

thermeco<sub>2</sub>

# PUMP IT UP!

The thermeco<sub>2</sub> high-temperature heat pump  
from ENGIE Refrigeration





**03**

The facts at a glance

**04**

Models

**05**

Product features

**06 – 07**

Exploded view and benefits

**08 – 13**

Simultaneous heating and cooling supply

**14 – 17**

CO<sub>2</sub> as a refrigerant

**18 – 23**

Industries and references

**24**

Contact and imprint

**TABLE OF**  
CONTENTS

# OUR thermeco<sub>2</sub> HIGH-TEMPERATURE HEAT PUMP IS UNIQUE.

**100%**  
REGENERATIVE HEAT GENERATOR

up to  
**+90°C**  
COOLING MEDIUM OUTLET TEMPERATURE

**HIGH-END**  
TECHNOLOGY

**90 to 1,000** kW  
RATED HEATING CAPACITY

QUALITY  
**MADE IN GERMANY**

**SIMULTANEOUS**  
HEATING AND COOLING

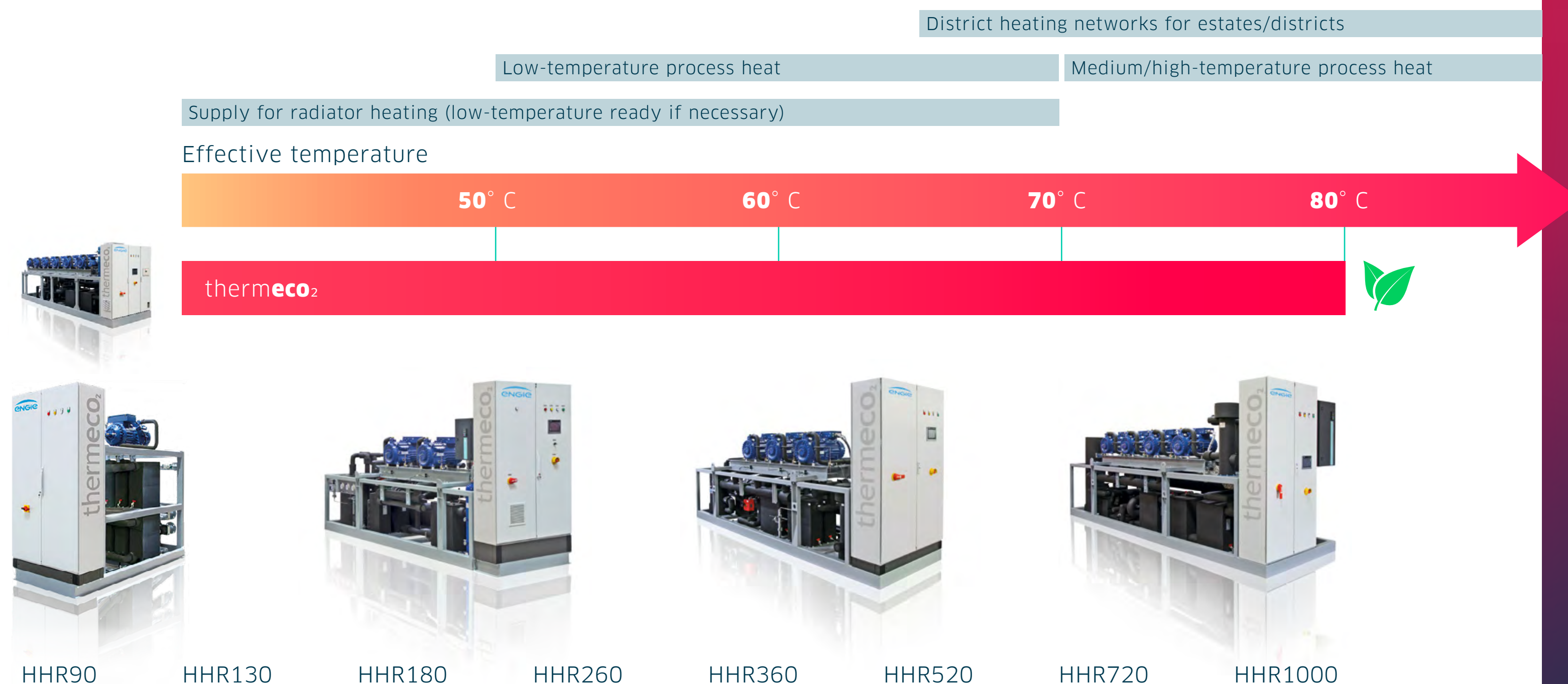
COMPACT AND ROBUST  
**DESIGN**

**SEE** for **03**  
yourself!



# ONE SERIES, EIGHT MODELS:

thermeco<sub>2</sub> offers the right performance for your application.



We offer you many power levels – between 90 and 1,000 kW for indoor installation and with low safety requirements. High condenser leaving water temperatures of up to +90 °C are possible. And one thing is certain with every version:

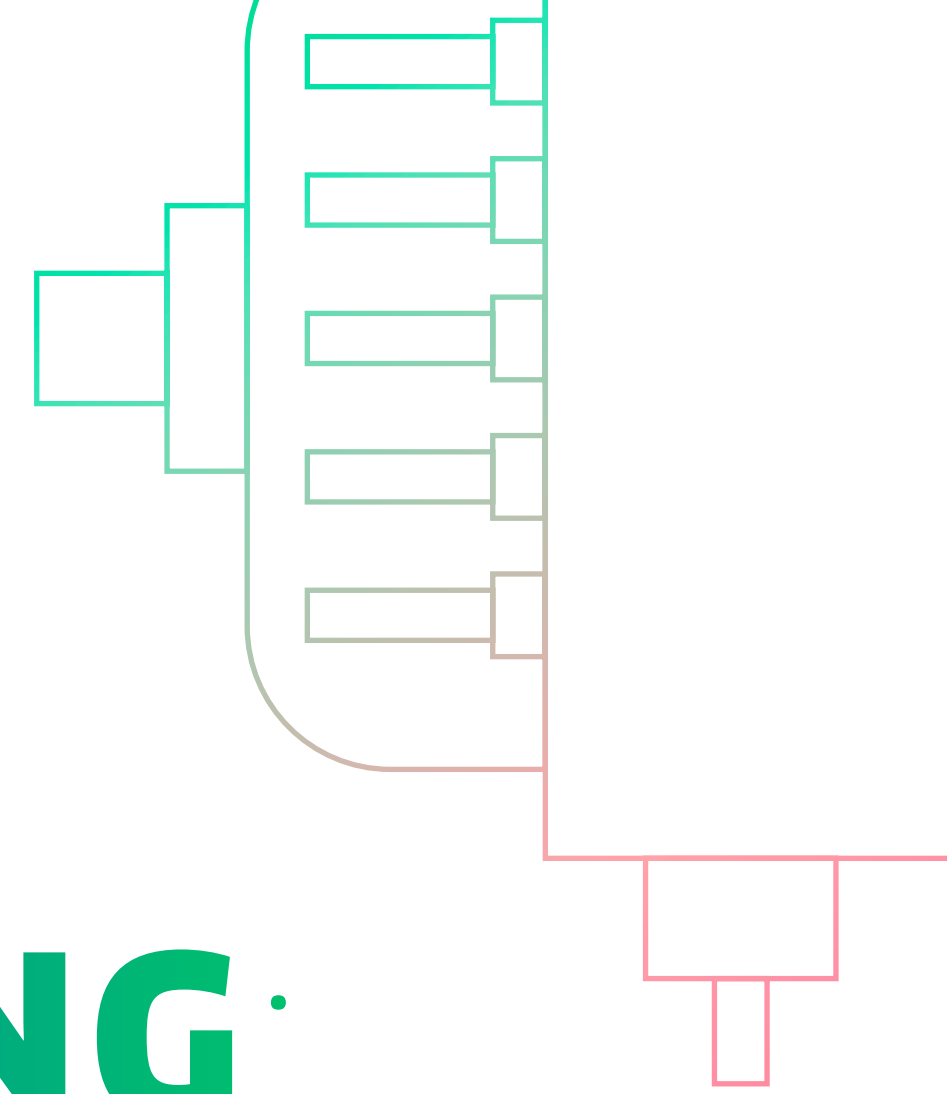
thermeco<sub>2</sub> improves your carbon balance!

**100 %**  
regenerative  
heat  
generator

**04**



# WHY HEAT PUMPS **MEAN** **SMARTER HEATING:**



Discover the functional principle of the therm**eco**<sub>2</sub> high-temperature heat pump!

Heat pumps are an especially intelligent and sustainable way of generating heat out of energy from renewable sources. And heat pumps are more than just an energy-saving and environmentally friendly way of heating. Clever concepts make it possible to use just one system to provide heat in the winter and cooling in the summer. In the same way, it is possible to simultaneously generate heating and cooling for offices and industrial processes, for example.

