

Air Source Heat Pump Installer Guide

What you need to know



BAXI

Why air source heat pumps

Our world is changing. We know we need to act to reduce emissions globally to limit further global warming and the devastating impact this is having on our world. The UK and Irish government's have set legally binding targets to achieve net zero greenhouse gas emissions by 2050. And, 15 years before that, in 2035, Britain has committed to cut emissions by 78% compared to 1990 levels.* With electricity well on the way to being decarbonised, heating is the next important challenge of our generation.

Heating is responsible for one-third of the UK's total emissions. Today, 85% of UK homes are heated by natural gas.** To meet our 2050 net zero targets we'll need to decarbonise virtually all the heat used by homes, as well as industry. Air source heat pumps will help with the heating challenge, along with other solutions. The government target is that by 2028 600,000 air source heat pumps will be installed each year.*** Baxi believes in a multi-strand pathway to the net zero challenge including air source heat pumps, heat networks and conversion of the gas grid to hydrogen where appropriate.

In this guide you'll find out more about what an air source heat pump is, how they work and the considerations for installing them. It will help you to stay informed and help you inform your customers.

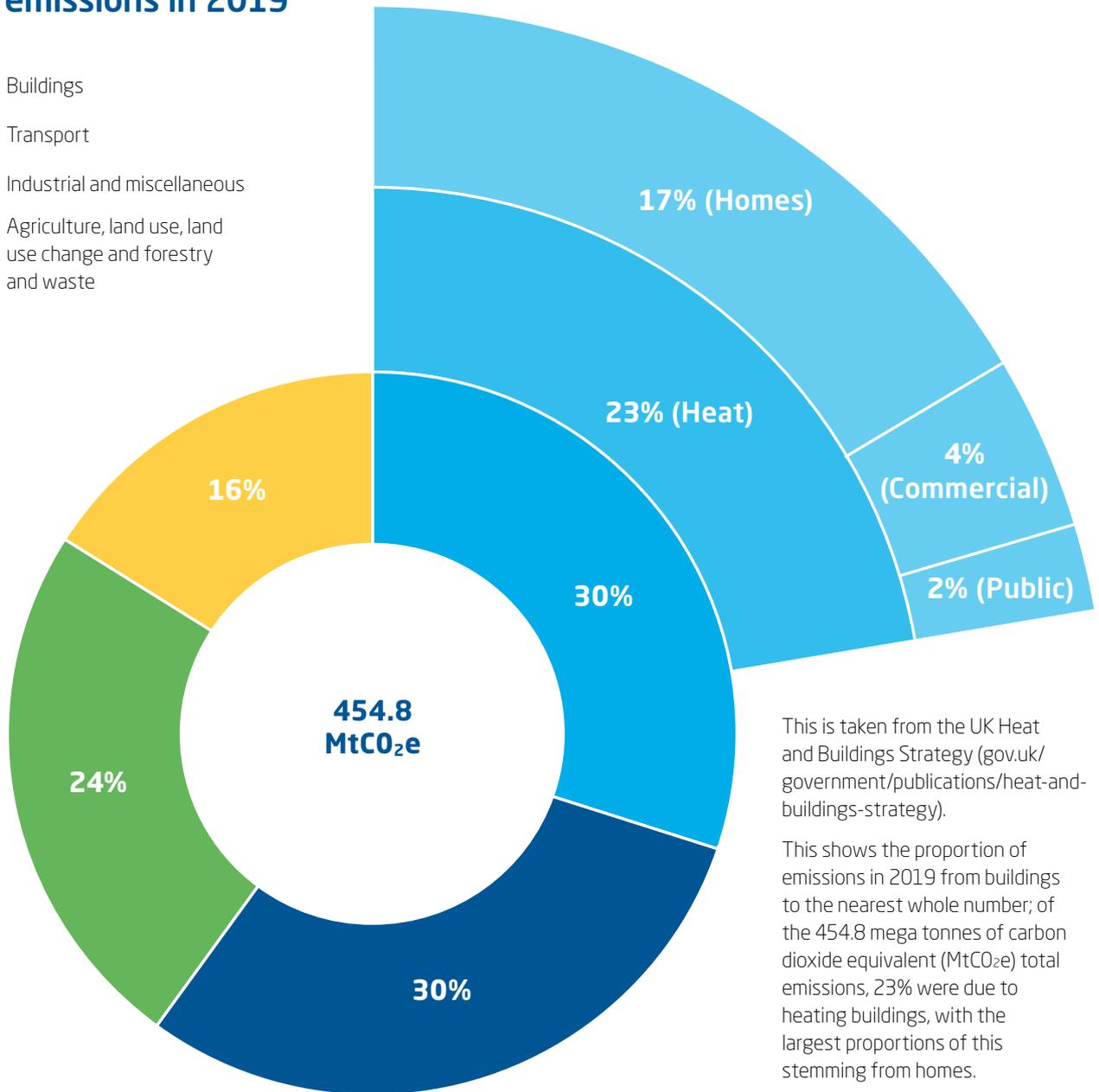
* UK enshrines new target in law to slash emissions by 78% by 2035 - GOV.UK (www.gov.uk)

