Global wind power capacity increased by about 11,700 MW in 2005, the largest volume ever installed in a single year and 43% more than in 2004. Total world wind power generating capacity now lies at over 59,300 MW, including 100-200 MW not yet fully confirmed. For comparison, peak demand in the United Kingdom is just over 60,000 MW.

Development this year will set another new record—a global total of 75,000 MW is within reach—although the year-on-year percentage leap is not likely to be as big as it was between 2004 and 2005, given that 2004 was an unusually sluggish year. Wind power's annual growth rate in 2005 was 24%, higher than the 20% in 2004 but not enough to avoid a fall in the compound annual growth rate (CAGR) for the past five years to around 26%, compared with 28.5% in 2004. World wind energy capacity, however, is still doubling every three years. Even with a CAGR of 10% over the next ten years, wind capacity will reach 140,000 MW in 2015. Our forecast is for 100,000 MW before 2010.

Progress in Germany slowed again in 2005, with only an 11% increase in capacity. In terms of new megawatt installed, however, it was only beaten by the US. Germany still has by far the largest volume of capacity of any country, but both the US and Spain are closing the gap. The Spanish market grew by 21% last year, making it the second country to exceed 10,000 MW. Other high growth rates in Europe came from Italy (36%), Portugal (96%) and the UK (50%). France, Ireland and Norway also recorded healthy increases, but from lower baselines. Overall in Europe, capacity increased to nearly 41,000 MW, although Europe's annual growth of 18% was below the global figure.

The US saw a 36% increase on its poor performance in 2004 and will also soon break through to 10,000 MW. Canada's growth was 54%, though from a much lower base. In the Pacific region, capacity increased by 37%, due to steady growth in Japan (17%), and strong growth in Australia (96%). In Asia there is now nearly 6000 MW of wind capacity, with India's growth at 49% and China's at 65%. As we predicted at this time last year, Japan, Portugal, the UK and China all pushed past the 1000 MW milestone in 2005.

United States rolling

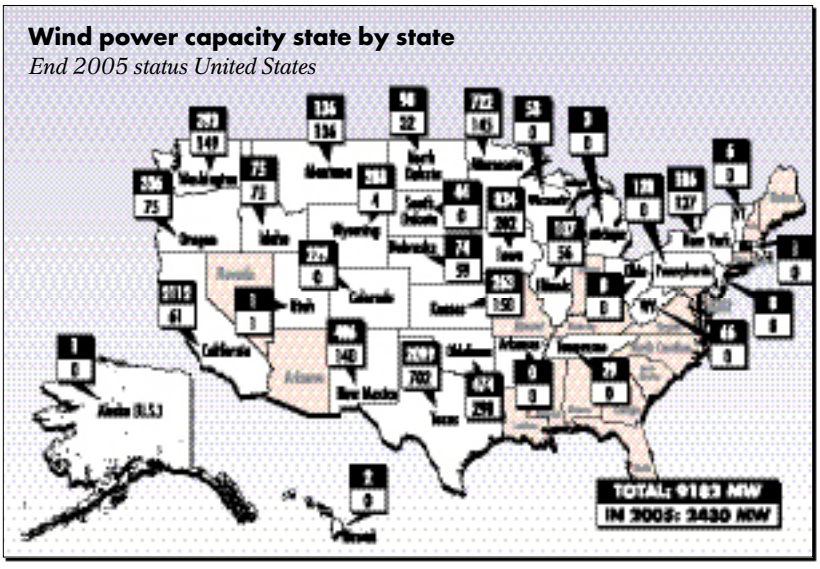
Largest annual growth yet seen in America

MARK ANDERSON
Windpower Monthly
United States

Coming off its biggest year ever, the US wind industry is positioned for more record-shattering numbers in 2006 and beyond. In round figures, the world's main energy guzzler installed more than 2400 MW of wind power in 22 states last year. If predictions of another 3000 MW hold true, the national total will surpass 12,000 MW by year's end.

All this despite turbine scarcity and rising prices, perpetual transmission issues, vexing environmental concerns, a fickle production tax credit (PTC) for wind generation, a federal government notoriously sluggish on energy policy and a populace with a growing appetite for energy, yet unlikely to show serious signs of weaning itself off fossil fuels any time soon. In January, even President George Bush chastised the nation for its addiction to oil in his State of the Union address.

