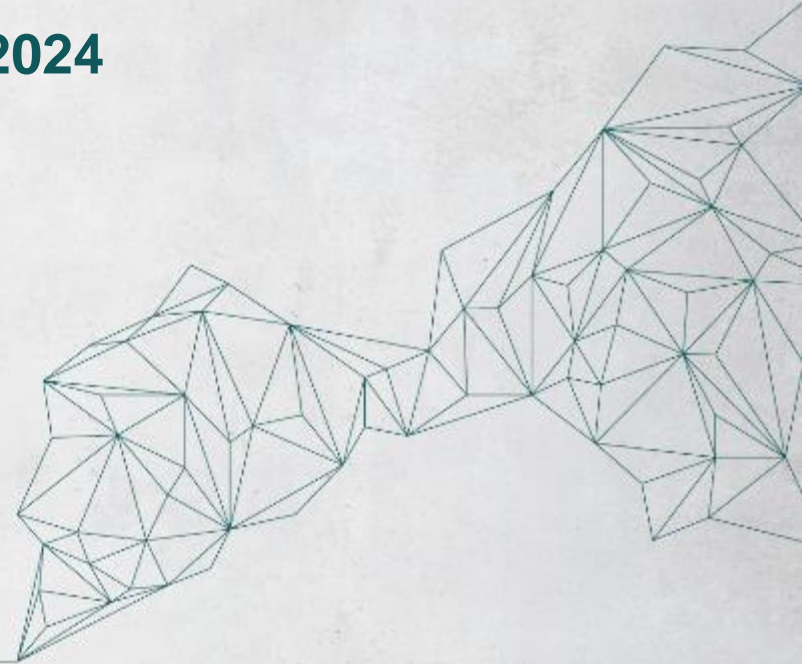


**Chillventa Specialist Forums 2024**  
**Chillventa Fachforen 2024**

**CONNECTING  
EXPERTS.**





# Heaten - High Temperature Heat Pumps

## Cases to decarbonise Industrial Heat

October 9<sup>th</sup> 2024

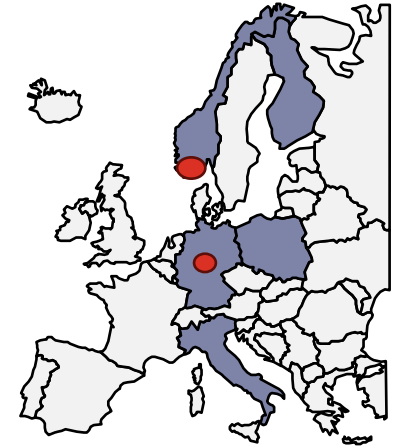
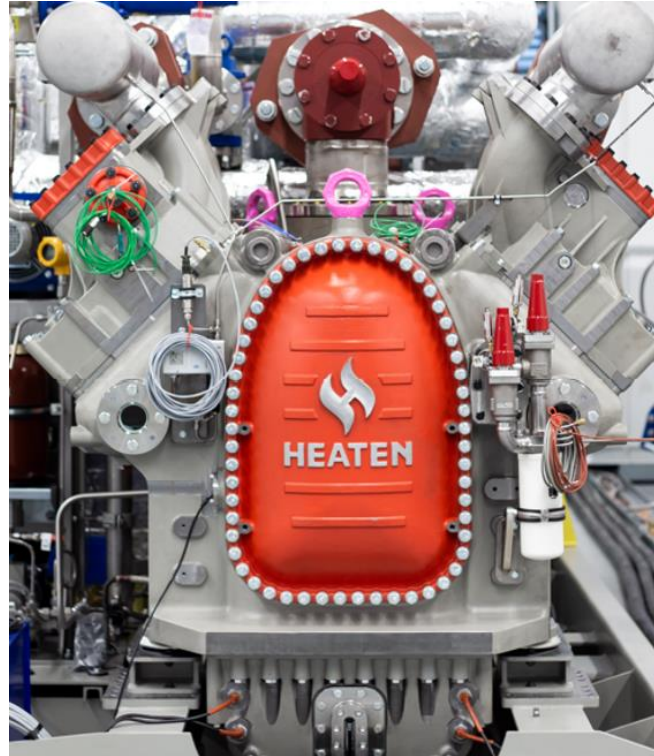
Public



