

Things to consider to optimize the industrial heat pump efficiency

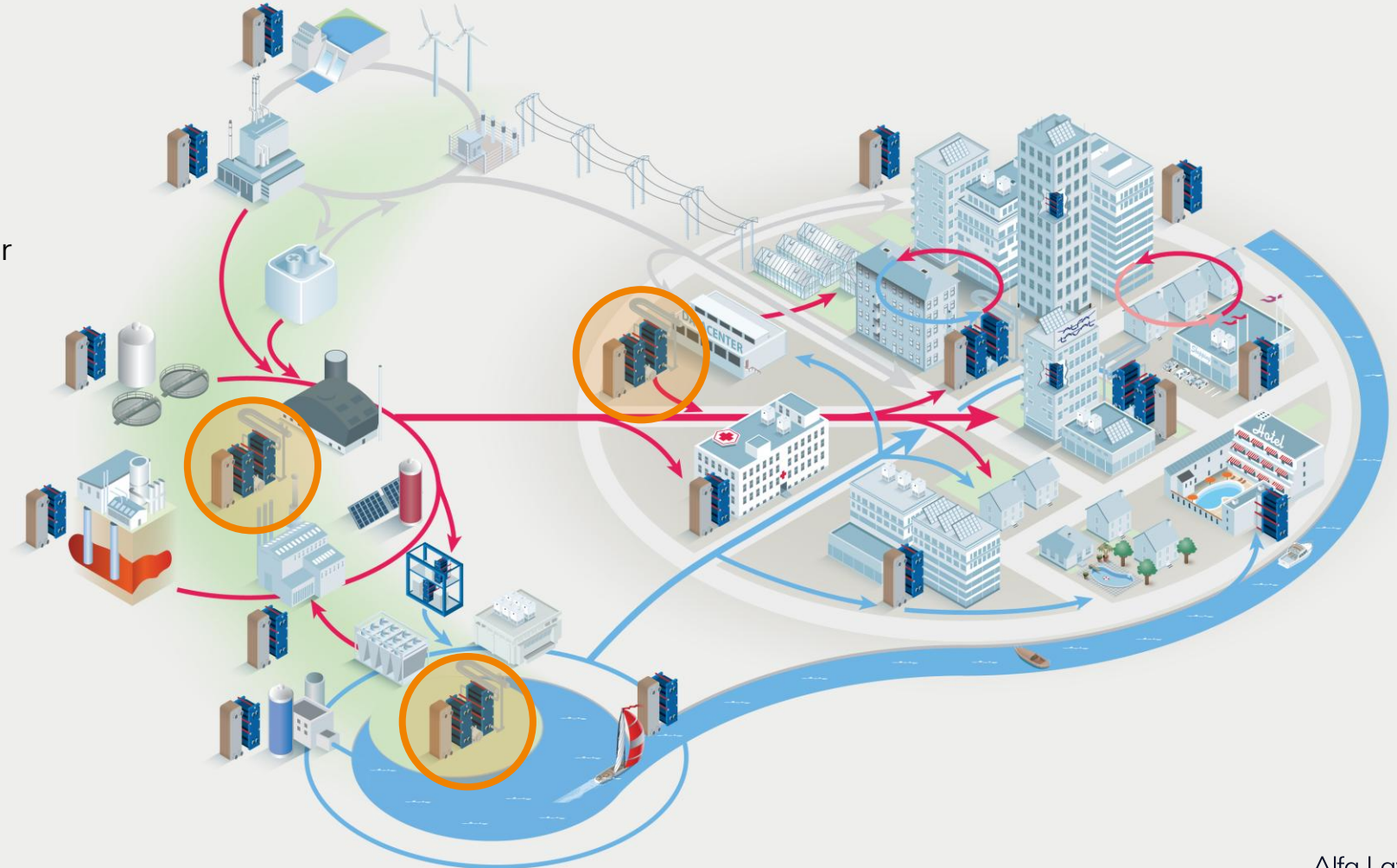
Industrial & large heat pump opportunities

Heat sources from:

- Industrial waste heat
- Data center cooling
- Natural sources like river, lake or seawater
- Sewage water (clean)
- Geothermal and ground heat
- Returning district heating
- Air

Heat supply to:

- Industrial processes heat/preheat
- Space heating
- District heating



Key parameters for optimal efficiency

When the suitable heat source is identified for a heat pump, it is important to consider:

What supply temperature is really needed?

