

Geothermal Energy

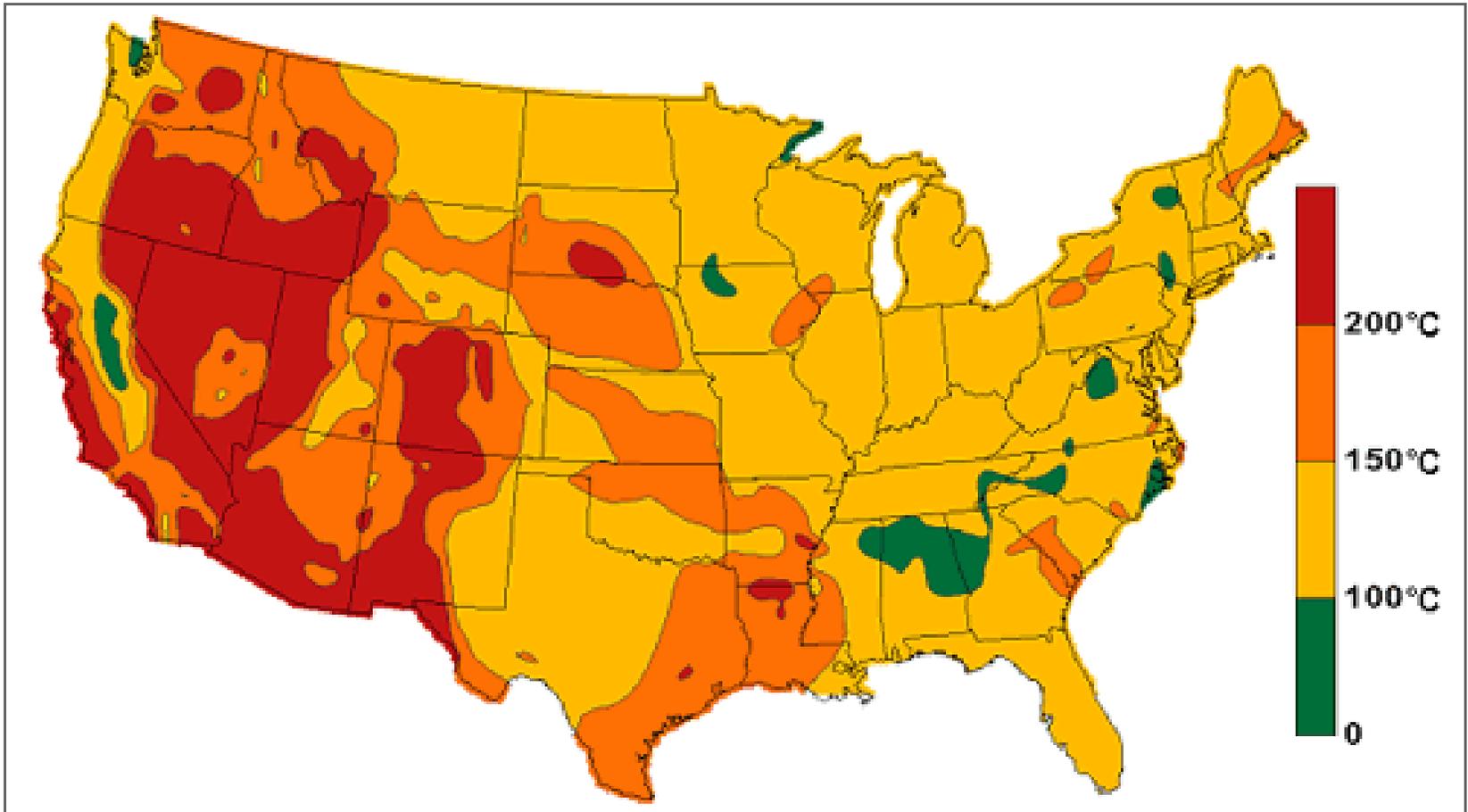
**Oregon Renewable Energy Working Group
Inaugural Meeting
Salem, February 22, 2006**

