

OFFSHORE WIND ENERGY: CURRENT RESEARCH, MAIN CHALLENGES AND FUTURE PERSPECTIVES

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Abstract. In the context of renewable energies, achieving a competitive cost of electricity is essential. Reducing the dependency on non-sustainable technologies implies increasing the participation of renewable sources. Clearly, wind and solar energies are the most prominent examples. In the onshore wind energy, the cost of electricity is already close to be competitive when compared to traditional technologies. But mainly due to environmental issues, the number of available installation places is rapidly decreasing. The best locations are already taken, and places with immediately subsequent quality are being occupied quickly. One alternative to circumvent the limited availability of high-quality locations is to go offshore. This implies increased costs due to substructure, installation, connection, operation and maintenance. To make offshore wind energy more competitive, we need to increase the specific generation per turbine by designing larger machines with new rotor concepts like those with variable geometry, and to lower the specific investment and cost of energy over the whole life cycle. Economical aspects are essential to conceive a new generation of offshore wind turbines. Offshore converters with different operational life characteristics, *e.g.*, design with reduced lifetime, but increased rated power could result more profitable than existing ones. Therefore, this could also represent a very promising approach. Although the available offshore converters are already in the range of 5-10 MW and with rotor diameters from 120 to 160 m (very large machines), the viability of the current and planned offshore projects strongly depends on incentive policies affordable only by well-developed countries. In this keynote lecture, I talk about current research, main challenges and future perspectives in the field of offshore wind energy. By sharing my expertise in this fast growing area, I will try to give a broad overview about the current German and European research landscapes.

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