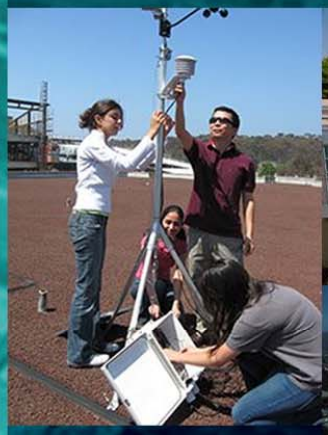
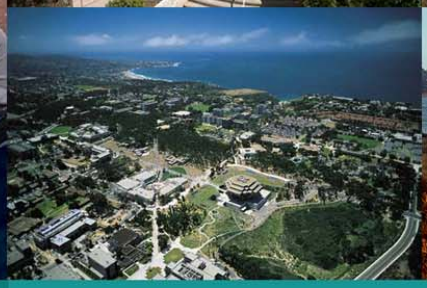
UC San Diego

November 2008

UC San Diego Sustainability Assessment Report





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List of Acronyms

ACS	Advisory Committee on Sustainability
CALPIRG	California Public Interest Research Group
Cal-OSHA	California Occupational Health and Safety Administration
CO_2	Carbon Dioxide
CSWG	Climate Solutions Work Group
DEMROES	Decision-Making Using Real-Time Observations for Environmental Sustainability
ESI	Environment and Sustainability Initiative
ESYS	Environmental Systems
GHG	Greenhouse Gas
HDH	Housing, Dining, and Hospitality
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
LEED-EB	Leadership in Energy and Environmental Design for Existing Buildings
LRDP	Long Range Development Plan
OCGA	Office of Contracts and Grant Administration
OMRI	Organic Materials Research Institute
PCW	Post-Consumer Waste
PV	Photovoltaic
UC San Diego	University of California, San Diego

Executive Summary

This report, the first campus sustainability assessment for the University of California, San Diego (UC San Diego), is a study of both the challenges and the opportunities for the campus. It is the result of the ongoing efforts of the dedicated faculty, staff, and students at UC San Diego. Included is an examination of 11 areas of concern and a total of 35 indicators, or metrics. Each metric is intended to set a baseline for future performance, as well as provide ideas on where the campus community can most improve.

… a combination of dedication, innovation, and creativity is needed to address the challenges of sustainability

The metrics in this assessment not only measure progress but also raise awareness in our campus community. By publishing these results, we hope to spark discussion, stimulate innovation, and promote new ideas for improving our sustainability performance.

The authors of this report have carefully documented the processes and procedures necessary for gathering and analyzing the information contained in this assessment. Our goal is to create a tool and develop methods for continuing the process of sustainability assessment and allowing the process to be both transparent and reproducible.

We believe that a combination of dedication, innovation, and creativity is needed to address the challenges of sustainability. Also, no one single solution or "silver bullet" will solve the challenges we face, but a combination of solutions are needed to improve our sustainability performance on campus. We plan to use this assessment to guide our efforts to improve our campus performance and take a leadership role in each area included in this report.

Campus Setting and Sustainability Opportunities and Challenges

UC San Diego is located at the southern tip of the California coast, in a semi-arid climate. This location and other factors provide a number of unique opportunities and challenges to becoming a more sustainable campus. For example, there is little to no potable water available in the San Diego region. Most of the water used in the area is Colorado River water, which travels hundreds of miles to reach San Diego. Because other cities and states also use water from the Colorado River, and San Diego lies at the end of this water system, water usage is a significant regional challenge.

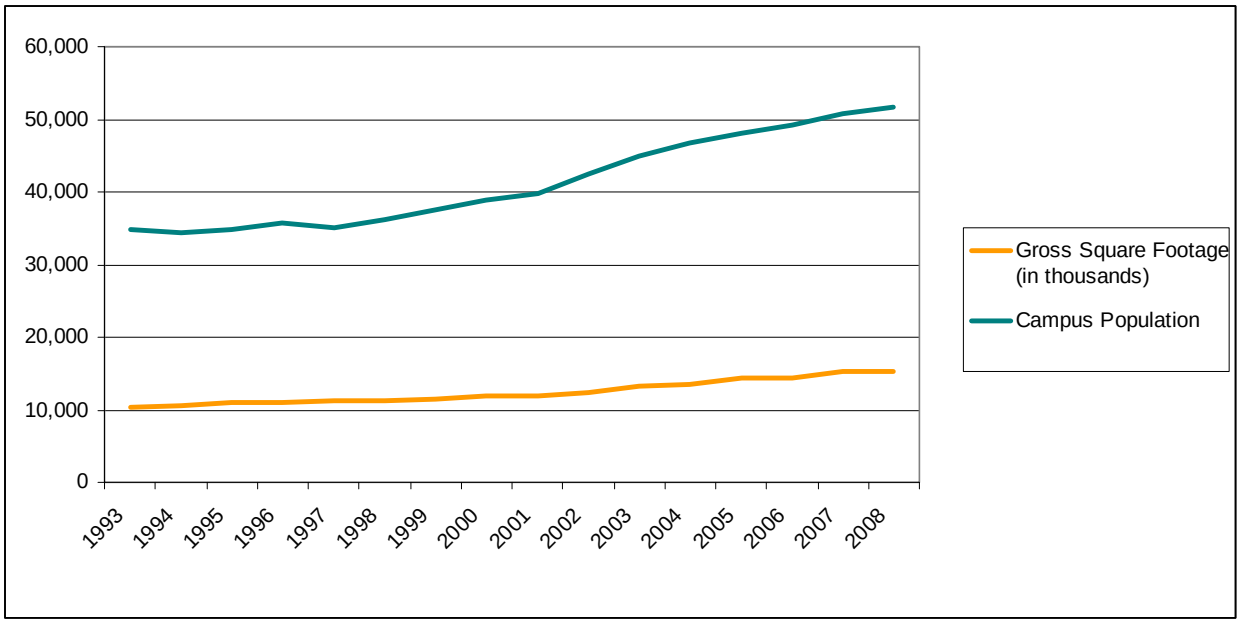
Another challenge is the procurement of local, organic food. Due to the semi-arid climate, very little food is grown within San Diego County. Much of our food is imported from the Imperial Valley, located approximately 120 miles to the east.

An opportunity is provided by San Diego's climate, which is generally mild, and which is a result of the city's latitude and the cooling effect of the air coming from the Pacific Ocean. Thus, buildings on campus require less energy for heating and cooling than buildings located in other parts of the nation with more extreme temperature ranges. As an example, UC San Diego is exploring building technologies that use natural ventilation systems to take advantage of the mild local climate.

Another opportunity is provided by abundant levels of solar energy reaching this area, which is currently being harvested by several existing photovoltaic (PV) energy installations. Future PV systems are planned for the campus.

The most important challenge lies in campus growth, both in built environment and student enrollment, planned for the next several years. This growth will likely increase our use of resources, including energy. Recent growth trends in campus population and square footage of the built environment are shown in Figure 1. These trends present the framework for much of the data contained in this assessment, which shows increasing resource consumption. The continuation of these trends also sets the framework for future sustainability assessments.

Figure 1: UC San Diego Campus Square Footage and Population, 1993-2008



Although UC San Diego has aggressive programs to manage and reduce energy usage and to track greenhouse gas (GHG) emissions, our total emissions have increased in recent years due to recent campus growth. Based on historical trends, energy usage and GHG emissions will likely continue to grow in the future. However, the University of California has committed to the American College & University Presidents Climate Commitment, which requires all University of California campuses to develop a timeline for reducing emissions and eventually reaching "climate neutrality." UC San Diego is currently developing a Sustainability Impact Action Plan, which will outline our goals and how we plan to achieve the goals in spite of the challenges we face. As the name implies, this Plan will also include goals and timelines for reducing other environmental impacts, as many of these impacts are related. For example, reducing water usage could also reduce energy usage, as energy is needed to move water around the campus.

Finally, we note that our efforts are supported by the interest and dedication of top-level administration at UC San Diego, including Chancellor Fox, Vice Chancellor for Business Affairs Steve Relyea, Vice Chancellor for Resource Management and Planning Gary Matthews, Vice Chancellor for Research Art Ellis, and Interim Assistant Vice Chancellor for Auxiliary and Plant Services Russell Thackston. Other administrators and campus staff share their passion and dedication, in particular the staff working in Campus Operations, who do much of the work discussed in this report on a daily basis. Many other campus leaders and organizations work diligently to support sustainability programs and search for climate and

environmental solutions including the Scripps Institution of Oceanography, the Environment and Sustainability Initiative (ESI), many Professors and several key student organizations.

Summary of Findings and Recommendations

We have developed a number of recommendations for improving campus sustainability. These recommendations were developed from the results of this assessment. A general recommendation that relates to all the information contained in this report is the following:

- Develop a tool for campus sustainability practitioners to collect data, beginning with a select group of indicators included in this report. The tool should be web-based and easy to use, so this information may be readily gathered annually. The data should also be made available to the entire campus to ensure transparency and accountability.

A summary of both findings and recommendations in each of the 11 areas is provided below. Please also refer to Appendix A for a summary list of all recommendations.

Academics and Research

The indicators show that UC San Diego is well represented in the area of educating students in environmental and sustainability courses. However, the number of courses offered and the number of students enrolled in these courses has remained relatively steady over the last two academic years. Additionally, the amount of funding received for research has grown steadily in recent years. Data specifically regarding the funding received for sustainability-related research are unavailable.

Recommendations:

- Create a standard definition for “sustainability-related course” and “sustainability-related research” for future assessments.
- Include a designation in the course catalog for sustainability-related courses. Currently, sustainability-related courses are not separately identified or listed in the course catalog, but are sometimes described in the departmental course descriptions. Implementation of this recommendation will require input and collaboration across many campus groups, such as the Academic Senate.
- Gather data on the total amount of extramural funding received for sustainability research.
- Continue to recruit faculty and develop new course offerings in sustainability and environmental areas.
- Create a committee comprised of faculty to develop a course standard and outline for core sustainability course(s).

Built Environment/Green Building Practices

Currently, approximately 3% of campus building space is in a certified green building, although this metric will increase to about 15% as UC San Diego constructs several new green buildings in the next few years. Although buildings with previously established funding will meet Leadership in Energy and Environmental Design (LEED) Certified or the equivalent, UC San Diego now requires all new buildings to achieve LEED Silver as a minimum, with the goal of LEED Gold or better. However, UC San Diego has a large number

of older buildings and will need to retrofit them to achieve additional benefits from green building practices and technologies. Campus is completing its first LEED for Existing Buildings (LEED-EB) certified building and has plans to continue certification of additional existing buildings. LEED for Commercial Interiors will be applied to renovated buildings as appropriate.

In all buildings on campus, building maintenance includes many environmentally-friendly features, such as monitoring energy usage and looking for new opportunities to improve energy efficiency in buildings. Additionally, most of the cleaning supplies used by UC San Diego in campus buildings are Green Seal-certified.

UC San Diego is exploring the implementation of additional green building technologies on campus.

Recommendations:

- Change campus financial structures to better incentivize the incorporation of green building features during the planning and construction phase of the building. For example, combine budgets for both the capital expenditures (construction) and the operations of the building.
- Strive to achieve LEED Gold or higher to take a stronger leadership role in green building practices in the UC system and beyond.
- Identify older buildings in need of major retrofits and renovations, such as energy efficiency upgrades, and seek funding for those projects. On average, the process of retrofitting a building for LEED-EB certification saves $170,000 per year, with an average payback period of 2.6 years.[1] Seek alternative funding mechanisms for these projects, such as rebates from the utility.
- Achieve 100% use of Green Seal-certified cleaning supplies.
- If feasible, use microclimate data, such as the data collected through the DEMROES project, at each building site to further improve energy and water management systems.
- Explore the reuse of condensate from Heating, Ventilation, and Air Conditioning (HVAC) and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment.
- Keep abreast of changing green building standards and update the campus standard as necessary to remain a leader in this area.

Energy

Researchers at UC San Diego Scripps Institution of Oceanography helped alert the world to climate change through by identifying significant increases in atmospheric carbon dioxide (CO_2), which is tied to fossil fuel usage. The campus has initiated an aggressive program to reduce energy usage, install renewable energy generation capacity on campus, and track and report GHG emissions. Total energy usage per square foot of building space declined from 2003 to 2006, but GHG emissions per capita have increased somewhat. In addition, total energy usage and total GHG emissions have increased and will likely continue to do so due to growing campus population and related campus expansion of building space.

[1] See: www.armstrong.com/common/c2002/content/files/37082.pdf

Reducing GHG emissions will prove to be a difficult challenge in light of recent trends and planned campus growth.

Energy management is a priority on campus. Building-level sub metering for energy usage is widely available, allowing campus managers to effectively track and manage energy use on campus. Approximately 90-95% of buildings are sub metered for electricity and natural gas usage.

Recommendations:

- Develop a Climate Action and Environmental Impact Plan that will define how UC San Diego will reduce total GHG emissions even while accommodating planned campus growth.
- Continue tracking and reporting GHG emissions. For future inventories, add emissions from commuting and air travel, two sources that are required by the American College & University Presidents Climate Commitment.
- Ensure that all campus buildings are sub metered for electricity and natural gas usage to more easily manage these energy resources. Investigate the possibility of sub metering departments or laboratories to allow these academic units to be more accountable for their energy usage.
- Conduct regular audits of equipment that uses chilled and heated water to more effectively track energy and water usage and to maintain equipment efficiencies.

Food

Data regarding sustainability associated with providing food on campus are very difficult to track, as the organization and management of food outlets on campus are highly decentralized. Although Housing, Dining, and Hospitality (HDH) has an aggressive sustainability program, many food vendors on campus are not managed or under direct control of HDH or the University Centers.

For example, many food vendors are located in the University Centers, and although they contract with the campus, their operations are not controlled by the University Centers, nor are their staff employed by UC San Diego. Thus, there is currently more opportunity to implement sustainable practices in the outlets managed by HDH.

Currently, about 2-3% of the food purchased by HDH is certified organic, and 100% of the coffee is fair trade-certified. Although no large-scale composting program currently exists, a pilot composting project is progressing at one of the food service outlets.

Recommendations:

- Include sustainability requirements for all food purveyors in contract language. Partner with vendors to encourage and adopt practices beyond those required in their contracts through education and sharing best practices across all campus food outlets.
- Continue to research and implement composting alternatives to divert food waste from the landfill. Once implemented, apply the finished compost as fertilizer on campus.
- Form a campus Food System Work Group.
- Continue to work with UC Sustainability Steering Committee Sustainable Food Services Working Group and other groups to research and implement options to purchase more local, organic food for campus outlets.

- Establish a tiered schedule, to accomplish the following over a five year period:
    1. Assess all campus food service operations, to ascertain the level of compliance and/or the changes required to obtain "Green Business Certification."
    2. Conduct a staged implementation at each facility, where deemed physically and/or fiscally feasible, based on the preceding assessments and taking into consideration the amount of campus control over each facility.

Land Use and Habitat

UC San Diego is committed to preserving a portion of its land for natural habitats, while balancing plans for growth in the next few years.

Also, UC San Diego is taking steps to reduce the amount of potable water used for irrigation by planting roughly 75% of landscaped areas with drought-tolerant or native species. In addition, an estimated 25% of the water used for irrigation is reclaimed water, thus allowing potable water to be used for other purposes.

The total amounts of pesticides, herbicides, and fertilizers applied to UC San Diego lands have declined since 2005. Currently, some of the pesticides and herbicides applied to the campus are naturally-derived, organic alternatives.[2] However, the data are not comprehensive, and additional room for improvement exists. Furthermore, inorganic fertilizer makes up the majority of the fertilizer applied on campus. (Inorganic fertilizer is defined as fertilizer that is made from nonliving materials, a more unsustainable source than organic fertilizers.)

Recommendations:

- Expand the use of reclaimed water for irrigation purposes.
- Investigate and document any long-term environmental impacts of installing artificial turf, and then determine whether artificial turf fits with the sustainability goals of the campus.
- Reduce use of herbicides and pesticides where possible and increase the use of products listed with the Organic Materials Research Institute (OMRI). Also, gather data on the total volume/weight of products used that are listed with OMRI vs. the total volume and weight of products used.
- Reduce usage of inorganic fertilizer and replace with naturally derived, organic alternatives, e.g. compost, manure, and other fertilizer made from living organisms. Research the possibility of expanding the campus pilot composting project and using the finished compost as fertilizer on campus.
- Explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment. (This recommendation is also provided in the "Built Environment/Green Building Practices" section.)

[2] Organic alternatives are defined as materials that are listed with the Organic Materials Research Institute (OMRI).

- Develop irrigation policies and schedules that reflect the type of plants being irrigated, and that minimize the irrigation that occurs during peak sunlight hours (evaporation is highest during these hours). Also, investigate the possibility of gathering and using real-time soil moisture data to determine when landscaping should be irrigated.

Outreach

Currently, various staff at UC San Diego are involved in extensive outreach efforts to educate students, faculty, and staff about sustainable practices and policies. Highlights include Earth Week, and Focus the Nation, an international event devoted to raising awareness about climate change. However, room for improvement exists in this area, as the campus population continues to grow. No indicators are included in this section for this assessment.

Recommendations:

- Develop indicators to measure the extent and effectiveness of sustainability outreach.
- Establish visible, real-time, campus or building displays showing energy, water, waste, and other resource or emissions data to increase campus community awareness of sustainability issues.

Purchasing

The Procurement & Contracts Department has implemented several policies and programs to increase the purchasing of environmentally preferable products, which are products that have a lesser effect on human health and/or the environment when compared with competing alternatives that serve the same purpose. Many environmentally preferable products have received an environmental certification, such as ENERGY STAR. Other initiatives relate to reducing the packaging of products and consolidating shipments to reduce energy use associated with transportation. Additional activity related to purchasing is occurring at the system-wide level through the University of California Office of the President, and the UC San Diego Procurement & Contracts team is actively working with the Office of the President on these initiatives.

However, indicators for this area data are difficult to identify and track at this time. Thus, the only data presented are related to paper purchasing through the Storehouse, which provides approximately 95% of the paper used on campus. UC San Diego is performing well behind a campus sustainability leader (the University of British Columbia) in one metric: use of paper per student. In addition, about 19% of the content of all paper purchased is made from post consumer waste. Although 55% of all paper contains some recycled content, approximately 45% of all paper purchased on campus is virgin paper (with no recycled content).

Recommendations:

- Implement tracking mechanisms to collect data on environmentally preferable purchasing both by Procurement & Contracts and by campus departments.
- Create a full time position to coordinate sustainable purchases and ensure that sustainability requirements are included in all contracts and procurement documents.
- Educate campus departments on environmentally friendly alternatives to the items they purchase; provide ready access to purchase these alternatives.

- Consider mandating the purchase of environmentally-friendly alternatives when these alternatives are cost effective and perform equally to the conventional products.
- Issue a mandate to purchase cut white paper with a minimum 30% PCW content, and allow for exceptions only when publication standards require the use of 100% virgin paper. Also, proactively promote and market the selection of 50% or 100% PCW content paper to the campus community, bringing higher volumes to the marketplace and resulting in lowered prices of these paper types.

Recycling and Waste

UC San Diego's waste reduction and recycling programs include many materials, such as glass, paper, plastic, hazardous waste such as batteries, and electronic waste. The campus diversion rate is now at 67% by weight, which means that 33% of the waste generated on campus still goes to a landfill. This diversion rate has improved greatly over the past two fiscal years, growing from 37% to 67%. However, one challenge comes from limited staff time available for the recycling programs. Currently, the staff member in charge of the recycling program is also charged with managing other campus programs. To improve performance in this area, a full-time staff member is needed.

In addition, hazardous waste is well tracked and managed on campus, but volumes of hazardous waste have steadily been increasing. In the past two fiscal years, hazardous waste tonnages have increased by 28%. Hazardous waste is managed separately from solid waste by the Environment, Health, and Safety Department.

Recommendations:

- Research and implement a campus-wide composting program.
- Develop a campus-wide task group including, at a minimum, membership from Facilities Management, HDH, University Centers, and Facilities Design and Construction to develop collaborative strategies to reduce solid waste and increase diversion of solid waste.
- Create a full-time position to coordinate recycling and composting programs.

Social Responsibility and Community Engagement

This area includes data on community service and campus student organizations. The data reveal that most (63%) of the students reported being involved in community service in 2002-2003. However, more recent data are not available. Also, 83 student campus organizations deal with environmental, social justice, or sustainability issues, and 16 of these exist strictly to address sustainability issues, suggesting that students continue to be highly engaged in community service as related to sustainability.

UC San Diego has also implemented a number of programs to increase flexibility for employees. Some employees are allowed to telecommute and/or work flexible schedules, which also reduces traffic congestion and commuting-related emissions.

Recommendations:

- Gather updated data on the percentage of students required to perform community service.

