Princeton University
Woodrow Wilson School of Public and International Affairs
Spring 2007

WWS-402d: Policy Task Force

Development of Policy Initiatives for the Sustainable Use of Energy at Princeton University

Room 012 Robertson Hall
Tuesdays 7:30-10:00 PM

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Overview

Compelling evidence that climate change is occurring as a result of emissions of carbon dioxide from fossil fuel combustion now exists. In addition, increasing global demand for oil in the face of limited global supply is driving up oil prices. For both these reasons there is a growing need and interest in reducing our demand for fossil energy and replacing fossil fuel based energy with alternative energy sources that do not contribute to climate change nor increase our dependence on foreign oil. Although the U.S. federal government has taken little action to mitigate climate change, states, local municipalities and now universities are increasingly taking action themselves. The objective of this task force will be to recommend policy initiatives that Princeton University can undertake to become a leader among universities in reducing emissions of greenhouse gases. The task force will utilize findings from a student initiated seminar conducted in fall 2006 under the Princeton Environmental Institute entitled "ENV-ST01 Toward an Ethical Greenhouse Gas Emissions Trajectory for Princeton University" in which student teams

investigated available methods for using energy more sustainably including increasing the energy efficiency of buildings and vehicles, harnessing solar or geothermal energy on campus, and purchasing electricity and fuel from low-GHG emitting sources. This task force will also examine initiatives that are underway at other Universities and determine which might be applicable to Princeton. The ultimate goal of the task force will be to make recommendations to senior members of the Princeton administration on effective policy measures that Princeton can implement to become a world-leader in the sustainable use of energy.

Structure and Calendar

The goal of the task force is for each student to write a research paper that will contribute to the group report. Sessions in the early part of the semester will consist of lectures and relatively extensive reading. Later sessions will focus more on individual research topics, establishment of the objectives of the group report, and finally on the presentation of the group report to senior administrators at Princeton University. Initial readings for the task force are either available on Blackboard, are on reserve in the Woodrow Wilson School library, are available on world wide web sites described below and identified during the semester or will be distributed in class.

The calendar for the task force described below is subject to modification as the semester progresses. We will have several guest speakers who are still being scheduled. Our initial plan is that each student will spend the first eight weeks of the semester on a research paper that will form the basis of the group report. Paper outlines will be due on Tuesday March 6 in class, for discussion with the director and advice from the senior commissioner and graduate consultant during week 6 (mid-term week). Week 7 will be used to discuss how to integrate the individual research topics into a group research project and report. Week 8 will be used for consultation with the director (no group meeting is scheduled). Semi-final individual papers will be due on Friday April 6 (the second week following spring break). Week 9 and 10 (April 10 and 17) are for oral presentations of individual reports, and for discussion of the content of the final report. A draft of the final report, prepared by the senior commissioner, will be presented at the session on April 24 with a final report available for approval on April 27. Final revised papers will be due by Friday May 4, 2000. We will plan to present to senior Princeton administrators during reading period the week of May 7, 2006.

Individual papers are expected to be approximately 20 double-spaced pages in length (or 10 single spaced pages with spaces between paragraphs), with tables, graphs and references additional. **Each report should be preceded by an abstract which distills the essence of the findings of the report into one paragraph**. The end of each paper should be followed by a list of references that were consulted in writing the paper. Web sites, interviews, and paper documents should all be listed here. The final group report will synthesize the major goals and objectives identified in the individual papers. Appendices may be used to provide additional details.

Readings are available on Blackboard or via web links provided below. Additional material is on reserve in Stokes Library.

Schedule

Week 1- February 6, 2007.
Scientific Evidence for Climate Change and Policy Initiatives – Speaker: Denise Mauzerall.

An excellent way to obtain an overview of climate issues is to watch Al Gore's film "An Inconvenient Truth". If you have not already seen the movie, please try to see it before the first class. It is available electronically via Blackboard under our class, "Course Materials/ Films" on certain specified computers on-campus (see Blackboard site for details).