** Annex-2-Heat-in-UK-Buildings-Today-Committee-on-Climate-Change-October-2016.pdf (theccc.org.uk)

*** <https://www.gov.uk/government/news/plan-to-drive-down-the-cost-of-clean-heat>

UK emissions in 2019

- Buildings
- Transport
- Industrial and miscellaneous
- Agriculture, land use, land use change and forestry and waste



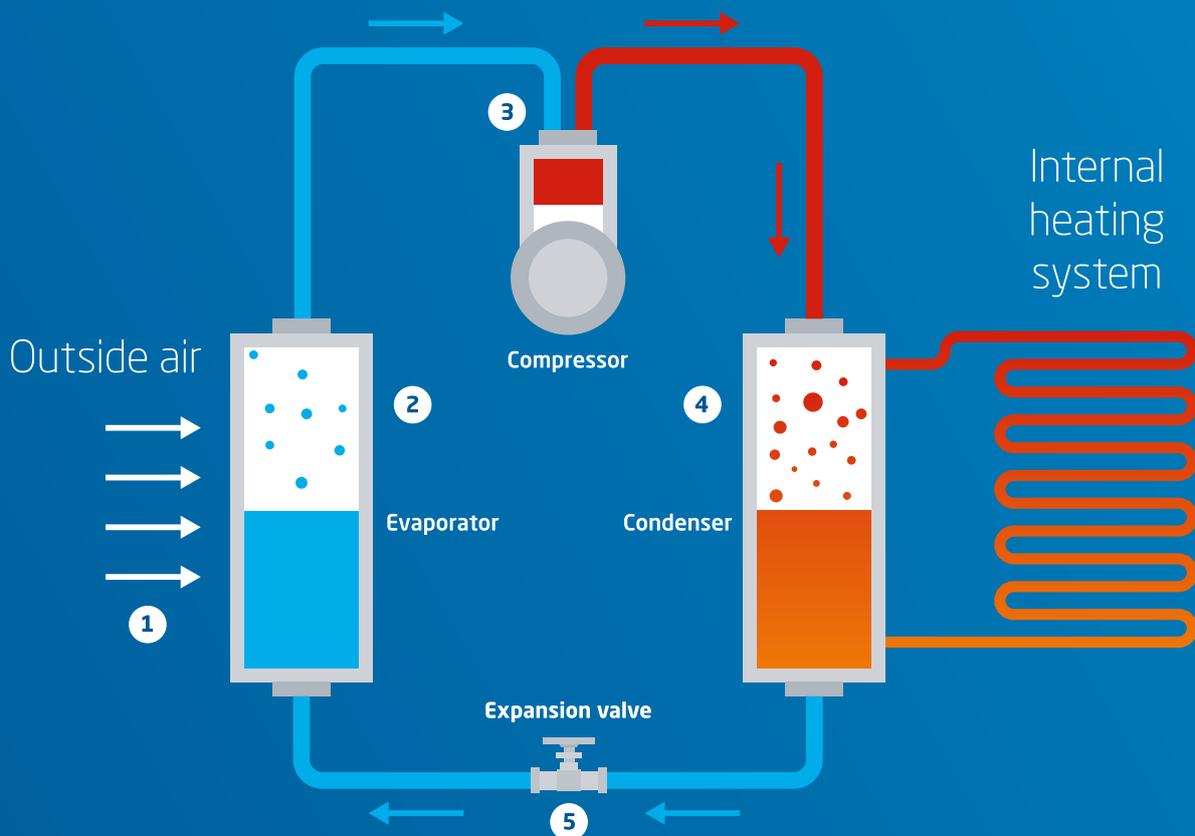
This is taken from the UK Heat and Buildings Strategy ([gov.uk/government/publications/heat-and-buildings-strategy](https://www.gov.uk/government/publications/heat-and-buildings-strategy)).

