



LPRO: LEGISLATIVE POLICY AND RESEARCH OFFICE

GEOHERMAL ENERGY

BACKGROUND BRIEF

WHAT IS GEOHERMAL ENERGY?

Geothermal energy is energy from the internal heat of the earth. It is found in rocks and fluids at various depths, including in hot springs. Useful heat is extracted by drilling or pumping.

Geothermal heat is used to generate electricity and directly heat buildings. Traditionally, steam turbines and very high-temperature geothermal resources were used to create electricity. More recent technological innovations have enabled electricity generation at lower temperatures. Most of the country's geothermal generation is in the West, as shown in Figure 1.

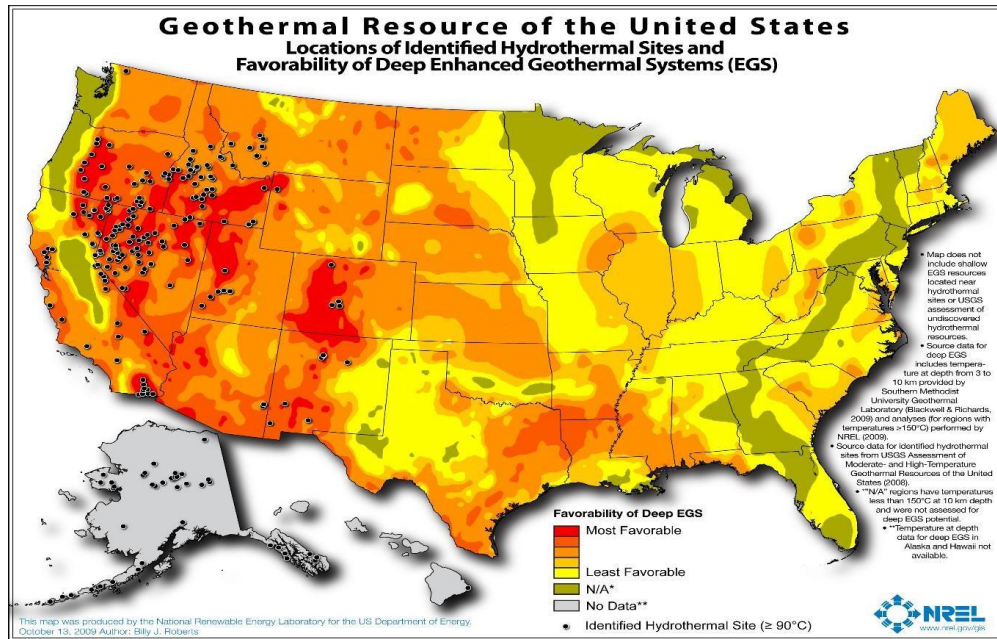
Figure 1: Geothermal Resources of the United States

TABLE OF CONTENTS

WHAT IS GEOHERMAL ENERGY?

GEOHERMAL ELECTRICITY GENERATION IN OREGON

GEOHERMAL HEATING



National Renewable Energy Laboratory Geothermal Maps

Challenges geothermal developers face include high upfront capital expenses, resource uncertainty, and location of some geothermal sources near environmentally sensitive areas.

GEOTHERMAL ELECTRICITY GENERATION IN OREGON

In Oregon, areas with the greatest geothermal resource potential are in the central and southeastern parts of the state. The National Renewable Energy Laboratory (**NREL**) has developed an interactive mapping tool of geothermal resources.¹ Additionally, the Oregon Department of Geology and Mineral Industries (**DOGAMI**) maintains an interactive map of geothermal springs and wells in Oregon.²

