

Heat Pump Alliance
STRABAG Umwelttechnik &
Atlas Copco Energas

Industrial Steam Production by Customized Heat Pumps

Atlas Copco

NEFI Tech Talk
May 31, 2023

STRABAG
WORK ON PROGRESS

Chapter 1

STRABAG at a Glance

STRABAG Umwelttechnik GmbH

STRABAG
WORK ON PROGRESS

STRABAG at a Glance



Output
volume
€ 16,1 bn.

Net income
€ 596 mio.



Strong
brands

STRABAG
ZÜBLIN

Employees
73.606

Locations
>700 in
 over **80**
countries

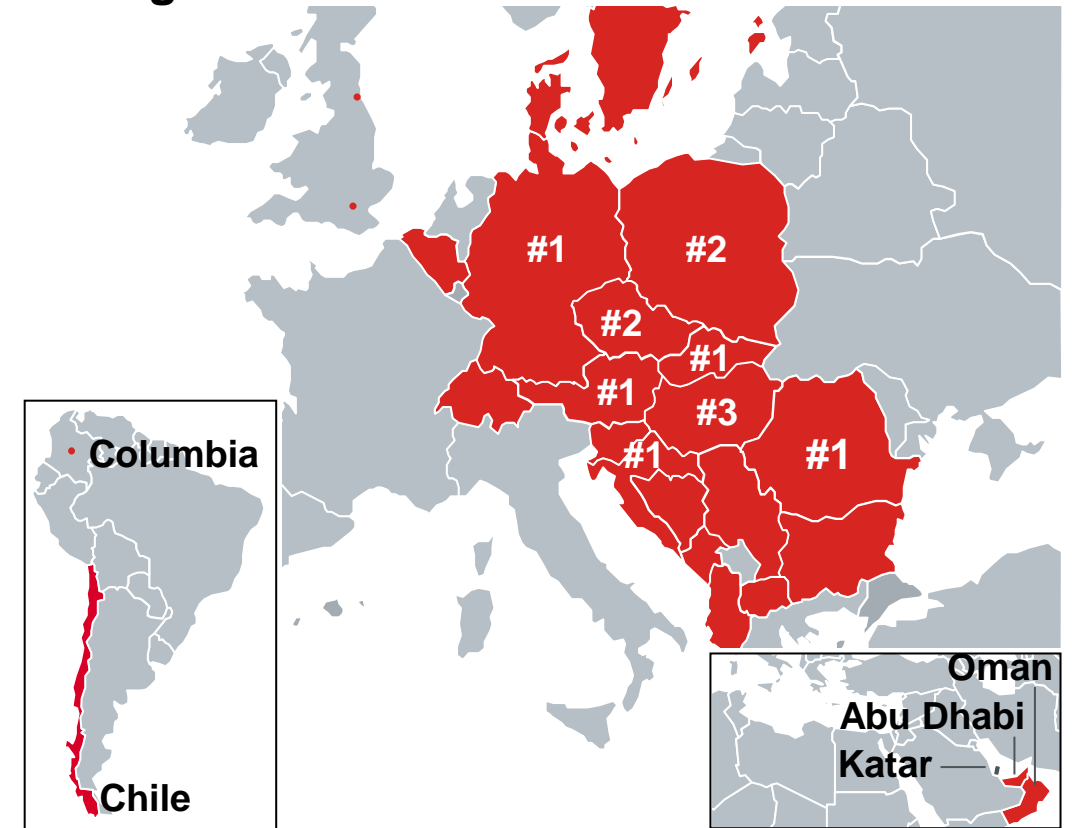


S&P Rating
**BBB,
outlook
stable**

Equity ratio
> 30 %



Strong markets



STRABAG Umwelttechnik GmbH

Key data:

- 2014 Internal merger of Heilit Umwelttechnik GmbH and STRABAG Umwelтанlagen GmbH to form STRABAG Umwelttechnik GmbH
- Approx. 330 employees (170 employees / 160 commercial) in two business areas:
 - LANDFILLS & CONTAMINATED SITES
 - PLANT ENGINEERING AND CONSTRUCTION
- Annual turnover of approx. EUR 100 million
- Market leader in the business area LANDFILL & CONTAMINATED SITES in Germany
- Internationally oriented activities in PLANT ENGINEERING AND CONSTRUCTION with orders in various markets
- Competence and own engineering resources for turnkey plant construction (individual projects as general contractor up to EUR 100 million) numerous self-developed, partially patented processes and technologies in the product portfolio

Work Areas and Fields

Clear Vision. Clean Energy.



Biogas production and utilisation

- Biogas production
- Biogas processing & biomethane
- CO₂ recovery and use

Energy production

- Geothermal power plants
- Large industrial heat pumps
- Combined heat and power plants

Waste treatment

- Mechanical processing and sorting of solid waste
- Biological treatment of waste
- Recycling of secondary raw materials

Chapter 2

Realized Projects



Selected Projects



Biowaste treatment plant Berlin (GER)

Turnkey design & build project as general contractor

Contract value: €26 million

Capacity: 60,000 t/a

Scope of delivery: mech. processing, fermentation, composting, biogas processing to natural gas quality, exhaust air treatment



Geothermal Plant Garching a.d. Alz (GER)

Turnkey Design & Build Projekt as EPC

Contract value: €33 million

Power: 4.7MWel

Scope of delivery: Thermal water circuit, two-stage ORC circuit with water cooling, CHP



Organic waste treatment plant Liege (BEL)

Turnkey design & build project as general contractor

Contract value : €35 million

Capacity: 70,000 t/a

Scope of delivery: mech. processing, fermentation, thermal drying of digestate, composting, use of biogas in CHP, exhaust air treatment



MBT Ljubljana (SLO)

