

Wind Power in the US

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| <u>SIZE</u> | IBIS World |
| Revenue | \$6.9 billion |
| Profit | \$2.1 billion |
| Annual Growth rate (08-13) | 16.9% |
| Expected annual growth rate (13-18) | 9.6% |
| Businesses | 90 |
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| Key Drivers | <ul style="list-style-type: none"> • Government regulation • Electric power consumption • Price of electric power • World price of iron ore |
| | Record breaking number of new installations of wind generators in 2012 |
| | <ul style="list-style-type: none"> • Electricity demand will grow in future • Industry output is growing faster than economy • A lot of small innovative companies are in the market |
| <u>Industry Structure</u> | |
| Life Cycle Stage | Growth |
| Capital Intensity | High |
| Regulation Level | High |
| Barriers to entry | High |
| Competition | Medium |
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| | Government incentives |
| | State level mandates incentives for growth |
| | Number of enterprises is expected to grow 4.5% to 112 by 2018 |
| | Off-shore wind farms: concern about effect on shipping routes, risk of low flying planes, More effective because in closer proximity to large population areas on the coast. Off-shore will become the focus of this industry in the next five years. |
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| Coastal Energy locations | New England, Mid-Atlantic region |
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| <u>Supply Chain</u> | |
| Buying Industries | <ul style="list-style-type: none"> • Electric power transmission • Construction |

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| | <ul style="list-style-type: none"> • Manufacturing • Consumers |
| Selling Industries | <ul style="list-style-type: none"> • Transmission line construction • Steel farming (assist in construction of wind turbines) • Wind turbine manufacturing |
| Products and Services | <p>Produce on single product: Electricity</p> <ul style="list-style-type: none"> • Utility scale: 69.7%: wind farms that have greater than 1 Megawatt(MW) of energy capacity. • Distribute scale: 30.03%: wind farm generating less than 1MW. Private owners created wind farms to use for their own purposes and sell excess capacity. <p>Utility companies have built wind farms faster than small developers.</p> |
| Demand | <ul style="list-style-type: none"> • Government legislation and assistance (producer tax credit, PTC, 2.3 cents per kwh created) • Interest in green technology |
| Market segmentation | <ul style="list-style-type: none"> • 56% Utilities • 24% Commercial (e.g. Walmart has made it a priority to power their stores with wind energy) • 20% Industrial Users |
| Markets | <ul style="list-style-type: none"> • Texas (22% installed capacity) • California (8.8%) • Oregon (5.8%) • Washington (5.6%) • Colorado (3.7%) • Oklahoma (4.2%) • Illinois (5.9%) • Minnesota (5.6%) • North Dakota (3.0%) |
| Market Concentration | <p>Medium. Four largest industry participants hold 43.4% of the market. Rapid growth. Consolidation has increased (Expected to rise)</p> |
| Key Success Factors | <ul style="list-style-type: none"> • Ability to pass on cost increases • Optimum capacity utilization • Superior financial management and debt management • Ability to negotiate successfully with |

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| | regulators |
| Competition | Medium. Increasing due to growth |
| Barriers to Entry | High. Requires large amounts of capital, and expertise. “Most industry participants have experience putting together wind projects abroad, where favorable government legislation has led to dramatic increases in wind output.” (IBIS Report 22111D, p.20). |
| Globalization | Low. Industries in EU and China (40% in 2011) are much faster growing. |
| Major Companies | <ul style="list-style-type: none"> • NextEra Energy Resources (NEER) (23.0% market share) • Iberdrola Renovables (11.8%) • Duke Energy Corporation (4.9%) • MidAmerican Holdings (3.7%) • American Electric Power Company Inc. (2.8%) • Xcel Energy Inc. (1.8%) • The rest are smaller companies |
| Technology Change | High. Turbines (mostly used: horizontal axis turbines), transmission |
| Revenue Volatility | Medium. Higher level of revenue volatility implies greater risk. Government support is very time limited, and other types of commodities affect revenue. |
| Regulation & Policy | Heavy regulations. 36 states have renewable portfolio standards (RPS) that require energy providers to increase the amount of renewable energy sources. (About 20% on average has to be renewable) |
| Industry Assistance | High. <ul style="list-style-type: none"> • American Recovery and Reinvestment Act of 2009 • The Energy Policy Act of 2005 • The Energy Policy Act of 1992 (PTC) American Wind Energy Association |

