What is an Air Source Heat Pump (ASHP)?

An Air Source Heat Pump (ASHP) is a heating and cooling system that extracts heat from the outside air and transfers it indoors to provide space heating and hot water. It operates efficiently even in cold temperatures, making it a sustainable alternative to traditional fossil fuel-based heating systems. ASHPs are widely used in the UK for residential and commercial buildings, particularly in the context of energy-efficient home renovations, extensions, and retrofits.

ASHPs are increasingly adopted in the UK as part of the government's strategy to reduce carbon emissions and achieve net-zero targets by 2050. They are particularly relevant in the residential retrofit sector, where older homes are upgraded to improve energy efficiency. ASHPs are also commonly used in new-build projects to comply with Part L (Conservation of Fuel and Power) of the Building Regulations 2022 and the Future Homes Standard.

An ASHP works on the principle of heat transfer. It absorbs heat from the ambient air using an evaporator coil and a refrigerant. The refrigerant, now in a gaseous state, is compressed to increase its temperature. This heat is then transferred to the indoor heating system, such as underfloor heating or radiators, via a heat exchanger. In cooling mode, the process is reversed to remove heat from the building.

ASHPs are highly efficient, with a typical coefficient of performance (COP) of 3 to 4, meaning they produce 3 to 4 units of heat for every unit of electricity consumed. This efficiency is influenced by factors such as outdoor temperature, system design, and insulation levels in the building.

Practical Examples

1. **Residential Retrofit**: A Victorian terraced house in London is retrofitted with an ASHP to replace an old gas boiler. The system is paired with underfloor heating and improved insulation to maximise efficiency.
2. **New Build**: A developer installs ASHPs in a new housing development in Manchester to meet the energy efficiency requirements of the Future Homes Standard.
3. **Commercial Application**: A small office in Birmingham uses an ASHP for both heating and cooling, reducing its reliance on traditional HVAC systems.

Related Terms

1. **Ground Source Heat Pump (GSHP)**: A system that extracts heat from the ground, often used in larger properties or where space permits.
2. **Coefficient of Performance (COP)**: A measure of a heat pump's efficiency, calculated as the ratio of heat output to electrical energy input.
3. **Building Regulations Part L**: The UK regulation that sets standards for the energy efficiency of buildings, including the use of heat pumps.
4. **Future Homes Standard**: A set of proposed regulations aiming to ensure that new homes built from 2025 produce 75-80% less carbon emissions compared to current standards.
5. **Underfloor Heating**: A heating system often paired with ASHPs to distribute heat evenly and efficiently.
6. **Renewable Heat Incentive (RHI)**: A government scheme that provides financial incentives for installing renewable heating systems, including ASHPs.
7. **Insulation**: Materials used to reduce heat loss in buildings, essential for maximising the

efficiency of ASHPs.