

ECO 414S/3502S: Energy and Regulation

CALENDAR DESCRIPTION: This course surveys important features of energy markets and related environmental challenges. One of the central objectives is to provide an understanding of the key economic tools needed to analyse these markets. A related objective is the development of a framework for understanding the public discourse on energy and the environment. Topics include the theoretical and empirical tools necessary to analyse energy markets, the politics and history of energy, the hydrocarbon economy (oil, natural gas and coal), electricity markets, global warming and other externalities, renewable energy, conservation, carbon taxes and 'cap-and-trade'.

Prerequisites: ECO200Y1/ECO204Y1/ECO206Y1,
ECO220Y1/ECO227Y1/(STA247H1,STA248H1)/(STA250H1,STA255H1)/(STA257H1,STA261H1)
Distribution Requirement Status: This is a Social Science course
Breadth Requirement: Society and its Institutions (3)

LOCATION AND TIME: Mondays 2-5 Larkin 248

EVALUATION:

Evaluation for this course consists of a Paper worth 40%, Problem Sets worth 20%, Midterm worth 20% (held Monday February 9, 2015) and a Final Exam worth 20%.

The only generally acceptable reason for missing an exam or term test is illness. A medical certificate is required. We are asked to remind you that plagiarism and cheating are **serious** academic offences with potentially serious penalties.

RESEARCH PAPER:

- a. Undergraduates taking the course may write an overview paper analysing an energy topic of interest.
- b. Graduate students taking the course are required to include some empirical analysis in their paper.

Paper Outline is due Thursday, February 5, 2015. This is a hard deadline. Late submissions will be penalized. Please submit the outline electronically as an attachment and name the file using your name. For example, my outline would be "YatchewOutline.doc" or "YatchewOutline.pdf". Your two-page outline must contain the following:

- a. An abstract not exceeding 200 words
- b. A list of key references (be sure to do a citation search)
- c. An outline of how your analysis will be conducted and the anticipated results of your analysis
- d. If your analysis is empirical, a spreadsheet with any data that you will be using

The Paper is due Thursday, March 26, 2014. This is a hard deadline. Late submissions will be penalized 10% per day. Please submit the paper electronically as an attachment, and name the file using your name. For example, my paper would be "YatchewPaper.pdf".

COURSE MATERIALS

All items marked with an asterisk * are available electronically through University of Toronto Libraries.

Required Reading

These following two books provide broad overviews of energy issues. You are expected to have reviewed them during the first two weeks of the course.

David Buchan, *The Rough Guide to the Energy Crisis*, Rough Guides, 2010. Hardcopy is difficult to obtain as it is out of print. Available electronically at Amazon.ca on Kindle.¹

Richard Muller, *Energy for Future Presidents, The Science Behind the Headlines*, Norton 2012. Hardcopy and Kindle editions available.

Recommended:

Daniel Yergin, *The Quest*, The Penguin Press, 2011

Additional References:

Carol Dahl, *International Energy Markets*, PennWell, 2004.

Joseph Dukert, *Energy*, Greenwood Press, 2009.

Subhes Bhattacharyya, *Energy Economics*, Springer, 2011. *

Additional Sources:

International Energy Agency, <http://www.iea.org/>

- a. *Energy Statistics Manual*
- b. *Electricity Information 2013, IEA Statistics*
- c. *2011 Key World Energy Statistics*

National Energy Board (Canada)

Canadian Energy Overview 2013, Energy Briefing Note (June 2014)

Canadian Energy Dynamics 2013 – Energy Market Assessment (March 2014)

BP (formerly British Petroleum) www.bp.com/statisticalreview

- a. *Statistical Review of World Energy*
- b. *Statistical Review Workbook* (Excel spreadsheet)

Lawrence Livermore Laboratories

Energy and Carbon Flow Charts available at <https://energy.llnl.gov/>

¹ You do not need a Kindle device as Kindle books can be read on Macs and PCs.