Turnkey Design & Build Projekt as EPC

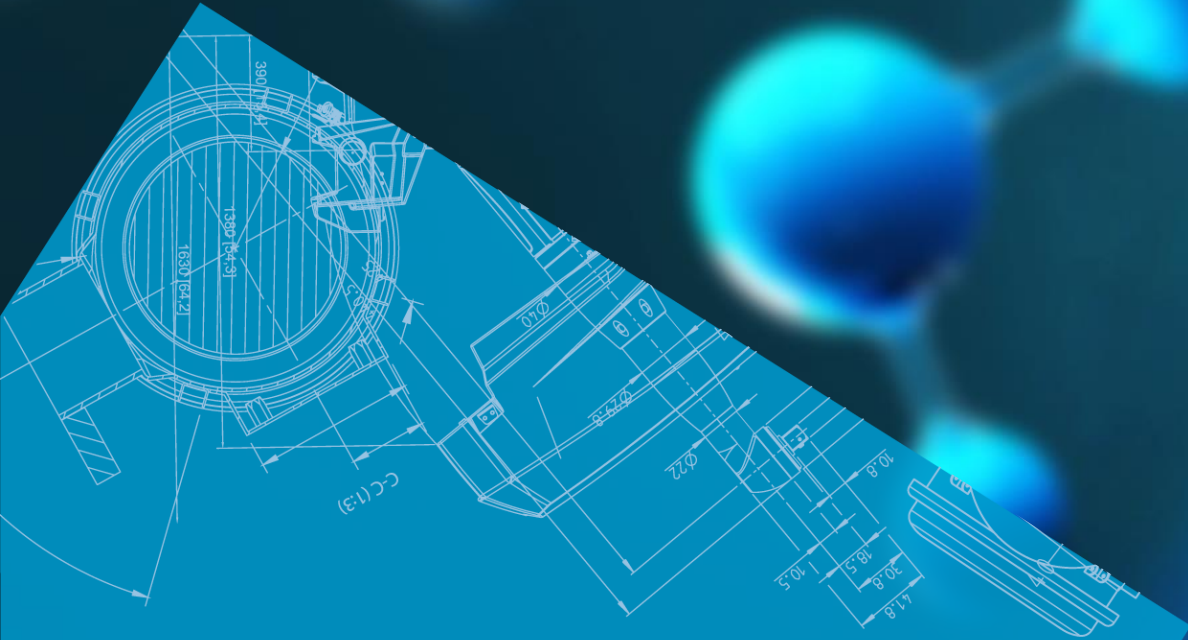
Contract value: €112 million

Capacity: 171,000 t/a

Scope of delivery: mech. processing and sorting, fuel processing, fermentation, composting/post-rotting, biogas use in CHP, exhaust air treatment

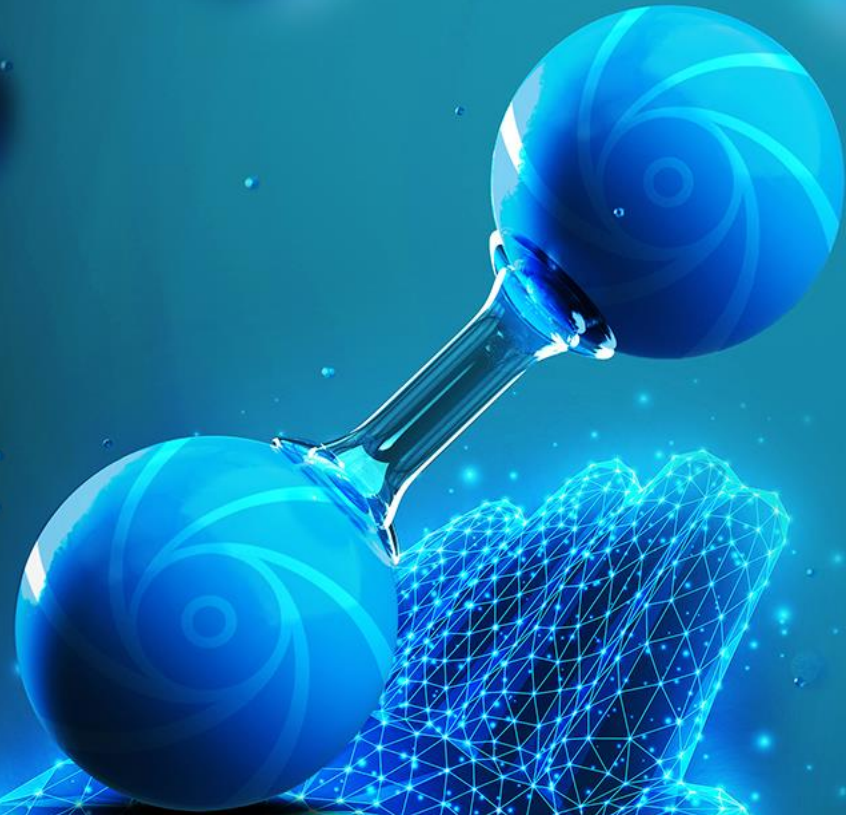
Chapter 3

Atlas Copco



Atlas Copco

Gas and Process Division





This is the Atlas Copco Group



Customers in more than **180** countries



49 000 employees in **70** countries



Established in **1873** Stockholm, Sweden



Turnover of **141** BSEK/ **13** BEUR*



Operating margin of **21.4%**

*Based on the average exchange rate in 2022.

