

GEOHERMAL HEAT PUMP

INTRODUCTION

A geothermal system uses the natural energy from the earth. The temperature is generally constant between 50 and 60 °F at 10' below the ground level. This can be used to provide energy for homes, using a geothermal heat pump.

HEAT PUMPS

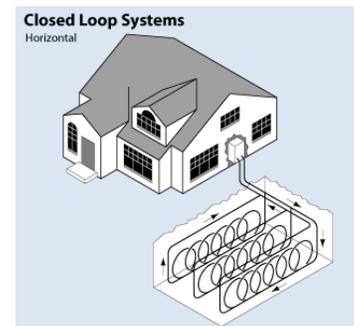
Geothermal heat pumps use the constant temperature of the earth as an exchange medium for heat. The ground temperature is warmer than the air above it during winter and cooler than the air above it in summer. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water.

A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger (a system of pipes buried in shallow ground).

There are several types of geothermal heat pump systems. Some of the most used solutions for residences are:

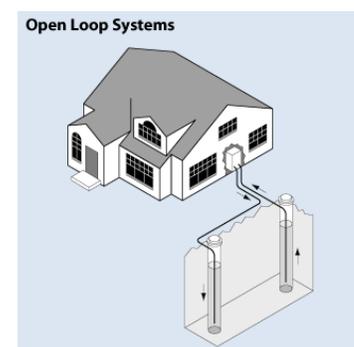
Horizontal Closed-loop system

This type of geothermal heat pump is generally most cost-effective for residential installations, particularly for new construction where sufficient land is available. It requires trenches at least 4 feet deep. The most common layouts use two pipes, one buried at 6 feet and the other at 4 feet, or two pipes placed side-by-side at 5 feet in the ground in a 2-foot-wide trench.



Open-loop system

This type of system uses well or surface body water as the heat exchange fluid that circulates directly through the heat pump system. Once it has circulated through the system, the water returns to the ground through the well, a recharge well, or surface discharge. This option is practical only where there is an adequate supply of relatively clean water and all local codes and regulations regarding groundwater discharge are met.



FINANCING OPTIONS

Listed below are some different programs available for Cambridge residents.

- **Federal Tax Credit** : 30% of cost with no upper limit (installation included)
 - Closed-loop rating system required : COP \geq 3.3 or EER \geq 14.1 (check with your contractor)
 - Open-loop rating system required : COP \geq 3.6 or EER \geq 16.2 (check with your contractor)

- **Renewable Energy Equipment Sales Tax Exemption** :
 - Massachusetts law exempts from the state's sales tax "equipment directly relating to any solar, windpowered; or heat pump system, which is being utilized as a primary or auxiliary power system for the purpose of heating or otherwise supplying the energy needs of an individual's principal residence in the commonwealth."