

Campus Sustainability Assessment 2007

UC SANTA CRUZ



Executive Statement

The attached report helps us and the larger community better understand our sustainability-related successes and identifies areas for improvement in sustainability efforts. It also establishes a basis for measuring progress over time. It is the work of over 60 staff, faculty, and students who pooled their collective knowledge to create this, UCSC's first Campus Sustainability Assessment.

This Assessment illuminates a number of striking features regarding UCSC's commitment to sustainability. Some of the greatest successes have been in the areas of energy, food, land preservation, transportation, water, and curriculum and co-curricular opportunities. For example:

- Since 2006, and thanks to UCSC students, UCSC purchases 100% of its energy from renewable sources, making it the sixth largest renewables purchaser in higher education in the United States.
- Over 60% of campus commuters use alternatives to single occupancy vehicles and UCSC has won several awards for its innovative transportation programs. These include a bike shuttle, vanpools, student bus passes, and a carsharing program.
- 55% of campus land is designated as protected natural landscape.
- According to a recent water audit, water consumption per capita fell 40% since the 1980s.
- Approximately 25% of produce served in dining halls is organic, with much of it coming from local providers.
- From the integration of campus and forest, to the avoidance of air conditioners for comfort, to the use of small-scale storm water conveyance systems that protect the natural environment, building and land use design has long prioritized environmental stewardship.
- The campus has won national and international recognition for innovative student learning opportunities such as the Education for Sustainable Living Program and the College Eight Environmental Service Learning Project.

While the campus celebrates its many successes, this Assessment also identifies areas that can be targeted for improvement in the coming years. In particular, there is room for improvement in recycling diversion rates, purchasing practices, and in overall planning for long-term sustainability goals.

- The UC Policy on Sustainable Practices includes many ambitious goals for Environmentally Preferable Purchasing. The campus will need to work to implement this policy in the coming years.
- The waste diversion rate is currently 32%, below the stated goal of 50% by 2008. The UC Policy on Sustainable Practices goal to achieve 75% by 2012 will take a concerted effort.
- While the campus has initiated several committees and a Pilot Sustainability Office, there is work to be done to create a shared and comprehensive vision for how to best to build on early successes so ensure UCSC will remain a leader in sustainability.

In addition, UCSC has made a strong commitment to sustainability as evidenced by the signing of the Climate Compact with the local city and county governments, UC participation in the American College and Universities Presidents Climate Commitment, and the formation of the Chancellor's Council on Climate Change. The Council is currently developing a Climate Action Plan expected by the end of calendar year 2008 that will establish our timeline for achieving carbon neutrality.

We are issuing this important report on Earth Day 2008 to emphasize how important it is to us that UCSC be a truly "green" campus community.

George Blumenthal, Chancellor
Tom Vani, Vice Chancellor, Business and Administrative Services

George Blumenthal
Chancellor

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Vice Chancellor, Business and Administrative Services

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Electronic Appendices:
Please visit the UC Santa Cruz web page on campus sustainability at sustainability.ucsc.edu. This page provides information on campus-wide efforts and activities, as well as updates and additional detail related to this assessment.

Letter from the Campus Sustainability Subcommittee

The Campus Sustainability Subcommittee (CSS) commissioned the completion of this assessment, our first formal action in 2006, as a first attempt to benchmark campus progress, celebrate successes, identify challenges, and point towards future directions for UCSC sustainability efforts.

The assessment serves two main functions. First, it informs the reader about where the campus is today – a "snapshot" of current conditions, collecting and presenting more detailed information than has been gathered in one place to date. It highlights campus achievements and identifies connections among the diverse activities that define the University's role within the local community and ecology.

Second, it will help guide future action by indicating key priorities and opportunities for improving campus sustainability practices. UCSC's 2005 Long-Range Development Plan adopts a set of physical planning principles and guidelines that have sustainability at their core. This assessment is one essential way of integrating those principles into the daily life of the campus.

The subcommittee's work has been guided by a definition of sustainability that provides for meeting the needs of the present without compromising ecosystems or the ability of future generations to meet their own needs. The subcommittee is also aware that sustainability in a broader context encompasses social and economic systems as well as environmental ones. This assessment focuses on environmental indicators and represents the first phase of UCSC's formal efforts to quantify and measure progress in sustainability. Readers will see that the indicators often go beyond a narrow sense of the term *environment*, extending to such priorities as health, life-cycle costs, community well-being, and the educational activities of the institution. Future assessments are expected to incorporate a refined set of indicators, add greater detail to the metrics, provide updates on progress, and add to the understanding of sustainability for UCSC.

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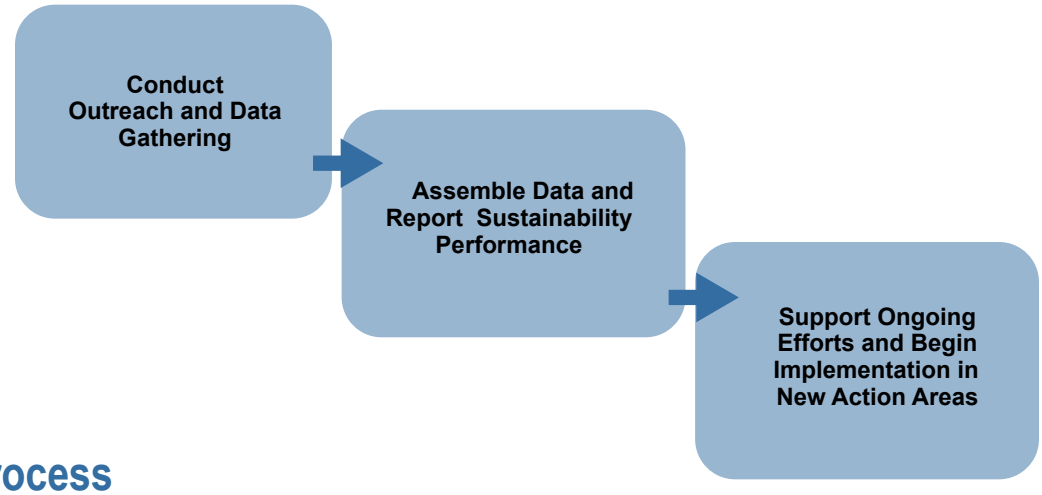
Summary and Key Findings

UC Santa Cruz has a long history of environmental stewardship, and this assessment – the first of its kind at UCSC – describes numerous successes of which the institution can be proud. It also acknowledges that there is room for improvement. This assessment represents an important step in realizing the vision of becoming a truly sustainable institution. The Summary and Key Findings highlights selected successes, outlines the key challenges, and provides the overarching recommendations that emerged from the assessment.

This assessment includes a set of performance indicators and establishes a baseline for ecological performance. Taking action to improve campus sustainability fulfills the University's mission and obligations. This report provides information necessary to assist campus leadership in making informed decisions and in setting priorities for the University's continuing sustainability efforts.

The Sustainability Assessment



The Process

Prior to the official start of this project, a team of students, staff, and faculty worked to build a shared vision, raise funds from multiple campus sources, and develop a proposal to complete this assessment. Launched by the Campus Sustainability Subcommittee in February 2007, the assessment process began with stakeholder meetings to identify categories and specific indicators to assess.

Data was gathered on a wide range of activities and impacts, involving many campus members and drawing on documentation from across the University. The assessment team interviewed more than 60 staff, faculty, and students in creating the original base of quantitative and qualitative data. These apparently straightforward processes – gathering data and writing a report – resulted in enhanced understanding of sustainability for many involved, laying a clear foundation for ongoing work. The process of the assessment, as illustrated above, brought new connections and ideas to existing working relationships.

Summary of Opportunities

UCSC has the **opportunity to emerge as a leader** in the rapidly growing campus sustainability movement. A fringe endeavor limited to a handful of campuses ten years ago, the effort to pursue sustainability in higher education research, teaching, and operations is becoming a part of the mainstream with new staff positions, courses, conferences, and substantial external funding. In part, this will require increased coordination and education regarding efforts and successes. It will also involve visibly and tangibly strengthening the campus' commitment to sustainability programs and projects. In addition, many of these efforts will result in **substantial cost savings due to lower life-cycle costs** of operation.

A more sustainable UCSC will also likely achieve **stronger relationships with the community and the region** through shared vision and activities. As UCSC strengthens its reputation through sustainability efforts, **this leadership will draw funding, students, and recognition**.

In addition to enhancing its direct relationships, institutional competitiveness, and financial well-being, the university can, through its sustainability efforts, **contribute to a healthy society and meet UCSC's obligations to future generations**.

Challenges, Recommendations, and Next Steps

UCSC faces a number of integrated but distinct challenges in pursuit of sustainability. The institution needs **mechanisms for prioritization** for the efforts and ideas that are large in number and growing. To support this planning, UCSC will need a **clearer vision and goals with supporting performance data** covering many aspects of sustainability. The data must be used to **measure and report performance** in target areas.

On the ground, implementation of sustainability goals will require **coordination and communication efforts**, as well as the **regular, permanent funding mechanisms** appropriate to the task. New and realigned resources, including **new positions and new functions in existing positions,** will likely be needed to support ongoing sustainability efforts.

Even with resources and effective program implementation, these ambitious goals will continue to be a challenge for leadership and management. There will be a need for continued **senior-level administrative support** for implementation that is visible to the campus community and unwavering in its resolve. It will require **awareness of the UC systemwide policies and goals** on sustainability among administrators and throughout the campus community.

Beyond awareness, the effort will require **genuine multi-stakeholder dialogue** about how to institutionalize sustainability and connect the various campus initiatives. The greatest leverage will come from **engaging faculty and students**, in particular, through coursework, internships, and ongoing orientation for new students. This work must become understood in terms of the institution's mission, with explicit connection to UCSC's guiding documents and principles. For example, the Principles of Community and the strategic plans of individual units could incorporate sustainability concepts. The assessment includes **more than 50 major recommendations** (located at the end of each relevant section). Most of these came from those who will have a role in implementation.

Key Findings

Governance and Decision-Making Structure:

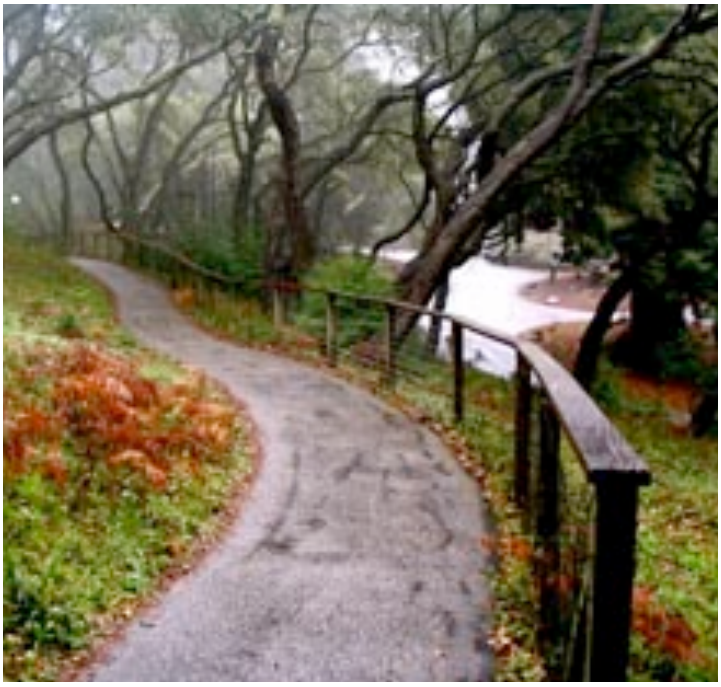
- The Campus Sustainability Subcommittee convened in 2006. In 2007, a two-year pilot Sustainability Office with a Coordinator position was created.
- UCSC is subject to the UC Office of the President Policy on Sustainable Practices (UC Policy), requiring ongoing implementation.
- Performance reporting, designated campus-wide roles, and campus goals in the area of sustainability need to be established.

Energy and Climate:

- In addition to the UC Policy, the UC system is a signatory to the American College and University Presidents Climate Commitment (ACUPCC) and Chancellor Blumenthal signed the regional Climate Compact, an agreement with the city and county of Santa Cruz, in September 2007. The new Chancellor's Council on Climate Change began meeting in February 2008.
- UCSC has completed a greenhouse gas emissions inventory; however, this inventory's boundaries are narrow and will be expanded. No climate action plan currently exists.
- UCSC has a history of energy efficiency and an ongoing slate of efficiency-related projects. The institution purchases 100% renewable energy (making it the sixth largest renewables purchaser in higher education nationwide).
- Energy consumption per square foot declined slightly between 1993 and 2007 (despite increases in computers and other equipment). Total energy use climbed about 30% over that period, though campus square footage increased just over 50%.
- There is opportunity to create/implement on-site renewable power generation.
- Co-generation provides a third of campus electricity needs.

Green Building:

- UCSC has no LEED certified buildings, but several certification projects are underway, including new buildings, major interior renovations, and existing buildings.
- UCSC is a challenging place to build, with many steep ravines, sensitive storm water needs, and the commitment to maintaining a healthy forest and meadow environment.



Land, Habitat, and Watershed:

- 55% of campus land is designated as protected natural landscape.
- Annual surveys are used to monitor habitats and provide data for land management practices.
- Pest management has become steadily less chemical-intensive over the past 15 years.

Transportation:

- The campus fleet began using 20% biodiesel (B-20) in all vehicles in 2007.
- Transportation and Parking Services (TAPS) has a wide range of alternative transportation options, including: a campus shuttle service, a bicycle shuttle, bus passes for all students, staff, and faculty on Santa Cruz Metro Transit District, vanpools for selected locations, and most recently, a campus/city carsharing partnership, currently with Zipcar.
- Over 60% of commuters reach campus by means other than single-occupancy vehicles (compared to only 28% by alternative vehicle use by county residents). Nonetheless, cars, buses, and motorcycles powered by fossil fuels represent more than 90% of the commute.
- UCSC faces an inherent challenge in its attempts to minimize transportation energy use: it is situated in the hills, apart from the surrounding community.
- The ratio of parking spaces to campus population (students, staff, and faculty) has declined by approximately 30% over the past 20 years.

Summary and Key Findings

Recycling and Waste Management:
- UCSC's 2007 recycling rate was 32%. It will take a concerted effort to reach the 50% diversion rate goal by June 2008.
- There is growing coverage of special and hazardous wastes that are small-volume but more acutely important, including computer and electronics waste and waste oil from fleet vehicles. UCSC is also increasingly diverting higher-volume streams such as construction and demolition waste and surplus items.
- There are neither campus-wide nor regional composting programs (typically important for cities and universities to achieve 50% diversion).
- Programs require evaluation to increase diversion rates as stated in the UC Policy on Sustainable Practices (UC Policy).

Purchasing:
- UC Policy on Sustainable Practices (UC Policy) elements on purchasing are largely not in place at UCSC. Systems to promote, ensure, or facilitate sustainable purchasing are needed. (The situation is similar at many other UC campuses.)
- UCSC staff are participating in ongoing UC-wide efforts on strategic sourcing. Recent efforts to centralize purchasing and deploy new procurement software will make it easier to pursue sustainable purchasing.
- Specifically, there is a need for local, top-down interpretation of the UC Policy and guidelines for sustainable procurement.
- Implementation of the UC Policy will require considerable staff time and campus-wide education.

Food Systems:
- UCSC students have unparalleled opportunities for academic and experiential learning about local and global food systems.
- The Center for Agroecology and Sustainable Food Systems (CASFS) promotes sustainability and social justice in the world's food and agriculture system, boasts a world-renowned apprenticeship program, conducts research, teaches numerous courses, and manages a 28-acre organic farm on campus land.
- The Food Systems Working Group – a collaborative effort of CASFS, UCSC dining services, purchasing, local farms, campus and community organizations, and representatives from faculty, students, and other UCSC staff – initiates local, organic, socially-just food purchasing policies, organizes trainings and events, and supports a statewide campaign (also launched by this group) to assist other UC institutions in these efforts.
- Nearly a quarter of UCSC Dining Services' produce in 2006-2007 was organic, much provided through an innovative local sourcing arrangement with a local farmers cooperative.
- UCSC Dining Services has achieved "Green Certification" (through the City of Santa Cruz and Monterey Green Business Program) for six of ten facilities and is pursuing certification for the others.

Curriculum:
- Numerous sustainability-related courses and programs exist, spread across the natural and physical sciences, social sciences, and centers and institutes.
- UCSC – like most higher education institutions – does not have a set of benchmarks, a definition of performance, or shared understanding about how sustainability can or should appear in the curriculum, from degree programs to general education requirements. The institution might benefit from a way and a place to discuss these issues.

Co-Curricular Activities:
- There are numerous campus student organizations and internship opportunities related to sustainability, including the Student Environmental Center, the Campus Sustainability Council, the Program in Community and Agroecology, and the Green Campus Program.
- Since 2002, an Annual Campus Earth Summit has been held that engages staff, faculty, students, and community members in developing visions for a sustainable campus.
- College Eight runs a nationally award-winning Sustainability Service Project as part of their Core Course, involving all of the college's first-year students. As the environmentally-themed college, many of its programs focus on sustainability.
- The Education for Sustainable Living Program, in its fifth year at UCSC, is an internationally award-winning, student-led course and lecture series involving over 300 students annually in campus sustainability projects and learning.
- Staff support and coordination of the various programs presents challenges.

Water Use and Conservation:
- Water consumption has risen only modestly since the 1980s: despite a 72.7% rise in enrollment since 1986-1987, annual campus water consumption increased only 4.2% (185.2 to 192.9 million gallons).
- Annual per capita water usage fell 40% during the same time (from 22,022 to 13,282 gallons per student).
- UCSC undertook a comprehensive water efficiency survey in 2007 (see Appendix E) that suggests a number of possible conservation projects that could result in a 10-15% reduction in total annual water use (saving 20 to 30 million gallons per year).

Acknowledgements

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The report authors thank the 2008 Campus Earth Summit attendees, who provided thoughtful feedback on the following sections: Energy and Climate, Green Building, Recycling and Waste Management, Purchasing, Food Systems, Curriculum, and Co-Curricular Activities.

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Editors' Disclaimer

The information contained in this report represents the editors' best effort to collect and synthesize a diverse array of data, perspectives, background knowledge, and institutional history. We apologize for any inaccuracies or omissions. We also apologize if we have accidentally left out anyone of the many people who contributed to the assessment.

List of Performance Indicators

Governance and Decision-Making Structures

- Decision-Making Structures and Reporting
- Establishment of Sustainability Policies and Governance Mechanisms
- Policy, Planning, and Voluntary Commitments
- Funding Mechanisms for Sustainability Projects
- Implementation of UC Policy

Energy and Climate

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- Electricity from Renewables
- Utilities Management, Monitoring, and Tracking
- Greenhouse Gas Emissions, 2006

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- Prominent Examples of Green Building and Site Stewardship Success
- Green Building Baseline, Policies, and Process
- Green Building Expertise Development Among Campus Staff
- Links Between Building Decision Making and Broader Sustainability Goals

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- Habitat Protection
- Pest Management
- Land Management
- Watershed Management

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- Average Vehicle Ridership (AVR)
- Campus Fleet and Fuel Consumption
- Parking
- Bicycles and Pedestrians
- Air Travel
- Funding

Recycling and Waste Management

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Purchasing

- Data Collection for Establishing Sustainability Performance
- Life-Cycle Costing and Strategic Sourcing
- Adherence to UC Policy on Sustainable Practices
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- Co-Curricular Opportunities
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- Student Organizations and Student-Run Cooperatives
- Research Programs and Facilities

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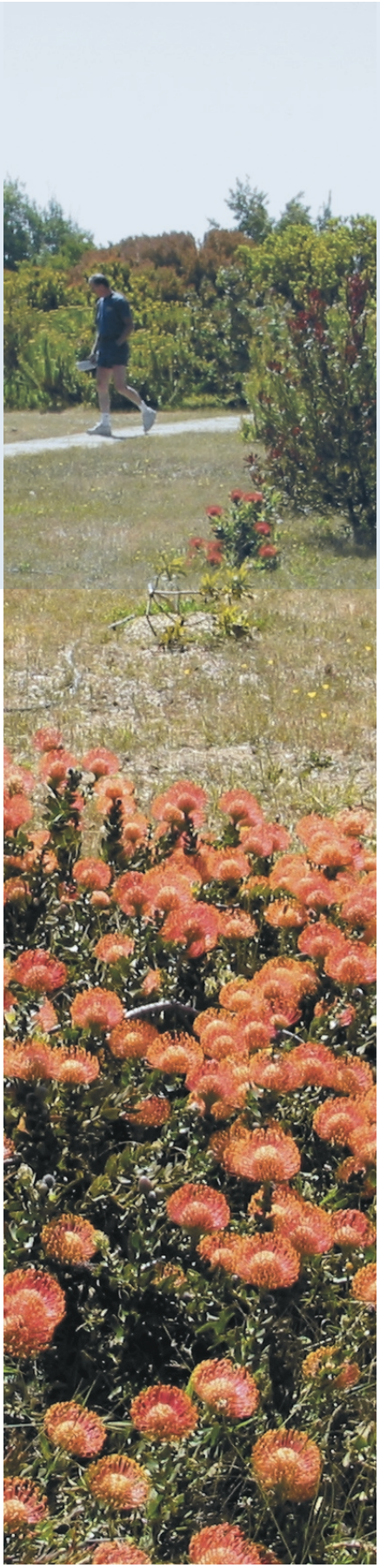
UC Policy on Sustainable Practices

The Green Building Policy and Clean Energy Standard was adopted by the UC Regents in July 2003 following a campaign led by students of the California Student Sustainability Coalition, UC Go Solar. In June 2004, UC issued its Policy on Green Building Design and Clean Energy Standards, requiring an annual progress report to the Regents. In January 2006, the policy was expanded to include sustainable transportation practices and greenhouse gas emissions reduction. In March 2007, the policy was further extended to cover the areas of climate protection practices, green building renovations, sustainable operations and maintenance, waste reduction, and environmentally preferable purchasing. With the most recent expansion, the policy's name was changed to "Policy on Sustainable Practices." In this document, this policy will be referred to as the **UC Policy**.

For more information on the policy, implementation guidelines, UCSC's progress, and implementation challenges, please see Appendix A and the end of the Governance section titled, Implementation of UC Policy. A full version of the policy, policy guidelines, annual report summaries, and UC systemwide achievements can be downloaded at the UC Office of the President's Facilities website: http://www.ucop.edu/facil/sustain/.



UC Policy Elements

- Green Building Design
- Clean Energy Standard
- Climate Protection Practices
- Sustainable Transportation Practices
- Sustainable Operations
- Recycling and Waste Management
- Environmentally Preferable Purchasing

Key Challenges to Full Implementation

- While some of the policy goals are achievable in a short time frame, many must be woven into the institution's practices over time.
- The policy crosses traditional departmental and academic boundaries which presents a challenge for implementation. It is not always obvious who is responsible for implementation. New procedures are needed to identify who must take action and training is often needed to fully understand how to implement specific policy goals.
- Some goals have specific timelines requiring immediate attention to accomplish. Other policy elements are more vague and indicate a general principle or philosophy to be applied, rather than a specific, measurable goal.
- Funding mechanisms need to be developed in almost every case where a cost is associated with implementation. Even when savings will eventually be realized, there is generally no designated budget to cover initial expenses.

Long-Range Development Plan

Development of the UC Santa Cruz campus is guided by a Long-Range Development Plan (LRDP) approved by the University's Board of Regents. The California Public Resources Code Section 21080.09 defines a Long-Range Development Plan as "a physical development and land use plan to meet the academic and institutional objectives for a particular campus or medical center of higher education." The LRDP is updated periodically to meet changing needs and conditions. This process ensures that campus development supports academic, research, and public service goals, while also responding to UC systemwide policies and projected enrollment demand. The Regents have adopted a series of LRDPs for UC Santa Cruz, published in 1963, 1971, 1977, 1988, and 2005. In each plan, the campus' physical planning approach has carefully balanced its academic, research, and service mission with a commitment to careful stewardship of the remarkable site entrusted to the campus. Links to information on UCSC's series of LRDPs can be found at http://ppc.ucsc.edu/.

2005 LRDP Physical Planning Principles and Guidelines

The 2005 LRDP is guided by planning principles outlined below. These principles are intended to protect the campus' extraordinary natural and cultural features, while at the same time incorporating those features into a built environment that, when taken as a whole, maintains UCSC's unique character, community, and quality of life.

At the heart of UCSC's approach to physical planning is a commitment to sustainable development. In its planning, design, construction, and operations, UCSC strives to achieve more sustainable outcomes for the campus and community.

Note: Sustainability refers to principles of physical development, institutional operation, and organizational efficiency that meet the needs of present users without compromising the ability of future users to meet their needs—particularly with regard to the use of natural resources.

Sustainability
- Promote sustainable practices in campus development
- Promote sustainable practices in campus operations
- Encourage broad-based sustainability initiatives

Land Use Patterns
- Respect the natural environment and preserve open space as much as possible
- Integrate the natural and built environment
- Maintain UCSC's core configuration
- Encourage sustainability and efficiency in building layouts

Natural and Cultural Resources
- Respect major landscape and vegetation features
- Maintain continuity of wildlife habitats
- Design exterior landscaping to be compatible with surrounding native plant communities
- Maintain natural surface drainage flows as much as possible
- Protect historic and prehistoric cultural resources

Access and Transportation
- Promote a walkable campus
- Discourage automobile use to and on the campus
- Consolidate parking facilities at perimeter campus locations

Campus Life
- Enrich the academic experience for all students
- Offer university housing opportunities for students and employees
- Create an array of facilities that enrich the quality of campus life

Santa Cruz Community
- Communicate and collaborate with the surrounding community
- Encourage the economic health of the surrounding community
- Provide an accessible and welcoming public-service environment

Governance and Decision-Making Structures

Governance is the part of management or leadership processes that makes decisions, defines expectations, grants power, sets a cultural tone, or verifies performance. Governance for sustainability at universities is typically not yet clearly defined, either in terms of institutional goals or leadership responsibilities.

At UC Santa Cruz, commitment to sustainability at the administrative level has recently begun to gain strength, in part as a result of the passage of the UC Policy on Sustainable Practices (UC Policy) and also due to the persistent dedication of many campus members who are committed to seeing UCSC become a leader in sustainability. The fall 2007 appointment of George Blumenthal as Chancellor of UCSC bodes well for sustainability. One of his first acts as Chancellor was to sign the Climate Compact on solutions to global warming, a collaborative agreement with the Santa Cruz city and county governments.

Most of the policy changes and other commitments UCSC has made are in their implementation infancy. This assessment has identified opportunities and limitations, an understanding of which can shape how decision making on sustainability is institutionalized at UCSC.

Summary of Activities and Performance

Focused on UCSC:

- **UCSC created the Campus Sustainability Subcommittee** (CSS), an official deliberative body for campus sustainability (reporting to the Advisory Committee for Facilities). This was a result of two years of efforts by an ad hoc group of students and staff. All other UC campuses have a comparable committee in place.
- At the request of the Chancellor, CSS drafted **a campus definition, vision, and mission statements on sustainability** for consideration by the Chancellor and the broader campus community and that guided development of this assessment.
- **A two-year pilot program for a Sustainability Office** was implemented in June 2007 with the hiring of a **Sustainability Coordinator** and several Sustainability Interns. Details of funding, reporting, and positions for the long term are yet to be determined.
- **This assessment** is the first attempt to compile and track sustainability performance information campus-wide. It is not yet clear how or where the function of ongoing tracking will be served.
- The Student Union Assembly has a subcommittee, the **Campus Sustainability Council**, which allocates funds from an $18 per year student fee (approximately $240,000 in 2006) to student organizations to collaborate on the Blueprint for a Sustainable Campus. For more information, visit http://sua.ucsc.edu/CSC/

Involving a significant external component:

- **Implementation of the UC Policy** is underway but incomplete, and lacking in some areas. In others, notably sustainable food or site stewardship, UCSC is leading where policy is silent.
- UCSC is part of UC's signing on to **the American College and Universities Presidents Climate Commitment (ACUPCC)**. In January 2008, the Chancellor created the **Chancellor's Council on Climate Change**. Action to implement this commitment is pending.
- UCSC has signed a collaborative **Climate Compact** with the city and county governments of Santa Cruz (see the Energy and Climate section).

Governance and Decision-Making Structures

Challenges

- **Lack of clear communication and accountability mechanisms** has hindered implementation of the UC Policy or other improvement in sustainable practices where several units are responsible for the activity, such as waste reduction or purchasing.
- **Structure, reporting channels, and mechanisms** may need to be revised to reflect UCSC's growing understanding of campus sustainability. For example, the locations and structures of the Pilot Sustainability Office, the Campus Sustainability Subcommittee, and the recently formed Chancellor's Council on Climate Change need to be further developed.
- **Sustainability crosses traditional boundaries** and has implications in both academic and administrative units.
- **Funding** – Investing in sustainability projects, in particular, projects that involve financial paybacks over the long term and that help reduce UCSC's carbon footprint, is necessary. Investments have been made in specific operational areas, but no funding is specifically dedicated to sustainability and no clear process for identifying priorities exists.

Performance Indicators

Overview

Decision-Making Structures and Reporting
- Support for Policy Implementation and Sustainability Reporting
- The Academic Senate

Establishment of Sustainability Policies and Governance Mechanisms
- Guiding Documents
- Campus Sustainability Subcommittee
- Pilot Sustainability Office and Sustainability Staff

Policy, Planning, and Voluntary Commitments
- Climate Change Commitments
- Long-Range Development Plans

Funding Mechanisms for Sustainability Projects
- Student Fees
- Administrative Commitments

Implementation of UC Policy

Figure G1: Selected Progress Related to Governance for Sustainability (as of December 2007)	Little or no progress, next steps not identified	Little progress, next steps partly identified	Some progress, next steps clearly articulated	Notable progress or planning	Significant progress	Displaying leadership
Campus Sustainability Assessment: Institutional buy-in, nearing completion						
Establishment of Governance Mechanisms: CSS established, Sustainability Coordinator position initiated						
Green Building: UCOP-mandated baseline established, budget limits full institutionalization						
Climate Action: Climate Compact signed, official committee just established, no projects yet identified or implemented (but UCSC is a member of California Climate Action Registry)						
Implementation of UC Policy of March 2007: Some activity, partial compliance, numerous challenges						

✦ *Decision-Making Structures and Reporting*

Why This Indicator?

The University's actions to institutionalize sustainability have an overarching theme: while the University clearly aims to make progress, sustainability governance has not been strategically planned before now and could be improved. UCSC is currently lacking the necessary mechanisms of staff support, consistent reporting to decision-makers, and establishment and/or enforcement of official policies. However, the administration has designated a two-year pilot position of Sustainability Coordinator to facilitate longer-term planning with campus decision-makers.

Administrative Committees Involved in Decision Making for Sustainability Planning

Decisions at UCSC are usually advised by committees. Following are some of the highest-level committees (advisory bodies to the Chancellor and Provost) involved in decision making for sustainability planning:

- Advisory Committee for Facilities (ACF)
- Campus Business Operations Committee (CBOC)
- Campus Welfare Committee (CWC)
- Deans Advisory Council (DAC)
- Information Technology Committee (ITC)
- Strategic Communications Committee (SCC)
- Executive Advisory Council (EAC)
- Chancellor's Cabinet

More information is available at http://planning.ucsc.edu/eac/

Support for Policy Implementation and Sustainability Reporting

To be effective, policies must be endorsed, enforced, and reported at the appropriate levels. The high-level commitment to sustainability is a new focus for the UC System. It is understandable that there is currently uneven understanding of the UC Policy and other commitments and their long-term implications and requirements. For those charged with directly enacting the policy, it is important to have explicit support from leadership.

