

Quick Guide: Air source heat pumps

An air source heat pump is a low-carbon way of heating a home which absorbs heat from a cooler place and uses it to increase the temperature inside the home.

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What is an air source heat pump?

Most home heating systems either burn fuel or convert electricity into heat.

Heat pumps are different because they don't generate heat; instead, they move existing heat energy from outside into the home.

This makes them more efficient as they deliver more heat energy than the electrical energy they consume.

An air source heat pump is a low-carbon way of heating a home. They absorb heat from a cooler place and use it to increase the temperature inside the home.

Air source heat pumps look similar to air-conditioning units; their size depends on how much heat they'll need to generate for the home - the more heat, the bigger the heat pump.

How does an air source heat pump work?

It can be summed up in three stages:

- **Stage one** – Outside air is blown over a network of tubes filled with refrigerant. This warms up the refrigerant, and it turns from a liquid into a gas.
- **Stage two** – This gas passes through a compressor, which increases the pressure. Compression also adds more heat – similar to how the air hose warms up when you top up the air pressure in your tyres.
- **Stage three** – The compressed, hot gasses pass into a heat exchanger, surrounded by cool air or water. The refrigerant condenses back into a cool liquid and starts the cycle all over again!

Air source heat pump installation

Air source heat pumps are usually positioned outdoors at the side or back of a property. They need plenty of space around them for air to circulate.

Inside, you'll usually have a unit containing pumps and hot water; it's usually smaller than a standard boiler.

They are less disruptive to install than ground source heat pumps, as they do not require any digging in your garden.

Using an air source heat pump at home

Air source heat pumps can be used to heat up a home and its water. Here are some things to consider:

Using an air source heat pump for heating

Heat pumps work best when there's less of a difference between the inside and outside temperatures. In much the same way that your fridge has to work harder in hot weather.

This makes them a good match for underfloor heating systems. Floors cover a much bigger area than radiators, so they don't need to get as hot to provide the same amount of heat.

Air source heat pumps also have a lower output than a gas or oil-fired boiler. This means they can't deliver heat as quickly. Instead, they're best used to heat your home up slowly over a longer period.

Air source heat pump and radiators

If there are radiators in the home and it's switching from a gas-fired heating system to an air source heat pump, it's likely that bigger radiators will be required to keep the house 'toasty' warm.

Using an air source heat pump for hot water

Heat pumps can also be a great source of hot water – but the water will be cooler than from a boiler. Practically this means that, when running a bath, it's likely that more hot water and less from the cold tap will be needed. So, a bigger hot water tank to cover those needs will also be required too.

Air source heat pumps – advantages and disadvantages

Air source heat pump advantages

- Highly efficient source of heat and hot water
- Zero carbon if used with a renewable tariff
- Can closely match the running costs of other home heating systems
- Installation cost offset by Renewable Heat Incentive payments
- Low-maintenance with a long service life
- Some systems can provide cooling in the summer

Air source heat pump disadvantages

- Lower output temperature than conventional boilers – you may need to update your insulation and invest in bigger radiators too
- May work best in older homes as part of a hybrid system with a conventional boiler
- Need outdoor space, and can be noisy
- Expensive to install and works best with a water tank
- Don't work as efficiently in extremely cold weather

Different types of air source heat pumps

There are two main types of air source heat pumps: 'Air-to-air' and 'Air-to-water'.

Most air source heat pump installations in the UK are what's known as 'air-to-water' types. There is also a 'hybrid' air source heat pump which can often be combined with an existing central heating system and boiler.

'Air-to-water' air source heat pumps

Most air source heat pump installations in the UK are what's known as 'air-to-water' types. In these systems, the heat is transferred into a conventional 'wet' heating system. And this set-up gives you hot water and central heating.

'Air-to-air' air source heat pumps

A minority of UK air source heat pumps are 'air to air'. And, as their name suggests, these transfer the heat into the air, which is distributed around the home. They don't provide hot water though.

Hybrid air source heat pump

There is also a hybrid air source heat pump which can often be combined with an existing central heating system and boiler. In these hybrid air source heat pump systems, the heat pump provides a 'base load' for the day-to-day heating and hot water. With the boiler only firing up to provide hotter water or a quick heat boost during a particularly cold snap.

Are there any maintenance requirements for air source heat pumps?

Air source heat pumps:

- Use well-established technology and may have a working life of 20 years or more.
- Should be professionally serviced – every two or three years (or annually, if there is a compressor inside the home) – to make sure that it's still working at its best.

What does air pump heat source servicing entail?

During a heat pump service, you should expect:

- A check of the expansion vessel pressure and any necessary top-ups
- A check and clean of the heat pump circuit filter
- A check of the valves for movement freedom
- A check to ensure that the water stops and both valves reset properly
- Opening the primary system safety valve and checking that it discharges securely
- Checking whether it's necessary to top up the concentration of the system refrigerant
- Checking the primary system pressure doesn't rise above a recommended value
- Releasing any air from the primary heating system
- Checking and correcting the fuse fitted on the electrical supply
- A check for the correct temperature setting and operation of thermostats
- Checking the operation of motorised valves
- Checking yield performance

There are some things to be checked outside of the regular maintenance, including:

- That there's a plentiful supply of air. This means regularly checking for leaves or rubbish caught in the fan's grilles. And pruning back any plants growing too close to the unit or its pipes
- Check that grilles are not blocked by ice in very cold weather and clear snow from the air source heat pump

REMEMBER: All services should also come with a service certificate.

Are air source heat pumps efficient?

- An air source heat pump system can help to lower the carbon footprint as it uses a renewable, natural source of heat – air.
- How much CO2 saved depends on the fuel being replaced.
- A heat pump needs a power source, usually electricity, to power the heat pump, so there will still be some resulting CO2 emissions.
- To get the best from a heat pump, it's key to know how to use it most effectively.

Information provided by: Which? <https://www.which.co.uk/reviews/ground-and-air-source-heat-pumps/article/air-source-heat-pumps-explained-a15MC4f773Zq>

EDF Energy: <https://www.edfenergy.com/heating/advice/air-source-heat-pump-guide>

