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Europe Leads the Way in Green Energy Solutions

Proactive regulations, tech advancements and aggressive investment are creating opportunities in green energy across Europe.

KEY TAKEAWAYS

- The regulatory environment in Europe has encouraged research and investment in green energy solutions in the region. Many EU countries and individual companies have taken the initiative to accelerate integration of renewable and alternative energy options ahead of established deadlines.
- As the heaviest carbon emitters, energy producers will require the largest investments to reduce carbon emissions. This is driving substantial investment in the conversion to alternative energy sources
- The goal of lower carbon emissions is driving technology advancements to improve efficiency and lower costs in greener solutions. Wind turbines are a notable example, where improving economics and technical innovation are increasing demand and driving growth.
- Decarbonization is another key trend toward green solutions. Conversion of carbon-intensive energy sources to carbon-neutral sources and the increased use of biofuels are important steps toward compliance with EU regulations. Full compliance will require significant investment to upgrade the electrical grid.

NON-U.S. GROWTH EQUITY



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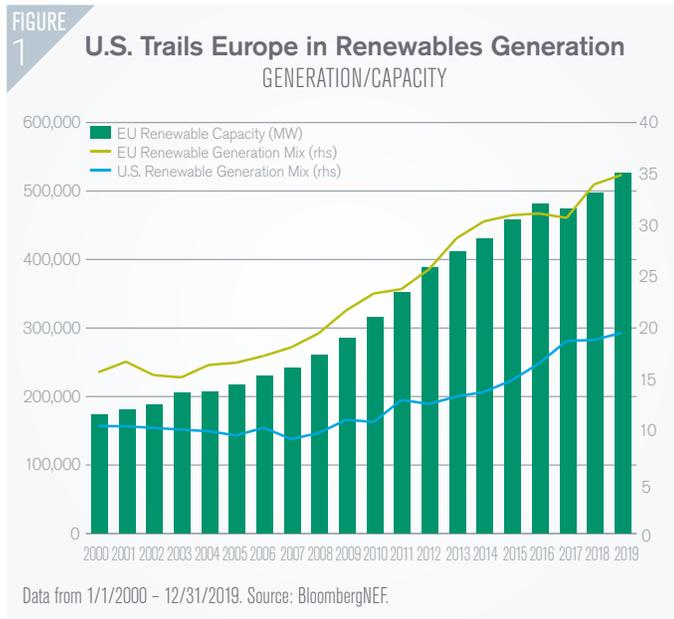
The European Union (EU) has led the way in clean energy investments. As early as the 1990s, Europe established the legal framework supporting a multi-decade investment cycle to reduce fossil fuel-based power generation. Europe set binding targets for renewable power generation and a framework for greenhouse gas emission-reduction targets, ironing out a de facto market-based mechanism to price the cost of carbon emissions from the power sector. Europe accomplished all this well ahead of other regions.

REGULATORY ENVIRONMENT SUPPORTS EARLY ADOPTION OF RENEWABLES AND ALTERNATIVES

Some member states have accelerated environmental policies to increase their renewable generation mix to comply with EU standards on their own initiative. For example:

- Spain's 2005 Renewable Energy Plan called for renewable sources to generate 29.4% of the nation's electricity by 2010.
- Germany's 2010 Energiewende (energy transition plan) advocated carbon-free energy sources generate 60% of power by 2050. Renewable energy represented 47% of electricity output by 2020.
- Pre-Brexit, the U.K.'s 2013 Energy Act set the legal framework for the Contracts for Difference (CfD) regime to incentivize low-carbon electricity generation. The law included provisions for government-backed power purchase agreements (PPAs) to encourage investment in historically higher-cost renewables.

These examples of electricity market reform have helped push the EU at least 11 years ahead of the U.S. in renewable power generation. See **Figure 1**.

