



American Wind Energy Association Annual Wind Industry Report

YEAR ENDING 2008





AWEA conducted the research for this report with the help of AWEA business members and public data sources. Data should not be resold or used without citation.

Table of Contents

Wind Energy Industry Growth in 2008	2
Policy	3
U.S. Wind Project Growth	4
Global Capacity Growth	6
“20% Wind Energy Scenario” Report Card	7
Wind Project Installations by State	8
Turbine Manufacturers	10
Project Owners	11
Utility Wind Power Rankings	12
Projects	14
Utility Scale Turbines	15
Manufacturing	16
Wind Industry Employment	17
U.S. Small Wind Market	18
AWEA Membership	19
Definitions	20
Appendix: 2008 Projects List	21

Wind Energy Industry Growth in 2008

In 2008, the U.S. wind energy industry brought online over 8,500 megawatts (MW) of new wind power capacity, increasing the nation's cumulative total by 50% to over 25,300 MW and pushing the U.S. above Germany as the country with the largest amount of wind power capacity installed. The new installations place the U.S. on a trajectory to generate 20% of the nation's electricity by 2030 from wind energy as long as the industry continues to garner long-term policy support.

The growth in 2008 channeled an investment of some \$17 billion into the economy, positioning wind power as one of the leading sources of new power generation in the country along with natural gas. The new wind projects completed in 2008 account for about 42% of the entire new power-producing capacity added nationally during the year, according to initial estimates, and will avoid nearly 44 million tons of carbon emissions--the equivalent of taking over 7 million cars off the road.

The amount that the industry brought online in the 4th quarter alone – 4,313 MW – exceeds annual additions for every year except 2007. In all, wind power generating capacity in the U.S. now stands at 25,369 MW, producing enough electricity to power the equivalent of close to 7 million households and strengthening our national electricity supply with a clean, inexhaustible, homegrown source of energy.

Wind projects installed through the end of 2008 generated over 1.25% of the nation's electricity in 2008.

Nearly 4,000 MW of projects that could have been commissioned in 2008 will now be brought online in the early part of 2009. AWEA expects over 5,000 MW of new capacity to be commissioned in 2009.

The U.S. market for small wind turbines – those with capacities of 100 kW and under – grew 78% in 2008 with an additional 17.3 MW of installed capacity. This growth was largely attributable to increased private equity investment for manufacturing, which allowed equipment supply and availability to increase. The industry projects 30-fold growth within as little as five years, for a total installed capacity of 1,700 MW, due primarily to the new 30% federal Investment Tax Credit passed by Congress in October 2008 and enhanced in February 2009.

Policy

A stable policy environment helps encourage investment in wind equipment production facilities. Wind turbine and turbine component manufacturers announced, added or expanded over 70 facilities in the past two years, including over 55 in 2008 alone. The renewable energy measures in the stimulus bill will help sustain that momentum and encourage additional clean energy investment and job creation.

On February 17, 2009, President Obama signed into law the American Recovery and Reinvestment Act (ARRA) of 2009. The legislation includes a three-year extension of the production tax credit (PTC) and a new program that allows renewable energy developers the option of forgoing the PTC and instead securing a grant from the Treasury department in the amount of a 30% investment tax credit (ITC). This program to help monetize renewable tax credits is considered critical for the wind industry to continue its growth in the face of the economic downturn, which has dramatically reduced the ability to secure value for renewable tax credits.

To help consumers buy small wind systems, the recovery bill also removed the \$4,000 cap on the small wind ITC. Small wind investors are now allowed to claim a full 30% ITC for qualified small wind energy property.

The new law authorizes an additional \$1.6 billion of new clean renewable energy bonds to be distributed to tribal governments, public power providers, and electric cooperatives to finance facilities that generate electricity from renewable resources.

It also provides a new 30% credit for investment in qualified property used in a “qualified advanced energy manufacturing project.”

Provisions that will facilitate the planning and building of new transmission lines include \$3.25 billion in additional borrowing authority each for the Bonneville Power Administration and Western Area Power Administration for transmission lines constructed after February 17, 2009, that deliver power from renewable energy resources. In addition, the law provides \$4.5 billion for DOE’s Office of Electricity Delivery and Energy Reliability (OE) program to accelerate the hiring of personnel, for worker training, for subsequent legislation on transmission improvements and to provide a resource assessment of future demand and transmission requirements. OE, in coordination with FERC, is also directed to provide technical assistance for the development of interconnection-wide transmission plans for the Eastern and Western Interconnections and ERCOT.

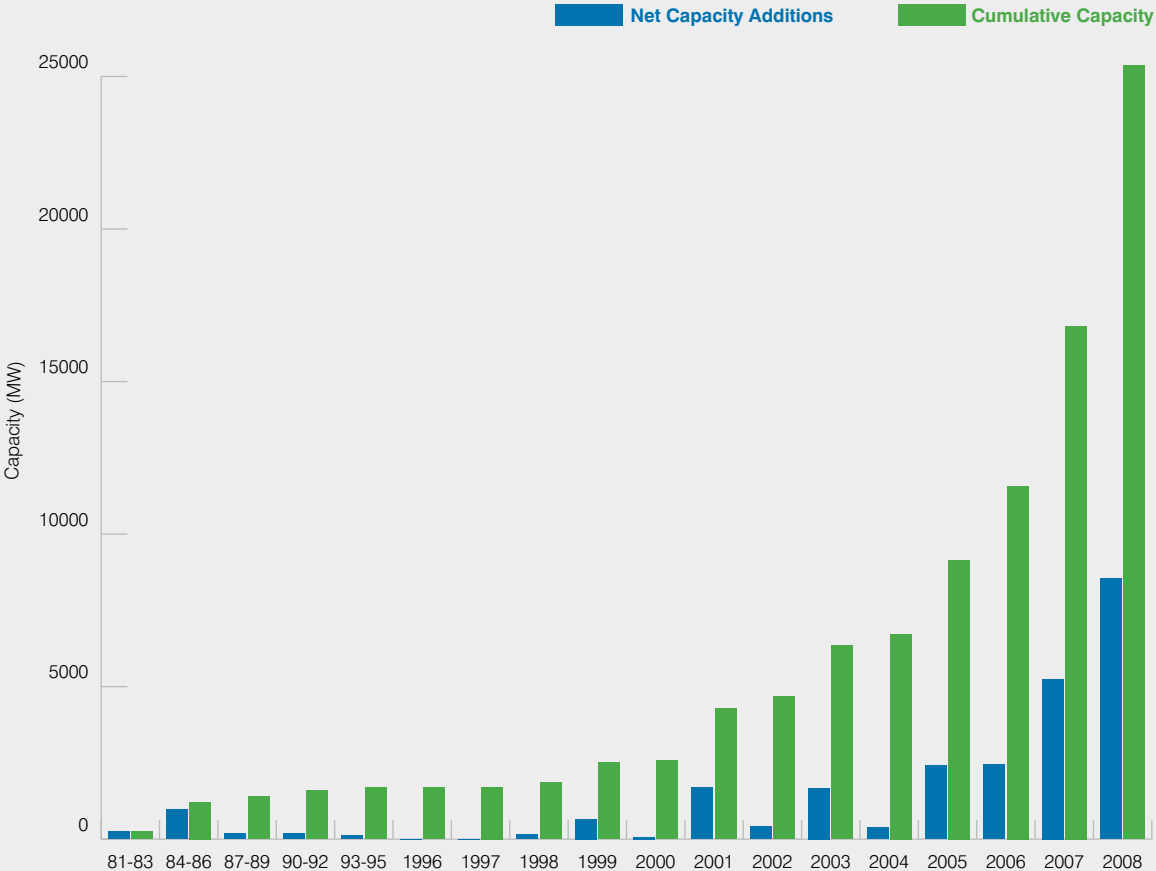
With the legislation passed, AWEA now turns its attention to its next major legislative priorities: the effort to enact a national renewable electricity standard and pass legislation to support construction of Green Power Superhighways (transmission lines) that are needed to enable renewable development. AWEA is also moving quickly to help ensure that the economic recovery bill is implemented in a way that is most effective for promoting wind power deployment.

AWEA and the Solar Energy Industries Association (SEIA) recently released a white paper titled “Green Power Superhighways: Building a Path to America’s Clean Energy Future,” detailing current inadequacies of the U.S. electric transmission infrastructure and offering policy solutions to address them. Inadequate transmission capacity is a significant barrier to renewable energy development in the U.S.—the white paper emphasizes that the nation’s renewable energy resources cannot reach their full potential without renewed investment in transmission infrastructure.

U.S. Wind Project Growth

FIGURE 1: NATIONAL CAPACITY GROWTH

Year	Net Capacity Additions	Cumulative Capacity
1981-1983	240	240
1984-1986	982	1,222
1987-1989	181	1,403
1990-1992	181	1,584
1993-1995	119	1,703
1996	1	1,703
1997	8	1,711
1998	142	1,853
1999	659	2,512
2000	67	2,579
2001	1,694	4,273
2002	412	4,685
2003	1,672	6,357
2004	372	6,729
2005	2,420	9,149
2006	2,454	11,575
2007	5,249	16,823
2008	8,545	25,369



Wind capacity additions in 2008 were 8558 MW. 12.5 MW of wind power were decommissioned.

With the OPEC oil embargo as backdrop, the modern wind industry got its start in the U.S. in the 1970s. The Federal renewable energy research program was launched in 1974, one year after the embargo, and AWEA was incorporated in the same year.

Federal and State investment tax credits drove a flurry of activity in the early 1980s that would recede late in the decade due to massive cuts in government funding. The average turbine size in the 1980s was 100 kW; and power cost more than 30 cents/kWh due to mechanical difficulties and low equipment availability rates.

The first federal production tax credit (PTC) was passed in the Energy Policy Act of 1992 (EPAAct) to expire for the first time in mid-1999. The early 2000s were characterized by a roller coaster of annual installations as the PTC was allowed to lapse, then extended, three times.

The industry has now enjoyed four years of record growth due to relatively stable policy support. 2009 is not expected to see growth as strong as in 2008, but with the federal policies recently enacted, the industry will likely install at least 5,000 MW of new capacity and return faster than it otherwise would have to a trajectory of rapid expansion.

Figure 2 shows the growing importance of the wind industry to the larger electric generation industry. Wind was less than 2% of all the new capacity added in 2004, increasing

to 35% in 2007 and 42% in 2008. Wind and natural gas together have represented close to 90% of all new generation capacity added since 2005.

Large numbers of wind power projects are proposed in every region of the country with strong wind resources. As illustrated by Figure 3, close to 300,000 MW of proposed wind projects are currently waiting in line to connect to the grid. The proposed wind projects in these queues have applied for interconnection to the grid, but most of these wind plants cannot be built because there is insufficient transmission capacity to carry the electricity they would produce. While not all of these wind projects will ultimately be built, it is still clear that wind power development is outpacing the expansion and modernization of our electric grid.

