

# *The Promise and Limitations of Achieving a Carbon-Neutral Campus*

## ENVIRONMENTAL POLICY CLINIC

*Environmental Studies 330  
University of Redlands, Fall 2006*

Classroom: Lewis Hall 134  
T & Th, 1-2:20, plus  
additional hours to be arranged.

Dr. Monty Hempel, Lewis 140  
Office hours: M 2-3, W10-12  
and by appointment, ext.8589  
E-mail: [hempel@redlands.edu](mailto:hempel@redlands.edu)

*Colleges and universities are defined by their contributions to society. With global warming, society faces a crisis as complex and overarching as any we have ever known, one that threatens the viability of our civilization. Solving it will mean transforming the way we power and organize our daily lives and the economy that supports them; and it will mean doing so rapidly, within a generation. As challenging as that task is, it presents enormous opportunities to institutions willing to take the lead.*

*-- A Call for Climate Leadership (AASHE and EcoAmerica, September 2006)*

### PROJECT DESCRIPTION

The Fall 2006 Clinic will investigate the challenge of climate change (global warming) as it pertains to the campus community. In particular, we will examine the feasibility of policies for *carbon-neutral* planning, design, and operation of colleges and universities, using the University of Redlands as a focal point. "Carbon neutral" means taking responsibility for our greenhouse gas emissions by achieving a net balance between the production of atmospheric emissions of carbon dioxide and its equivalent (carbon-dioxide equivalent, CDE), and the subtraction (offsetting or sequestration) of those emissions. This can be accomplished through a combination of efficiency, substitution, "sufficiency," and off-setting strategies. Specifically, we can reduce CDE emissions by (1) using economic instruments, designs, and technologies that promote greater efficiency in the use of carbon-based fuels, (2) by substitution, using non-carbon-based fuels and technologies (e.g., wind power); (3) through social and lifestyle changes that promote the goals of reduced consumption and *sufficiency* ("how much is enough?"), and (4) through offsetting, and using subtraction processes such as carbon sequestration (e.g., planting trees to sequester carbon) and deep injection of CO<sub>2</sub> into the earth (e.g., Norway's North Sea CO<sub>2</sub> injection program) for the purpose of keeping emissions in "sinks" – i.e., out of the atmosphere. In the common parlance of climate scientists, it all boils down to **reducing net sources of carbon** (e.g., phasing out coal-fired power plants), **increasing "sinks"** (e.g., planting billions of trees, worldwide) **and offsetting new emissions** (e.g., buying and selling carbon credits").

Working closely with the Design Studio team, which will be performing a campus sustainability assessment for the University of Redlands this year, the Clinic team will focus on the carbon-dioxide dimensions of campus sustainability. This will necessarily involve issues and choices about energy, transportation (both car and air travel), building design, solid waste, and many other factors involved in our campus emissions of greenhouse gases.

In order to be successful, this project will rely heavily on the assistance and cooperation of University administrators and budget officers, facilities planners and managers, and leaders of many of the student, faculty, and staff organizations on campus. Our goal as a clinic team is not to adopt or

implement a campus policy of campus neutrality but rather to test its feasibility as a potential policy within the unique structure of opportunities and constraints that make up the University of Redlands.

### **BACKGROUND on Policy Clinics**

The Policy Clinic is designed to investigate challenging issues in environmental policy and management, using the methods of science, ethical analysis, and public interest research. The Clinic is in many ways an extension of the Design Studio. It is problem-driven, with a student-faculty team attempting to create or test innovative policy responses to concrete environmental or natural resource problems. Clinic projects typically result in a report to University administrators, government clients, or groups of public and private stakeholders involved in a specific environmental challenge or controversy.

Unlike the introductory Design Studio, the Clinic is not a core requirement for EVST majors, but it is a strong complement to the studio experience. It also fulfills the practicum requirement for our majors. Design remains an important concept in clinic projects, but the emphasis is on the design of policy, implementation, and management strategies.

Although each clinic operates as a closely-knit student-faculty team, some division of labor among individuals and subgroups of researchers is usually necessary. Research tasks are assigned with an eye to both the skills and the interests of individual student members. Every team member is expected to be fully engaged in the project and contributing his or her share of the work in a timely manner! Neither "free loader" behavior nor isolationism ("lone ranger" behavior) is acceptable in this project.

In the broadest sense, the Policy Clinic deals with questions of environmental governance and sustainability. It focuses on the conditions of political, economic, and managerial feasibility that must be addressed in order to achieve more sustainable forms of development and human lifestyles. Although it also addresses the role of science and technology in promoting sustainability, it is primarily concerned with issues of policy analysis and design. As such, it pays close attention to environmental questions that intersect deeply with questions of economics, politics, business, and ethics.

