15TH IEA HEAT PUMP CONFERENCE

MAY 26–29, 2026 | HOFBURG

VIENNA 2026

OST
Eastern Switzerland
University of Applied Sciences

Realized projects and what is to come with focus on success factors

Workshop: Decarbonizing Process Heating with High-Temperature Heat Pumps – From Market to Application, 26 May 2026, Vienna

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Institute for Energy Systems IES
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IES | Institute for Energy Systems

Content

- Realized Demonstration Cases
- Representative Cases
- Success Factors

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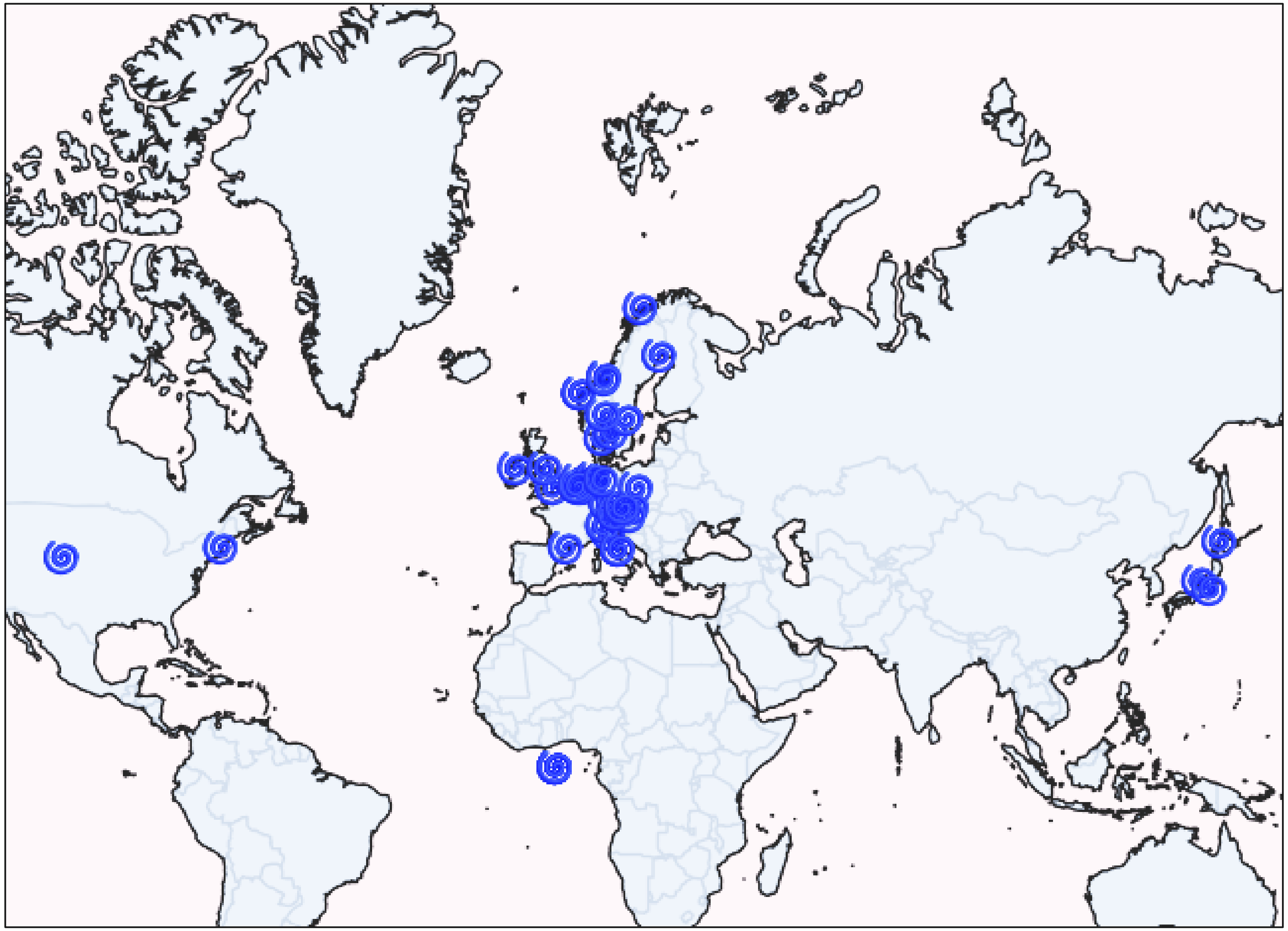
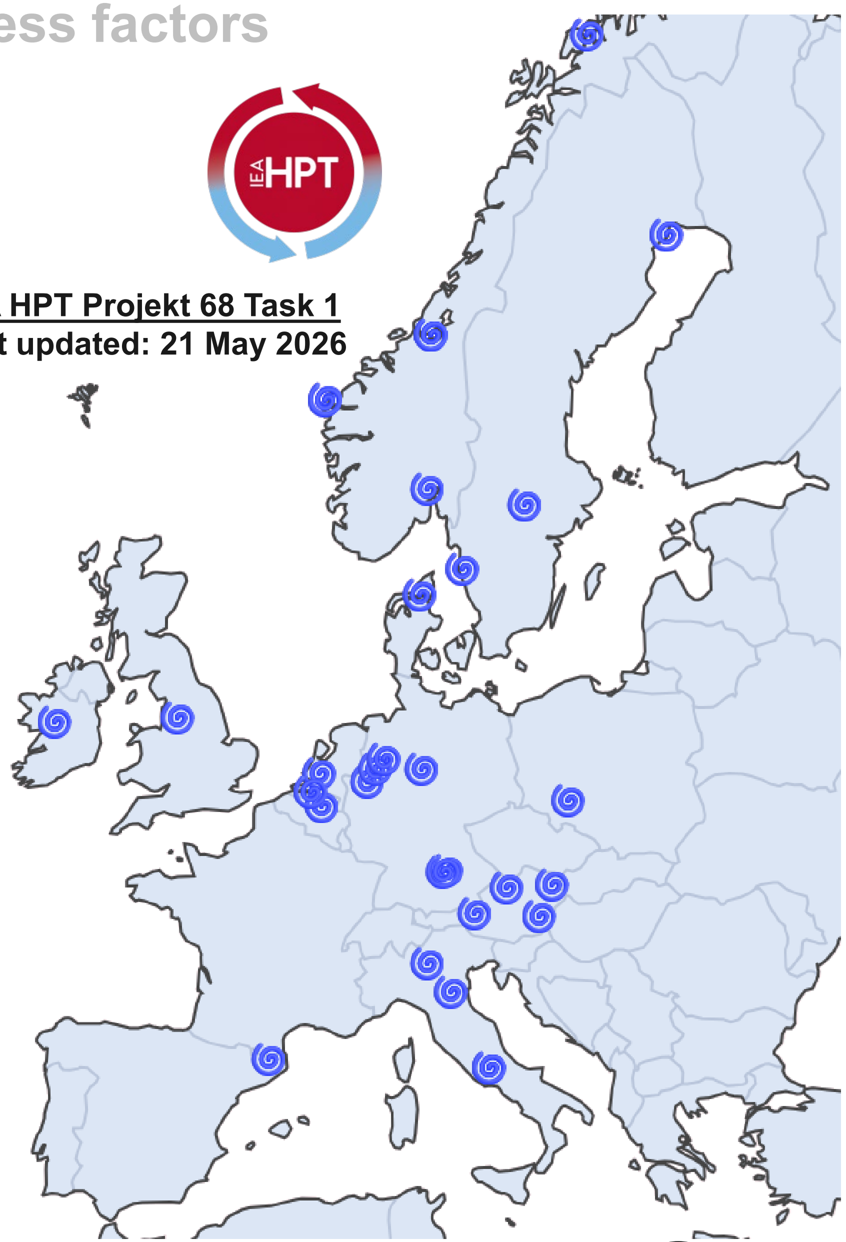
40+ Demostration Cases



IEA HPT Projekt 68 Task 1
Last updated: 21 May 2026



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40+ Demonstration Cases from IEA Project 68