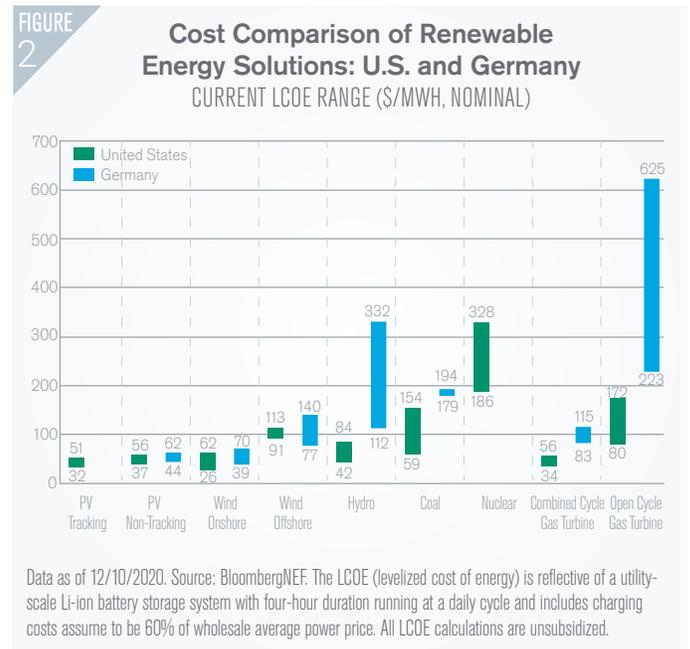


Legislative activities have moved forward Europe's renewable energy investment agenda by setting strict emission targets. The Brussels Agreement (2014) set the initial target of cutting emissions to 30% of 1990 levels, then the Paris Agreement

(2015) amended it to 40%. Most recently, in December 2020, the landmark EU Green Deal legislation proposed an emissions-reduction target of 55% of 1990 levels by 2030, setting specific industry goals through legislative, political and financial mechanisms. (Bloomberg research estimates the EU was at approximately 73% of 1990 levels at year-end 2019.) The EU has made climate change mitigation one of three main priorities in its COVID-19 recovery, dedicating 30% of its multi-annual budget and recovery fund to achieve a climate neutrality goal by 2050.

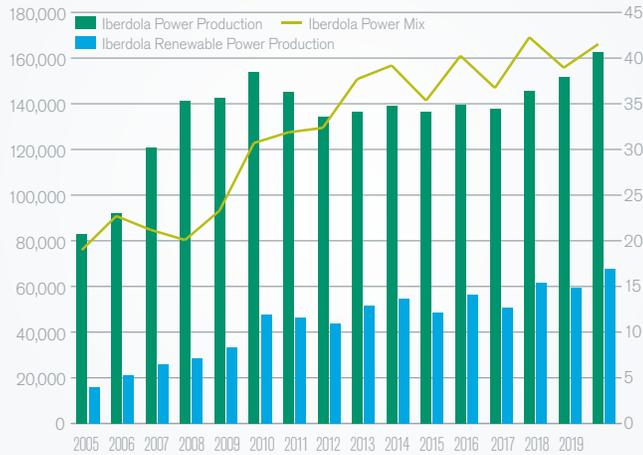
EARLY ADOPTION AND EXPERTISE BOOST EUROPE'S POWER INDUSTRY

The EU's policy framework sets a roadmap for electric utilities to be the economic mechanism driving change. Power generators are the heaviest carbon emitters, requiring the most investment to reduce carbon intensity. The EU has already initiated significant investment to drive down the cost of renewable power generation. Many EU countries already generate close to 50% of their annual power from renewable energy sources. Some utilities do so at a cost largely less than that of fossil fuel generation, making them global leaders in renewable power production, pipelines and investments.



Spanish utility Iberdrola is a great example of a global leader in renewable power generation. The company operates globally integrated utility assets in some of the highest return environments with large secular growth opportunities. Its globally integrated model helps enable the company to select the best project return opportunities in the most attractive markets, including the U.S. In fact, Iberdrola is set to begin construction of the largest project in the U.S.—the 800MW Vineyard Wind Project—located 15 miles off the coast of Massachusetts. The €2.5 billion project will begin delivering power as early as 2024. Over the next 10 years, we anticipate Iberdrola could triple its renewable capacity under the EU Green Deal and other governmental policies.

FIGURE 3
Renewable Power Capacity Is Increasing
IBERDROLA POWER CAPACITY MIX



Data as of 1/1/2005 – 12/31/2019. Source: BloombergNEF.