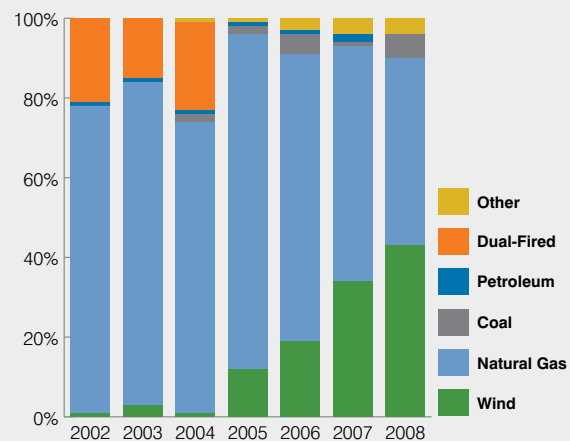
Renewable Electricity Share of U.S. Mix

Wind energy production has grown at record rates in recent years, diversifying the nation's electricity mix. In 2008, wind generated 52 million megawatt-hours (MWh) representing 1.26% of all generation¹. This was a 51% jump in generation compared to the 34.5 million MWh generated in 2007, which was 0.83% of all generation.

All non-hydro renewable generation increased from 2.5% in 2007 to 3% in 2008. Wind energy now contributes over 42% of all non-hydro renewable generation, up from 33% in 2007. Total generation in 2008 was 4,115 million MWh, which was a 1% decrease from 2007 generation.

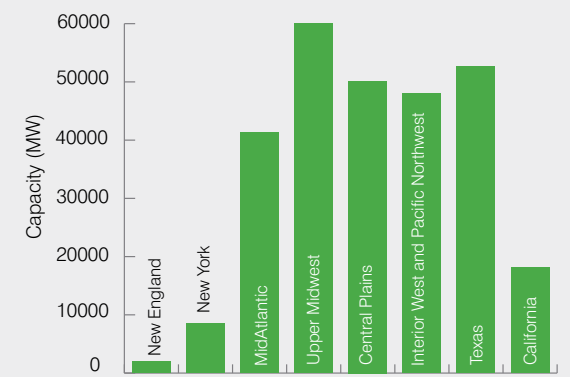
¹ From DOE EIA Electric Power Monthly

FIGURE 2: PERCENTAGE OF NEW CAPACITY ADDITIONS



Sources: Ventyx, SNL, AWEA, SEIA, Berkeley Lab

FIGURE 3: INTERCONNECTION QUEUE

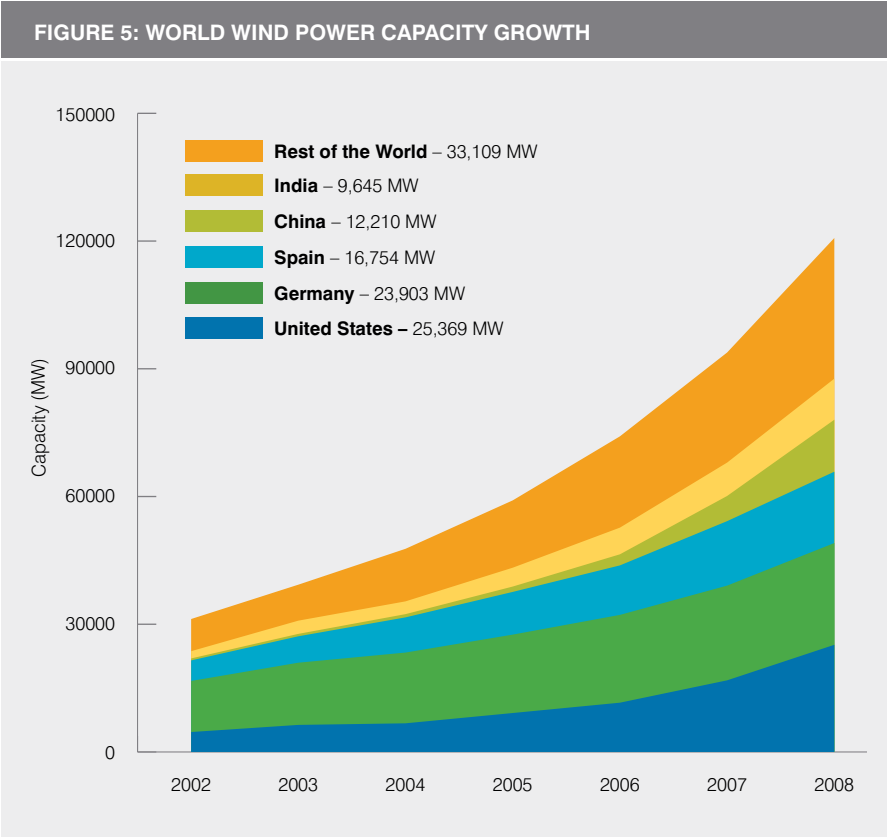
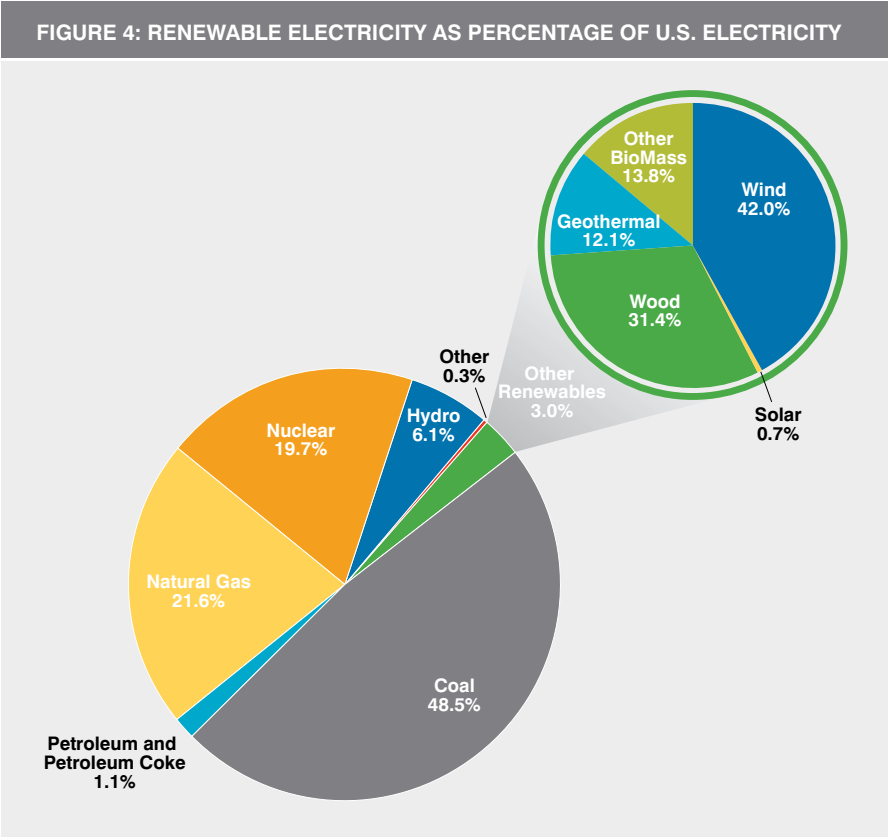


Global Capacity Growth

Over 27,000 MW of new wind power generation capacity came on line worldwide in 2008, bringing the total global wind power capacity to over 120,000 MW through the end of 2008.

Also in 2008, the U.S. overtook Germany (23,903 MW) as the country with the most wind power capacity installed. According to the Global Wind Energy Council, Europe and North America each added about 8,900 MW of new installed capacity during the year, with Asia close behind at 8,600 MW.

China also exhibited very rapid growth and is on its way to overtake Germany and Spain to reach second place in terms of total wind power capacity in 2010. China would then have met its 2020 target of 30,000 MW (30 GW) a full ten years ahead of schedule.



“20% Wind Energy Scenario” Report Card

The U.S. Department of Energy’s report, *20% Wind Energy by 2030: Increasing Wind Energy’s Contribution to U.S. Electricity Supply*, found that reaching a level of 20% wind energy by 2030 was feasible under one closely examined scenario.

Included in the report are an examination of America’s technological and manufacturing capabilities, the future

costs of energy sources, U.S. wind energy resources, and the environmental and economic impacts of wind development. Under the 20% wind scenario, installations of new wind power capacity would increase to more than 16,000 megawatts per year by 2018, and continue at roughly that rate through 2030. A total of 300,000 MW of land based and offshore wind power capacity would have to be installed to meet that level of electricity production.

The actual installation levels for 2008 were more than double what the report deemed necessary to meet the 2030 goal. Even given the lower numbers projected for 2009, installations for 2009 will be 20% higher than the report projected. A cumulative installed capacity of over 25,300 MW was not estimated to be met until late 2010.

