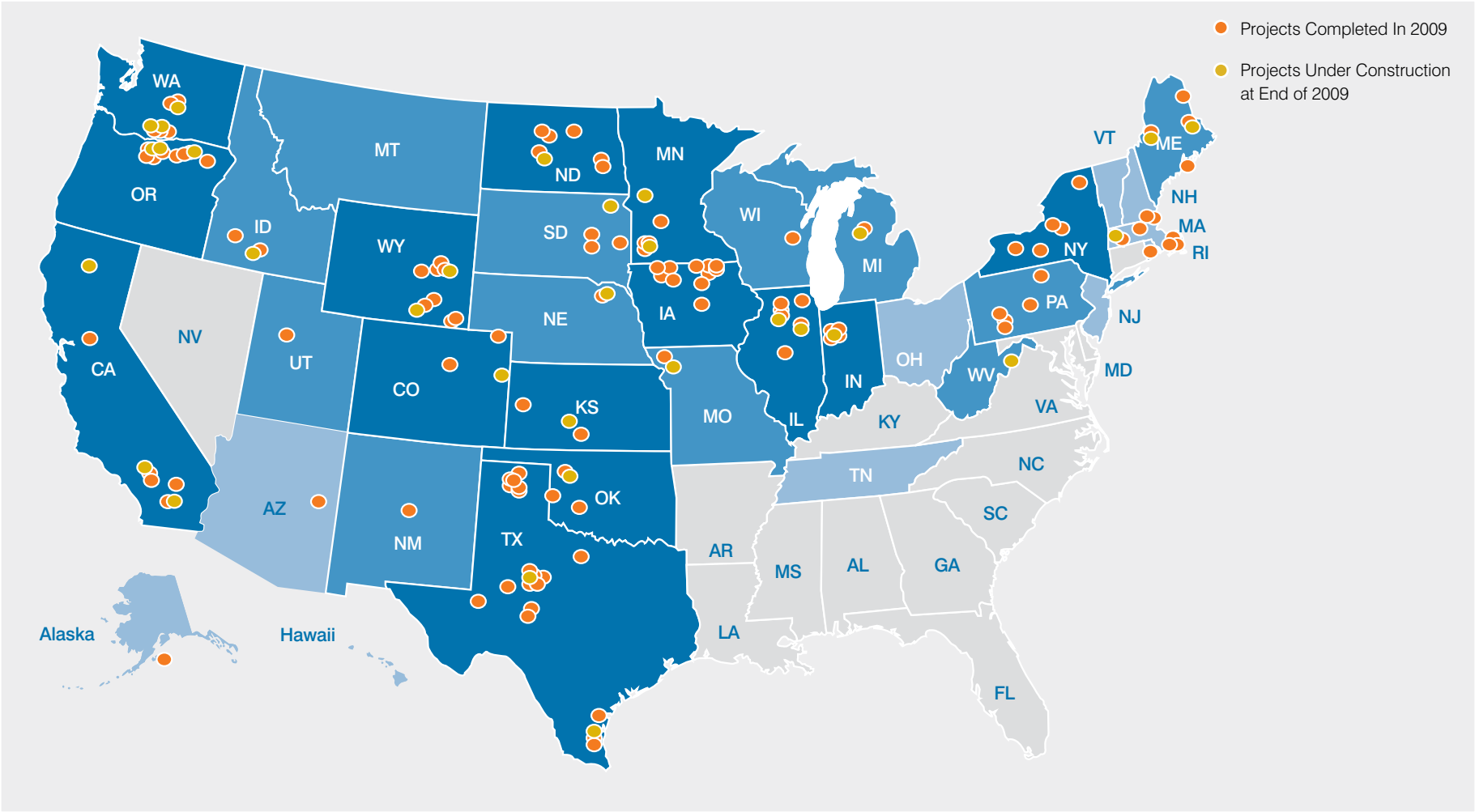
Project installations tend to be planned where there is a confluence of a great wind resource, an availability of transmission capacity to get the power to market, and a strong policy environment that supports long-term demand for wind power. Over 2,750 MW of wind capacity was under construction at the end of 2009, lower than the over 4,000 MW that was under construction at the end of 2008. The level of new installations that the country will see in 2010 will be dependent to a large degree on what policies are put in place at the national level. Details of projects under construction can be found in Appendix B.

Table 2 CAPACITY ADDITIONS BY STATE, QUARTERLY

State	end 2008	1Q09	2Q09	3Q09	4Q09	end 2009
Texas	7113	789	454	436	613	9405
Iowa	2791	102	160		617	3670
California	2442	152	120	7	3	2723
Washington	1367		137	30	375	1908
Oregon	1067	368	45	179	162	1821
Minnesota	1736	50	2		9	1796
Illinois	916			201	431	1548
New York	707	568				1274
Colorado	1068			174	4	1246
North Dakota	714			53	436	1203
Oklahoma	831			35	265	1130
Wyoming	676	138	2	170	116	1101
Indiana	131	400			505	1036
Kansas	815	199				1014
Pennsylvania	361		102	133	153	748
New Mexico	497			100		597
Wisconsin	395	54			0	449
Montana	272				104	375
West Virginia	330				0	330
South Dakota	187	51	50		25	313
Missouri	163		146			309
Utah	20				204	223
Maine	47	57		1	71	175
Nebraska	72	81				153
Idaho	75	71				147
Michigan	129				14	143
Hawaii	63				0	63
Arizona				63		63
Tennessee	29				0	29
New Hampshire	25			0		26
Massachusetts	6	0	1	0	7	14
Alaska	3			5	1	9
Ohio	7			0	0	8
New Jersey	8				0	8
Vermont	6				0	6
Rhode Island	1	2		0	0	2

Note: "0" in row indicates that <.4 MW of capacity

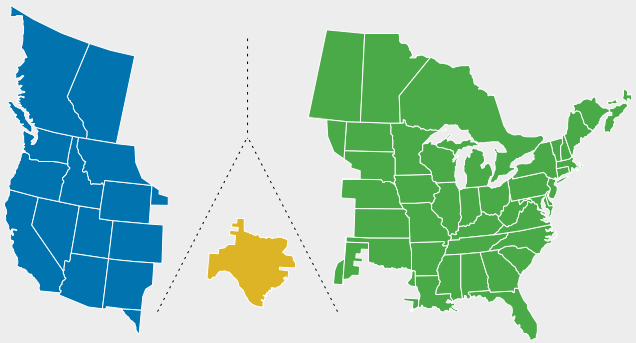
Fig. 16 2009 U.S. WIND POWER PROJECT LOCATIONS



While Figure 13 shows the wind generation percent by state, there has been a recent effort to study in integration of wind projects at the interconnection level; eastern interconnection, western interconnection, and the Electric Reliability Council of Texas (ERCOT). In 2008 and 2009, these studies include the Eastern Wind Integration and Transmission Study (EWITS), the Joint Coordinated System Plan (JCSP) and Western Wind Integration Study. Figure 17 shows the breakdown of installed wind capacity for each interconnection.

There is a significant amount of wind development activity across the country, with hundreds of wind projects under development in various stages. The transmission interconnection queue can provide some insight to the potential build out of wind projects. Figure 18 shows the wind capacity in the transmission interconnection queues, by region. There are nearly 300,000 MW of wind projects in the interconnection queues across the country. Projects lined up in queues in the Pacific Northwest and Interior West alone sum to nearly 100,000 MW of wind capacity. The Upper Midwest region of MISO has nearly 70,000 MW of wind projects in the queue, the Electric Reliability Council of Texas (ERCOT) has 45,000 MW, the MidAtlantic region of PJM has nearly 37,000 MW and the Central Plains region of the Southwest Power Pool (SPP) has over 30,000 MW.

Fig. 17 INSTALLED WIND CAPACITY BY INTERCONNECTION



	Capacity Installed (MW)
Eastern Interconnection	16,180
Western Interconnection	10,115
ERCOT (Electricity Reliability Council of Texas Interconnection)	8,745

Fig. 18 WIND IN TRANSMISSION INTERCONNECTION QUEUE, BY REGION

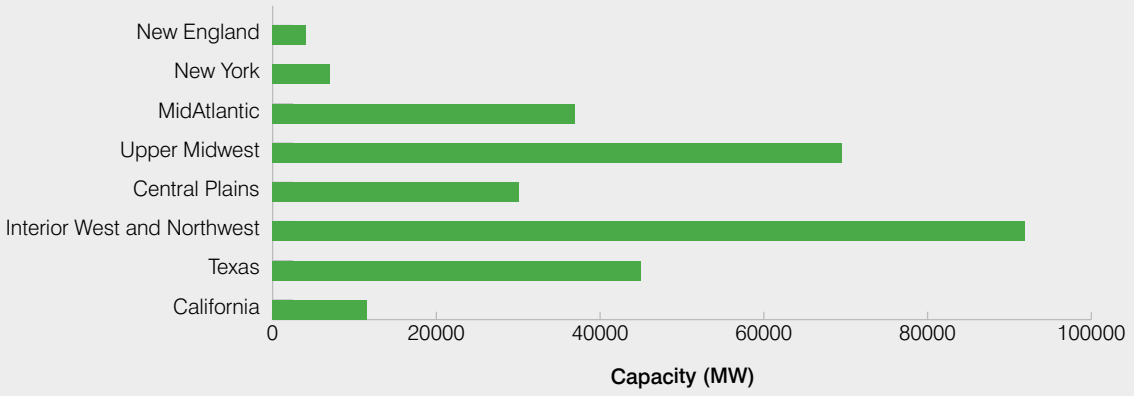
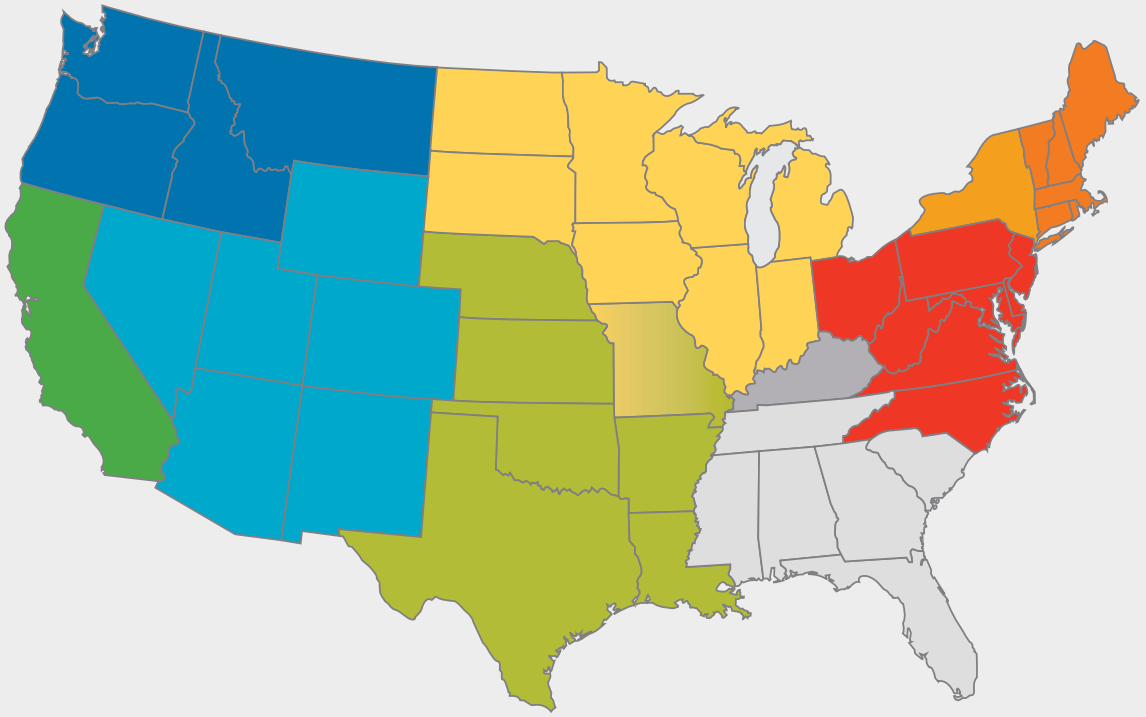


Fig. 19 AWEA REGIONAL PARTNERS



AWEA Regional Partner	Website
Renewable Northwest Project	www.rnp.org
Center for Energy Efficient & Renewable Technologies	www.ceert.org/
Interwest Energy Alliance	www.interwest.org/
The Wind Coalition	www.windcoalition.org
Wind on the Wires	www.windonthewires.org
ACENY	www.aceny.org
RENEW New England	website under development
Mid-Atlantic Renewable Energy Coalition	website under development

State policy is a major driver for wind development. In lieu of satellite offices, AWEA works with and supports eight Regional Partners across the country. Regional partner boards include project developers and manufacturers from wind companies active in the region. Most also include stakeholders from other renewable technologies and non-profit entities supporting the healthy growth of renewable energy. These organizations provide authentic local and regional voices on policy issues.

PROJECT OWNERS AND DEVELOPERS

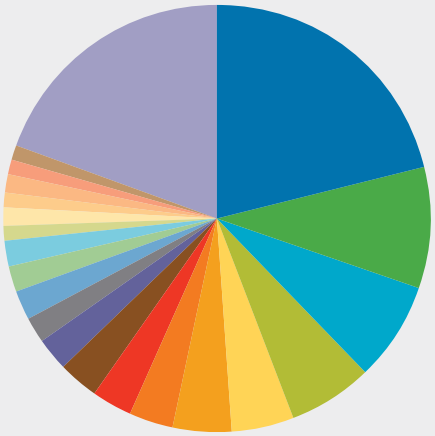
NextEra Energy Resources continues to lead ownership of wind assets in the U.S., with over 7,400 of the over 35,000 MW installed. As shown in Fig. 21, the trend over time is one of diversification, however. NextEra Energy Resources now owns about 21% percent of all U.S. wind power assets, down from over 40% through the end of 2004.

Besides NextEra Energy Resources, eight other companies now own over 1,000 MW of wind power assets, up from five last year. The top five companies own about 49% of the total U.S. fleet, down from 53% last year. Horizon-EDPR moved into the third spot in terms of overall ownership. With installations close to 1,000 MW in 2009, E.On Climate & Renewables moved into fifth place, up from ninth in 2008.

