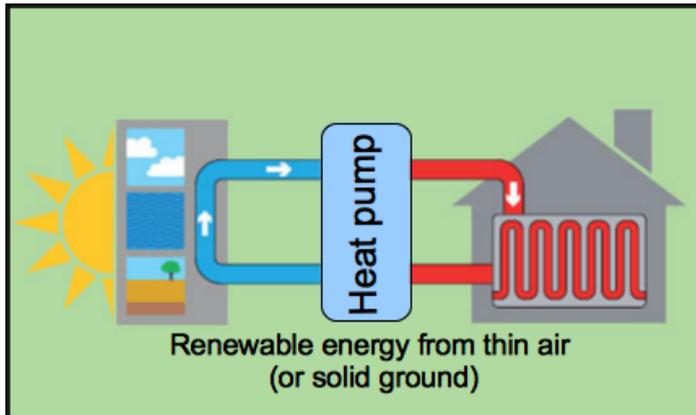


Heat Pumps

Heat pumps are great because:

- You get more heat from the system than the electricity you put in.
- Although at the moment the carbon emissions work out similar to gas heating; this will improve as we get more of our electricity from renewable sources



What is a heat pump?

A heat pump brings heat into the house from outside, either from the air (ASHP) or the ground (GSHP) or sometimes from water. The heat brought in will be replaced by more heat from the sun (or by geothermal energy in the case of deep GSHP). Typically you get 2.5-4 times more heat energy into your house than the energy you use to run the pump,

However, most heat pumps aren't very good at generating high temperatures. You can expect only up to 45-50°C with reasonable efficiency unless you get a high temperature heat pump and they do cost more. A gas central heating system will usually run the radiators at around 75°C.

To use this lower temperature heat effectively, you can either use underfloor heating, or warm air heating, or you can use over-sized radiators or forced convection radiators.

Can the heat pump give me hot water too?

45°C is hot enough for a bath but you need to heat your hot water cylinder up to at least 60°C weekly to kill bacteria. If your heat pump can't do this you will need a backup immersion heater.

Will it save energy, reduce carbon emissions, save money?

It will almost certainly save energy overall and at least break even on carbon emissions. With the current UK power station mix most heat pump systems will have lower carbon emissions than an oil fuelled heating system and be similar to a gas system. Hopefully, this will improve as our electricity grid system uses more renewable electricity.

Similarly, whether or not you will reduce your heating bills depends both on the heat pump efficiency and the relative price of your alternative fuel, which you can also expect to change over time. Right now, heat pumps are usually cheaper electric storage heaters but not necessarily better than oil or mains gas. You can get help to pay for the system through the Renewable Heat Incentive.

Renewable Heat Incentive (RHI)?

The Renewable Heat Incentive (RHI) is a government scheme to encourage people to invest in renewable heat technologies such as solar panels for hot water, heat pumps and biomass boilers. The RHI will give you a guaranteed income for 7 years, designed to help pay back the cost of the installation. It is based on your assessed heating needs. The OFGEM website has very good information on the RHI.

What is the COP rating? What is SPF?

COP means coefficient of performance and it indicates how much heat you get out of your pump for every unit of electricity you put in. The COP varies with the temperature – both input and output temperature. SPF means seasonal performance factor. This like an average COP over the year. It should be at least 2.5 to qualify for the RHI.

What efficiency can I expect?

The Energy Savings Trust (EST) conducted a field

For more information go to <http://www.transitioncambridge.org/energy> and look for the [heat pumps FAQ](#).

trial of 83 systems of various types in 2009/2010 (go to www.energysavingtrust.org.uk and search for 'heat pump field trial'). They found excellently performing systems with efficiency > 3.0 of both types but the average was around 2.3 for GSHPs and 2.1 for ASHPs. Nearly half the ASHPs and two thirds of the GSHP systems had efficiencies > 2.2, which means they were as good or better on carbon emissions than a gas condensing boiler with 90% efficiency.

Of the ones that did perform poorly, sometimes this was because the heat pump was poorly configured. Often the householders, and sometimes even the installers, did not understand the controls very well.

The most important factor in heat pump performance is the target temperature but the outside temperature also matters, especially for ASHPs. However even ASHP should work, even down to -15°C, which we don't often get in Cambridge!

GSHPs are less affected by the weather because the ground temperature does not vary so much, especially for the borehole systems which can be 80m deep.

Can I use it for cooling too?

Some heat pumps can be run in reverse in summer for cooling, so yes. But you will need to make sure you buy a unit which has this capability and it may not be as efficient as a one-way system.

Is my house suitable?

For a heat pump to work well the house needs to be draught proofed and insulated first. Also, heat pumps aren't good at generating heat in fits and starts; they like to work steadily most the time. Ideally the house should have a high thermal mass so it doesn't cool down rapidly when the outside temperature drops.

The heating system is also critical. Normal gas central heating systems run water through the radiators at about 75°C. The hotter they are the faster they warm the room. However, unless you have a high temperature heat pump it can only go up to 45C-50°C tops and ordinary radiators will not be very efficient at this temperature. You can make them more effective by making them bigger (more surface) or by incorporating a fan to force the air past as in ecovector radiators. Alternatively, you can use an underfloor heating system or warm air ducts which are more effective at lower temperatures.

Finally, you need to have a heat source for your heat pump. For a GSHP you need either suitable ground (and access) to bore deep holes, totalling at least

100m (but only 100-150mm wide), or space to lay the same length but in shallow trenches, 1-2m deep. The holes or trenches must be at least 5m from the footings of any building.

For an ASHP the external unit must be no more than 15m from the house, well ventilated and exposed to the elements and with around 4m² space around it. An external wall or flat roof is good.

What does an ASHP look/sound like?

It looks and sounds pretty much like an air conditioning unit.

What does a GSHP look/sound like?

When it is in the ground, the heat pump is invisible and silent.

How much maintenance will be needed?

Heat pump systems need very little maintenance: usually just an annual check to ensure all is OK.

How long will it last?

GSHPs should have last at least 25 years, ASHPs a little less. You can expect a 10 year warranty.

How much does it cost?

A GSHP will cost around £7,000 - £13,000 to buy and install. An ASHP should be a good bit less. Changes to your radiator system will be extra.

Does it need planning permission?

GSHPs do not need planning permission unless your home is a listed building or in a conservation area. ASHPs are often a permitted development depending on size and location.

What should I look out for from suppliers?

You must use a supplier certified with the MCS certification scheme in order to qualify for the RHI. You should also compare quotes, ask for reference sites, and check out the details of the warranty.

The heat pump supplier may or may not provide the heating system as well. If they do not, you need to make sure that the two systems are designed to work together. The target temperature and the overall heating demand are critical. The calculations must be based on your particular house.