IEA HPT Projekt 68 Task 1
Last updated: 21 May 2026

HTWP Supplier	Industry	Heat Source in → out (°C)	Heat Sink in → out (°C)	Refrigerant	Compressor Type	Heating Capacity (MW)	COP	Heat Source Media	Heat Sink Media
Kobelco	Wastewater (sewage sludge)	93 → n.a.	n.a. → 160	R718	Roots, Screw	0.7	2.9	Steam (saturated)	Steam (saturated)
Epcon/Rotrex	Wastewater (sludge)	100 → n.a.	n.a. → 125–146	R718	Turbo	0.5	4.5–8.7	Steam (saturated)	Steam (saturated)
Spilling	Chemicals	152 → n.a.	n.a. → 240	R718	Piston	12.0	5.3–5.8	Steam (5 bar)	Steam (19.5 bar)
Kobelco	Chemicals (Bioethanol)	65 → 60	20 → 110–120	R245fa	Screw	0.4	3.5	Water	Steam (saturated)
Qpinch	Chemicals (Ethylene Polymerization)	135 → 80	140 → 185	R718/H PO	n.a.	2.9	0.45	Steam/Water	Steam (saturated)
Celeroton	Chemicals (Methanol Distillation)	75 → n.a.	n.a. → 157	Methanol/Water	Turbo	n.a.	n.a.	Methanol/Water	Methanol/Water
SPH Sustainable Process Heat	Steam generation	46 → 41	90 → 123	R515B, R1233zd	Screw, Piston	1.2	2.3	Water	Steam
Everllence	District heating	29 → 3	n.a. → 200	Natural	Centrifugal	40.0	>2	Water	Steam (15 bar)
Turboden	District heating	70 → 60	60 → 120	R1233zd(E)	Centrifugal	6.0	5–8	Water	Water
RANK	District heating	25 → 15	60 → 90/105/130	R1234ze(E), R1233zd(E)	Screw	1.0	2.78	Water	Water
AGO Energie & Anlagen	District heating	23 → n.a.	120 → n.a.	R717, R718	Piston	1.8	2.6	Water	Water
AtmosZero	Food	40 → 20	n.a. → 165	R513a/R1233zd(E)	Centrifugal	0.7	1.3–2.04	Air	Steam (7 bar)
AGO Energie & Anlagen	Food (Brewery)	90 → n.a.	120 → n.a.	R717, R718	Piston	1.2	6.1	Water	Water
TTI	Food (Deep-frying)	95 → n.a.	150 → 170	R718	Turbo	1.0	3	Process Gas	Oil
Olvondo	Food (Milk)	85/31 → 75/26	105 → 155	R704	Piston	5.4	2	Water/Water	Steam (5 bar)
Skala Fabrikk	Food (Milk)	5/20 → 0/12	95 → 115	R290, R600	Piston	0.3	2.5–3.4	Ice Water/Water+Glycole	Water
GEA	Food (Milk Spray Drying)	5 → 3	35 → 130	R744	Piston	0.9	2.5	Water	Water
Aneo Industry	Food (pelleting)	60 → 30	4 → 75/140	R717, R718	Screw, Piston, Centrifugal	1.7	3.1	Humid Air	Water/Steam (2 bar)
Aneo Industry	Food (Protein/fish oil)	80/98 → 35/98	n.a. → 148	R717, R718	Piston, Centrifugal	4.4	3.5–6.5	Water/Steam (saturated)	Steam (4.5 bar)
Mayekawa Europe	Food (Shrimp Processing)	12 → 7	140 → 145	R717, R601	Screw + Screw	0.8	1.8	Ammonia	Steam (4 bar)
AMT Kältetechnik	Food (Drying)	76 → 72	96 → 138	R1336mzz(Z)	Screw	0.4	3.2	Water	Water
Oilon/Astatine	Food (Whiskey)	60 → n.a.	n.a. → 115	Hightemp-Refrigerant	Piston	1.0	5	Water	Water
Heaten	Food (SugarPproduction)	102 → 100	128 → 130	R1233zd(E)	Piston	4.0	6	Steam (saturated)	Steam (saturated)
GEA	Food (Sugar Refining)	75 → 75	110 → 140	R601	Screw	4.0	3–5	Steam	Steam
Enerin	Food, animal feed (fish meal/oil)	16–72 → n.a.	n.a.. → 163–167	R704	Piston	0.4	1.75–2.35	Water	Water
HTT	Food/Paper/Materials	90/150 → 70/130	n.a. → 265/200	Air	Turbo	0.6	1.5–1.8	Water	Oil/Water
ThermoDraft	Marine	75–85 → 65–75	90–100 → 110–120	R1233zd(E)	Screw	0.1	3.4–5.6	Water	Water
Psycotherm, Heaten	Materials (Roof Tiles)	85/60 → 70/50	230/125 → 300/225	Air, R600a, R718	Piston, Turbo	1.0	1.5/2.1	Air/Humid Air	Air/Steam (5 bar)
Piller Blowers & Compressors	Materials (EPDM)	92 → 60	n.a. → 126–131	R718	Turbo	10.0	4.4	n-Hexane/Water	Steam
Ochsner Energie Technik	Materials (Leather)	55 → 50	100 → 110	R1233zd	Screw	0.3	3.2	Water	Water
SPH Sustainable Process Heat	Materials (Metal Treatment)	92 → 84	90 → 159	R1336mzz(Z)	Piston	1.0	2.5	Water	Steam (6 bar)
SPH Sustainable Process Heat	Materials (Tobacco Drying)	50 → 36	90 → 139	R515B, R1233zd	Piston	0.7	2.5	Water	Steam (3.5 bar)
MHI Thermal Systems	Materials (Drying)	55 → 50	70 → 130	R134a	Centrifugal	0.6	3	Water	Water
AMT Kältetechnik	Materials (Bricks)	88 → 84	96 → 121	R1336mzz(Z)	Piston	0.3	5	Water	Water
Combitherm	Materials (Brick Drying)	102 → 74	110 → 120	R1233zd(E)	Screw	0.8	4.2	Water	Water
SPH / Spilling	Pharma	70 → n.a.	n.a. → 184	R600, R718	Piston	1.7	4.4	Water	Steam (11 bar)
Olvondo	Pharma	36 → 34	105 → 183	R704	Piston	2.3	1.7	Water	Steam (10 bar)
Turboden	Pulp & Paper	17 → 8	104 → 170	R600a	Centrifugal	12.0	2	Water	Steam (superheated)
Spilling	Pulp & Paper	133 → n.a.	n.a. → 240	R718	Piston	11.2	4.2–4.7	Steam (3.2 bar)	Steam (16 bar)
BS NOVA	Pulp & Paper (Steam)	90 → 80	n.a. → 162	LiBr-H O	Absorption	0.3	0.48	Water	Steam (6.5 bar)
Cannon Bono	Pulp & Paper (Steam)	90 → 80	105 → 162	R1233zd(E)	Screw	0.6	5.2	Water	Steam (6.5 bar)

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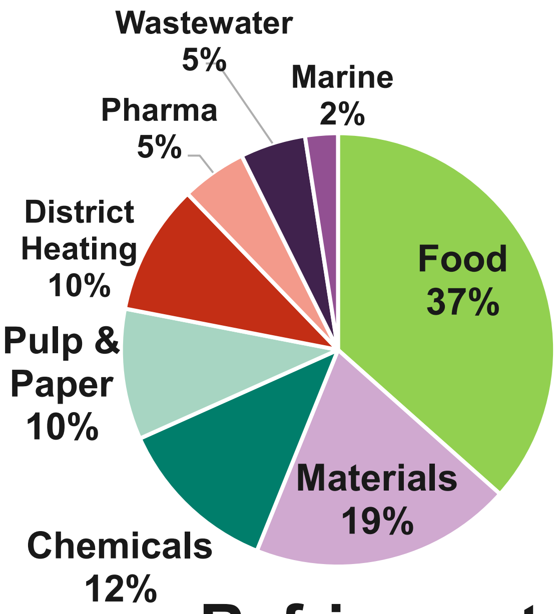
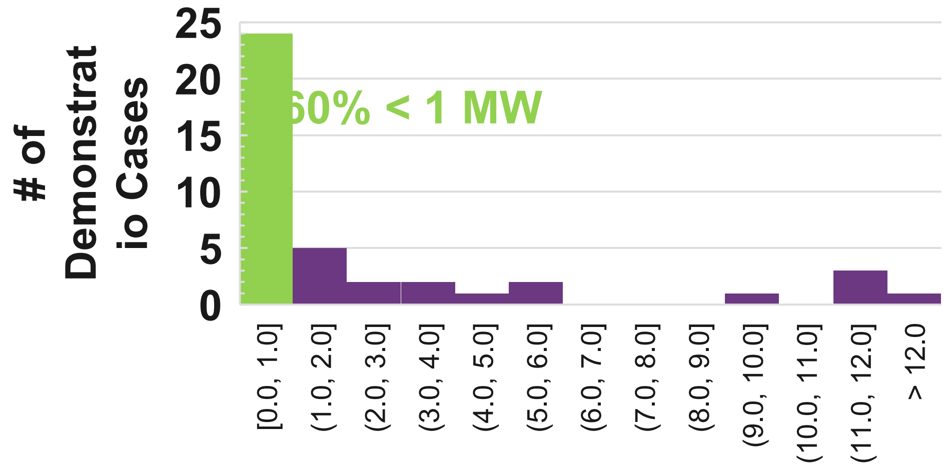
Realized Demonstration Cases from IEA Project 68

