

## NEW US industry forecasts for 2012 & 2017

# Wind Turbine Systems & Components

Study # 2439

January 2009

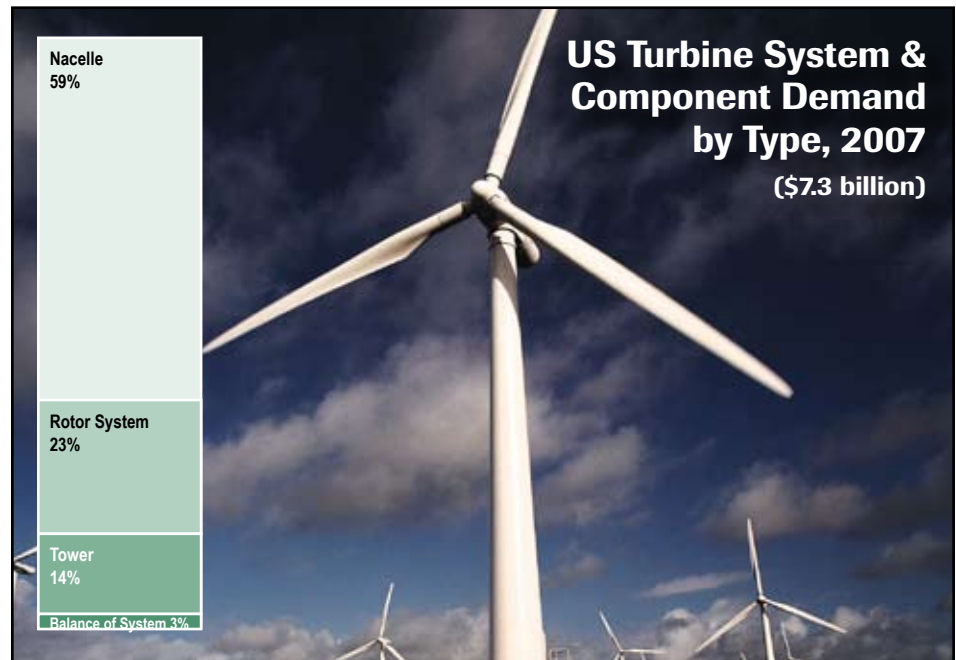
\$4600

### US demand to rise 6.8% annually through 2012

In light of rising interest in developing domestic renewable energy resources, such as wind, that are cleaner and are not subject to the fuel price shocks, demand for wind turbine systems and components is expected to increase 6.8 percent per year to \$10.1 billion in 2012. Gains will also be driven by renewable portfolio standards at the state level, as well as continued political will to support incentives that help make wind energy more cost competitive. Furthermore, this industry benefits from a relatively established manufacturing process, although continued technological development will make wind energy more competitive in a growing number of areas with lower wind speeds and in off-shore installations.

### Utility-scale applications to remain dominant

Despite the continued development of vertical wind turbine systems and those designed for distributed power applications, horizontal axis turbines for utility-scale projects will continue to dominate the wind turbine system market through the forecast period. Most wind turbine sales in the US will be for on-shore applications through the 2017; however, a growing number of turbine systems will be installed for off-shore applications, particularly in the northern Atlantic waters and the Great Lakes, through the forecast period. This advancement will be driven in part by the establishment of state and federal regulatory schemes, and technological improvements that enable installation in a wider range of locations.



### Rotor systems to post stronger value sales gains

The primary components of a wind turbine system are the nacelle, the rotor system and the tower. In 2007, the nacelle and its internal components accounted for the largest share of wind turbine system value sales with 59 percent. However, the value sales of rotor systems will post stronger gains in light of the use of increasingly long blades made of higher-value materials that are stronger and lighter than previous generations.

### Less established wind energy regions to grow faster

Much of the US has strong wind energy potential with large areas of open land rated windy enough for efficient power generation and a shallow continental

shelf along the Atlantic shoreline. As of 2007, the West South Central subregion accounted for the largest share of sales with 33 percent, driven by the high level of installed wind energy capacity in Texas and Oklahoma. However, subregions with less established wind energy markets are expected to post stronger gains through 2012.

### Study coverage

This new Freedonia industry study, *Wind Turbine Systems & Components*, is priced at \$4600. It presents US historical demand data (2002, 2007) plus forecasts for 2012 and 2017 by product, application and region. The study also considers market environment factors, highlights regulations and incentives, evaluates company market share and profiles 35 US industry competitors.

