Climate Resiliency FACT SHEET Extension UtahStateUniversity

Geothermal Energy in Utah: Massive Potential to Meet Growing Electricity Needs

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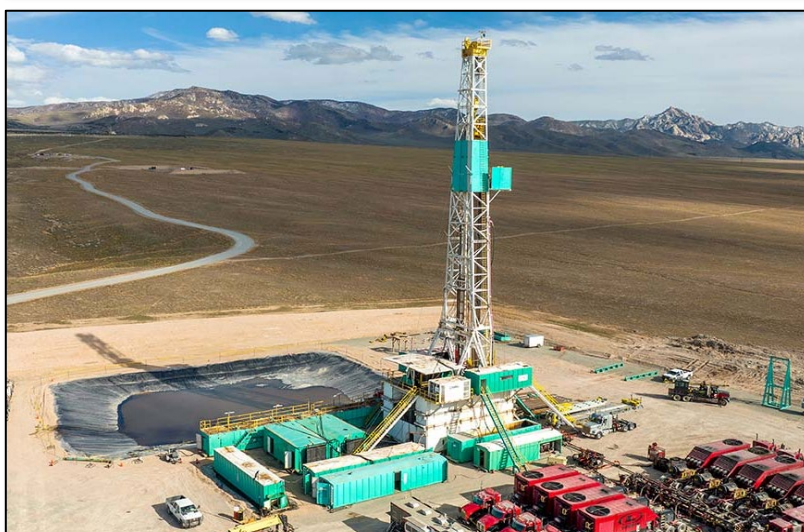
In 2024, Utah generated over 35 million megawatt-hours (MWh) of electricity with 78% of the state's electricity mix coming from two fossil fuels: coal (45%) and natural gas (33%; U.S. Energy Information Administration [EIA], 2025a,b). Fossil fuels are useful because they are a readily dispatchable energy source, meaning they can be burned as needed and provide a reliable source of power to meet fluctuating customer demand (U.S. Department of Energy [DOE], 2019). However, generating electricity from fossil fuels contributes to climate change and local air pollution by emitting greenhouse gases—carbon dioxide and methane—as well as other pollutants (Ask MIT Climate, 2023; Spath & Mann, 2000; U.S. Environmental Protection Agency, 2023).

An alternative, renewable energy source that can provide dispatchable energy but has few to no climate-warming and polluting impacts is **geothermal energy**, heat from within the Earth (U.S. DOE, 2019). The Earth's internal heat is constantly available, so geothermal power plants can run on demand or continuously. This allows geothermal energy to provide operating characteristics similar to coal and gas with the potential to function as a primary source of dispatchable, baseload electricity (U.S. DOE, 2019).

Highlights

- Geothermal energy, heat from within the Earth, is a renewable energy source that can provide flexible, baseload electricity—like coal or natural gas—but without the climate-warming and polluting effects.
- Utah has an estimated 49,000 MW of geothermal energy potential, which, if fully developed, could generate about 390 million MWh of electricity each year, almost 12 times the electricity Utah consumed in 2023.
- 95% of Utah's geothermal resources are accessible through enhanced geothermal systems (EGS), which fracture bedrock and pump water into the new pathways to bring heat to the surface.



Utah FORGE Geothermal Laboratory, Near Milford, Utah
Credit: Eric Larson, Flash Point SLC, for Utah FORGE, used with permission

