

## **MBA212 – Energy and Environmental Markets**

The University of California at Berkeley

Haas School of Business

Spring 2011

Professor Severin Borenstein

### **Syllabus**

**Course Description:** In the past 30 years, some of the largest industries have made the transition from a regulated to market-based paradigm. Managers in many transportation, information technology, and energy companies have had to devise strategies to cope with changes in economic regulations and the evolution of new markets and trading platforms. The energy industries feature a complex mix of regulation and market-driven incentives. As classic economic regulation of energy markets has been reduced, however, environmental concerns have increased and spawned a new set of regulations leading to new business challenges and opportunities.

Drawing on the tools of economics and finance, we study the business and public policy issues that these changes have raised in energy markets. Topics include the development and effect of organized spot, futures, and derivative markets in energy; the political economy of deregulation; climate change, environmental impacts and policies related to energy production and use; the economics of alternative energy sources; privatisation of publicly owned energy assets; market power and antitrust; and the transportation and storage of energy commodities. We examine the economic determinants of industry structure and evolution of competition among firms in these industries; investigate successful and unsuccessful strategies for entering new markets and competing in existing markets; and analyze the rationale for and effects of public policies in energy markets.

**Class Meeting:** Monday & Wednesday, 9:40-11 AM, Haas F320 (faculty building)

**Office Information:** Office number F649, Phone: 2-3689

**Email Contact:** borenste@haas.berkeley.edu

**Office Hours:** Office Hours will be posted on the course website.

**Course Website:** TBA

**Grading:** 40% quizzes, 30% final exam, 20% Electricity Strategy Game (ESG) (performance in game, strategy memos and other related assignments), 10% class participation. There will be seven quizzes (30 minutes each) and a final exam. Your quiz grade is based on the five best scores over the semester. The final exam date is still pending.

**Electricity Strategy Game:** The ESG is an electricity market simulation in which each team owns a portfolio of generation units and bids those units into an electricity market. Students will be assigned to teams in early February and will play as part of that team until late March. At that time, students will be reassigned to different teams and will play as part of those teams until the end of the semester. The ESG starts with a simple cost and

bidding structure. Over the semester, more complexity is added including cost variation, transmission constraints, price regulation, and pricing of greenhouse gases. Grading is based on performance in the ESG, two strategy memos, and quality of participation in the ESG debriefing on the last day of class. The schedule for the ESG will be announced in early February.

**Class Expectations:** The class will start promptly at 9:40am. Please arrive at least a couple of minutes before that so you are seated and ready to start on time. Arriving late not only means that you will miss some of the material, it will also disrupt the class and distract everyone else. Late arrivals should have a very good excuse. Likewise, the class is only 80 minutes long, substantially shorter than a typical movie. You are certainly allowed to go to the bathroom or get a drink of water when it is necessary, but it should not be necessary very often. Walking in and out of class is distracting to the other students and to me.

If you do find that you need to enter or leave during class, please open and close the door quietly. Classroom doors will slam loudly if you don't close them gently. Please make sure that doesn't happen.

Class participation is a significant part of your grade and the learning process. I will cold call. Please come prepared for each class. If for some reason you are not prepared (or are missing class entirely), please let me know in advance, so I will not call on you.

**No Electronics Policy:** This course will follow the "no electronics" policy that was adopted in the MBA core this year. Use of laptop computers, cellphones, ipads, or other electronic devices during class will not be permitted. If you have a certified medical need to use a laptop in class, please come and talk to me about it.

**Course Prerequisites:** Required: BA201A or equivalent (MBA-level Microeconomics) Recommended: BA203 or equivalent (MBA-level Finance). If you haven't taken a solid microeconomics course, this is probably not the right course for you.

**Readings:** There is one required textbook: K. Viscusi, J. Harrington, and J. Vernon, *Economics of Regulation and Antitrust*, 4th edition, Cambridge, MA: MIT Press, 2005 (hereafter VHV). The book isn't as up to date as I'd like, but it does a good job on the basic economics and there are many used copies available. I have also listed several readings from an optional textbook: N. Keohane and S. Olmstead, *Markets and the Environment*, Washington, DC: Island Press, 2007 (hereafter KO). All other readings are available in the course reader (labeled [R]) or on the course website (labeled [W]). The reader is distributed through study.net. Instructions for accessing study.net are on the course website.