Heat pumps allow cooling and heat generation to be taken to new levels of efficiency for all kinds of applications. Our heat pumps with CO<sub>2</sub> technology, including therm**eco**<sub>2</sub>, are especially sustainable: the natural refrigerant is powerful, climate-friendly and non-critical to use.

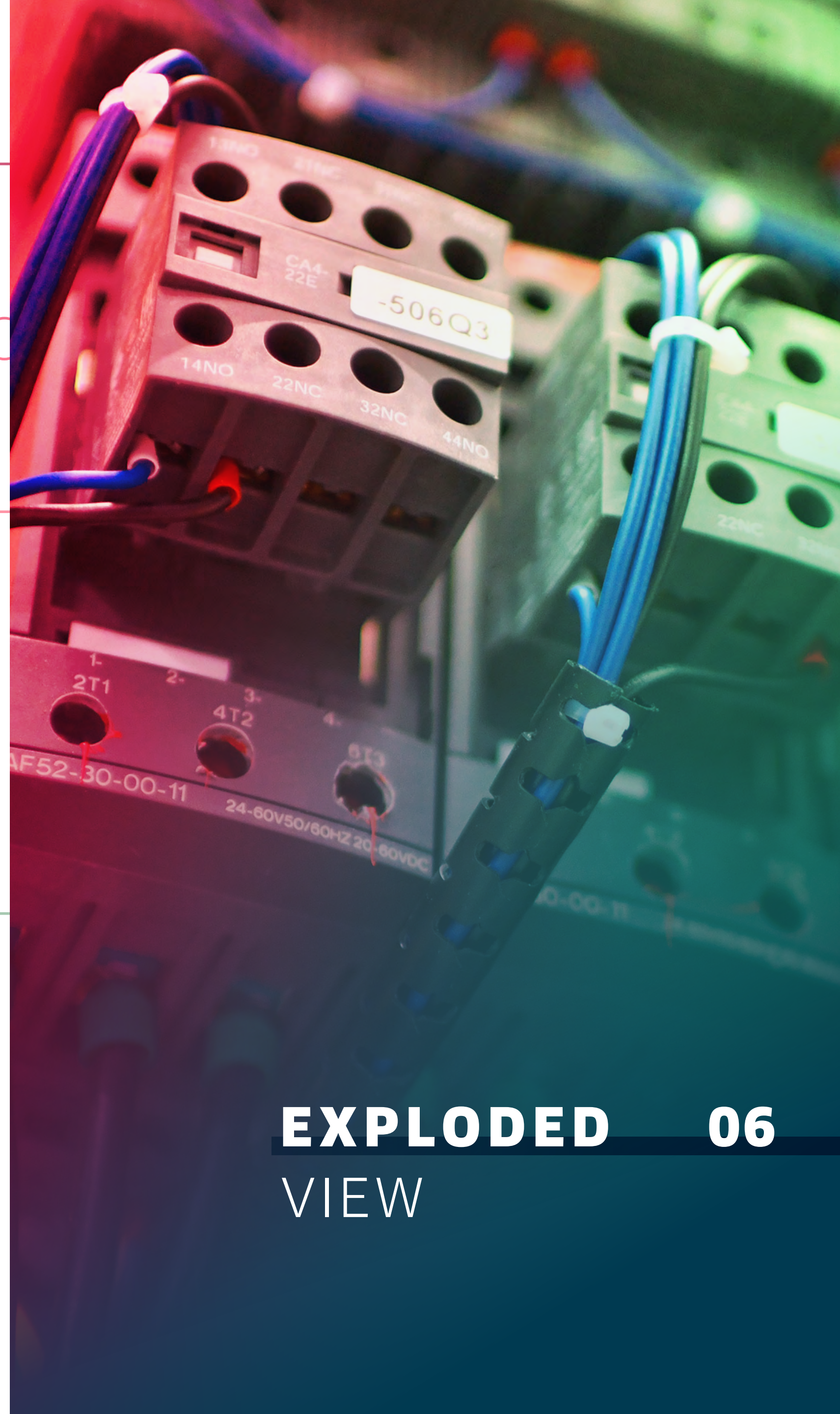
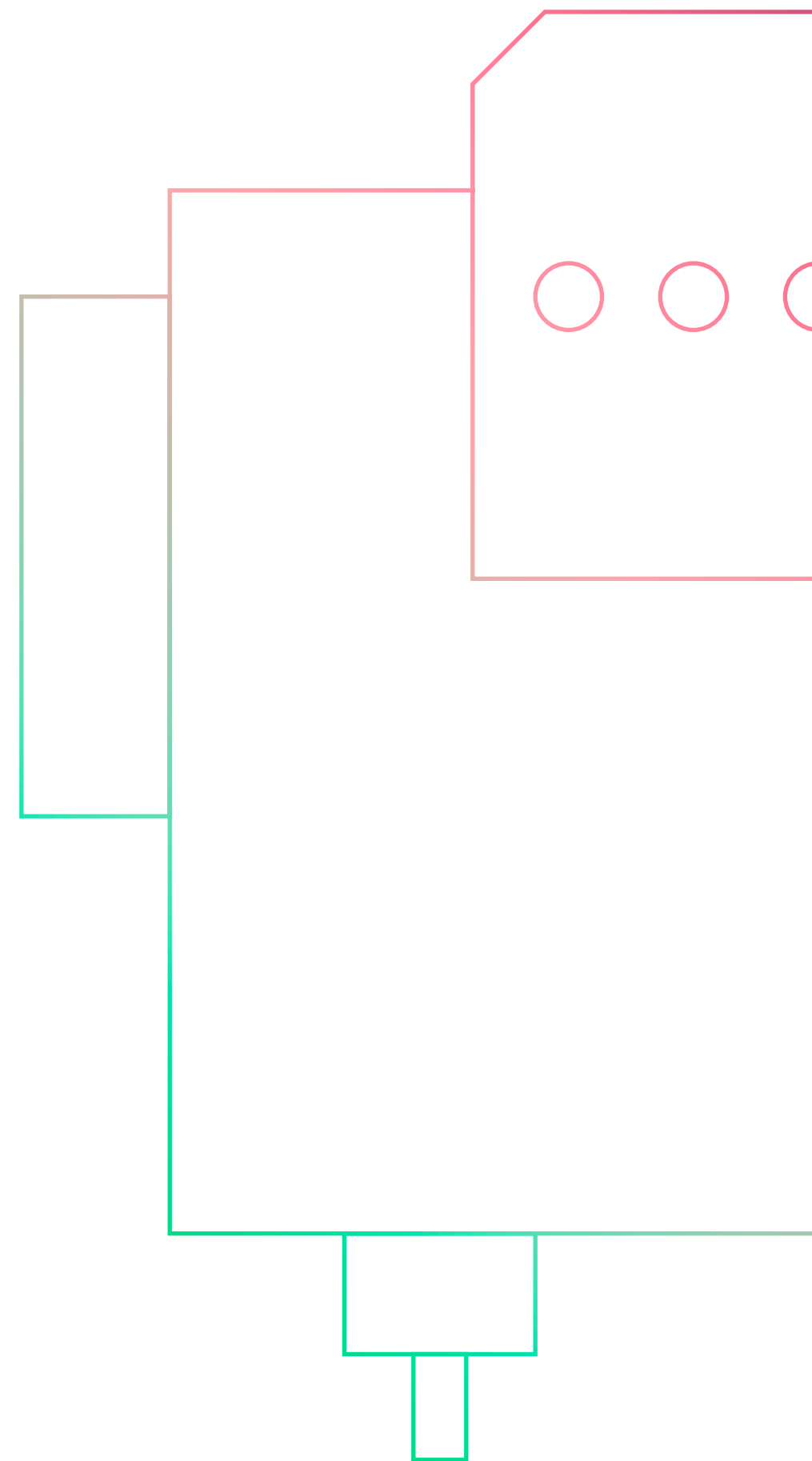
**PRODUCT** **05**  
FEATURES



# thermeco<sub>2</sub> - **PERFECTLY** THOUGHT-OUT

Users who choose the thermeco<sub>2</sub> benefit from an efficient, energy-saving and environmentally friendly technology.

This is ensured by a sophisticated design principle that relies primarily on high-end components - for top quality **made in Germany**.