"There's an awful lot tied up with the conventional ways we've used energy," says Randy Swisher of the American Wind Energy Association (AWEA). "A dramatic change in direction is difficult for the policy decision makers to come up with and there needs to be ongoing pressure. But although we haven't yet seen the kind of leadership required to make needed changes, the fact that we're having this kind of discussion when the energy bill isn't even a year old is significant."



And while that bill, the US Energy Policy Act of 2005, did extend the PTC through the end of 2007, many industry watchers agree that a ten year extension is what is really needed. "If we could ever get a long term PTC extension, we'd see billions of dollars flow into this

America's record busting year

New wind power stations online 2005

STATE/PROJECT	DEVELOPER	SUPPLIER	MW
California (60.50 MW)			
Kumeyaay Wind Power	Superior Renewable Energy	Gamesa 2 MW	50.00
Tehachapi	Coram Energy	GE 1.5 MW	10.50
Idaho (75.00 MW)			
Fossil Gulch	United Materials Exergy	GE 1.5 MW	10.50
Wolverine Creek	Invenergy Wind	GE 1.5 MW	64.50
Illinois (54.45 MW)			
Crescent Ridge	Illinois Wind Energy Eurus	Vestas 1.65 MW	54.45
Iowa (200.00 MW)			
Century Wind Project	Enxco	GE 1.5MW	150.00
Century Wind Project (exp.)	Mortenson	Mitsubishi 1MW	35.00
Intrepid (expansion)	Mortenson	Mitsubishi 1MW	15.00
Kansas (150.00 MW)			
Elk River Wind Farm	PPM Energy	GE 1.5MW	150.00
Minnesota (138.70 MW)			
Cottonwood	Dan Juhl	Suzlon 1.25 MW	15.00
Murray	SMMPA	Suzlon 1.25 MW	10.00
Trimont Area Wind Farm	PPM Energy	GE 1.5MW	100.50
Tholen & Petersen	Tholen & Petersen	Vestas 1.65 MW	13.20
Montana (135.00 MW)			
Judith Gap	Invenergy Wind	GE 1.5MW	135.00
Nebraska (59.40 MW)			
Ainsworth Wind Energy Facility	RES America	Vestas 1.65 MW	59.40
New Jersey (7.50 MW)			
Jersey-Atlantic Wind Farm	Jersey American Wind	GE 1.5MW	7.50
New Mexico (140.00 MW)			
San Juan Mesa	Padoma Wind Power	Mitsubishi 1MW	120.00
Caprock Wind Ranch (II)	Cielo Wind Power	Mitsubishi 1MW	20.00
New York (136.95 MW)			
Maple Ridge	PPM Energy/Horizon	Vestas 1.65 MW	136.95
North Dakota (31.50 MW)			
Wilton Wind Farm	FPL Energy	GE 1.5 MW	31.50
Oklahoma (298.20 MW)			
Blue Canyon II	Horizon WE	Vestas 1.8 MW	151.20
Weatherford	FPL Energy	GE 1.5 MW	106.50
Weatherford (expansion)	FPL Energy	GE 1.5 MW	40.50
Oregon (75.00 MW)			
Klondike II	PPM Energy	GE 1.5 MW	75.00
Texas (701.10 MW)			
Horse Hollow	FPL Energy	GE 1.5 MW	210.00
Sweetwater 3/Cottonwood Creek	DKRW, Catamount	GE 1.5 MW	135.00
Callahan Divide	FPL Energy	GE 1.5 MW	114.00
Wind Energy Center Buffalo Gap	AES	Vestas 1.8 MW	120.60
Sweetwater Phase II	DKRW, B&B*, Catamount	GE 1.5 MW	91.50
Three community projects	John Deere	Suzlon 1.25 MW	30.00
Washington (149.40 MW)			
Hopkins Ridge Wind Project	RES American/ Puget Sound	Vestas 1.8 MW	149.40
Others			
Small installations, mainly under 1MW were undertaken in Alaska, California, Colorado, Illionois, Iowa, Massachusetts, Michigan, Minnesota, Montana, New York, Oklahoma, Texas, Utah and Wyoming			18.67
Total			**2431.37**

* Babcock&Brown

industry," says Swisher.