Required Reading

Please be sure to read the following articles which are available under "Course Materials/Global Climate Change Overview" on blackboard and by following the links below.

Hansen, Jim. "The Threat to the Planet." *New York Review of Books*. Vol. 53, No. 12, July 13, 2006, pp. 12-16.

Rosen, Richard A. Ruth f. Weiner, and reply by Jim Hansen. "The Threat to the Planet: An Exchange. *New York Review of Books*. Vol. 53, No. 14, September 21, 2006, p. 98. http://www.nybooks.com/articles/19304

A summary report for policy makers by the Intergovernmental Panel on Climate Change was just released on Friday February 2, 2007. It provides an overview of the findings of an international assessment of climate change science. Please read the article in the New York Times, "Science Panel Calls Global Warming Unequivocal" summarizing its conclusions at:
http://www.nytimes.com/2007/02/03/science/earth/03climate.html
Please also read the summary report which is available at:
Intergovernmental Panel on Climate Change (IPCC) . *Climate Change 2007: The Physical Science Basis, Summary for Policymakers*, February 2007.
http://www.ipcc.ch/SPM2feb07.pdf

Supplementary Material (on reserve in Stokes Library)

Flannery, Tim. *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth*. New York: Atlantic Monthly Press, 2006. ISBN 10: 0-87113-935-9, or

Gore, Al. *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. Emmaus, PA: Rodale, 2006. ISBN 13:978-1-59486-567-1

Week 2 – February 13, 2007 – Princeton Speakers Tom Nyquist, Director of Engineering and Shana Weber, Sustainability Director.
Energy supply and demand on campus, monitoring of energy use, future demands and conservation efforts. Campus sustainability plans and campus organizations and administrative entities working on sustainable use of energy. Princeton policy environment. Where are the opportunities?

Please look over the web sites listed below:

Association for the Advancement of Sustainability in Higher Education
http://www.aashe.org/about/programs.php

American College and University President's Climate Commitment,
http://www.aashe.org/presidentsclimatecommitment.php

College Sustainablity Report Card http://www.endowmentinstitute.org/sustainability/

Campus Climate Challenge. http://climatechallenge.org/

Supplementary Material on reserve in Stokes:

Sustainability on Campus: Stories and Strategies for Change. Edited by Peggy F. Bartlett and Geoffrey W. Chase. The MIT Press. 2004.

Greening the Ivory Tower: Improving the Environmental Track Record of Universities, Colleges, and Other Institutions. By Sarah Hammond Creighton. The MIT Press. 1998.

Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century: Lessons in Smart Management for Administrators, Staff, and Students. By Julian Keniry. National Wildlife Federation. 1995.

Field trip to Princeton's co-generation plant to be scheduled.

Week 3 – February 20, 2007. **Princeton Speakers Tom Kreutz and Michael Gillenwater, instructors for ENVST01_F2006, Towards an Ethical CO_2 Emissions Trajectory for Princeton.**

Please read the final report that integrates the individual team reports (will be made available on blackboard). In addition, please look over the individual team report documents available on Blackboard under: "CourseMaterials/StudentTeams/FinalReports&Workbooks/".

In addition, please familiarize yourself with various Mitigation Options. The articles below are available on Blackboard under Course Materials or by following the links below. Be sure to read the first three articles and then choose among the rest.

S. Pacala and R. Socolow, Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies. *Science* vol. 305 August 2004.

Jochem, Eberhard K. "An Efficient Solution." *Scientific American*, September 2006, Vol. 295 Issue 3, pp. 64-68.

Kammen, Daniel M. "The Rise of Renewable Energy." *Scientific American*, September 2006, Vol. 295, Issue 3, pp. 85-93.

American Solar Energy Society, Tackling Climate Change: Carbon Emission Reductions from Energy Efficiency and Renewable Energy by 2030, January 2007.

Heywood, John B. "Fueling Our Transportation Future." *Scientific American*, September 2006, Vol. 295, Issue 3, pp. 60-64.