**EXPLODED** 06  
VIEW



### Touch panel

- 7-inch touch display with intuitive operating concept



### Switch cabinet

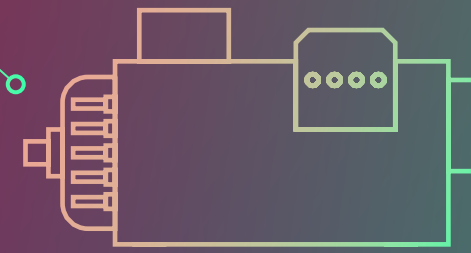
- Quality made in Germany
- Variable regulation concept, top computing speed and IT security thanks to integrated Siemens S7 PLC
- Connectivity with standard BCS protocols
- Compact design with diverse options
- Energy management options
- Optional connection to CoolCare remote maintenance software

### Insulation

19 mm diffusion-resistant insulation of the entire refrigerant circuit prevents condensation and corrosion

### Compressor

- Semi-hermetic reciprocating compressors
- Condenser leaving water temperatures up to 90 °C
- High-pressure design for maximum temperatures with optimum efficiency
- Part winding start reduces the start-up current peaks



### Internal heat exchanger (IHE) with control valve

- IHE improves efficiency (COP)
- Enables higher cooling medium outlet/supply temperatures
- 3-way control valve prevents pressure peaks and thus expensive system downtimes and the risk of inadequate heating supply



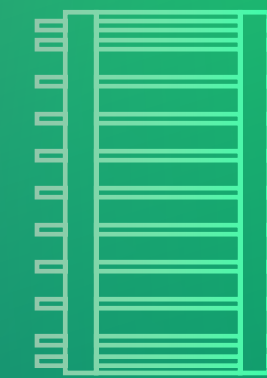
### Evaporator

- High-pressure plate heat exchanger in soldered version
- High resistance against corrosion and extreme pressures for transcritical applications with CO<sub>2</sub>
- Integrated refrigerant distribution system for optimum evaporator performance



### Gas cooler

- Counterflow plate heat exchanger in soldered version with slim exterior carbon steel frame for extremely high operating pressure
- Low storage volume and lower refrigerant filling enable a fast reaction to temperature fluctuations



### Oil regulation system

- Fully automatic, regular and needs-based lubricant supply for all compressors
- Highly efficient, fully welded and maintenance-free oil separator with integrated oil pan
- Filter dryer for high level of operational safety and long service life

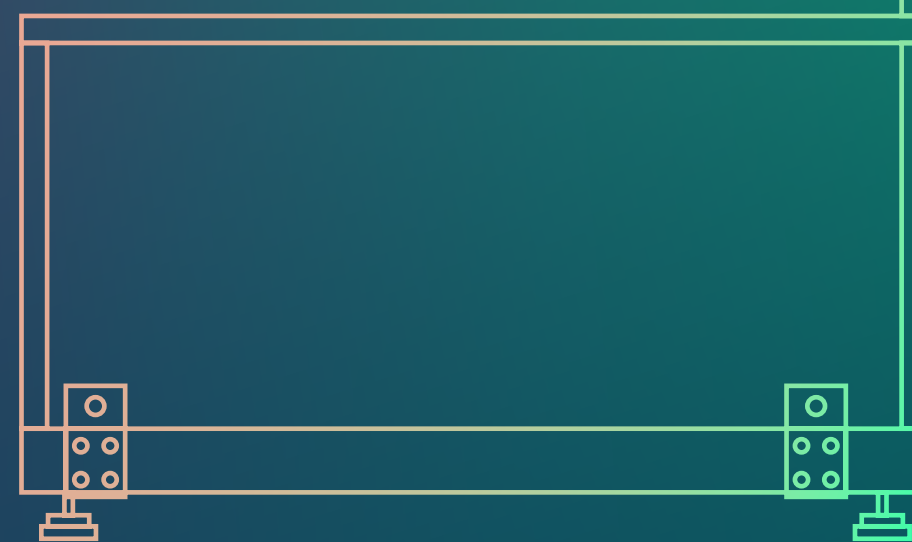


### Refrigerant

- Natural refrigerant CO<sub>2</sub> [R-744]
- Low safety requirements due to safety group A1
- The refrigerant does not contribute to the destruction of the ozone layer (OPD=0) or the greenhouse effect (GWP=1)

### Frame

- Welded steel frame combines stability and a compact design into a robust industrial solution
- Rubber-bonded metal feet for low-vibration operation
- Easy transport due to integrated crane eyes
- Easy maintenance and accessibility due to optimised positioning of components



# EXPLODED VIEW 07





“How can the heating and cooling supply be more green? ENGIE Refrigeration provides the answer. Our therm**eco**<sub>2</sub> high-temperature heat pump is a key heating and cooling technology.

It develops its full potential whenever there is a simultaneous strong demand for heating and cooling. This is where it shines with an outstanding performance and maximum efficiency. That is how we assist you reliably on your path to climate neutrality!”

**Jochen Hornung**

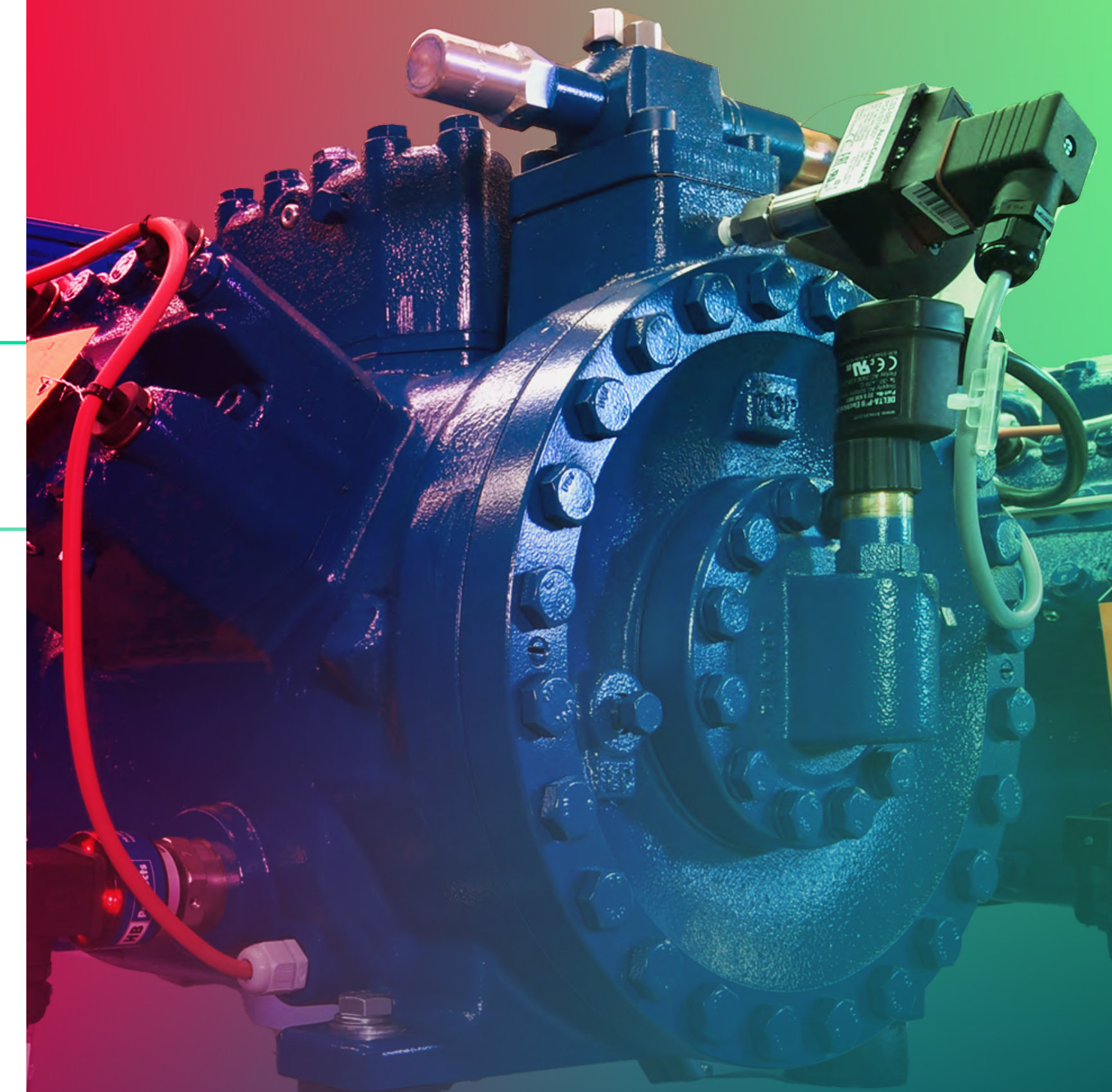
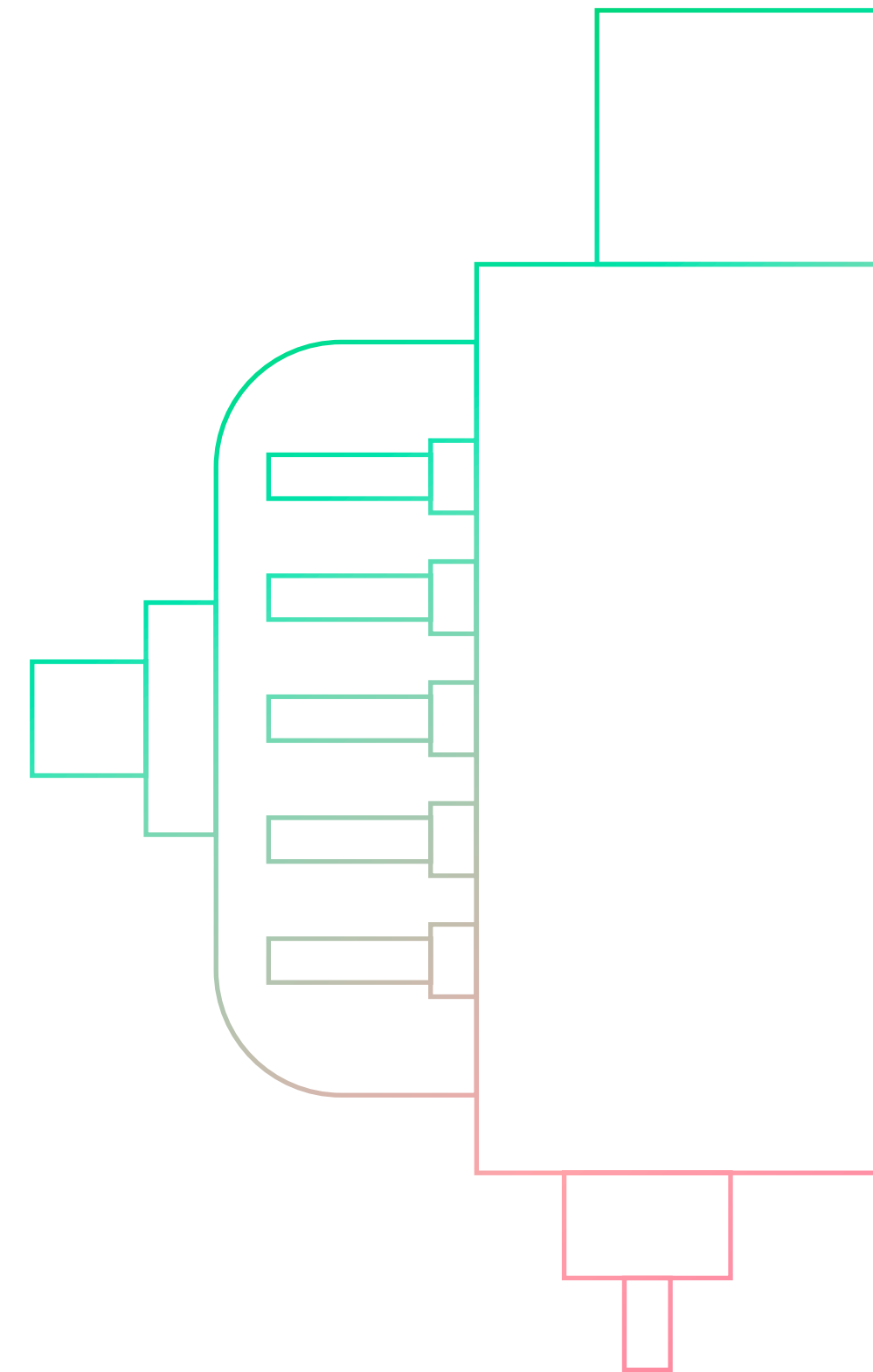
CEO of ENGIE Refrigeration



