UNIVERSITY OF WISCONSIN–LA CROSSE
STUDENT ASSOCIATION
235 CARTWRIGHT CENTER 1725 STATE STREET LA CROSSE, WI 54601 (608) 785-8717

SA1516-059: Resolution Approving Spring 2016 Green Fund Request, Solar Photovoltaic Renewable Energy System

DATE: April 20th, 2016
AUTHOR(S): Jeremy Ames
SPONSOR(S): Segregated University Fee Allocation Committee

WHEREAS; The Joint Committee on Environmental Sustainability believed this request fulfilled the requirements of the Green Fund, and;

WHEREAS; SUFAC is responsible for submitting recommendations to Student Senate, and;

WHEREAS; after discussion, SUFAC denied the request for funding, and;

WHEREAS; the Student Senate is required to approve all Green Fund Requests.

THEREFORE BE IT RESOLVED; that the Student Senate approve the solar PV renewable energy system at $0.

Molly Davies
President, Student Senate
Vice-President, Student Association

04-27-2016
Date

Kaylee Otterbacher
President, Student Association

04-27-2016
Date

- Green Fund -

University of Wisconsin-La Crosse
Application for Environmental Sustainably Reserve

SPRING 2016

Application must be received by March 21, 2016

Please send completed applications to greenfund@uwlax.edu. You will be sent a confirmation e-mail verifying that the proposal was received.

For more information about the Green Fund or the application process please refer to the following; Green Fund Bylaws, Green Fund webpage or email us at greenfund@uwlax.edu.

Include the following with this application:

- At least 3 price comparisons of the item(s) or project.
- Budget Sheet
- Other supporting documentation

Contact Information

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Unit/Organization/Department: Students for Sustainability (Student Organization), Facilities Planning and Management

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Please give a brief overview of the proposed items or project(s) you are requesting funding. What would be the approximate cost?

This proposal requests funds for an engineering evaluation, design, and installation of a solar photovoltaic (PV) renewable energy system. The system will be integrated into the project to construct a student-approved 35,200 square foot, two-story addition on the southwest corner of the Recreational Eagle Center (REC). The recently selected architectural and engineering (AE) firm is at the beginning of the design process for the REC addition. Now is the best time to include a renewable energy system, because decisions made during the initial design phase will allow the AE to design a system that will optimize solar gain, system efficiency, and aesthetics.

The final design could include a PV system that is mounted on the roof, a ground mounted array that tracks the sun with an ability to rotate and tilt, or some combination of available PV system options. Attachment 1 provides a visual example of these systems. Such systems could easily be integrated in the yet to be designed REC addition and as funding allows onto the existing structure pending a structural engineering assessment. **In the end, the PV system location, design, and sizing will be dependent on an AE design and structural assessment**.

Data from the Solar Energy Industries Association, lists the 2015 U.S. average PV system design, purchase, and install cost at approximately $3/watt. Based on budget, included as Attachment 2, the maximum size PV system could be approximately 83,000 watts. At 15 watts/ft^2 of PV panel, we estimate up to approximately 5,500 ft^2 of PV panels for a roof mount system.

To achieve this impressive renewable energy system, this proposal requests $288,000.

PV systems are not currently eligible for incentives from Wisconsin's Focus on Energy or UWL's electrical power provider, Xcel Energy. Any acquired future project incentives will be used to reduce any Green Fund financial commitment.

What is the general timeline for the project? (When do you see this being on campus?)

This project is scheduled to begin in 2016 and be completed in 2017.

Please give a detailed explanation on the environmental impact of proposed project? Will this project reduce UW-Ls Carbon Foot print, water usage or electricity consumption? If indirectly please explain how.

Buildings fundamentally impact people's lives and the health of our planet. The REC addition will be designed to Leadership in Energy and Environmental Design (LEED) standards. As such, the addition will be designed and built to reduce energy consumption by at least 30% when compared to a building not designed to LEED standards. In addition, LEED buildings are designed to assure a healthy indoor environment for building occupants. This LEED designed addition and the proposed PV system will visibly demonstrate UW-L's environmental sustainability leadership and commitment. In addition, this combined project will set the appropriate tone for encouraging others to accelerate adoption of sustainable green building and high efficiency building development. Building to LEED standards and integrating a renewable energy system gives UW-L the tools to have an immediate and measurable impact on energy conservation.

