10 kW Solar Array for Baker Commons
or
Educational Solar lighting system around campus

1. Introduction

As part of a service project for environmental philosophy we propose the idea of funding and installing either a 10 kW solar array on the roof of Baker Commons or an educational smaller scale demonstration of solar garden lighting systems around campus. Through our research we have looked into each option to determine cost, funding as well as the amount of energy the college would receive from each system. Possible payment options available for sustainable energy in Iowa include the Alternate Energy Revolving Loan Program (AERLP) a viable loan option for Luther’s campaign in reduction of emissions. Likewise, due to the large amount of money Luther College budgets for energy costs during particularly harsh winters (depending on the cost of heating for this particular winter) funding could become readily available to promote alternative energy project on campus. This could be looked into further at the end of Luther’s fiscal year in May. These systems will provide both an educational aspect and promote more sustainable living on campus. In Luther’s effort to reduce its carbon footprint by 50% solar stands as a viable option to promote sustainable energy.

2. Background

Currently Luther has no means of energy gathered by solar arrays. Solar along with other mechanisms for utilizing renewable energy are important to establish in an effort to show commitment to reduce carbon emissions. Solar is a clean renewable energy resource that requires relatively low maintenance and in the long term will make returns on cost of construction. The arrays in question are under warranty for 20 years and would be expected to repay for itself in 9-12 years based on 5-7 hours of sunlight daily [1]. Not only is solar clean but is an aesthetically pleasing means of producing electricity. Cost can be an issue since solar does take a long time to pay off with such a high upfront cost, for this reason the small-scale proposal becomes an option with low cost however low energy outputs as well. Cost can be dealt with by applying for programs such as the AERLP where qualified applicants can receive a loan consisting of AERLP funds up to 50% of the total loan at 0% interest; the maximum loan is $250,000 for a
maximum term of 20 years (much more than required for a 10kW system). The
loans are specifically for renewable energy in Iowa and are given based on
technical merit and financial qualifications.

3. Proposal I: 10 kW solar array for Baker Commons

After reviewing previous plans for a 10 kW solar array at three different
locations on the Luther campus done by Dennis Pottratz of GoSolar we concluded
Baker commons to be the most viable site to set up an array. The commons are in
plain view to much of campus and the community to provide the aesthetic aspect
of the array. Based on the location of the roof (facing 15 degrees South) and the
slope of the roof (45 degrees) makes it the best candidate for a large-scale solar
array on campus. The 9190 watts would produce about 15,202 annual KWH's (1
KWH is equal to the amount of electricity required to burn a 100 watt light bulb
for 10 hours) again based on the system receiving 5-7 hours of sunlight daily (a
reasonable estimate). Cost for a system of this size would be roughly $7 per watt
or roughly $60,000 [2]. Any shading including snow significantly reduces
production. The rack would cover an area of 50 feet by 10 feet, using a Unirac
frame. [1]

4. Proposal II. Small-scale solar lighting

This is an alternate plan to introduce solar to Luther's campus. The small-
scale demonstration would serve strictly as an educational and aesthetic system
not producing any useable or storabe energy other then powering the bulb on
the unit. Strictly using the system for an educational purpose has advantages in
the sense of cost to the college. These systems run around $70 for 3 lighting units
on a scale of higher quality rather then cost. We propose purchasing 15 lights,
which would amount to $350 at $23.33 per light. These units could be placed
nearly anywhere around campus that receives 4-8 hours of sunlight a day
preferably facing South. The panel on the unit is located on the top and in plain
view, which plays to the educational aspect of the proposal. It will be clear to
students where the energy is coming from based on the design of the lights,
which is the key point of making an educational display that will provide the
knowledge of solar energy in a simple and easy to understand manor. Along with
the lights a small display reiterating the facts of solar and how the energy is being
created would be present next to the display (laminated poster with
explanation). Solar landscape lighting offers a low maintenance low cost option
to promoting education on sustainable energy on campus. The lights have a large
array of design options and can easily be purchased online.
5. Summary

The fact that this is one of the first solar power project on campus adds additional value. In an effort to reduce carbon emissions on campus, solar offers another option to work along with other renewable energies. Diverse means of energy promotes renewable energies and shows the commitment of the Luther community to operate in an earth friendly sustainable way. We hope to bring awareness of renewable energy sources to the students of the Luther College and the community of Decorah. A successful project will inspire others to promote renewable energy and implement projects of a larger scale across Luther College’s campus.

6. Contact

This project can be taken further in a number of ways which include but are not limited to: Dan Bellrichard, Luther College Sustainability Coordinator, bellda02@luther.edu; Maren Stumme-Diers, Luther College Assistant Sustainability Coordinator, stumma01@luther.edu; Jon Jensen, Associate Professor of Philosophy, jensjo01@luther.edu; and the authors of this proposal listed below.

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[2] Figures are based off other similar sized systems and would be subject to change from different costs and alternate mounting systems.