



### Award Category

Water Efficiency

### Green Features

High-efficiency plumbing fixtures

High-efficiency irrigation system with controller

Preventive maintenance program for irrigation

Water metering upgrades

Metering and leak detection software

Cooling tower condensate monitoring

### Annual Water and Cost Savings

37.7 million gallons

19% water use savings (2010-2011 vs. 2002-2005 average)

Estimated annual savings: \$452,657

### Cost

Approx. \$800,000 (not including housing retrofits)

### Time Period

Initiated 2007 (ongoing)

# UCSC Water Efficiency and Water Management Improvements

In response to city water restrictions, UC Santa Cruz implemented numerous initiatives to improve how water is measured and managed on campus.

A collaborative approach led to water use reductions in buildings, as well as best-practice upgrades to metering, irrigation systems, and cooling towers.

**UC** Santa Cruz has led a concerted effort to manage and minimize its water consumption, initially by using native vegetation that requires little or no irrigation, and using a centralized cooling tower system. In recent years, the campus has launched numerous leading-edge water conservation policies and practices, many instituted in collaboration with the City of Santa Cruz.

Water consumption had been a contentious issue for UCSC and the city, due to recent droughts and the potential for campus growth to contribute to water shortages in the city. When UCSC settled a 2006 city lawsuit, aggressive limits were placed on campus water usage. As part of the settlement, UCSC collaborated with city staff to hire a consultant to conduct a survey of campus water usage, and to develop a list of potential water efficiency projects.

### The campus-wide survey and planning process led to the identification of 54 water efficiency retrofit projects in 2007. By the end of 2011, all high-priority projects had been completed.

Completed projects include the replacement of toilets, urinals, and showerheads with high-efficiency fixtures, and installation of faucet aerators in high-use areas of more than 20 buildings campus-wide — based on an audit of existing fixtures conducted by students. Other projects included water metering upgrades, high-efficiency irrigation retrofits, the adoption of new software for meter reading and leak detection, and cooling tower condensate monitoring.

Early in the process, UCSC's energy department conducted an audit to evaluate the extent and effectiveness of existing domestic water and irrigation metering. Campus staff then worked in conjunction with the city water

department to share technology approaches, and devised a plan to adopt the same state-of-the-art wireless metering system that the city was using. The new system has allowed the campus to reduce the amount of unmetered water on the campus to less than five percent.



Several weather stations monitor campus microclimates for irrigation control. Image: RainMaster.

Campus staff also worked with the city to improve its water management systems. The city has been a large-volume user of Sensus water management software customer for 20 years, and through the city-campus relationship, UCSC was able to leverage the city's customer support. Through the use of this software and sophisticated metering equipment, UCSC now receives monthly leak reports. This system has identified dozens of leaks — in irrigation systems, dorms, and campus apartments — and rapid detection has enabled the campus to stop these leaks promptly. The campus is also in the process of upgrading to the city's drive-by meter reading system and installing magnetic meters, which are highly accurate and require little maintenance.

UCSC's irrigation staff has implemented many best-practice projects as well. The school's EvapoTranspiration irrigation controller system by RainMaster has been upgraded and expanded. With several weather stations across the campus, the system can deter-

## Contacts

Patrick Testoni  
Campus Energy  
Manager, Energy  
Services  
testonip@ucsc.edu  
831.459.2243

Dean Fitch  
Senior Planner  
Physical Planning and  
Construction  
drfitch@ucsc.edu  
831.459.4936

Roger Edberg  
Assistant Grounds  
Superintendent  
Physical Plant  
rjedberg@ucsc.edu  
831.459.3667

## Project Team

UCSC: Energy Services,  
Physical Plant, Physical  
Planning, Facilities,  
Housing, Dining,  
Athletics, Irrigation and  
Grounds, Arboretum,  
Farm and Garden Staff

City of Santa Cruz:  
Water Department

Water Efficiency Survey  
Consultant: Maddaus  
Water Management

## More Information

[http://www1.ucsc.edu/  
conserving\\_water/](http://www1.ucsc.edu/conserving_water/)

[http://sustainability.  
ucsc.edu/](http://sustainability.ucsc.edu/)

mine conditions in the campus's various microclimates, from shady redwood forests to sunlit meadows. Programming the controllers to adjust irrigation levels according to this site-specific weather data and vegetation allows for accurate and efficient watering. The system also has built-in leak detection that sends an alarm and shuts down controllers when a leak is detected. The campus grounds crew has evaluated and retrofitted irrigation nozzles, and has instituted an annual preventative maintenance program to identify controller errors or system failures.



*The Earth & Marine Sciences Building's high-use bathrooms were retrofitted with high-efficiency fixtures, resulting in substantial water savings. Image: Patrick Testoni.*

## By charging a small monthly water metering maintenance fee to campus customers, UCSC was able to upgrade and add metering equipment.

UCSC's physical plant staff developed an innovative funding model to pay for the annual water metering upgrades. The model was approved by the campus's various recharge customers — the non-academic departments, such as housing and athletics, which have their own budgets and funding. Using this model, contributions are made every year to the fund, allowing the campus to

manage such a costly budget item in the fiscal year when the metering is upgraded.

In addition, the city and UCSC worked together to develop specific water usage limits in the event of a drought, now included in the city's Water Shortage Contingency Plan. UCSC also developed a comprehensive water shortage plan including an education and awareness campaign, with promotional materials, events, competitions, and online conservation tips.

## LESSONS LEARNED

UCSC's water conservation goals and achievements would have been less impressive without the city's initial push and ongoing support, and involvement from multiple stakeholders and disciplines across campus. Project efforts were coordinated between students, city staff, and campus departments — energy services, facilities, physical plant, housing, dining, athletics, irrigation, grounds, arboretum, farm and garden, and academic departments. UCSC staff continue to meet with city water personnel to troubleshoot issues and discuss new technologies and ways to further improve campus water management and efficiency practices.

Campus staff also tested different fixtures (showerheads, toilets, urinals, and faucet aerators) to ensure water savings and reliability. In comparing zero-flush and low-flush urinals, they found that the zero-flush urinals generate toxic waste from replaceable traps, and had some clogging issues, and thereby determined that low-flush urinals were preferable. Staff members have worked continuously with campus occupants to resolve issues that have arisen. For example, they found that some faucet aerators didn't distribute water well, and through trial and error, they determined which ones worked best. They also found that the faucets required keyed locks to prevent people from removing the aerators, an example of the diligent work required to ensure continued water savings.

*Best Practices* case studies are coordinated by the Green Building Research Center, at the University of California, Berkeley.

The Best Practices Competition showcases successful projects on UC and CSU campuses to assist campuses in achieving energy efficiency and sustainability goals. Funding for *Best Practices* is provided by the UC/CSU/IOU Energy Efficiency Partnership.

