Editorial: Wind Power Generation

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1 Introduction

The new millennium belongs to renewable energy sources as the world is increasingly looking for green, and sustainable energy sources. Wind power is the most rapidly growing technology for renewable power generation. It is estimated that by 2020, at least 20% of the world's energy requirement is likely to be fulfilled by renewable energy out of which a major portion will come from wind energy. Thus it is an honour and pleasure to present this special issue on 'Wind Power Generation'.

This special issue consists of eight papers from reputed researchers from different parts of the world. In these papers, different technical, energetic, economic and environmental aspects of wind power generation have been discussed.

2 Scanning the issue

The paper by Otero and Ponta uses finite element method (FEM) to simulate the structural behaviour of variable geometry oval trajectory (VGOT) Darrieus wind turbines. The key feature of a VGOT machine is that each blade, instead of rotating around a central vertical axis, slides over rails mounted on a wagon formed by a tubular reticulated structure supported by standard train bogies.

The paper by Shikha, Bhatti and Kothari reviews and analyses the traditional basic assumptions in establishing the Betz limit with mathematical derivation of the ideal power coefficient using Euler's and Bernoulli's theorem. This paper concludes that the value of ideal power coefficient may improve further with new R&D.

The paper by Soder analyses the possible share of the electric energy that could come from wind power in the future. The possible limits of wind power, the possible amount of wind power in an isolated area and a simplified method of evaluating the consequences of wind power expansion have been presented.

The paper by Tryfonidou and Wagner suggests the use of two indicators cumulative energy demand (CED) and energy payback time (EPT) to indicate environmental impacts, especially in the case of power-producing systems. Both CED and EPT have been calculated in the paper for a modern 5 MW wind energy converter (WEC) for offshore use which amount to 85,000 GJ and 4 months, respectively.

The paper by Purohit and Kandpal attempts to develop a simple framework for the techno-economic evaluation of windmills in India. The amounts of water delivered by five somewhat different designs of windmill pumps at different locations, the unit cost of water delivered and the unit cost of useful energy delivered by the windmills have also been estimated.

The paper by Pohekar and Soni deals with wind assessment, monitoring, development and environmental impact in India. Financial interventions and state policies on commercialisation are also presented with a view to identifying the barriers to further commercialisation.

The paper by Raju presents the modelling and simulation (using MATLAB/SIMULINK) of a grid-connected variable speed wind energy conversion system with reduced switch count power converters is presented. The mathematical model of each element of the system is developed separately and they are integrated to simulate the whole system for various wind velocities.

The paper by Ponta, Otero and Lago reviews the actual state of development of a non-conventional new vertical-axis wind turbine. The paper also proposes some engineering solutions for the VGOT design and presents a brief economic analysis of the feasibility of the project.

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I am grateful to all the authors for contributing such precious and informative articles for this special issue of IJGEI. Thanks are also due to the reviewers who have spared their valuable time in reviewing different articles and thus enhancing their quality. I firmly believe that this issue will provide professionally relevant information and guidelines to all the stakeholders in the field of wind power generation. I am extremely grateful to members of the editorial team headed by Dr. M.A. Dorgham, for their immense contribution at every stage of preparation of this special issue. I acknowledge my deep appreciation for their efforts but for which this special issue would not have acquired its present shape. Last but not the least, I would like to place on record my sincere thanks and appreciation of the immense and untiring efforts put in by my research scholar Ms. Shikha in helping me at every stage of this project.