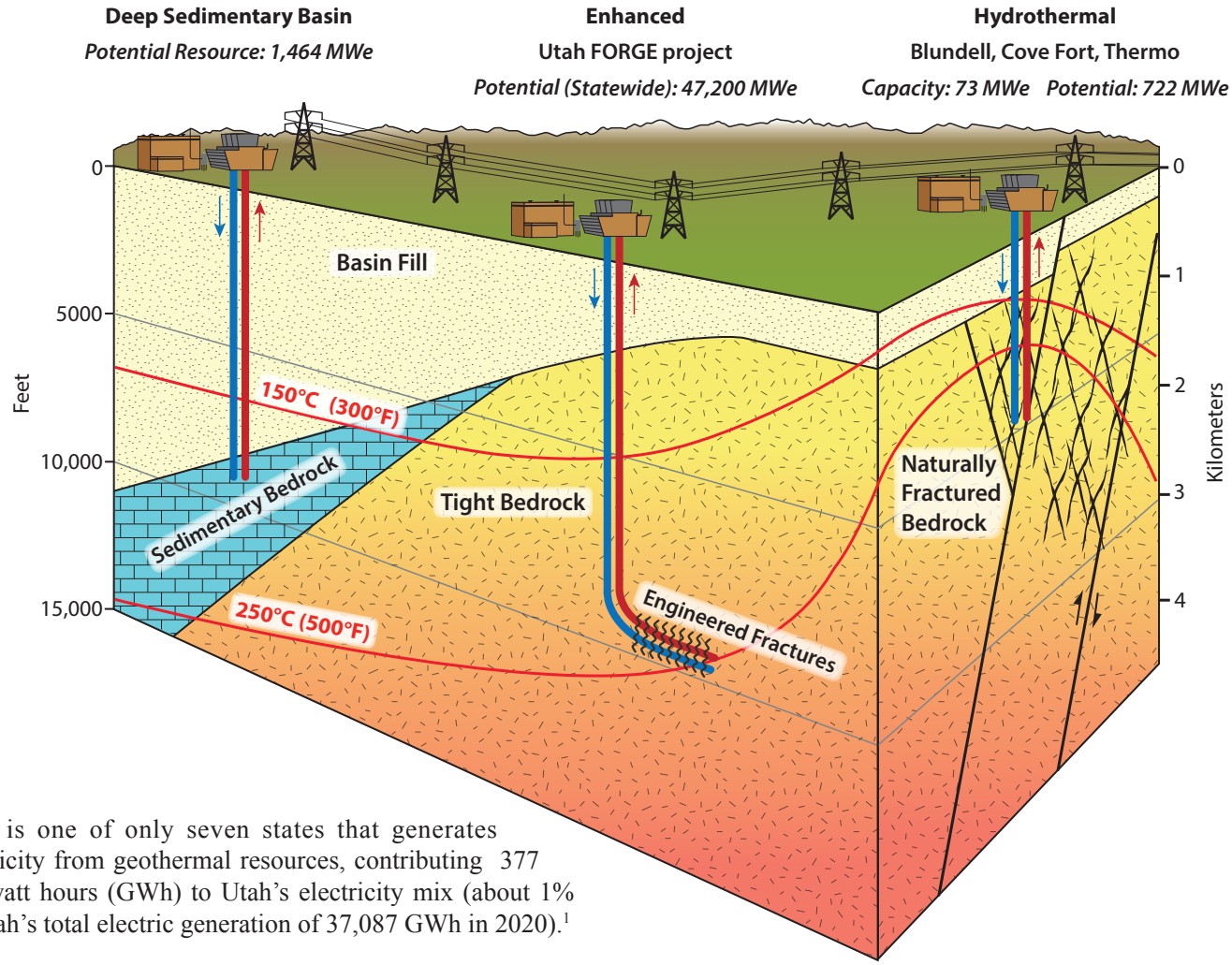
Geothermal in Utah

Energy From the Heat of the Earth

UTAH OFFICE OF ENERGY DEVELOPMENT

Geothermal energy is a renewable, mostly carbon neutral domestic resource that provides long-running applications with a predictable base load electrical output and vastly scalable design. To highlight the multiple benefits of this valuable and under-utilized resource, the Utah Geological Survey (UGS) and the Utah Office of Energy Development are compiling an updated assessment and overview of geothermal resources in Utah.