Please complete readings for each meeting *before* the day on which the material will be covered. I will let you know beforehand which readings are required for each day.

## COURSE SCHEDULE

## **1. January 19: Introduction to Course and Energy Overview**

Council of Economic Advisors, *Economic Report of the President*, “Chapter 11: Recent Developments in Energy,” 2006. [W]

D. Rotman, “Natural Gas Changes the Energy Map,” *Technology Review*, Nov/Dec 2009 [R]

S. Borenstein, “Cost, Conflict and Climate: U.S. Challenges in the World Oil Market” [W]

J. Griffin and S. Puller, “A Primer on Electricity and the Economics of Deregulation” in *Electricity Deregulation: Choices and Challenges*, Griffin and Puller eds., Chicago: University of Chicago Press, 2005. [R]

M Mahoney, “Follow the Flow,” *Technology Review*, May/June 2010. [R]

## **2. January 24: Pricing, Scarcity and Market Efficiency**

S. Borenstein, “Understanding Competitive Pricing and Market Power in Wholesale Electricity Markets,” *Electricity Journal*, July 2000, pp. 49-57. [R]

R. Smith, “Electric Industry Capacity Glut Jolts Investors,” *Wall Street Journal*, 11/11/03. [R]

J. Mouawad, “A Fast-Growing Independent Strikes Gold in Oil Refining,” *New York Times*, 5/18/05. [R]

J. Mouawad, “Oil Refiners See Profits Sink as Consumption Falls,” *New York Times*, 5/14/08. [R]

KO, Ch. 4, “The Efficiency of Markets”

## **3. January 26: Market Power in Energy Markets**

S. Borenstein, “The Trouble with Electricity Markets,” *Journal of Economic Perspectives*, 2002, pp. 191-201. [R]

S. Borenstein, J. Bushnell and M. Lewis, “Market Power in California’s Gasoline Market,” Center for the Study of Energy Markets Working Paper #132, University of California Energy Institute, May 2004, pp. 1-11. [W]

Reliant transcript. [W]

## **4. January 31: QUIZ / The 2000-2001 California Electricity Crisis**

S. Borenstein, “The Trouble with Electricity Markets,” *Journal of Economic Perspectives*, 2002, pp. 191-201. [R]

R. Oppel Jr. and L. Bergman, “Deal for Use of Gas Pipeline Stirs Dispute on Competition,” *New York Times*, 3/26/01. [R]

## **5. February 2: Introduction to the ESG / Introduction to Auctions**

“Instructions for the Electricity Strategy Game”. [W]

“Going, going, gone! A Survey of Auction Types,” Agorics, Inc. [W]

## **6. February 7: Auctions and Bidding**

“Going, going, gone! A Survey of Auction Types,” Agorics, Inc. [W]

## **7. February 9: Natural Resource Extraction and Pricing**

P. Pashigian, “Depletion of A Natural Resource,” *Price Theory and Applications*, McGraw-Hill, 1995, pp. 606-619. [R]

KO, Ch. 6, “Managing Stocks: Natural Resources as Capital Assets”

## **8. February 14: QUIZ / First ESG Divestiture Auction**

“ESG Generation Portfolios”. [W]

## **9. February 16: Commodity and Futures Exchanges**

U.S. Department of Energy, Energy Information Administration, “Derivatives and Risk Management in the Petroleum, Natural Gas, and Electricity Industries,” October 2002, Section 2, pp. 3-14. [W]

M. Sesit and D. Reilly, “ ‘Hot Money’ Helps Drive Oil Volatility,” *Wall Street Journal*, 7/14/05. [R]

J. Wilke and C. Cummins, “U.S. Accuses BP Of Manipulating Price of Propane,” *Wall Street Journal*, 6/29/06. [R]

## **10. February 23: The Economic Role of Energy Storage**

T. Carlisle, “Asset Helps Keep Canada’s EnCana Afloat,” *Wall Street Journal*, 10/7/02. [R]

J. Ball, “Unbridled Energy: Predicting Volatile Wind, Sun,” *Wall Street Journal*, 10/2/09. [R]

R. Smith, “Solar Plant to Generate Power After Sundown,” *Wall Street Journal*, 12/31/10. [R]

## **11. February 28: The Economic Role of Energy Transportation**

Technology Review, *Briefing: The Smart Grid*, Jan/Feb 2011. [R]

