

BE/NRE 527: Social Institutions for Energy Production

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TTh 12:40 a.m. – 2:10 p.m.

Ross E0550

Office Hours (Executive Residence 3613): Tuesday 2:30 – 4 p.m.

INTRODUCTION

Energy is the lifeblood of industrial economies, but also a key factor in environmental and national security problems. Because of the extensive externalities associated with energy use, and the uneven distribution of energy resources around the globe, balancing the benefits and costs of energy use is one of the major challenges facing humanity. This balancing act involves a range of social institutions that are supposed to align the incentives of businesses and individuals with the greater good of people and the planet. But do they really accomplish this goal? And can they cope with the massive increase in energy use expected in developing countries over the next two decades?

In most developed countries, the marketplace plays the predominant role in determining what energy sources are used, and how. But government policy plays an extremely important role, as well---governments at the local, state, regional, national, and international levels all mold aspects of energy policy. In addition, non-governmental organizations (NGOs) of all sorts affect our energy choices, either by influencing government policy or influencing corporate behavior directly. In developing countries, government often controls most supplies of non-renewable energy resources, as well as the development of the infrastructure needed to exploit energy resources.

The goal of this course is to give you a solid grasp of the environmental and social impacts of, and the institutions that govern, energy use, so that you can play a more effective role in shaping future policy or business decisions. We will begin with basic scientific and technological facts regarding the major uses for and sources of energy. We will then study energy markets (including spot and futures markets), and what they are capable of accomplishing; we will also study the ways energy markets may fail. This will lead into an overview of the role of government in influencing energy decisions. We will begin with a high-level perspective, then work with a series of case studies that examine in depth what government has accomplished in the area of energy policy, and the types of issues facing business managers in the energy industries.

Prerequisites: Economic reasoning will be used throughout the course, and many readings will take an economic perspective. We will not be doing any complicated economic analysis, but it will be helpful if you have at least been exposed to intermediate economics, have some recollection of what “market failure” means, and are willing and able to read articles that present econometric analysis of data.

READINGS

All of the readings for this course can be found on the web or on the course CTOOLS site. In particular, we will make use of three major recent studies of energy use and policy:

World Energy Assessment: Energy and the Challenge of Sustainability, United Nations Development Program, New York, 2000, available on the web at

<http://www.undp.org/energy/activities/wea/drafts-frame.html>

This report was updated in 2004. The update can be found at
<http://www.undp.org/energy/weaover2004.htm>

Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges, Report of the National Commission on Energy Policy, December 2004,
<http://www.energycommission.org/materials/>

This report has been updated as:

Energy Policy Recommendations to the President and the 110th Congress, National Commission on Energy Policy, April 2007,
http://energycommission.org/files/contentFiles/NCEP-Recom-final-single_4773e92b6f5c2.pdf

Winning the Oil End-Game: Innovation for Jobs, Profit and Security. Rocky Mountain Institute, 2007. <http://www.oilendgame.com/>

STRUCTURE OF THE COURSE

My intention is that this course be interactive, with substantial student input, and based on dialogue rather than a strict lecture format. Students are expected to master the content of the readings, to make constructive contributions to class discussions, to make occasional presentations, and to perform adequately or better on the midterm examination.

The course is divided into two halves, separated by midterm break.

The first half develops basic concepts of energy supply and demand, energy markets, and energy policy. This section builds the analytical toolbox you need to participate meaningfully in discussions of energy policy and institutions. It will be more lecture oriented than the second half, and less oriented toward current policy issues.

The second half explores in detail a series of energy institutions/policies and their performance. This section is designed to equip you with a critical perspective regarding what can be accomplished by energy markets and various types of government policy. My intention is to inoculate you against the utopian claims that are often made by well-meaning and/or self-interested players in the energy arena. This section will consider a variety of current energy challenges and policies for a sustainable energy future, using the tools developed earlier in the semester.

ASSIGNMENTS AND GRADING

Your course grade is based on four components:

Short Papers	20%
In-class Performance	15%
Midterm Exam	30%
Final Project	35%

Short Papers.

- You will be asked to write one short (3 page) paper individually assessing the political economy of the 2005 and 2007 Energy Acts. (10% of grade)
- You will write one short position paper (2-3 pages) as part of a group for one of the 5 class debates that will take place in the second half of the course. (10% of grade) You will have a chance to select one of 5 topics, but you will be assigned to debate one side or the other. You will work in a team of 4 students and will turn in a joint 2-3 page paper before class laying out your key arguments.