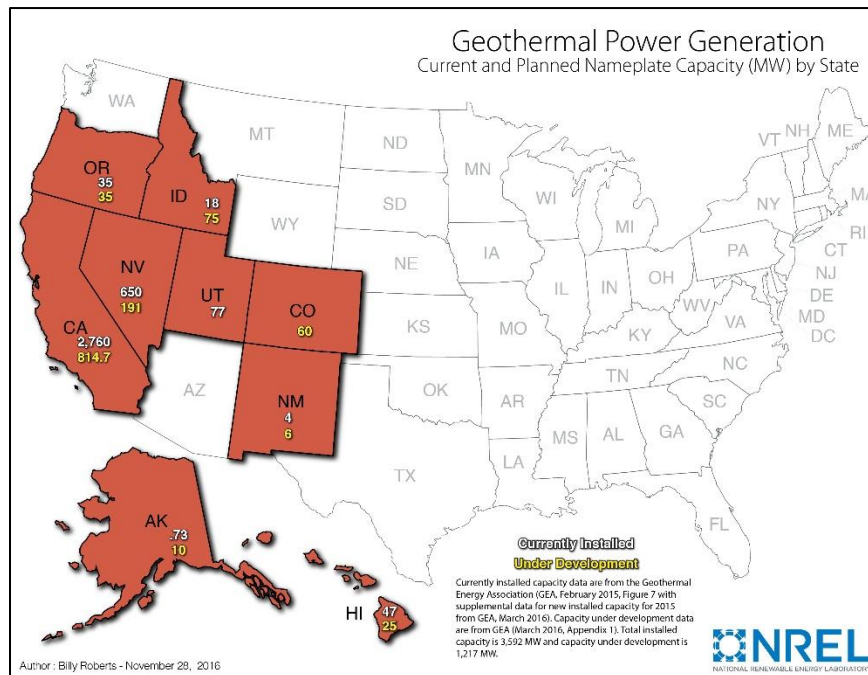
The U.S. Geological Survey's Assessment of Moderate and High Temperature Geothermal Resources of the United States identified 595 megawatts (**MW**) of high probability capacity in Oregon from conventional geothermal resources. The same report also identified more than 43,000 MW of potential capacity in Oregon from enhanced geothermal systems (**EGS**). EGS requires the injection of high-pressure water to modify subsurface conditions to enhance flow and permeability. While the potential to develop EGS in Oregon is significant, the technology is still in the research and development phase, and the U.S. Department of Energy has targeted 2030 for commercialization of the technology.³

In 2017, the U.S. Energy Information Administration ranked Oregon fifth in the nation for geothermal electricity generation. As of November 2016, nameplate capacity of installed geothermal power generation was 35 MW, with another 35 MW of planned capacity under development. Figure 2 shows the existing and planned capacity of geothermal plants throughout the United States.

¹ NREL's Geothermal Prospector: <https://www.nrel.gov/gis/geothermal.html>

² DOGAMI's Geothermal Information Layer for Oregon: <http://www.oregongeology.org/gtilo/index.html>

³ ODOE's 2018 Biennial Energy Report: <https://www.oregon.gov/energy/Data-and-Reports/Documents/2018-Biennial-Energy-Report.PDF>

Figure 2: Current and Planned Geothermal Power Plants in the United States

National Renewable Energy Laboratory

The state's first geothermal power plant began operating in 2010 at the Oregon Institute of Technology (**OIT**) in Klamath Falls, with an initial electricity-generating capacity of 280 kilowatts (**kW**). A second plant at OIT generates 1.2 MW of power. In 2012, U.S. Geothermal Inc. brought online a 28 MW facility at Neal Hot Springs near the eastern Oregon town of Vale. In 2015, a 3.1 MW geothermal power plant began operation in Paisley, Oregon. Additional geothermal opportunities are being explored at Crump Geyser and Glass Butte in Lake County and at Newberry Crater.

Geothermal power plants have the unique ability to provide near constant carbon-free output all year, compared to more variable output renewables such as wind and solar. Geothermal energy is also used in direct heating applications, displacing conventional natural gas and electricity consumption.

GEOTHERMAL HEATING

The City of Klamath Falls uses geothermal energy to heat buildings, residences, and pools and to even melt snow. In Lakeview, a geothermal well system is used to heat school properties and hospital buildings. Other examples of direct use of geothermal heat in the state include drying agricultural products, aquaculture (raising fish), heating greenhouses, and heating swimming pools at spas and resorts. Hot springs resorts are widespread in Oregon, including Ashland, Belknap, Breitenbush, and Hot Lake.

Please note that the Legislative Policy and Research Office provides centralized, nonpartisan research and issue analysis for Oregon's legislative branch. The Legislative Policy and Research Office does not provide legal advice. Background Briefs contain general information that is current as of the date of publication. Subsequent action by the legislative, executive, or judicial branches may affect accuracy.