

Geothermal hot in sustainable world

James P. Gray, Newport Beach Daily Pilot, 8-28-10

Much of Iceland sits on active volcanic zones. In fact, that is why the country is known as the land of fire and ice. In those volcanic areas, when ground water flows down into the cracks of the Earth's surface and encounters hot or molten rock, it either turns into hot water that can be harvested to heat buildings, or steam that can be used to generate electricity in a fairly cheap and clean manner. This is so successful that Icelanders consider geothermal energy and fish to be their two largest natural resources.

From what we can gather, California's Paleo-Indians were using the steam and hot water of the geysers in the Mayacamas Mountains in Sonoma County more than 10,000 years ago to keep warm, and geothermal pools have been a part of Icelandic culture from the time of their first settlers.

The first prototype of a geothermal power plant was built in Tuscany, Italy, in 1905, and that plant went into full production in 1911. Tuscany's facility continued to be the only geothermal power plant in the world until New Zealand built another one in 1958. Since that time, geothermal plants were brought on line in Mexico in 1959, the United States in 1960, Japan in 1966, Siberia in 1967, and Iceland in 1969.

Now many other countries have built their own plants as well, including El Salvador, China, Tunisia, Indonesia and Kenya. All of this has resulted in a 20% increase of global geothermal power in just the last five years, and it now accounts for about 5% of the world's total generation of electricity. All of this gives rise to some people saying that geothermal energy is really steaming.

The Earth's core is found about 4,000 miles below the surface, and the temperatures there are estimated to be about 7,200 degrees Fahrenheit. The heat in the core originally came from the molten rock that was formed when Earth was first created, but now the heat is sustained by the decay of radioactive particles.

Fortunately, scientists believe that this generation of extreme heat will continue for billions of years into the future, so for all practical purposes, geothermal is considered to be a never-ending source of energy. That also means that the entire world resource base of geothermal energy is greater than the resource bases of coal, oil, natural gas and uranium combined.

If we were to dig down about 50 to 60 miles into the Earth, we would hit molten rock of about 1,200 to 2,200 degrees Fahrenheit, and about three to four miles down we would find dry rock of about 300 to 400 degrees. So geothermal energy could be used any place on Earth to generate electricity, but the dry rock areas would be quite a bit more expensive.

It is cheaper to generate electricity in volcanic zones where the cracks in the Earth's surface allow groundwater to percolate down to the hot rocks, and then generating plants can harness the resultant steam. Therefore, just like in Iceland, the Western United States, Alaska and Hawaii are ideal places to use geothermal energy to make electricity.

Today in Iceland, a full 90% of the homes are heated by piping in hot water, and steam is used to generate 25% of its electricity. But there are other benefits in addition to costs. For example, geothermal energy is reliable, sustainable, available and because the amount of land usage is relatively small, aesthetically less harmful. In addition, geothermal energy is environmentally friendly because there are virtually no waste emissions except for water vapor, and it there is no need to pipe or truck in any external fuel to run the generators.

And, happily, more recent technology is reducing the costs of geothermal generating plants in the non-volcanic areas as well. All that is needed is to drill two holes down about four miles. Then fresh water is poured into the first hole and onto the molten rock, and then the resultant steam is harnessed to generate electricity when it escapes through the second hole. Simple, clean and relatively inexpensive.

So considering the costs, environmental harms and health hazards caused by our burning of coal, which is still our primary source of power to generate electricity, and the political problems that are being faced by hydroelectric generating plants, many smart investors are starting to look into geothermal energy power for heating buildings and generating electricity. This system is working well in Iceland, and there is no reason why it cannot work increasingly well here.