FIGURE 6: ACTUAL ANNUAL INSTALLATIONS COMPARED TO 20% SCENARIO

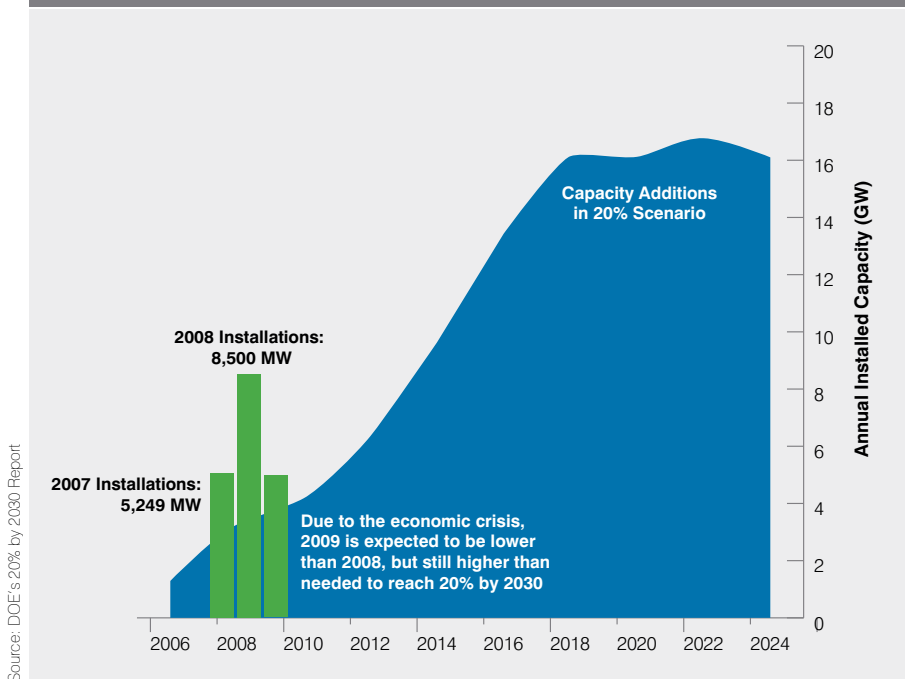
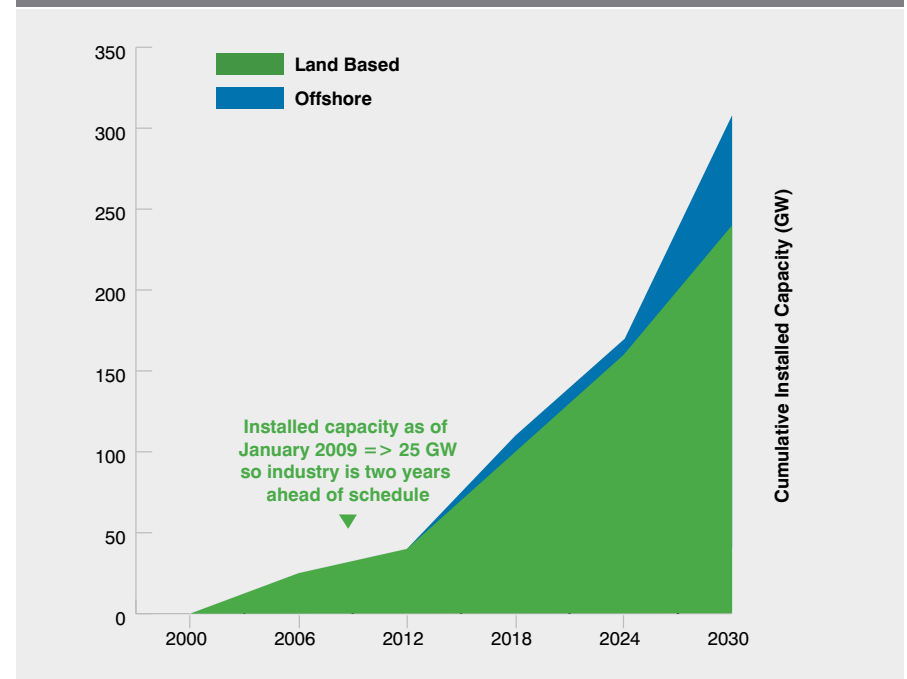


FIGURE 7: ACTUAL TOTAL CAPACITY COMPARED TO 20% SCENARIO



Wind Project Installations by State

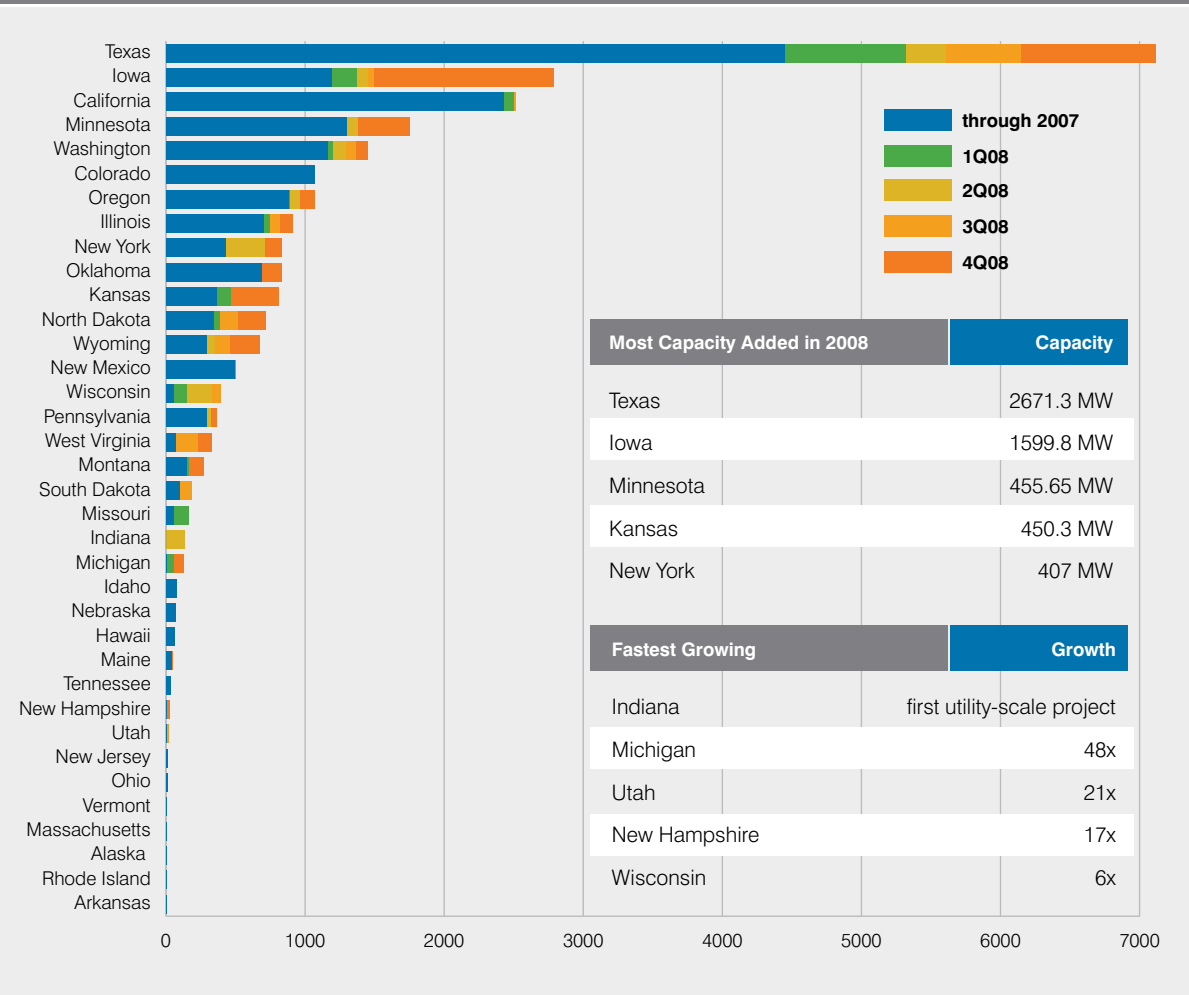
Texas once again installed the largest amount of new capacity in 2008— 2,671 MW — moving it into a league of its own. More new wind capacity was added in Texas during the year than in any country except China and the U.S. If Texas were a country, it would rank sixth in the world, behind Germany, the rest of the U.S., Spain, China, and India.

Iowa surged into second place in the U.S., behind only Texas. California, once the location of practically all the wind power activity in the U.S., now ranks third for wind project capacity.

Oregon moved into the club of states with more than 1,000 MW installed, which now numbers seven: Texas, Iowa, California, Minnesota, Washington, Colorado, and Oregon.

Indiana saw its first utility-scale project installed in 2008 — a 130.5-MW facility developed by Orion Energy Group. Other fast-growing states include Michigan, which added 127 MW to its end-2007 total of 2.6 MW; Utah, which boosted its total to 20 MW from its previous total of 1 MW; New Hampshire, which saw the addition of a 24-MW plant; Wisconsin, which added three large wind projects; and West Virginia, which quadrupled its end-of-2007 total.

FIGURE 8: WIND POWER CAPACITY INSTALLATIONS BY STATE



Two states – Minnesota and Iowa – now get over 7% of their power needs from wind and thirteen get more than 2%.

Figure 9 shows states penetration, with top 5 states including:

- MN:** 7.48% (up from 4.60% in 2007)
- IA:** 7.10% (up from 5.46%)
- CO:** 5.91% (up from 1.34%)
- ND:** 4.86% (up from 1.83%)
- NM:** 4.41% (up from 3.86%)

Some of the largest states by MW do not fall into the top 5 list by penetration given the states of Texas, Washington, and California have a much higher in-state generation demand.

The legislative districts with the most wind power installed as of the end of 2008 are all in the top two states, Texas and Iowa. Rep. Randy Neugebauer (R) has the largest amount of wind power in his district, more than the entire state of California. These rankings are for House Congressional districts. The Senators from the states with most wind power installed are, as previously indicated in the State rankings, from Texas, Iowa, California, Minnesota, and Washington.

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 other landowners. Each wind turbine contributes \$3,000 to \$5,000 or more per year in rental income, while farmers continue to grow crops or graze cattle up to the foot of the turbines.

FIGURE 9-10: % GENERATION AND MW INSTALLED

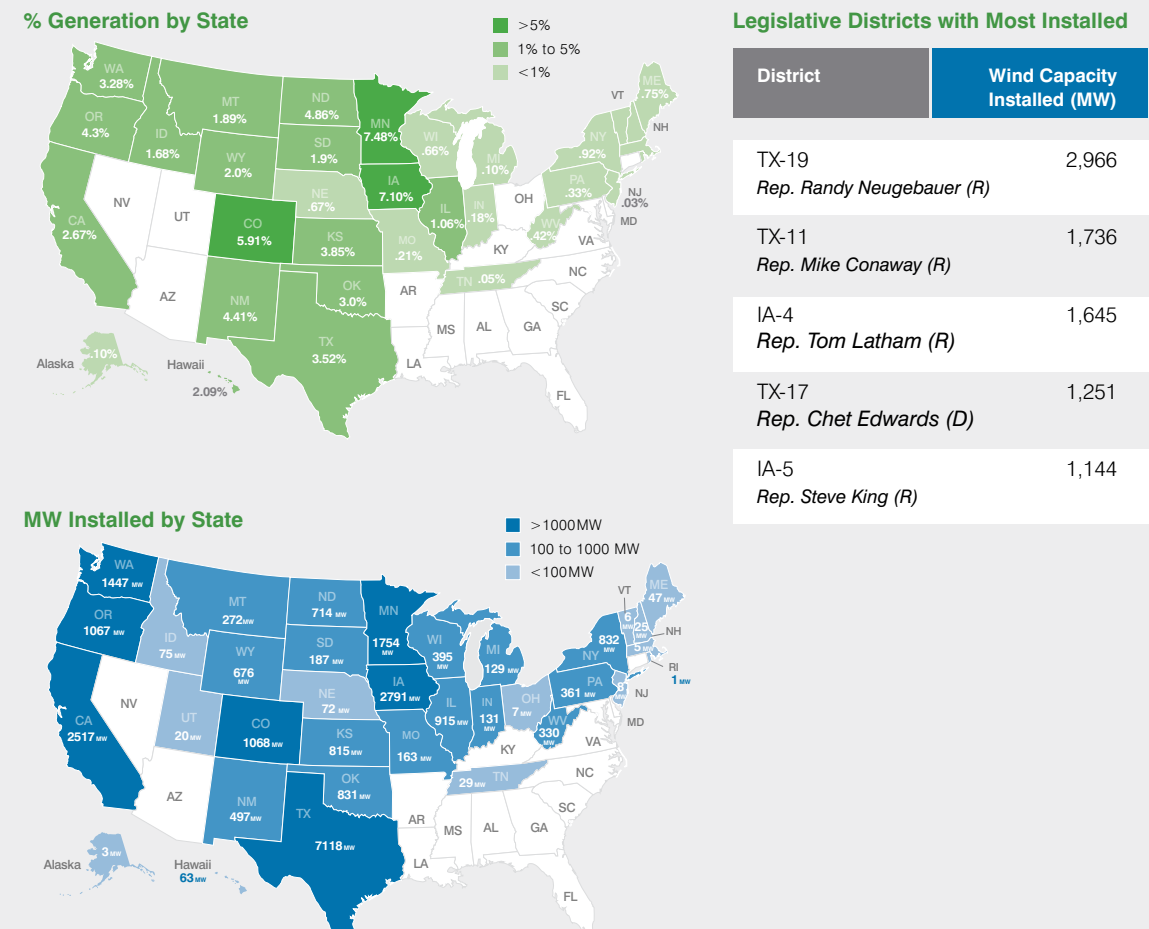


Figure 9: Actual Generation as Reported in From DOE EIA Electric Power Monthly
Figure 10: AWEA Wind Power Projects Database

Turbine Manufacturers

Figure 12 shows that GE Energy continues to dominate the market, with 43% of the newly installed capacity in 2008 and over 48% of the over 5,000 turbines installed in 2008. The turbine market is still fairly concentrated, with the top eight

companies accounting for over 98% of the new capacity added. Vestas and Siemens retained the second and third place spots in terms of installed capacity.

