

AIR TO AIR HEAT PUMPS

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What's all the fuss about heat pumps?



Heat pumps extract heat from the environment:

Unlike most heating systems, heat pumps don't burn a fuel to create heat; instead, they move heat between the inside and outside of your house.

Air source heat pumps extract from the air, water source from water, ground source from the earth, etc.

Heat Pumps can be more than 100% efficient:

Instead of creating 0.9kWh of heat from 1kWh of gas, 1kWh of electricity can be used to move 3kWh or 4kWh of electricity into your home.

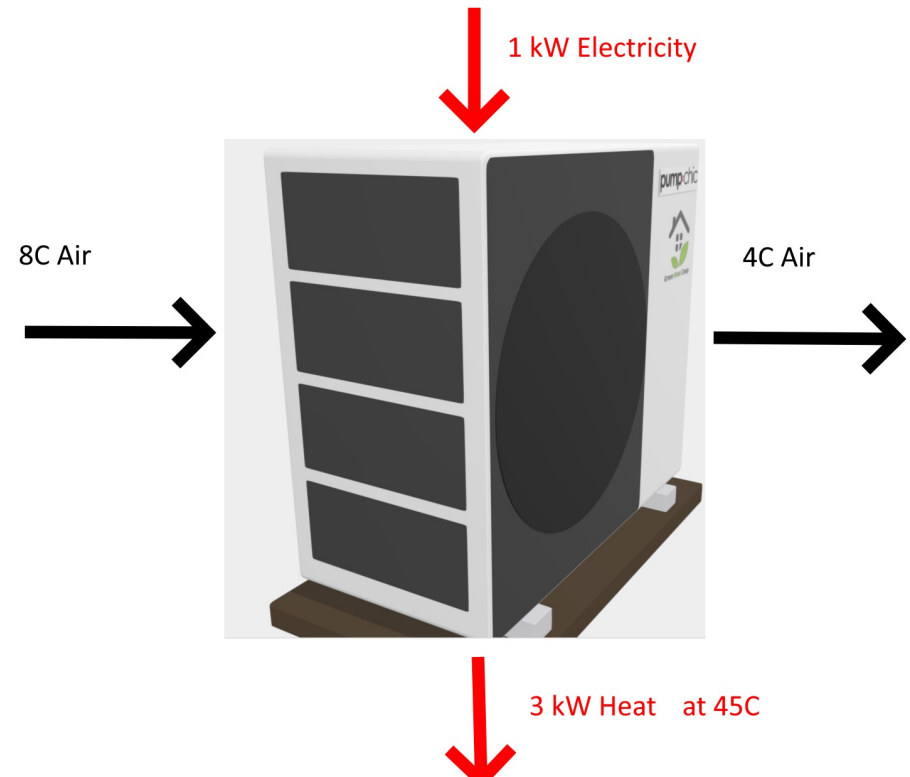
The ratio of energy in to heat out over the year is called the Seasonal Coefficient of Performance (SCOP).

Heat pumps run on electricity:

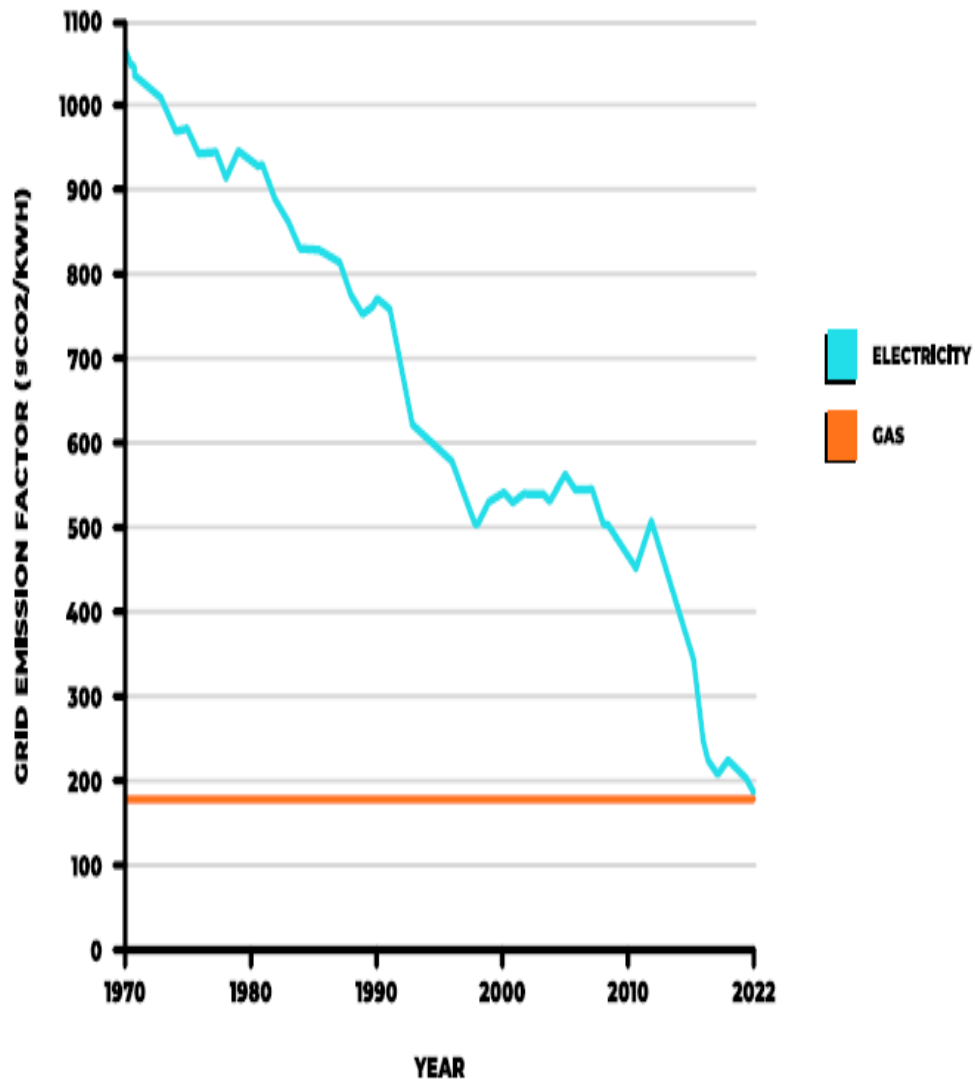
So as the grid decarbonises, they can ultimately provide close to zero carbon heating

Heat pumps are (can) cool :

They move heat rather than creating it, so unlike a boiler in summer can run backwards and provide cooling



But what does that mean in practice?



85%

Immediate reduction in household carbon emissions when a home in Bath with a gas boiler installs a heat pump. Each year this gets even better!

Based on:

- Heat pump SCOP of 3.8
- 2024 grid carbon intensity (63% that of gas)
- *Even a poor install, with a SCOP of 2.5, will cut your carbon by 77%!*

Sounds great, what else?



More comfortable:

Air to water heat pumps are run at low temperature, providing gentle heat which is better for you and your home.

Cheaper bills:

Not all installs save money. But a decent quality install that hits a SCOP above 3.2 and allows your gas meter to be taken out should provide savings: especially if run with an off-peak electricity tariff.

Guilt free:

Low carbon, cheaper heat means you don't have to hesitate before keeping your home at the temperature you actually want it at.



What's the catch?

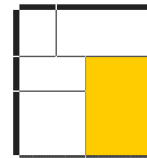


Faff: Installing a heat pump means re-designing your heating system

- Full home survey and room by room heat loss assessment.
- Siting decision needed for the outdoor unit and hot water tank.
- Average of 8 radiator replacements due to lower flow temperatures.
- New pipe runs may impact existing wall and floor finishes. Some old pipes may need replacing.

Cost: A typical air-to-water heat pump will cost £15,500. Even after the government BUS subsidy, this would set you back £8,000.

