

F&ES 80106b – E³
Professor Erin Mansur
Spring 2007

Yale School of Forestry and Environmental Studies
Course F&ES 80106b: Energy Economics & the Environment (E³)
Yale School of Management Course 622

Class hours: Mondays and Wednesdays 10:00 - 11:20 p.m.
Class location: 230 Prospect Street

Course Syllabus

Overview

This economics course examines energy issues that pertain to the environment. The objective is to apply economics to particular issues of energy markets, environmental impacts, investment in renewables, and other energy issues such as transportation and conservation. We will review the economics behind a particular energy issue and then have a discussion about a related article or case study. The class places an emphasis on economics methodology and is intended for students with some economics background. Students are required to have completed the F&ES economics requirement of either the Economics of Natural Resource Management (F&ES 84002a) or the Economics of Pollution (F&ES 84001b).

The course has been structured into four sections. The first section of the course will provide an **overview of energy markets**. We will begin by reviewing key economic concepts. We will review energy fundamentals such as energy sources, energy uses, and key definitions. The class will examine the economics of extracting nonrenewable resources. We will examine energy market regulation questions like: What are natural monopolies and how are they regulated? What is PURPA? How successful has regulation and deregulation been of oil, natural gas, and electricity markets?

Second, we will look at **environmental implications of energy**. Here we will discuss some energy-related externalities and examine their regulation. In particular we will ask: What are the externalities of traditional fuel sources like coal? What are some ways that regional pollution has been regulated? What are the economics of climate change?

Next, we will discuss issues of **investment in renewable energy sources**. We will define the technologies of renewables and consider their private and social costs and benefits. The economics of policies, such as renewable portfolio standards, will be examined. We will ask: What issues matter to investors? Where are renewable portfolio standards being implemented? How effective are portfolio standards likely to be in correcting for externalities?

In the final section, we will examine some **other issues in energy economics**. We will examine issues of transportation economics like: What are the CAFE standards and what is the regulated firms' perspective of these standards? We will also discuss issues of inducing energy conservation like: Have demand side management programs been successful?

F&ES 80106b – E³
Professor Erin Mansur
Spring 2007

For each topic, we will begin with a review of some of the key economics concepts that will be useful in examining the issue at hand. The concept will be applied to a short example using qualitative and quantitative techniques. Then, the class will examine a specific application of that week's topic. The class will discuss an academic article or a case study. Some weeks there will be multiple articles or cases discussed. As described below, students will form groups and at least one group per week will be in charge of leading the discussion.

The class enrollment is limited to 25 students. Students interested in taking the class must register for the class and submit a 1-2 page written statement regarding why they are interested in taking the class.

Office Hours and Teaching Assistants

Office hours: Mondays 2-4pm in 230 Prospect (Room 202)
 Tuesdays 2:30-4:30pm in 55 Hillhouse (Room 301)
 or by appointment
Phone: (203) 432-6233
E-mail: Erin.Mansur@yale.edu
Class web site: <http://classesv2.yale.edu> (then MGT 622 / FES 80106)

Teaching assistants:	Bailey McCallum and Beth Moore
TA office hours and location:	
Bailey McCallum	Tuesdays noon-1:00 P.M. in SOM Food for Thought
Beth Moore	Thursdays 2:30-4:30 P.M. in Sage Lounge
TA review hours and location:	Mondays 8:00-9:30 P.M. in Sage 32

Readings

I expect that this class will require about ten hours of work per week. The class textbook is:

Thomas Tietenberg. *Environmental and Natural Resource Economics*, seventh edition, (Boston, MA: Addison Wesley, 2006).

The textbook (TXT) provides an excellent review of important economics concepts in environmental and natural resource economics. Page numbers are based on the seventh edition though you are welcome to use any edition. Most of the additional readings are either on the class web site (classesv2.yale.edu, CWEB) or are contained in a **reading packet** (READER), which is available at RIS. The additional articles with web sites (WWW) are not in the reader because they are quite long. You may want to skim them on-line. The readings are meant to provide a mix of perspectives. Those interested in reviewing general microeconomic concepts may consider looking at an edition of Pindyck and Rubinfeld, *Microeconomics*, which is available at the library.