# UNUSED **POTENTIAL?** NOT WITH thermeco<sub>2</sub>!

Our high-temperature heat pumps make it possible to generate warm water and chilled water with just one machine.

**How you benefit:** You save money on investment and operation while saving the environment. That is how you can utilise the full potential!



**SIMULTANEOUS 09**  
HEATING AND  
COOLING



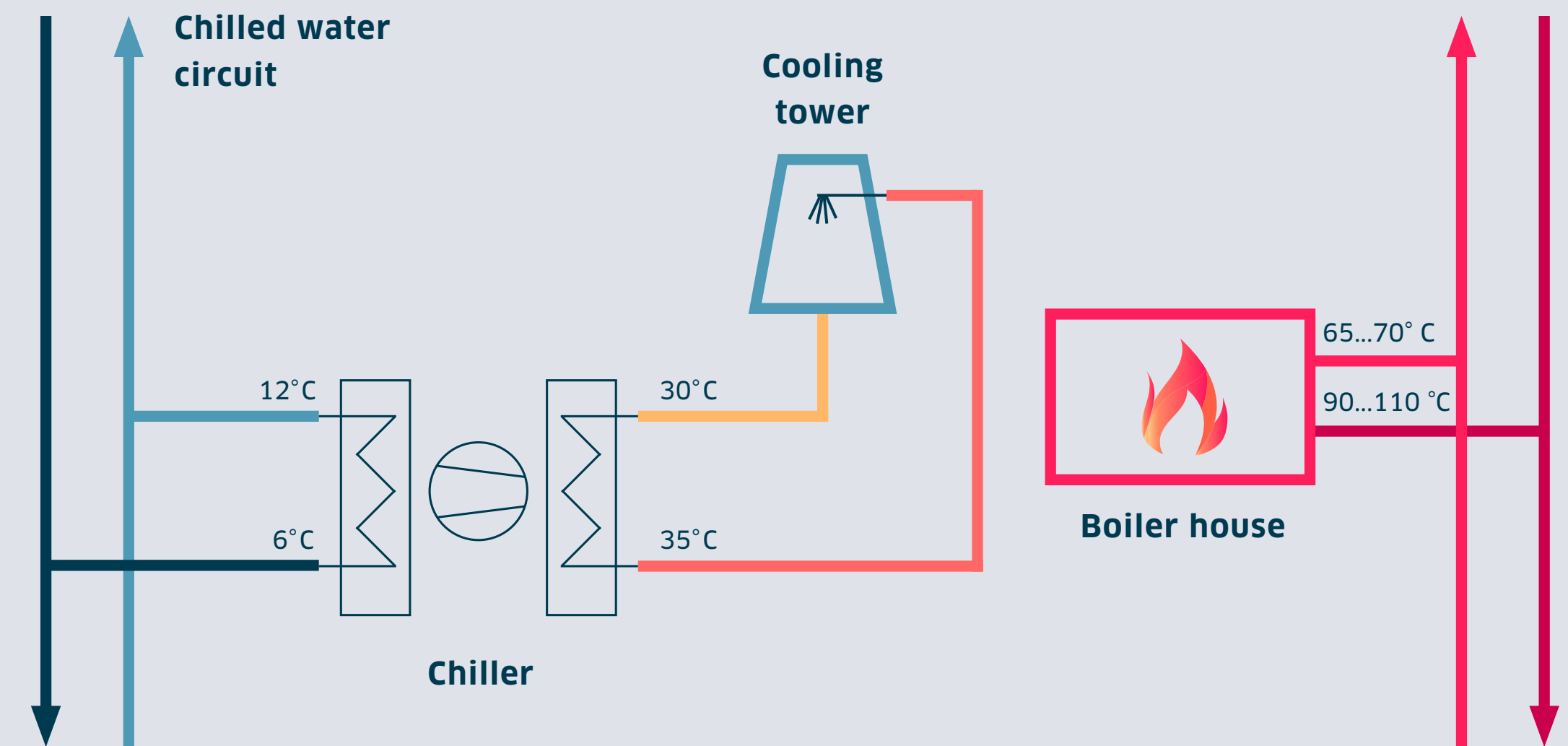
## DOES THIS SEEM FAMILIAR?

Standard heating and cooling application involving two systems?

In Germany, this is the typical starting point: so far, you have used the two standard applications for heating and cooling in two systems.

Warm water is generated in the boiler house, refrigeration is performed by conventional chillers, and the exhaust heat from the refrigeration is released into the environment by a re-cooling system such as a cooling tower.

