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Paisley Oregon Geothermal Project

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Keywords

Geothermal binary power development, Paisley, Oregon, Rancher/Rural Electric Collaborative; low temperature geothermal

Surprise Valley Electrification Corporation (SVEC) Geothermal Project at Paisley, Oregon is a unique project where a rural electric utility and nearby ranchers are working in cooperation to produce renewable power. Rural electric cooperatives have played a major role in bringing electrical power to rural America and they are now poised to play a major role in developing small geothermal resources scattered throughout their service territories. Rural electric cooperatives were formed in the early 1900s providing a critical mechanism to build and maintain power systems throughout the nation and especially in rural areas, including the western U.S.

The distribution systems operated by the rural electric cooperatives in the western U.S. serve many small communities and reach rural areas where substantial geothermal resources exist. In fact, many ranchers throughout the West have inadvertently tapped into hot water during development of ground water for irrigation purposes. The combination of the local rural electric cooperative and ranches with hot wells make a good team to develop geothermal resources within their service territory.

The development of small modular low temperature geothermal power systems within the last few years has opened a large potential market. Not too many years ago geothermal power development was only viable for geothermal resources with temperatures of 300°F or above. ewer binary systems are now allowing development of geothermal resources between 200 and 300°F. Chena Hot Springs Resort near Fairbanks, Alaska is producing electrical energy at temperatures of 165°F. Other systems, such as one in Klamath Falls, Oregon at the Oregon Institute of Technology, are also producing power at temperatures below 250°F. The system at the Oregon Institute of Technology is productive at 195°F.

Rural electric cooperatives have recently become very interested in this low temperature binary power production for several reasons. First, it is a base-load renewable energy with a very high availability, above 90 percent; without intermittent and unpredictable power issues such as wind and solar, and without the price volatility of fossil fuel based power. Second, the generation technology is in modular form making it easy to install and it can be tied into the rural electric grid without major transmission upgrades. The modules range in size from 250 kW to 5 MW and are often at remote locations at the end of the rural electric cooperatives' lines. By having base load power in these locations, it serves the cooperatives' grid well; reducing the potential power outages at remote locations on their service system and converting their investment in transmission into a two way system where excess power can be sold at market prices. Modern modular power systems are also easier to operate and maintain as a result of technology built into their systems allowing the rural electric cooperative to operate and maintain the systems with local experienced staff. Finally the rural electric cooperatives are organizations of, by, and for their communities, and they have a vested interest in developing sustainable economic activity in their service territories. Whereas the typical geothermal development

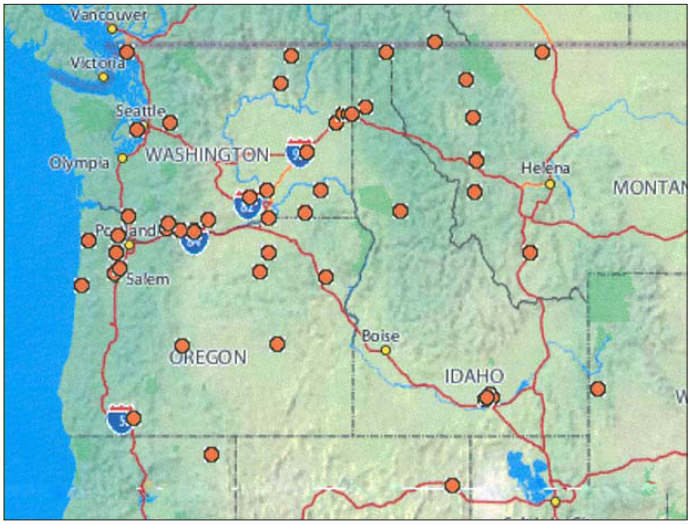

Figure 1. Northwest Rural Electric Cooperatives (From Northwest Requirements Utilities).

company has a high overhead, a high level of debt, and a requirement to make a substantial return on investment, rural electric cooperatives have small overheads, small debt and no profit requirement. They are literally entities of the rural areas they serve. On a financial basis this makes a significant difference. One of the ways this is most obvious is the level of cooperation between the ranchers and the utility. They have been business partners for years and this is a logical extension of that business relationship.