New companies are entering the U.S. market each year, however. 2008 saw turbines installed in the U.S. by newcomers to the U.S. market Acciona, REPower, Fuhrlander, DeWind, and AWE.

FIGURE 11: MANUFACTURERS' SHARE OF TOTAL WIND POWER FLEET

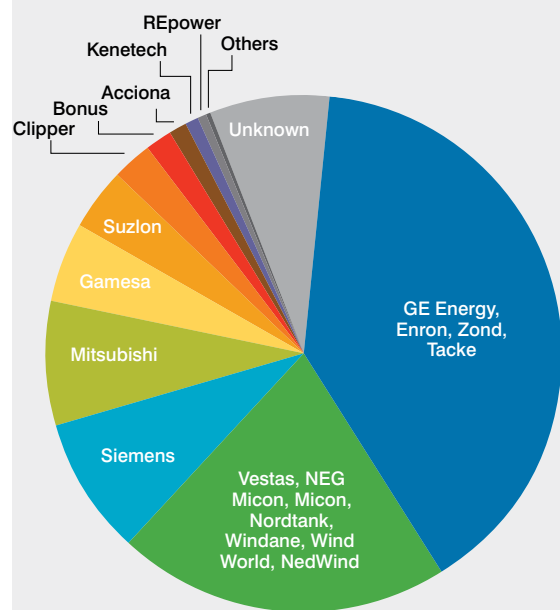
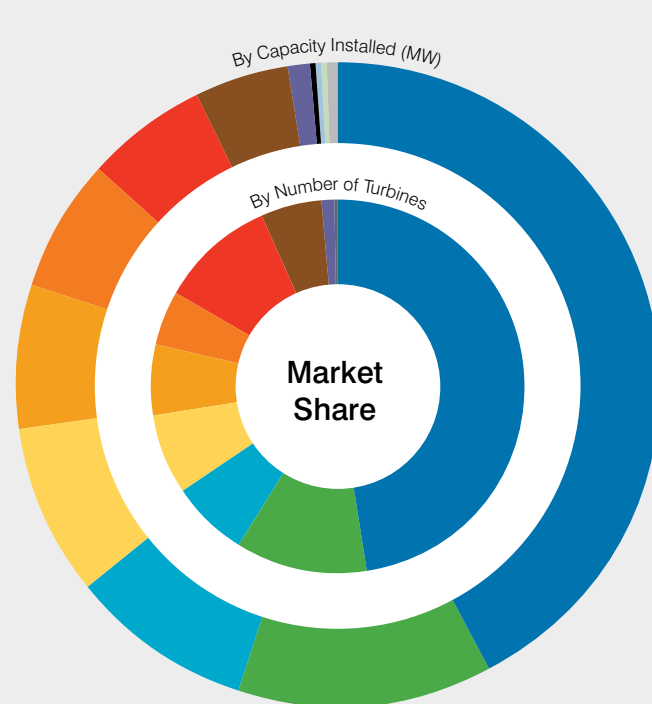


FIGURE 12: MANUFACTURERS' PERCENTAGE OF 2008 INSTALLATIONS



Company	MW Capacity	# of Turbines
GE Energy	3657	2438
Vestas	1120	569
Siemens	791.2	344
Suzlon	736.1	363
Gamesa	616	308
Clipper	595	238
Mitsubishi	516.4	515
Acciona WP	409.5	273
REpower	102	51
Fuhrlander	5	2
DeWind	4	2
AWE	1.8	2
Other	3.9	-

Includes Turbines Larger Than 100 kW

If a project meets AWEA minimum criteria for project completion, "completion" is determined by project owners, which may lead to some discrepancies between numbers reported by manufacturers and project owners.

Project Owners

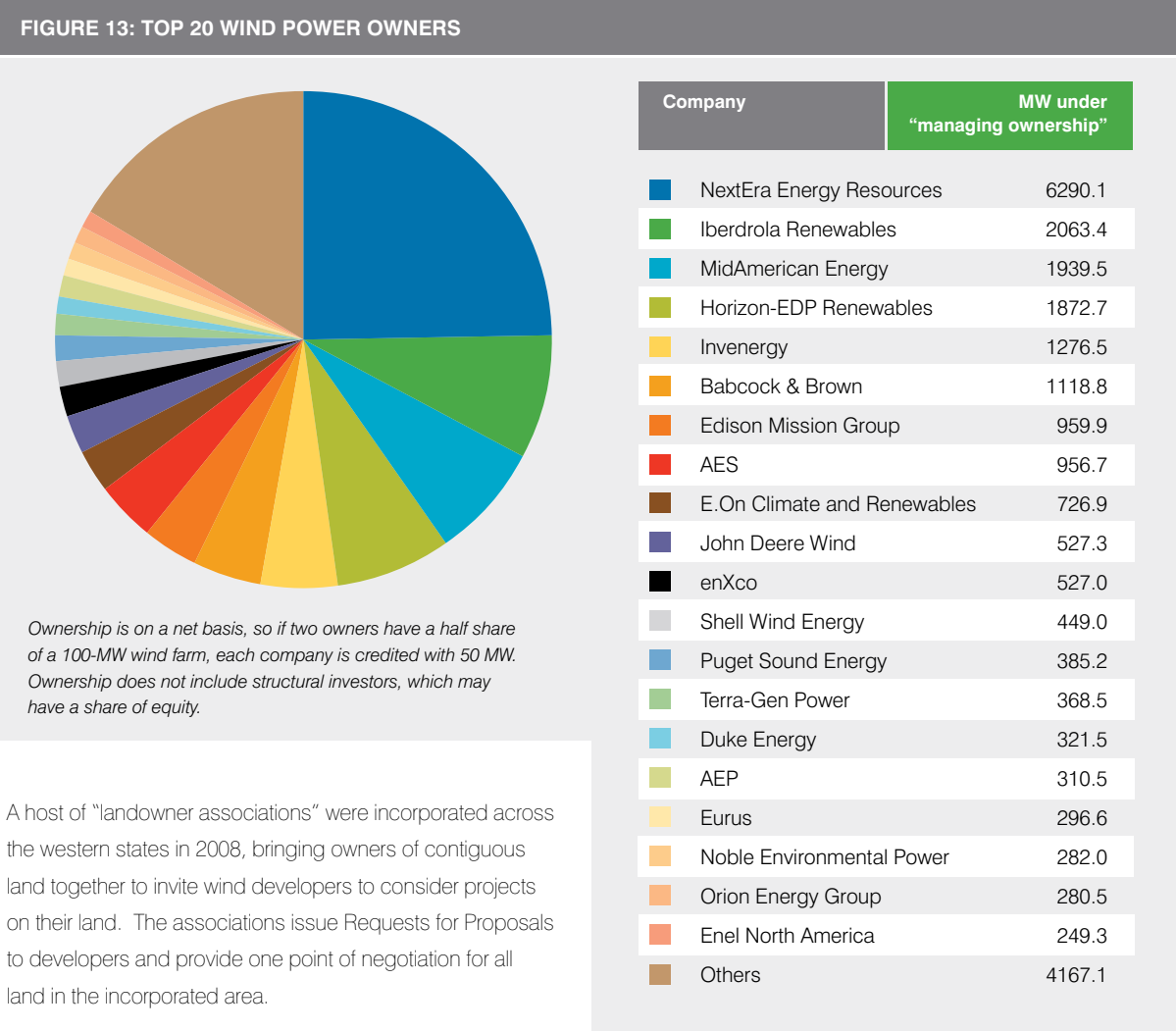
NextEra Energy Resources (formerly FPL Energy) continues to dominate the ownership of wind assets in the U.S., with 1,215 MW installed in 2008, bringing its total to 6,290 MW, roughly 25% of the total 25,369 MW installed.

Besides NextEra, five companies own over 1,000 MW of wind assets: Iberdrola, MidAmerican Energy (including managing ownership of both MidAmerican and PacifiCorp), Horizon-EDP Renewables, Invenergy, and Babcock & Brown.

Although Independent Power Producer ownership of wind assets is still the norm, ownership by utilities accounts for about 15% of installations. That percentage has remained approximately the same for the last three years.

More communities are interested in developing their own projects or making themselves attractive to wind developers. According to Windustry, a non-profit organization supporting community ownership of wind projects, the U.S. had 736 MW of community projects in July, 2008 (including municipal utility owned projects). Projects are generally less than 20 MW in size but depending on how community wind is defined, larger ones do exist, such as the 205 MW Last Mile Electric Cooperative project in Washington. Community Wind has not been strictly defined but a community wind project generally includes some opportunity for local investment, control and involvement.

FIGURE 13: TOP 20 WIND POWER OWNERS



A host of "landowner associations" were incorporated across the western states in 2008, bringing owners of contiguous land together to invite wind developers to consider projects on their land. The associations issue Requests for Proposals to developers and provide one point of negotiation for all land in the incorporated area.

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 majority of retail customers in the nation continue to receive wind energy from their local electric utility. 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. In all cases, only the portion of wind power under contract or owned by the utility being used to serve their own retail customers is counted in these tables.

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, 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 2008, with the other utilities in the top five positions unchanged from last year. The list of IOUs was expanded to show the top 25 utilities for 2008 as the number of investor-owned utilities getting involved with wind power continues to grow.

In the category of municipal electric utilities, CPS Energy (the municipal utility for the City of San Antonio, TX) continues to lead the rankings shown here for munis. Southern Minnesota Municipal Power Authority breaks into the top five for this listing in 2008.