Atlas Copco

Atlas Copco Gas and Process

– An overview



Establishment

1980



Production locations

Germany, Canada, United States, India, China and Korea



Construction code

All common international codes and standards



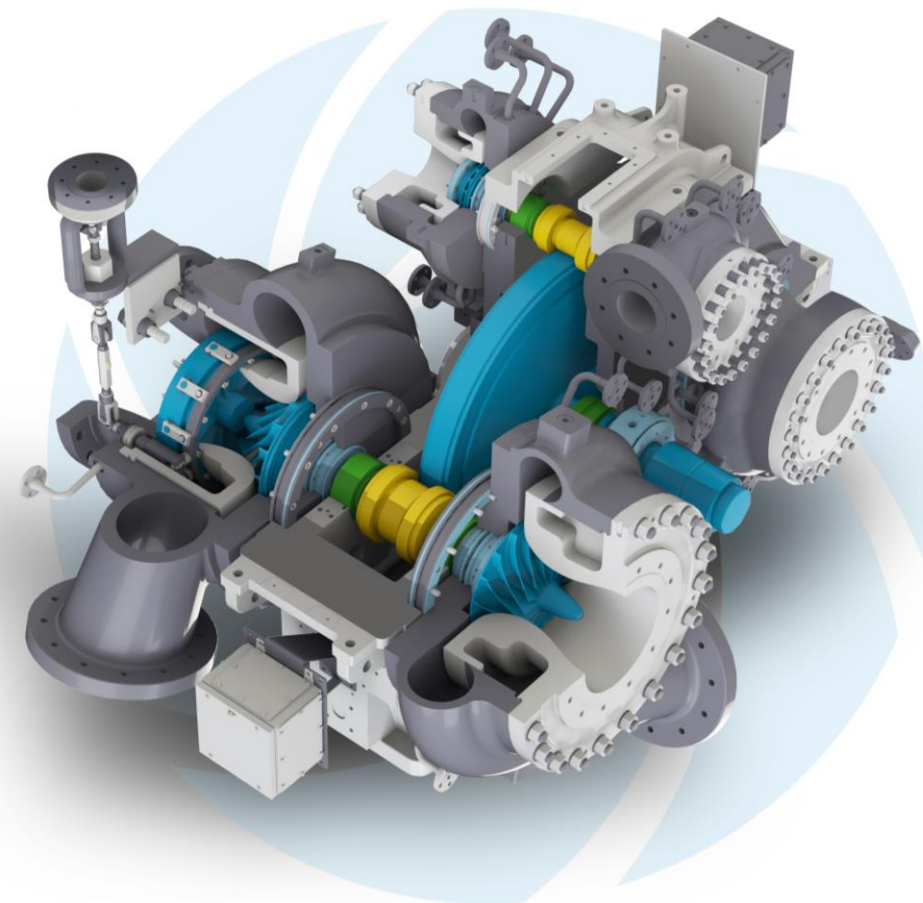
Markets served

Hydrocarbon processing, industrial gases, power generation, energy storage, heat pumps, CCUS across the globe in more than 180 countries

Flexible technology for decades of operation

Integrally geared turbocompressors

- More than **60 years** of experience with over **8000** turbocompressors and expanders on our reference list
- Radial, integrally geared compressors can handle multiple sections in a single machines – **Flexibility**
- Aerodynamically optimized speeds and customized impeller designs offer best efficiencies at all possible flow rates and pressures for **high COP**
- Proven bearing and gear technology with life times exceeding regularly 30 years and life-long spare parts availability – **Reliability and Robustness**



