

GEOHERMAL ENERGY

Heat from the Earth Power for the Future



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eothermal energy is the earth's internal heat. It is known that the temperature within the earth increases with increasing depth. Through several forms of geological processes such as fractures and natural heat convection, this heat resource, in the form of hot water or steam, can be found near or at the surface of the earth.

The City of San Bernardino is located near several earthquake fault zones which include the San Jacinto, Loma Linda, and the San Andreas. The consequence of being close to these faults is that geothermal (meaning "earth" and "heat") energy is readily available. Since the turn of the century residents of San Bernardino have, on a very small scale, enjoyed this natural heat in the form of steam baths and hot springs. Many wells in the valley exhibit temperatures between 120° F and 140° F. One of the "hottest" areas is found in the southwest portion of the city near the old "Urbita Springs" (now Inland Center Mall) and near the National Orange Show Fairgrounds.

San Bernardino is one of just a few communities nation-wide that offers geothermal energy as an alternative source for space heating. Our heating district lies in the southwest portion of the city and currently serves over 35 public and private buildings.

San Bernardino's location near the San Jacinto, Loma Linda, and San Andreas faults provides the perfect geologic conditions for a geothermal (meaning "earth" and "heat") resource potential. The San Bernardino Municipal Water Department taps this source, as it migrates through the groundwater, with two wells producing 120° F to 140° F water.

This water is then sent through a pipeline distribution system that is used by the buildings as a heat source. Our current customers include:

- | | |
|---------------------------------------|------------------------|
| ■ Radisson Hotel | ■ State Building |
| ■ National Orange Show | ■ St. Bernardine Plaza |
| ■ Sun Publishing | ■ City Hall |
| ■ Convention Center | ■ County Law Library |
| ■ Animal Shelter | ■ Library Headquarters |
| ■ Water Reclamation Plant | ■ Blood Bank |
| ■ Automated Health
Systems Laundry | ■ County Jail |



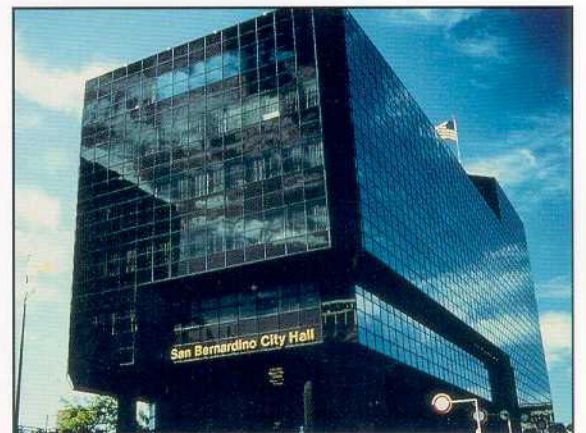
Radisson Hotel



San Bernardino County Complex



Downtown San Bernardino



San Bernardino City Hall



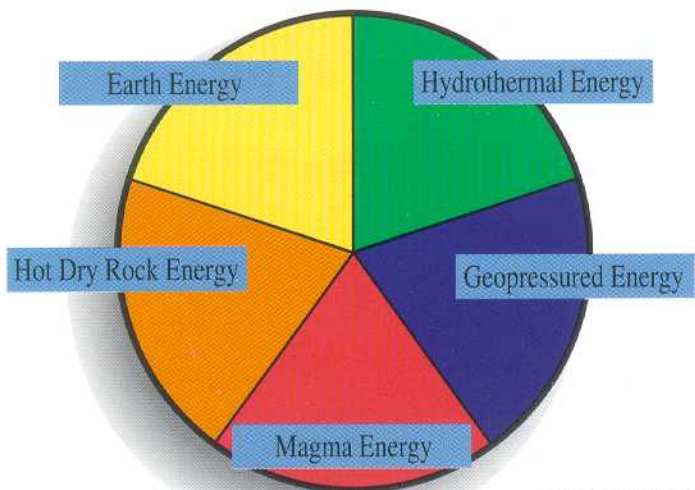
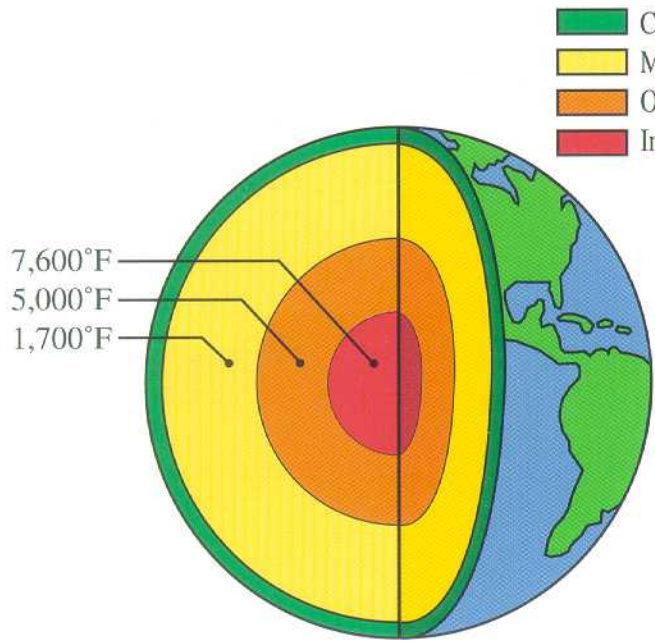
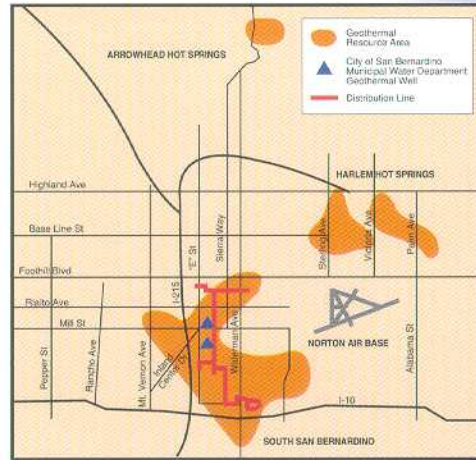
What is Geothermal Energy?