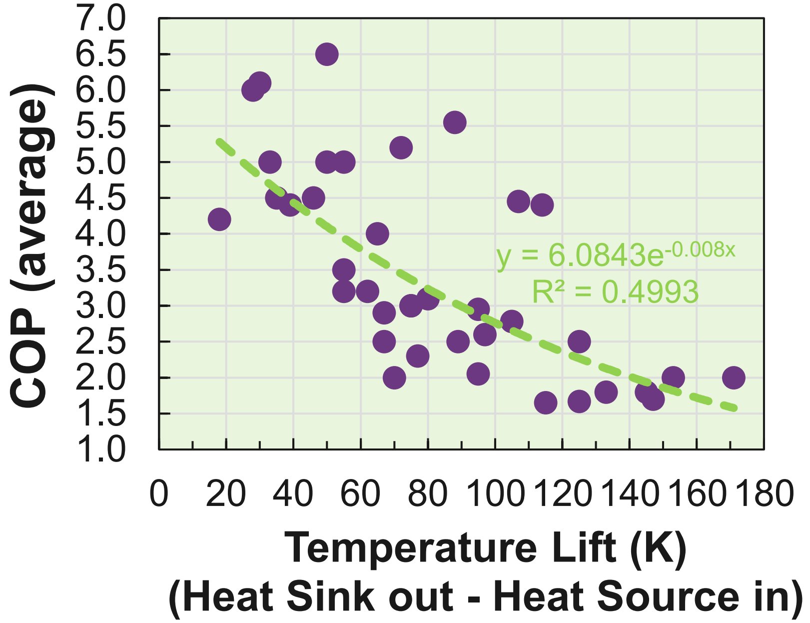
Industry



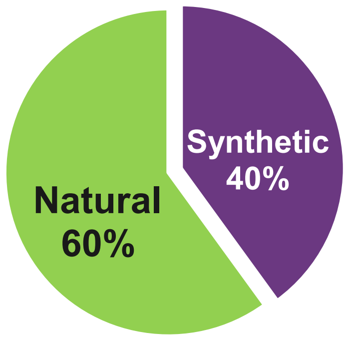
Heating Capacity



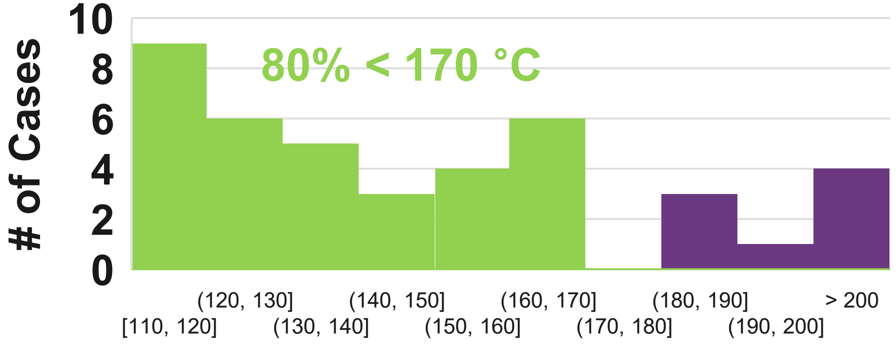
COP (average)



Refrigerants



Heat Sink Outlet Temperatures



Heat Source and Sink Media

	Heat Source	Heat Sink
Water	73%	41%
Steam	20%	59%
Air	7%	2%

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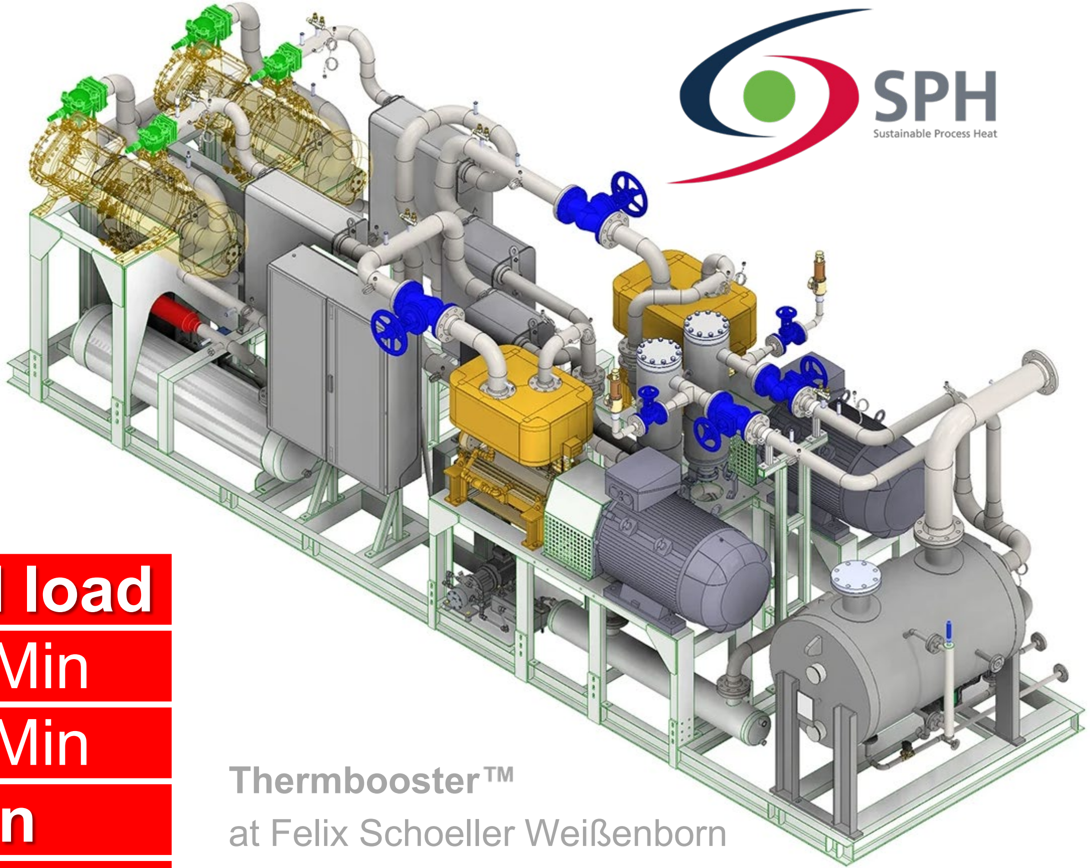
Piston compressor technology

Success factors = Flexibility

- **Time to full load**
- **Shutdown:** < 5 min incl. pumpdown
- **Emergency stop:** Few seconds
- **Restart:** within seconds after stop

Configuration	Time to start	Time to full load
Completely cold	Up to 30 Min	Up to 75 Min
Cold	< 5 Min	Up to 45 Min
Hot	**< 5 Min**	**< 10 Min**
Minimal capacity	0	< 3 Min



Thermbooster™
at Felix Schoeller Weißenborn

- Steam 2.2 bar(a) (123 °C)
- Waste heat 46 °C/41 °C (paper dryer)
- 1’180 kW, COP 2.3