Smallest compressor build

Diameter: 12 mm



Highest pressure compressor

Output: 200



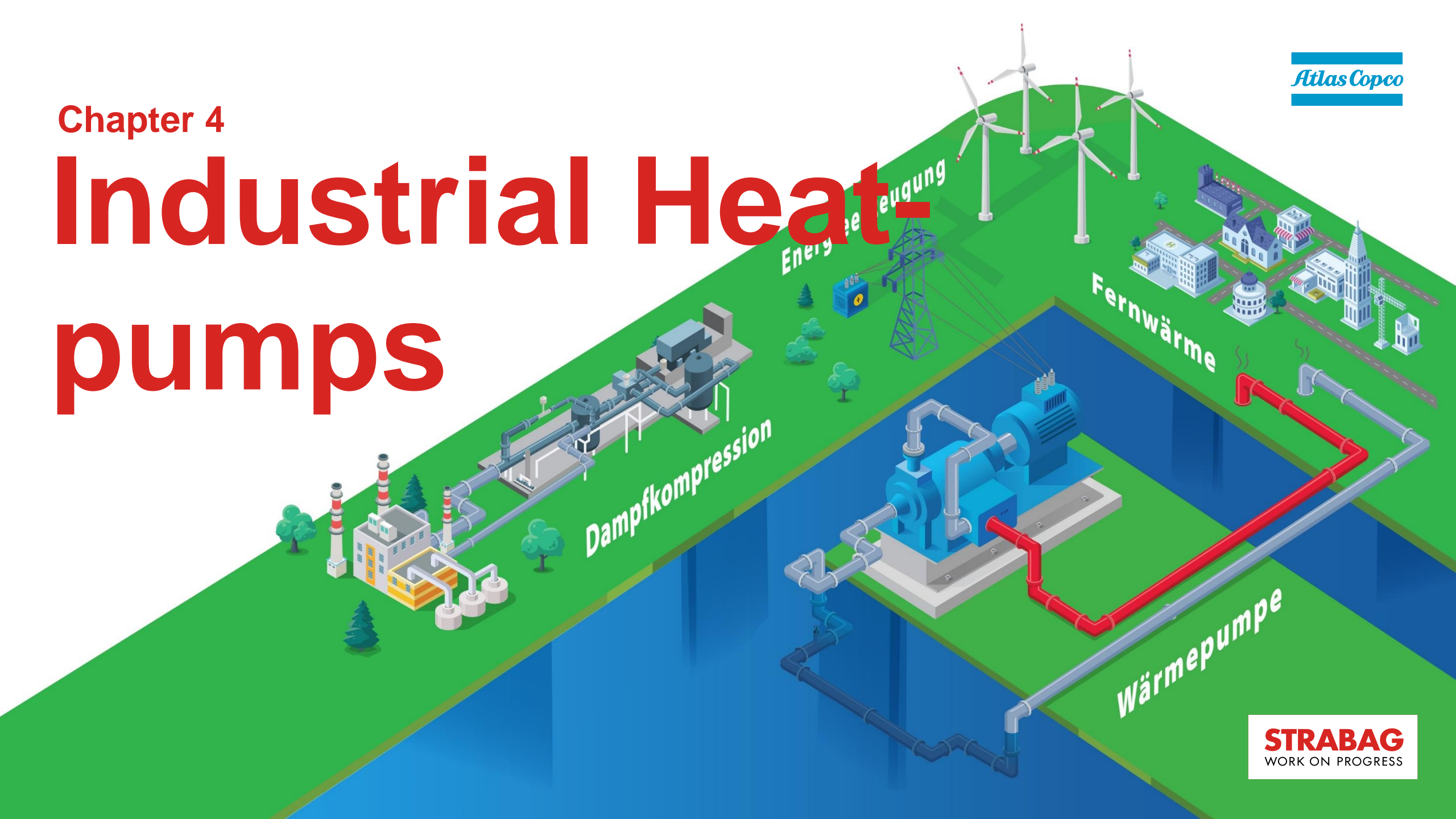
Largest compressor build

Diameter: 1530 mm

Chapter 4

Industrial Heat pumps

Atlas Copco



STRABAG
WORK ON PROGRESS

Industrial Heat Pumps

Delivered turnkey by STRABAG Umwelttechnik GmbH as general contractor in exclusive cooperation with Atlas Copco Energas GmbH



Press Release



STRABAG Umwelttechnik and Atlas Copco Energas agree on cooperation in industrial and high-performance heat pumps

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Cologne, Dresden, 12.12.2022 Cologne-based Atlas Copco Energas GmbH and STRABAG Umwelttechnik GmbH (Dresden-based business area plant engineering and construction) have agreed on an extensive cooperation in the area of industrial and high-performance heat pumps. The two companies will work together to bundle their respective resources and capacities, with the goal of further improving customer focus in the vastly growing market for large-scale heat pumps. Furthermore, Atlas Copco Energas and STRABAG Umwelttechnik want to position themselves to meet future market requirements.

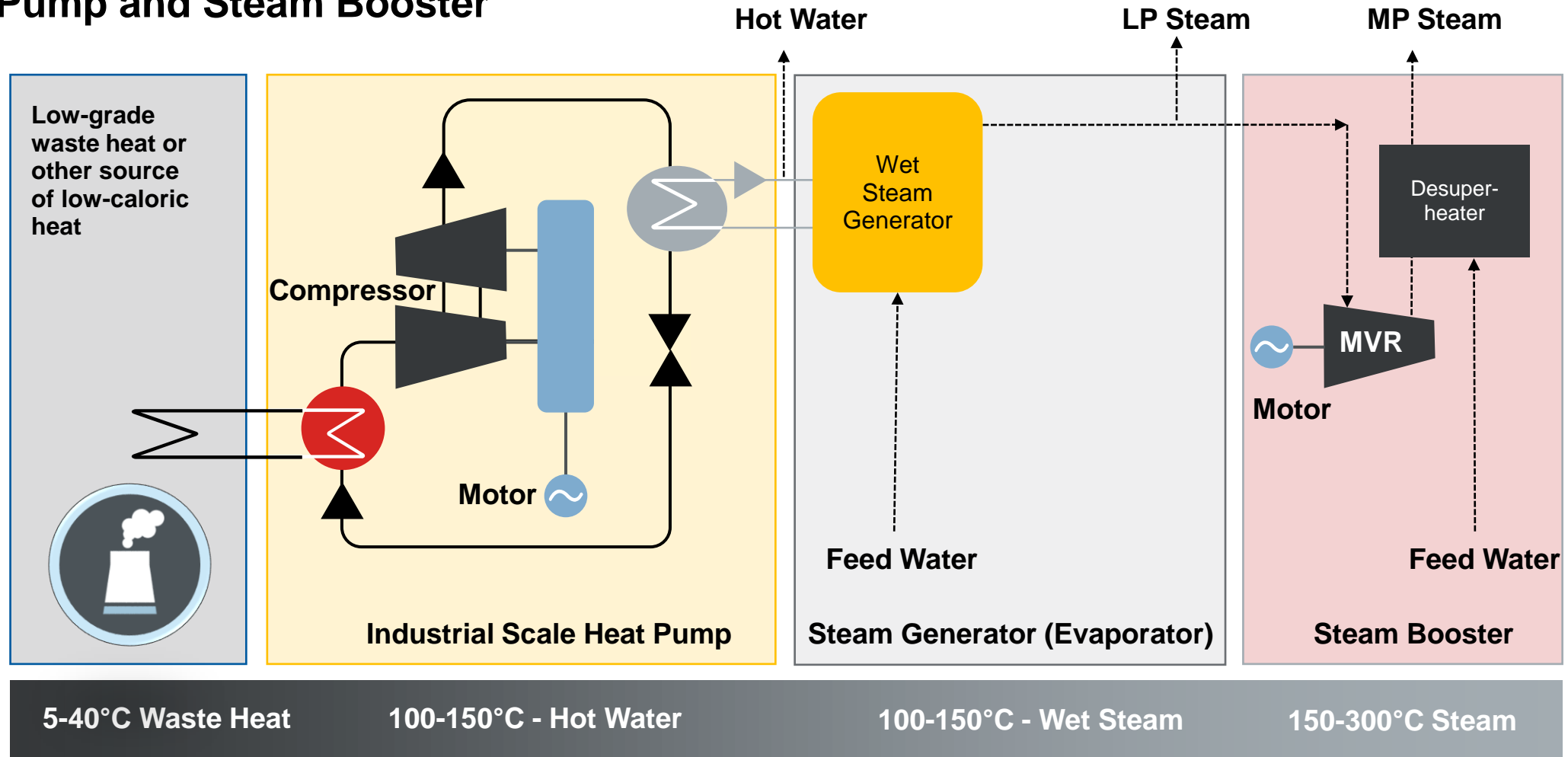
Industrial Heat Pumps

Delivered turnkey by STRABAG Umwelttechnik GmbH as general contractor in exclusive cooperation with Atlas Copco Energas GmbH