- A high temperature lift reduces the efficiency
- Temperatures far above 100°C reduces the efficiency from normally a COP of 3-6 to about 2-3.

Which type of refrigerant should you use?

- Depending on the operating conditions, temperatures, installation location, there are several refrigerant gases to select from.
- Choosing a system with the natural refrigerant (ammonia, CO₂ or hydrocarbon) instead of a synthetic alternative would assure an ecologically correct and energy efficient solution.

System efficiency for best payback

Depends on refrigerants, compressors, **heat exchangers**, pumps, valves, regulation and the total engineering of the system.

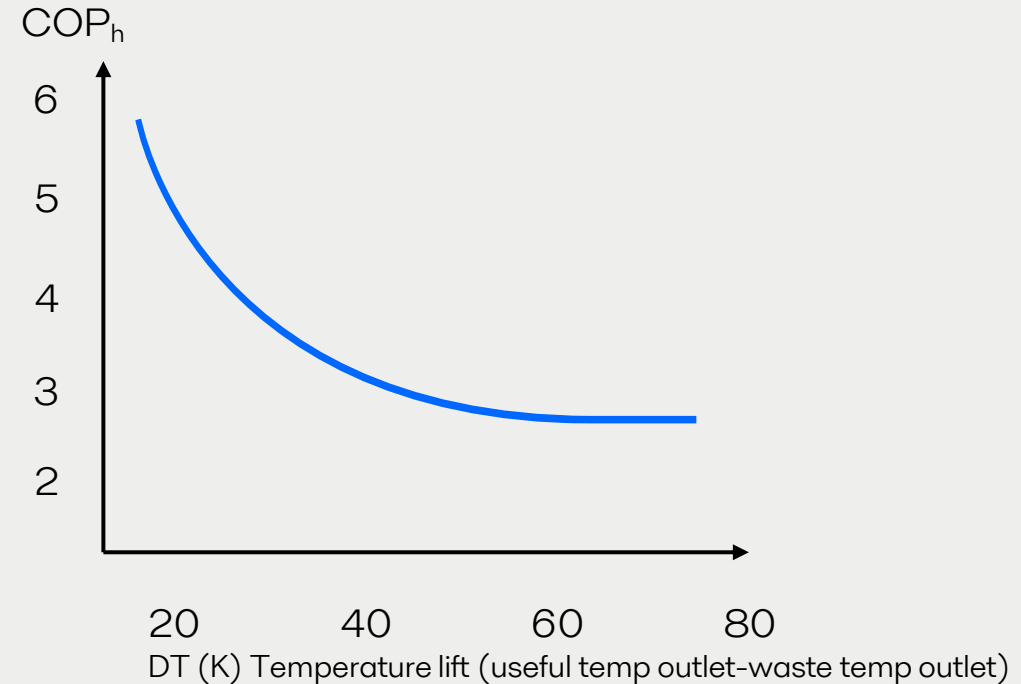
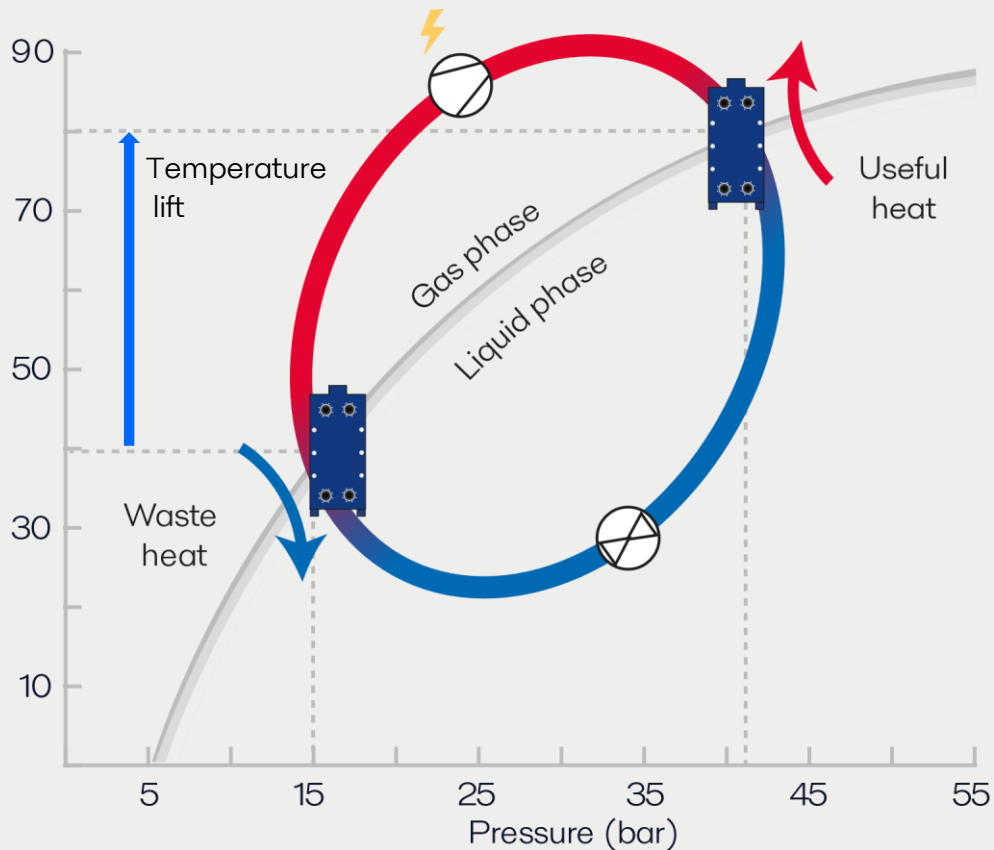


