

Elena Paltseva, September 2017

Energy and Environmental Economics

This course provides a general overview of important aspects of provision, management, and economic and political importance of energy resources and their environmental implications.

More specifically, the course will address market interactions, pricing and regulation in oil, gas, coal and electricity markets. In this discussion, we will also cover most recent developments in the energy field, such as fracking revolution in oil and gas, as well as touch upon the issues of energy security. We will proceed to address the environmental aspects of energy, talk of renewable energy, emissions and emission trading, and discuss the prospects of green energy transition. To add a broader economic perspective, we will also look into the impact of energy resources, and natural resources in general, on economic and institutional development.

This course is typically given credit by Economics departments.

Intended Learning Outcomes:

By completing this course a successful student will be able to

- Describe and analyze the key issues in functioning of electricity, oil and gas markets, and their influence on the market outcomes for consumers and producers;
- Describe and analyze the environmental aspects of energy;
- Assess advantages and disadvantages of currently used and proposed energy- and environment-related policies and regulations;
- Analyze and explain the interrelation between resources, institutional and economic development, and growth;
- Discuss and conceptualize topical issues within the field of energy and environmental economics with a group of peers.
- Use instruments such as tables, graphs, basic game-theoretical models and analytical tools to analyze the issues of energy and environmental economics.

The approaches learned in the course would also enable the student to examine economic problems in other related fields such as international trade, theory of industrial organization or political economy.

Pre-requisites:

One course in macroeconomics, one course in microeconomics and one course in calculus.

Teachers:

- Main instructor: Elena Paltseva, Assistant Professor of Economics at Stockholm Institute of Transition Economics (SITE) at the Stockholm School of Economics.
 - E-mail: elena.paltseva@hhs.se. Phone: +46 8 736 9688
- Chloe Le Coq, Associate Professor of Economics at SITE, SSE (Chloe.LeCoq@hhs.se) will be a guest teacher

Webpage: Readings, lecture notes, and other information about the course will be uploaded on the course webpage: <https://sites.google.com/a/swedishprogram.org/energy-and-environmental-economics/>. It is thus very important that you visit this webpage often.

Seminars: There will be 12 three-hour seminars, see the tentative overview below. Seminars include lectures, discussions, experiments and presentations of individual/two by two/groupwise work. The seminars are held at the Stockholm School of Economics (rooms are to be announced).

Readings: The course reading will mostly consist of articles and reports (see below for a preliminary list). There will be no single required textbook. However, occasional chapters from Subhes C. Bhattacharyya, 2011. "Energy Economics. Concepts, Issues, Markets and Governance", Springer will be used during the course.

Grading: Your grade will be calculated according to the following breakdown:

- Attendance and participation: 10 %
- Written mid-term exam: 25 %
- Case discussion/presentation: 20%
- In-class presentation of the final paper/discussion: 20 %
- Final paper: 25 %

Attendance and participation: Your regular attendance and active participation is required. Every absence will lower your overall participation grade by one step (A becomes A-, etc.). You can avoid this reduction by doing an assignment for compensating for your absence. However, this compensation opportunity is only available for a maximum of two absences. If there are any readings that you are expected to complete before the class, please come to class prepared to engage fully with the materials.

Written mid-term exam: There will be a written mid-term exam. This exam will be about the material brought up in the first part of the course.

Case discussion/presentation will be based on the same case study for the entire class. Students will form groups, and each group will present a specific aspect of this case, followed by general discussion. For example, a case can address global oil and gas industry, with questions to groups including (i) a comparison of the profitability of the oil value chain segments, and reasons for variation in profitability, (ii) a comparison of the incentives to innovate of national vs. international oil companies, (iii) advantages of relying on natural gas vs. oil in historical perspective, etc.

Final paper: At the end of the course, you are required to hand in a paper and to present your findings. Depending on the number of students taking the course, the paper is to be written by a single author or by two or three co-authors.

The subject of the paper is to be some energy economics or environmental economics. The paper should be based on a scientific approach, including a clear methodology and criticism of your

sources. Maximum length of the paper: 6000 words. You will receive more instructions, including some suggestions about potential subjects for the papers.

There are four hand-ins for your work with the paper:

- Hand-in of ideas about the subject of your paper: In this hand-in, you should suggest and briefly describe ideas for the subject you would like to write about.
Deadline XXX
- Hand-in of synopsis of your paper: Here you give an overview of your planned paper, preferably as a table of contents in which you have included descriptions of what you will include in each section.
Deadline: XXX
- Hand-in of preliminary version of your paper. This is the version of your paper that you present in class at seminars 11 and 12 and which will be discussed both by your opponents (see below) and in class.
Deadline: XXX
- Hand-in of final version of your paper. After the presentation and the discussion in class at seminars 11 and 12, you have a few days for taking comments into account and prepare the final version of your paper.
Deadline: XXX

In-class presentation and discussion of the final paper. Each of the students/groups will not only present their paper, but also act as discussant(s) to the presentation of another paper. The discussant(s) is (are) expected to critically and constructively evaluate the work of their classmate(s), with the main purpose being to help the authors to improve the paper. In order to prepare the discussion, the discussant(s) is (are) expected to receive and read a version of the paper to be presented in class. Again, you will be given a much more detailed list of instructions on how to proceed with discussion and what to focus on.

