

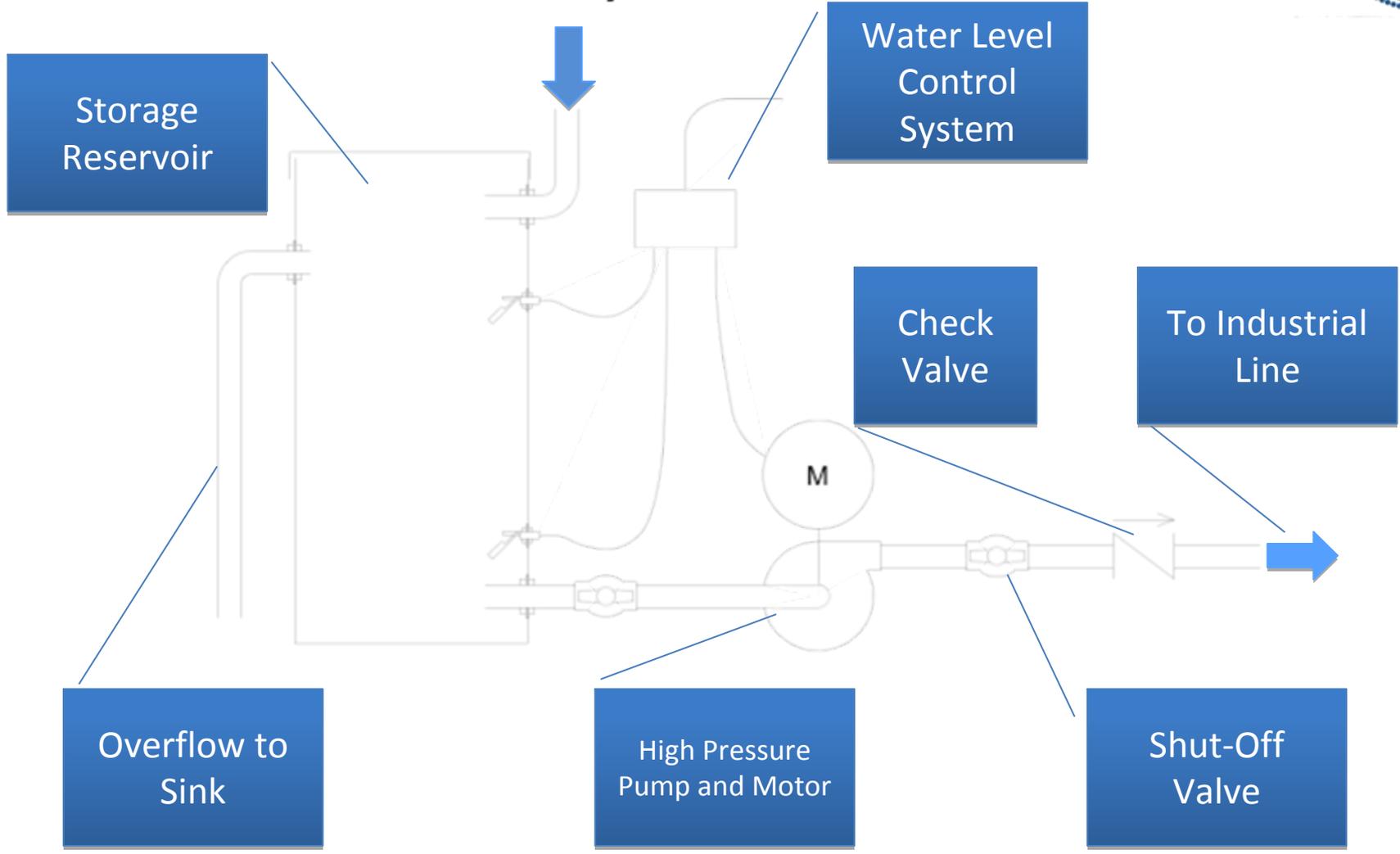
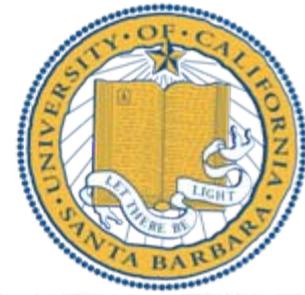
ESB and CNSI Deionized Water



600,000 Gallons Per Year



Deionized Brine Runoff Reclaim System





TO: Students, Staff, and Faculty
UC Santa Barbara

FROM: Grant Making Committee
The Green Initiative Fund (TGIF)

DATE: December 2010

RE: TGIF Funding Applications for 2010-11

Supported by a quarterly lock-in fee paid by all UCSB students, The Green Initiative Fund (TGIF) provides funding for projects that enhance our campus' environmental, cultural, and economic sustainability. TGIF supports projects that provide renewable energy, increase energy efficiency, conserve water, reduce waste, educate the campus about environmental impacts, and facilitate strategic research to improve the campus' operational sustainability. The fund awards approximately \$150,000 total to 10-12 projects per year.

