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## Utility Geothermal Working Group Update

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### Keywords

*Power generation, utility and transmission issues, power purchase agreements, financing, development costs, risks, training*

### ABSTRACT

The Utility Geothermal Working Group begins its second year of operation. This paper describes the progress made in the first year of the group's existence. Activities include monthly meetings and webcasts that focus on the three geothermal technologies: power generation, direct use, and geothermal heat pumps. The paper identifies key findings that emerged in conducting the monthly meetings and webcasts, mainly focusing on power generation. There is also some discussion on future plans of the working group.

### Introduction

The Utility Geothermal Working Group (UGWG) is a group of utilities and ancillary associations formed under the US Department of Energy's (DOE) Geopowering the West (GPW) Initiative. Along with the DOE, the group is supported by a number of organizations, including: Bonneville Power Administration (BPA), Geothermal Resources Council (GRC), National Rural Electric Cooperative Association (NRECA), and Western Area Power Administration (Western).

The UGWG's Mission is to accelerate the appropriate integration of three geothermal technologies into mainstream applications:

Power Generation

Direct Use

Geothermal Heat Pumps (GHP)

The UGWG accelerates the integration of the technologies in such a manner that is cost effective for both the utilities and the customers they serve. The mission is accomplished

through the coordinated efforts and actions of its members in collaboration with industry stakeholders, federal agencies, trade associations, and research organizations.

### Member Driven Actions

The Member Driven actions may include, but are not limited to, education, case history development, market surveys, and research. Other Member Driven actions could include

1. Identify the most promising areas for geothermal development, using technology such as GIS
2. Refine modeling techniques
3. Address and Eliminate misconceptions, barriers, and constraints such as siting and permitting, Aesthetics, Transmission issues, Ancillary Services, and Financing
4. Identify ongoing technical challenges and R& D needs
5. Develop a Model Power Purchase Agreement that addresses key issues such as performance, transmission, ancillary service, system regulation, operating reserve, maintenance and replacement, and unit commitment.

### UGWG Membership

UGWG Membership includes

Arizona Public Service	BPA
State Working Groups	GRC
Sandia National Lab	Western
Idaho National Lab	NRECA
Ormat, Int'l	Palo Alto Utilities
Redding Electric Utility	Salt River Project
Seattle City Light	South San Joaquin Irrigation District
Springfield UB	Utility Energy Forum

## First Year Activities

### Monthly Teleconference

Since first formed in September 2005 at the GRC Annual Meeting in Reno, NV, the group conducts Monthly Meetings to address current issues and ways to market existing, new, and emerging technologies. The meeting format is typically

Via Teleconference  
1<sup>st</sup> Wednesday of the Month  
10 am MST  
One Hour or Less

### Joint Meetings

The group conducted two on site monthly meetings and recruited additional utilities to join. The meetings were

26<sup>th</sup> Annual Utility Energy Forum  
May 3-5, 2006 Tahoe City, CA  
GRC Annual Meeting  
September 10-13, 2006 San Diego, CA

At the Utility Energy Forum, the group met for ½ day to discuss group issues and then participate in any one of three workshops related to utility issues: Renewables, Green Buildings, and Best Practices. Some of the group stayed on and participated in the Forum through Friday, including the Renewables Breakout Session May 4. As the result of the meeting, three additional utilities joined the working group and two webcasts on transmission issues and geothermal heat pumps were planned and conducted.

At this GRC Annual Meeting the UGWG will conduct its second face to face meeting. Prior to the meeting, The members were encouraged to submit papers for the GRC meeting's two sessions designed to address Utility Issues.

Out of the monthly meeting activities, the group is addressing key issues confronting future geothermal development. In addition, the group has assisted one of its members, Moorhead Public Service, in applying for a grant from the American Public Power Association's (APPA) Demonstration of Energy-Efficient Development (DEED) program. The application proposes the development of a **GROUND SOURCE HEAT PUMP GUIDEBOOK FOR UTILITY MANAGERS**. If APPA accepts the proposal, MPS and its sponsors will develop a unique educational tool. The Guidebook will be unique because it will address a utility's role, risk, and benefits to developing and implementing a GSHP program.

