

RUTGERS

Edward J. Bloustein School
of Planning and Public Policy

May 23-24, 2017
Rutgers University-New Brunswick
New Brunswick, NJ

In-Depth Introduction to Electricity Markets

A Two Day Professional Short Course

Presented by
Center for Energy, Economic and Environmental Policy

POST-CONFERENCE WORKSHOP

Cost Benefit Analysis of
Energy Efficiency and
Renewable Projects

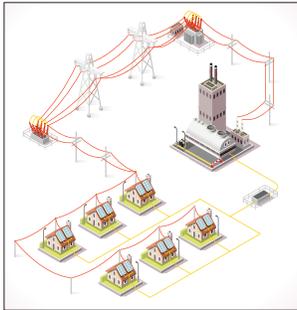
May 25, 2017





Overview

This comprehensive introductory course provides an in-person overview of the industry, focusing on the linkages among power system engineering, markets, regulatory policy, and business strategies. Specific examples and actual market data are used to illustrate basic principles and ideas. The course covers electricity markets in the United States (New England, New York, PJM, Texas, Midwest, California, the West and the South) and Ontario and Alberta's electricity markets in Canada.



The instructor employs several approaches to elicit participation from attendees, including group exercises and an electricity market simulation in which participants bid a portfolio of generation resources over the course of the seminar under various market rules and conditions. Participants will have plenty of opportunities to ask questions and discuss issues of special interest to them. Extensive and comprehensive course notes will also be provided. Continental breakfast and lunch are included.

This course has been previously presented over 75 times in the last 15 years to over 1,500 students in the U.S., Africa, Asia, Canada, and Europe.

This course has been approved for 13 Continuing Legal Education Credits for Planners and has applied for the same for both attorneys and professional engineers in New Jersey.

Areas Covered

Attendees will obtain the answers to the following questions:

1. What are the major components of a power grid?
2. What is meant by loop flow or parallel flow?
3. What is dispatch and unit commitment?
4. What ancillary services are needed to operate the grid?
5. In reliability analysis, what is the difference between adequacy and security?
6. Why is locational marginal pricing necessary?
7. Why are prices based upon marginal costs not average costs?
8. What is meant by uniform clearing prices and why are they used?
9. Why are both day-ahead and real-time markets necessary?
10. How is congestion risk managed?
11. How are markets for emissions, renewable resources and capacity related?
12. How do retail electricity markets work?
13. What role has economies of scale played in the structure of the electric power industry?
14. What portions of the industry remain economically regulated and why?
15. What is RTO/ISO governance?
16. What are the roles of the federal and state governments in the power sector?
17. Why is transmission planning necessary and what are the major issues?
18. What are the different types of forecasting techniques?
19. Why is risk management so important in electricity markets?
20. What does the statement mean that natural gas is typically the marginal fuel for electricity production and what is its implication for electricity prices?
21. What are different business strategies pursued in each portion of the electric power supply chain (generation, traders, transmission and distribution, retail marketers and aggregators)?
22. How does cost-of-service regulation result in rates?

Agenda

TUESDAY, MAY 23, 2017

8:30 – 8:50 am Registration and Continental Breakfast

8:50 – 9:00 am Welcome and Opening Remarks

SESSION I: POWER SYSTEMS

9:00 – 10:30 am Generation, Transmission, Distribution and Load

Power system components, types of organizations and businesses involved with the grid, power system supply chain, generation dispatch and unit commitment, power flows, ancillary services, and reliability analysis.

10:30 – 10:45 am Networking Break

10:45 – 12:00 pm Business Analysis of Power System Operations and Investments

Integration of business analysis with power system engineering including the generation investment decision, calculating the cost of electricity, and the economics of generation dispatch, unit commitment and ancillary services.

12:00 – 1:00 pm Group Luncheon

"A Romp Through Restructuring...Looking Backwards to Look Forward"

Craig Glazer, Vice President Federal Government Policy, PJM Interconnection

SESSION II: ELECTRICITY MARKETS

1:00 – 2:30 pm Electricity Markets: Energy, Capacity and Ancillary Services

Review of real-time, day-ahead, capacity and ancillary services markets, locational marginal prices, transmission congestion, transmission congestion contracts, and congestion risk management.

