

School of Public Policy  
School of Industrial and Systems Engineering

**Energy Technology and Policy**

PUBP 8803D

ISYE 8803

Wednesday 1:30-4:30 pm

Location: ESM 212

Instructors: Drs. Valerie Thomas and Marilyn Brown

**Course Description**

This course examines the policies and technologies affecting the production and use of energy, focusing in particular on innovative and sustainable energy options. The course provides a fundamental understanding of energy systems, including historical trends of supply and demand, resources and technologies, and related economic, global climate change, and security issues. Policies and technology associated with different energy systems will be examined including plug-in hybrid electric vehicles, ethanol, and other alternative transportation fuels; smart buildings and advanced lighting; industrial ecology approaches; solar and wind systems; and the next generation of nuclear energy. Policies will be examined at the national and international scale, and at the state and local level where novel approaches are often first introduced. Given the ubiquitous nature of energy in modern society, this course will offer insights for students pursuing a diversity of careers. The course has no formal prerequisites.

**Texts:**

- *Energy and American Society – Thirteen Myths*. B. K. Sovacool and M. A. Brown (eds.), 2007. ISBN-13; 978-1-4020-5563-8.
- *Physics of Societal Issues*. David Hafemeister. Springer, 2007.

**Grades and Examinations**

Class Participation: 10%  
Class project: 25%  
Mid-term exam: 20%  
Final exam: 25%  
Homework, Quizzes: 20%

Because of the highly interactive nature of the course, *10 percent* of the student's grade depends on general class participation. Students are expected to come to the class having read the assigned readings and prepared to discuss the material. The instructors will encourage dialogue by helping the students lay out the facts, pose questions, and help the class discover and understand the underlying principles.

Students will work in teams to complete a class project dealing with some energy policy or energy technology issue. The results will be summarized in a presentation to the class near the end of the semester. The project is worth *25 percent* of each student's grade.

There will be two exams: *20 percent* of the grade is based on a mid-term exam and *25 percent* of the grade is based on the final exam.

The remaining *20 percent* of the grade is based on the completion of homework and quizzes.

## Schedule and Reading Assignments

### Week 1 (January 9). VT and MB

#### Energy Overview

Overview of energy issues: history of energy use; energy, climate and the economy.

- A Thousand Years of Energy Use in the United Kingdom. *The Energy Journal* **19**(4). Fouquet R and Pearson PJG, 1998.
- *Developing an "Energy Sustainability Index" to Evaluate U.S. Energy Policy*, Marilyn A. Brown and Benjamin K. Sovacool, Georgia Institute of Technology School of Public Policy Working Paper, December 2006 (<http://www.spp.gatech.edu/faculty/workingpapers.php>).
- *Hafemeister*. Chp. 10 (pp. 249-262) The Energy Situation

### Week 2 (January 16). VT

#### Petroleum

*Ending the Energy Stalemate*. National Commission on Energy Policy. Chapter 1, pp. 1-18.

[http://www.energycommission.org/files/contentFiles/report\\_noninteractive\\_44566feaabc5d.pdf](http://www.energycommission.org/files/contentFiles/report_noninteractive_44566feaabc5d.pdf)

- *Hafemeister: Chp. 10 pp. 262-266*. 16.6 Petroleum Economy (pp. 417-421). Energy/Environment Chronology, pp. 446-453.
- The End of Cheap Oil, Colin J. Campbell and Jean H. Laherrere, *Scientific American* **278** (3) March 1998, pp. 78-83.

### Week 3 (January 23). VT and MB

#### Nuclear Energy

- The Future of Nuclear Power (MIT). Executive Summary and Chapter 1. <http://web.mit.edu/nuclearpower/>
- *Hafemeister* Chapter 1, section 1.1: Nuclear Age, Nuclear Proliferation (pp. 3-5); Chapter 5 (pp. 105-128) Nuclear Proliferation; Chapter 7 Nuclear Pollution (pp. 163-170, 7.7 Geologic Repositories p. 185-190); Fusion Power (pp. 333-334); Plutonium Economy (pp. 422-425).