The rural electric cooperatives, being owned and financed at the local level, have established mechanisms to work with local ranches, farms, and rural communities to develop the geothermal resources in their area. They supply power to the same ranches which have hot wells and/or geothermal potential beneath their lands and therefore are often looked at by the owners of the resource as the logical group to develop the resource for local use. The project at Paisley, Oregon is a good example of a rural power development project which has involved the local rural electric cooperative teaming together with local ranchers to develop geothermal energy.

The project in Paisley did not start with the electric cooperative. The issue with any project, no matter how large or small, is who puts up the initial risk capital. The project in Paisley was first initiated through a feasibility study partially funded by USDA (75%) and matched by a 25% contribution from others.

Interestingly Chevron Energy Solutions (a business unit of Chevron) was the matching entity identified in the USDA grant application. However, between the time the study was submitted and funded (about 6 months), the account executive with Chevron involved in the project, took a new position with the start up geothermal company Altarock Energy. To its credit Chevron simply allowed the project to follow the account executive and Altarock agreed to supply the match. After about a year, Altarock Energy, with a completed feasibility study, decided it did not want the project because the project was not an Enhanced Geothermal System (EGS) candidate. The project however had gained momentum since the feasibility had identified a resource that could produce economical base-load power.

Dennis Trexler and Dan Hand were the authors of the USDA Feasibility Report, which recommended further development. There was little question about the resource and the need for base-load sustainable power was great. Surprise Valley Electric Corporation, the local electric cooperative, became interested in the development of the resource. SVEC had known about this resource since the early 1980s, when the rancher discovered the 235°F water while drilling for irrigation water. In fact the rancher has used this water for irrigation since 1981 to grow high quality alfalfa hay. While the water from this resource has been used, the thermal energy has been wasted. The rancher, who drilled the well for irrigation water for his ranch, built a 2 acre cooling pond to cool the water before applying to his crops. This has been a common practice with many irrigation wells in Oregon, Idaho, Nevada and Utah which have temperatures too high for application on crops.

Although the feasibility study recommended development, without a development partner, this project was going nowhere. The rancher was unwilling to put his ranch at risk to acquire risk capital and the traditional geothermal development companies were just not interested in a small project. That is when SVEC stepped in and became the developing partner. SVEC understood the power application could be integrated into the ranch in a supportive way. The cooler water from the discharge of the power plant actually improves the irrigation quality of the water and the thermal energy provides another source of income for the ranch and helps keep rural electric rates inexpensive. So, with a solid partner behind the project, things began to happen. First SVEC funded an extended flow test which validated a minimum resource flow rate and temperature using the existing irrigation well and pump. The rancher also contributed to the flow test with on-site support (dozer, backhoe, welding, and food service) and the rancher agreed to pay the cost for replacing the 10 inch threaded pipe in the well. SVEC was particularly pleased with the flow test, not in the least