LECTURE TOPICS AND READINGS

1. Background and Introduction (2 weeks)
 - a. David Buchan, *The Rough Guide to the Energy Crisis*, Rough Guides, 2010.
 - b. Richard Muller, *Energy for Future Presidents, The Science Behind the Headlines*, Norton 2012.
 - i. Reviews in NY Review of Books: Review of Richard Muller's book by Bill McKibben: "The Scientist Who Made a Total Turnaround", New York Review of Books, October 11, 2012. Reply by Richard Muller: "On Turning Down the Heat", New York Review of Books, November 22, 2012.
2. Energy in World History (1 week)
 - a. Roger Fouquet, "A Brief History of Energy", in *International Handbook on the Economics of Energy*, eds. Joanne Evans and Lester Hunt, 2009, Edward Elgar.
 - b. Vaclav Smil, "World History and Energy", in *Encyclopedia of Energy, Volume 6*.*
 - c. Vaclav Smil, "War and Energy", in *Encyclopedia of Energy, Volume 6*.*
 - d. Amy Myers Jaffe, "Geopolitics of Energy", in *Encyclopedia of Energy, Volume 2*.*
3. Economic Tools: Theory and Empirical Analysis. (2 weeks)
 - a. Theory:
 - i. Refer to your texts in microeconomics to review the following subject areas: supply/demand analysis; consumer and producer theory; industry structures – monopoly, oligopoly, monopolistic competition, perfect competition; game theory; externalities; public goods; taxes and deadweight loss.
 - b. Empirical Work:
 - i. David Ryan and Andre Plourde, "Empirical Modeling of Energy Demand", in *International Handbook on the Economics of Energy*, eds. Joanne Evans and Lester Hunt, 2009, Edward Elgar.
 - ii. Hendry, D. and K. Juselius (2000) "Explaining Co-integration Analysis: Part I", The Energy Journal, vol. 21, 1-42.*
 - iii. Hendry, D. and K. Juselius (2002) "Explaining Co-integration Analysis: Part II", The Energy Journal, vol. 22, 75-119.*
4. Global Warming and Other Externalities (2 weeks)
 - a. *Economists' Voice*, The Berkeley Economic Press.
 - i. Stiglitz, J. 2006, "A New Agenda for Global Warming"
 - ii. Arrow, K. 2007, "Global Climate Change: A Challenge to Policy"
 - iii. Schelling, T. 2007, "Climate Change: The Uncertainties, the Certainties, and What They Imply About Action"
 - b. Socolow, R. and S. Pacala
 - i. "A Plan to Keep Carbon in Check", *Scientific American*, pp. 50-57. September 2006.*
 - ii. "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies", *Science*, 305, pp. 968-72, 2004.*
 - c. Robert Stavins, "The Problem of the Commons: Still Unsettled After 100 Years", *American Economic Review*, 2011, 81-108.*
 - d. Robert Rohde, Richard A. Muller, Robert Jacobsen, Elizabeth Muller, Saul Perlmutter, Arthur Rosenfeld, Jonathan Wurtele, Donald Groom, Charlotte Wickham, "A New Estimate