Martinot, Eric, Renewable Energy Gains Momentum: Global Markets and Policies in the spotlight, *Environment*, 48:26, July/August 2006.

Martinot, Eric. *Renewables 2005 Global Status Report*. Prepared for REN21 Network by The Worldwatch Institute. pp. 1-35.

Is It Time to Shoot for the Sun? *Science*. Vol. 309 July 2005. pp. 548-551.

US Department of Energy. "A Consumer's Guide to Energy Efficiency and Renewable Energy." 2005. www.eere.energy.gov

US Department of Energy. "Building Technologies Program." 2006. www.eere.energy.gov/buildings

Ram, B., W. Musial and S. Butterfield. "Energy from Offshore Wind." National Renewable Energy Laboratory. Feb. 2006. Houston, TX.

"The Renewable Portfolio Standard: How It Works and Why It's Needed." American Wind Energy Association. Oct. 1997. http://www.awea.org/policy/rpsbrief.html

"Wind Power Today: Federal Wind Program Highlights." U.S. Department of Energy. Apr. 2005. http://www.nrel.gov/wind/pdfs/37147.pdf

Tester, Jefferson W., Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, and William A. Peters. *Sustainable Energy: Choosing Among Options*. MIT Press, 2005. Just out last year, this tome is a comprehensive quantitative introduction to energy technologies, with extensive discussion of non-technical issues. (on reserve in Stokes)

US Green Building Council. 2005. www.usgbc.org.

Carbon Mitigation Initiative, Princeton Environmental Institute, Princeton University. http://www.princeton.edu/%7Ecmi/

Week 4 – February 27. Initiatives at Harvard. Michael Crowley.

Below is a listing of annotated web sites provided by Michael Crowley. Please look them over as well as the Harvard Sustainability Pledge press release (on blackboard) before his visit:

Broad Harvard Policy on Energy / Sustainability
Our Sustainability Principles, which were signed by the President, have proven to be quite effective for us: http://www.greencampus.harvard.edu/about/principles.php

Particular Initiatives
For an overview of the Harvard Green Campus Initiative's (HGCI) funding structure: http://www.greencampus.harvard.edu/about/funding.php

This structure is important to understand because explains the context of each initiative's evolution within the HGCI.

The HGCI's Programs are orientated around behavioral change and green building projects. An overview of our Programs can be found here: http://www.greencampus.harvard.edu/about/programs.php

You may want to focus on our Green Campus Loan Fund (GCLF). This is a $12 mil. fund that is used to finance energy conservation projects across campus. To date we've loaned over $8.5mil in projects with a median ROI of 29%. See: http://www.greencampus.harvard.edu/gclf/. The latest fund statistics are on Blackboard for your reference.

Green Campus Issues
Use of RECs vs. Offsets
The HGCI has focused heavily on purchasing RECs. (see

http://www.greencampus.harvard.edu/cre). We are also in the process of launching a more formalized renewable energy research initiative that will compare the benefits of purchasing RECs vs. investing in onsite renewables. To date we haven't focused very heavily on offsets.

President's Climate Commitment
At Harvard, we've noticed that the President's endorsement of our program (especially by the signing of our Sustainability Principles) has certainly helped our University stakeholders to prioritize their climate change mitigation and environmental efforts. Yet, it would have been difficult to receive this endorsement had it not been for the many small, successful projects that we have achieved across the campus. These projects enabled us to garner real grassroots support that filtered up to the Presidential level. Leith Sharp published a paper describing this grassroots strategy, which you can access here: http://www.greencampus.harvard.edu/about/documents/green_universities.pdf

Pledging Carbon Neutrality
We firmly believe in the value of setting greenhouse gas reduction goals. As I'm sure you're aware, Yale University has taken the lead in this effort:
http://www.yale.edu/sustainability/greenhouse_fin1.pdf
We've been encouraging the Harvard administration to take similar measures. Harvard students have also overwhelmingly endorsed the idea. Last semester the undergraduate student body passed a resolution by 83% calling for the Faculty of Arts and Sciences to reduce their GHG emissions to 11% below 1990 levels by 2020. (Yale's commitment is 10%, hence Harvard's push to 11%!). Here's an article about the resolution in the Harvard Crimson: http://www.thecrimson.com/article.aspx?ref=516203 . Here's a link to the student's white paper:
http://www.hcs.harvard.edu/~eac/vote/positionpaper_studentversion.pdf