Assignments

Understanding economics requires application. **Four problem sets** will be assigned. The questions will require direct application of concepts discussed in class as well as asking students to apply these concepts to new problems. Students are encouraged to work in groups of two or three to discuss strategy of problem solving. However, write-ups must be done independently.

There will be eight class discussions, approximately one for each topic covered in the class. Every student will be responsible for emailing a question about the reading. In addition, each student will help lead **one of the discussions** at some point in the semester. The discussion leaders will look over the students' questions and some general ones that I provide, and will prepare written answers to the questions ahead of time. Refer to the syllabus to see the list of topics and readings for the discussions.

In addition, there will be one closed note **take-home test** that will require application of the concepts learned in class. The test will be given out April 2 and will be due April 9 in class. The test should take no longer than three hours to complete.

Finally, students will write a 15 to 20 page **research report** on some energy policy. Students can work in small groups of two or three. The reports will be due by May 11. No late papers will be accepted. Follow the citation guideline in <http://www.dartmouth.edu/%7eresources/>. In addition, during the last three lectures, students will present a summary of their research.

All assignments are due at the beginning of class on the date shown below. Grades will be determined with the following weights:

Problem sets	15%
Discussion and class participation	15%
Research report presentation	10%
Research report	30%
Take home test	30%

DUE DATES

- March 7: One-page research paper proposal.
April 9: Test covering Lectures 1-16.
May 11: Research paper (due by 5:00 P.M. in room 202, 230 Prospect St.).

Problem set	Topic	Date
1	Pricing non-renewables	January 31
2	Regulation and restructuring	February 12
3	Externalities	February 28
4	Climate change	March 28

COURSE PLAN AND READING LIST

I OVERVIEW OF ENERGY MARKETS

January 17. Lecture 1: Introduction.

Chapter 2 on "Valuing the Environment: Concepts." (TXT)

January 22. Lecture 2: Introduction to energy fundamentals.

Robert Ristinen and Jack Kraushaar. 1998. *Energy and the Environment*, John Wiley & Sons. pp. Chapters 1 and 2, pages 1-63. (READER)

Kenneth S. Deffeyes. 2001. *Hubbert's Peak: The Impending World Oil Shortage*, Chapter 1. Available on line at <http://pup.princeton.edu/chapters/s7121.pdf> (WWW)

January 24. Lecture 3: Pricing of exhaustible resources.

Chapter 7 on "The Allocation of Depletable and Renewable Resources." (TXT)

Chapter 5 on "Sustainable Development: Defining the Concept". (TXT)

January 29. Lecture 4: Discussion of energy prices and markets.

William Nordhaus, "The Allocation of Energy Resources," *Brookings Papers*, No. 3 (1973), pp. 529-570. <http://cowles.econ.yale.edu/P/cp/p04a/p0401.pdf> (WWW)

Forest Reinhardt, Ramon Casadesus-Masanell, and David J. Hanson. 2002. "BP and the Consolidation of the Oil Industry--1998-2002," *Harvard Business School Case: 702012* (READER)

January 31. Lecture 5: Economic regulation of energy markets.

Kip Viscusi, John Vernon, and Joseph Harrington. 2000. "Chapter 18: Economic Regulation of Energy," *Economics of Regulation and Antitrust*, Cambridge, MA: MIT Press. pp. 603-652. (READER)

Chapter 8 on "Depletable, Nonrecyclable Energy Resources." (TXT)

Problem set 1 due

February 5. Lecture 6: Electricity regulation and restructuring.

Paul Joskow. 1998. "Electricity sectors in transition," *Energy Journal*, 19(2). (CWEB)

Severin Borenstein. 2002. "The Trouble with Electricity Markets: Understanding California's Restructuring Disaster," *UC Energy Institute Power Working Paper PWP-081* (published in *Journal of Economic Perspectives*, 16). (CWEB)

Peter Van Doren and Jerry Taylor. 2004. "Rethinking Electricity Restructuring" *Cato Institute Policy Analysis No. 530*. <http://www.cato.org/pubs/pas/pa530.pdf> (WWW)

II ENVIRONMENTAL IMPLICATIONS OF ENERGY

February 7. Lecture 7: Externalities of conventional fuels.

