
The Economic, Environmental, and Social Benefits of Geothermal Use in New Mexico

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Geothermal heat and water have been used in the Land of Enchantment for centuries. More than 10,000 years ago, North America Paleo-Indians used hot springs for cleansing, cooking, healing, and negotiating.

Chief Geronimo himself bathed in the revitalizing waters. One of the first health spas was built in 1880 at Ojo Caliente Mineral Springs.

Currently, geothermal heat or water is used in at least 30 hot springs—ranging from rustic to ritzy—across the state, and to also heat buildings, grow roses, and hatch young tilapia.

Economic benefits

Geothermal resources benefit New Mexico's economy in several ways. Geothermal saves energy and cuts operating costs.

Geothermal businesses create jobs, foster commercial growth, promote rural development, attract tourists, and pay taxes. Some pay state and federal royalties as well.

New Mexico is home to two of the largest geothermal greenhouses in the United States, with a combined payroll of over \$5 million and annual gross receipts of over \$30 million.

In business since 1977, Burgett Geothermal Greenhouse near Cotton City is the largest employer in Hidalgo County, and the largest geothermal greenhouse in the U.S. The 30-acre complex employs about 60 people, and ships 25 million roses a year to markets in

the southwest. In addition to taxes, Burgett pays state and federal royalties.

Burgett Greenhouse's annual cost savings by using geothermal heat compared to natural gas is about \$1.8 million.



The Masson Radium Springs Farm geothermal greenhouses are located on private land in southern New Mexico. (Credit: Robb Williamson)

Established in 1987, Masson Geothermal Greenhouse in Radium Springs is the third largest geothermal greenhouse in the country, and the largest employer in northern Dona Ana County. The greenhouse employs 110 people and covers 18 acres. More than 30 kinds of potted plants including poinsettias are sold to markets from Arizona to the Midwest. Masson plans to expand to 40 acres in the future.

Masson Greenhouse's annual cost savings by using geothermal heat compared to natural gas is about \$790,000.

In addition to greenhouses, geothermal water is used in aquaculture. Founded in Animas in 1995, AmeriCulture, Inc. is the largest Nile Tilapia fingerling producer in the country. Its geothermally heated, indoor facilities provide an optimum rearing environment for the fish, and minimize the possibility of introducing pathogens. AmeriCulture's 10-12 full-time employees produce over 7 million fingerlings a year for shipment to domestic and international commercial producers.

The low cost of geothermal energy makes it possible for AmeriCulture to compete with growers in Latin America. The company's annual cost savings by using geothermal heat compared to natural gas is about \$240,000.

AmeriCulture has plans to expand. It is working on a binary geothermal power plant design that, once built, would create 160 additional jobs in an onsite production and processing facility.



Owned and operated by the Village of Jemez Springs, the Jemez Springs Bath House is open seven days a week. (Credit: Jemez Hot Springs Bath House)

Spas and resorts heated with geothermal are scattered across New Mexico. The Jemez Springs Bath House has been around for approximately 100 years. About 20,000 people visit the bath house each year to soak in the therapeutic water. Eight attendants

and 21 massage therapists work in the bath house.

With a staff of one, the Artesian Bath House and RV Park in Truth or Consequences has continuously operated since 1930. In 2005, over 6,600 people visited the bath house and 36-space RV park.

Geothermal water from the Gila Hot Springs on the West Fork of the Gila River heats homes, greenhouses, and pools. Family owned and operated since 1940, the Gila Hot Springs Ranch boasts a natural hot springs jacuzzi and an RV park and campground. Gila Hot Springs is the site of the famous geothermally-heated Doc Campbell's Post Vacation Center built in 1963.

The numerous geothermal businesses across the state employ many people. Using a standard multiplier of 2.5, geothermal businesses create at least 540 direct, indirect, and induced jobs in New Mexico.

Environmental benefits

In addition to energy savings, geothermal energy prevents the emissions of greenhouse gases (GHG) and air pollutants, helping to keep New Mexico's air clean and its sky clear.

The business which use geothermal water for aquaculture, greenhouses, swimming pools, resorts, space heating, and hot water also prevent the emissions of air pollutants and GHG. If these businesses used electricity to generate the heat that geothermal water naturally contains, not only would most be unable to afford to stay in business, but they would emit at least 66,480 tons of carbon dioxide each year—the equivalent of 140,255 barrels of oil. In addition, they would emit 141 tons of nitrogen oxides and 98 tons of sulfur

dioxides each year into New Mexico's air (see Table 1).

