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## **The Advantages and Disadvantages of Geothermal Energy**

Geothermal energy is the heat from the Earth. It's clean and sustainable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma. Put simply, geothermal energy is the energy stored and flowing as heat beneath the surface of the earth. This heat comes from two fundamental sources. Firstly, heat remaining from the original formation of the earth. This residual heat can be pictured most readily as the extremely hot molten outer core and solid inner core, and mantle of the earth; the heat from these gradually travels up through the thousands of kilometers of rock to the earth's crust, where it flows through the earth's surface. Secondly, there is heat generated locally within the earth's crust, from the natural decay of the radiogenic elements uranium, thorium and an isotope of potassium. These occur in almost all rocks, but in certain granitic bodies, they can be concentrated such that there is a marked elevation in the local surface heat flow. The average 'heat flow' through the earth's crust is about 87 kilowatts per square meter of the surface ( $87\text{mW/m}^2$ ). Compared to a household radiator rated at (say) 2000 W, the average heat flow per square meter is a very small number, but when combined with the large area of the earth's surface, the global heat flow is very large, approximately 44 terawatts (1 terawatt =  $10^{12}$  or a million watts). To produce geothermal-generated electricity, wells, sometimes a mile (1.6 kilometers) deep or more, are drilled into underground reservoirs to tap steam and very hot water that drive turbines linked to electricity generators. The first geothermal generated electricity was produced in Larderello, Italy, in 1904.

Geothermal energy is generated in over 20 countries. The United States is the world's largest producer, and the largest geothermal development in the world is The Geysers north of San Francisco in California. In Iceland, many of the buildings and even swimming pools are heated with geothermal hot water. Iceland has at least 25 active volcanoes and many hot springs and geysers.

Hot dry rock resources occur at depths of 3 to 5 miles everywhere beneath the Earth's surface and at lesser depths in certain areas. Access to these resources involves injecting cold water down one well, circulating it through hot fractured rock, and drawing off the heated water from another well. Currently, there are no commercial applications of this technology. Existing technology also does not yet allow recovery of heat directly from magma, the very deep and most powerful resource of geothermal energy.

In order to better understand the whole geothermal energy concept I also need to point out advantages and disadvantages of this renewable energy source. First I'll start with the geothermal energy advantages. Direct use of geothermal energy is definitely one of geothermal energy advantages. Since ancient times, people have used geothermal power directly for purposes of taking baths, preparing meals, and today this renewable source of energy is primarily used for heating homes or buildings mostly through the use of district heating systems. These heating systems pipe hot water into buildings from the surface of the earth, and are available for immediate use. Geothermal energy is ecologically acceptable renewable energy source because of low greenhouse gas emissions. Ground-based heat pumps can be used almost anywhere. For instance even snowy Canada uses them. Geothermal energy is also renewable energy source, and this means that this energy source won't disappear after some time. Geothermal energy can constantly be at our disposal because the earth continually replenishes our water supply through rain, and the earth's interior is in a constant state of producing heat. Geothermal energy is cheaper. It is more advantageous than the energy obtained on coals.

Like with all other energy source geothermal energy also has some disadvantages. So here are few of them. Geothermal energy isn't widely spread source of energy and

most countries do not make use of geothermal energy, which in many cases results in difficulties during the geothermal system installation in your home or office. There are also some difficulties during the installation process because in order to install geothermal system requirements are usually wide spaces and long pipes. This of course can be quite tricky to do in areas with very dense population.

In conclusion, geothermal energy is one benefit to humanity and should be exploited to its full potential. Geothermal energy is an energy source that can be used indefinitely because of their long existence. The resulting pollution level is very small and by using this type of alternative energy we give to Earth a chance to live longer.

#### Literature :

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