

Sustainability Audit of the Campuses of the Claremont Colleges

**Audit conducted during the Summer 2007
Final report completed October 16, 2007**

Executive Summary

The community of the Claremont Colleges has become increasingly aware of the rising levels of carbon dioxide in the earth's atmosphere and the rising average global temperature. These trends have compounded environmental concerns over the depletion of fossil fuels, the availability of clean water, threats to biodiversity, and the earth's growing human population. Two recent popular movies, *An Inconvenient Truth* and *The 11th Hour*, describe in a compelling way the perils that await Planet Earth unless the human population acts quickly, wisely, and cooperatively.

This past spring (2007), the Council of Presidents of the Claremont Colleges established a Sustainability Initiative to find local solutions to these global problems. The Initiative provides funds to faculty/student/staff research teams to develop and implement new ideas and approaches for advancing the environmental sustainability of the Claremont campuses. With partial funding from the Initiative, a team of 15 students and about 5 faculty performed a first-pass sustainability audit of the Claremont campuses. Their activities consumed 10 intensive weeks this past summer (2007), and they enjoyed the support and active collaboration of the facilities personnel from all of the Colleges.

The team documented the historical usage of key resources and utilities – electricity, natural gas, and water – in order to establish baselines against which to compare future usage, and to identify targets for conservation programs. In addition, the team studied emissions, waste disposal, and recycling programs with the ultimate goal of assessing the feasibility of achieving carbon neutrality within the next decade or two. We summarize briefly here the team's most notable findings and recommendations, and point the reader to chapters and sections of the full final report for more detailed accounts of particular topics. Chapter 1 of the final report is an extensive overview of the team's activities and findings. Chapter 8, the last chapter, is a complete discussion of the team's final recommendations. Chapters 2 through 7 are in-depth reports of the many topics the team included in their broad survey of the state of sustainability of the Claremont campuses.

Water The most daunting challenge to sustainability in Claremont is the availability of water. In Chapter 2 the team presents reasoned arguments that conclude that a 50% reduction in water use is required to reach true sustainability on our campuses. Since 50% of our water use goes to irrigation of landscaping, an obvious recommendation is that we transition to native and drought-tolerant plants as quickly as possible. But some grass turf is needed to support normal, healthy human activities and exercise, so we must find ways to reduce excess water use in dorms, academic buildings, food services, and chillers for air conditioning. Rainwater harvesting and graywater systems may help to supply water for essential irrigation of landscaping. Ironically, end-users of water in southern California pay less than 50% of the true financial cost of water, making water relatively cheap – about one-tenth the cost of electricity and one-fourth the cost of natural gas for the Claremont Colleges. Sustainability with respect to water will be driven by the environmental and societal impacts but not by the financial impact in the “triple bottom line.”

Electricity and Natural Gas The costs of electricity and natural gas for the Claremont Colleges have risen by more than a factor of 2 over the past 8 years, accompanied by wild fluctuations. The current annual costs of electricity (\$6.5M) and natural gas (\$2.5M) are substantial operating costs, and the rate of increase in these costs is alarming. In Chapters 3 and 4, the team examines the historical record of usage of electricity and natural gas, and concludes that a 20% reduction can be achieved with a vigorous, coordinated conservation program. But we must go further. Our consumption of electricity and natural gas entails the emission of large amounts of carbon dioxide, a greenhouse gas, resulting in a huge “carbon footprint.” If we are ever to achieve carbon neutrality, we must reduce substantially our burning of natural gas to generate hot water for space heating and domestic hot water. Solar heating of water (50% efficiency!) seems to be the most sensible way to do this. Similarly, we must shift to powering our campuses with electricity that is generated from renewable energy sources, either by off-campus commercial energy companies, or by on-campus solar technologies. We estimate that on-campus photovoltaic arrays could generate 10% to 15% of our electricity needs, and solar heating panels could replace a similar fraction of our natural gas consumption. A review of the most promising solar technologies can be found in Chapters 3 and 4.

Emissions and the “Carbon Footprint” of the Claremont Colleges In addition to the emissions of CO₂ linked to our natural gas and electricity consumption, travel by students, faculty, and staff contributes a surprisingly large amount to the Colleges’ carbon footprint. (See Chapter 6.) A nearly complete analysis of the Harvey Mudd campus suggests that travel accounts for 50% of the carbon emissions of the Claremont Colleges. In particular, the travel of students from homes around the country/world to campus and back home again, two to three times a year, seems to be an unavoidable consequence of assembling a diverse student body drawn from many communities and countries. While an increase in train travel can help, we will probably need to invest in the generation of green energy to offset these carbon emissions that seem so tightly linked to the mission of the Colleges.

Building Performance The team also studied building performance, including energy usage, HVAC systems (heating, ventilation, and air conditioning), and the use of modeling software to predict and evaluate the energy efficiency of building designs. The team concludes their study in Chapter 4 by urging the Colleges to establish standards for the design, construction, and performance of sustainable buildings which will meet and exceed LEED certification. In a separate study of the performance of building offices, Professor Hazlett’s group focused on the sustainability of our stream of office supplies, and makes specific recommendations in Chapter 7 for recycled-content paper and printer cartridges. Another independent group, led by Dr. Hilton, developed GIS-based software tools (Geographic Information System) to explore the benefits of increasing the urban tree canopy of the Claremont Colleges, including improvements to the energy efficiency of buildings, the management of stormwater runoff, and the positive effects on air quality (see Chapter 5).

Final Recommendations The most pressing of the team’s final recommendations appear below – a more thorough discussion of the full recommendations can be found in Chapter 8.

- **Reduce our electricity usage by 25% by 2012** – Launch a vigorous conservation program, including real-time monitoring and display of electricity usage on a per building basis.
- **Generate 10% of our electricity from renewable energy sources by 2020** – Deploy photovoltaic arrays on building rooftops and parking lots.
- **Institute conservation, improve heating systems, and use solar water heating to reduce our consumption of natural gas by 20% by 2020** – Deploy solar water heating panels on building rooftops and areas adjacent to buildings.
- **Reduce water use by 40% by 2020** – Replace grass turf wherever possible with native or drought-tolerant plants. Increase metering to determine end uses of water and identify further targets for conservation.
- **Increase recycling to 50% by volume of the waste stream by 2012** – Expand and improve the current recycling and composting programs.
- **Establish building standards that meet and exceed LEED certification** – Convene a team of staff, trustees, faculty, students, and building professionals to investigate, create, and share standards for building design and performance at the Claremont Colleges.
- **Commit to the goal of carbon neutrality by 2020** – Follow the lead of Pitzer, Claremont McKenna, and Pomona Colleges in signing the American College and University Presidents Climate Commitment to climate neutrality. Construct a program and choose a date by which the Colleges will achieve climate neutrality.
- **Create the position and appoint a Claremont University Consortium sustainability coordinator** – The coordinator will organize sustainability initiatives across the campuses, sharing resources, ideas, and successful approaches to achieving carbon neutrality. Each college is urged to create a sustainability committee comprised of staff, faculty, students, trustees, and alums, and the new CUC coordinator will provide staff support for meetings of the chairs of the sustainability committees from the individual campuses. The CUC sustainability coordinator will also oversee the new Claremont Colleges Sustainability Website, organize and publicize sustainability issues and events at the Colleges, promote the inclusion of sustainability topics in curricula and programs in Claremont, and generally create a cultural awareness of sustainability across the campuses.