BGS 370: Energy Technology and Policy

Semester: Fall 2013
Location: CBA 4.348
Day/Time: M & W from 9:30 – 11:00 am
Course Listing: BGS 370
Unique #: 03130

Instructor: Carey King, Ph.D.
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Office hours: M 11:00 am – 12:00 pm (noon), Tu 2:00 pm – 3:00 pm, and by appointment but unavailable on every other Thursday (starting Sept. 5).

Course Summary

Technology development for energy production and consumption is the driving force behind the broad economic growth that the world has experienced over the last two centuries. This economic prosperity has generally followed the production and consumption of fossil fuels. Machines and high density fossil fuels replaced animate work by humans and animals in the farm, and we have been free to develop increasingly 'productive' technologies and systems. Due to issues ranging from fossil resource depletion and related cost increases, environmental constraints, and geopolitical security, much of the world is looking to transition to renewable energy resources and technologies. However, there is tremendous debate on the feasibility and capabilities of future energy production options, both fossil and renewable.

This class presents students with background information to understand the broad context of energy production and consumption in the United States and world overall. The class begins with background material discussing past energy trends and fundamentals of energy and power including the different physical forms in which energy is stored and transformed. With these fundamentals, the class will explore different energy resources, environmental impacts, and societal uses for these energy resources. After this class, students should have an *appreciation and understanding* for the different schools of thought with regard to future energy technology options.

Grading Schedule

10%: General class participation (attendance) and commentary on reading materials in class and online (Canvas course organization, replacing Blackboard)
45%: Homework
30%: End of term final exam
15%: Term (short) paper the running class homework theme "Saudi America: Destiny or Fantasy?"

Textbooks:

1. *The Bottomless Well* by Peter W. Huber and Mark P. Mills (2005). Basic Books.
2. *Limits to Growth: The 30-Year Update* by Donella Meadows, Jorgen Randers, and Dennis Meadows (2004). Chelsea Green Publishing.
3. *Energy in Nature and Society: General Energetics of Complex Systems* (Smil, 2008). The MIT Press.

The Bottomless Well:
Summary Quotes

Preface: "What lies at the bottom of the bottomless well isn't oil, it's logic. Fuels recede, demand grows, efficiency makes things worse, but logic ascends, and with the rise of logic we attain the impossible – infinite energy, perpetual motion, and the triumph of power. It will all run out but we will always find more." (Preface of *The Bottomless Well*)

Limits to Growth: The 30-Year Update:
Summary quotes:

"If current predictions of population growth prove accurate and patterns of human activity on the planet remain unchanged, science and technology may not be able to prevent either irreversible degradation of the environment or continued poverty for much of the world." – Royal Society of London and U.S. National Academy of Sciences, 1992 (Chapter 4 of *Limits to Growth*: *The 30-Year Update*)

"Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about". - Union of Concerned Scientists (1992) as quoted in *Limits to Growth: The 30-Year Update* (Chapter 1, p. 15).

<u>Energy Data Sites and other References:</u>

1. Energy Information Administration: www.eia.doe.gov
    a. *Annual Energy Review:* http://www.eia.gov/totalenergy/data/annual/index.cfm
    b. *Annual Energy Outlook:* http://www.eia.gov/forecasts/aeo/
    c. International Energy Statistics: http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm#
    d. *International Energy Outlook,* 2005, 2008, EIA
2. *BP Statistical Review of World Energy:* www.bp.com/statisticalreview/
3. Davis and Diegel, *Transportation Energy Data Book*, US Department of Energy: http://cta.ornl.gov/data/index.shtml
4. Hall, C. A. S., & Klitgaard, K. A. (2012). *Energy and the Wealth of Nations: Understanding the Biophysical Economy* (1st ed.): Springer.
5. Smil, V. (2003). *Energy at the Crossroads: Global Perspectives and Uncertainties*. Cambridge, Mass.: MIT Press.

Observance of University policies:
Standard University policies relating to accommodation for students with disabilities and to scholastic dishonesty will be followed in this course. Information regarding these policies may be found in the General Information Bulletin.

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD.

Known upcoming absences:
By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

If you must miss a class for any reason other than a religious holy day, please notify me at least 2 classes in advance so that we can make arrangements for completing any assignments.

Measurement and evaluation:
Standard overall course/instructor evaluations will be administered at the end of the course, as well as periodic topical evaluations specifically focused on course improvement.