- Establish a methodology for the Advisory Committee on Sustainability to determine campus goals and objectives for enhancing the social aspects of sustainability at UC San Diego.

Transportation

UC San Diego has made considerable progress in improving transportation programs to offer commuters more alternative transportation choices. As recently as 2001, about 67% of commuters were using single occupancy vehicles to travel to and from the Main Campus; currently, only 49% of commuters are commuting via single occupancy vehicles to and from the Main Campus. As a result, 51% of commuters are now using alternative forms of transportation, such as public transit, vanpools, carpools, biking, and walking. When the Hillcrest Medical Center commuters are taken into account, the percentage of UC San Diego's commuters driving in single occupancy vehicles falls to 47%. UC San Diego's performance in this area is similar to other UC campuses. Also, approximately 37% of vehicles in the campus fleet are run on alternative fuels.

The campus population density is higher than that of the area surrounding the campus. Currently, the percentage of students accommodated in campus housing is 43% (including graduate and undergraduate students). New housing is currently being constructed, and should accommodate about 50% of students in the future. However, increasing the population density even further could improve the percentage of commuters using alternative transportation. The addition of new on-campus housing has the potential to increase building-related GHG emissions from UC San Diego. However, by reducing the number of commuters coming to and from campus, the new housing will have the potential to lower commuter-related GHG emissions regionally.

Recommendations:

- Prioritize and expand alternative transportation options to enhance commuter options and eliminate need for additional parking capacity.
- Continue to replace fleet vehicles that run on gasoline with vehicles that use alternative fuels.
- Continue to collaborate with local agencies to improve and expand alternative transportation options for campus commuters, such as potentially expanding the San Diego Trolley system to the UC San Diego area.
- Continue to regularly gather data on commuters' attitudes towards driving and other forms of transportation, and their reasons for choosing various modes of transportation.
- Continue to work with public agencies adjacent to campus to improve safety and bicycle access on roadways adjacent to campus.
- Routinely monitor and track demographic patterns to determine opportunities to increase alternative modes of transportation and/or the development of additional routes and service for shuttles and other alternative modes of transportation.

Water

Water usage on campus is slightly higher in comparison to other UC schools. Also, compared to energy, water usage is not highly tracked and measured. Only 54% of the buildings on campus are estimated to have their own sub meter for water usage, while about 90-95% of the buildings on campus have a sub meter for energy usage. As a result,

campus staff may not be as well equipped to manage water demand and to understand where and how water is used throughout the campus.

Although all new buildings have water-efficient fixtures, UC San Diego has a number of older buildings on campus. Additional steps are needed to improve the percentage of water-efficient fixtures on campus in older buildings.

Opportunities may exist to increase the use of reclaimed and/or recycled water for irrigation and other purposes.

Recommendations:

- Improve sub metering for water at the building level to allow for better management of water usage.
- Identify buildings with large water usage and inefficient fixtures, and perform retrofits in those buildings. Prioritize optimum building replacement (e.g., high-use buildings first) and systematically retrofit campus buildings.
- Explore the reuse of condensate from HVAC and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, and for appropriate process equipment.
- Improve education and awareness around water usage in buildings and water used for irrigation. Since it is estimated that about 86-87% of potable water usage occurs in buildings, the education efforts may best be focused on building water usage.
- Investigate the feasibility of rerouting reclaimed water into the water purification system so that need for parallel piping is reduced or eliminated, i.e., purify reclaimed water to potable water standards. Determine the options for working with City/County to further a recommendation to implement a program of this type.

UC San Diego has a long history of advancing sustainability through academic research and education. In fact, the first scientist to document rising levels of CO_2 in the atmosphere was a researcher at Scripps Institution of Oceanography, Charles Keeling.

At UC San Diego, we have also strived to improve the sustainability of campus operations. UC San Diego leadership has created a Climate Solutions Work Group (CSWG), a high-level team made up of administrative and academic leaders. Please see Appendix B for a listing of current CSWG committee members. This group is monitoring and implementing projects on campus to reduce GHG emissions, and will be overseeing the development of a campus-wide Climate and Sustainability Action Plan. The goals of this plan will be to forecast emissions, plan for emission reductions, and develop a timeline for reaching climate neutrality.

Realizing the importance of sustainability to the ongoing health and vitality of the campus, UC San Diego created an Advisory Committee on Sustainability (ACS), comprising faculty, staff, and students. Please see Appendix B for a listing of current ACS committee members. This committee recommended that UC San Diego hire a full-time staff member dedicated to coordinating sustainability efforts on campus. The campus hired a Sustainability Coordinator in September 2007. Currently, the ACS is crafting a new definition of sustainability to better guide campus efforts. Both the CSWG and the ACS, along with other groups within the campus community, are invested in creating solutions to the sustainability challenges we face today.

The ACS has also proposed the adoption of the following principles to define sustainability:

- We are committed to the creation of a sustainable relationship between human societies and the natural environment upon which we all depend.
- We recognize that sustainability is a key part of our mission, and that sustainability encompasses social, economic, and cultural interactions set within a supporting ecosystem.
- We recognize that UC San Diego can make vital contributions to sustainability solutions through its research, teaching, and operations.
- We encourage the development of academic programs to create sustainability solutions through research and experiential learning.
- We encourage the incorporation of sustainability concepts in all academic disciplines and across all levels of education and campus operations.
- We commit to conduct open, periodic assessments of UC San Diego's progress toward sustainability to guide campus policy and decision making, and to openly communicate assessment results to UC San Diego's community.

In addition, UC San Diego has a Waste Reduction and Recycling Policy, which has been in place for 11 years. This policy applies to all facilities and provides standards for UC San Diego to reduce waste at the source, encourage the procurement of recyclable and reusable materials, and increasing the total volume of materials diverted from landfills to recycling processes.

In addition to the UC San Diego Sustainability Policy, the University of California Office of the President has promulgated a *Policy on Sustainable Practices*, which applies to all UC

campuses. This policy includes guidance on green building, transportation, solid waste and recycling, and environmentally preferable purchasing.

The purpose of this report is to begin the process of assessing UC San Diego's progress towards sustainability, as outlined in the last of the Sustainability Principles. A number of indicators, or metrics, are provided in 11 different areas of concern in the realm of sustainability. As the name implies, these indicators are only meant to indicate or generally point toward the status of sustainability throughout the complex intertwined systems at UC San Diego. However, these indicators were selected as key measures and should be considered baselines against which future progress will be measured. The indicators also point to areas in which the campus has room for improvement.

Due to the interconnected nature of sustainability topics, there is overlap between a number of categories and indicators discussed in this report. For example, transportation is a separate category, but is tied to the Energy and Climate category. Purchasing is related to Recycling and Waste, since all items that are purchased must eventually be disposed of in one way or another. However, this assessment includes 11 separate categories in order to show the importance of each one, and to specifically discuss the current performance and opportunities in each area. Where possible, overlapping categories and related synergies across categories are discussed.

Key Components of This Report

In addition to the aforementioned sustainability principles adopted by UC San Diego, the concept of sustainability normally includes consideration of a combination of social, environmental, and economic and financial factors. This initial sustainability assessment focuses on the social and environmental factors. Specifically, indicators cover topics such as resource usage, emissions, social factors such as community involvement, and the use of best practices to improve our performance. Economic performance may be included in future reports to gain a fuller picture of campus sustainability.

The Sustainability team has developed 35 indicators within 11 areas of concern: Academics & Research, Built Environment, Energy, Food, Land Use and Habitat, Outreach, Purchasing, Recycling and Waste, Social Responsibility and Community Engagement, Transportation, and Water. See below for a full list of indicators.

This report has a separate section on each area that includes the following:

- Background
- Indicators: data and analysis
- Indicator Summary
- Challenges
- Future Plans and Recommendations

This sustainability assessment is the first for UC San Diego, and the campus plans to continue performing assessments and publishing reports on a regular basis. In the future, additional information may be included, or indicators of less significance may be omitted. Feedback on the content and methodology associated with this report is highly encouraged.

A note on data: Some of the data in this report already existed due to the ongoing efforts of UC San Diego's dedicated staff in many different departments. Some data were collected for

the purposes of this report. Due to the wide range of data included, they are presented in varying formats. For example, some data cover each academic year, while other data are presented according to calendar year. In some cases, data formats for other campuses do not match the data available for the UC San Diego campus. These data are provided for benchmarking purposes because no other data are available. We will work toward presenting consistent data formats in future reports.

Process of Creating This Report

This report was commissioned by the Advisory Committee on Sustainability, a committee comprised of students, staff, and faculty from various departments throughout UC San Diego. The Project Manager for the creation of this report was the Campus Sustainability Coordinator, Maggie Souder.

The first step in the process of creating this report was to research best practices in the field of university sustainability reporting. From this research, we developed a list of potential categories and indicators to include in this assessment. Our initial list was culled to reflect sustainability priorities and relevant programs, as well as available data. The authors of this report have utilized the results of this research to benchmark our performance versus other universities, where possible.

After reducing the list of potential indicators to reflect priorities at UC San Diego, we gathered data for each of the indicators. Data were gathered from various departments and divisions across the University through meetings and interviews. Qualitative data were also gathered to gain information regarding relevant practices, policies, and future plans for each of the 11 issue areas included in this assessment.

Data were compiled and analyzed, and the report drafted. A number of students, faculty, and staff reviewed the initial draft and provided comments, including the members of the ACS, who reviewed the draft in detail during two working sessions. To the greatest extent possible, all of these comments were incorporated in the report. However, additional comments are encouraged to improve and expand the next sustainability assessment. We also expect that indicators may be added or removed to reflect changing technologies or best practices in each category.

List of Indicators

Academics and Research

Indicator AR1: Sustainability-Related Courses

Indicator AR2: Number of Students Enrolled in Sustainability-Related Courses

Indicator AR3: Funding Received for Academic Research

Built Environment/Green Building Practices

Indicator BE/GB1: LEED-Certified Buildings or the Equivalent

Indicator BE/GB2: Average Age of Campus Buildings

Indicator BE/GB3: Green Cleaning Practices

Energy

Indicator E1: Total Energy Consumption

Indicator E2: Energy Consumption per Square Foot of Building Space

Indicator E3: Fuel Mix for Purchased Electricity

Indicator E4: GHG Emissions

Indicator E5: Percentage of Campus Buildings Sub metered for Energy Use

Food

Indicator F1: Percentage of Food Purchased that is Certified Organic

Indicator F2: Tonnage of Food Waste Diverted for Composting

Land Use and Habitat

Indicator LUH1: Percentage of Landscaped Areas Planted with Native or Xeriphytic Plants

Indicator LUH2: Percentage of Landscaped Area Irrigated with Reclaimed Water

Indicator LUH3: Pesticide Use

Indicator LUH4: Fertilizer Use

Purchasing

Indicator P1: Paper Usage per Capita

Indicator P2: Percentage of Post-Consumer Waste in Paper Purchases

Recycling and Waste

Indicator RW1: Total Solid Waste and Recycled Material Generated

Indicator RW2: Campus Diversion Rate

Indicator RW3: Waste Generated per Capita

Indicator RW4: Hazardous Waste Generated

Social Responsibility/Community Engagement

Indicator SR/CE1: Percentage of Students Involved in Community Service

Indicator SR/CE2: Sustainability-Related Organizations

Transportation

Indicator T1: Transportation Modal Split

Indicator T2: Campus Size and User Density

Indicator T3: Average Cost and Availability of Residence Hall Rooms

Indicator T4: Inventory of Automobile and Bicycle Parking Spaces

Indicator T5: Total Number and Percentage of Fleet Using Alternative Fuels

Water

Indicator W1: Gallons of Water Consumed

Indicator W2: Water Consumption per Capita

Indicator W3: Percentage of Campus Square Footage Metered for Water Use

Indicator W4: Gallons/Day of Wastewater Discharge

Indicator W5: Percentage of Highly Efficient Fixtures Installed on Campus

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Background

The mission of the University of California is based around three obligations: to provide education at both the undergraduate and graduate levels, to perform research, and to provide other kinds of public service. All three areas are "shaped and bounded by the central pervasive mission of discovering and advancing knowledge."[3]

Given this mission statement, incorporating sustainability into the education, research, and other public services is an essential component of UC San Diego's contribution to advancing sustainability in California, in the United States, and beyond. Indeed, sustainability will bring many challenges and will require new technologies, policies, and other advancements for society to adequately address those challenges. Institutions of higher education are obliged to train the future leaders and innovators and conduct cutting-edge research so that these challenges will not only be addressed, but will be solved.

This section only discusses a portion of the activities on campus relating to sustainability in academics and research. One of the challenges is gathering comprehensive information in this area due to the large amount and wide range of work that is occurring across the campus.

UC San Diego has a long history of researching and teaching environmental and sustainability issues. Charles Keeling of the UC San Diego Scripps Institution of Oceanography was the first scientist to document rising levels of CO_2 in the atmosphere, essentially providing the first scientific evidence of the problem of global climate change. UC San Diego continues to contribute to ocean and earth research. For example, Scripps Institution of Oceanography has become a world leader in the study of environmental changes related to global climate change and its impacts. UC San Diego faculty and researchers lead in cutting edge sustainability solutions research, teach an extensive list and variety of graduate and undergraduate courses, and mentor and supervise the Environmental Systems (ESYS) major and supervise many sustainability-related senior internships/projects.

The most recognizable undergraduate environmental major on campus is the interdisciplinary ESYS program. With approximately 175 majors, the rapidly growing program prepares students in environmental sciences and engages students to address complex interdisciplinary problems. The ESYS major draws upon resources in many campus departments, including the Scripps Institution of Oceanography, Biology, Chemistry, etc.

Other key ESYS majors include Biology - Ecology, Behavior, and Evolution, Environmental Chemistry, and Environmental Policy. The Division of Arts and Humanities house the ESYS minor and an interdisciplinary Environmental Studies minor. UC San Diego offers an Environmental Engineering Degree within the Jacobs School of Engineering. The department of Chemistry offers a B.A and a B.S. in Environmental Chemistry, and undergraduate students can earn a B.S. degree in Earth Science, or a minor in Marine Science, both from Scripps Institution of Oceanography. UC San Diego also offers myriad opportunities to concentrate on sustainability issues within individual graduate research programs.

[3] From the University of California Academic Plan, 1974-1978.

Beyond these academic offerings, another indication that UC San Diego is working to integrate sustainability into academics and research programs is the establishment of the Environment and Sustainability Initiative (ESI) in 2005. ESI has worked to bring together the intellectual resources of the campus around sustainability challenges. ESI sponsored interdisciplinary research and actively promoted concepts of sustainability throughout UC San Diego's curriculum. ESI also conducted public forums, workshops, and student service learning experiences that focus on sustainability. Seventy-five faculty members are currently working with ESI on various projects and initiatives.

A number of faculty have actively partnered with the campus Facilities Department to test or implement sustainability-related research projects on campus. For example, students, faculty, and staff are collaborating to test and evaluate the use of 100% soy-based biodiesel in one of UC San Diego's campus shuttles, known as the "Greenline." In another example, faculty and a team of students are, as part of the DEMROES project, placing sensors on campus buildings to collect detailed information related to the microclimate surrounding each building. The ultimate goal of the project is to provide accurate climate data that will help campus operations staff make informed decisions about the heating and cooling of buildings, and irrigation.

For this assessment, the indicators in the Academics & Research issue area focus on two of the three parts of UC San Diego's mission: education and research. Also, see the Social Responsibility/Community Engagement area for a related indicator on the percentage of students performing community service. Additional data related to sustainability practices associated with campus research may be included in future assessments.

Indicators

Indicator AR1: Sustainability-Related Courses

UC San Diego has a number of courses on the topic of sustainability, including a seminar in which the students research and work on projects related to campus sustainability. In addition, a number of courses deal with environmental, social, and/or economic issues. Table 1 lists the total number of courses with sustainability content that were offered in the 2006-2007 and the 2007-2008 academic years. For the purposes of this assessment, courses with sustainability content are defined as courses that include teaching and discussion of the environment, conservation, social justice and equity, and sustainability. Also included are biology courses that cover various environmental issues. Both graduate and undergraduate courses are included in the totals found in Table 1.

Table 1: Environmental and Sustainability Courses at UC San Diego

Academic Year	Total Number of Courses with Sustainability Content
2006-2007	195
2007-2008	196

Source: Environment and Sustainability Initiative, 2008.

In comparison, the total number of sustainability-related courses currently being offered at UC Santa Cruz was 163 as of 2007[4]; however, this number includes internships and other field studies, which were not included in the data collection for UC San Diego. UC Berkeley reported that 81 sustainability-related courses were offered as of 2004.[5] None of these measures are easily comparable, however, due to differing definitions of "sustainability courses" and imperfect means of data collection. Due to the very broad construction of "sustainability course" for this assessment, we recommend developing and refining a campus definition for future assessments. Nonetheless, UC San Diego should be considered well represented in this area, considering the total number of courses offered, and the many departments and schools that offer sustainability courses, as described above. At the same time, the data indicate that the number of course offerings is not currently growing from year to year.

Indicator AR2: Number of Students Enrolled in Sustainability Courses

This assessment does not include data on the total number of students who enrolled in a sustainability course because many students likely enroll in multiple courses during one quarter or one year. Thus, these numbers may represent an overestimate of individual students actually enrolled in "sustainability courses." However, Table 2 does report the total enrollment in all the courses included in Table 1. These data includes totals from both graduate and undergraduate courses.

Table 2: Total Enrollment in All Sustainability Courses

Academic Year	Total Enrollment in Sustainability Courses
2006-2007	15,161
2007-2008	15,455

Source: Environment and Sustainability Initiative, 2008.

Based on the data in Table 2, the growth in total enrollment in sustainability courses from the 2006-2007 academic year to the 2007-2008 academic year is about 2%. However, during the same time period, the student body grew by about 2%. Therefore, the growth in the number of students enrolled in sustainability courses may not actually demonstrate increased interest in these topics.

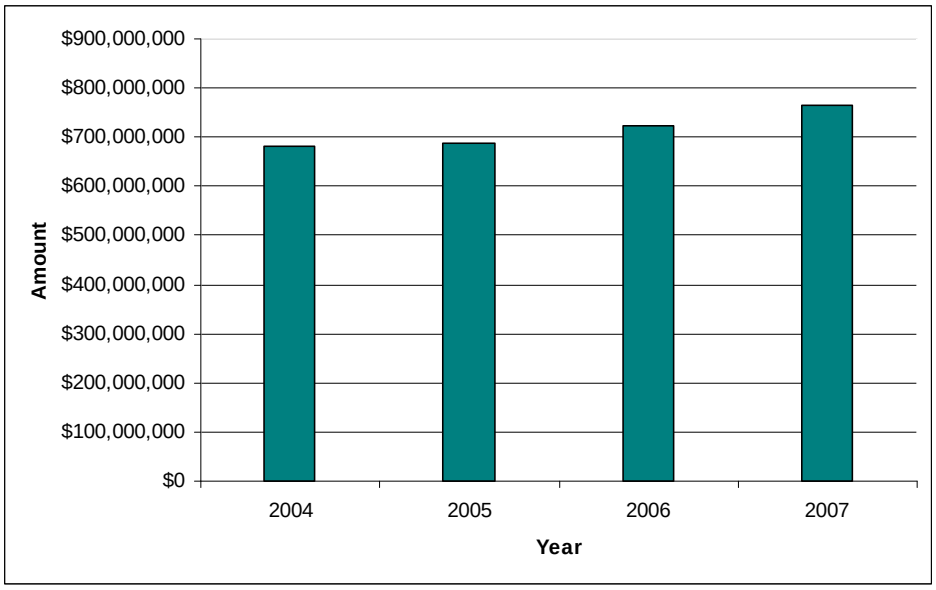
Indicator AR3: Funding Received for Academic Research

UC San Diego tracks the amount of funding received annually for academic research. This funding could be received from government grants or private institutions. Data are provided in Figure 2. Between 2004 and 2007, the amount of funding received for research increased by about 12%. Currently, funding received for sustainability-related research is not tracked. However, there may be additional data available from the Office of Contracts and Grant

[4] UC Santa Cruz, *Campus Sustainability Assessment.* 2007. p. 70.
[5] UC Berkeley. *Campus Sustainability Assessment.* 2005. p. 115.

Administration (OCGA). We plan to expand our search to include OCGA for future assessments.

Figure 2: Funding Received at UC San Diego by Calendar Year



Source: Controller's Office

Indicator Summary

The metrics above indicate that UC San Diego is strongly committed to the teaching of environmental and sustainability issues. However, the number of courses and student enrollment in those courses has remained relatively steady. Also, the actual extent to which students are educated about sustainability is more difficult to measure.

From Indicator AR3, we conclude that the campus has continued to successfully increase the amount of funding received for academic research. This indicator is included because research is an important component of the activities on campus, and these data serve as a proxy for other resource usage on campus. For example, conducting research requires building space and electricity, and could require heating, cooling, water and other resources.