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What **supply temperature**
is really needed?

Heat pump efficiency

The temperature impacts the efficiency.



Efficiency of the heat pump = COP_h (Coefficient Of Performance heating)

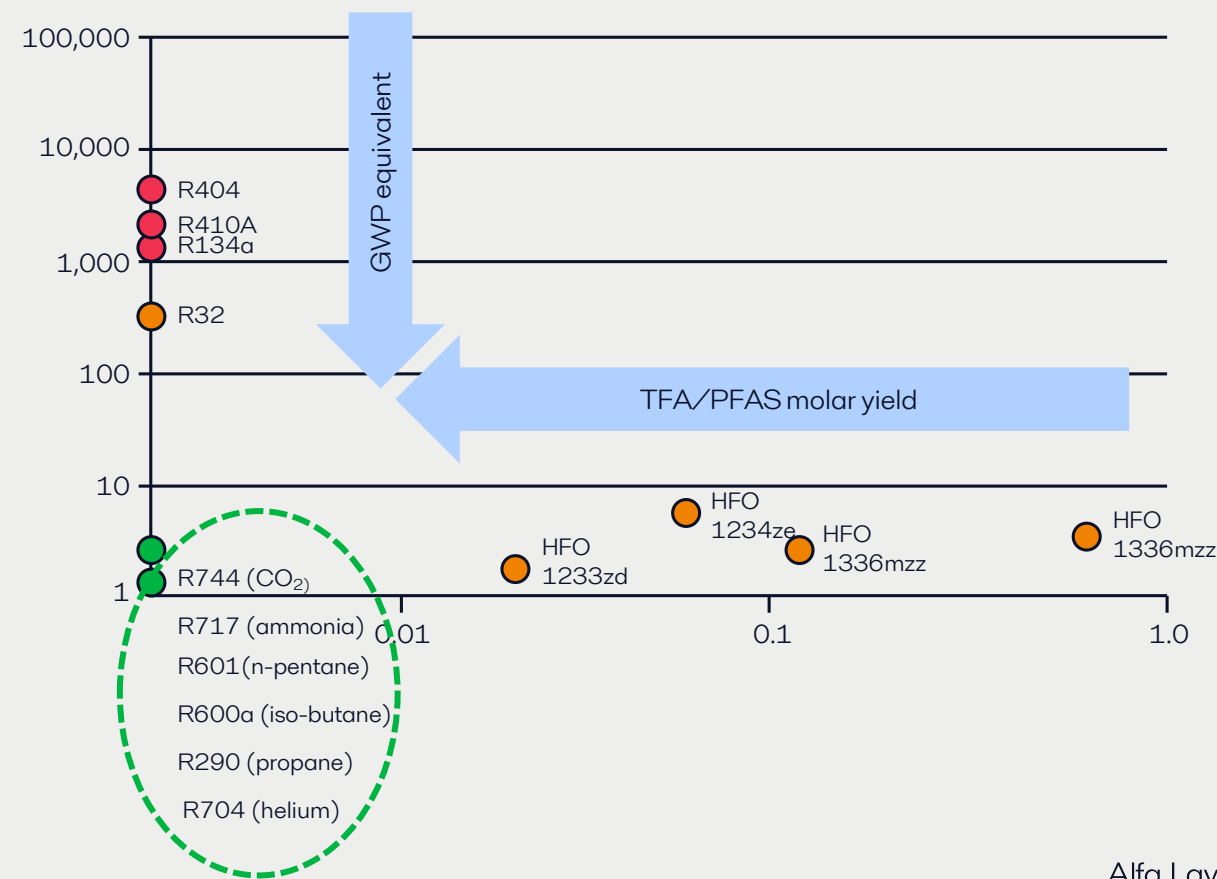
