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## The Economic, Environmental, and Social Benefits of Geothermal Use in Idaho

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Idaho has benefitted from its rich geothermal resources for centuries. Native Americans, settlers, miners, and trappers soaked in the many hot springs. In 1892, the Boise Warm Springs Water District became the first site in the country to use geothermal water for heat. Boise is the only State Capitol heated by geothermal energy.

Today, geothermal energy is used across the “Gem State” to raise tilapia and alligators, produce caviar, grow lilies and poinsettias, heat homes and government buildings, and revive tired muscles. Idaho’s geothermal resources bring many economic, environmental, and social benefits to its citizens and visitors alike.

### *Economic benefits*

Geothermal resources benefit Idaho’s economy in several ways. The many businesses which use geothermal water or heat create jobs, foster commercial growth, attract tourists, and pay taxes. Geothermal water or heat used by state and municipal entities cut heating costs, saving valuable taxpayer money. Geothermal water has heated one million square feet of the Capitol Mall Complex since 1982.

The City of Boise currently sells geothermal water to heat about 3.2 million square feet. At today’s prices, if forced to use natural gas, City customers would spend 30% more than what they pay for geothermal.



**The River Pool is one of Lava Hot Springs Inn’s five outdoor hot pools which have free flowing geothermal mineral water ranging in temperature from 44°F to 112°F. (Photo: Lava Hot Springs Inn)**

The numerous geothermal small businesses across the state employ countless Idahoans, many in rural areas. Aura Soma Lava employs 10 to 12 people; Banburg Hot Springs, 5 in the slow season; Downatta Hot Springs, 30 during the summer; Fish Breeders of Idaho, 20; Opaline AquaFarms, LLC, 3; and Riverside Inn and Hot Springs, up to 14.

Ace Development USA, Inc. in Bruneau produces 500,000 pounds of tilapia a year on five acres. In business since 1986, it employs three people.

Express Farms in Melba sells bedding plants grown in 85,000 square feet of greenhouses heated by geothermal energy. Annual sales total \$1.25 million. It has been in business since 1983 and employs from 5 to 22 people, depending on the season.

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Idaho Rocky Mountain Ranch in Stanley began in 1930 as a private, invitation-only guest ranch. It opened to the general public in 1976, and hosts approximately 1,100 guests each year. Twenty-five people work at the ranch during the summer season.

Terrace Lakes Recreational Ranch in Garden Valley has been operating for over 40 years. About 2,000 people visit the facility which employs 45 people and boasts an 18-hole championship golf course, a natural geothermal swimming pool which is open all year, cross country skiing, and access to 850 miles of groomed snowmobile trails.

Ward's Greenhouse Inc. in Garden Valley has been in business for 40 years. Fifteen people work full-time in the geothermal greenhouse; 30 people part-time on a seasonal basis. In 2005, sales of bedding plants, hanging baskets, and poinsettias totaled \$1.6 million. Ward's plans to invest about \$13 million in 2008 to build a second, larger geothermal greenhouse which would cover 16 acres and provide 58 full-time and 40 part-time jobs.

Using a multiplier of 2.5, the geothermal businesses described create about 560 direct, indirect, and induced jobs in Idaho. Countless more people work in the other businesses which use geothermal water or heat. In addition to jobs, the geothermal businesses pay local, state, and federal taxes.

Idaho is poised to generate electricity from its high temperature geothermal resources. Boise-based U.S. Geothermal Inc. plans to break ground on a 13.7-megawatt (MW) geothermal power plant at Raft River in the summer of 2006. The company has signed a 20-year power sales contract to sell 87,600 megawatt hours a year of electricity to Idaho Power Company. The plant is expected to

deliver first commercial power by October 2007.

The price of electricity from the Raft River Geothermal Power Plant will not be subject to the uncertainties of fossil fuel markets, resulting in predictability for Idaho Power's customers.

In addition to providing stable electricity prices, the Raft River Geothermal Plant will also create jobs—approximately 80 during construction and 15 permanent full-time jobs for day-to-day operations. Using a multiplier of 2.5, Phase One of the Raft River geothermal plant will create more than 200 direct, indirect, and induced jobs in Idaho. In addition, U.S. Geothermal pays leases and taxes. The company leases land from local ranchers and farmers, paying them about \$50,000 per year. The plant would pay about \$700,000 in indirect business taxes each year. An investment of \$38 million in Phase One would result in an output growth of \$95 million for the U.S. economy.



**Drill rig workers during the well workover at Raft River, Idaho. (Photo: U.S. Geothermal Inc.)**

U.S. Geothermal may build an additional 20 MW of capacity at Raft River in Phase Two, creating more jobs and resulting in additional lease and tax payments.