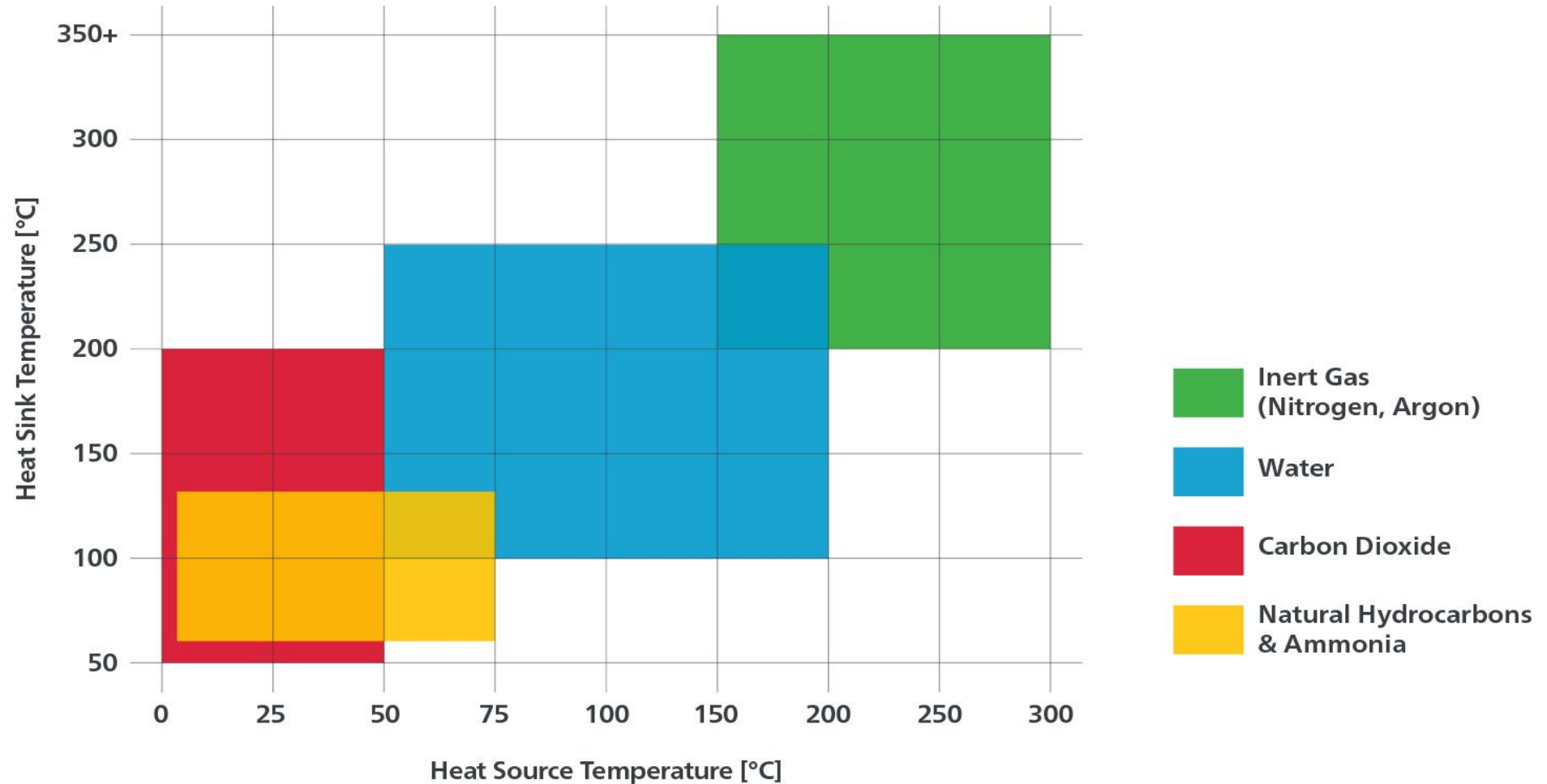
Application	Range of process heat	Technology / process	Typical heat sources	Typical heat demand
Large scale industrial high temperature heat pumps adapted to the respective project and customer needs ("customized solutions")	Power range of 10 MW _{th} to 50 MW _{th} per unit at heat levels from 80°C up to 300°C	<p>Subcritical or super-critical cycle processes with common natural refrigerants (e.g. n-butane, isobutane) or CO₂ as working medium</p> <p>Additional steam booster can be added in the process if required</p> <p>Coefficient of power (COP) from 2,0 to 5,0</p>	<ul style="list-style-type: none"> – waste heat from industrial production and cooling processes – thermal water – sewage treatment plant effluents – surface and running water 	<ul style="list-style-type: none"> – process heat or steam for industry (e.g. chemical, paper and food industry) – district heating for heating networks