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| Firm Characteristics | |
| Revenues | |
| Employees | |
| Market share | |
| Market capitalization | |
| Profits | |
| Value of business | |
| Exports | |
| Carbon footprint | |
| R&D Funding | |
| | |
| Major Customer | |
| Major Supplier | |
| | |
| Major Products/ Services | |
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| Barriers to Expansion | |
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Associations

- American Wind Energy Association (AWEA) (<http://www.awea.org/>)
- Energy.gov (<http://energy.gov/eere/wind/wind-program>)
- US Bureau of Ocean energy Management
- Virginia Alternative and Renewable Energy Association (VA-AREA) (<http://www.va-area.org/>)

Offshore wind farm projects worldwide

- Belgium
- China
- Denmark
- Germany
- Netherlands
- Norway
- South Korea
- Sweden
- UK

Wind Farm Projects in the US

Oregon, WindFloat Pacific Project (by Principle Power, Inc.)

“The proposed lease request is approximately 15 nautical miles offshore Coos Bay, Oregon with an area of approximately 15 square miles. The project would consist of five 6.0 megawatt (MW) wind turbine generators mounted on floating foundations, anchored to the seafloor in 1,200 to 1,600 feet water depth.”

(<http://www.boem.gov/Oregon/>).

Cape Wind Project, Massachusetts

Block Island Project, Rhode Island

Atlantic Wind Connection, including New York, New Jersey, Maryland, Delaware, and Virginia.

Most proposed projects are in the infant stages and are under review of the BOEM.

Atlantic Grid Holdings LLC

So far no offshore wind farm in the US has been built.

Wind Power in Virginia

US Bureau of Ocean energy Management activities in VA:

(<http://www.boem.gov/State-Activities-Virginia/>)

Federal lease has been acquired and sets the stage for further progress in the project of establishing the Virginia Offshore Wind Technology Advancement Project (VOWTAP).

Dominion Power won auction for wind farm off VA Beach.

Companies in VA:

Dominion Power (Info <https://www.dom.com/about/stations/renewable/offshore-wind-power.jsp>)

Virginia Offshore Wind Technology Advancement Project (VOWTAP) Team:

- [Alstom Power Inc.](#), a wind turbine manufacturer and major supplier of equipment and services to the global power generation market
- [KBR](#), a global engineering, construction, and services firm with experience in offshore wind
- [Virginia Department of Mines, Minerals and Energy](#)
- [National Renewable Energy Laboratory](#)
- [Virginia Tech Advanced Research Institute](#), representing the [Virginia Coastal Energy Research Consortium](#)
- [Newport News Shipbuilding](#), a division of Huntington Ingalls Industries
- [Tetra Tech](#), environmental consultant

US:

GE Energy, manufacturer of wind turbines

...more research

VA Companies:

- Dominion Power

- Apex Clean Energy (<http://apexcleanenergy.com/>)

...more research

Hampton Roads Offshore Wind Farm Project

VA – AREA Members (http://www.va-area.org/members_directory) selected list based on relevance to Off-Shore Wind Power:

- Abacus solar USA
- Alstrom
- Antares Group Incorporated
- Apex Wind Energy
- Appalachian Power, American Electric Power
- Arcadis, (Infrastructure, Water, Environment, Buildings)
- Ashlaw Energy
- **Atlantic Wind Connection** (<http://www.atlanticwindconnection.com/>)
- Baker Renewable Energy
- Bowman Geothermal
- BP Wind Energy
- Convanta Energy
- Dewberry
- Dominion Power
- Earl Industries
- Eastlight renewable ventures
- Ecofuels
- Edp renovaveis
- Ewing Bemiss & Co
- Geosyntec consultants
- The institute of advance learning and research
- Invenergy
- Institute for engery and environmental research
- MAREC, mid atlantaic renewable energy coalition
- Old Dominion Electric Corporative
- Siemens
- Southern Virginia Product Advancement Center
- Tangent Energy Solutions
- US Green Energy Corporation
- Urban Grid
- VOW Coalition, Virginia Offshore Wind Coalition
(<http://www.vowcoalition.org/>)

Most of the companies that are listed here are global players. The biggest market by looking at their webpages is China (possible due to high growth rates and less government/ environmental regulations)