Any UCSB student, staff, or faculty member may submit a proposal for consideration. All proposals will be reviewed by a student-majority governance board that will select projects based on the following guiding principles:

1. UCSB students, staff, and faculty are able to submit project proposals, as long as they are under the umbrella of a campus department. Individuals and organizations outside the University are not able to submit project proposals.
2. TGIF funding will not support projects that are already mandated by law or UCSB policy/directive. TGIF will only fund projects that are not currently paid for by the University or through existing rebate programs.
3. TGIF is limited in its funds and is more likely to support projects which have secured additional funding through other sources such as grants and donations.
4. Projects shall reduce UCSB's impact on the environment.
5. Projects shall have publicity, education, and outreach components.
6. Student participation is encouraged in all projects.
7. Projects shall have received all necessary *written approval* by appropriate campus officials prior to consideration (if you are not sure if this is applicable to your project, contact Grant Keefe).
8. Preference will be given to projects that:
 - a. demonstrate the greatest reduction of UCSB's greenhouse gas emissions, water consumption, waste generation, and/or energy usage for the least cost.
 - b. can demonstrate short-term returns on investments.
 - c. are located on the main UCSB campus to enable transparency between the student body and the results of the projects they are funding.
9. Projects that are able to repay the fund are encouraged to do so when appropriate.
10. Project organizers/leaders must prepare a final poster presentation to the campus community.

If you would like to submit a proposal, please email the attached funding application to the TGIF Grants Manager, Grant Keefe, at grant.keefe@vcadmin.ucsb.edu by **January 25, 2011**. Also, feel free to contact Grant with any questions regarding TGIF or the review process.

The TGIF Committee looks forward to reading your proposals!



The Green Initiative Fund Funding Application

APPLICANT INFORMATION

Project Title: **Recycling the brine from campus reverse osmosis systems**

Sponsoring Organization (must be part of a campus department): **Department of Geography**

Primary Contact

Name: **Lakshmanan Nataraj**

Title: **Mr.**

Phone: **8054534117**

Email: **lakshmanan_nataraj@umail.ucsb.edu**

Secondary Contact

Name: **Mo Lovegreen**

Title: **Executive Officer**

Phone: **805-308-1246**

Email: **mo@geog.ucsb.edu**

Start Date: **Fall 2011**

End Date: **Fall 2012**

How did you hear about TGIF? **Environmental Affairs Board**

PROJECT DESCRIPTION

- (1) Give a brief overview of the project. *Please be concise (3-4 sentences)*
Currently, the Reverse Osmosis (RO) system at the Engineering Sciences Building (ESB) creates RO water and RO process water at the ratio 1:1. The process water is sent directly down the drain. At present, the ESB produces around 50,000 gallons per month of RO water (600,000 per year), which means an equal amount of RO process water is sent down the drain. The project aims to capture that process water in a storage reservoir and pump it back into the building's industrial line (effectively recycling the water).
- (2) Please state specifically what the funding will be used for. *(3-4 sentences)*
This is a pilot project. We have done some preliminary feasibility research and we believe that the salinity of the process water will not significantly affect the water quality of the building's industrial line. Part of this project's funding will be used to assess the effects on the industrial line's water quality. The major part of the funding will be used to install storage reservoir into which water from the RO process water will enter.
- (3) Will this project require ongoing maintenance or servicing? If yes, how will this be continually funded? Who will be responsible for conducting this maintenance/service?
UCSB Facilities has shown interest to help facilitate this project. (support letter attached)