Challenges

As noted above, some important data in this field are difficult and time-consuming to gather. Although courses and enrollments can be viewed electronically, it is currently not possible to electronically sort through classes in search of environmental and sustainability-related content. Gathering data for Indicator AR1 involved manually reading the course descriptions for hundreds of courses offered at UC San Diego. Furthermore, the course descriptions are only a few sentences long and may not adequately describe whether or not the course includes content related to sustainability. Including a designation in the course catalog for sustainability-related courses could allow members of the campus community to find these courses more easily.

Also, defining the concept of a "sustainability-related course" is difficult, since the general definition of sustainability includes consideration of economic, social, and environmental factors. However, many of the courses included in Indicator AR1 cover just one or perhaps two of the three factors. A similar challenge will be to define the concept of "sustainability-related research" for future assessments, and to gather data regarding the amount of funding received for sustainability-related research. As noted above, the only data currently collected regarding research includes the total funding received for academic research. By working with the OCGA and other groups on campus, we hope to include more specific data on the funding received for sustainability-related research in future assessments.

Future Plans and Recommendations

The campus is planning to expand its data-tracking efforts to incorporate more items in the area of sustainability associated with education and research. Collecting data on sustainability-related research is particularly important for future data gathering, since conducting research is a core component of UC San Diego's mission. However, due to the fragmented nature of the six colleges at UC San Diego, and the many departments that work on sustainability issues, these data may be difficult to gather.

Recommendations:

- Create a standard definition for "sustainability-related course" and "sustainability-related research" for future assessments.
- Include a designation in the course catalog for sustainability-related courses. Currently, sustainability-related courses are not separately identified or listed in the course catalog, but are sometimes described in the departmental course descriptions. Implementation of this recommendation will require input and collaboration across many campus groups, such as the Academic Senate.
- Gather data on the total amount of extramural funding received for sustainability research.
- Continue to recruit faculty and develop new course offerings in sustainability and environmental areas.
- Create a committee comprised of faculty to develop a course standard and outline for core sustainability course(s).

Background

In the United States, buildings consume up to 70% of the electricity generated, 12% of potable water, and are responsible for 39% of all GHG emissions.[6] At UC San Diego, buildings use approximately 95% of the electricity generated or purchased on campus, and approximately 85% of potable water consumed on campus. Also, about 68% of the campus GHG emissions are due to energy consumption in buildings. However, new technologies abound for reducing the environmental impacts of buildings while also creating safer and more productive places for occupants to live, breathe, and work. The de facto green building standard in the United States is the LEED green building certification program developed and administered by the United States Green Building Council.

Recognizing the importance of green buildings on UC campuses, The University of California Office of the President's *Policy on Sustainable Practices* lists a number of policy guidelines related to green building design. For example, as of this writing, all new buildings are required to be built to the LEED Certified rating or UC LEED equivalent at a minimum, and to a LEED Silver rating or higher or UC LEED equivalent whenever possible. UC San Diego has taken a leadership role by committing to achieving at least LEED Silver or the equivalent for all new campus buildings.

Laboratory and acute care facilities are excepted from the University of California Office of the President's policy, although new lab buildings must be designed and built to the Laboratories for the 21st Century Environmental Performance Criteria. Further study will also be conducted to find or develop a standard for acute care facilities.

Because the *Policy on Sustainable Practices* requires new buildings and some renovations to achieve a LEED Certified rating or UC LEED equivalent, the University of California developed an internal certification and rating system based on the LEED program. UC San Diego has used this internal system for the certification of its new buildings.

At UC San Diego, most new buildings are evaluated for sustainability at the programming phase, before initial designs are even created, to maximize green building aspects that are included in each project. One of the crucial elements that is considered during this phase is the microclimate of the building site.

One innovation that is currently being researched at UC San Diego is the collection and use of data on meteorological conditions at each building site through a project known as Decision-Making Using Real-Time Observations for Environmental Sustainability (DEMROES). As mentioned in the section on "Academics and Research," faculty and students are placing real-time wireless sensors on campus buildings to collect data. One of the goals of the project is to provide campus facilities staff with information to feed the energy management system for improved building operation, energy conservation, and irrigation management.[7]

[6] United States Green Building Council, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1718

[7] See the following website for more information on the DEMROES project: http://maeresearch.ucsd.edu/kleissl/demroes/

The maintenance and operations of buildings are increasingly including environmentally-friendly options, such as ongoing monitoring of energy usage to identify new opportunities for conservation and efficiency. Green cleaning practices are also included in green building practices.

Indicators

Indicator BE/GB1: LEED-Certified Buildings or the Equivalent

Currently, only one building has been certified as LEED equivalent under UC's internal LEED equivalent rating system: One Miramar Street Housing. This building represents just 2% of the total square footage on campus. However, a number of projects are currently in the planning, design, or construction phase and all will be certified under UC's internal system, or in the LEED program administered by the U.S. Green Building Council. Upon expected completion of these projects by 2012, approximately 15% of the gross square footage on campus will be in a LEED-certified or equivalent building.

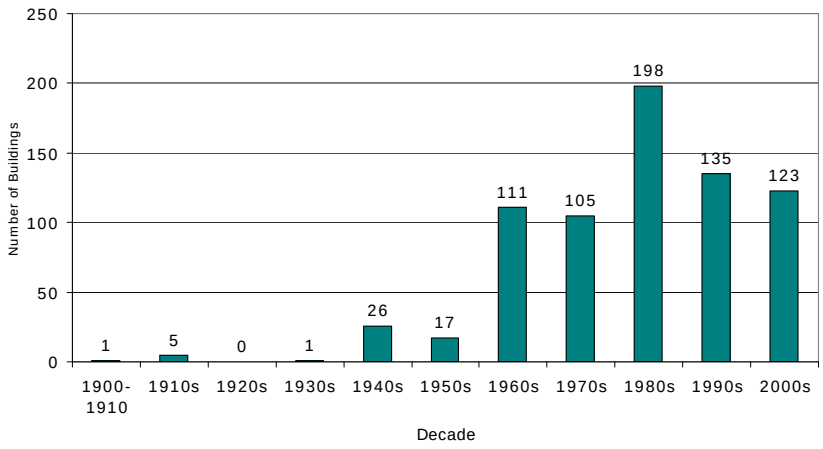
Indicator BE/GB2: Average Age of Campus Buildings

All sustainability-related decisions include trade-offs. Although new buildings may include many more "green" features, such as efficient energy systems, water recycling, and use of recycled construction materials in the building itself, the use of existing buildings is often a sustainable choice, since using an existing building does not require the time, resources, and capital investment of creating a new structure. The average age of campus buildings is thus an indicator that provides insight into the use of existing buildings vs. new buildings.

In the future, about 15% of the total square footage on campus will be in a LEED-certified building or the equivalent

At UC San Diego, the average age of a campus building is 24 years. This age reflects the history of construction at UC San Diego, as the 1980s was the decade in which the most buildings were constructed. However, the oldest building on campus was constructed in 1904. The last two decades have also seen significant growth in the building stock, although the rate of growth has declined since the 1980s. Figure 3 below shows the number of buildings constructed in each decade since 1900.

Figure 3: Buildings Constructed by Decade



Source: UC San Diego FacilitiesLink Database

BE/GB Indicator 3: Green Cleaning Practices

Green cleaning is one of many practices considered under the LEED-EB standard, a standard which is currently being implemented in select buildings at UC San Diego. The use of green cleaning practices and products helps to reduce the environmental impacts resulting from the built environment, such as poor indoor air quality and the emission of cleaning chemicals to our waterways and ultimately to the ocean. Many environmentally friendly products offer other benefits, such as reduced exposure to potentially hazardous chemicals for the building's cleaning staff.

76.5% of cleaning products used in UC San Diego's buildings are Green Seal-certified

One example of a more sustainable green cleaning practice instituted at UC San Diego is the use of re-usable mop heads. These mop heads are removable and washable, reducing the amount of solid waste generated from cleaning. In addition, the pole holding the mop head holds the cleaner and the water, which is a more efficient method for using water; this practice has led to a savings of approximately 814,000 gallons of potable water per year. Finally, using these mops does not require workers to fill, lift, and move buckets of water, which greatly reduces worker injuries.

Data regarding green cleaning practices is applicable to all buildings – both those managed by HDH, and all nonhousing buildings on UC San Diego's campus. Currently, 76.5% of all cleaning products used are Green Seal-certified. The Green Seal certification program is administered by Green Seal, an independent, nonprofit organization.[8]

Indicator Summary

UC San Diego has begun to implement the new green building standard from the UC *Policy on Sustainable Practices*, but most buildings are not yet certified in any green building program. This situation is true for other UC campuses, as well. UC Santa Cruz currently does not have any LEED-certified buildings, although several buildings in the design phase

[8] See www.greenseal.org for more information.

will be LEED-certified or the equivalent.[9] UC Santa Barbara has pursued LEED certification for existing and new buildings, yet as of 2005-2006, only 5.63% of the square footage on campus was part of a LEED-certified building.[10]

A significant portion of the campus building stock at UC San Diego was constructed over 20 years ago. Most likely, opportunities exist in many of these structures to achieve energy and water savings through retrofits. For example, one study found that green-certified buildings are 25-30% more efficient, when compared to building code baselines.[11] According to the U.S. Green Building Council, buildings that have been certified under the LEED-EB standard achieve, on average, $170,000 in savings per year after a 2.6 year payback period.[12]

Building maintenance includes many environmentally-friendly features, such as monitoring energy usage and looking for new opportunities to improve energy efficiency in buildings. Finally, green cleaning products are widely used in many campus buildings, although there is room for improvement.

Challenges

Although the average age of a campus building is fairly young (24 years), many buildings are much older and thus are not equipped with modern technologies. Finding the resources and will to retrofit these buildings will be challenging, especially in a period of ongoing campus growth in which most resources will likely be directed to constructing new buildings.

Another challenge is related to costs. As green building features and technologies become more commonplace and expected, costs for these features become equivalent to conventional building costs. High performance green buildings, however, such as those that achieve LEED Platinum certification, may cost slightly more in the construction phase. However, study after study has shown that green buildings do save money over time through reduced energy, water, and waste removal costs.[13] However, the UC system currently allocates separate funds for capital projects such as constructing new buildings, and for the operation and maintenance of those buildings. Due to the separate funding for these related costs, a strong financial case cannot always be made for including green features in new buildings.

Finally, green building technologies and practices are constantly changing and improving. For example, the U.S. Green Building Council regularly updates each of the LEED standards, and also develops new standards for different types of buildings and projects. Another example is noted above: UC San Diego is currently collecting microclimate data through sensors on some buildings, with the goal of using these data to more efficiently manage energy and water usage on campus. A practice that may be on the leading edge today could be incorporated into all new buildings in the near future. Thus, updating the campus green building policies and practices will be crucial to maintaining a leadership role in the green building area in years to come.

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[9] UC Santa Cruz, *Campus Sustainability Assessment.* 2007.

[10] UC Santa Barbara, *UC Santa Barbara Campus Sustainability Plan*, April 2008.

[11] Kats, G. "The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force." October 2003.

[12] See: www.armstrong.com/common/c2002/content/files/37082.pdf

[13] See, for example, Kats, Greg. *The Costs and Financial Benefits of Green Buildings*, 2003.

Future Plans and Recommendations

Growth in the square footage on campus is planned for the next few years, which presents an opportunity to incorporate green principles into the design of all new buildings. As noted above, all new buildings constructed will be certified to the LEED Silver standard or higher (or the equivalent). This will increase the percentage of square footage in campus buildings certified in a green building program to about 15% of the total campus square footage.

In addition, the cleaning staff will continue to search for new Green Seal-certified products. Presently, Green Seal products are unavailable for certain types of products; one example is germicides.

One technology that has yet to be implemented on campus is recycling of grey water, or used water from sinks and showers, for irrigation or other purposes. Campus staff are exploring the use of grey water recycling on campus. Also, campus staff are investigating the possibility of reusing water from HVAC and other cooling systems on campus. This water could be used for irrigation or could be reused in other equipment. These technologies relate to the Land Use and Habitat and Water sections, included later in this report.

Finally, the UC Office of the President is considering increasing the standard for all new buildings from the LEED Certified level to LEED Silver. By going beyond this standard and achieving LEED Gold for all new buildings, UC San Diego can take a leadership role in this area while also realizing significant costs savings in the future due to reduced energy and water consumption of these buildings.

Recommendations:

- Change campus financial structures to better incentivize the incorporation of green building features during the planning and construction phase of the building. For example, combine budgets for both the capital expenditures (construction) and the operations of the building.
- Strive to achieve LEED Gold or higher to take a stronger leadership role in green building practices in the UC system and beyond.
- Identify older buildings in need of major retrofits and renovations, such as energy efficiency upgrades, and seek funding for those projects. On average, the process of retrofitting a building for LEED-EB certification saves $170,000 per year, with an average payback period of 2.6 years.[14] Seek alternative funding mechanisms for these projects, such as rebates from the utility.
- Achieve 100% use of Green Seal-certified cleaning supplies.
- If feasible, use microclimate data, such as the data collected through the DEMROES project, at each building site to further improve energy and water management systems.

[14] See: www.armstrong.com/common/c2002/content/files/37082.pdf

- Explore the reuse of condensate from HVAC and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment.
- Keep abreast of changing green building standards and update the campus standard as necessary to remain a leader in this area.

Background

Climate change and related issues of energy usage are among the most important issues of our generation, and the most challenging global environmental issue we have ever faced as a society. Although many current alternatives to our current dependence on fossil fuels are available, it will take time, dedication, innovative technological advances, and concerted effort to reduce overall energy usage and replace traditional fuels with new alternatives.

UC San Diego has provided leadership in the area of energy usage reduction and climate change. For example, in 2001, UC San Diego installed a 30-megawatt cogeneration plant on campus, an efficient plant that utilizes natural gas for electricity generation, then captures heat from the process to generate additional electricity. This plant provides about 80% of the electricity used on campus, saving money and reducing energy losses from the transmission and distribution of energy from off-site generators. In addition, UC San Diego was a charter member of the California Climate Action Registry in 2002, and has been measuring and reporting GHG emissions since 2003. UC San Diego has won a "Climate Action Leader" award from the California Climate Action Registry for its early efforts to track and manage GHG emissions as well as the 2008 City of San Diego "Climate Protection Champion" award, the 2007 San Diego Excellence in Energy Organization award, 6 UC/CSU Sustainability Conference Best Practices Awards, 2005 and 2006 San Diego Excellence in Energy Innovative Government Energy Efficiency Program award, 2007 Special Achievement in Sustainable Transportation, 2005 and 2006 Flex Your Power honorable mention awards, and the 2005-2008 (inclusive) Model Pollution Prevention Vehicle Service and Repair Facility awards.

In March 2007, President Dynes of the University of California made an important commitment by signing the American College & University Presidents Climate Commitment on behalf of all 10 UC Chancellors. This Commitment requires all 10 UC schools to create a climate action plan for achieving climate neutrality as soon as possible.

More recently, in January 2008, UC San Diego has joined the Chicago Climate Exchange, a voluntary but legally binding trading system for reducing GHGs and trading emission reductions or offsets.

The number of energy conservation and research projects on campus are far too many to list here. One area of note is UC San Diego's efforts to reduce energy usage from computing. For example, the GreenLight Project, a collaboration between the California Institute for Telecommunications and Information Technology, the University's Administrative Computing and Telecommunications group, the UC San Diego Center for Networked Systems, the San Diego Supercomputer Center, and the Department of Computer Science and Engineering, is a project in the field of green cyberinfrastructure. The project involves constructing two energy-efficient datacenters, and then using the datacenters to research ways to make computing and networking more energy efficient. Also, scientists throughout campus will be connected to these "green" computer processing and storage system using photonics-light over optical fiber.[15] UC San Diego has also joined

[15] See the following website for more information on the GreenLight Project: http://www.calit2.net/newsroom/release.php?id=1342

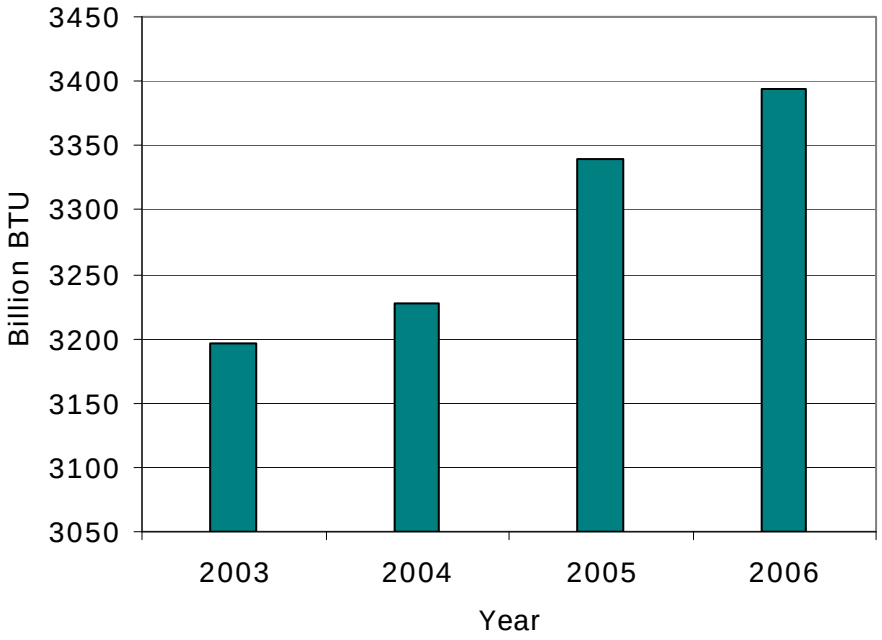
the Green Grid, a global consortium of companies working to improve energy efficiency in data centers and other computing environments.[16]

Indicators

Indicator E1: Total Energy Consumption

UC San Diego's total energy consumption is an important trend, and is tied to the total amount of resources consumed for energy production. In the case of UC San Diego, most of the electricity is generated from the combustion of natural gas. Natural gas is also used to heat most buildings. Other energy usage includes fuel for the campus fleet. See Figure 4 below for data on total energy consumption at UC San Diego.

Figure 4: UC San Diego Total Energy Consumption



Source: UC San Diego 2006 Environmental Report

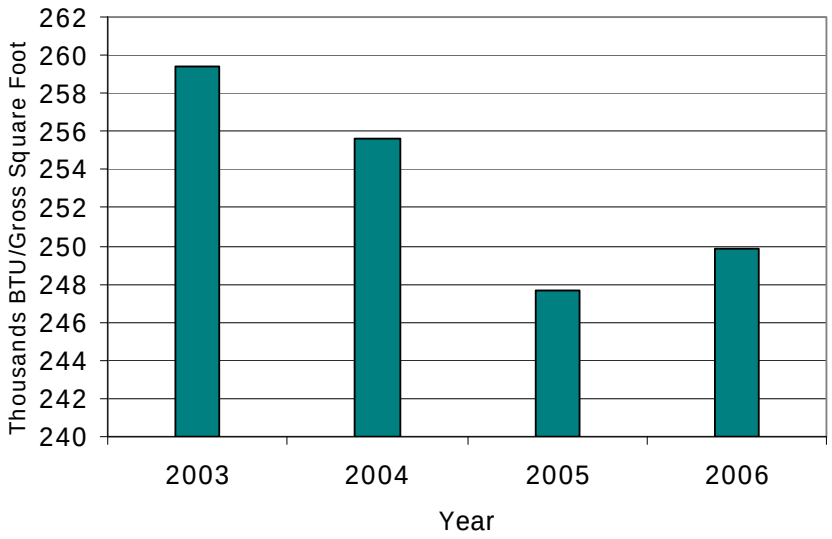
Indicator E2: Energy Consumption per Square Foot of Building Space

As the campus continues to expand, total energy consumption has increased, which is evident from Figure 4. However, measuring energy consumption per square foot of building space provides a normalized measure of energy usage, relative to the overall size of the campus built environment.

[16] See the following website for more information on the Green Grid: http://ucsdnews.ucsd.edu/newsrel/general/01-08ReduceEnergyLossAtDataCenters.asp

Figure 5 shows the trend of energy consumption per square foot at UC San Diego from 2003-2006. These data show that energy usage per gross square foot of building space has actually declined relative to 2003, although an increase in this metric occurred from 2005 to 2006.

