

UNDERSTANDING HEAT PUMPS

This advice guide is part of a series of guides produced by the Association of Plumbing & Heating Contractors Ltd. to provide essential basic information that a homeowner may consider having carried out in their home. This guide is about understanding heat pumps and their use within the home.

Heat pumps are up to three times more efficient than traditional boilers, helping to cut pollution and carbon emissions in households. As a result they are becoming more and more popular. With the introduction of the RHI (Renewable Heat Incentive) customers are looking even closer at these appliances as a viable choice.

What are heat pumps?

While heat pumps may sound complicated the principles are quite simple, in as much as they use refrigeration gases to extract heat energy from cool sources such as the ground or the outside air, and even water. When it collects the heat energy it transfers it to a heating system.

A good example of a heat pump working is a domestic refrigerator or freezer. The main compartment is cold or even freezing, this is because a refrigerant gas extracts the heat energy from the food compartment, keeping it cold, and then releases the heat energy into the atmosphere via the black pipework and grills at the back of the appliance. If you have a look at the back of a fridge you will find it will be warm. Now imagine this is your home, we extract the heat energy from the ground and use it in your heating system. Heat pumps work like a fridge in reverse, using electricity to transfer heat - even in freezing conditions - making them a clean, low-carbon heating solution.

The main types of domestic heat pumps in the UK are 'ground source heat pumps' and 'air source heat pumps', although 'water source heat pumps' are now entering the market.

Ground source heat pumps



Ground source heat pumps tap into the heat energy supplied by the sun. Imagine the earth as a huge solar collector, absorbing heat energy from the sun all year around. Of course the surface of the earth is also susceptible to heat losses through weather, for example rainfall. However, the deeper we dig the more stable the temperature becomes at around 8-10°C.

The heat collector element of the heat pump can be in one of three forms, horizontal, vertical or a slinky. This must be accurately sized for the heat pump system being installed.

Horizontal collectors are used when there is a lot of land, generally the pipe is laid out in long straight runs. Vertical collectors are now preferred because they are more efficient, run inside a bore hole around 75 to 100m deep. Slinky collectors are used instead of horizontal collectors when the space is limited, taking up a third less space. The size of loop or collector must be accurately sized, this will be done as part of the overall design. Ground source systems are highly efficient but need outdoor space for loops or boreholes. They're ideal for larger plots

Air source heat pumps



Air source heat pumps work on a similar principle to ground source heat pumps, however, this time the heat pump uses the outside air, to absorb heat and transfer it to the building. Air source heat pumps are the most common choice in UK homes. They're easier to install, require less space, and work efficiently even in cold weather.

Are heat pumps suitable?

There are considerable advantages to installing heat pumps and in some cases they will save you a considerable amount of money and reduce the overall emissions produced and released into the atmosphere by a boiler.

However, there are still some considerations to be thought through before looking further.

The first has to be the availability of outside room or space. A ground source heat pump using pipework laid in the ground will require a considerable amount of space to be effective; consider whether drilling a bore hole is possible and it may be that you can only decide this after a survey has been conducted. An air source heat pump will need to be mounted on a wall or be free standing on the ground with sufficient clean air around it.

The next consideration concerns your home. **You must make sure that your property is well insulated before fitting any renewable technology for heating your home.** This will include cavity wall insulation and double or triple glazing windows and doors, along with draft excluders.

Finally, the heating system you want to use and the fuel currently available will have a bearing on the effectiveness and suitability of a heat pump. For example, heat pumps work extremely well and save more money when replacing a solid fuel boiler in a property with underfloor heating. Therefore it may not actually be advantageous to install one if you already have a highly efficient mains gas boiler with a traditional wet central heating system. A qualified installer will be able to advise you after conducting a survey.

Most UK homes are suitable for heat pumps, and 90% already have enough insulation. Households need space outside for the unit and a hot water cylinder indoors. Improving insulation further reduces running costs but generally isn't essential.

Households may be eligible for a £7,500 Boiler Upgrade Scheme grant in England and Wales towards the cost of a heat pump installation. Installations are VAT-free, and some suppliers offer 0% finance options. To find out more visit gov.uk/heatpump.

In summary

Heat pumps are a very efficient way to heat a home, they could save you money on your heating and hot water running costs. But, heat pumps should not simply be considered a straight alternative to a boiler. Careful design and survey work should be undertaken to decide if a heat pump is the right piece of equipment to install for your home.

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