



E.ON Energy Research Center

**fcn** Institute for Future  
Energy Consumer Needs  
and Behavior



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**Prof. Dr. Reinhard Madlener**

Lehrstuhl für Wirtschaftswissenschaften,  
insbesondere Energieökonomik

Institute for Future Energy Consumer Needs and  
Behavior (FCN), E.ON Energy Research Center

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Lecture and Exercise (V2/Ü2) in

## Smart Grid Economics and Information Management

14ss-42457 (Vorlesung), 14ss-42458 (Übung), 14ss-46631 (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 side management. 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

### Target audience

This course is dedicated to Master (MSc) students in economics and engineering economics.

### Requirements

Basic knowledge in Economics (Micro/Macro) and Energy Economics

### Organization

The lectures are grouped into blocks and will be held over 2 days. All lectures will take place at the E.On Energy Reserch Center (Mathieustr., Main Building, 52074 Aachen). The lectures are scheduled as follows: Wednesday April 9, 09:00-17:00 hrs (SemRaum 0023) and Wednesday May 7, 09:00-17:00.

The exercise sessions will be held from 10:00 to 11:30 hrs (SemRaum 0023) on the following dates: April 16, 23, and 30, and May 14, 21, and 28. 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, and only one student belonging to each group needs to be present.

The exams dates are: August 6, 08:30-09:30, in room 1010|131 (AachenMünchener Halle); September 19, 17:00-18:00, in room 1820|201 (Fo 1).



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**Literature (selection)**

Erdmann G, Zweifel P. Energieökonomik, Theorie und Anwendungen. 1. Aufl. Berlin-Heidelberg: Springer; 2007.

Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX. Zeitschrift für Energiewirtschaft. 2008:147-161.

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 Mr. Giovanni Sorda ([gsorda@eonerc.rwth-aachen.de](mailto:gsorda@eonerc.rwth-aachen.de); Office hours: by appointment only).