Figure 5: Energy Consumption per Gross Square Foot



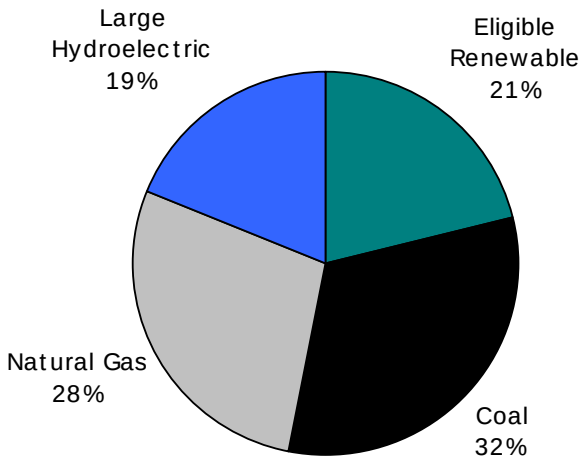
Source: UC San Diego 2006 Environmental Report and Additional Analysis

Indicator E3: Fuel Mix for Purchased Electricity (Main Campus Only)

Roughly 80% of UC San Diego's electricity for the Main Campus (including the Scripps Institution of Oceanography) is generated on site at the cogeneration plant, which uses only one fuel source: natural gas. A small amount of additional electricity is generated from on-site PV panels.

The remainder of electricity consumed by the Main Campus, about 20%, is imported. Figure 6 shows the average fuel mix used for UC San Diego's purchased electricity for 2007. Although fossil fuels make up the majority of the fuel mix for purchased electricity, the amount of eligible renewable electricity has increased in recent years. One of the goals in the UC *Policy on Sustainable Practices* is to procure 20% of grid-provided electricity from renewable sources by 2010; UC San Diego has already surpassed that goal by achieving 21% of grid-provided electricity from renewable sources.

Figure 6: Average Fuel Mix for Purchased Electricity Used on the Main Campus (20% of Total Electricity Used on the Main Campus)



Source: UC San Diego Energy Manager. Electricity used at the Hillcrest Medical Center and other off-campus sites is not included.

Indicator E4: GHG Emissions

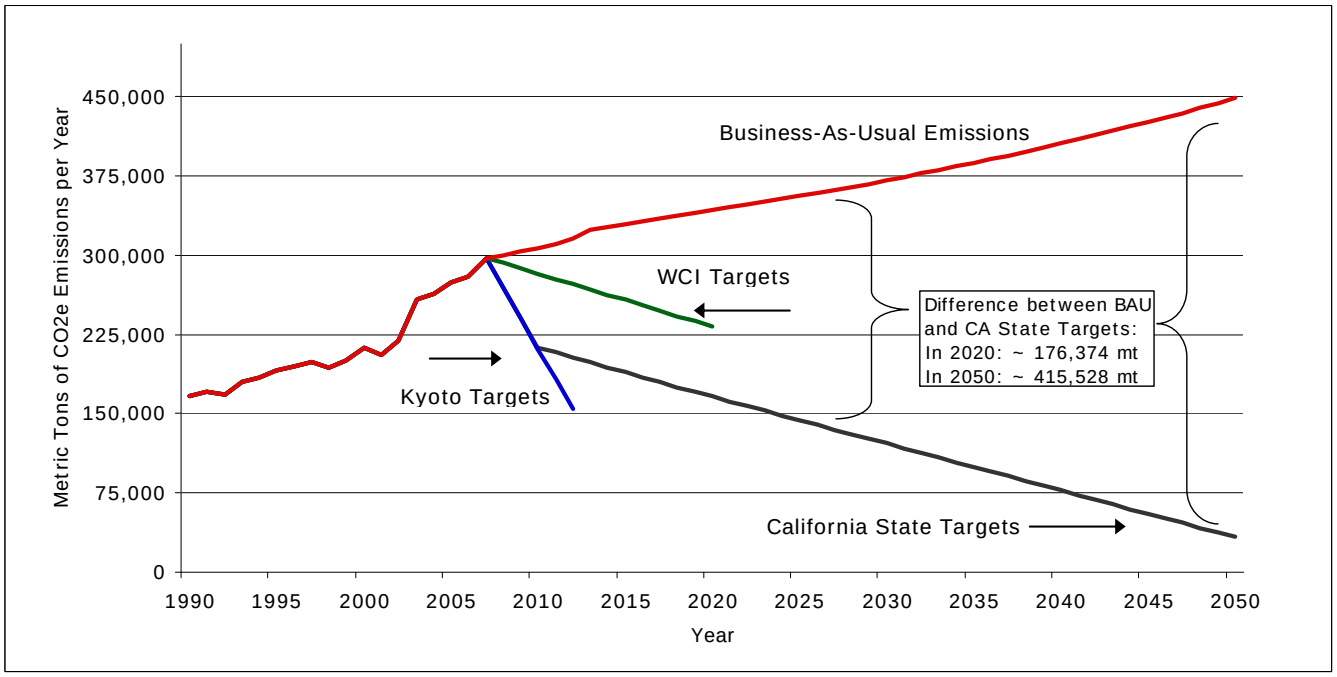
UC San Diego first measured all CO_2 emissions in 2003, which is the first year that emissions were reported publicly to the California Climate Action Registry. Starting in 2004, UC San Diego tracked and reported the GHG emissions of all six Kyoto GHGs. These emissions from the six Kyoto gases are converted to one common measure, the CO_2 equivalent, based on the Global Warming Potential of each gas.

Total GHG emissions have been rising since first measured and reported in 2003, and the normalized measure of GHG emissions per capita has increased from 2005 to 2006. Absolute historical emissions and an emissions trajectory are shown in Figure 7. Figure 8 shows emissions per capita for the last 4 years.

Certain emissions are not included in the UC San Diego's GHG Inventory because they were not required by the California Climate Action Registry. However, in 2008, estimated emissions from commuting and air travel were added to previous GHG inventories, two sources of emissions that are required by the reporting commitment contained in the American College & University President's Climate Commitment. Sources that are not included are emissions from purchasing and from waste disposal, composting, and recycling.

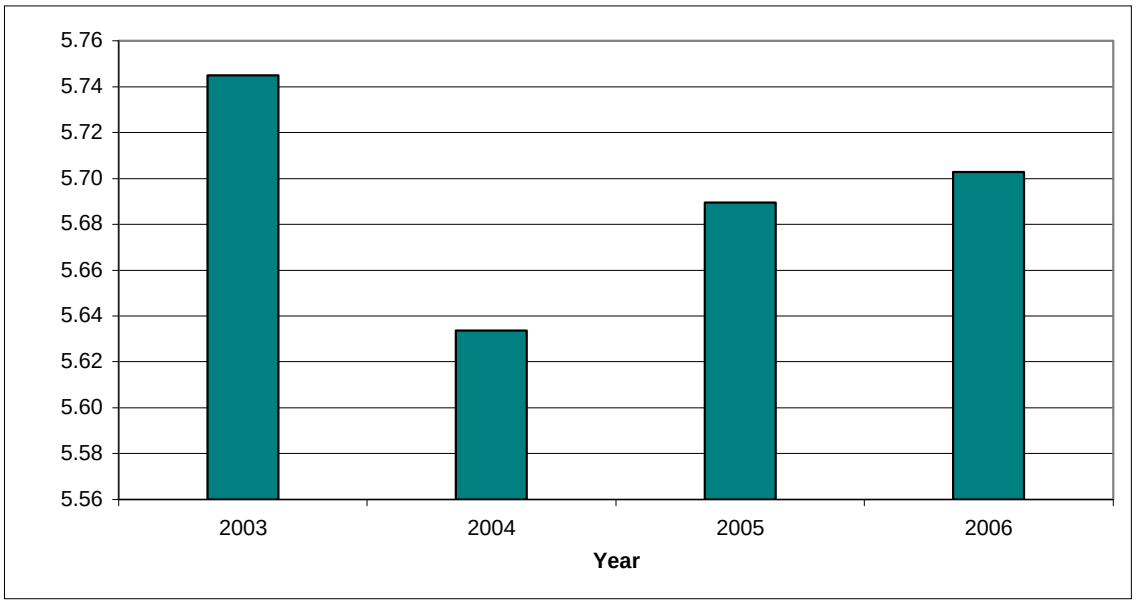
Total energy usage and GHG emissions have increased in the past 4 years and are likely to increase due to planned campus growth. This presents a significant challenge to the campus, in reaching emission reduction goals. Several entities have set emissions reduction targets, which are displayed in graphical format in Figure 7. The Kyoto Protocol target is to reduce emissions to 7% below 1990 levels by 2012. The Western Climate Initiative is an agreement between California and several other western states, to reduce emissions to 15% below 2005 levels by 2020. Finally, the State of California has committed to reducing emissions to 2000 levels by 2010, and to 1990 levels by 2020.

Figure 7: UC San Diego CO_2 Equivalent Emissions Trend and Trajectories



Source: UC San Diego Emissions Reports to the California Climate Action Registry and additional analysis. Note: In, 2003 only emissions of CO_2 were included in the emissions inventory.

Figure 8: UC San Diego CO_2 Equivalent Emissions per Capita



Source: UC San Diego Environmental Report
Note: In, 2003 only emissions of CO_2 were included in the emissions inventory.

Indicator E5: Percentage of Campus Buildings Sub metered for Energy Use

This indicator is related to the tracking and measurement of energy use on campus. By placing sub meters on buildings for electricity, natural gas, and other energy uses, the Campus Energy Manager can more accurately determine which buildings use which resources, and when. Table 3 provides estimates of the percentage of buildings on campus that are sub metered for energy usage.

Table 3: Buildings Sub metered for Energy Usage

Type of Sub meter	Percentage
Buildings Metered for Electricity Usage	90-95%
Buildings Metered for Chilled and Heated Water	30%
Buildings Metered for Natural Gas Usage	90-95%

Source: UC San Diego Energy Manager

In addition to sub metering buildings, UC San Diego could also add sub meters at the departmental level to track and manage energy usage by specific groups or organizations on campus. For example, UC San Diego could place sub meters on laboratories or other energy-intensive facilities. Such sub metering would allow the energy management team to more effectively understand how and when energy is used by various groups on campus. Ultimately, each group or department with a sub meter could be held accountable for their energy usage.

Indicator Summary

UC San Diego is a leader in addressing climate change as evidenced by its early action in measuring and reporting GHG emissions, as well as its aggressive program to reduce energy usage and install renewable energy generation capacity on campus. Total energy usage per square foot of building space declined by 3.5% from 2003 to 2006. However, GHG emissions per capita have increased somewhat from 2005 to 2006, and total energy usage and GHG emissions increased due to increased campus population and related campus expansion of building space. The overall trend of increased energy usage and related GHG emissions will likely continue, as UC San Diego is planning to construct a number of new buildings in the coming years.

Clearly, UC San Diego is easily able to track electricity and natural gas usage, since almost all buildings on campus are sub metered for these resources. However, only about a third are sub metered for chilled and heated water usage, making this energy more difficult to measure and manage.

Challenges

An entire separate report could be written on the challenges facing UC San Diego and all institutions with regard to energy use and reducing GHG emissions. Although UC San Diego utilizes a highly efficient system for on-site electricity generation that incorporates state-of-the-art pollution controls, the fuel for the system is natural gas. Making further reductions in

energy usage and GHG emissions will be difficult and will require a combination of efficiency projects and installation of new technologies. Achieving climate neutrality in the near future will include additional renewable energy installations, a continuation of aggressive energy efficiency programs, and potentially the use of offsets.

Future Plans and Recommendations

UC San Diego continues to move aggressively to reduce energy usage and add on-site renewable energy capacity. Several new solar panel arrays are being installed that will eventually provide 1 megawatt of capacity to the campus by January 2009. UC San Diego hopes to add an additional 1 megawatt of solar capacity in 2009. In comparison, however, the cogeneration plant, which provides 80% of the electricity used on campus, has a capacity of 30 megawatts.

Additional on-site renewable energy generation will come from fuel cells that will be powered by methane captured from the nearby sewage treatment plant at Point Loma. Other hydrogen-powered fuel cells may be installed. Additionally, UC San Diego is planning to expand the cogeneration plant to an additional 15 megawatts of capacity. Campus hopes to import additional biogas, but unless this new cogeneration unit uses methane from renewable sources, then overall GHG emissions will increase, making it more challenging for the campus to reach its GHG emissions reduction goals.

As noted in the section on “Built Environment/Green Building Practices,” campus staff are researching the possibility of using real-time microclimate data to better manage energy and water usage on campus. Please see the “Build Environment/Green Building Practices” section for more information and a recommendation regarding this project.

Perhaps most importantly, UC San Diego will develop a Climate Action Plan by the end of 2008. The goal of the Climate Action Plan is to establish a firm baseline of current GHG emissions (including emissions from air travel and commuting) and then develop goals for reducing GHG emissions against the baseline. A target date for reaching climate neutrality will also be identified in the Climate Action Plan.

UC San Diego is also planning the inclusion of additional sub metering to support behavior change strategies to reduce energy usage. By sub metering at the departmental or smaller level, groups on campus will be able to see and monitor their own energy usage. Also, departments that are sub metered could potentially be charged when their energy consumption rises above a predetermined baseline.

Recommendations:

- Develop a Climate Action and Environmental Impact Plan that will define how UC San Diego will reduce total GHG emissions even while accommodating planned campus growth.
- Continue tracking and reporting GHG emissions. For future inventories, add emissions from commuting and air travel, two sources that are required by the American College & University Presidents Climate Commitment.
- Ensure that all campus buildings are sub metered for electricity and natural gas usage to more easily manage these energy resources. Investigate the possibility of sub metering departments or laboratories to allow these academic units to be more accountable for their energy usage.

- Conduct regular audits of equipment that uses chilled and heated water to more effectively track energy and water usage and to maintain equipment efficiencies.

Background

Providing nutritious food is vital to the health and sustainability of the campus community. However, industrial agriculture production in the United States and beyond has continued to take a toll on natural resources through water usage, the application of fertilizers and pesticides, and continuing loss of land for natural ecosystems due to agricultural expansion. As food prices continue to rise during the first half of 2008, more and more people are becoming concerned about the long-term sustainability of the food production systems on which we now rely. Organic food production addresses some of the above challenges by requiring farmers to use only natural pesticides and fertilizers instead of the more resource- and energy-intensive options. However, as of 2005, cropland used for organic food production only accounted for 0.5% of the U.S. total cropland in production, and 0.5% of the total pasture land for livestock.[17]

Because UC San Diego is a large, complex campus, a number of food outlets, from snack shops to delis to full restaurants, are located on campus. Four main organizations manage food service on campus: HDH, The University Centers, and the UC San Diego Real Estate Office, and the Faculty Club. Each of these organizations has a different level of control over the food service outlets that they manage. Currently, the Faculty Club is investigating opportunities to operate more sustainably, and data may be available for the next assessment.

HDH oversees, manages, and staffs all of the food service outlets that are a part of their organization. Due to the high level of control over their outlets, HDH staff are able to drive new initiatives, and most of the data regarding food and sustainability in this report are from HDH, which has 11 outlets on campus.

In contrast, the University Centers have approximately 12 food service outlets, all of which are managed and staffed by outside vendors. At this time, the University Centers organization does not provide guidelines regarding sustainability issues to their food vendors, and no data are available regarding the vendors' sustainability programs. The same is true of other vendors throughout the campus that have leases and contracts through the Real Estate Office.

Housing, Dining, and Hospitality – Current programs

HDH has a number of initiatives related to sustainability. Currently, 100% of coffee served at their outlets is Fair Trade-certified. HDH is committed to recycling, and provides recycling containers at all outlets. Furthermore, 100% of "yellow" waste grease is diverted from HDH and the University Centers' food outlets, and is used as a feedstock for producing biodiesel fuel.

Currently, all dining facilities managed by HDH are undergoing energy and water audits to determine additional opportunities for energy and water conservation projects. Previous energy and water audits have led to successful implementation of efficiency projects. In one location (Plaza Café), a number of initiatives led to energy savings, such as switching light

[17] U.S. Department of Agriculture, Economic Research Service. See: http://www.ers.usda.gov/Data/Organic/

bulbs to more efficient models, repairing broken seals on a refrigerator, and implementing a new policy to unplug certain appliances during nonbusiness hours.

In addition, several facilities have planned renovations in the next 2-3 years. In these locations, renovations will be planned and implemented to include energy and water efficiency measures, as well as a number of other green building features, such as increased daylighting and natural ventilation systems. Finally, HDH's Canyon Vista restaurant recently received its "Green Business" certification, which involves implementing a number of projects to reduce waste, conserve energy and water, and prevent other forms of pollution.

Indicators

Indicator F1: Percentage of Food Purchased that is Certified Organic

A preliminary assessment indicates that 2-3% of the food purchased by HDH is certified organic. This is a preliminary estimate and additional work is needed to better track these data.

The percentage of organic food is low because HDH must buy their food and supplies in bulk, and most of the suppliers they use do not offer organic options for bulk purchases. Both HDH and UC Office of the President staff are researching options to expand organic purchases.

Preliminary estimates show that 2-3% of the food purchased by Housing, Dining, and Hospitality is certified organic

Indicator F2: Tonnage of Food Waste Diverted for Composting

HDH is currently working with a student group and UC San Diego Facilities staff on a pilot composting project at the Muir College Sierra Summit facility. Approximately 100 pounds of food waste per day is removed by a student volunteer team. However, only about 10-11% of this waste is currently being composted due to lack of capacity at the on-site composting tumbler.

Indicator Summary

Purchasing organic food in large enough quantities to satisfy the needs of a large institution is not a problem specific to UC San Diego. Other institutions are also finding this challenging. According to the University of California Santa Barbara Campus Sustainability Plan (April 2008), about 5% of produce purchased at UC Santa Barbara is certified organic.

Purchasing organic food and diverting food waste for composting are just two of the many indicators that could be included in this section. Because both the organic purchasing and composting programs are new, UC San Diego has little progress to show in these areas at this time. However, HDH has made significant efforts in reducing the impacts of their facilities by performing audits, reducing energy and water usage, and improving recycling programs. The next step is to focus on the sustainability of the food that is being served.

Challenges

Although the University of California has a system-wide initiative to research additional options to purchase more local, organic food, UC San Diego will continue to find this area challenging. Most organic food is marketed at the retail level, and commercial vendors have limited organic options.

Furthermore, UC San Diego is researching options for composting, including having the campus waste hauler remove food waste for off-site composting. However, only one composting facility in San Diego is currently permitted to compost food waste, which may provide a challenge due to the large volume of food waste generated at UC San Diego.

Finally, the numerous vendors who manage food outlets on campus operate relatively independently from campus administration. Working with these vendors may be challenging due to their sheer number, and influencing their practices may be challenging due to a low level of control over their operations. This challenge is especially applicable at the Price Center and other facilities that host food vendors that are not under the direct control of HDH or another campus organization.

Future Plans and Recommendations

HDH is pursuing a number of sustainability projects at their food outlets and has had a number of successes in reducing the environmental impacts of their facilities. In addition, HDH has a number of plans for expanding their sustainability programs. Below are some highlights:

- Utilize biodegradable utensils at all HDH outlets (already accomplished).
- Expand pilot composting project to other food outlets.
- Expand sustainable purchasing, including local, organic, and fair trade items.
- Partner with food vendors to reduce deliveries and distribute food deliveries more efficiently.
- Implement new tracking system to better understand sales of organic food products in retail outlets.

Recommendations:

- Include sustainability requirements for all food purveyors in contract language. Partner with vendors to encourage and adopt practices beyond those required in their contracts through education and sharing best practices across all campus food outlets.
- Continue to research and implement composting alternatives to divert food waste from the landfill. Once implemented, apply the finished compost as fertilizer on campus.
- Form a campus Food System Work Group.
- Continue to work with UC Sustainability Steering Committee Sustainable Food Systems Work Group and other groups to research and implement options to purchase more local, organic food for campus outlets.

- Establish a tiered schedule, to accomplish the following over a five year period:
    1. Assess all campus food service operations, to ascertain the level of compliance and/or the changes required to obtain “Green Business Certification”
    2. Conduct a staged Green Business Certification implementation at each facility, where deemed physically and/or fiscally feasible, based on the preceding assessments and taking into consideration the amount of campus control over each facility.

Background

UC San Diego occupies 1,152 acres of developable land, some of which is directly adjacent to the Pacific Ocean. The area enjoys a Mediterranean climate, with dry summers and mostly sunny days throughout the year. In addition, the region is quite arid, receiving on average 12 inches of rainfall per year. Because of its location next to the Pacific Ocean, stormwater management is essential for reducing the environmental impact of UC San Diego, since most stormwater runs directly into the Pacific Ocean. Furthermore, in such an arid region as San Diego, water conservation is essential, and some of the indicators below relate to the use of water and reclaimed water for irrigation purposes.

An important component of sustainability is balancing development with human needs for open space, wildlife needs for habitat, and preservation of sensitive ecosystems. In 2004, UC San Diego completed a Long-Range Development Plan (LRDP) to guide physical development and land use from 2004–2020. One of the five general concepts in the LRDP is consideration of "The Park," which includes the natural resources of the campus, such as the coastal bluffs, hillsides and canyons, and eucalyptus groves. The LRDP labels some areas that are designated for preservation as an "Ecological Reserve." Other areas are identified as "Grove Reserve" and "Restoration Lands." Limited development will occur in these areas.

Also included in the LRDP is consideration of a general concept regarding connections, which tie various parts of the campus together, including the landscaped features of the campus.