Policies often come from the highest administrative levels. While "on the ground" staff may have the tactical responsibility to implement, leadership must continue to set the strategic direction and allocate resources to make such policies a priority. For example, UC Office of the President (UCOP) provided no resources to implement its Policy on Sustainable Practices, making it difficult to enact policy elements that require additional executive-level time and resources.

Currently, institutional reporting to managers and by managers to the level of the vice chancellors does not routinely incorporate sustainability. This may mean lost opportunities for meeting policy mandates, implementing cost-saving resource efficiency measures, and mission-related opportunities. If these issues were explicitly discussed when campus activities are planned and evaluated, improving sustainability performance could become a higher – and clearer – priority.

The Academic Senate

Membership in the University of California **Academic Senate**, which is defined in detail in Standing Order of the Regents 105.1, is open to all ladder rank faculty. As mandated by the University's Board of Regents, the faculty is empowered to determine academic policy, set conditions for admission and the granting of degrees, authorize and supervise courses and curricula, and advise the administration on faculty appointments, promotions, and budgets.

The Academic Senate plays two roles in campus decision making in matters within the scope of this assessment. With its authority over curriculum and graduation requirements, the Senate determines the profile of ecological literacy and sustainability in undergraduate general education. Information and discussion in the Curriculum section is offered by this assessment to the Senate for consideration. Through shared governance, the Senate is involved in campus decision making in varying ways across the areas surveyed in this assessment. At this point, the Academic Senate has not designated any specific "home" within its structure for addressing sustainability issues. There is one seat on the Campus Sustainability Subcommittee designated for the chair of the Academic Senate. The Senate might wish to consider creating a special committee or task force to deal with sustainability issues that fall in its domain, following the lead of UC San Francisco.

Main Guiding Documents for UCSC

UC Mission Statement
http://www.universityofcalifornia.edu/aboutuc/missionstatement.html

Principles of Community
http://www.ucsc.edu/about/principles_community.asp

Long-Range Development Plan
http://lrdp.ucsc.edu/

The LRDP explicitly and implicitly incorporates sustainability principles.

✦ *Establishment of Sustainability Policies and Governance Mechanisms*

Guiding Documents

Main guiding documents for UCSC are the UC Mission Statement, the Principles of Community, and the Long-Range Development Plan (LRDP). The LRDP incorporates sustainability, ecological, social, and economic principles, both explicitly and implicitly. The University's Mission Statement and the Principles of Community, however, do not mention promoting sustainability either in practice or teaching.

Campus Sustainability Subcommittee

The purpose of the Campus Sustainability Subcommittee (CSS), launched in October of 2006 after two years of an ad hoc effort by staff and students, is to prioritize activities for improving campus sustainability and to advise the Advisory Committee for Facilities (ACF) concerning implementing sustainable policies and practices. The first act by the Subcommittee was the initiation of this assessment.

One challenge faced by CSS is that some components of sustainability fall outside the purview of the ACF. These include food systems and certain aspects of the UC Policy and the Presidents Climate Commitment such as procurement, curricular concerns, etc. The structure and reporting of CSS will need to be re-evaluated. Its current reporting structure was created to allow for immediate action to be taken while a more permanent structure could be designed, if necessary.

The Chancellor requested that CSS create a campus vision, mission, and definition of sustainability. This was submitted in fall 2007, and is now under consideration by the Chancellor's Office.


2008 Campus Sustainability Subcommittee

Pilot Sustainability Office and Sustainability Staff

Many institutions of higher education have recognized an opportunity to improve the effectiveness of sustainability efforts by providing designated staffing and resources. In spring of 2007, UCSC launched a two-year pilot program for a campus Sustainability Office and hired a Sustainability Coordinator. This position is meant to serve as an informational resource for staff and students, contribute to understanding how best to address challenges of institutionalizing sustainability, and promote sustainable practices in every aspect of campus life. (See Appendix F.)

What Does the Campus Sustainability Coordinator Do?

Since the program was initiated, the current Sustainability Coordinator has been involved in completing this assessment, developing a campus sustainability website, organizing UCSC's involvement with a national effort concerning climate change called *Focus the Nation*, initiating the Campus Sustainability Internship Program, and supporting the Campus Sustainability Subcommittee. Over the coming year, the Coordinator will help the UCSC administration develop a long-term plan for the Sustainability Office. See Appendix F for more information on the goals and roles of the Campus Sustainability Coordinator position.

There are other staff members on campus who are charged with supporting sustainability activities in various areas. Some of the positions identified:

- The Sustainability Programs Manager, paid for by student fees and employed through Student Affairs, works with student organizations such as the Student Environmental Center.
- The College Eight Programs Coordinator assists with organizing the Sustainability Projects included in the College Eight Core Course (see the Curriculum section).
- UCSC Physical Plant has an Energy Manager who works to promote energy efficiency, a Recycling

Coordinator, staff in the Grounds Department who work to promote site stewardship, and other staff who address water and building efficiency.
- A Safety, Training, and Resource Conservation Coordinator in College and University Housing facilitates conservation activities and education in the residence halls.
- The Food Systems Working Group Coordinator (part-time), paid for by student fees and reporting to the Center for Agroecology and Sustainable Food Systems, works to implement and expand the sustainable food policies.
- The Environmental Health and Safety Office also has several staff members dedicated to working on environmental stewardship issues.
- Environmental Studies houses an Environmental Internship Coordinator and a Coordinator for the Program in Community and Agroecology (PICA). The PICA Coordinator, funded by an independent grant, manages internships, classes, educational projects, and workshops with a hands-on approach to sustainability and coordinates with other sustainability-related organizations.

The challenge inherent in having so many related positions and entities is coordinating efforts and ensuring consistent communication not only between staff but with students and faculty who may be working on or interested in similar projects. Aside from the Annual Campus Earth Summit, a one-day event hosted by the Student Environmental Center since 2002 (see the Co-Curricular Activities section), there is currently little formal infrastructure to this end.

✦ *Policy, Planning, and Voluntary Commitments*

Climate Change Commitments

In the last several years, UCSC has become part of several larger groups that demonstrate commitment to sustainability. When UC President Dynes signed the American College and Universities Presidents Climate Commitment (ACUPCC) on behalf of all UC institutions, he committed UCSC to the various elements of the Commitment, including forming a climate action committee to plan for achieving carbon neutrality. For more information on the ACUPCC, see http://www.presidentsclimatecommitment.org/. UCSC recently signed a local Climate Compact with the city and county of Santa Cruz, which also invites broader participation in the surrounding area (see the Energy and Climate section).

Long-Range Development Plans

Included in the two most recent Long-Range Development Plans (LRDPs), drafted in 1988 and 2005 respectively, are many considerations concerning how to expand the campus in a way that is most consistent with principles of sustainability. The 1988 LRDP, for example, includes many impact mitigation measures, including projects designed to ensure water use efficiency. An awareness of the ecological and social implications of campus expansion is expressed intermittently throughout the documents. The 2005 LRDP includes, among other mitigation measures, planning for improving and expanding bike paths around campus to facilitate motorless travel and explicitly addresses principles of sustainability.

✦ *Funding Mechanisms for Sustainability Projects*

Why This Indicator?

The institution has made important funding commitments to sustainability projects and personnel, but the current situation has notable shortcomings and leaves important challenges ahead.

Student Fees

The largest consistent funding on campus for sustainability-related projects, outside of established operations (recycling, site stewardship, energy conservation, stormwater management, etc.), comes from a student fee referendum and is managed by the Campus Sustainability Council (see the Co-Curricular Activities section and Appendix G). The approximately $240,000 annually in this fund is generated by a $6-per-student-per-quarter fee, and is distributed through an application process to registered student organizations. After just three years in existence, nearly 70% of the funds have been allocated as permanent funding for only four student organizations, leaving approximately $70,000 to support new groups or projects outside the scope of these permanently funded organizations. Furthermore, this funding is generally not available to non-student campus units interested in greening their operations.

Administrative Commitments

Funding for the Pilot Sustainability Coordinator position has been provided through administrative entities: the Chancellor and Executive Vice Chancellor's Office, Business and Administrative Services, and Student Affairs. However, permanent funding is yet to be determined and there is no dedicated funding for campus sustainability projects. Additionally, current funding levels may not be sufficient to cover existing commitments (such as the Presidents Climate Commitment) or to support implementation of existing policies (in particular, the UC Policy).

✦ *Implementation of UC Policy*

Why This Indicator?

The UC Policy and accompanying guidelines, signed into policy in March 2007, lay out a number of strategic and tactical approaches to improving sustainability performance. The UC Policy has 102 separate policy components and implementation procedures:

- 20 under the category of Green Building.
- 9 under Clean Energy.
- 3 under Climate Protection.
- 15 under Sustainable Transportation Practices.
- 11 under Sustainable Operations.
- 6 under Recycling and Waste Management.
- 37 under Environmentally Preferable Purchasing Practices.
- 1 (an annual reporting requirement) under Authority and Report Schedule.

This extensive policy will take time and planning to fully implement. UCSC's challenge is to see that the necessary structure and mechanisms are put in place to ensure implementation and to monitor progress.

The introductory section of this assessment titled, UC Policy on Sustainable Practices, in addition to Appendix A, describes progress toward meeting the UC Policy in greater detail. The policy can be found at: http://www.ucop.edu/facil/sustain/.

Opportunities and Recommendations

Determine (at an appropriate executive level, such as Chancellor or Vice Chancellor) an explicit governance structure and reporting process for sustainability.

- Re-evaluate the function and reporting line for the Campus Sustainability Subcommittee.
- Identify highest-level, permanent staff position to be the institution's point person for sustainability (clarify the job description and reporting structure).
- Identify any additional resources including staff positions and job descriptions necessary to provide staff to support sustainability policies, programs, and coordination.

Improve governance for high-level and institution-wide commitments.

- Ensure a clear mandate and necessary resources for the committee charged with fulfilling the Presidents Climate Commitment and organizing climate action.
- Consider adding a commitment to sustainability to the Principles of Community and/or Principles of Sustainability to the basic guiding documents of UCSC.

Enhance existing efforts with greater transparency, better communication, and more carefully directed reporting.

- Ensure regular reporting to Advisory Committee for Facilities (ACF) and the Chancellor's Executive Advisory Council (EAC) on compliance with existing sustainability policies.
- Facilitate communications among the many staff members concerned with sustainability practices and between these specific staff members and other faculty and students.
- Review existing job descriptions and incorporate a sustainability component where applicable.
- Integrate sustainability considerations into existing reports from "on the ground" staff to unit managers, and from unit managers to vice chancellors and other high-ranking administrators.
- Identify annual reporting practices for policy implementation and progress on sustainability programs.

Maintain current funding and consider innovative and emerging funding mechanisms.

- Continue to fund and expand the Pilot Sustainability Office to assist in meeting current and future sustainability commitments. Specifically, identify permanent resources and reporting structure needed to reach the University's sustainability goals.
- Explore new ways of allocating the student funds administered by the Campus Sustainability Council to increase their availability for campus-wide sustainability activities.
- Establish a Revolving Loan Fund to fund facilities projects designed to reduce cost and conserve resources.

We gratefully acknowledge the contributions to this section by the following people:
Bill Ladusaw, *Linguistics Professor and Vice Provost and Dean, Undergraduate Education*
Ashish Sahni, *Assistant Chancellor*
Matt St. Clair, *Sustainability Manager, UC Office of the President*
Christina Valentino, *Assistant Vice Chancellor, Business and Administrative Services*
Tom Vani, *Vice Chancellor, Business and Administrative Services*

Energy and Climate

Society's patterns of energy use may represent the single greatest environmental impact, with central importance for the economy and consequences for human health. There is a link to energy security nationally and regionally, as the nation attempts to move toward an economy that is more resilient to global energy supply, demand shocks, and geopolitical forces.

Inevitably, energy issues are woven into many aspects of this assessment. This is most obvious with green building and transportation, but it is subtly present in areas such as purchasing and food systems (the embodied energy in the production and delivery of goods), water consumption (the energy used to transport and treat potable water and waste water), and governance (challenges that cross traditional decision-making boundaries).

Summary of Activities and Performance

Policy and Governance:

- The University of California, as a ten-institution system, has signed the **American College and University Presidents Climate Commitment (ACUPCC)**. In January 2008, the Chancellor created the **Chancellor's Council on Climate Change**.
- In conjunction with the city and county of Santa Cruz, UCSC has signed onto the **Climate Action Compact**, which involves creating a greenhouse gas reduction plan and establishing five collaborative partnerships with local public, private, and non-profit organizations. There are therefore a total of three policies concerning climate change to which UCSC has committed. See Appendix D for more information.
- The UC Policy on Sustainable Practices (UC Policy) directly promotes energy efficiency using the **Leadership in Energy Efficiency Design (LEED) system for green building,** requiring energy standards in equipment purchasing, mandating efficiency measures in ongoing operations, promoting sourcing of power from renewables, encouraging the development of onsite renewable energy, etc.
- A **Strategic Energy Plan** focused on energy conservation for UCSC will be developed by July 2008 as part of a systemwide effort.

Generation:

- **100% of UCSC's campus electrical load comes directly or indirectly from renewable sources**, due in large part to a student fee referendum passed in 2006. This is achieved through the procurement of Renewable Energy Credits (RECs) from a variety of sources (wind, solar, biogas, small-scale hydro, and geothermal) to augment the approximately 16% renewables that come from the local utility.
- **UCSC currently generates one-third of its electrical load onsite through two combined heat and power plants** (a process known as co-generation).
- **There are currently no photovoltaic installations on campus**, but opportunities are being explored as part of an electrical master plan.

Current Condition: Buildings, Energy Use, and Greenhouse Gases:

- **Existing green building strategies reinforce the mandate to reduce energy consumption** (see the Green Building section).
- **Lighting retrofits for energy efficiency have been undertaken** for many of the older academic buildings, and there are opportunities for improvement in housing, dining, and residential spaces. Upgrading facilities is an ongoing effort with the innovation of new, more efficient lighting technologies.
- **UCSC energy services staff regularly develops, maintains, and implements a portfolio of potential energy efficiency measures** (EEMs) focusing in three major areas – equipment retrofits, renewable energy technologies, and the commissioning of existing buildings.
- **UCSC participates in the Alliance to Save Energy's Green Campus Program**, an ongoing program through which several student interns install or implement energy-saving equipment and techniques. Total savings as a result of their efforts during 2006-2007 was estimated at $31,000 and came at little cost to the University.
- **UCSC's Physical Plant department staffs two full-time positions** (and additional student interns) to pursue energy efficiency measures. The campus lacks dedicated staff for these functions in other campus units.

2006 Greenhouse Gas (GHG) Emissions Inventory

UCSC's 2006 GHG emissions inventory, verified under the reporting standards of General Reporting Protocol Version 2.2, is officially registered in the California Climate Action Registry database. The 2006 emissions report is available at:

http://www.climateregistry.org/CARROT/public/reports.aspx .

- **The campus completed its first year of greenhouse gas (GHG) reporting for the year 2006.** This reporting is done through the California Climate Action Registry and is third-party certified. Air travel, commuting, and purchases are not included in the boundaries of this inventory.
- **There is currently no climate action plan. However, the Chancellor has appointed a Chancellor's Council on Climate Change,** and an action plan is expected by December 2008. UCSC has programs that ultimately reduce GHG emissions. These include energy efficiency measures, multimodal transportation, and the purchase of electricity from renewable sources, though more can be achieved.
- The UCSC campus has a **"no cooling for comfort"** policy in new and existing buildings. Cooling equipment is limited to areas with high heat loads (e.g., computer rooms), heat-sensitive equipment (e.g., laboratories), or areas where high human occupancy results in high heat loads (e.g., lecture halls).

Challenges

- **UCSC now has three similar, but distinct, institutional commitments to take action on climate protection** (the UC Policy, the ACUPCC, and the Climate Compact). See Appendix D for more information.
  - The campus lacks a unified organizational structure to facilitate GHG reductions.
  - A more comprehensive inventory of UCSC greenhouse gas emissions must be assembled. Some of the necessary data is not tracked consistently and is challenging to collect (faculty and staff travel, commuting, and purchases).
  - Priority must be given and a dedicated funding mechanism provided to facilitate energy efficiency and renewable energy projects on campus.
- **The campus lacks dedicated sustainability staff in its ancillary departments.** This may hinder the application of energy efficiency projects in housing, dining, athletics, and other departments.
- **Establishing on-site generation of renewable energy will require careful planning** and the collaboration of multiple departments (Physical Planning and Construction, the Physical Plant, Purchasing, etc.).

Performance Indicators

Overview

Campus Energy Use
- Total Energy Use
- Energy Use Per Square Foot of Assignable Building Space

Energy Efficiency Efforts
- Retrofits of Existing Buildings
- Planning and Monitoring
- New Construction and Major Renovation Projects
- Other Programs

Electricity from Renewables
- Share of Electricity from Renewables

Utilities Management, Monitoring, and Tracking
- Current Practices

Greenhouse Gas Emissions, 2006
- Tracking and Reporting of Emissions and Sources

✦ *Campus Energy Use*

Why This Indicator?

Despite a frequent focus on alternative fuels and electricity from renewables, overall energy use remains an important indicator of environmental impact. By focusing on total use, attention is drawn first and foremost to efficiency efforts that inherently meet multiple goals simultaneously. Naturally, the campus is also focused on sources of energy – several subsequent indicators address this issue in detail.

Total Energy Use

Total energy use has gradually increased over the past decade, rising in fiscal year 2006-2007 to 30.3% above the 1993-1994 level. This follows the trend in society generally. During this period, building square footage (assignable square feet) has increased 50.9%.

Note: A **BTU**, or British Thermal Unit, is a unit used to measure the amount of heat required to increase the temperature of a pound of water one degree Fahrenheit. BTUs are often used in data collection referencing the energy use related to heating, cooling, and electricity.

Energy Use Per Square Foot of Assignable Building Space

Energy use per square foot has remained generally stable, around 9% lower since 2000 than during the 1990s (see Figure E2). This stability is an impressive efficiency success given expansion in the numbers of computers, labs, equipment, and appliances throughout campus and in dorms over that time.

Figure E1: Total Campus Energy Use (Billions of BTU)
Source: UCSC Physical Plant

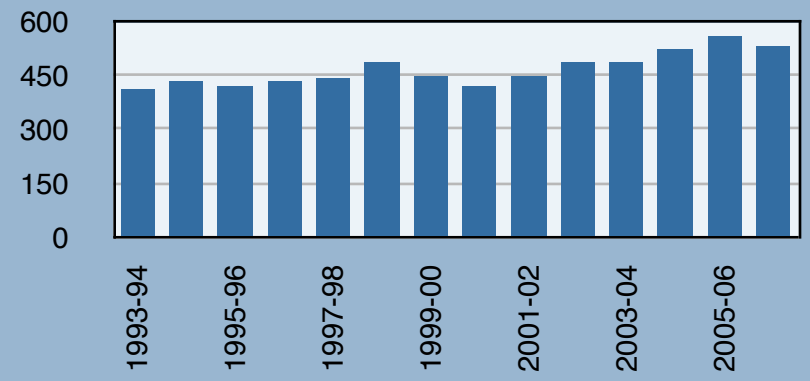
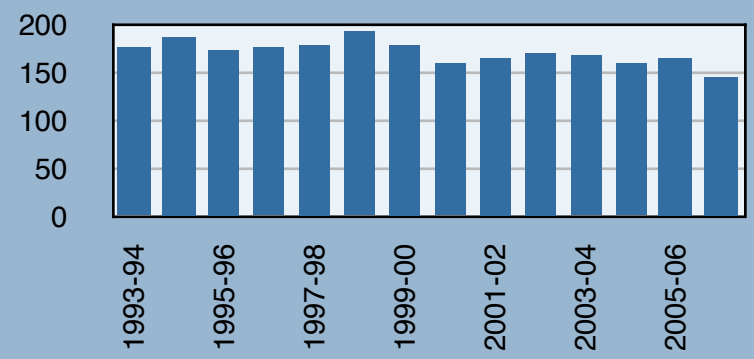


Figure E2: UCSC Campus Energy Intensity, 1993 - 2006 (Thousands of BTU Per Assignable Square Foot)
Source: UCSC Physical Plant



✦ *Energy Efficiency Efforts*

Why This Indicator?

While total energy use, GHG emissions, and other aggregate measures are straightforward, it can be difficult to summarize the efforts that implement an institution's strategy for energy use reduction. This apparently qualitative indicator is included to draw attention to the diverse activities being implemented at UCSC.

UCSC regularly takes actions that gradually reduce the energy needs of the institution by making the local built environment more efficient. These actions form a coherent indicator because they are part of a deliberate strategy to improve performance over time.

Retrofits of Existing Buildings

- Lighting upgrades.
- HVAC upgrades (UCSC won a Best Practices award at the UC/CSU/CCC Sustainability Conference in 2007).
- Building management through upgraded metering and monitoring.

Planning and Monitoring

- Data gathering to prioritize retrofit projects.
- Energy management systems upgrades to increase monitoring capabilities.
- Commissioning of existing buildings.

New Construction and Major Renovation Projects

- Use of LEED and the UCOP-approved Green Building Campus Baseline (see Appendix C).
- Consideration of energy efficiency in new construction required by the Long-Range Development Plan (LRDP).

Other Programs

- Experimentation with new or untapped technologies, such as LED (light emitting diode) lighting, variable-speed drives, or building-integrated photovoltaics.
- Employment of student interns by the Green Campus Program to identify energy efficiency projects. The program saved the campus $31,000 in the 2006-2007 academic year.
- Energy efficiency measures have saved 2,995,000 kWh annually since 2000, reducing CO2-equivalent emissions by 1,585 tons each year.

✦ *Electricity from Renewables*

Why This Indicator?

To meet goals for GHG emissions reduction and for energy security, a need to improve efficiency and foster the transition from fossil fuels to renewable energy sources exists. The purchase of Renewable Energy Credits (RECs) is a crucial step that supports that market transformation.

Share of Electricity from Renewables

In 2006-2007 approximately 16% of the "grid mix" – the composition of the electricity purchased from the utility – came from renewable sources such as hydropower.

In 2005, students voted in a referendum to tax themselves (via student fees) to pay for RECs, or "green tags", to match the remaining 84% of the campus' electricity demand. With this program, all of UCSC's electrical use is from "green" sources.

Figure E3: Electricity from Renewables, Pre-2005
Source: UCSC Physical Plant

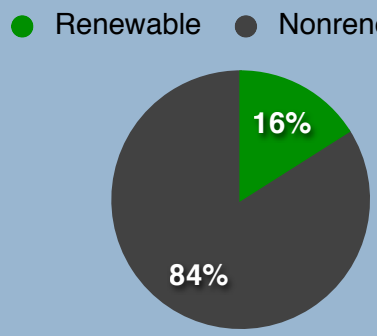
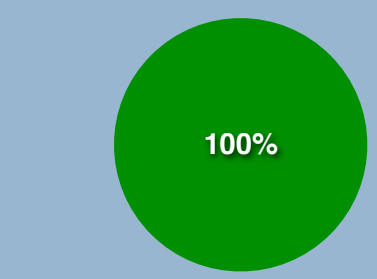


Figure E4: Electricity from Renewables, 2005 to present
Source: UCSC Physical Plant



✦ *Utilities Management, Monitoring, and Tracking*

Why This Indicator?

You cannot manage what you do not measure. Monitoring also serves to measure energy savings. This allows UCSC's Physical Plant to accurately identify problem buildings, identify water/irrigation leaks (and high uses), and measure the efficiency of building equipment.

Monitoring and Tracking Activities
Source: UCSC Facilities

- Data gathering to prioritize retrofit projects.
- Monthly monitoring of electric, natural gas, water, irrigation, hot water, chilled water (ac), and seawater utilities.
- Installation of system that monitors electrical use for major buildings in real time (existing for some buildings, expanding to other buildings).

Current Practices

The campus currently monitors all major and most minor energy uses with very few exceptions. There are approximately 1,450 individual meters, requiring approximately six days for one person to read (see the Opportunities and Recommendations of this section).

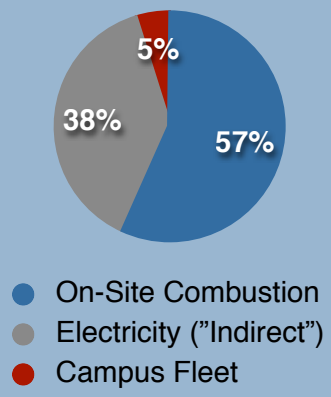
Physical Plant is increasing its effort to capture real-time data across campus through meters and remote sensing. For example, the Physical Sciences Building was equipped with comprehensive metering of electrical and thermal loads. It is hoped that the campus will be able to develop a life-cycle cost analysis, i.e., the initial cost, maintenance costs, and energy costs for this building over its lifetime.

✦ *Greenhouse Gas Emissions, 2006*

Why This Indicator?

Scientists now believe that human-caused emissions are, with at least 90% certainty, a major force in climate change.[1] Measuring emissions is the first step in identifying strategies to mitigate impacts.

Figure E5: Greenhouse Gas Emissions from Campus Operations
Source: UCSC Facilities



Notes:
- This inventory captures only those emissions required by the California Climate Action Registry and other GHG inventory protocols.
- This inventory currently does not include important but harder-to-quantify emissions, such as commute travel and air travel.
- The 38% of emissions resulting from purchased electricity are calculated based on the utility's grid mix. The purchase of RECs effectively cancels out this

Tracking and Reporting of Emissions and Sources

UCSC emitted nearly 40,000 tons of carbon dioxide and CO2-equivalent emissions in 2006 as calculated for emissions related to the use of fossil fuels. More than half of GHG emissions came from on-site burning of fossil fuels, mainly natural gas. The second biggest source was electricity use. UCSC's electricity contract for this period was with Arizona Power Supply, whose "grid mix" included a large share of coal. Beginning in 2008, electricity is provided by the local utility, Pacific Gas and Electric, Co., whose grid mix includes only 2% from coal.

[1] Intergovernmental Panel on Climate Change (IPCC). (2007). Findings of the IPCC Fourth Assessment Report: Climate Change 2007: Climate change impacts, adaptation and vulnerability. Available at http://www.ipcc.ch/SPM6avr07.pdf

Opportunities and Recommendations

Fulfill the requirements of the UC Policy systemwide targets.

- Incorporate energy efficiency into all new capital projects and renovations.
- Implement procedures for Climate Protection Practices.
- Reduce energy consumption 10% or more by 2014 (compared to a year 2000 baseline).

Follow through with climate action commitments.

- Climate action commitments include the UC Policy on Sustainable Practices Climate Protection section, American College and Universities Presidents Climate Commitment, and the Climate Action Compact.
- Once a Climate Action Plan is developed, it will need to be given high priority for the institution.
  - The matrix found in Appendix D comparing the three separate climate commitments can be used to inform climate action planning.
  - Explicitly link climate action planning to other long-term campus planning efforts.
  - Describe the current education and research activities related to climate change and sustainability and set out planned actions to make these a part of the curriculum, research agenda, and other educational experience for all students (as committed to in the ACUPCC).

Increase on-site generation.

- Plan to achieve the institution's share of the total UC goal. (The systemwide goal is 10MW of on-site generation by 2014. There are no specific campus goals to date.)
- Explore options for on-site generation of renewable energy at UCSC including photovoltaics, solar hot water, and wind generation (such as the site on Mt. Hamilton or the Marine Services Campus). This goal will require collaboration of multiple departments on campus (Physical Plant, Physical Planning and Construction, and Purchasing).
- Plan to increase campus co-generation using more efficient, newer technologies such as fuel cells and/or gas turbine recuperating engines.

Acquire a system that allows for real-time and accurate data acquisition.

- Currently staff read individual meters on location. Systems exist that would allow for automated reading without being onsite. Though these systems are expensive, they could save resources spent on fuel, automotive maintenance, personnel time, and wasted energy and water.

Aggressively pursue retrofits (especially lighting and HVAC) and commissioning.

- Increase awareness and funding available for lighting retrofits to other campus entities (housing, dining, faculty/staff housing, etc.). Continue training all lighting personnel on latest technologies. Ensure that, while utility incentives for lighting retrofits are based on energy savings, decisions at the UCSC level be made to consider other factors, such as maintenance costs and indoor environmental quality for occupants.
- Develop and implement a strategic plan for identifying, quantifying, and performing HVAC-related energy efficiency measures and dedicate the appropriate personnel and resources.

We gratefully acknowledge the contributions to this section by the following people:
Tommaso Boggia, *Former UCSC Undergraduate Student*
Ian McDonald, *Energy Analyst*
Matt St. Clair, *Sustainability Manager, UC Office of the President*
Patrick Testoni, *Energy Manager*

Green Building

UCSC's indoor and outdoor built environment provides space for the campus to meet both its programmatic objectives and basic human needs. Accordingly, green building is a major component of UC's sustainability-related policies.

UCSC can build on its distinguished history of sustainable-site development and energy-efficient buildings. The campus is widely viewed as a success in balancing the demands of a major academic venture within a unique and dynamic ecosystem. The ways in which construction and operation of campus facilities are accomplished present significant opportunities for limiting adverse environmental effects. The institution is also well positioned to meet the rising expectations of the green building movement, including improved environmental performance in the supply chain of building products (from resource extraction to waste), healthier spaces for work and study, and more efficient energy and operational systems.

Campus growth will inevitably alter the physical environment: storm water patterns will be changed, habitats disrupted, and resources consumed. Design decisions will affect continuing operations for the entire life of a building. From its inception, its spectacular natural setting has inspired those charged with creating UC Santa Cruz to be particularly imaginative in campus design. When planning, designing, building, maintaining, and renovating its facilities, the campus continually addresses issues of habitat integrity, storm water management, energy and water conservation, and efficient use of resources. At the same time, competing demands of escalating construction costs, use of sustainable materials and methods, efficient building performance, and responsible environmental planning will pose significant challenges.

Note: This section focuses mainly on new construction and major renovations, especially those covered by LEED-NC. UCSC has no LEED certified buildings as yet because there are few buildings whose design and construction postdate the widespread use of the LEED framework.

Summary of Activities and Performance

- UCSC has a long-standing institutional commitment to stewardship of the campus that facilitates the design and construction of buildings with excellent environmental performance.
- UCSC's Green Building Campus Baseline – mandated by UCOP – describes the institution's formal commitment to LEED credits for all projects. (See the summary of UCSC's Green Building Campus Baseline in Appendix C.)
- The 2005 Long-Range Development Plan (LRDP) includes physical planning principles related to sustainable development, operations, and community initiatives. For more information, see page 13.
- UCSC is moving quickly to use LEED frameworks in several areas:
  - LEED-EB pilot project for Engineering 2.
  - Several LEED-CI projects are underway.
  - Collaborative effort among Physical Planning and Construction, Student Affairs, and the Student Environmental Center to pursue LEED-NC certification for Cowell Student Health Center expansion.
  - Biomedical Sciences Facility designed to be the equivalent of LEED Silver.

Challenges

Still, like other institutions, there are numerous challenges to building "green" buildings, notably:

- Tightening budgets, even in the face of increasing construction costs.
- The potential effect of insufficient capital budgets on long-term operation and maintenance costs.
- The need for new expertise to meet rising expectations and to take full advantage of emerging technologies.


