

# Swedish Program

## Energy and Environmental Economics

August-December 2019

### Syllabus

(preliminary version, to be updated during the course)

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 oil, gas and electricity 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:** Two courses in macroeconomics, two courses in microeconomics and one course in calculus.

#### Teachers:

Elena Paltseva, Assistant Professor of Economics at Stockholm Institute of Transition Economics (SITE) at the Stockholm School of Economics.

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Guest lecturer: Chloe Le Coq, Associate Professor of Economics at Stockholm Institute of Transition Economics (SITE) at the Stockholm School of Economics.

- E-mail: [chloe.lecoq@hhs.se](mailto:chloe.lecoq@hhs.se)

**Webpage:** Readings, lecture notes, and other information about the course will be uploaded on the course webpage. It is thus very important that you visit it often.

**Lectures:** There will be 12 three-hour lectures. They include classic lecturing, discussions, experiments, presentations of individual work, article discussions and fun facts game on energy issues. The lectures are held at the Stockholm School of Economics (see tentative overview below as well as, schedule and rooms file).

**Readings:** The course reading will mostly consist of articles and reports (see below for a preliminary list, subject to revision). 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 final grade will be calculated according to the following breakdown:

- Participation, including "fun facts game" on energy markets: 15 %
- Case discussion/presentation: 25%
- In-class presentation of the project: 30 %
- Final exam: 30 %

**Attendance and participation:** Regular attendance is mandatory. An unexcused absence may negatively affect your final grade. Your grade will not be affected if you miss a class due to illness or in the case of a (documented) emergency situation. If you have a personal or family event that conflicts with a class, and cannot be re-scheduled, you may ask your instructor for an excused absence. Such a request should be made at least one week prior to the class in question. In case of excused absence you will be asked to do an assignment on the topics you missed.

Active participation in class discussions is expected. 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.

**Case discussion/presentation** will be based on the same case study for the entire class. Each student 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 the students 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.

**Midterm Project/presentation:** Students are also expected to work on a project and present their findings in class. The subject of the project is to be within the energy economics or environmental economics, and can be either chosen from a list of potential topics offered by the teacher, or proposed by the student herself. The project should be based on a scientific approach, including a well-posed question, clear methodology and criticism of your sources. You will receive more instructions during the course.

There are two hand-ins for your work with the project:

- Hand-in of ideas about the subject of your project: In this hand-in, you should suggest and briefly describe ideas for the subject you would like to study and present about.

Deadline: Sep 11, 2019

- Hand-in of synopsis/plan of your project: Here you give an overview of your planned project, your research question, what aspects you intend to cover, etc. You can do it a bullet list/a table of contents in which you have included descriptions of what you will include in each part of your presentation.

Deadline: Sep 30, 2019

These hand-ins are then followed by in-class presentation of your project (October 23, 2019). After each presentation we have a short class discussion. Again, more information and guidance will be provided in the beginning of the course.

**Written final exam:** A 2-hour exam will be held in during the exam week, and will cover all the material of the course. It will include both analytical and essay-type questions. An example of exam questions will be provided early in the course.

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

Energy and environmental economics: introduction.

- \*BP Energy Outlook 2017 (<https://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf>) (pp.1-22 compulsory, the rest is recommended reading)
- \*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>
- 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 (sections 1-3 compulsory, the rest is recommended reading)  
[http://www.seas.upenn.edu/~lior/documents/Sustainableenergydevelopment\\_May2011\\_withsome\\_game-changers.pdf](http://www.seas.upenn.edu/~lior/documents/Sustainableenergydevelopment_May2011_withsome_game-changers.pdf)

Basics of game theory. Oil market. Properties of crude oil. Oil supply and demand. Market structure. Oil pricing. OPEC.

- \* Bhattacharyya, Ch. 14.2.1-2 (scan for historical perspective), 14.3.3.1-3
- \* BP energy outlook, 2016 edition,  
<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2016.pdf>, section on oil and 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, 3, 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>, section 1 (other sections are optional but also helpful reading)

- Wingfield, Dodge and Sam, "Oil-Producing Giants Keep the Taps Open", Bloomberg, <https://www.bloomberg.com/graphics/opec-production-targets/>
- 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>
- "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!*

Gas market. Gas supply and demand. Sequential markets. Convergence and Divergence of prices.

- \* Bhattacharyya, Ch. 15
- International Gas Union (2015), [Wholesale Gas Price Survey](#), section 1.
- 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

Shale revolution. Fracking.

- \*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](http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=523539)
- World Energy Outlook (2013), IEA, Chapter 13, <https://www.iea.org/publications/freepublications/publication/WEO2013.pdf>

Electricity market. Experimental game. Electricity supply and demand. (Guest lectures by Chloe Le Coq)

- \*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.
- Le Coq C., Orzen H. and Schwenen S., [Pricing and Capacity Provision in Electricity Markets: An Experimental Study](#) Journal of Regulatory Economics, 51(2), 123-158, 2017.
- Wolak F. [Measuring the Competitiveness Benefits of a Transmission Investment Policy: The Case of the Alberta Electricity Market](#) Energy Policy 85, 2015
- Wolfram C. (1999), "[Measuring Duopoly Power in the British Electricity Spot Market](#)," American Economic Review 89 : 805-826.

Environmental Issues. Institutional context. Externalities. Carbon pricing. Emission trading. Support schemes for renewables. (Guest lectures by Chloe Le Coq)

- \*H. Allcott, D. Taubinsky (2015) [Evaluating behaviorally motivated policy: experimental evidence from the lightbulb market](#), The American Economic Review

- Allcott, Hunt, and Michael Greenstone (2012). "Is There an Energy Efficiency Gap?" *Journal of Economic Perspectives*, Vol. 26, No. 1 (Winter), pages 3-28.
- 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.
- \*Ellerman, A. Denny, Claudio Marcantonini, and Aleksandar Zaklan. "The EU ETS: Ten years and counting", *Review of Environmental Economics and Policy*, 2016, 10 (1) pages 89-107.
- 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.
- Bhattacharyya, Ch. 23-26

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

- \*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.
- Le Coq, C. and Paltseva, E. (2014) "EU-Russia Gas Relationship at a Crossroads", in "Russian Energy and Security up to 2030", edited by Susanne Oxenstierna and Veli-Pekka Tynkkynen, Routhledge [[link to the SITE working paper version](#)]

Natural resources and economic development. Dutch disease. Resource curse. Natural resource and institutional development. Oil and democracy

- \*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](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>