

MBA212 – Energy and Environmental Markets

The University of California at Berkeley

Haas School of Business

Spring 2019

Professor Severin Borenstein

Syllabus

Course Description: In the past 40 years, many of the largest industries in the developed world have transitioned from regulated to market-based paradigms. Managers in many transportation, information technology, and energy companies have had to devise strategies to cope with changes in economic and environmental regulations, and the evolution of new markets and trading platforms. The energy industries feature a complex mix of regulation and market-driven incentives, which vary across countries and across states in the U.S. In the last two decades, energy markets have been rocked by deregulation initiatives, the California electricity crisis, the Enron collapse, volatile commodity prices, and now the imperative to reduce greenhouse gases and the impact of climate change, at the same time that the fracking revolution in reducing the cost of hydrocarbon extraction.

Drawing on the tools of economics and finance, we study the business and public policy issues that these changes raise in energy markets. Topics include alternative regulatory structures for energy utilities; the development and effect of organized spot and futures markets in energy; climate change, environmental policy; the emerging markets for green energy and emissions reductions; market power and antitrust; and the transportation and storage of energy commodities. We investigate firm strategies for entering new markets, competing in existing markets, and responding to regulation; and we analyze the rationale for and effects of public policies in energy and environmental markets.

Class Meeting: Tu/Th, 11:10 AM-12:30 PM, Chou Hall N470.

PLEASE NOTE: The last class meeting is May 14. Haas MBA courses run on a 15-week schedule. The final exam will be in class on May 14.

Office Information: F661, Phone: 510-642-3689 (but email is better way to reach me)

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

Course Website: on bCourses

Grading: 30% quizzes, 30% final exam, 30% Electricity Strategy Game (ESG), 10% class participation. There will be three quizzes (40 minutes each) and a final exam (80 minutes, on May 14). Your lowest quiz score is dropped if it is lower than your final exam, in which case quizzes are 20% and final exam is 40%.

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. The ESG starts with a relatively simple cost and bidding structure. Later, complexity is added with transmission constraints, different auction formats, and the addition of a tradable greenhouse gases permit market, as well as other unforeseen events. Grading is based on performance in the ESG, strategy memo assignments, and quality of participation in the ESG debriefing. The schedule for the ESG is on the last page of this syllabus. There will be three phases (“Years”) of the ESG. Students will be assigned to one team for Years 1 and 2, then to a different team for Year 3.

Class Expectations: The class will start promptly at 11:10 AM. 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 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 walking in and out of class is distracting to the other students and to me. Please minimize it.

Class participation and Attendance: Class participation is a significant part of your grade and the learning process. 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. Because so little of the course material exists in textbooks or readings, it is extremely important to attend class regularly. It will also affect your class participation grade.

No Electronics Policy: This course will follow the “no electronics” policy that has been adopted in the MBA core. 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: BA201A or equivalent (MBA-level Microeconomics or undergraduate intermediate microeconomics) is required. If you haven’t taken at least a solid intermediate undergraduate microeconomics course, this course will likely be difficult for you to pass.

Readings and Video Assignments: There is no textbook that is a good fit for this course and reading assignments are very light. A few optional readings from two textbooks will be suggested during the semester, mostly as background or an alternate presentation of material. The first optional textbook is 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. It’s also available electronically (at no charge) to UCB students through the library, at

<http://site.ebrary.com/lib/berkeley/docDetail.action?docID=10225297> . I will also suggest several optional readings from N. Keohane and S. Olmstead, *Markets and the Environment*, Washington, DC: Island Press, 2007 (hereafter KO).

All required readings, mostly newspaper articles, will be available on bCourses. Though there is little required reading, it is very important that you read the required assignments *before* the day on which the reading will be discussed. The readings that will be listed on bCourses will include both required reading and optional material for those who want to learn more about a topic. I will announce in class each week which readings are required for the following week.

Because there is no textbook that fits the course, I have recorded a collection of screencast videos (my voice over either a whiteboard or slides) that cover much of the foundational material for the course. In order to allow more time in class for interactive learning, there will be screencast videos required before almost all classes. The videos (typically 4 or 5 videos around 10-12 minutes each, averaging 40-60 minutes total) will be posted on bCourses. You will need to watch them before the relevant class. It is critical that you watch and absorb this material at the time it is assigned. The following class will assume that you have covered the video material and will pick up from there.