In-class Performance Your performance will have a variety of facets, including:

- Your performance in one of 5 debates we will hold in the second half of the course. (5%) You will have a chance to sign up for one of 5 topics, although you are not guaranteed to get your first choice. In class, one student will be selected randomly to present a 5-minute opening speech affirming the proposition for the day, then a second student will be randomly selected to present the negative case. Following that, other students will have an opportunity to offer rebuttal or surrebuttal arguments and closing statements.
- You will also be asked to serve as “class expert” on one of the readings for one class. This means you will be expected to open discussion of the reading with a short summary of its main argument, and to respond critically to any shortcomings you find in the article. In addition, there will be opportunities to contribute individually to discussions in most classes. (Total: 10% of grade).

Midterm Exam **The midterm exam will cover the first half of the course.** This material forms the basic toolkit we will use in the rest of the class for thinking about energy issues and institutions.

Final Project: You will work in teams on a topic you select in consultation with me. A team should have 4 members. Your paper should **be at most 15 pages (Double spaced; font size 12; one-inch margins) of text, with no more than 10 additional pages of**

exhibits. A title page does not count towards the page requirement. My evaluation of your work will be based primarily on the analysis in the main body of the paper.

- **February 5 in class: 1-page topic proposal is due. Please be prepared to briefly describe your proposal to the class.**
- **April 10 in class: Poster Session presenting your findings (This will count for 10% of your overall grade.)**
- **April 18, 5 p.m.: Final paper is due (The paper will count for 25% of your final grade).**

Overview of Daily Topics

Items highlighted in bold are required reading for the class; the others are supplemental.

Section 1: Overview of Energy Issues and Institutions

1. Tues, January 8—The Transition to Sustainable Energy
 - **Jeffrey Chow, Raymond J. Kopp, and Paul R. Portney, “Energy Resources and Global Development,”** *Science*, 28 November 2003, 302: 1528-1531.
<http://www.rff.org/rff/News/Features/Energy-Resources-and-Global-Development.cfm> Also see the excellent supplemental materials available at <http://www.rff.org/rff/News/Features/Global-Energy-Resources-Supplemental-Material.cfm>
 - **WEA, Overview, pp. 1-26**
 - “Energy Challenges and Opportunities,” Chapter 1 in *Federal Energy Research for the Challenges of the 21st Century*, Energy Research and Development Panel (J. Holdren, Chair), President’s Committee of Advisors on Science and Technology, Executive Office of the President of the United States, November 1997, <http://www.ostp.gov/Energy/ch1.pdf>, esp. pp. 1-16.
 - Boulding, Kenneth. “Earth as a Spaceship,”
[http://www.eoearth.org/article/The_Economics_of_the_Coming_Spaceship_Earth_\(historical\)](http://www.eoearth.org/article/The_Economics_of_the_Coming_Spaceship_Earth_(historical))
2. Thurs, January 10---Supply and Demand for Exhaustible and Renewable Energy
 - **Robert Solow, “The Economics of Resources and the Resources of Economics,”** *American Economic Review*, May, 1974, 64: 1-14.
 - **WEA, Chapter 9, “Energy Scenarios,” pp. 333-343 and Annexes A-C, pp. 456-466.**
 - “Shell Global Scenarios to 2025,”
http://www.shell.com/home/content/aboutshell-en/our_strategy/shell_global_scenarios/ceo_introduction/scenarios_2025_introduction_ceo_30102006.html
 - World Energy Outlook 2007, US Energy Information Administration,
[http://www.eia.doe.gov/oiaf/ieo/pdf/0484\(2007\).pdf](http://www.eia.doe.gov/oiaf/ieo/pdf/0484(2007).pdf)
 - Global Business Network, “Scenarios,”
<http://www.gbn.com/AboutScenariosDisplayServlet.srv>
3. Tues, January 15---An Introduction to Institutions
 - **Elinor Ostrom, “Understanding the Diversity of Structured Human Interactions,”** Chapter 1 in *Understanding Institutional Diversity*, Princeton, NJ: Princeton University Press, 2005.
 - **Ronald H. Coase, “The Institutional Structure of Production,”** Nobel Prize Lecture, 1991, Chapter 1 in *Essays on Economics and Economists*, Chicago, IL: University of Chicago Press, 1994.
<http://nobelprize.org/economics/laureates/1991/coase-lecture.html>

- **Oliver E. Williamson, “Transaction Cost Economics: How it Works, Where it is Headed.”**
- Oliver Williamson, “Transaction Cost Economics and Organization Theory,” Chapter 4 in Neil J. Smelser and Richard Swedberg, editors, *The Handbook of Economic Sociology*, Princeton, NJ: Princeton University Press, 1994.
- Douglass North, *Institutions, Institutional Change and Economic Performance*, Ch. 1, 8, Cambridge: Cambridge University Press, 1990.