Academic Resource Center (ARC)

- Insufficient state and UC systemwide processes to deal with some of the challenges to better campus stewardship of the built environment, such as mechanisms to ensure commissioning and life-cycle costing.
- No clear roadmap for the implementation and funding of the wide range of UC Policy on Sustainable Practices (UC Policy) mandates.

Performance Indicators

Overview

✦ *Prominent Examples of Green Building and Site Stewardship Success*

Why This Indicator?

Prominent successes in sustainable construction are acts of responsibility and stewardship and are centrally important to meeting sustainability goals. At an institution of higher education, these acts also teach by design and by example.

Where Are We Now?

The best indicator of green building progress over the long term is the campus building stock and its surrounding infrastructure. UCSC has a number of projects and campus features that demonstrate the institution's long-standing commitment to preserving the balance between human use of the site and the health of ecosystems.

Prominent Examples of Green Building and Site Stewardship Success

These examples capture a number of successes that have accumulated over the history of the institution and the development of the campus.

Physical Sciences Building
The Physical Sciences building is a five-story, 136,210 gross square foot building located in the science and engineering area of campus. Its T-shape and east-west spine allow flexibility in the assignment of lab and office space, enhance cross ventilation, and provide substantial daylighting. The surrounding redwood forest shades the building in combination with the configuration of window and shading devices (determined by sun studies). Air conditioning is limited to rooms with high internal heat gain (e.g., computer server rooms) or containing heat-sensitive equipment.

Biomedical Sciences Building (In Design)
The Biomedical Sciences building will be a state-of-the-art science facility with natural light and ventilation, water conservation measures, and site-sensitive storm water management. The building is currently aiming to achieve LEED Silver – an impressive feat for a lab building.

Co-Generation for Heat and Power
UCSC's central heating plant engages in co-generation, the recapturing of waste heat from the combustion of natural gas for heat to generate electricity improving campus overall energy efficiency. Since 2000, UCSC's co-generation has met about one-third of its electricity consumption (33.7%).

Integration of Campus and Forest
A startling and beautiful feature of UCSC is the weaving together of buildings, courtyards, and redwood forest throughout campus. While conventional construction methods can often disturb landscaping well beyond a building's footprint, UCSC requires that the approach taken to both design and construction of its buildings allows building footprints to nestle amongst the campus' large trees.

✦ *Green Building Baseline, Policies, and Process*

Why This Indicator?

Large and long-lived building projects necessarily stretch out over a long timeframe. Policies and processes are needed to capture and operationalize an institutional commitment so that vision does not rely entirely on particular individuals at a given point in time. Large construction and renovation projects transcend single individuals and small groups. Their scale and timeframe test UCSC's ability to create systems that ensure the implementation of a plan and adherence to vision and principles.

Where Are We Now?

There are many policies and processes in place to shepherd projects to successful completion. These documents and procedures represent the effort of the UC system as a whole and UCSC as an individual institution to keep challenging capital construction processes on track and in accordance with the vision and goals established by the UC Regents, UCSC administration, and the campus community.

Green Building Baseline
Source: UCSC Physical Planning and Construction and Physical Plant

Baseline

Strengths:

- Enshrines expectation of significant performance above and beyond standard commercial construction.
- Allows external stakeholders to see green building starting point for all major capital projects.

Potential weaknesses:

- Funding uncertainties have prevented adoption of additional baseline commitments (e.g., instrumentation required for EA5 - Measurement and Verification).
- Possibility for baseline to become out-of-date without clear timeline for revisiting and updating.

Process

Key elements that are present:

- Integrated design process includes all stakeholders and professional consultants from the project start.
- Experienced campus staff has considerable institutional memory and specific knowledge of campus systems and conditions.

Key elements that are absent:

- Thorough documentation of staff's institutional knowledge.
- Tools for easy communication of steps in design and construction to campus stakeholders.

Physical Sciences Building (PSB)

✦ *Green Building Expertise Development Among Campus Staff*

Why This Indicator?

Staff identified the need for ongoing training and knowledge building to have the shared understanding and individual skills to meet green building goals.

Of course, familiarity with the LEED framework is by no means a complete and thorough indicator of staff ability to create and deploy context-sensitive and successful green building strategies. Still, LEED is a broad and detailed framework, and it is a readily available indicator. It is augmented here with information on additional trainings and workshops attended by staff.

Where Are We Now?

Green building represents a rising expectation of campus capacity for conceiving, shaping, and managing projects. Many technical disciplines acknowledge this challenge with requirements for continuing education. This indicator attempts to capture the current level of capacity in Physical Planning and Construction.

Green Building Expertise Development Among Campus Staff

Source: UCSC Physical Planning and Construction

LEED Accredited Professionals (APs)

Below is a numbered list of relevant architecture, engineering, and planning staff who are LEED Accredited Professionals in Physical Planning and Construction:

- Project managers, planners, and inspectors: 24 total staff.
- Three LEED APs.
- One AP in the Physical Plant.
- Five additional staff who attended trainings related to sustainability and green building in 2007.

Relevant Green Building Conferences

Examples of relevant green building conferences and focused learning activities attended by Physical Planning and Construction staff:

- LEED-CI workshop.
- LEED-EB workshop.
- UC/CSU/CCC Sustainability Conference.
- Fundamentals for LEED Accreditation (SJSU Professional Development).
- Low-Impact Development workshop (by State Water Resources Control Board).
- Labs21 Design Charrette for Biomedical Sciences Building.
- Mandatory training in storm water regulation compliance.

Engineering Building 2

Links Between Building Decision Making and Broader Sustainability Goals

Climate and Energy
- The UC Policy requires that new buildings outperform California's Title 24 (energy code) by 20%, and that they achieve LEED Certified equivalency (with the request to "strive to achieve" LEED Silver).
- No formal link to climate action planning, which has only just begun officially.

Purchasing
- Many green building baseline credits mandate environmentally preferable purchasing of paints, finishes, flooring materials, and appliances; no clear pathways for joint implementation of this mandate.

Land and Habitat
- Green building baseline credits include storm water management (through campus-wide policies); storm water plan is currently incorporated into the Green Building Campus Baseline (see Appendix C).

Transportation Infrastructure and Campus Development
- Green building baseline credits include public transportation and, on a project-discretionary basis, bicycle storage and changing rooms.

Recycling and Waste Management
- LEED requires in-building recycling infrastructure.
- The baseline includes a requirement for LEED-NC (version 2.1) credit 2.1 (recycling of 50% of construction and demolition waste) with the discretion to pursue LEED credit 2.2 (75%).

✦ *Links Between Building Decision Making and Broader Sustainability Goals*

Why This Indicator?

Green building and overall energy performance are inextricably linked. For more on this topic, see the Governance section.

Where Are We Now?

Green building is an important part of UCSC's sustainability efforts, but not the only part. Coordination of these overlapping but distinct endeavors will be an ongoing challenge.

Physical Sciences Building

Opportunities and Recommendations

Reshape funding models, budgets, and costing processes for capital construction.

- Use life-cycle costing as a primary decision tool for all capital projects on campus.
- Involve oversight bodies and project funders (including the UC Office of the President) in addressing these challenges.
- Specifically, seek to overcome the artificial distinction between first costs and subsequent life-cycle costs for long-lived structures and building systems.
- Identify alternative external funding opportunities to support green building initiatives.

Integrate green building strategies into ongoing operations and maintenance.

- Increase coordination between Physical Plant and Physical Planning and Construction on green building opportunities.
- Identify how best to use LEED for Existing Buildings (LEED-EB) to support implementation of the UC Policy's priorities on sustainable operations.

Build skills and knowledge on green design, construction, and materials selection.

- Increase training opportunities for staff.

Use the physical campus to educate the campus community on green building.

- Develop curriculum related to green building.
- Post signage in high-traffic areas in notable buildings to raise awareness among students, staff, faculty, and the campus community about specific green building practices that have already been implemented at UCSC.
- Make design and development processes more transparent to a wider range of campus stakeholders, especially those who advocate for green building in particular and sustainability generally.
- Ensure inclusion of green building strategies in climate action planning.

Integrate implementation of policies on green building and purchasing.

- Clearly identify overlap between UCOP goals on sustainable purchasing and green building.
- Ensure fulfillment of purchasing goals and policies that contribute to green building goals and opportunities.

We gratefully acknowledge the contributions to this section by the following people:
John Barnes, *Director, Campus Planning*
Diane Behling, *Senior Facilities Analyst, Capital Planning and Space Management*
Robin Draper, *Director, Capital Planning and Space Management*
Matt St. Clair, *Sustainability Manager, UC Office of the President*
Frank Zwart AIA, *Campus Architect and Associate Vice Chancellor, Physical Planning and Construction*

Land, Habitat, and Watershed

The UC Santa Cruz campus is located in an ecologically diverse area along the central coast of California, overlooking the Monterey Bay National Marine Sanctuary. The magnificent setting of the campus provides opportunity to manage both undeveloped and developed land holdings while providing an education to thousands of students housed on or commuting regularly to campus lands. As a campus nestled within a complex natural environment, the University understands the need to balance the requirements of maintaining and developing facilities to support teaching, research, and public service while managing the natural environment that is an integral part of the campus and the surrounding region.

A walk around the UCSC campus reveals the interactivity between the natural environment and the built campus: new buildings are co-located with old-growth trees, views of meadows extend beyond the music building, and a small herd of deer are seen often grazing on the shrubs on Science Hill. As one UCSC planning specialist puts it, "Natural environment and human activity are intertwined [at UCSC] in a raw way that doesn't occur anywhere else in a campus setting."

Summary of Activities and Performance

- The UCSC campus includes over 2,000 acres of land. 55%of the campus is designated in the 2005 Long-Range Development Plan (LRDP) as Campus Natural Reserve, site research area, and other land use designations that restrict development.
- The UCSC Campus Natural Reserve consists of 410 acres of natural land set aside to preserve natural communities for teaching, field research, and natural history interpretation.
- UCSC has approximately 4.8 million gross square feet (GSF) of building space.
- UCSC has undertaken a Water Efficiency Survey and is conducting a study of potential applications for recycled water systems on campus.
- UCSC has used an Integrated Pest Management (IPM) approach to control weeds, diseases, insects, and rodents on campus for approximately 15 years with success.
- The UCSC Storm Water Program is drafting a Storm Water Management Plan that outlines the best management practices to be used on campus to control erosion, minimize the potential for water pollution, and educate the changing campus population on behaviors that affect storm water quality.
- A high priority for the management of irrigation systems is water conservation. Nearly 85% of all irrigation occurs at night and a centralized computer-controlled system for irrigation, based on UCSC's irrigation weather station data, is underway.

Note: Physical Planning and Construction recently conducted an extensive Water Efficiency Survey. This section draws on the study for aggregate water use for irrigation only. For more information on water use, see Appendix E.

Challenges

- Inherent tension exists between the preservation of a unique ecosystem and the human use of the landscape. As a result, efforts to accommodate the needs of a growing student population can be controversial.
- The water supply in the watershed is limited at the source (with significant constraints in drought years), requiring ongoing implementation of water conservation and efficiency measures.
- Unique methods of storm water management are required, since drainage incorporates unusual natural features.

Performance Indicators

Overview

Land Use
- Land Classification and Growth

Habitat Protection
- Special Status Species
- Land Restricted from Development
- Native Species in Landscaped Areas

Pest Management
- Pest Management Techniques
- Pesticide Use

Land Management
- Site Stewardship Program
- Prominent Land Management Successes

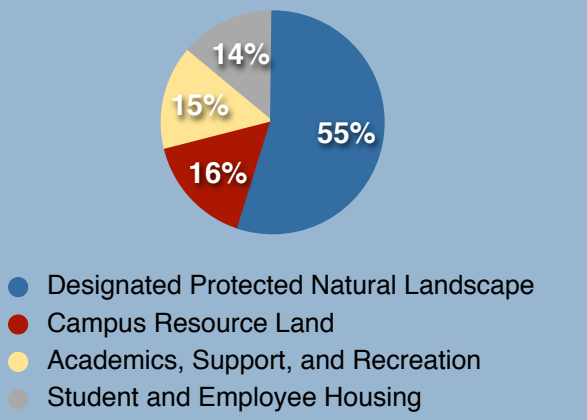
Watershed Management
- Storm Water Policies
- Storm Water Management
- Irrigation and Water Use

✦ *Land Use*

Why This Indicator?

For the campus to minimize its impact on local hydrology and ecology, while ensuring that facilities are top flight, construction projects must be undertaken with a thorough knowledge of and sensitivity to current and potential effects on the environment.

Figure L1: Campus Land Use
Source: 2005 UCSC LRDP



Notes:
- "Designated and Protected Natural Landscape" includes site research and support, protected landscape, campus natural reserve, and campus habitat reserve.
- "Campus Resource Land" is land that is not slated for development under the 2005 LRDP but may be developed in the future.
- "Academics, Support, and Recreation" includes physical education and recreation, campus support (event venues, facilities infrastructure, etc.), and academic core classes.
- "Student and Employee Housing" includes faculty/staff housing as well as the college areas.

Land Classification and Growth

More than half (55%) of UCSC's 2,000-plus acres are officially classified as protected area. A further 16% of land is outside of planned development under the 2005 LRDP.

Projected campus growth indicates that by 2020 there could be as many as 19,500 students, an increase of 27%, and approximately eight million GSF of building space on campus.

✦ *Habitat Protection*

Why This Indicator?

The open spaces on and around the UCSC campus have influenced the character of the University since its founding. Campus-owned land contributes to regional greenbelts that constitute crucial habitat for wildlife and several special status species. Portions of the campus also provide water recharge areas where rainwater can seep into the ground and refill the aquifer. The Long-Range Development Plan (LRDP) of 2005 expresses an imperative to protect the maximum amount of open space for both aesthetic and ecological reasons. Open space contributes to wildlife habitat preservation in addition to maintaining the natural beauty that attracts so many students, staff, and faculty to the University and the surrounding region.

Special Status Species

Landscaping and development activities on campus are influenced by the presence of special status species such as the California red-legged frog, Ohlone tiger beetle (OTB), and the San Francisco popcorn flower. The University works closely with regulatory agencies to preserve critical habitats and protect these species. Physical Plant Grounds Services hires an entomologist annually to survey presence and distribution of the Ohlone Tiger Beetle (OTB) and submit recommendations concerning best management practices in maintaining the OTB habitat. Campus faculty members also work with Grounds Services, contributing their research efforts to finding new ways to restore and protect native species habitat.

A Habitat Conservation Plan (HCP) is in place for a portion of the campus now identified as a reserve pursuant to a 2005 Implementing Agreement between the U.S. Fish and Wildlife Service and the Regents. Portions of the 25.5-acre reserve are retained as high-quality grassland and forest habitat on the campus for the California red-legged frog and the Ohlone tiger beetle.

Land Restricted from Development

55% of campus land is restricted from development, which protects habitat for special status species and provides conservation of natural areas. Physical Plant Grounds Services maintains all campus lands including the developed landscapes near buildings, the transition zones between building clusters, and all undeveloped land.

The Campus Natural Reserve (CNR) is managed under the direction of the CNR Committee. The CNR consists of approximately 20% of campus land (410 acres) and provides student interns, faculty researchers, and staff a location for working in the field. The CNR connects the academic community with some of the natural elements of campus. The CNR and the Physical Plant Grounds Services Site Stewardship Program partner to create volunteer opportunities in ecological restorations with projects ranging from erosion control and meadow restoration to removing non-native species and restoring natives. A Campus Plant Species List and other information is available on the UCSC Campus Natural Reserve website: http://ucreserve.ucsc.edu/UCSCCNR/default.html.

Native Species in Landscaped Areas

Appropriate native or well-adapted plant species are preferred in all landscaped areas, and there is a list of recommended plant species from which landscape architects can draw. Grounds Services reviews all plans for landscaping and works with project managers to ensure that all plants used are appropriate for their environment.

✦ *Pest Management*

Why This Indicator?

The University uses many techniques to manage the populations and impacts of weeds, diseases, insects, and rodents that impact the campus community. The University strives to minimize use of pesticides because some pesticides have been linked to harmful effects on other species, groundwater, soil, and human health. On this campus where the animal and human populations interact so closely, it is important to ensure that the UCSC environment and its downstream effects are hospitable to all communities. The use of pesticides at UCSC occurs only within the context of an Integrated Pest Management (IPM) program that minimizes chemical use and prioritizes pest management through non-chemical methods wherever possible.

Pest Management Techniques

UCSC Grounds Services uses a wide range of pest management techniques to minimize the use of chemicals. UCSC Grounds:

- Changes irrigation patterns on turf to slow moles and gophers.
- Uses low toxicity ant baits instead of neurotoxic pesticides.
- Uses a roach bait that is a pharmaceutical drug already used for human parasites.
- Prevents earth-to-wood contact for termite control and rot.
- Encourages beneficial insects with a wide diversity of flowering plants, and does not treat some pests on ornamentals to give beneficial insects a food source or breeding site.
- Eliminates standing water for mosquito control,
- Prevents rodent entry to buildings.
- Traps instead of using rodenticide.
- Controls ground squirrel populations by changing their environment to impair visual communication with dense vegetation at least three feet in height.
- Releases predator mites for spider mite control.
- Releases nematodes for Black Vine Weevil.
- Works with natural reserve volunteers for weed pulling parties instead of herbicide use.
- Controls snails and slugs by pruning and clearing foliage so sunlight and air can penetrate to ground level and dry it out. UCSC only uses a fertilizer for control (no aldehydes).
- Uses best management practices for all areas of turf and landscape to promote plant health and vigor for resistance to diseases and insects and to improve competition with weeds.

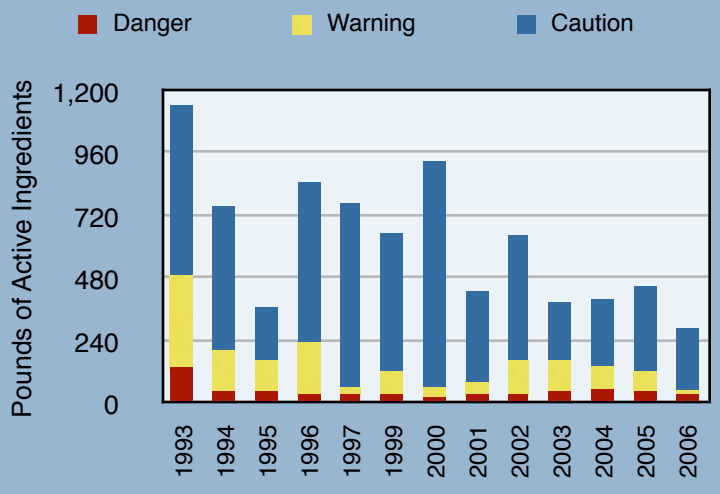
By encouraging the presence of certain predator species, the campus preserves the traditional ecosystem and controls the rodent population without use of pesticides. As part of the IPM program on campus, raptor posts have been installed in and around campus meadows as nesting sites for birds of prey. Coyote dens are also fostered on campus and routinely protected from human disturbance.

Pesticide Use

Overall pesticide use and, in particular, use of the most toxic pesticides have declined over many years as a result of Integrated Pest Management (IPM) techniques

Figure L2: Annual Pesticide Use on UCSC Grounds (by Year and Regulatory Labeling Category)

Source: UCSC Physical Plant



Note: Data from 1998 is not included.

Classifications of Pesticide Toxicity

Source: US EPA Label Review Manual, Chapter 7 – August 2007

UCSC's pesticide tracking data uses the Environmental Protection Agency's classifications of toxicity from contact, ingestion, or inhalation. In summary form:

Danger: serious or irreversible damage in trace quantities or at very low concentrations.

Warning: modest or serious irritation or damage from small quantities.

Caution: mild irritation from contact with higher quantities with no lasting effects.

applied since the early 1990s. IPM includes reduced utilization of pesticides and management of naturally occurring predator species to reduce the occurrence of pests.

The few pesticides used on campus are individually approved by the UCSC Environmental Health and Safety Office and the process of selecting a site and method for application involves collaboration between Environmental Health and Safety and Grounds Services.

✦ *Land Management*

Site Stewardship Program

UCSC's Grounds Services has an ongoing Site Stewardship Program that organizes interns and volunteers to "involve the university community in ecological restoration and guardianship of UCSC land" and "to raise awareness about restoration and stewardship issues so that individuals can minimize their impact on the natural landscape."

Project examples include:

- ***Upper Jordan Gulch Project*** – In the drainage between the firehouse and College Nine, pedestrians and cyclists have created a shortcut through the forest causing erosion, compaction to the root systems, and direct damage to plants. The Site Stewardship Program will be mulching the trail, breaking up compacted soil, and planting native vegetation to restore the habitat on the trail scars.
- ***Invasive Plant Removal*** – The native species of UCSC's meadows are threatened by non-native grasses and chaparral species. The Site Stewardship Program focuses on removing invasive species such as French broom and fennel to encourage growth of native grasses and forbes.

For more information about the program – or to get involved as an intern or volunteer – visit the website of Grounds Services: http://ucscplant.ucsc.edu/ucscplant/Grounds/.

Prominent Land Management Successes

Prominent stewardship successes are centrally important to meeting sustainability goals. At an institution of higher education, land stewardship is taught by design and example and is an opportunity for leadership.

The examples below, the Meadow and the Campus Natural Reserve, capture a number of successes that have accumulated over the history and development of the UCSC campus.

Prominent Examples of Land Management Success

The Meadow
The continued preservation of the meadow adds to the ambiance of the setting, maintains campus activity along only two transportation axes, and contributes to the city's continuous greenbelt. It is also part of the UCSC's efforts to protect a number of special status species.

Campus Natural Reserve
Because of its unique and rare natural setting, UCSC established its own Campus Natural Reserve in the 1980s. The Reserve functions as an outdoor classroom for environmental teaching and research and is as much a part of the physical academic environment as a building on Science Hill.

✦ *Watershed Management*

Why This Indicator?

In developed areas, storm water can gather unnatural speed, volume, and pollutants. At UCSC, storm water runoff flows from the built environment into the surrounding natural environment where it must support flora, fauna, ephemeral streams, and groundwater recharge. If the developed environment is not well managed, storm water runoff can transport hazardous levels of pollutants, accelerate erosion, and otherwise degrade the natural systems of which it is a part.

Where Are We Now?

UCSC has worked to preserve the campus' redwood forests and grasslands that are punctuated by deep ravines and sinkholes. One outgrowth of this environmental sensitivity has been a reliance on small-scale, separate storm water conveyance systems that are designed to protect the built environment by removing runoff from built features and re-dispersing it into the natural landscape. This strategy has preserved natural features and avoided a large conventional underground piping system. This delivers additional runoff to the local landscape, but this runoff has the potential to erode soils and deliver pollutants to the surrounding ecosystem.

Storm Water Policies

The ongoing protection of storm water resources and the natural environment has been a collaborative effort involving many campus entities. Through successive LRDPs and evolving Campus Standards, the campus has promoted building practices that minimize storm water impacts.

The Environmental Health and Safety Department has drafted a Storm Water Management Plan, currently under regulatory review, which documents ongoing campus efforts to protect storm water resources. The draft Storm Water Management Plan also identifies specific additional storm water protection measures the campus has committed to implementing over a five-year timeframe.

The stewardship mission of the Campus Natural Reserve, Agroecology Program, Site Stewardship Program, and Recycling Program, among others, have contributed to the protection of the natural landscapes and the management of storm water resources.

Storm Water Management

Through the efforts of a hands-on team, Grounds Services maintains many systems that lower runoff volume and protect storm water quality. Efforts include: litter removal; maintaining and reestablishing native and drought-tolerant vegetation; trail, path, and roadway management; maintenance of storm water dispersal systems; and, where applicable, storm water treatment devices. Pre-storm, during storm, and post-storm maintenance by Grounds staff is essential for ensuring that storm water flows are reintegrated into the natural environment.

The campus promotes alternative transportation, while minimizing impervious areas such as paved roads and parking lots. These strategies reduce the amount of runoff and improve the water quality of runoff.

Near-term activities to strengthen campus storm water management efforts include:

- Physical Planning and Construction will be adopting a Low Impact Development Checklist to ensure that new development includes all feasible measures to manage storm water in a manner that mimics natural patterns.
- Physical Planning and Construction commissioned a study, Stormwater and Drainage Master Plan, of storm drain system needs in partnership with Kennedy/Jenks in 2004. Phase One and Phase Two of a multi-year, multi-phase capital improvement project is underway to improve conditions of natural drainages throughout campus.
- Grounds Services continues to develop and refine a storm drain preventive maintenance program to prevent storm water from flowing off roads, paths, courtyards, and away from facilities by re-dispersing the storm water with minimal impact on the natural landscape.
- Environmental Health and Safety and campus groups will promote widespread stewardship of the storm water resource through adoption of additional best management practices, education, and outreach efforts via informational brochures, a campus storm water web page (http://cleanwater.ucsc.edu), and other activities.

Irrigation and Water Use

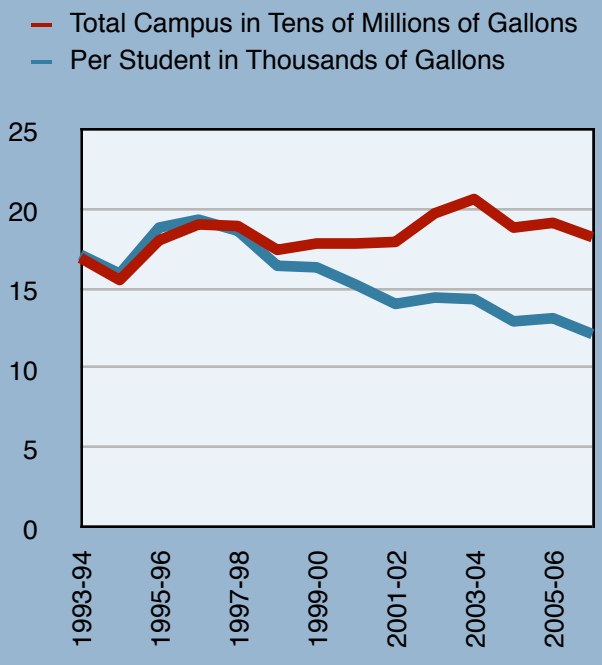
In some California communities, landscaping has been estimated to account for over 50% of all residential water use. Therefore, in an ongoing effort to conserve water, irrigation is tracked and minimized. Santa Cruz experiences cyclical dry seasons that necessitate watering of some areas such as sports fields.

UCSC has implemented several measures to increase water use efficiency. In 2000, a centralized, radio-linked, and computer-controlled irrigation system, RainMaster Evolution, was installed on the sports fields and is now incorporated into new construction.

At present there are 15 such controllers in operation. The controllers recalculate irrigation schedules based on evaporation data from a campus weather station and provide situational coefficients for slope, soil type, and plant species to determine water needs and distribute that amount automatically. The system also senses leaks through flow control valves and responds by shutting off individual circuits if an unscheduled flow is detected. All automated watering on campus occurs at night through early morning, when evaporation rates are low. Some areas outside the centralized system are being considered for a retrofit to be brought into the system. However, in some cases limited resources have prevented new construction from integrating its landscape irrigation into the centralized system.

Figure L3: Campus Water Use (Total Campus and Per Student)

Source: UCSC Physical Plant



Note: As the graph above demonstrates, total water use for the campus has been fairly steady through a period of significant growth in both total square footage of building space and enrollment. As a result, the per-student-water-use-intensity of campus operations has declined by 37% from its peak in the 1996-1997 academic year. See Appendix E on Water Use and Conservation.

Opportunities and Recommendations

Ensure transparency and thoughtfulness of campus development.
- Facilitate continued dialogue concerning campus development.

Continue and, where feasible, expand use of Integrated Pest Management (IPM).
- Continue to explore new options for improving the efficiency of the Integrated Pest Management system and other landscaping techniques and further reduce pesticide and water use.
- Evaluate the need for increased resources to implement IPM.

Continue to improve storm water protection.
- Evaluate use of a point-based system as part of the Low-Impact Development Program to numerically measure progress for storm water protection in new development.
- Continue implementation of recommended capital improvement projects from Stormwater and Drainage Master Plan.
- Evaluate resources needed to manage and maintain diverse, natural storm water conveyance systems. These environmentally beneficial diverse storm water systems are more resource intensive to maintain than conventional, hard-piped systems. This will support the investments being made in the storm water capital improvements projects.
- Develop digital media-based outreach for incoming students to promote campus stewardship and protection of the storm water resource. This will help build core awareness in a digitally-enabled and changing student body.

We gratefully acknowledge the contributions to this section by the following people:
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Robin Fried, *Storm Water Manager, Environmental Health and Safety*
Elizabeth Howard, *Reserve Steward, Campus Natural Reserve / Younger Lagoon Reserve*
Dean Raven, *Senior Superintendent, Grounds*
Courtney Trask, *Civil Engineering Project Manager*
Frank Zwart AIA, *Campus Architect and Associate Vice Chancellor, Physical Planning and Construction*

Transportation

The UC Santa Cruz campus occupies over 2,000 acres of grasslands, oak woodlands, and redwood forests on the southern slope of the Ben Lomond Mountains overlooking Monterey Bay. Surrounded on three sides by undeveloped parklands, the campus is accessed by only two roads passing through residential neighborhoods on the northwest side of the city of Santa Cruz—one of which features a seven percent grade between the Westside flats and the campus entrance. Its geographic size, topographic relief, and limited roadways create access challenges for UCSC students, staff, faculty, and visitors on a daily basis. The institution must provide access and mobility while addressing the resulting impacts on land use, traffic congestion, noise, air pollution, storm water quality, and greenhouse gas emissions.

Despite these challenges, nearly 59% of all person-trips made to and from campus use alternative transportation modes such as carpools, buses, vanpools, and bicycles. Despite a 17% increase in campus population between 2000 and 2007, UCSC's 2006-2007 traffic counts show a reduction in traffic to 2000 levels. UCSC Transportation and Parking Services (TAPS) has been actively promoting sustainable transportation for decades, and its efforts have been successful in minimizing single-occupancy vehicle use.

Still, old challenges remain and new ones are emerging. The campus is overwhelmingly reliant on fossil-fuel-powered transportation. The maximum growth accommodated by the 2005 LRDP would significantly expand the campus footprint, including new building groups considerably uphill from current development. The institution needs more secure funding models for both commuter access programs and the Campus Transit shuttle service. Finally, transportation accounts for 41% of all greenhouse gas emissions in California,[2] and effective solutions – made on a local and national level – will require large-scale planning, public and private investments, and changes in individual behavior.

Summary of Activities and Performance

Policy and Planning:

- The UC Policy on Sustainable Practices (UC Policy) includes guidelines for sustainable transportation. Many, but not all, of these have been enacted at UCSC, including implementing a carshare program, collecting information about average vehicle ridership, and providing low-cost bus passes for staff.
- UCSC's campus is large and spread out. A four-mile loop road runs through and around campus, and a core road allows limited vehicle access to the academic heart of the University. Campus shuttles traverse both, and regional buses from the Santa Cruz Metro Transit District (SCMTD) serve the loop road.
- Decisions made concerning transportation on campus are informed by the Transportation Advisory Committee, an administrative committee that includes seats for six voting student representatives.
- Since 2007, all campus transit and fleet diesel vehicles have run on B-20, a diesel fuel that is at least 20% biodiesel.