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Renewable Energy Division**



OREGON
DEPARTMENT OF
ENERGY

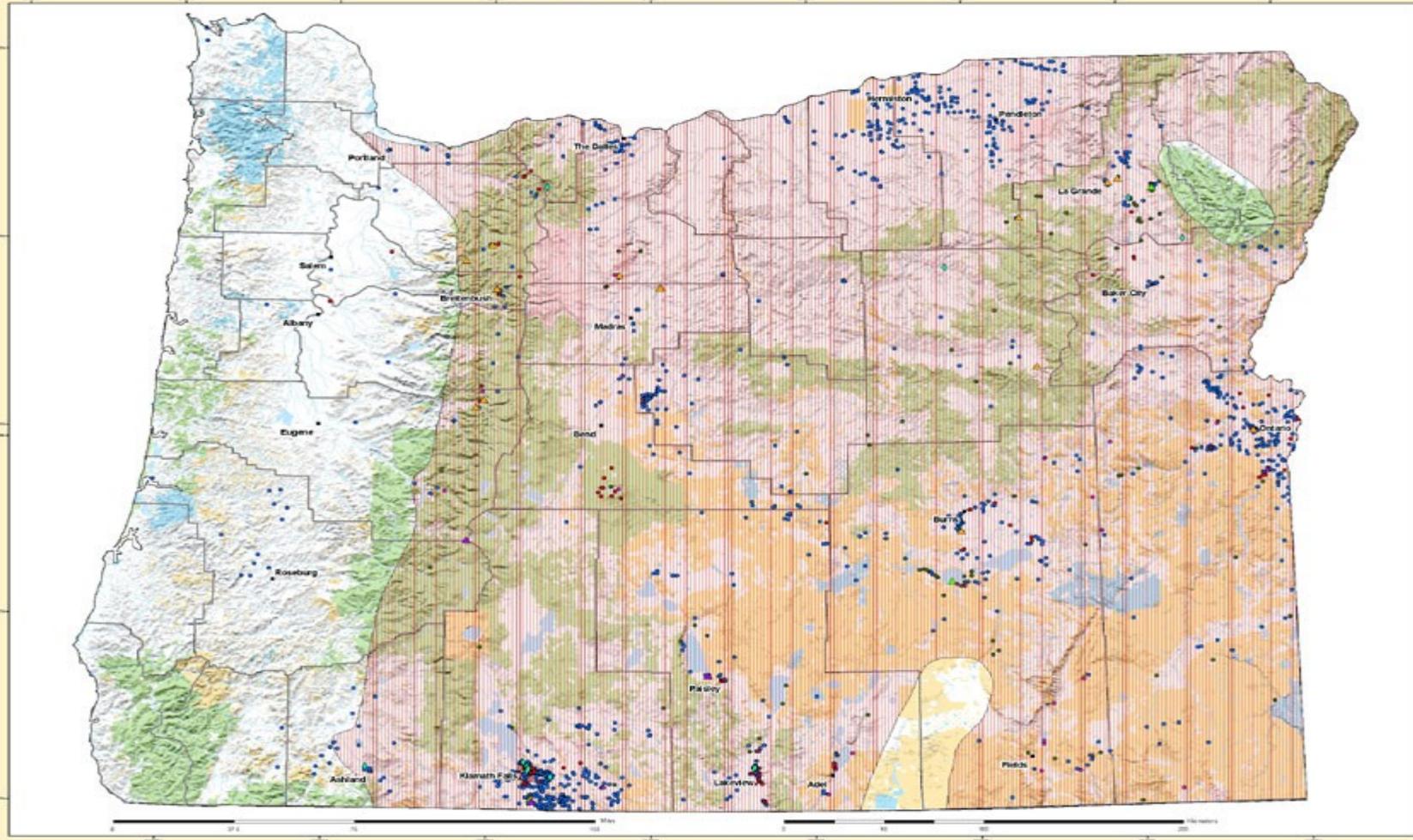
Geothermal Potential at 6 kilometer (3.8 mile) depth



