

WinterGreen Research, INC.

**Utility Grade Wind Turbine Market Shares, Strategies, and Forecasts,
Worldwide, 2012 to 2018**

Wind Turbines Implement Renewable Energy On Grand Scale

Mountains of Opportunity



Picture by Susan Eustis

WinterGreen Research, Inc.

Lexington, Massachusetts

www.wintergreenresearch.com

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REPORT # SH25031852

515 PAGES

177 TABLES AND FIGURES

2012

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CHECK OUT THESE KEY TOPICS

Wind Markets
Energy sector
Wind Turbine Financial
Orders
Wind Turbines
Wind Blades
Wind Farms
On-Shore Turbine Market
Forecast
Offshore Wind Turbines
Market Forecasts
Wind Genrated Eelectricity
Challenges For Offshore
Wind Farms

Storage to Accommodate
Variable Nature of Wind Power
Wind Energy Storage
Cost Of Wind Integration
Turbine Blade
Wind Turbine Hybrid Natural
Gas Systems
Wind Turbine Hybrid Solar
Energy Systems
Benefits of Wind Power for
Utilities
Rotor Area
Wind Speed
Wind Turbine Metal
Components

Wind Turbine Forged Parts
Wind Turbine Cast Parts
Wind Turbine Machined Parts
Wind Turbine Blade
Technology
Wind Turbine Smart Controls
Wind Turbine Stealth
Research
Wind Turbine Floating
Foundations
National Energy Offshore
Wind Power

Wind Turbine Growth Strategy:

Wind Turbine: Market Shares, Strategies, and Forecasts, Worldwide, 2012-2018

LEXINGTON, Massachusetts (March 26, 2012) – WinterGreen Research announces that it has published a new study on wind turbines. The 2012 study has 515 pages, 177 tables and figures. Worldwide markets are poised to achieve significant growth as countries impose stricter environment controls on the use for fossil fuels and coal to generate electricity. The fact that wind energy has reached parity for the long term comparative cost of energy, bodes well for market growth.

China is emerging as a significant user of wind energy. The leadership of China has a focus on local generation of electricity using wind and solar renewable sources. Chinese leadership is very concerned about the pollution brought by the fossil fuel power generations and is very concerned about the deleterious effect of air pollution on the grandchildren. Like people everywhere, these leaders are very attached to family and to their grandchildren.

Japan is anticipated to start to replace its entire nuclear electricity generating capacity. That nuclear power generation capacity has been shut down completely and is unlikely to ever reopen. Floating wind generator systems represent a significant market opportunity for vendors. Wind systems are relatively quick to put in place and get operational.

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The aim of virtually every government in the world is to encourage low carbon energy generation technologies to take over. This strategy echoes with a core message from the International Energy Agency's World Energy Outlook 2011: Delaying action to reduce emissions is a 'false economy' - for every \$1 of investment avoided in the power sector before 2020 an additional \$4.3 would need to be spent after 2020 to compensate for the increased emissions.

A single Vestas wind turbine generates 25 times more energy than it uses in its lifecycle. A single Vestas wind turbine emits only one percent of carbon dioxide when compared to a coal power plant. When producing solutions to harness wind energy a small negative impact on the environment is made. Vestas is committed to reducing this impact to the extent possible.

China led the world in installing wind-power capacity in 2011. It is very interesting that China is moving to implement local generation of renewable energy. This is a strategic move to use the wind energy where it is generated. The ability to use wind electricity where it is generated as much as possible appears to be the most cost efficient way to leverage renewable energy.

Local generation of wind energy is the most efficient way to utilize the power. Wind energy is poised to be less expensive than any other type of energy generation, faster to implement, and easier to store. The ability to distribute it directly from substations leverages an in place infrastructure, supporting direct investment in energy generation rather than build out of expensive high energy transmission lines.

Most electricity is used near urban centers that are not high wind areas, conducive to building wind farms with high power turbines. Localization of wind energy generation represents a way to get close to cities and population centers in a way that eliminates the need to build high power transmission lines. Localized wind energy can be transmitted to electrical substations and distributed to the users in an efficient manner.