Finally, for rural electric co-operative utilities, the rankings show Great River Energy as the leader in rural electric cooperative again in 2008 as last year, with over 300 MW of wind power on their system. Minnkota Power Cooperative and Associated Electric Cooperative move up the rankings into the second and third spots with wind power capacity on their system at 193 MW and 158 MW, respectively.

Table 1: Utility Ownership of Wind Power Capacity

Utility	Capacity (MW)
MidAmerican Energy (Including PacifiCorp)	1939.5
Puget Sound Energy	385.2
We Energies	146.5
Dominion Energy	132
Xcel Energy	126.9
Portland General Electric	125.4
Oklahoma Gas & Electric	120
Sacramento Municipal Utility District	102.2
Kansas City Power & Light	100.5
Westar	96

A fourth table, new this year (above), ranks the top ten utilities who own their own wind projects in a new listing shown as Table 1. These utilities have made utility ownership a priority for their utility and are likely paving the way for ownership of wind turbine projects to grow substantially in future years. Electric utility MidAmerican Energy (including PacifiCorp) leads all other U.S. utilities by a very wide margin and shows up as one of the largest owners of wind project assets in the entire country for any organizations (see Figure 13)

Table 2: Investor Owned Utilities

Utility	Under Contract MW (PPA)	Utility-Owned MW	TOTAL MW
Xcel Energy	2779.5	126.9	2906.4
MidAmerican Energy (including PacifiCorp)	423.9	1939.5	2363.4
Southern California Edison	1137	0	1137
Pacific Gas & Electric	980.9	0	980.9
Luminant Energy (formerly TXU)	913.1		913.1
American Electric Power	467.7	0	467.7
Alliant Energy	377.9	67.65	445.6
Puget Sound Energy	50	385.2	435.2
Exelon Energy	351		351
Empire District Electric Co	255		255
First Energy	243.5		243.5
San Diego Gas & Electric	238.5		238.5
Portland General Electric	100	125.4	225.4
Public Service New Mexico	204		204
Reliant Energy	198.9		198.9
Otter Tail Power	101.5	88.5	189
We Energies	25.5	146.5	172
Oklahoma Gas & Electric	51	120	171
Northwestern Energy	135		135
Dominion Energy		132	132
Minnesota Power	101.5	25	126.5
Idaho Power	113		113
Aquila	112		112
Kansas City Power & Light		100.5	100.5
Duke Energy Indiana	100		100

Table 3: Rural Electric Co-operative Utilities

Utility	Under Contract MW (PPA)	Utility-Owned MW	TOTAL MW
Great River Energy	318.7		318.7
Minnkota Power Cooperative	191	1.8	192.8
Associated Electric Cooperative	157.5		157.5
Basin Electric	131.7	5.2	136.9
Lower Colorado River Authority*	106		106
Cowlitz PUD		94.2	94.2
Western Farmers' Electric Coop	93.2		93.2
Klickitat PUD		53.2	53.2
Lakeview Light & Power		53.2	53.2
Wolverine Power Cooperative	52.8		52.8

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

Table 4: Municipally-Owned Utilities

Utility	Under Contract MW (PPA)	Utility-Owned MW	TOTAL MW
City Public Services San Antonio	501.8		501.8
Austin Energy	439.4		439.4
MSR Public Power Agency	199.5		199.5
Seattle City Light	175		175
Southern Minnesota Municipal Power Authority	109	10	119
Sacramento Municipal Utility District		102.2	102.2
WPPI Energy	75	10.4	85.4
Oklahoma Municipal Power Authority		51	51
Indiana Municipal Power Agency	50		50
Missouri River Energy Services	38.9	5.2	44.1

Projects

Although some progress was made on several proposed offshore projects, the U.S. market continues to be entirely land-based at the present time. Two of the five largest single-owner projects in the country — Capricorn Ridge and Buffalo Gap — had phases added in 2008. Capricorn Ridge now stands at 662.5 MW and Buffalo Gap at 523.3 MW. All of the five largest wind projects are in the Southwest: four in Texas and one in Colorado. The wind areas of Tehachapi (approx. 700 MW), San Geronio (approx. 350 MW), and Altamont Pass (approx. 550 MW) in California are not considered single wind farms because the projects contained in them have many different owners.

The average project size has been slowly ratcheting up. In 2008, the average project size was about 70 MW. Wind projects can range from only one turbine to hundreds of turbines. AWEA generally considers a project to be “one project” if it is owned by the same owner and contiguous. They are often built in a number of phases and can have several power purchasers and turbine types.

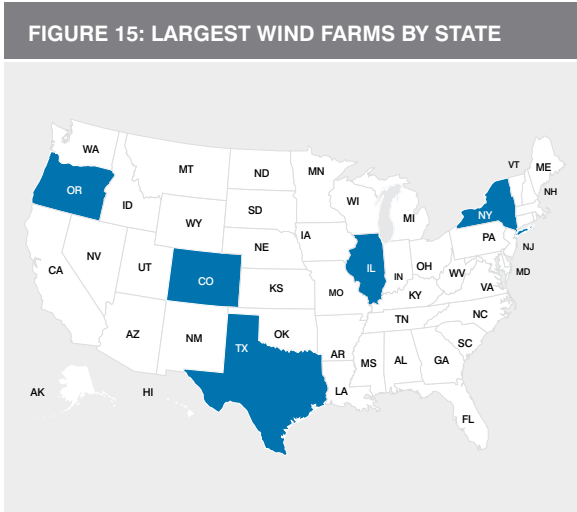
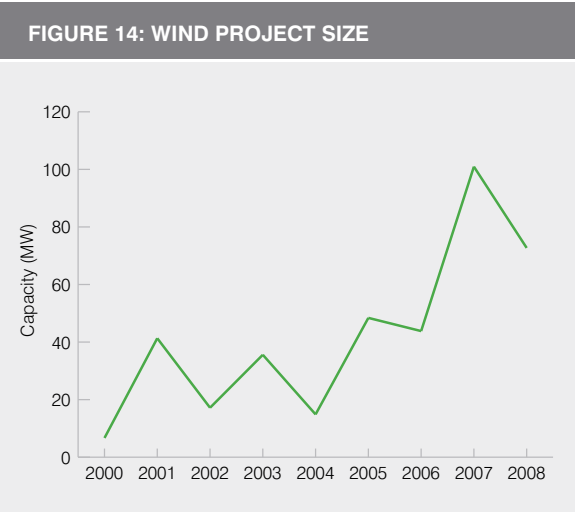


Table 5: Largest Wind Farms by State and MW

Name	State	MW	Year Brought Online	Owner
Horse Hollow	TX	735.5	2005/2006	NextEra Energy Resources
Capricorn Ridge	TX	662.5	2007, 2008	NextEra Energy Resources
Sweetwater	TX	585.3	2003, 2005, 2007	Babcock & Brown Wind, Duke Energy
Buffalo Gap	TX	523.3	2005, 2007, 2008	AES
Peetz Table	CO	400.5	2007	NextEra Energy Resources
Lone Star	TX	400.0	2007, 2008	Horizon-EdP Renewables
Twin Groves	IL	396.0	2007, 2008	Horizon-EdP Renewables
Roscoe Wind Farm	TX	335.5	2008	E.On Climate & Renewables
Maple Ridge	NY	321.8	2005/2006	Iberdrola Renewables/Horizon-EdP Renewables
Klondike	OR	320.2	2001/2005/2007	Iberdrola Renewables

Utility Scale Turbines

Installed wind turbines continue to grow larger, but at a slower rate. Over 5,000 turbines were brought on line in 2008. The 1.5-MW turbine size is still by far the most popular — over half the machines installed in 2008 were 1.5-MW units. Larger turbines are pulling the average up a bit, though: 125 3-MW and 240 2.5-MW turbines were installed. The average new turbine capacity of those installed in 2008 went up slightly to 1.67 MW, from 1.65 in 2007.

The AWEA wind power projects database tracks commercial installations 100-kW and larger, but there are few installed in the 100-kW to 1-MW range. Full data on tower height was not collected, but it is clear that towers are getting taller as well. Most utility-scale wind turbines are installed on towers in the height range of 60-80 meters, but some of the larger units are installed on 100-meter towers.

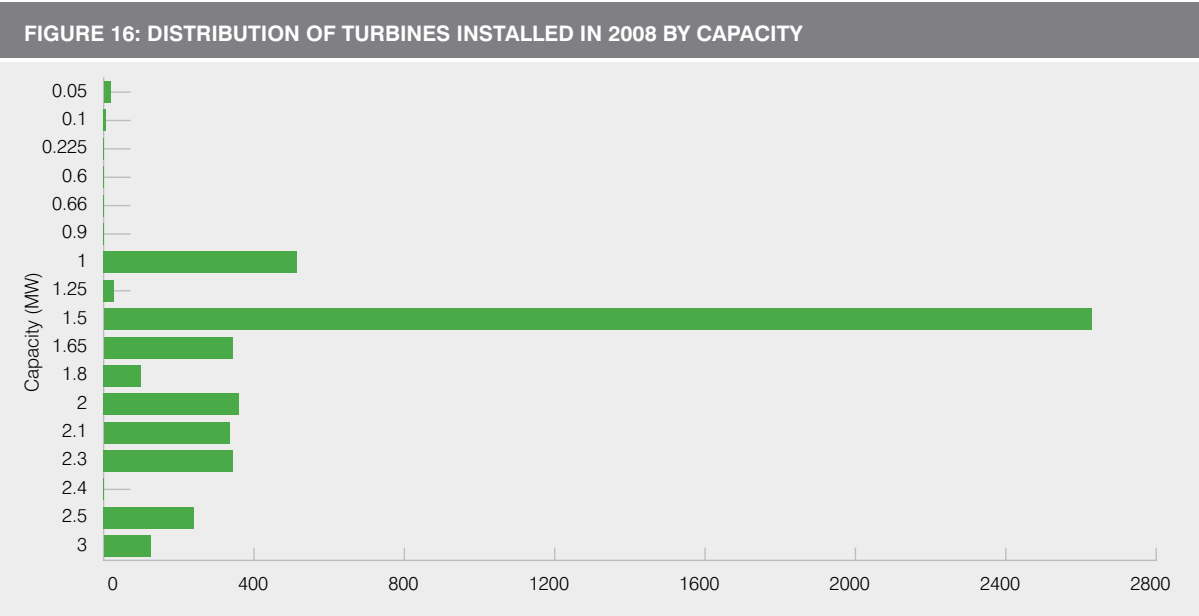


Table 6: Typical Sizes and Material Use for Utility-Scale Turbines

Capacity range:	1-3 MW
Tower heights range:	45-105 meters
Rotor diameter range:	57-99 meters
Blade length range:	26.8-45 meters

Table 7: Turbine Components

Component	% Weight	% Steel
Rotor		
hub	6%	100%
blades	7.20%	2%
Nacelle		
gearbox	10.10%	96%
generator	3.40%	65%
Frame	6.60%	85%
Tower	66.70%	98%

Source: DOE's 20% by 2030 Report

Manufacturing

Wind power's recent growth has also accelerated job creation in manufacturing, where the share of domestically manufactured wind turbine components has grown from under 30% in 2005 to around 50% in 2008. Wind turbine and turbine component manufacturers announced, added or expanded over 70 facilities in the past two years, including over 55 in 2008 alone. These manufacturing facilities, once fully online, represent 13,000 new direct jobs and nearly \$2 billion in investment. Due to the recent slowdown in orders, wind turbine and turbine component manufacturers in different parts of the country have announced some layoffs, but some plan to rehire the workers as the market picks back up.