**The results: high costs for gas, electricity and water treatment.**



**Standard heating  
and cooling  
application involving  
two systems**

**SIMULTANEOUS 10**

HEATING AND  
COOLING

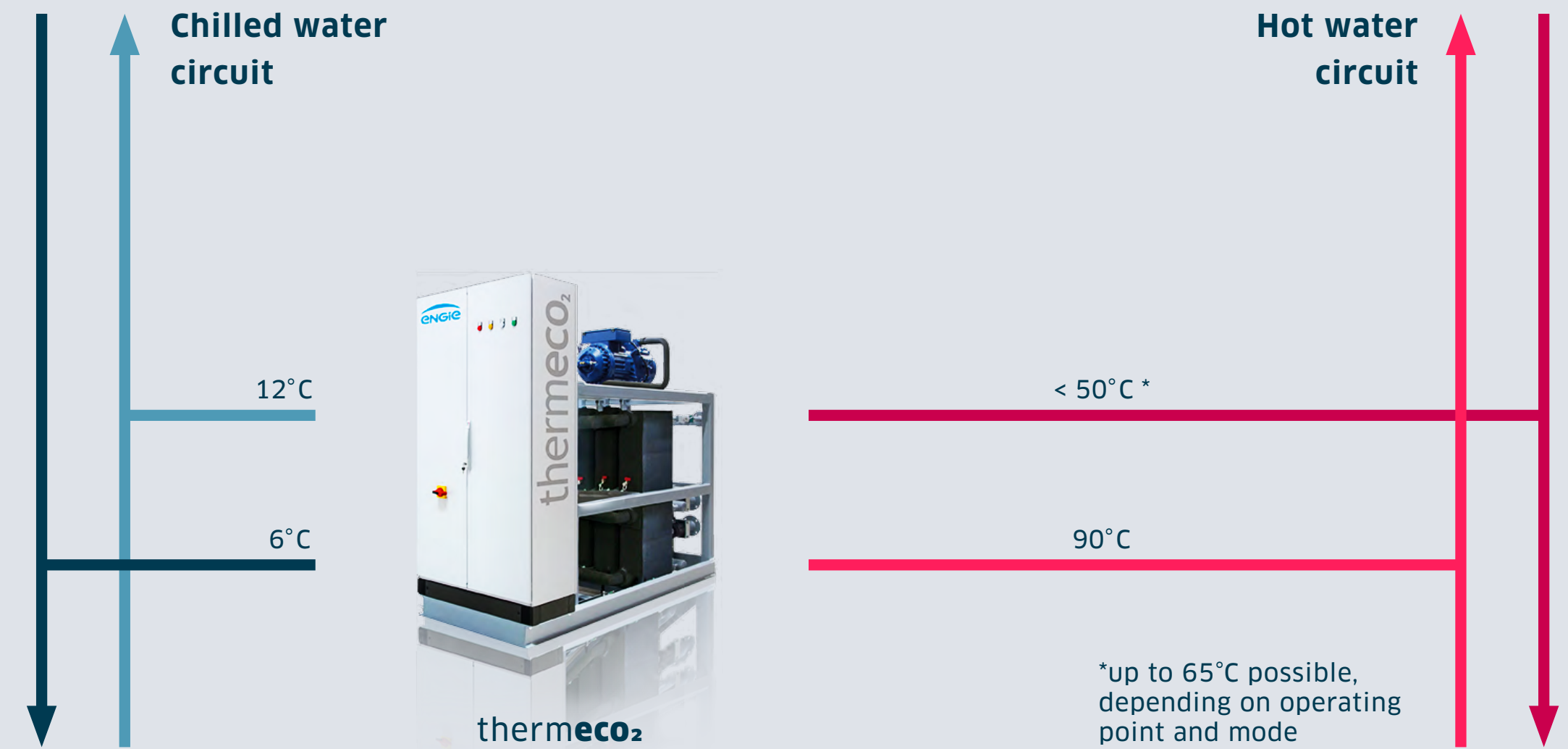


## YOUR FUTURE:

### Heating and cooling supply with thermeco<sub>2</sub>

Now all you need is our thermeco<sub>2</sub> high-temperature heat pump to handle the functions of heating and cooling in a single machine and utilise them simultaneously.

thermeco<sub>2</sub> is ideal for challenging temperature ranges. The standard temperature range reaches from +90 °C hot water to -5 °C refrigeration.



**Heating and cooling supply with thermeco<sub>2</sub>**

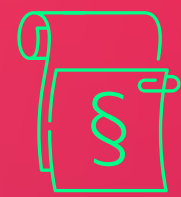
## SIMULTANEOUS 11

HEATING AND COOLING

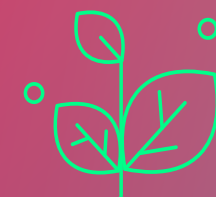


# ALL SIGNS POINT TO THE **FUTURE!**

The therm**eco**<sub>2</sub> prepares your supply and thus your business for a green future. And you gain full planning and investment security.



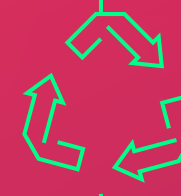
Without statutory limitations



Sustainability is a significant competitive advantage



Security for the future and a secure long-term heating supply



No waste and recycling requirements



National and European funding available



No availability restrictions



Independence from gas and the cost pressure of fossil fuels



Tax-free, therefore self-financing

**SUPPLY 12**  
SECURITY



# Ready for tomorrow? Certainly, with thermeco<sub>2</sub>!

## **GWP = 1**

No destruction of the ozone layer, no greenhouse effect (ODP = 0, GWP = 1)

## **INDUSTRIAL DESIGN**

Highly efficient even in extreme conditions

## **SAFETY GROUP A1**

Low safety requirements

## **WITH PLANNING AND INVESTMENT SECURITY**

No legal restrictions, no taxes, no waste and recycling requirements and no availability restrictions



## **ROI**

Very fast amortisation, eligible for subsidies in various categories

## **SERVICE-FRIENDLY**

No certification of expertise and no certification duties in line with German regulations on chemicals and climate protection

## **KEY TECHNOLOGY**

High-tech machine with interfaces for all common BCS systems, combined with a versatile control concept

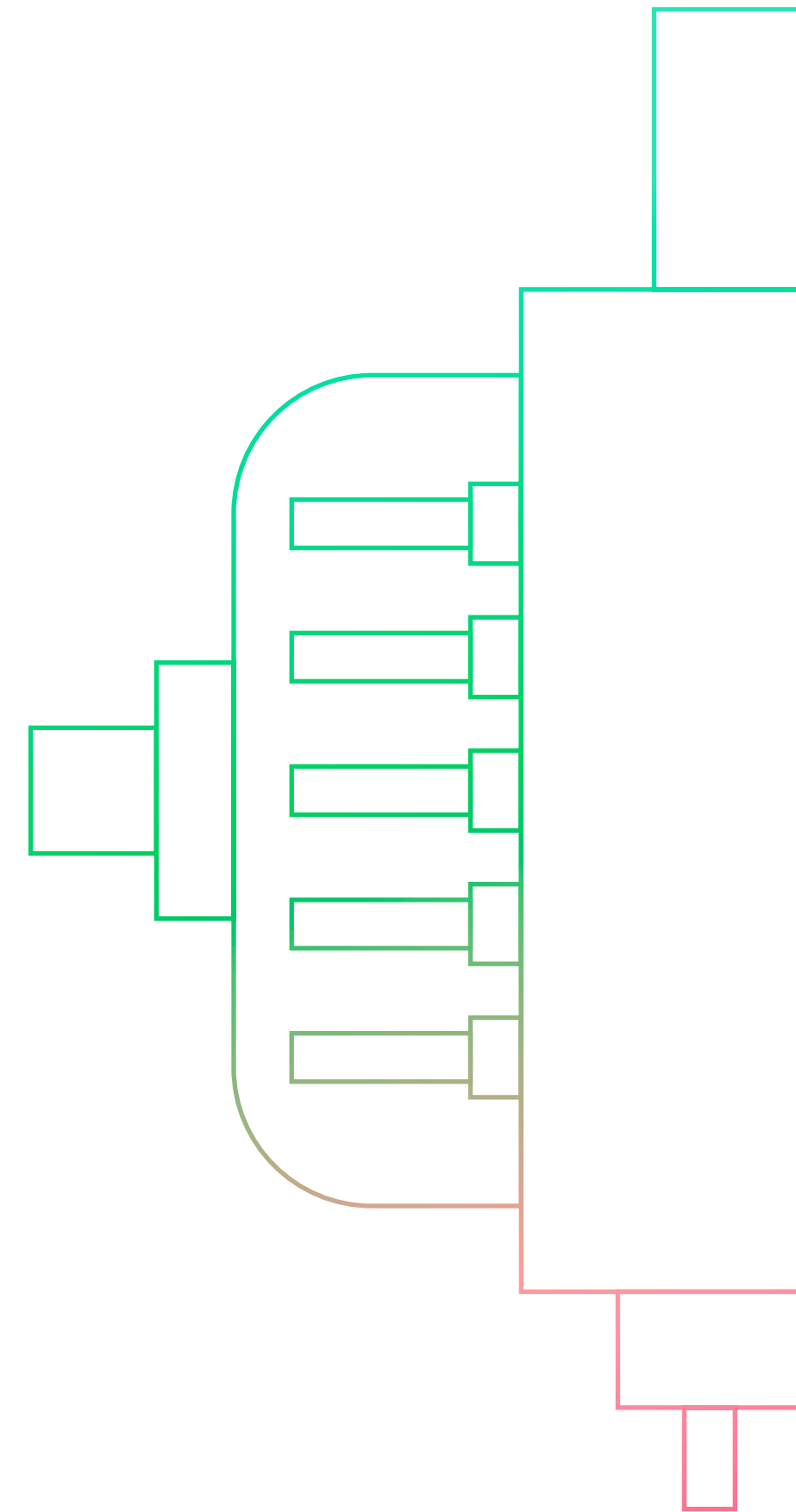
**PRODUCT 13**  
ADVANTAGES



# NATURAL<sup>2</sup>:

## CO<sub>2</sub> as a refrigerant

Our therm**eco**<sub>2</sub> only uses the natural refrigerant CO<sub>2</sub>. That's good for the climate. **And we can explain why!**





# NATURAL<sup>2</sup>: CO<sub>2</sub> as a refrigerant



## WHY IS CO<sub>2</sub> A GOOD REFRIGERANT?

The refrigerant market is currently undergoing a transformation. Environmentally harmful HFC refrigerants are increasingly being replaced with HFO refrigerants and natural refrigerants. The F-gas Regulation has further strengthened the long-term trend towards natural refrigerants.