Alternative Transportation Programs:

- Transportation services providing access to, from, and on campus are diverse, and include SCMTD buses, Campus Transit shuttles, bike shuttles, disability vans, and commuter vanpools.
- TAPS coordinates with the SCMTD to meet the changing needs of the UCSC commuter population. However, buses can fill quickly and may not have capacity for commuters waiting during peak travel times.
- TAPS launched a partnership in the fall of 2007 with Zipcar, a carsharing program that allows students, campus employees, and community members to rent cars by the hour, giving them access to a vehicle without the need to own one.
- UCSC supports bicycle transportation in many ways. For example, TAPS offers a bike shuttle for all campus users and a zero-interest bike loan for faculty and staff.

[2] California Energy Commission. Inventory of Greenhouse Gas Emissions and Sinks 1990-2004. October 2006.

Funding:

- TAPS, a self-funded unit, receives approximately half its revenue from parking fees and from the Student Transit Fee, respectively.
- All students pay $95.66 per quarter for a mandatory Student Transit Fee that funds most of the Campus Transit operation and all student ridership is provided under contract by SCMTD. This fare-free transit pass program, in operation since 1972, was the result of a strong, concerted student effort, and was one of the first programs of its kind in the country.
- Faculty and staff can purchase bus passes for $5 per month, a rate that is subsidized by UCSC TAPS using parking fee revenues.
- The students recently passed a referendum that enabled the UCSC Office of Physical Education, Recreation, and Sports to replace gasoline-powered with diesel-powered vans that run on 99% biodiesel fuel (purchased offsite).
- Parking enforcement is managed by the Campus Police and nearly all parking citation revenue accrues to that operation.

Challenges

- By UC policy, transportation is considered an auxiliary unit, and must be self-funded. TAPS receives the vast majority of its funding through parking fee revenues and the Student Transit Fee. At present, no UC central funding is allocated for transportation systems.
- The 2005 Long-Range Development Plan mandates traffic mitigation measures which TAPS is charged with implementing. However, the magnitude of improvements needed requires additional funding.
- Data concerning traffic volume and modal mix is available, but commuter surveys conducted between 2000 and 2004 had low response rates that do not accurately represent other campus demographics (i.e. campus affiliation, trip origin, etc.). This makes it difficult to determine populations to target for outreach. Likewise, little or no current data exists concerning campus-related air travel.

Performance Indicators

Overview

Modal Mix: How People Travel to Campus
- Single-Occupancy Vehicle Usage
- Alternative Transportation Options

Average Vehicle Ridership (AVR)
- AVR Tracking
- Comparison to the City of Santa Cruz

Campus Fleet and Fuel Consumption
- Campus Fleet Composition
- Fuel Types and Total Fuel Use

Parking
- Parking Spaces Per Student
- Parking Utilization
- The Future of Parking

Bicycles and Pedestrians
- Walkways and Bike Lanes
- Planned and Possible Improvements
- Bike-Related Resources

Air Travel
- Tracking Air Miles

Funding
- Revenue Sources

✦ *Modal Mix: How People Travel to Campus*

Why This Indicator?

To understand campus transportation issues, it is valuable to track the types and occupancy of vehicles, commuter or otherwise, entering and leaving the campus. These figures are gathered every three to five years by TAPS, and used to guide their efforts toward traffic reduction.

Single-Occupancy Vehicle Usage

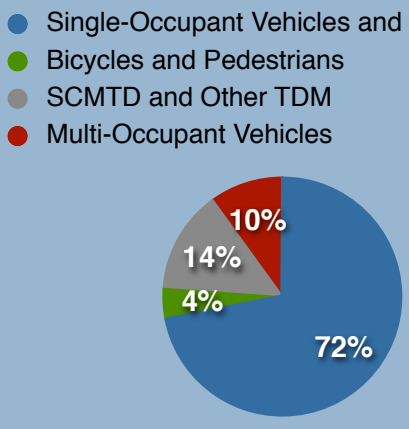
One measure of the magnitude of effective sustainable transportation is the percentage of all passenger-trips made by single-occupant vehicle (SOV). Minimizing the percentage of trips made via single-occupancy vehicles helps to reduce the carbon footprint, traffic volume, and parking demand associated with transportation.

As of Spring 2004, only 39% of all trips made to and from the UCSC campus were made via this mode—compared with 72% of all commute trips throughout Santa Cruz County.[3] Figures T1 and T2 illustrate the transportation modes used to reach campus by commuters and visitors and comparable mode splits for commuters countywide. Although SOVs represent the largest portion of the mode split, it is a vast improvement from the proportion of SOVs driven to campus in 1989, which was 47%.

Alternative Transportation Options

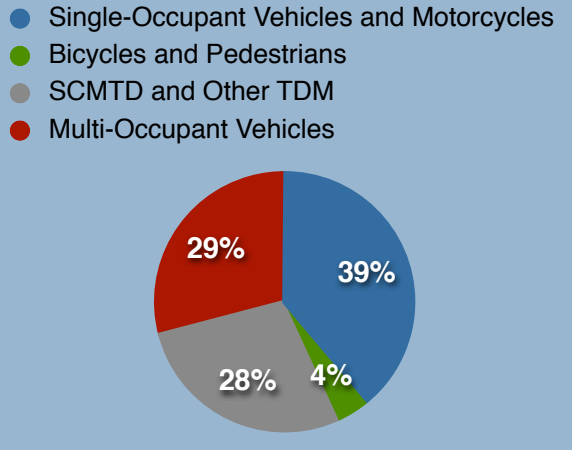
TAPS collects data about vehicle occupancy and travel mode in part to better understand the campus traffic flow and to find the most effective way to decrease the percentage of SOVs. Fuel-less modes such as bicycles and foot traffic constitute only a small fraction of the total campus trips, largely because of the distance from town and challenging topography. Other high-occupancy modes of alternative transportation, such as Santa Cruz Metropolitan Transit District (SCMTD) buses or carpooling, are more convenient choices for most commuters, and are more likely to substitute for trips in an SOV. As shown in Figure T3, the percentage of commuters who use alternative modes to reach campus has been generally increasing since UCSC began measuring mode split in 1989—during which time campus enrollment has grown by 57% (an additional 5,300 students).

Figure T1: How Santa Cruz County Commutes, 2005
Source: Santa Cruz County, Regional Transportation Commission



Note: SCMTD stands for Santa Cruz Metropolitan Transit District and TDM stands for Travel Demand Management.

Figure T2: How People Travel to Campus, Spring 2004
Source: UCSC TAPS



Note: SCMTD stands for Santa Cruz Metropolitan Transit District and TDM stands for Travel Demand Management.

[3] 2006 RTC Transportation Monitoring Report, Section II: The Transportation System Profile. Santa Cruz County Regional Transportation Commission. Available at http://www.sccrtc.org/pdf/TMR2006/TMR_2006Section2.pdf

✦ *Average Vehicle Ridership (AVR)*

Why This Indicator?

The UC Policy requires measurement of average vehicle ridership, a statistic that indicates how many people are, on average, occupying each vehicle that enters campus—a higher value is better. It is a useful metric for determining how effective travel demand mitigation, especially transit use, vanpooling, and carpooling, have been at providing alternatives to single-occupancy vehicles.

AVR Tracking

Because UCSC has only two entrances, average vehicle ridership (AVR) can be discerned fairly simply through direct observation of vehicles and occupants. Most other campuses use surveys to determine AVR, and while surveys, unlike direct observation, can capture the demographic of the riders (students, faculty, etc.), they are less likely to measure the character of the entire traffic stream. UCSC's method of determining AVR differs from that used by other UC institutions, most of which do not have the topographical challenges caused by the hilly landscape. This deters bicycle and pedestrian commuters and it is difficult to contextualize the mode-split based AVR (shown in Figure T4).

Comparison to the City of Santa Cruz

The city of Santa Cruz provides a good comparison, since it faces many challenges similar to that of campus. According to the city of Santa Cruz's Master Transportation Study (MTS) conducted in 2003, peak-hour AVR in the city of Santa Cruz was 1.22, while that of UCSC was 1.53. Though the AVR for the city was determined by survey, it is the most appropriate available comparison for traffic counts.

Figure T3: Share of UCSC Commuters Using Alternative Transportation
Source: UCSC TAPS

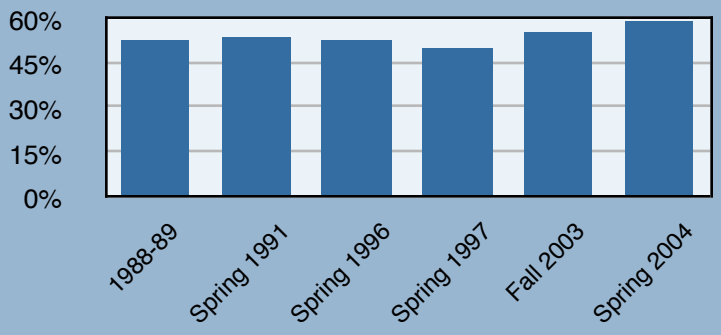
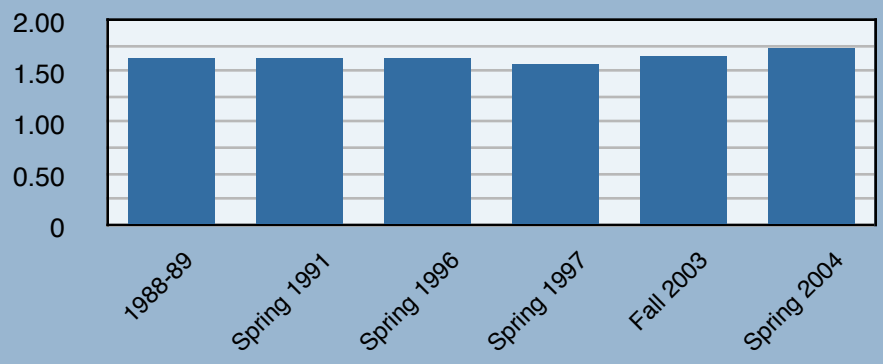


Figure T4: Riders Per Vehicle to Campus
Source: UCSC TAPS



✦ *Campus Fleet and Fuel Consumption*

Why This Indicator?

According to the US Department of Energy, each gallon of gasoline burned releases 20 pounds of carbon dioxide, a greenhouse gas, into the air. Combustion of fossil fuels also generates other air pollutants, including oxides of nitrogen and particulates, which contribute to air quality degradation. In general, however, higher fuel efficiency corresponds to reduced production of air emissions, including carbon dioxide.

Ideally, the fuel efficiency of a vehicle should be considered in relation to the function of a vehicle. For example, when comparing the fuel efficiency of a vanpool with an automobile, vehicle capacity or occupancy should be considered when determining which provides the most fuel-efficient travel mode. Similarly, service vehicles operating short distances on-campus may benefit from conversion to alternative fuels or "right-sizing" the fleet (using the most effective vehicle for a given job) to achieve improved fuel efficiencies and lower greenhouse gas emissions.

Campus Fleet Composition

The campus fleet ranges from standard sedans and small electric carts to tractors used on farms and firetrucks. The fossil fuel-powered vehicles have a weighted average fuel efficiency of 11.0 miles per gallon. The composition of the campus fleet by vehicle category is given in Figure T5.

Fuel Types and Total Fuel Use

Campus vehicles use a variety of fuel sources. For example, many smaller vehicles use electric motors. TAPS has one shuttle and many vanpools that operate on compressed natural gas (CNG). All diesel-fueled campus vehicles, including shuttle buses, run on a B-20 mixture including 20% soybean oil. Potential for further improvement is exemplified by UC Irvine's recent conversion of shuttles and diesel vehicles to 100% biodiesel. The UC Policy requires that campus fuels be at least 50% non-fossil fuels by 2010 (in addition to requiring a 20% increase in low-emission vehicles, compared to 2004-2005). Figure T6 illustrates the total fuel purchase of Fleet Services, which includes gasoline, diesel, and biodiesel.

UCSC's Campus Transit shuttle fleet comprises about 30 buses that transport students, staff, and faculty over several different routes around campus. The routes and frequency of shuttle service vary according to time of day, season, and other factors. Many campus shuttles are more than ten years old, and are being retired or retrofitted to comply with current California Air Resources Board (CARB) emissions requirements. Recent fleet acquisitions have consisted of younger,

Figure T5: Campus Fleet Composition (Number of Vehicles in Each Class)
Source: UCSC Fleet Services

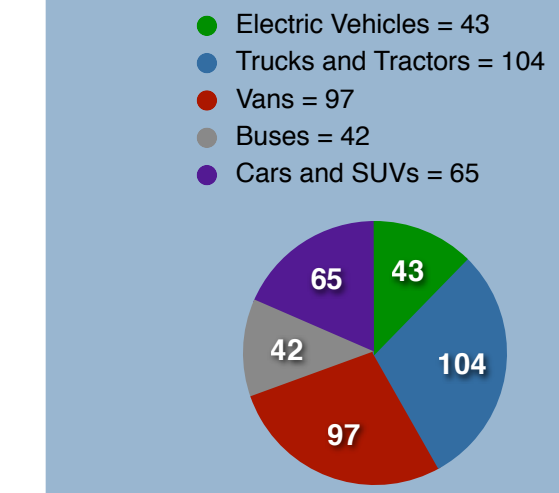
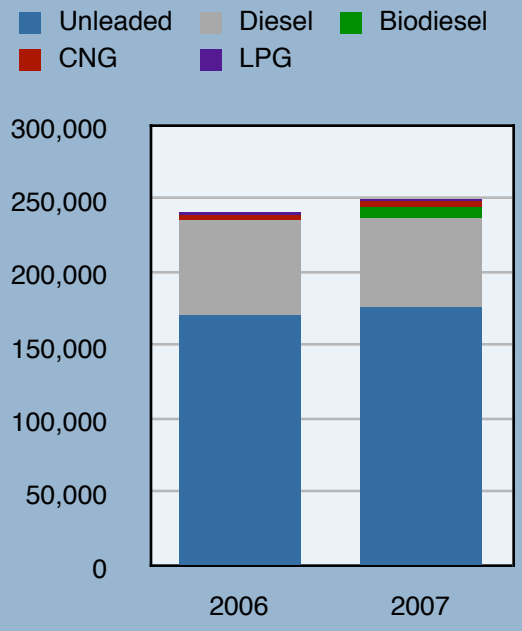


Figure T6: Fuel Use by Campus Fleet
Source: UCSC Fleet Services



This campus fleet fuel use data includes both on-campus and off-campus fuel purchases for calendar years 2006 and 2007.

used vehicles with higher reliability and improved emissions rates. New transit vehicles, which are required by the UC Policy to be "the cleanest and most efficient," are very costly and funding for such vehicles is not yet available.

✦ *Parking*

Why this Indicator?

When assessing the parking systems of a campus from a sustainability perspective, trends that show decreasing parking spaces per capita over time and high—but not tight—parking utilization, indicating availability of alternative transportation, are the key indicators of success. Both of these are true at UCSC.

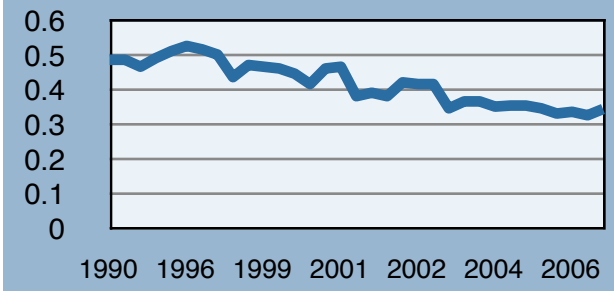
Parking is a contentious topic on many university campuses. While many people prefer an inexpensive or no-cost, plentiful parking supply, paved lots create large amounts of impervious surface area, which can lead to storm water runoff and erosion problems. Increasing parking may also intensify traffic on campus, which in turn produces noise and air pollution, as well as a less pedestrian-friendly environment.

UCSC's trends indicate that parking and transportation demand management have been clearly steering the campus toward more sustainable transportation and parking practices. However, UCSC, like virtually every other institution of higher education, will need to push even further in this direction to achieve its goals for climate action.

Parking Spaces Per Student

Over the past ten years, no net increase in parking spaces has occurred. As a result, the total number of automobile parking spaces available in 2007 is about the same as it was in 1997—despite a 41% increase in student enrollment. When measured as per capita capacity, parking supply continues to decline. Figure T7 illustrates the number of parking spaces available per student since 1988, showing a high of approximately 0.52 spaces per student in the mid-1990s to approximately 0.35 in 2007. There are now approximately 5,000 automobile parking spaces available for a campus population of approximately 15,000 students plus associated staff and faculty.

Figure T7: Parking Spaces Per Enrolled Student
Source: UCSC TAPS



Note: This graph shows the ratio of parking spaces per student enrollment for calendar years 1990 to 2007.

Parking Utilization

Overall, the number of parking spaces has decreased in relation to student population, and utilization has not skyrocketed, which indicates that more campus members are choosing to use alternative transportation, or to live on campus. (On-campus housing options have increased over time.) Both help to reduce traffic congestion, greenhouse gas emissions, and impacts to air quality.

Figure T8, Campus Daytime Parking Utilization, indicates how many auto parking spaces available on-campus are occupied during the typical school-term weekday. While this varies from location to location, parking demand is usually considered "tight" when utilization reaches 90-95%, a level seen only in some pockets of campus. This indicates that the current parking matches the overall needs of the population fairly well.

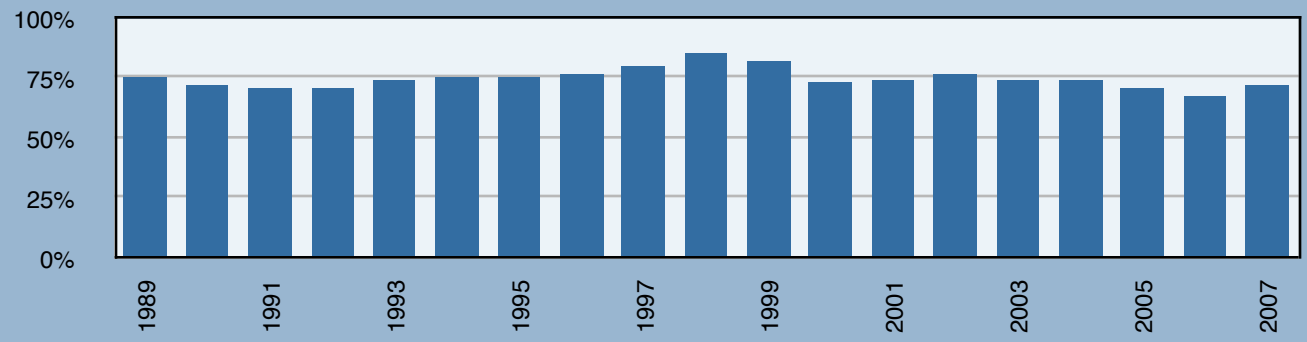
The Future of Parking

Campus expansion may create some challenges in the area of parking. In order to "promote efficient land use…and encourage a pedestrian-friendly campus," the 2005 Long-Range Development Plan (LRDP) proposes that "development rely on careful infill and clustering of new facilities." This approach will increase the density of campus development while minimizing the travel distance between facilities.

However, this also means that many buildings will be constructed on existing parking areas thereby reducing parking capacity while increasing campus population. Though densification of campus and decreased parking are positive developments from an ecological and pedestrian standpoint, the campus is then challenged to find ways of meeting desire and access needs of staff and faculty members that feel they require parking on campus. The 2005 LRDP outlines plans to shift the majority of on-campus parking capacity to "collector lots" situated on the periphery of the campus core, thereby making UCSC more pedestrian-friendly.

Figure T8: Campus Daytime Parking Utilization

Source: UCSC TAPS



Note: Campus daytime parking utilization data is collected by TAPS in the Spring of each year.

✦ *Bicycles and Pedestrians*

Why this indicator?

Fuel-less modes of transportation, as noted above, are a relatively small proportion of total transportation used traveling to and from campus. However, these modes clearly constitute a significant share of on-campus travel—including travel to destinations from parking lots, bus stops, and bike parking. An understanding of what the campus offers a bike rider or pedestrian is important for encouraging increased use of these two modes, which would reduce both car traffic and fossil-fuel use.

Walkways and Bike Lanes

Many walkways (not including paths designated for pedestrian use only) around campus are shared by pedestrians and bicycles, though walkways around buildings are often not included in the cost of constructing the building. This means bike and pedestrian paths must be added as funding becomes available. TAPS secures external grants, when possible, to fund the addition of bike lanes to existing roadways.

As noted previously, bicycles and pedestrians constitute only four percent of the person-trips made to and from the campus. Considering the campus topography, geographic size, and relative distance from Santa Cruz, this comes as no surprise. Current data is unavailable, but experience suggests that walking comprises a high share of on-campus travel. Besides connecting facilities within the campus core and colleges, pedestrian paths, both formal and informal, provide access to facilities from transit stops and parking lots.

Planned and Possible Improvements

The recent campus LRDP called for a more pedestrian-friendly campus and adding bike lanes on existing roadways where feasible. Additionally, future construction of new roadways should incorporate bike lanes and sidewalks.

Development of a more pedestrian-friendly campus entails many complementary improvements, including: construction of new sidewalks and pathways to fill existing gaps in the circulation network, measures to separate pedestrians from vehicles on service roads, enhanced or channelized pedestrian crossing of campus roadways, and improved way-finding, signage, and nighttime lighting. In some areas, pedestrian and bike travel may benefit from the use of traffic-calming design measures or vehicle restrictions. Over 40% of the student population lives on campus, which reduces the number of commuters to campus. Walkways around campus are used by these students, and are very important parts of the aesthetic and practical nature of transportation on campus.

Bike-Related Resources

UCSC has a student-operated Bike Co-Operative located next to the Student Union and the Bookstore. Currently, there are approximately 1,200 bike-rack spaces around campus. The Office of Physical Education, Recreation, and Sports offers free bicycle repair and bicycle licenses at the East Fieldhouse every Thursday and sells bike lights at wholesale prices.

The University provides a free, award-winning bike shuttle, featuring a vehicle that runs on compressed natural gas. This shuttle encourages people who may be discouraged by the seven-percent-graded main campus road to commute by bike. The shuttle travels from Olive Street on Mission to campus at 15-minute intervals on weekdays between 7AM and 1PM, and can carry up to 18 passengers and bicycles per trip.

TAPS also offers a zero-percent interest bicycle loan program to UCSC faculty and staff. This program, designed to encourage bicycle commuting, is managed by Ecology Action. UCSC employees may qualify for the opportunity to borrow up to $750, interest-free, to purchase a bicycle (including electric–assisted bicycles) and/or bicycle related accessories. More information is available at http://www2.ucsc.edu/taps/pages/bikeloan.html.

✦ *Air Travel*

Why This Indicator?

Conference travel can be a large part of university work for faculty, staff, and students, and may contribute significantly to the overall quantity of greenhouse gas emitted by campus activities. Because of the several commitments that UCSC has made to cataloging and reducing greenhouse gas emissions, it is important that air miles and the associated emissions be tracked.

Tracking Air Miles

At present, UCSC does not have a standardized system for tracking air travel miles. Therefore, overall emissions from University air travel are difficult to calculate.

✦ *Funding*

Why this Indicator?

As traditional transportation systems evolve toward greater reliance on alternative methods and, ultimately, into fully sustainable travel modes, adequate funding is critical to accommodate the operating and infrastructure costs associated with these new transportation programs and services. One of the major obstacles for ensuring adequate funding for transportation systems is that the traditional funding model at all UC campuses is no longer sustainable.

Where are we now?

UC policies define transportation and parking services as a self-funded “auxiliary enterprise” reliant on user fees (initially parking fees). No central funding is provided to cover the broad range of transportation and access needs for any given campus. This system worked well in the early years as parking fees funded the initial development and expansion of parking infrastructure. However, with rapidly rising costs of capital construction, user fees can no longer support even these costs. In order to increase parking capacity without intensive capital construction, parking fees have been used to support the creation, development, and expansion of alternative transportation programs and services that reduce parking demand and the need to build additional parking.

Over time, new demands have been placed on these limited transportation funds as campus planning guidelines and environmental requirements have recognized the benefit of alternative transportation at reducing other impacts associated with traffic and parking—including reduced greenhouse gas emissions. However, no additional funds have been provided for the implementation of these requirements. As the institution considers ambitious actions to reduce greenhouse gas emissions, including transportation-related emissions, a new sustainable transportation funding model for all UC campuses needs to be pursued.

Just as a well-rounded transportation program provides a diverse range of travel choices, a successful transportation funding model must rely on a variety of separate, complementary revenue sources. Conversely, a funding model that relies too heavily on parking revenues will suffer—and potentially become unsustainable—as alternative transportation programs, growing roadway congestion, or rising fuel costs effectively reduce parking demand.

Revenue Sources

As of 2006-2007, TAPS’ annual funding consists of approximately 51% from parking revenues, 48% from a mandatory quarterly Student Transit Fee, and the remaining 1% accrues from Charter Services provided by Campus Transit. Nearly all of the above funding is derived from user fees. In addition, TAPS has been very successful in garnering external regional, state, and federal grants to pay for capital projects (such as bike/pedestrian facilities and signals), as well as vehicle acquisition funds for new vanpools and Disability Van Service vehicles. However, the availability of these funds varies with budget cycles and in competition with other agencies. Parking enforcement is managed by the Campus Police and nearly all parking citation revenue accrues to that operation and not to TAPS.

Opportunities and Recommendations

Research cost effective greenhouse gas reduction opportunities.

- In light of the importance of reducing impact on global climate change, pursue methods of assessing which transportation options most effectively reduce greenhouse gas emissions.
- In collaboration with campus climate action planning, conduct a transportation-specific assessment of costs, potential savings, and carbon reduction possibilities related to efficient and clean-burning shuttles and buses.

Research and develop innovative strategies for peak traffic management.

- Perform further studies to develop strategies for peak traffic management to ensure that bus riders are guaranteed a seat on a bus, and private vehicle traffic can be reduced.

Facilitate the switch to renewable fuels.

- Continue to explore increasing use of bio-fuels and other alternative fuel options for the campus fleet.
- Research construction options for an on-campus B-99 biodiesel pumping station to make fueling of current and future biodiesel vehicles convenient.

Encourage fuel-less and sustainable transportation modes.

- Increase number of bike lanes and paths to make the campus more “bike-friendly.”
- Maintain efforts to encourage and promote travel demand mitigation, including bicycle and foot traffic on campus and vanpool and bus use for commuters.

Seek funding sources for sustainability projects.

- Continue to seek consistent sources of funding for upgrading campus shuttles and improving other travel demand mitigation measures.

We gratefully acknowledge the contributions to this section by the following people:
Teresa Buika, *Transportation Planner, TAPS*
Tracy Freeman, *Transit Manager*
Larry Pageler, *Director, Transportation and Parking Services*

Recycling and Waste Management

Immense savings of energy, resources, and landfill space resulting from efficient reuse and recycling, as well as the high population density and paper-intensive activities of a university setting, make recycling efforts a key strategy for reducing a campus' ecological footprint. UCSC has had strong recycling efforts on campus since the startup of cardboard and office paper recycling in student residential areas in 1991. The overall campus recycling rate has increased annually, though it is still below the rate specified for 2008 by the UC Policy on Sustainable Practices (UC Policy). Various campus units have been working to reduce the campus waste stream, and the campus community is highly supportive of recycling and waste reduction. With additional resources, UCSC can meet the ambitious recycling goals specified by the UC Policy.

Summary of Activities and Performance

- The waste diversion rate has increased steadily over the past several years and is currently at 32% (the goals expressed in the UC Policy are: 50% diversion by June of 2008, 75% by 2012, and 100% by 2020).
- Each UC campus uses different methods for refuse and recycling services. At UCSC, the Grounds department under the Physical Plant maintains and empties all outdoor waste and recycling bins and indoor recycling bins in administrative buildings. Students, faculty, and staff empty bins in their rooms or offices into central bins, which are emptied by Grounds personnel.
- The campus population is generally supportive of recycling, and there has been active participation in recycling and waste reduction efforts since the early 1970s.
- There are savings potentials in recycling given that the tipping fee at the city of Santa Cruz landfill is currently $66.98 per ton for trash, with a scheduled increase of $70.67 per ton in 2008 and $74.56 in 2009. Recycling fees are not charged to specific campus users.

Challenges

- Waste stream tracking is challenging for the Physical Plant, in part because there is no campus standard or requirement for reporting waste/recycling by separate departments to the central recycling office.
- While several small-scale waste audits have occurred in various areas of campus, a comprehensive, campus-wide waste audit has never taken place. Although nationally recognized university waste stream statistics specify the average composition of campus waste, a UCSC audit would help prioritize types of waste to target.
- It has been challenging to establish recycling infrastructure inside offices, due in part to the difficulty in coordinating efforts of the several units in charge of refuse collection and the lack of designated spaces for recycling bins in some buildings.
- Currently, UCSC has no large-scale composting facility, and the city and county of Santa Cruz do not accept UCSC waste for composting.

Performance Indicators

Overview

Solid Waste Recycling and Disposal
- Diversion Rate

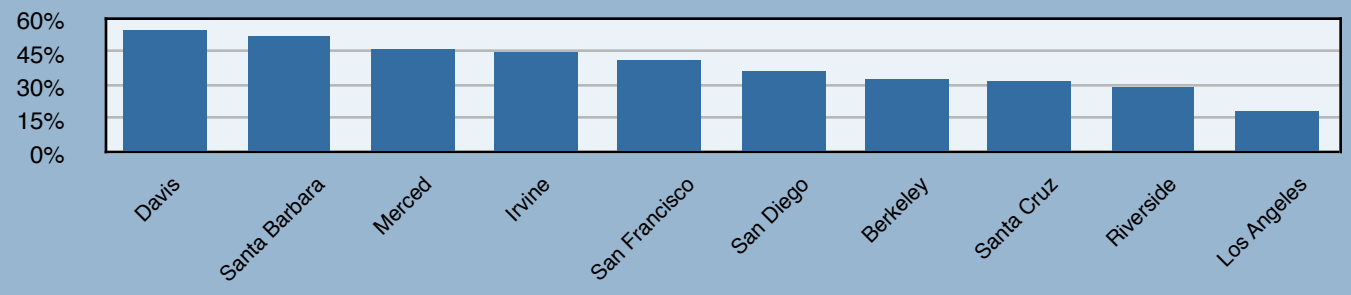
Reuse and Recycling Infrastructure
- Collection Containers
- Hauling and Waste Stream Tracking

Paper Recycling
- Infrastructure
- Tracking and Tonnage Diverted

Electronic Waste
- Infrastructure
- Disposal practices

Other waste
- Construction and Demolition Waste
- Fleet Maintenance
- Campus Surplus
- Summer Maintenance
- Green Waste

Figure R1: Waste Diversion Rate by Campus, 2006
Source: UC's Annual Report on Sustainablity Policy, 2008



✦ *Solid Waste Recycling and Disposal*

Why This Indicator?

Recycling rates simultaneously measure two aspects of performance: how well potentially reusable materials are collected and how much the use of virgin materials is replaced by recycled resources. When waste is diverted from the landfill, materials that have economic value become available as raw material. By closing these loops, the burden on ecosystems from which resources are extracted is lightened.

Diversion Rate

UCSC's waste diversion rate for 2006 was 32.3%, and has been increasing annually since 2002. However, there are challenges to achieve a 50% diversion rate by 2008 as specified by the UC Policy.

The transient nature of any campus student body requires ongoing outreach and education. Student interns and student organizations have proven effective in communicating to other students and in raising awareness about recycling and the misuse of resources. The Student Environmental Center and the Waste Prevention Working Group are examples of two of these effective groups.

In addition to everyday recycling efforts at all ten colleges, end-of-the-year move-out events are organized with the goal of collecting and donating all waste from students leaving the dorms. These events have proven successful; however, a more coordinated effort campus-wide could improve their effectiveness.

