

Evaluation of current status and future directions of wind energy in India

A. K. Singh · S. K. Parida

Received: 17 July 2012 / Accepted: 15 November 2012 / Published online: 10 December 2012
© Springer-Verlag Berlin Heidelberg 2012

Abstract Wind energy is the fastest growing electricity generation technology. During the last decade of the 20th century, grid-connected wind capacity worldwide has doubled approximately every 3 years. Climate change is a major challenge to sustainable development worldwide and is increasingly recognized by forward-looking political and business leaders. One of the tasks we are facing is a profound transformation of our energy system over the next few decades of replacing fossil fuels with renewable energies and dramatically increasing energy efficiency. At present, wind energy is receiving considerable attention in the world. In this study, development of wind energy system and the potential of wind energy in India have been investigated. This paper presents the progress made by wind energy in the recent years, and discusses the potential of this technology. The aim of the work is to investigate the wind energy plants and projects in India. It can be concluded from this analysis that wind energy utilization in India and throughout world has sharply increased.

Keywords Wind energy · Electricity · India · Renewable energy sources

Introduction

The limited fossil fuel energy resource is a critical issue throughout the world. However, energy shortage is going to be severe in India compared with many other countries in the world. Rapid growth in economy along with the

population gives rise to a scenario of high demands of energy resources such as oil, gas, wind, and solar radiation. In 2009, India was the fourth largest oil consumer in the world, after the United States, China, and Japan (EIA 2010). With a population of 1,210,193,422 (1.21 billion), the country is the second most populous country in the world; the Indian per capita fossil reserves belong to a low level in the world. India's per capita consumption (639 kWh) is one of the lowest in the world. The government plans to provide universal access and to increase per capita consumption to 1,000 kWh by the end of 2012. This translates into a required generation capacity of 800 GW compared to 160 GW today. There is almost zero escalation in the variable cost of generation from renewable sources; in contrast, the variable cost of fossil fuel-based power generation is expected to increase (GENI 2010). The world witnessed the strongest periods of economic growth ever recorded until the middle of 2008, and this had continued to support global energy consumption. Although world primary energy consumption growth slowed to 2.4 % in 2007 compared to 2.7 % in 2006, it was still greater than the 10-year average for the fifth consecutive year. The economy of India was in second position in terms of gross domestic product (GDP) of 7.1 % in the world in 2008 (World Bank 2010). The Electricity Supply Industries (ESI) must provide energy to the large part of the country that still remains off-grid. The electric energy sector in India has been making continuous progress in conventional as well as renewable power generation. Also, the industry has been exposed to reform process with a view of promoting private ownership, restructuring, and competition at generation and distribution levels. Renewable power generation capacity in India has been set up largely through private sector investments, and this has been possible mainly because of a conducive, strong and clear policy framework, and investor-friendly

A. K. Singh (✉) · S. K. Parida
Department of Electrical Engineering, Indian Institute of Technology, Patna, India
e-mail: aks.kings@gmail.com