Chapter 4 on "Property Rights, Externalities, and Environmental Problems" (TXT)

Chapter 3 on "Valuing the Environment: Methods" (TXT)

February 12. Lecture 8: Discussion of externalities.

Kip Viscusi, Wesley Magat, Alan Carlin, and Mark Dreyfus. 1994. "Environmentally Responsible Energy Pricing," *The Energy Journal*, 15(2): 23-42. (CWEB)

Nicholas Muller and Robert Mendelsohn. Forthcoming. "The Damages Due to Air Pollution in the United States," *Journal of Environmental Economics and Management*.

Kumar, Surender and D. Rao. 2001. "Valuing The Benefits of Air Pollution Abatement Using a Health Production Function: A Case Study of Panipat Thermal Power Station, India," *Environmental and Resource Economics*, vol. 20, no. 2, October 2001, pp. 91-102. (CWEB)

Problem set 2 due

February 14. Lecture 9: Economics of pollution control.

Chapter 15 on "Economics of Pollution Control: An Overview." (TXT)

Chapter 17, pages 395-403. (TXT)

February 19. Lecture 10: Discussion of pollution control policies.

Forest Reinhardt. 1992. "Acid Rain: The Southern Company (A)" *Harvard Business School Case 9-792-060*. (READER)

Forest Reinhardt. 1993. "Acid Rain: The Southern Company (B)" *Harvard Business School Case 9-793-040*. (READER)

US Environmental Protection Agency. "Acid Rain Program 2005 Progress Report," <http://www.epa.gov/airmarkets/progress/docs/2005report.pdf>

February 21. Guest Lecture by Sue Tierney.

The Effect of Federal and State Policies on Traditional Generation Technologies.

Location and time: 230 Prospect (10 – 1).

February 26. Lecture 11: Economics of climate change.

Chapter 17, pages 404-419. (TXT)

Joel Smith. 2004. "A Synthesis of Potential Climate Change Impacts on the U.S." <http://www.pewclimate.org/docUploads/Pew%2DSynthesis%2Epdf> (WWW)

HM Treasury. 2007. "Stern Review: The Economics of Climate Change" Executive Summary. (CWEB) January.

full review available at: http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm (WWW)

February 28. Lecture 12: Introduction to climate change policies.

Kimberly O'Neill Packard and Forest Reinhardt. 2000. "What Every Executive Needs to Know About Global Warming," *Harvard Business School Case*: R00409. (READER)

BBC articles on Russian ratification of the Kyoto protocol:

<http://news.bbc.co.uk/1/hi/sci/tech/3256604.stm> (WWW)

<http://news.bbc.co.uk/1/hi/world/europe/3957717.stm> (WWW)

<http://news.bbc.co.uk/1/hi/world/europe/3985669.stm> (WWW)

Warick McKibbin and Peter Wilcoxon. 2002. "The Role of Economics in Climate Change Policy," *Journal of Economic Perspectives*, Winter. 16(2): 107-129. (CWEB)

Pew Center on Global Climate Change. 2003. "Beyond Kyoto: Advancing the International Effort Against Climate Change,"

<http://www.pewclimate.org/docUploads/Beyond%20Kyoto%2Epdf> (WWW)

Problem set 3 due

March 5. Lecture 13: Discussion of Climate Change.

Forest Reinhardt and Patia McGrath. 2002. "Global Climate Change After Marrakech (A)" *Harvard Business School Case* 9-702-075. (READER)

Forest Reinhardt. 1997. "Tokyo Electric Power Company" *Harvard Business School Case* 9-792-060. (READER)

III INVESTMENT IN RENEWABLE ENERGY SOURCES

March 7. Lecture 14: Overview of renewable technology.

World Energy Assessment, pages 219-305.

<http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=Document&DocumentID=5037> (WWW)

Duncan Austin and Craig Hanson. 2002. "Introducing Green Power for Corporate Markets: Business Case, Challenges, and Steps Forward," *World Resource Institute Corporate Guide to Green Power Markets #1*. (READER)

One-page research paper proposal due.

March 12-23. Spring Break – No class.

March 26. Lecture 15: Discussion of investing in energy projects.

