

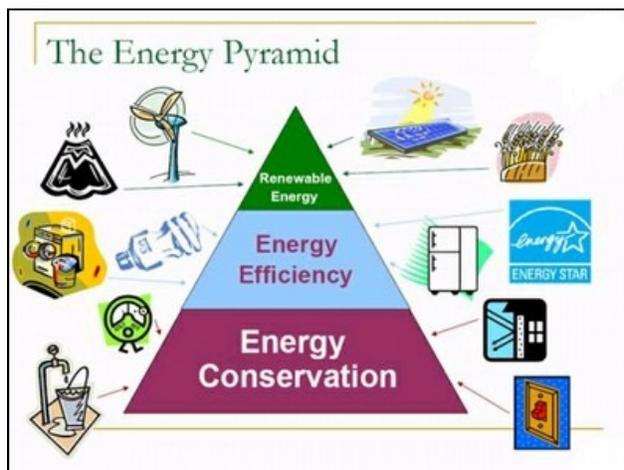
GARP 0232-001 Sustainable Energy (Fall 2011)

Location/Time: Monday/Wednesday, 15:50 to 17:15 in Bates 05
Instructor: Dr. Carsten Braun, Office hours MWF 12:00 to 13:00, Wilson 201
cbraun@westfield.ma.edu

What is Sustainable Energy?

Sustainable energy is the supply of energy that it meets our needs today without compromising the ability of future generations to meet their needs. A broad interpretation includes fossil fuels as transitional sources. A narrow interpretation includes *only* energy sources not expected to be depleted in a time frame relevant to humans.

Sustainable energy is an important piece of our energy future, but the largest opportunities are currently in energy conservation and efficiency. (Source: <http://www.smartenergysavings.net/>).



This course explores sustainable energy as an alternative to our current fossil fuel-based energy system. Weekly readings and discussions cover sustainable energy choices, sources and technology, energy conservation, climate impacts, and policy choices. We will also incorporate hands-on activities, the Stabilization Wedges Game, field trips, guest speakers, and other group activities to learn more about exciting technologies to reduce global greenhouse gas emissions.

Learning Goals and Outcomes

Learning Goals	Leaning Outcomes – At the end of this course, you will be able to:
Knowledge of Sustainable Energy Sources and Technologies	1) Differentiate between sustainable, renewable, carbon-free, and carbon-neutral energy and between energy sources, energy carriers, and energy uses. 2) Evaluate existing and emerging sustainable energy technologies and their global environmental, economic, and societal impacts.
Appreciation of Sustainability and Equity Issues	1) Recognize the connections between energy use, population growth, climate change, and global sustainability. 2) Discuss issues of global equity between and within generations related to sustainable energy and sustainable development.
Increase Information Literacy	1) Identify and process different types of information and sources and evaluate their usefulness, applicability, and availability. 2) Evaluate the quality, accuracy, reliability, objectivity, and timeliness of the information and sources.
Practice Critical Thinking	1) Effectively select appropriate modes of inquiry, analysis, interpretation, evaluation, synthesis, and communication. 2) Have confidence in your critical thinking skills despite uncertainty, ambiguity, or controversy.

Course Logistics

We meet twice a week for 75 minutes. The first class will typically introduce the topic(s) for each week and provide content and background information. A reading/homework activity will prepare us for the more discussion-based second weekly class meeting.

Our course is structured around three themes as summarized in the table below.

Course Schedule and Topics	
Theme 1 The Big Picture (~3 weeks)	What is sustainability: issues of global equity and development What is sustainable energy? Energy use, energy efficiency, and energy conservation Fossil fuels and Peak Oil The energy, population, pollution, food, and global warming conundrum
Part 2 'Cool' Technologies (~9 weeks)	Cool sun and hot wind! Geothermal energy = unlimited power 5 miles below us! Nuclear energy = sustainable energy? Electricity = the solution? Sustainable biofuels and biomass vs. food supply Transportation of the 21 st century – cars? Other options: tides, rivers, fusion, fuel cells, waste, cities, etc.
Part 3 Now What? (~3 weeks)	Solutions: The Stabilization Wedges Game Geoengineering and artificial trees Carbon sequestration and storage = Clean Coal? Economics: carbon taxes, carbon trading, carbon offsets Politics and policy: a portfolio of no-regrets solutions Personal Action Plan: Let's practice sustainability!

The specific allocation of time and topics is somewhat flexible and depends on current events, student interest, and the availability of guest speakers.

➔ This is your course!

We will debate, discuss, talk, question, analyze, evaluate, challenge, listen, present, read, write, review, revise, engage...in-short: we will learn. But, what you take away from this course depends on your interest and engagement – this is not a course to sit back and passively wait for learning to happen!

Typically, one or two students will serve as discussion facilitators each week: they will provide an overview/summary of the assigned reading (using MS PowerPoint) and then facilitate our conversation and discussion.

We will also 'play' the excellent Stabilization Wedges Game created by the Princeton Carbon Mitigation Initiative. The Stabilization Wedges Game is a team-based exercise that teaches players about the scale of the greenhouse gas problem, plus technologies that already exist to reduce our carbon emissions and get us off the path toward damaging climate change.

I will also try to invite suitable guest speakers. I have a few ideas for guests, but suggestions are always appreciated!

