University of Washington | CAMPUS SUSTAINABILITY FUND

Project Approval Form

Project Title: Campus Green Lakes: Sustainable Oceanography Lake Pilot Project

Primary Contact: Kate Stevenson (katest17@uw.edu)

By signing this form, I confirm that the project lead(s) has/have discussed this project with me, and that I *(please check all that apply)*:

- [x] approve the stated project to be conducted on the University of Washington-Seattle campus (this approval can only be given by campus units or by individuals on behalf of campus units) **(REQUIRED)**
- [ ] agree to be part of the project team
- [ ] will provide support to the project by being a partnering organization, department, or individual.
- [ ] am the administrator for my campus unit and agree to be responsible for the financial and human resources transactions associated with this project.
- [ ] agree to take over the operational costs of this project.

With the following stipulations *(if applicable)*:

Mark Murray

Name/Signature: Assistant Director | **Date:** 1/11/13

Title: Env. Health & Safety

Department/Organization:

Phone: 206-616-6261 | **Email:** Mmurray@uw.edu

Additional Notes:

See Attached Scope.

Please save this completed form as "Project Contact Name_Project Name" and email it to uwcsf@uw.edu. The email originating directly from the approving body will be considered a signature. Paper copies may be sent through campus mail to Attn: CSF Fund Coordinator, Box 351248 or dropped off to the CSF Office at 280 Gerberding Hall and must include an original signature of the approving body.

2012-2013 CSF Grant Application

Project Information

Project Title: Campus Green Labs: Sustainable Oceanography Lab Pilot Project

Total Amount Requested from the CSF: $ 1,000.00

Is this a:
(x) Grant
( ) Loan
If Loan, estimated payback period to be in _____ months

RSO or campus unit name and budget number through which awarded CSF funds will be administered:
RSO or Campus Unit Name: Oceanography
Budget Number: 75-0364

How did you hear about the CSF?
( ) Friend or colleague
(x) Class/Academic Department
( ) Email/Website
( ) Other _____

1) Project Description:
Executive Summary: Project description (in 1-2 sentences), location on campus, proposed cost, environmental problem the project is seeking to solve (1 sentence), any statistics/metrics, website or background info, people or departments involved.

Our ENVIR 480 Sustainability Studio project group partnered with Shelly Carpenter, lab manager at the Marine Sciences Building, to focus on reducing the water and energy consumption of commonly used lab equipment. We will install LED bulbs in one growth chamber in the Marine Sciences Building and faucet aerators throughout the building to test the viability of implementing these technologies in more campus labs.

Labs are hesitant to incorporate these products because no case study exists to demonstrate successful implementation. We have consulted with experts from several research institutions to identify the most beneficial, convenient, and cost-effective products available. This project will provide an example for other labs to reduce waste and earn net savings. It will also contain an educational component aimed to help other students organize similar projects in other facilities.

2) Environmental Impact

Impact Area:
(x) Waste
( ) Food
(x) Water
( ) Transportation
( ) Living Systems and Biodiversity
(x) Energy Use
( ) Other _____

Explain the environmental problem in 1-3 sentences, and how your project will mitigate the problem:

Campus laboratory facilities are major contributors to water use, energy consumption, and waste generation. Due to the wide variety of equipment, large appliances, sinks, and disposable products labs require, in many cases, sustainability is compromised to maintain research quality, expedience, and a smoothly running facility. This project aims to provide campus labs with simple sustainability solutions to quickly and easily reduce consumption without sacrificing productivity. In order to provide reliable advice on our website, we would like to implement LED grow lights and sink aerators in the Marine Sciences Building as a case study working towards a large-scale implementation.

Details:

There are approximately 70 sinks in the Marine Sciences Building, none of which have faucet aerators. Faucet aerators are a simple and inexpensive way to save on utilities and reduce water consumption. Installation takes less than five minutes per sink, and removal can be performed just as quickly. Mass implementation of sink aerators throughout campus would significantly reduce water use, in agreement with the goals of the Climate Action Plan and the UW's commitment to sustainability. Considering the cost reduction based on a 30% reduction in water flow (taking into account filling beakers and tasks that are not affected by reduced water flow) the one-time cost of 70 sink aerators would be $350, which last a minimum of 5 years (based on 5-year warranty). UW plumbing will advise our group on the proper brand/model aerator for this facility.

On the 3rd floor of the Marine Sciences Building there are five growth chambers, each of which consumes a substantial amount of energy. The growth chambers currently use 32-watt T8 fluorescent bulbs, which we would like to replace with 19-watt LED bulbs. On their own, these bulbs would save $0.84 per month. However, we have communicated with Seattle City Light regarding their commercial energy efficiency rebate program. This program allows for $0.02-$0.23 rebate per kWh saved. They expressed enthusiasm towards working with us if this project leads to an LED conversion on a larger scale than one growth chamber for a limited period of time. Based on a conservative rebate estimate ($0.125 per kWh

saved) an LED conversion in just five growth chambers would save $25.97 per month. This program would only apply for mass implementation of energy saving bulbs and must be negotiated prior to installation. If this case study is successful, this mass implementation could be considered, potentially saving hundreds of dollars per month while eliminating waste.

