

What is a heat pump?

Efficiency
Electrification
Resilience

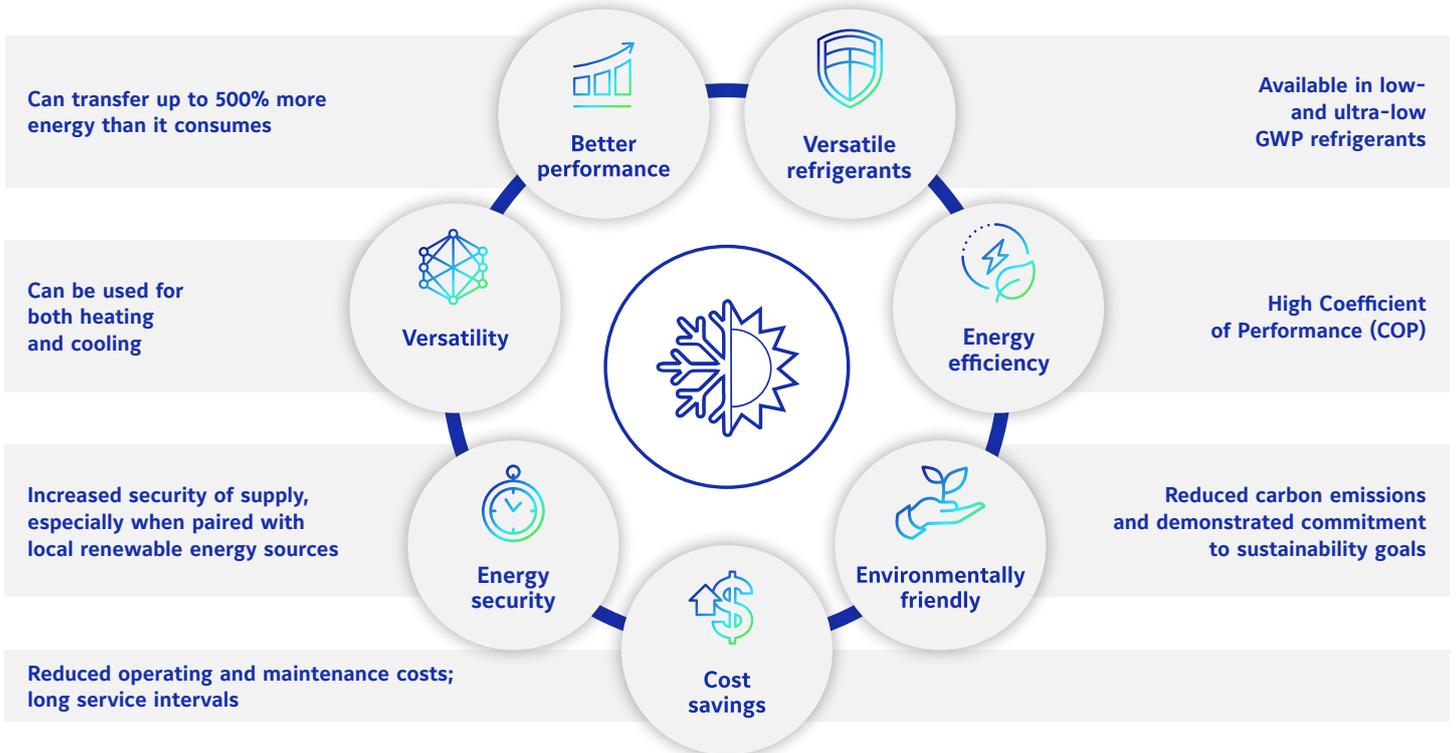
Heat pumps are an environmentally sustainable technology that use electricity to circulate energy rather than burn fuel.

Almost **50% of global energy production** is used to heat and cool homes and commercial buildings.

Heat pumps are **three to five times more energy efficient** than conventional heating systems.

Heat pumps could **replace 80% of gas used to heat buildings** and will help residential, commercial and industrial buildings reach net zero.