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### *Environmental benefits*

Geothermal energy prevents the emissions of greenhouse gases (GHG) and air pollutants, helping to keep Idaho's air clean and its sky clear.

The businesses which use geothermal water for aquaculture, greenhouses, swimming pools, resorts, district and 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 110,000 tons of carbon dioxide each year—the equivalent of 230,000 barrels of oil. In addition, they would emit 231 tons of nitrogen oxides and 188 tons of sulfur dioxides each year into Idaho's air (see Table 1).

Once built, over 20 years Phase One of the Raft River Geothermal Power Plant will offset over 1 million tons of carbon dioxide emissions that would have been generated by a similar-sized gas-fired plant. This is equivalent to 2.2 million barrels of oil. In addition, the plant will offset the emission of 112 tons of nitrogen oxides and 90 tons of sulfur dioxides every year. Phase Two will prevent the emission of even more GHG emissions and air pollutants (see Table 2).

### *Social benefits*

Social benefits are difficult to measure quantitatively. One key social benefit from geothermal energy's use in Idaho, 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*

According to the Idaho Department of Water Resources, only about 17% of the 1,057 geothermal wells and springs in Idaho are being used. Many opportunities exist for entrepreneurs to develop these resources into thriving businesses. Several are in the feasibility study phase.



**Geothermal water and heat create a bright future for Idaho. (Photo: Idaho Rocky Mountain Ranch)**

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

Site	Location	Application	Annual Energy Use		Annual Emissions Offset (lbs)			Zip
			Btu billion	Equivalent kWh	Nitrogen oxides	Sulfur dioxide	Carbon dioxide	
1 Ace Development USA Inc	Bruneau	Aquaculture	72.5	21,247,648	41,575	33,622	19,739,512	83604
2 Arraina, Inc	Gooding	Aquaculture	N/A					83330
3 Aura Soma Lava	Lava Hot Springs	Resort/Pool	N/A					83246
4 Banbury Hot Springs	Buhl	Resort/Pool, Space Heating	9.3	2,725,560	5,333	4,313	2,532,103	83316
5 Baumgartner Campground	Fairfield	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83327
6 Bear Lake Hot Springs	Paris	Resort/Pool	1.3	380,992	745	603	353,950	83261
7 Boise Warm Springs Water District	Boise	District Heating	30.0	8,792,130	17,204	13,912	8,168,074	83712
8 Boise, City of	Boise	District Heating	104.0	30,472,107	59,625	48,218	28,309,228	83701
9 Burgdorf Hot Springs	Burgdorf	Resort/Pool, Space Heating	8.2	2,403,182	4,702	3,803	2,232,607	83638
0 Canyon Bloomers, Inc.	Buhl	Greenhouse	28.6	8,381,831	16,401	13,263	7,786,897	83316
1 Canyon Springs Fish Farms	Twin Falls	Aquaculture	N/A					83301
2 Castle Mountain Creek subdivision	Crouch	Space Heating	10.8	3,165,167	6,193	5,008	2,940,507	83622
3 Challis Hot Springs, Inc.	Challis	Resort/Pool	2.2	644,756	1,262	1,020	598,992	83226
4 College of Southern Idaho	Twin Falls	District Heating, Greenhouse	N/A					83301
5 Corral	Corral	Space Heating	1.2	351,685	688	556	326,723	83322
6 Cub River Guest Ranch	Preston	Resort/Pool	N/A					83263
7 Del Rio Hot Springs	Preston	Space Heating	0.9	263,764	516	417	245,042	83263
8 Desert Hot Springs Resort	Twin Falls	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83302
9 Don Campbell	Twin Falls	Aquaculture	N/A					83301
0 Downatta Hot Springs	Downey	Resort/Pool	2.5	732,678	1,434	1,159	680,673	83234
1 Edward's Greenhouses	Boise	Greenhouse	10.7	3,135,860	6,136	4,962	2,913,280	83703
2 Epicenter Aquaculture	Challis	Aquaculture	43.5	12,748,589	24,945	20,173	11,843,707	83226
3 Express Farms	Marsing	Greenhouse	0.8	234,457	459	371	217,815	83641
4 Fish Breeders of Idaho	Buhl	Aquaculture	174.0	50,994,354	99,781	80,692	47,374,827	83316
5 Flora Company	Boise	Greenhouse	N/A					83703