- (4) How do the project goals meet the TGIF mission statement and guiding principles (see cover letter)? *(3-4 sentences)*
Firstly, by storing the RO process water in a storage reservoir we can save huge quantities of water from being wasted down the drain. Secondly, tapping this stored water into the building's industrial line is a great way to recycle this water. If this is successful in Engineering Sciences, we could also expand it to CNSI which has a similar RO system.
- (5) What specific environmental impact will this project help mitigate on campus? *(2-3 sentences)*
By storing the RO process water in a reservoir, we save it from being drained. Then by pumping this water to the building's industrial line, we also recycle. More than 600,000 gallons of water could be saved annually. Also, at present, we do not have the exact ratio of RO water: process water. Although we assumed it as 1:1, we believe it could be more than what we have assumed.
- (6) How does this project support other sustainability efforts on the campus and help move the university beyond its current programs? *(3-4 sentences)*
Efficient water management is a sine qua non for any university. Having identified a major source of water wastage and a productive way to mitigate it, there is an urgent need to implement this project and save large quantities of water. Moreover, this will be prove to be quite helpful as the university is gearing towards long range development plans for future.
- (7) Is there an example of a similar project that has been completed or is currently being implemented at another institution? If yes, please elaborate. *(3-4 sentences)*
RO process water and brine water disposal is usually done in big desalination plants. The common disposal method is to pump it to an evaporation pond. A system for enhancing the evaporation pond performance has been implemented at Ben Guiron University, Israel. University of Texas is currently studying brine water disposal to solar ponds. Prof. Yoram Cohen of UCLA has done considerable research on reverse osmosis desalination and brine disposal. However, we are not aware of any project where brine water is tapped to the industrial water line. Hence, in case we are not able to tap the process water to the industrial line, we could always look what other institutions have done for alternatives.
- (8) What sources of labor will your project use? Consider the labor involved in manufacturing and recycling any project materials in addition to the labor here at UCSB. *(3-4 sentences)*
The project involves installing a storage reservoir and pipes connecting the RO process water outlet to the reservoir and the reservoir to the industrial line. UCSB Facilities has shown interest in helping out with this project and will supply labor with at a minimal cost. (support letter attached)
- (9) What materials will you need for your project? Where do these materials come from and what are the plans for safe disposal of any products or byproducts of your project? *(3-4 sentences)*
We will need a storage reservoir, connecting pipes, valves, a pump, shut off valves, flow-meter (to track the system's water savings), and pump control system in order to store the RO process water and pump it into the industrial line.

PROJECT TIMELINE

Please append a projected timeline for the proposed project. This timeline will be used by the TGIF Committee and Grants Manager to assess the project's ongoing advancement. You may choose the format of the timeline, but it should be as detailed as possible and include the following:

Fall 2011(First half): Quantitative Data Analysis on the quality of the industrial water and RO process water.

Fall 2011 (Second Half): Installing the storage tank and tapping the RO process water to the tank.

Winter 2011 – Spring 2011: Maintaining the system, tracking the amount of water we are able to save and educating UCSB students and faculty about our project.

EDUCATION AND PUBLICITY PLAN

- (1) Please give a brief overview of your educational and publicity program.
First we plan to remind the students and faculty of ESB (especially those who use the RO system) on the amount of water that is being wasted. On a broader level, we propose to educate the students of UCSB by tabling on water conservation (in coordination with UCSB Environmental Affairs Board).
- (2) Who is your audience, and what do you hope to communicate to them?
Our primary audience will be students and faculty of UCSB, particularly building occupants who utilize the DI water. We hope to let them know how this project will be effective in saving large quantities of water. On a broader scale, this project will also showcase the efforts of UCSB as a key player in efficient water management, both nationally and globally.
- (3) How will you engage UCSB students in the education and publicity components of your project?
We currently work with UCSB Environmental Affairs Board, a student run organization which engages in environmental projects and helps promote environmental awareness primarily to students, staff and faculty of UCSB.
- (4) Will there be a hands-on and/or service component?
The project involves a one time installation and monthly maintenance.

PROJECT INDICATORS

- (1) How will the success of the project be measured? Consider both quantitative and qualitative measures.
We would first save at least 600,000 gallons of water (per year) from going into the drain. Then, recycling this water to the industrial line is a great way to make efficient use of this stored water. We would use a flow-meter to exactly track the amount of water saved by the reservoir.
- (2) Can you provide or develop a quantitative baseline prior to beginning the project and then reassess these measurements after its completion in order to show the impact of the project? If yes, please explain the methodology.
Currently, the RO system creates RO water and RO process water in the ratio 1:1, which results in wastage of 600,000 gallons per year or more. If this project is successful in its implementation, we will be able to show that we saved close to 600,000 gallons of water.
- (3) Do you anticipate the project will result in Greenhouse gas reductions? If yes, use the CO₂ calculation spreadsheet available on the TGIF webpage and include it with your application.
This project will have reductions in GHG emissions because less energy is required to transport and filter the water that is saved. However, these reductions would be extremely difficult to measure,. Based on the spreadsheet provided in the TGIF website, we could save at least 1641.60 lbs of CO₂ or more.

