



Award Category

Sustainability Innovations

Green Initiatives

Replaced CFL and T8 fixtures with bi-level fixtures

Integral occupancy sensors in fixtures dim to 3-5% when unoccupied

Verification of savings with measurement tools

Pilot program provides seed funding for revolving loan program

Student-led effort with collaboration with numerous facilities groups

Size

Six residence halls

Annual Energy and Cost Savings

95,430 kWh
\$11,450

Cost

Loan amount \$68,365
Utility incentive \$22,903
Campus labor and management \$30,430

Completion Date

Spring 2013

UCSC Stairwell Lighting Retrofit and Green Revolving Loan Fund

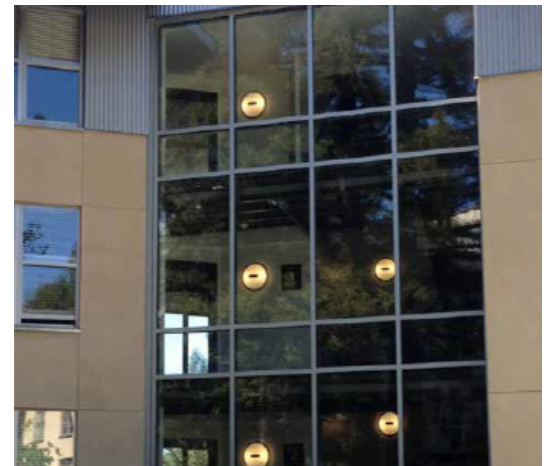
A student-led team at UCSC leveraged a lighting retrofit to use predictable energy savings to seed a new revolving loan fund for energy efficiency. The fund will be used for reinvesting energy cost savings in support of energy conservation projects to meet aggressive campus energy goals.

A new “revolving” loan program developed with leadership of UC Santa Cruz students, in collaboration with a broad range of campus stakeholders, will provide a mechanism for energy savings to be reinvested in future energy efficiency projects on campus. The project had its start in 2011 when students from the PowerSave Green Campus Program and the UCSC Physical Plant determined that a residence hall stair lighting retrofit would be highly cost effective, as the current lighting was using 83 percent more energy than needed. Erin Linney, a project coordinator for the student group, submitted a proposal for the retrofit to the UCSC Carbon Fund, which is funded through student fees (approved by students in 2011). However, the lighting retrofit cost of \$68,365 was considered too costly for the Carbon Fund, which has an annual budget of approximately \$200,000. The Carbon Fund committee ultimately agreed to provide the grant with the caveat that the energy savings be verified, and that cost savings be used to fund future energy efficiency projects on campus.

A project that would deliver reliable and measurable energy savings was needed to kick-start the fund. Lighting fixture and control retrofits generate such of savings.

Project team members researched energy efficiency loan programs at other colleges; this helped them to form the vision of what would become the Green Revolving Loan Fund (GRLF). They engaged a wide range of campus groups, and began the process of developing a memorandum of understanding (MOU) that would outline the terms for funding and repaying the costs of the lighting retrofit. Involved groups included the UCSC Carbon Fund, Physical Plant, Planning and Budget, the Sustainability Office, the PowerSave Green Campus Program and

College Housing and Educational Services (CHES). Previously CHES applied any energy cost savings to a variety of needs including general maintenance, loan debt payments and energy efficiency projects. The GRLF was planned to provide a sustainable alternative that would focus energy cost savings on future energy and sustainability projects at UC Santa Cruz to be led by students, staff and faculty. Furthermore it will support these projects without relying on additional student fees.



One of the six residence hall stairwells after the retrofit. Image: Erin Linney, UCSC.

Students from the PowerSave team calculated that replacing the 156 existing light fixtures in six dormitory stairwells with bi-level fixtures with integrated occupancy sensing controls would save \$11,450 annually. The team specified LaMar Circline and Voyager lights that combine fluorescent with LED lamps and dim to three or eight percent of full power, respectively, when stairwells are unoccupied. The retrofit will reduce the buildings' annual lighting use by 95,430 kWh and reduce the associated CO₂ emissions by 25 tons.