Heat pumps can **deliver zero-emissions** heating when running on renewable electricity.



Johnson Controls: Expertise and innovation in heat pump applications

Part of our suite of sustainable products and tailored solutions to assist our customers on their journey to net zero.

With district heating and cooling, we can heat and cool entire localities and help to make significant savings on CO₂ emissions.

We are investing in technology for larger applications, higher temperatures (>120°C) and greater capacities on true low-GWP refrigerants.

We have the largest portfolio of heat pump solutions for residential, commercial and industrial buildings.

Featuring a range of low- and ultra-low global warming potential (GWP) refrigerants to reduce total carbon footprint and comply with regional regulatory requirements.

Johnson Controls projects have saved customers \$7.8 billion through energy and operational savings since January 2000.

Johnson Controls projects saved customers more than 37 million metric tons of carbon emissions since January 2000.

Johnson Controls is an environmental leader

We are included in:

Platinum-level Sustainability Recognition (EcoVadis)

Clean200 (Corporate Knights)

Europe's Climate Leaders 2023 (Financial Times)

2023 ESG Industry Top-Rated Companies (Sustainalytics)

2023 Global 100 (Corporate Knights)

HRH The Prince of Wales' Terra Carta Seal

2023 World's Most Ethical Companies (Ethisphere)



Key points

What is a heat pump?

A heat pump is an energy multiplier, powered by a minimal amount of electricity. By exchanging or transferring heat using electricity, heat pumps can provide an efficient alternative to traditional gas and oil heating while delivering significant emissions reductions, a critical step toward decarbonization. Heat pumps can also provide year-round cooling and heating in one system.

How does a heat pump work?

- A heat pump extracts heat from an ambient source, like outside air, earth and water.
- This heat is boosted by the heat pump, until it reaches the desired, higher temperature.
- This amplified heat is transferred to wherever it is needed, such as under-floor heating.
- Similarly, it can 'pump' heat out of an indoor space to keep it cool.

Why choose heat pumps?

Efficiency Electrification Resilience

- **Efficiency:** Heat pumps consume less energy and are more efficient compared to conventional heating and cooling systems, delivering energy savings and reduced operational costs.
- **Electrification:** An important asset in the drive to decarbonize commercial and industrial buildings, heat pumps offer reduced carbon emissions and a demonstrated commitment to sustainability goals (LEED points, Scope 1 and 2 emissions).
- **Resilience:** With a long lifespan and reduced dependence on fossil fuels, heat pumps offer improved security of heating and cooling supply.

Setting the stage

Almost 40% of global greenhouse emissions come from commercial and industrial buildings.

- While building energy efficiency has improved, emissions have reached an all-time high alongside an increase in construction.
- We are accelerating the pace of the building transformation, with the goal of reaching the critical 2030 milestone of 50% emissions reductions.
- While we know that the initial outlay for a heat pump is high, these costs are rapidly repaid by the efficiency of the heat pump's performance and innovative financing approaches can significantly reduce capital costs.

Global demand for more environmentally sustainable electric heat pumps is growing significantly.

- Heat pumps are well suited to reducing emissions in the supply of low temperature (<100°C) heat, which, according to the IEA, is the largest source of industrial heat demand today.
- A heat pump will typically have a coefficient of performance (COP) of three to five (but can be higher for applications in the industrial space, where COP can be up to eight).

Heat pump payback on average is below 5 years – equivalent to an annual interest rate of around 13%*.

- The capital cost of an industrial heat pump is higher than an oil or gas boiler. However, payback times can be shorter, and it can offer a solid return on investment.
- Innovative funding options to reduce upfront capital and government incentives are available, which make for an attractive business case.

We live, work and play in buildings. Up to 90% of our lives are spent indoors.

- Customers are looking for viable options on improving indoor building spaces.
- This is where we excel. We are a one-stop shop, providing customers with everything they need for end-to-end for healthy, net-zero buildings and enhanced operations and lifecycle performance.

* Under normal market conditions.