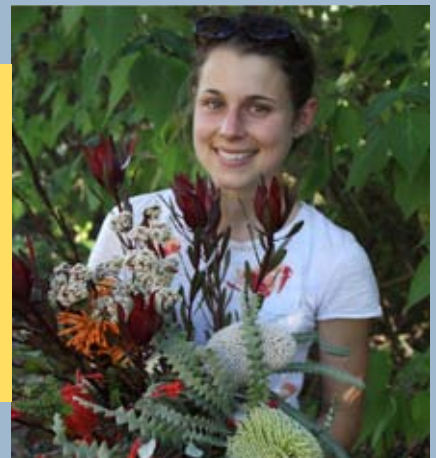




Annual Report

2011-2012



UCSC Carbon Fund
University of California Santa Cruz
Sustainability Office
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118 Kerr Hall
Santa Cruz, CA 95064
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Acknowledgements

The Carbon Fund thanks all University of California Santa Cruz (UCSC) students for their generous contribution, though a student fee of \$3/quarter, without which the Carbon Fund would not be able to provide campus sustainability grants and fulfill its mission of improving UCSC's negative impact on the environmental impact and carbon footprint.

The Carbon Fund thanks all present Carbon Fund Project Leaders for their dedication to reduce GHG emissions to the UCSC campus and their mentors, who include UCSC staff, faculty and other students who guide them, and the committee for being the driving force behind the success of the Carbon Fund program.

The Carbon Fund thanks the 2010-2011 committee and committee staff for their hard work in starting the program.

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Executive Summary

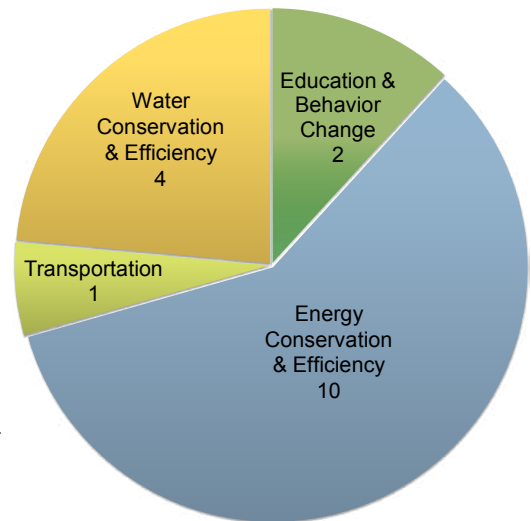
The UCSC Carbon Fund is pleased to present its first annual report and describe the achievements made during its first year of operation. In three funding rounds, the Carbon Fund has granted over \$225,000 to 17 projects resulting in an estimated lifetime reduction of more than 2,000 MTCO₂e.

The Carbon Fund Committee, comprised of five students and staff members allocated grants for the first funding round in Winter of 2011. Nine grants were awarded during this funding round to reduce greenhouse gas emissions on campus and within the community totaling an allocation of \$93,480.

The 2010-2011 academic year left the Carbon Fund with \$112,013 available in funds that were not distributed during the first year of operation. This was due to the fee measure taking effect before the committee was formed to provide grants, resulting in a carry-forward of funds. The Carbon Fund committee intends to use the carry-forward to initiate a Green Revolving Loan Fund (GRLF). The GRLF will be used to fund projects through loans repaid through energy savings.¹

During the 2011-2012 academic year the Carbon Fund received an allocation of \$111,420. During Fall 2011, five projects were awarded grants totaling \$108,146. During Winter 2012, three projects were awarded grants totaling \$26,130.