### Webcasts

The monthly meetings also provided the catalyst to conduct three webcasts.

Power Generation – January 24  
Direct Use – March 14  
GeoExchange – April 18

Some of the key findings presented in the webcasts include:

## Why Geothermal Power?

### Utility Grade Power

- ♦ Modular power plants are readily expanded as needs increase
- ♦ Power costs competitive with current fossil fuel technologies
- ♦ Base Load power produced 24/7 @ over 90% Capacity Factor
- ♦ Fuel Risk assumed by project operator not by consumer

### Sustainable & Environmentally Safe

- ♦ Many projects operating for decades at 98%+ availability
- ♦ Geothermal is non-combustion - near zero emissions

### Minimal Surface Use—Independent of Weather

### Field Proven Technologies—8,000 MW World Wide

### Straight Forward to Install, Operate and Maintain

- ♦ Projects developed over 3 year period - O&M by local staff

## What Are the Costs of a 20 MW Project?

Exploration & resource assessment 12 Months time frame	\$5.0 M
Well field drilling and development 12 Mos. time frame after completion of item 1	15.0
Power plant, surface facilities, & transmission 18 Months time frame with overlap of item 2	30.0
Other costs:	10.0
Commitment fees	
Legal & Accounting fees	
Consultants,	
Interest during construction, and	
Debt service and operating reserve	
Construction contingencies and Developers fee	
<b>Total Financed Cost for 20 MW Project</b>	<b>\$ 60.0 M</b>
<i>To be provided as construction phase financing</i>	
<b>Total Average Development Period</b>	<b><u>36 months</u></b>

## What Are the PROJECT RISKS and Ways to Mitigate Them?

PROJECT RISK	MITIGATION
Exploration – Lack of heat/fluid	Max use of surface technologies Go-No Go exploration steps
Resource Capacity Risk	Drill & Test deep wells Develop digital resource model
Regulatory Risk	Use experienced permitting consultant Apply early & take no short cuts
Drilling Risks (dry well)	Use data & resource model for drill targets Use blow out & well control well insurance
Plant Construction Risk	Use credible supplier/contractor Get turn-key fixed price/date certain contract Use Field Proven technology Get start-up performance guarantee
Financing Risk	Execute financible take or pay PPA with utility Execute binding commitment with lender

### ***What Are the Steps to Implementing a Successful Geothermal Power Project?***

1. Delineated geothermal resource, with a bankable report, defining probable long term performance.
2. Financible Power Purchase Agreement from a creditworthy purchaser.
3. Defined permitting path without pitfalls.
4. Credible developer with proven track record and experienced supply/subcontract team.
5. Control of entire geothermal resource to preclude competing interests for same fluid/steam supply.
6. Use of Proven Technologies.

### ***What About Direct Use and Ground Source Heat Pump Applications?***

The utility members of UGWG express little or no interest in pursuing direct use applications. On the other hand, the majority of the utility members are very interested in pursu-

ing GSHP applications at some level. The level ranges from a low level of involvement such as offering information on the technology to customer to a high level such as installing, warranting, leasing, and maintaining the systems.

### **Future UGWG Activities**

The group will continue to conduct monthly meetings and recruit additional utilities. Recruitment will include activities centering on two future meetings

27<sup>th</sup> Annual Utility Energy Forum  
 May 2-4, 2007 Tahoe City, CA  
[www.utilityforum.com](http://www.utilityforum.com)

GRC Annual Meeting  
 September 30-October 3, 2007 Sparks, NV  
[www.geothermal.org](http://www.geothermal.org)

Some of the key issues that the Group plans to address include those surrounding transmission, financing, power purchase agreements, spinning reserves, marketing, green tags, and permitting.

