Introduction: This course presents institutional, theoretical and empirical aspects of the economics of energy markets and environmental regulation. Energy consumption is an essential driver of economic activity and the main source of polluting emissions. While energy industries are strongly driven by fundamental economic forces, regulation is an important safeguard to ensure their well-functioning. This course first examines the economic aspects of electricity markets, including its historical and theoretical foundations as well as recent empirical studies. The second part of this course presents the fundamentals of primary energy markets through the theory of exhaustible resources, and the empirical aspects of crude oil and retail gasoline markets. The third part focuses on environmental regulation and the energy transition through the lens of European objectives and policies including emissions markets, energy efficiency, and renewable energy deployment.

Main concepts: Topics covered include: natural monopoly, vertical integration, price regulation, regulation of networks, peak-load pricing, market power, antitrust regulation, pay-as-bid vs uniform price multi-unit auctions, supply function equilibria, transmission congestions, the effect of forward contracting, demand-response, capacity markets, Hotelling rule, oil prices, mergers, environmental taxes and cap-and-trade regulation, the effects of environmental regulation, pass-through of emissions pricing, energy efficiency, rebound effect, energy transition, and renewable energy policies.

Objectives: This course aims at: 1) developing an understanding of the functioning of energy markets, through the presentation of a variety of relevant concepts and applications; and 2) providing microeconomic and econometric tools of analysis that are useful across many industries beyond energy markets. The course delivers useful background for public and private sector roles in the energy and environmental industries, regulation, research, trading, investment, think tanks, or consultancies.

Evaluation: Enrolled students are expected to actively participate to class (10% of final grade). The evaluation is composed of:

1. a short presentation (15 minutes) about one of the articles marked by a * in the outline below (40% of final grade);

2. a research proposal (5 pages) about a relevant topic related to the course (40% of final grade).

Students are expected to use the concepts covered, state a research question, present economic intuitions, and deliver their own discussion of the methods and results.

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At the end of the class, the students must: 1) have acquired knowledge about the functioning of energy markets, 2) understand the main challenges about energy and environmental policies, 3) have a good understanding of the microeconomic and econometric methods of analysis presented in class, and more generally, 4) be able to conduct independent research on relevant topics related to energy economics and policy.

Outline:

The course is organized in 12 sessions of 1h30.

I. The electricity industry

1. Foundations (Session 1)
   • A brief history from nationalisation to “deregulation” in Europe and the U.S.
   • Evolving paradigms: natural monopoly and competitive markets.
   • Economic efficiency, peak-load pricing, regulatory issues, investment adequacy, and profitability.
   • The aftermath of “deregulation”: the California crisis, market power and anti-competitive conducts.

2. Market power in electricity markets: theory (Session 1-2)
   • Multi-unit auctions (pay-as-bid vs. uniform), supply function equilibria, and transmission networks.


3. Market power in electricity markets: empirical studies (Session 3)

- Measuring market power, the effects of forward contracts and the empirical study of bidding behaviors in multi-unit auctions.
4. Investment and capacity markets (Session 4)

- Peak-load pricing, the fundamentals of capacity markets, and the study of empirical behavior in capacity markets.

5. Demand and retail markets (Session 4)

- The theory of retail competition, the role of demand-response and the econometrics of price elasticities.

II. Other energy markets

1. Exhaustible resources (Session 5-6)

- Dynamic management of an exhaustible resource, the Hotelling rule and the empirical economics of oil prices.
2. Retail gasoline (Session 7-8)

- Mergers, collusion, Edgeworth cycles and sticky prices in retail gasoline markets.


III. Energy transition and environmental regulation

- Brief introduction to the energy transition in Europe. (Session 9)

1. Energy efficiency (Session 9)

- Investment, rebound effect and efficiency gap.


2. Environmental markets and regulation (Session 10)

- Functioning of environmental markets, the effects of environmental regulation, and pass-through of emissions pricing.
3. Renewable support policies (Session 11-12)

- Market integration of renewables, support mechanisms and the costs of fossil fuel subsidies.

  
  
  


- Expecting the unexpected: Emissions uncertainty and environmental market design. *NBER*.


