

FINA 7371
The Energy Value Chain

Spring 2016

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The course provides an overview of energy economics. It applies economic concepts and analysis to understanding how and where value is created and where it is lost between obtaining raw materials and delivering energy to consumers as transportation fuel or electric power. Students will learn about the structure and operations of the transportation fuel and electric power value chains as well as how prices along the value chain are determined. The class will use that learning in considering several contemporary issues, such as the future availability of oil and gas, climate change, energy security, alternative energy development, and regulation.

The course also serves as introduction to two other energy economics courses that deal in more depth with the upstream oil and gas industry and with refining and petrochemicals.

Instructor

The instructor is D. H. Bellman. Prior to working with the Global Energy Management Institute, Professor Bellman spent thirty-five years at Exxon. He gained experience in a wide variety of functions, from acquiring raw materials, to plant operations, to sales. In the early 1990s he was Business Analysis and Strategic Planning Manager for Exxon Chemical's worldwide polymers businesses. Subsequently, he was Business Development Manager for the company's Global Polyethylene Business and involved in creating new joint-ventures, acquisitions, and investments in olefin and polymer complexes in East Asia, West Europe, Australia, Latin America, and the Arabian Gulf, as well as in the US. He earned a bachelor's degree in mechanical engineering at Duke University, and a master's degree in business administration at Stanford University.

Materials

Textbook: No required textbook

Case Studies: "The Global Oil & Gas Industry"
"Shaping the Future of Solar Power: Climate Change, Industrial Policy, Free Trade"
"First Solar, Inc. in 2010"
"Khosla Ventures: Biofuels Strategy"

These cases should be obtained using the following link:

<https://cb.hbsp.harvard.edu/cbmp/access/43542921>

Course Outline

Objective

Understanding the factors driving the evolution of energy value chains and their consequences

Requirements

1. Three homework problems
2. Small team presentation of a current energy issue
3. Three tests and four case quizzes
4. Brief final paper due by 8:00 p.m. on the day scheduled for a final exam

Class Schedule and Topics

Session 1 1/25/16

- Course overview
- Some Concepts
 - ⇒ Value chains
 - ⇒ Economic rent
 - ⇒ Traps in analysis and decision-making
- Primary and secondary energy sources
- Energy density
- Efficiency

Read: Wang & Aamoot, New York Times, June 27, 2008, "Your Brain Lies To You"

Session 2 2/1/16

- Global energy supply and demand
- Hydrocarbon origins and reserves

Read: International Energy Agency (IEA), World Energy Outlook 2015

- IEA, "World Energy Outlook Fact Sheet"
- IEA, "Golden Rules for a Golden Age of Gas" (Executive Summary)
- MPG Petroleum, "Petroleum Origins and Reservoirs"
- Simmons, "Calculating Oil and Gas Reserves"
- Maugeri, "Impoications for Prices, Geopolitics and the Environment,"

Session 3 2/8/16

- Climate change
- Pricing

Read: IPCC, "Climate Change 2014, Summary for Policy Makers"

- Bloomberg, Paulson, Steyer, June 2014, "Risky Business,"
- The Economist, March 30, 2013, "A Sensitive Matter"
- Tierney, New York Times, Sept 11, 2007, "Feel Good Vs. Do Good On Climate"
- Friedman, New York Times, Sept 19, 2007, "Doha and Dalian"
- Cohen, New York Times, December 25, 2010, "Bundle Up, It's Global Warming"

Session 4 2/15/16

- Commodity prices
 - ⇒ Degree of competition
 - ⇒ Price regimes
 - ⇒ Dynamics
- Group formation for end of term presentations

Preparation: Complete group formation

Read: Al Husseni, "Lessons Learned From 2008"

Session 5 2/22/16

- Homework discussion
- Speculation
- Electricity markets and prices
- Test #1 (Review)

Preparation: "Texas Price Crash" homework

Read: Pirrong, "Commodity Speculation: Good, Bad, Ugly?"

- Paul, New York Times, September 15, 2013, "Wall Street Exploits Ethanol Credits, and Prices Spike"

Session 6 2/29/16

- Test #1 (On Global Supply & Demand, Hydrocarbon Resources, Climate Change, Prices)
- Test #1 Answers
- Oil and gas access and exploration
- Exploration decisions

Preparation: Study for Test #1

Session 7 3/7/16

- The value of information
- Oil and gas production
- Exploration and production agreements and fiscal systems
- Homework assignment

Spring Break 3/14/16

Session 8 3/21/16

- Homework discussion
- Oil refining
- Gas processing
- Coal
- Evolution of the global oil and gas industry
- Homework assignment

Preparation: "Upstream Investment" homework:

Read: Inkpen & Moffett, "The Global Oil & Gas Industry," 2013

- University of Texas Center for Energy Economics, "NOC Performance", 2009
- OSHA, "Basic Refinery Process: Description and History, Part II"

Session 9 3/28/16

- Homework discussion
- Logistics and trade
- Transactions and financial markets
- Test #2 Review

Preparation: "Simpler World" homework

Preparation: Select and submit final group presentation topics

Session 10 4/4/16

- Test #2 (On Fossil Fuels)
- Test answer review
- Electric power generation, transmission and distribution

Preparation: Study for Test #2

Session 11 4/11/16

- Renewable energy sources
- Industrial Policy, Free Trade (case discussion)
- Commercializing new technology
- “First Solar” case discussion

Preparation: “First Solar, Inc in 2010” case for discussion
“Shaping the Future of Solar Power: Climate Change, Industrial Policy,
Free Trade” case for discussion

Read: Steinhurst, “The Electric Industry at a Glance,” January 2011

- Schwartz, “The Future of Clean Energy”
- Hastings-Simon, Pinner, and Stuchtey, “Myths and Realities of Clean Technologies”
- Wikipedia, “Smart Grids”

Session 12 4/18/16

- Energy reliability and security
- Alternative transportation fuels
- Commercialization, scale and financing
- “Khosla Ventures Biofuels Strategy” case discussion
- Test #3 review

Preparation: “Khosla Ventures Biofuels Strategy” case for discussion

Read Campbell, Reuters, January 14, 2010, “Deepwater spills and short attention spans”

- European Expert Group, “Future Transport Fuels”, January 2011 (Executive Summary)

Session 13 4/25/16

- Final exam paper review
- Test #3 (On Alternative Energy Sources)
- Presentation Workshop

Preparation: Study for Test #3

Read: Dukert, “Energy”, Chapter 8, “Looking Ahead to Sustainable Development”

Session 14 5/2/16

- Group presentations and discussion (topics to be announced in class)

Take-home exam due date 8:00 p.m. on date scheduled for final exam.