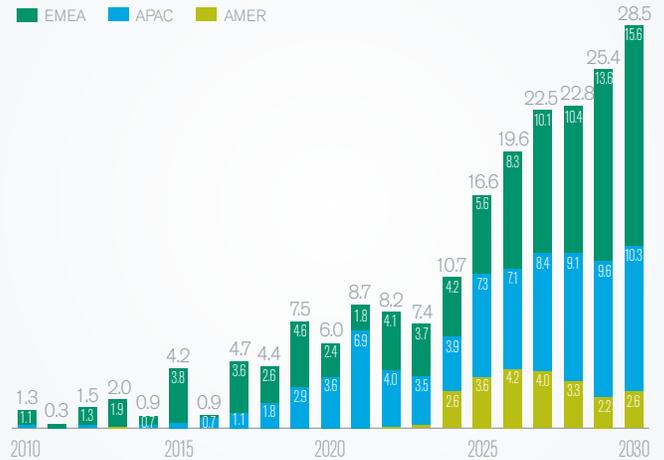
Danish utility Orsted, the dominant offshore wind operator using the world's fastest growing large-scale renewable energy generation technology, is another noteworthy innovator in the green energy space. Orsted has offshore wind farms in operation and development across Europe, Taiwan, South Korea and the U.S. The company has been recognized as the global leader in renewable energy since establishing the world's first offshore wind farm in 1991. Orsted also operates the first U.S. offshore wind farm, Block Island Wind, and has five U.S. projects in the advanced development stage. The offshore wind market is set to grow at a 15% compound annual growth rate (CAGR), according to the International Energy Agency's Sustainable Development Scenario policy.

MARKET CONDITIONS CREATE INVESTMENT OPPORTUNITIES IN WIND TURBINE MANUFACTURERS

The global focus on reducing carbon emissions and the improving economics of wind power are driving increased demand for wind turbines. Moreover, to meet strict standards of renewable energy generation capacity, EU energy companies will require state-of-the-art technologies that operate efficiently and at low cost. According to BloombergNEF (BNEF) projections, global wind turbine installations should increase from 6 GW in 2020 to 28.5 GW in 2030.

Turbine manufacturers have dramatically lowered the cost of power production over the last 10 years. According to BNEF calculations, the "levelized cost of electricity" (i.e., average net present cost of electricity generation over the expected life of the turbine) has declined by 63% since 2009 for onshore turbines and 58% for offshore turbines.

FIGURE 4
Wind Turbine Installations Are Inflecting Positively



Data as of 12/31/2020; data for 2021 – 2030 is estimated. Source: BloombergNEF.

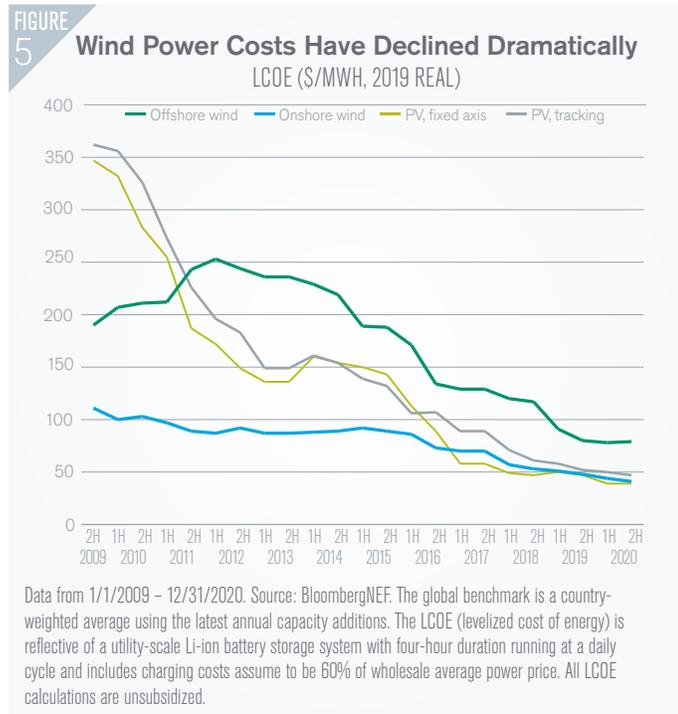
Increases in turbine capacity, life expectancy and price per megawatt are among the key drivers of improved turbine economics. According to Berkeley Lab and Bernstein Research, the average useful life of U.S. onshore turbines has increased from 22 years in 2009 to 30 years in 2019. At the same time, average turbine capacity increased from 1.5 MW to 3.5 MW. Finally, onshore turbine price/MW declined by 40% to 50%. The improved efficiency and reduced cost make wind turbine-generated power very competitive with the cost of other types of energy generation. See **Figure 4**.