FIGURE 17: 2008 FACILITIES BY COMPONENT

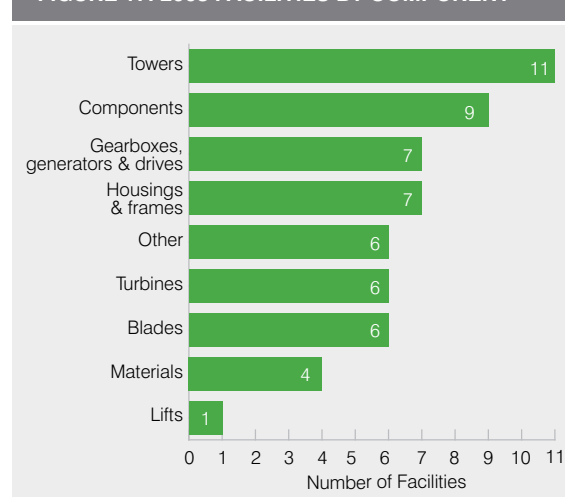
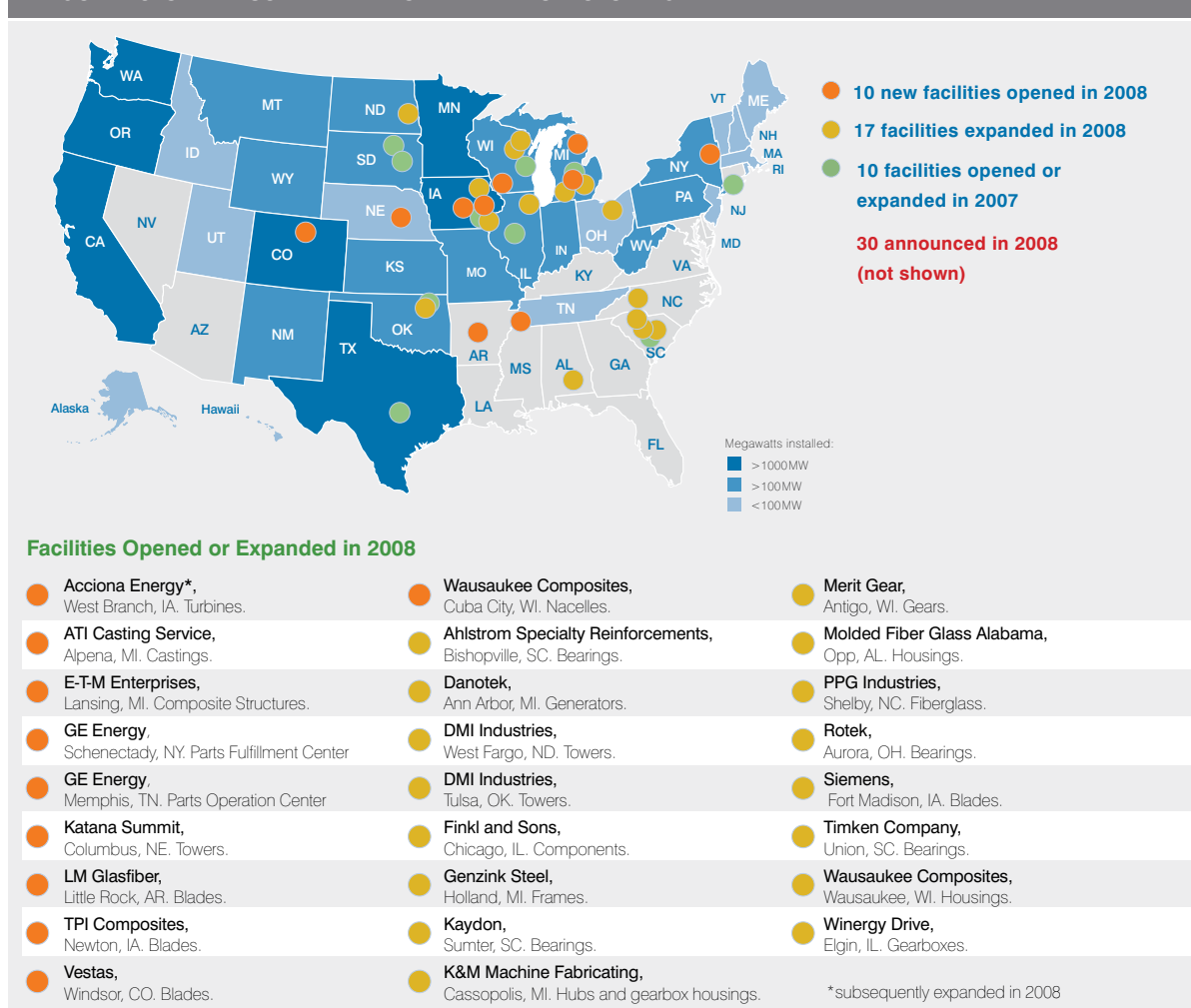


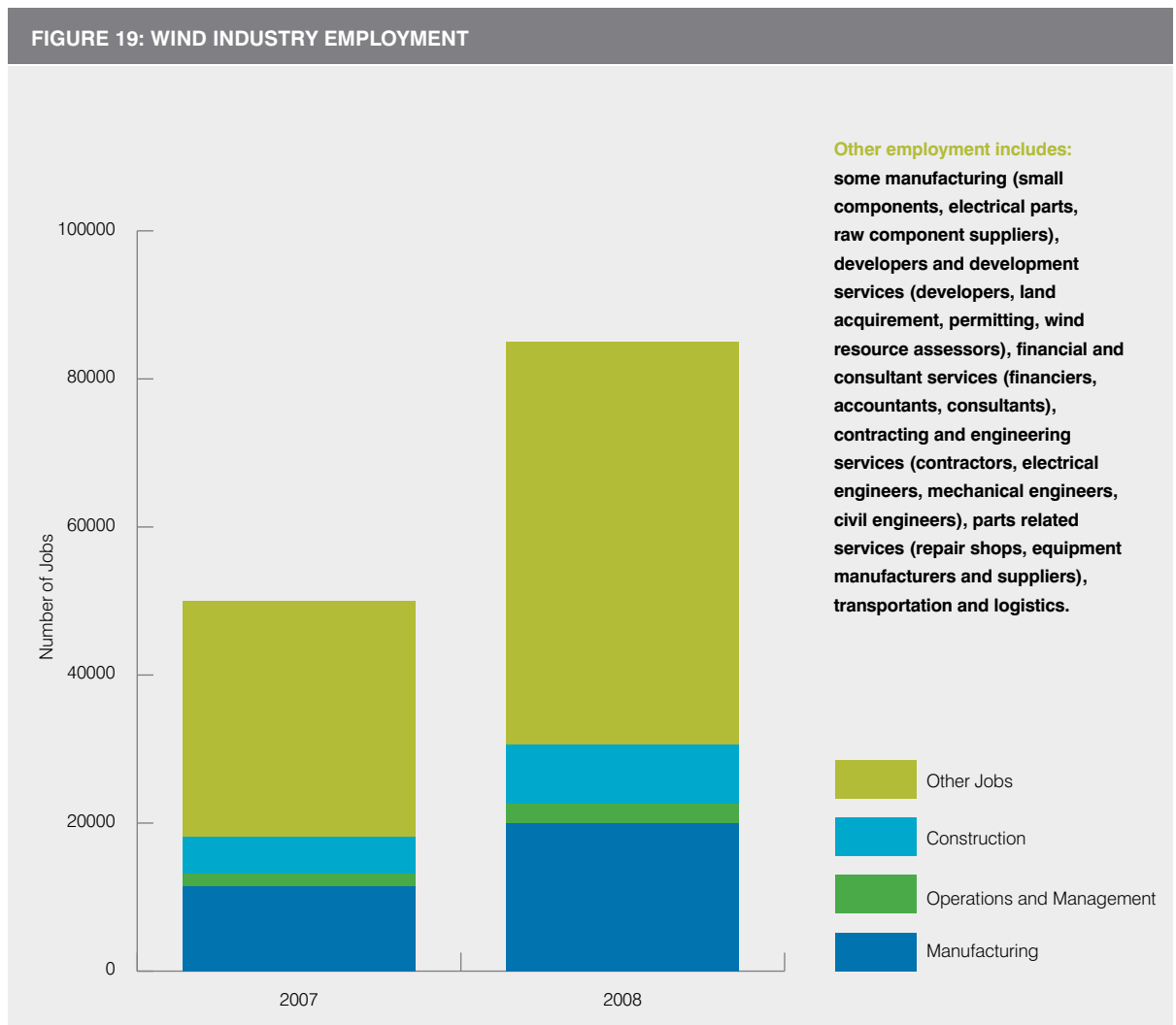
FIGURE 18: UTILITY-SCALE WIND TURBINE MANUFACTURING



Wind Industry Employment

The wind industry added 35,000 jobs in 2008 resulting in a total of about 85,000 people employed in the wind industry today, up from 50,000 a year ago. These jobs are in areas as varied as project development, turbine component manufacturing, construction and installation of wind turbines, wind turbine operations and maintenance, legal and marketing services, and more.

The increase in wind energy employment needs has placed a greater emphasis on the development of new educational programs. At the end of 2008, AWEA identified over 100 different educational institutions that are offering or developing programs that focus on wind or renewable energy. These programs include certificate programs and two-year associate's degrees that focus on wind technician training, to bachelor's degrees and graduate degrees that benefit a range of areas specific to the wind industry. Additionally, AWEA conducted a national education survey to identify current educational efforts and future workforce development needs. The preliminary results of that survey will be available by mid-2009.



U.S. Small Wind Market

The U.S. market for small wind turbines – those with capacities of 100 kW and under – grew 78% in 2008 adding 17.3 MW of installed capacity. Over 10,000 small wind turbines were sold in the U.S. in 2008. This growth is largely attributable to increased private equity investment that allowed manufacturing volumes to increase, particularly for the commercial segment of the market (systems 21-100kW). The still-largest segment of the market, residential (1-10kW), was likewise driven by investment and manufacturing economies of scale, but also rising residential electricity prices and a heightened public awareness of the technology and its attributes.