Section 2: Energy Markets

4. Thurs, January 17: Competitive Markets and the Role of Prices: The Global Oil Market

- Friedrich Hayek, “The Use of Knowledge in Society,” *American Economic Review*, 1945, 35: 519-530.
- **Robert Pindyck and Daniel Rubinfeld, *Microeconomics*, Fourth Edition, Upper Saddle River, NJ: Prentice Hall, Ch. 2, “The Basics of Supply and Demand”**
- Robert Pindyck and Daniel Rubinfeld, *Microeconomics*, Fourth Edition, Upper Saddle River, NJ: Prentice Hall, Ch. 9, “The Analysis of Competitive Markets”
- Stephen Martin, “Petroleum,” in Walter Adams and James Brock, *The Structure of American Industry*, Tenth Edition.
- “Hubbert Peak Theory,” http://en.wikipedia.org/wiki/Hubbert_peak

5. Tues, January 22: Market Power in Energy Markets

- **W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., “Oligopoly, Collusion and Antitrust,” Chapter 5 of *Economics of Regulation and Antitrust*, Cambridge, MA: The MIT Press, 1998. (You can skip over the section on Product Differentiation, pp. 109-112, and on Antitrust Law, pp. 122-132.)**
- **James M. Griffin, “OPEC Behavior: A Test of Alternative Hypotheses,” *The American Economic Review*, Vol. 75, No. 5. (Dec., 1985), pp. 954-963.**
- **James M. Griffin and Weiwen Xiong, “The Incentive to Cheat: An Empirical Analysis of OPEC,” *Journal of Law and Economics*, Vol. 40, No. 2. (Oct., 1997), pp. 289-316.**
- Borenstein, Severin, James Bushnell and Frank Wolak, “Measuring Market Inefficiencies in California’s Restructured Wholesale Electricity Market,” *American Economic Review*, 2002, 92: 1376-1405.
- Wolfram, Catherine. “Measuring Duopoly Power in the British Electricity Spot Market,” *American Economic Review*, 1999, 89: 805-826.
- Borenstein, Severin. “The Trouble with Electricity Markets (and some solutions),” University of California Working Paper, PWP-081, 2001.

6. Thurs, January 24: Energy Investments: Transaction Costs, Contracts, and Vertical Integration in Oil, Gas and Electricity

- **Oliver E. Williamson, “Transaction Cost Economics: How it Works, Where it is Headed,” *De Economist*, 1998.**

- Paul Joskow, “Vertical Integration and Long-Term Contracts: The Case of Coal-Burning Electric Generation Plants,” *Journal of Law, Economics and Organization*, 1985, 1: 33-79.
- Keith Crocker and Scott Masten, “Pretia ex Machina? Prices and Process in Long-term Contracts,” *Journal of Law and Economics*, 1991, 34: 69-99.
- Gary D. Libecap and Steven N. Wiggins, “Contractual Responses to the Common Pool: Prorating of Crude Oil Production,” *The American Economic Review*, Vol. 74, No. 1. (Mar., 1984), pp. 87-98.
- Keith J. Crocker and Scott E. Masten, “Regulation and Administered Contracts Revisited: Lessons from Transaction-Cost Economics for Public Utility Regulation,” *Journal of Regulatory Economics*, 1996, 9: 5-40.
- Kaserman, David L. and John W. Mayo, “The Measurement of Vertical Economics and the Efficient Structure of the Electric Utility Industry,” *Journal of Industrial Economics*, 1991, 39: 483-502.

7. Tues, Jan. 29: Managing Volatility: Spot Markets, Contracts, Futures Markets

- “Equilibrium in Futures Markets,” chapter 4 from lecture notes on Futures Markets by Darrell Duffie.
- New York Mercantile Exchange, “A Guide to Energy Hedging,” <http://www.nymex.com/media/energyhedge.pdf>.
- New York Mercantile Exchange, “Risk Management with Natural Gas Futures and Options,” <http://www.nymex.com/media/riskmanagement.pdf> For electricity futures information, see http://www.nymex.com/jsp/markets/ele_pre_agree.jsp For more information on NYMEX visit www.nymex.com.
- Emile J. Brinkmann and Ramon Rabinovitch, “Regional Limitations on the Hedging Effectiveness of Natural Gas Futures,” *The Energy Journal*, 1995, 16: 113-124.
- Michael J. Doane and Daniel F. Spulber, “Open Access and the Evolution of the U.S. Spot Market for Natural Gas,” *Journal of Law and Economics*, 1994, 37: 477-517.
- Thomas P. Lyon and Steven C. Hackett, “Bottlenecks and Governance Structures: Open Access and Long-term Contracting in Natural Gas,” *Journal of Law Economics and Organization*, 1993, 9: 380-398.
- Robert S. Pindyck (2001), “The Dynamics of Spot and Futures Markets: A Primer,” *The Energy Journal*, 22 (1), 1-29.

