

BA212–Energy and Environmental Markets

The University of California at Berkeley

Haas School of Business

Professors Severin Borenstein & Catherine Wolfram

Spring 2010

Syllabus

Course Description: Beginning in the 1970s, some of the largest industries in developed and developing economies have transitioned from a heavily regulated business environment to a more market-based paradigm. Managers in many transportation, telecommunications, financial and energy companies, among others, have had to devise strategies to cope with changes in regulatory structure and the evolution of new markets and trading platforms. The energy industries feature a complex mix of regulation and market-driven incentives. Over the last decade, industries that had previously been viewed as staid and conservative have been rocked by deregulation initiatives, the California electricity crises, the Enron scandal, volatile commodity prices and the challenge of reducing greenhouse gas emissions.

Drawing on the tools of economics and finance, we study the business and public policy issues that these changes have raised in energy markets, and in the environmental markets to which they are closely tied. Topics include the development and effect of organized spot, futures, and derivative markets in energy commodities and pollution permits; the political economy of deregulation; the environmental impacts and policies related to energy production and use; market power and antitrust in energy and environmental markets; 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 and environmental markets.

Class Meeting: MW, 11:10AM-12:30PM, C135 Cheit Hall

Office Information: Borenstein: Haas F649, 642-3689;

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

Course Website: <http://courses.haas.berkeley.edu/Spring2010/BA212/>.

Login and password to be distributed in class.

Grading: 60% exams, 20% OPEC Game, 20% Electricity Strategy Game (ESG). There will be one midterm exam and a final exam (midterm is 20% of grade, final 40% of grade). The midterm exam grade can be dropped if it is lower than your final exam grade (in which case, 60% of the grade will be based on the final exam grade). The grading for the OPEC game and the ESG will be based on the memo each team will write, performance in the game, and your explanation of that performance during game wrap-ups.

Exams: The midterm exam will be March 10 in class. The final exam will be May 12 from 6pm-9pm in Andersen Auditorium.

Course Prerequisites: Required: BA201A or equivalent (MBA-level Microeconomics).

Readings: There is one required textbook: Viscusi, K., Harrington, J., and Vernon, J., Economics of Regulation and Antitrust, 4th edition, Cambridge, MA: MIT Press, 2005 (hereafter VHV). We have also listed several readings from an optional textbook: Keohane, N. and Olmstead, S., Markets and the Environment, Washington, DC: Island Press, 2007 (hereafter KO).

All other readings are available in the course reader (labeled [R]), on the course website (labeled [W]). The reader is distributed through study.net.

Please complete readings for each meeting *before* the day on which the material will be covered.

COURSE SCHEDULE

I. ENERGY MARKETS OVERVIEWS

Class 1 (January 20): Course Overview and Introduction to Oil & Natural Gas Markets

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

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. 1-7. [W]

A. Tussing and B. Tippee, *The Natural Gas Industry: evolution, structure, and economics*, Tulsa, OK: Pennwell. 1995, pp. 1-23. [R]

D. Rotman, "Natural Gas Changes the Energy Map," *MIT Technology Review*, November 2009. [R]

Class 2 (January 25): Overview of Electricity & Environmental Markets

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, pp. 1-11. [R]

Resources for the Future, "Navigating Energy Choices in the 21st Century," *Resources*, Winter 2005. [W]

Jefferies & Company, Inc. "Clean Technology Primer," Introduction. [R]

KO, Ch. 1, "Introduction"

Class 3 (January 27): A Refresher on Pricing, Market Power & Scarcity

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

S. Borenstein, "The Trouble with Electricity Markets," *Journal of Economic Perspectives*, 2002, pp. 191-203. [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]

S. Oster, P. Barta and R. Gold, "As Oil Price Sets New High, Stress Hits Developing Nations," *Wall Street Journal*, 11/1/07. [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"

II. NATURAL RESOURCE MARKETS

Class 4 (February 1): Pricing and Extraction of Natural Resources; Introduction to the OPEC Game

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

OPEC Game Instructions. [W]

Class 5 (February 3): OPEC Meeting

III. REGULATION AND DEREGULATION OF ENERGY MARKETS

Class 6 (February 8): Economic Regulation of Natural Monopoly Markets

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

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

Class 7 (February 10): Incentive Regulation and Case Study of Diablo Canyon Nuclear Plant

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]

Class 8 (February 17): Regulation and Deregulation of Non-Monopoly Markets

VHV, Ch 18, "Economic Regulation of Energy: Crude Oil and Natural Gas", pp. 641-646, 671-685

S. Borenstein and J. Bushnell, "Electricity Restructuring: Deregulation or Reregulation," *Regulation*, no. 2, 2000, pp. 46-52. [W]

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

IV. LESS REGULATED ENERGY MARKETS

Class 9 (February 22): Deregulation and Competition Policy

VHV, Ch. 7, "Mergers," pp. 203-214.

