

## Briefing

# Farmers Irrigation Small-Scale Hydroelectric Project

May 31, 2005

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## Summary

Soar Technologies proposes to install a 40 kilowatt (kW) hydroelectric turbine for Farmers Irrigation District to operate within the water delivery system. Soar will build and operate it and then sell it to Farmers after at least one-year of operating experience.

As proposed, the turbine will serve a dual function. It will provide essential pressure reduction, while also generating more than 120,000 (kWh) per year. The project will serve as a demonstration of these techniques and technologies for both irrigation systems and drinking water supply systems in Oregon.

## Relation to Strategic Plan/Action Plan/Budget

This project meets Strategic Goal 2, by providing an average of 120,000 kWh of energy per year from a renewable resource and Goal 5, by helping demonstrate a small-scale, urban energy application. The results of the demonstration will be useful as we develop strategic relationships with water treatment facilities, traditionally large users of energy.<sup>1</sup>

The project addresses the renewable resources Open Solicitation Program element, Action Plan IIA. To staff's knowledge, this is a new application in Oregon. Funds for the project are included in the approved FY '03 budget, within the amount set aside to fund the Open Solicitation Program.

## Project Description

Soar Technologies is proposing to install a micro hydroelectric turbine generator system in Farmers Irrigation's Kenwood Vault in Oak Grove County Park. The intent of this project is to recover hydraulic power from the change in head associated with supplying water to the irrigators. In the absence of this project the energy would be dissipated, as opposed to recovered, in a pressure reduction valve.

The Farmers Irrigation District is a customer of Pacific Power. The project will interconnect to Pacific's distribution system and serve local loads.

The proposed turbine would be located in the existing underground equipment vault on the existing irrigation water supply line. There is no change to the water supply (quantity or quality) or stream operations from this project. The turbine will parallel the existing pressure reducing valves. The project would consist of the following:

- A 40 KW hydro turbine unit, Pelton turbine in a sealed enclosure, vertical orientation of the shaft, 40 KW induction generator connected by a belt drive, mechanical seals, 6 inch diameter

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<sup>1</sup> The Natural Resource Defense Council estimated that water treatment facilities use about 5% of the total electricity consumed.

inlet and outlet piping. The turbine and assemble is being manufactured by Canyon Industries, a leader in the small hydro turbine market.

- Turbine inlet control valve assembly (2-inch nozzle), hydraulically operated, diaphragm operators, control of needle/nozzle and deflector assembly
- Turbine electrical equipment including protective relaying with freestanding weatherproof enclosure. Includes provisions for supply connection form local utility, includes utility meter base and power distribution panel. Net-metering meter to be supplied by the utility.
- Equipment to be installed in existing underground concrete vault, 20' x 16' with cover and access ways. Includes installing 3-phase electrical service, lighting and drainage sump in the vault.
- All required installation services included. Associated piping, instrumentation, control and other equipment, including crane service and assembly.

The system will be installed and owned by SOAR Technologies for the first year. After the first year, the system will be purchased by Farmers Irrigation. The cost to Farmers will be reduced by the amount of the BETC and any incentive paid by the Energy Trust.

Preliminary engineering has been completed on this project and the project engineers have met with Pacific to review interconnection issues. A new three phase service will be installed for this project.

The project was initially scheduled to be completed in 2005 but due to the permitting requirements of the Federal Energy Regulator Commission and the Oregon Water Resources Department the project is now scheduled to go online at the start of the 2006 irrigation season. An early commitment from the Energy Trust assures the developer it is worth engaging in the regulatory processes. Energy Trust is not committed, if the project fails to meet regulations.

## Cost Analysis

The analyses assume a 15-year economic life to the project. The table below summarizes the comparison of project costs and market values:

<u>Cost/Value</u>	<u>NPV</u>
Total Project Costs	\$ 98,928
Market Value of Energy	\$ (41,032)
BETC Pass Through	\$ (19,125)
Above Market Costs	\$ 38,711
<b>Energy Trust Contribution</b>	<b>\$ 35,000</b>

The project cost listed above includes all costs for financing, contingencies, reserves, capital equipment, construction, engineering, ongoing operations and annual maintenance. A pass-through partner will be used for the Oregon Business Energy Tax Credit (BETC). The value of the BETC calculated above represents 25.5% of installed project costs.

For the first year the turbine output will be limited to 25kW and Pacific will pay Farmers Irrigation based on tariffs established under Schedule 135, Net Metering Service,. After year one, the output of the turbine will be increased to 40kW. Production payments will then be based on the new net metering tariff with its higher allowable capacity or on the existing Schedule 5, Partial Requirements

Service. The analysis assumed a capacity factor of 20% during the first irrigation season and an 85% capacity factor during the irrigation season in years two through fifteen. The irrigation season is five months per year.....

The Energy Trust's contribution represents 90% of the above market costs, after netting for the BETC pass-through. The Energy Trust will receive all the green tags for the project. The Energy Trust would pay annually for four years based upon production at twelve cents per kWh.

### **Benefits**

- Over the expected life of the project, it will avoid approximately 11,500 tons of CO<sub>2</sub> emissions. To sequester this much carbon would require planting 618 acres of trees.

In addition to the quantifiable benefits of the program, staff believes this project will benefit the Energy Trust in the following ways:

- Develops relationships with a highly visible partner expanding into self generation in a non-traditional setting. .
- The project provides a new, urban use of a proven renewable technology, and a potential show-case for at least a dozen other cities and water districts in Oregon.
- The project allows the Energy trust to continue to include hydro electric generation in a safe, fish friendly fashion.
- Allows the Energy Trust to support a different ownership model for small-scale and distributed generation that lowers risk to the eventual project owner.

### **Committee/Public Review**

An initial application for the project was first provided to the Energy Trust in March, 2005. A revised initial application and full application was provided in April, 2005. The revised application reflected the change in system capacity from 25kW to 40kW

The project will be reviewed by the Renewable Energy Advisory Council (RAC) on June 9, 2005. Based on the new procedures and policies for Open Solicitation Projects requiring less than \$50,000, the project could be approved by the Executive Director of the Energy Trust.

### **Recommendation**

Staff strongly supports this project.