6 Givens Hot Springs	Givens Hot Springs	Resort/Pool	0.5	146,536	287	232	136,135	83641
7 Gold Fork Hot Springs	McCall	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83638
8 Green Canyon Hot Springs	Newdale	Greenhouse, Resort/Pool	9.1	2,666,946	5,218	4,220	2,477,649	83436
9 Haven Hot Springs	Lowman	Resort/Pool	3.5	1,025,749	2,007	1,623	952,942	83637
0 Heise Hot Springs	Ririe	Resort/Pool	4.4	1,289,512	2,523	2,040	1,197,984	83443
1 Home Hotel and Motel	Lava Hot Springs	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83246
2 Hooper Elementary School	Soda Springs	Space Heating	5.0	1,465,355	2,867	2,319	1,361,346	83276
3 Idaho Capitol Mall Complex	Boise	District Heating	24.3	7,134,575	13,960	11,290	6,628,170	83702
4 Idaho Rocky Mountain Ranch	Stanley	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83278
5 Indian Springs Resort	American Falls	Resort/Pool	2.1	615,449	1,204	974	571,765	83211
6 Latter-day Saints Church	Almo	Space Heating	0.9	263,764	357	538	192,927	83312
7 Lava Hot Springs Inn	Lava Hot Springs	Resort/Pool, Space Heating	26.8	7,854,303	15,369	12,428	7,296,813	83246
8 Lost River Geothermal Company	Acro	Greenhouse	N/A					83213
9 Maple Grove Hot Springs	Thatcher	Resort/Pool	N/A					83283
0 Miracle Hot Springs	Buhl	Resort/Pool, Space Heating	9.9	2,901,403	5,677	4,591	2,695,464	83316
1 Mountain States Plants	Buhl	Greenhouse	N/A					83316
2 Mountain Village Resort	Stanley	Resort/Pool	N/A					83278
3 Nat-Soo-Pah Hot Springs & RV Park	Twin Falls	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83301
4 Opaline AquaFarms, LLC	Given Hot Springs	Aquaculture	58.0	16,998,118	33,260	26,897	15,791,609	83641
5 Pristine Springs, Inc.	Jerome	Aquaculture	N/A					83338
6 Red River Hot Springs	Elk City	Resort/Pool	7.0	2,051,497	2,775	4,188	1,500,543	83525
7 Riggins Hot Springs, the Lodge at	Riggins	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83549
8 Riverdale Resort	Preston	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83263
9 Riverside Inn and Hot Springs	Lava Hot Springs	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83246
0 Sawtooth Lodge	Grandjean	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83637
1 SeaPac of Idaho, Inc.	Buhl	Aquaculture	N/A					83316
2 Silver Creek Plunge	Garden Valley	Resort/Pool	3.6	1,055,056	2,064	1,669	980,169	83622
3 Sligar's Thousand Springs Resort	Hagerman	Resort/Pool	7.7	2,256,647	4,416	3,571	2,096,473	83332
4 Smith Creek Hatchery	Caribou	Aquaculture	N/A					83217
5 Terrace Lakes Recreational Ranch	Garden Valley	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83622
6 Twin Falls, City of	Twin Falls	District Heating	N/A					83301
7 Twin Springs Resort	Boise	Resort/Pool, Space Heating	12.0	3,516,852	6,881	5,565	3,267,229	83716
8 Veteran's Administration	Boise	District Heating	12.1	3,546,159	6,939	5,611	3,294,456	83702
9 Wards Greenhouses	Garden Valley	Greenhouse	36.0	10,550,556	20,644	16,695	9,801,688	83622
0 Zim's Hot Springs	New Meadows	Resort/Pool	7.0	2,051,497	4,014	3,246	1,905,884	83654
<b>Total</b>			<b>807.4</b>	<b>236,631,198</b>	<b>461,615</b>	<b>375,495</b>	<b>218,016,561</b>	
					<b>231</b>	<b>188</b>	<b>109,008</b>	<b>Tons/year</b>

N/A = Not available

**Table 1** – Greenhouse gas and air pollutant emissions offset by geothermal businesses in Idaho.

Name	Location, County	Installed Capacity MWe	Annual Energy produced MWh	Annual Energy produced kWh	Annual Emissions Offset (tons)			20-year Carbon dioxide offset (tons)	Zip
					Nitrogen oxides	Sulfur dioxide	Carbon dioxide		
Raft River Phase One	Raft River, Power	13.7	114,011	114,011,400	112	90	52,959	1,059,190	83211
Raft River Phase Two	Raft River, Power	27.4	228,023	228,022,800	223	180	105,919	2,118,380	83211
<b>Total</b>			342,034	342,034,200	335	271	158,878	3,177,570	

*Assumes 95% capacity factor*

**Table 2** – Potential greenhouse gas and air pollutant emissions offset by Raft River Geothermal Power Plants.