EnergyTrust

Briefing
OSU Dixon Recreation ReCardio Install Project
(3 kW)
December 3, 2008

Summary
The Dixon Recreation Center at Oregon State University is proposing to retrofit 22 elliptical trainers to generate renewable energy. The generation will be fed onto the utility grid through an inverter to displace some of recreation center s existing load. The university conservatively estimates the system capacity at 3kW and anticipates generating 3,500 kWh on an annual basis.

Recommendation
Staff supports this project and recommends it be accepted as a demonstration project under the Open Solicitation Program for up to $5,812.50 in funding.

Background
The Dixon Recreation Center is the main recreation facility at OSU. The center offers a wide range of facilities, programs and services to students, staff, and the general public. Dixon is a high use facility and OSU staff conservatively estimate that each elliptical machine is in use for 8-10 hours each day. Use rises during the academic year and falls slightly during the summer.

In response to strong student demand, the center is interested in retrofitting its 22 elliptical trainers with ReCardio technology to allow them to generate electricity that can be interconnected with the utility grid.

ReCardio is a product developed by ReRev.com, LLC, a Florida-based company. According to ReRev, the ReCardio product was successfully installed in 15 elliptical trainers at a health center in Gainesville, FL earlier in 2008. The product enables each trainer to generate a maximum of 400 watts on a continuous basis. To generate interest in the technology, ReRev is offering to install the product at their cost and provide all necessary operations and maintenance costs free of charge for five years.

OSU is seeking an incentive under the Renewable Resources department s demonstration project guidelines. Since the technology does not have a long history in the field this project provides an opportunity to better understand the amount of generation that is possible under different scenarios. To meet the goals of the demonstration project pathway, OSU has developed a plan for disseminating data gathered and information learned from the project.

Financial return is not OSU s objective with this project. Instead, the goal is to address student demand in a manner that promotes educational opportunities and public outreach.

Relation to Strategic Plan/Action Plan/Budget

This project meets Strategic Goal 3 by providing 3,500 kWh of energy per year from a renewable resource. The project supports Strategic Goal 5 by promoting a new business solution for renewable energy generation. Funds are in the approved budget for Pacific Power as a demonstration project under the Open Solicitation Program.

Technical Analysis

The ReCardio product will be installed on OSU s existing Precor Elliptical Trainers. Precor trainers are long-lived machines and come standard with a lifetime frame warranty, a 10 year parts warranty, and a one year labor warranty. Energy Trust has not tried to analyze where the existing machines fall in their warranty lives, nor if the ReRev modifications will void the Precor warranty or significantly alter the machine s operating life. OSU has stated that they will replace any machine that fails during ReRev s warranty period, which is described below.

The existing trainers have permanent magnet generators built into them. These generators are used to regulate a user s workout by dumping load into large resistors. The resistors convert the generated electricity into heat, staying at about 140° F during active use. The ReCardio technology removes these resistors and installs a proprietary product which allows the generated electricity from multiple machines to flow through a combiner into an AC inverter and onto the utility grid.

Each machine is technically capable of producing 400 watts continuously. ReRev s experience at the Gainesville facility has shown that the machines can be reasonably expected to produce 100 watts continuously under normal use. Strong users can produce significantly more power. Each machine is fitted with a display showing its instantaneous generation.

Energy Trust staff modeled various production regimes based on user strength and fitness center occupancy and believe that OSU s generation estimate of 3,500 kWh is both conservative and prudent given the lack of data and experience with the new technology.

ReRev is warrantying the system for five years, including labor for any upgrades or repairs. The company warranty includes updating the system free of charge should the technology be improved during the warranty period. ReRev is also installing a 6kW inverter to allow for system expansion in the future.

Benefits

Over the five year life of the project, the expected clean energy production will avoid over six tons of CO2 emissions.

In addition to these benefits, staff believes the project will benefit Energy Trust in the following ways:

- The project is a demonstration of a new, commercially available renewable technology that could be adopted by a large, existing market. Data and key information disseminated from this project will help Energy Trust and the market learn the capacity of and how to value this potential resource.
- Energy Trust s Open Solicitation Program receives inquiries every few months asking about the possibility of generating electricity from exercise machines. With OSU assistance, this project will help staff determine the potential of that market and respond to future inquiries.

- The project enhances Energy Trust s relationships with OSU and Corvallis developed during the 2008 Corvallis Energy Challenge.
- The project is expected to generate publicity for both OSU and Energy Trust.

Economic Analysis

Capital and installation costs for the project are expected to total $14,000. In addition, OSU will provide publicity and data collection at a cost of $1,000. Energy Trust staff based its analysis on a system life of 5 years, which is the length of the warranty on the technology, and an internal rate of return of 5% for the project s social benefits.

It is unknown whether the project will receive a BETC pass-through and ODOE has not yet made a determination. The project can be classified as renewable under Oregon s broad statutory definition, but ODOE does not currently have a programmatic classification for this type of project. As such Energy Trust staff assumed the project will not qualify for a BETC pass-through.

OSU intends to pay for the project outright using student fees.

The table below summarizes our comparison of project revenues and costs and calculation of above-market costs.

NPV Revenue from electricity savings	$771
Total Revenues	**$771**
Minus	
Project s upfront installed cost	($14,000)
Costs for reporting data collection required by EnergyTrust	($1,000)
O & M costs (fully covered under warranty)	$0
Total costs	**($15,000)**
NPV Net above-market costs	***($14,229)***
Energy Trust Incentive ($5,812.50) as a percentage of above market costs	41%

Energy Trust calculated its incentive based on the government rate for solar PV projects of $1.75 per installed watt because the project has a capacity factor and size very similar to PV. We ve added an additional $1,000 to cover OSU s costs related to disseminating the key data and lessons learned from the installation. The total recommended Energy Trust incentive of $5,812.50 represents 41% the calculated above market costs of the project. Energy Trust will take possession of 50% of the project s renewable energy certificates, as per negotiations with OSU.

Should the project receive a BETC pass-through Energy Trust s incentive would still not cover 100% of the project s above market costs.

Though the project will not come close to paying for itself within the assigned 5 year system life, financial payback is not the university s motive for the installation. The university s objectives are primarily non-financial:

1. **This project responds to student demand.** OSU says students have pressed for a project like this for over three years. According to the project lead, it seems obvious to generate electricity from exercise equipment, but no one is doing it.

2. **To create opportunities for student engagement and education.** OSU believes that students may be motivated by the installation to research ways to improve the system to increase performance. The university also hopes to expand the system to additional machines over time.

3. **To raise public awareness.** OSU expects the project will encourage people to think outside the box with respect to traditional energy sources. The university envisions the installation being a focal point for events, competitions, and fundraisers.

Committee/Public Review

Staff analyzed the project in the fall of 2008. It met the criteria established in the application process as a demonstration project.

Staff seeks input and review by the RAC on December 3, 2008.