8. Thurs, Jan. 31: Electricity Markets

- Paul L. Joskow, “Markets for Power in the United States: An Interim Assessment,” *The Energy Journal*, v. 27, no. 1, 2006.
- Matthew Barmack, Edward Kahn, and Susan Tierney. “A cost-benefit assessment of wholesale electricity restructuring and competition in New England,” *Journal of Regulatory Economics* (2007) 31:151–184
- Timothy Brennan, et. al. *A Shock to the System: Restructuring America’s Electric Industry*, Resources for the Future, Washington, DC, 1996, pp. 1-14 and 37-59.

- Steven Stoft, *Power System Economics: Designing Markets for Electricity*, Wiley-IEEE Press, 2002.
- **Jerry Taylor and Peter van Doren, “Rethinking Electricity Restructuring,” Cato Institute Policy Analysis No. 530, 2004.**
- Frank Wolak, “What Went Wrong With California’s Restructured Electricity Market?,” Working Paper, Stanford University.
- Paul Joskow, “California’s Electricity Crisis,” NBER Working Paper W8442.
- Timothy J. Brennan, Karen L. Palmer, and Salvador A. Martinez, “The California Experience,” Chapter 5 in *Alternating Currents: Electricity Markets and Public Policy*, Washington, DC: RFF Press, 2002.
- Borenstein, Severin. “The Trouble with Electricity Markets: Understanding California’s Restructuring Disaster,” *Journal of Economic Perspectives*, 2002, 16: 191-211.
- Paul Joskow, “Restructuring, Competition and Regulatory Reform in the U.S. Electricity Sector,” *Journal of Economic Perspectives*, 1997, 11: 119-138.
- William Hogan, “Electricity Market Restructuring: Reform of Reforms,” *Journal of Regulatory Economics*, January 2002, pp. 103-132.
- M. Granger Morgan, “The Role of Research and New Technology in a Restructured Networked Energy System,” Chapter 10 in Hung-po Chao and Hillard G. Huntington, editors, *Designing Competitive Electricity Markets*, Norwell, MA: Kluwer Academic Publishers, 1998.
- Timothy J. Brennan, Karen L. Palmer, and Salvador A. Martinez, “State and Federal Roles,” Chapter 12 in *Alternating Currents: Electricity Markets and Public Policy*, Washington, DC: RFF Press, 2002.
- R. W. Bacon and J. Besant-Jones, “Global Electric Power Reform, Privatization, and Liberalization of the Electric Power Industry in Developing Countries,” *Annual Review of Energy and Environment*, 2001, 26: 331-359.
- <http://arjournals.annualreviews.org/doi/pdf/10.1146/annurev.energy.26.1.331?cookieSet=1>
- David Newbery, “Reforming the Electricity Supply Industry,” Chapter 6 in *Privatization, Restructuring, and Regulation of Network Utilities*, Cambridge, MA: The MIT Press, 1999.
- Paul Joskow, “Transmission Policy in the United States,” *Utilities Policy*, 2005, 13: 95-115.

Section 3: Government Involvement in Energy Markets

9. Tues, Feb. 5: Market Failure, Government Failure and the Theory of the Second Best
- **Arthur A. Goldsmith, “Market Failure and Government Failure,” Chapter 3 in *Business, Government, Society: The Global Political Economy*, Chicago: Irwin, 1996.**
 - **Stephen Breyer, “Typical Justifications for Regulation,” Chapter 1 in *Regulation and Its Reform*, Cambridge, MA: Harvard University Press, 1982.**
 - Gary D. Libecap and Steven N. Wiggins, “The Influence of Private Contractual Failure on Regulation: The Case of Oil Field Unitization,” *The Journal of Political Economy*, Vol. 93, No. 4. (Aug., 1985), pp. 690-714.

- **“Legal Theory Lexicon: The Second Best,”**
<http://legaltheorylexicon.blogspot.com/2003/11/legal-theory-lexicon-011-second.html>
- R. G. Lipsey and Kelvin Lancaster, “The General Theory of Second Best,” *The Review of Economic Studies*, Vol. 24, No. 1. (1956 - 1957), pp. 11-32.

