Introducing the next-generation of

HIGH-TEMPERATURE HEAT PUMP SOLUTIONS

Harness your waste heat for a more **efficient** and **sustainable** tomorrow

SUPPORTING NET ZERO JOURNEYS

TargetZero
SOLUTIONS FOR DECARBONISATION

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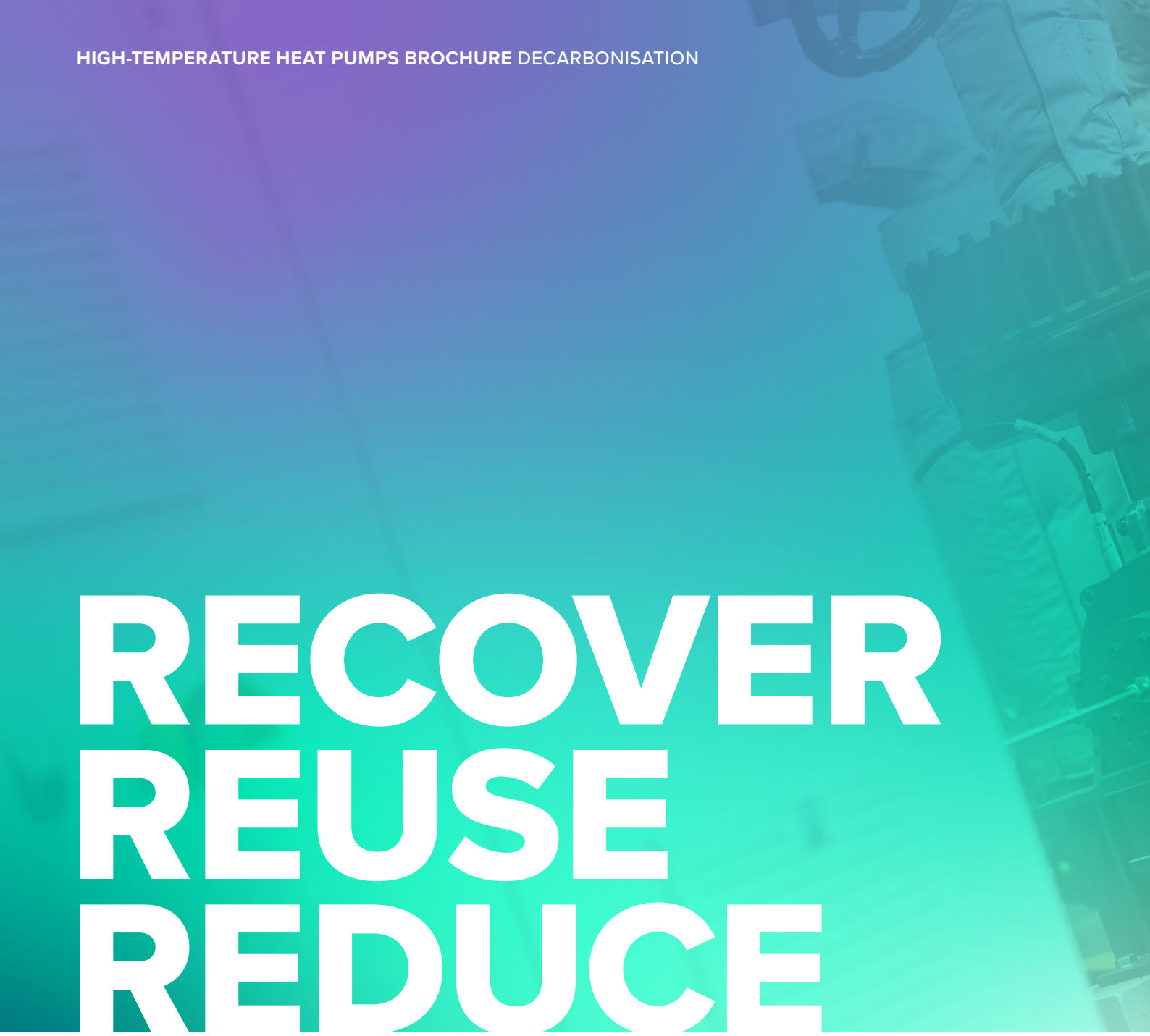


