

Wind Energy Market – Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented By Type (Offshore and Onshore), By End-User (Industrial, Commercial, and Residential), By Region, Competition 2018-2028

https://marketpublishers.com/r/W1D584D82E60EN.html

Date: October 2023

Pages: 182

Price: US\$ 4,900.00 (Single User License)

ID: W1D584D82E60EN

Abstracts

The Global Wind Energy Market, valued at USD 78.11 billion in 2022, is poised for substantial growth in the forecast period, with a robust Compound Annual Growth Rate (CAGR) of 10.67% projected through 2028.

Wind Turbine Manufacturing: This sector encompasses the entire process of designing, developing, and manufacturing wind turbines, which are instrumental in converting wind energy into electrical power. Wind turbine manufacturers produce a diverse range of turbines in various types and sizes, tailored to different applications, including both onshore and offshore wind farms.

Wind Farm Development: Companies and organizations engaged in wind farm development play a pivotal role in identifying suitable locations with strong and consistent wind resources. They are responsible for securing permits, designing wind farms, and overseeing their construction. This includes the installation of wind turbines, electrical infrastructure, and associated facilities.

Wind Farm Operation: Wind farm operators are tasked with the ongoing maintenance and performance optimization of wind turbines. Their responsibilities encompass regular inspections, repairs, and proactive measures aimed at ensuring the reliability and efficiency of the turbines.

Grid Integration: The efficient transmission of wind energy from wind farms to end-users



relies on the expertise of companies and utilities working to integrate wind power into existing electrical grids. Their goal is to ensure the reliable and stable supply of electricity to consumers.

Financing and Investment: The wind energy market involves various financial institutions, investors, and project developers who provide funding for wind energy projects. This includes activities such as project financing, equity investments, and the management of renewable energy investment funds.

Regulatory and Policy Frameworks: Governments worldwide play a pivotal role in supporting the growth of wind energy through the establishment of policies, incentives, and regulations. These frameworks often include mechanisms like feed-in tariffs, tax incentives, renewable energy standards, and environmental regulations.

Research and Development: Ongoing efforts in research and development are focused on enhancing wind turbine technology, improving energy storage solutions, and optimizing the overall efficiency of wind energy generation.

Offshore Wind Energy: The offshore wind energy sector specializes in the development of wind farms located in bodies of water, typically in the ocean. Offshore wind power has gained prominence due to its potential for higher energy production and reduced environmental impact when compared to onshore wind.

Sustainability Commitment: Wind energy is widely recognized as a clean and sustainable energy source. Many companies in the wind energy sector emphasize their commitment to reducing carbon emissions and contributing to a greener energy mix as a central part of their mission.

As the world continues to prioritize clean and renewable energy sources, the Global Wind Energy Market remains at the forefront, actively contributing to a more sustainable and environmentally friendly energy landscape.

Key Market Drivers

The global wind energy market has experienced remarkable growth and transformation over the past few decades. Driven by the need for cleaner, sustainable energy sources and a global commitment to reducing greenhouse gas emissions, wind energy has become a prominent player in the world's energy landscape. In this comprehensive analysis, we will delve into the key drivers and trends shaping the global wind energy



market, explaining them in detail to provide a thorough understanding of the industry's dynamics.

Climate Change and Environmental Concerns

One of the most critical drivers of the global wind energy market is the urgent need to address climate change and mitigate its effects. The burning of fossil fuels for electricity generation and transportation is a significant contributor to greenhouse gas emissions, leading to global warming and environmental degradation. Wind energy offers a sustainable alternative by producing electricity without emitting carbon dioxide (CO2) or other harmful pollutants. As governments worldwide commit to reducing emissions under international agreements like the Paris Agreement, wind energy's role in decarbonizing the energy sector becomes increasingly vital. Many countries have established renewable energy targets and policies to transition to cleaner energy sources, reduce dependency on fossil fuels, and combat climate change. These targets often include specific goals for wind energy capacity installation. For example, the European Union has set ambitious targets to achieve a significant share of its energy consumption from renewables, with wind power playing a central role. Such policies create a favorable regulatory environment and incentives for wind energy projects, driving market growth.

Falling Costs and Technological Advancements

Advancements in wind turbine technology and economies of scale have led to a significant reduction in the cost of wind energy production. Larger, more efficient wind turbines can capture more energy from the wind, reducing the levelized cost of electricity (LCOE). As a result, wind energy has become increasingly competitive with conventional fossil fuels. Innovations such as taller towers, longer blades, and advanced control systems have improved efficiency and grid integration. This cost decline has made wind energy an attractive option for both utilities and consumers. Energy security and diversification of energy sources are critical considerations for many nations. Wind energy provides an indigenous, domestic source of electricity production, reducing dependence on imported fossil fuels. This enhances energy security by reducing vulnerability to supply disruptions and price fluctuations in the global energy markets. Countries with diverse energy portfolios that include wind power are better equipped to manage energy-related risks. The wind energy industry has a substantial impact on job creation and local economies. The construction, operation, and maintenance of wind farms require a skilled workforce, leading to employment opportunities in both rural and urban areas. Additionally, the wind energy supply chain,