This section of the assessment also considers environmental impacts to the land from the application of herbicides, pesticides, and fertilizers. Application of these chemicals helps to preserve the landscaping on campus, but many of these chemicals could end up in groundwater or in the Pacific Ocean, causing damage to local ecosystems.

Indicators

Indicator LUH1: Percentage of Landscaped Area Planted with Native or Xeriphytic Plants

As noted above, San Diego receives slightly less than 12 inches of rainfall per year, on average. Most rainfall occurs from December–March. Thus, the use of native plants, which are naturally adapted to the semiarid climate, and xeriphytic plants, which are drought-tolerant, greatly reduces the need for irrigation water.

At this time, approximately 26% of UC San Diego's developable land is set aside for native and drought-tolerant landscapes. These lands are a portion of "The Park" lands described in the LRDP.

Of all developable land, approximately 200 acres are landscaped, and 75% of that acreage is planted with native and drought-tolerant species. UC San Diego's high water use areas consist of about 54 acres of turf for programmed uses, or remnant turf at older

75% of landscaped areas are planted with drought tolerant or xeriphytic plants and 25% are irrigated with reclaimed water

developments. Data for this indicator are provided by the Manager of Grounds and Landscaping.

Indicator LUH2: Percentage of Landscaped Area Irrigated with Reclaimed Water

According to the Manager of Grounds and Landscaping, approximately 25% of landscaped areas are irrigated with reclaimed water. This percentage has been relatively steady from 2005-2007. However, this is a preliminary estimate, and is not based on actual data.

Indicator LUH3: Pesticide Use

Pest control on campus is based on the concepts of Integrated Pest Management, in which barriers and other non-chemical methods are used for pest management, so that chemical inputs are reduced.

However, a number of pesticides and herbicides are used on campus, in both liquid and solid forms. Table 4 shows a summary of usage of these items, and

Figure 9 shows a graphical summary of the same information.

Currently, the contractor that provides pest control services to the campus estimates that about 80% of applications for insect and fungi control are listed with the Organic Materials Research Institute (OMRI), meaning that they are considered safe enough for organic farming purposes. These materials tend to be far less toxic than other alternatives. However, insecticides and fungicides are only a small portion of the total amount of herbicides and pesticides applied on campus, as evident from Table 4. Data on the total percentage of herbicides and other materials that are listed with the OMRI are not available. The contractor that provides pest control services is continuing to research less toxic alternatives, including the use of additional products listed with the OMRI, to replace traditional herbicides and other products. [18]

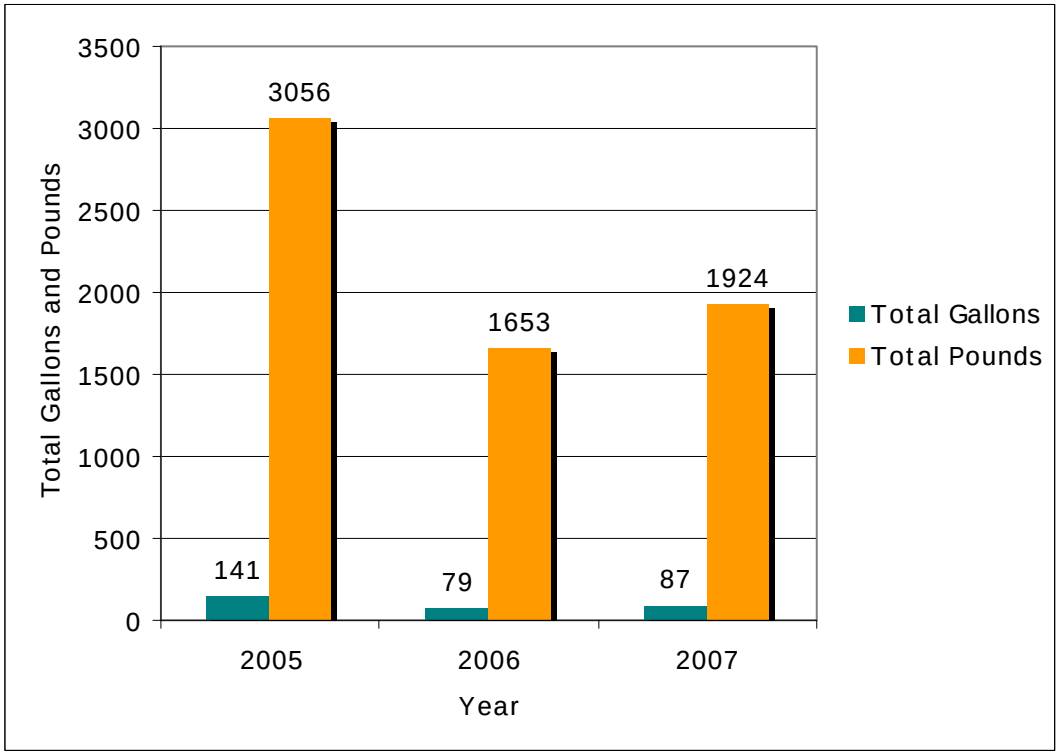
Table 4: Herbicide and Pesticide Use

State of Herbicide / Pesticide	2005	2006	2007
Liquid Herbicides (gallons)	133	69	74
Granular Herbicides (pounds)	2921	1540	1830
Insecticides (gallons)	6	6	8
Fungicides (gallons)	0.4	3	2
Surfactants (gallons)	1	1	3
Slug and Snail Bait (pounds)	52	No data	46
Rodenticides (pounds)	83	113	48
Total Gallons	140	79	87
Total Pounds	3056	1653	1924

[18] Email communication, Manager, Grounds and Landscaping, June 23, 2008. Data provided by the contractor performing pest control services.

Source: Manager, Grounds and Landscaping
Note: All numbers are rounded

Figure 9: Summary of Herbicide and Pesticide Use



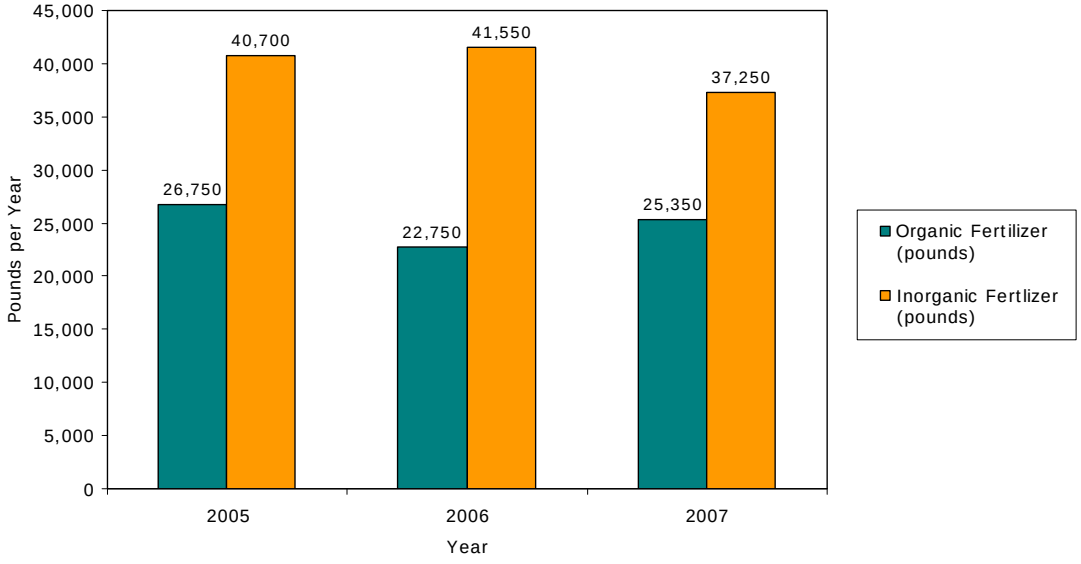
Source: Manager, Grounds and Landscaping

Indicator LUH4: Fertilizer Use

Fertilizers are used to improve the appearance of landscaped areas on campus. However, fertilizers are also linked to some environmental impacts, such as eutrophication of waters due to excess nitrates and phosphates. Also, inorganic fertilizers are made from nonliving materials. They can be immediately used by plants, but they have some negative impacts. For example, inorganic fertilizers can more easily be washed below the roots of plants, thus wasting them. They sometimes contain chemical salts and can damage young plants if applied too heavily. These salts can also build up in the soil over time, causing toxic conditions. Organic fertilizers are those are derived from living organisms, and include compost and animal manures. Organic fertilizers are usually not immediately available to plants, and must be broken down further to be useful. However, they are usually less harmful to local ecosystems, and are generally preferable to inorganic fertilizers from a sustainability perspective.

Figure 10 shows annual use of inorganic and organic fertilizers on campus. Total amounts of fertilizers applied have decreased by about 7% between 2005 and 2007.

Figure 10: Fertilizer Use



Source: Manager, Grounds and Landscaping

Indicator Summary

UC San Diego is taking steps to reduce water used for irrigation by planting about 75% of landscaped areas with drought-tolerant or native species. In addition, an estimated 25% of the water used for irrigation is reclaimed water, thus allowing potable water to be used for other purposes. However, room for improvement exists in this area, particularly in regions with high water usage, such those with turf. One solution may be to replace natural turf with artificial turf, although more research is needed to determine the tradeoffs of using artificial turf products.

Although the total gallons and pounds of pesticides and herbicides used on campus have declined significantly (37%) since 2005, a large amount of these items is still applied.

Furthermore, the use of inorganic and organic fertilizer has declined by 7% since 2005. Inorganic fertilizer makes up the majority of the fertilizer applied on campus.

Challenges

The 2004 LRDP identified 297 acres of developable land for future construction projects. Some of these projects are already underway, reducing the amount of land available for open space or habitat preservation.

At the same time, UC San Diego is growing to meet demand as overall population increases in the State of California, and the campus needs additional space to accommodate more students and fulfill its mission as an institution of education and research.

As evident from Indicators LUH3 and LUH4, further challenges exist in keeping the landscape healthy and pest-free while reducing the amount of materials applied on campus that could be damaging to the environment.

Future Plans and Recommendations

As noted in the section on "Built Environment/Green Building Practices," campus staff are researching the possibility of using real-time microclimate data to better manage energy and water usage on campus. For example, data on rainfall during the winter months could be used to inform the irrigation schedule for landscaping. Please see the "Built Environment/Green Building Practices" section for more information and a recommendation regarding this project. Other data could better inform irrigation schedules; for example, monitoring the amount of moisture present in the soil would help landscaping staff better manage irrigation based on the actual water needs of the plants. Other potential water conservation measures include developing irrigation schedules based specifically on the type of landscaping, as well as irrigating during non-peak sunlight hours to reduce evaporation loss.

Also, campus staff are researching the possibility of using condensate from HVAC and other cooling systems for irrigation and other purposes, as well as reusing water from sinks and showers (greywater) for irrigation and other purposes.

Recommendations:

- Expand the use of reclaimed water for irrigation purposes, if possible.
- Investigate and document any long-term environmental impacts of installing artificial turf, and then determine whether artificial turf fits with the sustainability goals of the campus.
- Reduce use of herbicides and pesticides where possible and increase the use of products listed with the OMRI. Also, gather data on the total volume/weight of products used that are listed with OMRI vs. the total volume and weight of products used.
- Reduce usage of inorganic fertilizer and replace with naturally derived, organic alternatives, e.g. compost, manure, and other fertilizer made from living organisms. Research the possibility of expanding the campus pilot composting project and using the finished compost as fertilizer on campus.
- Explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment. (This recommendation is also provided in the "Built Environment/Green Building Practices" section.)
- Develop irrigation policies and schedules that reflect the type of plants being irrigated, and that minimize the irrigation that occurs during peak sunlight hours (evaporation is highest during these hours). Also, investigate the possibility of gathering and using soil moisture data to determine when landscaping should be irrigated.

Background

A number of organizations and groups are working to educate faculty, students, staff, and others on campus and beyond regarding sustainability issues. It is challenging to measure how many campus members are aware of sustainability issues, and it is also difficult to measure the level of their awareness. However, we can begin to track and expand our outreach efforts as a community.

One of the most important times of the year for conducting sustainability outreach is Earth Week. In 2008, the theme of Earth Week was "Choose to Change," which included a focus on individual actions that campus members can do to reduce their environmental impact. One hallmark activity of Earth Week is an annual trash sort. Other green events ranged from a Green Car Show (which included some of UC San Diego's fleet vehicles) to talks and seminars, to an Eco Job Fair. A campus sustainability award ceremony was also included in the festivities.

Another important outreach event was Focus the Nation, which occurred on January 31, 2008. Focus the Nation is a national event, with participants taking part at over 1,900 college and university campuses, and many other community groups. The goal was to bring everyday awareness to the issue of climate change through various events, such as workshops, seminars, poetry readings, and many more. The next national Focus the Nation event will occur in February 2009.

Other sustainability outreach opportunities include new employee orientations, student orientations, departmental meetings, and special events. One event of note is the "Share Case" event, a trade expo which is open to all UC San Diego employees. Various departments, such as Facilities Management and the Bookstore, share information regarding their current programs and practices at this event, and working sessions are held to better inform and train employees on services and programs available on campus. Sustainability information has been presented at former "Share Case" events.

UC San Diego also interfaces with the greater community in the San Diego region on sustainability issues. For example, the ESI has held a number of workshops and conferences that are open to the community. UC San Diego also plans to share best practices with local government agencies in areas such as energy and water conservation.

Some related information is provided in the category on Social Responsibility and Community Engagement, which includes data on the number of organizations on campus that deal with sustainability issues.

Indicators

No indicators are included in this category at this time. Future indicators may be developed for the next Sustainability Assessment.

Challenges

A large percentage of students, faculty, staff, and other members of the UC San Diego community will likely participate in an environmental or sustainability-themed event each year. However, the extent to which the community understands the messages and begins to change their own behaviors is very difficult to measure. This Sustainability Assessment is the first attempt to measure how individuals' behaviors, considered together, form a picture of sustainability at UC San Diego. However, further research is needed to understand how education and outreach inform people's attitudes and potentially change their behaviors to include more sustainable practices.

Future Plans and Recommendations

Future plans in this category could include keeping track of how many people attend various environmental and sustainability events, or conducting surveys on overall campus awareness of sustainability issues and personal practices related to sustainability.

Another project in the planning stage is the Sustainability Walk, which is envisioned as a permanent installation of plaques, monitors, and other displays along several prominent campus walkways. The purpose of this project is to increase awareness of campus sustainability efforts, and to increase participation in sustainable behaviors. Some of these displays will show real-time energy usage and could also show other real-time data.

Recommendations:

- Develop indicators to measure the extent and effectiveness of sustainability outreach.
- Establish visible, real-time, campus or building displays showing energy, water, waste, and other resource or emissions data to increase campus community awareness of sustainability issues.

Background

As with any large organization, UC San Diego purchases a wide range of goods and services every year. The annual amount spent by the entire UC system for goods and services is the largest of any higher education system in the world. By requiring vendors to provide environmentally preferable products and services while at the same time demonstrating the steps they are taking to make their company "green", the Procurement & Contracts team at UC San Diego and in the greater UC system influences vendors to make cutting edge changes to their supply chain practices. This results in intrinsic and programmatic changes from the top down as companies must change their way of thinking -- and in some cases their business models -- in order to keep up with the sustainability requirements for doing business with UC San Diego.

The Procurement & Contracts Department is responsible for a large portion of all purchasing activities on campus, although not all purchasing occurs through the Purchasing & Contracts Department. Because of the decentralized organizational structure of UC San Diego, purchasing is highly decentralized and highly complex. Responsibilities for low dollar transactions (less than $5,000) are delegated to specific staff within campus departments. These purchases are known as Low Value Purchases. Although the Procurement & Contracts team has negotiated contracts with vendors, end users are granted flexibility, especially at the low dollar level, to make purchases from other vendors. Purchases of goods and services above $5,000 or for restricted items are sent to the Procurement & Contracts department for processing.

The Procurement & Contracts team was part of the UC-wide collaboration that developed the *UC Guidelines for Environmentally Preferred Purchasing* and has implemented the Environmentally Preferable Purchasing requirements in the *UC Policy on Sustainable Practices.* Examples of these policies include paperwork reduction (through the use of limited signed copies, etc.), purchasing ENERGY STAR rated products, negotiating recycling programs for batteries and lighting products, and working with suppliers to reduce packaging.

The UC San Diego Procurement & Contracts Department also is engaged in campus sustainability efforts to reduce GHG emissions through increased energy efficiencies and use of alternative energy. These initiatives, also described in the "Energy" section, include the purchase of: solar panel installations, a fuel cell installation, a compressed natural gas fuelling station, a hydrogen fueling station, and an energy storage facility. Other areas of this report that contain information related to the work of the Procurement & Contracts team are: "Built Environment/Green Building," which provides information about UC San Diego's purchases of Green Seal-certified cleaning products; "Transportation," which provides information about the purchasing of alternatively fueled vehicles in UC San Diego's fleet, and "Food," which contains information on purchasing organic products. Additionally, Procurement & Contracts is organizing and hosting a life sciences supplier forum to bring together strategic life sciences companies, key shipping companies, and other invited suppliers to discuss supply chain optimization, packaging and labeling best practices, and other innovations in the life sciences arena that will lead to further sustainability enhancements.

Finally, UC San Diego is one of a few of the UC Campuses that maintains a central receiving facility for shipments to the campus. The receiving operation is located off-campus within the major San Diego logistics hub for global transportation and distribution activities. This location allows for consolidated shipments between the receiving facility and main campus, significantly reducing the number of trucks driving to and from campus. Additionally, this venue has resulted in successful negotiations with suppliers to achieve bulk shipping, reduction in packaging, and lower transportation costs/energy consumption.

Although many of these policies and practices are not easily measurable, one campus initiative that results in measurable changes on campus is in the area of paper purchase and use. Procurements & Contracts has begun to phase out use of virgin paper and adopt 30% Post Consumer Waste (PCW) recycled content paper for "cut sheet" paper office supplies. Campus staff are also investigating the recycled content of the offerings for other paper office supplies, which include folders, envelopes, and other paper products. The two indicators below focus on paper usage at UC San Diego.

Indicators

Indicator P1: Paper Usage per Capita

According to the U.S. EPA, paper and paper products make up the largest portion of the solid waste generated in the U.S., at approximately 34% of all waste generated.[19] Thus, reducing paper usage can greatly reduce the total amount of waste generated. Also important is purchasing paper with recycled content to reduce the demand for virgin paper and "close the loop" of recycling programs.

In 2006/2007, UC San Diego used approximately 1,568 sheets of paper per person, and 3,002 sheets of paper per student

Total cut white paper purchases are made by UC San Diego's Storehouse; they provide the paper to Imprints (which provides copier and printer services throughout campus) and to the greater campus community for paper usage that is not supplied by Imprints. In essence, The Storehouse's purchases and distribution of paper make up 95% of the cut white paper at UC San Diego. Data for the Storehouse show that UC San Diego purchased 162,400 reams of paper in fiscal year 2007/2008, which is 81,200,000 sheets of paper. This equates to 1,568 pages per person, and 3,002 pages per student.

In comparison to UC San Diego, the University of British Columbia, a sustainability leader, has been tracking paper usage per student since 1999. They started with 3,194 sheets per student in 1999, and are now at 1,872 sheets per student as of 2006-2007, 1,130 sheets/student/year less than UC San Diego.[20]

Indicator P2: Percentage of Post-Consumer Waste Content in Paper Purchases

Figure 11 shows data representing total paper purchases for virgin paper (no recycled content) and for the three major types of recycled paper during fiscal year 2007/2008. Using these data, we calculated that the total percentage of PCW

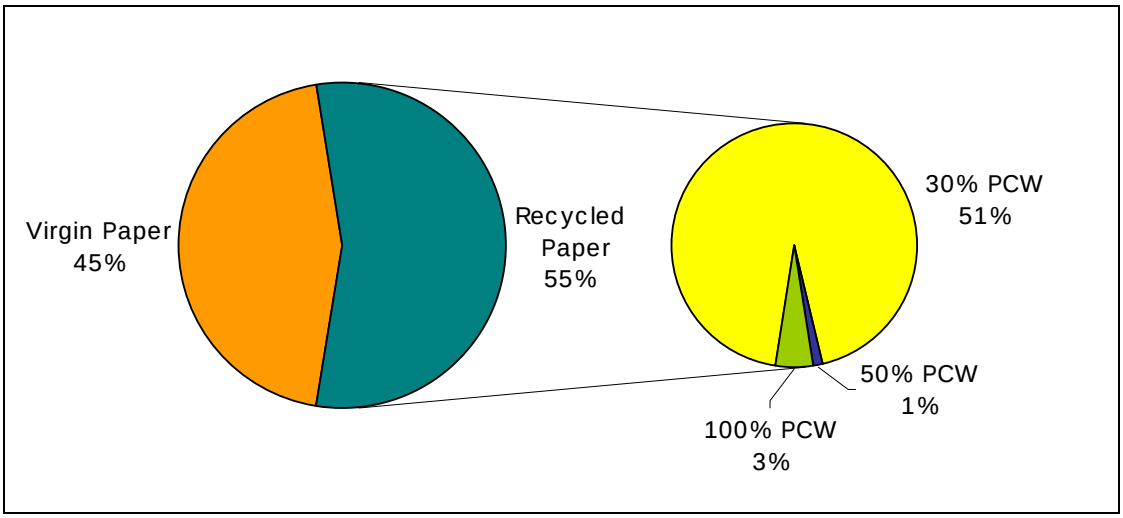
The total percentage of PCW content paper purchased by UC San Diego is 18.6%.