Most U.S. wind projects are developed and owned by independent power producers (IPPs). In many cases the IPP is the unregulated subsidiary of a utility. In 2009, 84% of the new capacity additions were IPP-owned. Ownership by utilities stayed at about 15% for the fourth year. "Community wind" projects tend to be smaller ones, usually less than 20 MW of capacity, and provide benefits to the local community in addition to lease payments and/or tax payments, either through a component of local ownership or through use of the electricity on site. Because they often use smaller turbines, more "community wind" projects were installed than utility projects, but in terms of capacity, they were less than 1% of the total of new additions.

Ownership is on a net basis, so if two owners have a half share of a 100-MW wind farm, each company is credited with 50 MW. Ownership does not include structural investors, which may have a share of equity.

Fig. 20 TOP 20 WIND POWER OWNERS IN U.S.



Company	MW under "managing ownership"
NextEra Energy Resources	7458
Iberdrola Renewables	3225
Horizon-EDPR	2642
MidAmerican Energy	2205
E.On Climate & Renewables	1720
Invenergy	1500
Edison Mission Group	1210
Infigen Energy (previously BBW)	1090
AES	1057
enXco	882
Duke Energy	735
Noble Environmental Power	726
John Deere Renewables	705
BP Wind Energy	679
First Wind	478
Shell	449
Puget Sound Energy	429
Eurus Energy	417
Acciona Energy	415
Babcock & Brown Ltd	413
Others	6630

Ownership is on a net basis, so if two owners have a half share of a 100-MW wind farm, each company is credited with 50 MW. Ownership does not include structural investors, which may have a share of equity.

In terms of new capacity additions for 2009 alone (Table 3), Iberdrola Renewables edged NextEra Energy Resources to gain the top spot. Noble Environmental Power rounds out the top five in terms of new additions in 2009. Including developers of small projects, there were about 50 project developers that completed 138 projects in the U.S. in 2009 (fig. 23), up from just over 20 developers installing 22 projects in 2004.

Fig. 21 U.S. WIND POWER OWNERSHIP DIVERSIFYING OVER TIME

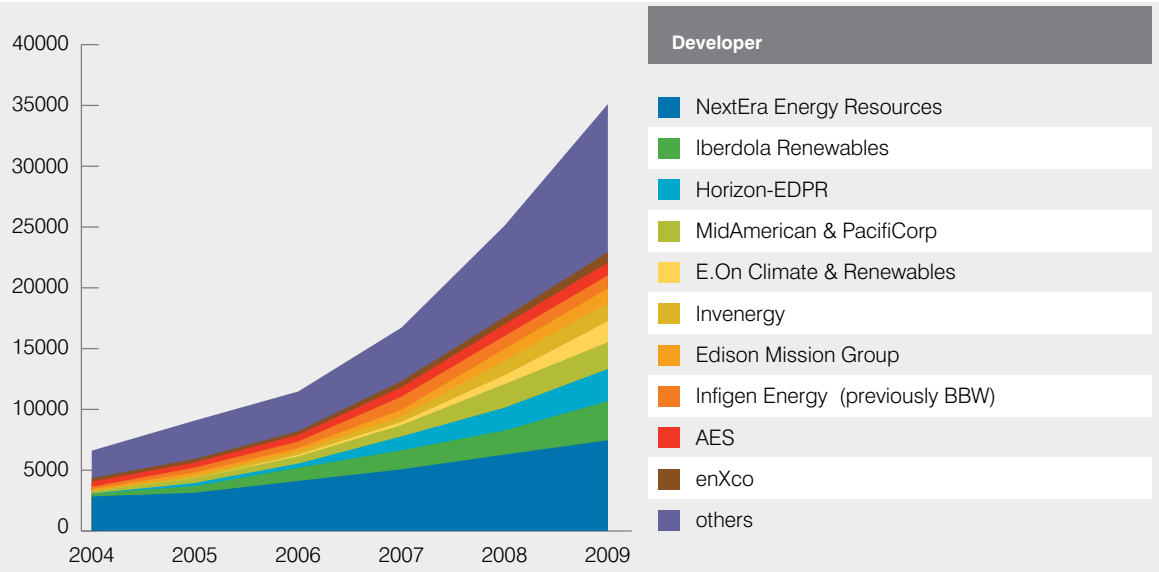


Table 3 10 NEW CAPACITY ADDERS IN 2009, BY OWNERSHIP

Company	Capacity Added in 2009
Iberdrola Renewables	1241 MW
NextEra Energy Resources	1170 MW
E.On Climate & Renewables	993 MW
Horizon-EDPR	769 MW
Noble Environmental Power	444 MW
BP Wind Energy	434 MW
First Wind	386 MW
Babcock & Brown Ltd	384 MW
Duke Energy	364 MW
Invenergy	296 MW

PROJECTS

The Horse Hollow Wind Farm was surpassed as the country's largest wind farm in 2009, when the final phase of E.On Climate & Renewables' Roscoe Wind Farm came online. The project was built in four phases, named Roscoe, Champion, Pyron and Inadale. Together, it has 627 turbines and a combined generating capacity of 781.5 MW. Over 400 landowners received lease payments to host the turbines. Alone, the Roscoe Wind Farm can produce enough power for the equivalent of 250,000 average U.S. homes. The six largest wind farms in the U.S. are now located in Texas.

A proliferation of community projects in 2009 kept the average project size the same as in 2008, at about 75 MW per project (Fig. 22). Excluding all projects with turbines smaller than 1 MW, the average project size rises to 85 MW per project in 2009. AWEA considers a project to be "one project" if it is owned by the same owner and is contiguous. Projects are often built in a number of phases and may have more than one power offtaker and type of turbine.

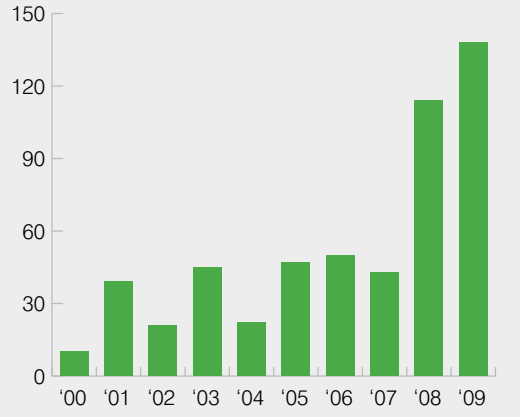
Table 4 LARGEST U.S. WIND FARMS

Installed Capacity	Project Name	State	Year Online	Owner
782	Roscoe Wind Farm	TX	2008	E.On Climate & Renewables
736	Horse Hollow	TX	2005, 2006	NextEra Energy Resources
663	Capricorn Ridge	TX	2007, 2008	NextEra Energy Resources
585	Sweetwater	TX	2003, 2005, 2007	Infigen Energy/Duke Energy
523	Buffalo Gap	TX	2005, 2007, 2008	AES
458	Panther Creek	TX	2008, 2009	E.On Climate & Renewables
400	Peetz Table	CO	2007	NextEra Energy Resources
400	Lone Star	TX	2007, 2008	Horizon-EDPR
396	Twin Groves	IL	2007, 2008	Horizon-EDPR
322	Maple Ridge	NY	2005, 2006	Iberdrola Renewables/Horizon-EDPR

Note: The wind areas of Tehachapi (>700 MW), San Gorgonio (>350 MW), and Altamont Pass (>550 MW) in California are not considered one wind farm because the projects contained in them are owned by many different owners.

Fig. 22 AVERAGE WIND PROJECT SIZE, MW

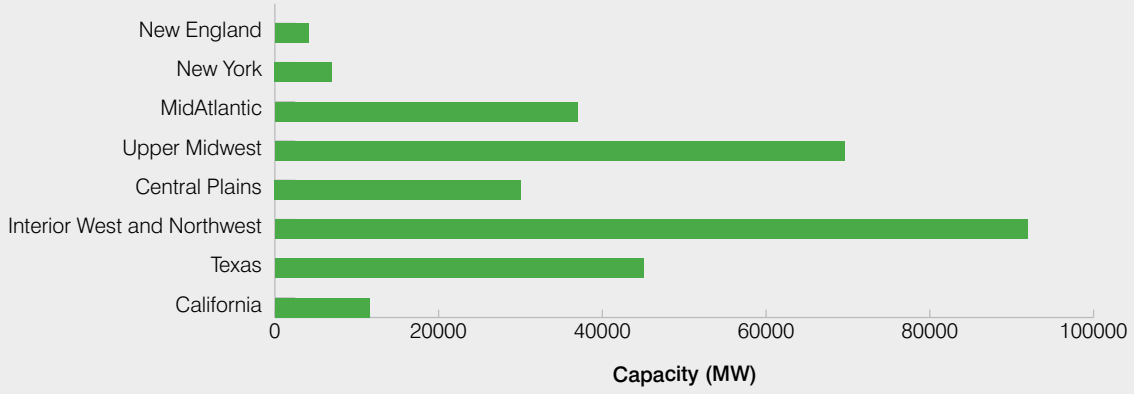
Fig. 23 NUMBER OF PROJECTS INSTALLED BY YEAR



TRANSMISSION

Nationwide, nearly 300,000 MW of proposed wind projects have applied for interconnection to the electric grid but have not yet been connected. Since an application for interconnection is usually one of the first steps in the process of developing a potential wind project, it is likely that a significant number of these projects will not be developed to completion. Nevertheless, the magnitude of this number indicates the significant level of interest in developing wind energy, particularly since many applications for interconnection require a significant financial deposit. Figure 18 shows the regional distribution of proposed wind projects that are currently pending in the queues. Unsurprisingly, the states that have the best wind resources and have seen the most wind development to date are also the states with the largest amount of wind awaiting interconnection.

Fig. 18 WIND IN TRANSMISSION INTERCONNECTION QUEUE, BY REGION



Moreover, the large number of wind projects in the interconnection queues provides an indication that the nation's electric grid is currently inadequate for accommodating the demand for wind energy. This is particularly apparent when the size of the interconnection queues is compared to the number of transmission projects moving forward in the near future.

The inadequacy of the nation's electric grid is a major impediment to the continued growth of the wind industry. As discussed above, many proposed wind projects cannot be deployed because there is insufficient transmission capacity to transmit their output. Table 5. shows the proposed transmission lines in the near-term which, if all built, could carry an additional 32,000 MW of wind capacity. In addition, many wind projects that have connected to the grid are forced to curtail a significant amount of their output or are facing low or even negative electric prices because there is inadequate transmission to carry their full output.

As a result, the location of proposed transmission projects may provide some indication of where future wind projects are likely to be developed to take advantage of this added transmission capacity. It is important to stress that the transmission projects listed in Table 5 are only proposed projects, and that the list is most likely not comprehensive. While some projects are relatively far along in the development process and construction work has even begun on some, the success of most of these projects is still heavily dependent on the outcome of cost allocation and permitting decisions as well as other uncertainties. This table includes only transmission projects that are proposed to be completed within the next four years, so many planned transmission projects with later proposed completion dates are not included.

Table 5 NEW TRANSMISSION LINES PROPOSED

Transmission Project Name & Location	Voltage (kV)	MW Expected	Year Online
Populus-Terminal (ID, UT)	Double 345	1,600	2010
Walla Walla-McNary (OR, WA)	235	400	2010
Southwest Intertie (ID, NV)	500	1,850	2011
Northeast Energy Link (ME, NH, MA)	(DC) 320	1,000-2,000	2012
BPA lines from Open Season (WA, OR)	500	2,800	2012
CREZ (TX)	345	9,859	2012-2013
CO-WY intertie (WY)	345	900	2012-2013
CapX (MN, SD, ND)	345	2,275	2012-2014
Tallgrass/Prairie Wind (KS, OK)	765	5,800	2013
Tehachapi (CA)	500	4,500	2013
Pawnee-Smoky Hill upgrade (CO)	345	500	2013
Total		~32,000 MW	

OFFSHORE PROJECTS

Proposed Projects

Offshore wind is gaining momentum in the United States. Significant milestones in 2009 included a Memorandum of Understanding between the Federal Energy Regulatory Commission and the Department of Interior regarding jurisdiction on the Outer Continental Shelf, the release of the Minerals Management Service's final rule for offshore development on the Outer Continental Shelf and the issuance of five exploratory leases for offshore wind development.

Many states interested in offshore wind have also taken a leadership role to encourage such development in their waters and several state water projects have been proposed. In July 2009, the Texas General Land Office issued two offshore leases to Baryonyx Corporation for offshore wind development. The New York Power Authority issued a Request for Proposals (RFP) for 500 MW of offshore wind in the New York state waters of Lake Erie and/or Lake Ontario in December 2009.

A table of many U.S. offshore wind projects is included on the following page (Table 6). Projects listed include those with significant progress in one or more of the following areas - permitting, obtaining a land lease, wind resource testing and public involvement. This is not an exhaustive list; other projects are proposed and in various stages of planning.

Offshore Wind Turbines

Larger wind turbines have been adapted for the marine environment and others are being created specifically for offshore applications. Deeper water technology is also being explored - in June 2009, the first full scale floating offshore turbine, Statoil's Hywind, was installed off the coast of Norway for two years of testing. Table 7 lists many of the commercial turbines that are particularly suited for offshore wind sites.

Power Purchase Agreements

Power purchase agreements (PPA) ensure that a project will have a long-term buyer for the electricity produced. Two offshore wind projects have secured power purchase agreements – NRG Bluewater Wind for its project in Delaware and Deepwater Wind for its Block Island Wind Farm. NRG Bluewater Wind has a PPA with Delmarva Power and Light for up to 200 MW of offshore wind at 9.893 cents/kWh (in 2007 dollars). Deepwater Wind negotiated a PPA with National Grid in 2013 for up to 30 MW of offshore wind at 24.4 cents/kWh, with a 3.5 percent annual increase in price. Cape Wind is currently negotiating a PPA with National Grid for its project in Nantucket Sound and NRG Bluewater Wind is in discussions with the University of Maryland for a 55 MW PPA.

Table 6 OFFSHORE WIND PROJECTS UNDERWAY IN U.S.

