

## Ground Source Heat Pumps (GSHP)

Ground source heat pumps (GSHPs) use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in the home.

Heat from the ground is absorbed at low temperatures into a fluid inside a loop of pipe (a ground loop) buried underground. Heat is extracted from the water in a similar way to how a refrigerator works. The fluid passes through a compressor that raises it to a higher temperature, which can then heat water for the heating and hot water circuits of the house. The cooled ground-loop fluid passes back into the ground where it absorbs further heat from the ground in a continuous process as long as heating is required.

Normally the loop is laid flat or coiled in trenches about two metres deep, but if there is not enough space a vertical loop can be installed down into the ground via a borehole to a depth of up to 100 metres for a typical domestic home. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, the air, or water is constantly renewed naturally, largely by the movement of ground water.

The ground, at 2m deep and lower, stays at a fairly constant 8°C temperature, so the heat pump can be used throughout the year.

Unlike gas and oil boilers, heat pumps deliver heat at lower temperatures over much longer periods. During the winter they may need to be on constantly to heat your home efficiently. Radiators won't feel as hot to the touch as they might do when using a gas or oil boiler. Those installing GSHP need to consider whether a back-up system will also be required.

GSHPs differ in size and complexity, so cost and payback are difficult to specify. Payback is also influenced by: efficiency of the system; the type of system being replaced; energy efficiency of the home; and whether the GSHP is also being used for heating domestic hot water as well as space heating.

The efficiency of a GSHP system is measured by the Coefficient of Performance (CoP). This is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Typically, for every unit of electricity used to pump the heat, 3 to 4 units of heat are produced.

In addition to planning requirements (domestic GSHP are usually a permitted development), consideration needs to be given to the area and type of land and access for machinery.

The Energy Saving Trust has completed field trials of ground and air source heat pumps, in order to get a better idea of how they perform and the savings they achieve

in real life environments. Read the final report 'Getting warmer: a field trial of heat pumps' on their website at [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

Some GSHPs (ground-to-water) are eligible for the domestic Renewable Heat Incentive (RHI) – see Factsheet 4.e