Reality, however, suggests the PTC will retain the shaky confidence of its two year cycle. "I don't think a ten year extension will happen," says Mike O'Sullivan of FPL Energy, which added more than 500 MW in 2005 to maintain its standing as far and away the biggest US wind developer. "The politics in Washington calls for the PTC to stay as a two year deal due to the way the federal budget is scored."

BIGGER BOOM

Even without a long term tax credit, US wind power has plenty pushing it forward, with many signs pointing to an even bigger boom ahead. According to a study by Emerging Energy Research (EER), a Massachusetts-based advisory company, the US has potential to grow to over 28,000 MW by 2010. "The North American wind power market is operating at an entirely new level," says EER's Godfrey Chua. Here, too, O'Sullivan offers a cautionary note, however. "When you do the math, that's nearly 5000 MW a year," he says. "I think that prediction is a little aggressive."

Nevertheless, the US is eager to find solutions to its thirst for energy. The nation is still recovering from Hurricane Katrina's body blow to the Gulf Coast petroleum industry, while colossal unrest in the Middle East has led to per-barrel prices that seem headed ever northward. Meanwhile, unprecedented profits reported by oil companies and this winter's sky high home heating costs have worked to plant the idea of renewables in the minds of a growing number of Americans.

Further, an increasing push of state mandates for clean energy, primarily in the form of renewable portfolio standards (RPS), will require more and more states to install more and more wind facilities by specific deadlines. Roughly 20 states now have an RPS. "Of course, the fact that a legislature passes an RPS doesn't mean we'll automatically see thousands of megawatts of wind," says Swisher. "There are still too many opportunities for those who don't want to see the RPS to put up roadblocks."

A trend towards large wind developments accelerated throughout 2005 and included a dozen projects of 100 MW or more (table). The nation's two largest producers—Florida-based FPL Energy with 3800 MW operating or under construction and Oregon-based PPM Energy with 1600 MW operating or under construction—serve as bicoastal bookends, but other firms contributed to the trend. Following FPL's pacesetting 500 MW, PPM added just short of 400 MW, Horizon Wind Energy added 220 MW, Invenergy added 200 MW and Enxco 150 MW.

The year's largest projects were FPL's 220.5 MW Horse Hollow in Texas and MidAmerican/Enxco's 185 MW Century Wind in Iowa. PPM recently announced that a pair of large developments expected to go online in 2005 are now at or near completion: Maple Ridge, a 198 MW project in New York got connected in January, and Shiloh, a 150 MW project in California (a joint venture with Horizon), could be operating before the end of this month. Then, in the last days of December, Xcel announced an ambitious plan for adding 775 MW in Colorado by the end of this year.

In all, the number of states with commercial wind power developments has reached 30. California, which added but 62 MW, remains the leader at 2150 MW. With significant development lined up for this year (table), it is likely to retain that lead. Texas is closing fast after install-

ing more than 700 MW to reach 1995 MW. And while those two states together account for more than 45% of the nation's installed capacity, Iowa's total of 836 MW and Minnesota's 744 MW both showed significant gains in third and fourth place. No other state had as much as 500 MW by the end of last year.

Turbine availability was a major topic of concern in 2005 and is likely to remain so in the foreseeable future. The market for 2006 is reportedly sold out and most 2007 supplies are already spoken for. In response, project developers continue to pursue some form of a buy-now install-later framework strategy (WINDPOWER MONTHLY, January 2006).

"Very few suppliers would refuse to talk about a framework arrangement," says PPM Energy's Harm Toren. "It can set up an ongoing relationship where all the negotiating and heavy lifting has already been done. The framework is there and all we have to do is fill in the blanks. They're great for planning purposes."

In other words, few turbines ever hit store shelves these days. That often leaves smaller players winning bids, then buying machines from the big guys at middlemen's prices. Sometimes it leaves smaller players out in the cold.