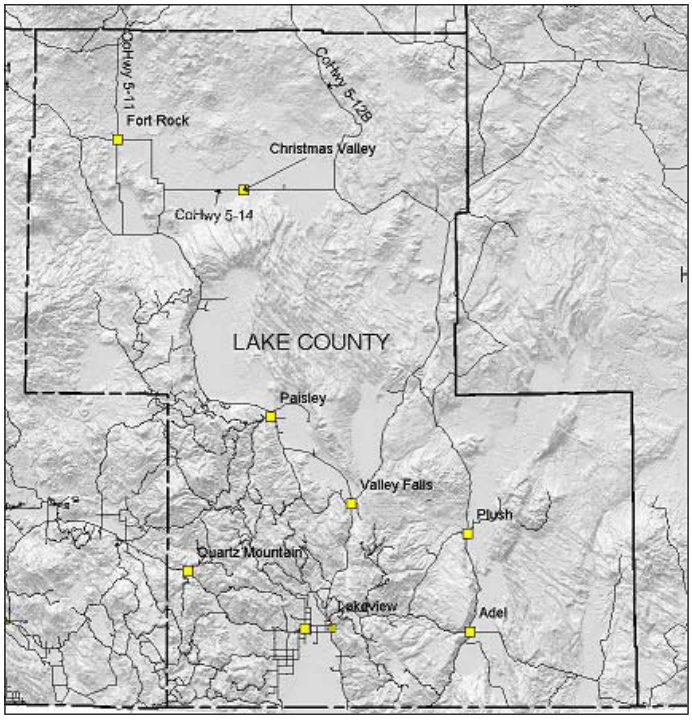

Figure 2. Clark Niewendorp, June 2005.

Figure 3. Paisley Drilling May 2011.

because the ultrasonic flow meter they used for testing irrigation wells validated the flow results produced by the consultants. With a solid flow test, SVEC hired two consultants, Dr. Roy Mink of Mink GeoHydro and Dan Hand of Sustainable Engineering, to guide the project along. With SVEC funding the consultants have secured support funding from the following programs:

(1) The US DOE Geothermal Technologies Program. A 2 million dollar grant that is currently helping to fund exploration work and will later contribute to the purchase of the power plant equipment.

(2) A preliminary guarantee from the State of Oregon for a Business Energy Tax Credit worth up to 35% of the project. This program contributes to the project only after it is on line and producing green power.

(3) An allocation of Clean Renewable Energy Bonds which will provide project financing at rates well below commercial lending rates.

(4) Production well drilling is being under taken by Surprise Valley Electrification Cooperative.

As a result of the funding grant from the DOE Geothermal Technologies Program, SVEC has funded a 2 meter probe survey, a gravity survey, and geological studies to keep the project moving forward. Although the original plan was to use the existing well, SVEC has decided to drill a new well because of the risks involved with upgrading the existing well to geothermal requirements. SVEC has selected a driller and is expected to complete the drilling work in the summer of 2011. Since modular equipment is available from several manufacturers SVEC is also in the process of selecting the equipment manufacturer. Rural electric cooperatives have several key advantages over traditional geothermal development entities that make them an ideal developer of small geothermal resources.

(1) Rural Electric Cooperatives know the community and have existing business relationships with large property owners.

(2) Rural Electric Cooperatives have access to low interest loans and are not leveraged with significant debt.

(3) Rural Electric Cooperatives own the power lines in rural areas, often right at the resource and typically can take up to 10 MWs of power without significant transmission work.

(4) Often the small resources that are not of interest to traditional development companies are well known and the amount of risk is suitable for the rural electric cooperative.

Plant construction for the Paisley Project is expected to be occurring by fall of 2011 with power on line scheduled for 2012. The project has moved very smoothly with resource work conducted by a retired professor from the University of Oregon, Dr. Silvio Pezzopane and a graduate student from Boise State University, Kyle Makovsky, with assistance from Dr. Roy Mink and Lynn Culp. Lynn is the Member Service Manager from SVEC and he has directed the local manufacturing of several useful geothermal assessment tools, including a well logging wireline, a weir, flow test equipment and a complete 2 meter probe set of equipment. Engineering and project direction was done by Dan Hand of Sustainable Engineering. Dan Silveria, Surprise Valley Electrification Corporation General Manager, is the over-all project manager. Considerable field and logistical support was supplied by the Colahan Ranch.

By way of extension SVEC is looking into the development of other geothermal resources within its service territory and the local region. Another local entity, Klamath Water and Power Agency (a group of Oregon ranchers) is looking into the resources in its service area. This development model is one that finally harnesses the well known resources the geothermal community has been aware of for years; and it does it from within the community. It is also of note that SVEC's interest has gained notice from traditional developers and supports a healthy development market. This is good for resource owners and equipment manufacturers; and encourages other rural electric cooperatives to get into the market.