This shows the proportion of emissions in 2019 from buildings to the nearest whole number; of the 454.8 mega tonnes of carbon dioxide equivalent (MtCO₂e) total emissions, 23% were due to heating buildings, with the largest proportions of this stemming from homes.

How air source heat pumps work

Air source heat pumps extract heat from the air to provide heating and hot water for residential and commercial buildings. The units are usually situated outside the building. Ambient air is pulled across a finned heat exchanger and the refrigerant inside is then superheated via an electrically driven compressor. This heat is then transferred to water through a plate heat exchanger, and pumped throughout the building to radiators, under floor heating or hot water tanks – just like a boiler.

- 1** The fan draws in ambient air from the outside, across the evaporator.
- 2** Liquid refrigerant absorbs the air's heat and evaporates into a vapour, even at low temperatures.
- 3** This vapour enters the compressor where the pressure and temperature are increased.
- 4** The heated refrigerant passes through the condenser, transferring heat into the home's heating and hot water system.
- 5** The refrigerant flow is then controlled by the expansion valve to continue heat pump operation.

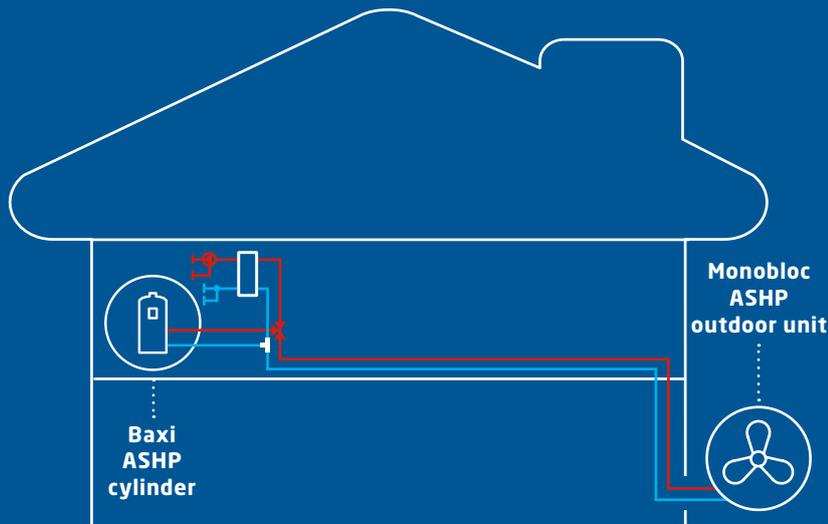


Types of air source heat pump

What is a monobloc air source heat pump (ASHP)?

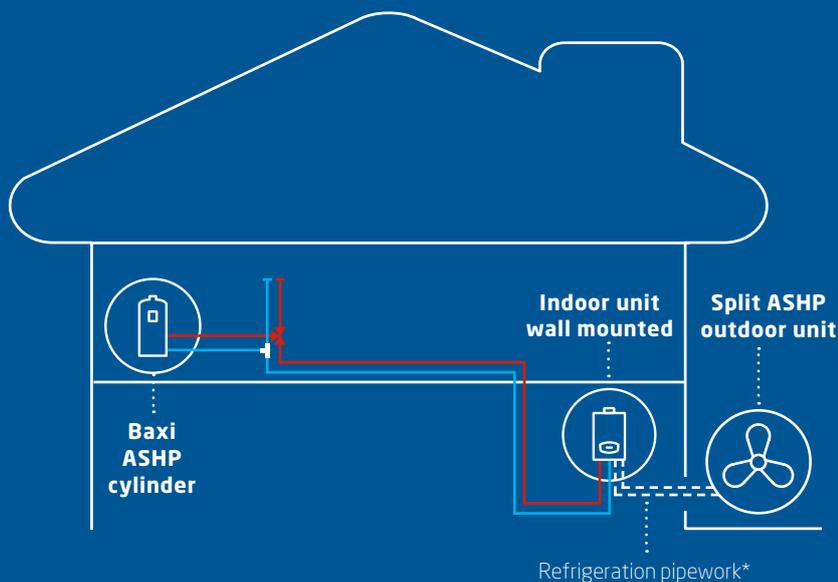
Monoblocs are self-contained heat generators. All the hydronic, refrigeration and electrical components are inside the casing, similar to a boiler. These are the most common type of air source heat pump.

