Energy Resource Scarcity, Technology, and Mitigation Strategies

Instructors

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Credit Hours: 2 credit hours

Meeting Times: Twice a week for 48 minutes each meeting

Grading System: Letter grades

Course Goals

- Discussion of the looming oil scarcity in the world and natural gas in North American continent.

- Discussion of the energy use in the United States, and the implications of the scarcity of hydrocarbon fuels.

- Discussion of energy technologies, past, present and future.

- Discussion of mitigation strategies.

Course Content

- Oil depletion in the United States and the world. What heavy reliance of foreign sources imply for the economy?
- How will the transportation sector cope with scarce supplies?
- What are the geopolitical implications of reliance on Middle Eastern?
- North American natural gas depletion. How is natural gas used? Energy flow through the US economy.
- Coal use and electricity generation in the US economy. Global warming concerns.
- Nuclear fuels and nuclear technology.
- "Well-to-wheel" approach for comparing alternative energy pathways.
- Past and present energy technologies. Coal, nuclear, hydro, and natural gas based power plants. New technologies based on wind, biomass and solar energy.
- Solutions to scarcity of hydrocarbon fuels. The special challenges of the transportation fuels
- The myth of the "hydrogen economy" as a solution.
- Building of local structures; public transportation, revitalization of cities, energy efficient housing, and community sustainable agriculture.

Upon completion of this seminar course, a student, irrespective of background, will be able to:

- Critical evaluation of prospects for growth or decrease in oil and natural gas production.
- Evaluation of the prospects for renewable energy sources making up for the depletion of hydrocarbon fuels.
- Evaluation of the issues of continued burning fossil fuels as the relate to global warming, such as positive feedback from reduction of ice cover of Greenland, Gulf Stream slow down, thawing of permafrost.
- Evaluation of the prospects new energy technologies.
- Evaluation of mitigation strategies.

Outline of Topics

Week	Topics Covered	Writing Assignments
1	Oil depletion in the United States and the world.	
2	Transportation as the main user of oil. The special challenge of fuels for transportation. Concepts of "well-to-wheel" energy and emission analysis: a useful tool for comparing alternate energy pathways	**Short essay** on the *pros* and *cons* of methods of prediction
3	Natural gas depletion in the United States and the world	**Short essay** on energy efficiency of various modes of transportation
4	Natural gas use in the United States, residential and commercial sector, industrial use, and electricity generation.	**Short essay** on liquefied natural gas.
5	Coal use and global warming. New coal technologies and energy pathways.	
6	Nuclear energy, its waste and nuclear threats.	**Short essay** on world's fossil fuel trends
7	Disturbing trends in the economy of the United States. The "hydrogen economy": myth or reality?	**Comprehensive Paper** on relevant topics selected by groups and work continued until end of quarter
8	Mitigation strategies at the federal and state levels. Use of taxes, zoning regulations, and public infrastructure projects.	
9	Mitigation strategies by localities and individuals. Public transportation, community sustainable agriculture, modes of living.	
10	Student Presentations of **Comprehensive Paper**	

Each lecture period will constitute 30-35 minutes of actual lecture/presentation followed by 10-15 minutes of group discussion, in which participation by all students is mandatory.

Assignments and Grade Assessment

- Group Discussions: 10% of grade
- 4 Short Essays (see above): 40% of grade
- Comprehensive Paper: 25% of grade (each student must write independently)
- Presentation (Group) on Comprehensive Paper: 25% of grade

Reading Material

- Source material available through Carmen web site at http://carmen.osu.edu (course notes by instructors and reading materials, useful web links)
- Beyond the Oil, The View from Hubbert's Peak by Kenneth S. Deffeyes, Hill and Wang, New York, 2005.

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- Knowingly providing or using assistance in the laboratory, on field work, or on a course assignment unless such assistance has specifically been authorized;
- Submitting plagiarized work for an academic requirement. Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas;
- Submitting substantially the same work to satisfy requirements for one course that has been submitted in satisfaction of requirements for another course, without permission of the instructor of the course for which the work is being submitted;
- Engaging in activities that unfairly place other students at a disadvantage, such as taking, hiding or altering resource material, or manipulating a grading system.

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Any violations of the above policies will be reported to the University Committee on Academic Misconduct. Students who cheat in class may receive a failing grade on the assignment in question or in the class in general. Students who violate the computing policy may also be denied access to University Computing Resources.