

DANISH TECHNOLOGICAL INSTITUTE

IEA HPT Project 68
Industrial High-Temperature Heat Pumps

17. November 2026

Benjamin Zühlsdorf, PhD
Innovation Director

Industrial Process heat demand – EU28

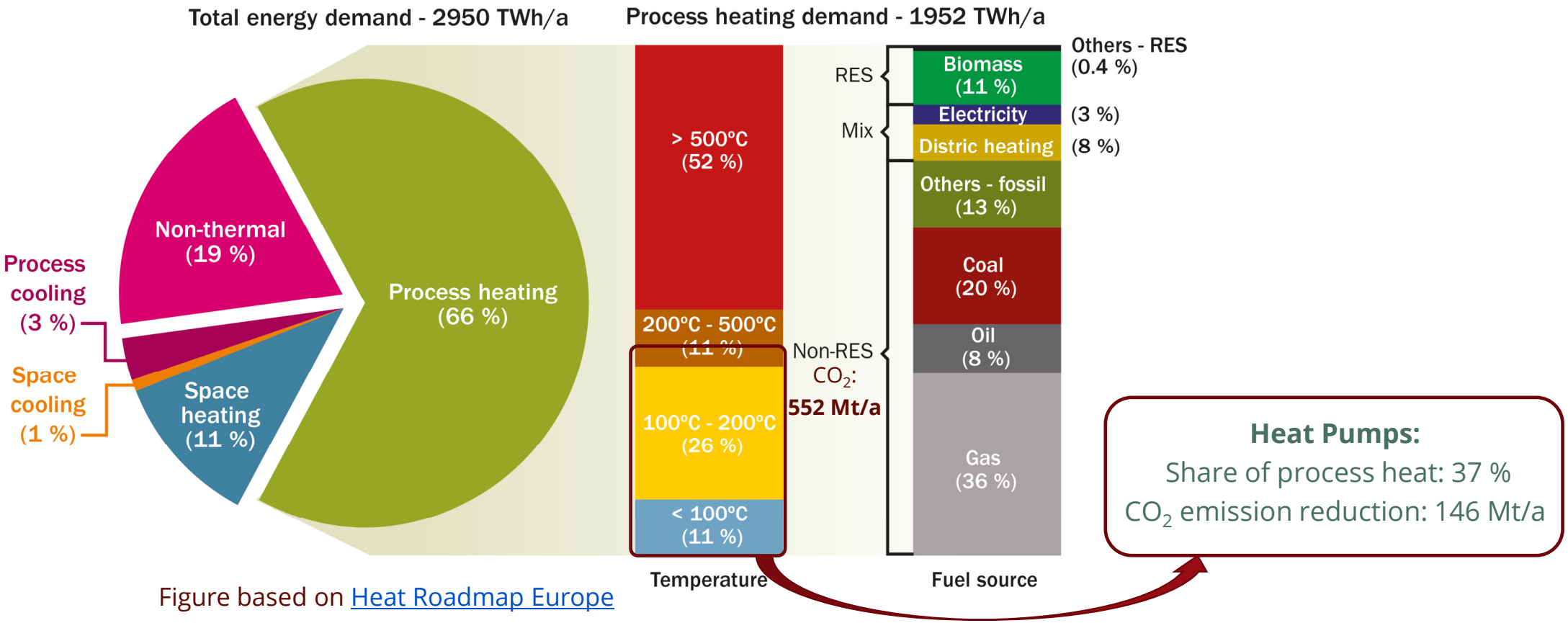


Figure based on [Heat Roadmap Europe]

Electrification Action Plan

The Clean Industrial Deal and the Affordable Energy Action Plan introduced a key performance indicator on the share of electricity in final energy consumption, setting 32% by 2030 as reference, and announced the Electrification Action Plan, which was presented on 17 July 2026.



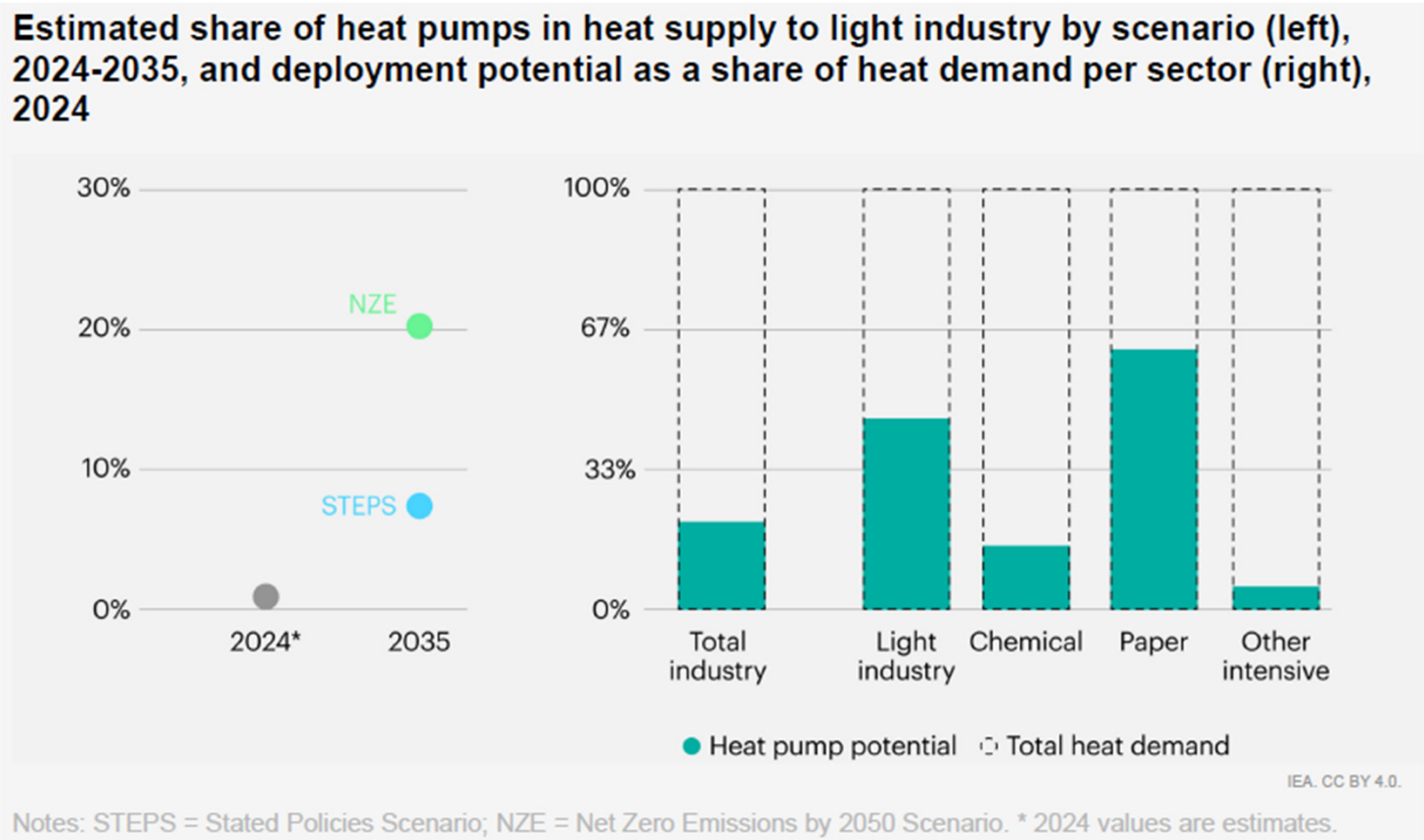
The Electrification Action Plan aims at **making Europe the first electro-powered continent**, with a stronger carbon market to support EU's industry in the clean transition and electrification.