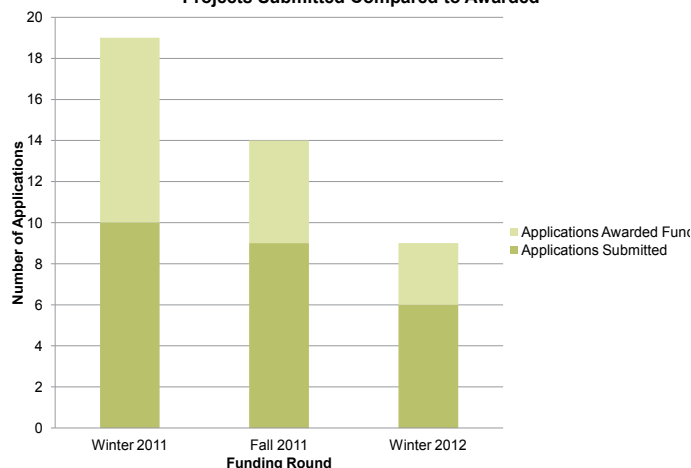
Number of Projects Funded from 2011-2012



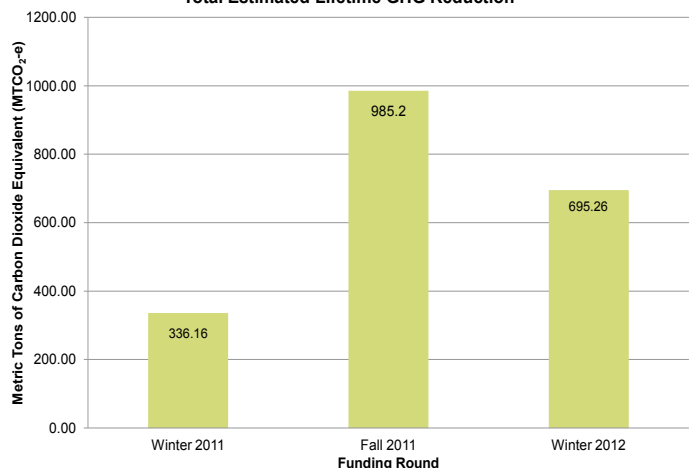
Background

In 2006, in order to offset the climate impact of campus energy use, UCSC students passed Measure 28, taxing them to buy Renewable Energy Certificates (RECs). In 2010 UCSC students voted, in record numbers, to change the use of the funds through the passage of Measure 44 with the intent of directing the funds to benefit UCSC and local community. Measure 44 created UCSC's Carbon Fund to be a new point of pride and leverage in reducing UCSC's carbon footprint.

Projects Submitted Compared to Awarded



Total Estimated Lifetime GHG Reduction



¹ See Page 11, 'Looking Forward' for more information.

Committee

The Committee is established in accordance with Measure 44 to publicize and manage the Carbon Fund. The Committee strives for a sustainable future by working to mitigate climate change through funding and participating in projects that reduce greenhouse gas emissions, conduct relevant research, or carry out education and behavioral change programs. The Committee's commitment is foremost to the campus and its students, but also to the wider community as climate change is a threat without boundaries.

The Committee is a student run organization comprised of students, UCSC staff and faculty. It has a student chair/ facilitator, student staff and a majority student membership, to oversee the Carbon Fund. As such, the Committee's first consideration in achieving its mission is that of student needs, education, and engagement.

2011-2012 Committee Members

Voting Members	Name	Student/Staff
Campus Climate Action Chancellor's Undergraduate Internship Program	Tan Ha	Student
Student Environmental Center	Ashley Nguyen	Student
Green Campus Program	Erin Linney	Student
Chancellor's Executive Committee on Sustainability and Climate Change	Sophie Barrett	Student
Path To A Greener Stevenson	Melissa Ott	Student
Sustainability Office	Lacey Raak	Staff
Campus Energy Manager	Patrick Testoni	Staff
Purchasing Working Group	Kathryn Cunningham	Staff
Non-Voting Members	Name	Student/Faculty
UCSC Carbon Fund Student Facilitator	Andrea Stone	Student
UCSC Carbon Fund Outreach Coordinator	Elissa Martinez	Student
Environmental Studies/ Electrical Engineering Faculty Consultant	James Barsimantov	Faculty

Awarded Projects

Winter 2011 Funding Round



A Coastal Californian Pilot-Scaled Renewable Energy System Planning Model

Project Leader: Tiffany Wise-West, a graduate student in the Environmental Studies Ph.D. program, in collaboration with UCSC Electrical Engineering and Environmental Studies

Carbon Fund Grant: \$15,000

Estimated Lifetime GHG Reduction: 18.13 MTCO₂e

Project Description: The project team collaborated with local businesses and the city to install solar panels and a wind turbine on a platform on the Wharf Headquarters roof, along with sensors that monitor wind and solar power.