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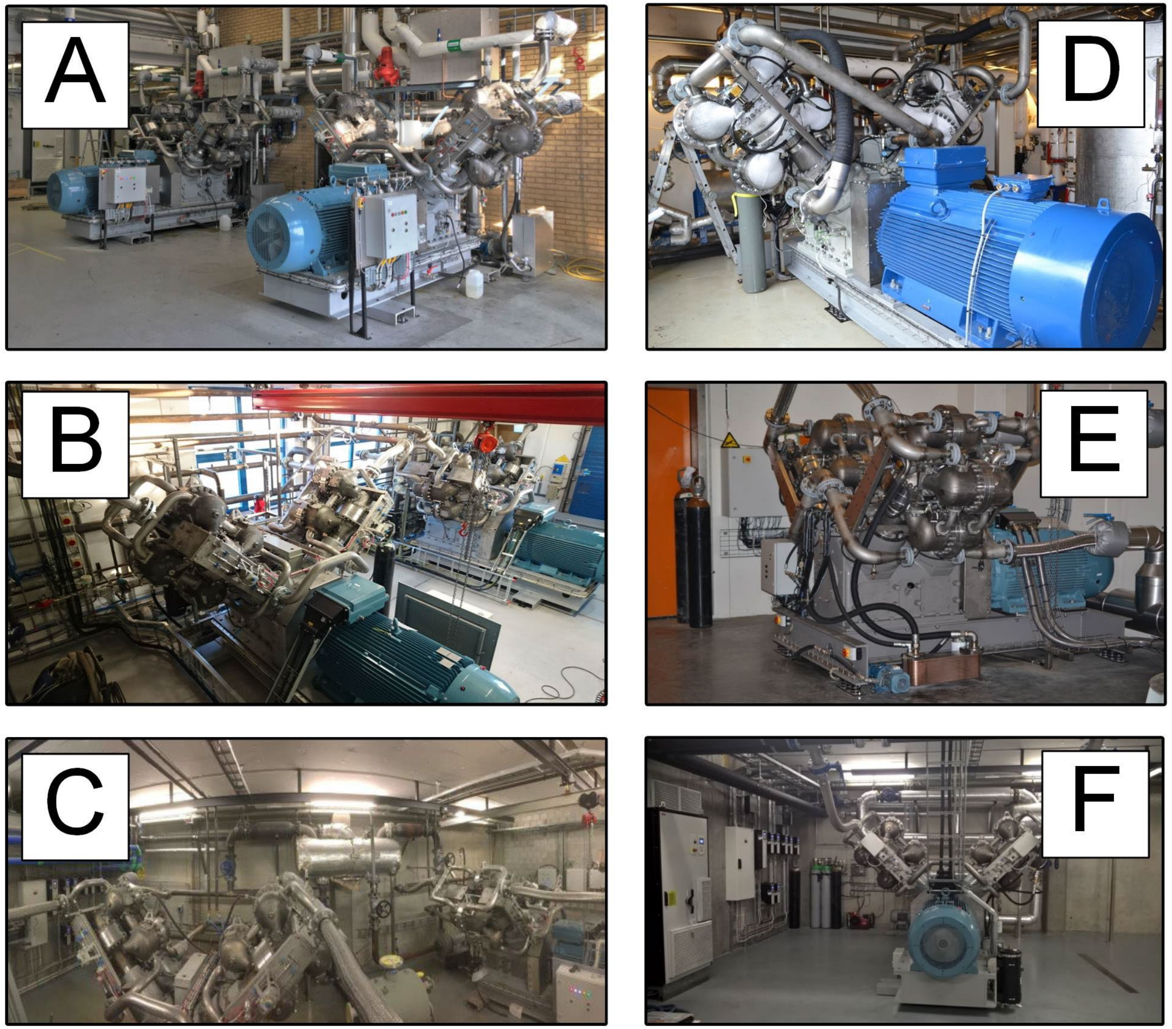
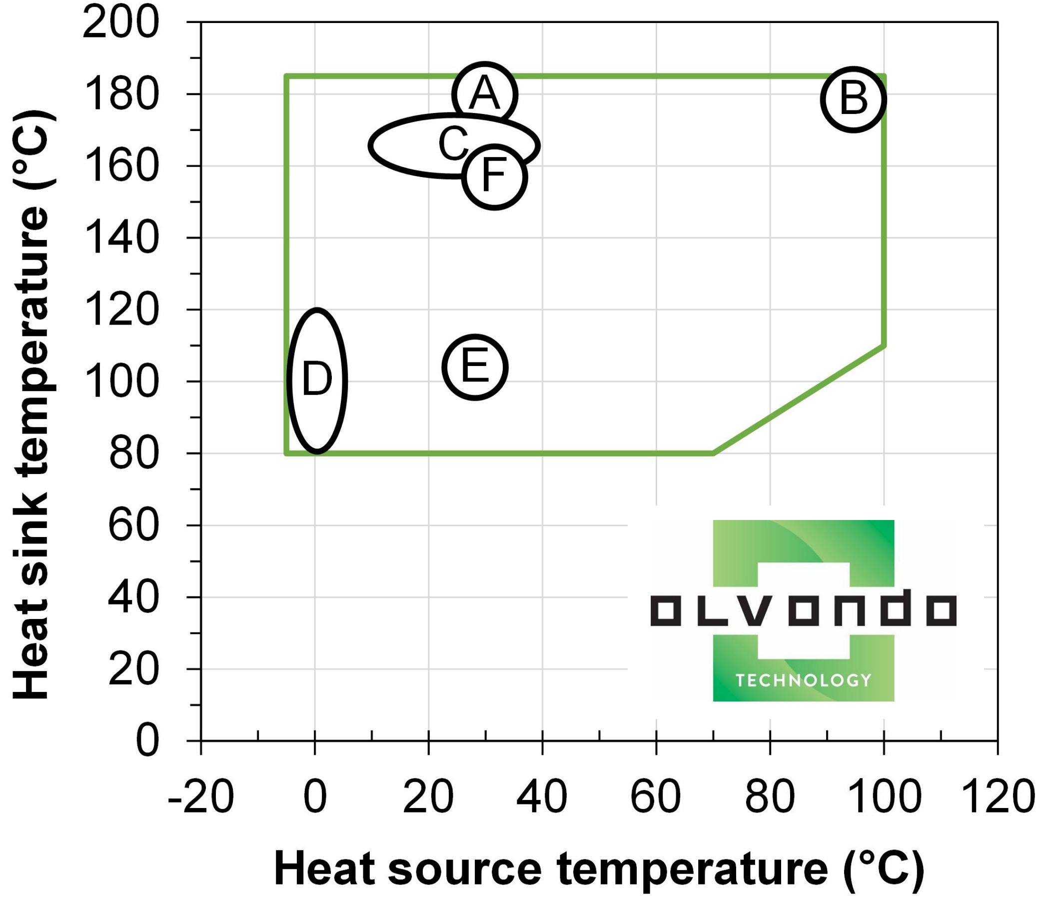
Reference projects from Olvondo HighLift



Images courtesy of Olvondo

Success factors

- Flexible operating range & high lift



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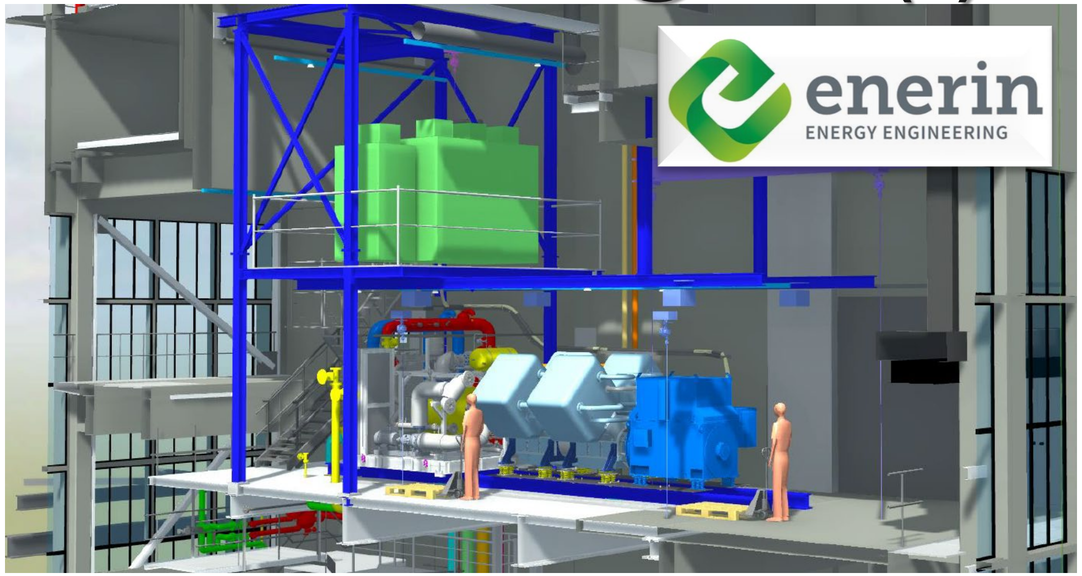
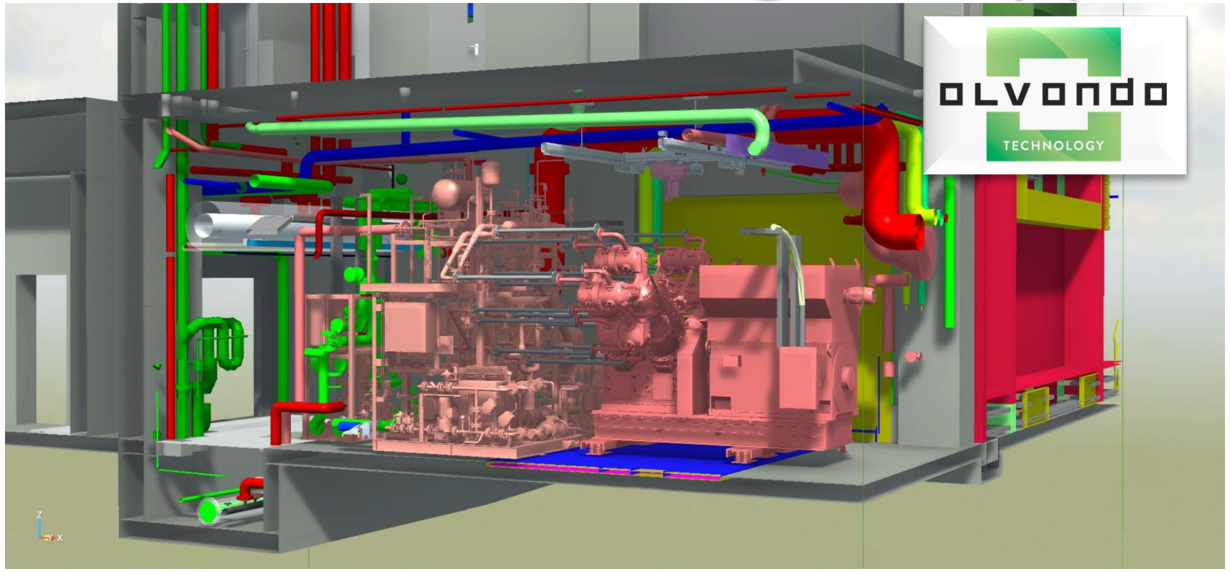
Roche