State	Developer	Project Name	Location	Miles from shore	Planned Capacity
Delaware	NRG Bluewater Wind, LLC	Mid-Atlantic Wind Park*	Offshore from Rehoboth Beach	13	300 - 450 MW
Massachusetts	Cape Wind Associates	Cape Wind	Nantucket Sound	5	468 MW
	Town of Hull Municipal Light Plant	Hull III	Vicinity of Harding Ledge	2	12 - 15 MW
New Jersey	NRG Bluewater Wind, LLC	*	Offshore from Atlantic Beach	16	348 MW
	Garden State Offshore Energy, LLC	*	Offshore from Avalon	20	345 MW
	Fishermen's Energy, LLC	Phase I	Offshore from Atlantic City	3	20 MW
	Fishermen's Energy, LLC	Phase II*	Offshore from Atlantic City	7	350 MW
North Carolina	Duke Energy	NC Coastal Wind Demonstration Project	Eastern Pamlico Sound	7	3 - 15 MW
Ohio	Lake Erie Energy Development Corporation	Cleveland Bay	Cleveland Bay	4	20 MW
Rhode Island	Deepwater Wind, LLC	Block Island Wind Farm	Offshore from Block Island	3	30 MW
	Deepwater Wind, LLC	Rhode Island Offshore Wind Farm*	Offshore from Sakonnet	15	385 MW
Texas	Wind Energy Systems Technology	Galveston Offshore Wind Farm	Offshore from Galveston	10	150 MW

Table 7 OFFSHORE TURBINE SPECIFICATIONS

Manufacturer	Turbine Name	Rated Capacity	Rotor Diameter	Hub Height
Areva/Multibrid	M5000	5 MW	116 meters	90m
BARD	BARD 5.0	5 MW	122 meters	90m
GE*	3.6sl	3.6 MW	111 meters	site dependent
Nordex	N90	2.5 MW	90 meters	75m, 80m, 100m, 120m
REpower	5M	5 MW	126 meters	85-95 m offshore
	6M	6 MW	126 meters	100m for those onshore now
Siemens	SWT-3.6-107	3.6 MW	107 meters	80m or site specific
Vestas	V112-3.0 MW	3 MW	112 meters	site specific
WinWind	WWD-3	3 MW	90, 100, 103 meters	80-100 meters

** In September 2009, GE acquired ScanWind and will be able to offer their direct drive offshore technology in the future.*

UTILITIES

Utility Wind Power Rankings

Electric utilities play a critical role in the wind energy industry, as they deliver the majority of wind energy generated from the wind projects scattered across the country to end use customers. The tables provided in this section of the report list the utilities with the greatest amount of wind capacity in place to serve their retail electric customers – residential, commercial, and industrial customers. The tables show both the amount of wind power capacity under long-term contracts (Power Purchase Agreements, PPAs) as well as the amount of wind power projects owned and operated by the utilities.

Electric utility MidAmerican Energy (including PacifCorp) leads all other U.S. utilities by a very wide margin in terms of ownership of wind assets and shows up as one of the largest owners of wind project assets in the entire country for any organizations. Utility-owned projects accounted for about 15% of all the capacity installed in 2009, a rate consistent with the past few years.

For each electric utility, the amount of wind power capacity in the "Under Contract (PPA)" and "Utility Owned" is added together to reach a combined total for each utility.

This combined amount of wind power capacity is used to derive the overall rankings. Three separate rankings are provided here, one for investor-owned utilities (IOUs), one for municipally-owned utilities (munis) and one for rural electric co-operative utilities (co-ops).

For the IOU rankings (Table 9), Xcel Energy continues to be the leader by a wide margin related to wind power on its system, making it the largest wind-powered utility in our rankings again in 2009. AEP's various utility subsidiaries contracted for large amounts of wind in 2009, moving it to the fourth place. The number of investor-owned utilities getting involved with wind power continues to grow.

In the category of municipal electric utilities (Table 10), CPS Energy (the municipal utility for the City of San Antonio, TX) continues to lead the rankings shown here for munis. The Southern California Public Power Authority – a joint powers authority consisting of 10 municipal utilities and one irrigation district – contracted for power from the Milford Wind project in Utah and the Pebble Springs project in Oregon, moving it into third place. Snohomish Public Utility District contracted for the wind energy from the Hay Canyon Wind Project, moving it into fourth place.

Table 8 UTILITY OWNERSHIP OF WIND POWER CAPACITY

Utility	Capacity (MW)
MidAmerican Energy (including PacifiCorp)	2205
Puget Sound Energy	429
Portland General Electric	275
Alliant Energy	267
Oklahoma Gas & Electric	221
Westar	149
We Energies	147
Otter Tail Power	138
Turlock Irrigation District	137
Xcel Energy	127

Finally, for rural electric co-operative utilities (Table 11), Basin Electric built Prairie Wind 1, the largest project to be solely owned by a rural electric cooperative utility in the U.S. With that project and an additional purchase from a project owned by NextEra Energy Resources, Basin Electric moves into the top spot. Western Farmers moves into fourth place with contracts from three large projects in Western Oklahoma.

Table 9 INVESTOR-OWNED UTILITIES

Utility	Under Contract MW (PPA)	Utility-Owned MW*	TOTAL MW
Xcel Energy	3049	127	3176
MidAmerican Energy (including PacifiCorp)	612	1631	2244
Southern California Edison	1772	0	1772
American Electric Power PPA[3]	1196	0	1196
Pacific Gas & Electric	1131	0	1131
Luminant Energy (formerly TXU)	913	0	913
Alliant Energy	378	267	645
Puget Sound Energy	50	429	479
First Energy	376	0	376
Portland General Electric	100	275	375
San Diego Gas & Electric	342	0	342
Westar	146	149	295
Oklahoma Gas & Electric	51	221	272
Wisconsin Public Service	124	109	233
Public Service New Mexico	204	0	204
Idaho Power	192	0	192
Arizona Public Service	190	0	190
Otter Tail Power	45	138	183
We Energies	26	147	172
Northwestern Energy	160	0	160

** Owned and Used for Customers*

Note: Tracks power contracts of one year duration or longer

[1] Data collected with help from the American Public Power Association

[2] Data collected with help from the National Rural Electric Cooperative Association

[3] One 100-MW project in Illinois was online but not yet delivering energy to AEP at the

Table 10 MUNICIPALLY-OWNED UTILITIES[1]

Utility	Under Contract MW (PPA)	Utility-Owned MW	TOTAL MW
City Public Services San Antonio	579	0	579
Austin Energy	439	0	439
Southern California Public Power Authority*	233	0	233
Snohomish PUD	217	0	217
MSR Public Power Agency	200	0	200
Los Angeles Department of Water & Power	69	120	189
Seattle City Light	175	0	175
WPPI Energy	129	10	139
Turlock Irrigation District	0	137	137
Cowlitz PUD	0	124	124

*Does not include LADWP contracts

Table 11 RURAL ELECTRIC CO-OPERATIVE UTILITIES[2]

Utility	Under Contract MW (PPA)	Utility-Owned MW	TOTAL MW
Basin Electric	227	125	352
Great River Energy	319	0	319
Minnkota Power Cooperative	290	0	290
Western Farmers' Electric Coop	216	0	216
Associated Electric Cooperative	158	0	158
Sunflower Electric Power Corp.	124	0	124
Lower Colorado River Authority*	106	0	106
Perdenales Electric Co-op	90		90
Lakeview Light & Power	0	83	83
Klickitat PUD	0	53	53

*LRCA is a state agency that provides wholesale power to consumer-owned utilities

ENVIRONMENTAL IMPACTS

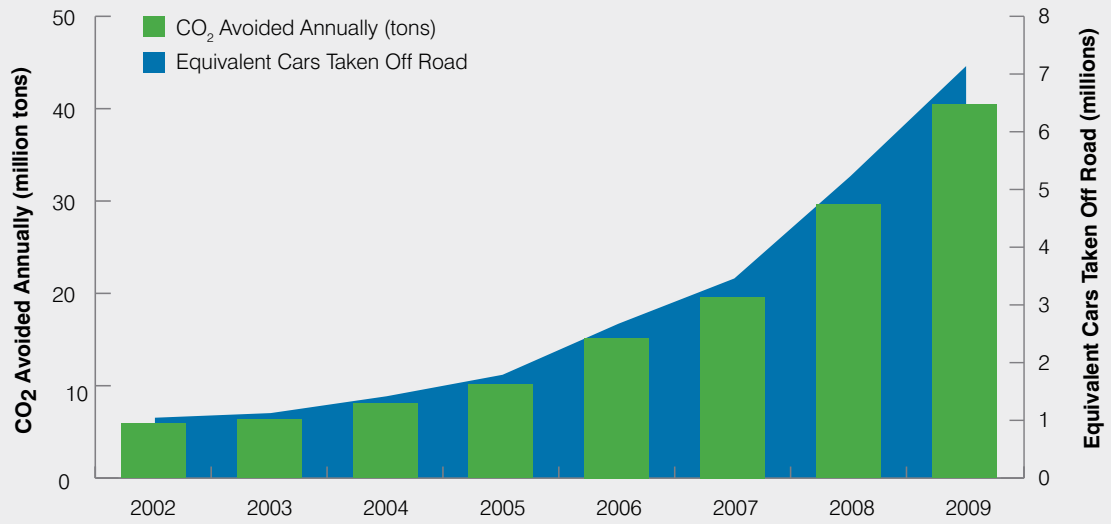
Wind power avoids generation from fossil fuel power plants, often coal and natural gas generation, reducing greenhouse gas emissions, some conventional pollutants and water consumption.

Electricity produced by a wind plant must be matched by an equivalent decrease in electricity production at another plant. When it is available, system operators use wind energy, which has very low operating costs, and reduce the output of the marginal power plants (those that are most expensive to operate). Marginal power plants are almost always natural gas, coal or oil-fired units because of their variable fuel costs. Wind energy is also occasionally used to reduce the output of hydroelectric dams, which can store water to be used later to replace more expensive marginal generation.

In 2009, wind generation of 70.8 million megawatt-hours (MWh) avoided over 40 million metric tons of CO_2, the equivalent of reducing power sector CO_2 emissions by nearly 2%, or taking over 7 million cars off the road.

New wind projects were installed throughout all four quarters of 2009, meaning some projects were not online for an entire year. In 2010, when the new wind projects installed throughout 2009 produce power for a full year, the entire U.S. wind fleet will avoid over 62 million metric tons of CO_2, the equivalent of reducing power sector emissions by more than 2.5%, or taking over 10.5 million cars off the road.

Fig. 24 AVOIDED CO_2 EMISSIONS FROM WIND

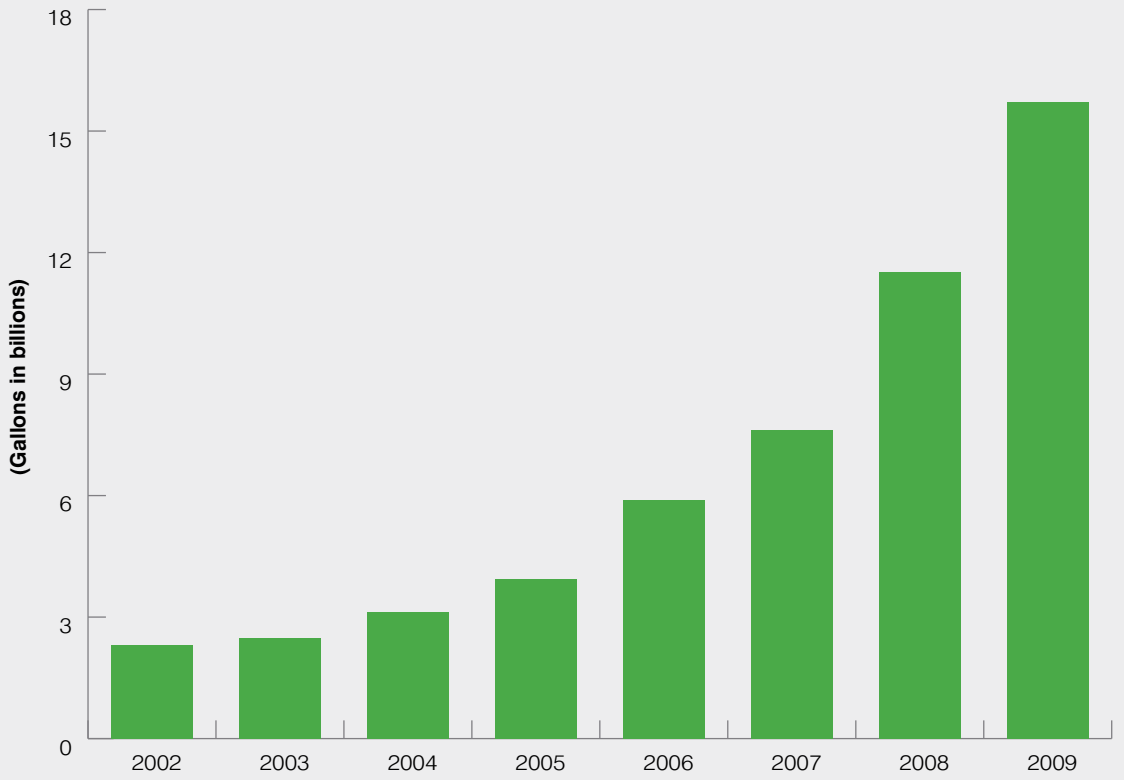


A number of studies from independent system operators (ISOs) and regional transmission organizations (RTOs) have estimated system-wide impacts additional wind generation, including impact on CO_2 emissions. According to these studies, wind energy can displace anywhere from 0.44 to 0.74 metric tons of CO_2 per megawatt-hour (MWh) generated, depending on the region and the fuel on the margin. On average, wind generation today will avoid roughly 0.6 metric tons (1,300 pounds) of CO_2 for every MWh of wind generation. This is the rough equivalent of wind displacing natural gas 75% of the time, and coal the remainder of the time. This means a single turbine of average size in 2009 would avoid over 3,000 metric tons of CO_2 annually, the equivalent of taking more than 500 cars off the road.

While CO_2 emissions are not currently regulated in the U.S., conventional pollutants such as NO_X and SO_2, which cause smog and acid rain, are regulated in the power sector. Depending on the current state, regional and national regulation of conventional pollutants, wind generation can help meet the reduction goals of various regulations by avoiding emissions when it backs down the marginal fuel, most commonly coal and natural gas.

By directly reducing the use of fossil fuel generation, wind energy can also help reduce the consumption of water. Water is used for the cooling at thermal (natural gas, coal, and nuclear) power plants. The majority of water withdrawn for cooling is recycled back through the system. However, approximately 2 to 3% of water can be lost through evaporation. This water consumed through evaporative losses ranges from 100 to over 500 gallons per MWh for fossil fuel units. Shown in Figure 25, the reduction in output of fossil power plants from wind generation in 2009 led to water consumption savings of over 15 billion gallons of water. When all new wind projects installed throughout 2009 produce power for a full year in 2010, this water savings will increase to over 20 billion gallons per year.