Increasing visibility
Our behavioral change programs use social marketing techniques to communicate environmental issues and influence the behavior of the University population. Our pledge campaign is good example one of these efforts. Every fall before Thanksgiving break we ask students, faculty and staff to commit to a series of energy conservation actions, including shutting down computers and electronics before leaving for break. If 50% of a building's occupants sign the pledge, then Harvard purchases RECs to offset 10% of its GHG emissions. Here's link to the Pledge's website:
http://www.greencampus.harvard.edu/pledge/forms/pledge.php. I've also attached a press release that summarizes the results of the 2007 pledge.

Use of sexy technologies
We certainly see value in the use of sexy, yet expensive technologies. The GCLF has committed to funding any onsite renewable technologies, regardless of the payback (the loan, however, must still be paid back within 5 years). We have used external grant sources such as the Massachusetts Technology Collaborative, http://www.mtpc.org/. The MTC partially funded a 36 kw photovoltaic array at the Business School,
http://www.hbs.edu/news/releases/102103_solar_panels.html

Week 5 – March 6. Initiatives at Yale. Julie Newman

Please see the Yale Office of Sustainability web site: http://www.yale.edu/sustainability/

Week 6 – March 13. Discussion of other university greenhouse gas emission reduction strategies. Students will be asked to each choose a university and report on their findings of key policy approaches and initiatives. Universities to consider examining include:

New York University, NYU Green Action Plan, http://www.nyu.edu/about/green.html

University of Colorado, Colorado Environment Center, http://ecenter.colorado.edu/greening_cu/index.html

Brown University, Brown Environmental Action Network, http://www.brown.edu/Students/BEC/

Tufts University, Sustainability Efforts at Tufts, http://www.tufts.edu/tie/tci/TuftsSustainability.htm

University of Connecticut, Office of Environmental Policy, http://www.ecohusky.uconn.edu/sustainabledesign.html

University of California, University of California Sustainability Policies and Best Practices, http://www.ucop.edu/facil/sustain/

Middlebury College, Carbon Reduction Resolution, http://www.middlebury.edu/administration/enviro/initiatives/carbon_reduction_resolution.htm

College of the Atlantic, Press Release: College of the Atlantic Commits to "Net Zero" Greenhouse Gas Emissions, http://www.coa.edu/html/pressreleases_199.htm

Spring Break March 19-23, 2007

Week 7 – March 27, 2007 Individual Consultations. No class meeting.

JP outlines due by March 27 at the latest. Feel free to turn them in early for earlier feedback. We will discuss the outlines during the individual meetings.

Week 8 – Week of April 3.

Discussion of integration of individual research into group research project and report. Overall objectives. Goals of presentation to Princeton administrators.

See WWS MPA workshop report prepared last semester for the NJ Department of Environmental Protection on strategies for NJ to reduce its carbon dioxide emissions: "The Garden State in the Greenhouse Climate Change Mitigation and Coastal Adaptation Strategies for New Jersey". This report is organized in a way that may be a good template for the integrated report for the task force.
http://www.princeton.edu/~mauzeral/teaching/wws591a_report.pdf

Draft research papers due, Friday April 6, 2006.

Week 9 – April 10, 2007. Oral presentations start. Discussion of final report.

Week 10 – April 17, 2007. Oral presentations continue.

Week 11 – April 24, 2007. Presentation of final report. Discussion of revisions.

Week 12 - May 1, 2007. Discussion and approval of final report.

**** Final revised papers are due by Friday May 4, 2007. ****

Week of May 7, 2006. Arrangements will be made to present policy recommendations and final report to senior members of the Princeton administration.

