CARBON FUND

ANNUAL REPORT 2021-2022

> UNIVERSITY OF CALIFORNIA SANTA CRUZ

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Acknowledgments

The Carbon Fund, on behalf of the UCSC Sustainability Office would like to thank the UCSC student body for their continuing support to combat climate change on campus through student fees. We would like to thank all Carbon Fund project managers for their commitment to reducing resources use and creating opportunities for students and the community.

Thank you!

WHAT IS THE UCSC CARBON FUND?

Carbon Fund grants provide funding to projects that directly reduce greenhouse gas emissions, conduct relevant research, or carry out climate-related educational programs.

The Carbon Fund supports the UC systemwide goal of being carbon neutral by 2025 and has about \$130,000 annually to allocate to sustainability projects that will help reach this goal.

Grants have two funding levels: Macro grants are for projects requesting more than \$5,000 and Micro grants are for projects requesting less than \$5,000. The Carbon Fund provides grant funding on a yearly cycle based on the academic schedule.

2006 📮

In 2006, UCSC students passed Measure 26, a student fee measure that taxed students \$3 in order to buy Renewable Energy Certificates (REC's), which helped offset the climate impact of campus electricity purchases.

2010

In 2010, students changed the use of these funds from REC's to funding projects through the passage of Measure 44.

This amendment allowed funds to be used for sustainability projects that will reduce the campus's carbon footprint, ultimately creating the Carbon Fund.

2022

In 2022 We awarded 7 micro projects and 6 macro projects!

The Carbon Fund Committee

The Carbon Fund Committee is consisting of of 9 voting members who review project proposals from students, staff, and faculty in accordance with the Carbon Fund criteria and mission statement. The Committee also provides assistance to proposal authors in both project development and post-funding implementation. Carbon Fund Committee meetings are open to the public. Interested students, staff, faculty, or community members may attend committee meetings but do not have speaking rights unless requested in advance. If you are interested in attending a meeting, please contact the Carbon Fund staff.



Yihsu Chen Faculty Advisor



Patrick Testoni Energy Analyst: Physical Plant



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Kiaya Moser Carbon Fund Coordinator



Kate Battaglia Carbon Fund Coordinator

AWARDS: MICRO PROJECTS

Solar at Natural Reserves

The solar system supports research and teaching efforts at a site that does not have electricity. This reduces emissions and gas purchases from gas generators.

Access to this system will have a direct impact on students and researchers in their ability to learn and conduct research.

Cal Teach E-Bikes

The Cal Teach program helps to launch STEM undergraduate majors into teaching careers with coursework, mentorship, internships, and financial support.

The overall purpose of the Cal Teach E-Bikes project is to reduce the carbon footprint of transportation of Cal Teach undergraduate STEM majors traveling to and from middle and high school classrooms throughout Santa Cruz County.

The Cal Teach E-Bikes project will reduce barriers to transportation while mitigating climate change.







IMS E-Bike Fleet

The purpose of this project is to reduce the carbon footprint of local transportation for graduate students, faculty, visiting researchers and staff running errands and traveling between the Coastal Sciences Campus and Main Campus through the purchase of two electric bikes.

This fuel savings are equivalent to eliminating 2.65 tons of CO2 emissions annually.

Replacing 2-stroke Engines with Electric at the UCSC Farm: Weed Wackers

Replacing 2-stroke engines with electric equipment reduces greenhouse gas emissions and advances the Farm's work of agroecology and equitable food systems through experiential education, participatory research, agricultural extension, and public service.

LiFi GreenHouses

The project uses a visible-light enabled IoT approach to monitor and control greenhouses. This project would reduce the amount of energy used to heat and cool glasshouses, as well as reduce the amount of water used for plant growth.







Internet of Things (IoT) Connected Campus Energy Monitoring

While more people lived and worked remotely, many rooms remained unoccupied or under-utilized. Since the university has not updated temperature and lighting controls and scheduling to match use patterns, the goal of this project is to reduce energy waste from lighting and heating vacant spaces and buildings using IoT sensors.

Analysis of this data allows us to identify lighting, heating, and ventilation of unoccupied rooms and buildings. This information will be used to make changes in building management. These changes will improve occupancy comfort, reduce energy waste, and decrease greenhouse gas emissions.

Farm Future

The Farm Future project will test the upcycling of aquaculture effluent (waste water that is high in nitrates and phosphates) to irrigate and fertilize soilgrown crops using wicking beds.