Local delivery of wind energy is a priority for the Chinese because they see it as a way to avoid the crushing costs of building high voltage transmission systems. Vestas China has received its first V100 turbine order. The order came from Datang Hubei Renewable Energy (Datang Renewable). The newest addition to the 2 MW platform in China took place in early 2011. The order represents an important step into the low wind regime in China, but also a step into the new geographical market of the Hubei province for Vestas.

The 27 units of V100-1.8 MW turbines have a total capacity of 48.6 MW. They will be installed in the Long Ganhu wind farm in the Hubei province, a low-wind site with an average wind speed at 5 m/s. Compared to other wind power plants in China, the Long Ganhu site is situated close to one of the intensively energy consuming areas of Hubei province.

This answers the call from the National Government of pursuing the development of "distributed" wind power in China. The successful application of Vestas' V100 at this wind site will set an example for distributed wind power at low-wind sites in other provinces, and the open-up in the Hubei province will bring new business opportunities for Vestas.

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The low-wind sites in China is a new market of huge potential, but a new market implies new challenges for wind power developers. A proven and reliable technical platform and well-recognized business partners are a plus. Datang Renewable's selection of Vestas for low-wind sites is the best recognition of long-term value in cooperation with a market leading vendor. The contract is of great significance; it helps open up a new market for Vestas, but also firms steps towards the exploitation of the dominant wind regime in China.

Vendors have a significant presence in renewables-based energy generation technologies: hydro, solar thermal and photovoltaic and biomass. Vendors own cogeneration assets, producing hydrogen through wind power. Hydrogen is used in stationary fuel cells, creating electricity for campus environments that is stable 24 hours per day. In this case, hydrogen becomes an energy storage mechanism.

According to Susan Eustis, lead author of the study, "wind energy market growth is inevitable. The requisite 100 successful trials have long since proved the viability of the technology, the turbines have elaborate systems engineering to ensure simplicity of design, and the costs provide wind generated energy at parity with fossil fuel generation. As storage systems evolve to mitigate the difficulties in intermittent supply of wind, wind energy will grow at a phenomenal rate. Storage will come from the manufacture of hydrogen to achieve campus fuel cell systems and from thin film batteries that provide 40,000 times the energy density of existing lead acid batteries. Breakthroughs in lithium will also provide better energy storage."

Markets growing as fast as the wind energy markets have been growing have difficulties in the evolution of technology and manufacturing. Several vendors report difficulties in manufacturing. Vestas had significant difficulties meeting obligations and had to address manufacturing issues, but retained its brand recognition as a company offering a high quality unit.

Sinovel was not so fortunate. Sinovel encountered macroeconomic cyclical fluctuations as well as delays to some project approvals which impacted sales revenues and also caused a relatively large increase in management costs. Management costs went up 78% to 288m yuan in 2011. Companies in China have come under further pressure this year after grid companies temporarily halted new connections amidst a review of turbine quality.

Sinovel had some market setbacks. In addition to the fatal accidents, a short-circuit accident in February at a Jiuquan wind farm in Gansu seems emblematic of Sinovel's struggles. The mishap knocked 598 turbines, with a combined capacity of 840,000 kilowatts, off the grid. Fluctuating voltage during the incident threatened the entire region's power system, according to the State Electricity Regulatory Commission. The commission called the incident "the gravest accident in China's wind power industry in recent years."

Chinese wind-turbine prices have declined by around 20% for each of the past three years and sell for around half the price of a machine sold in Europe. Chinese wind turbine companies have come under further pressure this year after grid companies temporarily halted new connections amidst a review of turbine quality.

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GE encountered market difficulty of a different nature. Demand for wind energy in the U.S. dropped about 50 percent to 4,900 megawatts. The slump prompted Fairfield, Connecticut-based GE, which has the largest share of the U.S. market, to improve its design and attract customers in new low wind markets. Towers are taller, blades longer and lighter, and turbines more reliable. New designs target installation in low wind areas for local distribution of wind generated power.