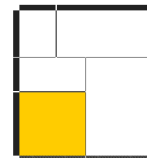
Kitchen



Design temp: 18°C
Air changes: 1.25/hr
Area: 18.73 m²
Volume: 46.81 m³
Heat loss: 848 W,
45 W/m²

	1900	260 x 1900 mm Output at 45°C, 290 W	As surveyed
	K2	1000 x 600 mm Output at 45°C, 670 W	New
The expected heat loss is met.			✓

Living room



Design temp: 21°C
Air changes: 0.75/hr
Area: 12.41 m²
Volume: 31.01 m³
Heat loss: 784 W,
63 W/m²

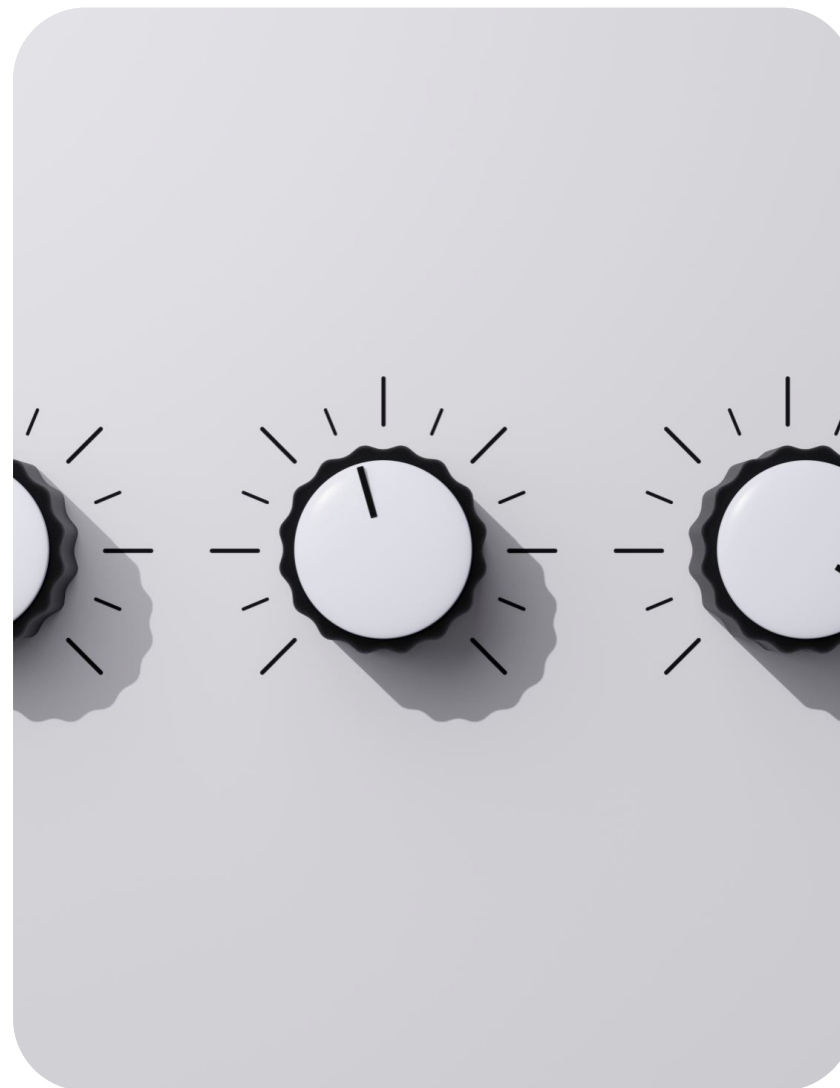
	1000	1000 x 600 mm Output at 45°C, 433 W	Removed
	Lux	600 x 1329 mm Output at 45°C, 796 W	New
The expected heat loss is met.			✓

And....



Old habits die hard: Most people now know how to run a gas boiler.

- Installing a heat pump means learning to deal not just with a new heating controller, but with a *different sort of heating system*
- Hacks and habits designed for boilers may not work as well for heat pumps
- This can be confusing, and in the worst case could lead to poor performance or unexpected bills
- Its not rocket science, but it does take an effort, and sometimes a bit of trial and error to learn the new system



WHAT ABOUT AIR TO AIR?!

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Components of an air-to-air heat pump system



Similar external unit

The same as a split system air to water (some companies actually use the same exact hardware). Slightly smaller than a standard monoblock air to water

Fancoil units replace radiators

These deliver heat to your home via air rather than water. They replace radiators or underfloor heating

Not so unfamiliar?

You may know air to air heat pumps better than you think. *They used to be called air conditioning units!*



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Multi-splits and single units



Multi-splits are the most common:

In a multi-split system, one external unit can normally supply up to 5 separate internal fancoil units.