Figure R2: Total Campus Waste Diversion Rate
Source: UCSC Recycling Coordinator, UC Office of the President

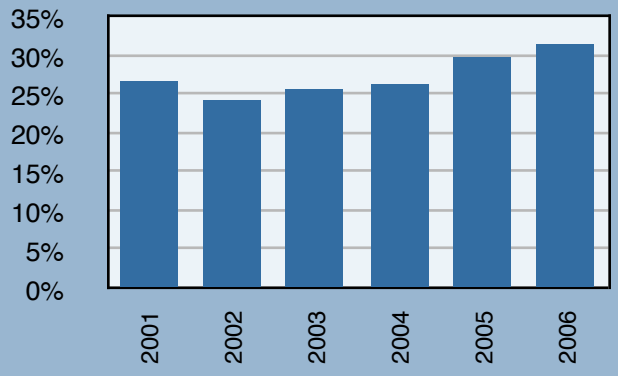
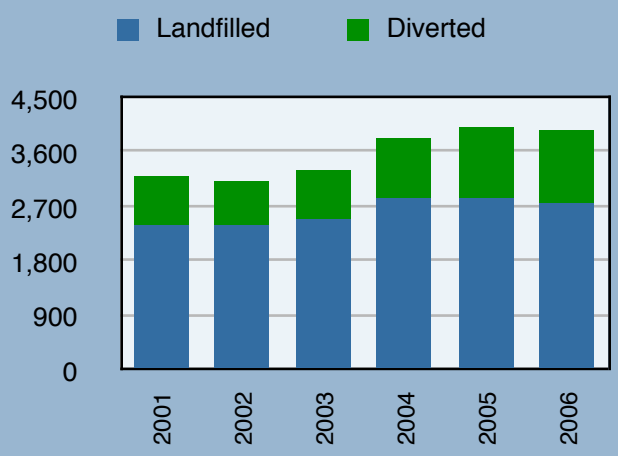


Figure R3: Total Campus Waste Generation (Tons)
Source: UC's Annual Report on Sustainablity Policy, 2008



✦ *Reuse and Recycling Infrastructure*

Why This Indicator?

The success of a recycling program depends upon a combination of physical infrastructure, education, and individual behavior. Convenience of recycling collection containers is a key factor in determining how much waste will be diverted from the landfill, and subsequently how much recycled material will be available for reuse as raw materials.

Collection Containers

At UCSC, unlike most UC campuses, the Grounds Department provides "self-haul" refuse and recycling services for the campus. They serve nearly 150 refuse and 70 cardboard recycling dumpsters throughout campus six days a week. Public recycling areas, including 300 collection cans for mixed containers and paper, are provided outside most buildings and are strategically located throughout campus quads and causeways, though there are opportunities to increase the number and accessibility of recycling receptacles. Implementing indoor recycling has been challenging. Fire codes often restrict bin placement and type in buildings.

Establishing infrastructure to ensure that recycling is convenient in offices is also a challenge due to the need to coordinate the efforts of different units. Currently, staff and faculty are given recycling boxes for their desks and are responsible for emptying them into central bins, usually located in office mail rooms and copy rooms. There are currently more than 600 central bins that are emptied by Grounds recycling crews once a week, while trash cans in individual offices are emptied by custodial staff.

College and University Housing Services (CUHS) promotes use of campus recycling centers and provides bins in mailrooms for universal wastes such as printer cartridges and small electronics. CUHS maintenance shops also accept chemicals, foam packing peanuts, printer cartridges, and e-waste. During move-out, some areas are designated as "collection areas" for usable items, which are later donated.

Hauling and Waste Stream Tracking

UCSC's Grounds Services self hauls all recyclables and trash to the Santa Cruz Resource Recovery Facility and Recycling Center. Because Santa Cruz's recycling center currently accepts commingled recyclables, all goods that are recyclable are accepted in campus recycling bins. Unlike refuse, there is no charge to departments for hauling the recycled paper and containers, which creates an incentive for departments to encourage recycling from within to save money. Self hauling allows UCSC to track volumes of waste produced and diverted.


College Eight Pulper

Current Reuse and Recycling Activities

- Recycling bins have been placed in all dorm rooms and on-campus apartments.
- In Winter 2008, "multibins" will be placed in every college mailroom to accept batteries, CDs, and other universal waste items.
- New experimental bins that feature much smaller, attached trash receptacles to act as both trash and recycling bins have been introduced at the Physical Plant, with plans to use them across campus.
- The Recycling Coordinator is working with Physical Planning and Construction to ensure that indoor bins are accommodated in new buildings.

✦ *Paper Recycling*

Why This Indicator?

Each day, university departments and offices generate about 1.5 pounds of paper waste per person; paper and paper products also make up 35%, the largest portion, of the national waste stream.[4] Purchasing recycled paper and recycling used paper can greatly decrease the use of virgin materials incurred by daily activities and help reduce deforestation and landfill use.

Infrastructure

Recycling bins for paper are located in every mailroom, and most individual offices, apartments, and dorm rooms have receptacles. However, the success of the recycling program depends on staff, student, and faculty initiative for emptying the recycling bins into central bins.

Tracking and Tonnage Diverted

While information concerning tonnage of paper diverted from the landfill is available, data concerning total campus purchase of paper and total paper refuse are not available. It is, therefore, nearly impossible to gauge what percentage of potentially recyclable paper is being diverted. While overall paper use is difficult to track, office paper diversion is well documented. UCSC sells used office paper to a local recycling firm, and the revenue is used to fund a portion of the recycling program.

✦ *Electronic Waste*

Why This Indicator?

Electronic waste is defined as any electronic equipment, such as computers, printers, fax machines, or televisions, which contains hazardous substances that should not be landfilled. Improper disposal of e-waste is a violation of California state hazardous waste regulations and carries penalties of up to $25,000 fine per occurrence per day. According to the U.S. Environmental Protection Agency, Americans put 4.6 million tons of e-waste in landfills in 2000, and some e-waste "recyclers" send the waste overseas, where it is dismantled under highly unsafe conditions, or simply dumped. Most of the harmful substances in computers and printers can also be reused in manufacture of new products, but if recycled substances are not available, more virgin materials must be mined, leading to deleterious environmental impacts. Mindful disposal of e-waste is highly important at a technology-dependent university and can avert environmental problems upstream and down.

Infrastructure

An electronic waste (e-waste) disposal program has been in effect since 2001, with several ways by which the campus community can dispose of unwanted electronic waste. Some colleges have e-waste bins that are monitored and emptied by the college maintenance staff and are available for use by any campus member. Staff and faculty can also contact their division's Facilities Coordinator or UCSC Surplus for pickup of electronic waste. Students can contact fixit.ucsc.edu for pickup, or leave e-waste at a designated collection area at their college.

Figure R4: Paper Diversion (Tons)
Source: UCSC Recycling Coordinator

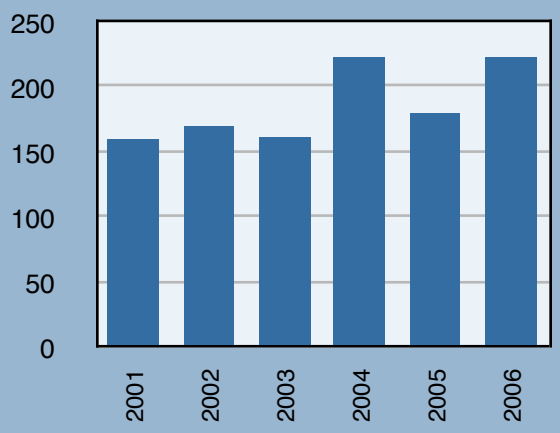
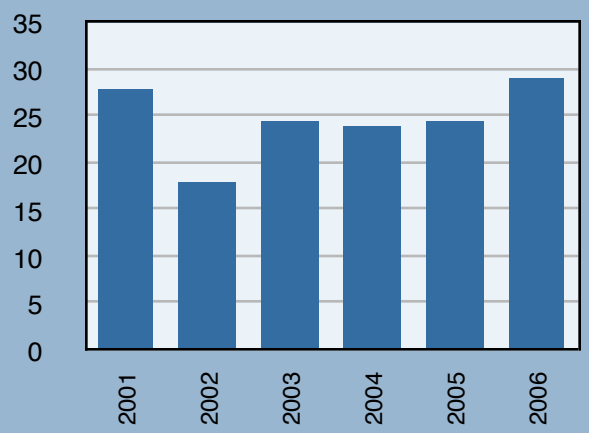


Figure R4: E-Waste Diversion (Tons)
Source: UCSC Recycling Coordinator



[4] Municipal Solid Waste 2006, US Environmental Protection Agency. Available at http://www.epa.gov/msw/facts.htm

Composting at the OPERS Fall Festival

Disposal Practices

All e-waste is channeled through campus Surplus. Some is repaired and sold, and some sorted for recycling and disposal. All vendors who accept UCSC e-waste are reviewed for adherence to the UC Policy before approval. Vendors further downstream are not often reviewed as thoroughly.

Because the disposal options for e-waste are largely determined by the materials in the item, the UC Policy discusses e-waste as a purchasing issue. For hazardous substances, the best solution is smart purchasing decisions.

✦ *Other Waste*

Why This Indicator?

Much of the waste generated by a University is never seen by campus members, and it is important to include these "behind-the-scenes" streams. Only a few have been highlighted briefly here.

Construction and Demolition Waste

Campus construction or renovation projects involve generation of large amounts of concrete, wood, and metal waste. Much of this can be recycled or reused elsewhere, but the necessary sorting is not always done by contractors. Campus practice currently requires contractors on major construction projects to develop and implement a waste management plan, recycling and/or salvaging at least 50% of construction, demolition, and land-clearing waste.

UCSC Grounds Services now picks up roll-off containers from most construction sites and, in the process, encourages separation of materials to allow recycling and tracking of the campus waste stream. Pickup through Grounds is not a campus standard and disposal of construction and demolition waste is sometimes handled by private vendors that have not been required to collect and submit their waste stream data.

Fleet Maintenance

Oil for the vehicle fleet is reclaimed by Bayside Oil, the same vendor from which Fleet Services purchases previously reclaimed oil. This oil is actually of a higher grade than "new" oil and, therefore, the preferred option. Antifreeze is recycled and reprocessed on campus by CleanQuest, who also disposes of any associated waste. A small amount of fluids is disposed of by Environmental Health and Safety as hazardous waste. Tires, batteries, and any other waste are all recycled or disposed by approved vendors. When vehicles are to be discarded, they are sent to campus Surplus, where they are resold or sent to dismantlers and recycled.

Campus Surplus

For disposal, much of the campus' physical resources such as furniture, appliances, electronics, and other items go to Surplus, located at lower campus, to be sold for reuse or sent to the Santa Cruz Resource Recovery Facility and Recycling Center. Surplus helps divert waste to reuse by upgrading and reselling up to 80% of the computers and other electronics that are brought in and 80% of the audio-visual equipment.

Large percentages of other items, such as desks (35-50%) and chairs (50%), are also resold. University Housing recycles mattresses, box springs, appliances, furniture, and carpet on an annual basis, and many of those materials pass through Surplus before reuse, recycling, or disposal. Surplus keeps records on all items received, though items purchased for under $1,500 are no longer inventoried, which makes data tracking more difficult.

Summer Maintenance

During the summer maintenance period, about 10% of all mattresses on campus are removed, some of which are refurbished. Carpeting is sent to a firm that burns it for electricity, but a new contract is under negotiation that would ensure that it would be recycled to a higher use. Data concerning these diversion rates has only been documented for the past few years. Improved tracking of these waste streams could help ensure continued and improved diversion.

Green Waste

Campus green waste and wood waste, including gardeners' and turf crew clippings and campus tree trimmings, are chipped and used back on landscapes or hauled separately to the regional recycling facility to be ground into mulch.

Opportunities and Recommendations

Create a comprehensive plan for achieving the UC Policy goals.

- Identify a plan for action and resource allocation to create the shifts in practice and awareness needed to meet the ambitious goals laid out in the UC Policy.
- Evaluate funding for staff, equipment, and materials needed to divert a larger percentage of the waste stream.

Rethink waste management.

- Convert the traditional integrated waste management approach to an overall resource management plan. This approach, for example, will broaden a waste audit from studying a slice of the waste stream to better material management at the source and procurement level.
- Develop a resource management plan that retains a focus on product life cycle, including vendors accepting responsibility of the material from production to final use and procurement practices that demonstrate life-cycle savings.

Expand recycling infrastructure.

- Work with building design teams to ensure that indoor recycling is easy and convenient.
- Increase the number of recycling centers and bins throughout campus.
- Explore opportunities for composting, such as collaboration with the city and county of Santa Cruz, or the development of an on-site composting facility.

Identify areas for improvement in waste diversion.

- Perform a waste audit to pinpoint the areas of campus waste production that are in most need of attention.

Improve communication, coordination, and reporting.

- Broaden the participation in developing the recycling plan to include the different departments on campus that operate separate recycling programs.
- Require construction contractors to develop and implement construction waste recycling plans. Require all construction and demolition activities to report waste stream volumes and diversion rates, or use University collection services for accurate materials accounting.
- Require all campus units to report recycling activities and separate waste streams.
- Improve staff coordination between Purchasing, Surplus, and Recycling for better life-cycle management of materials and waste.

Continue outreach and education efforts.

- Continually train and educate the campus community—including faculty, staff, and the changing student population—about recycling and the importance of resource management.
- Increase the awareness that waste is not resource management, but resource failure; throwing something out should be the last option, not the default option.
- Use this educational opportunity to impress the importance of individual actions working collectively to improve the environmental impacts of campus sustainability efforts.

We gratefully acknowledge the contributions to this section by the following people:
April Casper, *Hazardous Waste Manager*
Steve Goldie, *Receiving Manager*
Ilse Kolbus, *Director, Physical Plant*
Dean Raven, *Senior Superintendent*
Silas Snyder, *Safety Training and Resource Conservation Coordinator*
Dave Wade, *Recycling Coordinator*

Purchasing

The purpose of UCSC's Purchasing Department is to support the teaching, research, and public service missions of the University in a cost effective manner while ensuring adherence to University policies and procedures. This includes facilitating purchases, guiding campus purchasers in their decision making, and negotiating contracts with vendors. The overarching goal is to meet the needs of campus customers as quickly and efficiently as possible. This goal shapes the influence of the Purchasing Office on resource use, since they must meet the needs of many and various campus members. Implementing green purchasing, then, is heavily reliant on end-users for success. Likewise, implementation of campus-wide policy depends upon clear communication from the senior administration to ensure that end-users know about and understand green purchasing policies and their importance.

The goods and services that the University buys, uses, and disposes of determine, to a large extent, the total ecological footprint and carbon emissions of the institution through the resources that are involved in the manufacture of those goods, and the volume and composition of the campus waste stream. Purchasing, therefore, is a bridge between consumption and the environmental and social impacts of the local and global economies.

Summary of Activities and Performance

- The March 2007 UC Policy on Sustainable Practices (UC Policy) lists 37 strategies or best practices in Section VII, Environmentally Preferable Purchasing Practices. Some are more clearly defined than others. UCSC Purchasing staff are interpreting these 37 points to identify opportunities for immediate implementation and to determine what resources may be needed to implement others.
- UCSC has recently designated part of a Purchasing staff position to: act as a liaison to the UC systemwide Sustainable Purchasing Committee, identify opportunities for implementation at UCSC, develop processes for sustainable purchasing, and facilitate implementation of the UC Policy. This is the first time that Purchasing staff time has been devoted explicitly to sustainable purchasing practice.
- In 2005, UCSC Purchasing centralized operations from 26 departments to one central office. Purchasing introduced an online shopping tool, CruzBuy, enabling end users to make purchases. Approximately half of all campus purchases are now made using CruzBuy. CruzBuy could provide opportunities for embedding sustainability criteria in the University's purchasing systems and habits.

Challenges

- There is little summary information available to describe the extent to which UCSC's purchases meet sustainability criteria. However, current information systems hold some promise for tracking such criteria.
- The procurement aspects of the UC Policy must not simply be understood but implemented over time and with broader understanding by campus staff and administrators. Purchasing on campus is a complex system, and vendors, end-users, and the numerous departments have varied capacities for and interest in changing what and how they purchase.
- To date, UCSC Purchasing has afforded training for one staff member on the UC Policy requirements. More training is necessary to fully implement the policy. There has not yet been a directive from the senior administration to inform the community about the policy or to promote implementation.

Performance Indicators

Overview

Data Collection for Establishing Sustainability Performance
- Data Collection Practices and Software

Life-Cycle Costing and Strategic Sourcing
- Life-Cycle Costing and Life-Cycle Analysis
- Strategic Sourcing Contracts
- Shipping and Receiving

Adherence to UC Policy on Sustainable Practices
- Overall Implementation
- Paper Purchasing
- Electronics
- Printing Services
- Water-Efficient Appliances and Equipment

Capacity Building for Sustainability Goals
- Recent or Current Activities

✦ *Data Collection for Establishing Sustainability Performance*

Why This Indicator?

Being able to collect purchasing data specific to sustainability can lead to an increased understanding of the needs of the campus, ability to observe overall purchasing patterns of the University, and assistance with prioritizing efforts to identify opportunities for more sustainable purchasing practices.

Data Collection Practices and Software

Prior to 2005, UCSC's purchasing functions were decentralized. Each of the 26 campus service centers employed its own method of tracking and recording purchases, if tracked at all. This made tracking overall campus purchases far more difficult. When purchasing was centralized and CruzBuy implemented, UCSC created a platform that allows for more consistent reporting and more reportable data. Purchasing is now better positioned to collect and analyze data that lends itself to prioritizing efforts that encourage sustainable procurement.

About half of UCSC's purchases are made using CruzBuy; other purchases remain outside the realm of tracking or audit for policy compliance. While some vendors provide records of purchases made using pro-cards, the University does not currently track or use this information to identify purchasing trends or practices on campus. Here, UCSC again has an opportunity to shine a light on purchasing patterns and opportunities for implementation of the UC Policy.

✦ *Life-Cycle Costing and Strategic Sourcing*

Why This Indicator?

Much of the resource use and cost associated with products occurs during manufacturing, distribution, and disposal. These processes are not readily visible to the purchaser. Analyzing these life-cycle costs and impacts allows the purchaser to avoid incurring unnecessary environmental impacts through consumption choices. The capacity for bulk purchases saves packaging and transportation resources.

Life-Cycle Costing and Life-Cycle Analysis

Life-cycle costing involves the documentation of a good's costs in procurement, use, maintenance, and disposal. Without such analysis, it is impossible to ensure that purchasing decisions achieve lowest cost. UCSC Purchasing does not currently conduct life-cycle costing as a matter of policy.

The UC Policy asserts: "'Cradle to cradle' is the preferred purchasing standard and is defined as accountable, responsible, and environmentally preferable supply chain management from material extraction, production, marketing, sale, use, disposal, collection, re-use, and the web of closed-loop cycles and processes." This policy element is clearly a long-term goal, but UCSC can seek to follow the intent by buying only goods from recycled or renewable materials and/or that will ultimately be reusable or recyclable.

Strategic Sourcing Contracts

The UC Office of the President has successfully negotiated 10 to 15 strategic sourcing contracts for the entire UC system, including a carpeting contract with Interface Flooring, a carbon-neutral company. These contracts, which allow bulk discounts and other advantages, are available to UCSC but do not preclude use of other vendors.

Shipping and Receiving

UCSC's Shipping and Receiving takes a certain amount of products that are to be delivered on campus and coordinates those deliveries to save time and resources. However, there are opportunities to streamline this system, such as re-examining the "desktop delivery" practice. If deliveries were consolidated further, UCSC could potentially reduce costs and lower the environmental impact of shipping.

✦ *Adherence to UC Policy on Sustainable Practices*

Why This Indicator?

Well-enforced guidelines and policies can have large and direct effects on the ecological impacts of a campus' purchasing practices and can help increase overall efficiency of operations.

Overall Implementation

The UC Policy, adopted systemwide in March of 2007, dictates several strategies to reduce the University's impact on the environment, particularly use of third-party certification as a gauge for sustainable products. However, the policy has no clear timeline for

implementation. UCSC's higher-level administrators have not yet issued a directive or allocated specific resources to support implementation of this complex policy. To date, UCSC has not altered practice in response to these March 2007 policy guidelines, but the campus is exploring options and evaluating needs.

The UCSC Purchasing Department is working toward interpreting the UC Policy for campus. The staff assigned this task began duties officially on November 1, 2007. It is expected that more precise interpretation can be completed in 2008 after which specific opportunities and plans for implementation can be considered. At the same time, some resources are being applied to understanding how to use CruzBuy to identify "green" and sustainable products for purposes of promoting their use over non-green or less sustainable products.

Insufficient resources within Purchasing and lack of education of end-users are examples of hindrances to compliance. Full adherence to the policy will also require consistent collaboration among many campus units. There is currently no infrastructure for reviewing the policy and planning clear implementation strategies for UCSC as a whole.

The guidelines for sustainable purchasing practices specifically emphasize standards for recycled content of paper, energy-efficient electronics and appliances, chemicals labeled by Green Seal, and low-flow water fixtures. Specific information concerning these particular areas is given below.

Paper Purchasing

UCSC Printing Services is currently using 30% recycled-content paper for all of their printing and have done so since before the UC Policy stipulated such practice. The use of 30% post-consumer waste (PCW) paper as opposed to virgin paper, saves 9,500 trees and enough power to light and heat 73 homes annually. Since the 2004 Annual Campus Earth Summit, Instructional Computing Labs has used 100% PCW paper with success (due to efforts of a motivated staff member). Because cost is a major obstacle to purchasing paper with high recycled content, the Printing Services Office is currently working with other UCs to purchase paper collectively, reducing the price and facilitating an eventual shift to 100% recycled content.

Electronics

UCSC IT personnel have developed desktop standard configurations for campus. In considering the best, lowest-cost configuration, this team embraced the Electronic Product Environmental Assessment Tool (EPEAT) certification as a requirement in all but one instance.

Instructional Computing Lab

Printing Services

Soy-based inks are also slowly being phased in to replace traditional petroleum-based inks, and Printing Services is looking into purchasing equipment that utilizes processor-less plates, which save water, paper, and other resources, as well as reducing the use of potentially harmful chemicals. Other projects to implement include purchasing Forest Stewardship Council (FSC) certified paper, which would ensure that any virgin content had been sustainably harvested. Printing Services is also looking into becoming a green certified operation.

Water-Efficient Appliances and Equipment

As buildings are renovated and repairs made, old water fixtures are phased out and replaced by new, more efficient technology. As mandated by the applicable building codes, all replacement water fixtures on campus are now low-flow: toilets use 1.6 gallons per flush, urinals one gallon per flush, and showerheads release two gallons per minute.

✦ *Capacity Building for Sustainability Goals*

Why This Indicator?

Sustainable purchasing is a particularly challenging topic because information on best practices and products is not readily available and is often subjective. Multiple factors affect the sustainability of any given product and must be assessed, including materials used, manufacturing methods, transportation distances, and the overall impact of the product. This is a complicated undertaking; staff resources and training are required, as is creating infrastructure that can support development of an effective implementation of the UC Policy.

Recent and Current Activities

As the UC Policy is interpreted for UCSC, communication with all UCSC buyers can begin. Purchasing Management is already creating opportunities for staff by conducting "Bridging the Gap" tours in which staff visit suppliers' facilities to understand how their business is conducted. This encourages open dialogue between suppliers and buyers and creates opportunities to identify areas for improvement in a supplier's business model. While there has yet been no training to introduce the UC Policy and Guidelines for Sustainable Purchasing Practice, the possibility of doing so is being considered.

Opportunities and Recommendations

Apply the UC Policy including, but not limited to the following.

- High priority (most feasible and/or greatest cost savings):
  - Obtain directive from top UCSC leadership endorsing sustainable purchasing practices.
  - Hold training events for staff and major buyers to ensure that the policy is understood and that next steps to implementation are clear.
  - Purchase only paper products made of 100% post-consumer content.
  - Ensure that appliance purchases meet Energy Star criteria.
  - Ensure that electronic products are registered Bronze or higher according to EPEAT.
- Medium or low priority (less feasible and/or less cost savings):
  - Use UCSC purchasing power to encourage market shifts in the local economy.
  - Negotiate take-back programs for electronic goods and packaging.
  - Purchase only goods that are packaged with minimal resource input or with biodegradable materials.
  - Phase in Green Seal products.
  - Include sustainable criteria in all RFPs as gradable criteria.
  - In annual reporting, provide status of and plans for expanding sustainable purchasing practices. In particular, create process for monitoring adherence to the UC Policy.

Improve and expand data collection and analysis.

- Explore options to expand collection of available data concerning University purchased goods.
- Compile and analyze existing data to understand sustainability performance and to identify data gaps over time and report regularly to the Campus Sustainability Subcommittee.

Re-examine processes and analysis of information flows.

- Identify which purchases (by type, dollar value, and scale of environmental or other impact) warrant life-cycle cost analysis. Make life-cycle cost analysis the standard for those purchases.
- Train purchase approvers to understand and adopt the UC Policy and Guidelines for Sustainable Purchasing, including making choices inside of CruzBuy.
- Educate end-users and large purchasers to understand the importance of sustainable purchasing.
- Ensure that suppliers showcase environmentally preferable purchases in CruzBuy.
- Integrate UC Policy mandates into BUS 43 and other commonly used procedural documents.

Create the institutional framework for implementing UC Policy elements on purchasing.

- Interpret UC Policy elements for UCSC context and circumstances. Coordinate appropriate units (including Physical Plant, Business Services, and Physical Planning and Construction) to determine priorities.
- Improve staff coordination between Purchasing, Surplus, and Recycling for better life-cycle management of materials and wastes.
- Develop an implementation plan.
- Consider creating a working group on sustainable purchasing that reports to CSS and assists in implementing the plan.

We gratefully acknowledge the contributions to this section by the following people:
Kate Cunningham, *Strategic Sourcing Buyer*
Bob Forsythe, *Director, Purchasing Department*
Vlad Metrik, *Co-Chair, Student Environmental Center*
Matthew St. Clair, *Sustainability Specialist, UC Office of the President*
Mike Steele, *CruzBuy Supplier Analyst*

Food Systems

Nationally and globally, human food systems represent a substantial impact on soil, water, and biodiversity. The ways humans interact with nutrient and water cycles, local ecosystems, and global climate to procure daily bread together comprises one of the greatest impacts on the earth's carrying capacity. These various food systems frequently have direct, negative impacts on human health through air pollution, compromised drinking water, and exposure to pesticides and other chemicals. Agriculture also supplies more jobs than any other economic sector globally, and UCSC is located at the edge of one of the richest agricultural regions in the world.

One subtle challenge of the food system is the way it distances "eaters" from the social and environmental impacts of production, largely by bringing food long distances at all times of the year. This now-pervasive trade in food can separate us from the underlying nature of food production by appearing to eliminate the seasonality of food. Food from local sources is by definition "in season" and more likely to connect us to the local bioregion. Shorter distances also mean less fossil-fuel consumption for food transport.

UCSC is a leader in sustainable agriculture research and training and the Farm-to-College movement. UCSC Dining Services is pioneering the design of sustainable campus food service programs, purchasing local, organic food, and consistently working to green campus operations. The Center for Agroecology and Sustainable Food Systems (CASFS), founded in 1967, operates a 25-acre organic farm and two-acre Chadwick Garden and serves as a center for training, research, and education. The campus Food Systems Working Group (FSWG), including students, staff, faculty, farmers, and community members, works to bring sustainable food to campus and to educate the community throughout the year. Numerous organizations and innovative educational programs, such as the Program in Community and Agroecology, the Kresge Food Cooperative, and Students for Organic Solutions, connect the campus farm, gardens, dining halls, and the community, providing a broad range of opportunities for learning about sustainable food systems.

While there have been great advances in the "greening" of UCSC's food systems, there are still many areas in which improvements are encouraged. Achieving true sustainability is a new frontier and, at this time, sustainability must be considered an ongoing journey and evolving process.

Summary of Activities and Performance

- Colleges and University Housing Services (CUHS) manages the five residential dining halls, catering, the University Center restaurant, Terra Fresca, and several of the campus cafés and coffee carts, including Oakes Café, Kresge Owl's Nest, Banana Joe's, and Perk Coffee Carts (including three Perks and one Perk Express).
- UCSC dining has been offering a wide range of vegetarian, vegan, organic, and healthy options since the early 1970s.
- In part because of a concerted student effort, UC Santa Cruz transitioned from having a contracted food service provider to an in-house operation in 2004-2005.
- Due to UCSC's leadership in food services sustainability, Dining Services staff have been mentoring and consulting other Universities through a webcast (titled *Academic Impressions: Sustainability & Dining*), conference presentations, and site visits.
- The innovative local-sourcing of produce from small, organic farming operations with commitments to social responsibility provided over 13% of produce served by dining services in 2006-2007.
- About a quarter of the produce served on campus is third-party certified organic – 23.8% in 2006-2007, 26.3% so far in 2007-2008. Approximately half of this produce was from local farmers, though the exact figures are unknown.
- The University Center's restaurant, Terra Fresca, features a wide range of environmentally preferable and healthy food options, including organic produce, antibiotic-free and hormone-free meat, seafood that meets the criteria of Monterey Bay Aquarium's

Seafood Watch, and organic, fair-trade coffee from the Community Agroecology Network (CAN), a campus group.

- UCSC has a wide range of academic and co-curricular programs focused on food systems and numerous other supporting courses on related topics. (See the Co-Curricular Activities section for more detail.)

- The Center for Agroecology and Sustainable Food Systems (CASFS) is dedicated to increasing ecological sustainability and social justice in the world's food and agriculture system. The Center, a unit within the Division of Social Sciences, manages 28 organic acres of productive campus land that supports a 120-member Community Supported Agriculture (CSA) program for campus and community members, as well as direct production and delivery to campus food services to supply students with fresh and sustainable food options. (See the Co-Curricular Activities section for more information on CASFS.)

- There are many student programs focused on food systems such as:
  - Program in Community and Agroecology (PICA) which provides a two-unit discussion class, as well as informal and structured gardening, cooking, and learning activities.
  - The Kresge Food Cooperative is a cooperatively-owned and run food outlet on campus that sells produce and bulk goods, and specializes in sustainable and organic goods.

Note: Not included in this assessment are independently-run operations or college-affiliated vendors such as: Stevenson, Cowell, and College Eight cafés, the Bookstore's Express store, Tacos Morenos, Hungry Slug, Joe's Pizza and Subs, and the University Inn.

Challenges

- Existing software and vendor tracking of sustainable food procurement/sales data is lacking detailed context.

- No primary vendor has been identified that will take the pulped compost from the dining halls in a consistent and coordinated fashion.

- Several common recyclable items used by the dining halls are not currently accepted by the city (aseptic containers, waxed cardboard containers, etc.).

- Recycling is not picked up often enough to provide sufficient room in the bins, which sometimes overflow. This can cause recyclable items to be put into landfill waste. However, there are plans to purchase more compactors, and add new bins for mixed recycling.

- Buying only food that is local and organic, particularly dairy and meats, is prohibitively expensive due to the current cost differential between organic/local foods and those grown using "conventional" methods.

- Although Dining Services provides compostable containers in the dining halls and for catering, there is no concerted effort to divert them from the landfill.

- Consumer education and creating habits is ongoing.