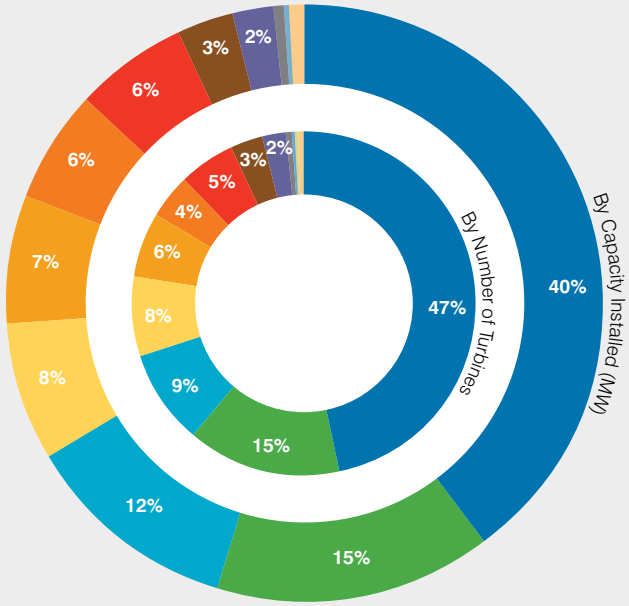
FIG. 25 ANNUAL WATER CONSUMPTION AVOIDED FROM THERMAL POWER PLANTS



TURBINE MANUFACTURERS

Figure 26 shows that GE Energy continues to lead the wind turbine manufacturer rankings. Similarly to the wind project owner rankings, 2009 brought more diversity to the U.S. wind turbine market. As shown in Table 13, there were five utility-scale turbine manufacturers with equipment installed in 2005. By 2009, that number had tripled. The GE Energy 1.5-MW turbine accounted for 40% of all the new capacity added in the U.S. in 2009. The top three manufacturers retained the same position as last year. Suzlon owns a majority interest in REpower (91%) and if those two companies' installed capacities were added together, they would rank in the third slot with 509 MW. With a number of its largest 2.4-MW turbines installed, Mitsubishi moved into fourth place in terms of capacity installations. In 2009, the top eight turbine manufacturers accounted for 96% of all new capacity added in the year, down slightly from 98% in 2008.

Fig. 26 MANUFACTURERS' PERCENTAGE OF 2009 INSTALLATIONS IN U.S.

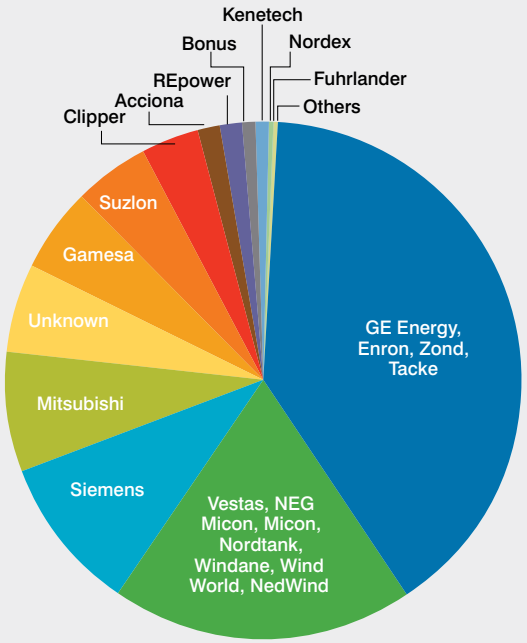


Company	# of Turbines	MW Capacity
GE Energy	2663	3995
Vestas	830	1488
Siemens	505	1162
Mitsubishi	428	751
Suzlon*	344	702
Clipper	242	605
Gamesa	300	600
REpower*	165	330
Acciona Windpower	136	204
Nordex	25	63
AAER	4	6
DeWind	3	6
Goldwind	3	5
Northern Power Systems	32	3
Fuhrlander	2	3
unknown	20	74
Total (Utility-Scale)	5702	9996

**Suzlon owns 91% of REpower*
Includes Turbines 100 kW and larger
Turbine installation data is reported by the project owner.

Fig. 27 MANUFACTURERS' SHARE OF TOTAL

Share of Cumulative Wind Installations



Note: when combined, the lead company has acquired the others.

Table 13 MAKERS OF TURBINES INSTALLED OVER PAST FIVE YEARS

2005	2006	2007	2008	2009
GE Energy	GE Energy	GE Energy	GE Energy	GE Energy
Vestas	Siemens	Vestas	Vestas	Vestas
Mitsubishi	Vestas	Siemens	Siemens	Siemens
Suzlon*	MItsubishi	Gamesa	Suzlon	Mitsubishi
Gamesa	Suzlon	Mitsubishi	Gamesa	Suzlon
	Gamesa	Suzlon	Clipper	Clipper
	Suzlon	Clipper	Mitsubishi	Gamesa
		Nordex	Acciona WP	REpower
			REpower	Acciona WP
			Fuhrlander	Nordex
			DeWind	AAER
			EWT	DeWind
			Northern Power Systems	Goldwind
				Fuhrlander
				Northern Power Systems

Manufacturers ranked in order of market share for each year.
**Suzlon owns 91% of REpower*

UTILITY-SCALE TURBINES

Fig. 28 AVERAGE WIND TURBINE CAPACITY

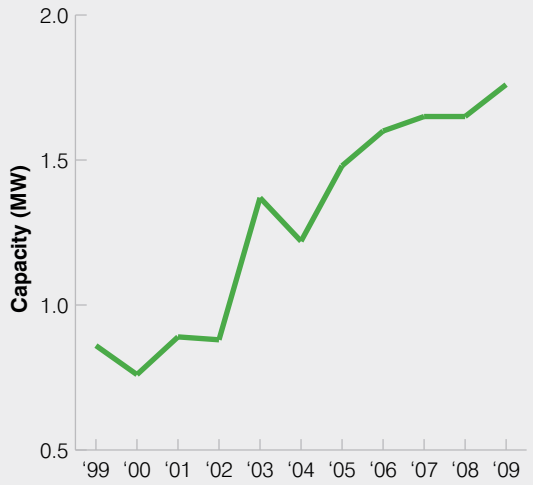
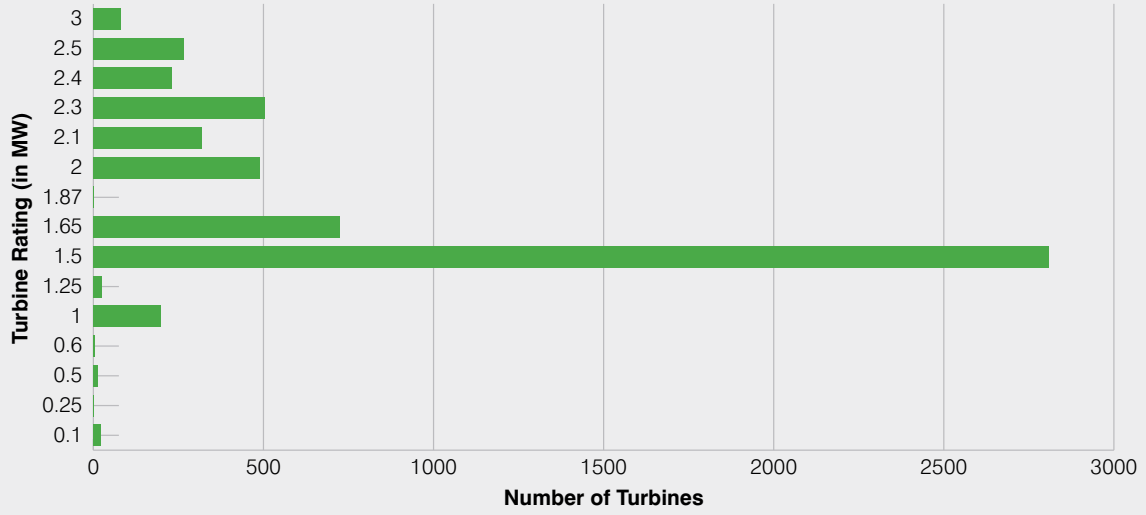


Fig. 29 DISTRIBUTION OF TURBINES INSTALLED IN 2009 BY CAPACITY



Utility-scale turbines continued to gradually grow larger. Over 5,600 turbines were installed in 2009, bringing the total to over 33,000 turbines. As the following bar chart shows, the 1.5-MW turbine is still the most popular in the U.S. by far. The average capacity for new turbines added in 2009 was 1.75 MW, up from 1.67 MW in 2008. Turbine manufacturers continue to push capacities higher to achieve more production from each unit. However, there are a few companies moving in to fill the needs of the mid-size turbine market as well, including firms that refurbish older turbines. While average turbine size increased slightly in 2009, from 1.66 MW to 1.75 MW, this was due to a shift in turbine models installed rather than the introduction of new wind turbine models into the U.S. market. In 2009, 17 turbine models from 14 original equipment manufacturers (OEMs) were installed in the market. Of the 17, only three were new to the market in 2009. Fuhrlander, which has previously installed its 2.5-MW model, saw erection of its first 1.5-MW model in the U.S. market. Goldwind turbines entered the market for the first time, with three 1.5-MW units installed in 2009. Canadian OEM AAER completed the first installations of its 1.5-MW machine. This list of turbine models only shows the rating for each model, but there may be multiple models available for a given rating. Multiple tower heights, rotor diameters and blade lengths may be available for each rating in order to best meet the needs of the wind project developer at a given site. In addition to those models listed, other models are currently available in the U.S. market. Turbine manufacturer Nordic opened a U.S. manufacturing facility in 2009 to supply the U.S. market, while additional turbine manufacturers are introducing new models, typically of higher megawatt ratings, into the U.S. market.

As the three new wind turbine models in the market were of the 1.5-MW rating, the installed turbine ratings and ranges for tower heights, rotor diameters and blade lengths remained unchanged from 2008. While the range for each is quite significant, most models currently installed in the American market do not reach the highest and lowest points in the range. For rotor diameter, most models currently available on the market range from 70-90 meters, with smaller or larger rated machines falling outside this range.

Utility-scale turbines are not just getting bigger – they are getting better, too, and it is the combination of both factors that has led to vast improvements in production capability since the first generation of turbines. A typical turbine installed in 1990 had a nameplate capacity of 250 kW but, because of low capacity factors and low availability, produced about 300,000 kWh per year. Over two decades, the technology has improved to the point where availability to generate is usually above 98% and taller towers and better siting technology have enabled project owners to achieve capacity factors in the high 30% and low 40% annually in the best wind resource areas. That means that a turbine with a nameplate capacity six times larger can produce more than 14 times more power, as seen in Figure 30.

Fig. 30 INCREASE IN WIND TURBINE PRODUCTIVITY

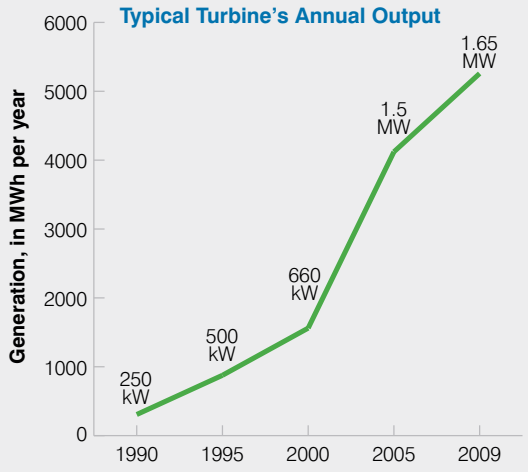


Table 14 SIZES AND MATERIAL USE FOR UTILITY-SCALE TURBINES INSTALLED IN 2009

Capacity range:	1-3 MW
Tower height range:	45-105 meters
Rotor diameter range:	57-101 meters
Blade length range:	26.8-49 meters

Component	% Weight	% Steel
Rotor		
Hub	6.0%	100%
Blades	7.2%	2%
Nacelle		
Gearbox	10.1%	96%
Generator	3.4%	65%
Frame	6.6%	85%
Tower	66.7%	98%

Source: DOE 20% Wind Energy by 2030

Table 15 TURBINE MODELS INSTALLED IN 2009

Manufacturer	Turbine Rating, MW
AAER	*1.5*
Acciona	1.5
Clipper	2.5
DeWind	2.0
Fuhrlander	*1.5*
Gamesa	2.0
GE	1.5
Goldwind	*1.5*
Mitsubishi	1.0
Mitsubishi	2.4
Nordex	2.5
Northern Power Systems	100
REpower	2.0
Siemens	2.3
Suzlon	1.25
Suzlon	2.1
Vestas	1.65
Vestas	3

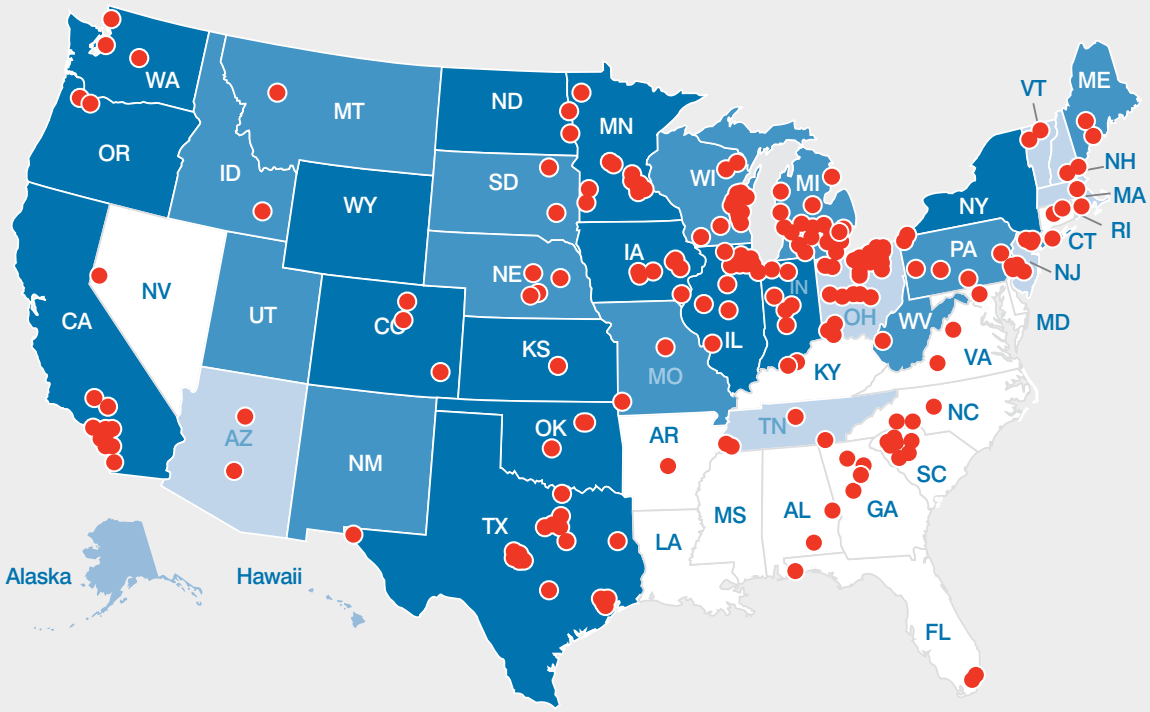
New models in the U.S. market in 2009 are in italics.