[19] http://www.epa.gov/garbage/pubs/msw06.pdf

20 The UBC Sustainability Report, 2006-2007, p.60.

content in all paper purchases is 18.6%. Also, 55% of all the paper purchased on campus has some recycled content.

Figure 11: Post-Consumer Waste Content in Paper Purchases



Source: Storehouse Paper Purchases

Indicator Summary

As a whole, UC San Diego is performing behind another campus sustainability leader in the metric of paper used per capita. However, this is the first year that UC San Diego has tracked and reported this metric.

Also, UC San Diego could improve the percentage of PCW content from the current 18.6% of paper purchased. Although slightly over half (55%) of all paper purchased contains recycled content, close to half of the paper purchased contains no recycled content. Also, most of the paper purchased with recycled content contains only 30% PCW.

Challenges

The cost of 30% PCW content paper versus 100% virgin paper is essentially the same, so it should not be difficult to replace the use of virgin paper with the 30% PCW content paper. The goal within Marketplace (the new online purchasing website, described in more detail below) is to redirect campus purchasers from their selection of virgin paper to the alternative 30% PCW paper. Stronger measures and policies to dissuade the purchase of virgin paper could also improve performance of this indicator.

Currently, 50% PCW and 100% PCW are more expensive than virgin paper and the 30% PCW paper. However, increasing the overall campus demand for 50% PCW and 100% PCW paper could help drive down the price from the supplier community.

Other challenges include lack of awareness or knowledge on the part of purchasers who are not in the Procurement & Contracts Department, as well as student, staff, and faculty awareness and demand for environmentally preferable products.

Future Plans and Recommendations

Procurement & Contracts is launching a new E-Procurement Purchasing System in fall 2008. Marketplace is a web-based, on-line shopping site (similar in format to Amazon.com) for the campus to purchase goods and services from suppliers. All strategically sourced contracts for the new Marketplace system will incorporate requirements for sustainability and environmentally preferable purchasing. Once Marketplace is fully operational and in use campus-wide, other purchasing processes will cease to exist. In Marketplace, products and services that meet standards such as "Green Seal" or "Energy Star" will be highlighted. Also, the new Marketplace website will allow for tracking sustainability accomplishments and will result in more accurate and complete data sets for environmentally preferable purchasing.

Procurement & Contracts is also working with campus leadership and with suppliers to develop additional sustainability criteria based on new technologies and best business practices. For example, currently, printers on campus are required to be Energy Star certified and the Energy Star features must be enabled when the printers are delivered. Printers listed on Marketplace, in addition to Energy Star certified, will be duplex (double-sided) enabled.

In addition, Procurement & Contracts continues to seek out training and discussion opportunities to develop new sustainability requirements to supplement and strengthen existing policies. [21] Additionally, Procurement & Contracts professionals continue to work on waste reduction/diversion programs and environmentally preferred purchasing through inclusion of comprehensive sustainability criteria in all RFPs and in non-bid contracts. For a discussion of the recycling and reuse efforts at the Campus Surplus Sales, please see the "Recycling and Waste" section of this report.

Other Plans:

The definition of "sustainability" varies across industry and UC San Diego's Procurement & Contracts Department looks for industry-specific metrics for defining sustainability for each bid that it issues.

Procurement & Contracts will also identify and support a sustainability expert to acquire knowledge of best practices for sustainable purchasing and spearhead implementation of those concepts and practices into its contracts and purchasing documents. This individual will also serve in a training role and be a resource to the rest of the department and campus.

A sustainability training program for department staff is in development by Procurement & Contracts. Finally, Procurement & Contracts will continue to implement and be actively involved in system-wide strategically sourced contracts that increase the amount of environmentally preferable purchases that are procured at the system-wide level.

[21] For example, see the following website: http://blink.ucsd.edu/Blink/External/Topics/Policy/0,1162,23724,00.html

Recommendations:

- Implement tracking mechanisms to collect data on environmentally preferable purchasing both by Procurement & Contracts and by campus departments.
- Create a full time position to coordinate sustainable purchases and ensure that sustainability requirements are in all contracts and procurement documents.
- Educate campus departments on environmentally friendly alternatives to the items they purchase; provide ready access to purchase these alternatives.
- Consider mandating the purchase of environmentally-friendly alternatives when these alternatives are cost effective and perform equally to the conventional products.
- Issue a mandate to purchase cut white paper with a minimum 30% PCW content, and allow for exceptions only when publication standards require the use of 100% virgin paper. Also, proactively promote and market the selection of 50% or 100% PCW content paper to the campus community, bringing higher volumes to the marketplace and resulting in lowered prices of these paper types.

Background

Our society uses a large variety of materials, which bring with them a host of problems. According to the authors of Natural Capitalism[22], 99% of the consumer products on the market today are consumed within 6 months of purchase. Some of those products can be recycled, and by capturing and recycling these materials, we can reduce the amount of virgin resources required for new products, as long as the recycled material actually displaces raw or virgin material.

The UC *Policy on Sustainable Practices* sets the following voluntary goals for the UC system:

- 50% waste diversion by June 30, 2008
- 75% waste diversion by June 30, 2012
- Zero waste by 2020

All campuses are also encouraged to develop an Integrated Waste Management Plan and a funding mechanism by June 30, 2007. Medical centers are encouraged to collect and report data to the campus with which they are affiliated.

UC San Diego conducts several waste reduction programs, which serve to reduce the amount of materials that are landfilled by reusing them, when possible. One program, known as Surplus Sales, serves as an outlet to dispose of used, excess property from the campus. Anyone is free to purchase used items from Surplus Sales. Various types of equipment, including medical research equipment, furniture, computers, and even vehicles, are available from Surplus Sales. Any items that are not reusable are sent elsewhere for recycling.

UC San Diego also has a single-stream recycling program that captures glass, metal, plastic (#1 and 2), and all paper products. Most green waste and all wood chippings are composted or mulched, respectively. In addition, all grass clippings are left on the lawn as mulch. Large metal objects, concrete, and dirt are all recycled instead of placed in landfills.

Additionally, UC San Diego Facilities Management recycling staff annually coordinate residence hall move-in and move-out collection events to maximize the diversion of discarded materials from landfill; items are recycled or reused.

Indicators

Indicator RW1: Total Solid Waste and Recycled Material Generated (Main Campus Only)

Figure 12 (see next page) shows the annual tonnages of waste sent to landfills and recycled from the Main Campus; Hillcrest Campus data were not available. (Waste and recycling tonnages from the Scripps Institution of Oceanography are included in this data.) These data were provided to UC San Diego by the waste hauler. However, the tonnages of

[22] Hawken, P., Lovins, A., and Lovins, L.H. *Natural Capitalism: Creating the Next Industrial Revolution*. 2000.

materials recycled were estimated, and not based on actual data. In the future, the UC San Diego staff will work with the campus hauler to improve data collection methods.

Indicator RW2: Campus Diversion Rate (Main Campus Only)

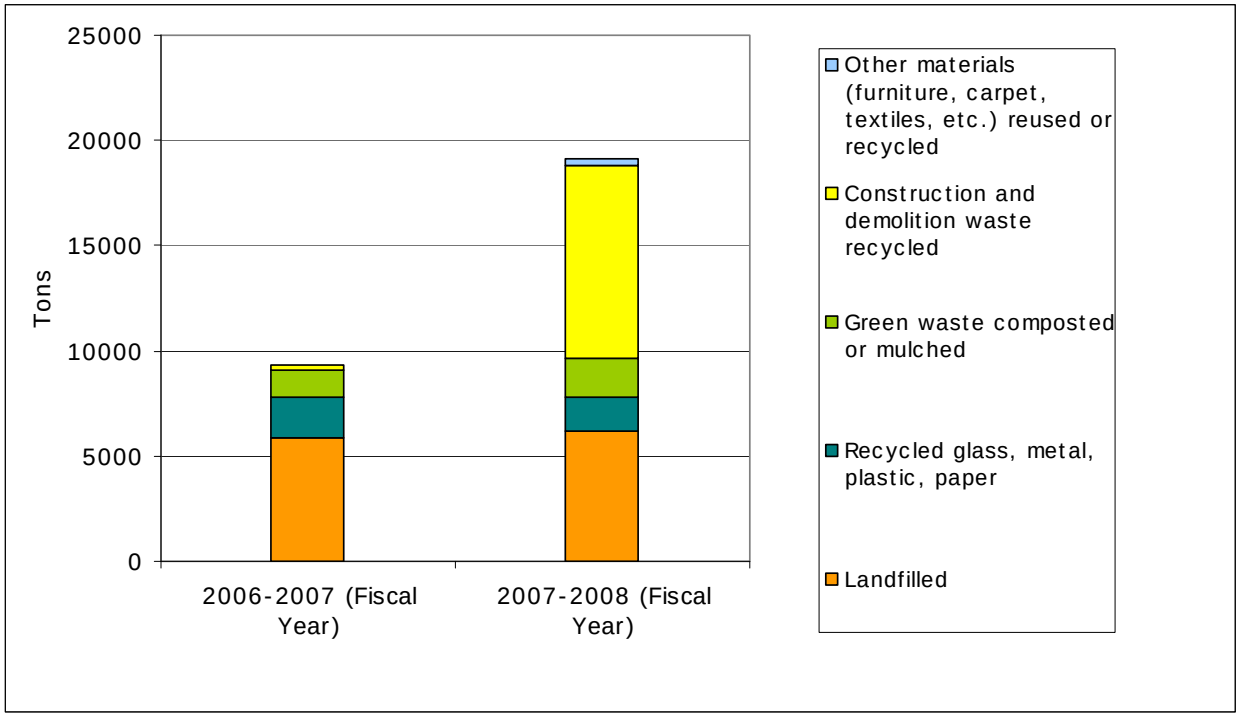
Based on the data presented in Indicator RW1 above, the campus diversion rate is as Table 5 indicates. A breakdown of the materials recycled, composted, or landfilled in shown in Figure 12. Although the campus diversion rate has increased greatly in the past fiscal year, the total amount of waste generated has also increased, mostly due to the construction and demolition waste generated (and recycled).

Table 5: UC San Diego Main Campus Diversion Rate

2006-2007 Fiscal Year	2007-2008 Fiscal Year
37.1%	67.4%

Source: UC San Diego Recycling Coordinator, Annual Recycling and Waste Reduction Report to the UC Office of the President (2006-2007 and 2007-2008).

Figure 12: Main Campus Waste and Recycling Tonnages



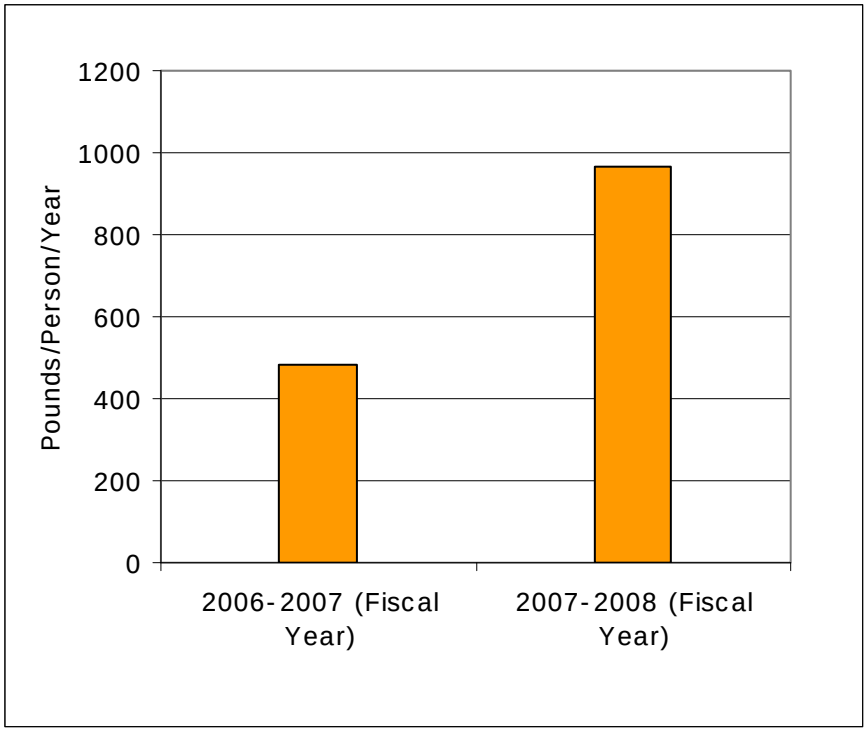
Source: UC San Diego Recycling Coordinator, Annual Recycling and Waste Reduction Report to the UC Office of the President (2006-2007 and 2007-2008).

Indicator RW3: Waste Generated per Capita

This indicator is developed using the data provided above in addition to population counts for the Main Campus (including the general campus and Scripps Institution of Oceanography). Figure 13 shows the waste generation per capita for the Main Campus, which is currently about 965 lbs/person/year.

In comparison, the U.S. average is 1,679 pounds/person/year. Thus, UC San Diego's average is far below the national average, although many UC San Diego employees and students generate additional waste at their residences, which is not included in these numbers. The U.S. national average also includes waste from manufacturing and other industries.

Figure 13: Main Campus Waste Generation per Capita



Source: UC San Diego Recycling Coordinator, Annual Recycling and Waste Reduction Report to the UC Office of the President (2006-2007 and 2007-2008).

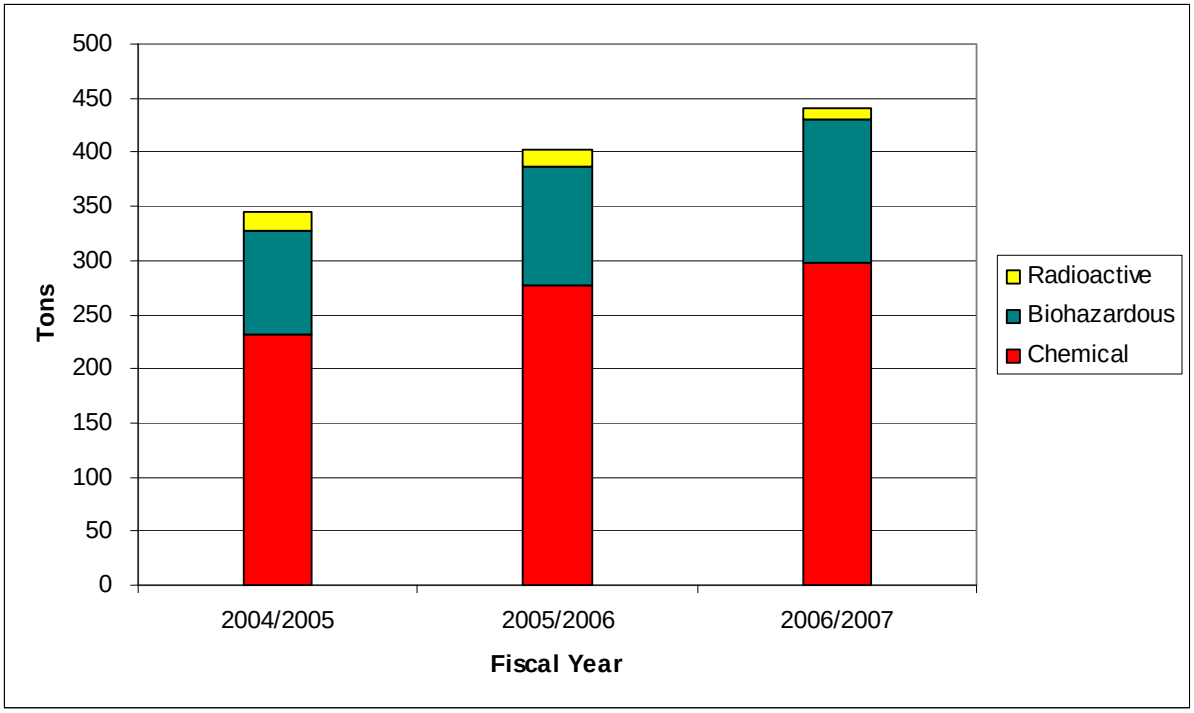
Indicator RW4: Hazardous Waste Generated and Disposed

The hazardous waste generated and disposed of on campus is tracked by the Environment, Health, & Safety Office and is reported to the California Department of Toxic Substances Control annually. This waste is generated by many activities at UC San Diego.

For the purposes of this report, hazardous waste is divided into three categories: chemical waste, radioactive waste, and biohazardous waste. The chemical waste includes many types of substances, including electronic waste, fluorescent light bulbs, ballasts, batteries, and many chemicals. Figure 14 shows the total tonnages of each type of waste disposed of in the last three fiscal years. These data are reported by fiscal year, and are not available for calendar year. As evident from Figure 14, chemical waste makes up the majority of hazardous waste disposed at UC San Diego, and this type of waste has been increasing steadily.

Some electronic waste is sent to a central storage area and reused by other campus users. Other electronic waste is sent to a recycler. All fluorescent light bulbs, ballasts, and batteries are also recycled.

Figure 14: Hazardous Waste Disposed of at UC San Diego



Source: Environment, Health, & Safety

Indicator Summary

The campus diversion rate is a key indicator in the waste and recycling category, because it is easily compared to other universities and jurisdictions, and it is the metric included in UC *Policy on Sustainable Practices.* Table 6 below shows the diversion rate of UC San Diego and several other UC schools.

In the 2007-2008 fiscal year, UC San Diego diverted 67.4% of its waste for recycling or composting, meeting the goal outlined in the *UC Policy on Sustainable Practices.* This diversion rate is also higher than the U.S. national average of 32.5% in 2006. UC San Diego achieved a large increase of 30.3% in the diversion rate from 2006-2007 to 2007-2008, which is mainly attributable to increased amounts of construction and demolition waste being generated and recycled. (See Figure 12.) As shown in Table 6 below, a large range of diversion rates exists at campuses in the UC system. However, all the schools represented in Table 6 show an increase in the diversion rate from 2006-2007 to 2007-2008.

In addition, hazardous waste disposal has grown in recent years. From the 2004/2005 academic year to the 2006/2007 fiscal year, hazardous waste disposed of at UC San Diego has increased by 28%. Both chemical and biohazardous wastes have increased, while

radioactive waste disposal has decreased by 39%. However, radioactive waste is only a small portion of all hazardous waste disposed of at UC San Diego.

Table 6: Diversion Rates at UC Schools

Year	UC Berkeley	UC Davis	UC Irvine	UC Los Angeles	UC San Diego	UC Santa Barbara
2006-2007	34.4%	56.0%	45.3%	19.9%	37.1%	53.2%
2007-2008	57.0%	69.0%	53.9%	52.0%	67.4%	65.0%

Sources: Annual Waste Reduction and Recycling and Preliminary Integrated Waste Management Plan submitted by each campus to the UC Office of the President.

Challenges

As noted above, UC San Diego has reached the first goal outlined in the UC *Policy on Sustainable Practices*. However, this goal was reached through large generation and recycling of construction and demolition waste. To continue to reach the goal of 50% and higher diversion, existing programs need to be strengthened, and new programs may need to be introduced. Certainly, achieving zero waste includes redesigning the current use of materials, from packaging to paper to hard-to-recycle items, so that waste is reduced at the source before it is even generated. Also critical is the need to implement accurate diversion volume tracking; it is believed that a fairly significant percentage of materials are currently diverted but not effectively tracked. These data are necessary in order to understanding true diversion accomplishments and patterns.

A current challenge is the administration of the recycling program on campus. The staff member responsible for recycling is also responsible for coordinating and managing several other programs on campus, and does not always have adequate time to work on improving the recycling program. Placing additional resources into the recycling program, including additional staff support, could improve the diversion rate and reduce waste removal costs for UC San Diego.

Another challenge is the need to coordinate among numerous groups and departments on campus. As noted in other sections of this report, UC San Diego is a complex university, and is highly decentralized. Like many other sustainability programs, coordination and education of all groups will be necessary to achieve results.

Finally, hazardous waste disposal will likely continue to grow on campus, as campus growth continues for the next several years, unless aggressive programs are put into place to reduce generation of these substances.

Future Plans and Recommendations

The Environment, Health, and Safety Office is currently researching new recycling options for UC San Diego. For example, one option is to recover and recycle copper from the tubing in air conditioner units. Before copper collection can occur at UC San Diego, however, the campus may need to obtain a permit.