Based on the requested budget, we estimate a system size at 83,000 watts. This should annually generate approximately 106,000 kilowatt hours of electricity, all of which should be consumed in the REC. The PV system will offset approximately 10% of the annual electrical demand in REC. Based on data provided by Xcel Energy, each kilowatt hour of Upper Midwest U.S. generated electricity produces approximately 1.054 pounds of carbon dioxide. This project will reduce greenhouse gas emissions by approximately 112,000 pounds of carbon dioxide per year. Putting this into familiar terms, this is equivalent to saving 5,700 gallons of gasoline, planting 1,250 trees, or recycling 36,500 pounds of trash.

How will this project increase student understanding of environmental issues or actions?

This project will increase environmental awareness among students by being in a central and visible location traveled by 1,000's of students on a daily basis. Educational signage will be placed along Badger Street and/or inside REC that explains how the PV System works and the value of such a system to the environment.

Approving this proposal will allow UWL students to visibly demonstrate institutional ecology through environmentally sound facility operations. In other words, this is a big scale project that will get noticed. As such, it will help all current and future UWL students see the value of their Green Fund. Just as important, this large scale PV system will demonstrate to the larger community that UWL students make a difference.

Lastly, the installed signage will contribute to educating campus faculty, staff, and visitors on renewable energy sources and more importantly, the benefits of energy conservation and efficiency.

Do you plan to collaborate with other entities? This includes, planning, executing the project through student or community organizations and university departments/offices.

Yes, the PV system design and installation will be managed by UWL Facilities Planning and Management (FPM) in partnership with the Wisconsin Division of Facilities Development, an Architectural/Engineering design firm, installation contractors, and staff from the REC. During the building design, FPM and REC Building Management staff will request review by students, with a specific request sent to the student co-authors of this request and the student organization, Students for Sustainability.

Large and complex projects require UWL staff member(s) to be involved, please list designated personnel who are involved in the proposed project or have been contacted to verify project viability.

Name(s): Doug Pearson, Executive Director of Facilities Planning and Management
Dan Sweetman, Environmental Health, Occupational Safety and Sustainability, Program Manager, Solid Waste and Recycling Coordinator

Email(s): dpearson@uwlax.edu dsweetman@uwlax.edu

Are you receiving additional funding from other university or non-university entities?
YES: NO: X

If yes, please state the other sources of funding that you are receiving and the amount received.

FPM will continue to pursue renewable energy incentives through Focus on Energy and Xcel Energy to offset total project costs. These two entities do not currently offer incentives. If these or other entities offer future incentives any awards will be used to reduce the Green Fund financial commitment.

Is there any other relevant information that you would like to add?

In 2010 H&H Solar Energy Services, based in Madison, WI, completed a renewable energy assessment of Green Fund eligible buildings to identify options for installation of PV renewable energy systems at UWL. Based on the assessment, REC was identified as the best option to install a PV system. At the time, the Green Fund awarded approximately 50% funding to this $150,000 project. The project was not completed because the State of Wisconsin eliminated their approximate 50% match. Wisconsin's Focus on Energy contributed a small incentive to this 2010 project.

Summary detail has been excerpted from the 2010 H&H Solar Energy Services report and is included as Attachment 3. Please note that the financials provided in the 2010 report are reflective of market conditions in 2010 and not reflective of current costs.

Since REC is a facility open for use by all UWL students, REC management has agreed that the REC is the optimal facility for this large scale renewable energy project. Since this is an important component to the REC addition project, REC management has agreed to fund future maintenance costs for the PV system.

Thank you for your consideration on this exciting PV project. We look forward to answering any questions about the critical need for including renewable energy in the REC addition project.

Attachment 1

Examples of Solar Photovoltaic Arrays

1. Example of a fix mounted PV array on equipment rails with a tilt-up leg for a flat roof. The equipment rails also allow for roof membrane replacement without removal of the array. (Photograph H&H Solar Energy Services)

2. Example of flat roof ballasted (weighted) pan racking system. Note the roofing stone filled pans hold the racks and modules to the roof. Other types of ballast may be used in the pans. These systems typically tilt the modules at 20 to 25 degrees. (Photograph H&H Solar Energy Services)

3. Example of a standing metal seam roof mounted solar electric system. Fix mounted systems have no moving parts and are therefore expected to require very little maintenance. (Photograph H&H Solar Energy Services)

4. Example of a clip designed specifically to connect to standing seam roofs with a tilt-up legs. (Photograph H&H Solar Energy Services)

