



**GEOPOWERING  
THE WEST**



OREGON  
DEPARTMENT OF  
ENERGY

# Geothermal Development in Mammoth Lakes, Calif.

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## Location





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## Wild by Nature

Welcome to Mono County, where Mother Nature is getting ready for a wild winter of outdoor activities. From alpine skiing to snowboarding and cross country or snowmobile treks, this Eastern Sierra Paradise is truly a natural family playground, year round!

The Holiday Season is approaching. This is a perfect time to come, stay and play in what again promises to be a winter wonderland. Get family and friends together or plan a romantic weekend with someone special.

Use this interactive map to learn more



Eastern Sierra Ski Report

Make your reservations now. Don't forget the long February weekends and all the activities surrounding Spring Break.

Remember, winter offers a variety of recreational activities. Naturally there's skiing and snowboarding. Ice climbing is gaining popularity. Sled dog rides and snowmobile trails await you.



### Legend

- Historic Sites
- Museums
- Ranger Station
- Visitor Center
- Scenic Vista Point
- Restrooms
- Road Closed in Winter
- Eastern Sierra Scenic Byway Interpretive Display

Click glass for larger image





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# Terrain





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# Terrain





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# Mono County, CA

- Land area is 3,030 square miles
- 94% of which is publicly owned
- 90% Federal incl. 2 National Forests
- Known for scenic & recreational resources
- Population in 2000 = 12,853
- Mammoth Lakes pop = 7,500



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# Mono County, CA

- Individual Income = \$ 24,793
- Household Income = \$ 31,924
- Tourism and recreation-oriented enterprises are the primary economic activity
- Large number of vacation homes and seasonal use housing
- Mfg homes @ \$160K, Cabins @\$600K



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# Recreation







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# Recreation





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# Geothermal Power



**Clean Renewable Energy**



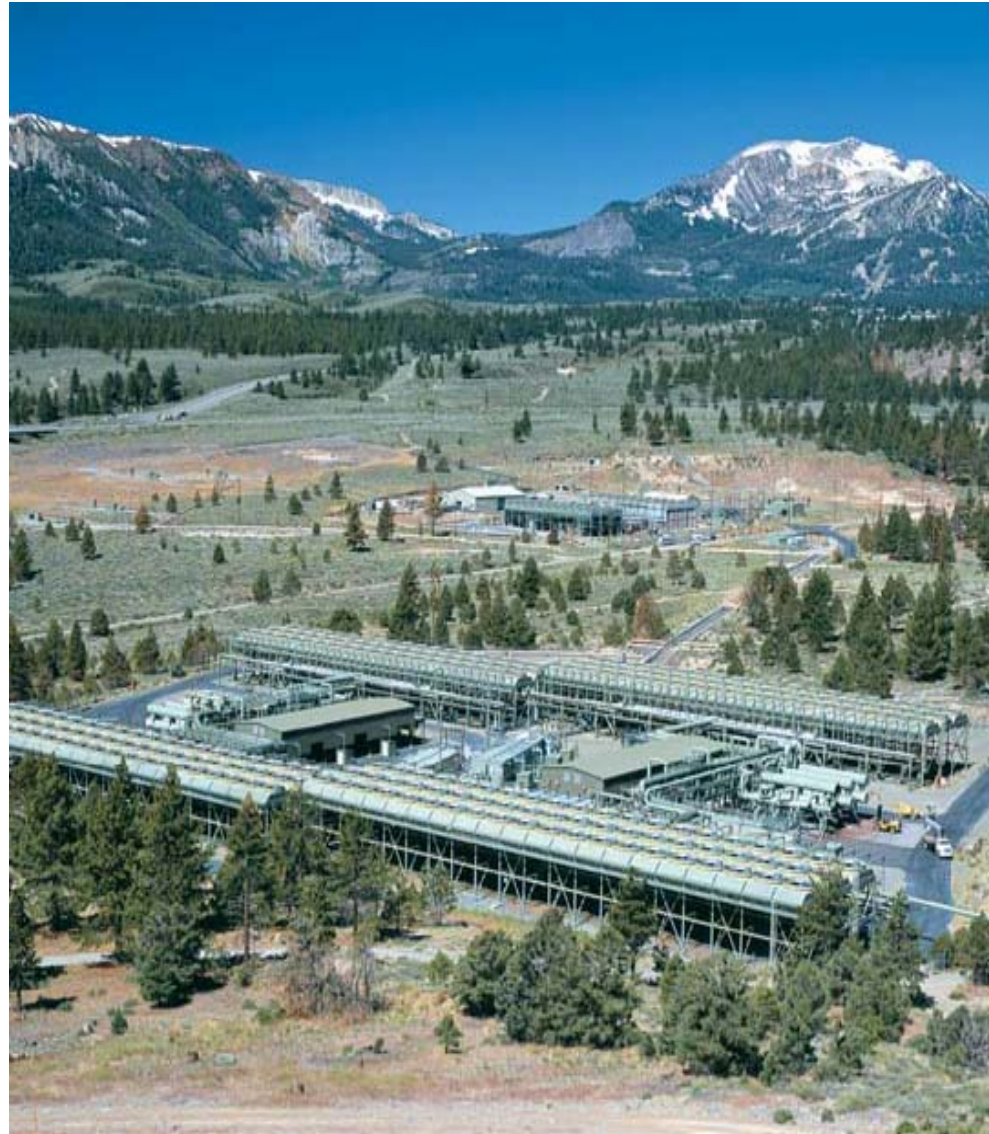
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# Mammoth Geothermal Plants