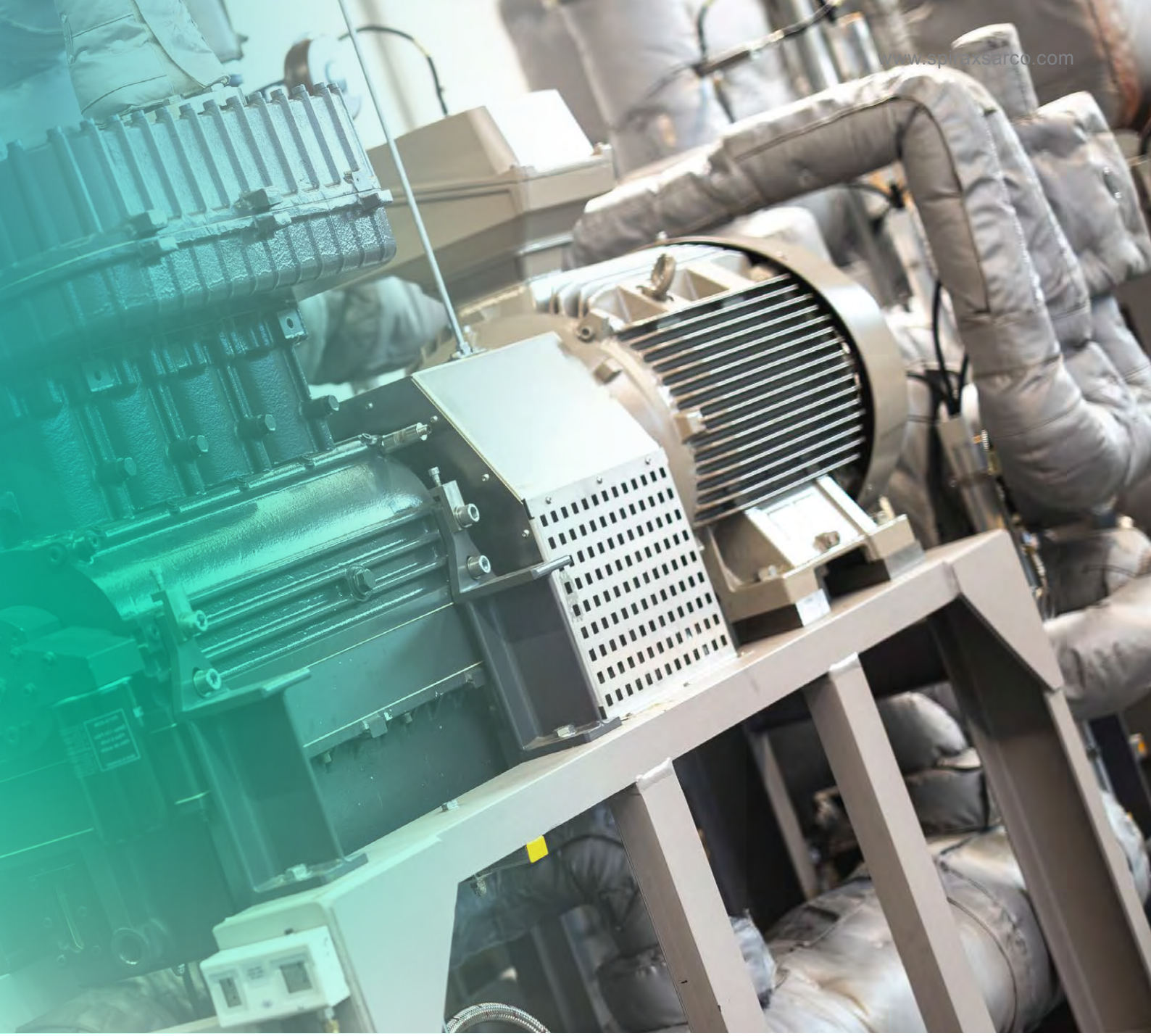
RECOVER REUSE REDUCE

Global demand for industrial heat processes between 100 – 200°C is 6,500TWh and set to increase by 20% by 2030. The heat for these processes is typically generated by burning fossil fuels. Fossil fuel consumption is emitting millions of tonnes of CO_2 into the atmosphere, causing a significant environmental impact. Previously, heat pumps were typically limited to outlet temperatures below 100°C. However, the landscape of industrial process heating is changing.

Spirax Sarco offer a range of high-temperature heat pumps that are able to generate temperatures up to 175°C, with future capacity to reach up to 200°C. Thanks to the development of new high-temperature compressors, combined with innovative process technology, demand for thermal energy can be met, and companies can minimise reliance on fossil fuel consumption, taking sustainable action to decarbonise their systems.

The high-temperature heat pump advantage

High-temperature heat pumps help you decarbonise your industrial processes, enabling you to overcome a major hurdle in your journey to net-zero. Handling high temperatures, offering unparalleled efficiency, our high-temperature heat pumps provide flexibility and range to suit your operational needs.



Where thermal energy is involved, Spirax Sarco are your ideal partners for success. With over 130 years of experience we are trusted and respected suppliers in the industry, with the knowledge and experience to deliver the best high-temperature heat pump solution for your business.

We will work with your team to conduct a detailed audit of your current thermal solution to determine the best configuration to meet your individual needs. Implementing a system that is operating at peak performance is where our team of experts in Thermal Solutions come in.

Embarking on your net-zero journey demands immediate action, and high-temperature heat pumps offer the perfect solution.

By harnessing previously wasted thermal energy, these systems deliver significant efficiencies, drastically reducing your reliance on fossil fuels and the associated carbon emissions. This not only demonstrates a commitment to sustainable practices, it lays a solid foundation for further decarbonisation efforts and achieving your ambitious net-zero targets

LOOKING TO THE FUTURE OF YOUR NET-ZERO JOURNEY.

Achieving sustainability in steam, hot water and other thermal energy systems helps us all move toward the global ambition of net-zero. As the global leader in steam and thermal energy system excellence, we are dedicated to supporting our customers in meeting their sustainability goals.

Our approach focuses on three pivotal phases: optimisation, effective system management, and decarbonisation of steam and thermal generation using renewable sources. By integrating these three stages, we pave the way for a more sustainable and efficient future.

