

# Geothermal Energy Potential

## State of Oregon

### Power Generation

Geothermal energy is heat from the Earth. It's clean and sustainable. Resources of geothermal energy range from the shallow ground to steam, hot water, and hot rock accessed by drilling wells up to thousands of feet beneath the Earth's surface. The extremely high temperatures in the deeper geothermal reservoirs are used for the generation of electricity.

Most power plants use steam to generate electricity. The high-pressure steam spins a turbine that rotates a generator, producing electricity. The largest source of carbon emissions in the U.S. are the many power plants still burning fossil fuels to boil water for steam. Geothermal power plants, however, do not burn fuels to heat water to steam. Instead, they use natural heat found below the Earth's surface to generate electricity.

New geothermal power plants produce near-zero CO<sub>2</sub> and emit very little air pollution.

And unlike solar or wind energy, geothermal energy is available around the clock.



### BENEFITS



**Jobs Boost.** Geothermal power plants employ about 1.17 persons per MW. Adding related governmental, administrative, and technical jobs, the number increases to 2.13.



**Economy Boost.** Over the course of 30 to 50 years an average 20 MW facility will pay nearly \$6.3 to \$11 million dollars in property taxes plus \$12 to \$22 million in annual royalties. Seventy-five percent of these royalties (\$9.2 to \$16.6M) go directly back to the state and county.



**Locally Produced.** Geothermal power can offset electricity currently imported into the state, keeping jobs and benefits in state and local communities.



**Near-Zero Carbon Emissions.** Geothermal flash plants emit about 5% of the carbon dioxide, 1% of the sulfur dioxide, and less than 1% of the nitrous oxide emitted by a coal-fired plant of equal size, and binary geothermal plants – the most common – produce near-zero emissions.



**Small Footprint.** Geothermal has among the smallest surface land footprint per kilowatt (kW) of any power generation technology.



**Reliable.** Geothermal power can provide consistent electricity throughout the day and year - continuous baseload power *and* flexible power to support the needs of variable renewable energy resources, such as wind and solar.



**Sustainable Investment.** Energy resource decisions made now for sources of electric power have 40-50 year consequences, or longer. Using renewables like geothermal resources avoids "price spikes" inherent in fossil fuel resource markets. Geothermal energy is an investment in stable, predictable costs. Investing in geothermal power now pays off for decades to come.

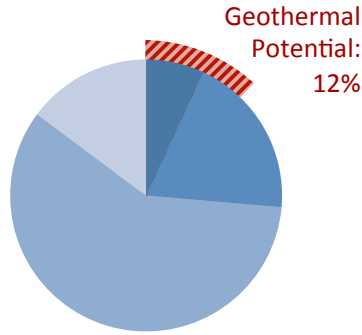
Discover the geothermal power generation potential in your state.

# Oregon Geothermal Power Benefits



## Current Oregon Electricity Production

- Other Fossil Fuels
- Natural Gas
- Hydro
- Other Renewables



## Reliable, baseload power:

2,435 MWe of geothermal potential

Total annual power consumption from coal in Oregon in 2013 was 157,000 GWh. Geothermal potential in the state is as much as 19,000 GWh – 12% of the state’s power consumption, providing reliable baseload power.



Developing the available geothermal resources can create temporary and permanent jobs and revenue streams in Oregon.

## Job Creation:

### Construction:

7,000 person-years

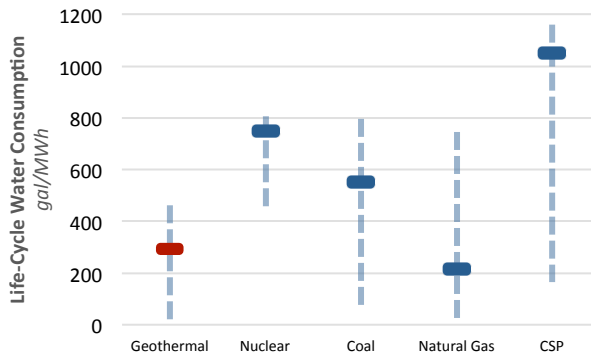
### Operation:

2,700 full-time jobs



## Water use reduction

## Geothermal Power Represents Significant Water Savings



Geothermal power has substantially lower life-cycle water consumption than other types of baseload generation. In addition, geothermal plants normally use brackish water for cooling (when necessary) that would not be fit for human consumption or use.

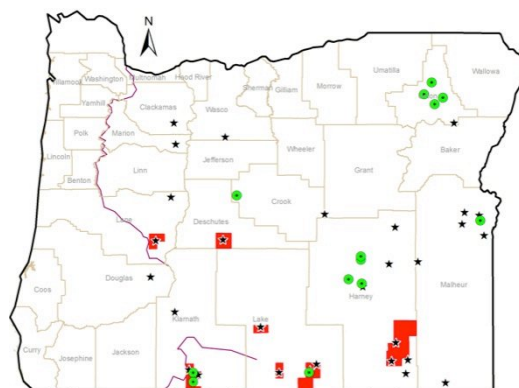


## Locally produced power:

In-state electricity production

## Oregon’s most promising Geothermal Resource Areas

Geothermal plants can operate for many decades providing stable jobs to local communities and revenue to state and municipal treasuries.



### Geothermal Locations

- Geothermal Systems
- ★ Geothermal Sites in Use
- Known Geothermal Resource Areas (KGRA's)

## Policies & Incentives

Federal and state policies and incentives helped catapult renewable energy technologies, such as wind and solar, into the billion dollar industries they are today. State incentive programs that help developers reduce upfront risk and secure power purchase agreements can help to incentivize geothermal power development in the state.

## Key Identified Geothermal Resource Sites in Oregon

- Neal Hot Springs, Malheur Co.
- Klamath Falls Area, Klamath Co.
- Paisley, Lake Co.
- Newberry Volcano, Deschutes Co.
- Vale Hot Springs, Malheur Co.
- Crump Geyser, Lake Co.
- Pueblo Valley, Harney Co.
- Hot (Borax) Lake, Harney Co.
- Mickey Hot Springs, Harney Co.
- Lakeview Area, Lake Co.
- Alvord, Harney Co.

**Geothermal Energy Association**  
<http://www.geo-energy.org>

**Geothermal Resources Council**  
<http://www.geothermal.org>

**Geothermal Exchange Organization**  
<http://www.geoexchange.org>

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Calculations in this flyer were based on the USGS 2008 Resource Assessment. Sources for other information in this flyer can be obtained by contacting the Geothermal Energy Association.