

Discover renewable energy

Using warmth from the ground to heat your home

Ground source heat pumps

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 round at a depth of 10 metres below the surface. What's more, 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, three to four units of heat are produced.

This kind of system could provide all of your home's heating: significantly cutting your bills – and reducing the amount of harmful carbon dioxide (CO₂) you release into the atmosphere.

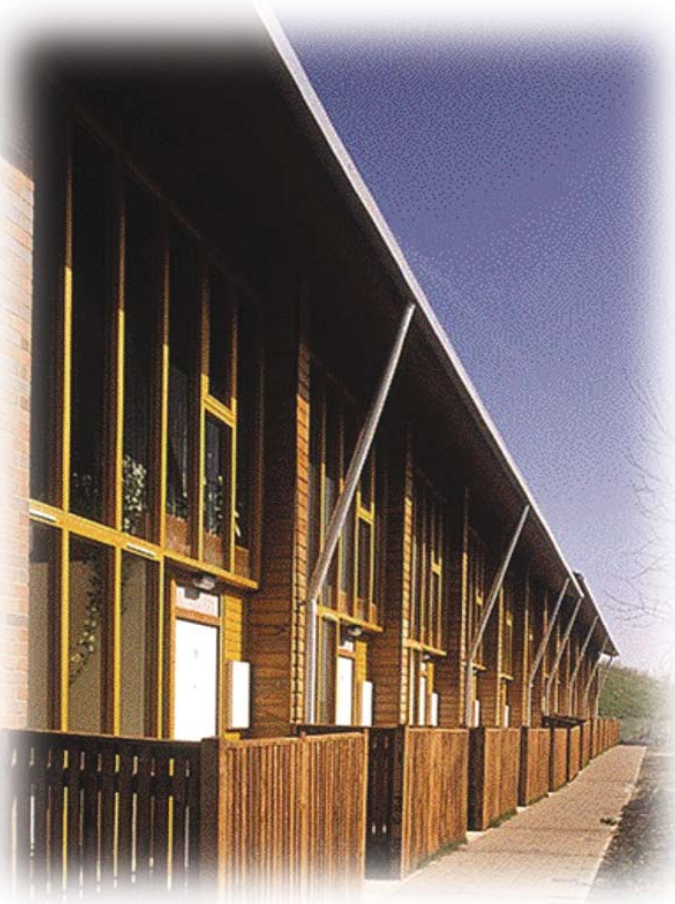


Photo courtesy of Gallions Housing Association

Could ground source heat pumps work for your home?

Before looking in detail at ground source heat pumps, it's worth making sure your house is suitable. And that means asking yourself the following questions:

- Is there space for a trench or bore hole to be dug just outside your home? And 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 need a back-up heating system for additional space or water heating? This will depend on your overall heating needs, compared to the size of system that you install.
- Is your home still being built? 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.

But don't feel you need to work out all this on your own. For guidance on the above, call your nearest Energy Saving Trust advice centre for free on **0800 512 012**.

Renewable energy is worth your effort

Renewable energy technologies like ground source heat pump systems are a way for you to save money over the long term, and to help prevent climate change. They can work alongside – and help you use less – energy generated from fossil fuels such as gas, oil and coal. And unlike fossil fuels they produce little or no carbon dioxide (CO₂): the harmful gas that's one of the biggest causes of climate change.



Photo courtesy of GeoScience



energy saving trust®

How do ground source heat pumps 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 will be filled with a mixture of water and antifreeze fluid, which is pumped round the ground loop to absorb heat from the ground.

There are three main types of ground loop, depending on whether you use a borehole or trench:

A **vertical** ground loop is used with boreholes

A **horizontal** ground loop can be used with a trench.

A **spiral coil** or “**slinky**” ground loop can also be installed in a trench.

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. Only then will a **condenser** transfer heat from the pump to a hot water tank.

In turn, the tank will feed your home’s **heat distribution system** – under-floor heating or radiators – to heat your home and, in some cases, your hot water. Ground source heat pumps can work with radiators, but under-floor heating is better as it works at a lower temperature.

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. In fact, before buying a ground source heat pump system, you must find ways to reduce those needs: insulating your walls, floors and loft, for example.

Always ask an expert to help

Planning a ground source heat pump system for your home needs professional help from the word go. An accredited 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.

To get the specialist support that you need – and any other advice you’re after – speak to your nearest Energy Saving Trust advice centre who can put you in touch with accredited installers. Call freephone 0800 512 012 and we’ll be happy to help.

How do ground source heat pumps affect the environment?

By using electricity to power the compressor in the heat pump, a ground source heat pump system will still produce a certain amount of CO₂ – although a lot less than a conventional gas or oil boiler. To reduce this amount further, you could use another renewable form of energy like solar electricity or sign up to a green electricity tariff to power the system.

Also, ground source heat pumps use toxic or flammable refrigerants to regulate temperature. Although these can potentially pose a threat to the environment, new, less harmful blends are being developed.

Pump control



Typical drilling rig



Internal heat pump



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 that produces 6kW of heat at any one time will cost from £6,500 to £11,500 to buy and install. This doesn't include the cost of your heat distribution system.

Your **running costs** will vary according to the type of heat distribution system you have in your home, which affects the efficiency of your ground source heat pump. As we've already mentioned, under-floor heating works at a lower temperature than radiators and will help your system to be more efficient. It should be cheaper to run than gas, oil, LPG or electric storage heaters.

And if you're using national grid electricity to power your compressor and pump, signing up to an **Economy 7** or **Economy 10** tariff – for cheap off-peak electricity – will also help to keep running costs down.

How much will you save?

When it comes to fuel bills, a typical ground source heat pump system that's able to produce 6kW of power could save your household **£650 - £750 a year**.

