

# Geothermal heat pumps for heating and cooling



GEOHERMAL HEAT PUMPS MOVE RENEWABLE ENERGY TO PROVIDE A WHOLE OF BUILDING HEATING AND COOLING SOLUTION IN HOMES, BUSINESSES, SCHOOLS, AND OTHER PUBLIC AND PRIVATE FACILITIES.

## Free renewable energy

About half of the solar energy that reaches the Earth's surface is absorbed and stored by the land and the oceans, and heat continually moves to the surface from the Earth's core. Geothermal heat pumps can harness this stored heat in rocks, soils, groundwater and surface water. This renewable energy is accessible today.

## Year round comfort

Heat is extracted from the ground or water source, and delivered to the building. These systems can be reversed in summer to discharge heat into the earth or water source, thus cooling the building.

## Energy efficient technology

A geothermal heat pump uses one unit of electricity to move about three units of heat energy from the earth. Since the ground remains at a relatively constant temperature throughout the year, warmer than the air above it during winter and cooler in the summer, they are more energy efficient than air-sourced heat pumps. Compared to conventional electrical heating devices they can reduce energy consumption by up to 70%. They can also be designed for use with green and/or off-peak electricity to maximise efficiency.

## ADVANTAGES

- Whole-building conditioning solution
- High energy efficiency
- Long life span
- Low electricity use
- Low maintenance
- Year-round comfort
- Quiet operation
- Low environmental impact
- Low annual operating cost
- Reliable energy source

## DISADVANTAGES

- High upfront capital cost
- May require resource consent



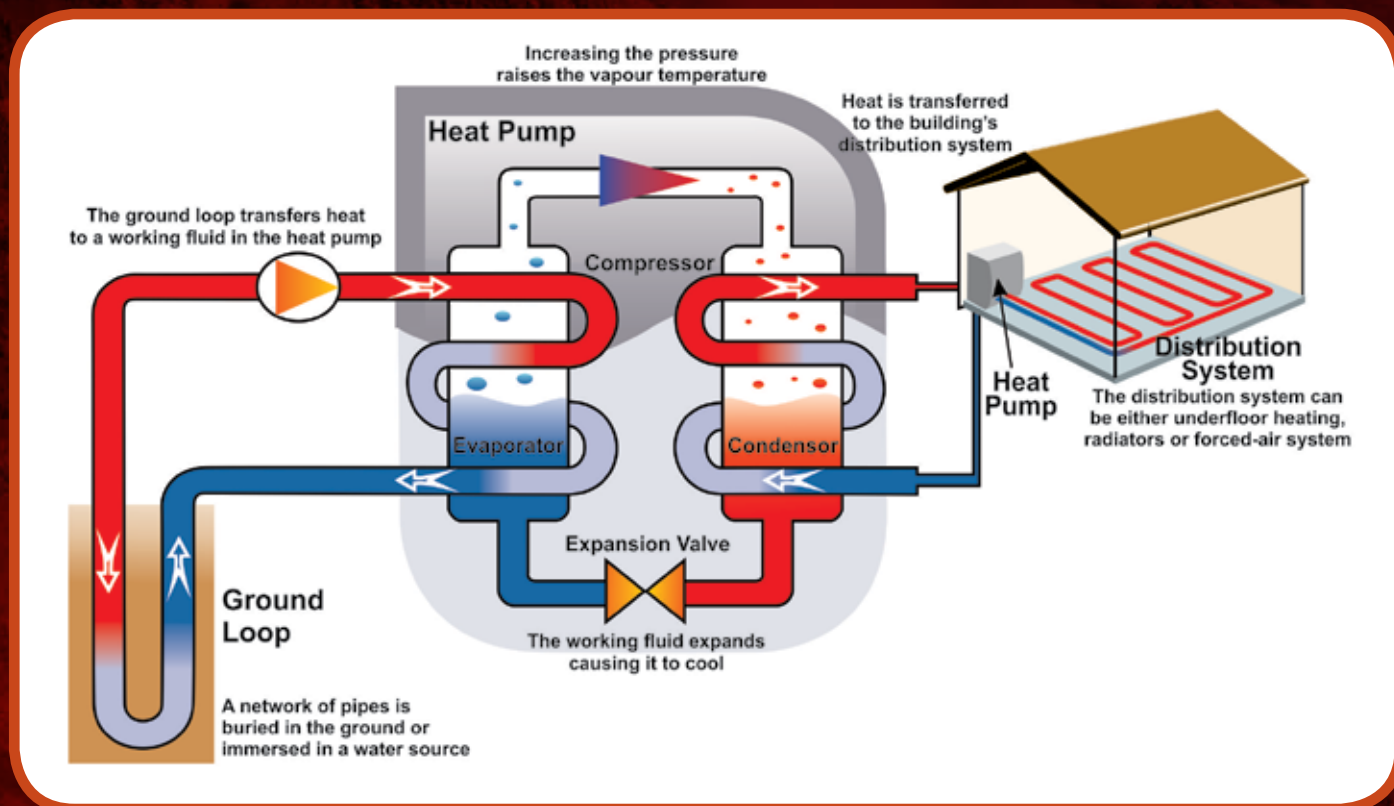
## Installation

Trained and experienced installers will design the right system for your project.

Ground loops can be installed vertically, horizontally or in a series of coils (slinkies), and as an open (extracting fluid and heat) or closed (extracting heat only) system.

Installers will determine your building's heat balance, the site's soil type and temperature, and the heat capacity and thermal conductivity of the ground. They will then calculate the optimum length of piping for your ground loop, and the correct size of heat pump for your building.

## How do geothermal heat pumps work?



New Zealand requires reliable, renewable energy sources into the future. The Government is supporting GNS Science in fostering increased use of renewable resources. By 2025, the Government's Energy Strategy aims for direct use of geothermal energy to account for more than 12 PJ/year.

For more information visit our website:

[www.gns.cri.nz/earthenergy](http://www.gns.cri.nz/earthenergy)

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