Its indicative **electrification target of 46% by 2040** will be assessed as part of the post-2030 Energy Union package.

Reaching this goal could **cut the EU's fossil fuel import bill** by €260 billion per year by 2040.

Source: https://energy.ec.europa.eu/topics/eus-energy-system/electrification_en

Heat Pumps for Industries – Perspectives



Source: IEA, Heat Pump Monitor 2026, https://www.iea.org/reports/heat-pump-monitor-2026

The Road Towards Implementation

Technology Awareness

- Commitment to sustainability and decarbonization
- Potentials, limitations and characteristics of the technology
- How to exploit the potentials?
- Variety of stakeholders involved

Technology Development

- Component and system development
- Testing and demonstration
- Variety of technologies
- Collaborative effort

End-user adoption

- Technology adoption life cycle
- Retrofitting of industries for HP-based heat supply
- Decarbonization strategies

Boundary conditions

- Cost for fuels and GHG
- Regulatory frameworks
- Subsidies & incentives
- Market developments

Market deployment

- Technology implementation within commercial projects
- Learning curve for operators and suppliers
- Supply chain covering considerable volumes
- Business models

IEA HPT Project 68
Industrial High-Temperature Heat Pumps

14 countries confirmed, 1 more with strong interest

June 2025 to May 2028

Task 1 – Technology developments (Lead: DTI)

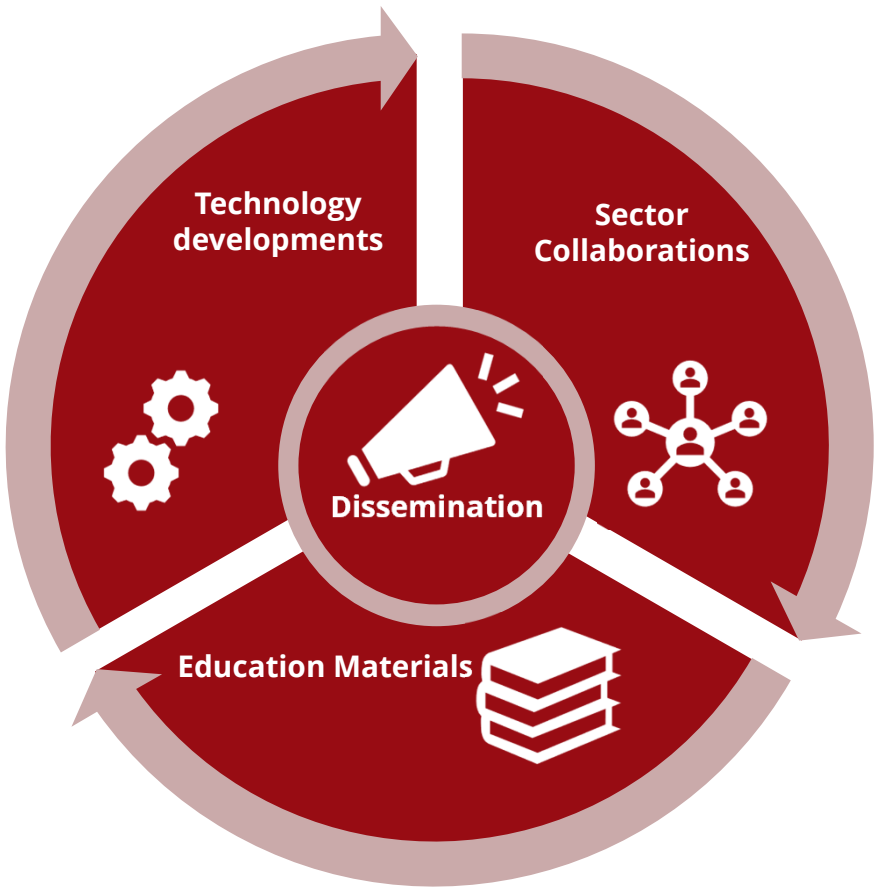
- Keep track of current and future technologies
- Provide updated overview

Task 2 – Sector collaborations (Lead: Uni-P)

- Highlight potential across sectors
- Identify common technology gaps
- Develop solutions to current barriers

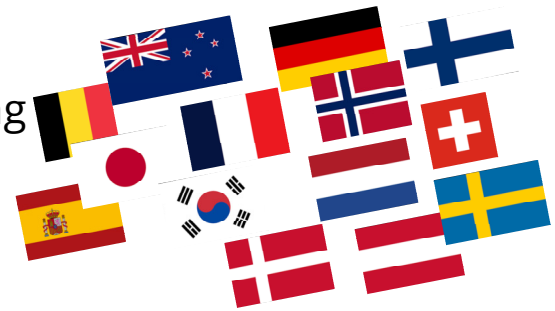
Task 3 – Education materials (Lead: AIT)

- Industry (end-users, consultants, suppliers, management….), academia, goverments



Project 68: New results are in!