### **WHY THIS PROJECT? WHY NOW?**

Humanly-induced climate change may be the defining issue of the 21<sup>st</sup> century. More than a dozen major studies in the past 3 years have left little doubt about the seriousness of the problem we face, though significant uncertainty remains about both the rate and the magnitude of climate changes we are likely to experience this century. Dr. James Hansen, the federal government's chief climate scientist (NASA) has warned that we have at most 10 years to make significant reductions in greenhouse gas emissions (primarily carbon dioxide) before the climate system reaches a "tipping point," in which cascading changes in the climate system become likely and, for the most part, irreversible within time frames that matter to most humans.

Higher Education, with its 4,000 colleges and universities, and 15 million students, has both a special opportunity and a responsibility to address this issue in ways that simultaneously educate students and that reduce the risk of globally wrenching dislocations, due to enhanced greenhouse warming.

The University of Redlands is well positioned to be a regional leader in this effort, though it is important to note that several dozen colleges and universities have already completed carbon-neutral campus studies and colleges such as Oberlin, Middlebury, and Carleton have already committed to carbon neutral policies with targets and timetables.

## **PROMISING AVENUES FOR INVESTIGATION** (A SAMPLE)

Energy conservation and efficiency improvements (LEED certification, master planning, "energy star")  
Generating or purchasing renewable power (wind, solar, geothermal, biofuels, etc.)  
Purchasing other green products and services (e.g., buying local and recycled products, where practical)  
Waste reduction (food scrap composting, paper and packaging, etc.)  
Transportation system improvements (bicycles, alternative fuels, walking, transit systems, etc.)  
Curriculum improvements (teaching climate science, policy and management)  
Community outreach (university partnerships to enhance climate adaptation and prevention ideas)

## **GRADING**

Written Section of Final Report.....	50%
Oral Presentation (including displays).....	20%
Contributions to Team Advancement*....	30%

\*Team contributions are based on research productivity for use by others, quality of learning interaction with other students, clarity of communication and quality of contribution in performing multi-team-member tasks.

**Regular attendance is required!** More than two unexcused absences will result in a grade reduction of 1/3 (e.g., 3.0 → 2.7), with each absence beyond 3 resulting in additional grade reductions, at the 1/3 rate.

## **PRELIMINARY WORK PHASES**

Specific products and work programs will be developed with the input of participating students. Initial work will be organized around the following research activities:

1. **Reconnaissance:** Overview of climate change issues, carbon emissions trends, inventory of key carbon-neutral initiatives, specific campus-based initiatives, and opportunities to apply "best practices" approaches to the University of Redlands.

Key information components:

- a. Course reading packet and supporting documents
- b. Library holdings, including journals.
- c. On-line networking and selected web sites
- d. Campus documents and reports (e.g., energy trends)
- e. Interviews with experts and opinion leaders on and off campus
- f. Interviews/surveys of Redlands students (and representatives at other campuses)
- g. Other stakeholder interviews

2. **Analysis:** Investigate management and policy implications of

- a. carbon emissions reductions at other campuses (model programs)
- b. feasibility of carbon reductions, by sector, at the University of Redlands
- c. carbon reductions through integrated, cross-campus measures at U of R
- d. political and economic feasibility of adoption at Redlands (e.g., cash flow analysis).

3. **Synthesis:** Develop policy proposals and analyses of potential barriers using "PolicyMaker" and other software tools, for the purpose of preparing management matrices and stakeholder analysis summaries of the apparent feasibility of pursuing a carbon-neutral campus under different scenarios.

4. **Decision Support:** Assist in development of a user-friendly campus decision support system for evaluating tradeoffs in achieving a carbon-neutral campus
  5. **Dissemination:** Convene a campus management and policy forum for distillation and dissemination of our results and findings.
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## **POLICY CLINIC WORK PLAN**

### **Carbon Reduction Initiative** – *feasibility study of a carbon-neutral campus policy*

1. Emissions Inventory (Clean Air-Cool Planet calculator)
  - a. Space Heating & Cooling
    - i. On-campus energy/fuel sources
    - ii. Natural gas purchases
  - b. Electricity (+ co-gen. and renewables)
  - c. Transportation
    - i. University Fleet (gasoline/diesel/electric/nat.gas)
    - ii. Campus Commuters
      1. Faculty & Staff
      2. Students
    - iii. Air Travel
      1. Faculty & Staff
      2. Students
  - d. Solid Waste – landfilled
2. Identify Carbon Neutral Options for University of Redlands
  - a. CDE Sources – Reduction and replacement options
  - b. CDE Sinks – Offsetting options
3. Develop Carbon Neutral Campus Strategy and Critique
  - a. Carbon Neutral Portfolio (steps and timing sequence)
  - b. Identify Implementation Barriers and “Sticking Points”
4. Implementation Plan – SWOT analysis
  - a. Administrators
  - b. Facilities Staff
  - c. Faculty
  - d. Students
  - e. Off-campus community
5. Report Findings (both written and oral)
  - a. Synthesize Key Points & Optimize Options (by rank)
  - b. Discuss Limitations and Tradeoffs
  - c. Invite Constructive Criticism from University
  - d. Stakeholders and Outside Experts

Note: The final report will be submitted to appropriate administrators of the University. They will also be invited to the oral presentation at the end of the semester.