Geothermal energy is renewable heat energy from deep in the earth. Heat is brought to the near-surface by deep circulation of ground water and by intrusion into the earth's crust of molten magma originating from great depth. The various thermal regimes in the earth give rise to a classification of geothermal resource types.

■ *Hydrothermal energy, geo-pressures energy and magma energy* all result from the concentration of earth's heat in discrete regions of the sub-surface by geological processes.

■ *Earth energy* is thermal energy at the normal temperature of the shallow ground without enhancement due to geologic processes. It is found everywhere across the United States and the world and can be tapped by geothermal heat pumps.

■ *Hot dry rock energy* occurs at depths of 5 to 10 miles beneath the surface everywhere. It also occurs at shallower depths in areas of thermal enhancement due to geological processes.



GEOITHERMAL ENERGY TYPES

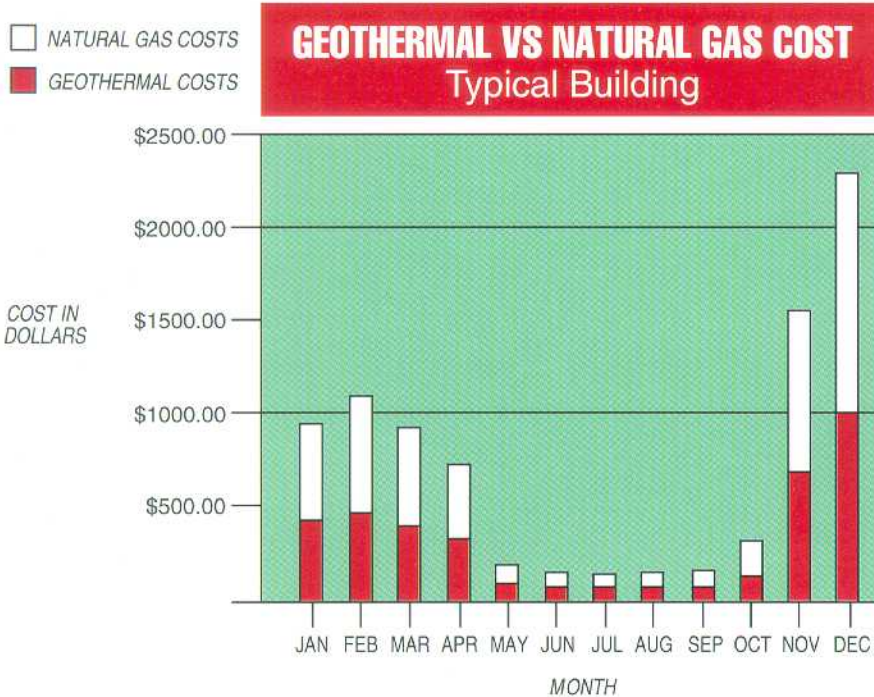
Geothermal History!

In the 1890's, a cut glass bowl in the lobby of one of the prior hotels contained eggs which guests could boil in the springs. One delicacy on the hotel menu was ham cooked tender in the springs overnight.

Guests came from all over the world to drink and bathe in the mineral waters which were supposed to cure or alleviate the symptoms of rheumatism, lung disease and a host of other ailments. Earlier, Indian tribes came to the springs for healing. Laying aside their weapons, they called the place "holy land."

Boiling up from deep (15,000 feet) fractures of the San Andreas Fault Zone, these springs are among the hottest (196 degrees Fahrenheit) in the U. S. The total flow of the 29 springs is in excess of 65,000 gallons a day.

The San Bernardino Municipal Water Department has targeted facilities such as office buildings, industrial laundries, laundrymats, bottling facilities, agriculture, fish farming, industrial manufacturing, etc. as being the most efficient and compatible users for geothermal energy.



The cost of heating your building with geothermal energy is roughly half the cost of natural gas. The dollar amount fluctuates from month to month but the percent of savings is consistent.

For information contact:
 Municipal Water Department
 City of San Bernardino
 P.O. Box 710
 San Bernardino, CA 92402
 (909) 384-5405