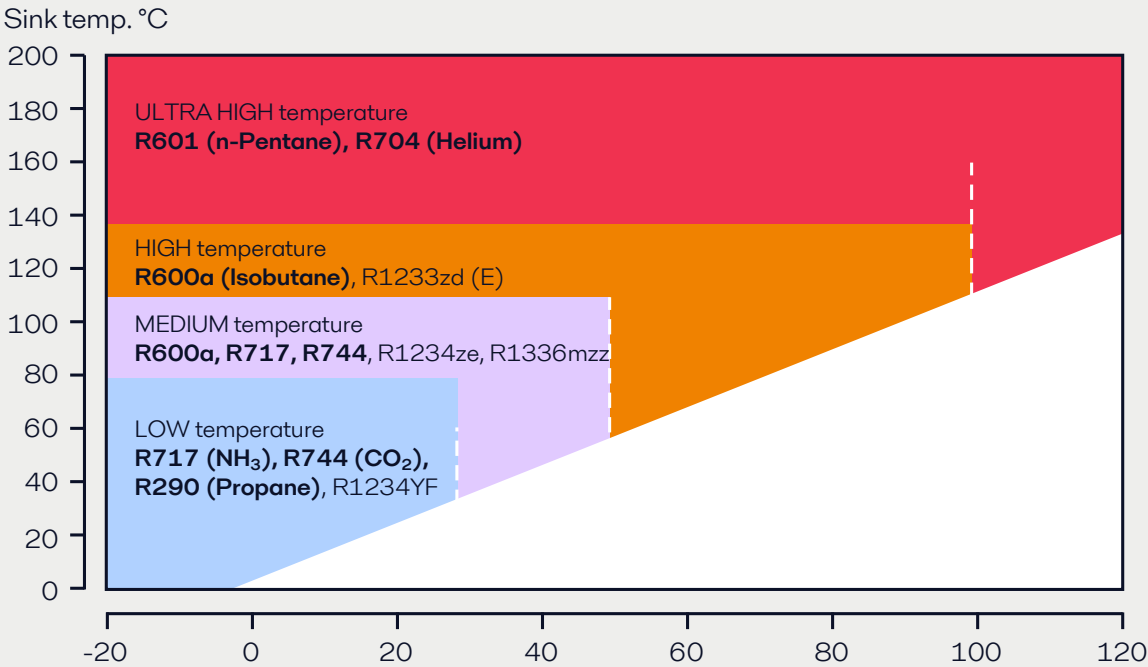
$$COP_h = \frac{\text{Heat Energy (useful heat) Supplied (kW)}}{\text{Electricity Power Consumed (kW)}}$$

2

Which type of **refrigerant** should you use?

Refrigerants

Natural refrigerant alternatives exist for heat pumps operating at all temperature levels.