Sustainability **Energy Management** **Efficiency** **Safety**

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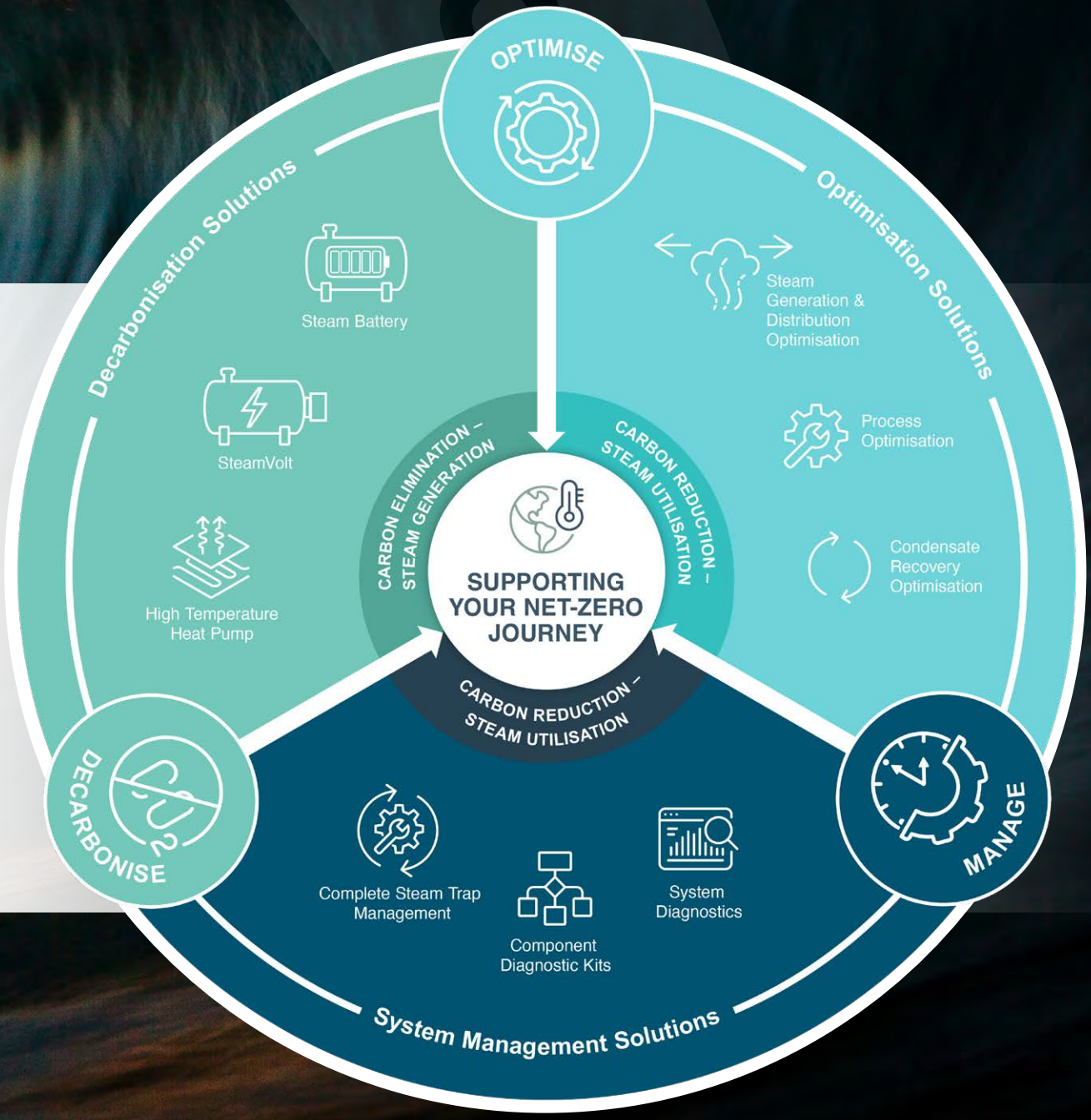
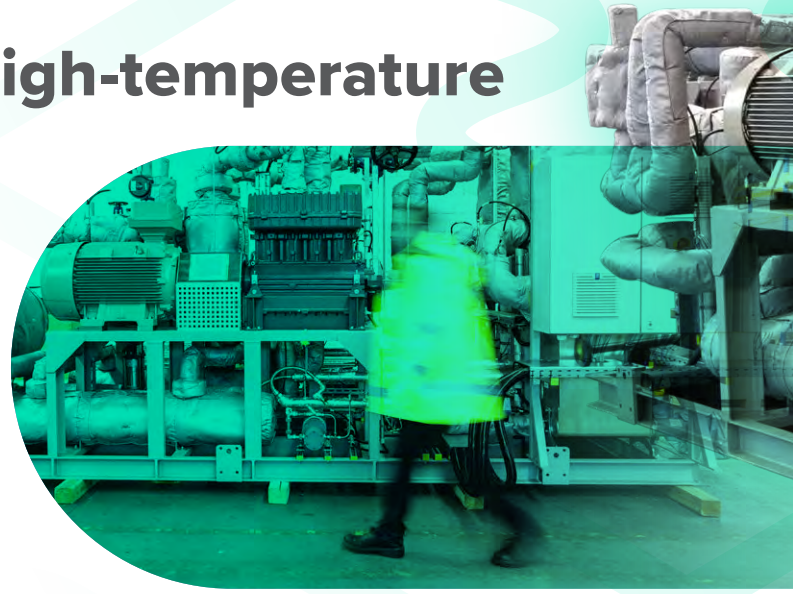

OPTIMISE
Decarbonisation Solutions
Optimisation Solutions
Steam Battery
SteamVolt
High Temperature Heat Pump
Steam Generation & Distribution Optimisation
Process Optimisation
Condensate Recovery Optimisation
CARBON ELIMINATION – STEAM GENERATION
CARBON REDUCTION – STEAM UTILISATION
SUPPORTING YOUR NET-ZERO JOURNEY
CARBON REDUCTION – STEAM UTILISATION
DECARBONISE
MANAGE
Complete Steam Trap Management
Component Diagnostic Kits
System Diagnostics
System Management Solutions

SUSTAINABLE INNOVATION:

Strategic benefits of high-temperature heat pumps

Our advanced industrial high-temperature heat pump system is engineered to deliver exceptionally high temperatures with unparalleled efficiency. By capturing and re-purposing waste process heat, this system effectively recovers valuable thermal energy.