### Week 4. (January 30). MB

#### Coal and Carbon Sequestration

- Rubin, *Introduction to Engineering and the Environment*, Chapter 5. Electric Power Plants and the Environment.

- Hawkins, D. G., D. A. Lashof, and R. H. Williams (2006) “What to Do about Coal,” *Scientific American*, **195** (3), 68-75.
- Socolow, R. H. (2006) Can We Bury Global Warming, *Scientific American*, July 2005, pp. 49-56.
- Hafemeister: Air and Water Pollution 6.1, 6.2, 6.3, 6.4, pp. 137-144 (Acid Rain pH, Clean Air Act and Allowance Trading, Pollution Scaling).
- The Future of Coal (MIT)

### **Week 5. (February 6). VT & MB**

#### **Wind and Solar Energy, Biopower, Renewable Portfolio Standard**

- Lovins, Amory (1976) “Energy Strategy: The Road Not Taken”, *Foreign Affairs*, 65 – 96.
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Seven – Renewable Energy Systems Could Never Meet Growing Electricity Demand in America” by Rodney Sobin
- *Hafemeister*: Renewable Energy Chapter 13. Solar Buildings Chapter 12.

### **Week 6. (February 13) MB**

#### **State Energy Policies.**

#### **Energy Policy Act of 2005 and the Georgia State Energy Plan (Exercise 3)**

- *State Energy Strategy for Georgia*, Selected Readings, December 14, 2006 (<http://www.georgiaenergyplan.org/>).
- Brown, Marilyn A. and Sharon (Jess) Chandler, 2008. “Governing Confusion: How Statutes, Fiscal Policy, and Regulations Impede Clean Energy Technologies,” *Stanford Law and Policy Review*, forthcoming.
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Six – The Barriers to New and Innovative Energy Technologies are Primarily Technical: The Case of Distributed Generation (DG)” by Benjamin K. Sovacool and Richard F Hirsh

### **Week 7. (February 20) MB & VT**

#### **Review of Key Concepts for Midterm**

#### **Energy Efficiency: Buildings and “Smart Growth”**

- Sovacool and Brown, *Energy and American Society*, “Energy Myth Nine – Energy Efficiency Improvements Have Already Maximized Their Potential” by Amory B. Lovins
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Ten – Energy Efficiency Measures are Unreliable, Unpredictable, and Unenforceable” by Edward Vine, Marty Kushler, and Dan York
- IPCC (Intergovernmental Panel on Climate Change). 2007. *Mitigation Options for Residential and Commercial Buildings*, Chapter 6: “*Climate Change 2007: Mitigation of Climate Change*.”
- *Hafemeister*: Chapter 11 Energy in Buildings; Chapter 14 Enhanced End-Use Efficiency (through 14.6 p. 364).

**Week 8. (February 27) Midterm Exam  
Continuation of Buildings and “Smart Growth”**

**Week 9. (March 5). MB & VT  
The Electric Grid, Transportation Energy Policy, and Plug-in Hybrid Electric Vehicles. MB**

- *Siting Critical Energy Infrastructure*. National Commission on Energy Policy, pp. 4-21. <http://www.energycommission.org/ht/display/ContentDetails/i/1580/pid/493>
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Eight – Worldwide Power Systems are Economically and Environmentally Optimal” by Thomas R. Casten and Robert U. Ayres
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Four – The Hydrogen Economy is a Panacea to the Nation’s Energy Problems” by Joseph Romm
- Hafemeister: 14.8 Utility Load Management, pp. 365-371.

**Industrial Ecology and Industrial Efficiency.  
Natural Gas, Combined Heat and Power, Cogeneration.**

- Sovacool and Brown, *Energy and American Society*, “Energy Myth Six – The Barriers to New and Innovative Energy Technologies are Primarily Technical: The Case of Distributed Generation (DG)” by Benjamin K. Sovacool and Richard F Hirsh
- Daniel Yergin and Michael Stoppard, “The Next Prize,” *Foreign Affairs*, Vol. 82, No. 6, July/August 2003, pp. 103-114.
- *Hafemeister*. 14.7 Cogeneration, pp. 364-366.