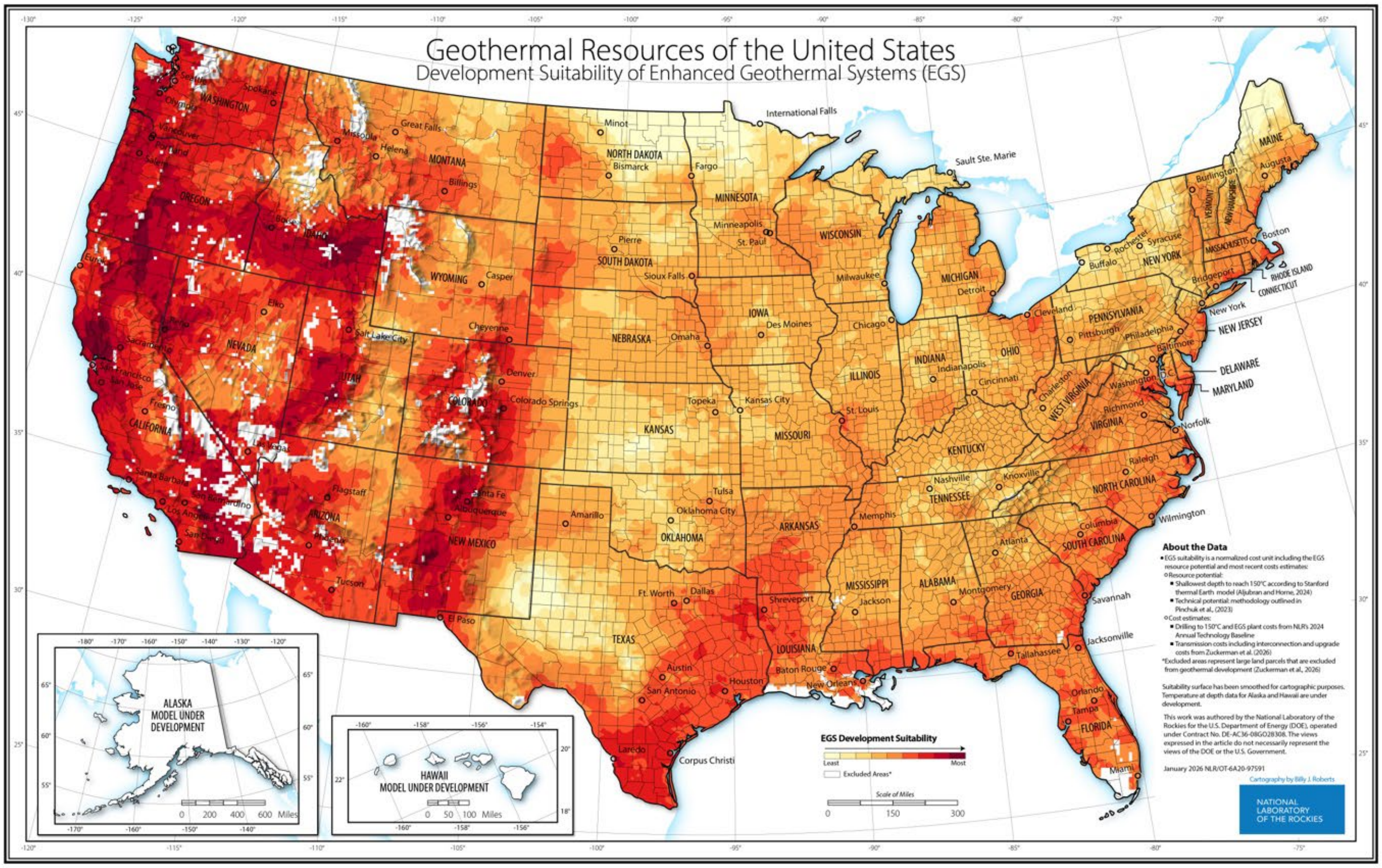


Figure 1. *High Temperatures Near the Earth's Surface Make Western Utah Highly Favorable for Geothermal Energy Development*

Source: Roberts, 2026, used with permission from National Laboratory of the Rockies (NLR)

Areas where geothermal heat is closer to the Earth's surface are critical for successful geothermal energy production because it is faster and cheaper to drill to shallow depths (Figure 1; Allis et al., 2013; Roberts, 2026). In Utah and the Great Basin, this "near-surface" geothermal energy could provide 135,000 megawatts (MW) of electricity capacity (U.S. Geological Survey [USGS], 2025). In Utah, geothermal energy potential is estimated at over 49,000 MW, but only a fraction of this resource has been developed (USGS, 2008; Szymanski & Hardwick, 2025). As of 2025, geothermal power plants in Utah contributed just 73 MW of electricity capacity, representing 1% of the state's net electricity generation and 5% of its renewable electricity portfolio (EIA, 2025c; Szymanski & Hardwick, 2025).