Pilot Plants at Pharma company F. Hoffmann-La Roche, Basel

Enerin: 1.8 t/h @ 7 bar(a)



Olvondo: 1.1 t/h @ 7 bar(a)



Images courtesy of Roche presented at IHW Forum at OST, 18/03/2026

Success factors:

- Steam generation: 7 bar(a), 165 °C
- Heat source: 6/12 °C low-temperature network
- Good controllability: 1:6 (target: 1:8) part-load
- Natural refrigerant / no HFOs

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Steam-generating heat pump with ammonia + water

Success factors:

- Natural refrigerants, cascade of screw, piston, and 4 turbo compressors
- Waste heat recovery from moist air in pet food pellet production
- 1.6 MW, 2 t/h steam at 120 °C and 1.5 bar(a)

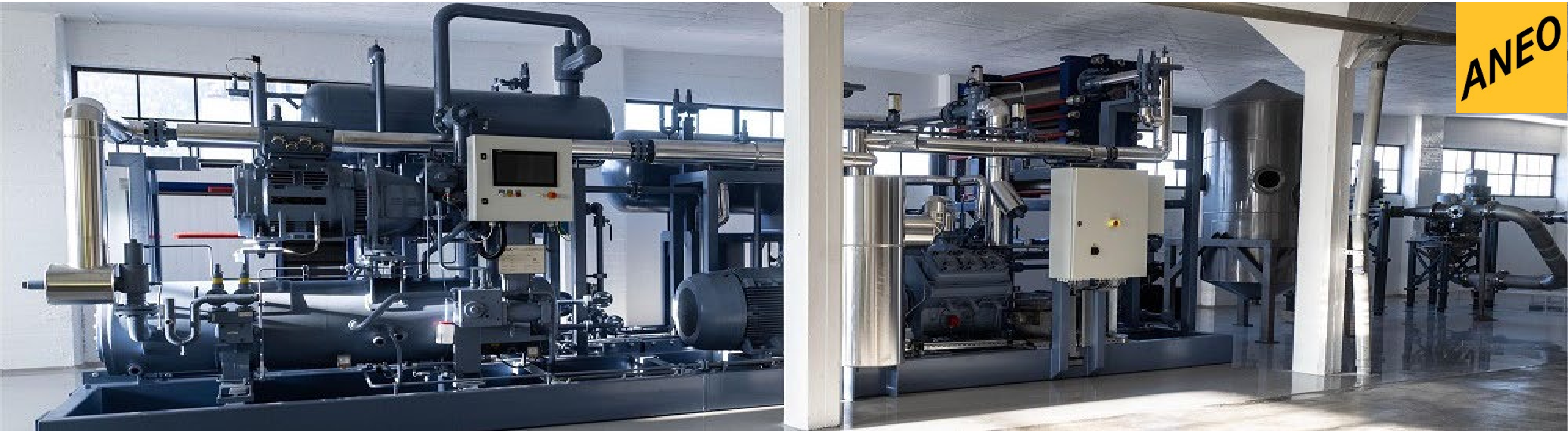

Image courtesy by Aneo Industry AS, Felleskjøpet Agri in Trondheim, Norway

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NH_3 heat pump for shrimp processing at Stella Polaris, Norway

Success factors

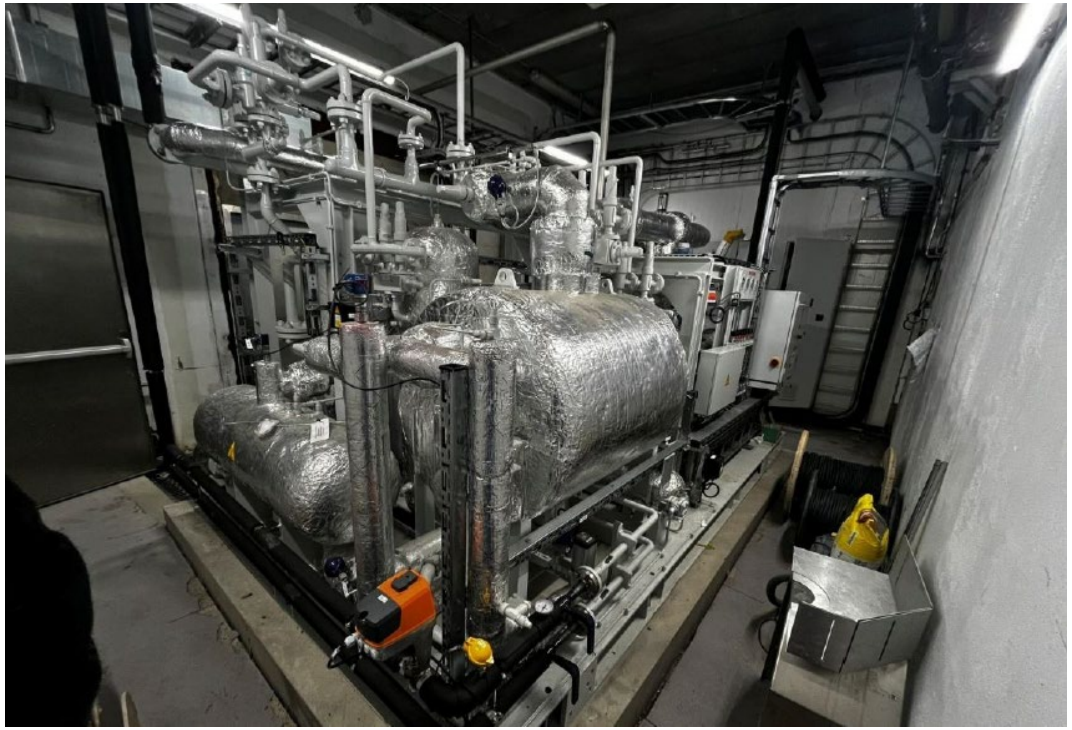
- R-717/R-601 (ammonia/pentane)
- 12/7 °C → 140/145 °C (steam)
- COP: 1.8 (combined COP: 2.5)
- Heating capacity: 0.8 MW_{th}
- CO_2 savings: 621 t/CO_2/a
- Investment: 0.8 Mio. EUR (excl. integration)

STELLA POLARIS NORWEGIAN PRAWNS SINCE 1968

MAYEKAWA MYCOM

TNO innovation for life

SPIRIT



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Electrified feed dryer

Success factors:

120 °C Hot Water

4 x HWW 2/9583I → **3.5 MW$_{th}$**

COP ~ 2.8

2/3 at COP 2.4 (40 °C → 120 °C)
1/3 at COP 4.0 (40 °C → 90 °C)