And CO<sub>2</sub>, technical name R-744, is such a refrigerant. It is both eco-friendly and user-friendly. CO<sub>2</sub> can be used safely as a refrigerant, and it is also cheap and easy to obtain. For this reason it is classed as sustainable.

In addition, CO<sub>2</sub> as a refrigerant has a GWP value of 1 and an ODP value of 0, so it has no harmful effects on the Earth's atmosphere.

## WHAT ARE THE BENEFITS OF USING CO<sub>2</sub> AS A REFRIGERANT?

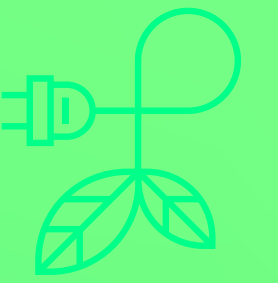
- Future-proof: a natural substance, so no usage prohibitions or restrictions are to be expected
- Very good availability
- Climate neutral and environmentally friendly
- No additional contribution to the greenhouse effect (GWP = 1)
- No contribution to the destruction of the ozone layer (ODP = 0)
- Non-toxic, non-flammable, thermally stable, suitable for materials
- Safety group A1
- Low running costs when compared to other natural refrigerants



**CO<sub>2</sub> AS A** **15**  
**REFRIGERANT**



# NATURAL<sup>2</sup>: CO<sub>2</sub> as a refrigerant



## WHY IS CO<sub>2</sub> NOT HARMFUL AS A REFRIGERANT EVEN THOUGH IT IS A PROBLEM AS EXHAUST GAS FROM COMBUSTION ENGINES?

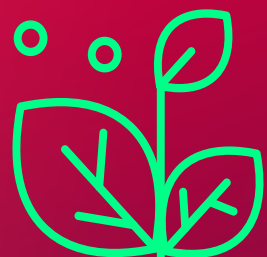
CO<sub>2</sub> refrigerant operates in a cycle process and is not released or emitted as it would be during a combustion process. It can only escape in the form of a leak. Leaks of a refrigerant with a GWP value of 1 are non-critical.

No environmentally harmful to the overall CO<sub>2</sub> balance. All the carbon dioxide involved existed beforehand, so no newly generated CO<sub>2</sub> is released.

CO<sub>2</sub> refrigerant is a by-product generated by plants operated by the chemical industry.





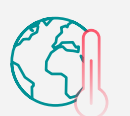










## WHAT ARE THE TECHNICAL CHALLENGES POSED BY MACHINES THAT USE CO<sub>2</sub> AS THEIR REFRIGERANT?

- High efficiency during supercritical operation in the interior heat exchanger
- For maximum efficiency, the required temperature regime needs to match the way the CO<sub>2</sub> heat pump is operated
- High pressures require a corresponding design, but can be managed easily in technical terms. In vehicle manufacturing, for example, much higher pressures of up to 2,000 bar are customary for common-rail injection





# IT'S THE REFRIGERANT THAT COUNTS!

REFRIGERANT	R-744 CO <sub>2</sub>	R-290 PROPANE	R-717 AMMONIA	R-32 HFO	R-134A HFC
Greenhouse effect					
Flammability					
Toxicity					

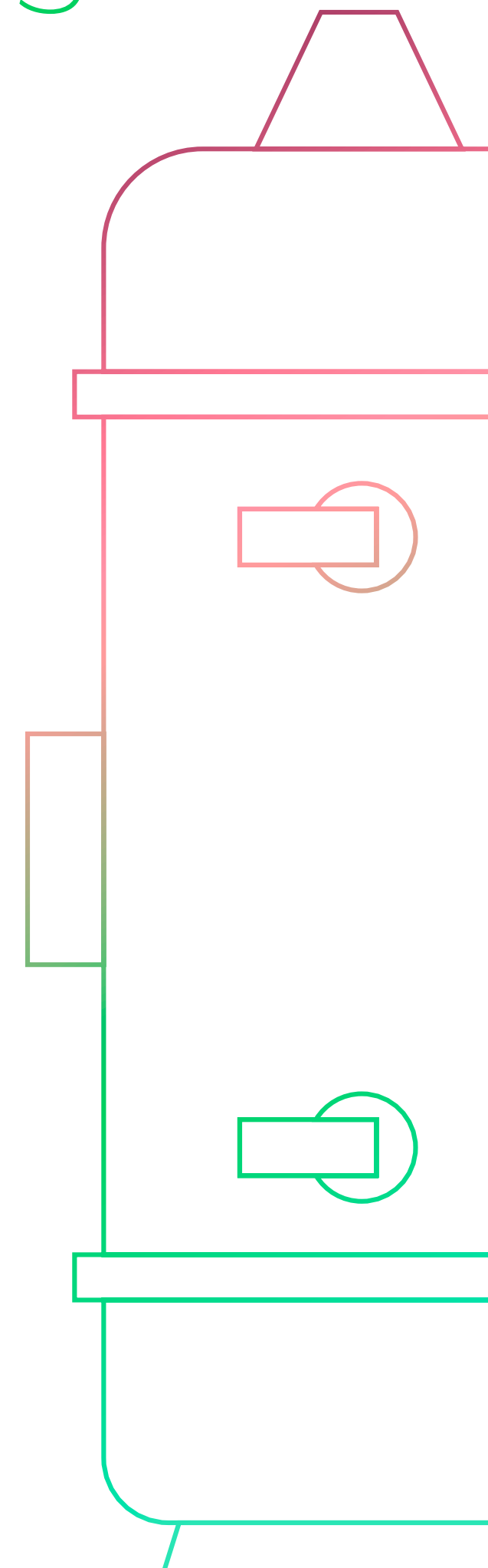
There are plenty of refrigerants – and your application determines which of them is the right one for you. But you're always ahead with CO<sub>2</sub> as a refrigerant: it is non-toxic, non-combustible, non-corrosive, antioxidant and eco-friendly.

**Compare the values, it's worth it!**



# ALWAYS READY: thermeco<sub>2</sub> impresses in numerous applications

**This machine really heats things up:** Our thermeco<sub>2</sub> large high-temperature heat pump provides condenser leaving water temperatures of up to 90° c as standard. This means it can replace conventional boilers in a range of applications.