<b>Plant</b>	<b>Year</b>	<b>Nameplate</b>
Mammoth Pacific I	1984	10
Mammoth Pacific II	1990	15
PLES I	1990	<u>15</u>
Gross Capacity		40
2005 Gross Capacity		35
2005 Net Capacity		25.1



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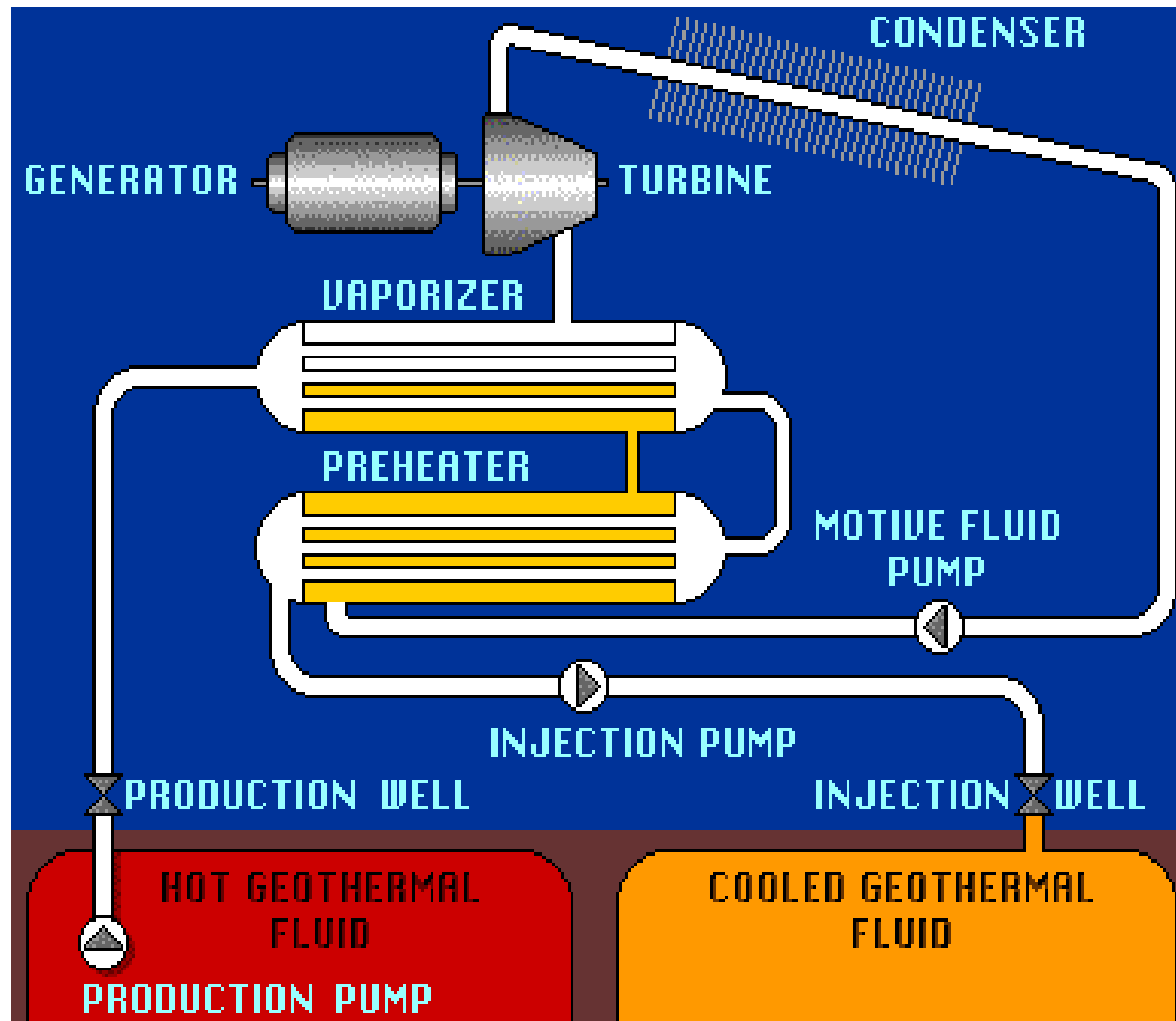






