Special issue on “Optimization challenges in energy economics”

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In the liberalized markets for electricity and gas, a power utility is facing a series of complex challenges. For many of these tasks, mathematical optimization methods can provide useful support for planning and decision making in energy economics. Therefore it is a logical consequence that the GOR (“Gesellschaft für Operations Research”—the German Operations Research society) working group “*Mathematical Optimization in Real World*” had a meeting devoted to this topic.

The 88th meeting of the GOR working group on real world optimization, taking place in Karlsruhe (Germany) on April 19th and 20th in 2012 was focused in such “Optimization Challenges in Energy Economics”. The present special issue of the Energy Systems journal is published in succession to this workshop.

This workshop was hosted by EnBW Trading GmbH. EnBW AG is the third largest power utility in Germany and EnBW Trading GmbH is providing the central interface

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along the value-added chain between generation, trading and sales. EnBW Trading GmbH is responsible for the integrated management of all market-related risks of the group. To this end, EnBW Trading GmbH is utilizing various mathematical models for load forecasting, unit commitment and valuation of energy assets, as well as fundamental market models. Furthermore, EnBW Trading GmbH is actively doing research on mathematical optimization for real-world problems in energy economics and is also maintaining close links to academia.

Thirteen invited talks were presented at the workshop on “Optimization challenges in Energy Economics” covering a wide range of topics. Challenges in the modeling of markets for electricity (wholesale and balancing) and commodities were highlighted. Detailed models of gas and electricity grids, as well as models for smart grids, were presented. Further presentations were dealing with investment decisions, hedging and management of thermal and hydro units under uncertainty in market prices or future share of renewables.

The five papers in this special issue were carefully selected from the contributions to the workshop. Michaela Fürsch and colleagues are introducing a stochastic model for finding optimal power plant investment decisions under uncertainty about the future share of renewable energies. The challenges in the formation of electricity spot prices in energy systems dominated by generation from renewable energy sources are examined by Christoph Brunner. In their contribution, Fabio and Massimo Genoese are assessing the value of storage in a future energy system with a high share of renewable electricity generation. Sonja Babrowski and colleagues are introducing a myopic approach to speed up the computation time of an energy system model. Finally, in his article, Franz Wirl is investigating the optimal introduction of carbon taxes, directing firms into emission reducing investments.

Thanks are addressed at first to the contributing authors. It was a pleasure to work with active individuals in this field which manifested their ideas into this special issue. Finally, we thank everyone involved in the organization of the conference and all reviewers for their thorough and constructive reviews.