- (4) Can you provide quantitative or qualitative data or reports demonstrating the success or achievements of similar projects at other institutions?
We are not aware of a similar project at other institutions to the best of our knowledge.
- (5) Describe the projected cost savings to the University and describe which entities on campus will benefit from these savings. *(3-4 sentences)*
The project could result in saving at least 600,000 gallons of water annually and if successful, we could also extend it to buildings such as CNSI which have a similar system. The campus would also benefit because this project will help reduce water consumption, a necessary goal for the campus to move forward with its long range development plan and also from reduced utility bills.
- (6) What is the estimated return on investment or payback time in years? Please provide details on how you calculated this ROI.
The cost of water is very low and often heavily subsidized. For this reason, the payback period is very long for water conservation projects. However, we believe the project could save anywhere between \$3000 - \$10,000 annually. Given that the initial installation is approximately \$2000 and the maintenance is approximately \$500 annually, the project would result in saving anywhere between \$8,000 – \$36,000 in a period of 4 years and this would linearly increase with more years to come.

APPROVALS

- (1) What approvals are needed to ensure project implementation? (Example: Campus Planning Committee, Design Review Committee, or Department approval)
We have spoken to UCSB Facilities (Dan Marquez) and ESB Building Sr. Dev Engineer (Tom Reynolds) and they have shown support for this project.
- (2) If your project requires modification or additions to existing campus structures, have you contacted Design and Construction Services for input and “real cost” estimation? If yes, please attach documentation.
NA
- (3) Do you have confirmed written support from all departments involved in the project?
Yes

Please include all letters of support with your proposal, if applicable. Applications missing them will be considered incomplete.

The Green Initiative Fund

Budget Form

If this project has been ongoing or occurred before, please describe previous years' budgets, including total amount spent and sources of funding. Please also include any justifications for increasing previous years' budgets and seeking funding from TGIF as oppose to using only the previous years' funding sources.

Please keep these questions in mind: If you are funded, will your project need any on-going funding after the completion of this grant? What is your strategy for supporting the project after this initial period to cover replacement, operational, maintenance, and/or renewal costs? *Please note: TGIF is unlikely to renew funding year to year for the same project.*

Use the following spreadsheet to list all budget items for which funding is being requested. Include cost and total amount for each item requested. Attach additional pages if necessary. Due to limited funding, TGIF is reluctant to employ Graduate Student Researchers (GSR) or other positions that pay student fees/insurance, and encourages projects to utilize student assistant positions instead. TGIF is also reluctant to provide funding for food or drinks for events.

PROJECT BUDGET		
ITEM	COST	REQUEST
Infrastructure (Capital expenses, etc.)		
Steel Storage Reservoir	\$1647.24	\$1647.24
Stainless Steel Water Pump	\$1308	\$1308
Water Flow Meter	\$50	\$50
Connecting pipes, valves and misc. items	\$100	\$100
Education (Outreach, publicity, etc.)		
Items for Tabling	\$50	\$50
Final Poster Printing	\$50	\$50
Personnel (Salary/wage, worker's compensation*, etc.)		
	\$400	\$400
	TOTAL	\$3555.20

**Note: This is a tentative budget. We are yet to get an exact quote from UCSB Facilities.*

OTHER FUNDING SOURCES

- (1) List all sources of funding (pending and approved) for this project including grants, volunteer efforts, and in-kind donations. Please include the following information: a) Fund description, b) Date submitted and status, c) Amount received that applies to this proposal.
None at the moment
- (2) Is your project scalable? Please explain. **Yes, if it is successful in ESB, it can be extended to other buildings with similar systems such as CNSI.**
- (3) Would your project still be viable if it does not receive *complete* funding from TGIF? No
- (4) What is the minimum amount of funding required for a successful project? **\$2800 (We could go in for a lower capacity tank)**

Green Campus 2010 Metrics tracking sheet
 Campus: UCSB Month: December Filled out by: Brandon Kaysen

1. ENERGY SAVINGS

This is for anything that identifies (potential) or creates (actual) energy savings, including kWh, therms, and water savings resulting from retrofits, audits, operational changes, etc.