MANUFACTURING

The manufacturing sector for the wind industry has grown significantly in the past several years, adding, announcing or expanding over 100 facilities since 2007. Currently, over 200 facilities across the U.S. supply to the wind industry, and this figure does not capture the many additional facilities at the sub-supplier level. Wind manufacturing facilities can be found in every region of the United States, and include major new wind-dedicated facilities and established businesses that have diversified into the wind energy industry.

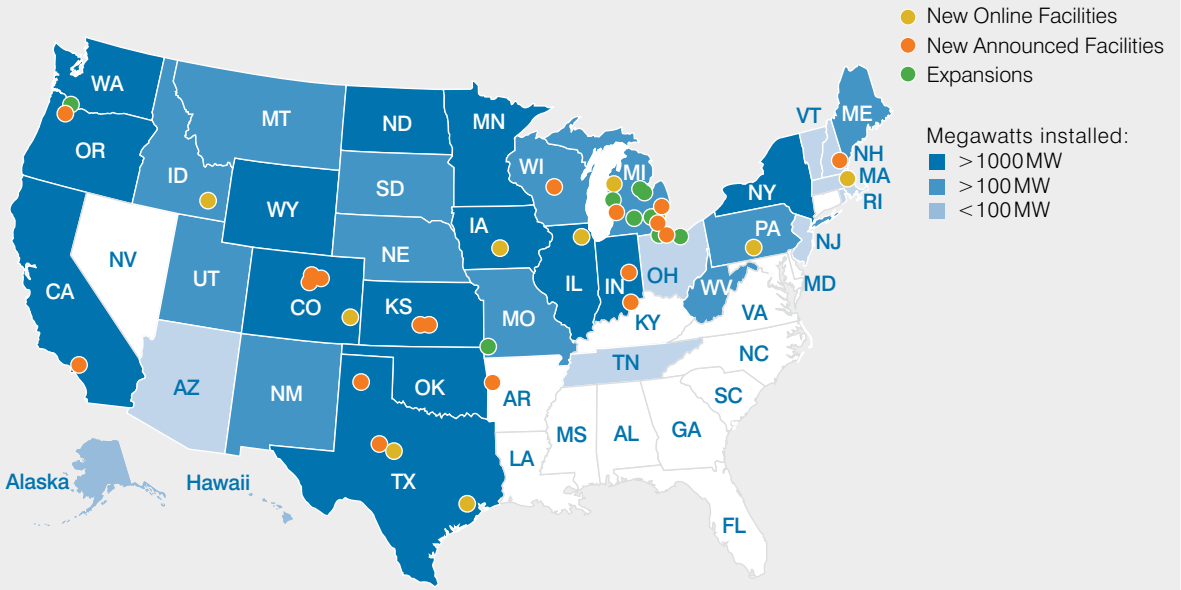
In 2009, the manufacturing sector continued to expand to accommodate the U.S. wind industry. Ten new facilities came online, representing investment through the supply chain, from turbine manufacturers to manufacturers of nacelle and tower internal equipment. An additional 20 facilities were announced, and nine facilities expanded. Most of the facility expansions were at factories that have previously supplied equipment for other industries and are entering the wind market.

FIG. 31 ALL WIND MANUFACTURING FACILITIES



While growth in previous years saw expansions for large components, such as towers and blades, the facility breakdown for 2009 indicates a growing supply chain for smaller components. Sub-components, such as bearings, electrical components and hydraulic systems, were the largest growth segment in 2009. Small turbine manufacturing was the second largest area for growth, reflecting the continuing U.S. dominance in the global small wind market.

Fig. 32 UTILITY-SCALE WIND TURBINE MANUFACTURING



New Online Facilities

- **Danotek** Canton, MI. (generators)
- **Dragon Wind** Lamar, CO. (towers)
- **Goian North American LLC** Ankeny, IA. (ladders and lifts)
- **Mariah Power** Manistee, MI. (small turbines)
- **Nordic WindPower** Pocatello, ID. (turbines)
- **RBC Bearings Inc.** Houston, TX. (bearings)
- **Tower Tech Systems** Abilene, TX. (towers)
- **Vacon Inc.** Chambersburg, PA. (drives)
- **Vestas** Boston, MA. (R&D facility)
- **Winergy** Elgin, IL. (gearboxes)

New Announced Facilities

- **Aeronautica Windpower/ Goss International** Durham, NH. (turbines)
- **Bach Composite Industry** Fort Lupton, CO. (blade materials)
- **Continential Wind Power** Santa Paula, CA. (turbines)
- **Creative Foam Corp.** Longmont, CO. (blade materials)
- **EMA Electromecanica** Sweetwater, TX. (electrical components)
- **Energy Composites Corp** Wisconsin Rapids, WI. (blades)
- **GE** Detroit, MI (R&D facility)
- **Mitsubishi** Fort Chaffee, AR (turbines)
- **PMC Technology** Golden, CO. (hydraulic components)
- **Powin** Tualatin, OR. (small turbines)
- **SGB USA** Wheat Ridge, CO. (electrical components)
- **Siemens** Hutchinson, KS (turbines)
- **SUREnergy** Port Clinton, OH (small turbines)
- **Tindall** Newton, KS (towers)
- **VAT-Energies** Yorktown, IN (small turbines)
- **Ventower** Monroe, MI. (towers)
- **Windstream** New Albany, IN (small turbines)
- **Windtronics** Muskegon, MI (small turbines)
- **Wind Tower Systems** Ottawa, KS (towers)
- **Zarges Aluminum Systems** Amarillo, TX (tower internals)

Expansions

- **Affordable Green Energy** Essexville, MI (small turbines)
- **Bay Composites** Essexville, MI (components)
- **Edco, Inc.** Toledo, OH (components)
- **Energetx Composites** Holland, MI (blades & housings)
- **FAG Bearings** Joplin, MO (bearings)
- **Johnson System Inc.** Marshall, MI (components)
- **Kalt Manufacturing** North Ridgeville, OH (components)
- **Renewable Energy Composites Solutions** Vancouver, WA (small turbines)
- **Three M Tool** Wixom, MI (castings)

The composition of 2009 facilities in some ways reflects the existing industry facilities. Both the blade and tower sectors have previously seen substantial growth, with 20 tower facilities (of which two came online in 2009) and 13 blade facilities currently online. As these sectors are fairly well developed, the number of announced facilities is small in proportion to the number already online. On the other hand, the number of new facilities announced in 2009 for turbine manufacture, which includes nacelle assembly by an original equipment manufacturer (OEM) and sometimes blade or tower manufacture, was equal to those already online. This is a reflection of growing domestication of the supply chain for the wind industry.

Fig. 33 NUMBER OF FACILITIES EACH YEAR

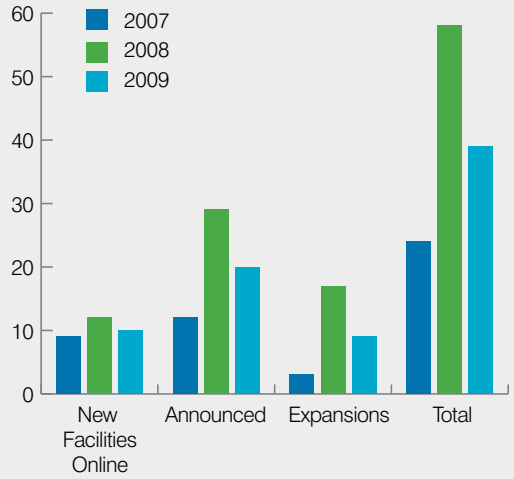


Fig. 34 2009 FACILITIES BY TYPE

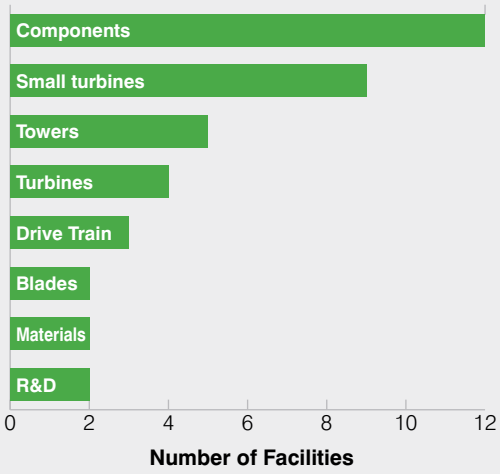
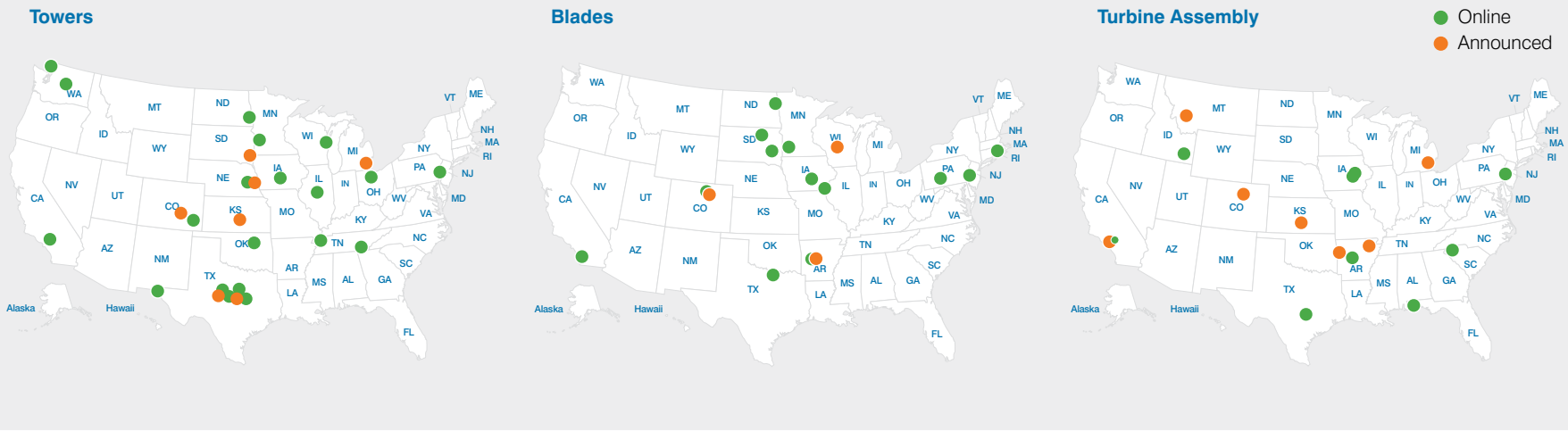


Fig. 35 MAJOR FACILITY LOCATIONS



Domestic content in U.S. wind turbines has increased significantly over the past several years. In 2005, the wind industry installed around 2,400 MW. This was the first major year for installations, and the U.S. had not yet built out the wind supply chain. At that time, domestic content in wind turbines, by value, was between 20 and 25 percent. This number primarily represents towers, which had developed some domestic manufacturing by 2005, and some domestic blade manufacturing. In 2009, the wind industry installed over 10,000 MW and domestic content was around 50 percent. The industry more than doubled domestic content while the market quadrupled.

Given their large size and relative simplicity of their manufacture, wind turbine towers were the first area to develop a strong domestic market. There are currently 20 U.S. facilities that manufacture utility-scale turbine towers, of which the majority came online in the past five years. An additional eight tower manufacturing facilities are announced. Tower manufacturing is driven by a robust market; Texas, the U.S. market leader for installed capacity, is home to a quarter of the online and announced manufacturing for towers. The majority of towers used in U.S. projects and manufactured in the U.S.

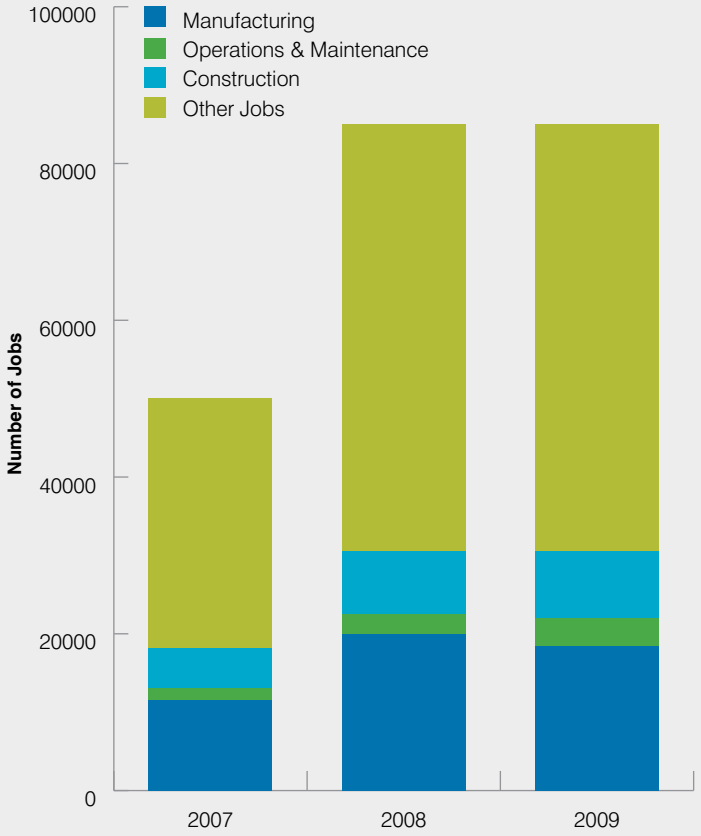
The second largest components in wind turbines, the blades, were the second area to develop a domestic market. There are currently 13 online blade manufacturing facilities, of which the majority came online in the past five years. An additional three blade manufacturing facilities are announced. The majority of blades used in U.S. projects are produced in the U.S.