Current Status: The Coastal Energy Research Facility has operated for over six months as a visual commitment to renewable energy by the City of Santa Cruz. The project is successfully charging the Wharf maintenance vehicle. This project showcases the Wharf's commitment to sustainability through this microgrid installation. The project has lead the way for other

applied sustainability projects such as an EcoTour, that will bring more visibility to the partnership and its commitment to its climate action goals, including reducing greenhouse gas emissions.

Drought Tolerant Plants and the Correct Places to Plant Trees

Project Leader: Stephen McCabe, Director of Development and Research at the Arboretum

Carbon Fund Grant: \$10,000

Estimated Lifetime GHG Reduction: 10.69 MTCO₂e



Project Description: The Arboretum is working with students and water conservation groups to help the public save water. In addition to saving water the project reduces energy used to pump and purify water, thus reducing greenhouse gas emissions. The Arboretum will provide educational programs and materials which will help people plant appropriate plants in places where they won't need a great deal of later chainsaw work.



East Field House Gym Lighting Retrofit

Project Leader: Erin Linney, Green Campus Intern, in collaboration with UCSC's Physical Plant

Carbon Fund Grant: \$18,757

Estimated Lifetime GHG Reduction: 74.54 MTCO₂e

Project Description: The East Field House (EFH) Lighting Project aims to retrofit the lighting in the basketball gym at EFH. The 30 metal halide fixtures currently in place in the gym will be replaced with 12 induction fluorescent fixtures, reducing energy consumption by 43%, and saving the school close to \$90,000 over the course of the fixtures' lifetime.

Current Status: The EFH basketball gym is newly retrofitted with induction lights. The challenges are a few unexpected expenses not initially included in the grant request. The team is monitoring the greenhouse gas reduction with the energy statements from the building and



comparing them to the baseline measurements.

Awarded Projects

Natural Bridges High School Water Conservation and Environmental Education

Project Leader: Lucy Ferneyhough and Winfield Atherton, interns with Impact Designs: Engineering and Sustainability Through Student Service (IDEASS) program

Carbon Fund Grant: \$8,000

Estimated Lifetime GHG Reduction: 1.57 MTCO₂e

Project Description: The project will install a water-conservation system at Natural Bridges High School/Career Training Center on Swift Street in Santa Cruz. The project includes a cistern and pipes to capture and channel rainfall to the school's garden.

Current Status: The project team purchased the materials necessary to build the rainwater catchment system at Natural Bridges High School. With instruction from teachers knowledgeable in construction, the students at the alternative education facility have been able to assemble these materials and gain hands on experience. To measure the impacts of the project, a flow meter will be installed which will measure the amount of captured rainwater that is released by the system. The students working on the project have learned about the realities of planning, implementing and managing a project.



PROPS (Programs Recognizing Offices Practicing Sustainability)

Project Leader: Shannon Miller, undergraduate in collaboration with the Sustainability Office

Carbon Fund Grant: \$2,415

Estimated Lifetime GHG Reduction: 31.24 MTCO₂e

Project Description: Works to assess the sustainable behaviors of the UCSC campus offices.

Current Status: This year, PROPS completed certification of eight new offices. It is currently in the process of certifying two offices off-campus UCSC buildings.

Some of the benefits that offices made this year include: installing occupancy-censored power strips in both staff

work and shared student computers, started composting, received educational workshops on waste, and formulated green teams that take the lead on maintaining motivation to make sustainable changes.