Currently, a pilot composting program is in place at one dining facility on campus. UC San Diego is researching options for creating a campus-wide composting program, which may involve collecting compostable items and transporting them to an off-site facility for composting. UC San Diego may be able to take advantage of emerging technologies to implement a solution in this area. For example, a professor at UC Davis is has developed demonstration project for a new anaerobic digester that converts food scraps to renewable energy.

Additionally, campus is investigating the availability of specialized vendors for redirecting campus surplus streams from landfill.

Recommendations:

- Research and implement a campus-wide composting program.
- Develop a campus-wide task group including, at a minimum, membership from Facilities Management, HDH, University Centers, and Facilities Design and Construction to develop collaborative strategies to reduce solid waste and increase diversion of solid waste.
- Create a full-time position to coordinate recycling and composting programs.

Background

UC San Diego exists in a larger community in the San Diego region, in California, and beyond. The mission of the University of California includes reference to other "public service," in addition to education and research. UC San Diego does not exist in a vacuum, but must form a positive relationship to the neighboring communities to succeed in fulfilling its mission. Also, UC San Diego works to include sustainability in our employment policies. This section explores UC San Diego's social responsibility in more detail.

One method of improving the relationship between the campus community and the surrounding areas is through donation of time and resources. The resources available at UC San Diego include not only academic expertise, but also a large body of students and staff who could become involved in the surrounding community as volunteers, interns, or paid staff at community agencies and nonprofit organizations. Thus, the two indicators below focus on the community service performed by students, and the number of sustainability-related organizations created and managed by students on campus. However, UC San Diego makes many other contributions to the local community, through donations of time and services, which are not all captured in this assessment.

Another area of social responsibility included in this section deals with employment policies. UC San Diego has instituted a number of employment policies designed to provide flexibility to our staff. For example, some employees are allowed to telecommute and are also allowed to work flexible work hours. Not only do these measures provide flexibility, they also reduce traffic congestion and emissions from commuting. Sustainability is now included in new employee orientations and may be expanded in future orientation programs.

Indicators

Indicator SR/CE1: Percentage of Students Involved in Community Service

Gathering data on student community service is not an easy task. Although some students are required to perform community service through their academic college, or for a particular course, most students are not required to perform service. However, a number of student groups are involved in organizations that focus on social justice issues, and through these organizations and other off-campus organizations, a number of students do volunteer their time or skills.

UC San Diego performed a survey of student community service activities from September 2002–September 2003, and received responses from about 8.5% of the undergraduate and graduate student population (excluding medical students). Because this special survey is not currently performed annually, 2003 is the most recent year for which data are available. For the purposes of this survey, community service was defined as follows:

Community Service is defined as all human, social service and environmental activities that contribute to improving the quality of community life. Community Service may be performed by individuals through nonprofit organizations, the campus, governmental and

community-based organizations or businesses and may be work done as a volunteer or for pay.

According to this survey, 64% of the student population engaged in community service. In addition, the average time spent engaged in community service was about 11 hours per month.

Table 7 shows additional results from the survey regarding the breakdown in the types of activities that students performed.

Table 7: Types of Community Service Activities Students Performed (2002-2003)

Type of Organization or Service	Percentage
Children, Schools, Education and Libraries	31%
Fundraising/Donation Drives	16%
Health Issues	15%
Humanitarian Services	10%
Religious	8%
Animals and the Environment	7%
Campus-Wide Service Events/Projects	6%
Advocacy/Political/Elections	3%
Other	3%
The Arts	1%

Source: Student Community Service and Service Learning Participation, UC San Diego, September 2002-September 2003.

Indicator SR/CE2: Sustainability-Related Organizations

83 student organizations on campus address environmental, social justice, or sustainability issues

A number of campus organizations, mostly student organizations, are partially dedicated to sustainability issues. In addition, a number of organizations are dedicated to environmental issues, and many are dedicated to social justice issues. Currently, there are a total of 83 student organizations that are organized around environmental, social justice, or sustainability issues.

However, there are currently 8 organizations that exist strictly to address sustainability issues. The criteria used to select these organizations as sustainability-related are: 1) the organization includes sustainability in its mission statement; or 2) the majority of the organization's work and projects address sustainability. They are listed in Appendix C. In addition to these 8 organizations, there are 8 additional organizations that have some

sustainability projects or include sustainability as part of their mission statement; these organizations are also listed in Appendix C. We note that other organizations with a significant sustainability program may not have been identified in our research, but could be added to future assessments if they have been overlooked.

In 2005, UC Berkeley reported that 60 student sustainability-related organizations existed on campus; however, their definition of sustainability was quite broad and included many organizations that UC San Diego lists as "environmental" or "social justice" organizations in this assessment. Based on the fact 83 organizations currently exist at UC San Diego that deal with one or more aspects of sustainability, we conclude that UC San Diego has an active and engaged community that is mobilizing to address many issues of importance to sustainability.

Indicator Summary

A majority (63%) of the students surveyed in 2002-2003 reported being involved in community service. More recent data are not available, nor is it known what percentage of students are required to perform community service to graduate from UC San Diego. However, 83 student campus organizations exist that deal with environmental, social justice, or sustainability issues, and 8 of these organizations exist strictly to address sustainability issues. This indicator suggests that students continue to be highly engaged in community activities, service, and activism.

Challenges

One challenge will be in gathering meaningful data regarding student community service. Not only is community service an important component of University education, it also improves neighboring areas and increases the connection between UC San Diego and surrounding neighborhoods.

Future Plans and Recommendations

UC San Diego plans to develop new indicators for future assessments that take into account the full range of contributions made to the local community. For example, the Hillcrest Medical Center offers discounted medical services to low income members of the community. Numerous other contributions are made, in time, resources, and services. Future assessments will better track how community service relates to sustainability, and will provide new indicators in this area.

Recommendations:

- Gather updated data on the percentage of students required to perform community service.
- Establish a methodology for the ACS to determine campus goals and objectives for enhancing the social aspects of sustainability at UC San Diego.

Background

UC San Diego's physical location in the coastal La Jolla area creates challenges for sustainable transportation options. Because La Jolla is a highly desirable area, housing costs in the neighborhoods surrounding UC San Diego are extremely high. The heart of downtown San Diego is about 13 miles away. Other residential areas are not within easy walking or biking distance. However, UC San Diego does have a strong commitment to providing on-campus affordable housing for students and staff, which encourages and allows some of the campus population to commute by walking, biking, or other sustainable transit modes.

In addition to the general guidelines established in the UC *Policy on Sustainable Practices*, UC San Diego's Transportation and Parking Committee has developed goals to ensure a sufficient parking supply, increase the scope of transportation options, preserve the financial integrity of the transportation and parking system, and keep transportation and parking costs affordable.

UC San Diego also established and invested in a strong program to support alternative transportation, which includes bicycling, walking, carpooling, vanpooling, bussing, and other transportation options. For example, students, faculty, and staff can create carpools to meet their needs, and carpools of three or more persons can purchase a permit to park in spots reserved for carpools. The vanpool program is open to all students, faculty, and staff. UC San Diego provides discounts on tickets for the local commuter train and local bus routes. Also, some of the local bus routes operated by North County Transit District and Metropolitan Transit System are free to campus users with a valid identification. All of these programs reduce traffic congestion, air pollution, and GHG emissions.

In April 2008, a transportation survey found that over half (53%) of the campus population (including commuters at both the Hillcrest and Main campuses) commuted to the campus using alternative forms of transportation, while approximately 47% of commuters used a single occupancy vehicle. Also, due to investments in alternative transportation programs, the percentage of commuters using a single occupant vehicle at the Main campus has declined from 66% in 2001 to 54% in 2007 to 49% in 2008.

In addition to commuter transportation, the campus owns and operates a fleet of vehicles. A number of these vehicles utilize alternative fuels, instead of gasoline.

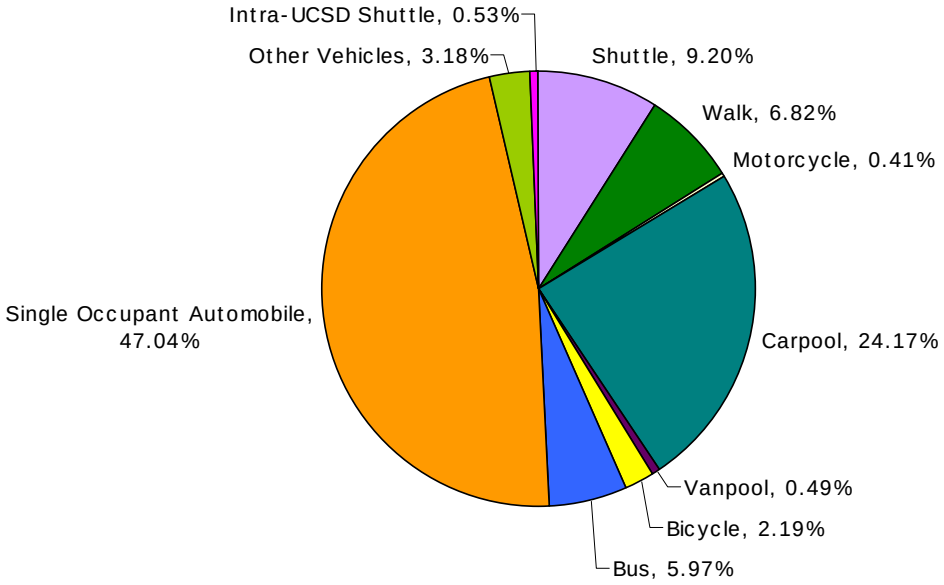
Although the campus has made significant progress in this category, additional room for improvement is found in the performance of all the indicators included below.

Indicators

Indicator T1: Transportation Modal Split

The transportation modal split is shown in Figure 15. These data include all campus users, which includes visitors, contractors, regular employees (staff and faculty), and students. In addition, these data include both the Main Campus and the Hillcrest Medical Center campus.

Figure 15: Transportation Modal Split for All Locations



Source: Survey of Pedestrian and Vehicular Traffic Tables, UC San Diego, Winter 2008 Transportation and Parking Services

We note that these data are collected from counting the number of people using each mode of transportation as they enter and leave campus. Thus, some information is not captured in these data. For example, some commuters may take a train and then use a shuttle, while others could drive alone, park elsewhere, and then use a shuttle to get to campus. However, these data are the most accurate and updated data currently available.

Indicator T2: Campus Size and Population Density

The campus size and population density provides a snapshot of UC San Diego's area. The idea is that the higher the campus density, the more campus users can commute to the campus using alternative modes, such as biking or walking. In other words, by living on campus, students and others can more easily walk, bike, or take a bus to their classes and meetings.

The entire campus area is 1,152 acres. The density of UC San Diego's campus is approximately 8 persons/acre or about 5,044 persons/square mile. In contrast, the density of the San Diego County is only 670 persons/square mile. Thus, the density of UC San Diego is much higher than the surrounding county.

Indicator T3: Average Cost and Availability of Residence Hall Rooms

UC San Diego has shown a commitment to keeping housing costs for students relatively affordable. Currently, the average cost of undergraduate and graduate student housing is shown in Table 8.

Table 8: Cost of Residence Hall Rooms at UC San Diego

	Average Annual Housing Cost (Meal Plans not Included) (2007-2008)
Undergraduate	$6,000
Graduate	$7,700

In addition, currently 43% of all students (graduate and undergraduate) are accommodated in student housing. UC San Diego is expanding housing resources to eventually accommodate a minimum of 50% of all students (graduate and undergraduate).

Indicator T4: Inventory of Automobile and Bicycle Parking Spaces

Although the campus population has been increasing steadily since 2001, UC San Diego's inventory of automobile parking spaces has remained fairly constant. For the Main La Jolla Campus, the total population, as well as automobile and bicycle parking spaces are shown in Table 9.

Table 9: Automobile and Bicycle Parking on Campus

Population	Number of Auto Parking Spaces (Fall 2007)	Auto Parking Spaces per Capita	Number of Bicycle Parking Spaces (Fall 2007)	Bicycle Parking Spaces per Capita
38,600	18,556	0.35	4,300	0.08

Source: Parking and Transportation Services

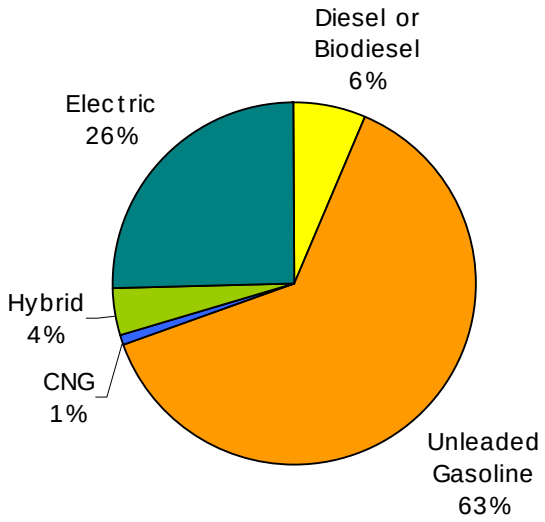
Although UC San Diego's campus population has grown by 42% since 1995-1996, the number of parking spaces has only grown by about 12%. In addition, Transportation and Parking Services reports that the parking vacancy rate during peak hours was 20%, which is well above UC San Diego's campus standard of 5%. The UC system campus standard for parking vacancy rates varies between 5 - 10%.

According to the Assistant Director for UC San Diego Transportation and Parking, the number of bicycle parking spaces has remained relatively constant from 2005-2007.

Indicator T5: Percentage of Fleet Using Alternative Fuels

UC San Diego has purchased a number of alternatively-fueled vehicles. A number of the campus shuttles are run on biodiesel, and UC San Diego is developing a "Greenline" shuttle from the main UC San Diego campus to the Hillcrest Medical Center campus. However, a majority of the fleet's vehicles are run on diesel or gasoline. Figure 16 shows the breakdown of the campus fleet by fuel usage.

Figure 16: Campus Fleet by Fuel Usage



Source: UC San Diego Fleet Manager

Indicator Summary

As these indicators show, UC San Diego has made considerable progress in improving transportation programs to offer commuters more transportation choices. Due to these programs, the growth in the number of parking spaces available has been slower than the campus population growth, reflecting lower demand for parking availability. At the same time, roughly half of commuters are driving in single occupant vehicles, and over a majority of the campus fleet is run on conventional gasoline.

The campus density is higher than the surrounding area, but could be higher. Campus housing is affordable, but slightly under half of the enrolled students can currently be accommodated in the current housing, although in the future, at least 50% of enrolled students will be accommodated in student housing.

Challenges

As noted above, the location of UC San Diego near a highly desirable and expensive neighborhood leads many campus users to live in other areas and commute to campus. Although the number of commuters using alternative means of transportation has been growing, the campus population is also growing, and more campus users are expected to commute to and from campus on a daily basis. Thus, the various transportation programs will need to continue to expand to accommodate more users.

Also, the campus density is higher than the surrounding area, but lower than some other metropolitan areas. Increasing the density will allow more commuters to travel to campus using alternative transportation modes.

Some alternative transportation commuting options, such as local buses and trains, are not operated by UC San Diego. Although UC San Diego staff are working with public agencies to improve transportation options, these decisions are ultimately not made by UC San Diego.

Ultimately, commuters make decisions on how they commute based on a number of factors. Despite having invested in shuttles, carpool and vanpool programs, and numerous other initiatives to promote alternative transportation, UC San Diego commuters' attitudes and preferences play a large part in their decision making with regard to transportation mode.

In 2006, UC San Diego staff conducted a survey of commuters' attitudes toward driving and alternative transportation options. According to the data gathered in this survey, respondents who commute by driving reported that they have considered using alternative transportation, including public transit, carpooling, vanpooling, and others. The reasons respondents provided for not using alternative means of transportation included "reduced flexibility coming and going to work or school" (69% of respondents) and "increased travel time" (65% of respondents).[23] Respondents also provided reasons that are ***not*** as important in their decision to drive vs. using alternative transportation, which included "hygiene or dress code issues," (82% of respondents) and "conflict with other ridesharing participants" (80% of respondents). These data reveal that continuing to improve and expand alternative transportation programs to provide more flexibility and reduced travel time could have a positive effect on increasing participation in these programs.

Additionally, respondents who do regularly use alternative transportation were asked why they choose to use these modes. Responses included "to reduce or eliminate parking costs" (77% of respondents), "to reduce or eliminate commuting costs," (57% of respondents), "convenience," (42% of respondents), and "to reduce or eliminate stress" (42% of respondents).

Future Plans and Recommendations

UC San Diego will continue to study various options for expanding and improving transportation options, with a focus on alternative transportation. For example, one option is being considered to reduce the need for parking capacity by restricting parking to certain students. Such a policy would potentially not allow first-year students to park vehicles on campus. Not only does such a policy increase parking capacity for other campus users, it would also serve to demonstrate to students that they may not need a car while matriculating at UC San Diego.

Also, UC San Diego is developing a new policy that requires all new vehicles purchased to be alternatively fueled. Departments that wish to purchase a conventionally-fueled vehicle will be required to request an exemption from the policy.

Recommendations:

- Prioritize and expand alternative transportation options to enhance commuter options and eliminate need for additional parking capacity.
- Continue to replace fleet vehicles that run on gasoline with vehicles that use alternative fuels.

[23] UCSD Commuting Survey, Survey Findings. Provided by the Assistant Director, Transportation and Parking Services.

- Continue to collaborate with local agencies to improve and expand alternative transportation options for campus commuters, such as potentially expanding the San Diego Trolley system to the UC San Diego area.
- Continue to regularly gather data on commuters' attitudes towards driving and other forms of transportation, and their reasons for choosing various modes of transportation.
- Continue to work with public agencies adjacent to campus to improve safety and bicycle access on roadways adjacent to campus.
- Routinely monitor and track demographic patterns to determine opportunities to increase alternative modes of transportation and/or the development of additional routes and service for shuttles and other alternative modes of transportation.

Background

Approximately 80-90% of San Diego's water supply is imported from either the Colorado River (via a 242-mile-long aqueduct from Lake Havasu) or from Northern California (via the 444-mile-long California Aqueduct). Water supplies from the Colorado River and from Northern California could be endangered due to the effects of climate change. With both sources, UC San Diego is located at or near the end of the water system. Thus, water conservation and efficiency will continue to be important topics at UC San Diego.

San Diego is located in southern coastal California, with an annual average rainfall of just 12 inches per year. Because the area depends on imported water, conservation of water resources is paramount.

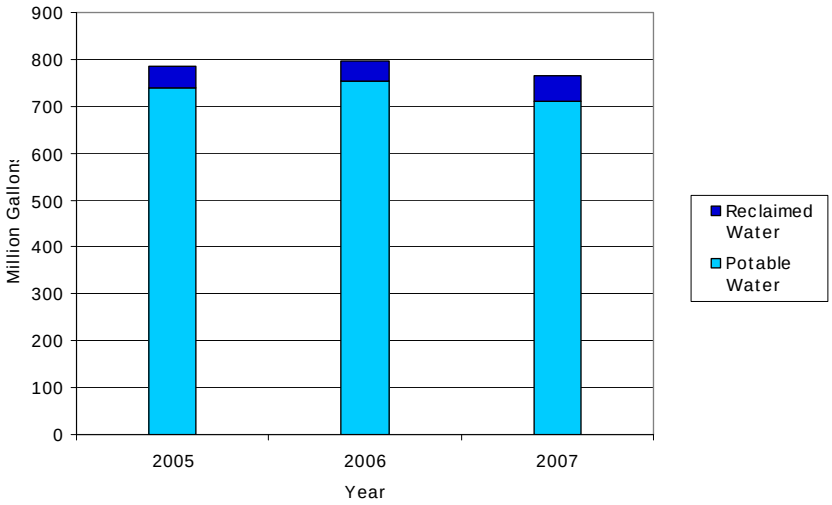
Much of the information in the Land Use and Habitat category relate to water usage, such as the percentage of landscaping that is planted with drought-tolerant plants. However, landscaping only accounts for about 14% of potable water usage; other major uses are Housing, Utilities (boilers, cooling towers, etc.), and the UC San Diego Hospital. This section of the report addresses overall water usage, wastewater discharge, and the mechanisms in place to conserve and manage water on campus.

Indicators

Indicator W1: Gallons of Water Consumed and Water Consumption per Capita

Overall water usage is an important indicator of resource consumption. The total water usage at the Main Campus and Hillcrest Campus of UC San Diego is shown in Figure 17. The data show that water usage has been relatively constant over the past 3 years.