Geothermal Energy in Oregon

Oregon Geothermal Resources
 Publication No. - OREG/AMIS-2002-1621 Rev. 1
 November 2002

Oregon Geothermal Resources



Legend

- Cities/Towns
- County Boundaries
- Rivers/Streams
- Lakes/Reservoirs

- ▲ Greenhouse
- ◆ Space Heating
- ◆ District Heating
- ▲ Aquaculture
- ▲ Spas/Resorts/Recreation Sites
- Regions of Known or Potential Geothermal Resources

Geothermal Categories

- Wells > 50 Degrees C
- Springs > 50 Degrees C
- Wells = 20 and < 50 Degree C
- Springs > 20 and < 50 Degrees C

Ownership

- Private Lands
- Bureau of Land Management and Other Federal Lands
- State Lands
- Native American Lands
- U.S. Forest Service Lands

Map prepared by Patrick Lavery and Julie Brienke at the Idaho National Engineering and Environmental Laboratory (INEL)

The U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Geothermal Technologies Program

Geothermal Data Provided by:

1. Geo Heat Center State Geothermal Database (GHEAD) Database, February 2002
2. National Geothermal Data Center, National Oceanic and Atmospheric Administration, 1992, Geothermal Resources of Oregon, Prepared for the Division of Geothermal Energy, United States Department of Energy, Map 1-500, 1992

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Map Production Information
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Geothermal electricity potential

- ◆ 400 MW in Oregon - estimate by the US Department of Energy - **base load** generation
- ◆ None of this has been developed to date
- ◆ Currently, one company is actively evaluating the Crump Geyser site near Adel in Lake county
- ◆ Major barriers:
 - ◆ high-risk up-front cost to confirm the resource
 - ◆ predominantly located on public lands (extensive environmental review)
 - ◆ relatively high cost relative to fossil fuel plants and large wind farms

Geothermal Electricity Generation

1980: 10-16 cents/kWh

**2000:
4 – 7 cents/kWh**

- Improved technology
- Reduced drilling costs
- Experience reduces risk



2007 Goal: about 5 cents/kWh

How geothermal energy is used

- ◆ Electricity generation
- ◆ Direct thermal use
- ◆ Geothermal or earth coupled heat pumps



Power generation



Direct use



Heat pumps

Geothermal Energy: direct heat

- ◆ About 2,500 earth coupled heat pumps in Oregon
- ◆ Klamath, Lake, Malheur and Harney Counties have a significant resource
- ◆ Oregon Institute of Technology - GeoHeat Center in Klamath-Falls



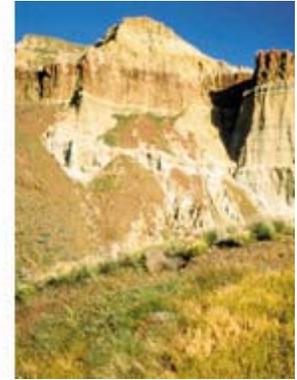
Geothermally heated side walk and green house

Direct use, continued

- ◆ Klamath and Lake counties are the most active in promoting the direct use of geothermal energy as part of their economic development efforts
- ◆ Main uses:
 - ◆ space heating of residential and commercial buildings, including district heating
 - ◆ heating of green houses and swimming pools

Oregon Geothermal Working Group

- ◆ Members represent a wide variety of stakeholders, including geothermal electricity developers, explorationists, local and state governmental entities, and utilities
- ◆ In part funded by US DOE's Geo-Powering the West (GPW), with ODOE as coordinator
- ◆ The Group deals with issues related to both electricity generation and direct use
- ◆ First meeting in Bend in November 2004. Two more meetings were held in Bend and one in Salem



Information Workshop

Renewable Energy Production Payments for small to medium sized projects Salem, April 5, 2006

**Goal: help evaluate this policy tool as the
REWG implements the REAP**

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