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Introduction to wind energy systems

H.-J. Wagner^a

Energy Systems and Energy Economics, Ruhr-University Bochum P.O. Box 102148, 44721 Bochum, Germany

^a e-mail: lee@lee.rub.de

Abstract

This article presents the basic concepts of wind energy and deals with the physics and mechanics of operation. It describes the conversion of wind energy into rotation of turbine, and the critical parameters governing the efficiency of this conversion. After that it presents an overview of various parts and components of windmills. The connection to the electrical grid, the world status of wind energy use for electricity production, the cost situation and research and development needs are further aspects which will be considered.

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The market introduction of wind energy is proceeding in industrialized countries as well as in development countries like e.g. India. The Indian wind energy sector had an installed capacity of 16 GW as end of 2011. In terms of wind power installed capacity, India is ranked fifth in the World. Still, the total potential of wind energy in the Indian country is far from exhausted. 1.2 Advantages and Disadvantages of Wind Energy Systems Wind energy offers many advantages, which explains why it is the fastest-growing energy source in the world. Research efforts are aimed at addressing the challenges to increase the use of wind energy. 1.2.1 Advantages • Wind energy systems are energized by the naturally flowing wind, therefore it can be considered as a clean source of energy.