Fully developing Utah's geothermal resources could generate about 390 million MWh of electricity each year, the equivalent of 11 times Utah's net electricity generation in 2024.

If Utah's geothermal resources were fully developed and run continuously, they could generate about 390 million MWh of electricity each year (U.S. DOE, 2019). This would be equivalent to 11 times Utah's net electricity generation in 2024 (35.1 million MWh) and nearly 12 times the state's total electricity consumption in 2023 (33.4 million MWh; EIA, 2025a,d). Utah's legislature expects the state's electricity demand to more than triple by 2050 (Utah Senate, 2024). Growing demand for electricity, along with Utah's rich geothermal resources and history of research and development, make the state well-suited for current and future geothermal energy projects (Akindipe, 2025).

What Is Geothermal Energy?

Geothermal energy is heat from the Earth's interior. Temperatures are highest in the Earth's molten core and decrease as heat travels through the mantle and crust, eventually dissipating at the surface (U.S. DOE, 2019). The amount of near-surface heat varies globally and correlates with tectonic activity (Faulds et al., 2012). Utah's high geothermal potential stems from interactions between the Pacific and North American tectonic plates in the Great Basin, which includes the western half of Utah (Figure 1; Faulds et al., 2012).

Generating Electricity From Geothermal Energy

To convert geothermal energy into electricity, geothermal power plants typically capture heat energy by pumping fluid, usually water, through hot areas near the Earth's surface. This process creates steam that spins a turbine to generate electricity (U.S. DOE, n.d.). Geothermal power plants require three site features:

1. ***Heat***, the energy source.
2. ***Fluid*** to carry the heat energy.
3. ***Permeable rock*** that a fluid can travel through.

To be considered geologically and economically suited for a power plant, a heat source must be at least 302 °F (150 °C) and less than 4 miles below ground (U.S. DOE, 2019).

Several types of geologic formations and technologies allow geothermal energy to be readily used for electricity generation (Table 1; Figure 2):