Porter Greenovation

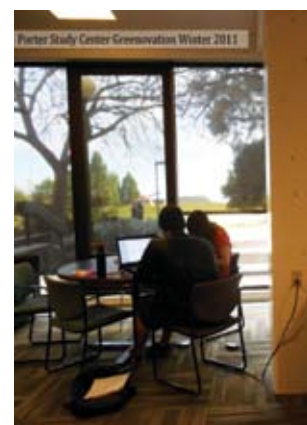
Project Leader: Sarah Gilchrist, in collaboration with the College Administration of Kresge/Porter

Carbon Fund Grant: \$15,935

Estimated Lifetime GHG Reduction: 29.27 MTCO₂e

Project Description: This project is a renovation of the Porter Study Center incorporating energy efficiency measures.

Current Status: A majority of GHG reductions has come from the altered use of lighting the Porter Study Center. The actual energy reduction is approximately 3,700 kWh per year, less than one ton per year of carbon emissions. The project scope has evolved in that the students working on the project learned about cost-benefit analysis and the restrictions that are intrinsic to the University and State-owned building policies and practices. The Porter Study Center is expected to be completed by September 2012.



Awarded Projects



Solar Powered Wetland Replica

Project Leader: Katelyn Sprofera and Elaine Ponce-Dick, in collaboration with the Student Environmental Center's Green Building Campaign

Carbon Fund Grant: \$1,000

Estimated Lifetime GHG Reduction: 1 MTCO₂e

Project Description: The Student Environmental Center's Green Building Campaign is developing of a solar powered constructed wetland that will replicate the native ecology of the Moore Creek Watershed on the UC Santa Cruz campus. The wetland is to be constructed in the greenhouse located on top of Thiemann Labs to serve as one of few solar displays on campus as well as a significant visual highlighting the importance of native

plants to the Santa Cruz ecosystem.

Current Status: The structure of the watershed replica is completed. A public art class is beginning to work on the mural and the sculpting of the barrels. Engineers without Borders are beginning the installation of the solar panel. Finally, the project will be completed with running water and the plants will be placed in the barrels. This will all be completed by the end of Spring 2012.

Take Back the Tap

Project Leader: Gabi Kirk, in collaboration with the Sustainability Office and the UCSC Dining Services.

Carbon Fund Grant: \$12,000

Estimated Lifetime GHG Reduction: 151.33 MTCO₂e

Project Description: "Take Back The Tap" is a pilot program to turn some of UCSC's drinking fountains into reusable bottle refill stations with pushback spigots similar to the ones used in fast-food restaurant soda fountains. The grant funds the installation of refill stations at the UCSC Office of Physical Education, Recreation and Sports (OPERS) and several other places on campus. The project will also work as a community based-social marketing campaign.

Current Status: In Spring 2012, six retrofits have been installed and starting in June 2012, an additional six will be put in making it easier for students to fill their reusable bottles. The project leaders have developed relationships with campus vendors to develop ways to remove bottled water from their businesses The OPERS facility and the Porter Slug Cafe is now water bottle free! The project is in the final stages of removing bottled water from the Wellness Center.



West Remote Retrofit

Project Leader: Erin Linney, Green Campus Intern, in collaboration with UCSC's Physical Plant

Carbon Fund Grant: \$10,373

Estimated Lifetime GHG Reduction: 18.39 MTCO₂e

Project Description: This project retrofits the lighting system in the West Remote Parking Lot. The 14 High Pressure Sodium (HPS) lights are being replaced with 14 LED lights. This project will reduce the university's carbon footprint by 1.2 metric tons of CO₂e per year. This lighting retrofit would also improve the light quality of the parking structure, since LED lights have a higher Color Rendition Index (CRI) of 75-95, compared to 23-28 for the High Pressure Sodium bulbs. The light therefore appears brighter, making it easier to see people from a distance and enhancing campus safety as a result. Moreover, no new HPS lamps would need to be installed for at least 20 years, which will reduce the amount of waste generated by the campus. Adopting efficient lighting systems more frequently

in campus buildings would strengthen UCSC's image as up to date with environmentally friendly technological innovation. By targeting the West Remote parking lot, Green Campus aims to engage a diversity of students, faculty and staff, with the goal to institutionalize energy efficiency and sustainable energy use.

