

Ground Source Heating for a Wanaka family home

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Rafe Maclean's newly built Wanaka home utilises a ground source heat pump for its heating and hot water requirements.

Architect and home owner Rafe Maclean designed his 222 square metre home in Wanaka to be warm, dry and energy efficient.

“With a young family, we wanted a home where every room could be kept warm and comfortable right through winter.”

Winter temperatures in Wanaka regularly drop below zero, so this can be an expensive and challenging enterprise.

Rafe, who often provides heating advice to his residential and commercial clients, chose to install two separate ground source heat pump systems in his own home. A 15 kW system that supplies heat to the underfloor heating system, heating the entire house, and a domestic hot water unit designed to provide hot water year round.

The two separate systems operate by circulating a carrier fluid through pipes buried in the ground (captor areas). As the fluid circulates underground it absorbs heat which is transferred to the buildings heating system by the heat pump unit.

The heat energy originates from deep within the earth and from solar energy absorbed at the surface and is available year-round. The captor area for the underfloor heating unit covers approximately 300 m², while the domestic hot water captor field is 35 m². Rafe's property is well suited to this type of installation as the captor field receives all day sun, allowing for a fairly shallow installation (approximately 600 mm). This provides additional heat gains from the sun's energy.

Key Benefits:

- Maintains high heating efficiency even when air temperatures are low
- All rooms in the home are heated evenly
- Low running costs, noise and visual impact

Key Features:

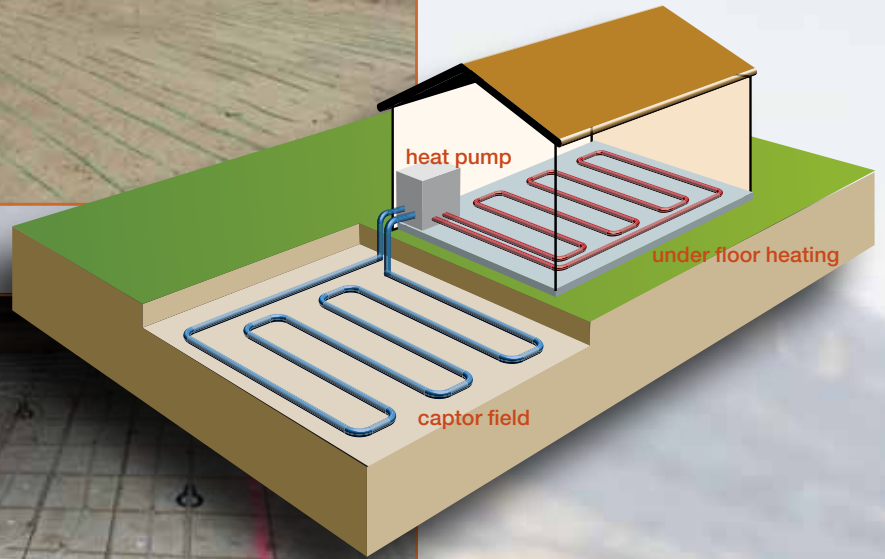
- Geopack 15 (15 kW) system providing heat to underfloor heating system
- DHW60 (Domestic Hot Water Unit) system providing hot water year round
- Heated area: 177 m²
- Horizontal Captor Area: 335 m² & 35 m²



The "captor field" being installed.



The under floor heating system. Heat generated by the captor field is used to heat water that is circulated through these pipes, installed in the concrete slab foundation.



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"The real benefit of ground source heat pumps is that they maintain high energy efficiency throughout the year, where air source heat pumps can suffer efficiency losses at low air temperatures."

The system was installed by Next Energy Ltd, a Christchurch based company specialising in geothermal heating.

"A big plus for us was the installer we worked with. They have a strong reputation and we found them to be trustworthy and responsive to our needs. They have been very good at checking in on us to ensure that everything is working as it should", says Rafe.

As an architect, Rafe is also keenly aware of the design benefits of such a system.

"From a design point of view, it can be challenging trying to appropriately site the large and sometimes noisy outdoor units that come with air source heat pumps. Our ground source heat pump presents no such problems – it is small, unobtrusive and about as noisy as a household fridge"

Rafe and his family are currently enjoying their second winter in their new home in Wanaka.

"Now, no matter where you go in the house, it's comfortable and warm" says Rafe.

Rafe Maclean

Home owner and architect

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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:

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