Wind turbine markets at \$32.2 billion in 2011 are anticipated to reach \$96.7 billion by 2018. Growth is expected to be worldwide and a result of vendor achievement of marked improvements in the technology. Wind markets for land based high wind areas are saturated. The ability to provide local land based systems in low wind areas and to implement offshore wind farms bodes well for market growth. Countries that invest in wind energy will achieve significant strategic advantage economically as wind energy represents efficient energy infrastructure delivery. Countries that do not invest in wind energy infrastructure will be left in the dust economically.

WinterGreen Research is an independent research organization funded by the sale of market research studies all over the world and by the implementation of ROI / TCO economic models that are used to calculate the total cost of ownership of equipment, services, and software. The company has 35 distributors worldwide, including Global Information Info Shop, Market Research.com, Research and Markets, Bloomberg, and Thompson Financial.

Companies Profiled

Market Leaders

Vestas	Acciona
Gamesa Corporacion Tecnologica S.A	General Electric / GE
Goldwind	Suzlon / REpower
Nordex AG	Siemens
Sinovel	United Technologies / Clipper Windpower

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Market Participants

5. Utility Grade Wind Turbine

Company Profiles

AMSC

Blue Carbon Technology

BP

CSIC holdings / HZ Windpower

Enercon

Eolia Renovables

Eoltec

Fuhrlander Aktiengesellschaft

Göteborg Kommunala / Göteborg

Energi

Kinglike Energy Technology

LGC Skyrota Wind Energy

LM Wind Power

Nacel Energy

Nanjing Supermann Industrial &

Trading Co. Ltd.

NextEra

Northern Power Systems

Qingdao

Rooftop Wind Power

Standard Steel / Alaska Wind

Turbine

Shanghai Donghai Bridge 102MW

Offshore Wind Farm Pilot Project

The Switch

TuuliWatti Oy

Urban Green Energy

Winwind

Yingli Green Energy

Selected Wind Industry

Associations and Regulators

Wind Turbines: Market Shares, Strategies, and Forecasts, Worldwide, 2012 to 2018

Report Methodology

This is the 503th report in a series of primary market research reports that provide forecasts in communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and energy. Automated process and significant growth potential are a priority in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. They are supported by a team, each person with specific research tasks and proprietary automated process database analytics. Forecasts are based on primary research and proprietary data bases.

The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

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The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors, distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards.

Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications, trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2011. With 2011 and several years prior to that as a baseline, market projections were developed for 2012 through 2018. These projections are based on a combination of a consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective.

The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes referencde to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a

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sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models have lists of servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world.

This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.

YOU MUST HAVE THIS STUDY

Wind Turbine Market Shares, Strategy, and Forecasts, 2012 to 2018

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WinterGreen Research, research strategy relates to identifying market trends through reading and interviewing opinion leaders. By using analysis of published materials, interview material, private research, detailed research, social network materials, blogs, and electronic analytics, the market size, shares, and trends are identified. Analysis of the published materials and interviews permits WinterGreen Research senior analysts to learn a lot more about markets. Discovering, tracking, and thinking about market trends is a high priority at WinterGreen Research. As with all research, the value proposition for competitive analysis comes from intellectual input.

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Susan Eustis, President, co-founder of WinterGreen Research is a senior analyst. She has done research in communications and computer markets and applications. She holds several patents in microcomputing and parallel processing. She has the original patents in electronic voting machines. She has new patent applications in format varying, multiprocessing, and electronic voting. She is the author of recent studies of the Solar REnewable Energy, Wind Energy, Thin Film Batteries, Business Process Management marketing strategies, Internet equipment, biometrics, a study of Internet Equipment, Worldwide Telecommunications Equipment, Top Ten Telecommunications, Digital Loop Carrier, Web Hosting, Web Services, and Application Integration markets. Ms. Eustis is a graduate of Barnard College.

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