



## Geothermal Energy Resources and Policy Incentives

By Christina Van Winkle

Geothermal energy refers to heat that is found within the Earth. This heat can be used in a number of ways through geothermal energy systems. First, it can be used to directly heat buildings, where hot water near the earth's surface is piped into buildings. Second, it can be used indirectly using ground source heat pumps, which transfer heat from the ground or hot water reservoirs into buildings in the winter, a process that is reversed in the summer to cool buildings. And finally, steam from hot water reservoirs can be used to generate electricity.

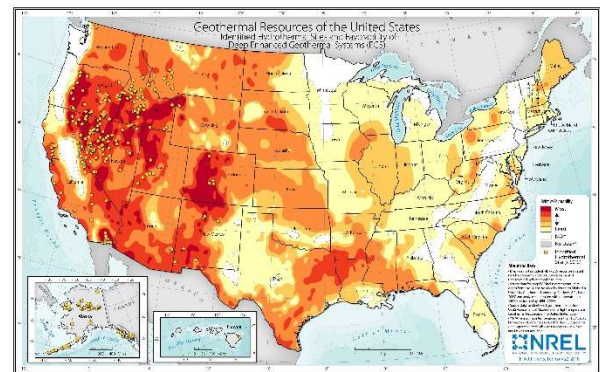
This *issue brief* provides an overview of geothermal energy resources and policies in the United States and Colorado. It concludes with information on recent legislation enacted to promote the use of geothermal energy resources in Colorado.

### Geothermal Energy Resources

Historically, geothermal energy systems have drawn heat from conventional hydrothermal resources found near the Earth's surface. More recently, enhanced geothermal systems have allowed the recovery of heat from low permeability geothermal resources, such as deep rock much further below the Earth's surface.

There are significant geothermal resources in the United States, particularly in the West. Figure 1 shows the identified hydrothermal sites and favorability of deep enhanced geothermal systems. Much of Colorado's western slope ranks as most favorable for deep enhanced geothermal systems.

**Figure 1. Geothermal Resources of the United States**



Source: National Renewable Energy Lab.

The U.S. uses geothermal resources both for heating and cooling spaces and for electricity generation. Currently, only seven states (California, Nevada, Oregon, Idaho, Utah, New Mexico, and Hawaii) have geothermal power plants, generating around 16 billion kilowatt-hours of electricity, equal to 0.4 percent of net electricity generation.<sup>1</sup> Colorado does not currently have any geothermal energy electricity generating facilities.

Colorado law defines geothermal energy as a renewable energy resource under the renewable energy standards. Thus, producers of electricity from geothermal energy are eligible to generate renewable energy credits, which can be sold and traded to meet compliance requirements with renewable energy standards. As of 2018, at least 22 other states also include geothermal energy in state renewable energy standards.

<sup>1</sup> U.S. Energy Information Administration. Geothermal explained. Use of geothermal energy. Accessible at:

<https://www.eia.gov/energyexplained/geothermal/use-of-geothermal-energy.php>

## Geothermal Energy Incentives in the U.S.

Federal renewable energy tax credits are available for geothermal heat pumps that meet certain requirements. In addition, the U.S. Department of Energy's Geothermal Technologies Office is currently soliciting grant applications from communities for geothermal district heating and cooling [projects](#).

Most states with active renewable energy standards include geothermal energy as a qualifying energy source. Moreover, as of 2018, at least 25 states include distributed geothermal energy projects in net metering policies, which allow distributed generation customers to sell excess electricity produced on-site to their utility provider in exchange for a credit on their utility bill. In Colorado, current law allows net metering for customer-sited renewable energy generation facilities, which includes geothermal energy. To date, the Colorado Public Utilities Commission has not had a geothermal project seek to be treated as net-metered.

## Colorado Regulation of Geothermal Energy

**Well permitting.** Geothermal resources are regulated under the Colorado Geothermal Resources Act and administered by the State Engineer within the Department of Natural Resources, Division of Water Resources.<sup>2</sup> The department has promulgated rules for geothermal well permitting, which establish minimum standards required to protect public health, safety, welfare, and the environment, and to promote its efficient use. The division processed nearly 90 geothermal permit applications per year in recent years.

**Resource ownership.** Under current law, geothermal resources associated with tributary groundwater are considered public resources with limited property rights to the landowner, whereas hot dry rock resources are considered a property

right as an incident ownership of the overlying surface.

**Geothermal leases.** The State Board of Land Commissioners offers geothermal exploration permits and production leases through direct negotiation or competitive sealed bids. More information can be found at: <https://slb.colorado.gov/lease/geothermal>.

**Property valuation and taxation.** Geothermal energy facilities are considered public utilities, and are assessed for property taxation by the Division of Property Taxation within the Department of Local Affairs using the income approach.

## Recent Legislation

In 2022, the Colorado General Assembly enacted two measures to promote the use of geothermal energy in Colorado.

*House Bill 22-1381* created the Geothermal Energy Grant Fund in the Colorado Energy Office and provided \$12 million in funding for the program. Funds may be used to invest in geothermal energy systems, including heating, cooling, and electricity generation.

*Senate Bill 22-118* modified statutory provisions that apply to solar energy so that they also apply to geothermal energy systems. Specifically, the bill limited the charges assessed for installation permits, created community geothermal gardens which are analogous to community solar gardens, required the Public Utilities Commission to determine minimum purchases by qualifying retail utilities of electrical output from community geothermal gardens, and required the Colorado Energy Office to develop consumer education materials on geothermal installations.

<sup>2</sup> Section 37-90.5-101, *et seq.*, C.R.S.