# Introduction Heaten



- High Temperature Heat Pumps
- Up to 200°C
- 1 - 8MW<sub>th</sub> per machine
- Piston based technology



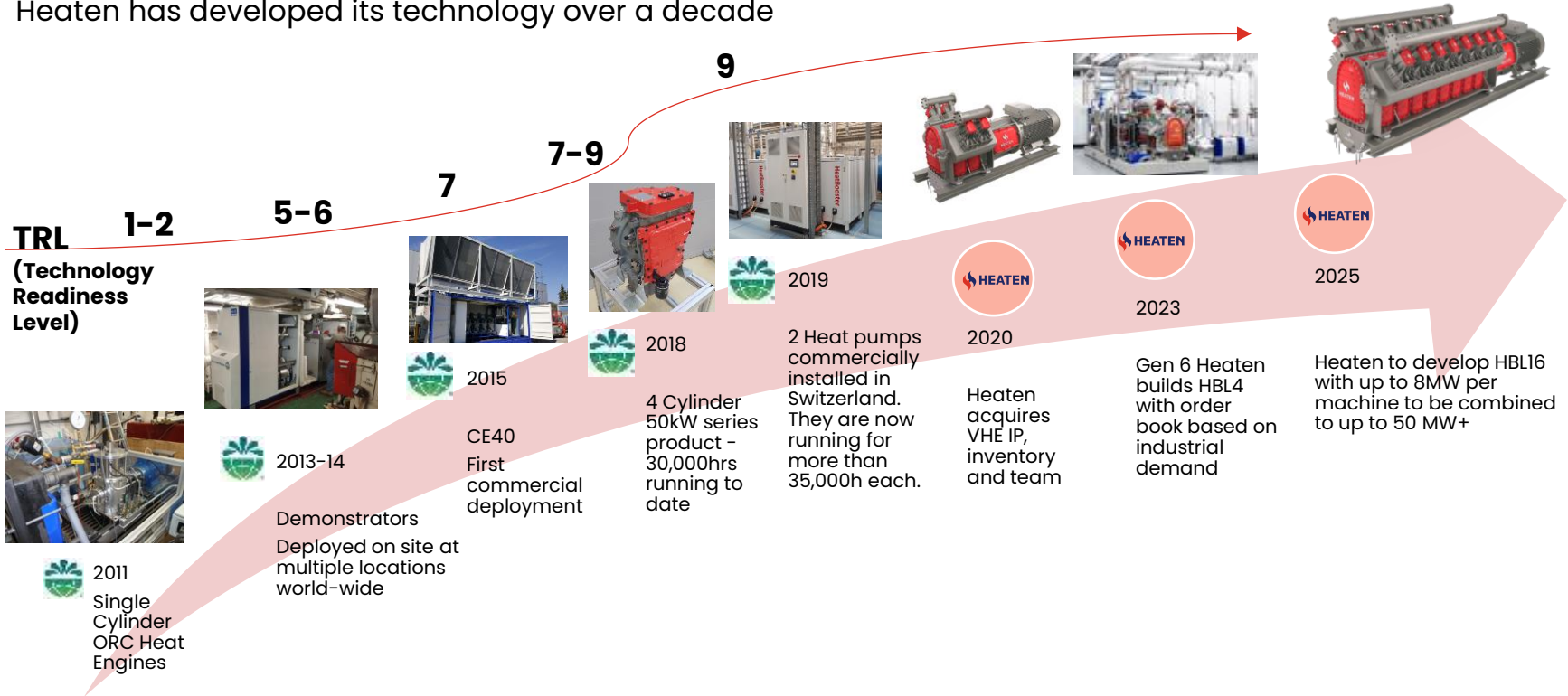
## Locations

- Kristiansand, NO
- Remscheid, DE

# Culmination of 13 Years of Development



Heaten has developed its technology over a decade

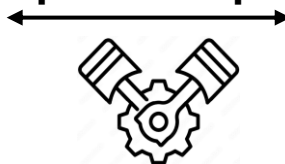


40  
Advent International  
EST. | 1984

Gas-to-  
Power



Strong  
partnership



Power-  
to-Heat



JENBACHER



Waukesha



# Evolving Heaten Solution



Heaten has developed a range of heat pumps that addresses customer needs

2019



**HeatBooster** – up to  
200 kW (4 parallel)

Swept volume: 190 m<sup>3</sup>/h