Social benefits

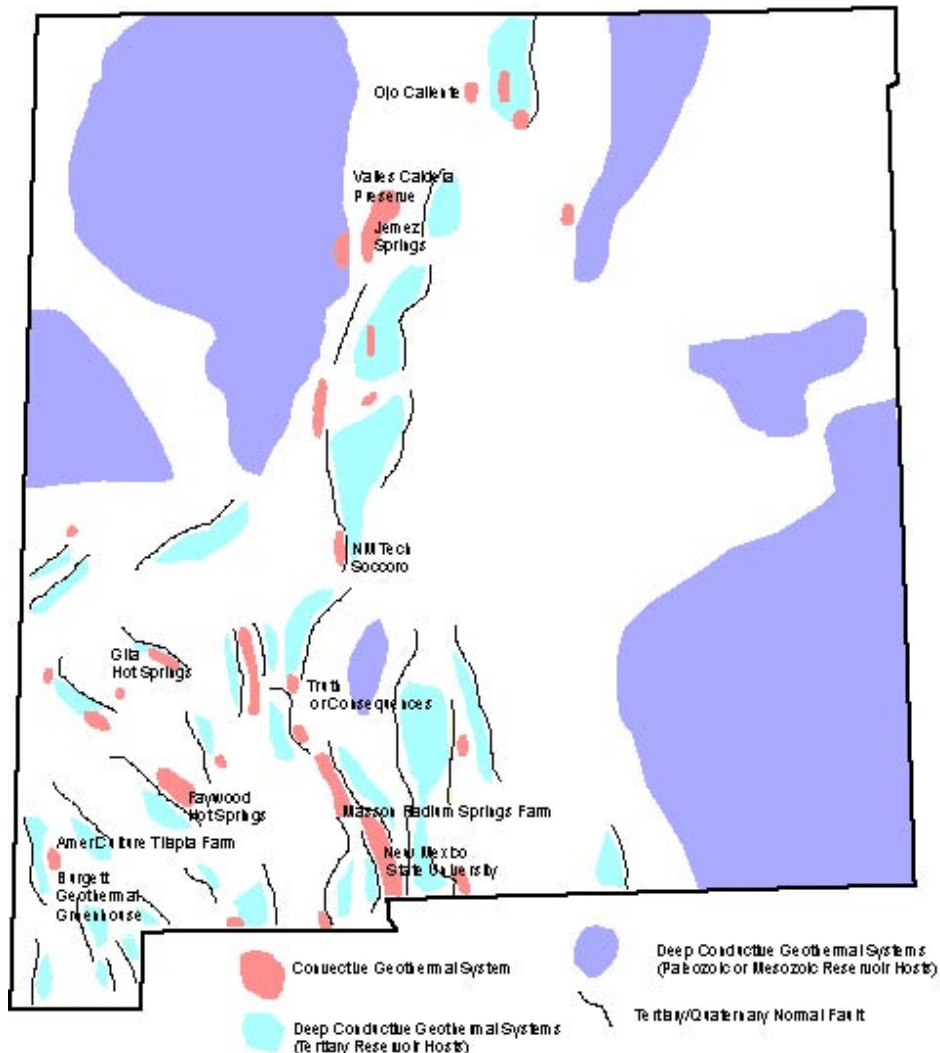
Social benefits are difficult to measure quantitatively. One key social benefit from geothermal energy's use in New Mexico, however, is improved quality of life through recreation. Geothermal provides many unique recreational opportunities enjoyed by tens of thousands of people each year, attracting tourists to the state.

Conclusion

While more than 360 thermal wells and springs are known to produce water with

temperatures over 86°F in 22 out of 33 New Mexico counties, the resource base is many magnitudes larger. All current use and nearly all the thermal well and springs tap shallow resources that are largely unexplored. An even larger resource base exists in deep reservoirs and aquifers beneath major sedimentary basins. The accessible and useable thermal energy in these resources is equivalent to more than 100 billion barrels of oil.

The potential for geothermal to contribute to New Mexico economically, environmentally, and socially—even more than it already does—is great indeed.



Geothermal resources in New Mexico. (Courtesy: Jim Witcher)

Site	Location	Application	Annual Energy Use		Annual Emissions Offset (lbs)		
			Btu billion	Equivalent kWh	Nitrogen oxides	Sulfur dioxide	Carbon dioxide
AmeriCulture, Inc.	Animas	Aquaculture	11	3,223,781	10,606	7,373	5,003,656
Artesian Bath House and RV Park	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Burggett Geothermal Greenhouses	Animas	Greenhouse	184	53,925,064	177,402	123,324	83,697,519
Charles Motel & Spa	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Faywood Hot Springs	Faywood	Resort/Pool	1	293,071	964	670	454,878
Fire Water Lodge Bed & Breakfast	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Geronimo Springs Museum	Truth or Consequences	Space Heating	1	293,071	964	670	454,878
Giggling Star	Jemez Springs	Resort/Pool	1	293,071	964	670	454,878
Gila Hot Springs Ranch.	Silver City	Space Heating	2.5	732,678	2,410	1,676	1,137,195
Hay-Yo-Kay Hot Springs and Spa	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Hot Springs Soaking Pools	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Indian Springs	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Jemez Springs	Jemez Springs	Space Heating	1	293,071	964	670	454,878
Jemez Springs Bath House	Jemez Springs	Resort/Pool	1	293,071	964	670	454,878
Marshall Hot Springs	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Masson Radium Springs Farm	Radium Springs	Greenhouse	76.8	22,507,853	74,046	51,474	34,934,617
Ojo Caliente Resort	Ojo Caliente	Resort/Pool	1	293,071	964	670	454,878
Radium Hot Springs Inn	Radium Springs	Resort/Pool	1	293,071	964	670	454,878
River Bend Hot Springs	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Senior Citizens Center	Truth or Consequences	Space Heating	1	293,071	964	670	454,878
Sierra Grande Lodge & Spa	Truth or Consequences	Resort/Pool	1	293,071	964	670	454,878
Wilderness Lodge and Hot Springs	Silver City	Resort/Pool	1	293,071	964	670	454,878
Totals			292.3	85,664,654	281,816	195,907	132,960,791
					141	98	66,480
					Tons/year		

Note: Energy use is estimated.

Table 1 – Greenhouse gas and air pollutant emissions offset by geothermal businesses in New Mexico.