including the manufacturing of wind turbines and components, generates economic activity. As a result, governments and regions often view wind energy as a means to stimulate economic growth and reduce unemployment. Corporations are increasingly adopting sustainability goals and environmental, social, and governance (ESG) criteria in their operations. Many large companies are investing in renewable energy projects, including wind farms, to reduce their carbon footprint and meet sustainability targets. These corporate off-take agreements provide stable revenue streams for wind energy developers and drive further investments in the sector. Public awareness of environmental issues and support for renewable energy have grown significantly. Communities often welcome wind energy projects due to their perceived environmental benefits and the potential for local economic development. Public support can facilitate permitting and regulatory approvals for wind farms, making it easier for developers to bring projects to fruition. Integration with other technologies, such as energy storage systems and smart grids, enhances the reliability and flexibility of wind energy. Energy storage allows excess wind power to be stored for later use, reducing the intermittency associated with wind generation. Coupled with advanced grid management systems, wind energy can play a more significant role in supplying stable and reliable electricity.

Offshore Wind Energy Expansion

Offshore wind energy is gaining momentum worldwide. Offshore wind farms offer the advantage of stronger and more consistent winds, leading to higher energy generation. As technology and experience in offshore wind develop, countries with access to offshore resources are investing heavily in this sector. The expansion of offshore wind contributes to the overall growth of the wind energy market.

Key Market Challenges

Land and Space Constraints & Energy Storage and Grid Integration

One of the fundamental challenges of wind energy is its inherent intermittency and variability. Wind turbines generate electricity when the wind blows, which is not constant. This variability can lead to fluctuations in power output, making it challenging to ensure a stable and reliable energy supply. Grid operators must manage this variability effectively to maintain a balanced and secure electricity grid. To address the intermittency issue, energy storage solutions are crucial for storing excess energy when the wind is strong and releasing it when the wind is calm. While advancements in energy storage technologies have been made, there is still room for improvement in terms of efficiency and cost-effectiveness. Additionally, integrating wind energy into



existing electrical grids can be complex and may require substantial grid upgrades and infrastructure investments. Onshore wind farms require significant land areas to accommodate the turbines and associated infrastructure. In densely populated regions, finding suitable land for wind farm development can be challenging. Additionally, landuse conflicts may arise as wind projects compete with agriculture, residential areas, and other land uses. Offshore wind farms have alleviated some of these issues but present their own challenges, including construction and maintenance costs. Wind energy projects, both onshore and offshore, can have environmental impacts. Bird and bat collisions with wind turbine blades are a concern, as are potential habitat disruptions. Careful site selection and mitigation measures are necessary to minimize these impacts. Additionally, the production and disposal of wind turbine components have environmental considerations, such as materials sourcing and recycling. The production of wind turbines requires specific rare earth metals and materials, such as neodymium and dysprosium for magnets. Securing a stable supply of these materials can be a challenge due to geopolitical factors, market fluctuations, and concerns about resource depletion. Efforts are ongoing to develop alternative materials and reduce reliance on rare earth elements.

Key Market Trends

One of the most prominent trends in the wind energy market is the rapid expansion of offshore wind projects. Offshore wind farms, located in bodies of water such as oceans and seas, benefit from stronger and more consistent wind patterns compared to onshore locations. As technology advances and developers gain experience, offshore wind capacity has surged, particularly in Europe, the United States, and Asia. Key factors driving this trend include:

Higher Energy Yields: Offshore wind farms typically experience higher wind speeds, resulting in increased energy generation and capacity factors.

Grid Connection: Proximity to major population centers enables efficient grid connection, reducing transmission losses and congestion.

Floating Wind Technology: Advancements in floating wind turbine technology have expanded the potential for offshore wind projects in deeper waters and more remote loc

Technological Advancements and Larger Turbines

Wind turbine technology continues to evolve rapidly, with a focus on increasing

Wind Energy Market - Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented By Type (Offshor...



efficiency and reducing costs. Key trends in this area include:

Larger Turbines: Manufacturers are producing larger wind turbines with higher hub heights and longer rotor blades. These larger turbines capture more energy from the wind and have higher capacity factors.

Advanced Materials: The use of advanced materials, such as carbon fiber composites, is reducing the weight of turbine components while maintaining strength and durability.

Digitalization and Smart Technology: Wind farms are increasingly equipped with sensors and digital platforms that enable real-time monitoring, predictive maintenance, and optimization of turbine performance.