TOP **BENEFITS...**

01

Eliminate CO_2 emissions by adopting green electricity

02

Reduce reliance on fossil fuel consumption across systems

03

Recover and **re-use waste heat to improve overall efficiency**

04

Deliver **high temperatures up to 175°C**, soon up to 200°C

05

Lower energy costs

06

Increased efficiency with **wide adaptability across processes**

07

Guaranteed peace of mind with **regular support to ensure optimum performance**

08

Seamless integration into your thermal energy processes

DECARBONISE WITH UNPARALLELED EFFICIENCY

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Industrial Sectors

- F&B
- Chemical
- Pulp & Paper
- Pharmaceutical
- Healthcare

HEAT SINK OUTPUT

HIGH TEMPERATURE THERMAL FLUIDS (WATER / OIL)

UP TO **175°C**

THERMAL OUTPUT CAPACITY

RANGE OF

0.3 – 2.5 megawatts

WASTE H SOURCE TEMPS

AS LOW AS

30°C

High-Temperature Thermal fluids

HIG TEMPER HEAT

HIGH RAN BETW

100%

AND **30%**

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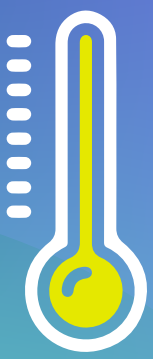
EAT
INPUT



GH-
RATURE
PUMP

Steam

GEABILITY
WEEN

OF LOADING
WHILST
MAINTAINING
SUPERIOR
EFFICIENCY

HEAT SINK OUTPUT
SATURATED
STEAM

1-8 barg

STEAM OUTPUT
CAPACITY

RANGE OF

0.5 – 3.6

tonnes

PER HOUR OF STEAM FLOW

Designed and customised solutions for your specific requirements.

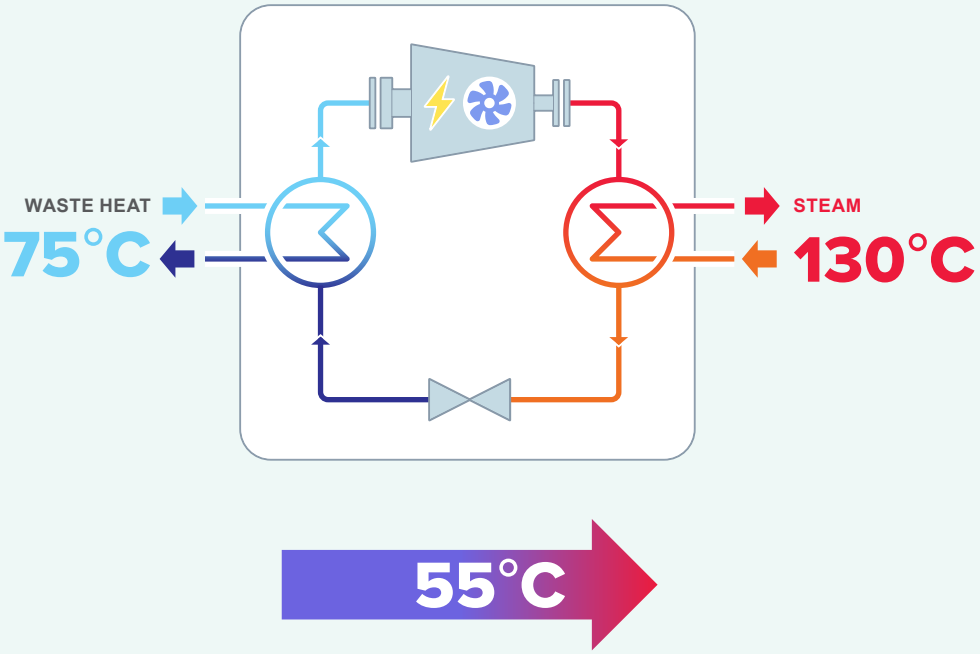
At Spirax Sarco, we understand that every business and industry has unique thermal energy needs. That's why we don't believe in a one-size-fits-all approach. Our expertise allows us to meticulously design and customise the ideal industrial high-temperature heat pump solution for your specific requirements.

Whether you need a single-stage or double-stage vapour compression system, we analyse your needs and optimise the Coefficient of Performance (COP) to ensure maximum efficiency and performance. With our tailored approach, you can rest assured that your heat pump will deliver the precise thermal output you need, maximising energy savings and minimising your environmental impact.

Our ability to make systems that can encompass multiple stages enables a wide range of waste heat sources to be used.