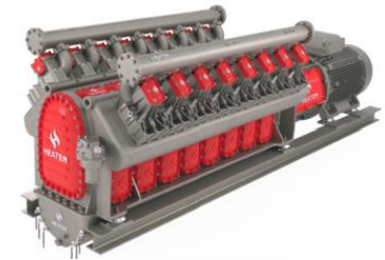
Today



**HBL4** – up to 2 MW

Swept volume: 1,496 m<sup>3</sup>/h

2025



**HBL16** – up to 8 MW  
(scaled up version of HBL4)

Swept volume: 5,984 m<sup>3</sup>/h

## Reduce costs

- High-efficiency technology is 3-4x more energy efficient than burning natural gas or oil and lower cost to operate
- Reduce exposure to volatile gas and carbon market prices
- Typical payback in 2-4 years or less

## Reduce CO<sub>2</sub> emissions

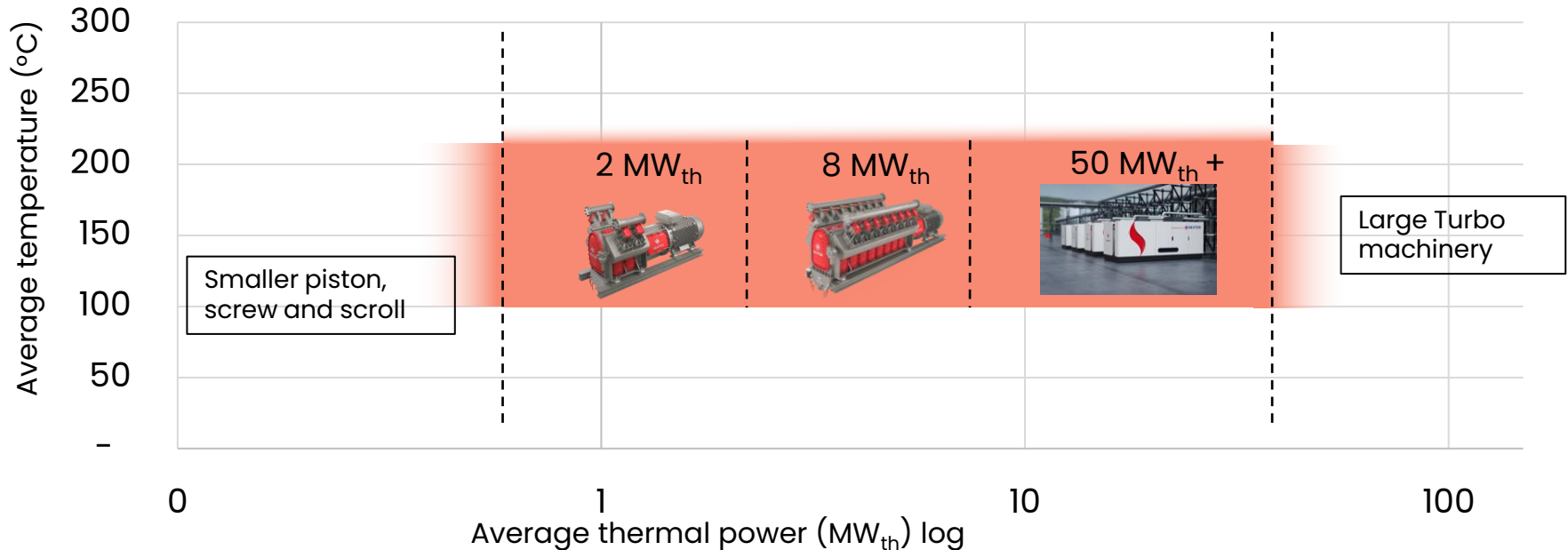
- Process only requires electricity, reducing carbon emissions and improving safety
- Aligns with SDGs and net-zero investing strategies