Performance Indicators

Overview

Food Options and Serving
- Meal Options and Portions

Purchasing
- Local/Organic Foods
- Other Certifications
- Low-Waste Disposables

Performance and Operations
- Waste Tracking and Disposal
- Waste Prevention
- Energy Efficiency
- Green Certification

Education and Outreach Activities
- Ongoing Efforts
- Selection of Food Systems Events

Composting Outreach Activities
- Receiving Locations/Volume Diverted
- Ongoing Efforts

✦ *Food Options and Serving*

Why This Indicator?

The types of foods provided in the campus dining halls and the way in which the food is served can greatly influence the overall ecological footprint of the University. Locally-purchased foods travel less distance and consume fewer fossil fuels during transportation. Vegetarian and vegan foods generally require fewer resources (water, land, and fertilizers) to produce. According to a report published by the United Nations Food and Agriculture Division, "The livestock sector is a major player, responsible for 18 percent of greenhouse gas emissions measured in CO2-equivalent. This is a higher share than transport."[5]

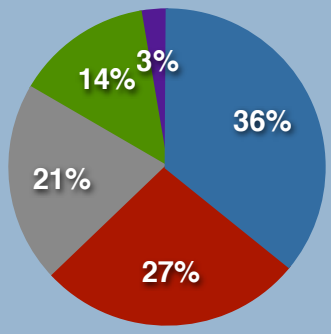
Unlike food from conventional agriculture, organic food may not be grown with synthetic pesticides or fertilizers, which may end up in ground and surface waters, air, wildlife, and the food itself. Thus, local and organic food, including vegetarian and vegan options, is preferable in terms of human health and the environment. The University's provision of these foods plus activities that promote thoughtful food selection and portioning, decrease the amount of food and energy waste overall.

Meal Options and Portions

Every dining hall at every meal on campus offers both hot and cold vegetarian and vegan options, which are clearly labeled. Students are actively encouraged to take small portions and to sample foods before they fill their plate to minimize waste. All first-year students living in the residence halls have an unlimited meal plan. This is believed to reduce waste because it takes away the pressure of eating larger quantities to get the most out of each meal.

Figure F1: Total Food Purchases by Category

Source: UCSC Dining Services



- 36% Processed foods (dry goods, frozen, juice)
- 27% Meat, poultry, and seafood
- 21% Produce
- 14% Eggs and dairy
- 3% Coffee/tea

Note: It is important to use simple criteria to improve food procurement (such as organic, local, and fair trade), but the proportions purchased of various products matters equally.

Considered as its own economic sector, agriculture accounts for about one-fifth of global greenhouse gas emissions, a large majority of water use, and many other impacts on health and the environment. These impacts are disproportionately high for animal products and processed foods. And of course, diet is the foundation of health.

Figure F1 suggests that UCSC's consumption of fruits and vegetables has room to rise, relative to other dietary categories.

[5] *Livestock's Long Shadow: Environmental Issues and Options*, United Nations Food and Agriculture Organization, 2006.

✦ *Purchasing*

Why This Indicator?

Not all food and food service outcomes are readily quantifiable. There are many different criteria that indicate various levels of a food's "sustainability." In some cases, there is an absence of data: food sourcing has become complex, and few vendors track the geography of sources, making it difficult to accurately identify the distance food travels. Similarly, straightforward yes/no criteria such as organic certification do not exist for (or are only one facet of) certain food purchasing: for meat, dairy, and especially seafood, there are numerous ways of describing "sustainable" options.

The campus dining facilities have two key reasons to provide local and organic food options. One is to help use the University's purchasing power to promote and sustain the local organic farming and food economy. The other is to honor the desires of the campus community who pursue healthy, sustainable lifestyles. As described in Figure F1, there are numerous benefits to purchasing local, organic foods, for both human and ecological health.

UCSC Dining Services has a number of programs and efforts in place to improve its performance in many of these areas. Some of those efforts are summarized here.

Local/Organic Foods

About a quarter of the produce served on campus is third-party certified organic – 23.8% in 2006-2007 and 26.3% so far in 2007-2008. (All of the food included in this quantitative indicator is certified organic. Organic certification is a third-party process of verification to ensure that federal standards are met).

98% of UCSC's organic *and* locally sourced food comes from ALBA Organics, a limited liability company and non-profit education and training entity that purchases from the Monterey Bay Organic Farmers Consortium (MBOFC) to provide food to UCSC. The MBOFC is a group of local farmers in the region and from the Campus Farm, who joined together to provide the campus with the bounty of the region's sustainable farms due to the efforts of the Food Systems Working Group.

UCSC is the first institutional member of the Community Alliance with Family Farmer's Buy Fresh Buy Local initiative, part of a national program in over 42 states, with more than 50 chapters (www.foodroutes.org). Following UCSC's lead, regional institutions such as UC Berkeley and Stanford have joined the initiative.

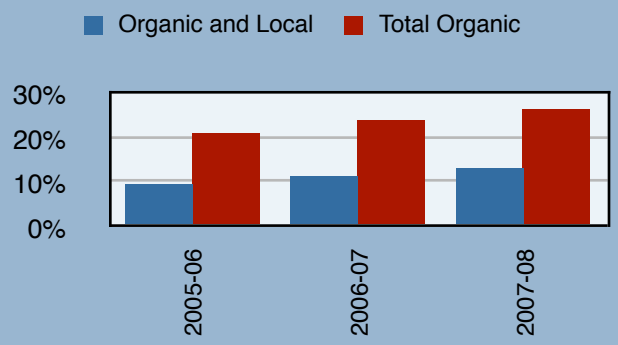
Other Certifications

Other sustainability criteria that UCSC uses to evaluate its food purchases include:

- The Community of Agroecology Network (CAN) coffee is available at all dining facilities. This coffee, known as "fair trade direct" provides better returns to the farmers than traditional fair trade and much better than conventional coffee.
- 75-80% of seafood served has been certified by the Monterey Bay Seafood Watch Program (www.mbayaq.org/cr/seafoodwatch.asp).
- 100% of liquid dairy products are hormone-free.

Figure F2: Organic and Local Produce, as a Share of Total Produce

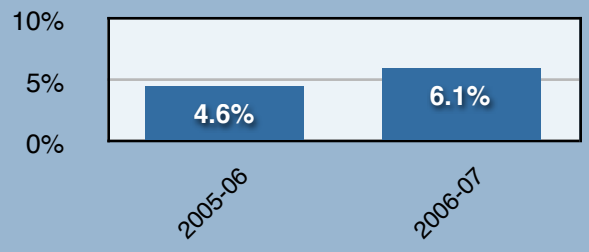
Source: UCSC Dining Services



Note: The data gathered for 2007-08 is only partial data collected through early December 2007.

Figure F3: Organic Produce as a Share of Total Food Purchases

Source: UCSC Dining Services



Note: This change from 2005 to 2006 fiscal years was from 4.6% to 6.1% or $194,000 to $303,000 in purchases of organic food, an increase of more than 50%.

- 100% of meats at Terra Fresca, a campus-run restaurant at the University Center, are antibiotic-free and hormone-free, though the proportion of certified meats in other dining facilities is unknown.

Low-Waste Disposables

- The dining halls issue every incoming first-year student a refillable, reusable bottle. Filtered water is available in the soda machines to encourage students to avoid purchasing bottled water.
- Dining halls use only reusable plates, cups, and silverware.
- For to-go containers, Dining Services has implemented use of compostable boxes.
- UCSC Catering uses disposable tableware derived from sugarcane that can be pulped and returned to the soil as compost. Catering provides collection containers at some events to separate and collect these items, but currently there is not oversight regarding how those items are disposed.

✦ *Performance and Operations*

Why This Indicator?

Growing, collecting, and transporting food is only one part of what makes a food system sustainable. The resources used to prepare food and dispose of waste have a large impact on the ecological footprint of a food system, and it is important to understand these processes to identify areas in which improvements can be made.

Note: Because there is no campus-wide policy for food systems, cafés not operated by the campus may not follow the practices promoted by Dining Services.

Waste Tracking and Disposal

Each dining facility kitchen tracks production and waste generation/diversion, primarily for prepared foods. All food waste from the College Eight dining hall is pulped onsite, and other waste from special waste reduction events is delivered to College Eight for pulping. Pulping leads to a two-thirds reduction in waste volume, and additional pulpers are being planned for the renovations at Cowell/Stevenson and Porter/Kresge. Pulped waste takes up less space in the landfills and has the side benefit of reducing injury rates related to trash pick-up. The goal is to divert this waste from the landfill entirely. However, UCSC Dining has not yet found a farm to take the pulp and on-site composting is not currently available.

Waste Prevention

As part of the waste prevention efforts:

- Many meals can be "made to order" or "upon request." This helps to ensure that the amount of food prepared is the amount that will be eaten.
- All inventory levels are adjusted for perishable food to reduce waste from spoilage or dehydration.
- For non-food waste, dining facilities' recycling efforts include having recycling bins in the dining halls and recycling pallet wrap from food shipments.
- All of the fryer oils are recycled or "rendered" for biodiesel fuel.
- All dining halls have discontinued use of straws.
- College Eight has removed individually-wrapped frozen novelties and individually-wrapped cracker packages.
- Post-meal production records and a sophisticated computerized production system allows purchases and production to closely match usage and promote waste prevention.

Energy Efficiency

There have been many efforts to improve the efficiency of campus dining halls and food processing, including the following:

- Purchasers only procure appliances that are Energy Star rated. Performance is also compared with performance evaluations from the California Energy Commission.
- When dining halls are remodeled, availability of natural light is a high priority. Buildings have several "zones," which allow darker areas to be electrically lit, while areas with light from windows are not.
- Dining Services primarily uses electric carts to transport food on campus.
- Dining Services has switched almost entirely to "green" cleansers.

Green Certification

There is an effort to have all the dining halls "Green Certified" by the city of Santa Cruz and the Monterey Bay Area Green Business Program. There are plans to have every dining facility certified within a year. The following table shows which of the dining halls and cafés operated by Dining Services are currently Certified Green Businesses. More information on the Green Business Program is available at http://www.montereybaygreenbusiness.org/index.html.

Figure F4: Green Certified Dining Facilities, as of December 2007
Source: UCSC Dining Services

UCSC Dining Facility	Certified Green?
Banana Joe's Café	Yes
College Eight/Oakes Dining Hall	No
Crown/Merrill Dining Hall	Yes
Cowell/Stevenson Dining Hall	Yes
College Nine/College Ten Dining Hall	No
Porter/Kresge Dining Hall	Yes
Kresge Owl's Nest Café	Yes
University Catering	Yes
Oakes Café	No
Perk Coffee Carts	No

✦ *Education and Outreach Activities*

Why This Indicator?

Education must be a large part of sustainability and waste reduction efforts. Ultimately, it is the individual choices of the students that make the biggest difference in the amount of post-preparation waste that is generated, which represents 40% of the waste from the dining facilities.

Ongoing Efforts

- Dining services develops innovative partnerships to reach out to eaters on campus, undertaking several outreach activities throughout the year. These include:
  - Two visits, with volunteers from the Student Environmental Center (see the Co-Curricular Activities section), to alternating dining hall locations to gather, weigh, and display food waste.
  - Creative marketing: front check-in stands, table tents, posters located near the plate collection area, stickers to promote asking for smaller portions, sampling and "cleaning your plate," and organic and local taste tests. More information is available at http://housing.ucsc.edu/dining/.
- Education for Sustainable Living Program (ESLP): the ESLP program's five-unit Action Research Team on Food Systems has annually developed campus-based research and education projects to provide ongoing support to existing Food Services Working Group (FSWG) projects and objectives since 2005.
- Curriculum, coursework, and internships: Dining Services has partnered with FSWG and College Eight to support the annual freshman Core Course with hands-on experiental learning opportunities that entail post-consumer food scrap collection and composting, as well as harvesting and delivering products to feed their peers.
- CASFS sponsors up to 20 interns per year for agroecology field work and farm-to-college based projects. This includes work with the innovative Life Lab Science Program that aims to inspire learning and conservation by engaging students and educators in the natural world.
- For more information on PICA and the Kresge Cooperative, see the Co-Curricular Activities section.

Selection of Food Systems Events

Dining Hall Events:

- Each College hosts two to three College Night events per quarter, some of which have an underlying sustainability theme. Organic nights are held annually at College Eight and frequently at College Nine/Ten. Crown/Merrill held an organic College Night in 2006-2007. While many College Night events have themes not related to sustainability, many of the Colleges make an effort to highlight sustainable food practices at the majority of these events. Each event brings together 300 to 700 residential diners, allowing a significant body of students to be educated and exposed to better practices in food production.
- During 2007-2008, each dining hall plans to host a Zero Waste day. This event will include educational tabling, food waste audits conducted by members of the Student Environmental Center, and staff education.

Food Systems Working Group Events:

- Green Peas Award – an annual spring-time ceremony to recognize and honor outstanding students, staff, and faculty that work within campus and community food systems was launched in 2007.
- Field to Fork Tour – an annual winter campus tour and educational training for visiting students, staff, and faculty who want to understand and utilize successful UCSC model programs and practices on their respective campuses.
- Farmer and Campus Community Dinner – an annual fall dinner event that draws the producers and campus stakeholders together to express gratitude and inform the FSWG on how to further strengthen and build relationships with food and farming partners.

Center for Agroecology and Sustainable Food Systems:

- Strawberry Shortcake Festival – an annual educational and tasting event hosted at the UCSC Farm in May to promote sustainable food systems and their world-renowned apprenticeship program.
- Harvest Festival – an annual harvest celebration and community education event that brings the campus and community together to learn about resources on the food system and taste the bounty of the harvest.
- Food for Thought Forum – an annual fall forum that brings faculty and researchers together with the general public and to explore relevant and pressing topics related to UCSC's food system and to expand awareness and understanding.

Fall Festival:

- Since 2004, the Student Environmental Center's Waste Prevention Campaign has worked with UCSC Dining Services to make the annual Office of Physical Education, Recreation, and Sports (OPERS) Fall Festival a low waste event. In 2007, UCSC Dining Services designed the entire festival around the Zero Waste goal, and succeeded in:
  - Diverting over 70 bags of compostable service-ware and food scraps to the College Eight pulper, resulting in over 1,000 pounds of pulp, that was distributed to the College Eight Garden Project and PICA for use in their composting.
  - Sending over 81.7 pounds of aluminum cans and 38 pounds of plastic water bottles to the recycling center.

International Short Course on Agroecology:

- In the summer of 2007, UCSC hosted the eighth annual three-week short course focused on agricultural sustainability. This event, hosted every other year at UCSC, draws participants from around the world.
- It is hosted by an Environmental Studies professor, the Program in Community and Agroecology, and the Community Agroecology Network.

✦ *Composting*

Why This Indicator?

Organic waste, when properly disposed of, can produce fertile, nutrient-rich soil. However, much of these wastes are instead sent to the landfill, where decomposition occurs far more slowly and where the soil cannot be used for soil replenishment. Composting can help close the loop of a food system by allowing food wastes to be returned to the soil. Additionally, food waste in landfills emits greenhouse gases as it decomposes.

Receiving Locations/Volume Diverted

To date there has not been consistent compost pickup or disposal for dining hall waste. Some locations, on and off campus, have been able to take some waste for periods of time, but because of the volume of pre-consumer food waste, and the fact that campus compost is not 100% organic, permanent arrangements have been elusive. Most recently, the Program in Community and Agroecology (see the Co-Curricular Activities section) was receiving 100 gallons of waste per week, but halted that arrangement because they could not manage the volume.

Ongoing Efforts

There are ongoing efforts to increase the campus' waste diversion through composting, including a campaign by the Student Environmental Center and continuous work by the Food Systems Working Group. There have been several studies concerning finding a location for an on-campus composting facility, but the results of these studies indicate that a large composting facility would be necessary for the volume of waste UCSC produces. To reduce post-consumer waste, the dining halls are considering using smaller trays, or eliminating their use entirely. At the Crown/Merrill dining hall, a switch to smaller trays created a 50% reduction in food scrap waste. Smaller trays can also help reduce water and soap use.

Opportunities and Recommendations

Set campus standards for sustainability procurement and practices.

- Explore a ban on plastic water bottles.
- Facilitate the use of sustainability criteria for purchasing patterns by smaller on-campus food providers/venues (not just the largest dining halls).
- Undertake a targeted assessment for increasing both local and organic procurement, creating a flexible system to incorporate new understandings about best practices, as this information becomes available.
- Explore opportunities to increase the proportion of produce that is local and organic.

Expand relationships to facilitate food system improvements.

- Work with the city of Santa Cruz and local vendors to arrange for pulp/food scrap pickup.
- Build additional relationships with suppliers that are flexible and able to work with existing primary vendors for efficiency and diversity of products available.
- Further develop sustainable food systems worker education and training for dining service employees.

Improve reporting systems to make sustainability-related information easier to access.

- Expand data that is available/collected on sustainable/humane procurement, waste reduction, and energy conservation initiatives.

Reduce greenhouse gas emissions and improve energy efficiency.

- Equip range hoods used in the dining halls with sensors that shut off when the range is not in use.
- Calculate carbon emissions related to food procurement and identify opportunities for reductions as part of campus climate action planning process.
- Provide sensor-activated water faucets in dining hall restrooms.

Improve waste prevention.

- Explore on-campus composting systems to support education and food service needs.
- Make all to-go containers compostable and provide methods for subsequent composting. Phase out the use of disposable to-go containers.
- Discontinue use of wooden stir sticks and individually-wrapped items in dining halls.

We gratefully acknowledge the contributions to this section by the following people:
Kent Bailey, *Assistant Director, Dining Services*
Candy Berlin, *Program Coordinator, Dining Services*
Scott Berlin, *Director, Dining Services*
Tim Galarneau, *Food Systems Education and Research Specialist, CASFS*
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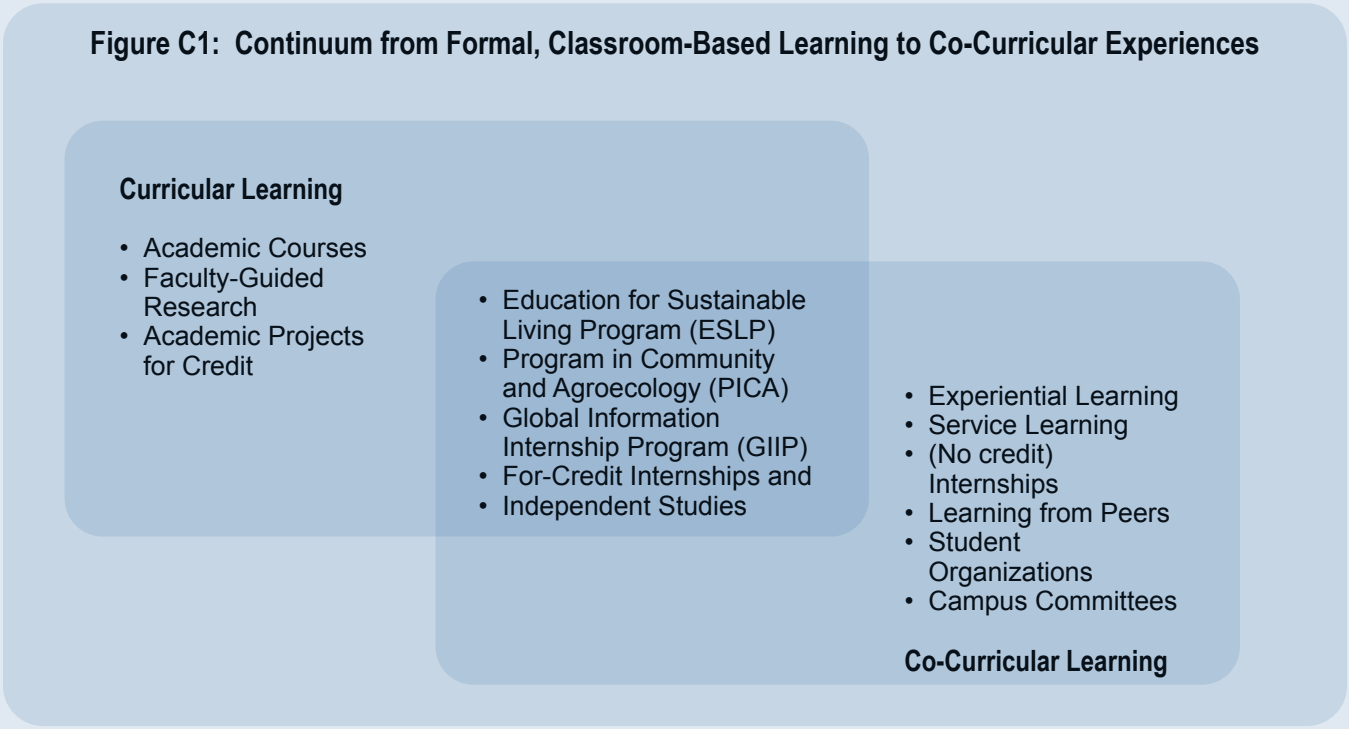
Sue Matthews, *Executive Director, University Housing Services*
Jean-Marie Scott, *Associate Vice Chancellor, College and University Housing Services*
Jan Perez, *Associate Specialist, CASFS*

Curriculum

Sustainability represents new challenges for all sectors of society, and it falls to institutions of higher education to provide the skills and knowledge to address those challenges. While it is impossible to foresee all future needs and expectations, it can be assumed that many academic disciplines will have opportunities to expand or reshape their research and curricula to help business and government solve current and emerging problems.

Ultimately, the goal of this section, and that of the subsequent section titled Co-Curricular Activities, is to characterize the learning opportunities presented to students at UCSC. Some of these opportunities are in the classroom, while others are experiential, occur among peers, or involve informal mechanisms. The diagram below briefly captures the continuum from formal, classroom-based learning to co-curricular experiences.

Figure C1: Continuum from Formal, Classroom-Based Learning to Co-Curricular Experiences



In compiling the list of "sustainability-related courses," questions came up about the definition and criteria of sustainability. This assessment used a simplistic but nonetheless helpful set of criteria to identify courses from the course catalog. This method is ultimately inadequate as a stand-alone assessment; hence, other methods for describing those academic opportunities available at UCSC are needed. Courses that reflect the following qualities were identified as "sustainability-related":

- Content relating to the natural world, including problems, challenges to, or the dynamics of complex ecological systems.
- Topics involving manufacturing, consumption, and/or consumerism from a social, economic, or environmental point-of-view.
- Issues of social and/or intergenerational equity and fairness relating to the allocation of natural resources.
- Spiritual, cultural, or aesthetic aspects of human relationships to nature.

This section is a preliminary attempt to look at sustainability-related courses that comprise curricular opportunities. Inevitably, some courses are missing, and some courses may be included that perhaps should not be.

There are also areas of academic life on campus that are not directly discussed in this assessment. Among these are:

- Pedagogical strategies
- Collaborative research opportunities
- Effectiveness of courses
- Non-center or non-institute research
- Courses that do not inherently have content related to sustainability, but allow for independent research that may be related to sustainability

While other sections have many more hard and fast indicators, this section merely aims to identify several benchmarks, raise important issues, and spark future discussion among faculty, academic planners, and students.

Summary of Activities and Performance

- UCSC offered 163 courses, internships, and field studies from a broad range of disciplines and departments that grant students the opportunity to learn about many aspects of sustainability in 2006-2007. The number of courses in this broad area is increasing.
- Some departments address not only the science, but also the social aspects of sustainability, such as Environmental Studies, Community Studies, Latin American and Latino Studies, Sociology, and Anthropology.
- Several science departments and programs address sustainability issues directly. Examples include new courses emphasizing the science and engineering of sustainable technologies in the Electrical Engineering and Computer Science Departments, and degree programs in Ecology and Environmental Biology and Environmental Toxicology.
- Sustainability-related learning is not limited to the classroom. On-campus organizations, events, and research opportunities allow students the opportunity to engage with issues of sustainability first hand. (See the Co-Curricular Activities section.)
- There is an interdisciplinary effort underway to explore creating a "School of the Environment," and an effort to develop a Sustainability Minor.
- The American College and Universities Presidents Climate Commitment (ACUPCC), signed by the UC system, calls for a report on the current state of sustainability in curriculum and research.

Challenges

- No other more specific assessment of curriculum has been done thus far, and there is a need for further study and analysis to prioritize recommendations and further understand challenges.

Performance Indicators

Overview

Sustainability-Related Courses
- Number of Courses
- Number of Courses Satisfying GE Requirements

Number of Departments That Have At Least One Sustainability-Related Course
- Number of Departments

Overview of Selected Programs
- Academic Departments
- Additional Academic Opportunities

Note: The assessment does not attempt to assess the performance of any class, organization, or other curriculum-related opportunity. Rather, this section strives to present data and information about the quantity and types of opportunities available to undergraduate students as part of their regular curriculum.

Additionally, in a narrative manner, a selection of departments and opportunities that specifically address sustainability are described. As mentioned, a study of the actual content of these courses is beyond the scope of this assessment.

✦ *Sustainability-Related Courses*

Why this Indicator?

Classes that fulfill general education requirements are typically lower-division classes that are open to all students, regardless of their major. The relative lack of classes that both relate to sustainability and also fulfill general education requirements could indicate that a relatively low number of students are exposed to sustainability concepts outside of those majors that include a significant number of such courses. However, there are many courses that allow students to choose research topics, and it is difficult to assess how much of thesis research relates to sustainability.

Number of Courses

For both general education requirements and courses as a whole, there appear to be few classes that teach material related to sustainability, as defined in this assessment. There were 7,683 courses taught for credit at UCSC in the 2006-2007 school year, and 163, or 2.1% of those fell into the category of "sustainability-related" as defined.

Number of Courses Satisfying General Education (GE) Requirements

Likewise, out of 1,313 classes that fulfill General Education requirements, 25 (or less than 2%) met the criteria for being "sustainability-related." There is, therefore, a high probability that many students graduate from UCSC with very little knowledge concerning concepts of sustainability.

Community Agroecology Network

Figure C2: Sustainability-Related Courses, by Level, 2006-2007
Source: 2006-2008 UCSC General Catalog

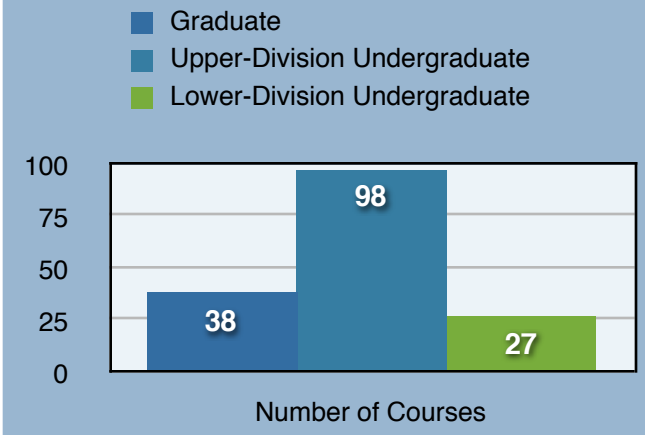
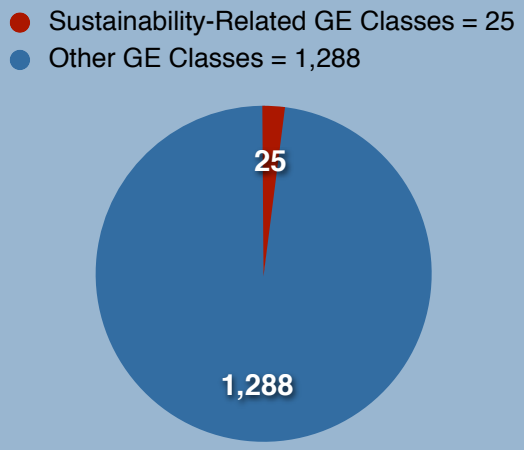


Figure C3: Sustainability-Related Courses Fulfilling General Education Requirements, 2006-2007
Source: 2006-2008 UCSC General Catalog



Note: There are 7,845 total courses in UCSC's course catalog. 1,313 courses currently fulfill general education requirements. Refer to Appendix B for a complete list of courses represented here.

✦ *Number of Departments that Have At Least One Sustainability-Related Course*

Why This Indicator?

Sustainability is a far-reaching issue, with connections to social justice, economics, politics, the sciences, and human values. Issues of sustainability can be addressed in a wide array of fields. Observing the proportion of departments that offer sustainability-related classes also indicates that students pursuing a given major have the option to learn about how their field relates to sustainability concerns.

Number of Departments

There are 60 established majors on campus. Majors that combine courses from different departments, but do not offer courses specific to the major are not included. Approximately one-third of the departments offer courses that fulfill criteria relating to sustainability, though many of these have only a few such courses. This finding is difficult to interpret without further study.

✦ *Overview of Selected Programs*

Note: The following list is merely a selection of departments or programs in which sustainability-related courses and material are prominent. Others with four or more sustainability-related courses include Sociology, Ocean Sciences, College Eight, Latin American and Latino Studies, Legal Studies, and Anthropology.

Academic Departments or Programs

Environmental Studies
Founded in the early 1970s, the interdisciplinary Environmental Studies department provides courses, internship and field study opportunities, events, and unique learning opportunities for students to pursue sustainability issues. Courses cover topics including ecology, natural history, conservation, agroecology, and sustainable agriculture. Students can also complete internships for credit with agencies both on campus, such as the Arboretum, Center for Agroecology and Sustainable Food Systems, or in the Santa Cruz community at agencies such as the State Legislator's Office or local environmental consultancies.

Community Studies
Courses in this department look at the ways in which economic class, race, gender, sexuality, and political systems affect social justice and organization. Students are also free to take two of their three upper division elective classes in other departments. Of the 48 upper-division courses offered by the department, only three are directly related to environmental sustainability. However, many of the others address issues that, explicitly or implicitly, affect human relationships to the environment. Students majoring in Community Studies are required to do a six-month field study, which offers the opportunity to work on a number of issues, including sustainability.

Biological Sciences
Many upper-division courses teach ecology and related topics, and have field study or laboratory components concerning ecological functioning. While these courses may not explicitly emphasize the interactions of humanity with the natural world, they lay a foundation of understanding ecological science that is crucial to the study of sustainability.

Earth and Planetary Sciences
This department offers a variety of courses, some of which include components that relate to human society's interactions with the natural world. Building on a foundation of geology and global cycling, Earth and Planetary Sciences teaches the groundwork of the planet's functions and humanity's interactions with them.

Environmental Toxicology
This program offers many courses concerning pollutants and their interactions with human and animal physiology, a subject vital to an understanding of sustainability. Students learn to analyze the effects of various pollutant substances on ecosystems, animals, and human health.

Independent Majors
Since its inception, UCSC has maintained a creative and innovative approach to education, allowing students the option to actively participate in the design of their course of study through the Petition for an Independent Major. Independent Major proposals are drafted by students in collaboration with their affiliated residential college (i.e. Porter College, Merrill College, etc.) and faculty advisors. With the support of the College, the proposal is then submitted to the Academic Senate for review and approval. Each year, varying numbers of students declare independent majors campus-wide, and nearly always some proportion are related to sustainability. For example, in the 2007-2008 academic year, there are nine independent majors, two of which are related to sustainability.

Additional Academic Opportunities

Field-Study and Internship Opportunities
This assessment identified several active field-study programs at UCSC. Five are linked to academic disciplines in Community Studies, Economics, Environmental Studies, Latin American and Latino Studies, and Psychology. Oakes College, Kresge College, and College Eight all offer courses that involve service-learning components, and Volunteers in Asia, an international program affiliated with Stanford University, has an office at Kresge College.

