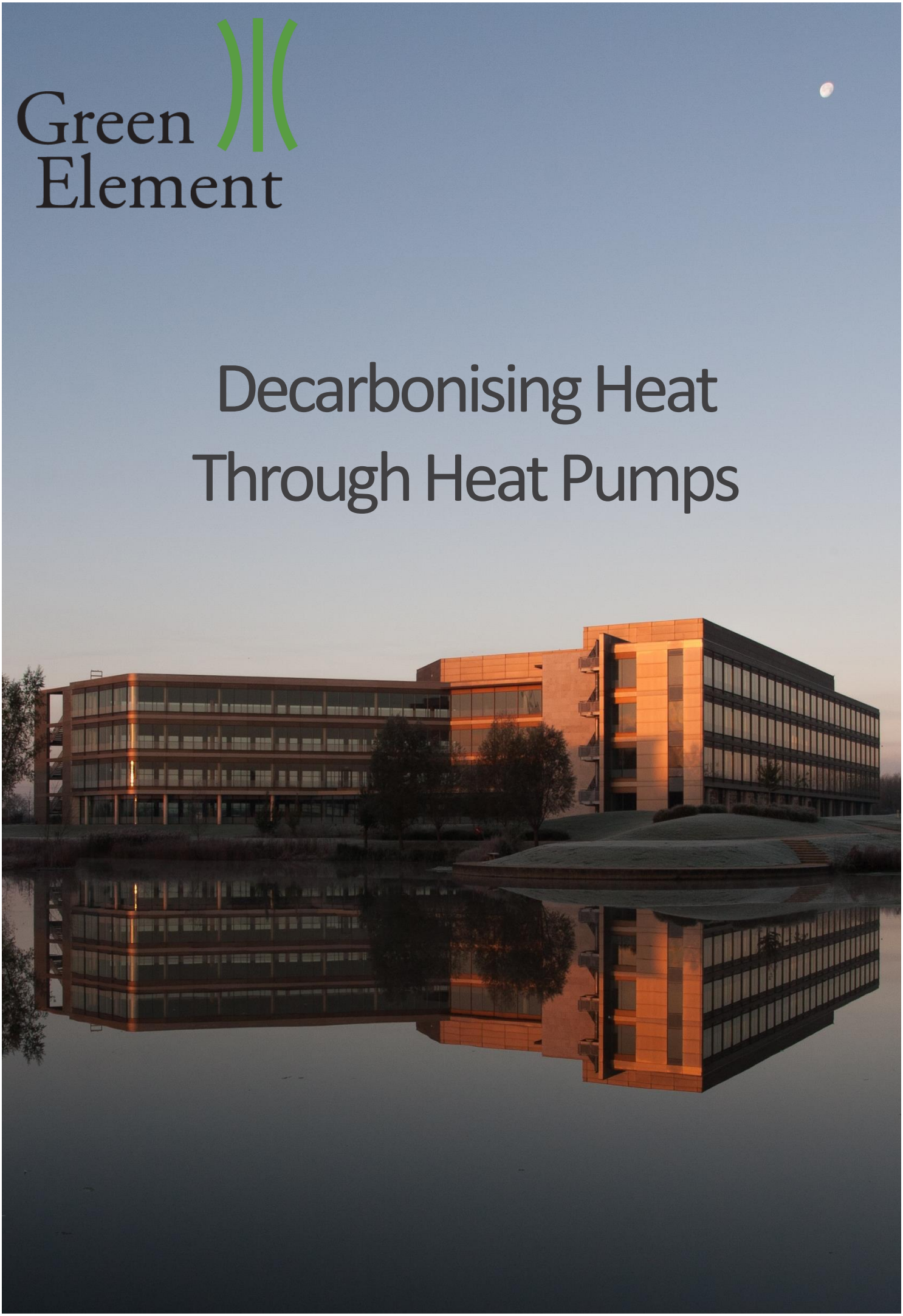
Green Element

Decarbonising Heat Through Heat Pumps



This guide will discuss

1. Low Carbon Heating in the UK
2. Different types of Heat Pumps
3. Other key Information

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Low Carbon Heating in the UK

Currently most energy for heating in the UK comes from natural gas, which is a fossil fuel. The Committee for Climate Change (CCC) in the UK state that 100% of residential and non-domestic buildings will need to use low carbon heating systems as part of the net zero strategy for the UK.

This will mean a transition away from traditional gas heating to low-carbon systems through retrofitting existing buildings and ensuring new buildings are equipped for the future. This can be achieved through improving energy efficiency through insulation, and through technologies for heating such as heat pumps and hydrogen.

In the 2020 CCC released it's Sixth Carbon Budget which included a Balanced Pathway to Net Zero, this projected that in 2050 heat pumps account for 52% of heat demand, 42% is district heat, 5% is hydrogen boilers and 1% direct electric heating.

Heat pumps refer to a technology that involves extracting energy from a source such as the air or ground for use in heating or cooling. Heat pumps can offer significant carbon emission savings when compared to conventional natural gas boilers due to their high efficiency and low electricity demand. The CO2 savings of heat pumps is 55-65% compared with an A-rated gas boiler, with this increasing towards 100% as electricity grid decarbonisation continues.

Types of Heat Pumps

Air-Source

Air-source heat pumps (ASHPs) take low-level heat occurring naturally in the air and convert it to high-grade heat by using an electrically driven or gas-powered pump. Installation includes an outdoor unit that collects heat, transfers it to refrigerant which is then used for space heating or to heat water.

Ground-Source

For ground-source heat pumps (GSHPs), pipework is buried underground which utilises the stable temperature, drawing heat into the system.

Water-Source

Water-source heat pumps (WSHPs) work in the same way as GSHPs but pipework is instead placed within a river, lake or ocean.

Waste heat

Waste heat recovery pumps are a form of heat recovery that involves capturing and utilising heat for other processes. Heat pump units are used in this process to enhance the energy captured and raise it to required levels.

Key Information

Common applications of heat pumps

- Space heating and cooling
- Industrial process heating and cooling
- Boiler pre-heating
- Drying during industrial processes

System design

- Key to the success of installing a heat pump is to first ensure that your building is of high energy efficiency. This is to minimise the demand for heating and can be achieved through measures such as improving insulation to avoid heat loss.
- Heat pumps are not a like for like switch for electric heating or gas boilers and require careful system design to be most effective.
- Systems with high cooling demand can be combined with solar photovoltaic panels to achieve increased system impacts. This Is because the time of day when solar output can be maximised matches when highest cooling is required usually.

Government support

- The renewable heat incentive (RHI) is a scheme in the UK aimed at encouraging the installation of renewable heat technologies including certain heat pumps and biomass boilers. It provides a quarterly payment based on p/kWh generated by the system. The scheme is open for new applicants for domestic systems until March 2022, and unfortunately closed to new entrants for non-domestic systems in March 2021.

Costs and payback

- Cost and payback periods for heat pump systems vary depending on the type of system and the application. Typical domestic air-source heat pump systems used to heat and cool homes cost can cost between £4,000 and £10,000. This will increase from here for larger and industrial systems.

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