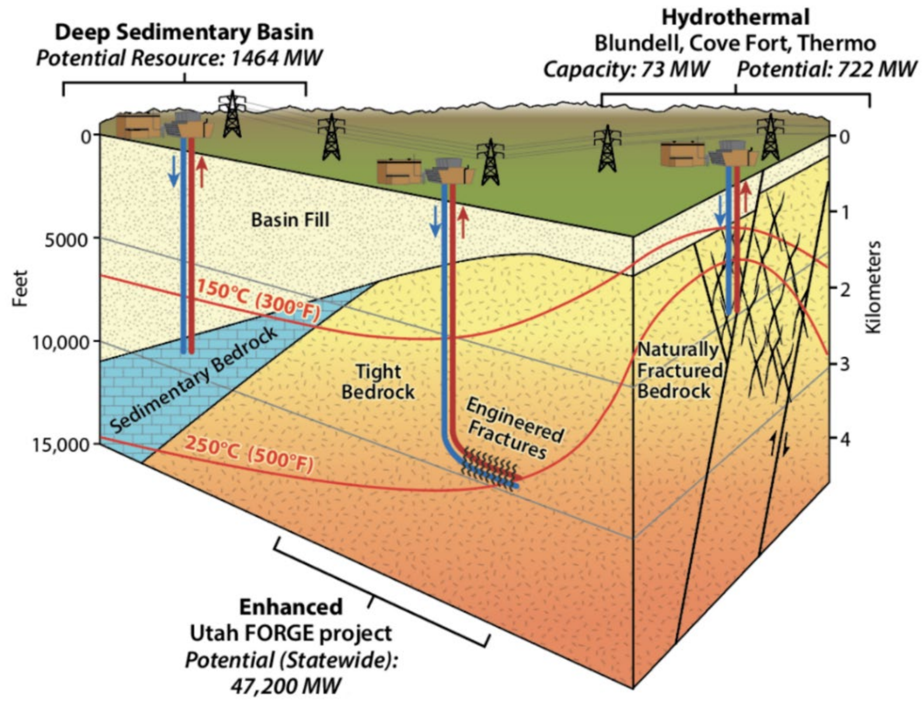


Figure 2. *In Utah, Electricity Can Be Generated from Hydrothermal, Deep Sedimentary, Closed-Loop (not shown), and Enhanced Geothermal Systems*

Source: Szymanski & Hardwick, 2025, used with permission

- **Hydrothermal resources** occur where heat near the surface combines with groundwater in naturally fractured bedrock (U.S. DOE, 2019). These sites can be obvious at the surface if water heated in vertical faults is released through heat vents, geysers, or hot springs. The geysers of Yellowstone National Park in northwestern Wyoming are a famous example of a hydrothermal resource.
- **Deep sedimentary basins** are regions with near-surface heat below permeable rocks where natural fluid may not exist but can be added by pumping water into the subsurface (Anderson, 2013; Berry et al., 2009).
- **Closed-loop systems** function like a heat pump by circulating a fluid through a closed loop to bring heat energy from hot sedimentary rock to the surface where it can be used to generate electricity (Ma, 2025; U.S. EIA, 2026).
- **Enhanced geothermal systems (EGS)** are used where there is near-surface heat without permeable rock. At these sites, the bedrock is artificially fractured ("enhanced"), and water is pumped into the newly created pathways to bring heat up to the surface (U.S. DOE, 2019). In Utah, 95% of the estimated geothermal resources require EGS for access (Berry et al., 2009).

Table 2. *Current and Planned Geothermal Projects in Utah*

County	Name	Owner	System type	Energy potential (MW)	Status
Beaver	Blundell Geothermal Power Plant	PacifiCorp	Hydrothermal	34	Operational: 1984–
Beaver & Millard	Cove Fort Geothermal Power Plant	Ormat Technologies, Inc.	Hydrothermal	25	Operational: 1990–2003; 2013–
Beaver	Thermo No.1 Geothermal Power Plant	CYRQ Energy	Hydrothermal	14	Operational: 2013–
Beaver	Bailey Mountain Geothermal Exploration Project	Ormat Technologies, Inc.	Hydrothermal	—	Approved by BLM: 2022
Beaver	Fervo Cape Station Geothermal Power Project	Fervo Energy	EGS	4,300	Approved by BLM: 2024
Beaver & Millard	Rodatherm Geothermal Test Bed	Rodatherm Energy Corporation	Closed-loop	2.5	Approved by BLM: 2024
Millard	Zanskar Dog Valley Exploration	Zanskar Geothermal & Minerals, Inc.	Hydrothermal	—	Approved by BLM: 2024
Iron	New Castle Geothermal Development Project	Utah Geothermal Energy Partners	Hydrothermal	20	Approved by BLM: 2025
Beaver	GFE Sustainable Geothermal Project	GFE Sustainable, Inc.	Hydrothermal	—	Exploratory drilling

Sources: Fervo Energy Company, 2026; Geuss, 2016; Milligan, 2014; Russell, 2025; U.S. Bureau of Land Management (BLM), 2024; BLM, 2025; Utah Division of Water Rights, n.d.