With this technology the aquaculture effluent has the potential to fully replace both irrigation water and synthetic fertilizers in agricultural production, reducing the carbon footprint and eutrophication potential of both agriculture and aquaculture.





AWARDS: MACRO PROJECTS

Microbiological culture incubators

Microbiological culture incubators are essential for supporting both lower and upper division biology laboratory courses.

The current microbiology incubators, were built some time ago and contain last generation fans, water jackets and electrical heating elements. Consequently, these units are less efficient than modern equivalents.

This project helps to mitigate climate change through reduction of UCSC's greenhouse gas emissions and concomitant reduction of our carbon footprint. This project would save 10.63 tons of atmospheric CO2 emissions over the first 25 years.



Carbon Sequestration, Dung Beetles, and Soil Microbes in Pasturelands

In the 2020 fall grant cycle, the project applied for a Carbon Fund grant to look at the effects of the tunneling dung beetle (Onthophagus taurus) on soil organic carbon and soil microbes that might increase carbon sequestration. This research is underway, and results from a related 2020 pilot study show that O. taurus do increase the abundance of soil microbes involved in carbon sequestration.

However, it is unknown whether a diversity of dung beetles, including tunnelers and dwellers (e.g. Onthophagus taurus and Aphodius) might have a stronger effect.

This project investigates the effects of dung beetle diversity on the soil microbial community, as well as soil organic carbon content, as indicators for soil carbon sequestration. It will also examine how management practices and landscape factors influence the diversity and abundance of dung beetles present on a ranch.



Energy efficient oil free vacuum pumps for the UCSC Stable Isotope Laboratory

Laboratories account for about half of the energy consumption at UCSC. The Earth and Marine Science Building (EMS) is the single largest power consumer by structure at UCSC. UCSC Stable Isotope Laboratory (SiL) is one of few largest labs in EMS, both in terms of space and power consumption. The vacuum pumps in the lab use approximately 1% of the power at EMS.

This project uses funding to replace fifteen outdated, energy-intensive vacuum pumps in the UCSC SiL with new energy-efficient technology.

This project would pay for itself via energy cost savings in less than 4 years and would save 115 tons of CO2 over a decade.



Fog Water Collection for Critical Irrigation Needs at the UCSC Farm

California is in a historic drought which may continue indefinitely and will likely become more extreme due to climate change. In spite of the potential stresses on coastal California communities, water from marine fog is not being used to its full potential.

The overall purpose of the project is to obtain information on the quantity of water that can be practically obtained from large fog collectors (LFCs) on a central California farm, what considerations maximize the volume of water collected per m2 of mesh, and how to best use the water collected from fog to protect perennial plants and orchards in times of extreme drought.



Physical Sciences Building Acetone Recycler

The project uses funding to acquire an acetone recycling system to reduce solvent waste, greenhouse gas emissions, and waste of research funding by allowing acetone used in cleaning glassware to be regenerated in a form suitable for reuse.

Chemistry laboratories generally consume large quantities of acetone. A large proportion of discarded acetone contains only minor impurities, but it must still be treated as hazardous waste and is shipped to an off-site location to be incinerated. Using commercially available, robust, and efficient acetone recycling systems, this acetone could be efficiently recovered as relatively pure solvent from the moderately contaminated waste solutions.

In addition to providing a reduction in hazardous waste and solvent usage, the installation of an acetone recycler can have a positive effect on the Department's sustainability culture. The community-run nature of the recycling operation will ensure active engagement of students and faculty and will help to raise their awareness of the impact that solvent usage has on the environment (locally and globally), as well as on use of water and electricity.





Trial of Solar-Powered Public Waste Container System

This project will run a trial of the BigBelly waste container system to evaluate its benefits, acceptability to the community, and value.

At present, public waste stations have a variety of container types that groundskeepers and/or recycling staff empty on a schedule, or when complaints are received. The stations have bins with plastic liners that have to be transported to dumpsters using electric carts, gasoline pickups, or larger trucks.

The system uses solar-powered compactors to increase the capacity of waste materials and uses fullness indicators at outdoor container stations, thereby reducing the frequency that the containers need to be emptied.



Executive Summary

The Carbon Fund strives to implement our mission statement and allocate funds through processes which including research on calculated life span of projects, carbon mitigation calculations, and cost per ton of carbon saved.

In addition, we have other criteria to ensure a diversity of quality projects including social justice, project feasibility, project implementation plan, metrics and reporting, student involvement, direct savings aspect, quality budget, etc.

Below is a breakdown of the Carbon Fund budget, based on the funding from the 2022-2021 grant cycle.