# Wind Turbine Systems & Components

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**APPLICATIONS**

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**UTILITIES DEMAND FOR WIND ENERGY SYSTEMS**

Item	2002	2007	2012	2017
Wind Electricity Generation (bil kW hrs)				
000\$ utility wind/kilowatt hour				
Utility-Grade Wind Energy Installed (MW)				
% new capacity				
Utility-Grade New Wind Capacity (MW)				
000\$/MW				
Utility-Grade Wind Energy Demand (mil \$)				
% utility-grade				
Wind Energy System Demand (mil \$)				

**Owners**  
 Wind turbine systems installed for use in utility-grade electric power generation applications may be owned by independent power producers, investor-owned utilities, public utilities and community-owned groups. In some cases, the owner is the original developer of the project, while in other cases, the owner took over operation once the wind farm was developed. In 2008, independent power producers accounted for the largest share of wind turbine system demand at the utility-grade level with 83 percent. However, through 2012, public utilities are expected to post the strongest growth, albeit from a small base.

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**SAMPLE TABLE**  
 Historical data for, 2002 and 2007 as well as Freedonia forecasts for 2012 and 2017; data illustrated with the aid of more than 70 tables and charts

**WIND TURBINE SYSTEMS & COMPONENTS**

**Blades --** Sales of blades for wind turbine systems are projected to reach \$1.5 billion in 2012. In general, advances will be made in the use of higher value blade materials that make the blades lighter and stronger. Growth is aided by a trend toward larger blades to accompany the development of larger wind turbine systems. Further advances will be restrained by the difficulty of transporting these large blades which must be done for the full length of the blades. Similarly, the development of a small wind market hampers value growth for blades sales since the blades used in these systems are smaller and lighter than utility-scale versions.

**SAMPLE PAGE**  
 Explanations that support each table's data and forecasts

Rotor blades convert wind energy to mechanical energy through the principles of airfoils. The blades are molded into airfoils to maximize the wind's lift, and are available with a stall-regulated or variable pitch design. Stall-regulated blades are designed to limit lift when the wind speeds are too strong so that the wind turbine system is not damaged. Variable-pitch blades are designed to regulate their speed by rotating to minimize their surface area. Three blades are installed on most wind turbine systems because this formation provides the best balance of simplicity of design with high rotation speed and load balancing.

Blades for wind turbine systems are made of laminated materials with a high strength-to-weight ratio, often including materials to protect against lightning strikes. The most commonly used material is fiber glass-reinforced epoxy or unsaturated polyester, with glass fibers generally accounting for 70 to 75 percent by weight. In most cases, epoxy is the preferred binder for blades more than 85 feet long because of its lighter weight and tensile and flexural strength, but polyester is easier to process and is less expensive. Fiberglass-reinforced materials are prevalent for blades up to 165 feet in length. Carbon fiber-reinforced plastics are increasingly being used for larger blades because of the need

**Freedonia's methods involve:**

- Establishing consistent economic and market forecasts
- Using input/output ratios, flow charts and other economic methods to quantify data
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- Interviewing key industry participants, experts and end users
- Researching a proprietary database that includes trade publications, government reports and corporate literature

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#2375..... 10/2008..... \$6100

## Turbines in China

Demand for turbines in China will grow 8.4% yearly through 2011, driven mainly gains in electric utilities construction and air-carrier services. The large steam turbine segment will decline with the completion of large scale power plant projects, but wind turbines, gas turbines, microturbines and turbine engines will all see double-digit annual growth. This study analyzes the 71 billion yuan turbine industry in China, with forecasts for 2011 and 2016 by product, market and region. It also details market share and profiles industry players.

#2324..... 06/2008..... \$5100

## World Turbines

Global turbine demand will rise 4.9% yearly through 2012. Gains in the large Chinese market will slow yet remain well above the average rate, with smaller developing markets growing even faster. Developed regions will also offer good opportunities. Aircraft engines will outpace the larger electric power generation market. This study analyzes the \$83.6 billion world turbine industry, with forecasts for 2012 and 2017 by product, application, world region and for 22 countries. It also evaluates market share and profiles industry players.

#2315..... 06/2008..... \$5500

## Fuel Cells

US commercial fuel cell demand will expand nearly sixfold through 2012 to \$975 million. Electric power generation will remain the largest market and grow 41% annually, bolstered by ongoing interest in less energy pollution and foreign dependency. Portable electronics will be the fastest growing market and benefit direct methanol fuel cells. This study analyzes the US fuel cell industry, with forecasts for 2012 and 2017 by product and market. It also reviews technology, evaluates market share and profiles major players.

#2328..... 04/2008..... \$4500

## World Biofuels

Global demand for biofuels will grow 20% annually through 2011, despite concerns about their impact on the environment and food supplies. Bioethanol and biodiesel will lead gains. North America will remain dominant while the Asia/Pacific region and Western Europe grow faster. This study analyzes the 37.7 million metric ton world biofuel industry, with demand and production forecasts for 2011 and 2016 by fuel, world region and for 16 countries. It also evaluates market share and profiles major players.

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