COURSE SCHEDULE

1. January 22: Course Intro, Energy Overview

2. January 24: Scarcity and Competitive Pricing

Video: Module 2 - Scarcity and Competitive Pricing

3. January 29: Understanding and Analyzing Market Power

Video: Module 3 - Market Power in Energy Markets

4. January 31: Economics of Energy Transportation

Video: Module 5 - Economics of Energy Transportation

5. February 5: Auctions and Introduction to the Electricity Strategy Game

Video: Module 7 - Auctions

6. February 7: Energy Storage and Exhaustible Natural Resources

Video: Module 6 - Economics of Energy Storage

7. February 12: Futures Markets

Video: Module 8 - Commodity and Futures Markets

8. February 14: Hedging Strategies

Video: Module 9 - Long-term Contracts and Hedging

9. February 19: QUIZ #1, then ESG team meetings

10. February 21: Quiz #1 review and Monopoly Regulation

Video: Module 10 - Natural Monopoly Regulation

11. February 26: Time-Varying Pricing and Monopoly Regulation

Video: Module 11 - Monopoly Regulation in Practice

12. February 28: ESG Portfolio Auction

13. March 5: California's Electricity Crises

Video: Module 4 - The California Electricity Crisis, 2000-01

14. March 7: Market Responses to Price Controls

Video: Module 12 - Price Controls in Non-Monopoly Markets

15. March 12: Deregulation and Competition Policy

Video: Module 13 - Deregulation and Competition Policy

16. March 14: Vertical Pricing Incentives

Video: Module 14 - Vertical Structure

17. March 19: Economics of Externalities and Property Rights

Video: Module 15 - Economics of Externalities

18. March 21: QUIZ #2 and ESG Year 2 Debriefing

SPRING BREAK

19. April 2: Quiz #2 review, Environmental Justice and Distributional Concerns

Video: Module 16 - Economics of Externalities in Practice

20. April 4: Cap and Trade in Theory

Video: Module 17 - Command & Control versus Market Mechanisms for Pollution Abatement

21. April 9: Alternative Market Mechanisms: Taxes vs. Cap and Trade

Video: Module 18 - Cap and Trade versus Emissions Taxes

22. April 11: California's Cap & Trade market and Cap & Trade in the ESG

Video: Module 20 - California's Cap and Trade Market

23. April 16: Tradable Pollution Permits in Practice

Video: Module 19 - Cap and Trade in Practice

24. April 18: Hybrid Regulation and Tradable Compliance

Video: Module 21 - Hybrid Regulation, Intensity Standards, and Tradable Compliance

25. April 23: QUIZ #3 and Introduction to Energy Efficiency

26. April 25: Quiz #3 review and Energy Efficiency Regulation

Video: Module 22 and 23 - Energy Efficiency theory and practice

27. April 30: Market-based Valuation of Alternative Energy

Video: Module 24 - Market-based Valuation of Alternative Energy

28. May 2: Environmental and Other Considerations in Valuation

Video: Module 25 - Incorporating Environmental Effects in Valuation

28. May 7: Cleantech Innovation Policy and Practice

Video: Module 26 - Cleantech Innovation

29. May 9: ESG debriefing

30. May 14: Final Exam

EXAM AND ASSIGNMENT SCHEDULE

Exams

February 19 (Tu)	1st in-class quiz
March 21 (Tu)	2nd in-class quiz
April 23 (Tu)	3rd in-class quiz
May 14 (Th)	Final Exam in class

Electricity Strategy Game Schedule:

Feb 7 (Th)	ESG team assignments posted for ESG Years 1 and 2
Feb 7 (Th)	Introduction to the Electricity Strategy Game in class
Feb 12 (Tu)	ESG strategies due by 5pm for Year 1, Day 1
Feb 18 (M)	ESG strategies due by 5pm for Year 1, Day 2
Feb 21 (Th)	Year 1 Strategy Memos due by 10pm
Feb 28 (Th)	ESG portfolio auction for Year 2, in class
Mar 4 (M)	ESG strategies due by 5pm for Year 2, Day 1
Mar 6 (W)	ESG strategies due by 5pm for Year 2, Day 2
Mar 11 (M)	ESG strategies due by 5pm for Year 2, Day 3
Mar 13 (W)	ESG strategies due by 5pm for Year 2, Day 4
Mar 19 (Tu)	Year 2 Strategy Memos due by 10pm
Apr 11 (Th)	Intro to Cap and Trade in the Electricity Strategy Game, in class
Apr 17 (W)	Sealed-Bid Portfolio Auction for ESG Year 3, bids due by 5pm
Apr 22 (M)	Sealed-Bid Allowance Auction for ESG Year 3, bids due by 5pm
Apr 24 (M)	ESG strategies due by 5pm for Year 3, Day 1
Apr 29 (M)	ESG strategies due by 5pm for Year 3, Day 2
May 1 (W)	ESG strategies due by 5pm for Year 3, Day 3
May 6 (M)	ESG strategies due by 5pm for Year 3, Day 4
May 8 (W)	True-Up Deadline for ESG Year 3 Allowances, 11:59pm
May 9 (Th)	Year 3 Strategy Memos due before class begins
May 9 (Th)	ESG debriefing, in class