

COMPUTATIONAL ENERGY MANAGEMENT IN SMART GRIDS

Special Issue of **NEUROCOMPUTING**

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Theme and Scope of the Issue

As the world population increases, the sustainable usage of natural resources becomes an issue that humanity and technology are urgently asked to face. Energy represents a relevant example from this perspective and the strong demand coming from developed and developing countries shoved the scientists worldwide to intensify their studies on renewable energy resources. At the same time, due to the increasing complexity of medium and low voltage distribution grids on which distributed electrical generators based on renewables have to be included, a growing interest has been oriented to the development of smart systems able to optimally manage the usage and the distribution of energy among the population with the objective of minimizing energy consumption with economic impact even at family consumption level. This yielded in a flourishing scientific literature on sophisticated algorithms and systems aimed at introducing intelligence within the energy grid, with also several effective solutions already available in the market.

The task is surely challenging and multi-faceted. Indeed the different needs of the heterogeneous grid costumers and the different peculiarities of energy sources to be included in the grid itself have to be taken into account. Moreover several ways of intervention are feasible, as the ones indicated in the US Energy Independence and Security Act of 2007 as reference: self-healing capability, fault-tolerance on resisting attack, integration of all energy generation and storage, dynamic optimization of grid operation and resources with full cyber-security, incorporation of demand-response, demand-side resources and energy-efficient resources, active client participation in the grid operations by providing timely information and control options, improvement of reliability, power quality, security and efficiency of the electricity infrastructure.

A multi-disciplinary coordinated action is required for the scientific communities in the Electrical and Electronic engineering, Computational Intelligence, Digital Signal Processing and Telecommunications research fields to provide adequate technological solutions to these issues having in mind the more and more stringent constraints we have to consider in terms of environment sustainability. In particular, this Special Issue will explore the new frontiers and challenges within the Computational Intelligence research area, including in particular Neural Networks, Evolutionary Computation and Soft Computing based solutions, for the optimal usage and management of energy resources in Smart Grid applicative scenarios.

Topics

- *Smart Home Energy Management*
- *Computational Intelligence for Smart Grids*
- *Learning Systems for Smart Grid Optimization Tasks*
- *Neural Networks based algorithms for Complex Energy Systems*
- *Evolutionary Algorithms in Energy Applications*
- *Soft Computing in Renewable Energy Systems*
- *Energy Resource and Task Scheduling*
- *Building Energy Consumption Forecasting*
- *Demand-side Management*
- *Short-term Load Forecasting*
- *Time Series Prediction in Smart Grid Applications*
- *Non-intrusive Electrical Load Analysis*
- *Hybrid Battery Management*
- *Brain inspired algorithms for Energy Efficiency*

Important Dates

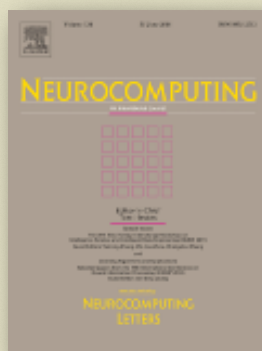
Deadline for manuscript submission: 1st August 2014

First Notification of Acceptance: 1st December 2014

Final manuscripts due: 1st March 2015

Publication of Special Issue: July 2015

*During the submission process, please
choose Article Type as SI: CEMiSG2014*



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