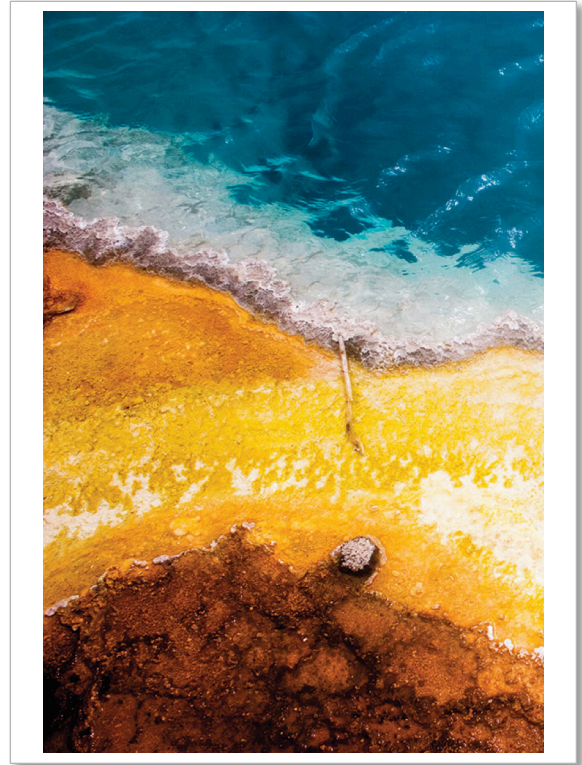


Potential for Geothermal Energy in Wyoming

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In order to determine the potential for geothermal-based electric power in Wyoming there are many criteria that must first be met. The first issue is what components are required to economically produce geothermal energy. Second, the components required to create geothermal energy must be met in Wyoming as well as the location. To produce electric power from geothermal sources three variables are key.

The first criterion for economic geothermal power plants is fluid temperature. Depending on which type of geothermal power plant is desired the water temperature from the system must meet some requirements. Flash and dry steam plants require fluid temperatures of at minimum 210°F (99°C) to produce power although temperatures above 300°F (148°C) are preferred (DOE, 2008). Binary-cycle power plants can operate with temperatures as low as 165°F (74°C).



Secondly, the water in the geothermal system must meet both discharge and clarity requirements. In order to create 1 megawatt (MW) from a binary-cycle system operating with 210°F (99°C) geothermal fluid discharge through the system of 1,300 to 1,500 gpm would be required. In a similar system using 300°F (148°C) fluid flows of 450 to 600 gpm are required. The water or fluid must also have minimal mineral and gas content to avoid corrosion of the piping system and costly maintenance and repairs.

Thirdly, a suitable location for the geothermal power plant must be found near the resource. In order for a geothermal power plant to be economically feasible it must be located near existing electric infrastructure, and have a shallow depth to easily reach geothermal resources. If a well must be drilled to great depths, the overhead to do so would be difficult to recoup through energy production. Power lines are also expensive to permit and construct, so having a short distance to connect to an existing power grid would be preferred.

There are two locations which may meet the requirements for potential economic geothermal power generation in Wyoming. The Jackson Hole area surrounding Jackson has numerous springs and the northern end of the valley may have in geologic history undergone volcanic activity. The northern half of the valley is made up of the Grand Teton National Park and is protected from exploration

and energy development. The southern end of the valley is predominantly privately owned, so the possibility of geothermal development does exist in that area, but the economic viability of this is far from certain.

The second location which meets the requirements for potential economical geothermal utilization is north of Jackson Hole in Yellowstone National Park. The Yellowstone caldera produces near surface water temperatures high enough for steam power plants. A total of 318 springs have been measured at over 194°F (90°C) and numerous steam vents in the park are as hot as 280°F (138°C). Total flow for the Yellowstone National Park system is around 49,000 gpm. Yellowstone National Park is also protected from any energy development, including geothermal resources.

Outside of the northwest corner of the state, geothermal water near the surface does not reach high enough temperatures or flows to be economic for geothermal development. The deep Laramide basins in the state do produce water in excess of 200°F (93°C) at depths of more than 12,000 feet. Outside of small binary-cycle power generation associated with oil and gas field development, it is unlikely that deep basin geothermal systems would be economic.

Although currently there is limited potential for economic geothermal resource development in Wyoming there are adequate resources for small scale energy production and geothermal heat pump implementation. The binary-cycle project at the Rocky Mountain Oilfield Testing Center could be expanded to help offset energy needs in oil and gas development, as well for the possibility of providing some minimal amounts of energy for public use. Geothermal heat pumps could also be utilized for regulating heat on an individual building basis, whether incorporated into new construction or retrofitted to existing buildings. As new technologies emerge and geothermal resources are discovered the viability of geothermal energy in Wyoming may increase in the future. However, this will likely only come to pass if geothermal energy becomes economically competitive with other sources of energy.

Sources:

National Renewable Energy Lab

U.S. Department of Energy

U.S. Geological Survey