Figure 17: UC San Diego Water Usage

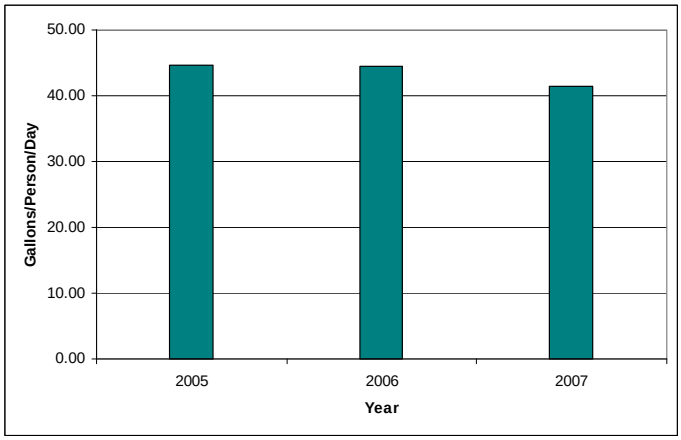


Source: UC San Diego Environmental Report

Indicator W2: Water Consumption per Capita

Water consumption per capita is a normalized method for assessing water usage. Figure 18 shows the trend of water consumption per capita over the past 3 years. Although total water usage has remained relatively constant over the past 3 years, water usage did decline slightly in 2007. Also, the campus population increased somewhat between 2005 and 2007. Thus, water consumption per capita declined by about 7.5% between 2005 and 2007.

Figure 18: Water Consumption per Capita



Sources: UC San Diego Environmental Assessment and additional analysis

Indicator W3: Percentage of Campus Square Footage Sub metered for Water Use

Two main water meters measure the amount of potable water that enters UC San Diego's campus. In addition, some buildings have their own meter or meters, so that individual buildings' water usage can be monitored. In some cases, multiple buildings are connected to a single meter, and in other cases, buildings are not sub metered at all.

Table 10 shows the square footage of buildings that are currently connected to a sub meter.

Table 10: Buildings Sub metered for Water Usage

	Gross Square Footage	Percentage of Campus Total Gross Square Footage
Single building with 1 or more sub meters	7,790,749	54%
Multiple buildings connected to one sub meter	3,336,310	23%
Buildings without sub meters	3,347,624	23%

Source: UC San Diego Campus Utilities

Indicator W4: Gallons/Day of Wastewater Discharge

UC San Diego must apply for and hold a permit to discharge used wastewater into the sewer system; the process of applying for the permit includes an estimation of the amount of wastewater discharged to the system. Table 11 shows these volumes for 2005, 2006, and 2007.

Table 11: Average Amount of Wastewater Discharged to the Sewage System

Year	Average Gallons per Day Discharged
2005	795,618
2006	909,015
2007	890,669

Source: UC San Diego Environment, Health, and Safety Office

About 13-14% of potable water consumption on campus is for irrigation.

Because UC San Diego uses approximately 2.0–2.2 million gallons per day, a large percentage (56-57%) of the water is used for irrigation, evaporated, or otherwise lost. The percentage of water used for landscaping irrigation is estimated by the Environment, Health, and Safety office; currently, approximately 13-14% of potable water used on campus is used for irrigation. Thus, about 86-87% of the potable water used on campus is consumed in buildings.

Indicator W5: Percentage of High Efficiency Water Fixtures Installed on Campus

About 33% of water fixtures on campus are water efficient models

Campus staff estimate that approximately one-third of all faucets and toilets installed on campus are water efficient models. However, this is a preliminary estimate.

All new buildings are installed with water efficient aerators on faucets, as well as low-flow toilets. However, many of the older buildings on campus have not been retrofitted with more efficient fixtures.

Indicator Summary

UC San Diego is the size of a small city, and uses enough water for a small city. Compared to other UC schools, UC San Diego has a higher water use per capita. However, UC San Diego also has a hospital and medical center, which are not included in the Santa Barbara, Santa Cruz, or Berkeley campuses. UC San Diego also has a number of utilities with large water demands.

Compared to energy, water usage is not highly tracked and measured. Only 54% of the buildings on campus are estimated to have their own sub meter for water usage, while about 90-95% of the buildings on campus have a sub meter for energy usage. As a result,

campus staff may not be as well equipped to manage water demand and to understand where and how water is used throughout the campus.

Although all new buildings have water-efficient fixtures UC San Diego has a number of older buildings on campus. Additional steps are needed to improve the percentage of fixtures on campus that are efficient models.

Challenges

Water usage will continue to be problematic as the campus continues to expand. However, with limited sub metering, the campus may have a difficult time understanding exact water demands and uses.

As noted in the Background to this section, San Diego's location at the end of two major water systems provides challenges. Our semi-arid climate does not provide much annual rainfall. At this time, California is in a state of drought due to low levels of rainfall over the past 2 years. Continuing to find opportunities to conserve water and reuse water will help us respond to these challenges. As noted in other sections, UC San Diego is exploring the possibility of using grey water (water from sinks and showers) for irrigation purposes. Other water reuse possibilities include using water from HVAC systems. Staff are also researching dew capture as a potential local water source.

Future Plans and Recommendations

New buildings and retrofits of older buildings will continue to incorporate water-efficient fixtures. In addition, campus staff are exploring opportunities to increase the amount of recycled and reclaimed water used on campus.

Recommendations:

- Improve sub metering for water at the building level to allow for better management of water usage.
- Identify buildings with large water usage and inefficient fixtures, and perform retrofits in those buildings. Prioritize optimum building replacement (e.g., high-use buildings first) and systematically retrofit campus buildings.
- Explore the reuse of condensate from HVAC and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, and for appropriate process equipment.
- Improve education and awareness around water usage in buildings and water used for irrigation. Since it is estimated that about 86-87% of potable water usage occurs in buildings, the education efforts may best be focused on building water usage.
- Investigate the feasibility of rerouting reclaimed water into the water purification system so that need for parallel piping is reduced or eliminated, i.e., purify reclaimed water to potable water standards. Determine the options for working with City/County to further a recommendation to implement a program of this type.

Appendix A: Summary of Recommendations

Table 12: Summary of Recommendations

Issue Category	Recommendations
General	• Develop a tool for campus sustainability practitioners to collect data, beginning with a select group of indicators included in this report. The tool should be web-based and easy to use, so this information may be readily gathered annually. The data should also be made available to the entire campus to ensure transparency and accountability.
Academics and Research	• Create a standard definition for "sustainability-related course" and "sustainability-related research" for future assessments. • Include a designation in the course catalog for sustainability-related courses. Currently, sustainability-related courses are not separately identified or listed in the course catalog, but are sometimes described in the departmental course descriptions. Implementation of this recommendation will require input and collaboration across many campus groups, such as the Academic Senate. • Gather data on the total amount of extramural funding received for sustainability research. • Continue to recruit faculty and develop new course offerings in sustainability and environmental areas. • Create a committee comprised of faculty to develop a course standard and outline for core sustainability course(s).
Built Environment and Green Building Practices	• Change campus financial structures to better incentivize the incorporation of green building features during the planning and construction phase of the building. For example, combine budgets for both the capital expenditures (construction) and the operations of the building. • Strive to achieve LEED Gold or higher to take a stronger leadership role in green building practices in the UC system and beyond. • Identify older buildings in need of major retrofits and renovations, such as energy efficiency upgrades, and seek funding for those projects. On average, the process of retrofitting a building for LEED-EB certification saves $170,000 per year, with an average payback period of 2.6 years.[24] Seek alternative funding mechanisms for these projects, such as rebates from the utility. • Achieve 100% use of Green Seal-certified cleaning supplies.

[24] See: www.armstrong.com/common/c2002/content/files/37082.pdf

Issue Category	Recommendations
Built Environment and Green Building Practices	• If feasible, use microclimate data, such as the data collected through the DEMROES project, at each building site to further improve energy and water management systems. • Explore the reuse of condensate from HVAC and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment. • Keep abreast of changing green building standards and update the campus standard as necessary to remain a leader in this area.
Energy	• Develop a Climate Action and Environmental Impact Plan that will define how UC San Diego will reduce total GHG emissions even while accommodating planned campus growth. • Continue tracking and reporting GHG emissions. For future inventories, add emissions from commuting and air travel, two sources that are required by the American College & University Presidents Climate Commitment. • Ensure that all campus buildings are sub metered for electricity and natural gas usage to more easily manage these energy resources. Investigate the possibility of sub metering departments or laboratories to allow these academic units to be more accountable for their energy usage. • Conduct regular audits of equipment that uses chilled and heated water to more effectively track energy and water usage and to maintain equipment efficiencies.
Food	• Include sustainability requirements for all food purveyors in contract language. Partner with vendors to encourage and adopt practices beyond those required in their contracts through education and sharing best practices across all campus food outlets. • Continue to research and implement composting alternatives to divert food waste from the landfill. Once implemented, apply the finished compost as fertilizer on campus.. • Form a campus Food System Work Group. • Continue to work with UC Sustainability Steering Committee Sustainable Food Services Working Group and other groups to research and implement options to purchase more local, organic food for campus outlets. • Establish a tiered schedule, to accomplish the following over a five year period: 1. Assess all campus food service operations, to ascertain the level of compliance and/or the changes required to obtain “Green Business Certification.”

Issue Category	Recommendations
Food	2. Conduct a staged implementation at each facility, where deemed physically and/or fiscally feasible, based on the preceding assessments and taking into consideration the amount of campus control over each facility.
Land Use and Habitat	• Expand the use of reclaimed water for irrigation purposes. • Investigate and document any long-term environmental impacts of installing artificial turf, and then determine whether artificial turf fits with the sustainability goals of the campus. • Reduce use of herbicides and pesticides where possible and increase the use of products listed with the OMRI. Also, gather data on the total volume/weight of products used that are listed with OMRI vs. the total volume and weight of products used. • Reduce usage of inorganic fertilizer and replace with naturally derived, organic alternatives, e.g. compost, manure, and other fertilizer made from living organisms. Research the possibility of expanding the campus pilot composting project and using the finished compost as fertilizer on campus. • Explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, for irrigation, and for appropriate process equipment. (This recommendation is also provided in the “Built Environment/Green Building Practices” section.) • Develop irrigation policies and schedules that reflect the type of plants being irrigated, and that minimize the irrigation that occurs during peak sunlight hours (evaporation is highest during these hours). Also, investigate the possibility of gathering and using real-time soil moisture data to determine when landscaping should be irrigated.
Outreach	• Develop indicators to measure the extent and effectiveness of sustainability outreach. • Establish visible, real-time, campus or building displays showing energy, water, waste, and other resource or emissions data to increase campus community awareness of sustainability issues.
Purchasing	• Implement tracking mechanisms to collect data on environmentally preferable purchasing both by Procurement & Contracts and by campus departments. • Create a full time position to coordinate sustainable purchases and ensure that sustainability requirements are in all contracts and procurement documents.

Issue Category	Recommendations
Purchasing	• Educate campus departments on environmentally friendly alternatives to the items they purchase; provide ready access to purchase these alternatives. • Consider mandating the purchase of environmentally-friendly alternatives when these alternatives are cost effective and perform equally to the conventional products. • Issue a mandate to purchase cut white paper with a minimum 30% PCW content, and allow for exceptions only when publication standards require the use of 100% virgin paper. Also, proactively promote and market the selection of 50% or 100% PCW content paper to the campus community, bringing higher volumes to the marketplace and resulting in lowered prices of these paper types.
Recycling and Waste	• Research and implement a campus-wide composting program. • Develop a campus-wide task group including, at a minimum, membership from Facilities Management, HDH, University Centers, and Facilities Design and Construction to develop collaborative strategies to reduce solid waste and increase diversion of solid waste. • Create a full-time position to coordinate recycling and composting programs.
Social Responsibility and Community Engagement	• Gather updated data on the percentage of students required to perform community service. • Establish a methodology for the ACS to determine campus goals and objectives for enhancing the social aspects of sustainability at UC San Diego.
Transportation	• Prioritize and expand alternative transportation options to enhance commuter options and eliminate need for additional parking capacity. • Continue to replace fleet vehicles that run on gasoline with vehicles that use alternative fuels. • Continue to collaborate with local agencies to improve and expand alternative transportation options for campus commuters, such as potentially expanding the San Diego Trolley system to the UC San Diego area. • Continue to regularly gather data on commuters' attitudes towards driving and other forms of transportation, and their reasons for choosing various modes of transportation. • Continue to work with public agencies adjacent to campus to improve safety and bicycle access on roadways adjacent to campus.

Issue Category	Recommendations
Transportation	• Routinely monitor and track demographic patterns to determine opportunities to increase alternative modes of transportation and/or the development of additional routes and service for shuttles and other alternative modes of transportation.
Water	• Improve sub metering for water at the building level to allow for better management of water usage. • Identify buildings with large water usage and inefficient fixtures, and perform retrofits in those buildings. Prioritize optimum building replacement (e.g., high-use buildings first) and systematically retrofit campus buildings. • Explore the reuse of condensate from HVAC and cooling systems for irrigation. Also, explore the use of two-pipe systems to use reclaimed or recycled water for gray water applications in restrooms, and for appropriate process equipment. • Improve education and awareness around water usage in buildings and water used for irrigation. Since it is estimated that about 86-87% of potable water usage occurs in buildings, the education efforts may best be focused on building water usage. • Investigate the feasibility of rerouting reclaimed water into the water purification system so that need for parallel piping is reduced or eliminated, i.e., purify reclaimed water to potable water standards. Determine the options for working with City/County to further a recommendation to implement a program of this type.

Appendix B: Members of the Advisory Committee on Sustainability and the Climate Solutions Work Group

Members of **Advisory Committee on Sustainability**:

Steve Benedict (Director, Environment, Health, & Safety)

Richard Carson (Professor, Economics)

Mark Cunningham (Director, HDH)

Monica Doyle (Marketing Director, UC Extension)

Boone Hellmann (Associate Vice Chancellor, Design and Construction)

Marci Holcomb (Senior Director, Project Management, Facilities Design and Construction)

Erika Kociolek (Undergraduate Student Representative)

Paul Linden (Chair, Mechanical/Aerospace Engineering, Director, ESI, Professor Mechanical/Aerospace Engineering)

Gary Matthews (Vice Chancellor, Resource, Management and Planning)

Meagan Moore (Graduate Student Representative)

Kaustuv Roy, Interim Chair (Associate Professor, Division of Biological Science)

Julie Sammons (Marketing Specialist, Career Services)

Jeffrey Severinghaus (Professor, Geosciences Research Division)

Lisa Shaffer (Executive Director, UC San Diego ESI)

Maggie Souder (Campus Sustainability Coordinator)

Helen Szkorla (Director - Budget/Capital for VC-Academic Affairs)

Mary Tharin (Undergraduate Student Representative)

George Tynan (Associate Vice Chancellor for Research, Professor Mechanical/Aerospace Engineering)

Dave Weil (Assistant Director, Facilities Management)

Melanie Zauscher (Graduate Student Representative)

Members of the **Climate Solutions Work Group:**

John Dilliott (Manager, Energy and Utility Services)

Art Ellis (Vice Chancellor, Research)

Cara Fladd (Director, Capital Planning)

Rex Graham (Senior Director, Media Relations)

Tony Haymet (Vice Chancellor, Marine Science, and Director, Scripps Institution of Oceanography)

Jerry Katzin (Foundation Board Member)

Erika Kociolek (Undergraduate Student Representative)

Paul Linden (Chair, Mechanical and Aerospace Engineering/Director, ESI)

Gary Matthews (Vice Chancellor, Resource, Management and Planning)

Mike Pritchard (Graduate Student Representative)

Steve Relyea (Vice Chancellor, Business Affairs) – CSWG Chair

Frieder Seible (Dean, Jacobs School of Engineering)

Lisa Shaffer (Executive Director, UC San Diego ESI)

Maggie Souder (Campus Sustainability Coordinator)

Bob Sullivan (Dean, Rady School of Management)

Russ Thackston (Interim Assistant Vice Chancellor, Auxiliary and Plant Services)

Byron Washom (Director, UC San Diego Strategic Energy Initiatives)

Dave Weil (Assistant Director, Facilities Management)

Gabriele Wienhausen (Associate Dean for Education, Division of Biological Sciences)

Appendix C: Sustainability Organizations on Campus

Table 13: Organizations That Address Sustainability Issues at UC San Diego and Beyond

	Name of Organization	Mission Statement or Purpose	Activities, Campaigns, or Projects
1	California Public Interest Research Group (CALPIRG)	A statewide student funded organization. CALPIRG students, researchers, advocates, and organizers stand up to powerful special interests to fight political corruption, make college affordable, strengthen voting rights and more.	Campus Climate Challenge, Student Debt Alert, Affordable Textbooks, New Voters Project, What's Your Plan, Hunger & Homelessness, Universal Health Care
2	Che Café Collective	The Che Cafe is a Non-Profit, student/community run and owned Co-op at UCSD. The Che Cafe is collectively run, meaning that there are no bosses and everyone has equal participation and responsibility in the community.	There are four primary foci of the Che Cafe: All-ages Shows, Vegan Food, Radical [progressive, leftist] Politics and Organic Gardening. Where these all come together is in a shared vision for an alternative community.
3	Circle K International	To promote the objects of service, leadership and fellowship to make the world a better place.	Habitat restorations, renovating transitional housing for low income families.
4	Engineers Without Borders at UCSD	Engineers Without Borders--UCSD Chapter is a non-profit organization dedicated to the betterment of developing communities around the world through the design, implementation, and construction of sustainable projects that fit the need of the community. Our goal is to establish an on-going relationship with these developing communities and to teach them the necessary skills to maintain the facilities and structures that we leave them with.	Numerous projects.

	Name of Organization	Mission Statement or Purpose	Activities, Campaigns, or Projects
5	Environmental Science & Policy	Provide a forum for science students to learn about environmental policy and the science-policy interface.	Seminars, Forums, Film Screenings, Discussions, etc
6	The Grain Project- UCSD	The Grain Project is a 501(c)3 nonprofit, public benefit corporation organized to promote unified, healthy, sustainable communities through farmers' markets, community gardens, and public art.	
7	Green Campus Program (GCP)	An environmental organization aimed at energy efficiency, policy changes to make the campus greener and sustainable, awareness, and education.	OEA of Career Services Center and ERC admin bldg, LEED EB of Campus Services Complex, Green Business Certification of Dining Halls, Creating a Composting Program on campus, CFL exchanges, energy saving competitions, office energy assessments (OEAs), Earth Week, Eco-Jeopardy, movie screenings, tree planting, water conservation, recycling
8	Housing, Dining, and Hospitality (HDH) Major Planet	Housing, Dining, and Hospitality supports sustainability, working independently and in conjunction with other green organizations on campus to create environmental awareness and change on campus. To further the effort in terms of marketing, the department has created an iconic "Superhero" named Major Planet, who is determined to save the planet, one campus at a time...beginning with UC San Diego.	Creating a Composting Program on campus

	Name of Organization	Mission Statement or Purpose	Activities, Campaigns, or Projects
9	Human and Earth Rights Organization (HERO) for Zero Population Growth	To provide information regarding environmental and social issues to the UCSD and San Diego communities.	
10	Jane Goodall Institute Roots & Shoots at UCSD	Join the Roots & Shoots global network to promote awareness and alleviate problems in the three areas of Roots & Shoots: people, animals, and the environment.	
11	The Journal of Environment and Development (JED)	The Journal of Environment & Development (JED) offers policy-makers, non-governmental organizations, scientists, academics, and the business community the only international forum that combines cutting edge academic research with practical analysis of working policies. The broad scope and interdisciplinary nature of The Journal of Environment & Development are demonstrated by the wide variety of interests and disciplines of its readers and contributors, which include political science, international relations, sociology, environmental studies and law, development studies, and economics.	
12	Net Impact	Net Impact's mission is to improve the world by growing and strengthening a network of new leaders who are using the power of business to make a positive net social, environmental, and economic impact.	
13	One Earth One Justice (OEOJ)	One Earth One Justice is an active social justice group that raises awareness to environmental and social injustices. We seek to empower people with opportunities to create change. We are an organization that operates on the principles of shared leadership moving toward the accomplishment of shared goals of justice.	Bettering Fair Trade Options on Campus, disposables campaign, Fair Trade Month, Fair Trade Coffee Carts

	Name of Organization	Mission Statement or Purpose	Activities, Campaigns, or Projects
14	ROOTS	To become conscience consumers of our own food, to promote sustainable agriculture, and to partner the UCSD community with the San Diego Food Sustainability Project (ROOTS).	
15	Social and Environmental Sustainability Committee (SESC)	The object of this Committee shall be to provide a forum for issues of social and environmental importance to the UC San Diego campus and local community; to create and execute programs which serve the collective interests of the campus population regarding social and environmental issues; and to provide counsel, information, and recommendations to the ASUCSD regarding said issues. It is a collective of social and environmental student organizations, in addition to student participants.	Creating a voting position on UCAB, Move Out Day 2008, creation of a Sustainability Center, and Focus the Nation
16	UCSD Organic Farm Co-op	To provide a forum in which members of the UCSD community can learn and implement organic farming practices, and to promote health and sustainability. We also promote cooperative ideologies along the lines of the Rochdale principles which include teaching members how to be active participants in a democratic entity and how to function democratically.	Composting, weeding, planting, harvesting, and other sorts of farming related activities.