

**WORLDWIDE ENERGY CHALLENGES – SPRING 2008**  
**The George Washington University, Course Syllabus**

**General Information**

**Date and Location:** Spring Semester 2008, Hall of States  
**Course number:** PSC 250.LH  
**Meeting time:** 6:15 pm to 8:15 pm, every Monday beginning January 14, 2008

**Instructor Information**

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**Course Description**

It is hard to imagine an item more fundamental to our lives and our economy than the reliable supply of affordable, clean energy. Virtually our every activity depends on it, yet we live in an era when:

- The price of oil is \$90-\$100 per barrel and we import over 60% of our needs;
- Our CO<sub>2</sub> emissions have already increased temperatures and could do so by much more, while the nations of the world try to grapple with post-Kyoto challenges;
- Blackouts that struck 50 million Americans and 10 million Europeans could happen again;
- New nuclear plants have been proposed for the first time in the US in more than 25 years;
- The price of electricity jumped 72% in Maryland and 59% in Delaware in 2006;
- The price of heating our homes with natural gas has skyrocketed;
- New LNG terminals will increase our dependence on foreign gas supplies;
- The price of coal has tripled and been beset by rail breakdowns;
- Hurricane Katrina demonstrated the fragility of our energy supply network;
- Foreign countries have amassed huge financial surpluses from energy sales that they can use to purchase firms and infrastructure worldwide, including in the US
- Technology developments could solve what appear to be some intractable energy issues

In such a time, it is clear that the security and sustainability of energy – and our economy that depends on it - is truly in question. *The need to assess and understand our energy situation today could not be more critical.*

What's the answer to our energy challenges, or are there several? What can you personally do? Will renewables and efficiency get us there? Could we be too late? The President signed the Energy Policy Act of 2005 (Public Law 109-58) on August 8, 2005, with billions in subsidies for industry participants and consumers. Is this law dealing effectively with our energy problems? The Congress appears on the verge of passing new energy legislation – can the Democrats deliver now that they are back in control of Congress?. We'll look at EPACK 05 and any new energy legislation in detail, explore its potential impacts, and assess whether Congress should have done (and should do) more.

Overall, this course will address the key factors that determine both the current use and the future outlook for all major forms of energy – including petroleum, natural gas, coal, nuclear, electricity, energy efficiency and renewables. The environmental impacts of our energy choices will also be a critical theme, and we will address energy security as well, and what both Congress and we as individuals can do to keep our energy situation in balance.

The course will include lectures and visits from prominent energy industry representatives to discuss this timely issue.

## **Course Requirements**

Course requirements include: 1) a substantive 5-10 page energy policy paper to a key decision maker, 2) a short presentation on the topic of the policy paper; 3) a final exam; and 4) active class participation and attendance. Student presentations will begin several weeks into the semester, and will continue for the remainder of the class sessions. Throughout the course, students will be expected to share their knowledge and question their assumptions about energy supply, development and use.

**Course Outline:** The course will roughly flow according to these ten topics.

### **Topic 1 - The Big Energy Picture (SESSION 1)**

1. The Centrality of Energy in Our Lives – Modernism vs. the Stone Age
2. Worldwide Consumption of Energy –An Inexorable Increase?
3. Haves and Have-nots - The Imbalance in Resource Allocations
4. The Recent Energy Legislation – Overview
5. How Congress is (Re)Organized to Deal with Energy Issues

### **Topic 2 – Petroleum Supply and Demand (SESSION 2, Oil Supply and Refining; and SESSION 3, Oil Demand)**

1. Resources – Are we Running Out of Oil?
2. OPEC and Petroleum Trade – The Russians are Coming
3. Where is the Price of Gasoline Going?
4. What we can Do – SUVs, Hybrids and Synfuels
5. Potential Administration and Congressional Actions in Petroleum Markets

Session 2 Readings: EPACT Title III (Oil and Gas); EPACT Title IX, Sub-Title J (Ultra-Deepwater and Unconventional Gas); “Beyond Oil” 1-3; Fueling the Future, 2 and 11; “Crude Oil: Uncertainty about Future Oil Supply”, GAO-07-283, February 2007