Primary Geothermal Systems in Utah



Utah is one of only seven states that generates electricity from geothermal resources, contributing 377 gigawatt hours (GWh) to Utah's electricity mix (about 1% of Utah's total electric generation of 37,087 GWh in 2020).[1]

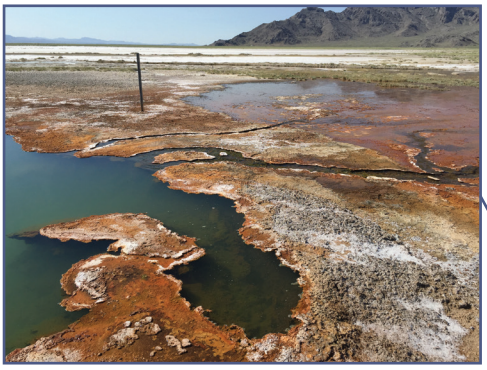
Utah's current geothermal power plant capacity is 73 megawatts of electric power (MWe). This is only 0.1% of the total undeveloped geothermal resource potential which is estimated at 49,400 MWe.[2,3,4]

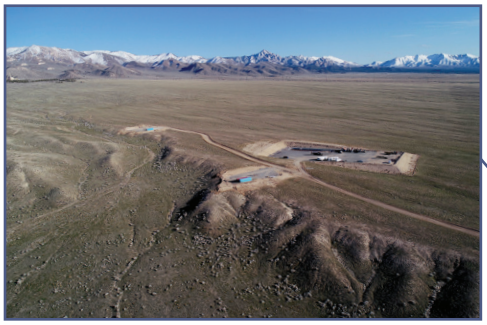
The Utah Frontier Observatory for Research in Geothermal Energy (FORGE) site in Milford, Utah, is actively working to successfully produce geothermal electricity from hot, low permeability crystalline rock and demonstrate technologies for enhanced geothermal systems (EGS) that could be applied across the United States.[5] Beginning in 2018, the U.S. Department of Energy committed $220 million to research and development at the Utah FORGE site.

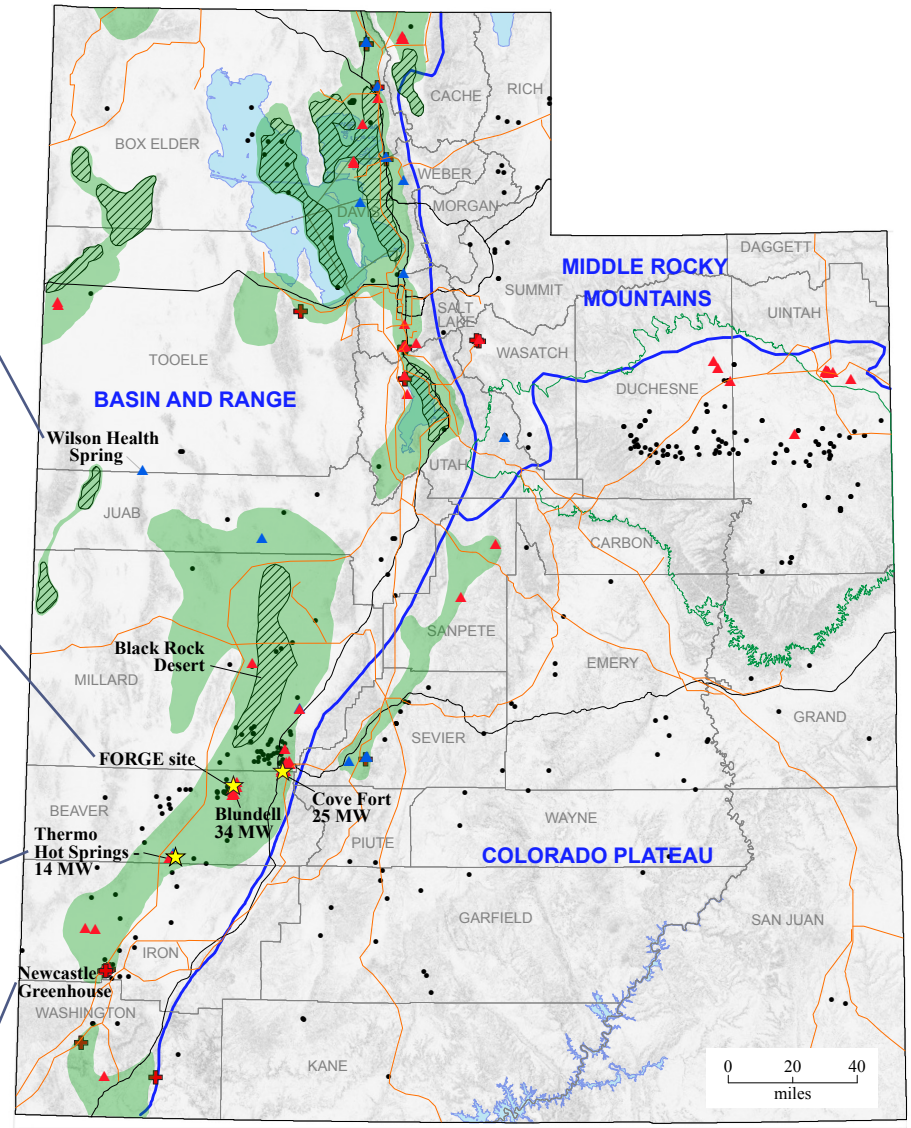
Target conditions for deep geothermal stratigraphic reservoirs with temperatures of 350–400°F (175–200°C) at depths of 10,000–13,000 feet (3–4 km) exist throughout western Utah, and specifically within the Black Rock Desert. Due to their large lateral extent, these prospective basin reservoirs are capable of supporting several power plants in excess of 100 MWe.[6]