14 countries participating



June 2025 to May 2028

Task 1 – Technology developments (Lead: DTI)

- Keep track of current and future technologies
- Provide updated overview

43+ Cases

55+ Technology suppliers

Newest trends



https://heatpumpingtechnologies.org/project68/

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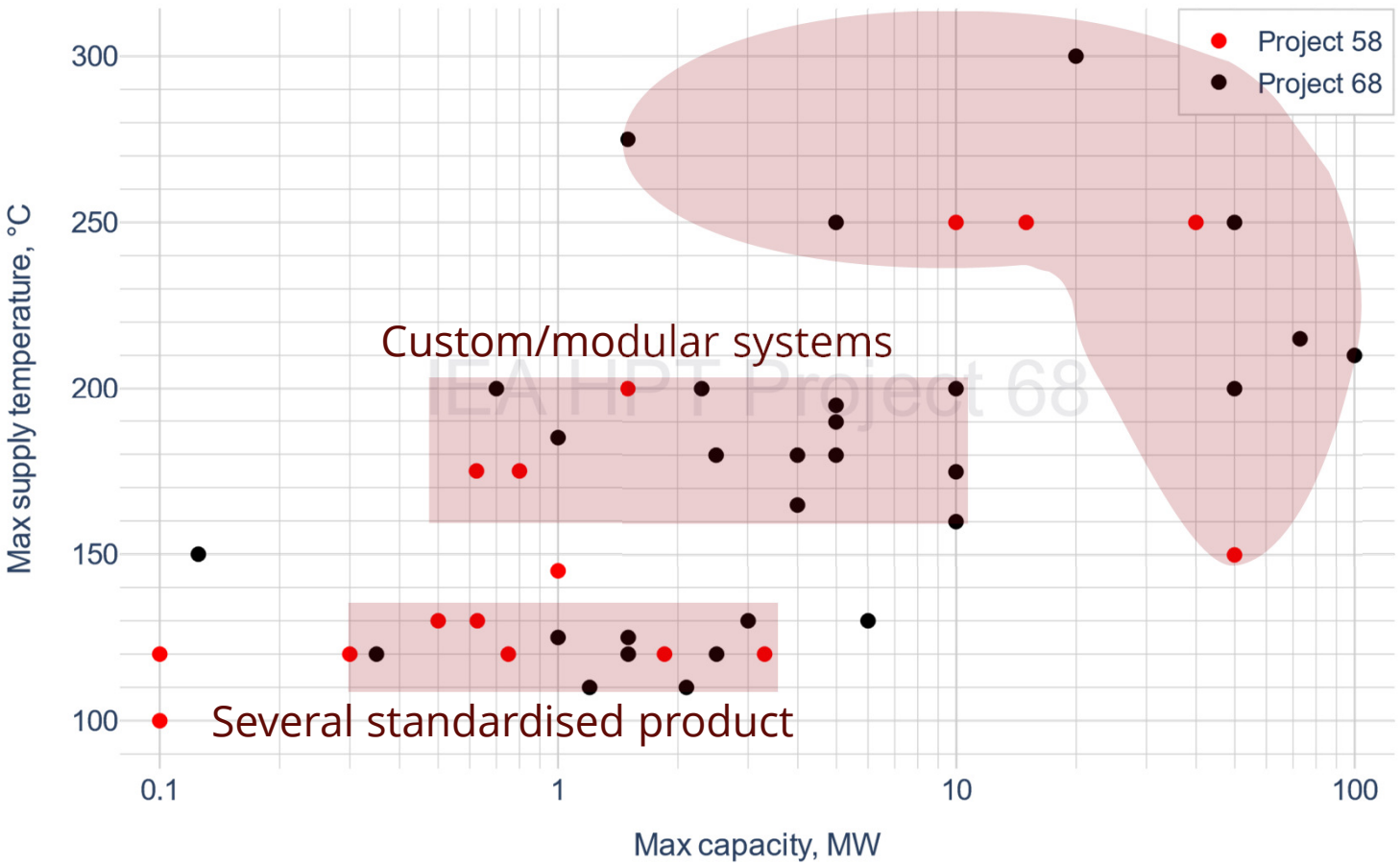
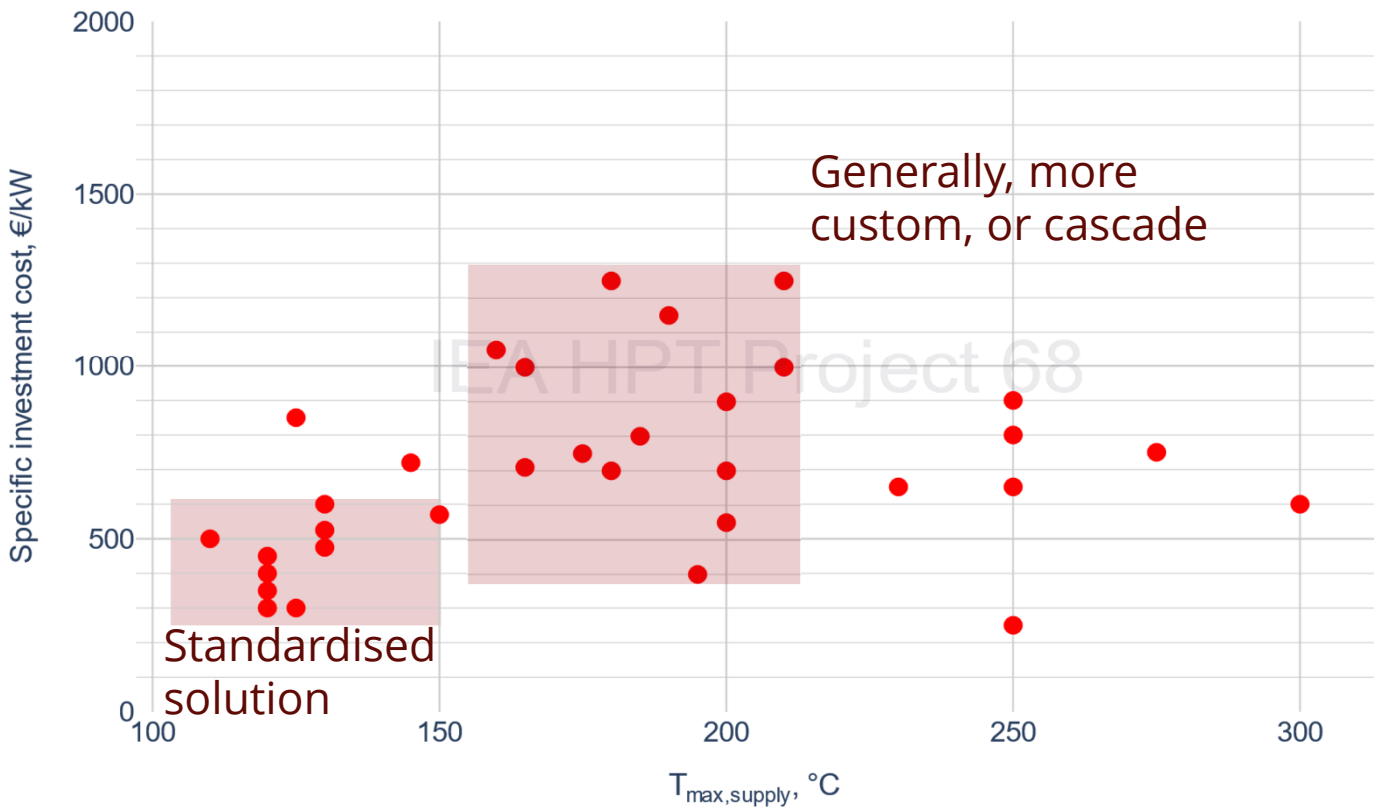
Where are the technologies today?

