Intelligent Decision Technologies 5 (2011) 295–296
DOI 10.3233/IDT-2011-0112
IOS Press

Call for papers

Intelligent Decision Technologies special issue "*Intelligent Forecasting Systems in Power Systems and Energy Markets"*

The needs that an energy supply system must meet are constantly changing, due to technological, social and political reasons. Effective energy planning is a dynamic process that is repeated periodically and adjusts to changing conditions. Energy decision makers and planners are no longer able to rely on inductive decision making since they have to investigate the effect of various decision parameters and possible future changes. Forecasting is a vital part of business planning in today's competitive environment. With increased penetration of renewable energy sources and introduction of deregulation in power industry, many challenges have been encountered by the participants of the electricity market. Forecasting of wind power, electric loads and energy price have become a major issue in power systems. Following needs of the market, various techniques are used to forecast the wind power, energy price and power demand.

Load forecasting has been challenge in the past due to following reasons. First, the load series is complex and exhibits several levels of seasonality: the load at a given hour is dependent not only on the load at the previous hour, but also on the load at the same hour on the previous day, and on the load at the same hour on the day with the same denomination in the previous week. Secondly, there are many important exogenous variables that should be considered, especially weather related variables.

Traditionally, electricity utilities and system operators are accustomed to understanding the supply side of load balancing with regards to the source of the energy, dispatch-ability and reserves, as well as the relative cost of producing electricity from non-renewable resources. With the recent and continued increase in penetration of wind power, the energy industry needs to adjust its thinking on how to integrate this intermittent power source into the electricity grid. The wind power industry currently requires an efficient forecasting to better position wind for continued growth and penetration into the global energy mix. The wind energy generation forecasting problem is closely linked to the problem of forecasting the variation of specific atmospheric variables (i.e. wind speed and direction, air density) over short time intervals and small spatial scales for a small volume of the atmosphere (the wind plant) for a variety of time horizons (i.e. look-ahead periods). In general, this is an enormously difficult problem because of the wide variety of spatial and temporal scales of atmospheric motion that play a role in determining the variation of the key parameters within the targeted forecast space-time volume.

The main objective of electricity market is to maximise profits. Energy price forecasts serve as a quantitative decision-making tool for determining the risk and reward of taking a market position. Developing predictive models for electricity prices is a relatively new area of application for the forecasting profession. Until recently, electricity was a monopoly in most countries, often government owned, and if not, highly regulated. As such, electricity prices reflected the government's social and industrial policy, and any price forecasting which was undertaken was really focussed on thinking about underlying costs. In this respect, it tended to be over the longer term, taking a view on fuel prices, technological innovation and generation efficiency. This changed dramatically, however, during the 1990s. Following the examples of structural reforms and market liberalisations in Chile, Britain, Norway, Argentina, and Australia in the early 1990s, other European countries such as Spain and Germany followed suit a few years later, as well as various regions in North and South America, and this trend has continued so that power sector reform has now become a major issue worldwide. In this new "environment", prices rather than resource needs drive decisions. Investors use price forecasts to establish the future value of that asset to be acquired, and asset owners use price forecasts to make various operational decisions. Thus, *forward prices* serve as benchmarks of value in power markets. Although electricity price series exhibit some of the stylised facts seen in load data, they also possess some very noticeable differences. Series of electricity

ISSN 1872-4981/11/$27.50

spot price are typically characterised by relatively high volatility, mean-reverting spikes, and a distribution that exhibits skewness and fat tails. The presence of such features means that it is not straightforward to apply, to electricity prices, models developed for load and for more traditional financial market prices.

The present issue "*Intelligent Forecasting Systems in Power Systems and Energy Markets*" focuses on accurate energy demand modelling intelligent computation (IC) approaches to provide well energy planning and accurate energy expenditure prediction. Particular forecasting technologies of this issue are concentrated on evolutionary computing, neural computing, fuzzy computing, probabilistic computing, wavelet transform, etc.

Papers are sought on recent novel IC technology developments with major application areas in (but not limited to): short term load forecasting, long term load forecasting, wind energy demand forecasting and business energy demand patterns forecasting.

Authors should submit digital copies (PDF preferred) of their papers following the IDT full-paper guidelines (http://www.iospress.nl/html/18724981_ita.html) of a maximum of 15 pages, including all tables, diagrams, and illustrations, to the Guest Editor, Dr. Vassilis S. Kodogiannis, by e-mail (kodogiv@wmin.ac.uk).

Important dates

Paper submission for review: November 15, 2011
Review results: February 1, 2012
Revised Paper submission: April 1, 2012
Final acceptance: April 15, 2012
Manuscript delivery to the publisher: On or before May 15, 2012

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