Single split option:

Alternatively, a single smaller external unit can be installed, feeding just one internal fancoil unit

Monoblock systems:

Air-to-air monoblock systems are sold which do away with the outside unit by bringing air in from outside via a duct. They are less common than standard split units as they have a reputation for being slightly noisier or less efficient.

The many faces of a fancoil:

- The most common design is a long rectangular unit mounted high on the wall
- They can also be floor standing / low wall mounted units, looking similar to a radiator or storage heater
- Or.... as a ceiling mounted grille, with the working parts hidden above
- Or..... as a low-level plinth / under kitchen unit heater
- Or.... as a single large fancoil, supplying multiple rooms via air ducts and grilles (large diameter ducts are needed, so old ducts installed for mechanical ventilation or older hot air heating furnaces can't be re-used)



Fancoil Units: Advantages



RAPID RESPONSE

Fancoils heat the room by heating the air, radiators mainly work by radiating heat to warm the fabric of the room.

This means that fancoils can **quickly provide noticeable heating** to occupants, even if the fabric of the room is still much colder (or visa versa)

IRREGULAR USE

Due to their rapid response times, fancoils are well suited to providing heating and cooling to spaces that are **rarely or irregularly used**.

Like (or even more than) with a gas boiler, occupants who want to save money/energy can leave most of the heating off, while **scheduling short bursts of heating** in the rooms at the times needed.

HEAT AND COOL

Unlike radiators, fancoil units are **equally good at both heating and cooling**.

As the UK climate gets hotter, while newer building designs tend to be better insulated but more prone to overheating, this may prove to be a major advantage.

LESS INTERNAL MESS

Fancoils receive a refrigerant feed direct from the heat pump, normally via an externally run pipe. This means less disruption from running and modifying internal pipework

Fancoils are **located high on walls**, so don't compete for wall space in the same way as the large radiators needed for low temperature air to water heat pumps.

Fancoil Units: Disadvantages



COMFORT & HOT AIR

Fancoils include a fan to circulate air, and **make a small noise** while running, especially at high output

Some people are less keen on heating via hot air, particularly if the heating is being run intermittently and room surfaces are still colder. Fancoils also **dry the air**, causing some allergy sufferers discomfort (more expensive units have mitigation).

LOCATION CHALLENGES

Fancoils generally need to be on an **external wall** as the refrigerant supply from the heat pump must be piped externally.

Moreover, each fancoil also needs its own **electricity supply** and a **condensate drain** connection. Getting drain connections and electricity cables to the right locations can be costly and/or impact internal finishes.

LIMITED NUMBER

Multi-split air to air heat pumps can generally **only supply up to 5 individual fancoils**.

Large houses with many rooms may need multiple air to air heat pumps, if they are to provide heating to all spaces within the home, which will add to costs and siting impact of the outdoor units.

HOT WATER

Traditionally, air to air heat pumps were not designed able to provide hot water alongside space heating, meaning a separate system is needed, such a hot water tank with an immersion element. This reduces the cost and carbon savings.

However, **some air-to-air manufacturers now offer a water heater** as 1 of the 5 end devices on a multi-split.

Air-to-air vs. air-to-water



Cost & disruption

- Air-to-water >> £15,500 (or £8,000 after grant)
- Air-to-Air >> £2000 + £1000 per fancoil {-£2,500 grant} and can be installed more quickly, with less disruption

Size of property

- Air-to-water can do a large house on one unit
- Air-to-air perfect for smaller buildings (<5 fancoils)

Controls & comfort

- Air-to-air controls may be more familiar. Can run intermittently, which will suit holiday homes and community spaces with less regular use. Creates a small background noise and may dry air slightly
- Air-to-water controls may be less familiar, but once set up may provide a slightly higher level of comfort for a home inhabited most of the year

Cooling

- Air-to-air will cool by default
- Air-to-water can cool - but only if and where underfloor heating or hydronic fancoils are installed instead of radiators. Even then may need to cool at lower output due to condensation risk on internal copper pipes



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 - **Futureproof Survey**
 - **Home Energy Efficiency Plan**
 - **Airtightness & Ventilation**
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3. **Ongoing support**
 - **Ad hoc project support**
 - **Heat Pump Quotes Service**
 - **Retrofit Co-ordination**