10. Thursday, Feb. 7: Market power: Natural monopoly and regulation, govt. ownership, and antitrust

- **W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., “Natural Monopoly Regulation,” Chapter 12 of *Economics of Regulation and Antitrust*, Cambridge, MA: The MIT Press, 1998.**
- Paul L. Joskow, “Inflation and Environmental Concern: Structural Change in the Process of Public Utility Regulation,” *Journal of Law and Economics*, 1974, 17: 291-327.
- Thomas P. Lyon, “Preventing Exclusion at the Bottleneck: Structural and Behavioral Approaches,” in Michael A. Crew, editor, *Expanding Competition in Regulated Industries*, (Boston, MA: Kluwer Academic Publishers), 2000.
- **John E. Kwoka, Jr., “Governance Alternatives and Pricing in the U.S. Electric Power Industry,” *Journal of Law, Economics and Organization*, 2002, 18: 278-294.**

11. Tuesday, Feb. 12: Environmental externalities

- **WEA, Chapter 3, “Energy, the Environment, and Health,” but skip pp. 86-95**
- **Peter Pashigian, “Environmental Regulation: Whose Self-Interests are Being Protected?,” *Economic Inquiry*, 1985, 23: 551-584.**
- **Paul Joskow and Richard Schmalensee, “The Political Economy of Market-Based Environmental Policy: The US Acid Rain Program,” *Journal of Law and Economics*, 1998, 41: 81-135.**
- **NCEP Report, section 2, “Reducing Risks from Climate Change,” pp. 19-29.**
- **WEA, Chapter 3, “Energy, the Environment, and Health,” pp. 86-95.**
- **Intergovernmental Panel on Climate Change, “Technical Summary.”**
- Bruce A. Ackerman and William T. Hassler, *Clean Coal Dirty Air: or How the Clean Air Act Became a Multibillion-Dollar Bail-Out for High-Sulfur Coal Producers and What Should be Done About It*, New Haven: Yale University Press, 1981.
- Robert W. Crandall, “Air Pollution, Environmentalists, and the Coal Lobby,” Chapter 5 in Roger G. Noll and Bruce M. Owen, editors, *The Political Economy of Deregulation: Interest Groups in the Regulatory Process*, Washington, DC: American Enterprise Institute, 1983.
- Per G. Fredriksson and Daniel L. Millimet, “Comparative Politics and Environmental Taxation,” *Journal of Environmental Economics and Management*, 2004, 48: 705-722.
- Ian Parry and Kenneth Small, “Does Britain or the US Have the Right Gasoline Tax?,” *American Economic Review*, 2005.

- David Popp, “R&D Subsidies and Climate Change: Is There a Free Lunch?,” NBER Working Paper 10880, October 2004.
- Jared C. Carbone, Carsten Helm, and Thomas F. Rutherford, “Self-Enforcing Agreements and International Trade in Greenhouse Gas Emission Rights,” working paper, University of Colorado, September 2004.
- Joel Darmstadter, “The Energy-CO₂ Connection: A Review of Trends and Challenges,” in Michael A. Toman, editor, *Climate Change Economics and Policy*, Washington, DC: RFF Press, 2001.
- Lawrence H. Goulder, “Confronting the Adverse Industry Impacts of CO₂ Abatement Policies: What Does it Cost?,” in Michael A. Toman, editor, *Climate Change Economics and Policy*, Washington, DC: RFF Press, 2001.
- Joel Darmstadter, “The Role of Renewable Resources in U.S. Electricity Generation: Experience and Prospects,” Chapter 16 in Michael A. Toman, editor, *Climate Change Economics and Policy*, Washington, DC: RFF Press, 2001.
- Thomas P. Lyon and John W. Maxwell, “Public Voluntary Programs for Mitigating Climate Change,” in Andrea Baranzini and Philippe Thalmann, editors, *Voluntary Agreements in Climate Policies*, Edward Elgar Press, 2004.
- Andrew Hoffman, “Climate Change Strategy: The Business Logic Behind Voluntary Greenhouse Gas Reductions,” *California Management Review*, Spring 2005, 47: 21-46.
- Adam Jaffe, Richard Newell, and Robert Stavins, “Energy-Efficient Technologies and Climate Change Policies: Issues and Evidence,” Resources for the Future Discussion Paper, December 1999.
- Peter van Doren and Jerry Taylor, “New Source Review: Blame the Congress,” Cato Institute, <http://www.cato.org/research/articles/taylor-031126.html>
- Howard Gruenspecht and Robert Stavins, “New Source Review Under the Clean Air Act: Ripe for Reform,” *Resources*, 2002, 147: 19-23.
- For the EPA’s official New Source Review site, visit <http://www.epa.gov/nsr/>

