

Electrical Power Generation Potential from Geothermal Energy in Colorado

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Historically, Colorado has been considered to have geothermal resources suitable only for direct-use applications. Until very recently, Colorado's geothermal potential for generating power has been assigned little promise. This appears to be based more on a lack of study, rather than on sound science.

Several factors suggest that Colorado's potential may be much greater than previously represented. Technology has improved such that it is no longer necessary to have water boiling to the surface as in the classic geothermal areas of Nevada, California, and Utah. In 2002, the SMU Geothermal Lab showed small areas of southern Colorado as having potential for geothermal power generation. More recently, a 2005 study of ten western states by the Idaho National Laboratory ranks Colorado in fourth place in terms of the number of potential sites (nine) for geothermal power potential. These sites were spread across the central part of the state.

A recent paper at the Geothermal Resource Council's annual meeting listed a number of geologic criteria that make the State of Nevada high potential for power generation— regionally high elevation, Quaternary volcanism, Quaternary faulting, and high heat flow. Fortunately, Colorado is also outstanding with respect to all these criteria.

Colorado has the highest average elevation (6,800') in the nation with 58 peaks over 14,000 feet above sea level and more than 700 higher than 13,000 feet. The state has at least five Quaternary volcanoes (one of which erupted only 4,000 years ago). The catalogues of Quaternary faults and thermal springs in the state contain more than 90 of each feature.

Geophysicists have detected a low velocity mantle plume under Colorado that is the same size as one detected at Yellowstone. Colorado has the second largest heat flow anomaly in North America, as shown on the Geothermal Map of North America. Moreover, drilling by AMAX at Mt. Princeton shows heat-flow values that are substantially higher than the published values. Several of the state's oil and gas basins reveal formation temperatures above 100°C (212°F) at relatively shallow depths. Indeed, 20 wells in the San Juan Basin have temperatures of 121°C (250°F) or more between 7,000-9,000 feet deep. One well has a temperature of 150°C (302°F) at a depth of only 7,400 feet.

The Western Governors' Geothermal Task Force identified Colorado as having the potential for 20MW of power generation. The state needs an updated, thorough evaluation of this potential energy source, particularly since Colorado's voters passed a renewable-portfolio initiative in 2004.