D.C. Johnston, “Grid Limitations Increase Prices for Electricity,” *New York Times*, 12/13/06. [R]

T. Aeppel, “Commodity-Freight Rates Slip As Global Growth Slows Down,” *Wall Street Journal*, 6/13/05. [R]

## **12. March 2: QUIZ / The Oil Price Controversy**

D. Strumpf, “China May Fuel Move to \$100 Oil,” *Wall Street Journal*, 12/30/10. [R]

G. Chazan, “Iraq Oil is ‘Game Changer’,” *Wall Street Journal*, 10/13/10. [R]

P. Krugman, “Fuels on the Hill,” *New York Times*, 6/27/08. [R]

## **13. March 7: Regulation of Natural Monopoly Markets**

VHV, Ch. 11, “Theory of Natural Monopoly,” pp. 401-423.

VHV, Ch. 12, “Natural Monopoly Regulation,” pp. 429-436.

## **14. March 9: Incentive Mechanisms in Regulation**

VHV, Ch. 12, “Natural Monopoly Regulation,” pp. 436-447.

H. Demoro, “PUC Staff Says PG&E Should Pay for Diablo,” *San Francisco Chronicle*, 5/15/87. [R]

E. Herscher and D. Dietz, “Agreement Reached On Diablo Canyon Cost,” *San Francisco Chronicle*, 6/28/88. [R]

## **15. March 14: Regulation and Deregulation of Non-Monopoly Markets**

VHV, Ch.16, “The Regulation of Potentially Competitive Markets,” pp. 555-568.

VHV, Ch. 18, “Economic Regulation of Energy.” pp. 641-646, 671-685.

P. Wonacott, “Gas Lines and Growing Pains — China’s Fuel Shortages Add to Pressure to End Central Planning,” *Wall Street Journal*, 8/17/05. [R]

L. Rohter, “Gas Smugglers Dodge the Law in Brazil and Venezuela,” *New York Times*, 12/7/06. [R]

D. C. Johnston, “Competitive Era Fails to Shrink Electric Bills,” *New York Times*, 10/15/2006. [R]

## **16. March 16: QUIZ / Competition Policy, Antitrust and Cartels**

VHV, Ch. 5, “Oligopoly, Collusion and Antitrust,” pp. 116-147

J. Bushnell, “Looking for Trouble: Competition Policy in the U.S. Electricity Industry,” in *Electricity Deregulation: Choices and Challenges*, Griffin and Puller eds., Chicago: University of Chicago Press, 2005, pp. 256-271. [R]

J. Fialka, “Lawmakers Struggle to Define Gasoline Price ‘Gouging’,” *Wall Street Journal*, 11/9/05. [R]

## **17. March 28: Demand Response and Dynamic Pricing**

S. Borenstein, “Time-Varying Retail Electricity Prices: Theory and Practice,” 2005. [W]

S. Borenstein, “The Trouble with Electricity Markets,” *Journal of Economic Perspectives*, 2002, pp. 204-207. [R]

## **18. March 30: Vertical Structures and Business Models**

VHV, Ch. 8, “Vertical Mergers and Restrictions.”

L. Meckler, “Pump Games: Fill Up With Ethanol? One Obstacle Is Big Oil,” *Wall Street Journal*, 4/2/07. [R]

R. Gibson, “Gas Stations Fume Over Refiners’ Sales”, *Wall Street Journal*, 12/15/09. [R]

S. Borenstein and J. Bushnell, “Retail Policies and Competition in the Gasoline Industry,” Center for the Study of Energy Markets Working Paper #144, University of California Energy Institute, May 2005, pp. 8-end. [W]

C. Palmeri, “We’ll make it up on the volume,” *Forbes*, 2/22/99. [R]

## **19. April 4: Long-Term Contracts and Relationships**

S. Borenstein, “The Trouble with Electricity Markets,” *Journal of Economic Perspectives*, 2002, pp. 201-203. [R]

## **20. April 6: QUIZ / Energy Externalities and Energy Security**

VHV, CH. 21, “Environmental Regulation”

