asiantaeth ynni
SevernWye
energy agency

A guide to

ground source heat pumps



The benefits of ground source heat pumps

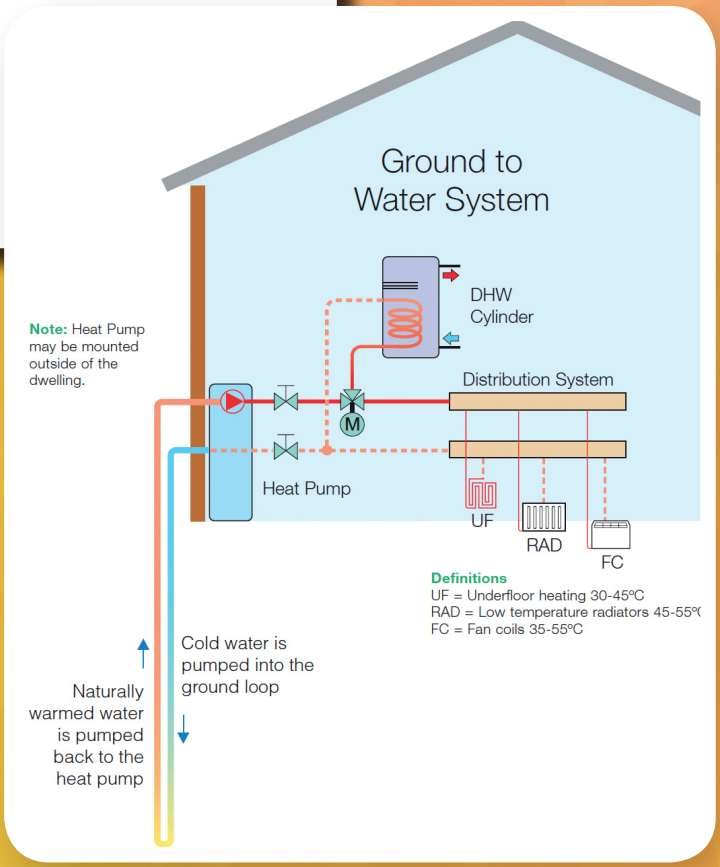
Ground source heat pumps can be used to produce heating and hot water for your home. They have the potential to lower your fuel bills and you may even be able to receive an income as part of the Government's Renewable Heat Incentive (RHI). They can also be an environmentally friendly way of producing heat and if powered by renewable electricity can form a 100% renewable heat source. Once installed, they are invisible from the exterior of the property. With very little maintenance required, they are becoming a popular heat source for homes.

References

*For details of the references used in this document please scan the QR image, visit **www.warmandwell.co.uk/warm-and-well/advice-materials.html** or call us on **0800 500 30 76**

How do ground source heat pumps work?

Ground source heat pumps use pipes which are buried in the garden to extract heat from the ground. This heat can then be used in radiators, underfloor heating systems and warm air convectors. It may also be able to produce hot water for your property.



The system works much like a refrigerator in reverse. A mixture of water and antifreeze is pumped around a loop of pipe, called a ground loop, which is buried beneath your garden. This liquid absorbs heat from the ground. The fluid passes through a compressor which increases the temperature and this higher temperature is then transferred to the heating and, in some cases, hot water systems. The cooled liquid passes back into the ground where it absorbs further energy from the ground in a continuous process as long as heating is required.