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# BINARY POWER





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# Public Participation

- Long Valley Hydrologic Advisory Committee
  - Formed in 1986
  - Public, agency, organizations
- Public presence via tours, talks, events



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# Conditions to Develop

Expansion allowed with

- Conditional Use Permit with 100 Conditions
  - Color of plant
- Similar conditions in EIS on Federal land
- Monitor and change/cease if negative impacts



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# Monitoring

- Long term
- Well, hot spring, stream criteria
- Planting and Revegetation
- Surveys
- Communicating results quarterly





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# Geothermal Plants

## **RANGE OF EMPLOYEE ESTIMATES**

<b>PHASE</b>	<b># PER MW</b>	<b>#PER 40 MW</b>
Drilling	25 per rig	25 per rig
Wellfield Construction	.04 - 1.30	2 - 52
<u>Plant Construction</u>	<u>.68 - 1.87</u>	<u>27 - 75</u>
Total Construction	.72 - 3.17	29 - 127
Wellfield Maintenance	25 per rig	25 per rig
<u>Plant Operation</u>	<u>.16 - .38</u>	<u>6 - 15</u>
Total Operation & Mainte	.41 - .73	16 - 29

Source: Sifford, 2001



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# Economic Activity

- MP plants employ 21 FTE plus seasonal help
- Average wage est. to be \$40,000
- Direct spending in community
- County receives
  - Property taxes
  - Royalties



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# Economic Activity

- Geothermal developers—under contract to a utility, government, or other entity to develop a project—often act as general contractors and hire other firms to do the work. This can include all facets of development, from construction site security and safety, to turnkey requirements.



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# Economic Activity

- Mechanical equipment and primary metal suppliers make casings for geothermal well shafts, drilling equipment, power plant equipment and controls, pumps, and transport or light-construction equipment (e.g., loaders, tractors, and trucks).





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# Economic Activity

- General consultants and contractors search for geothermal resources and prepare simulations of resource availability and economic analysis so that developers can obtain financing.



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# Economic Activity

- Drilling and well services firms use resource management, geoscience, and stabilization technology and expertise similar to that of the petroleum industry.



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# Economic Activity

- Environmental services firms manage permitting, well testing, water testing, air sampling, and other tasks required for regulatory approvals.



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# Economic Activity

- Power plant operations firms may be electric utilities or independent power producers, which require trained and certified power plant operators and maintenance staff.



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**Mammoth Lakes, Calif.**

**Environmentally acceptable design**