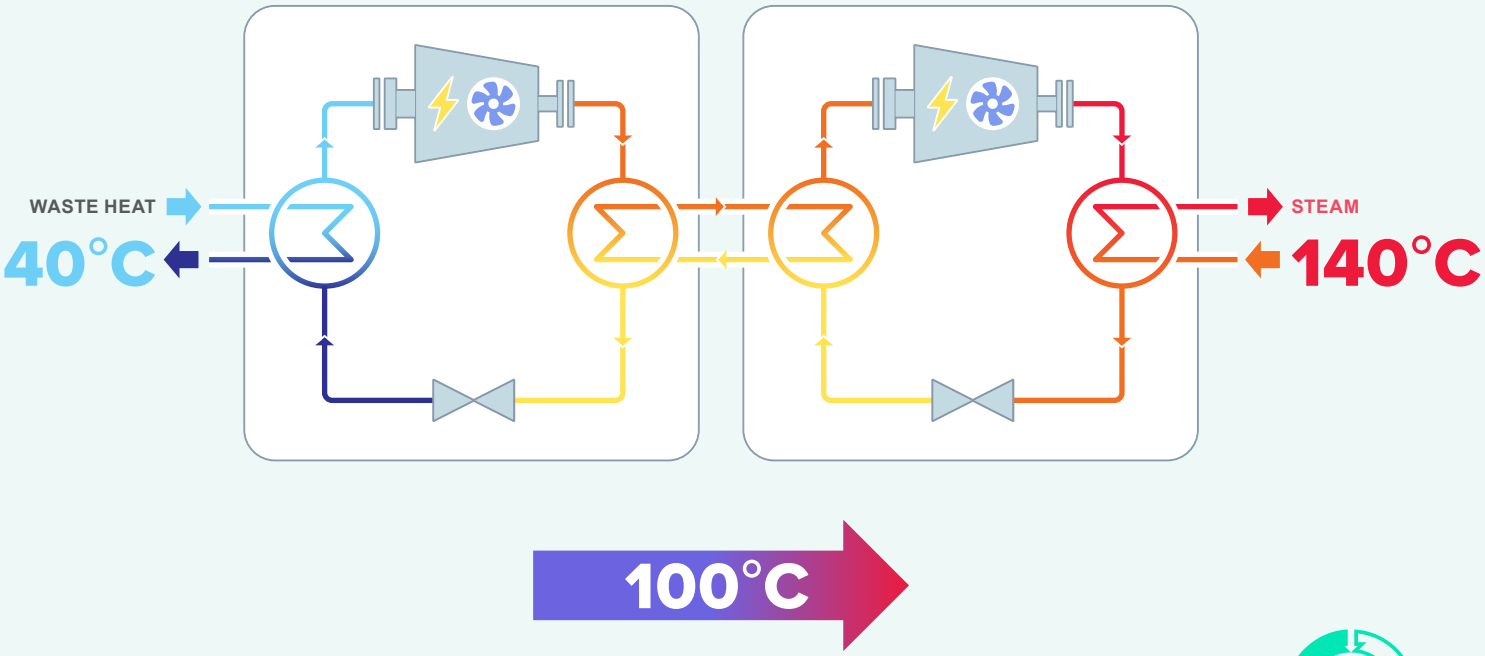
Single stage

High-temperature heat pump



Two stage

High-lift high-temperature heat pump



The values shown are for illustration only, other process variables possible

SMART INTEGRATION FOR EFFICIENT STEAM AND HEAT SOLUTIONS

Spirax Sarco understands that integrating a high-temperature heat pump is about more than choosing the right equipment – it's about ensuring the solution fits seamlessly into your specific process and operational needs. Every factory and application is different, so we take a tailored approach to help you achieve reliable, efficient performance.

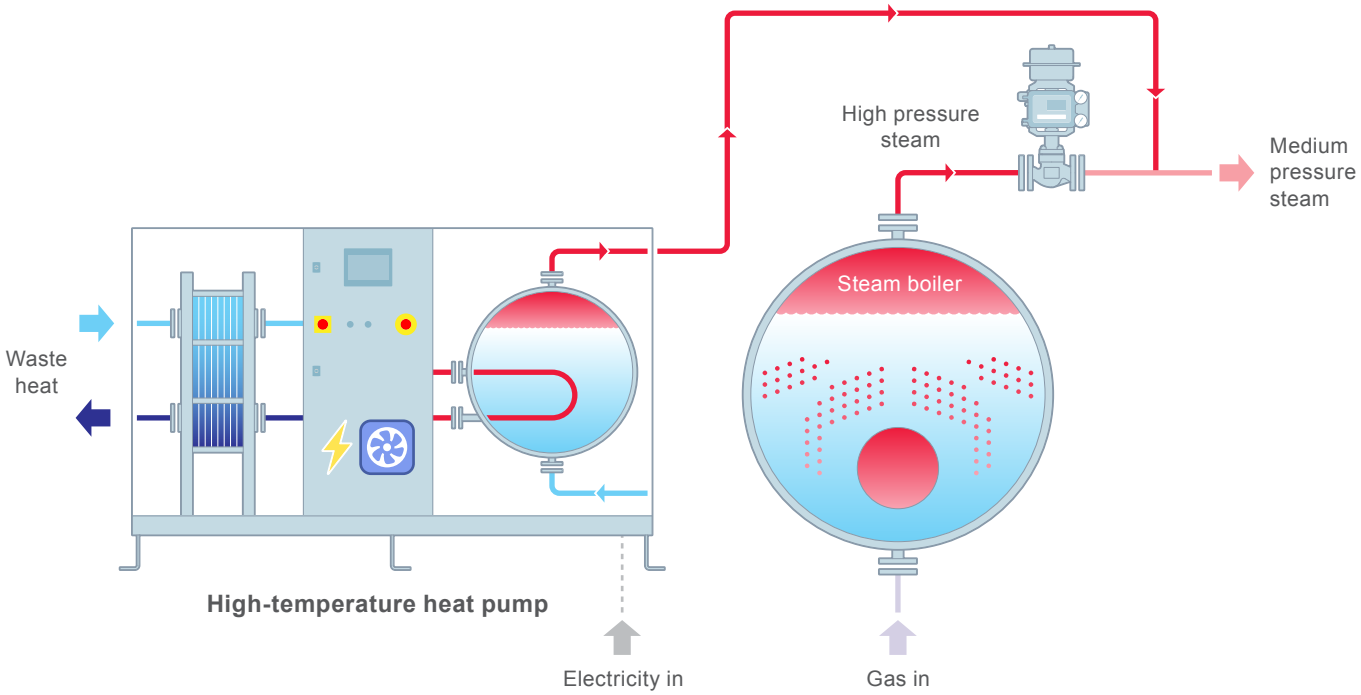
The following pages show a selection of integration examples to help you visualise how high-temperature heat pump can be incorporated into your operation and the flexibility available to you.

Integration with fossil-fueled boilers

This approach enables a phased transition to decarbonisation by recovering waste heat through your existing boiler and steam infrastructure. It helps cut CO_2 emissions and, with a strong COP, offers the potential for lower operating costs.