Wind turbines account for about 70% of the cost of onshore wind projects and 40% to 50% of offshore projects. Key turbine components include:

- **Rotor blade:** This component captures the power of wind and converts its energy into rotational energy. The rotor accounts for about 30% of the cost of the turbine. Rotor length is estimated to be the key enabler of turbine output increases.
- **Nacelle:** The nacelle houses the drive train, which includes the generator (converts rotational energy of the blade into electricity), gear box (speeds up rotational motion to improve generator operation), control system (stops the turbine in high winds), and other components. The nacelle accounts for about 50% of the cost of the turbine.
- **Tower:** The tower supports the entire assembly at a height preventing the blades from touching the ground and elevating the rotor to where the best wind speeds are found. The tower accounts for about 20% of the cost of the turbine.

MANUFACTURERS PLAN MORE POWERFUL TURBINES

Turbine manufacturers expect to increase output and efficiency through technological improvements, such as increased rotor length. Two of the three global leaders in turbine manufacturing have their headquarters in Europe, Denmark-based Vestas and Spain-based Seimens Gamesa. Advances in efficiency and output, coupled with regulatory requirements, are accelerating demand for wind turbines and increasing installation rates. In our view, these factors create a long runway of growth opportunity for Vestas and Seimens Gamesa.



INCREASED TURBINE DEPLOYMENT BOLSTERS HIGH-MARGIN, LONG-DURATION SERVICE REVENUE

Siemens Gamesa and Vestas appear poised to see boosts to revenue growth from service operations because complex turbines are used more in remote locations. The service operations generate high-margin and long-term recurring revenues, which, in our opinion, meaningfully improve group level earnings visibility. We also expect to see increased investment in renewable generation translate into substantial increased demand for high-voltage cable, which will be needed to connect turbines to the regional grid infrastructure. Prysmian, the global leader in submarine cable with 40% market share, could potentially see significant order growth. Some analysts estimate orders could double in two to three years, according to BloombergNEF.

DECARBONIZATION CREATES ADDITIONAL INVESTMENT OPPORTUNITIES

The most popular methods of reducing carbon emissions are converting energy sources from direct fossil fuel to electricity. They replace carbon-intensive legacy power generation with carbon-neutral power generation (e.g., wind and solar).

Member countries of the European Union (EU-27) have set specific incentives for electrification of the transportation and HVAC industries. According to McKinsey & Co., electrification and carbon-neutral power alone could contribute almost 50% of the EU-27's 2030 carbon reduction goal. The electrification of the transportation industry should benefit suppliers such as Valeo, Umicore, Infineon and STMicroelectronics as the demand for their products multiplies on electric vehicles. The electrification of building heating systems should benefit companies such as Schneider Electric.

Electrical power grids will require significant upgrades to manage the surging demand driven by electrification and shift in supply resulting from the availability of additional renewable sources. We believe companies such as Schneider Electric, ABB and Prysmian could benefit from the acceleration in grid investment growth over the next decade.

Renewable diesel mandates will help meet the EU's tough requirements for reducing greenhouse gas (GHG) emissions. Biofuels are deemed carbon neutral because when they burn, as photosynthesis removes the attendant carbon dioxide emissions from the atmosphere. According to Bloomberg research, the demand outlook for biofuels is strong and expected to grow approximately 10% annually thanks, in part, to European and U.S. regulations. Finland-based Neste has established itself as the global leader in refining renewable fuels, with proprietary technology allowing multiple waste feedstocks (including plastics) and lower costs. The global aviation industry's rising demand for sustainable aviation fuel (SAF) should also drive biofuel growth.

GREEN ENERGY IS POTENTIALLY POISED FOR MULTI-YEAR INVESTMENT CYCLE

We believe green energy solutions offer dynamic growth opportunities in today's market. The declining costs of renewable energy technology, combined with the regulatory environment and increased funding in Europe, should drive a multi-year investment cycle. In our view, many European companies, including operators and equipment manufacturers, have established themselves as global leaders who will benefit from this long-duration investment cycle.

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