Visit our website
for more
information
baxi.co.uk/ASHPs



What is a split air source heat pump (ASHP)?

Split heat pumps include an indoor unit and a matched outdoor unit. The two units are connected by refrigerant pipework. The refrigerant equipment is split between the indoor and outdoor units. In order to install the refrigerant pipework, the installer must be F-Gas certified.



*Should be installed by a specialist refrigerant engineer.

Considerations for you before installation

What are the different types of heat pump?

In the UK and Ireland, the three main types of heat pumps used are air source, ground source and water source heat pumps. Air source heat pumps are generally preferred because they are more flexible to install. Ground source and water source heat pumps are generally more time consuming and difficult to install, because of the groundworks that are required.

Why such a big push to install air source heat pumps now?

The government has set a legally binding target for the UK to be carbon neutral by 2050. Home heating is one of the biggest contributors to carbon emissions in the UK and this means the heating industry needs to do everything it can to reduce the use of fossil fuels over the next 30 years. Heat pumps and appliances that do not burn fossil fuels will have to be fitted at some point, so it's better to get ahead of the curve.

Will my customers' property work with an air source heat pump?

A qualified installer will need to complete a full design heat loss calculation to ensure the correct sizing of the radiators/emitters so that, even at lower temperatures, the emitters can still heat the home. Air source heat pumps normally operate between 35-65°C. Normally designs are carried out at 45°C flow temperature and 40°C return temperature. Having a proper design makes sure that the pipework and emitters are sized properly to work with an air source heat pump, giving optimal performance.

Do I have to be F-Gas certified?

Monobloc style air source heat pumps contain a hermetically sealed refrigeration circuit and do not require F-Gas certification to install. Split style air source heat pumps share or split the refrigerant circuit between the indoor and outdoor units, the pipework between these units must be done by an F-Gas certified engineer. To install and service a Monobloc and Split air source heat pump you need to have a knowledge of plumbing and heating and it is advisable to hold the industry approved NVQ level 3 in air source heat pump installation. From a maintenance perspective, a competent person could replace sensors, PCBs, hydraulic products, casings and the fan. You would need F-Gas certification to work on the refrigerant components.

Do I have to be an electrician to install an air source heat pump?

It is not necessary to be an electrician to install an air source heat pump. However, an electrician would be required to carry out any electrical work to provide power for the air source heat pump unit, due to the higher electrical current that is needed. Once the power supply has been delivered to the product, a competent engineer can run the rest of the cables from the air source heat pump to control switches, pumps and valves.

Do I have to be Gas Safe registered to install an air source heat pump?

You do not need to be Gas Safe registered to install air source heat pumps. A competent knowledge in plumbing and heating is all that is needed as a prerequisite for the NVQ Level 3 Heat Pump Installation qualification. System design and quality is very important when installing air source heat pumps, so a good knowledge of hydraulics and pipe fitting is strongly recommended.

What do I need to consider when changing a boiler to an air source heat pump?

You can't just replace a boiler with an air source heat pump and expect it to work properly. You need to start by carrying out a heat loss calculation for the property and advise the homeowner of any improvements that need to be made to insulation, windows and doors. This would improve the heat loss calculations and make it more efficient to heat the home with an air source heat pump. If there isn't already a hot water storage cylinder, you will need to install one, and if there is a cylinder in place, it may need changing, as an air source heat pump cylinder has a much larger coil inside to allow for better heat transfer and better reheat times.

Who needs to know, when installing an air source heat pump?

- Distribution Network Operator (DNO) (Electrical Supplier)
- Planning permission is not usually required but the unit must be positioned so as not to affect the appearance of the building
- Microgeneration Certification Scheme (MCS) possible grant funding
- Registered via Benchmark



Considerations for you and your customer before installation

Is there sufficient insulation in the property?

First off, there are a few actions for your customer to take to reduce the energy loss of their home: cavity wall insulation, loft insulation, double or triple glazing, and, most importantly, reducing draughts.

Once they have made their home as energy efficient as possible, they can then engage with an installer who will look at the heat loss in each room, the radiators in each room, the pipework, the external space where the customer is planning to place the air source heat pump.

Can air source heat pumps work with existing radiators?