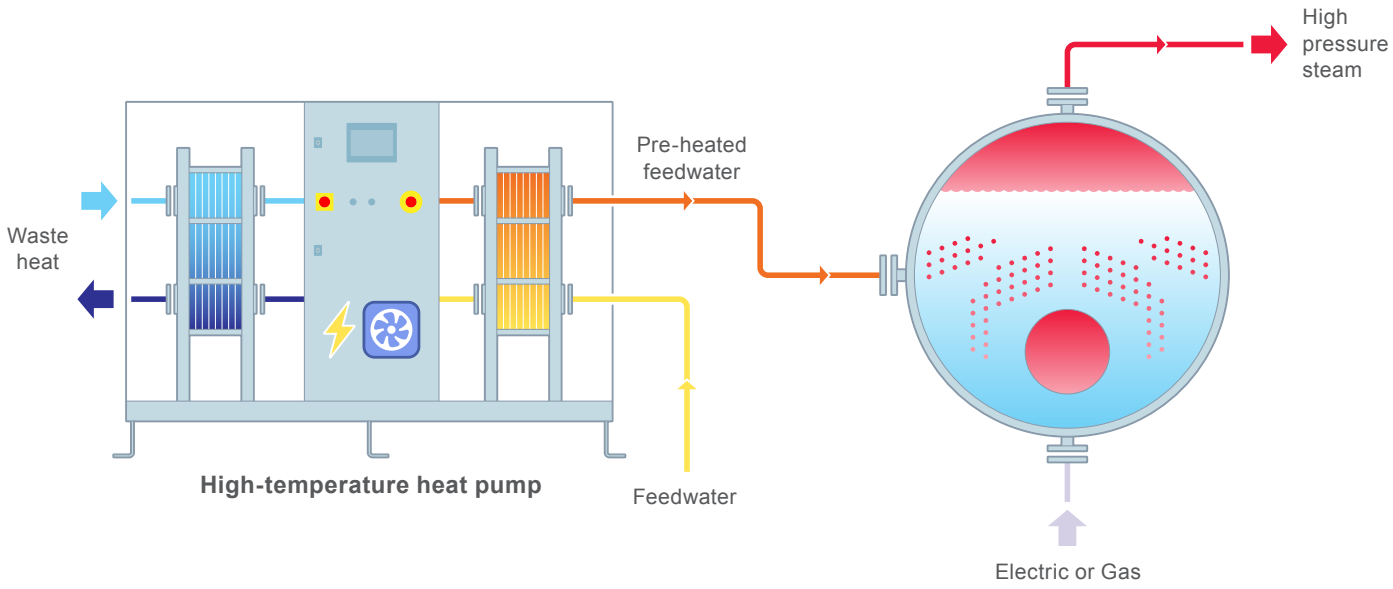
Integrating high-temperature heat pumps into existing steam generation systems

Decarbonising steam generation doesn't have to mean starting from scratch. By integrating high-temperature heat pumps with your existing fossil-fueled steam infrastructure, you can take a phased approach to sustainability. This solution enables efficient recovery and reuse of waste heat, reducing reliance on fossil fuels while maintaining operational flexibility.



As a boiler feedwater preheater

High-temperature heat pumps can also provide additional preheating to boiler feedwater, further improving energy utilisation. The result? Lower CO_2 emissions, strong COP values, and the potential for reduced operating costs – all while leveraging your existing boiler and steam infrastructure.



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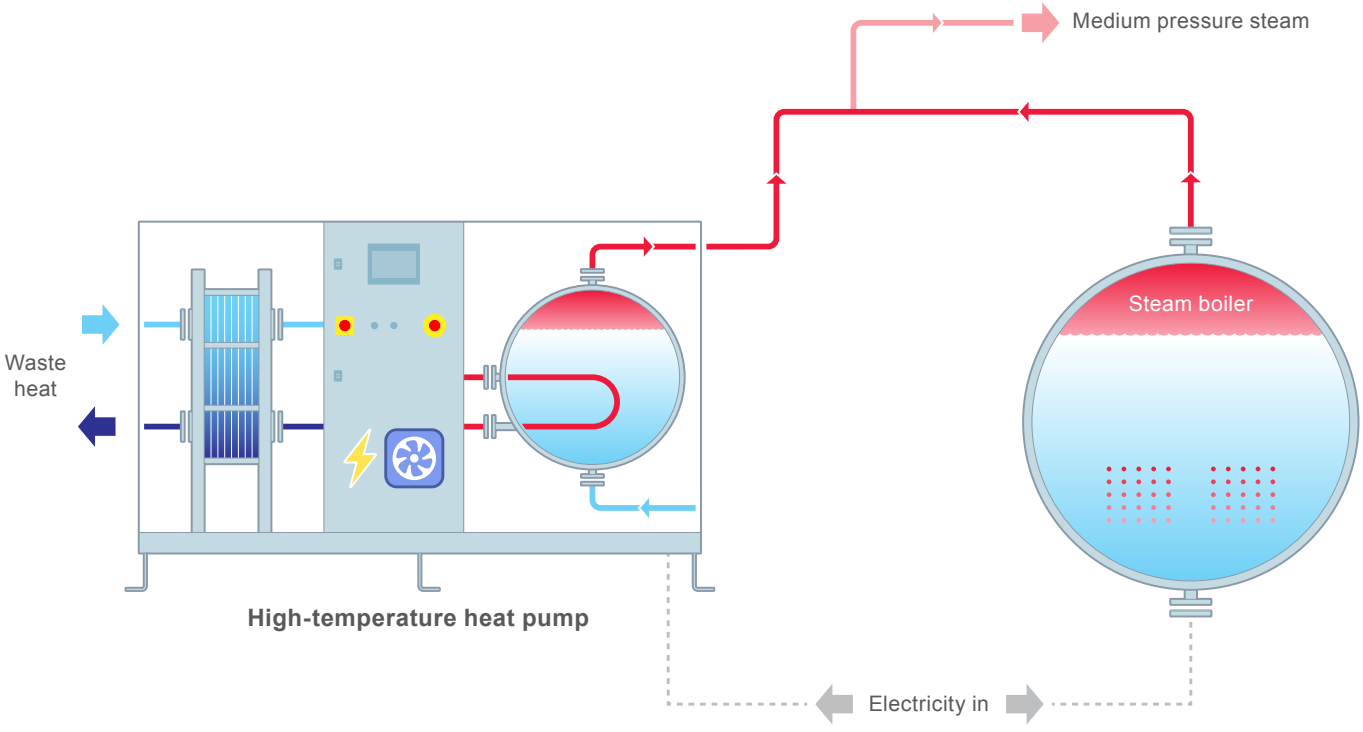
Electric boiler (hybrid)

Integrating a high-temperature heat pump with electric boilers creates a smart, efficient hybrid system. The heat pump delivers most of the thermal load, while the electric boiler meets peak demand – ensuring consistent performance and optimal energy use.