- of the Average Earth Surface Land Temperature Spanning 1753 to 2011” 2011, Berkeley Earth Surface Temperature, <http://www.scitechnol.com/2327-4581/2327-4581-1-101.pdf>
- e. Sixteen Concerned Scientists, “No Need to Panic About Global Warming”, *Wall Street Journal*, Op-Ed, January 27 2012. William Nordaus (response) “Why the Global Warming Skeptics Are Wrong”, *New York Review of Books*, March 22 2012. Cohen et al. and Nordaus response, “In the Climate Casino: An Exchange”, *New York Review of Books*, April 26 2012. Fred Singer, “The Climate Contrarians”, *New York Review of Books*, August 16 2012.
 - f. Bill McKibben, Global Warming’s Terrifying New Math, *Rolling Stone*, July 19, 2012.
5. Regulation and Government Intervention (2 weeks)
- a. Joseph Aldy, Alan J. Krupnick, Richard G. Newell, Ian W.H. Parry, and William A. Pizer. “Designing Climate Mitigation Policy” *Journal of Economic Literature*, 2010, 48:4, 903-934.*
 - b. Martin Weitzman, “Prices vs. Quantities”, *Review of Economics Studies*, 1974, 41:4, 477-91.*
 - c. Competition Bureau Merger Enforcement Guidelines
<http://www.competitionbureau.gc.ca/>
 - d. Government of Ontario, *Making Choices: Reviewing Ontario’s Long-Term Energy Plan*, 2013
 - e. Government of Ontario, *Green Energy and Green Economy Act*, 2009,
http://www.ontla.on.ca/web/bills/bills_detail.do?BillID=2145
 - f. Richard Green and Adonis Yatchew 2012: “Support Schemes for Renewable Energy: An Economic Analysis”, *Economics of Energy & Environmental Policy*, 1, 83-98.*
 - g. David Newbery 2012: “Reforming Competitive Electricity Markets to Meet Environmental Targets”, *Economics of Energy & Environmental Policy*, 1, 69-82.*
 - h. Nicholas Stern and James Rydge 2012 “The New Energy-Industrial Revolution and International Agreement on Climate Change”, *Economics of Energy & Environmental Policy*, 1, 101-119.*
6. Oil, Natural Gas and Coal (1 week)
- a. Daniel Yergin, *The Quest*, The Penguin Press, 2011
 - b. Bil McKibben, “Why Not Frack?”, *New York Review of Books*, March 8, 2012. Reply by John Deutch, *New York Review of Books*, April 26, 2012.
 - c. Alan Riley, “The Geostrategic Implications of the Shale Gas Revolution”, NATO Paper 10, 2012.
 - d. James Hamilton, “Oil Prices, Exhaustible Resources and Economic Growth”, in the *Handbook of Energy and Climate Change*, eds. Roger Fouquet, 2013. Also available on-line as an NBER working paper.
 - e. Lutz Killian, “The Economic Effects of Energy Price Shocks”, *Journal of Economic Literature*, 2008, 46:4, 871-909.*
 - f. James Smith, 2009, “World Oil: Market or Mayhem?”, *Journal of Economic Perspectives*, 23:3, 145-164.*
 - g. Henry Jacoby, Francis Sullivan and Sergey Paltsev, “The Influence of Shale Gas on U.S. Energy and Environmental Policy”, *Economics of Energy & Environmental Policy*, 1, 37-51.*
 - h. *The Future of Natural Gas. An Inter-disciplinary MIT Study*, 2011, -
<http://web.mit.edu/mitei/research/studies/naturalgas.html>

7. Electricity (1 week)

- a. *The Future of the Electricity Grid: An Interdisciplinary MIT Study*, 2011, <http://web.mit.edu/mitei/research/studies/the-electric-grid-2011.shtml>
- b. Adonis Yatchew and Andrew Baziliauskas 2011, "Ontario Feed-In Tariff Programs", *Energy Policy*, 39, 3885-3893.*
- c. Severin Borenstein, "The Private and Public Economics of Renewable Electricity Generation", *Journal of Economic Perspectives*, 2012, 26:1, 67-92.*
- d. Lucas Davis, "Prospects for Nuclear Power", *Journal of Economic Perspectives*, 2012, 26:1, 49-66.*
- e. Paul Joskow and John Parsons, "The Future of Nuclear Power After Fukushima" *Economics of Energy & Environmental Policy*, 2012, 1, 99-114.*
- f. Hunt Alcott and Michael Greenstone, "Is There an Energy Efficiency Gap?", *Journal of Economic Perspectives*, 2012, 26:1, 3-28.*