Textbooks

There are no mandatory textbooks for this course – the reading material will be provided either as hardcopies or online. However, please consider these five excellent books for purchase:

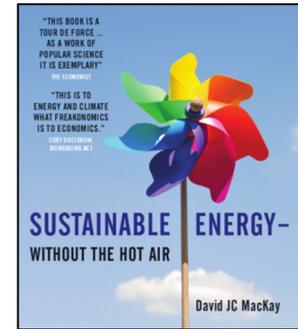
Evans (2007): *Fueling Our Future – An Introduction To Sustainable Energy*
ISBN-13: 978-0521684484, 192 pages, Paperback: \$25.99, Kindle: \$12.47

Gautier (2008): *Oil, Water, and Climate – An Introduction*
ISBN-13: 978-0521882613, 392 pages, Paperback: \$47.99, Kindle: \$31.20

MacKay (2009): *Sustainable Energy – Without The Hot Air*
ISBN-13: 978-0954452933, 384 pages, Paperback: \$32.31, Kindle: \$29.08
Free available online at <http://www.inference.phy.cam.ac.uk/withouthotair/>

Dresner (2008): *The Principles of Sustainability*
ISBN-13: 978-1844074969, 224 pages, Paperback: \$29.40

Alley (2011): *Earth: The Operators' Manual*
ISBN-13: 978-0393081091, 479 pages, Paperback: \$18.08, Kindle: \$13.49
<http://earththeoperatorsmanual.com/>



Assessment

Comprehensive Resource Portfolio (10 percent)

- You will compile an online resource portfolio (e.g. blog, website, wiki, etc.) = a resource for yourself and others with information and resources related to sustainable energy.
- This resource portfolio may include: useful websites with short descriptions, collection of papers and articles, listing of books and other materials, useful and interesting figures, graphs, pictures, data sets, case studies, contact information of local/regional experts, etc.

Expert Paper (30 percent)

- You will write a short, professional paper using a predefined format about one exciting sustainable energy technology = you will become an expert in that particular technology. You can choose whatever technology you find interesting (with prior approval).

Homework/Reading Assignments (20 percent)

- Six to ten assignments designed to offer reflection, additional in-depth study, interesting case studies, applications, relevant connections, or context for our in-class discussions.

Personal Action Plan With Action (20 percent)

- Here you get to practice sustainability in the real world! This can include a wide variety of hands-on activities, projects, or lifestyle changes (with prior approval). Your report has to include a documentation of your activities, a critical evaluation, and a personal action plan for your future.

Lighting Talk (10 percent)

- Towards the end of the course we will present lighting talks (5 minutes, 10 MS PowerPoint slides) about what we think are the biggest challenges and most promising solutions related to sustainability and sustainable energy.

Discussion Facilitator (10 percent)

- Everybody will at least once serve as discussion facilitator and provide an overview/summary of the assigned reading (using MS PowerPoint) and then facilitate our conversation and discussion.

→ I will provide you with detailed information about the specific requirements and expectations.

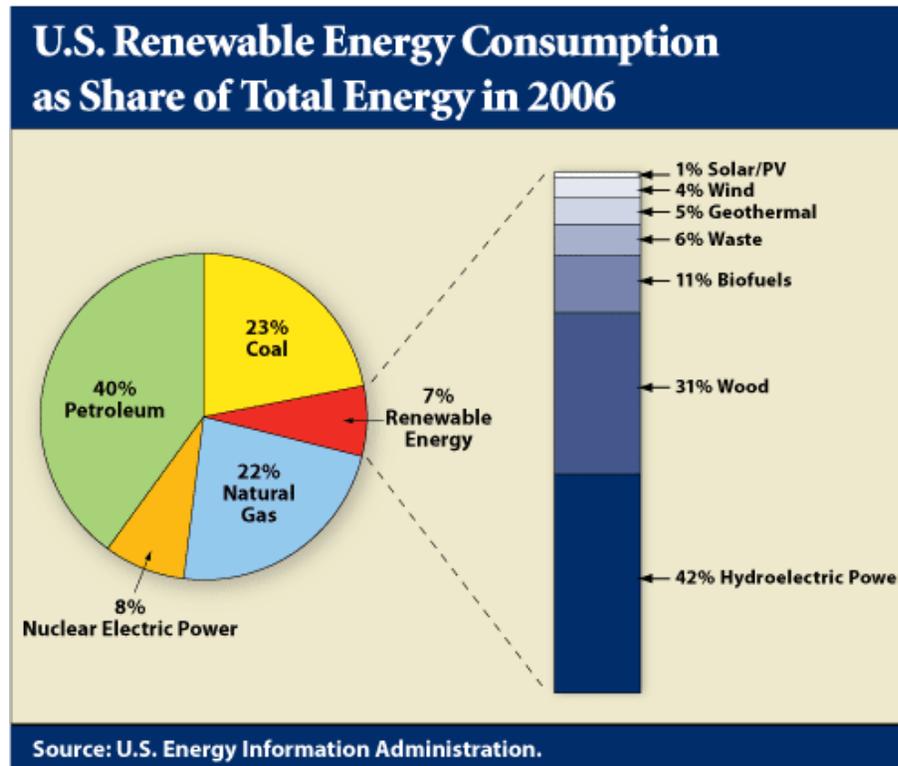
A Few Notes and Rules

- Adjustments to the schedule and assessment may be necessary to account for unforeseeable or unavoidable situations during the semester.
- Attendance is mandatory – skipping class is simply unacceptable.
- If you have to miss a class, please inform me in advance to make arrangements.
- It is your responsibility to keep up with the course material, hand-outs, assignments, due dates, grades etc. over the course of the semester.
- It is your responsibility to seek additional help and support as needed.

→ If you feel that you are not progressing as well as you hoped, please feel free to talk to me during my office hours or a mutually convenient time – the sooner the better!

Please do not wait until the end of the semester.

Course website: <http://www.westfield.ma.edu/cbraun/teaching/sustainable-energy/>



Source: <http://www.window.state.tx.us/specialrpt/energy/renewable/>