# Environmental Studies 12:
# Energy and the Environment

Winter 2009
Lectures: Tu/Th 10-11:50
X-hour: W 3-3:50
Room: 101 Fairchild

Prof. Andy Friedland
111 Steele Hall
646-3609
Office hours: M 11-12/Th 2-3 & by app't

**Course Description:** Every few years, it seems there's another "energy crisis." In the 1970s, the interruption of oil supplies from the Persian Gulf caused economic upheaval and inconvenience in the United States and other oil-importing nations and raised the issue of energy supply and scarcity. Energy production and use play key roles in a variety of environmental issues such as urban air pollution, acid deposition, environmental justice, the contamination and eutrophication of coastal ecosystems, and global climate change. Today, global climate change and the fluctuating price of oil (>$145/barrel for the first time ever in summer 2008 now down to ~$40/barrel) are receiving the most attention. Hence a "sustainable" energy system must address questions of both resource scarcity and the long-term environmental and economic impacts of energy technologies. This course provides an examination of principles governing the different energy supplies western societies have used, the impacts of energy use, and the major challenges that lie ahead in moving towards more sustainable energy systems in western society. We will draw on concepts and methods from environmental science, environmental studies, energy engineering, and occasionally economics. The course will teach students to analyze a variety of sustainable energy futures from an interdisciplinary applied science perspective. The main objective of this course is to give an understanding of the challenges that will confront our developed country in achieving a sustainable energy future.

**Readings:**

Wolfson, Richard. 2008. Energy, Environment, and Climate. W.W. Norton, New York. Chapters as assigned in syllabus.

Monitor writings by Lisa Margonelli (http://www.newamerica.net/people/lisa_margonelli) and columns related to energy by Thomas Friedman (NY Times) as well as readings available from the Rocky Mountain Institute (www.rmi.org).

Handouts and supplementary readings identified on Blackboard or given out in class.

**Films/Documentaries on Reserve in Jones Media Center** (all streamed except Oil On Ice):
*Who Killed The Electric Car*, *The China Syndrome*, *Oil On Ice*, *A Crude Awakening*

**Course Requirements and Grading:**

Course evaluation will be based on an energy brief (15%), a personal carbon audit (15%), a midterm examination (25%), a final examination (25%), a "Most Viable Energy Choice" Poster (done in groups of 5) (15%) and attendance and participation (5%).

***READ THIS!!!*** *The* ***Academic Honor Principle*** *applies to all Dartmouth students at all times. I recognize the importance of the Honor Principle and expect you to do so as well. I encourage* ***students with disabilities****, including "invisible" disabilities like chronic diseases, learning disabilities, and psychiatric disabilities to discuss with us after class or during office hours appropriate accommodations that might be helpful to them. Some students may wish to take part in* ***religious observances*** *that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please see me before the end of the second week of the term to discuss appropriate accommodations.*

## Lectures and Readings

| Date | Topic | Reading |
|---|---|---|

"Ch" refers to Chapter in the book by Wolfson; links to all other articles can be found in the "Readings" section of Blackboard.

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|---|---|---|
| 01/06 | Introduction and Energy Conversions | Ch 1, 2 |
| **Part I: The Status Quo in the US (with frequent discussion of renewables)** | | |
| 01/08 | Current Fuel Supply (with hints to the future) | Ch 3, 5 (→ 130) |
| 01/13 | Energy Demand | Ch 5 (130→ end) |
| **01/14 x-hour** | Nuclear Power in the Existing Electricity Supply | Ch 7 *China Syndrome* |
| 01/15 | Remaining Electric Supply including Hydro | Ch 10 (292→ 304) |
| 01/16 | **Energy Brief Due at 11 AM** | |
| **Part II: Environmental Impacts of Conventional Technologies** | | |
| 01/20 | Ecosystem Impacts of Conventional Fuel Systems | Ch 6, 14 |
| 01/22 | Human Health Impacts of Conventional Fuel Systems | pgs. 199-210, Blkbd |
| 01/27 | Assessing Greenhouse Gas Emissions from Non-fossil Fuel Energy Sources<br>**Guest Lecture**: Prof. Rich Wolfson, Middlebury | |
| **01/28 x-hour** | "Creating Your Poster" Workshop Guest instructor: Susan Simon<br>Half of class meets in Starr Instructional Center in Jones Media Center | |
| 01/29 | Global Climate Change & Future Energy Programs | Ch 12, 13 |
| 01/30 | **Carbon Audit Due at 11 AM** | |
| 02/03 | Power Plant Tour—*Meet at Power Plant* | Ch 4, Blackboard |
| **02/04 x-hour** | "Creating Your Poster" Workshop Guest instructor: Susan Simon<br>Half of class meets in Starr Instructional Center in Jones Media Center | |
| **Part III: Potentially Renewable & Innovative Energy Systems** | | |
| 02/05 | Solar Thermal and PV | Ch 9 |
| 02/10 | Ethanol, Hydrogen, ANWR and Other Proposals | Blackboard |
| 02/12 | Objectives for A Successful US Energy Program | |
| **02/17** | **In-class Exam (closed book)** | |
| 02/19 | The Next Generation of Wind Energy | Ch 10 (304→ end |
| | **Guest Lecture**: Sam Fairchild, CEO<br>Energy Composites Corporation | Ch 11 |
| 02/24 | Ground Source Heat Pumps<br>**Guest Lecture**: Prof. Charlie Sullivan | Ch 8 (→ 242) |
| 02/26 | Hydroelectric: A Closer Look | Blackboard |
| 03/03 | The Special Case of Personal Transportation | *Who Killed Elec Car?* |
| 03/05 | Weighing the Energy Sources and the Costs | Ch 15, 16 |
| **03/10** | **Posters due--Poster Session in Class** | |
| **03/10** | **Take-home final handed out in class** | |
| **03/16** | **Take-home Final Exam due at 10 AM** | |