Segmental Insights

Type Insights

Offshore wind energy accounted for the highest market growth during 2020-2027. This is attributed to higher capacity factor than that of onshore wind turbines. Offshore wind turbine has high-capacity factor, due to consistent wind flow at sea shore. For instance, the capacity factor for offshore wind turbine is 0.5-0.7, whereas the onshore wind turbine has capacity factor of around 0.25-0.3. In 2020, offshore wind power generated 25 TWh (+29%) in 2020, with capacity additions of 6.1 GW. China has installed half of all new global offshore wind capacity, making it a record in 2020. Also, in Europe, steady growth was recorded with the majority of additions in the Netherlands, followed by Belgium and the United Kingdom. The offshore wind power market is dominated by the United Kingdom, Germany, and China. The United Kingdom already has the world's largest floating wind farms, with 30 MW of operational capacity in Scotland and a further 150 MW in the pipeline in Scotland and Wales. The UK government has set the wind industry a target of reaching 40 GW by 2030, which will support the offshore wind power market in the country. In 2020, China led the world for the third year in a row, with over 3 GW of new offshore wind capacity in 2020. In 2020, China had a cumulative installed offshore wind capacity of 9.9 GW, making it the second-largest in the world. Countries such as China, Germany, and the United States are now facing the challenge that all the promising wind farm sites within 6 miles of the shore have already been exploited. Most countries are exploring offshore areas to boost the capacity further and meet their 2030 renewable targets.

End User Insight



The industrial end-user accounted for significant revenue share in 2022, owing to increase in demand for renewable energy sources. Wind power has significant demand in rural and isolated areas where grid power is not available. However, the price and demand of wind energy is highly volatile, due to its high dependency on government incentive schemes.

Regional Insights

The Asia Pacific region has established itself as the leader in the Global Wind Energy Market with a significant revenue share in 2022. Asia-Pacific is the largest wind power market in the world, with leading wind power markets such as China, India, and Australia. Encouraging growth, especially in China, is expected to make it the leading region during the forecast period. The Chinese wind power market is largely dominated by its onshore segment, with new installations of 48.94 GW in 2020, making it to a cumulative total of 278.32 GW of onshore wind capacity in 2020. The Chinese wind power market is largely comprised (nearly 95%) of Chinese manufacturers. As of the end of 2020, the top turbine manufacturers in China included Goldwind, followed by Envision and Mingyang. The small non-Chinese presence is held by three main foreign manufacturers, namely, Vestas, Siemens-Gamesa, and GE.

Key Market Players

Siemens Energy

Vestas Wind Systems

Siemens Gamesa Renewable Energy

General Electric (GE) Renewable Energy

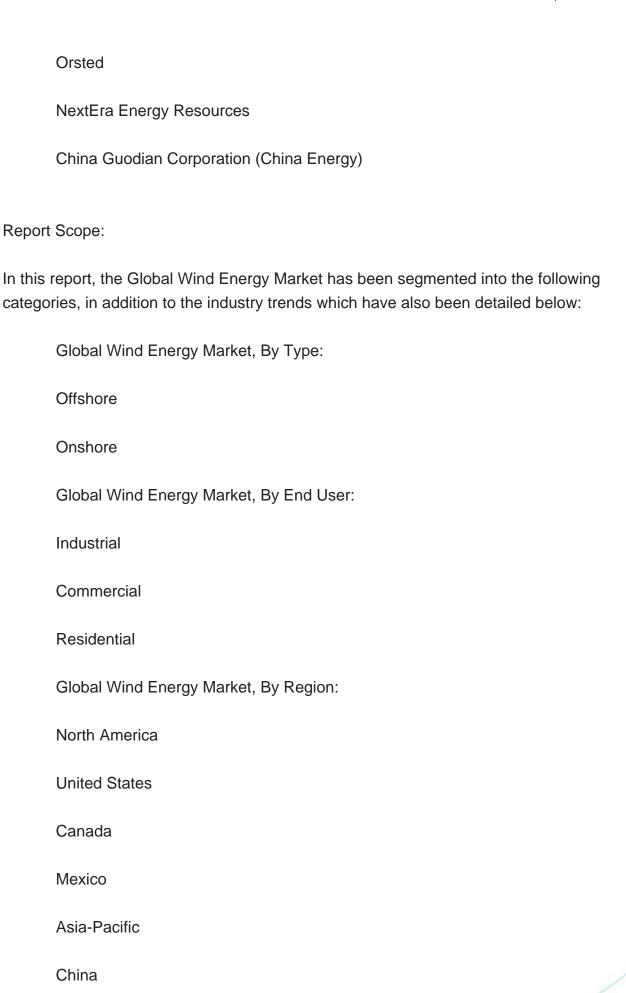
Goldwind

Envision Energy

Nordex SE

Suzlon Energy







India
Japan
South Korea
Indonesia
Europe
Germany
United Kingdom
France
Russia
Spain
South America
Brazil
Argentina
Middle East & Africa
Saudi Arabia
South Africa
Egypt
UAE

Israel



Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Wind Energy Market.

Available Customizations:

Global Wind Energy Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).



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