

Ground source heat pumps

Using warmth from the ground to heat your home

The heat of a UK summer doesn't just disappear into thin air. Some of it is absorbed and stored by the ground beneath our feet, which keeps a constant temperature of around 10 to 14°C all year at about 10 metres below the surface. Ground source heat pumps use this warmth to heat your rooms and even your water.

Ground source heat pumps are powered by electricity but for every unit of electricity used around two to three units of heat is generated.

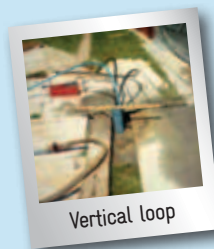
Could a ground source heat pump work for your home?

It's worth making sure your house is suitable for a ground source heat pump by asking the following questions:

- Is there space for a trench or bore hole to be dug just outside your home? Is the ground suitable for digging?
- What kind of heating fuel would your ground source heat pump be replacing? If it's electricity, oil or liquid petroleum gas and you live in an area with no gas supply then the payback will be more favourable.
- Do you want the heat pump to provide all your space heating, or will you use a back-up heating system when it gets really cold? Heat pumps are most effective at providing fairly constant low level heating.
- Is your home still being built, or undergoing major renovations? If so, it will be cheaper to install the ground source heat pump and underfloor heating system at the construction stage rather than when construction is complete.

How does a ground source heat pump work?

A ground loop made up of lengths of pipe is buried in the ground either in a deep borehole or a long trench. The pipe is filled with a mixture of water and antifreeze fluid which is pumped round the ground loop to absorb heat from the ground.



Vertical loop

There are two main types of ground loop:

A **vertical** ground loop is placed in boreholes. A **horizontal** ground loop is placed in a trench, either as a track loop or spiral coil or "slinky".



Horizontal loop

The type and length of ground loop and hole you use will depend on the space available and the ground conditions.

In the same way that your fridge uses refrigerant to extract the heat from inside the fridge keeping your food cool, a ground source heat pump extracts heat from the ground and uses it to heat your home. The pump's evaporator takes in the heat absorbed by the ground loop and a compressor gets it to the right temperature for your heating system. A condenser extracts the heat which can then be used to run your under-floor heating or radiators and in some cases your hot water. Ground source heat pumps can work with radiators but under-floor heating may be more suitable as it works at a lower temperature.

To find out more about installing a ground source heat pump call free on 0800 512 012 or visit energysavingtrust.org.uk



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Vertical loop (borehole) Photo courtesy of GeoScience. Horizontal loop Photo courtesy of Ice Energy Scotland



Choosing your ground source heat pump system

When buying a ground source heat pump system for your home you need to consider both the size of the system and the best way of installing the ground loop. The size of the pump and the loop largely depend on your home's heating needs. A certified installer will sort out the size of the system and the type of ground loop that best suits your needs before starting on the installation. Call the Energy Saving Trust on **0800 512 012** for more information. It is always advisable to find ways to reduce your heating needs as much as possible before you install the heat pump – for example by insulating your loft, cavity walls and floors.

How much will it cost to heat your home with a ground source heat pump?

The exact cost of buying and installing a ground source heat pump system will depend very much on the sort of home you have and where you live in the country. But as a general guideline a typical system will cost from £9,000 to £17,000 to buy and install. This doesn't include the cost of your heat distribution system.

Your running costs will vary depending on a wide range of factors including type of heat distribution system, level of insulation, how the heat pump is controlled and whether it is heating your hot water. For a typical installation you could expect running costs to be around £655 a year for a three bedroom semi-detached home or £860 for a detached home with three bedrooms. This is the total cost for space and water heating.

Signing up to an Economy 7 or Economy 10 tariff for cheap off-peak electricity may help to keep running costs down but your other electricity costs will go up. Ask your installer for guidance on the best option for you.

How much will you save?

A good quality ground source heat pump could **save you over £500** a year on your fuel bills. Savings will depend on the quality of the installation and on which fuel is replaced. Not all systems will result in a direct saving – see the table opposite.

Fuel replaced		Typical	Good
Gas	£ / yr tonnes CO ₂ /yr	-£40 0.3	£70 0.8
Electric	£ / yr tonnes CO ₂ /yr	£420 5	£530 5.5
Oil	£ / yr tonnes CO ₂ /yr	£50 1.1	£160 1.6
Coal	£ / yr tonnes CO ₂ /yr	£260 4.9	£370 5.3

This table gives likely savings for a typical and a good quality ground source heat pump installation in a three bedroom semi-detached house. Savings in Northern Ireland will vary. RHI payments not included.

There are plans to introduce a Renewable Heat Incentive (RHI) scheme in 2011 for heat generating technologies. Owners of eligible heat technologies will be paid an annual sum to reflect the amount of renewable heat they are deemed to have used. For the latest information on RHI visit energysavingtrust.org.uk

How the Energy Saving Trust can help

The Energy Saving Trust is a non-profit organisation providing free, impartial advice to help you stop wasting energy and money and help fight climate change. To find out what you can do to generate your own energy visit energysavingtrust.org.uk or call us free on **0800 512 012**.

Our advisors will:

- Give you personalised advice on what's practical for your home.
- Put you in touch with local certified installers.
- Tell you about grants and offers available.

To start generating your own energy visit

Energy Saving Trust energysavingtrust.org.uk

Microgeneration Certification Scheme (for certified installers and equipment)
microgenerationcertification.org

REAL Assurance Scheme realassurance.org.uk

Ground Source Heat Pump Association gshp.org.uk



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Keep up the good work

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