Integrated heat pump and electric boiler systems: a smarter way to heat

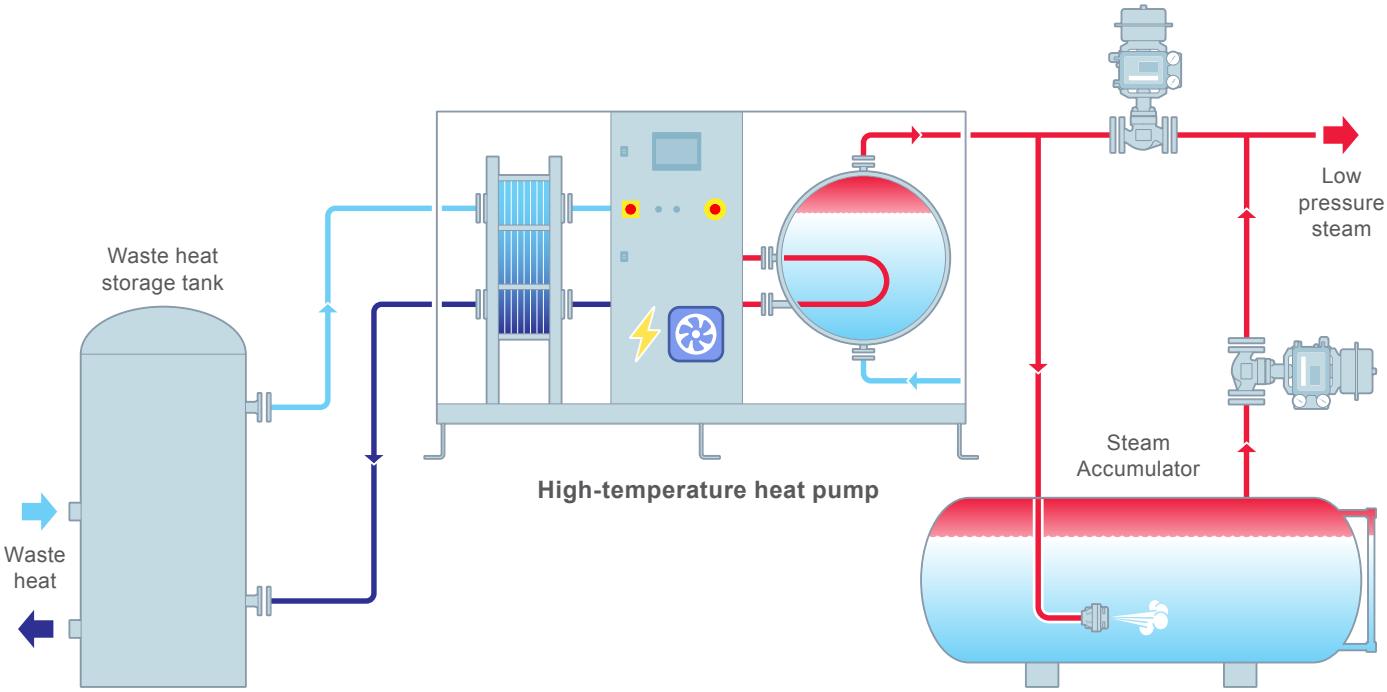
Combining a high-temperature heat pump with electric boilers creates a flexible, energy-efficient heating solution for industrial applications. The heat pump handles most of the thermal load, operating at high efficiency to meet continuous demand. When peak loads occur, the electric boiler steps in seamlessly. This complementary approach ensures each technology plays to its strengths – reducing energy consumption, optimising performance, and maintaining reliable heat even under changing conditions. Together, they deliver a system that maximises efficiency and supports sustainability goals without compromising on resilience.



Integration with thermal storage upstream/downstream

Balancing heat supply and demand with smart storage

When waste heat sources fluctuate in temperature and flow, plant requirements don't always match what's available. Heat storage solutions – such as buffer vessels or accumulators – offer a practical way to bridge that gap. Acting as thermal reservoirs, they store surplus heat when supply is high and release it when demand rises. This approach helps smooth out variability, stabilising high-temperature heat pump operation and reducing load fluctuations. The result? Improved system efficiency, greater flexibility, and easier integration with diverse heat sources – all while supporting a more resilient and sustainable process.