Other seminar participants are expected to actively participate in the class discussion of the paper as well. They, however, are not expected to prepare their questions/comments in advance.

Course structure and reading list (please note that the reading list is preliminary and will be updated as the course proceeds. Compulsory reading is marked by *.)

Seminar 1. Energy and environmental economics: introduction. Basics of game theory.

- *BP Energy Outlook 2017 (<https://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf>)
- *International Handbook on the Economics of Energy, 2009. Evans, J. and Hunt, L.C. (editors), Edward Elgar Ch. 1 (Fouquet, R. “A brief history of energy”) <http://libris.kb.se/bib/12736459>
- *Lior N., Sustainable energy development: The present (2011) situation and possible paths to the future, 2012. Energy, vol. 43, issue 1, pp. 174-191 http://www.seas.upenn.edu/~lior/documents/Sustainableenergydevelopment_May2011_with_omegame-changers.pdf

- *Smil, V., 2000. "Energy in the Twentieth Century: Resources, Conversions, Costs, Uses, and Consequences," Annual Review of Energy and the Environment, 25, pp. 21—51. <http://vaclavsmil.com/wp-content/uploads/docs/smil-article-2000-aree2000-1.pdf>

Seminars 2-3. Oil market. Properties of crude oil. Oil supply and demand. Market structure. Oil pricing. OPEC. Fracking and shale revolution in the oil context.

- *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, (2015), US Environmental Protection Agency, Chapter 2, http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=523539
- * Behar, Alberto, Ritz, Robert A., OPEC vs US shale: Analyzing the shift to a market-share strategy, Energy Economics (2017), <http://www.sciencedirect.com/science/article/pii/S0140988317300221>
- * Bhattacharyya, Ch. 14
- * BP energy outlook, 2016 edition, <http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2016.pdf>, section on liquid fuels
- * Dale S., (2016). "Energy in 2015: A year of plenty", BP presentation, London <http://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-spencer-dale-presentation.pdf> , section on oil markets
- * Fattouh, B. (2011). "An Anatomy of the Crude Oil Pricing System". Oxford Institute of Energy Studies, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/03/WPM40-AnAnatomyoftheCrudeOilPricingSystem-BassamFattouh-2011.pdf>, sections 1-4 (the rest is optional)
- * Samuelson, R., (2008). "Oil: An Introduction for New Zealanders" Ministry of Economic Development of New Zealand, <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/oil-an-introduction-for-new-zealanders/oil%20an%20introduction.pdf>, sections 1 and 2.4 (other sections are optional but also helpful reading)
- "Oil and Gas for Beginners: A Guide to the Oil and Gas Industry", (2013). Deutsche Bank Global Markets Research. Available online. *Highly recommended background reading on many sections of this topic and more!*

Seminar 3: Case discussion

Seminar 4. Gas market. Gas supply and demand. Exploration and Drilling. Sequential markets. Convergence and Divergence of prices.

- * Bhattacharyya, Ch. 15
- Haile, P., Hendricks, K., and Porter, R. (2010). [Recent US offshore oil and gas lease bidding: A progress report](#). International Journal of Industrial Organization, 28(4), 390-396
- Le Coq C. and R. Green (2010), [The length of contracts and collusion](#), International Journal of Industrial Organization 28(1), 21-29.
- Liski M. and J.P. Montero (2006), [Forward trading and collusion in oligopoly](#), Journal of Economic Theory 131 (1), 212-230

- Chapter 15, in Bhattacharyya, S.C. (2011): Energy Economics, Springer.

Seminars 5-6. (Chloe Le Coq) Electricity market. Experimental game. Electricity supply and demand.

- *Borenstein, S., Bushnell, J., and Wolak, (2002) [Measuring Market Inefficiencies in California's Wholesale Electricity Industry](#), *American Economic Review*, 2002, 92(5): 1376-1405.
- *Davis, L. and C. Wolfram. (2012). [Deregulation, Consolidation, and Efficiency: Evidence from US Nuclear Power](#), *American Economic Journal: Applied Economics*, 4(4): 194-225.
- Fabra, N., von der Fehr and Harbord (2006) "[Designing Electricity Auctions](#)," *Rand Journal of Economic*, Vol 37 (1).
- Newbery D. (2005). "[Electricity liberalization in Britain: The quest for a satisfactory wholesale market design](#)," *The Energy Journal*, vol. 0 (Special I): 43-70
- *Reguant M. (2014) Complementary Bidding Mechanisms and Startup Costs in Electricity Markets. *Review of Economic Studies*, 81(4): 1708-1742.
- *Wolfram C. (1999), "[Measuring Duopoly Power in the British Electricity Spot Market](#)," *American Economic Review* 89 : 805-826.