Current Status: The project timeline has been extended and will be completed by the end of the summer 2012.

Awarded Projects

Fall 2011 Funding Round

Bi-level Stairwell Lighting Retrofit

Project Leader: Daniel Glatman and Erin Linney, Green Campus Interns in collaboration with UCSC's Physical Plant

Carbon Fund Grant: \$68,365¹

Estimated Lifetime GHG Reduction: 363.4 MTCO₂e

Project Description: The student leaders are working directly with the UCSC Physical Plant as well as Housing to retrofit the stairwells at College 9 and 10. The current circline and T8 fixtures are being replaced with bi-level occupancy sensor fixtures. The new lighting will decrease the amount of energy the lamps consume through the use of an occupancy sensor that dims the light. The team plans to make this project be a catalyst for future retrofit projects on other dorms on campus.



Campus Sustainability Video

Project Leader: Katie Roper in collaboration with Global Information Internship Program (GIIP)

Carbon Fund Grant: \$14,856.67

Estimated Lifetime GHG Reduction: 90.77 MTCO₂e

Project Description: The Campus Sustainability Video (CSV) will work to create a unified university ethic around campus sustainability goals. CSV will not only address the "how to" of campus sustainability, but most importantly why. After viewing the video students will be asked to pledge to do at least one new environmental activity to help UCSC with its greenhouse gas reduction goals.

Current Status: The project team did initial behavior research in the Stevenson dorms and GIIP class and collected data on student's behaviors and attitudes about sustainability. Secondly, the team has been meeting with stakeholders to ensure that this video can make it to campus-wide audience. Lastly, the GIIP team is training GIIP students on filmmaking and working with ESLP leader Juan Hernandez, to have various students across campus contribute to the filming and execution of the film.



UCSC Bus Tracking System 2.0

Project Leader: Teresa Buika, Senior Transportation Planner in collaboration with UCSC School of Engineering and TAPS

Carbon Fund Grant: \$9,900

Estimated Lifetime GHG Reduction: 316.77 MTCO₂e

Project Description: Installation of a bus tracking system in on campus buses. Via the web or smartphone, Bus Tracking System (BTS 2.0) will provide campus transit riders the ability to track campus day and night shuttles, identified by their route, in real-time as they move around campus. With this information, individuals can determine when the next shuttle will arrive; information that can help one decide whether to wait for the next shuttle, possibly freeing up valuable SCMTD bus space for commuters, or to simply start walking, reducing a transit trip altogether.

Current Status: Development of the prototype Bus Node is on schedule and will be ready for installation by the end of Spring quarter, 2012. The first printed-circuit board is in the lab for evaluation. The project members will continue to design, fabricate, and assemble the remaining boards of the prototype bus node. GHG monitoring will start once the system is in use and can start to survey students on any changes in their transit travel choices.

¹ Funded out of the carry forward as a startup project for The Green Revolving Loan Fund. See page 11, 'Looking Forward' for more information.

Awarded Projects

Rain Harvesting to Offset Production of City Water

Project Leader: Ebin Lee Warner, IDEASS intern in collaboration with Santa Cruz County's Water Districts

Carbon Fund Grant: \$2,205

Estimated Lifetime GHG Reduction: 1.115 MTCO₂e

Project Description: Installment of rain harvesting systems in homes in the Santa Cruz area. By harvesting and storing rainwater on-site, households who volunteer can help reduce emissions from pumping, cleaning, and distributing water. In turn this water will be used to irrigate gardens and flush toilets while reducing their water bill. The Rain Harvesting Project will increase awareness of California's water issues and sustainable living developments, while decreasing carbon emissions, local stream and beach pollution, and chemical use at Santa Cruz County's water districts.

