



Award Category

Water Efficiency/Site Water Quality

Green Features

Collaborative, multi-stakeholder approach for effective troubleshooting and prioritization

Retrofits to sterilizers and condensing units

Custom “quench kits” for sterilizers

Training sessions and resources for equipment use

Annual Water and Cost Savings

3.6 million gallons

\$47,000

Cost

\$50,000 program budget

\$2,500 SFPUC equipment purchase grant

Completion Date

February 2014

UCSF Research Laboratories Water Efficiency Program

UC San Francisco engaged laboratory staff and vendors in a comprehensive analysis of its existing water-using lab equipment and processes. The project team identified and installed equipment retrofits and changes that are expected to save 3.6 million gallons of water and \$47,000 annually.

University laboratories have high water and energy use profiles relative to most other campus buildings, and decentralized management of their equipment can make conservation challenging. To help reach UC’s system-wide goal of reducing per capita potable water consumption 20 percent by 2020, UCSF’s Engineering Services and campus laboratory managers successfully collaborated on a water efficiency program focused specifically on laboratory equipment. The program included cataloging and establishing the condition of all water-using equipment, documenting existing barriers to water conservation in the labs, and crafting an action plan based on these assessments. Retrofits and upgrades to sterilizers and to water-cooled condensing units in cold-room research labs were completed during the first phase of this initiative.

Targeted equipment retrofits saved water and were found to have a cost-effective one-year payback.

Laboratory equipment is frequently purchased and maintained by outside contractors under service agreements with the labs, so lab managers may not have comprehensive records of equipment. Led by Winifred Kwofie, Associate Director of UCSF’s Engineering Services, the project team established that the first important and necessary step in the program would be to catalog and assess existing equipment. With that completed, the key to realizing substantial water savings in the labs was to better understand usage patterns, and to identify the operational challenges faced by the researchers and other users resulting from the age and current functionality of the equipment.

Collaboration, feedback and support from vendors, in-house maintenance engineers, research staff, and the San Francisco Public Utilities Commission (SFPUC) all proved to be vital in this process. Having a multi-stake-

holder team provided valuable insights into identifying problem areas causing excessive water consumption. For example, equipment service providers shared details on operational performance, and suggested ideas for water savings. Research staff used this information to develop solutions that could be readily implemented. The SFPUC provided program review, and outlined opportunities for incentivizing program efforts. Through these collaborations the team classified each piece of equipment based on age, recent use, repair history and maintenance costs. This exercise provided



Performing an in-house custom retrofit for a cold-room condensing unit. Image: Danny Paik.

clear guidance as to which units could be cost-effectively retrofitted, those that needed replacement, and those that had fallen into disuse and could be removed. Furthermore, the group was able to uncover many day-to-day barriers to conservation behaviors, such as a lack of training and operational guidelines that specifically address water conservation. To address this gap, the newly assembled team worked to create a feedback and continuous learning loop among project stakeholders that would ultimately evolve into new training programs and guidelines.

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Project Team

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More Information

The UCSF Office of
Sustainability has infor-
mation on campus water
and other resource
conservation programs
and initiatives:
[http://sustainability.
ucsf.edu/](http://sustainability.ucsf.edu/)
[http://sustainability.
ucsf.edu/1.426](http://sustainability.ucsf.edu/1.426)

The inventory and assessment of equip-
ment turned out to be not only useful for
discovering water conservation actions, but
also constituted a financial value proposition
for the labs, by identifying equipment with
frequent breakdowns and costly repairs that
needed to be replaced

Team members approached the project from the standpoint of both water conservation and cost savings in order to gain broad support.

In Genentech Hall on the UCSF Mission Bay
Campus, laboratory sterilizer equipment
previously relied on a constant flow of potable
water to cool effluent running from the steril-
izers to the drains. The team installed custom
built “quench kits” to cool the discharge prior



The project improved the operation of laboratory sterilizers. Image: Ana Alvarado-Lopez.

to sewer disposal, a change estimated to
provide annual savings of 626,000 gallons
of water, \$10,000 in water and sewer costs,
and \$45,000 in avoided maintenance costs.
In the course of their sterilizer equipment
analysis, the team also uncovered a number
of challenges including frequent equipment
breakdown caused by improper placement
of loads and glassware, and improper cycle
settings. This discovery informed a training

and awareness campaign that complemented
the retrofit strategies.

On the UCSF Parnassus campus, water-cooled
condensing units in laboratory cold rooms
provided a major opportunity to save water
and associated equipment costs. The existing
pressure-operated modulating valves were
not designed to shut off completely, thereby
consuming excess water and contributing to
leaks. The team developed an in-house retrofit
solution by installing a solenoid valve on each
unit to ensure complete shut-off when not in
use. This also helped to reduce the mainte-
nance burden as well as to protect the refrig-
erant systems from damage

These units have high operation and mainte-
nance costs, and some were not actively used.
Through comprehensive inventory and review,
the team was able to decommission aban-
doned units and reduce overall operational
costs. The cold room retrofits are estimated
to save annually 2.97 million gallons of water,
\$37,000 in water and sewer costs, and
\$20,000 in maintenance and repairs.

LESSONS LEARNED

According to project lead Winnie Kwofie, the
key component for success was collaborating
with the labs to identify solutions to address
operational challenges such as equipment
breakdowns and high repair costs, while at the
same time conserving water. Highlighting the
potential improvement of day-to-day operations
was an important motivator that generated
enthusiasm for the project.

Additional benefits for the lab community
resulted from the learning opportunities that
came from the discoveries of the assessment
team. Based on these discoveries, a training
session was held for vendors, laboratory
users, and facility personnel. Training guides
were developed outlining “dos and don’ts”
for sterilizer equipment use. The successful
retrofit projects provide replicable strategies
for improving the water efficiency laboratory
equipment in a research campus setting.

Best Practices case studies are coordinated by the
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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
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Best Practices Case Studies 2014