Reference Books on Reserve in Stokes Library

Sustainability on Campus: Stories and Strategies for Change. Edited by Peggy F. Bartlett and Geoffrey W. Chase. The MIT Press. 2004.

Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century: Lessons in Smart Management for Administrators, Staff, and Students. By Julian Keniry. National Wildlife Federation. 1995.

Greening the Ivory Tower: Improving the Environmental Track Record of Universities, Colleges, and Other Institutions. By Sarah Hammond Creighton. The MIT Press. 1998.

Smil, Vaclav, *Energy at the Crossroads: Global Perspectives and Uncertainties*. MIT Press, 2003.

Smil's book is an excellent overview of "energy."

Tester, Jefferson W., Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, and William A. Peters. *Sustainable Energy: Choosing Among Options*. MIT Press. 2005.

Just out, this tome is a comprehensive quantitative introduction to energy technologies, with extensive discussion of non-technical issues

International Energy Agency, *World Energy Outlook 2004*. Paris, France: OECD/IEA

The projections for the world energy system, typically twenty five years into the future, published by the International Energy Agency in its biannual World Energy Outlook, are cited by the energy industries and frame their worldview.

Deutch, John and Richard K. Lester, *Making Technology Work: Applications in Energy and the Environment*. Cambridge University Press, 2004

Deutch and Lester have written a set of case studies dealing with energy and environmental topics. The emphasis is on teaching the techniques of the policy analyst to the undergraduate engineer.

Speth, James Gustav, *Red Sky at Morning: America and the Crisis of the Global* Environment. Yale University Press, 2004

Speth has written a call to action. He identifies new routes to policy innovation, by providing a fresh perspective on the relationship between government and civil society.

Weart, Spencer. *The Discovery of Global Warming*. Harvard University Press, 2003.

Weart, a historian of science, tells a story of many small steps and lots of wrong turns.

Useful Websites – In addition to the specific web sites listed above in the syllabus, you may find the following sites useful as well.

Energy Information Administration, U.S. Department of Energy, 2004. *International Energy Annual 2002*. http://www.eia.doe.gov/emeu/iea/contents.html

Collection of Energy research documents and reports from the European Union on a variety of topics ranging from zero emission coal power plants to various renewable energy technologies. http://europa.eu.int/comm/research/energy/index_en.htm

BP, 2003. *BP Statistical Review of World Energy*
http://www.bp.com/subsection.do?categoryId=95&contentId=2006480

Energy Information Agency, U.S. Department of Energy, 2004. *International Energy Outlook, 2003*. Report # DOE/EIA-0484.
http://www.eia.doe.gov/oiaf/ieo/index.html.

International Energy Agency, 2002. *World Energy Outlook 2002*. Paris, France: OECD/IEA. By subscription:
http://library.iea.org/dbtw-wpd/Textbase/nppdf/stud/02/weo2002_1.pdf.

International Energy Agency, 2003. *Key World Energy Statistics. 2003.*
http://www.iea.org/dbtw-wpd/bookshop/add.aspx?id=144

Intergovernmental Panel on Climate Change. Includes the *IPCC Third Assessment Report—Climate Change 2001: The Scientific Basis; Impacts, Adaptation and Vulnerability; and Mitigation.* In addition, special reports entitled Carbon Dioxide Capture and Storage, Emission Scenarios, and Safeguarding the Ozone Layer and the Global Climate System. http://www.ipcc.ch/index.html
These are reports coming from the flagship international assessment effort of climate change.

IPCC, 2004. *Seventh International Conference on Greenhouse Gas Control Technologies*, Vancouver, Canada (papers presented)
http://www.ghgt7.ca

Gale, J. and Y. Kaya, eds., 2003. *Proceedings of the 6th International Conference on Greenhouse Gas Control Technologies, 1-4 October, 2002, Kyoto, Japan.* Two volumes. Amsterdam: Pergamon.
http://www.ieagreen.org.uk/ghgt6.htm

National Research Council, 2004. *The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs*. Washington, D.C., National Academy Press.
http://www.nap.edu/books/0309091632/html/