Current Status: The prototype is still in operation reducing municipal water use by an estimated 10,500 gallon a year. The prototype is a 700-gallon system with about 1200 sq. ft. of catchment area. That equates to a reduction of about 0.44 mg of Carbon Dioxide last year based on a 10-year average of the Santa Cruz Water District Report. Warren is planning to have both installs ready for the next wet season, November through April 2013.



Santa Cruz Municipal Wharf Electric Vehicle Charging Station

Project Leader: Tiffany Wise-West, a graduate student in the environmental studies Ph.D. program in collaboration with UCSC Electrical Engineering and Environmental Studies

Carbon Fund Grant: \$14,000

Estimated Lifetime GHG Reduction: 213.14 MTCO₂e

Project Description: IDEASS interns, UCSC faculty and staff, Cabrillo and Hartnell Community College student interns, and staff from the City of Santa Cruz will collaborate closely to install a plug-in electric vehicle charging station on the Santa Cruz Municipal Wharf. This project will draw residents and visitors that own electric vehicles to the Wharf by making charging accessible and convenient. Plug in electric vehicle owners will be able to charge their electric vehicles while exploring the marine environment and business offerings.

Current Status: The team's work to site, select, and install an electric vehicle (EV) charging station at the Santa Cruz Municipal Wharf has initiated a crucial dialogue within the City of Santa Cruz as to how EV charging station procurements, system networking, and installation specifications should be planned and standardized to ensure cost efficient and sensible City-wide access to chargers. While this dialogue has delayed the installation of the station by approximately three months, it is a critical step in creating the Central Coast EV charging network as promoted by the Monterey Bay Electric Vehicle Alliance and its supporting municipalities and agencies.

Awarded Projects

Winter 2012 Funding Round

Porter Greenovation (2nd Part)

Project Leader: Sarah Gilchrist, in collaboration with the College Administration of Kresge/ Porter

Carbon Fund Grant: \$3,960

Estimated Lifetime GHG Reduction: 14.81 MTCO₂e

Project Description: A still in-progress update to the HVAC system, and building envelope security measures. The second project will benefit from the gained awareness of such policies and processes, hopefully leading to even more success. The HVAC efficiency measures, and supporting building envelope upgrades, are still in the finalizing and implementation stage, but student-staff relationships the team developed during the initial upgrade are serving to expedite and inform the next stages' progress.

Solar Tube Installation and sustainable education at Natural Bridges Green School

Project Leader: Tatiana Sujatim and Alexa Schroeder, IDEASS Students

Carbon Fund Grant: \$3,270.08

Estimated Lifetime GHG Reduction: 349.57 MTCO₂e

Project Description: Solar tubes installation to use as a tool for sustainable education at Natural Bridges Green School.

Current Status: Project leaders are completing the permitting requirements including the Santa Cruz Facilities Modification form. This informs the property owners of the school (in this case, the city of Santa Cruz) about the scope of the project. Once approved and inspection is complete, installation of the solar tubes will begin, anticipated to begin summer 2012.

Watsonville High School Re-lamping Project

Project Leader: Benjamin Oberhand

Carbon Fund Grant: \$18,900

Estimated Lifetime GHG Reduction: 330.88 MTCO₂e

Project Description: Replace old light fixtures with cost-effective occupancy sensor bulbs while saving WHS money.

Financial Report

2010-2011

Expenses:

Winter 2011 Rollover Projects	\$78,065
<ul style="list-style-type: none"> •Coastal Energy Research Facility •Drought Tolerant Plants •East Field House Gym Lighting Retrofit •NBHS Water Conservation and Environmental Education •Porter Greenovation •West Remote Retrofit 	