The industry projects 30-fold growth within as little as five years, despite a global recession, for a cumulative U.S. installed capacity of 1,700 MW by the end of 2013. Much of this estimated growth will be spurred by the new eight-year 30% federal Investment Tax Credit passed by Congress in October 2008 and augmented in February 2009.

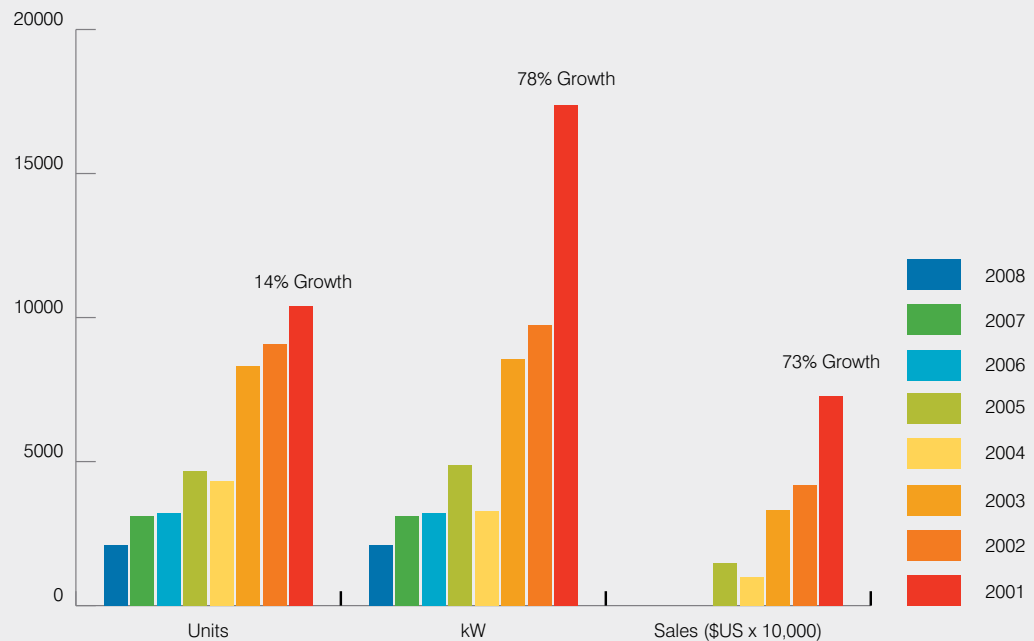
As shown by Figure 21, the market has become dominated by grid-connected units and will likely continue in this trend as these larger systems become more affordable.

The U.S. continues to command roughly half the global market share and is home to one-third of the 219 identified worldwide manufacturers.

Based on a survey of leading manufacturers, 2008 growth was largely due to the availability of capital and inventory, and the evolution of manufacturing economies of scale. Private equity investment has allowed supply to catch up to a demand that has been consistently strong over recent years.

Better manufacturer capitalization has led to an increase in production volumes, sales forces, and technical support within individual companies. Leading external market factors include rising and volatile prices of conventional electricity, state incentives, consumer education, and an increased public concern for environmental issues.

FIGURE 20: SMALL WIND GROWTH



Source: AWEA Small Wind Market Report

AWEA Membership

Despite record growth, the residential (1-10kW) and commercial (21-100kW) market segments showed an approximate 20% downturn in late 2008 and early 2009 due to a broad economic recession, but also because of typical sales drop-offs during winter months. Even with the dip, early 2009 residential sales were still 15-20% higher than in early 2008.

The American Wind Energy Association (AWEA) is the national trade association representing wind power project developers, parts manufacturers, equipment suppliers, service providers, utilities, researchers, non-profits and economic development organizations, and others involved in the wind energy industry. AWEA now brings together over 2,000 member companies from around the world.

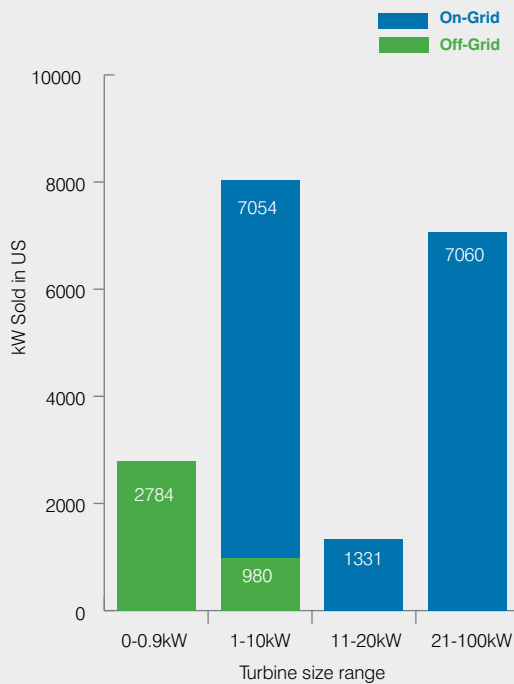
held early in 2009. Many of these newly-engaged companies are from the Midwest, which is rich in both wind resources and manufacturing capacity.

Membership is also growing from international companies, as more seek to take advantage of the world's largest wind market. Companies that are part of the well-developed value chain in Europe, as well as companies from the quickly-growing markets in Asia, are now looking to the U.S. market for new opportunities.

2008 was by far the biggest year yet in terms of the Association's membership growth, with over 800 new members joining. In the first quarter alone of 2009, with over 500 new members already having joined, this year looks likely to beat last year's total by mid-year.

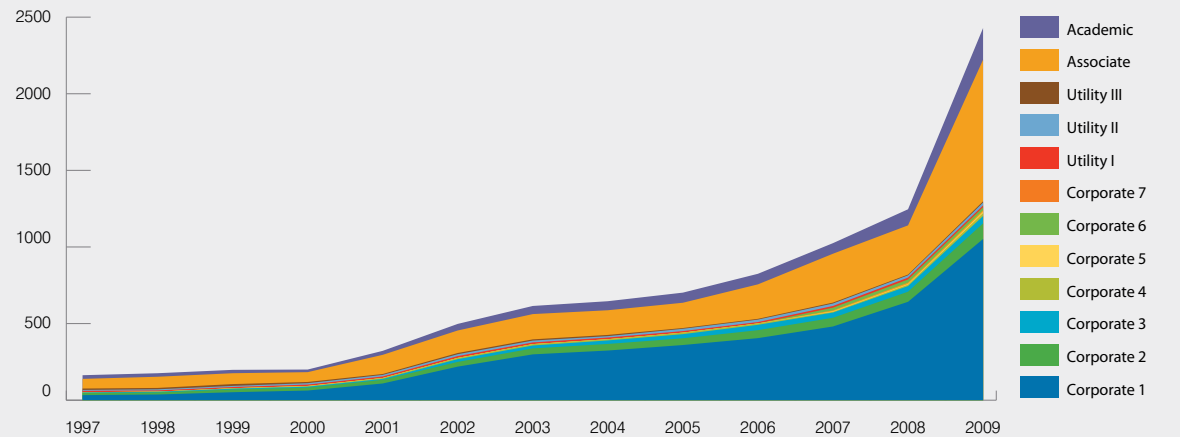
Membership in AWEA continues to grow at a fast pace, driven to a large extent by companies looking to diversify their businesses by supplying parts and services to the growing wind industry. Several of AWEA's Value Chain Workshops have been held to educate this particular audience, including a very popular workshop in Cleveland held in late 2008 and one in Wisconsin

FIGURE 21: SMALL WIND GROWTH



Source: AWEA Small Wind Market Report

FIGURE 22: AWEA MEMBERSHIP GROWTH



Definitions

Capacity (in Megawatts) — MW

Description: Total nameplate capacity
Information Source: Information as received from project developer at end of each quarter.

Completion Date

Description: Date on which wind project is considered to be operational. Usually “Commercial Operation Date”. AWEA’s minimum standards are that the project is online and able to produce electricity and tax credits, if applicable. If those criteria are met, the project owners determine completion date.

Merchant or “market”

Description: Wind power plants that are built without a traditional longterm power purchase agreement, instead selling power into a spot-market, sometimes with a hedge contract, or an option to sell the power at a certain price in the future.

Project developer or owner

Description: Owner/Equity Partner Company or companies that will have a managing interest in project when it is complete, though they may not have 100% ownership. Does not usually include structural equity investors.
Information Source: Project Developer Company or companies managing most aspects of project development process. Is often a joint effort among several companies.

Power Purchaser

Description: Utility contracted to purchase power under long-term Power Purchase Agreement (PPA) contract or use the power in case of utility ownership project developer or power purchaser

Project Name

Description: Name supplied by project developer project developer

Turbine Manufacturer

Description: Turbine vendor or supplier project developer or turbine manufacturer

Turbine Rating (in Megawatts) — MW

Description: Nameplate capacity rating of each turbine – typically the maximum potential power output of the turbine generator project developer

Appendix: 2008 Projects List

State	Project Name	Capacity (in MW)	Number of Turbines	Owner/Equity Partner
Alaska	Delta Junction	0.1	DES 0.1 MW	Alaska Environmental Power LLC
Alaska	Hooper Bay	0.3	DES 0.1 MW	Alaska Village Electric Coop (AVEC)
Alaska	Nome	0.9	Entegritiy 0.05 MW	Bering Straits Native Corp. and Sitnasuak Native Corp.
Alaska	Savoonga	0.2	DES 0.1 MW	Alaska Village Electric Cooperative (AVEC)
Alaska	Tin City Long Range Radar Station	0.225	Vestas 0.225 MW	Tin City Long Range Radar Station
California	Alite Wind Farm	24	Vestas 3 MW	Terra-Gen Power
California	Dillon	45	Mitsubishi 1 MW	Iberdrola Renewables
California	Edom Hills (repower)	20	Clipper 2.5 MW	BP Alternative Energy
Colorado	Wray School District	0.9	AWE 0.9 MW	Wray School District
Illinois	Agriwind	8.4	Suzlon 2.1 MW	John Deere Wind
Illinois	Twin Groves II (1Q08)	36.3	Vestas 1.65 MW	Horizon-EDPR
Illinois	Providence Heights	72	Gamesa 2 MW	Iberdrola Renewables
Illinois	Grand Ridge	99	GE Energy 1.5 MW	Invenergy
Indiana	Goodland I	130.5	GE Energy 1.5 MW	Orion Energy Group, LLC
Iowa	Century expansion (08)	12	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Charles City (1Q08)	57	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Pomeroy II (08)	1.5	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Top of Iowa II	80	Gamesa 2 MW	Iberdrola Renewables
Iowa	Top of Iowa III	29.7	Vestas 1.65 MW	Madison Gas & Electric
Iowa	Charles City (2Q08)	18	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Endeavor (2Q08)	62.5	Clipper 2.5 MW	NextEra Energy Resources
Iowa	Endeavor (3Q08)	12.5	Clipper 2.5 MW	NextEra Energy Resources
Iowa	Pioneer Prairie I	6.6	Vestas 1.65 MW	Horizon-EDPR
Iowa	Winnebago I	20	Gamesa 2 MW	Iberdrola Renewables
Iowa	Adair	174.8	Siemens 2.3 MW	MidAmerican Energy
Iowa	Carroll	150	GE Energy 1.5 MW	MidAmerican Energy