Of the eight turbine manufacturers with more than one percent of 2009 market share, the top seven have current or announced U.S. manufacturing facilities for nacelle assembly, towers or blades. There are currently six turbine manufacturers with eight online nacelle assembly facilities. There are another eight turbine manufacturers with announced nacelle assembly facilities. When they are all online, the number of facilities assembling nacelles will double.

WIND INDUSTRY EMPLOYMENT

At the end of 2009, 85,000 Americans were employed directly and indirectly by the wind industry. While wind industry employment did not grow between 2008 and 2009, this is largely due to the impressive growth seen in 2008, when the industry added 35,000 new workers. Compared to 2008, the construction sector employed an additional 500 workers in 2009 due to increased installation of new wind turbines over the 2008 level. Operations and management jobs also grew by 1,000 over the previous year. Due to overproduction in 2008 and the credit crisis, 1,500 manufacturing jobs were lost in 2009. However, these losses are expected to be temporary, and 2009 manufacturing employment should exceed even 2008 levels.

Fig. 36 TOTAL WIND INDUSTRY EMPLOYMENT

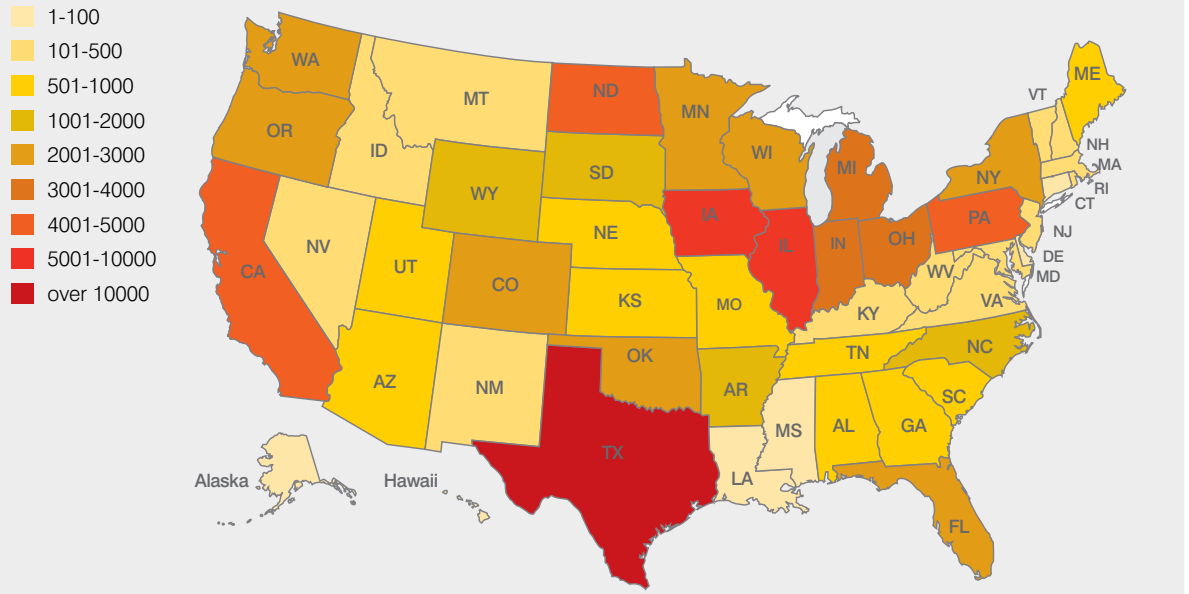


Other jobs include: some manufacturing, parts related services (repair shops, equipment manufacturers and suppliers) financial and consultant services (financiers, accountants, consultants), developers and development services (developers, land acquirement, permitting, wind resource assessors), contracting and engineering services (contractors, electrical engineers, mechanical engineers, civil engineers), transportation and logistics

Wind industry jobs exist in every state in the United States. While states that are building wind power capacity benefit from construction and operations and management jobs, even states without new capacity additions may benefit from jobs in the manufacturing sector. States with the highest concentrations of jobs typically have jobs in all three direct categories, demonstrating both wind power capacity additions and investments in the manufacturing sector. Texas, the leader in installations, has also attracted significant manufacturing capacity and is the leader in wind jobs, with over 10,000 in-state in 2009. Iowa and Illinois have the second highest density, with 5,000-10,000 jobs each in 2009. Both states have strong installations and strong wind manufacturing sectors.

Texas is the national leader for wind jobs, with over 10,000 jobs in the wind energy industry. Texas is a leader in wind energy manufacturing, with seven major wind manufacturing facilities, and was the leader for construction and operations and management jobs in 2009. Iowa comes in second for wind jobs; home to five major wind manufacturers, Iowa is the leader for workers employed in manufacturing for the wind industry but is second for construction and operations and management. The combination of strong installations and wind manufacturing sectors in Illinois, North Dakota and Pennsylvania put those states in the top five, demonstrating the need for a commitment to installations to drive employment overall. Rounding out the top ten are California, Ohio, Michigan, Indiana and Washington.

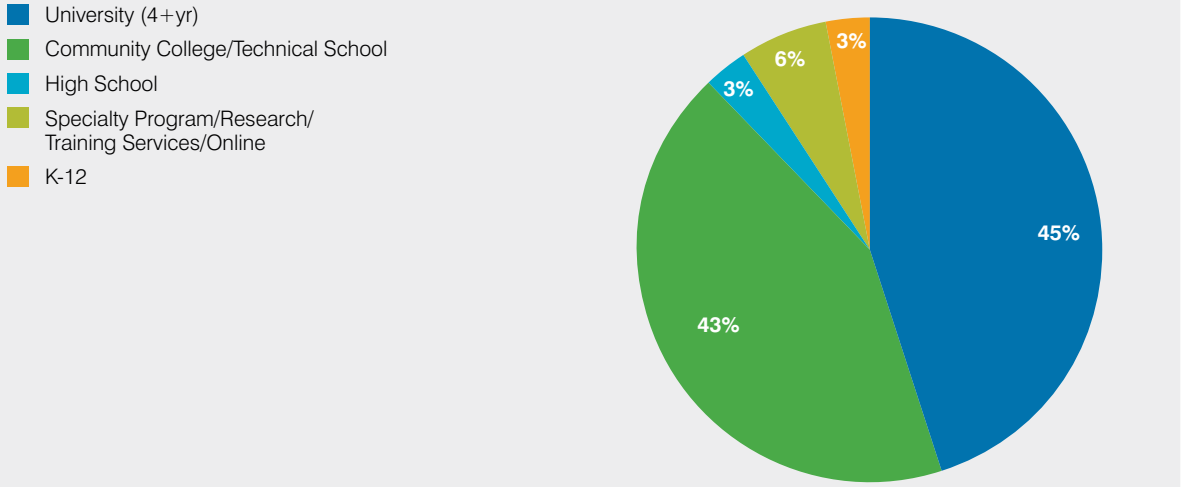
Fig. 37 WIND INDUSTRY JOBS BY STATE



EDUCATION & TRAINING

As the wind industry grows, employing 85,000 people today, ensuring a skilled workforce across all aspects of the wind industry is a top priority. As of February 2010, 205 educational programs offered a certificate programs, degree program, or coursework related to wind energy. Of these 205 programs, the largest two segments are four-year universities or colleges at 45% and community college or technical school programs at 43%. The programs offered, specific to wind, include wind turbine technician training, electrical engineering, mechanical & aeronautical engineering, science & technology, project management, policy, and many other programs. In early 2010, AWEA launched an Education Programs Database, available on the AWEA website at **www.awea.org/education**. The database contains a searchable list of educational wind programs in the United Statesof which AWEA has been made aware and continues to be updated as new programs are discovered.

Fig. 38 TYPES OF ACADEMIC INSTITUTIONS OFFERING WIND ENERGY PROGRAMS



Additionally, the AWEA Wind Turbine Service Technician Core Skill Set was approved by the AWEA Board of Directors on November 19, 2009 to provide educational institutions and training programs a clear understanding of the core skills needed in a wind service technician, as identified by AWEA industry members. Programs that can successfully demonstrate how they meet each area will be approved for the AWEA Seal of Approval.

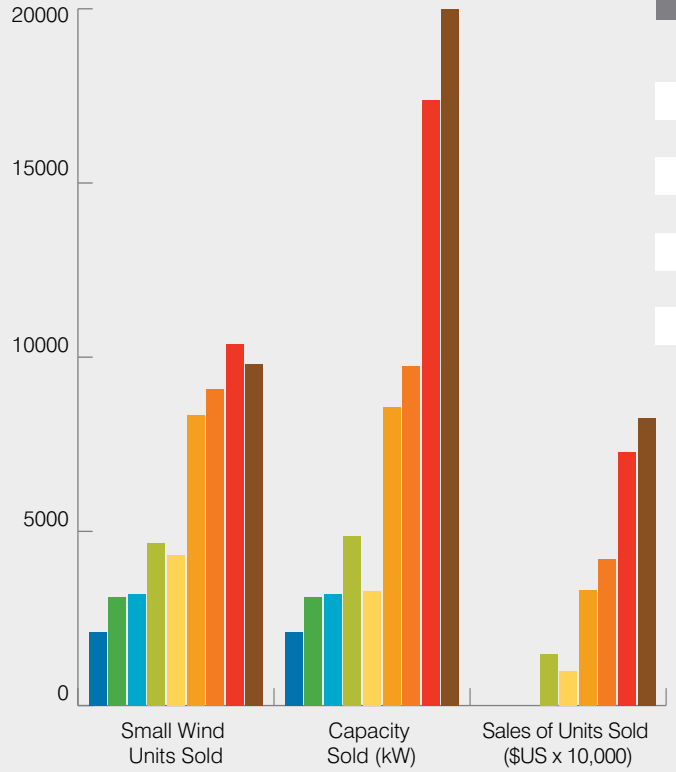
SMALL WIND MARKET

Despite an economic downturn, the U.S. market for small wind turbines – those with rated capacities of 100 kW and less – grew 15% in 2009 with 20 MW of new capacity. This growth equates to nearly 10,000 new units and pushes the total installed capacity in the U.S. to 100 MW.

Half of this 100-MW milestone in capacity came within the past three years. Manufacturers attribute this growth to a mixture of new and improved federal and state incentives, optimistic private equity investors, and sustained consumer demand.

The 2009 American Recovery and Reinvestment Act expanded the federal investment tax credit for small wind turbines, allowing consumers to take a full 30% of the total cost of a small wind system as a tax credit. Over the past five years an infusion of private equity investment of $170 million into 18 manufacturers worldwide (most of them U.S.-based) provided companies with the capital to increase production to lower costs and meet strong demand. An additional $80 million was invested into manufacturers during the peak of the economic recession in 2009, increasing the overall total to $250 million dispersed across 20 manufacturers.

Fig. 39 GROWTH OF U.S. SMALL WIND MARKET



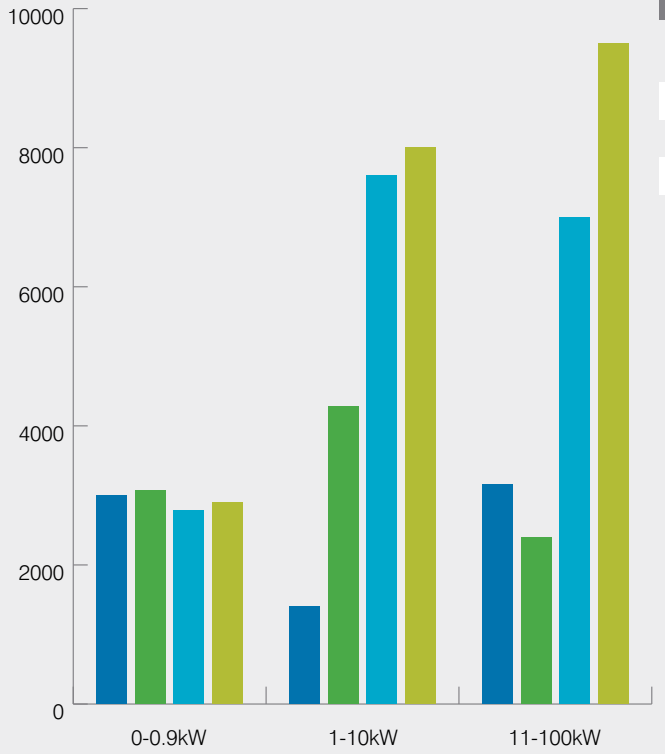
Year	Units	kW Sold	Sales $USD
2001	2,100	2,100	
2002	3,100	3,100	
2003	3,200	3,200	
2004	4,671	4,878	$1,489
2005	4,324	3,285	$990
2006	8,329	8,565	$3,320
2007	9,092	9,737	$4,197
2008	10,386	17,374	$7,266
2009	9,800	20,000	$8,240

The Small Wind Market in the U.S. encompasses wind turbines that are used to provide on-site power to individual homes, farms, or businesses. This market is defined as turbines with capacities of 100 kW and below, with a typical residential-scale turbine ranging 1-10 kW. Blade lengths for small scale turbines range from a couple feet to 40 feet. Utility scale turbines, in comparison, range from 100 kW up to 3,000 kW (3 MW), or about 90 to 150 feet.

The growth of the market segments of < 1-kW units, 1- to 10-kW units, and 11- to 100-kW units has changed over the years, with the 11- to 100-kW segment now the largest segment in terms of new capacity installed. In the previous two years, the 1- to 10-kW segment was the largest.

The number of identified U.S. manufacturers climbed from 66 to 90, though only 14 reported selling commercially in 2009. U.S. manufacturers continue to dominate the global industry, commanding roughly half of the world's market share. As in previous years, 95% of all small wind systems sold in the U.S. last year were made by U.S. manufacturers, which also continued to export one-third of their product.