Geothermal is a base load renewable energy source that produces electricity at an annual average of nearly 80% of its installed capacity (capacity factor). This is many times higher than intermittent wind and solar production in Utah, which have capacity factors averaging about 20% and 30%, respectively.[1]

Geothermal Resources of Utah







Geothermal resource map of Utah indicating active resources in use and areas of significant resource potential.

Geothermal and petroleum exploration industries have a synergistic relationship where advancements in drilling methods (e.g., horizontal wells and reservoir fracturing), drilling equipment, and downhole tool development facilitate reduced cost and increased efficiency of drilling and production.

A UGS study on produced water in the Uinta Basin estimated that 97% of the 776 wells analyzed exceeded standard direct-use temperature requirements (>120°F/50°C) and 5% are capable of geothermal electric power production (>285°F/140°C).[7] This estimate has peaked the interest of local governments and operators looking to possibly decarbonize oil and gas operations in the basin.

The most promising geothermal resource potential is predominantly found in rural Utah communities, and investments will impact all sectors of the economy and provide a variety of employment opportunities.

[1] Utah Geological Survey, Utah Energy And Mineral Statistics. https://geology.utah.gov/energy-minerals/info/energy-mineral-statistics/.

[2] Berry, J., and others, 2009, Utah Renewable Energy Rift Zones Task Force Phase 1 Report. https://ugspub.nr.utah.gov/publications/misc_pubs/MP-09-1.pdf.

[3] U.S. Department of Energy, 2019, GeoVision, Harnessing the Heat Beneath Our Feet. https://www.energy.gov/sites/default/files/2019/06/f63/GeoVision-full-report-opt.pdf.

[4] Idaho National Laboratory, 2006, The Future of Geothermal Energy: Impact of Enhanced Geothermal Systems (EGS) on the United States in the 21st Century. https://www1.eere.energy.gov/geothermal/pdfs/future_geo_energy.pdf.

[5] https://utahforge.com/about/

[6] Allis, R., and others, 2015, Will Stratigraphic Reservoirs Provide the Next Big Increase in U.S. Geothermal Power Generation? GRC Transactions, vol. 39.

[7] Hardwick, C. L., and others, 2015, A Basin-Scale Geothermal Assessment of Co-Produced Waters in Oil and Gas Fields, Uinta Basin, Utah, USA. GRC Transactions, vol. 39.