2008 Projects List Continued

State	Project Name	Capacity (in MW)	Number of Turbines	Owner/Equity Partner
Iowa	Crystal Lake - Clipper	190	Clipper 2.5 MW	NextEra Energy Resources
Iowa	Crystal Lake - GE Energy	150	GE Energy 1.5 MW	NextEra Energy Resources
Iowa	Endeavor II	50	Clipper 2.5 MW	NextEra Energy Resources
Iowa	Pioneer Prairie I	191.4	Vestas 1.65 MW	Horizon-EDPR
Iowa	Pioneer Prairie II	31.35	Vestas 1.65 MW	Horizon-EDPR
Iowa	Pomeroy III	58.5	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Story County	150	GE Energy 1.5 MW	NextEra Energy Resources
Iowa	Walnut Wind Project	153	GE Energy 1.5 MW	MidAmerican Energy
Iowa	Wind Vision	0.9	AWE 0.9 MW	Wind Vision
Kansas	Smoky Hills I	100.8	Vestas 1.8 MW	Enel North America
Kansas	Meridian Way I	105	Vestas 3 MW	Horizon-EDPR
Kansas	Meridian Way II	96	Vestas 3 MW	Horizon-EDPR
Kansas	Smoky Hills II	148.5	GE Energy 1.5 MW	Enel North America
Maine	Patriot	4.5	GE Energy 1.5 MW	
Massachusetts	Forbes Park	0.6	0.6	Forbes Park
Massachusetts	Hyannis Country Garden	0.1	DES 0.1 MW	
Michigan	Harvest Wind Farm	52.8	Vestas 1.65 MW	John Deere Wind
Michigan	Michigan Wind I	69	GE Energy 1.5 MW	John Deere Wind
Michigan	Stoney Corners	5	Fuhrlander 2.5 MW	Heritage Sustainable Energy
Minnesota	Prairie Star (08)	1.65	Vestas 1.65 MW	Horizon-EDPR
Minnesota	Cisco	8	Suzlon 2 MW	John Deere Wind/community
Minnesota	Corn Plus	4.2	Suzlon 2.1 MW	John Deere Wind
Minnesota	Ewington	20	Suzlon 2 MW	John Deere Wind/community
Minnesota	Federated	2.1	Suzlon 2.1 MW	Federated
Minnesota	Marshall	18.9	Suzlon 2.1 MW	John Deere Wind/community
Minnesota	Nobles	2.1	Suzlon 2.1 MW	Nobles

2008 Projects List Continued

State	Project Name	Capacity (in MW)	Number of Turbines	Owner/Equity Partner
Minnesota	Odin	20	Suzlon 2 MW	Edison Mission Group/Rahn Group
Minnesota	Elm Creek	99	GE Energy 1.5 MW	Iberdrola Renewables
Minnesota	Grand Meadow	100.5	GE Energy 1.5 MW	Xcel Energy
Minnesota	Hilltop Power	2	DeWind 2 MW	Hilltop Power LLC
Minnesota	Jeffers	50	Clipper 2.5 MW	Edison Mission Group
Minnesota	St. Olaf College	1.65	1.65	
Minnesota	Taconite Ridge Energy Center	25	Clipper 2.5 MW	Minnesota Power
Minnesota	Wapsipinicon Wind	100.5	GE Energy 1.5 MW	enXco
Missouri	Conception Wind Project	50.4	Suzlon 2.1 MW	John Deere Wind/Wind Capital Group
Missouri	Cow Branch Wind Project	50.4	Suzlon 2.1 MW	John Deere Wind/Wind Capital Group
Missouri	Loess Hills Wind Project	5	Suzlon 1.25 MW	John Deere Wind/Wind Capital Group
Montana	Diamond Willow Wind (08)	18	GE Energy 1.5 MW	Montana-Dakota Utilities
Montana	Glacier I	106.5	Acciona WP 1.5 MW	NaturEner USA
New Hampshire	Lempster	24	Gamesa 2 MW	Iberdrola Renewables
New Mexico	Mesalands	1.5	GE Energy 1.5 MW	
New York	Noble Bliss	100.5	GE Energy 1.5 MW	Noble Environmental
New York	Noble Clinton	100.5	GE Energy 1.5 MW	Noble Environmental
New York	Noble Ellenburg	81	GE Energy 1.5 MW	Noble Environmental
New York	Dutch Hill/Cohocton	125	Clipper 2.5 MW	First Wind
North Dakota	Langdon - OTP	40.5	GE Energy 1.5 MW	Otter Tail Power Co.
North Dakota	Langdon II	40.5	GE Energy 1.5 MW	NextEra Energy Resources
North Dakota	Tatanka	91.5	Acciona WP 1.5 MW	Acciona Energy
North Dakota	Ashtabula Wind Center - NextEra Energy Resources	148.5	GE Energy 1.5 MW	NextEra Energy Resources
North Dakota	Ashtabula Wind Center - Otter Tail	48	GE Energy 1.5 MW	Otter Tail Power Co.
North Dakota	Turtle Mountain College	0.66	Vestas 0.66 MW	Turtle Mountain Community College
Oklahoma	Buffalo Bear	18.9	Suzlon 2.1 MW	Edison Mission Group

2008 Projects List Continued

State	Project Name	Capacity (in MW)	Number of Turbines	Owner/Equity Partner
Oklahoma	Red Hills	123	Acciona WP 1.5 MW	Acciona Energy
Oregon	Elkhorn Valley (08)	3.3	Vestas 1.65 MW	Horizon-EDPR
Oregon	Klondike III (08)	2.4	Mitsubishi 2.4 MW	Iberdrola Renewables
Oregon	Klondike IIIA	76.5	GE Energy 1.5 MW	Iberdrola Renewables
Oregon	Rattlesnake Road	102.9	Suzlon 2.1 MW	Horizon-EDPR
Pennsylvania	Forward	29.4	Suzlon 2.1 MW	Edison Mission Group
Pennsylvania	Lookout	37.8	Suzlon 2.1 MW	Edison Mission Group
South Dakota	Tatanka	88.5	Acciona WP 1.5 MW	Acciona Energy
Texas	Camp Springs II (08)	88.5	GE Energy 1.5 MW	Invenergy
Texas	Capricorn Ridge expansion (1Q08)	142.5	GE Energy 1.5 MW	NextEra Energy Resources
Texas	Champion	126.5	Siemens 2.3 MW	E.On Climate & Renewables
Texas	JD Wind 4	79.8	Suzlon 2.1 MW	John Deere Wind
Texas	Lone Star II (1Q08)	104	Gamesa 2 MW	Horizon-EDPR
Texas	Roscoe	209	Mitsubishi 1 MW	E.On Climate & Renewables
Texas	Stanton Energy Center	120	GE Energy 1.5 MW	Invenergy
Texas	Capricorn Ridge expansion (2Q08)	156	GE Energy 1.5 MW	NextEra Energy Resources
Texas	Goat Phase I	80	Mitsubishi 1 MW	Edison Mission Group
Texas	Lone Star II (2Q08)	52	Gamesa 2 MW	Horizon-EDPR
Texas	Buffalo Gap 3	170.2	Siemens 2.3 MW	AES Wind Generation
Texas	JD Wind 9	10	Suzlon 1.25 MW	John Deere Wind/DWS
Texas	McAdoo	150	GE Energy 1.5 MW	Invenergy
Texas	Panther Creek I	142.5	GE Energy 1.5 MW	E.On Climate & Renewables
Texas	Silver Star I	60	Clipper 2.5 MW	BP Alternative Energy/Clipper
Texas	Wege Wind Farm	10	Suzlon 1.25 MW	John Deere Wind
Texas	Bull Creek	180	Mitsubishi 1 MW	Eurus Energy
Texas	Elbow Creek Wind Farm	121.9	Siemens 2.3 MW	NRG Energy

2008 Projects List Continued

State	Project Name	Capacity (in MW)	Number of Turbines	Owner/Equity Partner
Texas	Hackberry	165.6	Siemens 2.3 MW	RES Americas
Texas	JD Wind 10	10	Suzlon 1.25 MW	John Deere Wind/DWS
Texas	Ocotillo	58.8	Suzlon 2.1 MW	Duke Energy
Texas	Sherbino I	150	Vestas 3 MW	BP Alternative Energy/Padoma
Texas	Texas State Technical College	2	DeWind 2 MW	Texas State Technical College
Texas	Turkey Track	169.5	GE Energy 1.5 MW	Invenergy
Texas	Wolf Ridge	112.5	GE Energy 1.5 MW	NextEra Energy Resources
Utah	Spanish Fork	18.9	Suzlon 2.1 MW	Edison Mission Group
Washington	Nine Canyon III	32.2	Siemens 2.3 MW	Energy Northwest
Washington	Goodnoe Hills	94	REPower 2 MW	PacifiCorp
Washington	Hopkins Ridge II	7.2	Vestas 1.8 MW	Puget Sound Energy
Washington	Marengo II	70.2	Vestas 1.8 MW	PacifiCorp
Washington	Willow Creek	72	GE Energy 1.5 MW	Invenergy
Washington	Windy Point	8	REPower 2 MW	Cannon
West Virginia	NedPower Mount Storm, Phase I	164	Gamesa 2 MW	Shell WindEnergy/Dominion Energy
West Virginia	NedPower Mount Storm, Phase II	100	Gamesa 2 MW	Shell WindEnergy/Dominion Energy
Wisconsin	Forward Wind Project (1Q08)	99	GE Energy 1.5 MW	Invenergy
Wisconsin	Blue Sky - Green Field	145.2	Vestas 1.65 MW	We Energies
Wisconsin	Forward Wind Project (2Q08)	30	GE Energy 1.5 MW	Invenergy
Wisconsin	Cedar Ridge Wind Farm	67.65	Vestas 1.65 MW	Alliant Energy
Wyoming	Mountain Wind I	60.9	Suzlon 2.1 MW	Edison Mission Group
Wyoming	Happy Jack	29.4	Suzlon 2.1 MW	Duke Energy
Wyoming	Mountain Wind II	79.8	Suzlon 2.1 MW	Edison Mission Group
Wyoming	Glenrock	99	GE Energy 1.5 MW	PacifiCorp
Wyoming	Seven Mile Hill I & II	118.5	GE Energy 1.5 MW	PacifiCorp



1501 M St. NW, Suite 1000 | Washington, DC 20005 | 202.383.2500 phone | 202.383.2505 fax | www.awea.org