12. Thursday, Feb 14: Public Goods, Energy R&D and Information Problems

- **Adam Jaffe, Richard Newell, and Robert Stavins, “Technology Policy for Energy and the Environment,” *Innovation Policy and the Economy*, 2004.**
- **Robert M. Margolis and Daniel M. Kammen, “Underinvestment: The Energy Technology and R&D Policy Challenge,” *Science*, July 1999, 285: 690-692.**
- **Robert M. Margolis and Daniel M. Kammen, “Evidence of Underinvestment in Energy R&D in the United States and the Impact of Federal Policy,” *Energy Policy*, 1999, 27: 575-584.**
- David Popp, “Induced Innovation and Energy Prices,” *American Economic Review*, 2002, 92: 160-180.
- Vicki Norberg-Bohm, “Creating Incentives for Environmentally Enhancing Technological Change: Lessons from 30 Years of U.S. Energy Technology Policy,” *Technological Forecasting and Social Change* 65 (2000), p.125-148,
- Richard Duke and Daniel Kammen, “The Economics of Energy Market Transformation Programs,” *The Energy Journal*, 1999, 20: 15-64.

- Robert J. Lempert, “A New Decision Sciences for Complex Systems,” *Proceedings of the National Academy of Sciences*, 2002, 99: 7309-7313. http://www.pnas.org/cgi/reprint/99/suppl_3/7309

Thurs, Feb. 21: MIDTERM EXAM

Section 4: Policies for a Sustainable Energy Future

13. Tues, Mar 4: Energy Security

- **NCEP Report, section 1, “Enhancing Oil Security,” pp. 1-18.**
- **WEA, Chapter 4, “Energy Security”**
- **Ian Parry and Joel Darmstadter, “The Costs of US Oil Dependency,” RFF Discussion Paper 03-59. <http://www.rff.org/Documents/RFF-DP-03-59.pdf>**
- George Horwich and David Leo Weimer, “The Costs of Disruption under a Free Market,” Chapter 2, in *Oil Price Shocks, Market Response, and Contingency Planning*, Washington, DC: American Enterprise Institute, 1984.
- George Horwich and David Leo Weimer, “The Strategic Petroleum Reserve,” Chapter 4, in *Oil Price Shocks, Market Response, and Contingency Planning*, Washington, DC: American Enterprise Institute, 1984.

14. Thurs, March 6 Price controls

- **W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., “Economic Regulation of Energy: Crude Oil and Natural Gas,” Chapter 18 of *Economics of Regulation and Antitrust*, Cambridge, MA: The MIT Press, 1998.**
- **Joseph P. Kalt, “The Creation, Growth, and Entrenchment of Special Interests in Oil Price Policy,” Chapter 6 in Roger G. Noll and Bruce M. Owen, editors, *The Political Economy of Deregulation: Interest Groups in the Regulatory Process*, Washington, DC: American Enterprise Institute, 1983.**
- George Horwich and David Leo Weimer, “The Impact of Petroleum Market Regulations, 1973-1981,” Chapter 3, in *Oil Price Shocks, Market Response, and Contingency Planning*, Washington, DC: American Enterprise Institute, 1984.
- M. Elizabeth Sanders, “Regulating Producers,” Chapter 5 of *The Regulation of Natural Gas: Policy and Politics 1938-1978*, Philadelphia, PA: Temple University Press, 1981.
- Stephen Breyer, “Mismatch: Rent Control and Natural Gas Field Prices,” Chapter 13 in *Regulation and Its Reform*, Cambridge, MA: Harvard University Press, 1982.

15. Tues, March 11: The Energy Acts of 2005 and 2007 (Reaction Paper Due Today)

Energy Policy Act of 2005

- **Thomas site: <http://thomas.loc.gov/cgi-bin/bdquery/z?d109:h.r.00006>:**

- **Wikipedia entry:**
http://en.wikipedia.org/wiki/Energy_Policy_Act_of_2005
Energy Independence and Security Act of 2007
- **Thomas site for the Energy Independence and Security Act of 2007**
<http://thomas.loc.gov/cgi-bin/bdquery/z?d110:h.r.00006>:
- **White House Fact Sheet:**
<http://www.whitehouse.gov/news/releases/2007/12/print/20071219-1.html>
- **Wikipedia entry:**
http://en.wikipedia.org/wiki/Clean_Energy_Act_of_2007