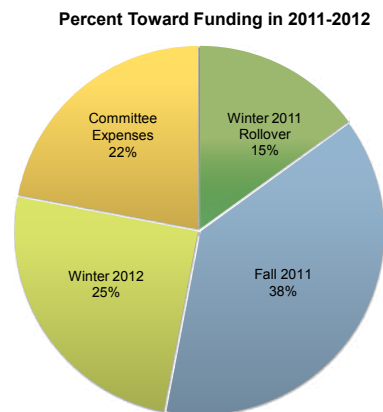
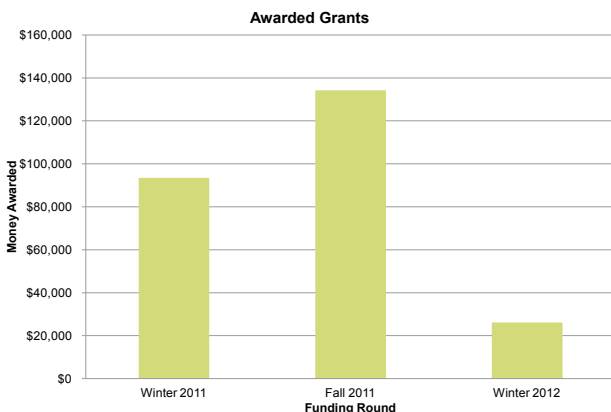
2011-2012

Revenue:

Student Referendum 2011-2012	\$111,210
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Expenses:

Renewable Energy Certificate	\$5,644
Student Staff Salaries and Administrative Costs	\$13,472
Outreach and Office Supplies	\$3,716
Winter 2011 Rollover Projects	\$15,415
<ul style="list-style-type: none"> •PROPS •Solar Powered Wetland •Take Back the Tap 	
Fall 2011 Projects	\$39,781
<ul style="list-style-type: none"> •East Field House Gym Lighting Retrofit (additional funding) •Campus Sustainability Video •Rain Harvesting to Offset Production of City Water •Santa Cruz Municipal Wharf EV Charging Stations •UCSC Bus Tracking System 	
Winter 2012 Projects	\$26,130.08
<ul style="list-style-type: none"> •Porter Greenovation (Part 2) •Solar Tube Installation for the Green School •WHS Re-lamping 	



Looking Forward

After one full year in operation the Carbon Fund has grown to find it's potential in reducing University of California - Santa Cruz and it's surrounding community's greenhouse gas emissions. After viewing 25 applications, the Carbon Fund Committee has created stricter policies for applicants to follow through with their project, funding projects with higher GHG reductions and those with the most impact to the UCSC campus. The Carbon Fund has raised the bar for funding 'green' projects and hopes to grow to make a considerable impact to the campus at large.

The Carbon Fund Committee has decided that along with the stronger policies noted above the current model of two funding rounds will be straining. For the 2012-2013 academic year, the committee has decided to do one funding round for the year. Future project funds will be awarded in the Winter quarter and the committee will host workshops and trainings for potential applicants leading up to the final application due date. There will be an abstract process in November 2012 where the committee will invite applicants to continue to the final application process. Only invited applications will be accepted. The hope of this new structure is to focus on the applicant's thought process for a stronger, well-articulated project with high GHG reduction.

The Carbon Fund is committed to leading the fight to reduce GHG emissions. The Carbon Fund plans to partner with the Bi-Level Stairwell Lighting Retrofit project, awarded in Fall 2011, and introduce an innovative funding model for future energy projects.

As mentioned in a footnote on page seven, the Bi-level Stairwell Lighting Retrofit was awarded in Fall 2011, but was funded out of the 2010-2011 carry forward amount (\$112,013) as a start up for the Green Revolving Loan Fund. The Bi-level Stairwell project will be receiving a PG&E incentive check once the lighting has been switched to more efficient bulbs. The funds from the incentive check will repay the Green Revolving Loan Fund (GRLF). With the success from the Bi-level project, the GRLF will be able to fund additional projects. The structure and guidelines for the GRLF will be established in the 2012-2013 academic year.

In conclusion, with the strong foundation formed over the 2011-2012 academic year, the UCSC Carbon Fund looks forward to many more years of operation and greater reductions in greenhouse gas emissions.