ACTUAL ENERGY SAVINGS									
Annual Projects	# / %	Annual kWh savings	Annual therm savings	Annual water savings (gall)	Project life (years)	Total project savings (kWh equivalents)	Total CO ₂ savings (lbs)	Total \$ savings	
# CFls Distributed								\$0.00	
Energy Audit Savings (% Reduction)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Total Savings - Annual Projects								\$0.00	
Current Month Projects	# / %	kWh savings	therm savings	water savings (gall)		Total project savings (kWh equivalents)	Total CO ₂ savings (lbs)	Total \$ savings	
% reduction in energy from energy competitions								\$0.00	
% reduction of fume hood use (cash height)								\$0.00	
Savings from (Insert name of Green Campus Event)								\$0.00	
Savings from (Insert name of Green Campus Event)								\$0.00	
Savings from (Insert name of Green Campus Event)								\$0.00	
Total Savings - Current Month Projects								\$0.00	
Totals for all projects this month		0.00	0.00	0.00			0.00	\$0.00	

Legend:
 User entered data
 auto calculated cells
 ignore these cells
 Totals

POTENTIAL ENERGY SAVINGS									
Annual Projects	# / %	Annual kWh savings	Annual therm savings	Annual water savings (gall)	Project life (years)	Total project savings (kWh equivalents)	Total CO ₂ savings (lbs)	Total \$ savings	
# CFls Distributed								\$0.00	
Energy Audit Savings (% Reduction)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Savings from (Insert name of Green Campus Project)								\$0.00	
Total Savings - Annual Projects								\$0.00	
Current Month Projects	# / %	kWh savings	therm savings	water savings (gall)		Total project savings (kWh equivalents)	Total CO ₂ savings (lbs)	Total \$ savings	
% reduction in energy from energy competitions								\$0.00	
% reduction of fume hood use (cash height)								\$0.00	
Savings from (Insert name of Green Campus Event)		2,431.46				2,431.46	3,663.12	\$316.09	
Savings from (Insert name of Green Campus Event)								\$0.00	
Savings from (Insert name of Green Campus Event)								\$0.00	
Total Savings - Current Month Projects		2,431.46					3,663.12	\$316.09	
Totals for all projects this month		2,431.46	0.00	0.00			3,663.12	\$316.09	

Legend:
 User entered data
 auto calculated cells
 ignore these cells
 Totals

2. WORKFORCE

Anything related to green careers, whether skill training or talking with professionals.

Project - Current Month	#	Unit	Category	Event title/description & date
# of workforce events	1	events	KPI	
# of people enrolled in training seminar		people	Involvement	Emerging Green Builders Meeting - Discussion on the LEED Rating System for New Construction and Existing Buildings -- 12/02/10
# of attendees at a green career panel		people	Interaction	
# of attendees at E- Coalition	20	people	Involvement	

3. ACADEMIC INFUSION

Academic infusion is for anything related to energy efficiency curriculum, whether meeting with faculty members or developing classes and seminars.

Project - Current Month	#	Unit	Category	Event title/description & date
# of faculty/staff working with GC on academic integration	3	faculty	KPI	Professors Eric Matthys, LeAnne Kryder, and Katie Maynard
# of academic projects	2	projects	Involvement	TGIF Grant development and Independent Study formation
# of students enrolled in a GC class		students	Involvement	
# of for-credit student interns	1	students	Involvement	LEED Portfolio Intern
# of academic survey respondents	1	students	Interaction	LEED Portfolio Intern

4. OUTREACH

This includes any activities that either educate people or increase awareness of Green Campus. Examples include people reached through tabling (interaction), website hits (remote interaction), pledges signed (commitment), or volunteering with the program in non skill/workforce activities (volunteering).

Project - Current Month	#	Unit	Category	Event title/description & date
# of outreach events held		events	KPI	
# of audits conducted	2	audits		SAE fraternity & SAASB 3rd floor (savings will be reported in January)
# of people who received your newsletter	50	people	Remote interaction	
# of views on your Green Campus website	230	hits	Remote interaction	
# of people who signed a pledge		people	Commitment	
# of people reached by tabling		people	Interaction	