5. Example of a top of pole mounted dual axis tracking PV array. (Photograph H&H Solar Energy Services)

6. Two examples of a top of pole mounted Solar Flair options (1.15kW & 2.02kW). (Photos provided by Lake Michigan Wind & Sun)

Attachment 2

Budget

Recreational Eagle Center
Roof Mounted Fixed Solar Photovoltaic System

Project Budget

Design, Equipment and Installation Cost	$250,000
Structural Assessment (A&E Fee)	$5,000
Standing Seam Metal Roof Warranty Inspection	$2,000
DOA Fee (4%)	$10,300
Contingency (7%)	$20,700
Total Budget:	**$288,000**

Attachment 3

Recreational Eagle Center
Roof Mounted Fixed Solar Photovoltaic System
Site Assessment Summary

This document summarizes data included in a Commercial Solar Electric Site Assessment conducted by Adam Gusse, H&H Solar Energy Services. Mr. Gusse is a Renewable Site Assessor, certified by Focus on Energy. The assessment was completed in January 2010 and limited to Green Fund eligible buildings.

Common Installation Issues

- For roof mounted systems, confirm with a qualified structural engineer as to the building roof structure's ability to support the additional weight and wind loading of a solar electric system.

- The roofing warranty may be impacted if installing panels on a roof. The REC new standing seam metal roof is warranted by Firestone Building Products. Firestone may extend the warranty but the extension requires their approval prior to installation. A written warranty extension request form can only be submitted by a Firestone Red Shield Licensed roofing contractor. The warranty extension must have a pre-PV installation and post-PV installation inspection. Firestone's total cost for this inspection is $1,500. Additional fees may be charged by the roofing contractor. .

- Solar electric modules are expected to last from 30 to 50 years. System siting should consider shading by future roof penetrations, tree growth, building activity, etc.; siting should especially consider future building expansion, or building usage.

- Operation and maintenance needs will be minimal with fixed mounted systems. Expect maintenance costs to be about 0.1% of the gross system cost per year to replace the inverters once in the solar electric system's first ten years. These costs were factored into each systems example economics.

Recreational Eagle Center Pitched Roof Mounted Option – (This is the large flat pitched metal roof visible from Badger Street.) A roof mounted system with as many as 90 flush mounted panels. The system size is established based on the maximum size possible for that location. Layout options for a PV array would be up to 90 panels on the roof, assuming panel dimensions of 40" X 60" and panel output of 210 watts.

- Estimated production up to 21,714 kWh per year
- Estimated installed cost of $132,300 - $170,100 (2010 estimate)
- Estimated 29 years to system cost recovery
- CO2 emission reduction per year (tons/year) 24.1

Issues:

1. Highly trafficked and very visible part of campus.
2. Standing metal roofing systems provide the lowest cost option for installing a PV system.
3. The roofing material should not require replacement before the end-life of the system.
4. The structural design should be investigated for this roof when considering a large roof mounted PV array.
5. The standing seam metal roofing material results in a low installation cost because of decreased labor time to install.
6. The mezzanine mechanical room directly below this upper roof section provides a short wire run for interconnection with the building's electrical system.

Recreational Eagle Center Flat Upper Roof Mounted Option – (This is the roof above the REC fieldhouse.) A roof mounted system with as many as 238 flush mounted panels. The system size is established based on the maximum size possible for that location. Layout options for a PV array would be up to 238 panels on the roof, assuming panel dimensions of 40" X 60" and panel output of 210 watts.

- Estimated production up to 56,848 kWh per year
- Estimated installed cost of $349,860 - $449,820 (2010 estimate)
- Estimated 30 years to system cost recovery
- CO2 emission reduction per year (tons/year) 63.0

Issues:

1. Highly trafficked and very visible part of campus.
2. The structural design should be investigated for this roof when considering a large roof mounted PV array.