## Clinic Team Member Tasks

CHECKMARK ALL THE TASKS FOR WHICH YOU SEE YOURSELF MAKING A CONTRIBUTION, AS WELL AS YOUR INVOLVEMENT LEVEL: High, Medium, or Low

☒ H [example]

\_\_\_\_\_ Problem analysis – greenhouse gas emissions and potential impacts – write-up

\_\_\_\_\_ Solution analysis – carbon-neutral strategy – promise & limitations – write-up

\_\_\_\_\_ U of R profile – all carbon-relevant characteristics, trends, and campus history

\_\_\_\_\_ External models & activities - other campuses, model carbon-neutral programs

\_\_\_\_\_ Campus emissions inventory - data gathering and analysis

\_\_\_\_\_ Facilities Management – campus electricity and natural gas

\_\_\_\_\_ Ground transportation-related emissions

\_\_\_\_\_ Air travel-related emissions

\_\_\_\_\_ Solid waste-related emissions

\_\_\_\_\_ Calculating emissions, by sector - Cool Planet calculator applications

\_\_\_\_\_ Campus tree/biomass sequestration analysis (Evergreen State methodology)

\_\_\_\_\_ Identifying/analyzing CDE reduction options (energy, transportation, etc.)

\_\_\_\_\_ Identifying/analyzing CDE offset options (“green tag” purchases, trees, etc.)

\_\_\_\_\_ Campus case study – focus on a residence hall?

\_\_\_\_\_ Liaison with Design Studio team (people in both Clinic and Studio)

\_\_\_\_\_ Campus Interviews? Survey research of campus views and attitudes?

\_\_\_\_\_ Economic analysis (costs and benefits of options)

\_\_\_\_\_ SWOT Analysis

\_\_\_\_\_ Implementation plan (putting ideas into action)

\_\_\_\_\_ Report coordinator – compiling/organizing sections

\_\_\_\_\_ Graphics displays, artwork, PowerPoint presentation, etc,

\_\_\_\_\_ Fact Checker

\_\_\_\_\_ Liaison with University staff/faculty; Communication/PR

## **DATA REQUIREMENTS**

### **Campus Greenhouse Gas Inventory**

We will use the "Cool Planet Calculator" as our principal instrument for inventorying and analyzing campus emissions (<http://www.cleanair-coolplanet.org/toolkit/content/view/146/132/>).

#### **Ideal Input Data - for as many fiscal years as possible, starting in 1990:**

- Operating Budget (\$)
- Research Dollars (\$)
- Energy Budget (\$)
- Full Time Students (#)
- Part-Time Students (#)
- Summer School Students (# MS-GIS + conference use?)
- Faculty (#)
- Staff (#)
- Total Building Space (sq ft)
- Total Research Building Space (sq ft)
- Purchased electricity (kWh)
  - electric fuel mix
- Purchased Steam (MMBtu)
- Purchased Chilled Water (MMBtu)
- Campus Co-generation plant
  - Natural Gas (MMBtu)
  - Electric Output
  - Steam Output (MMBtu)
  - Electric efficiency
  - Steam Efficiency
- Other on-campus stationary sources
  - "Residual Oil (#5 - #6)" (gal)
  - "Distillate Oil (#1 - #4)" (gal)
  - Natural Gas (MMBtu)
  - Propane (gal)
  - Other?
  - Solar / Wind / Biomass
- Transportation - University fleet
  - Gasoline Fleet Diesel Fleet (gal)
  - Natural Gas Fleet
  - Electric Fleet
  - Other Fleet
- Air Travel
  - Faculty / Staff Business (est. miles)
  - Student Programs (est. miles)
- Ground Transportation - commuters
  - Faculty / Staff Gasoline (gal)
  - Students Gasoline (gal)
  - Faculty / Staff Diesel Students Diesel (gal)
  - Faculty / Staff Electric

Students Electric  
Fertilizer Application  
    Synthetic (lbs.) - % Nitrogen  
    Organic (lbs.) - % Nitrogen  
Solid Waste  
    Landfilled Waste with no CH4 Recovery  
    Landfilled Waste with CH4 Recovery and Flaring  
    Landfilled Waste with CH4 Recovery and Electric Generation  
Refrigeration and other chemicals  
    HFC-134a  
    HFC-404a  
    HCFC-22  
    HCFE-235da2 Others HG-10

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Future Offset Strategies  
    Tree planting/forest preservation  
    Renewable energy credits  
    Composting  
    Other

## REQUIRED BACKGROUND READING

The reader is available for \$17 from Monica or Theresa in Lewis Hall. Every student is expected to purchase one.