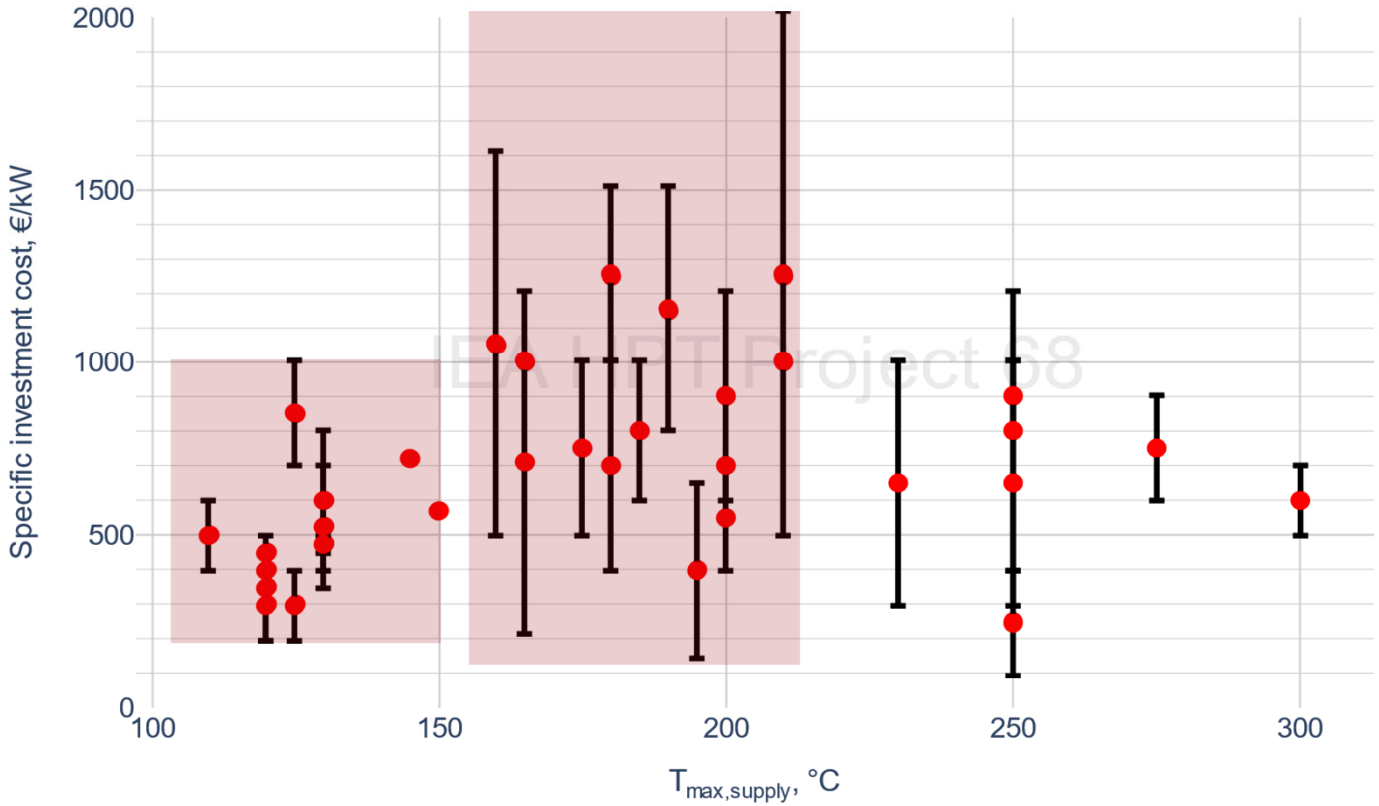


Advanced, often custom systems

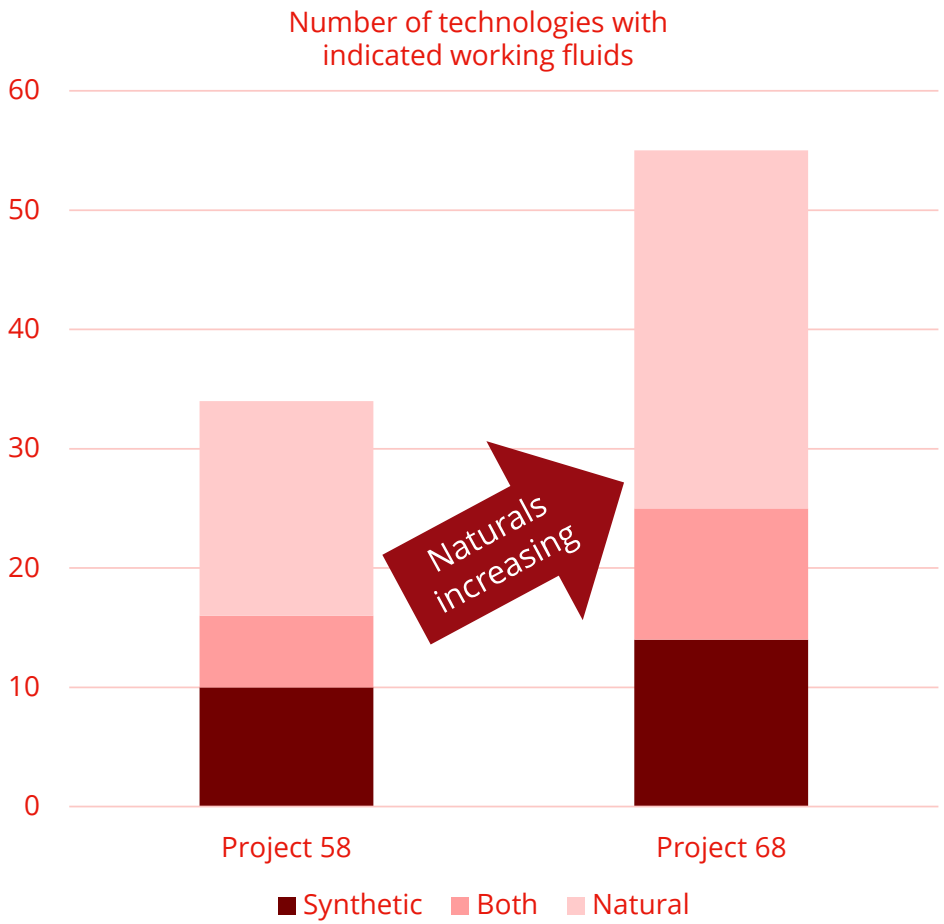
What do they cost?



What do they cost?



