

Module 1289SMER02 Energy Markets and Regulation (Master)

Wintersemester 2017/18

Convener: Dr. Susanne Nies

Email susanne.nies@web.de Office hour : by appointment (after course or telephone)

Tutorials: Johanna Bocklet jbocklet@uni-koeln.de

Lectures Friday 14-15.30 (room HS XIb) and 16-17.30 (room S24)

Please see outline on exact dates of lectures and tutorials.

Tutorials and Guest lectures Friday 15-16.30 (room HS XIb)

Exams : PT1: Friday February 2nd, 14-15:30 (room HS XXIV) or PT2: Tuesday, March 20th, 9:30-11:00 (room HS XXIV)

The course will be taught in English.

Lecture material and current updates can be found on ILIAS.

Overview of the Course

This course provides a comprehensive overview on energy markets and regulation, and at once an « insight into the real world » of power systems today. It covers the elements of the power sector value chain, as such as generation, transmission, distribution, but also demand side response, aggregation, storage, sector coupling with e-mobility and gas, and other elements of the new power system. From a geographical point of view it covers mainly Europe, but refers also to other geographies and experiences, like the early liberalization in Chile or the specificities of PJM in the US and the ISO model. The course presents regulatory institutions, their roles and interactions: National regulatory authorities as well as ACER ; governments and the role of the EU, Energy Community as well as the role of para-institutional players such as ENTSO-E or ENTSO-G.

The course contains many « real life » examples and discusses challenges as such as the system split of the European power system in 2006, the synchronization of Turkey to the Continental European system; the challenge of the solar eclipse in 2015 ; or the impact of Brexit on the European power market. On the edge of policy, governance and economics it discusses also the limits of markets in contemporary Europe, characterized by a strong role of national governments and regulators, and the European Commission push for more regionalization. The course includes extensive reference to the new and emerging power systems with the « Fourth industrial revolution », the impact and meaning of digitalization, the potential applications of block chain, cybersecurity risks, as well as the changing role of actors of power systems, and regulatory challenges. At the end of the course the student should master the economics of power systems at a basic level and be aware of contemporary challenges.

Course Requirements

The specialization module Energy Markets and Regulation can be chosen by Master students only.

The course is part of the Energy Economics Specialization group.

Each student will have to participate in a 90min final exam which accounts for 100% of the final grade. The final exam will be composed of three blocks: terminology; concepts; assessment. (*Only and exceptionally early leaver students are authorized to write a paper instead addressing the contents of the course.*)

Four tutorials will be set up and will see students present their response to exercise sheets. Those preparing and presenting can gain up to 9 additional points, which will be added as bonus points to the final exam points.

All students need to sign up on KLIPS 2 to register for the exam/early leaver paper at least 2 weeks before the respective exam. The class is worth 6 ECTS.

Course Readings

PEREZ-ARIAGA, Ignacio (Ed), The regulation of the power sector, Springer Berlin 2017 (new edition) (mandatory)

Barabasi, Alberto aszlo, Network Science, Cambridge University Press 2016 (online <http://barabasi.com/networksciencebook/>)

IEA, World Energy Outlook 2016 and 2017

IEA , Energy Technology Perspectives, 2016

IEA, Energy Investment Report 2017

Legendijk, Vincent, Electrifying Europe, Aksant, 2008

Parker, Geoffrey, Van Alstyne, Marshall, Choudary, Sangeet Paul, Platform Revolution : how networked markets are transforming the economy and how to make them work for you, Norton New York 2016

Tapscott, Don, Tapscott, Alan, The Blockchain Revolution, how the technology behind bitcoin is changing money, business and the world, Portfolio Penguin 2017
Schwab, Klaus, The Fourth Industrial Revolution, Penguin, 2017

Weedy, B.M., Electric Power Systems, Blackwell, 5th edition, 2012

Websites ACER ; BNetzA : EC ; EP ; ENTSO-E ; IEA

Overview Lectures and Tutorials

Date	Topic (Short) and Convener	Contents	Reading
Oct 13	1 Introduction	-overview on the course, -challenges of contemporary power systems -transition of the power sector value chain	Perez Ariaga Chapter 11; 14 IBM platform model Legendijk
	2 Power System Economics : an overview; generation	-from vertically integrated to liberalized -unbundling -investments	Perez Ariaga Chapter 2, 1, 7
Oct 27	Tutorial 1	-Administrative Issues -Introduction to Basic Concepts of the Electricity Market	
Nov 3	3 Power System Regulation : Principles and Institutions 1	-general principles of regulation	Perez Ariaga Chapter 3
	4 Power System Regulation : Principles and Institutions 2	-institutions -interaction of institutions national and European -the emerging regional dimension -power exchanges -the ENTSOs -the impact of Brexit Handout of exercise sheet 1 for tutorial 2	Perez Ariaga Chapter 3, 10
Nov 10	5 The Clean Energy for All Europeans package	-new regulation what for ? -the regulatory process -debate capacity markets -network codes : rules of the game of the Internal Energy Market	EC Website on Clean Energy for All Europeans Package European Parliament ITRE reports European Council reports
	6 Transmission and ENTSO-E	-the role of transmission -transmission tariffs -Regional Transmission Operator -ISO and the example of PJM	Perez Ariaga Chapter 6, 8

		<ul style="list-style-type: none"> -the synchronisation of Turkey -the solar eclipse 2015 -Germany and its neighbours (Suedlink etc.; capacities DK-DE and DE-PL ; AT-DE split ; -bidding zone study -system extension (example Ukraine; Baltics) <p>Handout of exercise sheet 2 for tutorial 3</p>	
Nov 24	<i>Guest Speaker(2-3:30pm)</i> Tutorial 2 (4-5:30pm)	<i>Boston Consulting Group: Future of Utilities</i> Exercise sheet 1	
Dec 8	Tutorial 3	Exercise sheet 2	
Dec 15	7 Distribution and Retail Markets	<ul style="list-style-type: none"> -new roles; new regulations ; DSO entity, interaction with TSO -distribution tariffs 	Perez Ariaga Chapter 5, 9
Dec 15	8 ICT and the Digitalisation of the Power system	<ul style="list-style-type: none"> -networks and platforms -IT architecture -block chain opportunities -cyber security -data privacy -smart meters -data hubs -regulatory challenges <p>Handout of exercise sheet 3 for tutorial 4</p>	Schwab Barabasi Parker Tapscott
Jan 12	9 System Adequacy and Welfare	<ul style="list-style-type: none"> -matching demand and supply -matching Security of Supply, sustainability and competitiveness -regulatory answers <p>Handout of exercise sheet 4 for tutorial 5</p>	Perez Ariaga Chapters 1, 7, 11
Jan 12	10 Exam Review (Tutorial)	General review of issues for the final exam	
Jan 19	Tutorial 4	Exercise sheet 3	
Jan 26	Tutorial 5	Exercise sheet 4	