Industrial Process Heat

Heat Pump and Steam Booster



Fluids / Refrigerants for Industrial Heat Pumps

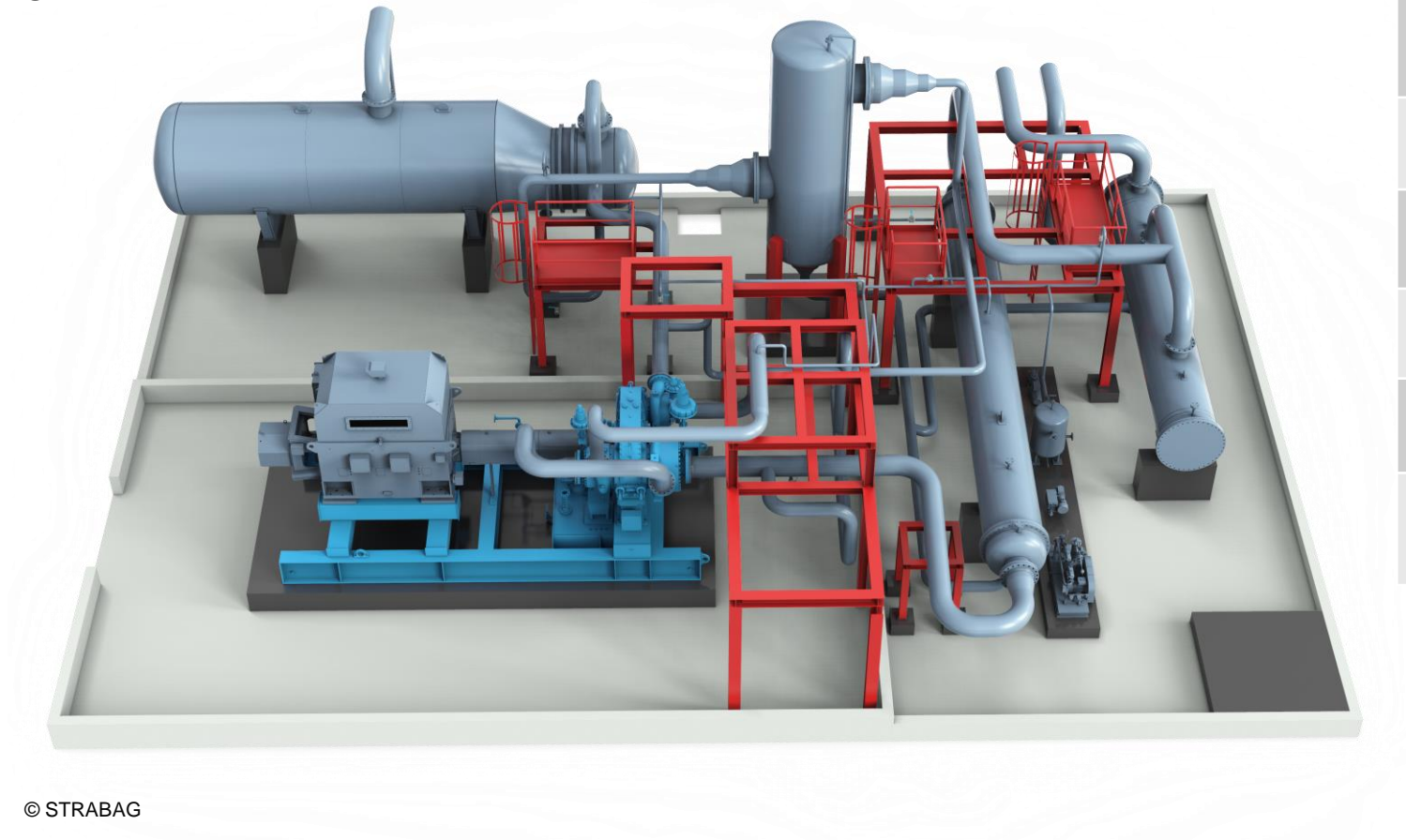


Chapter 5

Case Studies & References

Steam Generation in Chemical Industry

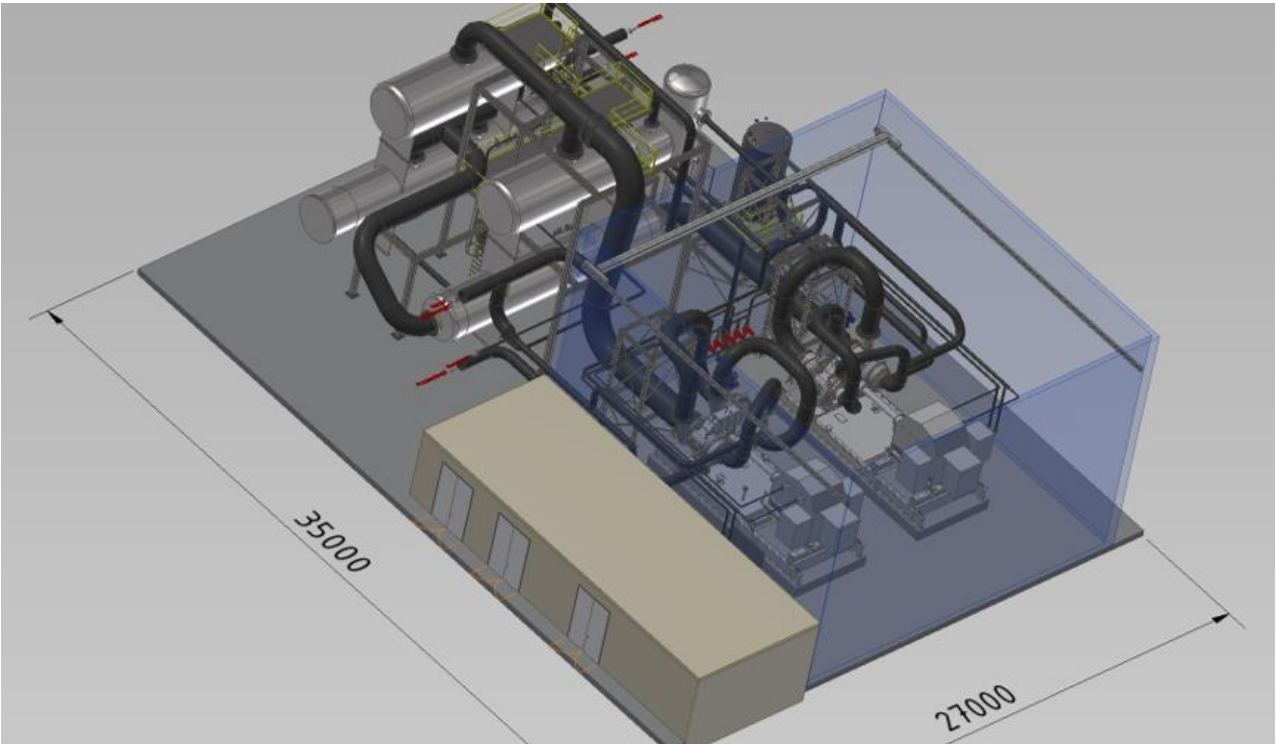
At a chemical park site in Germany, a butane heat pump shall generate process steam from waste heat (pre order phase).