Recreational Eagle Center Ground Mounted Option – 3 total top of pole mounted arrays on the west side of the Eagle Center; one top of pole mount **dual axis tracker** option at 2.88 kW, along with two top of the pole mount **fixed** axis options for a total of an 8.64 kW system. Layout options for a PV array would be an estimated maximum 48 panels, assuming panel dimensions of 39" X 54" and panel output of 180 watts. The top of pole mounting results in a higher installation cost in

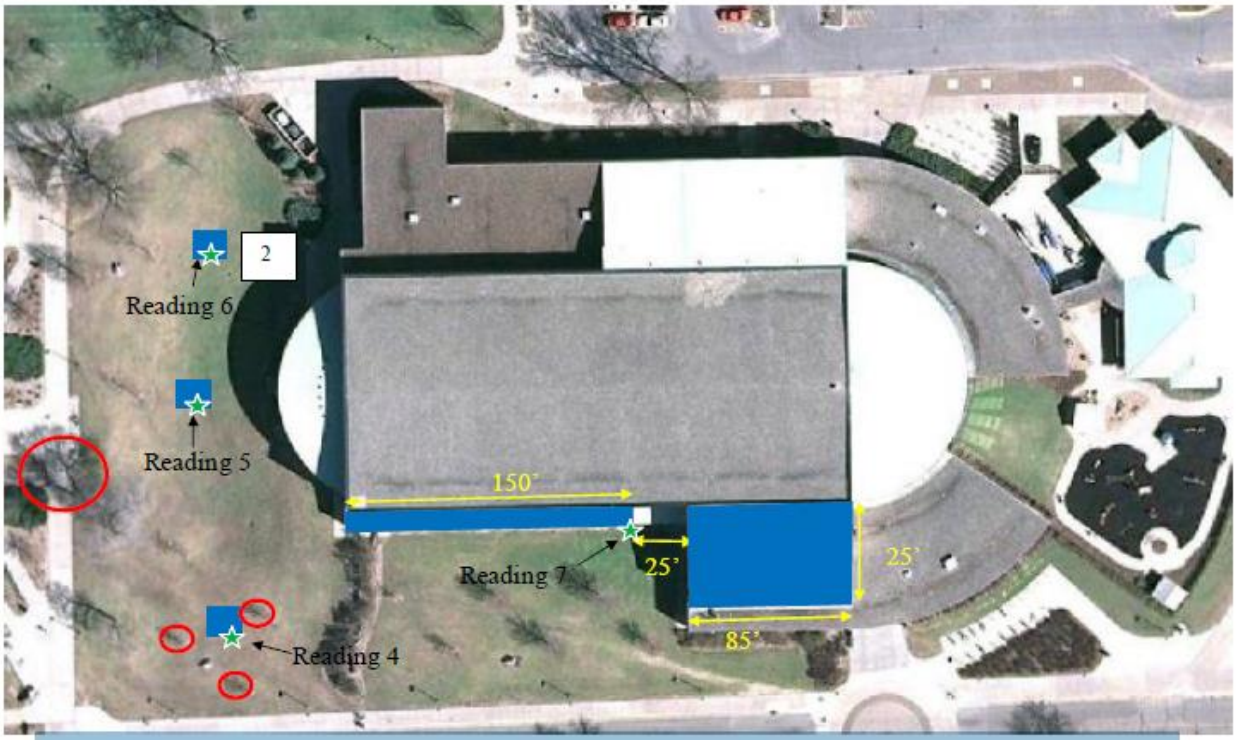
comparison to roof mounting because of the need for trenching and more labor time to install.

The system size is established based on the maximum size possible for that location.

- Estimated production up to 11,989 kWh per year
- Estimated installed cost of $74,880-$92,160 (2010 estimate)
- Estimated 31 years to system cost recovery
- CO2 emission reduction per year (tons/year) 13.3

Issues:

1. Highly trafficked and very visible part of campus.
2. The site is located within 115 feet of a mechanical room with suitable subpanels to interconnect system. Trenching would be generally unobstructed to the building.
3. The ground mount has some shading from the building and three trees southwest of the building. The trees would not currently shade the array, but future growth would increase shading. The three small trees should be relocated, providing a good solar window for dual axis tracking. The shading for the 2 northern ground sites would benefit from pruning of the larger Elm near Whitney, and should not be dual axis trackers due to significant shading from the REC building and mature trees to the northwest.
4. A minimum ground clearance of 6 feet for the panels for the top of pole arrays would help eliminate any winter shading from dorms south of the site and some smaller landscape trees.



The blue boxes represent suitable installation locations for PV panels that were identified in 2010. The 150 foot section of roof will not be included in this 2016 Green Fund Request. The 150 foot roof section is the location of the REC addition. PV panels could be installed on the 85 foot x 25 foot pitched roof section, the flat roof above the fieldhouse, the roof of the new addition or ground mounted on the west side of the building. **Architectural and engineering assessments will define optimal panel locations.**