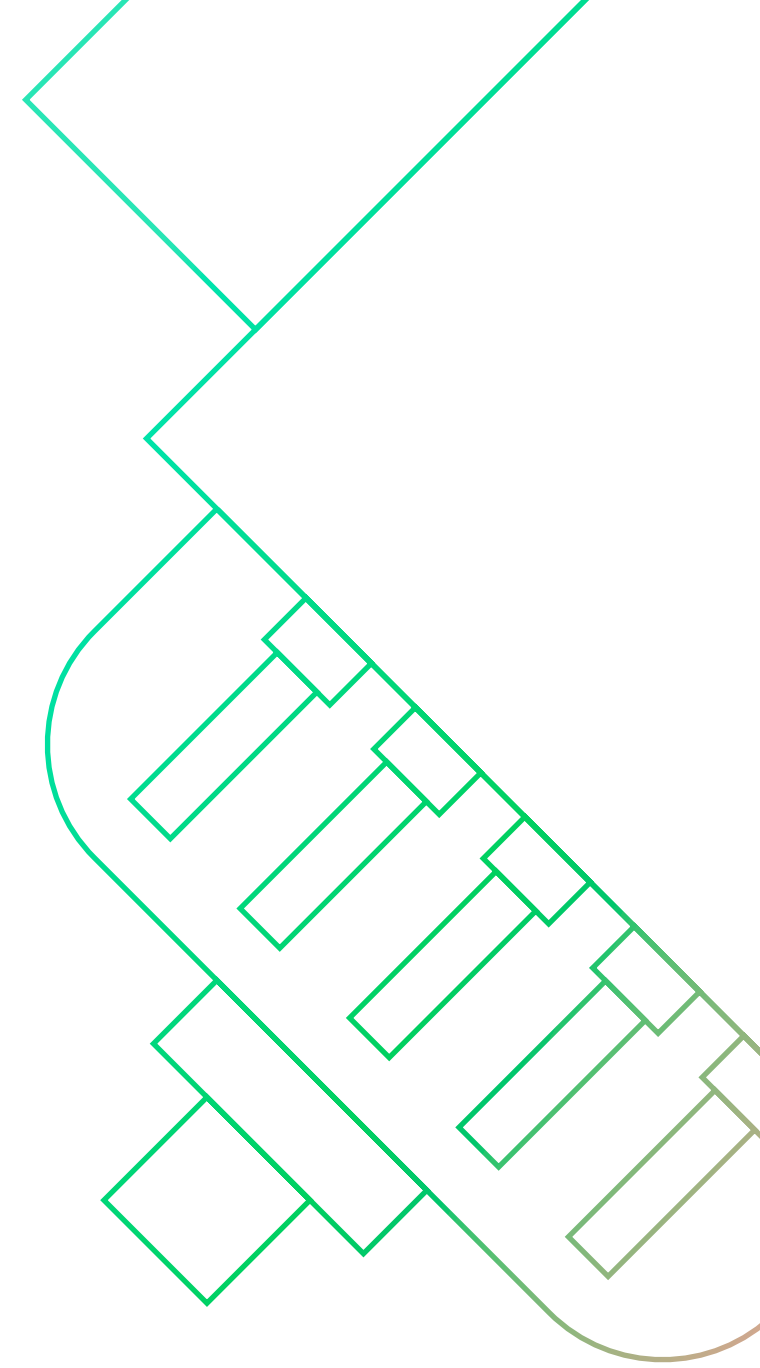
	ROOM HEATING AND CLIMATE CONTROL	WARM WATER PREPARATION	GREENHOUSES	HEATING NETWORKS	PROCESS HEATING AND COOLING
YOUR APPLICATION	Communal and public buildings, data centres, hotels, shopping malls, furniture stores, office buildings, airports, logistics buildings, hospitals, swimming pools, industrial buildings		Commercial greenhouses, horticulture industry	Heating networks, districts, housing estates	Food industry, chemicals and pharmaceuticals industry, manufacturing industry, hospitals, data centres
YOUR ADVANTAGES	<p>Monovalent in new builds and during renovation of existing buildings with heating systems with a design temperature of +70 °C (low-temperature heating)</p> <ul style="list-style-type: none"> <li>• Compliance with legal regulations (EnEV/GEG)</li> <li>• Heating and cooling (improved climatic comfort)</li> <li>• Listed internally with BAFA</li> </ul> 	<p>Monovalent for compliance with hygiene requirements for the heating of drinking water as per TrinkwV</p>	<ul style="list-style-type: none"> <li>• Ideal temperature range for use of different heating systems with especially large spreads between supply and return temperatures</li> <li>• Sustainability and long-term heating supply thanks to independence from gas / fossil fuels</li> <li>• Carbon-neutral food farming</li> <li>• Energy costs predictable over the long term</li> </ul>	<ul style="list-style-type: none"> <li>• As a base load in the energy mix with other heat generators (CHP, biomass, solar thermal energy collectors)</li> <li>• Monovalent over the long term in the context of lowering network temperatures (low-ex networks)</li> </ul>	<ul style="list-style-type: none"> <li>• Monovalent simultaneous heating and cooling</li> <li>• Lower investment costs</li> <li>• Major CO<sub>2</sub> savings through emission-free heating and cooling supply</li> <li>• Contribution towards climate protection goals with natural refrigerant CO<sub>2</sub></li> </ul>



# IN GLOBAL DEMAND – **PERFORMING WORLDWIDE!**

We are assisting customers on their path to climate neutrality with our eco-friendly high-temperature heat pump – in Germany, in Europe, and around the world.

More than 90 machines are currently in operation worldwide, and all of them are providing greater energy efficiency and sustainability.



**Would you like to discuss a specific project? Contact us directly!**

**REFERENCES 20**  
AROUND THE  
WORLD



# 3 BEST PRACTICE CASES presented here for you:

Five thermeco<sub>2</sub> with a total heating capacity of five megawatts are contributing to the zero-carbon strategy at greenhouses owned by the Osatina Group.

Two thermeco<sub>2</sub> high-temperature heat pumps ensure smooth-running processes at ALBA Recycling GmbH.

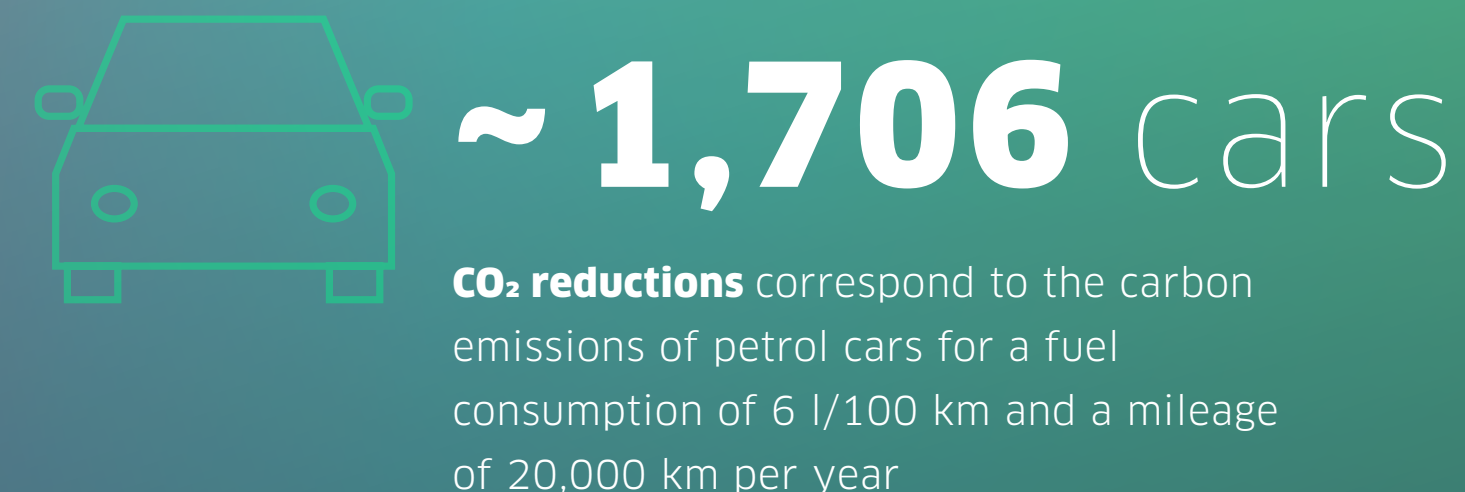
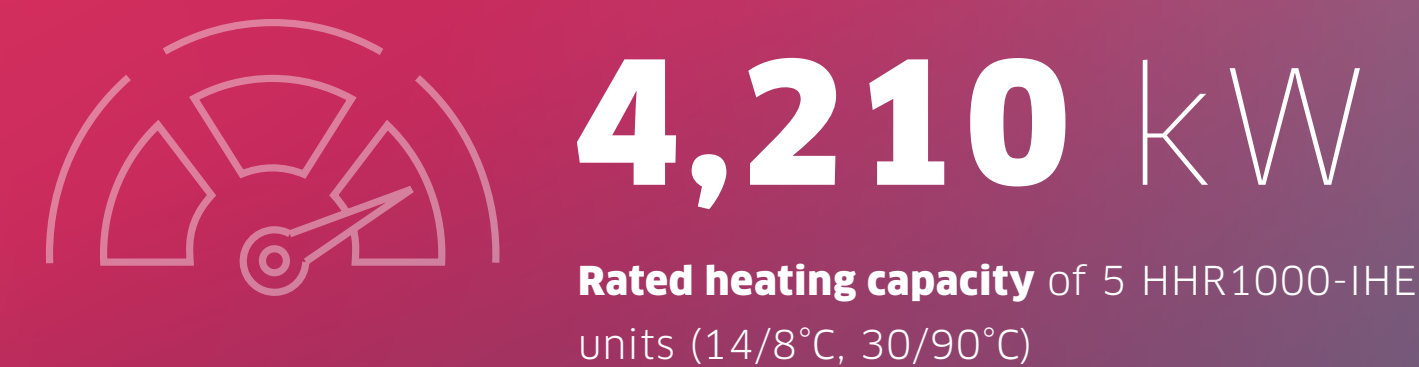
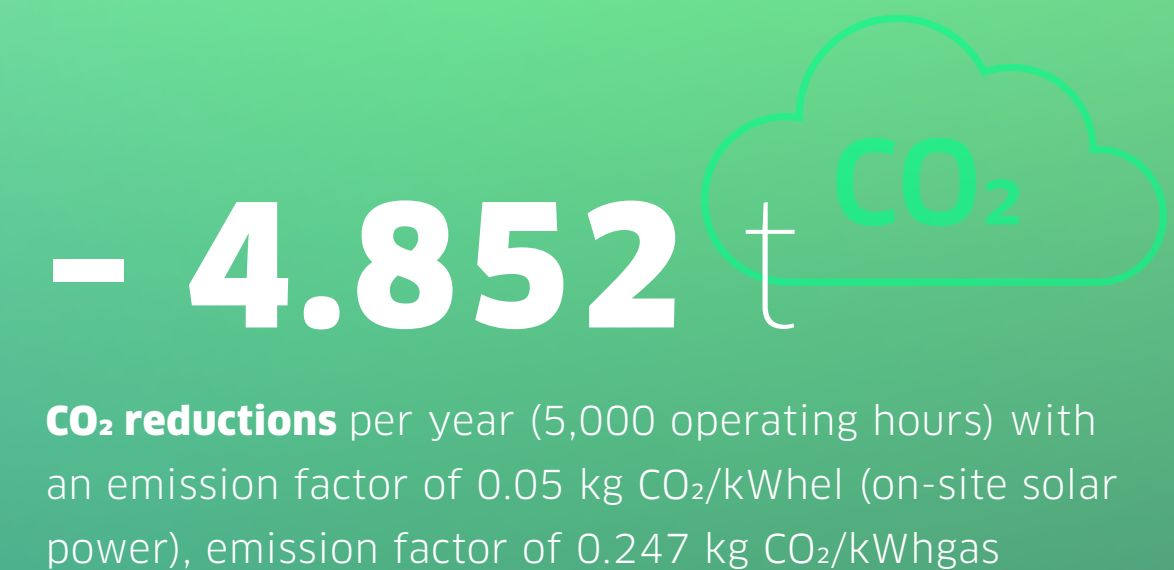
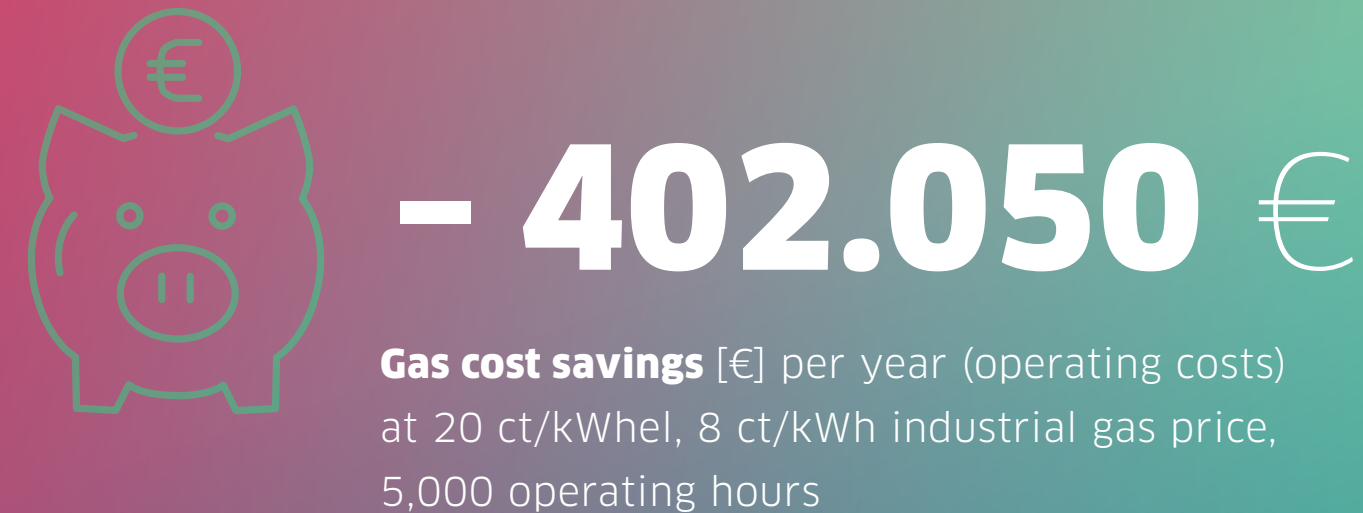
In the “ReUseEnergy” model project for the EU, thermeco<sub>2</sub> impresses as part of an innovative solution for waste heat utilisation.