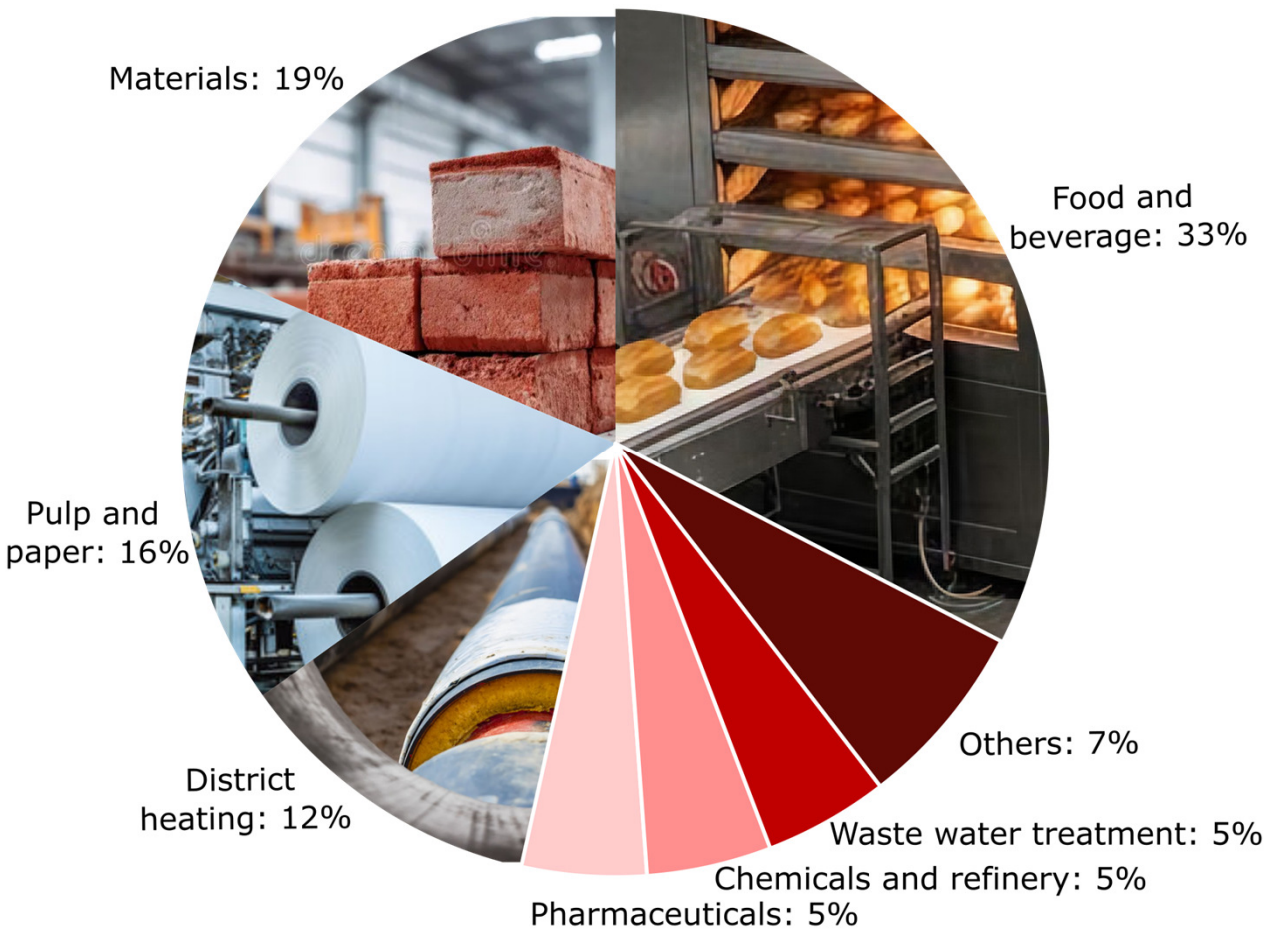
Refrigerants: the shift is happening



- Natural options now 75 % of reviewed portfolio; strongest growth in water/steam and hydrocarbons.
- Frequently used natural refrigerants: CO_2, Steam, Ammonia/Water, Hydrocarbons
- Frequently used HFOs: R-1233zd(E) R-1234ze(E)R1336mzz(Z)

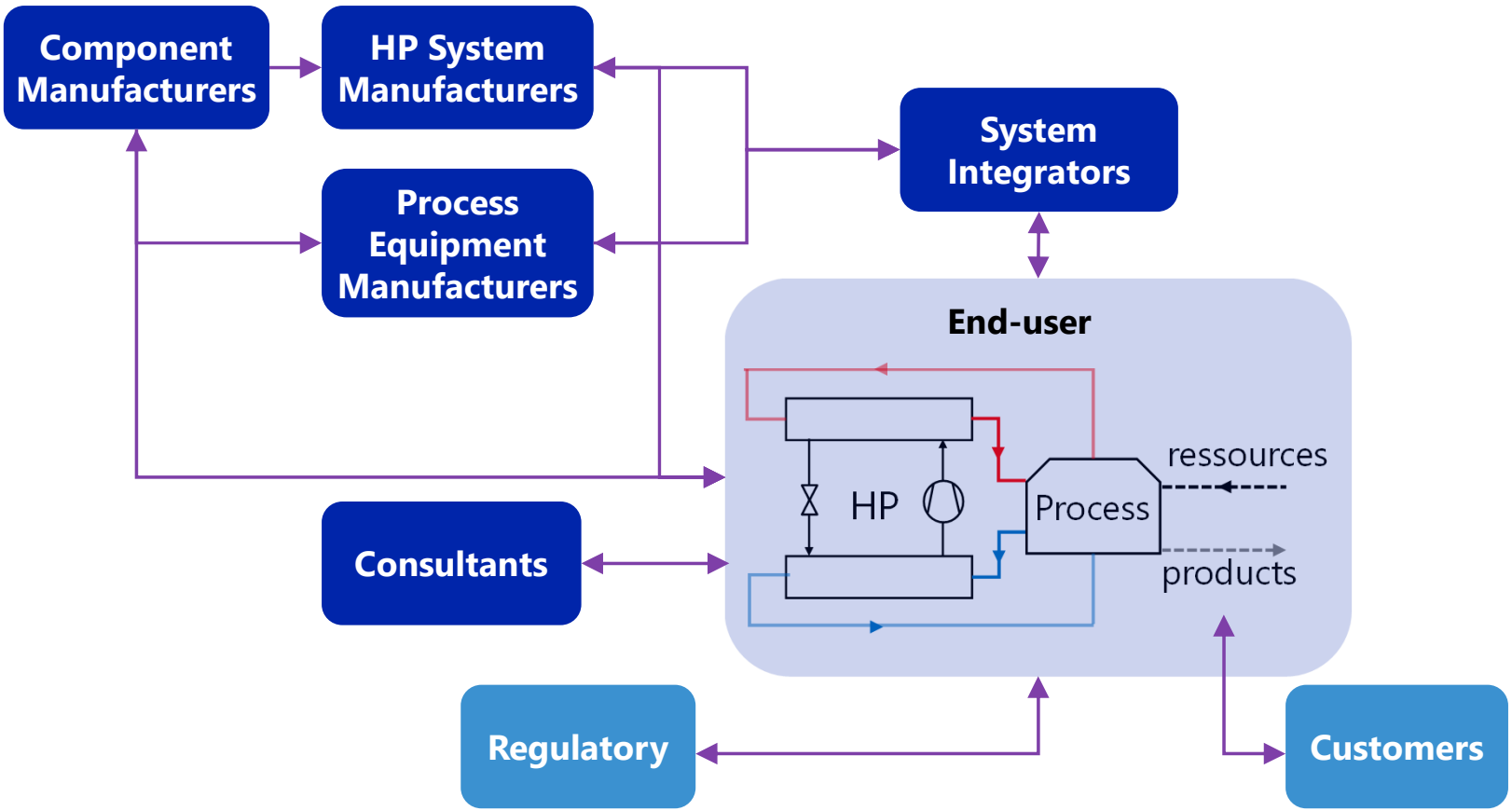
→ For every HFO HTHP, there is a NatRef alternative

Where are they installed?



Task 2 – Sector Collaborations

Objective: Establish a network and commitment of stakeholders along the entire value chain for market-uptake of HTHPs



If you are interested in participating in one of the sector collaborations, please contact me!

Contact details:

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Team leader *Energy Transition in Industry*

Department of Energy System Technologies

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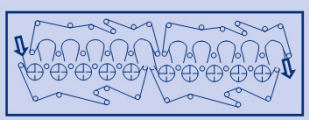
florian.schlosser@uni-paderborn.de

Further information on https://heatpumpingtechnologies.org/project68/.