These figures are based on an average 30 bulbs for the five chambers on the third floor, which are in use 517 hours per month, and the cost of energy in Seattle in October 2012 ($0.092/kWh). It should also be kept in mind that these bulbs reduce the light bulb waste stream by 11% due to increased product lifetime and they do not contain harmful mercury. LED bulbs also produce less heat, reducing cooling costs in refrigerated cold rooms. It is important to note that retrofitting fixtures and installing aerators are reversible changes that will not damage the building or equipment.

Explain how the impacts will be measured:

A faucet aerator is a sink attachment that reduces water flow. Shelly Carpenter has confirmed that a water meter is scheduled for installation at the Marine Sciences Building, which would allow us to measure the change in water consumption after the implementation of sink aerators. We will measure the impact of this portion of the project by checking the flow rate before and after implementation and by calculating gallons saved based on water meter readings.

Growth chambers are essentially walk-in cold rooms with shelves and grow lights used for algal culturing. We will measure the impact of retrofitting the current fixtures with LED bulbs by measuring the light output with a standard PAR probe, attaching power meters, and using these readings to calculate kWh of electricity saved. We will also create a revised cost-benefit analysis based on these findings. Finally, we will be able to document any positive or negative effects of lighting on algal culture growth rates based on the change in output spectrum from fluorescent to LED lighting. Since, there is no research literature available on topic, this represents a barrier for some labs to adoption of LED lighting for algal culturing.

3) Education and Outreach

How will your project be publicized to the campus and what are your specific outreach and education goals?

Our project would be publicized via a memo and website sent to all lab managers on campus. This memo will describe our project and provide the link to a website with the details of our case study, background information, and suggestions for simple ways to improve lab sustainability. The goal of our deliverables is to raise awareness for these products and emphasize the benefits they provide.

Within the Oceanography department, this growth chamber will advertise itself. By providing an LED growth chamber facility, we provide students and faculty with a facility that was previously unavailable. This facility will open doors for other

LED-centered student projects so that other students have the chance to experiment with LED lighting.

This project will not only benefit students, but will be educational for the scientific community as a whole. In literature searches and correspondence with more than fifteen phycology experts, we could not find a single article that directly addresses the comparative effects of LED and fluorescence in algal culturing. This project is not exactly research, but it has the potential to prompt more specific research with sustainability applications to benefit the greater good.

Although LED technology is still in its infancy, scientists and engineers have made strides in developing high-intensity, low-energy light sources. As this technology progresses, costs will decrease and there will inevitably be a shift towards LED grow lights across the scientific community. In fact, LED lights provide more manageable and precise lighting to imitate natural light, maximize growth, or create a highly specific environment for samples. According to the researchers we contacted, there is a consensus that LED grow lights are superior to fluorescent lights because the emitted light spectrum can be customized by the manufacturer, unlike fluorescent lights, which offers a fixed, sub-optimal spectrum for phytoplankton growth. In order to facilitate and expedite this collective shift to a more sustainable grow light, our project would draw attention to the viability and superiority of cutting edge LED technology.

4) Student Involvement

How many student jobs and/or volunteer opportunities does your project involve? Please describe their responsibilities.

This project is student-centered because it was designed by students in the Fall 2012 ENVIR 480 Sustainability Studio course, focusing on green labs. Prior to our CSF proposal, our team has already done quite a bit of work to plan this project. In ENVIR 480, we created a cost-benefit analysis, wrote a memo, provided ESS with a sustainability snapshot, met with clients at the Marine Sciences Building several times, and gave a presentation to faculty members to introduce our project, which was received with enthusiasm.

Making this project a reality shows that students have the power to better their own campus. We hope that this project will inspire other students to come up with sustainability projects and utilize campus resources to make these projects happen. In order to communicate the success of this project with fellow students, we hope that the PoE Blog, The Daily, and other campus news sources will publish an Op-Ed on this project with details about the CSF process and the Sustainability Studio course to further connect us with students.

Although this project would not create any specific student jobs, it sets an example for fellow students to do a similar project within their own department. Our project website will include a page for students interested in continuing our project in other campus labs. The page will provide specific details, contacts, resources, and tips that we learned from our experience.

5) Accountability, Feasibility, and Sustainability

Budget:

Item	Cost/Item	Quantity	Total	Notes
Philips LED T8 Tube GA	$49.58 (plus tax)	10	$495.80	These tubes are a direct replacement for fluorescent T8 bulbs, requiring no rewiring of existing 48" fluorescent fixtures with EM ballasts.
Faucet Aerators	$5.00 (plus tax)	70	$350.00	
P3 International P4460 Kill A Watt EZ Electricity Usage Monitor	$25.61 (plus tax)	2	$51.22	These would be very useful to donate to the PoE Dept. or ESS for student projects after our project is finished.
Shipping + Tax			$132.98	Estimated
TOTAL			$1,030.00	

Timeline:

Task	Time Frame	Estimated Completion Date
Install aerators, take initial measurements, install LED lights, measure light output, hook up power meter(s)	Week 1	**TIMELINE DEPENDENT ON DATE OF GRANT ALLOCATION
Start new cultures, zero output power meter	Week 2	
Take measurements	Week 3	
Take measurements	Week 4	
Take measurements	Week 5	
Compile data, analyze results	Week 6	
Create website/memo	Week 7	
Create website/memo	Week 8	
Create website/memo	Week 9	
Distribute memo to labs	Week 10	