2:30 – 2:45 pm Networking Break

2:45 – 4:00 pm Electricity Markets: Bilateral, Renewable and Air Emission Markets and Market Power and Mitigation

Renewable energy markets, emission allowance markets, settlement, arbitrage/speculation between markets, bilateral contracts, retail vs. wholesale markets, opportunity cost pricing, exercising market power, and market power monitoring and mitigation.

4:00 – 5:00 pm Team-based Generation Bidding Simulation

Seminar participants are divided up into teams representing different Independent Power Producers that submit their energy bids into an electricity markets. This simulation continues throughout the second day and results and bidding strategies under different market conditions and rules are discussed and analyzed.



WEDNESDAY, MAY 24, 2017

8:30 – 9:00 am **Continental Breakfast**

SESSION III: REGULATORY POLICY

9:00 – 10:30 am **U.S. Federal Legislation and Regulations**

Industry restructuring, federal legislation and regulations, role of economies of scale in regulatory policy, unbundling of electricity services, and open transmission access/FERC Order 888/889. Round 2 of Generation Bidding Simulation.

10:30 – 10:45 am **Networking Break**

10:45 – 12:00 pm **State Regulation and Policies**

Emerging federal and state policies, transmission expansion and cost allocation/FERC Order 1000, role of states in retail electricity markets, governance of Regional Transmission Organizations and Independent System Operators. Round 3 of Generation Bidding Simulation

12:00 – 1:00 pm **Group Luncheon**

1:00 – 2:30 pm **Business Strategies and Analysis I**

Technical and fundamental forecasting techniques, risk management instruments including swaps and options, pricing trends in electricity and natural gas, and causes of electricity price volatility. Round 4 of Generation Bidding Simulation.

2:30 – 4:00 pm **Business Strategies and Analysis II**

Business strategies (generation, transmission and retail), rate cases, cost-of-service regulation, revenue requirements, weighted average cost of capital, smart grid, course wrap up and evaluation.

Questions, comments and discussion are encouraged throughout the course, and participants are free to contact the instructor at any time during and after the completion of the course regarding course materials, trends in the industry, employment issues, etc.

Instructors



Frank Felder Ph.D. is an expert on the economics and reliability of restructured electric power systems. Frank is an Associate Research Professor at the Edward J. Bloustein School of Planning and Public Policy, Rutgers University, where he conducts research in electricity markets with the Center for Energy, Economic and Environmental Policy. He also consults a wide range of clients in the industry, advising them on market design,

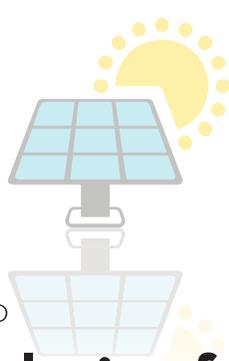
market power, electricity price forecasting, risk management, and retail electricity markets. He has testified before the Federal Energy Regulatory Commission and several state public utility commissions. Frank has conducted numerous seminars and lectures and has widespread experience explaining complex—and sometimes arcane—material in an intuitive, humorous, and accessible manner.

Frank holds a Ph.D. in technology, management, and policy from the Massachusetts Institute of Technology, where his studies focused on the economics and reliability of restructured electric power systems.



Craig Glazer (Guest Speaker), an attorney and Vice President Federal Government Policy at PJM Interconnection, coordinates all of PJM's regulatory and legislative policies before Congress, the Federal Energy Regulatory Commission, the U.S. Department of Energy and other federal agencies. Prior to coming to PJM, Mr. Glazer served as commissioner and chairman of the Public Utilities Commission of Ohio. Mr.

Glazer oversaw Ohio's move toward deregulation of its telephone, natural gas, transportation and electric industries. He also chaired the state's Siting Board and served as a member of the governor's cabinet. Craig is a graduate of University of Pennsylvania and Vanderbilt University School of Law.