**REFERENCES 21**  
AROUND THE  
WORLD



# EVERYONE LIKES TO **SAVE**.

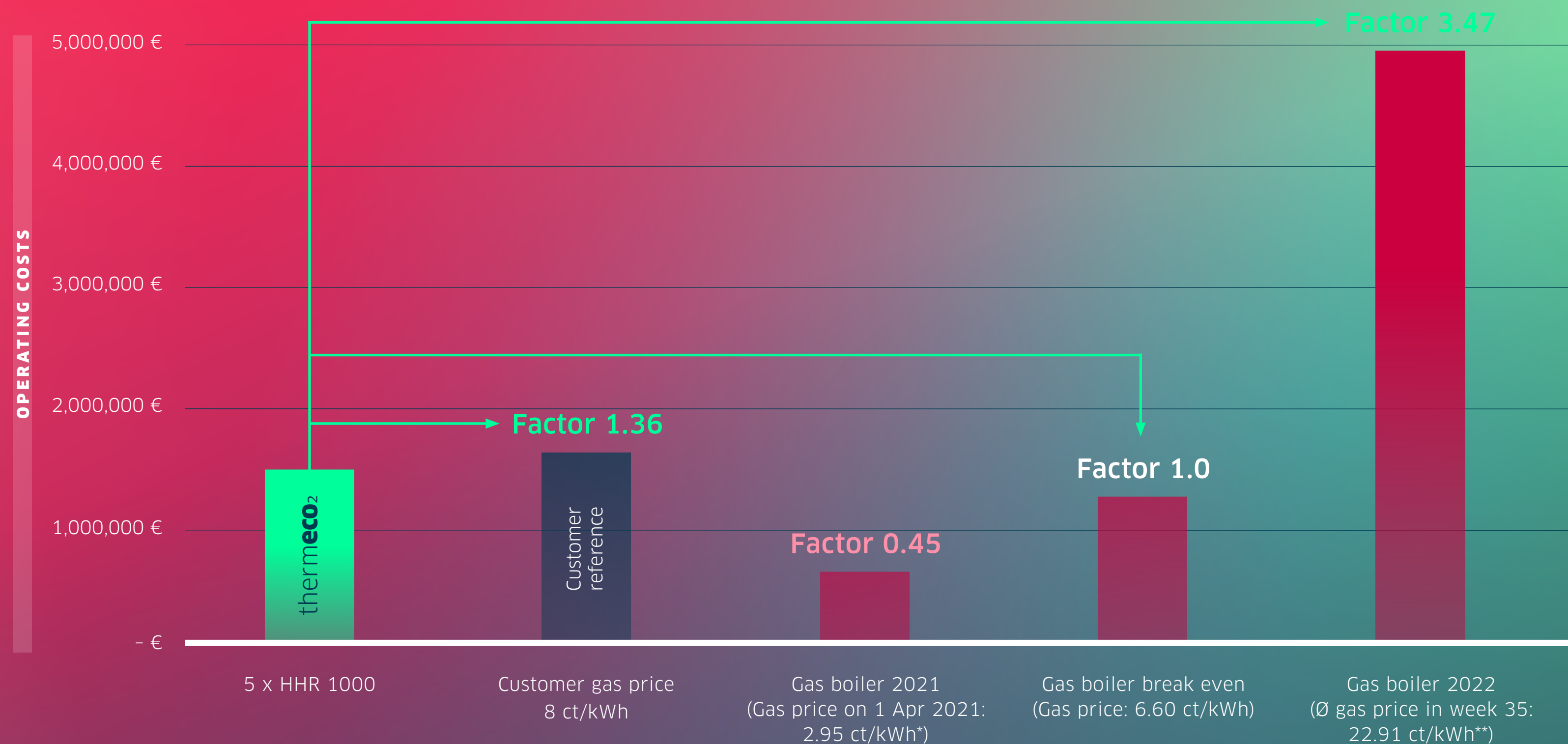
And therm**eco**<sub>2</sub> reduces CO<sub>2</sub> while saving you money!



**EFFICIENCY 22**  
VALUES



# WE LET THE **FACTS** SPEAK!



\*Source: Statista

\*\*Source: Spot ECSI THE

Energy prices are reaching unexpected levels - and there is no end in sight. Now more than ever, it's worth taking a closer look.

We compared the costs of our thermeco2 reference customer with an annual heating energy demand of around 21 GWh to the costs of a conventional gas boiler.

**And it's clear to see:**

**The results are impressive!**

## **GAS BOILER 23** VS. HEAT PUMP



# READY FOR THE **HEATING** OF THE **FUTURE?**

ENGIE Refrigeration ensures the right temperature for every process. Around the world, our heat pumps and chillers stand for maximum technical expertise, economy, efficiency and sustainability. Our aim: to provide our customers with the best solutions for their path towards climate neutrality. To achieve this, we rely on individual consultation, customised concepts and comprehensive services. As a member of the worldwide ENGIE Group, we have a global network of specialists at our disposal and can realise our refrigeration and heating solutions for you, both at home and abroad.

**The experts at ENGIE Refrigeration are here for you:**

National/International Service

National/International Sales

With eleven branch offices and around 130 service employees, we are always nearby and available around the clock, anywhere in Germany:

We are happy to  
**ADVISE YOU.**

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