

46ESS-51: Wind Turbines

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Recent climate data confirms the ongoing trend towards a global increase in temperature, decreasing ice coverage of Arctic and Antarctic, and other phenomena linked to climate change. As a result, clean and renewable energy is a growing sector in power generation. In fact, wind turbines are the leading technology in new power capacity installations in Europe. This paper provides an overview over the theoretical background of conversion from wind energy to mechanical energy and different wind turbine designs. The most common horizontal axis (HAWT) design is presented in detail, considering blade design and power control. Furthermore, future trends, e.g. the increase in off-shore wind parks and increasing rotor sizes, are discussed. The resulting implications and challenges are also examined. Since socio-economic acceptance, which is largely influenced by noise perception, is one of the major challenges for new on-shore installations, noise generation and means to mitigate it are reviewed.