Post-Conference Workshop

Cost Benefit Analysis of Energy Efficiency and Renewable Projects

This workshop covers the theory and practice of cost benefit analysis including the topics of time value of money, discount rates, monetizing non-market costs and benefits such as environmental externalities, the five major types of cost benefit analyses conducted for energy efficiency programs, uncertainty analysis, and data collection challenges. Participants will be provided with extensive and detailed course notes and supporting spreadsheets.

Learning Outcomes

- Understand the economic theory behind cost benefit analysis
- Learn the key assumptions and data sources to conduct cost benefit analysis of energy efficiency, demand response, and renewable energy projects and programs
- Investigate the implications of uncertainty of key assumptions through sensitivity analysis
- Conduct two detailed case studies of an energy efficiency and renewable energy cost benefit analysis
- Know the uses and misuses of cost benefit analysis including its limitations and proper role in formulating energy and environmental policy

Course Outline

May 25, 2017, 9 am to 12 noon

- Economic theory and principles of cost benefit analysis
- Time value of money and project finance
- Discount rate
- Standard financial metrics (payback, internal rate of return, cost-benefit ratios, net present value)
- Key assumptions and inputs used in cost benefit analysis of energy efficiency, demand response and renewable energy projects
- Quantifying costs and benefits of non-market impacts such as environmental externalities

May 25, 2017, 1 pm to 5 pm

- Uses and misuses of cost benefit analysis in the analysis of energy and environmental policy
- Uncertainty considerations and sensitivity analysis
- Investment tax credits, production tax credits and Modified Cost Recovery System (MACRS)
- Economic evaluation of renewable energy and energy efficiency programs
- Case Study A: Cost benefit analysis of an energy efficiency program
- Case Study B: Cost benefit analysis of a renewable energy program



REGISTRATION
to register [CLICK HERE](#) or

Call: 201 871 0474
fax: 253 663 7224
email: register@pmaconference.com
web: <http://pmaconference.com/>
Mail: POB 2303 Falls Church Va 22042

LOCATION

Address
Edward J. Bloustein School of Planning and Public Policy
Rutgers, The State University of New Jersey
33 Livingston Avenue
New Brunswick, NJ 08901

The front of the Bloustein School building faces Livingston Avenue. As you enter the main doors of the building, the Bloustein School is on the left. Go through the double doors to access the elevators.

The Bloustein School is a five-minute walk from the New Brunswick Train Station (NBK), which has NJ TRANSIT and Amtrak connections on the Northeast Corridor. The station is approximately one hour from Newark Airport, New York City and Philadelphia.

For directions and information about parking, visit bloustein.rutgers.edu/location

Hotels
The Heldrich Hotel, www.theheldrich.com, (732) 729-4670 and the Hyatt Regency-New Brunswick, newbrunswick.regency.hyatt.com, (732) 873-1234 are both within walking distance of the Bloustein School. A listing of additional hotels in the area may be found at bit.ly/ceeep-hotels.

PLEASE SELECT

In-Depth Introduction to Electricity Markets (May 23-24) AND WORKSHOP (May 25): US \$1600
EARLY BIRD before April 21: \$1400

In-Depth Introduction to Electricity Markets ONLY (May 23-24) : US \$1150
EARLY BIRD before April 21: \$950

WORKSHOP ONLY (May 25) : US \$790
EARLY BIRD before April 21: \$690

How did you hear about this event? (direct email, colleague, speaker(s))

Print Name Job Title

Company

What name should appear on your name badge?

Address

City State/Province Zip/Postal Code Country

Phone Email

List any dietary/accessibility needs here

CREDIT CARD INFORMATION

Name on Card Account Number

Billing Address Billing City Billing State

Billing Zip Code/Postal Code Exp.Date Security Code (last 3 digits on back of Visa/MC or 4 digits on front of AmEx)

OR Enclosed is a check for \$ _____ to cover _____ registrations.

15% discount for 3 participants, 25% discount for 4 or more.
Please call (201) 871 0474 or email register@pmaconference.com to register

Substitutions & Cancellations

Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before May 22, 2017 in order to be refunded and will be subject to a US \$195.00 processing fee per registrant. No refunds will be made after this date. In the event of non-attendance, all registration fees will be forfeited. In case of conference cancellation, Rutgers University's liability is limited to refund of event registration fee only.