Seminar 6. Midterm examination.

Seminars 7-8. (Chloe Le Coq and Elena Paltseva) Environmental Issues. Experimental game. Institutional context. Externalities. Carbon pricing. Emission trading. Support schemes for renewables.

- * Bhattacharyya, Ch. 23-26
- H. Allcott, D. Taubinsky (2015) [Evaluating behaviorally motivated policy: experimental evidence from the lightbulb market](#), *The American Economic Review*
- Cullen, J. (2013) "[Measuring the Environmental Benefits of Wind Generated Electricity](#)", *American Economic Journal: Economic Policy*, 5(4): 107-33.
- *Fabra, Natalia and Mar Reguant. (2014). [Pass-Through of Emissions Costs in Electricity Markets](#). *American Economic Review*, 104(9): 2872-99.
- *Gerarden, Todd D., Richard G. Newell, and Robert N. Stavins. (2015) "[Assessing the Energy-Efficiency Gap](#)" Cambridge, Mass.: Harvard Environmental Economics Program.
- *Newbery N. (2008). [Climate Change Policy and Its Effect on Market Power in the Gas Market](#), *Journal of the European Economic Association*, MIT Press, vol. 6(4), pages 727-751, 06.

Seminar 9. Energy security. Definition. Index approach. REES, CERE, TRI estimates for Europe. Policy solutions.

- Bhattacharyya, Ch 20.
- *Le Coq, C. and Paltseva, E. (2009) [Measuring the security of external energy supply in the European Union](#), *Energy Policy* 37: 4474-4481.

- *Le Coq, C. and Paltseva, E. (2012) [Assessing Gas Transit Risks: Russia vs. the EU](#), with E. Paltseva, *Energy Policy*, 4: 642-650.
- Sovacool, B.K. and Mukherjee, I. (2011) ‘Conceptualizing and measuring energy security: A synthesized approach’, *Energy Policy* 36: 5343-5355

Seminars 9-10. Natural resources and economic development. Dutch disease. Resource curse. Natural resource and institutional development. Oil and democracy

- *Andersen, J., Johannesen, N., Lassen, D.D. and Paltseva, E., 2016, “Petro Rents, Political Institutions, and Hidden Wealth: Evidence from Offshore Bank Accounts”, forthcoming at JEEA, [http://paltseva.com/AndersenJohannesenLassenPaltseva\(2016\).pdf](http://paltseva.com/AndersenJohannesenLassenPaltseva(2016).pdf)
- *Ozturk, I., 2010. “A literature survey on energy–growth nexus”, *Energy Policy*, vol. 38, Issue 1, pp. 340-349 <http://www.sciencedirect.com/science/article/pii/S0301421509007071>
- *van der Ploeg, F., 2011. "Natural Resources: Curse or Blessing?," *Journal of Economic Literature*, vol. 49(2), pp. 366-420 <https://www.jstor.org/stable/pdf/23071620.pdf>
- *Ross, M., 2015 "What Have We Learned about the Resource Curse?," *Annual Review of Political Science*, <https://www.sscnet.ucla.edu/polisci/faculty/ross/papers/articles/Ross%20-%20What%20have%20we%20learned%20ARPS%202015.pdf>
- Boschini A., Pettersson J, and Roine, J., 2007. "Resource Curse or Not: A Question of Appropriability," *Scandinavian Journal of Economics*, vol. 109(3), pp. 593-617. <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9442.2007.00509.x/pdf>
- Corden, W. M., and Neary, J. P. (1982). Booming sector and de-industrialisation in a small open economy. *The Economic Journal*, 825-848. (first two sections) <https://www.jstor.org/stable/pdf/2232670.pdf>
- Ross, M.L. 2001. “Does Oil Hinder Democracy”, *World Politics*, vol. 53, pp. 325-61 https://www.researchgate.net/publication/236710633_Does_Oil_Hinder_Democracy
- Sachs, J. D., & Warner, A. M., 1995. “Natural resource abundance and economic growth”, NBER WP 5398. National Bureau of Economic Research <http://www.nber.org/papers/w5398.pdf>
- Tsui, K. K., 2011. “More Oil, Less Democracy: Evidence from Worldwide Crude Oil Discoveries,” *Economic Journal*, 121, pp.89-115 <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0297.2009.02327.x/epdf>
- Vincente, P., 2010. “Does Oil Corrupt? Evidence from a Natural Experiment in West Africa,” *Journal of Development Economics*, 92(1) <http://www.pedrovincente.org/oil.pdf>

Seminars 11-12. Paper presentation and discussions of preliminary versions of students’ papers