John Gourville and Kerry Herman. 2003. "Cape Wind," *Harvard Business School Case* 504055. (READER)

Ben Esty and Michael Kane. 2001. "Calpine Corp: The Evolution from Project to Corporate Finance," *Harvard Business School Case: 201098*. (READER)

March 28. Lecture 16: Introduction to Policies for Renewables.

(Guest Lecture: Bryan Garcia, Yale University)

<http://ctclimatechange.com/StateActionPlan.html>

<http://www.ctinnovations.com/communities/progress.php>

Karen Palmer and Dallas Burtraw. 2004. "Electricity, Renewables, and Climate Change: Searching for a Cost-Effective Policy," RFF working paper, <http://www.rff.org/rff/Documents/RFF-RPT-Renewables.pdf> (WWW)

David Berry. 2002. "The Market for Tradable Renewable Energy Credits," *Ecological Economics*. September; 42(3): 369-79. (CWEB)

Scott Hassell and Alex Keally. 2004. "A Survey of Opinion on How to Improve the Contracts of the Massachusetts Green Power Partnership" *Mimeo*. (CWEB)

Problem set 4 due

April 2. Lecture 17: Discussion of Policies for Renewables.

Jeffery Grobman and Janis Carey. 2002. "The Effect of Policy Uncertainty on Wind-Power Investment," *Journal of Energy and Development*. 28(1): 1-14. (CWEB)

Carolyn Fisher and Richard Newell. 2003. "Environmental and Technology Policies for Climate Change and Renewable Energy," *Resources for the Future Discussion Paper*. (CWEB)

IV OTHER ISSUES IN ENERGY ECONOMICS

April 4. Lecture 18: Energy efficiency and conservation.

Amory Lovins and Chris Lotspeich. 1999. "Energy Surprises for the 21st Century," *Journal of International Affairs*, 53(1). 14 pages. (CWEB)

Paul Joskow, and Donald Marron. 1992. "What Does a Negawatt Really Cost? Evidence From Electric Utility Conservation Programs," *The Energy Journal*, 13(4): 41-74. (CWEB)

Auffhammer, Maximilian, Carl Blumstein, and Meredith Fowlie. 2007. "Demand-Side Management and Energy Efficiency Revisited," March 2007 WP-165
<http://www.ucei.berkeley.edu/PDF/csemwp165.pdf> (WWW)

April 9. Lecture 19: Guest Lecture by Michael Dworkin.
Policies of energy efficiency. Location and time TBA.

Take home test due

April 11. Lecture 20: Introduction to transportation economics.

Chapter 18 on "Mobile-Source Air Pollution" (TXT)

Delucchi, M. 2000. "Environmental Externalities of Motor-Vehicle Use in the U.S." *Journal of Transport Economics and Policy*, vol. 34 (2), pp. 135-168. (READER)

Parry, Ian W H and Kenneth A. Small. 2005. "Does Britain or the United States Have the Right Gasoline Tax?" *American Economic Review*, 95(4): 1276-1289. (CWEB)

April 16. Lecture 21: Discussion of CAFE and transportation policies.

Paul Portney, *et al.* 2003. "Policy Watch: The Economics of Fuel Economy Standards," *Journal of Economic Perspectives*, 17(4): 203-17. (CWEB)

Andrew Kleit. 2002. "CAFE Changes, by the Numbers," *Regulation*, 25(3): 32-35. (CWEB)

John Goodman and Patrick Moreton, "General Motors and the Problem of Fuel Economy," *Harvard Business School Case 39-792-063*. (READER)

April 18. Lecture 22: Discussion of other transportation policies.

A. Chin and P. Smith. 1997. "Automobile ownership and government policy: The economics of Singapore's vehicle quote scheme," *Transportation Research Part A: Policy and Practice*, 31(2): 129-140. (CWEB)

P. Newman and J. Kenworthy. 1988. "The transport energy trade-off: Fuel efficient traffic versus fuel efficient cities," *Transportation Research Part A: General*, 22(3): 163-174. (CWEB)

April 23. Group presentations

April 25. Group presentations

April 30. Group presentations

May 11. *Research paper due by 5pm at 230 Prospect.*