But even the turbine shortage might have a silver lining. According to the EER study, the fact that all North American turbine vendors sold out available capacity in 2005 has led to new manufacturing facilities in the US by Spain's Gamesa, Suzlon from India and home grown Clipper. "The door is wide open for new entrants willing to take the risk," says EEU's Chua.

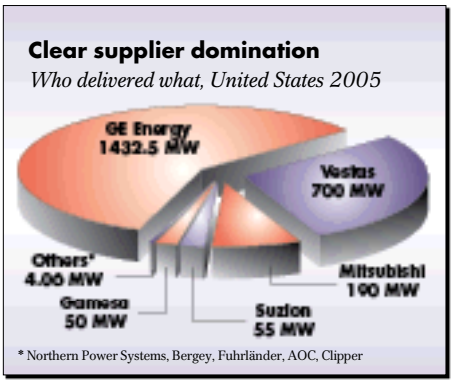


PHOTO: JOHN BACON

All go: *Construction of Invenergy's 135 MW Judith Gap facility in Montana started in June and was completed in December*

US projects on the way
More than 5000 MW planned

STATE	NO. OF PROJECTS	TOTAL MW
California	10	603
Colorado	3	280-380
Hawaii	3	61
Idaho	11	218-238
Illinois	2	445
Iowa	2	249
Kansas	1	30
Maine	2	110-140
Maryland	2	80
Massachusetts	3	48
Michigan	2	78
Minnesota	4	128
Montana	1	500
Nevada	3	190
New York	5	477
North Dakota	3	49
Oklahoma	1	120
Oregon	1	140
Pennsylvania	4	210
South Dakota	2	230-430
Texas	1	160
Vermont	6	142-152
Washington	1	230
West Virginia	1	300
Wisconsin	1	200
Wyoming	1	201
Total	**76**	**5479-5839**

INDUSTRY LEADERS

According to AWEA, GE Energy turbines were used in nearly 60% of all 2005 US installations, while nearly 30% were made by Vestas in Denmark. Japan's Mitsubishi, which supplied 8%, saw an early 2006 order from project developer Airtricity of Ireland for 250 MW.

The main turbine price drivers, according to GE's Robert Gleitz, are increasing steel, copper and other production costs, along with rising demand and the uncertainty of the two-year PTC cycle. "I don't see prices coming down," Gleitz says. "The industry needs the prices that are currently on the table."

As for shortages, Gleitz points again to the PTC. "It's not so much on GE, it's more on the supply chain," he says. "With enough blades and gearboxes we could produce more and we've gone back to our suppliers and asked what we can do. They come back to us and say they need long-term commitments."

Meanwhile, on the horizon is the enormous potential of offshore. Although none is expected to be installed this year or next, a 2005 US Department of Energy study suggests that 900,000 MW of wind generation capacity exists within 50 miles of the US coastline. At present, Texas seems positioned to win the US offshore race with a project announced by Galveston-Offshore Wind, a division of Wind Energy Systems, projected to bring 150 MW online in 2008. But two East Coast projects, Cape Wind in Massachusetts at 454 MW, and the 140 MW Long Island Power Authority project in New York, are still clearly in the running.

Again, FPL's O'Sullivan offers a dose of caution. "The Long Island project is ours and we believe it still has merit," he says. "But our belief is that offshore is a limited business model. It's at least twice if not three times more expensive than onshore. Also, offshore projects have to be significantly larger than onshore and there aren't too many shoreline communities that want to see wind turbines. It's usually expensive property and the not in my back yard factor comes into play."

Regardless of all else, few would disagree that the overall industry looks healthier than ever before. The previous record-setting year for the US was 2001, when just short of 1700 MW came onboard, while in 2004, due in large part to a lapse in the PTC, new capacity staggered to a dismal 398 MW. Might anything return the industry to those primitive days?

"You're asking what keeps me awake at night," says FPL's O'Sullivan. "The things that aren't going away are transmission issues and environmental permitting that is getting more difficult even in rural areas. Then there's the incredible increase in turbine prices from 2003 to 2006. That's a potential industry roadblock that could dampen wind's growth."

But even O'Sullivan ends on a positive note. "There was nearly $3 billion of investment last year and that's a big number," he says. "We've transitioned from a niche industry to a full-blown business."