Fig. 40 SMALL TURBINE MARKET GROWTH (U.S.), BY TURBINE SIZE



Year	Units	kW	Sales US$
2006	3000	1398	$3,160
2007	3064	4277	$2,400
2008	2784	7599	$6,991
2009	2900	8000	$9,500

APPENDIX A: ALL 2009 COMPLETED PROJECTS

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
AK	Kodiak Island Wind Project	4.5	GE Energy 1.5	Kodiak
AK	Delta Junction	0.1	Northern Power Systems 100 kW	
AK	Chevak	0.4	Northern Power Systems 100 kW	
AK	Unalakleet	0.6	Northern Power Systems 100 kW	
AZ	Dry Lake	63	Suzlon 2.1	Iberdrola Renewables
CA	Shiloh II	150	REpower 2	enXco
CA	U.S. Marine Corp Logistics Base	1.5	AAER 1.5	
CA	Pine Tree Wind Farm	120	GE Energy 1.5	LADWP
CA	Garnet Wind Project	6.5	500 kW	
CA	Windland	3	AAER 1.5	Windland
CO	Northeastern Colorado Wind Energy Center	151.8	Siemens 2.3	NextEra Energy Resources
CO	Northeastern Colorado Wind Energy Center	22.5	GE Energy 1.5	NextEra Energy Resources
CO	NREL research	1.5	GE Energy 1.5	NREL
CO	NREL research	2.3	Siemens 2.3	NREL
IA	Crystal Lake - Clipper (09)	10	Clipper 2.5	NextEra Energy Resources
IA	Iowa Lakes Lakota Wind	10.5	GE Energy 1.5	Iowa Lakes Electric Coop
IA	Iowa Lakes Superior Wind	10.5	GE Energy 1.5	Iowa Lakes Electric Coop
IA	Pioneer Prairie II (09)	70.95	Vestas 1.65	Horizon-EDPR
IA	Barton	160	Gamesa 2	Iberdrola Renewables
IA	Carsten Farms	0.2	Northern Power Systems 100 kW	
IA	Crane Creek	99	GE Energy 1.5	enXco
IA	Crystal Lake II	66	GE Energy 1.5	NextEra Energy Resources
IA	Lost Lakes Wind Farm	100.65	Vestas 1.65	Horizon-EDPR
IA	Osage Utilities	1.5	GE Energy 1.5	Osage Utilities
IA	Story II	150	GE Energy 1.5	NextEra Energy Resources
IA	Whispering Willow I	199.65	Vestas 1.65	Alliant (Interstate Power & Light)

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
ID	Cassia	29.4	Suzlon 2.1	John Deere Wind
ID	Mountain Home	42	Suzlon 2.1	John Deere Wind
IL	EcoGrove	100.5	Acciona Windpower 1.5	Acciona Energy
IL	Rail Splitter	100.5	GE Energy 1.5	Horizon-EDPR
IL	Arends Brothers	0.1	Northern Power Systems 100 kW	
IL	Richland Community College	0.1	Northern Power Systems 100 kW	
IL	Grand Ridge II	51	GE Energy 1.5	Invenergy
IL	Grand Ridge III/IV	60	GE Energy 1.5	Invenergy
IL	Lee/DeKalb	217.5	GE Energy 1.5	NextEra Energy Resources
IL	Top Crop	102	GE Energy 1.5	Horizon-EDPR
IN	Fowler Ridge Wind Farm Phase I (Clipper)	100	Clipper 2.5	BP Wind Energy/Dominion Energy
IN	Fowler Ridge Wind Farm Phase I (Vestas)	300.3	Vestas 1.65	BP Wind Energy/Dominion Energy
IN	Fowler Ridge II	199.5	GE Energy 1.5	BP Wind Energy
IN	Hoosier	106	REpower 2	enXco
IN	Meadow Lake	199.65	Vestas 1.65	Horizon-EDPR
KS	Central Plains	99	Vestas 3	Westar
KS	Flat Ridge I Wind Farm	100	Clipper 2.5	BP Wind Energy/Westar Energy
MA	City of Medford	0.1	Northern Power Systems 100 kW	Sustainable Energy Development
MA	Williams Stone	0.6	600 kW	Sustainable Energy Development
MA	Nature's Classroom	0.1	Northern Power Systems 100 kW	
MA	Woods Hole Research Center	0.1	Northern Power Systems 100 kW	Sustainable Energy Development
MA	Air Force Center for Engineering and the Environment	1.5	1.5 MW	
MA	Bartlett's Ocean Wind Farm	0.25	250 kW	
MA	Mark Richey Woodworking	0.6	600 kW	Mark Richey Woodworking
MA	Mount St Mary's Abby	0.1	Northern Power Systems 100 kW	Sustainable Energy Development
MA	Mount Wachusetts wind farm	3	Fuhrlander 1.5	Princeton Municipal Light

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
MA	MWRA Deer Island	1.2	600 kW	
ME	Stetson Wind	57	GE Energy 1.5	First Wind
ME	Presque Isle	0.6	600kW	
ME	Fox Islands	4.5	GE Energy 1.5	
ME	Kibby Mountain, phase I	66	Vestas 3	TransCanada
MI	Stoney Corners - REpower	14	REpower 2	Heritage Sustainable Energy
MN	Moraine II	49.5	GE Energy 1.5	Iberdrola Renewables
MN	Hilltop	2	DeWind 2	Southwest Wind Consulting
MN	DH Blattner	0.1	Northern Power Systems 100 kW	
MN	Willmar	4	DeWind 2	Willmar Municipal Utilities
MN	Uilk	4.5	Goldwind 1.5	
MO	Farmers City	146	Gamesa 2	Iberdrola Renewables
MT	Glacier Wind II	103.5	Acciona Windpower 1.5	NaturEner
NC	Appalachian State	0.1	Northern Power Systems 100 kW	
ND	Ashtabula II (3Q)	52.5	GE Energy 1.5	NextEra Energy Resources
ND	Ashtabula II (4Q)	67.5	GE Energy 1.5	NextEra Energy Resources
ND	Luverne	49.5	GE Energy 1.5	Otter Tail Power
ND	Prairie Winds ND1	115.5	GE Energy 1.5	PrairieWinds ND 1, Inc.
ND	PrairieWinds Minot Wind 2	4.5	GE Energy 1.5	PrairieWinds ND 1, Inc.
ND	Rugby	149.1	Suzlon 2.1	Iberdrola Renewables
ND	Wilton Wind Energy Center II	49.5	GE Energy 1.5	NextEra Energy Resources
NE	Elkhorn Ridge	81	Vestas 3	Edison Mission Group
NH	Mountain View Grand	0.1	Northern Power Systems 100 kW	Sustainable Energy Development
NM	High Lonesome	100	Clipper 2.5	Edison Mission Group
NY	Dutch Hill/Cohocton	125	Clipper 2.5	First Wind
NY	High Sheldon	112.5	GE Energy 1.5	Invenergy

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
NY	Noble Altona Windpark	97.5	GE Energy 1.5	Noble Environmental Power
NY	Noble Chateaugay Windpark	106.5	GE Energy 1.5	Noble Environmental Power
NY	Noble Wethersfield Windpark	126	GE Energy 1.5	Noble Environmental Power
OH	Upper Scioto Valley School	0.2	Northern Power Systems 100 kW	NexGen
OH	3-D Metals	0.1	Northern Power Systems 100 kW	
OK	Blue Canyon V	34.5	GE Energy 1.5	Horizon-EDPR
OK	Blue Canyon V Q4	64.5	GE Energy 1.5	Horizon-EDPR
OK	Elk City	98.9	Siemens 2.3	NextEra Energy Resources
OK	OU Spirit	101.2	Siemens 2.3	CPV
OR	Hay Canyon	100.8	Suzlon 2.1	Iberdrola Renewables
OR	Pebble Springs	98.7	Suzlon 2.1	Iberdrola Renewables
OR	Wheatfield	96.6	Suzlon 2.1	Horizon-EDPR
OR	Willow Creek	72	GE Energy 1.5	Invenergy
OR	Echo 1-7	44.55	Vestas 1.65	John Deere Wind
OR	Biglow Canyon phase II	149.5	Siemens 2.3	Portland General Electric
OR	Echo 8-9	20	REpower 2	John Deere Wind
OR	Threemile Canyon	9.9	Vestas 1.65	John Deere Wind
OR	Vancycle II	98.9	Siemens 2.3	NextEra Energy Resources
OR	Combine Hills II	63	Mitsubishi 1	Eurus Energy
PA	Locust Ridge II	102	Gamesa 2	Iberdrola Renewables
PA	Highland Wind Project	62.5	Nordex 2.5	Everpower
PA	North Allegheny	70	Gamesa 2	Duke Energy
PA	Armenia Mountain	100.5	GE Energy 1.5	AES
PA	Stony Creek	52.5	GE Energy 1.5	E.On Climate & Renewables
RI	Portsmouth	1.5	AAER 1.5	
RI	New England Tech	0.1	Northern Power Systems 100 kW	

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
RI	Easton Pond Business Center	0.1	Northern Power Systems 100 kW	
SD	Wessington Springs	51	GE Energy 1.5	NextEra Energy Resources
SD	Buffalo Ridge	50.4	Suzlon 2.1	Iberdrola Renewables
SD	Titan I	25	Clipper 2.5	BP Wind Energy/Clipper
TX	Barton Chapel	120	Gamesa 2	Iberdrola Renewables
TX	JD Wind 7	10	Suzlon 1.25	John Deere Wind/DWS
TX	Majestic	79.5	GE Energy 1.5	NextEra Energy Resources
TX	Noble Great Plains Windpark	114	GE Energy 1.5	Noble Environmental Power
TX	Panther Creek II	115.5	GE Energy 1.5	E.On Climate & Renewables
TX	Pyron Wind Farm	249	GE Energy 1.5	E.On Climate & Renewables
TX	South Trent Mesa	101.2	Siemens 2.3	Babcock & Brown Ltd
TX	Goat Phase II	69.6	Mitsubishi 2.4	Cielo/Edison Mission Group
TX	JD Wind 11	10	Suzlon 1.25	John Deere Wind/DWS
TX	JD Wind 8	10	Suzlon 1.25	John Deere Wind/DWS
TX	Notrees 1A (Vestas)	90.75	Vestas 1.65	Duke Energy
TX	Notrees 1B (GE Energy)	60	GE Energy 1.5	Duke Energy
TX	Notrees 1C (Vestas)	1.86	Vestas 1.86	Duke Energy
TX	Penescal	201.6	Mitsubishi 2.4	Iberdrola Renewables
TX	Sunray I	10.5	GE Energy 1.5	Valero
TX	Inadale Wind Farm	197	Mitsubishi 1	E.On Climate & Renewables
TX	Panther Creek III	199.5	GE Energy 1.5	E.On Climate & Renewables
TX	Sunray II	39	GE Energy 1.5	Valero
TX	Gulf Wind	283.2	Mitsubishi 2.4	Babcock & Brown Ltd
TX	Langford	150	GE Energy 1.5	Padoma
TX	Papalote Creek	179.85	Vestas 1.65	E.On Climate & Renewables
TX	NORESCO	0.1	Northern Power Systems 100 kW	

State	Project Name	Capacity (in MW)	Turbine	Owner/Equity Partner
UT	Milford Wind Corridor, Phase I (Clipper)	145	Clipper 2.5	First Wind
UT	Milford Wind Corridor, Phase I (GE Energy)	58.5	GE Energy 1.5	First Wind
VT	Bolton Valley Resort	0.1	Northern Power Systems 100 kW	
VT	Heritage Flight	0.1	Northern Power Systems 100 kW	
WA	Windy Point I - REpower (09)	40	REpower 2	Tuolumne Wind Project Authority
WA	Windy Point I - Siemens	96.6	Siemens 2.3	Tuolumne Wind Project Authority
WA	Windy Point II	29.9	Siemens 2.3	Cannon Power Group
WA	Harvest Wind Farm	98.9	Siemens 2.3	Cowlitz PUD, Lakeview Light and Power, Peninsula Light, & Eugene
Water and Electric Board				
WA	Wild Horse II	44	Vestas 2	Puget Sound Energy
WA	Windy Point II (09)	172.5	Siemens 2.3	Cannon Power Group
WA	Windy Point IIa - Windy Flats Extention	59.8	Siemens 2.3	Cannon Power Group
WI	Butler Ridge	54	GE Energy 1.5	NextEra Energy Resources
WI	Wasau High School	0.1	Northern Power Systems 100 kW	
WI	Energy Concepts	0.1	Northern Power Systems 100 kW	
WY	Glenrock III	39	GE Energy 1.5	PacifiCorp
WY	Rolling Hills	99	GE Energy 1.5	PacifiCorp
WY	Airforce	2	Gamesa 2	Airforce
WY	High Plains	99	GE Energy 1.5	PacifiCorp
WY	McFadden Ridge	28.5	GE Energy 1.5	Pacificorp
WY	Silver Sage	42	Suzlon 2.1	Duke Energy
WY	Campbell Hill	99	GE Energy 1.5	Duke Energy
WY	Casper Wind Farm	16.5	GE Energy 1.5	Chevron Global Power Co.