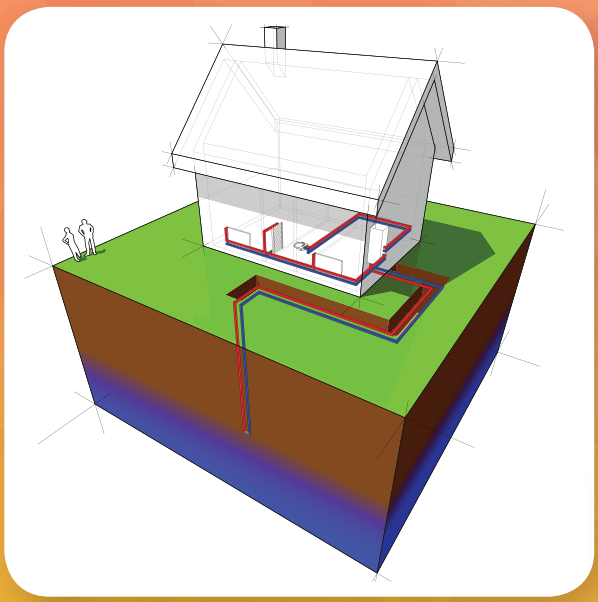
Because the ground stays at a fairly constant temperature under the surface, the heat pump can be used throughout the year.

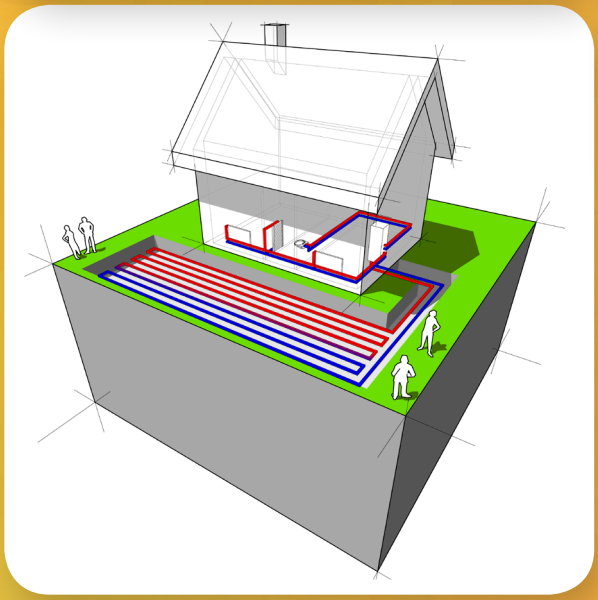
The length of piping required depends on the size of your home and the amount of heat you need. Longer loops can draw more heat from the ground, but need more space to be buried in. Normally the loop is laid flat or coiled in trenches about two metres deep, but if there is not enough space in your garden, a vertical borehole can be drilled instead.

Unlike gas and oil boilers, heat pumps deliver heat at lower temperatures over longer periods. This means that whilst your radiators might not feel as hot to the touch, they will produce a more consistent temperature.



A ground loop absorbs heat from the ground





The pipes may be laid either horizontally or vertically depending on how much space is available

Is a ground source heat pump right for you?

Things to consider

Your garden
You don't need a particularly large garden to install a ground source heat pump but it does need to be accessible to digging machinery and the ground needs to be suitable for digging a trench or borehole.

Insulation
Because ground source heat pumps produce heat at a lower temperature than traditional boilers, it's essential that your home is well insulated and draught-proofed if the system is to be effective.

Current fuel used
The system will pay for itself much more quickly if it's replacing an electric or LPG heating system. Heat pumps may not be the best option for homes using mains gas.

Heating system
Ground source heat pumps perform more effectively with underfloor heating or warm air heating than with radiator-based systems because of the lower water temperatures required (unless special low-temperature radiators are installed).

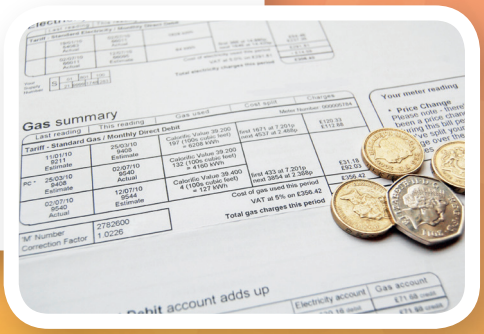
Planning law
Domestic ground source heat pumps are generally allowed as permitted developments, but check with your local authority to ensure you don't need planning permission.