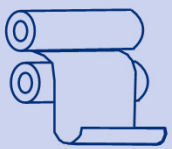
Sector collaboration leaders for the following sectors

Pulp & Paper

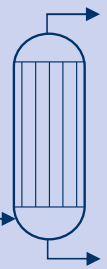
Seon Tae Kim, Panagiotis Stathopoulos
(DLR, GER)

Textiles

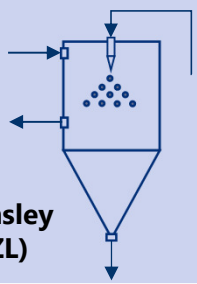
Sanduni Pathiraja, Martin Andersen
(DTI, DK)

Raw Chemicals

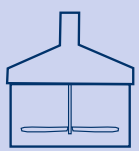
Fabian Ahrendts
(IEG, GER)

Dairy

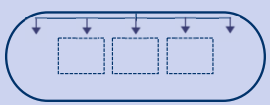
Tim Walmsley
(UWai, NZL)

Brewery

Milen Pérez Cammañ
(CARTIF, ESP)

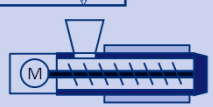
Pharmaceuticals

Sabrina Dusek
(AIT, AT),

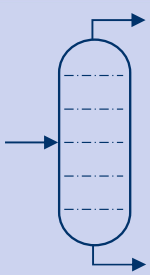
Recyclates





Kirsten Grübel
(RUB, GER)

Petroleum

Ole Moen
(SINTEF, NOR)

District Heating




Jaromir Jeßberger
(UBay, GER)

Task 3 – Development of Education Materials

❖**Duration:** 12/2025 – 11/2027

❖**Goals:**

- Developing education materials for industrial heat pump applications
- Define education pathways for different target groups

❖**Deliverables:**

- Task report
- Education materials

❖**Information source:**

- IEA HPT Annex 48, Annex 58 and new Annex project
- Relevant ongoing R&D projects

❖**Possible content:**

- Basics and functioning principles
- Components and systems
- Process integration
- Technoeconomic assessment
- Safety aspects, …

Development ro

Heating capacity	Tempe-rature	2020	2021	2022	2023	2024	29	2030
200 kW to 10 MW						Commercia roll-out		
>10 MW	< 120 °C							
	> 120 °C							







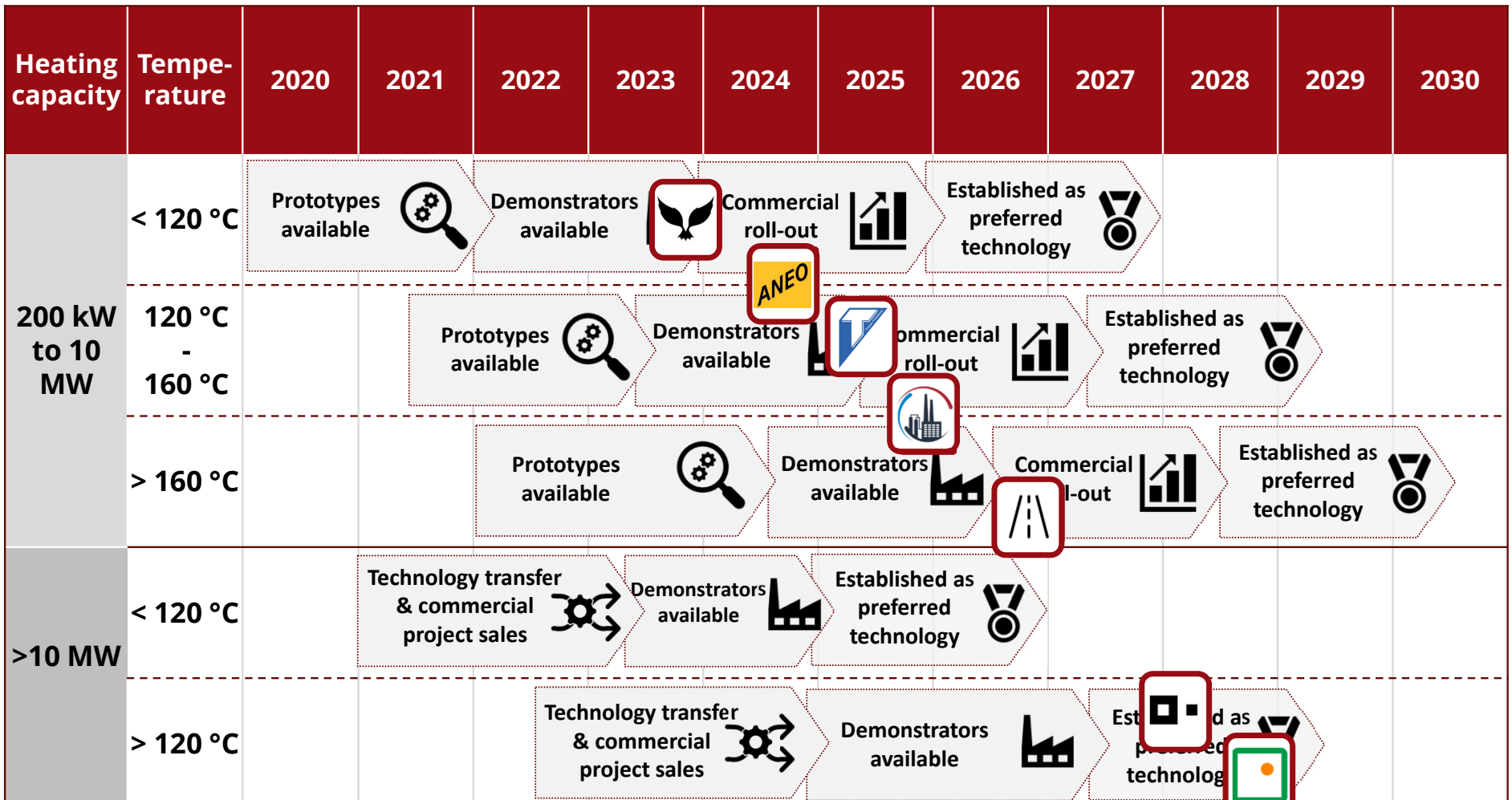






Source: IEA HPT Annex 58, Task 1 Report – B. Zühlsdorf et al. 2023

Industrial Heat Pumps – Development Roadmap



Source: IEA HPT Annex 58, Task 1 Report – B. Zühlsdorf et al. 2023

Conclusions

- Industrial High-Temperature Heat pumps play a crucial role for the global energy transition
- Thorough solutions require shift of mindset – not just 1:1 replacement
- Electrification requires end-users to work develop long-term strategies & working with new technologies
- Independent knowledge is crucial in this process
- Bringing technologies into application, requires collaboration and a clear strategy



