

## EMSC 470W – CAUSE 2013 – SUSTAINABLE ENERGY IN SCANDINAVIA: ONE REGION, MANY CHOICES

<b>Meeting:</b>	Thursday 6:00p-9:00p									
<b>Credits:</b>	3 (Sp)+1(Su) & 2(Fa)									
<b>Location:</b>	8 Deike (CAUSE Classroom)									
<b>Prior Classes:</b>	<a href="http://www.ems.psu.edu/~elsworth/courses/cause2013/">http://www.ems.psu.edu/~elsworth/courses/cause2013/</a>									
<b>This Class:</b>	<a href="http://www.ems.psu.edu/~elsworth/courses/cause2015/2015_emsc_470W.pdf">http://www.ems.psu.edu/~elsworth/courses/cause2015/2015_emsc_470W.pdf</a>									
<b>Texts:</b>	" <u>The Quest: Energy, Security, and the Remaking of the Modern World.</u> " <i>Daniel Yergin</i> . 2011. ISBN-10:1594202834 (TQ) " <u>Energy Myths and Realities: Bringing Science to the Energy Policy Debate.</u> " <i>Vaclav Smil</i> . 2010. ISBN-10:0844743283 (EMR) " <u>Energy Transitions: History, Requirements, Prospects.</u> " <i>Vaclav Smil</i> . 2010. ISBN-10:0313381771 (ET)									
<b>Facilitators:</b>	<table><tr><td><i>Derek Elsworth</i></td><td>231 Hosler</td><td><a href="mailto:elsworth@psu.edu">elsworth@psu.edu</a></td></tr><tr><td><i>Semih Eser</i></td><td>114A Hosler</td><td><a href="mailto:seser@psu.edu">seser@psu.edu</a></td></tr><tr><td><i>Jonathan Mathews</i></td><td>126 Hosler</td><td><a href="mailto:jmathews@psu.edu">jmathews@psu.edu</a></td></tr></table>	<i>Derek Elsworth</i>	231 Hosler	<a href="mailto:elsworth@psu.edu">elsworth@psu.edu</a>	<i>Semih Eser</i>	114A Hosler	<a href="mailto:seser@psu.edu">seser@psu.edu</a>	<i>Jonathan Mathews</i>	126 Hosler	<a href="mailto:jmathews@psu.edu">jmathews@psu.edu</a>
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### Course Description

This course will investigate the political, economic, scientific and technological factors driving the recovery and utilization of energy in contemporary society by contrasting past- and planned-development in Scandinavia, plus Iceland and the Netherlands. In particular, we will chart the catalysts of enabling energy technologies, the necessity of abundant sources of inexpensive energy, and the evolution from agrarian to industrial economies in each of these countries. Current status and future developments will be viewed from constraints on natural resources, contemporary views of environmental protection, and new trends in green engineering and industrial ecology of energy and materials flows.

Case studies/class presentations will focus on the significant role that energy resources have played in the evolution of the energy economies of these countries. Findings will be compiled in essays, papers and in an illustrated travel journal to be used online by future Penn State students. The course will include a ~14 day research expedition to Iceland, Scandinavia and the Netherlands in the third and fourth weeks of the summer semester (May ~17th-31st). We may be joined both in-class (electronically) and on the field excursion (in person) by students from the University of Utrecht in the Netherlands.

### COURSE OBJECTIVES

#### Content

- Review the scientific principles of energy conversion and power generation for a technical understanding of transforming natural resources into desired forms of energy.
- Survey the environmental impact of power generation in different energy systems in the context of their social, cultural, political, economic, technological and environmental conditions.
- Track the development of energy conversion technologies in Scandinavia, Iceland and the Netherlands, and compare and contrast them.