**Week 10 (March 12) VT  
Transportation Efficiency. Biofuels and Hydrogen**

- Keith, D. W. and Farrell, A. E. (2003) “Rethinking hydrogen cars,” *Science*, **301**, 315 – 316.
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Three – High Land Requirements and an Unfavorable Energy Balance Preclude Biomass Ethanol from Playing a Large Role in Providing Energy Services” by Lee R. Lynd, et al.
- *Ending the Energy Stalemate*. National Commission on Energy Policy. Chapter 4E (Non-Petroleum Transportation Fuels), pp. 70-78.  
[http://www.energycommission.org/files/contentFiles/report\\_noninteractive\\_44566feaabc5d.pdf](http://www.energycommission.org/files/contentFiles/report_noninteractive_44566feaabc5d.pdf)
- *Hafemeister*. Transportation Chapter 15 pp. 378-396.

**Spring Break March 17-21**

**Week 11. (March 26). MB  
Climate Change. Carbon Dioxide and Other Greenhouse Gases**

- Sovacool and Brown, *Energy and American Society*, “Energy Myth Twelve – Climate Policy Will Bankrupt the U.S. Economy” by Eileen Claussen and Janet Peace
- “What Drives the Ice Age Cycle?” *Science* **313** 28 July 2006, p. 455.
- *4<sup>th</sup> Assessment Report. Summary for Policymakers* by Intergovernmental Panel on Climate Change, 2007.
- Collins, et al. 2007. “The Physical Science Behind Climate Change,” *Scientific American*, pp. 64-73, August.
- *Hafemeister*, Chapter 8 Climate Change.

### **Week 12. (April 2). VT**

#### **Technologies to Address Climate Change**

- Socolow, R. and S. W. Pacala (2006) “A Plan to keep Carbon in Check”, *Scientific American*, **195** (3), 50-57.
- *Strategic Plan* (U.S. Department of Energy, Climate Change Technology Program, DOE/PI-0005) September, 2006, Chapters 1-3, pp. 1-56 ([www.climatetechnology.gov](http://www.climatetechnology.gov)).
- Cruzen, P. “Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?” *Climatic Change* **77**: 211-217, 2006.

### **Week 13. (April 9). MB**

#### **Climate Policy: UNFCCC, Kyoto Protocol and Carbon Trading**

#### **& Project Presentations**

- *Ending the Energy Stalemate*. National Commission on Energy Policy. Chapter 2, pp. 19-29.  
[http://www.energycommission.org/files/contentFiles/report\\_noninteractive\\_44566feaabc5d.pdf](http://www.energycommission.org/files/contentFiles/report_noninteractive_44566feaabc5d.pdf)
- Sovacool and Brown, *Energy and American Society*, “Energy Myth Thirteen – Developing Countries Are Not Doing Their Part in Responding to Concerns about Climate Change” by Thomas J. Wilbanks

### **Week 14. (April 16). MB and VT**

#### **Project Presentations**

### **Week 15 (April 23) MB & VT**

#### **Global Energy Policy**

#### **Review of Key Concepts for Final Exam**

- Sovacool and Brown, *Energy and American Society*, “Conclusions – Replacing Myths with Maxims: Rethinking the Relationship Between Society, Energy, the Future, and Sustainability, by Benjamin K. Sovacool and Marilyn A. Brown
- Vaitheeswaran, Vijay V. (2003), *Power to the People – How the Coming Energy Revolution Will Transform Industry, Change Our Lives, and Maybe Even Save the Planet*, Farrar, Straus and Giroux, New York. Chapter 11: “Micropower Meets Village Power”

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**Schedule for Class Projects and Final Exam**

March 12: 250-word Summary of Topic for Class Project

March 26: Quality draft of Class Project Report

April 25 (Friday): Final Project Report Due

April 29 (Tuesday): Final Exam 11:30 am - 2:20 pm