### NATIONAL & INTERNATIONAL OVERVIEWS

Thomas Karl and Kevin Trenberth, "Modern Global Climate Change," revised and updated from *Science* Vol. 302, no. 5651 (5 December 2003).

Monty Hempel, "Climate Policy on the Installment Plan," in Norman Vig and Michael Kraft, eds., *Environmental Policy: New Directions for the Twenty-First Century* (Washington, DC: CQ Press, 6<sup>th</sup> ed., 2006).

K. Hasselmann et al., "The Challenge of Long-Term Climate Change," revised and updated from *Science* Vol. 302, no. 5652 (12 December 2003).

Robert Watson, "Climate Change: The Political Situation," revised and updated from *Science* Vol. 302, no. 5652 (12 December 2003).

Joel Achenback, "The Tempest," *The Washington Post Magazine* (Sunday, May 28, 2006 W08).

Elizabeth Kolbert, "The Day After Kyoto" (Chapter 8), *Field Notes from a Catastrophe: Man, Nature, and Climate Change* (Bloomsbury, 2006)

Gus Speth, "Climate Change After the Elections (2004): What We Can Do in America: A Ten-Point Plan"

Cass Sunstein, "Montreal Versus Kyoto: A Tale of Two Protocols (Draft of 8/18/2006, forthcoming in *Harvard Environmental Law Review*).



Oliver Houck, "Tales from a Troubled Marriage: Science and Law in Environmental Policy," revised and updated from *Science* Vol. 302, no.5652 (12 December 2003).

### **STATE OF CALIFORNIA – GOVERNMENT**

California Climate Change Center, "Our Changing Climate: Assessing the Risks to California," July 2006 (CEC-500-2006-077).

AB 32, Global Warming Solutions Act of 2006 (March 31, 2006).

Executive Order S-3-05, Governor Schwarzenegger

2006 Climate Action Team Report to Governor Schwarzenegger and the California Legislature by California Environmental Protection Agency, March 2006 (Executive Summary)

### **CALIFORNIA – Nongovernmental Organizations (NGOs) Page**

Lisa Moor and Karen Douglas, "Global Warming and the Golden State: A Call to Action," Environmental Defense Fund, 2006.

"Open Letter on Global Warming from California Economists"

David Roland-Holst, "Economic Growth and Greenhouse Gas Mitigation in California" (Executive Summary, August 2006)

Union of Concerned Scientists, "Global Warming and California's Economy" (Fact Sheet, 2006)

Laurie Koteen et al., "Hot Prospects: The Potential Impacts of Global Warming on Los Angeles and the Southland," Environmental Defense Fund, 2001.

Natural Resources Defense Council Statement

Carbonfund.org (example of a carbon offset web site)

### **CAMPUS INITIATIVES** (in and outside California - examples)

Peggy Barlett and Geoffrey Chase, eds., *Sustainability on Campus: Stories and Strategies for Change* (The MIT Press, 2004), pp. 1-66

AASHE Bulletin (electronic copies will be distributed by the instructor)

Clean Air–Cool Planet Campus Climate Action Toolkit

Harvard University Initiative

Ithaca College Initiative

University of Florida Carbon-Neutral Initiative

University of California, Santa Barbara, Carbon-Neutral Initiative  
-- UCSB "Campus Climate Neutral" Project Proposal, June 9, 2005

University of Michigan (SNRE) Carbon-Neutral Visit Day

Middlebury College Carbon-Neutral Credit Card & Initiative



St. Andrews (Scotland) – First Carbon-Neutral University?

Linfield College Statement

Thomas Friedman, "The Greenest Generation," *New York Times*, April 21, 2006

**RECOMMENDED BACKGROUND READING**, for those who have time:

Norman Vig and Michael Kraft, eds., *Environmental Policy: New Directions for the Twenty-First Century* (Washington, DC: CQ Press, 6<sup>th</sup> ed., 2006); Deborah Stone, *Policy Paradox and Political Reason* (Scott Foresman and Company, 1988); Walter Rosenbaum, *Environmental Politics and Policy* (6<sup>th</sup> ed. 2004); Monty Hempel, *Environmental Governance: The Global Challenge* (Washington, DC: Island Press, 1996).