EWOS Cargill

Combitherm APPARATE- UND ANLAGENBAU

geelen counterflow cool and dry

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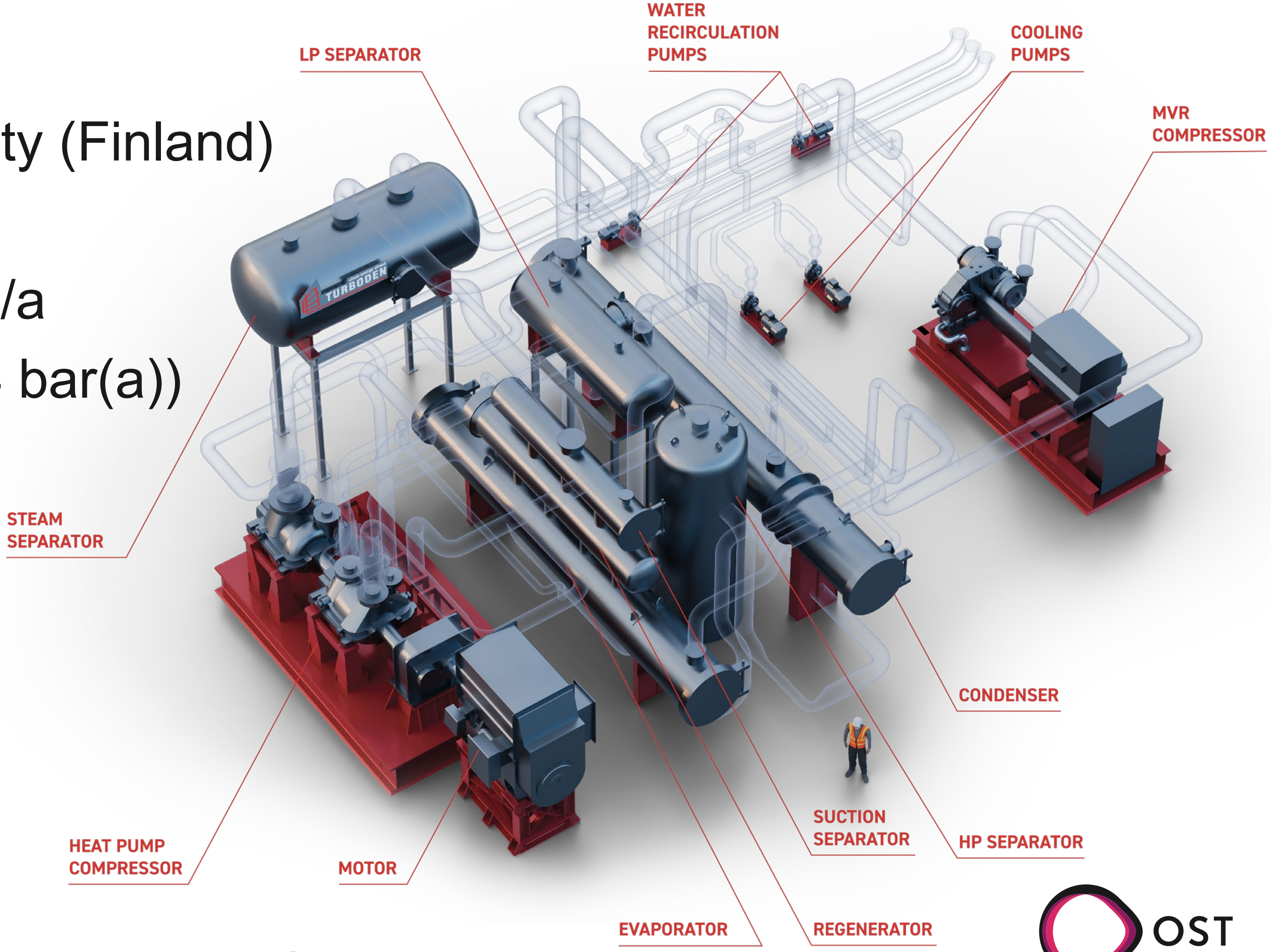
Largest Steam Heat Pump at Delfort Paper Mill

Success factors:

- Low-cost renewable electricity (Finland)
- Fully decarbonized steam
- CO_2 reduction >19’000 tCO_2/a
- 12.5 MW_{th}, 20 t/h steam (3.4 bar(a))
- 17/8 °C → 104/170 °C
- COP up to 2
- R600a (iso-butane)



delfort   clean energy ahead TURBODEN

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Key Takeaways

Success factors

- **Proven references** & operating experience
- **High reliability** (e.g., pharma applications)
- **Scalability** & **part-load flexibility**
- **High temperature lifts**
- **Natural refrigerant** solution
- **Low-cost electricity** (renewable)
- **Fully decarbonized** steam generation

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Acknowlegements

sweet swiss energy research for the energy transition

DeCarbCH

DeCarbonisation of Cooling and Heating in Switzerland) (SI/502260) www.sweet-decarb.ch (2021-2028)

IEA HPT Project 68:
Industrial High-Temperature Heat Pumps (SI/502999) (2025-2029)

IEA HPT TCP Annex 59
Heat Pumps for Drying (SI/502606) (2023-2027)

Push2Heat

Pushing forward the market potential of heat upgrading technologies in the industrial sector

Funded by the European Union

Grant Agreement No. 101069689
www.push2heat.eu

ZIMBA

Zero-carbon Industrial heat production by aMmonia water aBsorption heAt transformer

Funded by the European Union

Grant Agreement No. 101146932
www.zimba-project.eu

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Backup

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40+ Demostration Cases

Philip Morris

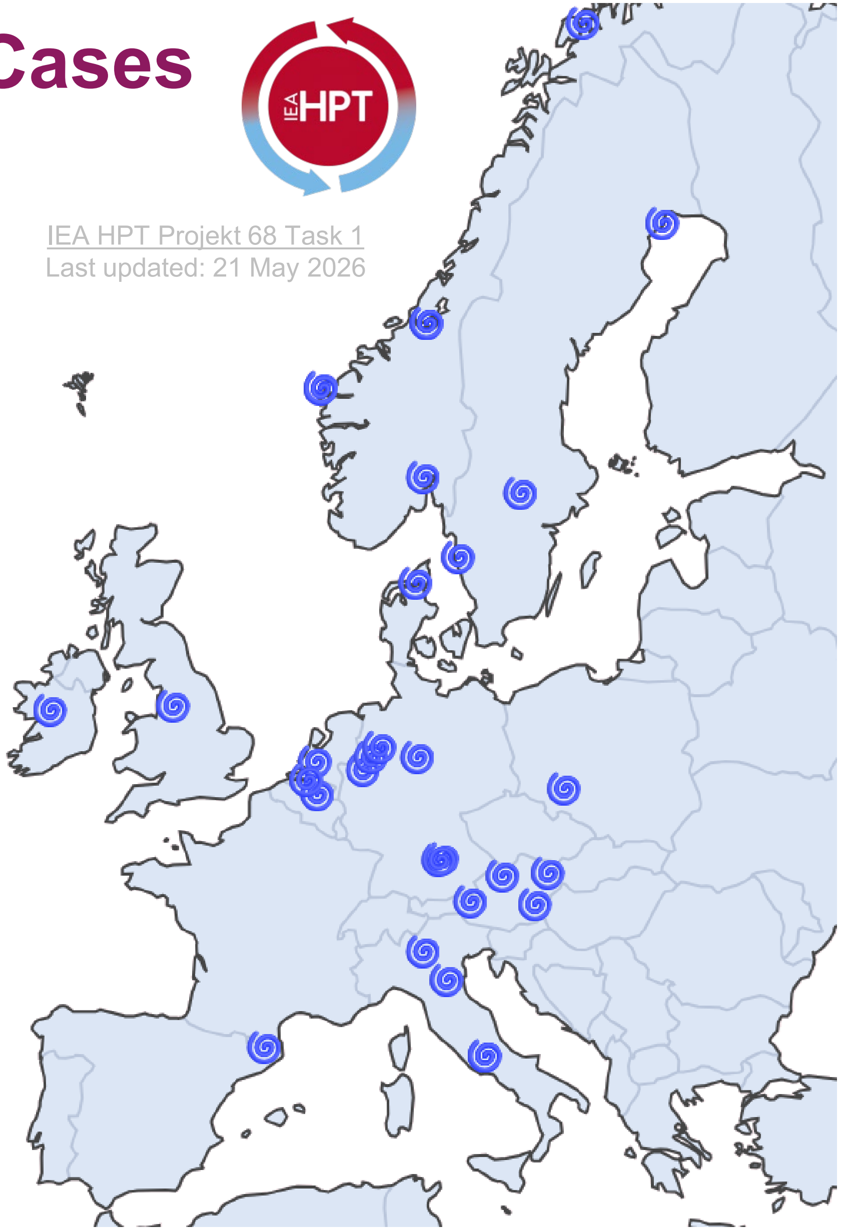
Bologna, Italy

36 °C → **139 °C**

3.5 bar(a) Steam

IEA HPT Projekt 68 Task 1

Last updated: 21 May 2026



Takeda

Vienna, Austria

65 – 70 °C → 115 °C Steam

→ **184 °C, 11 bar(a) Steam**

Other case studies:

- AGO, AMT, Aneo Industry, AtmosZero
- BS Nova, Cannon Bono, Celeroton
- Enerin, Epcon, Everllence
- GEA, Heaten, HTT, Kobelco
- Mayekawa Europe, MHI
- Ochsner, Oilon, Olvondo
- Piller, Qpinch, Rank
- Skala, SPH, Spilling
- ThermoDraft, TTI, Turboden

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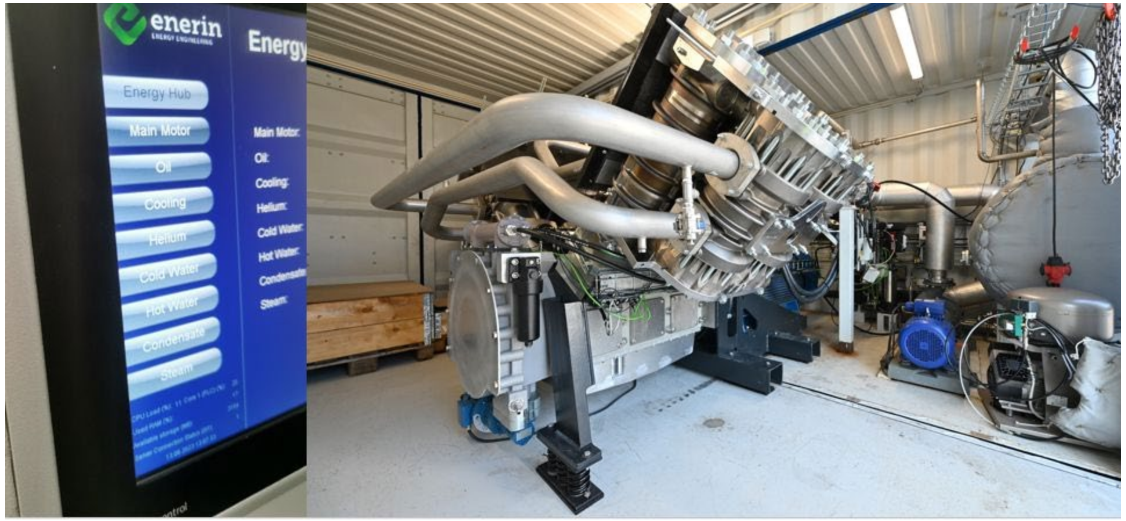
Reference projects from Enerin HoegTemp



Images courtesy of Enerin

- **IVAR -Biogas:** Demonstration plant for process steam and waste heat utilization since August 2023
- **GE Healthcare:** 800 kW, 2 bar(g) steam from a stable 15 °C heat source, expected COP 1.9 to 2.0
- **Pelagia Måløy:** 2 x 800 kW units (1.6 MW), 5 to 8 bar(g) steam from waste heat and seawater (5 to 90 °C), COP 1.5 to 2.5 (typically 1.8)
- **SUSHEAT EU-Projekt:** Integration of a 250 °C HTWP with thermal energy storage

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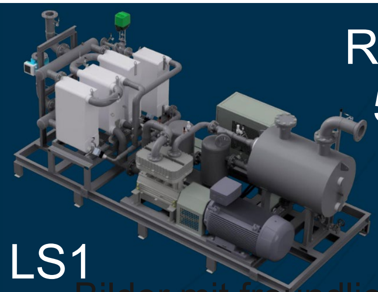
News 23. Oktober 2025:
Acquisition of SPH by Copeland

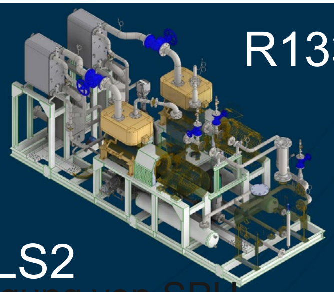
SPH Sustainable Process Heat

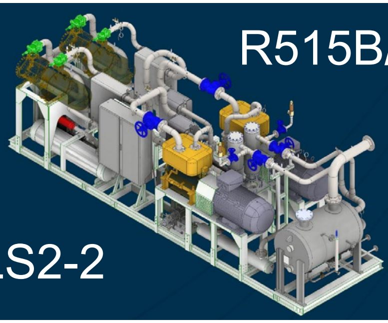
COPELAND

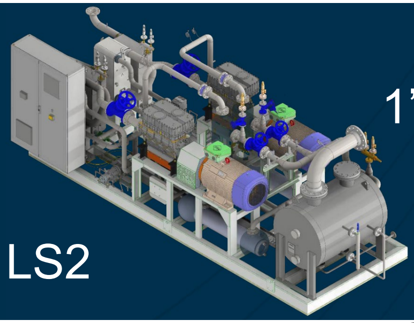
Reference projects from SPH

#	Country	Industrial Sector	Unit	#	$T_{Source} \rightarrow T_{Sink}$ (°C)	Medium Sink	$\dot{Q}_{th}$ (kW)	Refrigerant	COP (-)	Status
1	NL	Thermoplastics	LL2	2	75/65 → 130	Hot water	2'034	R1233zd	4.4	In operation
2	DE	Paper	LS2-2	1	46/41 → 123	Steam	1'180	R1233zd	2.3	Commissioning
3	IT	Consumer goods	LS1-2c	1	50/36 → 139	Steam	646	R1233zd	2.3	In operation
4	AT	Pharmaceuticals	LS2 + MVR	1	70/65 → 115	Steam	1'270	R600	4.2	In operation
5	ES	Packaging	LS2	2	92/84 → 159	Steam	1'060	R1336mzz(Z)	2.5	In operation
6	AT	Chemicals	LL1	1	70/60 → 140	Thermal oil	290	R1233zd	3.0	Being installed
7	DE	Bio plastics	LL2	1	75/65 → 110	Thermal oil	1'200	R600	5.0	Being nstalled
8	ES	Juice	LL2	2	80/70 → 110	Hot water	2'390	R1224yd	5.6	Commissioning
9	CH	Meat	LS1	1	88/83 → 140	Steam	361	R601	5.0	Q2/2026
10	DE	Whisky	LS1-2	1	65/18 → 120	Steam	621	R1224yd	2.1	Q2/2026


R1233zd
514 kW
120 °C
LS1


R1336mzz(Z)
540 kW
159 °C
LS2


R515B/R1233zd
1'180 kW
123 °C
LS2-2


R600
1'270 kW
115 °C
LS2

Bilder mit freundlicher Genehmigung von SPH

Images by courtesy of SPH

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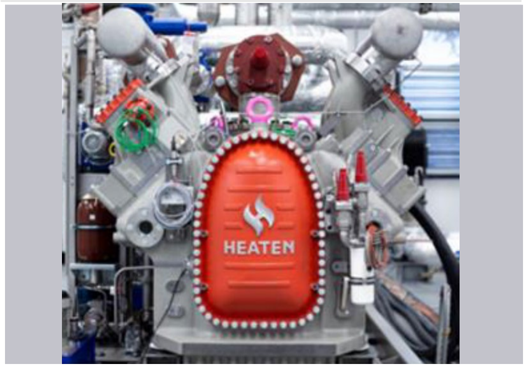
Reference projects from Heaten

End user	Südzucker	Südzucker	Felix Schoeller
Application/Sector	Sugar crystallization	Sugar evaporation	Pulp and paper
Location	Offenau, DE	Rain, DE	Osnabrück, DE
Product	2 x HBL4-S/S	2 x HBL4-S/S	HBL4-W/S 1-stage
Refrigerant	R1234ze(E)	R1233zd(E)	R600a
Heating capacity	2.8 MW	4 MW	>1 MW
Steam mass flow rate	4.2 t/h	6.6 t/h	> 1.6 t/h
Heat sink	98/100 °C	128/130 °C	120 °C
Heat source	62/59 °C	102/100 °C	40 °C
COP	3.8	6.0	-
CO_2 savings	1‘358 t/a	2‘660 t/a	-