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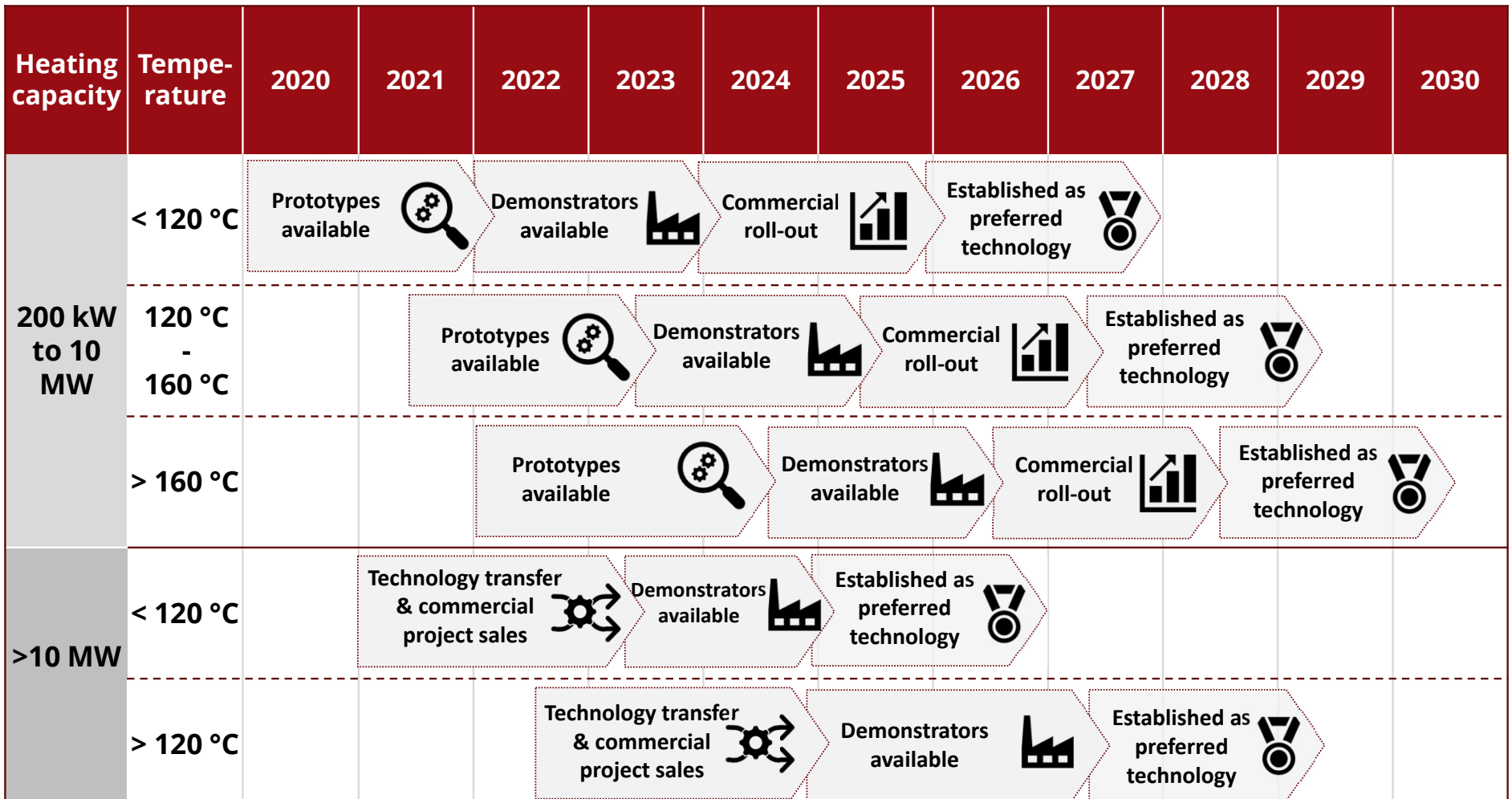
Development Perspectives for HTHPs towards 2030



Source: IEA HPT Annex 58, Task 1 Report – B. Zühlsdorf et al. 2023

IEA HPT TCP Annex 68: Demo cases in Germany

Lieferant	Branche	Quelle ein → aus [°C]	Senke ein → aus [°C]	Arbeits-medium	Verdichter	Leistung [MW]	COP	Fluid Quelle	Fluid Senke
AGO Energie & Anlagen	District heating	23 →	120 →	R717, R718	Piston	1.8	2.6	Water	Water
AGO Energie & Anlagen	Food and beverage, feed (Brewing)	90 →	120 →	R717, R718	Piston	1.23	6.1	Water	Water
Heaten	Food and beverage, feed (Sugar production)	102 → 100	128 → 130	R1233zd(E)	Piston	4	6	Steam (saturated)	Steam (saturated)
Piller Blowers & Compressors	Materials (EPDM rubber, stripper)	92 → 60	→ 126-131	R718	Turbocompressor	10	4.4	N-hexane / water	Steam
RANK	District heating	25 → 15	60 → 90 / 105 / 130	R1234ze(E), R1233zd(E)	Screw	1	2.78	Water	Water
SPH Sustainable Process Heat	Pulp & Paper	46 → 41	90 → 123	R515B, R1233zd	Screw, piston	1.2	2.3	Water	Steam