



Energy Efficiency Business Support



Air Source Heat Pumps

Air source heat pumps are a simple way of providing clean energy using ambient heat from outside air

Introducing GIS

Scotland's damp and chilly air isn't the most obvious energy source, but it contains enough heat for air source heat pumps to work. Using electrical energy, they transfer ambient heat from the outside air into your property for heating and cooling purposes. It's a great low carbon technology, so long as the heat provided is greater than the energy used in running the pump. If the electricity that powers them comes from a renewable source – such as solar, wind, or hydro – they can be carbon neutral.

In Scotland, air source heat pumps are not as efficient as ground or water source heat pumps because the air temperature can drop to well below freezing for parts of the year. However, they're less expensive. Air source heat pumps don't require a water source or large outdoor space for drilling holes, laying pipes, or storing fuel. This makes them a good option for smaller buildings. The only requirement is a little outdoor space that gets good airflow – a roof, for example, is ideal.

Air source heat pumps have no adverse impacts on air quality and are relatively low maintenance. They make good financial sense for organisations currently using oil or LPG for heating. If you're on the gas mains, however, you may not make a big financial saving.

How they work

Conjuring heat from the air isn't as mysterious as it sounds. The air source heat pump absorbs residual ambient heat from the air at low temperature and passes it to a fluid, such as water, which then provides space heating as part of a central heating system. This is what's known as an air-to-water heat pump. Air-to-air heat pumps use a fan system to distribute hot or cold air to the building.

The temperature of the heated water is lower than that achieved using regular heating systems. Air source heat pumps are more efficient when used with underfloor heating or bigger radiators so that there's a larger surface area to give off heat. This constant low heat works better with well-insulated properties that can retain it.

Air source heat pumps can work at temperatures as low as -15°C . But they're more efficient when there's less differential between inside and outside temperatures. The efficiency of heat pumps is given by the Coefficient of Performance (CoP) value, which is the ratio of energy in versus energy out. For example, if a heat pump has a CoP of 4 then it produces 4kWh of heat energy for every 1kWh of electricity needed to power it.



For most of the year, air source heat pumps have a CoP of around 3 or 4. In winter, when temperatures are routinely below 7°C, the CoP value can drop to between 2 and 3. This means that they use more energy when heat demand is highest. To overcome this, hybrid systems can be used. These combine a heat pump with a traditional system, such as a gas boiler. Just like a hybrid car, the system switches between the two energy sources, depending on which is most efficient at the time.

It's important to correctly assess the heating needs of a building before installing an air source heat pump. The bigger the system, the more electricity it will need to run, which may entail an electric system upgrade at the same time. Planning permission may be needed depending on the size of the system. Air source heat pumps are eligible for Renewable Heat Incentive (RHI) payments. ●

AT A GLANCE

- Needs well insulated buildings, as well as space outside with good air circulation
- Good replacement for oil or LPG for heating
- Not as efficient in winter months
- No impact on air quality and can be zero carbon
- Least expensive of the heat pump options
- Easy to install and maintain