Session 3 Readings: EPACT Title VII (Vehicles, Fuels); Title XV (Ethanol and Motor Fuels); Freedom from Oil – Part 1 (The Problem); EISA Titles I (Vehicle Fuel Economy) and II (Production of Biofuels)

### **Topic 3 - Natural Gas and LNG (SESSION 4)**

1. Why are my Gas Bills so High?
2. LNG – From Marginal Source to Mainstream
3. How Does Gas Get to my Home?
4. Should We Use Gas to Make Power?
5. How the US Government can Influence LNG Utilization

Session 4 Readings: EPACT Title III (Oil and Gas) and Title XVIII (Studies); Beyond Oil, 4

### **Begin Student Presentations: 1-2 PER WEEK THROUGH SESSION 13**

### **Topic 4 – Coal (SESSION 5)**

1. Different Coals for Different Uses
2. Is the US “the Saudi Arabia” of Coal?
3. Coal Transportation and Worldwide Trade
4. Is Coal Really Dirty? IGCCs and the NO<sub>x</sub>-SO<sub>x</sub> Revolution
5. Is the Government Doing Enough to Encourage “Clean Coal”?

Session 5 Readings: EPACT, Title IV (Coal); EPACT, Title IX, Subtitle F (Fossil R&D); Beyond Oil, 5; EISA Title VII (Carbon Capture)

**Topic 5 – Nuclear Energy (SESSION 6)**

1. Will the US Build Another Nuclear Plant? When?
2. Why Are Other Countries not Scared of Nuclear?
3. The Nuclear Energy – Nuclear Bomb Connection
4. Waste Disposal – The Achilles Heel of Nuclear Energy?
5. NRC Licensing, Risk Insurance and other Government Actions

Session 6 Readings: EPACT Title VI (Nuclear Matters); EPACT Title IX, Subtitle E (Nuclear Energy R&D); Beyond Oil, 8; Fueling the Future, 6

**Topic 6 – Electricity Generation and Transmission (SESSION 7, Power Generation, and SESSION 8, Electric Transmission)**

1. Is Power Generation a Competitive Business?
2. Federal Legislation – PURPA, EPAct, Order 888, and a possible new Energy Bill
3. Does the Nation’s Energy Superhighway have Potholes?
4. The Federal-State Tension in Power Regulation
5. Superconductivity and Other Technologies
6. The Value of Having Reliable Power

Session 7 Readings: EPACT Title XII (Electricity); EPACT Title XIII, Subtitle A

Session 8 Readings: EPACT Title XII (Electricity); EISA Title XIII (Smart Grid)

**Topic 7 – Electricity Efficiency and Retail Consumption (SESSION 9)**

1. Do we Use too Much Juice? What can you do?
2. What Happened in California?
3. Making Power on Site – The Challenges of Cogeneration
4. State Regulation, Utility Commissions and Setting Rates – Fairness vs. Finance
5. The Potential for Energy Efficiency
6. National and State Initiatives to Mitigate the Growth in Electricity Demand

Session 9 Readings: EPACT Title 1 (Energy Efficiency), EPACT Title IX, Subtitle A (Energy Efficiency R&D); EISA Titles III (Appliances & Lighting), IV (Buildings and Industry) and V (Government and Public Institutions)

**Topic 8 – Energy and the Environment (SESSIONS 10, 11 AND 12)**

**SESSION 10 – Energy-Environmental Impacts; SESSION 11 – Global Warming; SESSION 12 – Renewable Energy**

**Environmental Initiatives (SESSION 10)**

- a. Relative Environmental Impacts of Energy Sources
- b. Can we be Clean and Not Diminish Our Lifestyle?
- c. Scarce Resources - The Need for Clean Water
- d. The Role of Energy Efficiency
- e. Cost-Benefit Analysis
- f. The US Regulatory and Legislative Effort – CAIR, CSI and Other Programs