APPENDIX B: ALL PROJECTS UNDER CONSTRUCTION AT END OF 2009

State	Project Name	Capacity (in MW)	Number of Turbines	Turbine Rating (in MW)	Turbine Manufacturer	Project Developer	Power Purchaser
CA	Hatchet Ridge	101.2	44	2.3	Siemens	RES Americas/Pattern Energy	n/a
CA	Pine Tree extension	15	10	1.5	GE Energy	LADWP	LADWP
CA	San Gorgonio Farms (repower)	5	10	0.5	Vestas-RBB	San Gorgonio Farms	n/a
CO	Kit Carson Project	51	34	1.5	GE Energy	Duke Energy	Tri-State
ID	Tuana Springs	16	8	2	n/a	John Deere Wind	n/a
IL	Big Sky Wind Facility	239.4	114	2.1	Suzlon	Edison Mission Group	n/a
IL	Cuyaga Ridge	300	150	2	Gamesa	Iberdrola Renewables	n/a
IN	Meadow Lake II	99	66	1.5	Acciona WP	Horizon-EDPR	n/a
KS	Greensburg	12.5	10	1.25	Suzlon	John Deere Wind	n/a
MA	Brodie Mountain	15	10	1.5	n/a	Berkshire Wind Power Cooperative	n/a
ME	Kibby Mountain, phase II	66	22	3	Vestas	TransCanada	n/a
ME	Stetson Wind expansion	25.5	17	1.5	GE Energy	First Wind	n/a
MI	Stoney Corners II	18	9	2	REpower	Heritage Sustainable Energy	n/a
MI	Stoney Corners II	2.2	1	2.2	Northern Power	Heritage Sustainable Energy	n/a
MN	Grant County	20	n/a	n/a	n/a	Grant County Wind Farm LLC	Xcel Energy
MN	Ridgewind	26	n/a	n/a	n/a	Ridgewind Power Partners LLC	Xcel Energy
MN	Uilk	4.5	n/a	n/a	n/a	Uilk Wind Farm	Xcel Energy
MN	Valley View	9.9	n/a	n/a	n/a	Valley View Transmission	Xcel Energy
MO	Lost Creek Wind Farm	150	100	1.5	GE Energy	Wind Capital Group	Associated Electric Cooperative Inc. (AECI)
ND	Bison Wind 1A	36.8	16	2.3	Siemens	Minnesota Power	n/a
ND	Bison Wind 1B	39.1	17	2.3	Siemens	Minnesota Power	n/a
NE	Crofton Hills	42	n/a	n/a	n/a	Juhl Energy Development	NPPD
NY	Noble Bellmont Windpark	21	14	1.5	GE Energy	Noble Environmental Power	n/a
OK	Keenan II	152	n/a	n/a	n/a	CPV	OG&E
OR	Biglow Canyon phase III	174.8	76	2.3	Siemens	Portland General Electric	Portland General Electric

State	Project Name	Capacity (in MW)	Number of Turbines	Turbine Rating (in MW)	Turbine Manufacturer	Project Developer	Power Purchaser
OR	Combine Hills II	63	63	1	Mitsubishi	Eurus Energy	n/a
OR	Star Point	98.7	47	2.1	Suzlon	Iberdrola Renewables	n/a
SD	Day County Wind Project	99	66	1.5	n/a	NextEra Energy	Basin Electric
TX	Loraine	100.5	67	1.5	GE Energy	Third Planet	n/a
TX	Penescal II	201.6	84	2.4	Mitsubishi	Iberdrola Renewables	“76.8 MW for CPS San Antonio; 50 MW for South Texas Electric Cooperative: 74.8 MW merchant
WA	Linden	50	25	2	REpower	enXco	LADWP
WA	Vantage Point	90	60	1.5	GE Energy	Invenergy	PG&E
WA	Windy Point II (10)	29.9	13	2.3	Siemens	Cannon Power Corp.	n/a
WV	Beech Ridge	100.5	67	1.5	GE Energy	Invenergy	AEP-Appalachian Power
WY	Dunlap	111	74	1.5	GE Energy	PacifiCorp	PacifiCorp
WY	Top of the World (GE)	99	66	1.5	GE Energy	Duke Energy	Pacificorp
WY	Top of the World (Siemens)	101.2	44	2.3	Siemens	Duke Energy	PacificorpIA

APPENDIX C: U.S. WIND INDUSTRY MANUFACTURING FACILITIES

Name	City	State	Component
A&C Green Energy	Plano	TX	small wind: blades
A&D Machine, Inc.	Redgranite	WI	components: machining
ABB Inc.	Jefferson City	MO	components: electrical
Able Manufacturing	Joplin	MO	components: composite, metal and plastic fabrication
Abundant Renewable Energy	Newberg	OR	small turbines
Acciona Energy	West Branch	IA	turbines
Advanced Manufacturing	Cleveland	OH	components: gears
Aeromet Industries	Griffith	IN	components: other
AeroVironment	Monrovia	CA	small turbines
AFCO Precision Manufacturing	Napoleon	OH	components: machining
Afton Chemical	Sauget	IL	components: other
AGY	Aiken	SC	components: other
Alcan Baltek Corportation	Northvale	NJ	materials: blade materials
Allied Moulded Products	Bryan	OH	components: frames and housings
All-Pro Fasteners	Arlington	TX	components: fasteners
Ambassador Steel Corp.	Auburn	IN	materials: steel
American Superconductor	Middleton	WI	components: electrical
American Tower Co.	Shelby	OH	towers
American Wire Group	Hallandale	FL	components: other
Ameron	Rancho Cucamonga	CA	towers
Anderol Specialty Lubricants	East Hanover	NJ	components: other
AnemErgonics	Wheat Ridge	CO	small wind: towers
AOC Resins	Collierville	TN	components: other
Ashland Specialty Chemical	Dublin	OH	components: other
ATI Casting Service	Alpena	MI	components: castings
ATI Casting Service	La Porte	IN	components: castings

Name	City	State	Component
Atlantic Bearings	Doral	FL	components: bearings
Avanti Wind Systems	New Berlin	WI	components: ladders and lifts
Aztec Bolting	League City	TX	components: fasteners
Bal Seal	Foothill Ranch	CA	components: other
Barr Fabrication	Brownwood	TX	towers
Bassett Mechanical	Kaukauna	WI	components: on site
Beckhoff Automation	Burnsville	MN	components: controls
Bedford Machine & Tool	Bedford	IN	components: machining
Bergen Southwest Steel	El Paso	TX	towers
Bergey	Norman	OK	small turbines
Brad Foote	Cicero	IL	components: gears
Byrne Manufacturing	Mansfield	OH	components: other
CAB inc.	Nacogdoches	TX	components: castings
Canton Drop Forge	Canton	OH	components: gears
Cardinal Fasteners	Bedford Heights	OH	components: fasteners
Carlisle Industrial Brake and Friction	Bloomington	IN	components: other
Cascade Engineering	Cascade Township	MI	small wind: blades
Cast Fab	Cincinnati	OH	components: castings
CB Gear and Machine	Houston	TX	components: gears
Centa Corp.	Aurora	IL	components: other
Chicago Industrial Fasteners	Sugar Grove, Aurora	IL	components: fasteners
Citation Corporation	Novi	MI	components: castings
Climatronics	Bohemia	NY	components: sensors
Clipper Windpower	Cedar Rapids	IA	turbines
Columbia Gear Corporation	Avon	MN	components: gears
Connector Products	Cinnaminson	NJ	components: electrical

Name	City	State	Component
Creative Foam	Fenton	MI	materials: blade materials
CTM Magnetics	Tempe	AZ	components: other
Danotek	Canton	MI	generators
DeWind	Round Rock	TX	turbines
Diab Inc.	Desoto	TX	materials: blade materials
DMI Industries	Tulsa	OK	towers
DMI Industries	West Fargo	ND	towers
Dowding Machining	Hiawatha	IA	components: frames and housings
Dowding Machining	Eaton Rapids	MI	components: frames and housings
Dragon Wind	Lamar	CO	towers
Dyson Corp	Painesville	OH	components: fasteners
Elyria Foundry	Elyria	OH	components: castings
EMC Precision Machining	Elyria	OH	components: machining
Enerpac	Butler	WI	components: other
Enertech Manufacturing	Newton	KS	small turbines
EST-Aegis	Mechanic Falls	ME	components: bearings
E-T-M Enterprises	Lansing	MI	materials: blade materials
Federal Gear	Willoughby	OH	components: gears
Flash Technology	Franklin	TN	components: lighting
G&W Electrical	Blue Island	IL	components: electrical
Gamesa	Fairless Hills	PA	blades
Gamesa	Ebensburg	PA	blades
Gamesa	Fairless Hills	PA	towers
Gamesa	Fairless Hills	PA	turbines
GE Energy	Erie	PA	components: other
GE Energy	Salem	VA	components: other

Name	City	State	Component
GE Energy	Greenville	SC	turbines
GE Energy	Pensacola	FL	turbines
GE Energy	Tehachapi	CA	turbines
Genzink Steel	Holland	MI	components: frames and housings
Gerber Technology	Tolland	CT	components: automated machinery
Goian North America	Ankeny	IA	components: ladders and lifts
Goss International	Durham	NH	components: nacelle assembly
Greak Lakes Gear Technology	Canton	MI	components: gears
GS Manufacturing	Costa Mesa	CA	components: other
Hailo LLC	Holbrook	NY	components: ladders and lifts
Hamby Young	Aurora	OH	components: electrical
Hendrix Wire & Cable Inc.	Milford	NH	components: other
Hodge Foundry	Greenville	PA	components: castings
Honeywell Obstruction Lighting	Urbana	OH	components: lighting
Horsburgh and Scott	Cleveland	OH	components: gears
Hydac	Glendale Heights	IL	components: hydraulics
Hydac	Bethlehem	PA	components: hydraulics
Hydrotex	Tulsa	OK	components: other
Ideal Fabricators	Livonia	MI	components: machining
Iljin	Greer	SC	components: bearings
Ingersoll Machine Tools	Rockfold	IL	components: machining
K&M Machine-Fabricating	Cassopolis	MI	components: castings
Kalt Manufacturing	North Ridgeville	OH	components: other
Kamatics Corporation	Bloomfield	CT	components: bearings
Katana Summit	Columbus	NE	towers
Katana Summit	Ephrata	WA	towers

Name	City	State	Component
Kaydon Bearings	Avon	OH	components: bearings
Kaydon Bearings	Muskegon	MI	components: bearings
Kaydon Bearings	Sumter	SC	components: bearings
KEB America	Shakopee	MN	components: controls
Kemet	Greensville	SC	components: electrical
Keystone	Des Moines	IA	components: electrical
Knight & Carver Wind Group	Howard	SD	blades
Knight & Carver Wind Group	National City	CA	blades
LAI-International	Westminster	MD	components: other
Lindquist Machine Corp.	Green Bay	WI	components: machining
LM Glasfiber	Grand Forks	ND	blades
LM Glasfiber	Little Rock	AR	blades
Lovegreen Industrial Services	Eagan	MN	components: other
MAG Giddings & Lewis	Fond du Lac	WI	components: frames and housings
Magna Machine Company	Forest Park	OH	components: machining
Magnetek	Menomonee Falls	WI	components: electrical
Mariah Power	Manistee	MI	small turbines
Mariah Power	Reno	NV	small turbines
Merit Gear	Antigo	WI	components: gears
Merrill Tool and Machine	Alma	MI	components: machining
Messer Cutting Systems	Menomonee Falls	WI	components: other
Met One Instruments	Grants Pass	OR	components: sensors
Michigan Tool	Sturgis	MI	small wind: components
Midwest Industrial Castings	Minster	OH	components: castings
Miles Fiberglass & Composites	Portland	OR	components: frames and housings
Millwood Metalworks	Freeport	MN	components: other

Name	City	State	Component
Milwaukee Gear Company	Milwaukee	WI	components: gears
Molded Fiber Glass	Aberdeen	SD	blades
Molded Fiber Glass	Gainesville	TX	blades
Molded Fiber Glass	Opp	AL	components: frames and housings
Molded Fiber Glass	Adelanto	CA	components: frames and housings
Molded Fiber Glass	Ashtabula	OH	components: sensors
Muehlhan Wind Power	Louisville	KY	components: tower components
Nordic Fiberglass	Warren	MN	components: on site
Nordic WindPower	Pocatello	ID	turbines
Northern Power	Barre	VT	small turbines
NRG Systems	Hinesburg	VT	components: sensors
NSK	Ann Arbor	MI	components: bearings
NTN Bearings	Macomb	IL	components: bearings
N-Tron	Mobile	AL	components: electrical
Oerlikon Fairfield	Lafayette	IN	components: gears
Ort Tool and Die	Erie	MI	components: machining
Owens Corning Composites	Granville	OH	materials: blade materials
Owens Corning Composites	Brunswick	ME	materials: composites
Pacific Alloy	South Gate	CA	components: gears
Pacwind	Torrance	CA	small turbines
Pioneer Motor Bearings	Kings Mountain	NC	components: bearings
Plexus	Neenah	WI	components: electrical
Power Climber Wind	Seattle	WA	components: ladders and lifts
PPG Industries	Alpharetta	GA	components: other
PPG Industries	Delaware	OH	components: other
PPG Industries	Little Rock	AR	components: other

Name	City	State	Component
PPG Industries	Strongsville	OH	components: other
PPG Industries	Chester	SC	materials: blade materials
PPG Industries	Hamar	PA	materials: blade materials
PPG Industries	Lexington	NC	materials: blade materials
PPG Industries	Shelby	NC	materials: blade materials
RBC Bearings	Houston	TX	components: bearings
Remelle Engineering	Big Lake	MN	components: machining
Rotek	Aurora	OH	components: bearings
RTLC Windtower Products	Kosse	TX	towers
Seco Tools	Troy	MI	components: other
Second Wind Inc.	Somerville	MA	components: sensors
Shenandoah Machine Shop	Shenandoah	VA	components: other
SIAG Aerisyn	Chattanooga	TN	towers
Siemens Power Generation	Fort Madison	IA	blades
SIPCO	Webster	TX	components: other
SMI & Hydraulics Inc.	Porter	MN	towers
Southern States, LLC	Hampton	GA	components: electrical
Southwest Windpower	Flagstaff	AZ	small turbines
Specialty Metal Fabricators	Minonk	IL	components: machining
Standard Locknut	Westfield	IN	components: bearings
Stanley Machining & Tool	Carpentersville	IL	components: machining
Stanley Machining & Tool	Hampshire	IL	components: machining
Suzlon	Pipestone	MN	blades
T&B Foundry	Cleveland	OH	components: castings
TBailey	Anacortes	WA	towers
Tencate	Pendergrass	GA	on site materials

Name	City	State	Component
Tensar	Morrow	GA	on site materials
Thomas & Betts Corp.	Memphis	TN	towers
Three M Tool	Oakland	MI	components: castings
Timken	Union	SC	components: bearings
Timken	Canton	OH	materials: steel
Titan Technologies International	Houston	TX	components: other
Tower Logistics	Huntington	WV	components: ladders and lifts
Tower Tech	Manitowoc	WI	towers
Tower Tech	Abilene	TX	towers
TPI Composites	Newton	IA	blades
TPI Composites	Warren	RI	blades
Trenwa	Fort Thomas	KY	components: on site
Triad	Alda	NE	small turbines
Trinity Structural Towers	Coleman	TX	components: ladders and lifts
Trinity Structural Towers	Newton	IA	towers
Trinity Structural Towers	Clinton	IL	towers
Trinity Structural Towers	Fort Worth	TX	towers
Vacon Inc.	Chambersburg	PA	components: drives
Valmont Wind Energy	Valley	NE	small wind: towers
Vectorply	Phenix City	AL	materials: blade materials
Vestas	Windsor	CO	blades
Wausaukee Composites	Cuba City	WI	components: frames and housings
Wausaukee Composites	Wausaukee	WI	components: frames and housings
WebCore Technologies	Miami	OH	materials: composites
Wind Clean Corp.	Coleman	TX	components: other
Wind Turbine Industries	Prior Lake	MN	small turbines

Name	City	State	Component
Wind Turbine Personnel Hoist	Louisville	KY	components: ladders and lifts
Wind Turbine Tools	Lincoln	MT	components: on site
Wind Turbine Tools	Temecula	CA	components: other
Winergy	Elgin	IL	gearboxes
Winergy	Elgin	IL	gearboxes
WTEC	Fort Lee	NJ	components: electrical
Zero-Max	Plymouth	MN	components: electrical
Zoltek	Abilene	TX	materials: blade materials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