#### Process

- Conduct effective teamwork and collaborative learning
- Read critically, analyze thoughtfully and write effectively
- Present insightful and effective oral presentations
- Develop video and audio communication skills

### SCHEDULE AND TOPICS

#### 1. Introduction

**January 15:** Introduction: Themes, Teams, Practices and Travel Information

Prepare by watching: <http://fallmeeting.agu.org/2012/events/union-frontiers-of-geophysics-lecture-professor-sir-bob-watson-cmg-frs-chief-scientific-adviser-to-defra/>

## 2. Energy and Society – Myths and Realities (EMR)

**January 22:** History of Energy and Discussion. SE

## 3. Contemporary View of Energy and Society – Global (TQ)

**January 29:** A US and Global Perspective on Petroleum & Natural Gas. **Team 2**

*Running Out: Peak Oil and Its Meaning (EMR) Section 4. pp. 60-78*

**February 5:** A US and Global Perspective on Coal. **Team 1**

*Sequestration of Carbon Dioxide (EMR) Section 5. pp. 79-97*

**February 12:** Discussion of travel possibilities

*Bring a computer and three destinations per person that fit your project needs*

**February 19:** A US and Global Perspective on Nuclear Energy. **Team 3**

*Nuclear Electricity.... (EMR) Section 2. pp. 31-43*

**February 26:** A US and Global Perspective on Non-Depletable Energy Resources. **Team 4**

*Soft-Energy Illusions (EMR) Section 3. pp. 44-54*

*Liquid Fuels from Plants (EMR) Section 6. pp. 98-115*

*Electricity from Wind (EMR) Section 7. pp. 116-132*

## 4. Investigation of Component Countries

**March 5:** A continued role for coal? The challenges and solutions. **JPM**

*Spring Break and Submission of Research Proposals*

**March 19:** TBD – The Netherlands and Denmark

**March 26:** TBD – Sweden and Norway

**April 2:** TBD – Iceland

## 5. Historical View of Energy and Society – Regional (ET)

**April 9:** TBD - Energy Systems – Their Basic Properties. ET 1. **Team 1**

**April 16:** TBD - Global Transitions. ET 2. **Team 2**

**April 23:** TBD - National Transitions. ET 3. **Team 3**

**April 30:** TBD - Coming Transitions. ET 4. **Team 4**

## COURSE REQUIREMENTS

### Assignments

Critical review papers (3) on the presentation topics

An eight- to ten- page paper to review the class presentation topics with appropriate references to the texts and other literature sources. Submit essays electronically within one week of class presentation. **Team**

Oral presentations (3) in class

An electronic file of the presentation (.ppt/.pdf) should be submitted electronically one day before the presentation. **Team**

Research project

Teams will submit proposals for research projects to be carried out before and during the travel. Research proposals are due on March 1, 2015 and interim research reports are due on August 1, 2015. Final reports will be due at the close of the Fall 2015 semester. **Team**

### Grading

Oral Presentations	30%
Review Papers	30%
Research Proposal and Research Report	25%
Participation and Creativity	15%
Total	100%

## ADDITIONAL INFORMATION

### Organization of the Course

This course is organized around two anchors: oral presentations and overseas expedition. Oral presentations are in turn anchored around the readings from the course texts.

Coupled reading assignments from the three textbooks for oral presentations do not necessarily represent topical matches in all cases, but suggest topics and discourses to be selected for oral presentation and discussion. In all presentations the teams must try to reflect interrelationships in a Science, Technology and Society (STS) context. Teams were selected to provide, when possible complementary competencies by the members to cover both technical and non-technical aspects. The second anchor, the overseas travel, will be beneficial if the teams design good research projects to pursue both before and during the expedition.

Individual essays, team papers, e-portfolios, and research projects will facilitate, document, and integrate individual and collaborative learning. Peer evaluations will be sought for all team assignments and will be used in assigning grades earned from those team assignments. This is a challenging course that requires effective teamwork and good individual effort to become STS scholars of energy and to improve communication skills.

**Academic Conduct:** Penn State's policy on academic integrity applies to all aspects of course deliverables. Students are encouraged to work together, in groups, but to submit independent contributions where appropriate, and collaborative contributions where noted. Further details are available at:

[www.ems.psu.edu/students/integrity/index.html](http://www.ems.psu.edu/students/integrity/index.html)

**Attendance Policy:** Attendance, participation and engagement are required. Absence will be questioned.

**Accessibility:** Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Office for Disability Services (ODS) Web site provides contact information for every Penn State campus: <http://equity.psu.edu/ods/dcl>. For further information, please visit the Office for Disability Services Web site: <http://equity.psu.edu/ods>

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <http://equity.psu.edu/ods/guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.