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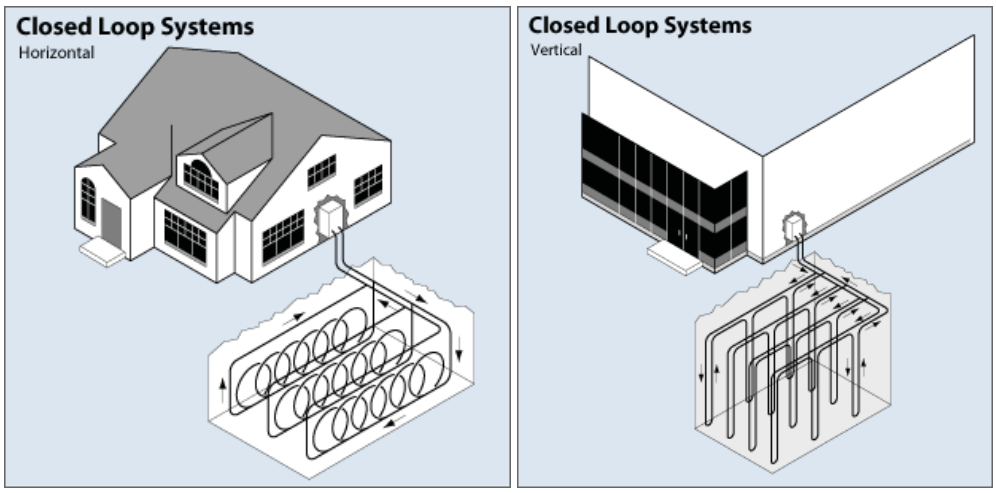
Geothermal Power Provides an Efficient Option for Central Heating

Geothermal power has been harnessed by humans for thousands of years, but today's applications are much more sophisticated than the use of hot springs to heat Roman baths. Technological advances have made geothermal a viable option for central heating in almost any location. Geothermal heat pumps fit right in with today's eco-conscious culture, contributing both to a better environment and to overall energy independence. Builders and developers can tap into consumer demand by incorporating geothermal technology into future projects.

A geothermal heat pump acts much like a conventional central heating, ventilation, and air conditioning (HVAC) system. Instead of using fossil fuels to generate energy, however, the geothermal heat pump relies on the relatively constant temperature below the earth's surface. Heat stored in the earth can be transferred to buildings during the winter and returned underground for cooling in the summer. Part of what makes geothermal heat pumps so efficient is that they use water as the heat exchanger. In contrast to conventional HVAC, which utilizes air-to-air heat extraction, geothermal systems take advantage of the fact that water can store over 3,000 times more heat per cubic foot than air.

Geothermal systems are flexible in both application and design. In addition to space heating, the heat exchanger can be configured to provide potable hot water and in-floor heating. The loop field that feeds the heat pump can also be designed to fit essentially any site. The most popular system involves a "closed loop" of pipe that circulates water (sometimes mixed with antifreeze). The loop can be constructed either horizontally or vertically, depending on site conditions.



Horizontal systems (on left) are most commonly used in residential applications, while vertical systems (on right) are typically more cost-effective for commercial and institutional applications where land area is more limiting. Source: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

Given enough space, a closed-loop horizontal geothermal system can be installed under pavement, in front or back yards, and even underwater. For an average home, a large trench is dug just below the frost line to accommodate several hundred feet of U-shaped or slinky-like coils of polyethylene tubing. The refrigerant within the tubing exchanges heat with the ground through the tubing walls. The pump system, located inside the home, constantly circulates refrigerant through the line for transferring or extracting heat. If space is at a premium and the soil is suitable, a loop system can be installed vertically. A series of wells is drilled, typically at depths ranging from 75 to 500 feet.

Ground source heat pumps have a higher capital cost than conventional HVAC, but the investment is offset by much lower operational costs. The payback period can be less than 10 years. Other benefits of geothermal systems include fewer mechanical components (resulting in longer-lasting equipment) and a variety of tax credits that may be available.

Although ground source heat pumps need electricity to run and may require supplemental heat sources in certain situations, their increased efficiency saves money and reduces environmental impacts compared to conventional systems. Geothermal power is one component of sustainable site design and can help make your next project more marketable to stakeholders, regulators, and potential homeowners - providing just the competitive edge you're looking for in today's market.

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