### **The Global Warming Debate (SESSION 11)**

- a. The Kyoto Accords – What Comes Next?
- b. The Six Greenhouse Gases (GHGs) and their Potentially Devastating Impacts
- c. Has this Administration done Enough?
- d. The Impact of Other Countries Emissions.
- e. Cap and Trade versus Carbon Taxes – What’s Best? Do Voluntary Measures Work?
- f. Potential Legislation to Mitigate CO2 and other GHG emissions

### **Renewable Energy (SESSION 12)**

- a. How Should we Define “Renewable”?
- b. Are Renewables Really More Expensive? Which Ones?
- c. Getting Renewables to Market - Renewable Portfolio Standards
- d. How Much Could Renewables Contribute?
- e. What is the Proper Role of the States and Federal Government, and does the Government Invest Enough in Renewables?

Session 10 Readings: EPACT Title I (Energy Efficiency), Fueling the Future 8; the green book; EISA Title VII (Carbon Capture)

Session 11 Readings: EPACT Title XVI (Climate Change); the green book

Session 12 Readings: EPACT Title II (Renewables); EPACT Title IX (Renewables R&D), Subtitle C; Fueling the Future 9; the green book; EISA Titles VI (R&D), XI (Transportation) and XII (Business Programs)

### **Topic 9 – The Worldwide Politics and Security of Energy (SESSION 13)**

1. Who Uses the Most, and Who Depends on Others?
  2. Is Energy Security Synonymous with Homeland Security?
  3. Sleeping Giants - China and India on the World Stage
  4. Could the Need for Energy Lead to Conflict? Has it Already?
  5. Multi-Lateral Institutions (e.g., World Bank) – Worthwhile?
  6. US Government Relations with Other Countries vis-à-vis Energy
- Session 13 Readings: Freedom from Oil, Part II (Solutions); EISA Title IX (International)

### **Topic 10 – The Longer Term Future: Year 2050 (SESSION 14)**

1. The Future Energy Mix – More of What?
2. Can the Developing World Avoid the Mistakes of the Developed?
3. The Hydrogen Economy – Should we Make the Switch?
4. Are we on the Right Track? What should we do to get there?
5. What is the Government’s Long-Term Vision of our Energy Future? What New Technologies are Under Development or Nearly Commercialized? Is it Enough?

Session 14 Readings: EPACT Title VIII (Hydrogen); EPACT Title XVIII (Studies); Beyond Oil, 6, 7 and 10; Fueling the Future, 4 and 13; EISA Title II (Biofuels); EPRI Prism study

### **REQUIRED TEXTS** (I can provide EPACT 05 and EISA; others available from on-line vendors)

1. “The Energy Policy Act of 2005” (EPACT 05, Public Law 109-58), 109<sup>th</sup> Congress.
2. “The Energy Independence and Security Act of 2007” (EISA), HR6
3. “Freedom from Oil”, David Sandalow, McGraw Hill, 2008
4. “Fueling the Future: How the Battle Over Energy is Changing Everything”, Heintzman and Solomon (Editors), Publishers Group West, 2005.
5. “Beyond Oil: The View from Hubbert’s Peak”, Ken Deffeyes, Hill and Wang, 2005
6. “the green book”, Elizabeth Rogers and Thomas Kostigen, Three Rivers Press, 2007

The instructor will also provide other readings on-line, including industry white papers, trade association studies, newspaper articles and consultants' reports.

### **OPTIONAL OTHER GOOD ENERGY BOOKS**

1. "Energy Victory", Robert Zubrin, Prometheus Books, 2007
2. "Power Down: Options and Actions for a Post-Carbon World" Richard Heinberg, New Society Publishers, 2004
3. "The Long Emergency: Surviving the Converging Catastrophes of the 21<sup>st</sup> Century", James Howard Kuntsler, Atlantic Monthly Press, 2005
4. "The Bottomless Well: the Twilight of Fuel, the Virtue of Waste, and Why we Will never Run out of Energy", Peter W. Huber and Mark P. Mills, Basic Books.
5. "An Inconvenient Truth", by Al Gore, Rodale Books, 2006.