
Editorial

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Biographical notes: Dr. Jun Ren is a Senior Lecturer at the School of Engineering, Liverpool John Moores University. He has more than 15 years of industrial, teaching and research experience within the areas of energy systems, risk analysis and safety assessment, logistics and supply chain analysis using techniques from operational research, artificial intelligence and systems engineering, and dynamic system modelling, simulation and control for engineering and management systems. He has been involved in the development of various decision support tools and applications for oil/gas development projects, logistics and supply chain systems, offshore installations and agile/lean systems.

Over the past decade, the climate change and problems of global warming have increasingly attracted public concerns. In order to reduce carbon dioxide emissions, studies on how to make good use of renewable energy have been actively carried out. In 2006, more than 18% of global final energy consumption came from renewable energy. In UK, the government has set a target of producing 10% of the country's electricity needs from renewable sources by 2010. In Europe, the renewable energy industry has been developing rapidly. The production of biofuel, for example, was 2.9 MMT in 2005 and has reached about 8.1 MMT in 2007. The UK's Renewable Transport Fuels Obligation (RTFO) will require 5% of all UK retail fuel to come from a renewable source by 2010. The rapid increase in the requirements of renewable energy opens the way for engineers and researchers to explore and exploit flexible and advanced renewable energy technologies and decision-making approaches in the planning, design and operation stages.

Motivated by the aforementioned factors, this special issue focuses on a broad spectrum of all relevant issues and provides a holistic examination of the current status and future trends of renewable energy technologies and applications. It contains 14 papers which are diverse and focus on different aspects of renewable energy systems and management and yet, they have a unity in that they all address questions that have arisen from actual experience.

The first paper, 'Minimisation of financial losses due to voltage sag by reconfiguration of distribution network' by A.K. Goswami, C.P. Gupta and G.K. Singh, presented a methodology for minimising financial losses due to voltage sags. The proposed methodology suggested to create various topologies by opening and closing of various isolators, check the feasibility of these topologies by load flow method, assess the number of voltage sags at selected network buses having sensitive equipments connected and then get the information about the average cost attributed to single trip of the process

due to voltage sags. This led to an optimised topology which yields the lowest voltage sag cost to customers. The developed methodology was applied to an Indian distribution system and can be used as a strategic planning tool for choosing the best topology that would lead to significant savings by minimising financial losses to both customers as well as the utility.

The second paper, 'Sizing and cost estimation methodology for stand-alone residential PV power system' by A. Chel and G.N. Tiwari, investigated the sizing and costing problems for a stand-alone photovoltaic (SAPV) power system based on the number of sunshine hours. The authors discussed the sizing and costing of PV system for different continents of the world. The unit cost of electricity generated from PV system was determined based on their life cycle cost analysis. The capital cost and unit cost of electricity for SAPV systems were evaluated in a case study in India. The analysis results provided evidence that PV power systems can play a major role which has the potential to convert sunlight energy directly to electrical energy at low operating and maintenance costs and without noise and environment pollution.

The paper, 'Economic analysis for a wind turbine in Vadravadra Village in Fiji' by R.D. Prasad, R.C. Bansal and M. Sauturaga, discussed the economics of wind energy conversion systems and conducted economic analysis on two cases. One is for a wind turbine alone installed at Vadravadra site in Gau Island in Fiji, the second is for a hybrid of wind-diesel configuration. This paper calculated a number of economic related parameters for the two cases. RETScreen software was also used to perform economic analysis on the wind turbine installed at the site and it was compared with the economic analysis done using cash flow.

R.D. Prasad, R.C. Bansal and M. Sauturaga in the paper entitled 'A case study of wind-diesel hybrid configuration with battery as a storage device for a typical village in Pacific island country' presented the optimum configuration of wind-diesel hybrid with battery storage for Vadravadra Village in Gau Island in Fiji. The optimum configuration is worked out using HOMER software in terms of the levelised cost of energy (LCOE). The optimum configuration of wind-diesel hybrid is found for different loads at the site. The paper also investigated how to construct a successful hybrid system in remote villages. The authors found that for a hybrid system to work successfully in a remote area, overseas aid from experts on wind energy need to be available, prepayment meters need to be installed at each home in the village and smart card need to be used so that villagers can pay for electricity whenever money is available to them and also they use electrical energy wisely. They concluded that there are many social and environmental benefits of using wind energy in Fiji.

The paper, 'On Chinese major regulations of renewable energy' by X. Deng, Y. Jiang and X. Chen, introduced the basic framework of renewable energy law and the corresponding regulations in China. The paper identified some major problems with the current regulations in practice such as incentive incompatibilities, policy mismatch and incompleteness of the implementation system. The authors intended to seek agreement to the introduction of new legislations to promote renewable energy development and utilisation. The paper recommended that there is a need to raise the consciousness of developing and utilising renewable energy in the whole society, to refine or replenish corresponding laws and regulations, to coordinate relationship between relevant regulations or policies, to establish a legislative enforcement mechanism integrating government administration, public participation and social counterweight, and to evaluate implementing situation of laws and polices and revise legal measures promptly.

The paper, 'Product cost calculations of various designs of conventional solar still systems' by S.K. Shukla, conducted performance evaluation of five types of solar stills by calculating their costs. The evaluation was based on the experiments performed at the India Institute of Technology (Delhi), India during 2001–2002. The analysis found that distillate output-cost/litre reduces when the life of stills is assumed to be 30 years. It suggested that the cost of distilled water produced from a multiwick double slope solar still is less than other solar stills due to higher yield/hour. However, for small scale purposes, multiwick single slope solar still is a better option.