16. Thurs, March 13: Energy Efficiency

- **Amory Lovins, Winning the Oil Endgame**
- **Kenneth Gillingham, Richard Newell, and Karen Palmer, “The Effectiveness and Cost of Energy Efficiency Programs,”** *Resources*, Fall 2004, pp. 22-25,
<http://www.rff.org/Documents/RFF-Resources-155-energyefficiency.pdf>
- **Gilbert E. Metcalf and Kevin Hassett, “Measuring the Energy Savings from Home Improvement Investments: Evidence from Monthly Billing Data,”** *Review of Economics and Statistics*, August 1999, pp. 516-528.
- **Adam Jaffe, Richard Newell, and Robert Stavins, “Energy-Efficient Technologies and Climate Change Policies: Issues and Evidence,”** *Resources for the Future Discussion Paper*, December 1999.
- **Thomas E. Copeland and Philip T. Keenan, “How Much is Flexibility Worth?,”** *The McKinsey Quarterly*, 1998, #2.
- **Thomas E. Copeland and Philip T. Keenan, “Making Real Options Real,”** *The McKinsey Quarterly*, 1998, #3.
- **James E. Smith and Robert F. Nau, “Valuing Risky Projects: Option Pricing Theory and Decision Analysis,”** *Management Science*, 1995, 41: 795-816.
- **Kenneth Gillingham, Richard Newell, and Karen Palmer, “Retrospective Examination of Demand-Side Energy Efficiency Programs,”** RFF Discussion Paper 04-19 rev, <http://www.rff.org/Documents/RFF-DP-04-19REV.pdf> .
- **William H. Golove and Joseph H. Eto, “Market Barriers to Energy Efficiency: A Critical Reappraisal of the Rationale for Public Policies to Promote Energy Efficiency,”** Lawrence Berkeley Laboratory, March 1996,
<http://eetd.lbl.gov/ea/ems/reports/38059.pdf>
- **Adam B. Jaffe and Robert N. Stavins, “The energy paradox and the diffusion of conservation technology,”** *Resource and Energy Economics*, 1994, 16: 91-122.

17. Tuesday, March 18: Climate Change—The Wedge Game

- **The Princeton Carbon Mitigation Initiative website:**
<http://www.princeton.edu/~cmi/resources/stabwedge.htm>
- **S. Pacala and R. Socolow, “Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies,”** *Science* 13 August 2004:

Vol. 305. no. 5686, pp. 968 – 972

- **Robert Socolow, Roberta Hotinski, Jeffery B. Greenblatt, and Stephen Pacala, “Solving the Climate Problem: Technologies Available to Curb CO₂ Emissions,” *Environment*, Dec 2004, volume 46, no. 10, pages 8–19.**

18. Thursday, March 20: Carbon Taxes vs. Cap and Trade

- **William A. Pizer, “Combining price and quantity controls to mitigate global climate change,” *Journal of Public Economics* 85 (2002) 409–434.**
- **Kenneth P. Green, Steven F. Hayward, and Kevin A. Hassett, “Climate Change: Caps vs. Taxes,” American Enterprise Institute Environmental Policy Outlook, June 2007.**
- **Stiglitz, Joseph (2006) "A New Agenda for Global Warming," *The Economists' Voice*: Vol. 3 : Iss. 7, Article 3. Available at: <http://www.bepress.com/ev/vol3/iss7/art3>**
- **Ian W. H. Parry, Robertson C. Williams, I11 and Lawrence H. Goulder, “When Can Carbon Abatement Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets,” *Journal of Environmental Economics and Management* 37, 52-84 (1999)**

19. Tuesday, March 25: Corporate Average Fuel Economy Standards

- **Ian Parry, Carolyn Fischer, and Winston Harrington, “Should CAFÉ Standards be Tightened?,” RFF Discussion Paper, December 2004.**
- **Andrew Kleit, “The Impact of Long-Range Increases in the CAFÉ Standard,” Working Paper, Pennsylvania State University, 2002.**
- **Andrew Kleit and Randall Lutter, “Increasing CAFÉ Standards: Still a Very Bad Idea,” AEI/Brookings Joint Center Regulatory Analysis, June 2004.**
- **Paul Portney, Ian Parry, Howard Gruenspecht, and Winston Harrington, “The Economics of Fuel Economy Standards,” *Journal of Economic Perspectives*, 2003, 17: 203-217.**
- **Partnership for a New Generation of Vehicles**
- **Energy Future Coalition/Transportation Working Group, “Analysis of Tax Credits to Stimulate Consumer Demand for Advanced-Technology, Fuel-Efficient Vehicles,” July 31, 2003.**
- **Environmental Defense, “Automakers’ Corporate Carbon Burdens: Update for 1990-2003,” August 2005**
- **World Business Council for Sustainable Development, “Mobility 2001: World Mobility at the End of the Twentieth Century and Its Sustainability”**