Faculty-Guided Research
As at many universities, students have the opportunity to work directly with faculty on independent research projects for credit. This allows interests that may not be deeply or directly addressed in any course to become the focus of study for a student as a part of their curriculum. The process of creating an independent study is quite simple, and many students take advantage of this opportunity, though the option is not always publicized.

Co-Curricular Activities
There are many programs for students that combine a classroom component with field work or other experiential learning. For the sake of avoiding redundancy, these programs are listed here, and elaborated in the Co-Curricular Activities section:

- Program in Community and Agroecology (PICA).
- Education for Sustainable Living Program (ESLP).
- Global Information Internship Program (GIIP).
- College Eight Core Course and Sustainability Projects.
- Sierra Institute.
- Chancellor's Undergraduate Internship Program (CUIP).

Opportunities and Recommendations

Assess the sustainability curriculum thoroughly.

- Undertake a specific assessment of the richness of sustainability content in the available courses and seek ways to expand the sustainability-related educational opportunities for all students.

Encourage new and support existing sustainability-related curricular opportunities.

- Currently there are two initiatives in their early stages: to create a Sustainability Minor and a School of the Environment. Both could offer increased opportunities for students to study issues of sustainability.
- Expand course offerings within departments that already have sustainability-related courses and those that do not.
- Increase the number of opportunities to incorporate for-credit field studies with institutionalizing sustainability on campus.

Consider educating all students about sustainability.

- Consider adding a General Education requirement for all students to ensure that every UCSC graduate has a basic understanding of sustainability principles.
- Consider offering a sustainability component in each of the ten College Core Courses, in which every freshman participates.
- Consider opportunities for faculty to explore adding sustainability concepts into existing courses. For example, other campuses have hosted workshops on integrating sustainability into the curriculum.

Facilitate conversation concerning improving the sustainability curriculum.

- Increased dialogue between faculty, staff, and students about curriculum gaps can foster student-run courses, the creation of new courses, as well as special events and focus groups that could work towards adding more sustainability courses to the current curriculum.
- Develop faculty surveys to learn more about courses with activities related to sustainability.

We gratefully acknowledge the contributions to this section by the following people:

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Ronnie Lipshutz, *Professor, Politics*
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Vivan Vadakan, *Staff Coordinator, PICA*
Mark Valen, *Chancellor's Undergraduate Intern, Education for Sustainable Living Program*

Co-Curricular Activities

UC Santa Cruz has a broad range of co-curricular activities available to students interested in learning about and practicing sustainability concepts. The term, "co-curricular" refers to the broad spectrum of university-related activities that take place outside of the regularly-scheduled, classroom-taught courses. Quantitative measurements in this category, as is the case with Curriculum, are difficult to define. Instead, a glimpse is offered into the various types of opportunities available to students that serve to augment, parallel, or apply the classroom learning provided within the structure of UCSC coursework.

Summary of Activities and Performance

- Student organizations – Several student organizations are highly active in the campus sustainability movement, including the Student Environmental Center (SEC), a student branch of the California Public Interest Research Group (CALPIRG), the Student Coalition for Responsible Electronic Waste (SCREW), and others.
- The Student Environmental Center organizes and hosts the Annual Campus Earth Summit, initiated in 2002, at which break-out groups create a Blueprint for a Sustainable Campus. This provides an opportunity for any campus member to converse about sustainability issues and contribute to the Blueprint, the guiding document for several student organizations.
- The Campus Sustainability Council, a subcommittee of student government, grants approximately $240,000 in funds annually to various organizations for sustainability projects related to the Blueprint for a Sustainable Campus.
- Most administrative and academic committees, some of which oversee sustainability-related activities on campus, have designated spaces for voting student representatives. However, this fact is not well-known to the student body.
- Campus departments or units often hire student staff or take on interns to assist with operations, which creates an excellent experiential learning opportunity as well as improving operational capacity.
- Several academic programs have learning components related to sustainability that occur outside of a classroom setting. These programs are described in greater detail under Co-Curricular Opportunities later in this section.
- Several research Centers and Institutes (see the Research Programs and Facilities Indicator in this section) at UCSC focus on research pertaining to sustainability issues, and provide opportunities for students to participate in that research.

2008 Campus Earth Summit

Challenges

- More resources are needed for staff to adequately support the growing number of student organizations and to manage the funding that is allocated to the organizations through student fees (see Student Organizations: Support later in this section).
- There are many simultaneous activities on campus, with no apparent system for consistently disseminating information for participation and collaboration.
- Students report difficulty communicating with the Student Committee on Committees, the branch of student government that makes official appointments to campus committees.

Performance Indicators

Overview

✦ *Co-Curricular Opportunities*

Why This Indicator?

Much of the learning value of a university education does not come from classroom experiences. There is a growing consensus that creating opportunities for internship and field experience is an important part of preparing students for the workforce. Allowing students to earn course credit for such experiences ensures that valuable field experience does not have to be in addition to a full course load, but can be part of the curriculum.

Overview of Selected Programs

Program in Community and Agroecology (PICA)
Through a two-unit discussion class, as well as living and working at the PICA gardens located on campus in the Lower Quarry, students discuss issues concerning sustainable food systems and how they relate to community, social justice, and farming practices. PICA allows participants who live at the Village, an on-campus housing complex next to the UCSC Farm, to become active parts of a community oriented to awareness and learning concerning sustainable food systems. As part of the academic program, PICAns take part in both informal and structured gardening, cooking, and learning activities at the Village and the Farm. More information, go to http://ucscpica.org/.

Food Systems
UCSC has many opportunities for students who are interested in food systems to not only learn about sustainable agriculture, but become involved in making the campus' food system more sustainable. The following are only a few of these opportunities available to UCSC students:
- The Food Systems Working Group (FSWG)
- Gardening internships.
- Students for Organic Solutions (SOS) campaign with the Student Environmental Center.
- Lifelab Science Program (environmental education program for schools).
- Santa Cruz County Food Systems Network.
- The UCSC Center for Agroecology and Sustainable Food Systems (CASFS).

More information is available at http://casfs.ucsc.edu/.

Education for Sustainable Living Program (ESLP)
ESLP, an award-winning student-created and student-led course and lecture series, hosted by College Eight, offers a unique opportunity for students to discuss and implement principles of sustainability. The lecture series, offered every spring quarter since 2004, is open to the public and brings internationally acclaimed speakers to UCSC to share their ideas, stories, and activities.

All students, approximately 250 annually, attend the lecture series. Approximately 100 of those students earn two units of credit by also completing associated writing assignments and participating in a student-led discussion group. The other 150 students earn five units of credit by enrolling in a student-led Action Research Team (ART) project. During winter quarter, approximately 30 students receive five credits for participation in a youth-led training seminar in which they plan the ART project that they then lead in the spring quarter course. Each ART leader must have a syllabus and reading list for their ART course, and leads the class to undertake a project on or off campus that pertains to a particular aspect of sustainability.

Global Information Internship Program (GIIP)
The goal of this program is to spread use of the Internet and the associated skills throughout the developing world. Through a yearlong series of lectures and labs, students learn leadership and information technology (IT) skills, which culminate in the development and execution of a project designed to facilitate use of technologies by a non-governmental organization or small business abroad. Several of the organizations GIIP works with are related to sustainability. More information is available at http://giip.ucsc.edu/.

College Eight Core Course and Sustainability Projects
Each of the ten colleges within UCSC requires that all residents complete the Core Course that defines the theme of that college. The theme of College Eight is *Environment and Society*, and its Core Course has both academic and service-learning components that focus on sustainability. The newly-introduced, award-winning Sustainability Projects complement the classroom component of the Core Course, and are a requirement for each of the over 400 first-year students at the college. This program allows students to choose to participate in one of five on- or off-campus field projects. The academic component of the College Eight core course, *Environment and Society*, focuses on the relationships between various human cultures and the natural world. More information is available at http://eight.ucsc.edu/.

Field Studies and Internship Opportunities
Internships serve to enhance classroom learning with field work or community service. In addition to academic research, students work with an organization, locally or abroad, to gain firsthand experience of work in their field of study. The Environmental Studies Internship Office places over 300 interns per year, all of which participate in projects related to sustainability. An example is the Life Lab Science Program, which allows UCSC students to teach local elementary school students about the environment through interactive gardening projects. The campus Arboretum and Natural Reserves also provide internship opportunities for students to learn about site maintenance and plant science. The Community Studies Department likewise has a very active internship program, and many of their students' field studies relate to sustainability. More information is available at http://envs.ucsc.edu/internships/.

Sierra Institute
This program introduces students to outdoor experiences as a venue for learning about the environment. The Sierra Institute, based in Humboldt, is a for-credit outdoor learning program that gives students fifteen units for an academic year quarter of learning, traveling, and outdoor activities. More information is available at http://www.humboldt.edu/~sierra/.

Office of Physical Education, Recreation, and Sports (OPERS) Outdoor Recreation
The outdoor recreation trips organized and run by OPERS include day and weekend trips and ongoing classes that are not for credit. This program hosts special events every Earth Day, offers workshops on sustainability topics such as composting, organic farm tours, and a spring break trip that involves visiting Native American reservations and learning about their approach to sustainability. Free bicycle repair and bicycle licenses are available at the East Field House every Thursday, in addition to bike lights for purchase at wholesale prices. Use of OPERS vans are donated for certain sustainability events. More information is available at http://www2.ucsc.edu/opers/.

Chancellor's Undergraduate Internship Program (CUIP)
CUIP is a competitive internship program that provides departments and units on campus with the opportunity to hire students to assist with projects on campus. Compensation to selected students is provided by payment of student fees by the Chancellor's Office and the unit or units hosting the project. While the projects are not necessarily related to sustainability, many previous sustainability projects, including this assessment, were supported through this program. The project experience is augmented and paralleled by a 2-unit class, in which students are introduced to campus infrastructure and administrators, and encouraged to communicate and collaborate in their work. In 2006-2007, six of the approximately 30 projects through CUIP were related to campus sustainability. More information is available at http://intern.ucsc.edu/cuip/.

✦ *Involvement in Campus Operations and Infrastructure*

Why This Indicator?

When it comes to education concerning sustainability, the University itself is the perfect laboratory. As evidenced by this assessment, a myriad of issues concerning sustainability are manifest in the functioning of any such institution, and granting students access to information and Decision Making structures helps to empower and educate them in ways not available in the classrooms.

On-Campus Internships and Paid Work

The operation of the UCSC campus presents an excellent opportunity for students to learn-by-doing and give back to the University. Many campus units have sustainability concerns in their purview. For example, the Physical Plant and its various units, including the Recycling Office, Site Stewardship Program, Energy Management, and Environmental Health and Safety, as well as the UCSC Arboretum, the Center for Agroecology and Sustainable Food Systems, and the Campus Natural Reserve offer paid positions or internship opportunities for student workers. In 2007, a pilot Sustainability Internship Program was initiated through the UCSC Sustainability Office, currently a two-year pilot office within Physical Plant, to facilitate student involvement, mentorship, and education through work with several projects and units on campus.

Annual Campus Earth Summit

Organized annually by the Student Environmental Center, the Annual Campus Earth Summit allows students, faculty, and staff to interact in working groups that focus on various topics concerning campus sustainability. The 2008 Summit, held in January, was the seventh annual event. The findings of these groups are assembled into the Blueprint for a Sustainable Campus, the guiding document for the Campus Sustainability Council, SEC, and ESLP. These working groups sometimes continue to meet, and have generated positive results from the ability of students and staff to interact and collaborate to improve the efficiency and practices of campus operations.

Campus Committees

Most administrative and academic committees, including those whose decisions affect campus sustainability, have voting seats available for interested undergraduate and graduate students. This allows students to learn about decision-making processes in a bureaucratic setting and to participate directly in the policymaking or recommendation functions of the University. Students can apply to be appointed to most committees through the Student Union Assembly's Student Committee on Committees (SCOC). More information on the SCOC is available at http://sua.ucsc.edu/scoc/.

The following is a sample of committees thatstudents interested in sustainability may find of interest:

- Advisory Committee for Facilities
  - Campus Sustainability Subcommittee
- Dining and Housing Master Planning Committee
- Campus Natural Reserve
- Campus Welfare Committee
- Transportation Advisory Committee

2008 Annual Campus Earth Summit

The following groups participated in organizing the 2008 Annual Campus Earth Summit event:

- Business and Administrative Services
- Center for Agroecology and Sustainable Food Systems
- College Eight
- College Nine/Ten
- Education for Sustainable Living Program
- Environmental Health and Safety
- Food Systems Working Group
- Physical Plant
- Pilot Sustainability Office
- SHR Training and Development
- STEPS Institute for Innovation in Environmental Research
- Student Environmental Center

2008 Campus Earth Summit Planning Committee

✦ *Student Organizations and Student-Run Cooperatives*

Why This Indicator?

Students learn from each other, just as they do from their professors, and student organizations help to bring power and voice to student interests related to sustainability. Student organizations are also an excellent way to ensure that staff and administrators have an avenue of communication to students for collaboration on campus projects, including those that are related to sustainability.

Student Organizations

Note: This is an attempt to capture the most active and relevant student organizations and is not comprehensive. Some important organizations may have been omitted.

The Student Environmental Center
Since 2001, the Student Environmental Center (SEC) has been committed to collaboration with the administration to create a sustainable campus. They host the Annual Campus Earth Summit, are connected to the statewide California Student Sustainability Coalition (CSSC), and participate in creating policy changes. They also founded and support ESLP (see Co-Curricular Opportunities). The SEC currently has four subgroups that discuss issues concerning green building, transportation, waste prevention, and food systems. It initiated the passing of the student fee referendum for funding sustainability projects, now administered by the Campus Sustainability Council (CSC). SEC has long been active in collaborative efforts to improve the campus' sustainability practices. They receive over $90,000 in annual funding from CSC and oversee a full-time Sustainability Programs Manager staff position. More information is available at http://enviroslug.org.

Friends of the Community Agroecology Network (FoCAN)
FoCAN is a student group that supports the work of the Community Agroecology Network (CAN). CAN is a faculty-initiated and partially student-run non-profit that facilitates local and national sales of coffee from several organic, cooperative growers in Central America. Because CAN brokers purchase directly between growers and consumers, there are no "middle-men." This ensures that the coffee growers and the consumers are treated fairly. CAN also sponsors undergraduate and graduate interns to go to Central America and work directly with the growers to help ensure the success of the program. CAN coffee is served in the UCSC dining halls. More information is available at http://www.communityagroecology.net/.

The Campus Sustainability Council
After passage of a student fee referendum (see Appendix G) for funding student projects on campus, the Campus Sustainability Council was created in 2003. This elected group of students, a subcommittee of the Student Union Assembly, oversees the allocation of approximately $240,000 collected annually through student fees. Of this, less than $70,000 is available for one-time projects with the rest being permanently or semi-permanently allocated to specific organizations. Funds are allocated through a winter and spring funding round to registered student organizations for projects related to campus sustainability. Positions on the Council, elected seats based on College affiliation, give interested students the opportunity to participate in funding allocation processes, enforce accountability measures, and make difficult decisions concerning funding of other student organizations. More information is available at http://sua.ucsc.edu/csc/.

California Public Interest Research Group (CALPIRG)
CALPIRG is a statewide group that works to defend citizens' rights through consumer advocacy and environmental and educational activism. The UCSC chapter of CALPIRG creates opportunities for internships and volunteer work on various issues, including homelessness, forest protection, and renewable energy. CALPIRG wrote and promoted the successful student fee referendum that led to UCSC's purchase of Renewable Energy Credits for all the electricity used on campus. They employ one full-time staff person each year.

Student Coalition for Responsible Electronic Waste (SCREW)
This group works with the Silicon Valley Toxics Coalition and Toxic-Free UC to promote education about the importance of recycling e-waste, and to ensure that students are informed about where e-waste bins are located around campus.

The Green Campus Program (GCP)
Beginning as part of the Alliance to Save Energy, the GCP provides internship opportunities for students to help implement energy efficiency projects on campus. As of 2007, the GCP projects had saved UCSC over $30,000 in energy costs and included installing bi-level lighting in stairwells and replacing hundreds of incandescent light bulbs with compact fluorescents. More information is available at http://www.ucsc.edu/about/sustainability/greencampus.shtml.

Student-Run Cooperatives

Bike Cooperative
This student-owned, operated, and run non-profit sells and repairs bikes and teaches bike maintenance skills. More information is available at http://bikecoop.ucsc.edu/.

The Kresge Food Cooperative
This is a cooperatively-owned and run food outlet on campus. The store is located at Kresge College that specializes in selling sustainable and organic produce and bulk goods. It also serves as a community center for alternative culture. More information is available at http://www2.ucsc.edu/kresge/commlife/food.shtml.

Support by Student Organization Advising and Resources (SOAR)

The purpose of the Student Organization Advising and Resources (SOAR) is to facilitate productive student engagement. SOAR's office supports more than 150 student organizations on campus including those listed above and several other sustainability-related groups with complex needs. SOAR helps manage fiscal accounts, keep records, advise student organizers one-on-one, and ensure that all events and activities comply with University policy.

SOAR plays a crucial role in raising the capacity and professionalism of student organizations. Without SOAR, student groups would be forced to reinvent the organizational wheel each year in their quest to turn good intentions into activities and activism. SOAR provides those crucial aspects of organizational development that would otherwise be absent from the student landscape: contextual knowledge, organizational learning, and continuity.

However, SOAR's work has recently become more challenging for various reasons:

- SOAR manages more than $1.25 million in student fee funds, nearly $1 million more than five years ago. Approximately $240,000 of the additional funds are designated specifically for campus sustainability programs. These funds are allocated to numerous Sustainability Student Organizations (SSOs) through the Campus Sustainability Council.
- SOAR currently has two full-time staff, three part-time staff and advisors, and a small number of student workers. Before it was reorganized, SOAR had ten staff (though it also oversaw additional areas).
- SOAR's advising and oversight responsibilities have increased substantially:
  - Student programs are up by over 400% since 2003; student-initiated outreach programs have increased by over 150% since 2005; and the number of student organizations has increased by 52% since 2002.
  - SSOs have initiated complex activities. To support this growth, SOAR is called on to provide policy development and increased staff oversight (e.g. negotiations with off-campus organizations and service providers; purchase and maintenance of equipment; tracking paid internships; etc.)
  - SSOs have created career staff positions. The hiring and supervision of career staff by students is uncommon in the UC system. SOAR is called on to oversee student-governed recruitment and supervision of staff to ensure fair hiring and compliance with contracts. SOAR also works with Human Resources staff to ensure students are trained in personnel policies.
  - SSOs are developing new organizational structures in the midst of conducting complex projects. To support this development, SOAR meets with students and is creating organizational development, financial, and leadership trainings.

More information on SOAR and support for student organizations can be found on SOAR's website at: http://soar.ucsc.edu/.

✦ *Research Programs and Facilities*

Why This Indicator?

Centers, institutes, and other campus programs provide opportunities through financial sponsorship and facilities for faculty, graduate, and undergraduate researchers from many disciplines to work together to produce research documents and publications that can be used as resources by policymakers and other interested parties. In addition, centers and institutes distribute grants and fellowships for graduate and post-doctoral students, work with local organizations, host lectures and events, and build and maintain databases of the collected information.

Summary

There are numerous centers, institutes, and other facilities and programs on campus, each of which focuses on specific, interdisciplinary areas of study. This assessment cannot describe the work of these undertakings in depth. However, a cursory description of the research component of University life, as exemplified by these organizations is provided. More information on these programs can be found in the UCSC 2006-2008 General Catalog (pages 59-74).

This assessment identified more than 25 entities that address sustainability-related issues. This list may not be comprehensive, but it provides a sense of the breadth of activity at UCSC:

- Arboretum
- California Institute for Quantitative Biomedical Research
- Center for Agroecology and Sustainable Food Systems (CASFS)
- Center for Global, International, and Regional Studies (CGIRS)
- Center for Information Technology Research in the Interest of Society (CITRIS)
- Center for Justice, Tolerance, and Community (CJTC)
- Center for Tropical Research in Ecology, Agriculture, and Development (CenTREAD)
- Geographic Information Systems Laboratory Institute of Geophysics and Planetary Physics
- Geospatial Visualization Laboratory
- Institute for Quantitative Biosciences (QB3)
- Institute of Marine Sciences
- Life Lab Science Program
- Monterey Bay Education, Science, and Technology Center at Fort Ord
- Museum of Natural History Collections (MNHC)
- Natural Reserve System:
  - Año Nuevo Island Reserve
  - Campus Natural Reserve
  - Fort Ord Natural Reserve
  - Landels-Hill Big Creek Reserve
  - Younger Lagoon Reserve
- Physical and Biological Sciences Division Facilities:
  - Earth Systems Modeling Laboratory
  - Greenhouses
  - Molecular Ecology and Evolutionary Genetics Facility
- Santa Cruz Predatory Bird Research Group
- Science, Technology, Engineering, Policy, and Society (STEPS) Institute
- University of California Observatories/Lick Observatory

Highlighted Programs

Center for Global, International and Regional Studies (CGIRS) and Sustainability Engineering and Ecological Design (SEED)
CGIRS is involved in initiating SEED which is defined here as the planning, development and deployment of technological and social systems and institutions that can protect the earth's ecological systems, for this and future generations. SEED is a five-year curriculum plan to mobilize growing student, campus, and broader interest in environmental challenges and related social concerns. The goal is to build links with the business community, to bridge the divide between Engineering and Social Sciences, and to foster new research initiatives in environmental informatics. The first course was offered fall quarter of 2007 titled EE80S: *Sustainability Engineering and Practice*, co-taught by the SEED organizers listed above. More information is available at http://www2.ucsc.edu/cgirs/.

Center for Agroecology and Sustainable Food Systems (CASFS)
CASFS hosts a world-renowned agroecology apprenticeship program, which has trained hundreds of students from all over the world in the principles of sustainable agriculture. This program has since brought its talents to many areas of the world, including

Santa Cruz County. Many of the organic farms in the area have received information and assistance through CASFS apprentices and other outreach mechanisms. CASFS, a division of Social Sciences, engages in education, research, and public service, and hosting events related to sustainable food systems. In particular, CASFS is leading the cutting edge of collaborative farm-to-institution social science research and applied programs toward evolving both models of co-curricular learning and UCSC's food system. More information is available at http://casfs.ucsc.edu/.

Center for Tropical Research in Ecology, Agriculture, and Development (CenTREAD)
CenTREAD is a coalition of graduate students and faculty at UCSC committed to fostering the interdisciplinary research and training needed to understand tropical environmental issues and develop ecologically-based, economically viable, culturally respectful, nonexploitative solutions that serve as a foundation for future generations. CenTREAD has focused on training graduate students and professionals from tropical countries to return as leaders in sustainability and conservation in their native countries, in addition to supporting graduate training and research by UCSC graduate students working in the tropics. More information is available at http://centread.ucsc.edu/

Science, Technology, Engineering, Polisy, and Society (STEPS) Institute for Innovation in Environmental Research
The focus of the STEPS Institute is to fund research projects and events that create dialogue and connections between UCSC's research and policymakers, non-governmental agencies, and other research laboratories. The goal of the institute is to link long-term interdisciplinary environmental research in science, technology, engineering, policy, and society. Current research emphasizes three major themes that affect sustainability: effects of global change, conservation of biodiversity, and alteration of the earth's water systems. More information is available at http://www.steps.ucsc.edu/

Institute of Geophysics and Planetary Physics
Institute of Geophysics and Planetary Physics approaches topics of nature-human interactions from the perspective of natural systems' effects upon humanity. This institute encompasses four research Centers: Center for Dynamics and Evolution of the Sea Land Interface (CDELSI), Center for Origin, Dynamics and Evolution of Planets (CODEP), Center for Study of Imaging and Dynamics of the Earth (CSIDE), and Center for Remote Sensing (CRS). These centers facilitate the research of the institute and help to promote valuable interdisciplinary work. More information is available at http://igpp.ucsc.edu/

Institute for Quantitative Biosciences (QB3)
Institute for Quantitative Biosciences (QB3) hosts interdisciplinary and multidisciplinary research and partners with the private sector to seek solutions to biomedical problems. The institute addresses a variety of topics, from atomic and molecular structures and applications to pharmaceuticals to environmental mitigation techniques and technologies. More information is available at http://www.qb3.org/

The Institute of Marine Sciences
The Institute of Marine Sciences focuses much of its research on ocean health and the effects of human pollutants on marine systems. Because of UCSC's proximity to the Monterey Bay National Marine Sanctuary, the campus and the affiliated Long Marine Lab facilities provide excellent opportunities for researchers to study oceanic ecology. More information is available at http://ims.ucsc.edu/

Opportunities and Recommendations

Further integrate co-curricular learning into the curriculum.

- Explore opportunities to expand the number of courses that include experiential learning and leadership training components.
- Develop new opportunities for students to apply co-curricular work toward major, general education, and/or unit requirements.
- Provide resources and support the development of independent majors relating to sustainability.
- Explore more formal support for internship opportunities in order to further integrate them into the UCSC academic experience.
- Explore development of a certificate program demonstrating to future employers that students had practical/ applied experience in sustainability as it relates to their majors.

Continue outreach and education efforts concerning co-curricular opportunities.

- Increase outreach to the student body concerning the various co-curricular programs on campus and the skills and experiences offered.
- Increase student awareness of opportunities to participate in the operation and decision-making processes at the University.

Improve coordination of student groups.

- Increase strategic approach and collaboration between student organizations to help create a unified voice.
- Expand communication, organization, and shared events and resources with off-campus Santa Cruz community groups related to sustainability.

Ensure that SOAR can properly support the growing number of student sustainability organizations.

- Evaluate resources allocated to SOAR to ensure that it has adequate funding to advise and support the student organizations and associated activities, including sustainability-related groups.
- Coordinate with SOAR, student groups, and especially the Campus Sustainability Council to help develop a web-based master calendar of co-curricular events related to sustainability. For instance, requesting that applicants for Sustainability Council funding post group events to the calendar (under the purview of the Sustainability Council) will increase awareness of events and foster inter-group communication.

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Appendices

Campus Sustainability Assessment

2006 - 2007

UC SANTA CRUZ

Policy on Sustainable Practices

The UC Policy on Sustainable Practices can be found at http://www.ucop.edu/facil/sustain/. The introductory section of this assessment titled, UC Policy on Sustainable Practices, as well as the end of the Governance section, titled Implementation of the UC Policy, describe progress toward meeting the UC Policy in greater detail. The UC Policy states that:

Resource sustainability is critically important to the University of California, the State of California, and the nation. Efficient energy use is central to this objective, and renewable energy and energy-conservation efforts provide a means to save money, foster environmental awareness, reduce the environmental consequences of University activities, and provide educational leadership for the 21st century.

The University is committed to stewardship of the environment and to reducing the University's dependence on non-renewable energy sources. With this commitment in mind, we will regularly review initiatives and best practices and share successes by augmenting the existing University guidelines. These guidelines currently recommend that the University operations:

- ***Incorporate the principles of energy efficiency and sustainability in all capital projects, renovation projects, operations and maintenance within budgetary constraints and programmatic requirements.***
- ***Minimize the use of non-renewable energy sources on behalf of the University's built environment by creating a portfolio approach to energy use, including the use of local renewable energy and purchase of green power from the grid as well as conservation measures that reduce energy consumption.***
- ***Incorporate alternative means of transportation to/from and within the campus to improve the quality of life on campus and in the surrounding community. The campuses will continue their strong commitment to provide affordable on-campus housing, in order to reduce the volume of commutes to and from campus. These housing goals are detailed in the campuses' Long Range Development Plans.***
- ***Track, report and minimize greenhouse gas emissions on behalf of University operations***
- ***Minimize the amount of University generated waste sent to landfill.***
- ***Utilize the University's purchasing power to meet its sustainability objectives.***

The Office of the President will annually report to The Regents on the Policy's impact on capital and operating costs, and overall campus sustainable practices.

History of the UC Policy

During the 2002-2003 academic year, students across the UC system founded the California Student Sustainability Coalition. With active support and guidance from Greenpeace, a campaign was launched to urge the Regents to pass a green building policy. Over 14,000 postcards were sent to President Atkinson and student governments at every UC campus supported the resolution. In just one year, the Regents launched a feasibility study and mandated that a policy be created. Since creation, this policy has twice been expanded to include additional categories including transportation, operations, climate protection practices, and purchasing.

The following are excerpts from the January 16, 2007 Report to the Members of the Committee on Grounds and Buildings from the UC Office of the President and from the UC Policy Guidelines for Sustainable Practices. These documents provide the official background information on the formation of what has evolved to become the UC Policy on Sustainable Practices (UC Policy).

- *At the December 2002 meeting of the Committee on Grounds and Buildings, The Regents requested that the President undertake a feasibility study for the adoption of a Green Building Policy and Clean Energy Standard for all proposed and to-be-renovated buildings. At the July 2003 meeting, The*

History of the UC Policy, continued

Regents approved "as university policy for all capital projects, the principles of energy efficiency and sustainability in the planning, financing, design, construction, renewal, maintenance, operation, space management, facilities utilization, and decommissioning of facilities and infrastructure to the fullest extent possible, consistent with budgetary constraints and regulatory and programmatic requirements." In June 2004, the President formally issued the Presidential Policy on Green building Design and Clean Energy Standards (Policy).

- *One of the Policy items (II.e.) addressed reducing transportation-related fossil fuel consumption. At the September 2005 meeting of the Committee on Grounds and Buildings, The Regents expanded this policy and authorized the President to adopt guidelines supporting sustainable transportation efforts throughout the University of California. The expanded Policy Guidelines were issued by President Dynes in January 2006.*
- *In October 2006, in response to the requirement that this policy guideline document be reexamined every three years, sections of the policy were clarified and new sections were added specifically in the areas of: renovation policy, climate change practices, green building operations and maintenance, recycling and waste management, and environmentally preferable procurement."*
- *In March 2007 President Dyne's signed an expanded "Policy on Sustainable Practices" that covers climate protection practices, green building renovations, sustainable operations and maintenance, waste reduction and environmentally preferable purchasing.*

For more information on the Policy and its implementation, please contact Matt St. Clair, Sustainability Manager at the UC Office of the President.

Systemwide Working Groups

There are five systemwide Working Groups related to the UC Policy on Sustainable Practices. Each has a Chair from the UC Office of the President and is comprised of members from each campus. Membership is primarily consists of staff, though faculty and students are encouraged to join. The groups generally have monthly conference calls, occasionally meet in person, and provide updates to the Systemwide Steering Committee. Groups and current Chairs are as follows:

2008 Systemwide Working Groups

Sustainable Purchasing
Chair: Lesley Clark, *Commodity Manager*

Climate Change
Chair: Dirk van Ulden, *Associate Director of Energy and Utilities*

Sustainable Operations
Chair: George Getgen, *Director of Facilities Management Services*

Renovations
Chair: Tara Lamont, *Assistant Director of Design and Construction Services*

Sustainable Transportation
Chair: Charlotte Strem, *Environmental Planning Coordinator*

Summary of UC Policy On Sustainable Practices Policy Commitments

More information on the UC Policy on Sustainable Practices is available at http://www.ucop.edu/facil/sustain/.

