Three Essentials of the Electric Grid: Business, Regulation and Deregulation

Vermont Law School, Summer 2013
Course web site: http://personal.psu.edu/sab51/vls/vls.html

Instructor

Seth Blumsack
Associate Professor of Energy Policy and Economics
The Pennsylvania State University
Tel: +1 412-425-8001
E-mail: blumsack@psu.edu

Course Overview

The energy and electric power industries in the U.S. are facing unprecedented challenges in meeting our society's demands for low cost, high-reliability energy and electricity with lower environmental impacts. This module will introduce the major financial and economic factors that companies in the electric power industry use in making production and investment decisions; the role of regulation in influencing economic decisions; and how emerging environmental regulations might affect these decisions. The module will also introduce the basics of deregulated electricity markets.

Background Requirements and Prerequisites

There are no formal prerequisites for this course. Students who have had at least one basic economics class will find themselves more comfortable with some of the economic concepts discussed in the module. Some algebra will be used in class examples and in homework assignments as well as the final exam.

Course Organization and Grading

Class meetings will consist of a mix of lectures and class discussions. Students are expected to participate in class discussions and should come to class familiar with the assigned reading material. There will be three problem sets assigned during the module, plus a take-home final exam. The problem sets will count towards 30% of the final grade (10% each), while the final exam will count towards 70% of the final grade. Students are encouraged to work together on the problem sets, but each student must turn in his or her own work. Students must work individually on the final exam.

Homework assignments turned in at the beginning of class will be graded and returned the following day. Late homework may not be returned in time for the exam. No homework assignments will be accepted after the end of class on Thursday, June 6 (4:00 pm).

Homework assignments should be handed in as hard copies with the student's name on each page; multiple pages should be stapled together. The instructor will not accept assignments submitted via e-mail or other electronic means.

Textbook and Readings

There is no required text for this course. The following readings will be available online by May 25, 2013, at *http://www.personal.psu.edu/~sab51/vls2013.zip*

1. W.M. Warwick, "A Primer on Electric Utilities, Deregulation and Restructuring of U.S. Electricity Markets."
2. M.G. Morgan, et al., 2008. *The U.S. Electric Power Sector and Climate Change Mitigation*, Pew Center on Global Climate Change.
3. Blumsack, S. Notes on Regulation and Restructuring (mimeo).
4. Jamison, M., 2005. "Rate of Return Regulation," also available at http://www.safirasia.org/Reference/Public%20Elibrary/Rate%20of%20Return%20Regulation.pdf.
5. Blumsack, S., et al., 2011. "The Costs of Pennsylvania's Alternative Energy Portfolio Standard," mimeo.
6. Blumsack, S. and L.B. Lave, 2003. "Mitigating Market Power in Deregulated Electricity Markets," mimeo.

In addition, the following readings are available online.

7. American Public Power Association (APPA), *A Neophyte's Guide to the Changing Electric Power Industry*, available online: http://www.appanet.org/aboutpublic/index.cfm?ItemNumber=17179.
8. American Public Power Association (APPA), *Understanding Electricity Markets*, available online: http://www.appanet.org/aboutpublic/index.cfm?ItemNumber=17766.

Class Schedule

Day 1: Electricity Economics and Regulation of Electric Utilities

- Concepts from economics and finance
- Economics of power generation, transmission and distribution
- Natural monopoly and the economic basis for regulation
- Destructive competition
- Time value of money

Readings:

- *A Neophyte's Guide to the Changing Electric Power Industry*, Section entitled "Basic Building Blocks."
- Blumsack, "Economics of Power Generation," mimeo
- Morgan, et al., *The U.S. Electric Power Sector and Climate Change Mitigation*, Sec. I-A and I-B.
- There is some basic information on net present value and the time value of money at http://en.wikipedia.org/wiki/Time_value_of_money.

Day 2: Regulation of Electric Utilities
<u>Problem set #1 due at the beginning of class</u>

- Rate-of-return regulation
- Rate-base determination and asset financing for regulated utilities
- Problems with the regulated utility model

Readings:

- The primary reading is the Jamison mimeo on rate-of-return regulation. Please focus on understanding the concepts covered rather than getting bogged down in details.
- *A Neophyte's Guide to the Changing Electric Power Industry*, Section entitled "The Various Industry Players."
- Warwick, Sec. 5 and 6.
- Blumsack, "Notes on Regulation and Restructuring," mimeo
- Morgan, et al., *The U.S. Electric Power Sector and Climate Change Mitigation*, Sec. I-A and I-B.

Day 3: Restructuring Electricity Markets
<u>Problem set #2 due at the beginning of class</u>

- Electricity market designs in the US
- Locational pricing in deregulated energy markets
- Measuring and mitigating market power
- Markets for capacity and ancillary services

Readings:

- Blumsack and Lave, "Mitigating Market Power in Deregulated Electricity Markets," mimeo
- APPA, *Understanding Electricity Markets*

Day 4: Energy Markets, Environmental Quality and Climate Change

Problem set #3 due at the beginning of class

- Renewable Portfolio Standards
- Energy efficiency and demand-side market participation

Readings:

- Blumsack, et al., "The Costs of Pennsylvania's Alternative Energy Portfolio Standard," Sections II and III.