



## Klamath and Lake Counties Agricultural Industrial Park

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**South Central Oregon  
Economic Development District**

Engineered Geothermal Systems Demonstration  
Projects

## – Timeline

- Project start date – June 30,2005
- Project end date - December 31, 2009 Delayed because of US DOE work on ARRA projects - anticipate completion in June 2010
- Percent complete – 95% Awaiting DOE Review of NEPA Report

- Budget
  - Total project funding - \$637,848
  - DOE share - \$297,640
  - Awardee share - \$340,208
  - Funding received in FY09 - \$57,821
  - Funding for FY10 - \$86,578
- Revised budget – original budget included \$100,000 construction which was reallocated to contractual to cover NEPA expenses

Four hurdles commonly encountered by businesses in using geothermal resources are awareness, drilling risk, regulatory uncertainty, and hardware/engineering.

Successful completion of this work helps eliminate the first three.

- Geo-heat Center at Oregon Institute of Technology (OIT)
- Klamath and Lake Counties
- Town of Lakeview
- City of Paisley
- Lake County Resources Initiative
- Team Klamath

The over arching goal of our efforts was to attract new businesses to Klamath and Lake counties for the purpose of capitalizing on our abundant geothermal resources. Due to the distance between the major population centers characterized by known geothermal resources, the project has focused on the establishment of two sites – one in each of the counties. At each site the goal was to establish a producing geothermal well on property that will then be available for purchase or lease by businesses considering a relocation or expansion into the area.

The final component of our project is to complete the NEPA review for the Town of Lakeview, Oregon. The town is proposing to install a direct use geothermal district heating system and a 200-Kw geothermal power plant and

Issuance of future federal funding requires review under the National Environmental Policy Act (NEPA) of 1969.

## **Explain how the project will impact costs, performance, applications, markets, or other factors in geothermal energy development.**

- District heating will be accomplished by pumping 183 degree Fahrenheit (°F) water from the supply well and transporting the water to the schools and hospital to supply approximately 5 million BTU's of heat energy per hour. These public facilities currently use #2 fuel oil and the projected annual savings to these public facilities will approximate \$170,000.
- After heating these facilities the return water, at 80 to 100 °F, will be available for the Lake County Industrial Park before re-injection into the groundwater aquifer



## Phase 1 – Land Parcel Identification

- The identification of suitable land required the collection of information addressing local geothermal resources, land ownership and zoning to identify the sites with the best prospects for this type of development. **Completed in 2005/06.**

## Phase 2 - Land acquisition and negotiation

- In this phase various approaches to accessing the necessary land were evaluated and prioritized. **Completed in 2006.**

## Phase 3 Resource Development

- Once the land was secured test pumping was performed to verify the capacity of the wells. If possible, water rights and other appropriate regulatory requirements were initiated to reduce the burden on the commercial developer. **Ongoing.**

## Phase 4 Outreach

- The final step in the process was the promotional campaign. In this phase key industries were targeted through various means to publicize the availability of the sites. **Ongoing.**

The geothermal resource on the Liskey property was once considered a nuisance to Jack Liskey, the ranch owner. It has been used for house heating, stock watering and crop irrigation on the 300-acre ranch. It has also been used for cooking cull potatoes for cattle feed and for frost protection of crops.

As a result of this project there are now six geothermal wells on the ranch which heat an array of greenhouse operations by finned tube pipes below each bench with a metal shield placed over them to better distribute the heat. The greenhouse effluent water is used to heat 37 shallow tropical ponds adjacent to the greenhouses. The outflow from the ponds is then cooled in a large storage pond and finally used for stock watering.

## Success Stories

- In 2007, Green Fuels of Oregon, Inc. signed a lease with Liskey Farms to develop a Biodiesel production facility in existing greenhouses.
- Local farmer Rick Walsh has located his Fresh Green Organic Garden Community Supported Agriculture facility at Liskey Farms. This business sells organically grown vegetables.
- “Gone Fishing” Farms uses the waste water from the Liskey Farms greenhouses to grow tropic fish for aquariums and tilapia for the food market. Geothermal water quickly mixes with the cold pond water to provide 80° F (27° C), which is ideal for the fish.

- Team Klamath assisted a company that provides Augmentative Biological Controls (ABC) for spider mite pests. The company, Biotactics, farm eight different species of predatory mites for all different climates. Utilizing geothermal water to heat the greenhouses helped lower their utilities and eliminate the high expense of propane.

## Schedule

- This project is primarily completed. Final report and Environmental Assessment were submitted to Golden Colorado in December 2009.
- Initial delays in implementation of the project were a result of staff changes. Delays in Lake County projects are because of NEPA process.

## Sources and Uses of Funds

	US DOE	Local
<b>Contractual</b>		
•Phase 1 Reports	\$15,078	\$14,922
•Lakeview Feasibility	60,528	40,000
•City of Paisley	14,283	5,077
•NEPA	99,000	
•Marketing Brochure		20,209
<b>Other</b>		
•Barry Lease	4,000	
•Biotactics Finance		125,000
•Climate Trust Incentive		135,000
<b>Project Admin</b>	104,751	
<b>TOTAL</b>	<b>\$297,640</b>	<b>\$340,208</b>

This project has set the stage for the region's renewable energy initiatives

Klamath County has sustainability as a brand for economic development

The Lake County Renewable Energy Working group which formed in 2008 has designated Lake County as the most Renewable County in Oregon.

Lake County Resources Initiative has adopted Renewable Energy as an ongoing program



\$1 million in ODOE SEP funds were received from by the community of Lakeview to convert the schools to geothermal heating

As part of its expansion the Lake District hospital is installing geothermal central processing unit

The Town of Lakeview has applied for ARRA funding to complete all projects

If grant funds are not available they will look at USDA community facility funding for the heating district – committed to moving forward

Surprise Valley PUD received \$2 million to advance the geothermal to electric project in Paisley – part of project is development of aquaculture operation

SCOEDD will continues to market Geothermal Ag Industrial Opportunities

With over 100 participants from all over the world, the Geothermal Energy Association's (GEA) two-day *Geothermal Energy Small Power and Direct Use Workshop* that took place last year at the campus of the Oregon Institute of Technology heralded a growing recognition that geothermal resources are available for a lot more than utility-scale electricity production.

Direct use for such things as heating of buildings, industrial processes, greenhouses, aquaculture (growing of fish), and resorts can help create economic opportunity.

# Supplemental Slides

- Kevin Rafferty, PE, Klamath County Geothermal Agricultural/Industrial Park Preliminary Site Selection Report, December 2005 - this report documents efforts to identify and prioritize potential geothermal sites in Klamath County
- Kevin Rafferty, PE, Lake County Geothermal Agricultural/Industrial Park Preliminary Site Selection Report, January 2006 - this report documents efforts to identify and prioritize potential geothermal sites in Lake County
- Darryl J. Anderson, PE, Geothermal Heating Feasibility Study, January 2009 – explores the possibility of utilizing known geothermal resource site (Barry Well) for heating district to include hospital, schools and Lake County Industrial Park
- RMT, Inc., Environmental Assessment for the Lakeview Geothermal Project, December 2009, Draft