And cut harmful emissions by around five tonnes a year.

Other kinds of heat pumps

Ground source heat pumps aren't the only way we can use natural stores of warmth to heat our homes. Air source and water source heat pumps are also available, working in a similar way but using different renewable resources from the world around us.

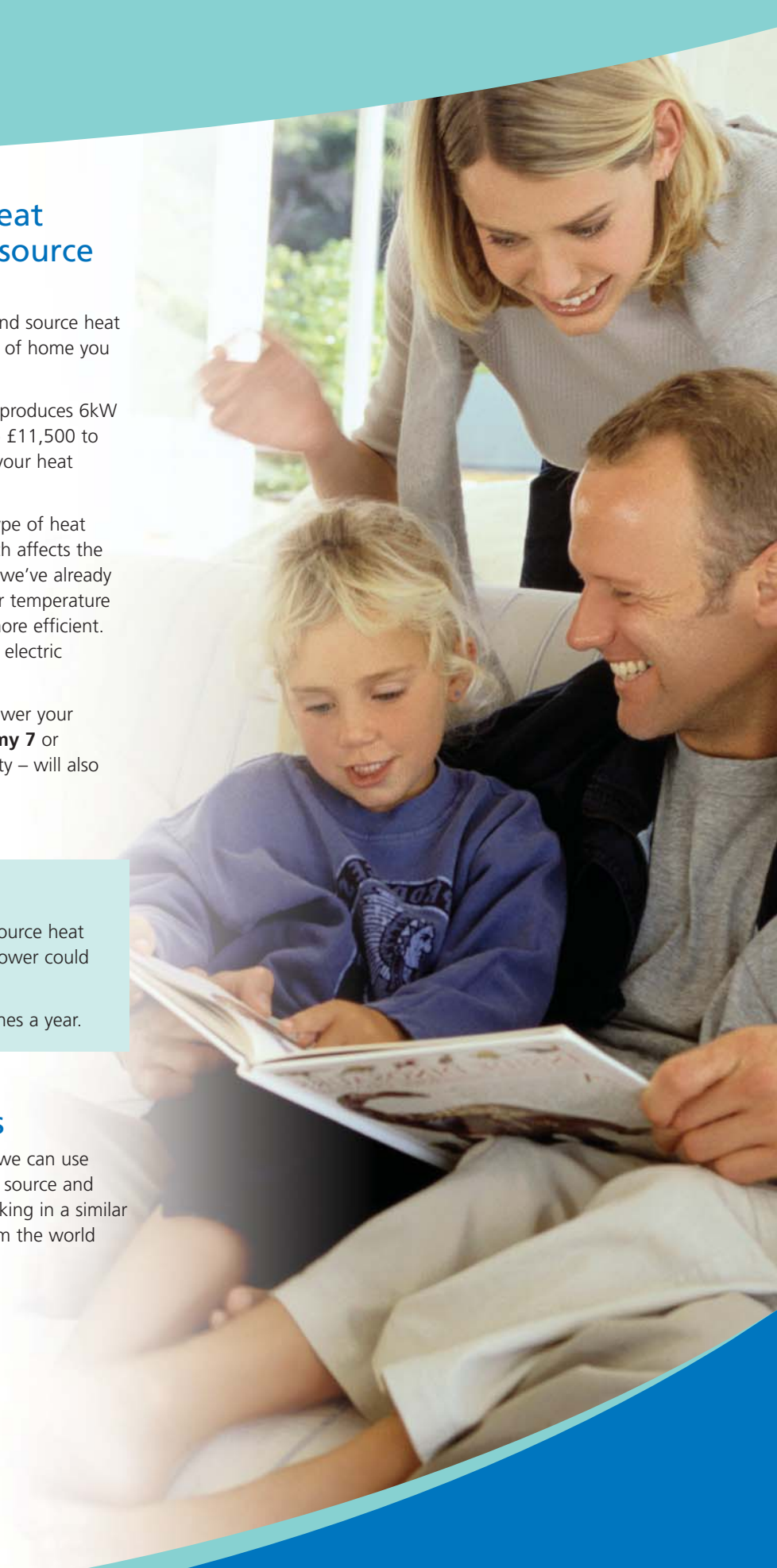


Photo courtesy of Ice Energy Scotland



How the Energy Saving Trust can help

The Energy Saving Trust is one of the UK's leading organisations set up to address the damaging effects of climate change. We aim to cut emissions of carbon dioxide (CO₂) – the main greenhouse gas causing climate change – by promoting the sustainable and efficient use of energy. And we want to make it easy for everyone to take action to save energy and help prevent climate change – by offering free, impartial advice.

So, if you're interested in using renewable energy in your home, call your nearest Energy Saving Trust advice centre on **freephone 0800 512 012**.

Our advisors will give you one-to-one advice on what's practical for your home, explain any technical or planning issues and put you in touch with a local, accredited installer. We can even tell you about grants and offers available to help with your planned home energy improvements.

And remember: there are lots of other simple ways to save energy in your everyday life, many of which won't cost you a penny. Again, we're here to help on **0800 512 012**, with more free tips online at **www.energysavingtrust.org.uk**.

Find out even more online

Energy Saving Trust – **www.energysavingtrust.org.uk**

Renewable Energy Association – **www.r-e-a.net**

REAL Assurance Scheme – **www.realassurance.org.uk/**

The UK Heat Pump Network – **www.heatpumpnet.org.uk**

The Heat Pump Association (part of the Federation of Environmental Trade Associations) – **www.feta.co.uk**

The IEA Heat Pump Centre (including case studies of ground source heat pump installations) – **www.heatpumpcentre.org**



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