Timing
Ground source heat pumps are ideal for new builds. If they are being installed to existing buildings, combining installation with other building work could help reduce costs.

Costs and savings

Installing a typical domestic-sized system costs between £13,000 and £20,000*[1]. Running costs will vary depending on a number of factors, particularly the size of your home and how well insulated it is.

How much you will save will depend on what type of heating system you currently have and what type of system you install.



A range of other factors will also impact upon your likely savings:

- **Which fuel type you are replacing**
  You will still have to pay fuel bills with a heat pump because they are powered by electricity. The more expensive the fuel you are replacing, the more likely it is that you will make a saving. Replacing conventional electric heating (e.g. storage heaters) is likely to see the greatest saving.
- **The heat distribution system**
  Underfloor heating can be more efficient than radiators because the water doesn't need to be as hot for the system to work effectively.
- **Hot water**
  If the heat pump is providing hot water then this could limit the overall efficiency. You might want to consider solar water heating to provide hot water in the summer, helping to maximise the efficiency of your system.
- **Controlling the system**
  You will need to learn how to control the system to get the most out of it. You will probably need to set the heating to come on for longer, but you might be able to set the thermostat lower and still feel comfortable. Your installer should explain to you how to control the system so you can use it most effectively.

The Renewable Heat Incentive (RHI)

Domestic ground source heat pumps can receive support under the Government's Renewable Heat Incentive (RHI). Through this scheme, as well as possibly benefiting from fuel savings, you will be paid a set amount for each kWh of heat energy produced. This is currently 19.86p per kWh. This rate applies until 31st March 2018, unless a high number of systems are installed – if this is the case the rate may be reduced.

The government brought in an annual heat demand limit of 30,000KWh per household in spring 2017.

In order to be eligible for the RHI, the heat pump must meet a minimum performance standard and come with an EU energy label.

You must also use a Microgeneration Certification Scheme (MCS) approved product and installer. Metering of the heat pumps electrical usage will be required



The table below shows the potential savings and RHI payments for an average three bed semi-detached home with a typical domestic ground source heat pump installation.

Existing systems	Fuel bills savings (£/year)	Renewable Heat Incentive (RHI) payment (£/year) until 31st March (unless a high number of systems are installed)
Gas	-£178 to -£318 (loss not saving)	£1,604
Electric (storage heaters)	£237	
Oil	-£285 to -£382 (loss not saving)	
LPG	£289 to £54	
Coal	£-9	

Maintenance

Heat pump systems typically come with a warranty of two to three years. You can expect them to operate for 20 years or more*[3]. However, they do require regular scheduled maintenance. You should check it annually and have a more detailed check carried out by a professional installer every three to five years.

The installer should leave written details of any maintenance checks you should undertake to ensure everything is working properly.

Finding an installer

Households considering a ground source heat pump should use a Microgeneration Certification Scheme (MCS) installer.

Severn Wye run a website called Link to Energy that allows you to search for suitably qualified local installers.

To get started, simply visit **www.linktoenergy.org.uk** and enter your postcode or town. Alternatively, you can call our advice line on **0800 500 30 76** and one of our advisors can provide further guidance and make referrals to suitable companies on your behalf.

link to energy
connecting with local tradespeople

We would always recommend getting a few quotes when you are considering having work done.

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Severn Wye Energy Agency is a not-for-profit company and charity (charity no. 1083812), established in 1999 under the European Commission SAVE programme to promote sustainable energy and affordable warmth through partnership, awareness-raising, innovation and strategic action.

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Warm and Well has been running for over 10 years and has helped thousands of people tackle their energy bills and make their homes more comfortable. Our friendly advisors provide free advice on reducing energy use and on the grants and incentives available.

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This fact sheet is part of a series that includes information on heating and hot water, home power generation, lighting and electrical appliances and reducing heat loss.
The full series of fact sheets can be found at:
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Large print copies are available on request

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