Designation	Quantity	Unit
Steam massflow	17	t/h
Steam temperature	117	°C
Steam pressure	1.8	bara
Source parameter (in/out)	88/66	°C
Heat pump output	10.2	MW _{th}
COP (design case)	4.3	

Steam Generation in Paper Industry

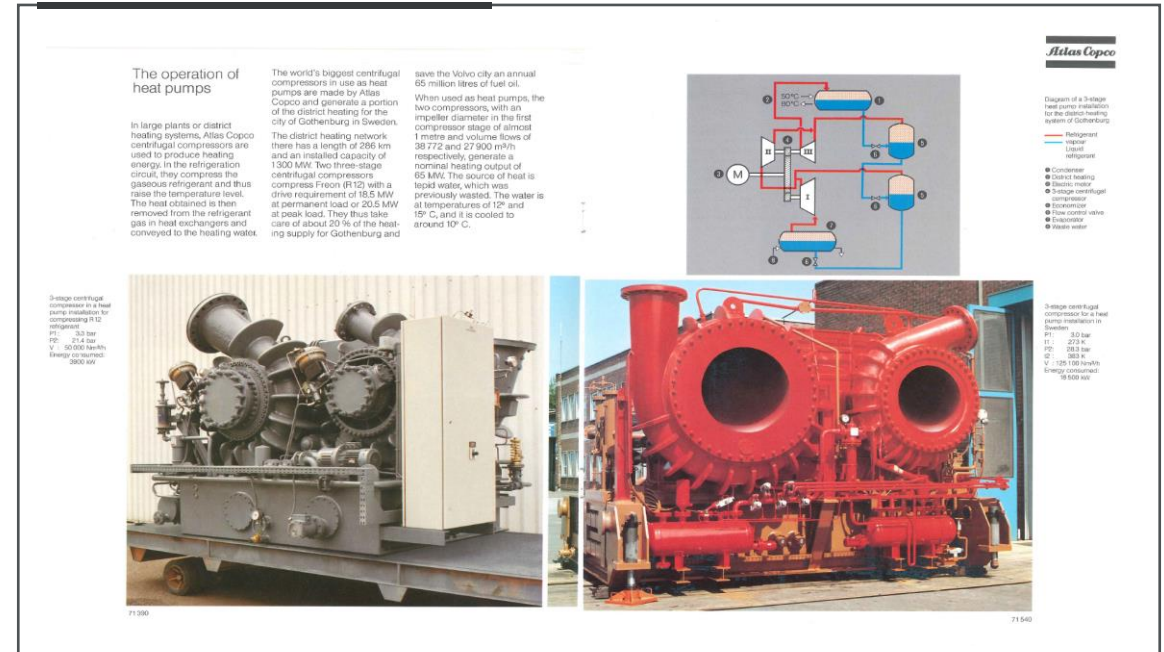
For a new paper machine, a butane heat pump with steam compressor shall produce 8bar steam from paper dryer waste heat at 45°C (pre-order phase)



Designation	Quantity	Unit
Steam massflow	65	t/h
Steam temperature	117	°C
Steam pressure	8.3	bara
Source parameter (in/out)	48/35	°C
Heat pump output	44.5	MW _{th}
COP (design case)	2.0	

Heat Pumps – References

- **Installations in district heating systems**
 - » Göteborg
 - » Karlstadt (decommissioned)
 - » Hammarby
- **District heat generation from Sewage Water**
- **50 MW nominal / 60MW design power**
- **Worlds oldest large heat pumps**
- **In operation since 1984 / 1997**



Reference	Year	Quantity	Type	Thermal Power	Fluid
Hammarby	1997	2	GT078R3G1	40 Megawatt	R134a
RYA 3/4	1984	2	GT098R3G1	60 Megawatt	R12 (changed to R134a)

Heat Pumps – The Stockholm Story



Atlas Copco Erfolgsgeschichte | Fernwärmeversorgung für eine nachhaltige Stadt mit Stockholm Exergi



