

# How is geothermal energy harvested

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This approach may be quite useful in the construction of the shallow residential geothermal heat-pump systems. Although operation of these systems is about a third of the cost of conventional heating and cooling systems, they are currently not economically viable, since the installation cost of the wells depends significantly on the well depth required for the power needs of the residence. These systems are used year round, with energy deposited into the soil from the residence in the summer months, and then retrieved in the winter months for heating.

Recently, a group of undergraduate students participated at the NSF-funded Research Experiences for Undergraduates program at Worcester Polytechnic Institute to work on this problem, which was brought to us from the New England Geothermal Professionals Association. With our modeling approach, the eigenvalue and the axial behavior gives a characteristic length for the well, over which an energy attenuation of  $1/e$  is achieved. Hence, three of these characteristic lengths are needed to attain over 90% of the possible energy available. We are currently extending these approaches to horizontal piping systems.

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[1] B.S. Tilley and T. Baumann, "On temperature attenuation in staged open-loop wells", *Renewable Energy*, 48 416-423: (2012)

Geothermal energy is a sustainable energy source that derives its heat from the earth's center. It has been used for millennia as a pure and renewable form of energy. We will look at the history of geothermal energy, its relevance in the energy industry, and the goal of this study in this article.

## Geothermal Energy: How It Works

Geothermal energy is a sustainable energy source that derives its heat from the earth's center. This energy is captured using a method that entails digging deep into the earth's crust to reach the heat source.

Drilling a borehole into the earth's crust to reach the hot water and steam trapped under the surface is the technique of harvesting geothermal energy. The hot water and steam are then transported to the surface through a pipe system and utilized to power turbines that create energy.

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The earth's core, which is composed of molten rock and metal, serves as the heat source for geothermal energy. This heat is produced by the decay of radioactive materials within the earth's crust and is continually supplied by sunlight.

Conduction is the method through which heat from the earth's core is transmitted to the surface. As hot water and steam rise to the surface, its heat energy is transferred to turbines, which transform the energy into electricity.

Geothermal energy is a clean, sustainable energy source with several advantages. It is a dependable source of energy that can be utilized to power homes and businesses while emitting no greenhouse gases. Furthermore, geothermal energy is inexpensive and can help to minimize our reliance on fossil fuels. Overall, geothermal energy is a promising renewable energy source with the potential to play an important part in our energy future.

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