## Improve plant operational flexibility

- 80,000+ hours between major overhauls maximises plant uptime
- Designed redundancy with multiple units able to deliver continuous heat
- Increase resilience to water shortages

# Flexible operation for industrial applications

Typical heat demand in the industry  
1.5–30 MW<sub>th</sub> saturated steam between 120–180°C

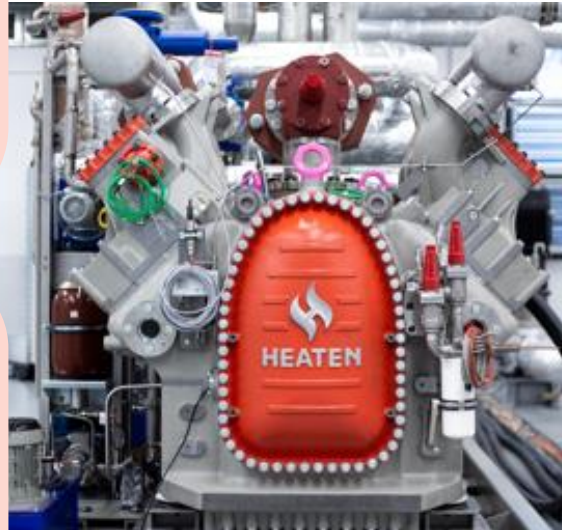


## PERFORMANCE & EFFICIENCY

- Efficiency curve is “flat” over 20 – 100% load range
- COP range of 50 to 55% of Carnot



## Unique large scale piston compressor



## SIZING & RANGE

- 1-8 MW<sub>th</sub> per HeatBooster
- 3-50 MW<sub>th</sub> per system



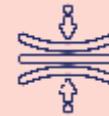
## SCALABILITY & COST

- Global manufacturing & service base
- Based on well-established mass-production



## FLEXIBILITY

- Can use all HFO's and HC's.
- Variable compression ratio: One hardware for all temp. range of 90-200°C
- Multi-cylinder family enables adaption to each application





# Market segments & applications

## Main market sectors



**Food, Beverage & Ingredients**



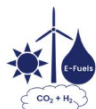
**District Heating**



**Chemical Industry and Refineries**



**Pulp and paper**



**New industries like  
CCS, CCU, and DAC**

## Applications

Target temperature 100–200°C

Target power range 1–50 MW<sub>th</sub>

Heat source: 10–150°C  
water or steam

Heat sink: 90–200°C  
water or steam

## Delivering steam using waste heat

Case Highlights	Values
Application	Steam/Steam
COP	4.7
Power output	6 MW
Steam output	10 tons/h
Operating hours	3,000 h/year
CO <sub>2</sub> savings	5.143 tons/year
Refrigerant	Butane
Payback	~ 3 years

Waste heat source



Water

Steam  
100 °C



Process heat sink



Steam  
140 °C

Hot water  
Pressurised



Drying or crystallizing ingredients

*Payback is indicative,  
and strictly case  
dependent*

## Drying, using steam, recovering waste heat

Case Highlights	Values
COP	2.63
Power output	1.48 MW
Steam output	2.28 tons/h
Operating hours	8,000 h/year
CO <sub>2</sub> savings	2,814 tons/year
Working fluid	R1233zd(E)

Waste heat source



Hot water at 64 °C

Hot water at 74 °C



Process heat sink



Steam at 145 °C

Condensate at 95 °C



Drying the paper web

## Delivering steam, recovering waste heat

Case Highlights	Values
COP	3.9
Power output	1.38 MW
Steam output	2.2 tons/h
Operating hours	8,000 h/year
CO <sub>2</sub> savings	2,624 tons/year
Working fluid	Butane

