# Geothermal heating system

**Geothermal heating** is a heating system that uses the great thermal inertia of the subsoil (10 and 16°C, depending on the latitude of the location) to generate heating, cooling and domestic hot water (DHW). Therefore, it is a renewable energy that, unlike the majority of **renewable energies**, does not mainly originate from radiation from the sun, but from the difference in temperature between the subsoil and above-ground.

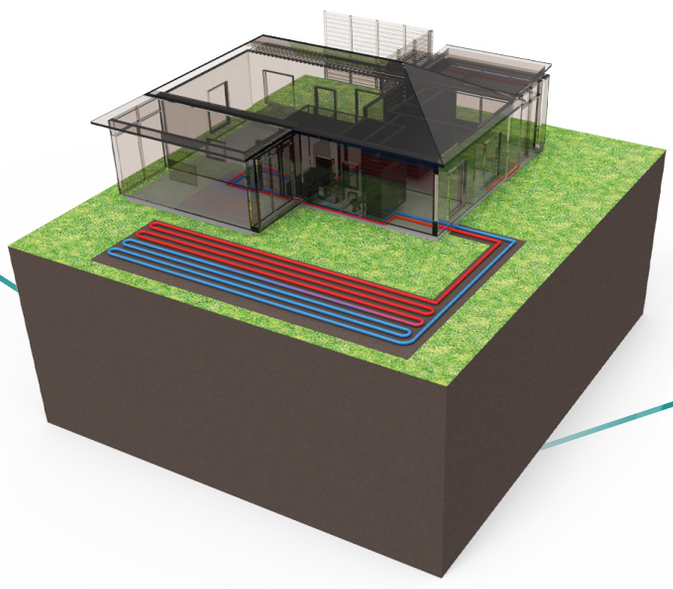
So, we can define it as **energy stored as heat under the earth's surface, an energy we can and should use** either to generate heat or electricity.

## Using it for heating, cooling and domestic hot water in buildings.

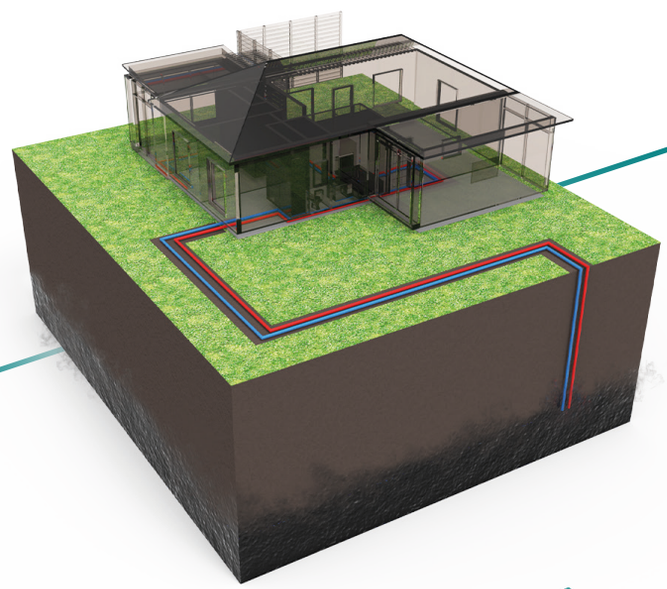
At a depth of 15 to 20 metres, it is considered that **the soil remains at a constant temperature all year round, no matter what the exterior temperature is,** with a slightly higher value than the annual average of the surface. So, we have an endless source of energy throughout all the seasons of the year.

We can capture it using a **system of horizontal pipes** at a shallow depth, when there is a plot of land large enough to lay them out; or capture is done using **vertical pipes** (geothermal boreholes) that penetrate the earth between 20 and 150 m depending on the energy demand and perforation diameters of just 10 or 15 cm.

The second system has the advantage of taking up less space and providing greater stability in the temperatures.



**Horizontal Geothermal**



**Vertical Geothermal**

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## Energy Efficiency of the Geothermal Equipment

To use the geothermal energy generated by the subsoil, we must install a **geothermal heat pump,** the performance of which does not depend on exterior conditions as there is a constant temperature all year round.

Instead of exchanging heat with the atmosphere as with conventional air-to-air pumps or the aerothermal air-to-water pumps, it does it with the soil: In winter, the heat pump absorbs heat from the soil and releases it in the building. In summer, it absorbs heat from the building and releases it into the soil.

The conclusion is that the geothermal water-to-water heat pump is one of the most efficient thermal transfer equipment on the market, obtaining a coefficient of performance of up to 5. This means that, for each electrical kWh consumed, the geothermal equipment can produce 5 thermal kWh in optimal conditions.

## Disadvantages of a Geothermal system

- Installation costs
- Large land needs for the horizontal or vertical pipes

## Advantages of a Geothermal system

- **Low consumption.** Although the data is probably exaggerated, an energy saving of 75% is declared compared to electric heating. In other words, for every 1kWh of electricity consumed, the equivalent of 4kWh is obtained.
- **Less contaminating.** As a result of the lower energy expenditure, $CO_2$ emissions are also reduced. A study affirms that the massive use of this heating system in the residential and services sectors would reduce global emissions of $CO_2$ into the atmosphere by 6%.
- **Durability.** The heat pump is no longer in contact with the outside, so its useful life is lengthened. It is advertised as lasting between 25 to 50 years.
- **Acoustics**. There is no need to install a compressor and ventilators outside, so the system is much quieter.
- **Aesthetics.** For the same reasons. An exterior exchanger is not needed.
- **Sanitary.** The risk of Legionnaire's disease is eliminated as there are no condensation towers.