National Research Council, *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*, Summary, 2010. [W]

K. Seelye, “Utility Buys Town It Choked, Lock, Stock and Blue Plume,” *New York Times*, 5/13/02. [R]

KO, Ch. 5, “Market Failures in the Environmental Realm”

## **21. April 11: Taxes versus Tradable Permits in Pollution Control**

- P. Portney, “Market-Based Approaches to Environmental Policy,” *Resources*, Summer 2003. [W]
- I. Parry and B. Pizer, “Emissions Trading versus CO2 Taxes versus Standards,” Chapter 5 of *Assessing U.S. Climate Policy Options*, 2007, Resources For the Future: Washington D.C., pp. 80-86. [R]

## **22. April 13: Tradable Pollution Permits in Practice**

- A.D. Ellerman and P. Joskow, “The European Unions Emissions Trading System in Perspective,” Pew Center on Global Climate Change, May 2008. [W]
- J. Bunge and C. Sweet, “U.S. Carbon Trading Centers on California,” *Wall Street Journal*, 11/24/10. [R]
- J. Spencer, “Why China Could Blame Its CO2 on West,” *Wall Street Journal*, 11/12/07. [R]

## **23. April 18: Environmental Standards and Information Policies**

- L. Meckler and K. Lundegaard, “New Fuel-Economy Rules Help the Biggest Truck Makers,” *Wall Street Journal*, 8/24/05. [R]
- J. Fialka and K. Kranhold, “Lights Out for Old Bulbs? — U.S. Plans a Switch To All Fluorescents For Efficiency’s Sake,” *Wall Street Journal*, 9/13/07. [R]

## **24. April 20: QUIZ / Energy Efficiency**

- K. Gillingham, R. Newell, and K. Palmer, “Energy Efficiency Economics and Policies,” Annual Review of Resource Economics, 2009, Vol. 1, pp. 597-619. [R]
- D. Owen, “The Efficiency Dilemma,” *The New Yorker*, 12/20/10. [R]

## **25. April 25: Alternative Energy Investments and Policies**

- P. Krugman, “Green Economics: How We Can Afford to Tackle Climate Change,” *New York Times*, 4/11/10. [R]
- J. Rather, “Is the Answer Blowing in the Wind?,” *New York Times*, 11/5/06. [R]
- L. Etter, “Ethanol Craze Cools As Doubts Multiply — Claims for Environment, Energy Use Draw Fire,” *Wall Street Journal*, 11/28/07. [R]
- L. Denning, “Solar Market is Risking Sunstroke,” *Wall Street Journal*, 12/11/10. [R]
- M. Wald, “Giant Holes in the Ground,” *Technology Review*, November/December 2010. [R]

M. L. Wald, “Making Renewables Reliable,” *New York Times*, 11/19/09. [R]

## **26. April 27: Innovation Policies and Incentives**

R. Buckman and J. Carlton, “Seeking the Green in Clean — Tech-Focused Venture Capitalists Plunge Into Risky Field of Alternative Energy,” *Wall Street Journal*, 12/3/07. [R]

J. Gertner, “Capitalism to the Rescue,” *New York Times*, 10/05/08. [R]

E. Hintz, “Creative Financing: The Rise of Cash Prizes for Innovation...” *Wall Street Journal*, 9/27/10. [R]

## **27. May 2: Hybrid Environmental Regulation**

J. Bushnell, C. Peterman, C. Wolfram, “Local Solutions to Global Problems: Policy Choice and Regulatory Jurisdiction,” National Bureau of Economic Research Working Paper #13472, October 2007. [W]

## **28. May 4: QUIZ / Business Planning and Cost/Benefit Analysis**

S. Borenstein, “The Market Value and Cost of Solar Photovoltaic Electricity Production,” Center for the Study of Energy Markets Working Paper #176, University of California Energy Institute, January 2008. [W]

M. Ramsey, “As Electric Vehicles Arrive, Firms See Payback in Trucks,” *Wall Street Journal*, 9/8/10. [R]

## **29. May 9: ESG Debriefing and Wrap-Up**