

## Lecture: “Smart Grid Economics and Information Management”

18ss-42457 (Vorlesung), 18ss-54271 (Übung), 18ss-46631, 18ss-50221 (Klausur)

### Description

The scope of the lecture is economics and information management of energy markets. The integration of the growing number of renewable energy sources imposes new challenges on energy markets and the power system. For a better coordination of supply and demand it is necessary to interlink centralized and decentralized generators, storage devices, as well as consumers with each other by means of information and communication technologies (ICT). Current electricity networks are extended by intelligent ICT components, thus incorporating the "Smart Grid". The existing market structures for electricity have to be adjusted in order to successfully integrate an increasing number of renewable energy producers, electric vehicles and new concepts like demand response (DR). Apart from the regulatory and economic background, methods for modeling and analyzing energy markets (i.e. agent-based simulation) are introduced and explained during the course.

### Course outline:

1. Electricity Markets
  - Market Models, EEX (spot and futures market), Over-the-Counter (OTC) Trade, Market Coupling
2. Regulation
  - Charges and Incentive Regulation, Network Congestion Management
3. Demand Side Management
  - Smart Metering, Tariffs, Price Elasticity, Storage Systems, Electric Mobility
4. Advanced Pricing in the Smart Grid
  - Temporal Pricing, Spatial Pricing, Price Elasticity

### Organization

The lectures are grouped into blocks and will be held over 5 days. All lectures will take place at the EON.ERC Main building, Mathieustr. 10 in Rooms 00.23 (first two lectures) and 00.24 (last three lectures). The lectures are scheduled on the following Tuesdays: April 10, 10:15-11:45 hrs, April 24, 09:00-13:00 hrs, May 8, 09:00-13:00 hrs, June 5, 09:00-13:00 hrs, and June 19, 09:00-13:00 hrs.

The exercise sessions will be held from 10:00 to 11:45 hrs (SemRaum 0024 and SemRaum 0023) on the following Tuesdays: May 15, May 29, June 26, July 3, and July 17. Please note that the students are expected to discuss the problem sessions (which will be handed out in advance) with a short presentation. The presentations can be prepared in groups.

The exam dates are: August 14, 11:00-13:00, in room 2352|021 (Aula 2); September 26, 14:00-16:00, in room 1072|001 (Couven-Halle).

### Target audience

This course is dedicated to master's (MSc) students in economics and engineering economics, and selected other related fields. In order to find out whether you are allowed to take this course, please get in touch with your study advisor.

### Requirements

Basic knowledge in Economics (Micro/Macro) and ideally also in Energy Economics.

### Literature (selection)

1. Erdmann G, Zweifel P. Energieökonomik, Theorie und Anwendungen. 1. Aufl. Berlin-Heidelberg: Springer; 2007.
2. Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX. Zeitschrift für Energiewirtschaft. 2008:147-161.

3. Stoft S. Power System Economics: Designing Markets for Electricity. IEEE; 2002., Ströbele W, Pfaffenberger W, Heuterkes M. Energiewirtschaft: Einführung in Theorie und Politik. 2nd ed. München: Oldenbourg Verlag; 2010:349.

**Information**

Further information can be obtained from the FCN Website ([www.eonerc.rwth-aachen.de/fcn](http://www.eonerc.rwth-aachen.de/fcn)). For more specific questions please contact Tim Höfer ([THoefer@eonerc.rwth-aachen.de](mailto:THoefer@eonerc.rwth-aachen.de)).