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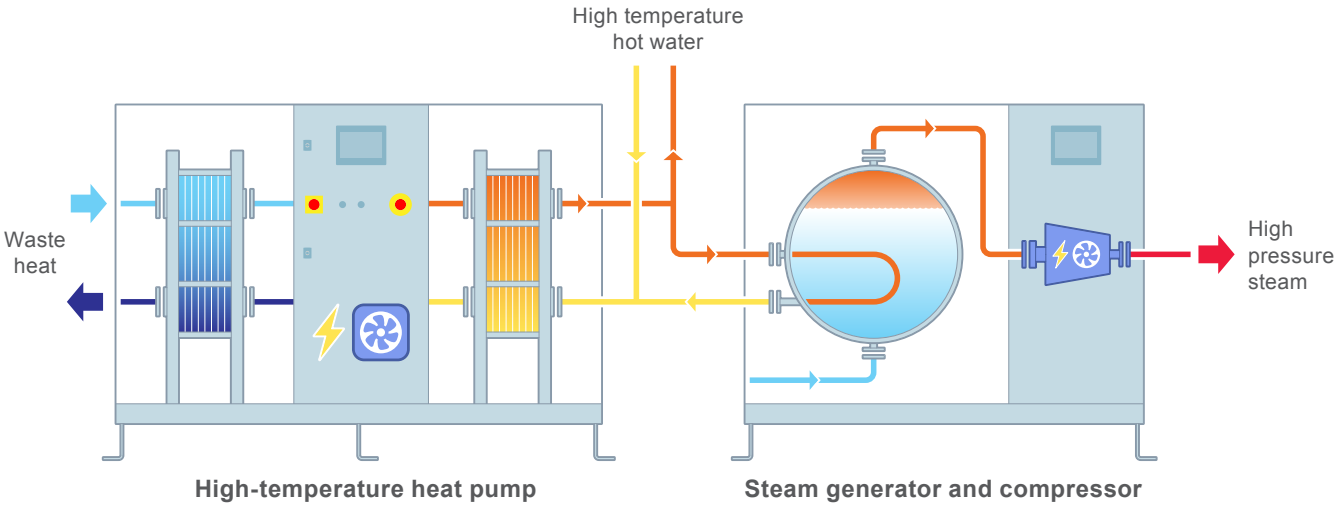
High-temperature heat pumps with steam compression (or MVR)

High-lift heat systems with steam compression for maximum flexibility to enable the supply of both high temperature hot water and steam

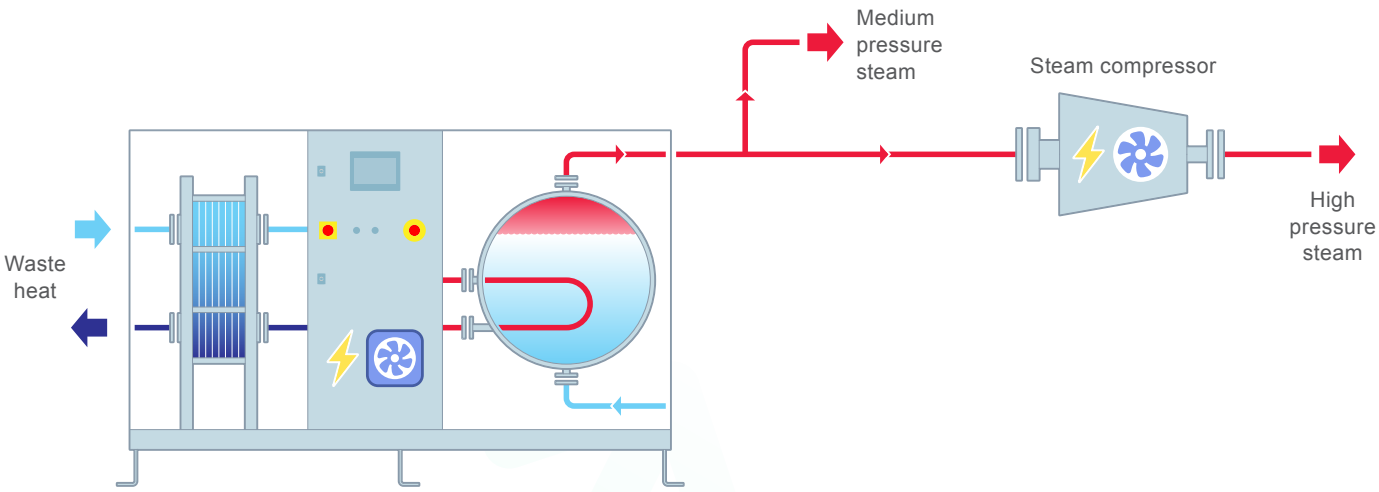
In applications where high temperature hot water is required and is generated in a high-temperature heat pump, add a steam generator and compressor package to raise useful steam, giving you the flexibility to meet diverse operational needs.



Integrating steam compression technology enables larger temperature lifts and produces higher-pressure steam with a lower CO2 footprint. This approach enhances efficiency and supports sustainability, making it ideal for demanding industrial applications.

Achieve higher temperatures and pressures with a lower carbon impact

By using the high-temperature heat pump for the initial lift and the steam compressor for the final boost, you can achieve higher steam pressures. This approach makes smart use of waste heat and renewable energy sources to cut CO_2 emissions – while still supporting high-demand applications.



High-temperature heat pump

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REFRIGERANTS

Choosing the right refrigerant for high-temperature heat pumps

Selecting the right refrigerant is central to every high-temperature heat pump. It shapes performance, safety, environmental impact, lifetime cost, and compliance for years to come. With industrial decarbonisation moving fast, finding a fluid that delivers efficiency, sustainability, and practicality is critical.

Hydrofluoroolefins: modern efficiency with compliance built in

Hydrofluoroolefins (HFOs) are gaining traction in modern high-temperature systems. Their ultra-low global warming potential and strong thermodynamic performance enable high discharge temperatures with impressive energy efficiency. Non-flammable and non-toxic, HFOs suit diverse industrial settings while supporting compliance with evolving F-gas regulations.

Natural refrigerants: returning to sustainable roots

Natural refrigerants remain a key part of the picture. The first refrigeration systems relied on these fluids, and today the industry is returning to those inherently sustainable options. Hydrocarbons like butane and pentane deliver outstanding efficiency and some of the lowest global warming potential available. They do require careful safety measures and charge minimisation, but the payoff is reliable, future-ready performance with strong cost benefits.

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