The authors' team, consisting of A. Tapaninen, M. Seppänen and S. Mäkinen, in their paper, 'Characteristics of innovation: a customer-centric view of barriers to the adoption of a renewable energy system', discussed the problems of customer perceived barriers to the adoption of wood pellet heating technology. The main frameworks used in their paper are perceived characteristics and basis of competition. Customers' perceived barriers were collected through a survey (sample size $N = 154$) of Finnish housing expo attendance in 2007. The innovation adoption of wood pellet heating systems was observed to be at the rather early stages in Finland. The results somewhat contradict theoretical expectations concerning evolution of the basis of competition. The results also indicated that while other perceived characteristics were present, trial-ability and observability were not found in their analysis. Lacking the trial is usually typical of long-commitment investments such as bioenergy systems.

S.W. Mohod and M.V. Aware in their paper entitled 'MATLAB/Simulink-based modelling and analysis of a grid connected wind energy conversion' presented an approach to model and simulate a grid connected variable speed wind generating system. Using MATLAB/Simulink in power system block-set, they modelled the wind generating system with direct drive generator and power electronics interface. The hysteresis current-controlled inverter has been implemented to capture the maximum energy from varying wind speed and maintaining the unity power factor at the point of common connection (PCC) on the grid. The authors then conducted simulation that provide control performance and dynamic behaviours of grid connected wind energy conversion system. The system model and control scheme evaluates the performance on the power grid so as to maintain the power quality norms according to the IEC 61400-21 Standard at PCC.

The paper, 'Policy-practice-research of Chinese bioethanol program: past and future' by S. Yu and J. Tao, reviewed China's short history regarding policy, practice and research of bioethanol production and analysed the opportunities and challenges of bioethanol implementation in China. Their research revealed that the use of domestic technology of non-grain bioethanol production is on the preliminary stage in China. In addition, it is facing difficulty on balancing crop use for food, feed and fuel. It is therefore essential for a successful bioethanol implementation that many issues must be taken into account such as government supports, technology improvement of non-grain bioethanol production, and investments in infrastructure and facilities for feedstock logistic.

The contribution from D. Yu and G. Li, 'The development of renewable energy in certain places of Western China', focused on Western China and discussed several aspects on the development of renewable energy. The authors investigated the current status of renewable energy development in Western China including water power stations, wind energy, solar photovoltaic cell and methane utilisation. Based on the investigation, they identified the major problems as the recycling problems with

geothermal energy, the disorder problems of wind power exploration and technology problems in solar energy. The paper also provided some suggestions to guide the future development of renewable energy in Western China.

The paper, 'Managerial challenges for dynamic systems – the case of biofuel chains' by K. Dautzenberg, J.H. Hanf and S-O. Jungklaus, discussed the current sector developments and addressed the organisation structure of the biomass-based energy value chain, exemplifying the production of bioethanol and biodiesel separately. The authors first analysed the emerging value chain organisation and management requirements in general, and afterwards, they applied it to a case study on bioethanol production. Due to the chain's characteristics, large companies such as the German Südzucker AG can particularly be regarded as the initiator of these chains. In addition to discussing that point, this paper also explored opportunities and threats for the suppliers as well as for the processors.

In 'Renewable energy and conservation options to meet Indian electrical energy demand', S. Mallah and N.K. Bansal examined the effect of introducing renewable energy and energy conservation potential on future electricity demand in India. The authors proposed a logarithmic linear econometric model to forecast the gap between the future electricity demand and supply if full potential of electricity savings is possible to introduce. The results have shown that the gap will be reduced to 50% and suggested that the remaining gap will be filled by technological development of renewable energy. In addition, the results showed that the electricity demand will be completely met in 2045 by using energy conservation and renewable energy technologies such as hydro, wind, biomass and solar energies.

The paper, 'Wind energy assessment for Timimoun' by Y. Himri, A.B. Stambouli, S. Himri and B. Draoui, presented the analysis of wind speed data and available wind energy in Timimoun. The measured data used in the study covered a period of 11 years between 1977 and 1988. The analysis revealed that the overall higher monthly mean wind speeds of the order of 5 m/s or more are observed during March–September. Higher wind speeds were observed in the daytime between 09:00 and 18:00 hours and relatively smaller during the rest of the period. The frequency distribution showed that the wind remained above 3 m/s for 68% of the time during the year at 68.5m above ground level. In the paper, two methods e.g., the RETScreen model and the actual frequency were used to obtain data of the annual wind energy production and plant capacity factors.

Finally, 'A methodical study of reliability analysis of the crude oil unit in processing heavy oil' by Q. Liu, G. Wang and Y. Yang, proposed a novel approach to analyse the safety and reliability issues on the crude oil unit in processing heavy oil. Based on the discussions of the corrosion mechanism, the authors constructed the fault tree model to identify the key factors that may lead to the failure of crude oil unit when processing heavy oil. Some key factors have been identified such as the temperature, consistence, relative movement speed and material, critically affect the corrosion rate of the naphthenic acid. In order to explore the relationships between the identified factors and the corrosion rate of the naphthenic acid, the paper used artificial neural networks to model such normally non-linear relationships. Laboratory experiments have been conducted to collect data of the corrosion rate using different materials in different temperatures, consistence and velocity. The analyses have shown that the proposed research method is sound and can be used in safety and reliability analysis of crude oil unit in processing heavy oil.

I believe that this special issue contains some of the current works available in the renewable energy domain and will contribute in enhancing knowledge in this area. I would like to thank the authors and reviewers for their support of this special issue.