Policy Area	Policy Milestones				
Green Building Design	New Buildings: Outperform Title 24 by 20%, LEED 2.1 equivalent, LEED Silver or higher	Labs: Labs21 EPC or LEED Silver	Renovations: LEED 2.1, Outperform Title 24, register with Savings by Design	Beginning with renovation projects with budget approval afterJuly 2007; outperform Title 24 by 20%; achieve at least LEED for Commercial Interiors Certified rating or equivalent	
Clean Energy Standard	Reduce systemwide energy consumption by 10%+ from 2000 level by 2014	Provide 10MW of local renewable power by 2014	20% of power from renewable sources by 2017 (2010)		
Climate Protection Practices	GHG emissions at 2000 level by 2014. By 2020, reduce GHG emissions to 1990 level; By 2050 reduce 80% below 1990 levels	Develop method to calculate and certify GHG emissions	Each campus join the California Climate Action Registry	By December 2008, UC will develop an action plan to become climate neutral	UCOP will form a Climate Change Working Group consisting of faculty, staff, admin, and students
Sustainable Transportation Practices	Increase number of PZEV and ZEV by 20-50% by 2009-10 from 2004-2005	And/or convert 50% of campus fleet to non-carbon fuel by 2009-2010	January 2009, transit pass program for employees	Report fleet efficiency annually to UCOP	
Sustainable Operations	Develop a plan to maintain at LEED EB standards	Work closely with the USGBC to develop plans	Submit one LEED-EB building for certification by July 2008	Develop an inventory of buildings that meet scope requirements	Develop a plan by 2009 to have whole campus LEED-EB certified
Recycling and Waste Management	Campuses will have IWMP by June 2007 including current and future plans, funding, and specific goals	Waste diversion: 50% by June 30, 2008; E-waste to be recycled only by recyclers who have signed the Pledge.	Waste diversion: 75% by June 30, 2012	Waste diversion: Ultimate goal of zero waste by 2020	
Environmentally Preferable Purchasing	Promote resource, energy and water efficient products. Recycled and rapid replacement materials for construction	Cradle-to-cradle standard	Minimum standard of 30% PCW paper, For uncut paper, 100% PCW	Focus purchasing on Energy Star, EPEAT, and other Green Seal products	All packaging must be 100% PCW, biodegradable, nontoxic, or produced with a minimum of resources (small).

List of Sustainability-Related Courses, 2006-2007

Courses that reflected the following qualities were identified as "sustainability-related":

- **Content relating to the natural world, including challenges to, or the dynamics of, complex ecological systems**
- **Topics involving manufacturing or consumption from a social, economic, or environmental point of view**
- **Issues of social and/or intergenerational equity and fairness relating to the allocation of natural resources**
- **Spiritual, cultural, or aesthetic aspects of human relationships to nature**

These criteria are simplistic but nonetheless helpful for identifying courses from the course catalog. This method is, of course, ultimately inadequate as a stand-alone assessment. Please see the Curriculum section for details.

Anthropology:
- 80K: Culture through Food
- 80N: Anthropology of Globalization
- 146: Anthropology and the Environment
- 173/273: Origins of Farming
- 194I: Consumption and Consumerism
- 211: Human Ecology
- 249: Ecological Discourses
- 284: Zooarchaeology

Biological Sciences:
- 142/242: Ocean Ecosystems (also Ocean Sciences 142)
- 158: Ecology of Reefs, Mangroves, and Seagrasses (also Ocean Sciences 157)
- 159: Biological Oceanography
- 163: Marine Conservation Biology

College Eight:
- 20B: International Affairs and Global Issues
- 20E: Climate Change
- 61/161: Education for Sustainable Living Program (ESLP)
- 80A/B: Environment and Society
- 90: College Eight Garden Internship

College Nine:
- 80A/B: International and Global Issues
- 85: Global Leadership: A Model United Nations Workshop

College Ten:
- 80A/B: Social Justice and Community
- 85: Social Justice Issues Workshop

Community Studies:
- 10: Introduction to Community Activism
- 80L: Social Documentation
- 100T: Agriculture, Food and Social Justice
- 123: Walmart Nation
- 149: Political Economy of Food and Agriculture
- 168: Globalization and Its Discontents.

Crown College:
- 123: Science and Human Values

Earth and Planetary Sciences:
- 121: The Atmosphere
- 290L: Topics in Climate Change

Economics:
- 170: Environmental Economics
- 171: Natural Resource Economics
- 249A: International Trade and Development

Education:
- 92B: Introduction to Theories of Learning

Environmental Studies:
- 15: Natural History of the UCSC Campus (2 units)
- 23: The Physical and Chemical Environment
- 24: General Ecology
- 25: Political Economy and the Environment
- 80A: The Future of the Rainforests
- 80B: The Ecological Forecast for Global Warming
- 83, 84, 183, 183B, 184, and 283: Environmental Studies Internships
- 93, 93F, 193, and 193F: Field Study
- 91/191F:Community and Agroecology Seminar
- 100/100L: Ecology and Society and Laboratory
- 104A: Introduction to Environmental Field Methods
- 105/105L: Biology and Ecology of the Vertebrates (also Biology 138)
- 107A,B,C: Natural History Field Quarter (offered every other year)
- 108/108L: General Entomology
- 110: Institutions, the Environment, and Economic Systems
- 115A/215A: Geographic Information Systems and Environmental Applications
- 115L/215L: Exercises in Geographic Information Systems
- 120: Conservation Biology
- 122: Tropical Ecology and Conservation
- 123 Animal Ecology and Conservation
- 129/129L: Integrated Pest Management and Laboratory
- 130A: Agroecology and Sustainable Agriculture
- 130B: Principles of Sustainable Agriculture
- 130L: Agroecology and Sustainable Agriculture Laboratory
- 131/131L: Insect Ecology and Laboratory
- 133: Agroecology Practicum
- 138/138L: Field Ethnobotany and Laboratory
- 140: National Environmental Policy
- 141: Natural Resource Economics
- 143: Sustainable Development: Economy, Policy, and Environment
- 148: Environmental Management Systems
- 149: Environmental Law and Policy
- 151: Environmental Assessment
- 152: Science and Land Use Decisions
- 156: Environmental Action Through Writing

List of Sustainability-Related Courses, 2006-2007, continued

Environmental Studies (continued):
- 157: Writing in the Natural Sciences
- 158: Political Ecology and Social Change
- 159: Nature Literature
- 160: Restoration Ecology
- 161A/161L: Soils and Plant Nutrition and Laboratory
- 162/162L: Plant Physiological Ecology and Laboratory
- 163/163L/263: Plant Disease Ecology and Laboratory
- 165: Freshwater Issues and Policy
- 166:Agroecosystem Analysis and Watershed Management
- 167/167L: Freshwater and Wetland Ecology and Laboratory
- 168/268: Biogeochemistry and the Global Environment
- 172: Science, Policy, and the Environment
- 173: An Introduction to World Environmental History
- 175: Biotechnology: Social and Environmental Dimensions
- 179: Environmental Interpretation
- 189: Environmental Studies Research Seminar
- 190: Capstone Course: Environment and Culture
- 194: Teaching Environmental Studies
- 195A: Senior Research
- 195B: Senior Thesis Group
- 196A: Senior Seminar: Management of Protected Lands
- 196B: Senior Seminar: Methods in Environmental Policy Analysis
- 196D: Senior Seminar: Risks, Values, and Choices
- 196E: Senior Seminar: Advanced Agroecosystem Analysis
- 196K: Senior Seminar: Sustainable Development in Developing Countries
- 196P: Senior Seminar: Regional Foodshed Research Practicum
- 196R: Senior Seminar: Advanced Research Topics in Applied Ecology
- 196S: Senior Seminar: Functions and Processes of Terrestrial Ecosystems
- 196V: Senior Seminar: Organic Agriculture Theory and Practice
- 198/198F: Independent Field Study
- 199: Tutorial
- 201A/B: Keywords and Concepts in Environmental Studies
- 201M: Interdisciplinary Research Methods in Environmental Studies
- 201N: Interdisciplinary Research Design in Environmental Studies
- 210: Political Ecological Thought and Environment
- 220: Conservation Biology
- 230: Agroecology and Sustainable Agriculture
- 235: Social Theories of Nature
- 240: Public Policy and Conservation
- 247: Regional Approaches to Environmental Policy
- 271: Valuing the Environment
- 280: Advanced Topics in Environmental Studies
- 281C: Advanced Readings in Risk and Public Policy
- 290: Interdisciplinary Research Seminar
- 290: Graduate Research Seminar
- 291: Advanced Readings in Environmental Studies
- 291C: Advanced Readings in Risk and Public Policy
- 291D: Advanced Readings in Tropical Ecology, Agriculture, and Development
- 291M: Advanced Readings in Biogeochemistry
- 291P: Advanced Readings in Environmental History and Anthropology
- 292: Topics in Research Environmental Studies
- 297/297F: Independent Study
- 299: Thesis Research

Environmental Toxicology:
- 101/201: Sources and Fates of Pollutants
- 144: Groundwater Contamination
- 145: Medical Geology
- 281F: Topics in Aquatic Toxicology

Latin American and Latino Studies:
- 126A: Global Capitalism and Community Restructuring
- 143J: Global Political Economy
- 167: Amazonian Societies and the Environment
- 194L: Etnicidate, Medio Ambiente y Desarrollo

Legal Studies:
- 131: Wildlife, Wilderness, and the Law
- 132: California Water Law and Policy (also Politics 132)
- 137: International Environmental Law and Policy
- 149: Environmental Law and Policy

Ocean Sciences:
- 80B: Our Changing Planet
- 142: Ocean Ecosystems (also Biology 142)
- 157: Ecology of Reefs, Mangroves, and Seagrasses (also Biology 158)
- 211: Climate Dynamics
- 213: Biogeochemical Cycles
- 215: Predicting the Atmosphere, Ocean, and Climate
- 285: Past Climate Change

Philosophy:
- 28: Environmental Ethics
- 290H: Environmental Ethics

Politics:
- 114/214: Thinking Green: Politics, Ethics, Political Economy
- 132: California Water Law and Policy (also Legal Studies 132)

Sociology:
- 15: World Society
- 125: Society and Nature
- 130: Sociology of Food
- 173: Water
- 179/179L: Nature, Poverty, and Progress: Dilemmas of Development and Environment and Laboratory
- 181: A Sociology of Place: The California Coast
- 184: Hunger and Famine
- 185: Environmental Inequality
- 223: Sociology of the Environment
- 227: Learning from Environmental Historians

Green Building Campus Baseline

The following tables, last updated in June 2005, show the LEED credits in UCSC's Green Building Campus Baseline, as provided by the campus and approved by the UC Office of the President. The tables come from the full baseline document. The document is available at http://ppc.ucsc.edu/standards/baseline/.

Prerequisite	Campus Baseline	LEED for New Construction v2.1
	6	**Sustainable Sites - 14 points**
Y	Y	Prereq 1 **Erosion & Sedimentation Control**
		Credit 1 **Site Selection**
		Credit 2 **Development Density**
		Credit 3 **Brownfield Redevelopment**
	1	Credit 4.1 **Alternative Transportation**, Public Transportation Access
		Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms
		Credit 4.3 **Alternative Transportation**, Alternative Fuel Vehicles
		Credit 4.4 **Alternative Transportation**, Parking Capacity and Carpooling
	1	Credit 5.1 **Reduced Site Disturbance**, Protect or Restore Open Space
	1	Credit 5.2 **Reduced Site Disturbance**, Development Footprint
	1	Credit 6.1 **Stormwater Management**, Rate and Quantity
		Credit 6.2 **Stormwater Management**, Treatment
	1	Credit 7.1 **Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof
		Credit 7.2 **Landscape & Exterior Design to Reduce Heat Islands**, Roof
	1	Credit 8 **Light Pollution Reduction**
	1	**Water Efficiency - 5 points**
	1	Credit 1.1 **Water Efficient Landscaping**, Reduce by 50%
		Credit 1.2 **Water Efficient Landscaping**, No Potable Use or No Irrigation
		Credit 2 **Innovative Wastewater Technologies**
		Credit 3.1 **Water Use Reduction**, 20% Reduction
		Credit 3.2 **Water Use Reduction**, 30% Reduction
	6	**Energy & Atmosphere - 17 points**
Y	Y	Prereq 1 **Fundamental Building Systems Commissioning**
Y	Y	Prereq 2 **Minimum Energy Performance**
Y	Y	Prereq 3 **CFC Reduction in HVAC&R Equipment**
	1	Credit 1.1 **Optimize Energy Performance:** 20% New / 10% Existing
	1	Credit 1.2 **Optimize Energy Performance:** 30% New / 20% Existing
	1	Credit 1.3 **Optimize Energy Performance:** 40% New / 30% Existing
	1	Credit 1.4 **Optimize Energy Performance:** 50% New / 40% Existing
		Credit 1.5 **Optimize Energy Performance:** 60% New / 50% Existing
		Credit 2.1 **Renewable Energy**, 5%
		Credit 2.2 **Renewable Energy**, 10%
		Credit 2.3 **Renewable Energy**, 20%
		Credit 3 **Additional Commissioning**
	1	Credit 4 **Ozone Depletion**
		Credit 5 **Measurement & Verification**
	1	Credit 6 **Green Power**

Green Building Campus Baseline, continued

Prerequisite	Campus Baseline	LEED for New Construction v2.1	
	1	**Materials & Resources - 13 points**	
Y	Y	Prereq 1	**Storage & Collection of Recyclables**
		Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell
		Credit 1.2	**Building Reuse**, Maintain 100% of Shell
		Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell
	1	Credit 2.1	**Construction Waste Management**, Divert 50%
		Credit 2.2	**Construction Waste Management**, Divert 75%
		Credit 3.1	**Resource Reuse**, Specify 5%
		Credit 3.2	**Resource Reuse**, Specify 10%
		Credit 4.1	**Recycled Content**, Specify 5% (post-consumer + ½ post-industrial)
		Credit 4.2	**Recycled Content**, Specify 10% (post-consumer + ½ post-industrial)
		Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally
		Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally
		Credit 6	**Rapidly Renewable Materials**
		Credit 7	**Certified Wood**
0	7	**Indoor Environmental Quality - 15 points**	
Y	Y	Prereq 1	**Minimum IAQ Performance**
Y	Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**
		Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**
		Credit 2	**Ventilation Effectiveness**
	1	Credit 3.1	**Construction IAQ Management Plan**, During Construction
	1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy
	1	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants
	1	Credit 4.2	**Low-Emitting Materials**, Paints
	1	Credit 4.3	**Low-Emitting Materials**, Carpet
		Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber
		Credit 5	**Indoor Chemical & Pollutant Source Control**
		Credit 6.1	**Controllability of Systems**, Perimeter
		Credit 6.2	**Controllability of Systems**, Non-Perimeter
	1	Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992
	1	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System
		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces
		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces
	1	**Innovation & Design Process - 5 points**	
		Credit 1.1	**Innovation in Design**: Provide Specific Title
		Credit 1.2	**Innovation in Design**: Provide Specific Title
		Credit 1.3	**Innovation in Design**: Provide Specific Title
		Credit 1.4	**Innovation in Design**: Provide Specific Title
	1	Credit 2	**LEED™ Accredited Professional**
	22	**Project Totals - 69 points (pre-certification estimates)**	
Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69 points			

Climate Change Policy Matrix

More information on these policies is available at the following websites:

- **UC Policy on Sustainable Practices - Climate Protection Practices, http://www.ucop.edu/facil/sustain/**
- **American College and Universities Presidents Climate Commitment (ACUPCC), http://www.presidentsclimatecommitment.org/**
- **City/Campus Climate Action Compact, http://sustainability.ucsc.edu/climate-action-compact**

Policy	Goals	Planning	Activities	GHG Calculation
UC Policy on Sustainable Practices - Climate Protection Practices	Though not campus specific - Presidential Policy contains these goals: * Reduce GHG emissions to 2000 level by 2014; * By 2020, reduce GHG emissions to 1990 level; * By 2050 reduce 80% below 1990 levels By Dec. 2008, UC will develop an Action Plan to become carbon neutral.	UCOP has formed a Climate Change Working Group consisting of faculty, staff, admin, and students. UCSC administration is forming Chancellor level climate action planning committee Action Plan will include: * A feasibility study for achieving 2014 and 2020 goals. * Target date for carbon neutrality. By January 1, 2009 or earlier the signatories will present GHG Reduction Action Plan to meet goals	Development of Strategic Energy Plans for each UC Campus	Develop method to calculate and certify GHG emissions Each campus join the California Climate Action Registry; UCSC has joined UCSC phase one calculation (2006) is complete and certified (including electricity, heating, and fleet fuel consumption.) Phase two will include additional sources such as commuting and air travel (pre-2006 and 2007).
American College and Universities Presidents Climate Commitment (ACUPCC)	Carbon neutrality ASAP and specific actions	November 15, 2007 - UCSC to report on institutional structure to implement planning. Within two years of signing, (April 2009) develop action plan for becoming carbon neutral with specific criteria.	Make inventory, plan, and updates public. Take intermediate action: pending plan (UCSC in compliance).	Within one year of signing complete inventory of GHG emissions; update every year thereafter.
City/Campus Climate Action Compact	January 1, 2008 the signatories from the public, private, and nonprofit sectors agree to set and present a Greenhouse Gas Reduction Goal for their organization Work on five demonstration projects collaboratively between city, campus, and county.	March 1, 2008 the signatories will have identified projects January 1, 2009 or earlier the signatories will present GHG Reduction Action Plan to meet goals	Signatories invite others to join the Regional effort	No Provision

Water Use and Conservation

UCSC has worked proactively to conserve water and reduce water usage since the 1980s. By 1989, for example, all campus toilets had been retrofitted with 3.5 gallons per flush (gpf) models – earlier toilets typically used four to seven gallons per flush – and student residence hall and apartment showerheads had been retrofitted with 2.5 gallons per minute models. As a result, from 1986-87 to 2005-06, annual campus water consumption increased by 4.2% as enrollment increased 72.7% . Over this same period, annual per capita water usage fell from 22,022 gallons to 13,282 per student, nearly a 40% reduction. See the table below for more details.

Water Use	1986 - 1987	1990 - 1991	1995 - 1996	200-2001	2005 - 2006
Total Water Use (Millions of Gallons)	185.2	139.0	181.1	179.7	192.9
	Comparison to 1986 - 1987 Baseline	-24.90%	-2.20%	-3.00%	+4.2%
Enrollment (Numbers of Students)	8,409.0	9,720.0	9,552.0	11,735.0	14,522.0
	Comparison to 1986 - 1987 Baseline	+15.6%	+13.6%	+39.6%	+72.7%
Gallons Per Student	22,022.0	14,300.0	18,960.0	15,313.0	13,282.0
	Comparison to 1986 - 1987 Baseline	-35.10%	-13.90%	-30.50%	-39.70%

UCSC's aggressive water conservation efforts are continuing. In April 2007, the campus hired consulting firm, Maddaus Water Management (MWM), to conduct a Water Efficiency Survey to review existing water use of facilities, assess water-consuming operations, and suggest possible water-saving practices and projects.

Between April and August 2007, MWM, UC Santa Cruz staff, and a group of students trained in water conservation survey techniques, walked the campus to identify uses of water and potential water conservation options. A team of 11 students measured faucet and shower flow rates in addition to toilet flush volumes, identified leaks and missing faucet aerators, inspected the kitchens of various facilities, and characterized and measured over 500 irrigated landscape areas.

MWM conducted a survey of the laboratories, greenhouses, cooling towers, pool, central irrigation control system, arboretum, and farm and garden. MWM interviewed staff responsible for each significant end use. MWM prepared a detailed breakdown of daily use of potable water (e.g., faucets, showers, toilets, urinals, kitchen, laundry equipment, laboratory equipment, ice machines, cooling towers, and the swimming pool), irrigation water, and lost or unaccounted water.

Based on these findings, the draft Water Efficiency Survey suggests a number of possible water conservation projects. Implementation of a number of these has the potential of a 10 to 15 percent reduction in total annual water use, saving 20 to 30 million gallons of water with an estimated cost savings of $330,000 to $500,000 per year. The water efficiency survey is currently in final draft form. Links to the survey will be placed on the campus sustainability web site after a final version is published: http://www.sustainability.ucsc.edu.

Goals of the Pilot Sustainability Coordinator Position

The following describes the goals, principal responsibilities and roles, and specific programmatic activities of the two-year pilot Sustainability Coordinator Position between June 2007 and June 2009.

Goals of this Position

Overview
Ensure that sustainability is institutionalized.
Ensure sustainability does not become a "sidebar" by working proactively to integrate into the core responsibilities of faculty, students, and staff.
Develop a plan for permanent Sustainability Office.
Facilitate the development of a clear plan for reporting structure, funding, position(s), and goals for a permanent Sustainability Office.
Create centralized communication, Coordination, Outreach, and Education.
Create a central space for coordination of campus sustainability activities and support educational initiatives where feasible.
Plan for Climate Action.
Work with faculty leadership, facilities staff, and administrators to determine place of climate action planning in campus sustainability and to ensure policy commitments are met.
Integrate sustainability into the classroom.
Help integrate operations and academics to establish UCSC as a living, learning laboratory in which students can learn and apply sustainability principles and techniques.

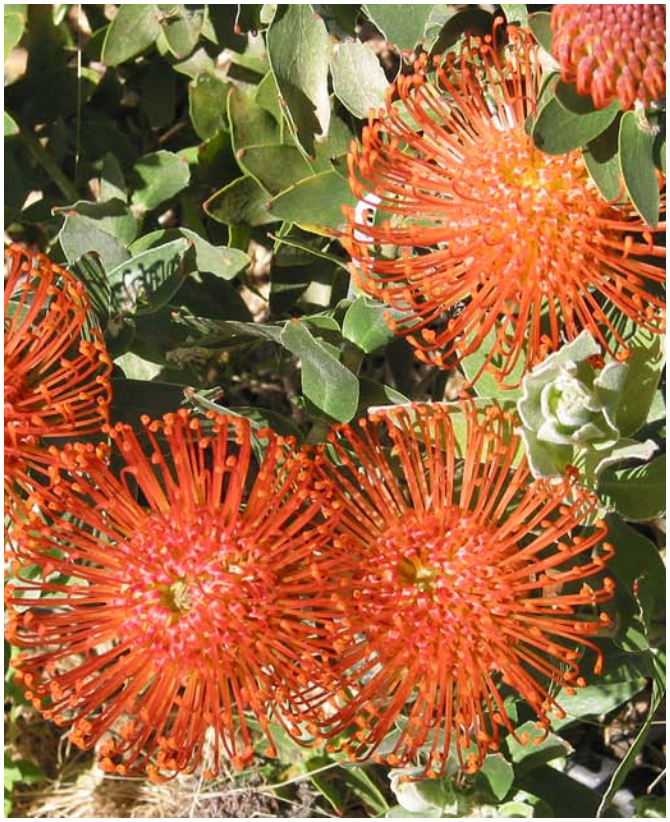
Principal Responsibilities and Roles

- Serve as highest-level staff devoted to sustainability at UCSC.
- Coordinate Sustainability Assessment process, facilitate goal-setting, and provide support as needed for policy and project development.
- Assist in providing awareness of and accountability to policy commitments (in particular the UC Presidential Policy on Sustainable Practices).
- Serve as liaison to UCOP to ensure campus compliance with annual reporting and other sustainability policies.
- Help make UCSC a nationally recognized leader in the Campus Sustainability Movement. Communicate successes to the national community through participation in conferences, publications, and outreach.
- Stay informed about and disseminate information on peer institution best practices through review of relevant literature, participation in conferences, attendance at trainings, etc.
- Coordinate campus sustainability related outreach and education efforts.
- Serve as support to the Campus Sustainability Subcommittee, the climate action steering committee, and other key administrative bodies.

Specific Programmatic Activities

- Institutionalization of Sustainability
- Sustainability Office
- Communication and Coordination
- Outreach and Education
- Climate Action
- Sustainability in the Classroom

Goals of the Pilot Sustainability Coordinator Position, continued



Specific Programmatic Activities

Institutionalization of Sustainability:
- Manage the completion of the first phase of the Campus Sustainability Assessment (published document and web versions)
- Provide recommendations for targeted improvements based on the assessment
- Facilitate planning for more comprehensive assessments / Phase Two

Sustainability Office:
- Design and implement a process for high-level decision makers and other key stakeholders to make recommendations regarding establishment of permanent infrastructure for campus sustainability coordination (funding, reporting structure, physical location)
- Identify key leaders to participate, conduct interviews, facilitate meetings, report findings
- Research and report on best governance practices at other institutions

Communication and Coordination:
- Quarterly update about activities to the Chancellor and his/her staff and twice-quarterly update about activities to the VC of BAS
- Attend and support Campus Sustainability Subcommittee meetings
- Coordinate staff/student interactions and activities including Education for Sustainable Living Program Action Research Teams (connecting them with staff and the Blueprint for a Sustainable Campus); The Annual Campus Earth Summit and Blueprint (in particular ties between students and the administration)
- Establish Chancellor's Sustainability Internship Program and supervise students
- Send regular campus sustainability updates to key stakeholders

Outreach and Education:
- Build and maintain official UCSC Sustainability website
- Ensure UCSC is recognized as a sustainability leader among institutions of higher education. In particular, help highlight campus successes in food systems and energy at UCSC. Publicize our successes through conference participation and media efforts
- Develop a campus sustainability awards program
- Develop a campus sustainability newsletter

Climate Action:
- Work with stakeholders to ensure a Climate Neutrality Plan is developed in accordance with the UC Policy on Sustainable Practices, the American College and Universities President's Climate Commitment, and the Climate Compact
- Provide recommendations to key decision-makers regarding structure, funding, and strategy for UCSC's Chancellor's Council on Climate Change
- Participate in the systemwide Climate Change Working Group

Sustainability in the Classroom:
- Facilitate connections between faculty and student research and coursework and the operational sustainability programs of the campus
- Stay informed and contribute to student, faculty, and staff initiatives such as the Education for Sustainable Living Program, the proposed School of the Environment, the Sustainability Minor, etc.
- Communicate with the Faculty Senate about sustainability activities

Student Fee Measures and Opinion Polls

The following ballot measures established the funding for the Campus Sustainability Council (http://sua.ucsc.edu/CSC/). In addition, an opinion poll in 2004 showed student willingness to match funding with the administration to fund Sustainability Coordinator positions on campus.

2003 Ballot Measure 9

This ballot generated the original fee that funded the Campus Sustainability Council. More information is available at http://elections.ucsc.edu/archive/Spring2003/measures.html#measure9.

The question posed by the ballot was: Shall a permanent Campus Sustainability Programs Fee of $3.00 per quarter be assessed to all undergraduates, effective Fall 2003, to create a new standing committee whose purpose will be to provide funding to UCSC student organizations for programs and events that facilitate collaboration between students, the administration, faculty, and the community to create, implement, and monitor environmentally sound practices on campus established through the protocol to be outlined in a blueprint for a sustainable campus?

Summary Points:

- New undergraduate compulsory fee of $3.00 per quarter.
- Fee begins Fall Quarter 2003, permanent fee (no ending date).
- Fee will be assessed to all undergraduates enrolled in the fall, winter, and spring quarters, and to undergraduates enrolled in State-funded summer programs.
- Fee will generate approximately $118,980 in 2003-2004.
- Sponsored for placement on the ballot by the Student Union Assembly (SUA).

2004 Opinion Poll

This opinion poll and specifically, Opinion Poll 1, was conducted during the 2004 Campus Elections, to understand if there was a need for Campus Sustainability Coordinators. More information is available at http://elections.ucsc.edu/archive/2004/ballot.html.

The question posed by Opinion Poll 1: Campus Sustainability Coordinators was: Do the students of UCSC support funding for two Campus Sustainability Coordinators who will work with students, staff, faculty, administration, and the community (specifically University Dining Services) to reduce energy usage, improve resource conservation, and increase the overall sustainability of the UCSC campus through education, outreach, data collection, and program implementation?

2005 Ballot Measure 14

This ballot doubled the original fee that funded the Campus Sustainability Council passed by the 2003 Ballot Measure 9. More information is available at http://elections.ucsc.edu/archive/2005/measures.cfm#measure14.

The question posed by the ballot was: Shall the undergraduates of UCSC increase the existing Campus Sustainability Programs Fee (Measure 9) from $3.00 per student, per quarter to $6.00 per student, per quarter to provide the Student Union Assembly (SUA)/ Campus Sustainability Council additional funding for new and evolving UCSC student organizations that facilitate collaboration between students, the administration, faculty, and the community to create, implement and monitor sustainability practices on campus, via the Blueprint for a Sustainable Campus?

Summary Points:

- Increases the existing Campus Sustainability Programs Fee from $3.00 per student, per quarter to $6.00 per student, per quarter.
- Fee increase begins Fall Quarter 2005 and is a permanent fee with no ending date.
- Fee will be assessed to all undergraduates enrolled in the fall, winter and spring quarters, and to undergraduate students enrolled in state-funded summer session.
- Fee will generate approximately $125,955 additional dollars in AY 2005-06, the first year it is in effect, with no return to Financial Aid.
- All funds generated from Measure 9 will be combined with Measure 14 funds and legally bound by Measure 14 ballot language.
- Fee is sponsored for placement on the ballot by a vote of the Student Union Assembly.

2004 Opinion Poll 1: Do the students of UCSC support funding for two Campus Sustainability Coordinators?	**Number of Votes**	**Percent of Votes**
Yes, there is a need.	1,065	77.79%
No, there is no need.	304	22.21%

UCSC Campus Sustainability Timeline

Over the years there has been excellent work towards making the campus sustainable by the UCSC community. This timeline includes selected highlights. It is not a comprehensive list of all campus sustainability efforts.

Year	UC Santa Cruz Selected Highlights
1967	• The Student Garden Project (Chadwick Garden) founded – later evolved into the Center for Agroecology and Sustainable Food Systems (CASFS).
1972	• Student Transit Fee of $3.50 per quarter passed to fund transit pass for all students – contract signed between UCSC and the SCMTD (Santa Cruz Metropolitan Transit District).
1970s	• Environmental Studies Department founded.
1989	• Transit contract extended to include faculty and staff. • College Eight founded – the first environmentally-themed college. • First UCSC Recycling program initiated at College Eight (and later expanded to all Colleges).
2000	• Seymour Marine Discovery Center, the public education facility of the Long Marine Lab, opens to the public.
2001	• Community Agroecology Network (CAN) founded. • Student Environmental Center (SEC) founded.
2002	• The California Student Sustainability Coalition (CSSC) founded and the UC Go Solar campaign. launched (leading to the creation of UC's first sustainability policy). • Annual Campus Earth Summit launched. • Program in Community and Agroecology (PICA) founded.
2003	• Annual Blueprint for a Sustainable Campus launched at Second Annual Campus Earth Summit. • Ballot Measure Nine passed ($3 per quarter student fee to support campus sustainability) and Campus Sustainability Council founded. • Education for Sustainable Living Program founded.
2004	• Food Systems Working Group (FSWG) founded. • Chancellor's Sustainability Action Council (CSAC) initiated by students and staff with the support of Acting Chancellor Marty Chemers.
2005	• Dining halls begin serving organic, socially just, locally grown produce. • CSAC hosts the 4th Annual Statewide Sustainability Conference (over 475 attendees). • Student opinion poll to create two Sustainability Coordinator positions jointly funded by the administration and students passed by 74%.
2006	• 100% Renewable Energy Purchase – Students pass fee referendums. • Green Campus Program launched. • Campus Sustainability Subcommittee (CSS) officially launched, replacing CSAC, reports to the Advisory Committee for Facilities.
2007	• Campus Sustainability Assessment launched. • Dining Halls begin receiving Green Certification. • Chancellor signs the Climate Compact with the Santa Cruz city and county. • Carshare program launched. • Pilot Sustainability Office launched and Sustainability Coordinator hired.
2008	• Chancellor's Council on Climate Change launched.