Current Geothermal Projects in Utah

Geothermal development on public and private land must adhere to local, state, and federal law and requires permits and permissions from the Utah Division of Water Rights and other agencies that consider environmental impacts (Harding et al., 2026; Open Energy Information, 2026). In Utah, most geothermal resources are located on public land managed by the U.S. Bureau of Land Management (BLM; BLM, n.d.).

As of November 2025, Utah is home to three operating hydrothermal power plants with several hydrothermal, closed-loop, and EGS projects in development (Table 2; Utah Division of Water Rights, n.d.). Because the time and cost of exploration, drilling, and construction can be a barrier to new geothermal projects, the U.S. Department of Energy began subsidizing geothermal resource exploration in the 1970s (U.S. DOE, 2010; U.S. DOE, 2019). Utah's progress in geothermal development results from a long history of support from these programs (Figure 3).

Key Events in Utah’s History of Geothermal Energy Development

1972 Energy and Geoscience Institute is established at the University of Utah.

1978 U.S. Department of Energy (DOE) begins sharing drilling costs to incentivize data sharing and decrease financial risk of geothermal energy development. DOE-funded geologic mapping is done at two future geothermal power sites in Utah (Roosevelt Hot Springs and Cove Fort-Sulphurdale).

1984 PacificCorp opens Utah’s first geothermal power plant, Blundell Geothermal Power Plant, at Roosevelt Hot Springs.

Utah’s FORGE laboratory in 2024

2018 DOE provides $140 million to University of Utah to establish the Frontier Observatory for Research in Geothermal Energy (FORGE) laboratory near Milford, Utah. The primary role of FORGE is to conduct research into Enhanced Geothermal Systems (EGS).

2023 Fervo Energy breaks ground on an EGS project in Beaver County. This builds on FORGE data and research with an initial capacity target of 400 MW.

Figure 3. *Key Events in Utah’s Development of Geothermal Energy*

Sources: Energy and Geoscience Institute, 2022; Fervo Energy, 2023; Milligan, 2014; U.S. Department of Energy, 2010; U.S. Department of Energy, 2018

Photo credit: Utah FORGE, 2024, photo used with permission, with timeline by Scott Hotaling

Today, building geothermal power plants is becoming much faster. The full process—from obtaining permits, exploring the site, and drilling preliminary wells—would typically take 7–10 years. However, Fervo Energy plans to begin operating 100 MW of capacity at Cape Station in 2026, only 3 years after receiving initial approval for the project (Akindipe, 2025; Cape Station, 2026). Faster geothermal development is due, in part, to faster drilling times, which reduce costs and encourage financial investment. Between 2021 and 2025, Fervo Energy obtained $973 million in financing, indicating growing confidence in the economic viability of EGS (Akindipe, 2025).

The Future of Geothermal Energy in Utah

Support for developing geothermal energy to generate electricity is growing in Utah. Governor Spencer Cox’s 2026 fiscal budget included $4.2 million for geothermal energy (Office of the Governor, 2024a). This is part of Utah’s Office of Energy Development “Operation Gigawatt” program, which intends to diversify and double

Including more geothermal energy in Utah's energy mix would help address issues of concern for many Utahns: poor air quality, climate change, and support for renewable energy research.

Utah's energy production by 2034 (Office of the Governor, 2024b). Including more geothermal energy and other renewables in Utah's energy mix would help address top issues of concern for Utahns: 41% are very concerned about poor air quality, 47% of Utahns are very concerned about the changing climate, and 78% support funding research for renewable energy (Hotaling et al., 2025; Schad et al., 2025).

However, industry commitment to using electricity from geothermal energy is still limited. PacifiCorp supplies about 78% of Utah's electricity but excludes geothermal energy from Utah's 2025–2045 preferred suppy portfolio because geothermal energy is currently less economically favorable compared to other electricity sources (PacifiCorp, 2025a,b; Utah Geological Survey, 2023). Continued investment in geothermal energy, especially EGS, should increase the potential for including geothermal energy in Utah's electricity mix.

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