Yes, they can. Air source heat pumps work with a much lower flow temperature than gas boilers, and the lower the flow temperature put through radiators, the less heat they will give out. However, if you have carried out all the measures to make that room more energy efficient, the radiator may need to emit far less heat than previously, so will work absolutely fine with an air source heat pump.

Should air source heat pumps be sized correctly based on the largest heat demand of the property?

Sizing an air source heat pump for a new build property is quite straight forward due to the higher standard of insulation from the UK building regulations. For older properties it will take a more in-depth approach to assess the heat loss and work out the right size air source heat pump required.

Where should an air source heat pump be sited?

Consideration needs to be taken over where the air source heat pump should be sited. Close to the property so as to use minimal pipework and within easy reach for servicing and maintenance, but with sufficient space needed around it to expel the cold air out. The outdoor unit needs to sit on a solid surface, 200mm above floor level. It's necessary to consider any potential indoor units required too and spacing available for boilers as well as cylinders.

Can an air source heat pump work alongside a boiler?

Yes. This is known as a hybrid system and is becoming more and more popular. Essentially, the property would predominantly use the air source heat pump for heating and hot water and when commissioning the system, you would set up the controller so that the boiler would provide supplementary heating and hot water in certain conditions, such as:

- If the temperature outside drops too low
- If the air source heat pump cannot reach temperature within a time limit
- If the cylinder needs to carry out a legionella cycle
- If the air source heat pump fails

An air source heat pump can work alongside a boiler; known as a hybrid system

What can customers do to reduce the cost of an air source heat pump installation?

The cost of installing an air source heat pump can be more expensive than replacing a customer's boiler like for like. But homeowners can reduce their carbon footprint and increase the efficiency of their property.

They need to consider:

- Insulation and replacement windows and doors
- Resizing of radiators/pipework
- Adding or replacing a cylinder
- Changing the boiler to an air source heat pump

These upgrades do not have to be done at the same time. Customers could do them in order, over a period of years. This would spread the cost and improve the home, energy bills and carbon footprint in the process.

Customers can upgrade over a period of years to help spread the cost

Air Source Heat Pumps

Air Source Heat Pumps (ASHPs) are forming a key part of the residential energy transition and offer a highly-efficient alternative to conventional domestic heating. They work by taking heat from the air, converting it into usable heat in the home.

Key benefits



Considerations for you and your customer before installation

How much does it cost to run an air source heat pump?

If the sizing and installation of an air source heat pump is correct, in a well-insulated house, with correctly sized radiators, in most circumstances it will cost the same as it currently does for the gas and electric used to heat a home (the bill will just be all electric). In some circumstances the cost could even be reduced, depending on how it's used.

The best way to use air source heat pumps is to maintain the level of heat, rather than switching it on and off as you would with a boiler. Homeowners would have their heating on for longer periods (but at a lower temperature), adjusting the room temperature by only 1 or 2 degrees.

It is important to explain that using an air source heat pump is very different to the way we currently use our gas boiler, but once they have adapted their routine, they can use their air source heat pump very successfully and efficiently.

What is the Boiler Upgrade Scheme (BUS)?

The government boiler upgrade scheme was launched in April 2022. It will provide a boiler upgrade grant to help owners of domestic and small non-domestic properties in England or Wales with the upfront cost of installing low carbon heating systems, such as heat pumps. It will run from 2022 to 2025.

The scheme will provide:

- £5,000 off the cost and installation of an air source heat pump
- £5,000 off the cost and installation of a biomass boiler
- £6,000 off the cost and installation of a ground source heat pump

The grant will only cover biomass boilers in rural locations and in properties that are not connected to the gas grid.

BUS is a grant to help with costs of installing a heat pump

How does BUS work?

You must be MCS certified for your customer to be eligible for the BUS grant. You will need to apply for the grant on behalf of your customer and then take the value of the grant off the price they pay.

- 1.** Check your customer's installation is eligible for the BUS on the government website and let them know.
- 2.** Provide a quote and agree a price for the installation.
- 3.** You, the installer, then applies for the grant.
- 4.** Ofgem will contact your customer to confirm that you are acting on their behalf.
- 5.** When the installation has been completed, you will take the amount of the grant off the price your customer pays.

To find out more visit

<https://www.ofgem.gov.uk/environmental-and-social-schemes/boiler-upgrade-scheme-bus>



To find out more visit our website



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Information is correct as at time of publication (September 2022)

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Residential and commercial heating and hot water solutions

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