Overview of Russian Electricity Industry

3th Module, winter 2019

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Course information

Course Website:

Instructor's Office Hours: by appointment

Class Time:

Room Number:

TAs: Eugeniy Shudrya

Course description

This course examines practically how the Russian electricity industry is designed and lays the foundation for Professor Silvester van Koten's course, which takes on a more theoretical angle. We will consider all parts of the electricity supply chain (generation, transmission, distribution and supply) and observe how they interact both with each other and with the customer. The course will offer a detailed depiction of the design of the wholesale and retail electricity markets as well as provide a general overview of how natural monopolies such as transmission and distribution grids are regulated. This course will also examine heat market regulation, especially with respect to how it influences electricity markets.

We hope that after successfully completing this course, students will have acquired the knowledge required to work for companies in all sectors of this dynamic industry. Specifically, students will learn to differentiate between electricity and capacity markets, get to know who the main market players are, what the end-user's electricity price is comprised of and how it is formulated, understand what cross-subsidization means, learn how, why and in what capacity the heat market influences electricity markets, and much, much more.

Course requirements, grading, and attendance policies

Prerequisites: Micro1-2, Industrial organization-1, some knowledge of game theory (auctions) is a necessity, Corporate finance-1 is desirable
Teaching and work forms: two lectures per week. In addition, there will be four classes in which we will discuss energy market cases.
Grading policy: The final grade will be based on four homework assignments made up of case studies, which will be distributed in class (80%) and on participation in class discussion (20%).

Attendance policy: Attendance is encouraged.

Course contents

1. General overview
    a. «Value chain»: generation, transmission, distribution, supply, consumption.
    b. Potentially competitive segments and natural monopolies. Transition from a natural monopoly to the competitive segment.
    c. Generation. Brief overview of generation technologies (steam turbine, CCGT, fossil-fuel plants, co-generation plants, HPPs, PSHPs, nuclear stations, wind farms, PVs, other exotic animals). Types of fuel. Reference fuel. Measures of fuel efficiency.
    d. System dispatch. Cost of system dispatch.
    e. Transmission and distribution. Grid tariffs, grid loss compensation schedule.
    f. Electricity and capacity markets. Wholesale and retail markets. Supply companies. Guarantied suppliers. Supply margin.
    g. Market infrastructure. Non-profit organization Market Council, JSC Administrator of Trading System, JSC Financial Settling Center (clearing company).
    h. Tariff structure.
2. Generation in detail. Russian generation structure. Overall installed capacity. Generation breakdown by fuel types. Market geography. Price and non-price zones. Shareholding structure (dominant role of state-owned companies).
3. Market design. Generation revenue and cost structure. Market segments (electricity, capacity).
    a. Electricity markets
        i. Day-ahead market. Pricing mechanism – first glance («copper table» - generation pool, supply and demand curves). Pricing mechanism – how it really works. Nodal price model. How prices are determined, nodal prices as Lagrange multipliers to balance constraints. Price of congestion. Examples.
        ii. Balancing market
        iii. Regulated agreements
    b. Capacity market (capacity auction rules and their implications)
    c. Investment guarantee mechanism – Long Term Capacity Agreements
4. Grids. Transmission and distribution. Market participants – Federal Grid Company, Interregional Distribution Grid Companies, independent Grid Companies. Assets (grid length, transformer capacities, etc.). Tariff structure (grid fee, loss compensation). Methodology for tariff setting (RAB, long-term indexation, cost plus).
5. Overview of supply companies
6. Selected topics of electricity industry development:
    a. Historic overview: from deficit to overcapacity
    b. Market or regulation?
    c. Can the capacity market become a reliable mechanism for investment guarantee?

d. Decentralized generation – current state and future outlook

Course materials

Required textbooks and materials

Reading material will be distributed before classes.

Academic integrity policy

Cheating, plagiarism, and any other violations of academic ethics at NES are not tolerated.