2 x HBL4-S/S

2 x HBL4-S/S



HBL4-W/S

Images courtesy of Heaten

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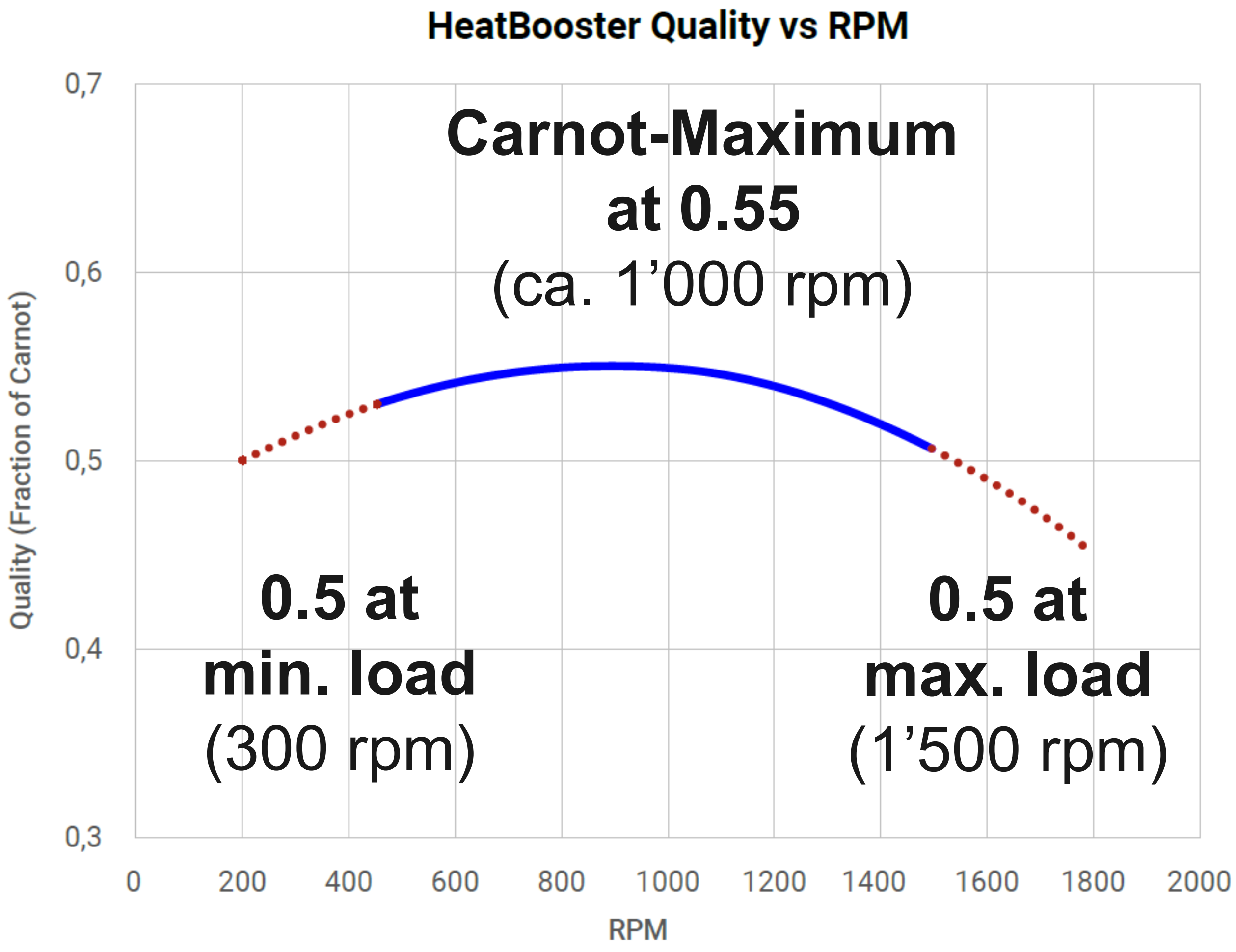
Piston compressor technology



Carnot quality is case dependent.

	HBL4-W/S	HBL16-W/S
Heating capacity	**0.8–2.5 MW**	**3.2–10 MW**
Refrigerant	Hydrocarbons and HFOs	
Charge	320–450 kg	1’280–1’800 kg
Partial load **Speed**	**30%–100%** **450-1’500 rpm**	**20%–100%** **300-1’500 rpm**
Swept volume	1’496 m³/h **(4 cylinders)**	5’984 m³/h **(16 cylinders)**
Max. pressure	45 bar	
Full to part load	**<1 min**	
Start-up	**10-15 min**	
Dimensions	9.5 x 2.7 x 2.7 m	11 x 2.4 x 2.5 m
Weight	25 tons	65 tons

Data source: Heaten AS, https://heaten.com/products

Source: Arpagaus, C.: 2. VDI-Fachkonferenz Einsatz von Großwärmepumpen in der Industrie, 17. September 2025, Berlin

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Demonstration Cases from IEA Project 68

IEA HPT Projekt 68 Task 1
Last updated: 21 May 2026

INDUSTRY	SUPPLIERS (n)	HEAT SOURCE IN → OUT (°C)	HEAT SINK IN → OUT (°C)	REFRIGERANTS (UNIQUE)	COMPRESSOR TYPE	HEATING CAPACITY (MW)	COP (MIN–MAX)	HEAT SOURCE MEDIA (UNIQUE)	HEAT SINK MEDIA (UNIQUE)
CHEMICALS	6	65 → 152	110 → 240	R718, R245fa, R718/H_3PO_4, Methanol/Water	Piston, Screw, Turbo	0.4 – 12.0	0.45 – 5.8	Steam (5 bar), Water, Steam/Water, Methanol/Water	Steam (saturated), Steam (19.5 bar), Steam/Water, Methanol/Water
STEAM GENERATION	1	46 → 41	90 → 123	R515B, R1233zd	Screw, Piston	1.2	2.3	Water	Steam
DISTRICT HEATING	5	23 → 70	60 → 200 (90/105/130**)	R717, R718, R1233zd(E), R1234ze(E), Natural	Centrifugal, Screw, Piston	1.0 – 40.0	>2 – 8 (2.78***)	Water	Steam (15 bar), Water
FOOD	16	5 → 102 (5/20 → 85/31****)	4 → 170 (35 → 155*****)	R717, R718, R744, R704, R290, R600, R601, R1233zd(E), R1336mzz(Z), R513a, High-temp.	Piston, Screw, Screw+Screw, Centrifugal, Turbo	0.3 – 5.4	1.3 – 6.5	Water, Air, Humid Air, Process Gas, Ice Water/ Water+Glycol, Water/ Steam (saturated), Ammonia, Steam (saturated)	Steam (2–7 bar), Steam (4–5 bar), Water, Oil
MATERIALS	8	50 → 102 (85/60 → 102/74******)	70 → 300 (230/125 → 300/225******)	R718, R1233zd(E), R1336mzz(Z), R515B, R134a, Air, R600a,	Piston, Screw, Reciprocating, Centrifugal, Turbo	0.3 – 10.0	1.5 – 5.0	Water, Air, Humid Air, n-Hexane/Water	Steam (3.5–6 bar), Air/Steam (5 bar), Steam, Air, Water
PULP & PAPER	5	17 → 133	104 → 240 (162*****)	R600a, R718, LiBr-H_2O, R1233zd(E)	Centrifugal, Piston, Absorption, Screw	0.3 – 12.0	0.48 – 5.2	Water, Steam (3.2 bar)	Steam (superheated), Steam (6.5–16 bar)
OTHER SECTORS (Marine; Food/ Paper/Materials; Pharma)	4	36 → 90/150	105 → 265/200	R704, R1233zd(E), R600/R718, Air	Piston, Turbo	0.1 – 2.3	1.5 – 4.4	Water	Steam (10–11 bar), Oil/Water

Suppliers (Number)
Heat Source In → Out (°C)
Heat Sink In → Out (°C)
Refrigerants (Unique types)
Compressor Type
Heating Capacity (MW)
COP (Min–Max)
Heat Source Media (Unique)
Heat Sink Media (Unique)

* Typical range of heat sink out temperatures in Chemistry (excluding "n.a." and "k.A." values).
** RANK provides multiple heat sink out temperature options.
*** RANK COP value; overall range for the industry is >2 to 8.
**** Second value pair shows source in → out / out → in (e.g., milk cooling) when applicable.
***** Range of heat sink out temperatures within the industry.
****** Second value pair shows source in → out / out → in and heat sink in → out ranges across materials applications.
ranges across materials applications.

ABBREVIATIONS
n.a. = not available
k.A. = no information available
MW = Megawatt
COP = Coefficient of Performance

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In English:
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Day 4: October 2, 2026

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