Atlas Copco Group
12.100 Abonnenten

Abonnieren

171



Teilen



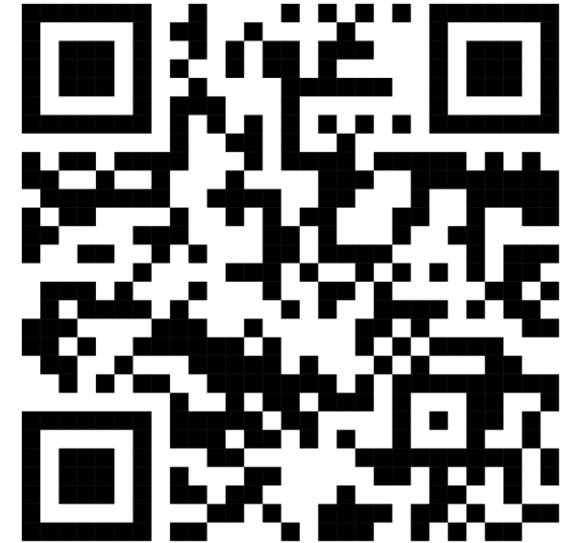
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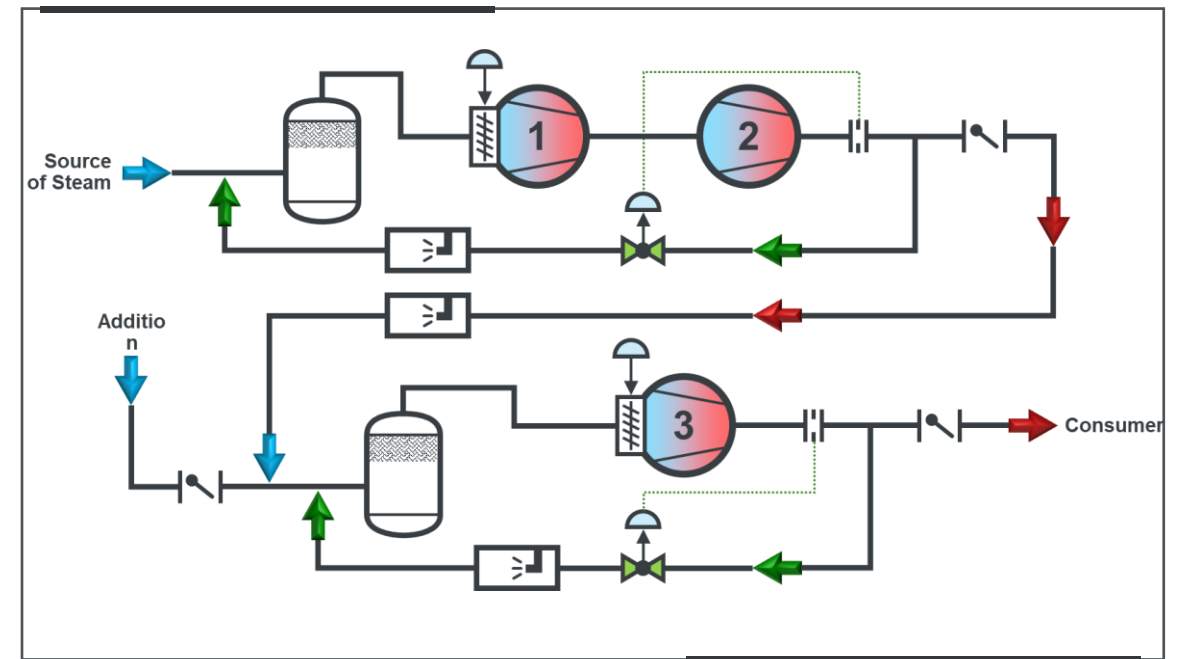
48.609 Aufrufe vor 3 Monaten #SuccessStory #AtlasCopcoGroup

Fernwärmesysteme und industrielle Großwärmepumpen können erheblich zu einer klimafreundlichen Gesellschaft beitragen. Die Bedeutung der Energiesicherheit und Unabhängigkeit von Energieimporten ist seit jeher hoch. Per Ljung, Betriebsleiter bei Stockholm Exergi, und Rasmus Rubycz, Marktmanager Neue Energie bei Atlas Copco Gas and Process, sprechen darüber, wie Atlas Copco Stockholm Exergi geholfen hat, mehr nachhaltige Stromerzeugung, Fernwärmeversorgung sowie Unabhängigkeit von Energieimporten zu erreichen. [Mehr ansehen](#)



Steam Compressors – References

- **More than 30 years experience, with more than 150 running references**
- **Very high temperature lifts (> 100K) possible**
- **Multi stages with interstage water injection cooling (desuperheater) to reduce power consumption and to maximise steam discharge flow**
- **Multi sections with extraction or injection between sections allow very flexible sidestream integration**



Steam Compressor – References

Year ordered	Code word	Name of buyer	Compressor type	Q'ty	Gas handled	Massflow kg/h	t1 °C	P1 bar(a)	P2 bar(a)	Speed rotors rpm	Driver Power kW	Driver Speed rpm	Name of end user	In country
2017	Nederlands	Nederlands	GT026T2K1	1	H2O	12 000	170	3.92	13.5	38 076	1 510	2 960	Nederlands	Nederlands



Customer Story

Steam Compressor – References

Year ordered	Code word	Name of buyer	Compressor type	Q'ty	Gas handled	Volume m³/h	t1 °C	P1 bar(a)	P2 bar(a)	Speed rotors rpm	Driver Power kW	Driver Speed rpm	Name of end user	In country
2008	China	China	GT098T1K1	1	H2O	179 166	118	1.84	3.29	8 904	7 900	1 480	China	China



Steam Compressor – References

Year ordered	Code word	Name of buyer	Compressor type	Q'ty	Gas handled	Massflow kg/h	t1 °C	P1 bar(a)	P2 bar(a)	Speed rotors rpm	Driver Power kW	Driver Speed rpm	Name of end user	In country
2006	Korea	Korea	GT032T2K1	1	H2O	19 000	158	5.9	12.3	23 902	1 800	3 552	Korea	Korea





Thank you!