

BEST PRACTICES

2014



Award Category

Water Efficiency/
Site Water Quality

Green Features

State-of-the-art
compound water meters

Computerized irrigation
control system linked to
weather data

Low-flow toilets and
showers

Waterless urinals

Replacing lawns with
drought-resistant
landscaping

Edible landscape
program

Water conserving
landscape design guide-
lines and master plan

Annual Water and Cost Savings

5,200 gallons per
student

\$167,000

Cost

\$115,000 for campus-
wide water controls

Completion Date

Ongoing

CSU San Marcos Comprehensive Water Conservation Program

With the state facing severe water shortage issues, CSU San Marcos has taken aggressive measures to accurately meter and conserve water. From campus-wide submetering to custodial training on water saving measures, these efforts have led to a remarkable net water use reduction across campus.

The San Diego region reached an unfortunate milestone in the fall of 2014 by exceeding 1,000 consecutive days of drought. Such low rainfall, combined with previous reductions in Colorado River supply, have sent water rates for CSU San Marcos up 217 percent since 2005. Campus water bills first surpassed its natural gas bills in 2013, now making water conservation an economic as well as an environmental concern.



The landscaped amphitheater at the University Student Union, opened in 2014. Photo: CSUSM.

Water conservation strategies on campus had been underway for years, however, facility managers were having difficulty establishing baselines and conservation targets because water use was not metered consistently or accurately. For example, irrigation was not separately metered, and water use was only measured at the district scale, with the exception of a few buildings having high water consumption, or those for which water was charged back to departments (such as athletic facilities, dining halls and laboratories.)

The campus team knew they would need a more robust system in order to track water use, to make educated decisions about how and where to conserve water in existing

buildings, to track anomalies in new buildings and facilities, and to document and evaluate various water conservation strategies as they were implemented. To improve metering, the entire water distribution system was first divided into separate lines for irrigation and for domestic water, with separate meters for these distinct uses and also for each building on campus. A new computerized irrigation control system was installed that incorporates local weather data to calculate irrigation needs. The system can also close valves and provide alarms when abnormally high flows indicate the existence of leaks.

Total water use has been reduced by 55 percent per student, in spite of large increases in buildings, sports facilities, landscaped acreage, and in the total student population.

The facilities team found that these initial steps greatly improved the water use data available. However they soon learned that water use measurements at many buildings were not accurate. Ed Johnson, Director of Sustainability and Utilities Department, says that conventional water meters were incapable of reading the low flow rates common in many buildings, missing up to 40 percent of the total water consumption in some cases. "One of our athletic field houses with showers was receiving a water bill lower than a typical single-family home," he explains. "We found that the meter wasn't capturing the slower flow from the low-flow showers and sinks." Such inaccurate measurements were providing only a fuzzy picture of the campus's overall water consumption, making it difficult to identify leaks and to find opportunities for water efficiency upgrades.

To correct this problem the facilities staff replaced meters with new types that were more appropriate to the supply line size and to the specific water consumption patterns

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CalSense
(irrigation controls)
ISS (custodial
contracting service)

More Information

https://www.csusm.edu/sustainability/water_con.html

<http://www.csusm.edu/sustainability/sustainability-masterplan.html>

for each building. In some cases the campus installed compound meters that are capable of reading both high and low flow rates.

These improvements allowed the staff to better understand water use patterns at each building on campus, and provided immediate results. With more accurate monitoring, the staff was able to identify leaks, both in buildings and in irrigation systems, that previously went undetected for months.

Installing accurate meters was one of the most crucial first steps for enabling significant water conservation across campus.

Indoor water conservation steps required an additional layer of education and coordination. The facilities team investigated various models of waterless urinals, automatic low-flow faucets, and low-flow toilets and flushometers. For the new waterless urinals the team first conducted preventative maintenance to ensure that the pipes servicing the fixtures were properly sized and free of clogs. They also worked to ensure that maintenance and custodial personnel were trained in maintenance of the fixtures, which Johnson says is no more time-consuming than for regular fixtures, however understanding and buy-in are still needed from various campus stakeholders.

From these and other efforts, CSU San Marcos has reduced its total water consumption by 11 percent since 2005, despite adding sports fields, a swimming pool, five new buildings, additional landscaped acreage, and doubling the number of students. On a per-student basis, water savings are 5,200 gallons per student per year, equivalent to \$167,000 in annual cost savings.

The facilities managers now aspire to pursue additional water conservation tactics to move towards a comprehensive and ambitious campus-wide net-zero goal for energy, water

and waste. For irrigation, Johnson hopes to test a mat irrigation technology for athletic fields, and he plans to explore a recapture system to treat and filter sewage to provide water for irrigation. He also hopes to collaborate with student groups on campus who can test these technologies, leveraging the campus as a living laboratory and adding to the teaching curriculum related to sustainability.



Compound water meters were installed to accurately measure low and normal flow rates. Photo: Ed Johnson.

LESSONS LEARNED

Specifying the appropriate water meter for each building was challenging, but essential to the success of the program. "It's something we learned the hard way, and some of these meters aren't cheap," said Johnson, "but I think the meters are paying for themselves."

Johnson also emphasized the importance of an attentive water program manager. "Just like energy management, you can't have a good water conservation program if you don't know what it is you're using, and how to control it, and it takes dedication to take this seriously," he notes. After the new computerized irrigation control system was installed, it stayed on default settings at first because there was no clear ownership for maintaining and monitoring the system. Water savings were insubstantial until a new grounds manager took ownership of it, at which time savings became very apparent.

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.

