Geothermal

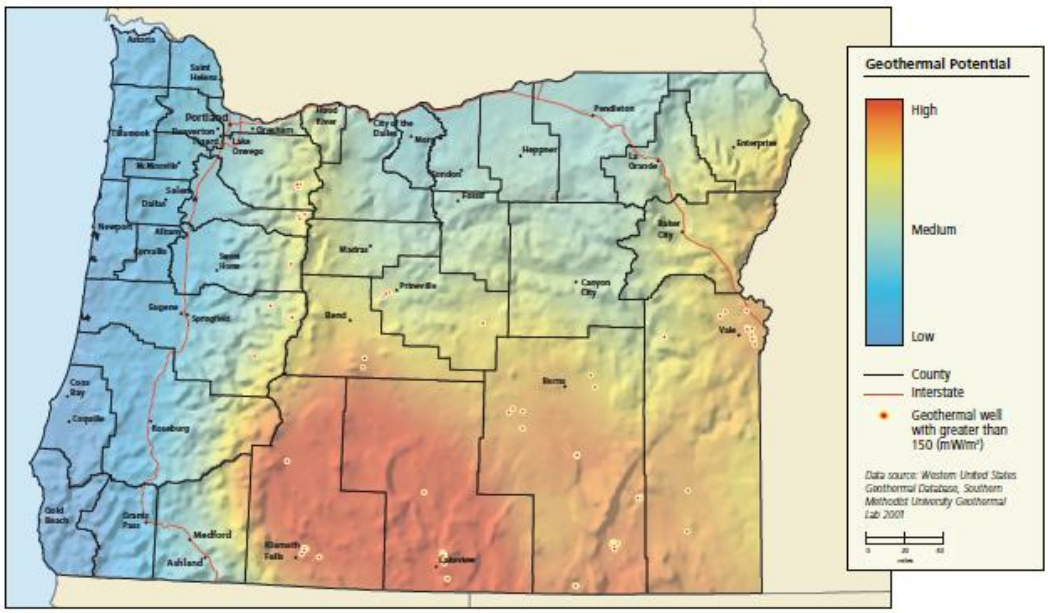

Figure 1: Geothermal Energy Potential in Oregon (Renewable Energy Atlas of the West, 2006)

Geothermal energy is the energy from the internal heat of the earth. It is found in rocks and fluids at various depths including hot springs. Useful heat is extracted by drilling or pumping. Geothermal heat is used directly to heat buildings, and to generate electricity. Traditionally, electricity generation was accomplished with steam turbines and required very high temperature resources. Recent technology innovations enable electricity generation at much lower temperatures.

U.S. geothermal energy generation was relatively stable between 2006 and 2013 with an average of three percent annual growth. Most of the country's geothermal generation is in the West (Figure 2). Geothermal power typically serves as a base load resource (available 24 hours a day, 365 days a year).

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

Areas with the greatest geothermal resource potential are mostly located in central and southeastern Oregon (Figure 1).

Geothermal for electricity generation

Oregon is ranked fifth in the nation for installed geothermal, electricity-generating capacity. 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. A second plant at OIT generates 1.75 megawatts of power. In 2012, U.S. Geothermal Inc. brought online a 26 megawatt facility at Neal Hot Springs near the eastern Oregon town of Vale. In 2014, a 3.1 megawatt geothermal power plant began operation in Paisley, Oregon. Additional geothermal opportunities are being explored at Newberry Crater, Crump Geyser, and Glass Butte.

Geothermal for Heating

The City of Klamath Falls uses geothermal energy to heat buildings, residences, pools, and even melt snow. In Lakeview, a geothermal well system is now being used to heat school

district 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.

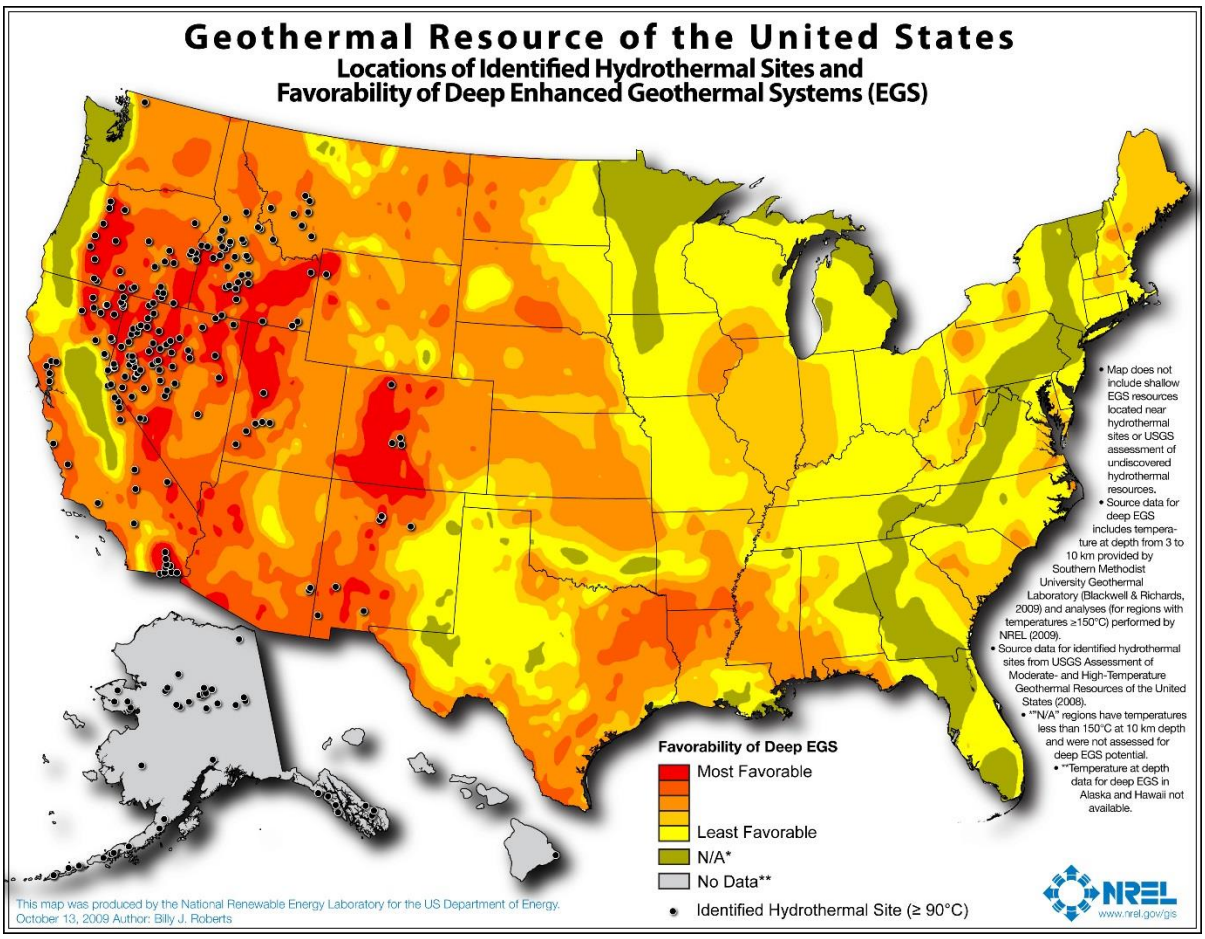

Figure 2: Geothermal resources in the US (National Renewable Energy Laboratory)