Waste heat source



Hot water at 77 °C

Hot water at 84 °C



Process heat sink



Steam at 128 °C

Condensate at 110 °C



Delivering steam for distillation and process

## Delivering steam, recovering waste heat

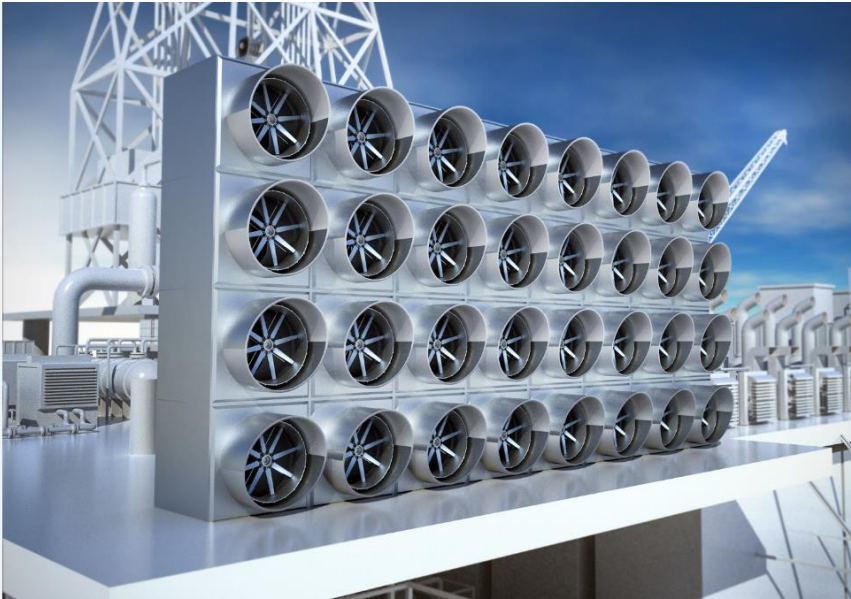
Case Highlights	Values
COP	3.7
Steam output	2.36 tons/h
Operating hours	8,000 h/year
Working fluid	Butane

Waste heat source



Hot water at 70 °C

Hot water at 80 °C



Process heat sink



Steam at 120 °C

Condensate at 90 °C



Heat circulation, energy reduction

## Delivering hot water, recovering waste heat

Case Highlights	Values
COP	2.4
Steam output	14.74 tons/h
Operating hours	8,000 h/year
Working fluid	R1234ze(E) and R1233zd(E)

Waste heat source



Hot water at 20 °C

Hot water at 24 °C



Process heat sink



Hot water at 130 °C

Hot water at 62 °C



Heat circulation, energy reduction

# The largest piston-based compressor for Heat pumps



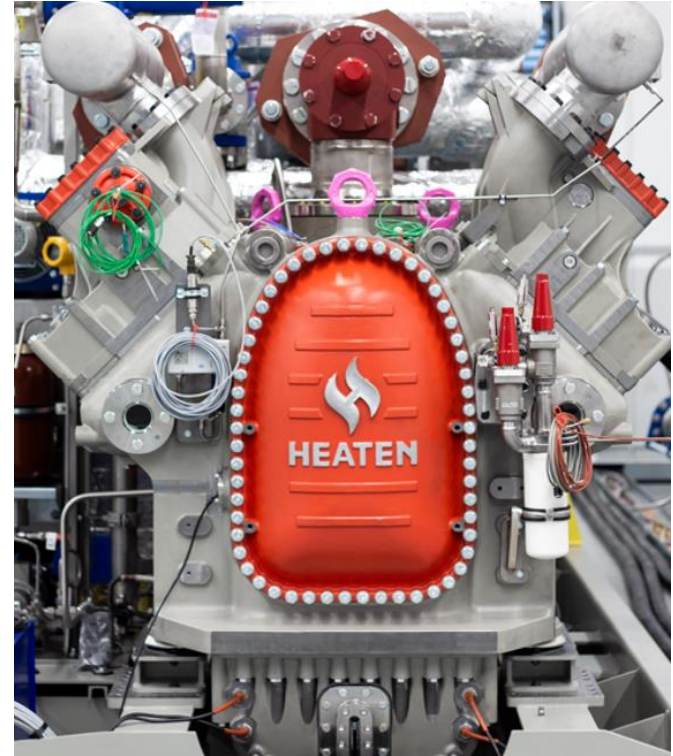
Discuss our solutions

**Visit our booth**

**4-203**

Download this presentation

Jeroen Koot - [jk@heaten.com](mailto:jk@heaten.com)



**Chillventa Specialist Forums 2024**  
**Chillventa Fachforen 2024**

**CONNECTING  
EXPERTS.**

