Geothermal Heat Pumps For Heating And Cooling

Geothermal 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. Heat also continuously moves to the surface from the Earth’s core. Heat is also contained in water bodies. Geothermal heat pump systems harness heat from the ground and the water.

INSTALLATION

Trained and experienced installers will design and install the right system.

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.

YEAR ROUND COMFORT

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

ENERGY EFFICIENT TECHNOLOGY

A geothermal heat pump uses one unit of electricity to move 3 or more units of heat energy from the heat source. Since the ground and water remain at a relatively constant temperature throughout the year, warmer than the air above it during winter and cooler in the summer the systems more energy efficient than air-sourced heat pumps. Compared to conventional electrical heating devices geothermal heat pumps can reduce energy consumption by up to 70%.

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

Challenges

- High upfront capital cost
- May require resource consent
New Zealand recognises geothermal energy as a key component of the nation’s renewable low carbon energy sources for the future. By 2030, the Geoheat Strategy for Aotearoa NZ aims for 7.5 PJ annual direct primary geothermal energy use in new projects, resulting in an additional 500 jobs.

HOW DO GEOTHERMAL HEAT PUMPS WORK?

Heat Pump

The ground loop transfers heat to a working fluid in the heat pump

Increasing the pressure raises the vapour temperature

Compressor

Evaporator

Condenser

Expansion Valve

The working fluid expands causing it to cool

Heat is transferred to the building’s distribution system

Distribution System

The distribution system can be either underfloor heating, radiators or forced-air system

A network of pipes is buried in the ground or immersed in a water source

To get involved, and find out more, visit:

www.nzgeoheat.nz
www.gns.cri.nz/earthenergy

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