Board Decision
Oregon Institute of Technology 1.5 MW Geothermal Project

March 7, 2012

Summary

Authorize up to $1.55 million to offset the above-market cost of a 1.5 megawatt (MW) geothermal electric facility, located on Oregon Institute of Technology's (OIT) Klamath Falls campus.

Energy Trust Goals

- The OIT project supports Goal 2 of the 2010-2014 Strategic Plan: to accelerate the rate at which renewable energy resources are acquired, helping to achieve Oregon's 2025 goal of meeting at least eight percent of retail electrical load from small scale renewable energy projects.

Background

- This would be the second and larger geothermal electric project on the OIT campus in Klamath Falls. The first project has been operational for two years and its production is exceeding expectations.
- The project will generate a net 7,646 MWh annually (0.87 aMW). All but 287 MWh will be used directly on campus. The 287 MWh that exceeds campus demand would be sold on a non-firm contract to Pacific Power.
- OIT is partnering with Johnson Controls, Inc. (JCI) on this project. The project consists of two geothermal units designed by JCI that will operate together. Both OIT and JCI received grants that are helping to fund the project.
- OIT's goals for the project are to cover interest on their bonds, to break even by year 20, and to have the facility available for educational purposes.

Technical Analysis

- The proposed facility would use 196 degree (Fahrenheit) water from a 5,308 foot well on campus. The well was drilled for use with this project. The water is not being used for other campus purposes.
- A test has shown flow of 2,500 gallons per minute (gpm) from the production well. The project needs 2,000 gpm.
- The project will consist of two units, each using binary technology, where a working fluid in a closed system is heated by geothermal water. The working fluid turns to steam and spins a turbine. It is then cooled and recondensed so the cycle can begin again.

- The two units are being operated in series. Rather than splitting the flow and sending half the hot water to one unit and half to the other, the full amount will be used in the first unit and then sent to the second unit.
    - Electricity production is a function of two factors: the amount of geothermal water flow and the temperature differential in the working fluid. Operating the units in series enables both units to function with the full amount of water, which increases the output compared to splitting the flow and operating in parallel.
    - In addition, the cooling water will run in the reverse direction from the hot water to maximize the difference in temperature between the cooling water and the hot geothermal water.
- OIT has done an hour-by-hour analysis of its electrical load and determined that load is high enough to directly use all but 287 MWh of the 7,646 MWh of electricity produced by the project. The university's current electric rate is approximately $0.05 per kWh ($50/MWh). OIT plans to sell the excess to Pacific Power on a non-firm contract at an estimated $20 per MWh.
- OIT has had initial conversations with Pacific Power on interconnection. OIT owns the two main power lines into the campus as well as multiple transformers for several buildings. This equipment was purchased in the vicinity of the project to make interconnection for this project easier.
    - In the event interconnection takes longer than anticipated, OIT can add a backfeed prevention relay and temporarily reduce production at times when campus demand is less than what the project is capable of producing. Because the 287 MWh in excess power is less than 4% of the project's total production and the non-firm rate is low, the effect of this on the project's revenues would be minimal.
- All permitting work is complete; completion is expected by the end of 2012.
- OIT has full site control – it owns the property and water for the project.

Financial Analysis

- We analyzed the project's finances assuming a 20-year life.
- Staff and an independent contractor reviewed the project design and costs and found them to be standard and reasonable for projects of similar size, type and design.
- In summary:

Project scope	
Size (MW)	1.5
Annual Output (MWh)	7,646
Project Life (years)	20

Revenues	
Power sales	$6,035,087
Grants	$7,684,837

Total Revenues	$13,719,924
Costs	
Capitalized, installed cost	$12,406,213
Operations expense	$2,019,587
Maintenance expense	$673,535
Other expenses	$187,432
Total Project Cost	$15,286,767
Above-Market Cost = Total revenue minus Total project costs	**($1,566,843)**

- The project has received $7.6 million in grants, including funds from USDOE and the Oregon University System. OIT is also using $3 million in bonds to finance the project, repaid at 4.5%. The project does not have a BETC.
- The project's above-market cost on a net present value (NPV) basis is $1.57 million which represents the differences between the project's lifetime costs and revenues.
- Staff proposes an incentive of $1.55 million, an NPV of $1.48 million, representing 95% of the project's above-market costs. Energy Trust would take title to 95% of the project's renewable energy certificates using the following arrangement: OIT would own 100% of the RECs for the first year of the project. Energy Trust would own 100% of the RECs for years 2-20 (these certificates, also known as RECs are environmental attributes of renewable energy generation, and can be sold separately and/or used to satisfy renewable energy portfolio requirements in Oregon).
- The NPV of this incentive per average megawatt is $1.69 million. This compares to $6.4 million/aMW for the first OIT geothermal project; $1.04 million/aMW for the Klamath Irrigation District hydro project; $2.2 million/aMW for the Revolution Energy Solutions Round II biopower project; and $4.36 million/aMW for the Christmas Valley solar project. It is within the target range for the Other Renewables Program budget ($1.39 – $4.62 million/aMW).
- Staff proposes that any contract with OIT should include milestones to ensure the project remains on schedule, while allowing Energy Trust to withdraw funding if the project is unable to move forward.
- Funds for the project are within the 2012 Other Renewables program budget.
- The Renewable Advisory Committee reviewed the project at its February 15, 2012 meeting and supported it.

Recommendation

Approve $1,550,000 in funding for the OIT project, by adopting resolution 623, below, authorizing the executive director to sign contracts consistent with the resolution.

RESOLUTION 623

APPROVING FUNDS FOR THE OREGON INSTITUTE OF TECHNOLOGY 1.5 MW GEOTHERMAL PROJECT

WHEREAS:

1. **Oregon Institute of Technology proposes to develop a 1.5 megawatt hydropower facility expected to generate 7,646 megawatt hours annually.**
2. **Staff and an independent contractor reviewed the project design and costs and found them to be standard and reasonable for projects of similar type and design.**
3. **The net-present value of the project's above-market costs is $1,566,843 over 20 years.**
4. **Staff proposes a $1,550,000 incentive, 95% of the above market costs and a net present value of $1,480,000, to be paid upon project commissioning.**
5. **At the proposed incentive, the project's energy would cost Energy Trust about $1.69 million per average megawatt (aMW), which is within the target range for the Other Renewables Program ($1.39 – $4.62 million).**
6. **Funds to support this project are in the 2012 board-approved budget.**

It is therefore RESOLVED, that the board of directors of Energy Trust of Oregon, Inc. authorizes:

1. **Payment of up to $1,550,000 to be paid to Oregon Institute of Technology to offset the above-market costs of the geothermal plant;**
2. **Energy Trust to take ownership of at least 95% of the renewable energy credits produced by the project; and**
3. **The executive director to enter into a contract(s) consistent with this resolution.**

Moved by: Seconded by:

Vote: In favor: Abstained:

Opposed: [list name(s) and, if requested, reason for "no" vote]