



Facts and figures – Germany

Wind energy research

Wind energy is high-tech

Wind energy accounts for the largest share of renewable electricity generation in Germany.¹ The advanced status of plant technology, which is also the result of a large number of innovative research projects, has earned Germany leading positions in international rankings today. The broad spectrum of research projects has contributed to the considerable optimization of wind energy technology. Numerous other research projects – for example, also in the field of intelligent power grids and the smart and efficient use of energy – illustrate the spectrum of high-tech for the energy transition.

Germany is one of the world's leading countries for wind energy technology

As technology leaders with efficient and powerful systems, German companies are at the forefront of the international trend towards CO₂-free power generation. The circular value chain extends from the planning and financing of the turbines to the production of wind turbines and large components, the transport, the installation, the operation, the servicing, and the dismantling of the wind farm. Wind energy is one of the global key technologies of the future. The wind energy industry: a broad spectrum of players from a wide range of industry and service sectors.²

High-tech demands large investments

The development of a new offshore wind turbine in the 10 MW+ category does not come cheap: it usually requires around €1 billion in development costs for all companies involved.³

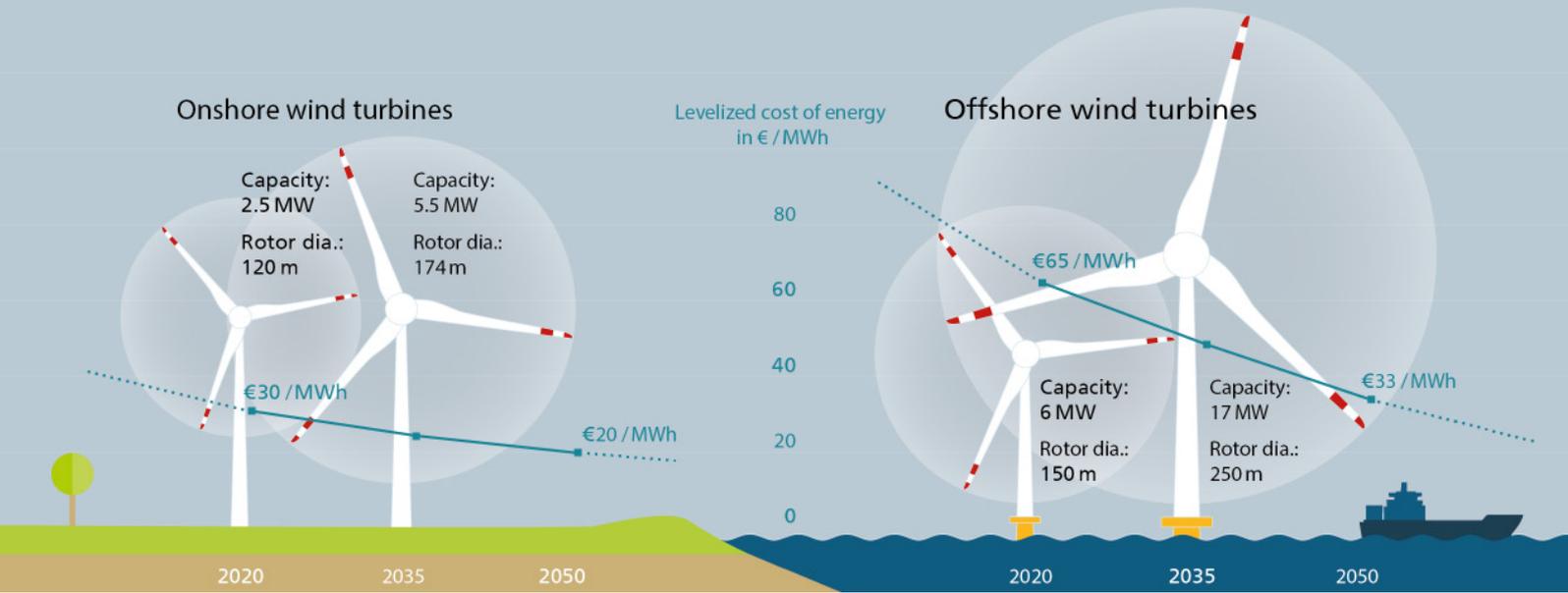
The wind energy sector is innovative thanks to research

Approximately 500 research projects were realized in cooperation with the industry between 2018 and 2022.

The **direct knowledge transfer** in the industry in the scope of BMWK projects is at **90%**.⁴

Economic benefit of wind energy research

Wind energy research has led to a continuous reduction of the LCoE (levelized cost of energy) in recent years, which is fully reflected in every turbine now installed. The cost of 1 kWh of offshore electricity has been reduced from €0.19 to approx. €0.05 in the last 10 years. When applied to the German expansion goals for 30 GW, that translates to savings of more than **€30 billion of energy costs** for the period until 2030 alone.⁵ Wind energy is thus also set to be the backbone of low-cost energy generation for the planned development of the hydrogen economy in Germany.



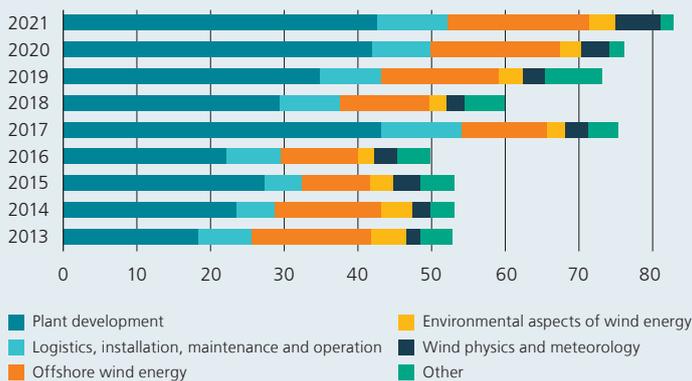
Investments in research infrastructure to date

Wind energy is playing a decisive role in the successful realization of the energy transition. Research institutes in the wind energy sector have developed a globally unique **research infrastructure for €250 million**⁶ with the support of the BMWK and other public providers of funding in recent years. This can also sustainably ensure the leading position of the wind energy sector in the years to come. Research institutes and companies are continuously striving to reduce the costs for electricity from wind energy even further and increase the reliability of the turbines. These public investments will also be available for the sustainable further development of wind energy technology in the coming years and thus make a considerable contribution to the requisite expansion of renewable energies towards climate neutrality.⁷

Further potential for reducing costs available

Industry insiders assume that it will be possible to reduce the costs for onshore and offshore wind energy even further in the future despite the current supply chain-related upheaval. Across all areas of application, the costs should decrease by 17–35 % in a cost projection for 2035 and 37–49 % for 2050. Larger and more powerful wind turbines will make a decisive contribution to these cost reductions. The replacement of old turbines is steadily reducing the LCoE for existing projects, too.

Subsidies for wind energy in millions of euros



Publication details | Publisher:



Fraunhofer Institute for Wind Energy Systems IWES
 Am Seedeich 45, 27572 Bremerhaven, Germany
info@iwes.fraunhofer.de, www.iwes.fraunhofer.de

Sources 1. BMWK, 2. BWE, 3. Fraunhofer IWES, 4. Research Alliance Wind Energy, 5. and 6. Fraunhofer IWES, 7. Project Management Jülich, **Graphics** Page 2 top: Lawrence Berkeley National Laboratory, page 2 bottom: Federal Report on Energy Research, **Photos** Page 1: © Jens Meier, page 2: © Helmut Gross, **09/2022**