20. Thursday, March 27: Technology-Forcing Regulations

- **Michael Porter and Claas van der Linde, “Toward a New Conception of the Environment-Competitiveness Relationship,” *The Journal of Economic Perspectives*, Vol. 9, No. 4. (Autumn, 1995), pp. 97-118.**
- **Edward A. Parson and Jennie C. Stephens, “Reducing Automobile Emissions: Strategy and Technology,” Working Paper for chapter in book**

Feasible Improvements: Technological uncertainty and strategic behavior in environmental regulation

- **Karen Palmer; Wallace E. Oates; Paul R. Portney, “Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?,”** *The Journal of Economic Perspectives*, Vol. 9, No. 4. (Autumn, 1995), pp. 119-132.

21. Tuesday, April 1: Promoting Renewables for Electricity Production

- **Joel Darmstadter, “The Economic and Policy Setting of Renewable Energy: Where Do We Stand?,”** Resources for the Future Discussion Paper 03-64, December 2003.
- **Karen Palmer and Dallas Burtraw, “Cost-Effectiveness of Renewable Electricity Policies,”** Resources for the Future Discussion Paper 05-01, January 2005.
- **Carolyn Fischer and Richard Newell, “Environmental and Technology Policies for Climate Change and Renewable Energy,”** RFF Discussion Paper, September 2003.
- **Robert J. Michaels, “Intermittent Currents: The Failure of Renewable Electricity Requirements,”** mimeo, California State University, Fullerton.
- David Berry, “The Market for Tradeable Renewable Energy Credits,” *Ecological Economics*, 2002, 42: 369-379.
- Trent Berry and Mark Jaccard, “The Renewable Portfolio Standard: Design Considerations and an Implementation Survey,” *Energy Policy*, 2001, 29: 263-277.
- Marc Chupka, “Designing Effective Renewable Markets,” *The Electricity Journal*, May 2003, pp. 46-57.
- Angus Duncan, “Green Tags...the What, Why and How Of,” Bonneville Environmental Foundation, April 2001.

22. Thursday, April 3: Voluntary Programs for GHG Reductions

- **Delmas, Magali A. and Maria J. Montes-Sancho. 2007. “Voluntary Agreements to Improve Environmental Quality: Are late joiners the free riders?,”** University of California, Santa Barbara, ISBER Paper 07.
- **Thomas P. Lyon and Eun-Hee Kim, “Greenhouse Gas Reductions or Greenwash? The DOE’s 1605b Program,”** mimeo, Stephen M. Ross School of Business, University of Michigan.
- **Thomas P. Lyon and John W. Maxwell, “Public Voluntary Programs for Mitigating Climate Change,”** in Andrea Baranzini and Philippe Thalmann, editors, *Voluntary Agreements in Climate Policies*, Edward Elgar Press, 2004.
- Haddad, Brent M., Richard Howarth, and Bruce Paton. (2003) “Energy Efficiency and Greenhouse Gas Emissions: Correcting Market Failures using Voluntary Participation Programs,” in Andrea Baranzini and Philippe Thalmann, editors, *Voluntary Agreements in Climate Policies*, Edward Elgar.
- Karamanos, Panagiotis. 1999. “Voluntary Environmental Agreements for the Reduction of Greenhouse Gas Emissions: Incentives and Characteristics of

Electric Utility Participants in the Climate Challenge Program,” working paper, School of Public and Environmental Affairs, Indiana University.

- Lyon, Thomas P. and John W. Maxwell, (2003) “Self-Regulation, Taxation, and Public Voluntary Environmental Agreements,” *Journal of Public Economics*.

23. Tuesday, April 8: Policy Interactions

- **Lori Bird, Ed Holt, and Ghita Carroll, “Implications of Carbon Regulation for Green Power Markets,” National Renewable Energy Laboratory, Technical Report NREL/TP-640-41076, April 2007.**
- **Ryan Wiser and Steven Pickle, “Financing Investments in Renewable Energy: The Role of Policy Design and Restructuring,” Lawrence Berkeley National Laboratory, LBNL-39826, march 1997.**
- **Edward A. Holt and Ryan H. Wiser, “The Treatment of Renewable Energy Certificates, Emissions Allowances and Green Power Programs in State Renewables Portfolio Standards,” Environmental Energy Technologies Division, Lawrence Berkeley Laboratory, April 2007**

24. Thursday, April 10: **Student Project Poster Session**