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]

Class 10 (February 24): Collusion and OPEC Game Debriefing

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

Class 11 (March 1): The Role of Storage

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

C. Rangel, "Hawaii Harnesses the Wind," *Wall Street Journal*, 12/23/09. [R]

Class 12 (March 3): 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]

C. Cummins, "Natural-Gas Prices Thrown in Doubt," *Wall Street Journal*, 11/12/02. [R]

G. Anders, "Combustible Mix: As Oil Prices Swing, Gas-Station Owners Try Futures Market," *Wall Street Journal*, 6/21/05. [R]

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

Class 13 (March 8): Auction Design and Implementation & Intro to Electricity Strategy Game

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

"Instructions for the Electricity Strategy Game". [W]

Class 14 (March 10): MIDTERM EXAM

Class 15 (March 15): ESG Divestiture Auction

"ESG Generation Portfolios" [W]

Class 16 (March 17 – Time TBD): Guest Speaker(s) – Panel on Business Models

SPRING BREAK

Class 17 (March 29): Vertical Structures and Business Models

VHV, Ch. 8, "Vertical Mergers and Restrictions."

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]

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]

Class 18 (March 31): Energy Transportation and Transmission

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

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

V. ENERGY, ENVIRONMENT AND "ENERGY SECURITY"

Class 19 (April 5): Energy Externalities

VHV, CH. 21, "Environmental Regulation"

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

I. Parry, "The Uneasy Case for Higher Gasoline Taxes," *Milken Review*, 4th Quarter 2005. [W]

M. Toman, "International Oil Security: Problems and Policies," Resources for the Future Issue Brief No. 02-04, January 2002. [W]

KO, Ch. 5, "Market Failures in the Environmental Realm"

Class 20 (April 7): Environmental Regulation: Prices vs. Quantities

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., p. 80-86. [R]

KO, Ch. 8, "Principles of Market-Based Environmental Policy"

Class 21 (April 12): Tradable Pollution Permits - from SO2 to CO2 & Carbon in the ESG

J. Kanter and J. Mouawad, "Money and Lobbyists Hurt European Efforts to Curb Gases," *New York Times*, 12/11/08. [R]

A.D. Ellerman and P. Joskow, "The European Union's Emissions Trading System in Perspective," Pew Center on Global Climate Change. [W]

KO, Ch. 10, "Market-Based Instruments in Practice"

Class 22 (April 14): Energy Efficiency and Environmental Standards

K. Gillingham, R. Newell, and K. Palmer, "Energy Efficiency Economics and Policies," *Annual Review of Resource Economics*, 2009, Vol. 1, pp. 597-619. [R]

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]

Class 23 (April 19): Alternative Energy Sources and Fuel Diversity

National Research Council, *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*, Chapter 6. [R]

Class 24 (April 21): 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]

L. Abboud, "The Silicon Shake-Up – Solar Companies That Dealt With Shortage Early Prosper," *Wall Street Journal*, 9/21/07. [R]

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

Class 25 (April 26): Hybrid Environmental Regulations

J. Bushnell, C. Peterman and C. Wolfram, "Local Solutions to Global Problems: Climate Change Policies and Regulatory Jurisdiction," *Review of Environmental Economics and Policy*, 2008, pp. 175-193. [W]

Class 26 (April 28): 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]

Class 27 (May 3): Global Climate Change

R. Mendelsohn, "Is the *Stern Review* an Economic Analysis?" *Review of Environmental Economics and Policy*, 2008, pp. 45-60. [W]

S. Dietz and N. Stern, "Why Economic Analysis Supports Strong Action on Climate Change: A Response to the Stern Review's Critics" *Review of Environmental Economics and Policy*, 2008, pp. 94-113. [W]

Class 28 (May 5): Electricity Strategy Game Wrap-up

Class 29 (May 10): Final Review

EXAM AND ASSIGNMENT SCHEDULE

Exams

March 10	Midterm Exam
May 12	Final Exam, 6-9:30PM

OPEC Game

February 1	Introduction to the OPEC Game in class
February 3	First OPEC Meeting, in class
February 4	Initial production quantities due by 10PM
February 5	First day of production in OPEC Game
February 7	Production quantities for second day due by 10PM
February 8	Second day of production in OPEC Game
S-Th, 10PM	Change in production quantity due to take effect following weekday (except Feb. 14 th)
February 15	Market closed (President's Day)
February 19	Last day of production in OPEC Game
February 24	OPEC Game Debriefing in class; OPEC Game Strategy Memo due by 11AM

Electricity Strategy Game

March 8	Introduction to the Electricity Strategy Game in class
March 15	First ESG Divestiture Auction, in class
April 1	Round 1 ESG strategies due by 10PM
April 5	Round 2 ESG strategies due by 10PM
April 8	Round 3 ESG strategies due by 10PM
April 12	Round 4 ESG strategies due by 10PM
April 15	Sealed Bids for Second Phase ESG Divestiture Auction due by 10PM
April 19	Round 5 ESG strategies due by 10PM
April 22	Round 6 ESG strategies due by 10PM
April 26	Round 7 ESG strategies due by 10PM
April 29	Round 8 ESG strategies due by 10PM
May 3	Emissions Credit Verification by 10PM
May 4	Final Income Statements Distributed
May 5	ESG Debriefing in class; ESG Strategy Memo Due by 11AM