Students working with facilities staff used “dataloggers” borrowed from the PG&E Pacific Energy Center Tool Lending Library to verify

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Project Team

Alliance to Save Energy
PowerSave Green Campus Program
UCSC Carbon Fund
UCSC Physical Plant and Facilities
UCSC Planning and Budget Department
UCSC Sustainability Office
UCSC College Housing and Educational Services

More Information

projectclearinghouse.ucsc.edu/bi-level-stairwell-lighting-retrofit

ucscsustainability.blogspot.com/2013/02/powersave-green-campus-team-wins-award.html

ucscsustainability.blogspot.com/2013/03/green-revolving-loan-fund-established.html

the cost savings. (Students and staff at UCSC had relied on these tools from the Pacific Energy Center in other projects that have been received Best Practice awards.) The measured data confirmed that stairwells were indeed unoccupied for extensive periods of time, and that the dimming was working as expected. The verification was also used to

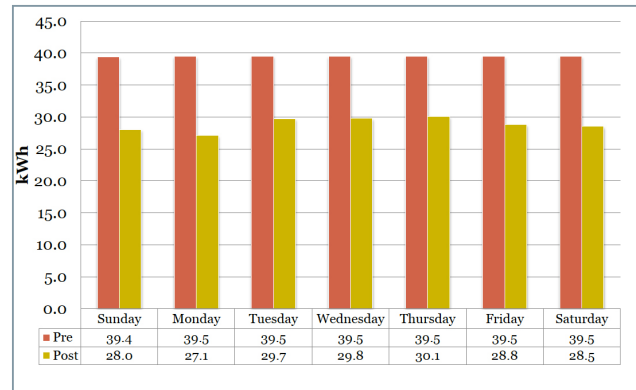


Chart showing pre and post retrofit lighting energy consumption in a typical stairwell. Image: UCSC.

verify that when dimmed, the light levels in the stairwells would still be above the code required levels, as safety in exit stairs is always of the utmost importance.

A revolving fund is a sustainable model for funding energy efficiency projects when other funding sources are not available.

In addition to the loan from the Carbon Fund, additional funding for labor and project management was provided by CHES. The project also qualified for a utility incentive from Pacific Gas and Electric Company. As described by the terms of the MOU, a sum of \$68,000 was repaid by CHES to the GRLF in June 2013, providing the first investment in the new fund. Patrick Testoni, UCSC's Campus Energy Manager, explains that the campus plans to grow the fund with additional projects possibly funded by the Carbon Fund and also

through donations from the many alumni who are committed to helping the campus to make its operations more sustainable. With the first project completed and the loan repaid, the campus will soon be reviewing applications for the next round of funding.

The bi-level stairwell lighting retrofit project at UC Santa Cruz is an example of a diverse group of university stakeholders coming together with open minds to leverage the dollars that a simple lighting retrofit project would save. Arguably, the fixture replacement was the simple part. What required more thought and collaboration was the creation of the GRLF program.

LESSONS LEARNED

Erin Linney explains that getting support from a diverse set of campus groups was critical to the success of the project, and that understanding the bureaucratic landscape of a university campus can be a challenge. The team initially failed to communicate with everyone that wanted to be involved, so with some individuals the team "started off on the wrong foot", she explains. The MOU was eventually sent to approximately 20 campus groups or individuals. Patrick Testoni also notes that metering or another form of verifying energy saving will be important with future projects supported by the fund, and that the campus hopes to provide loans to departments that do not have other funding sources for energy efficiency.

The project was also valuable for serving the university's educational purposes. Upon graduation, Linney took a job as an energy efficiency analyst with a firm that verifies savings from utility programs. "I learned to verify energy savings and to write an energy efficiency grant over the last three years, and now I work for a firm doing verification all across the country," she explains.

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.

