Low carbon heating

Heating systems are one of the most significant investments that a community building will make, and moving to a low carbon heating system offers an opportunity to improve energy efficiency, save money on bills and reduce carbon emissions. Before making such a decision it is important to ensure that occupants of the building have a clear picture of the current situation including:

1. How is the building's heating currently managed and used?
2. What activities are taking place through the week?
3. When does the building feel comfortable? uncomfortable? and for whom?
4. How energy efficient is the building?
5. What is the indoor air quality like?

Once you have answers to these questions you can then consider your priorities going forward, such as – heating cost and carbon emissions reduction; improved comfort; improved usability; what is the budget; and is there any available funding? What is needed and what is feasible for your building?

Heat pumps are one of the most common low carbon heating sources. They use the warmth from the outdoor air, ground, or water to heat the internal air or water in a building. They function even in cold conditions, to provide hot water and heating in the building. There are different types of heat pump:

Air source - air to water
Takes heat from the air to heat a wet central heating system

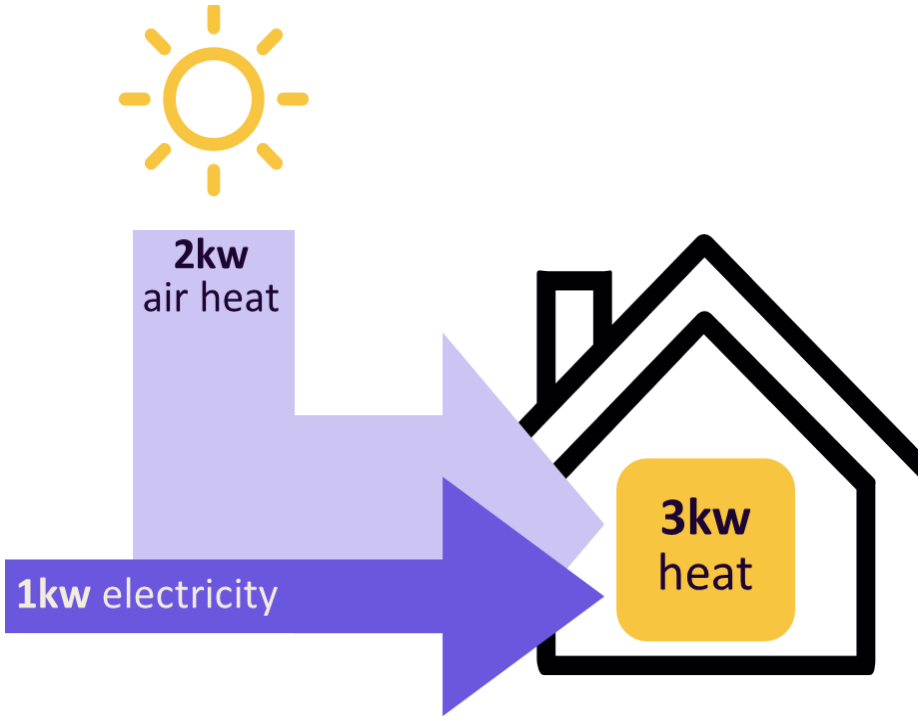
Air source - air to air
Takes heat from the air to heat internal air in a building

Ground source
Takes heat from the ground to heat a wet heating system

Water source
Takes heat from water to heat a wet heating system

Here's how they work -

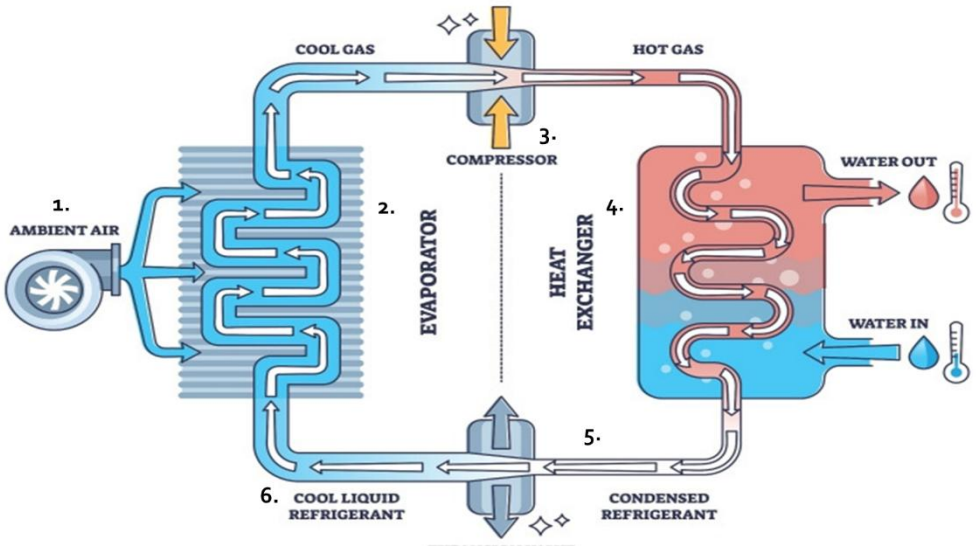
- Heat pumps are 'low carbon' because they produce 3-4 units of heat for every unit of electricity they use.
- A Coefficient of Performance, or CoP, is used to measure their efficiency.
- The CoP represents the ratio of heat output to electricity input.
- A CoP of 3 means 1 unit of electricity converts into 3 units of heat out.
- A Seasonal Coefficient of Performance (SCOP) measures a heat pump's average efficiency over an entire heating season, providing a more realistic, year-round rating than a single-point CoP.



The inside workings of a heat pump -

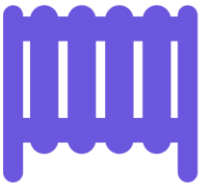
At the heart of a heat pump is the refrigerant cycle. This is what's going on in our fridges but in reverse. A refrigerant is a liquid with a very low boiling point, so it turns into a gas at relatively low temperatures. A fan pulls outside air across an evaporator, where the refrigerant absorbs heat energy from the air (even when it's below freezing). This 'boils' the refrigerant into a gas, which then passes through a compressor. This compresses the gas which increases its temperature.

1. Heat sourced from the air outside or ground. This is blown over the heat exchanger surface of the exterior of the heat pump.
2. This heat is warm enough to cause the refrigerant liquid in the heat pump to evaporate and turn into a gas.
3. This gas is then moved through a compressor, which increases the pressure, causing its temperature to rise.



4. The gas (now heated) is passed over the internal heat exchange surface. This heat can then be blown around the building interior or transferred to central heating.
5. As the heat is transferred into the home, the gas falls in temperature, causing it to return to a liquid state.
6. The cycle of reverse refrigeration repeats until your home reaches the required temperature setting on your

Do radiators for a heat pump system need to be bigger?



70°C

Heat pumps are more efficient when they work at lower flow temperatures. Lower flow temps may require bigger radiators.

45°C

If the temperature of our radiators is lower, in order to provide the same amount of heat as before, the radiator may need to have more surface area, or 'heat emitting' area. (this will depend on current pipe and radiator sizes).

Heat pump building suitability

Replace your current heating system if it's approaching the end of its life.	A heat loss survey determines sizes of heat pump, radiator, pipework and placements.	Buildings with high heat demand may require fabric upgrades such as insulation, windows and doors.
Ensure electrical connection can support a heat pump; contact the district network operator for potential upgrades.	Efficiency is maximized when heat pumps are left on constantly, (not running constantly), this requires a shift in heating control habits.	Time of use energy tariffs tailored for heat pump use can reduce running costs significantly.

Get more energy advice at www.cse.org.uk/advice