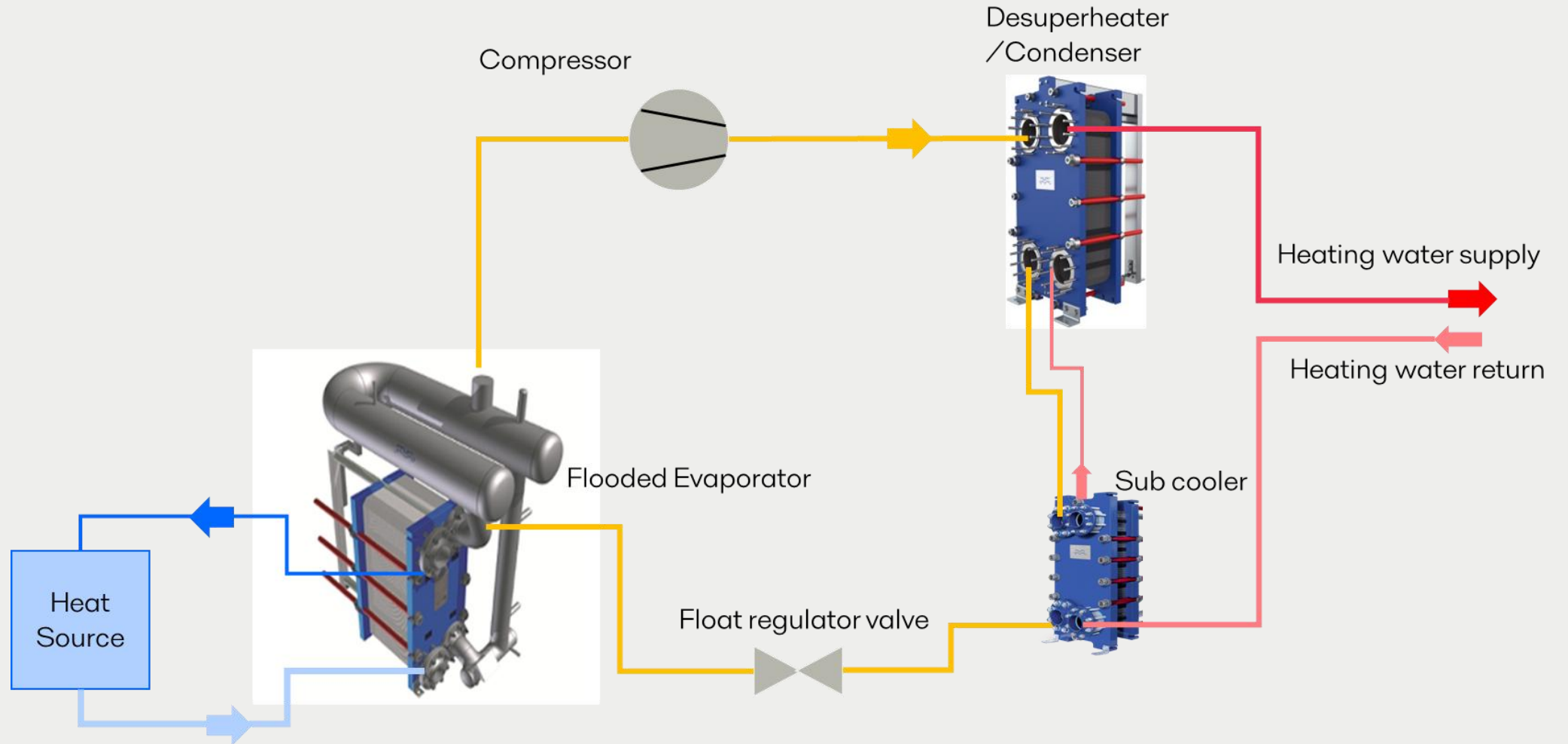




System efficiency for payback

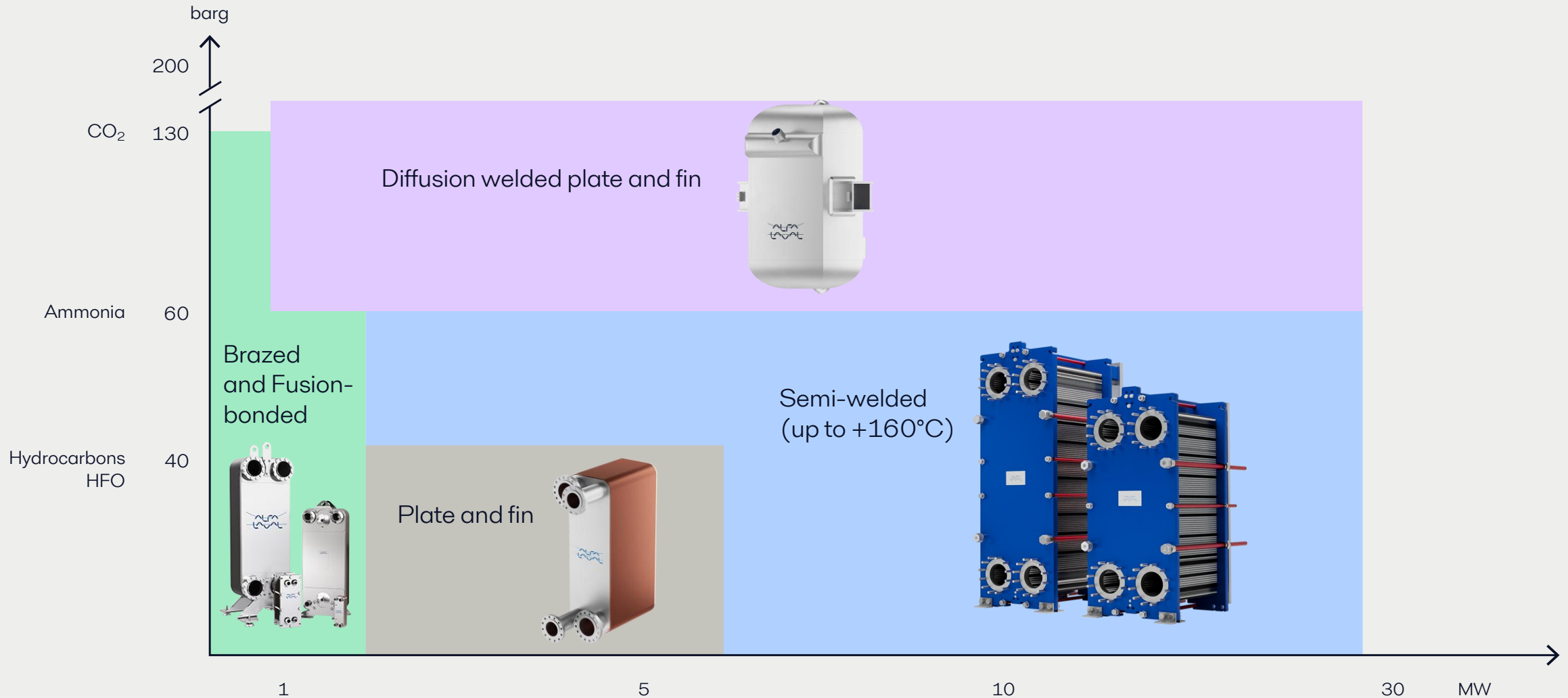
Industrial heat pump **setup**

Heat exchangers in focus



Alfa Laval plate heat exchangers

for industrial heat pumps



The plate heat exchanger advantage

Combination of compactness and efficient close temperature pinch point

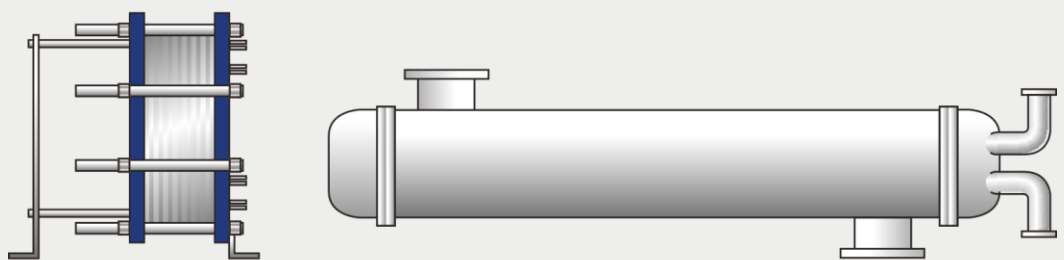
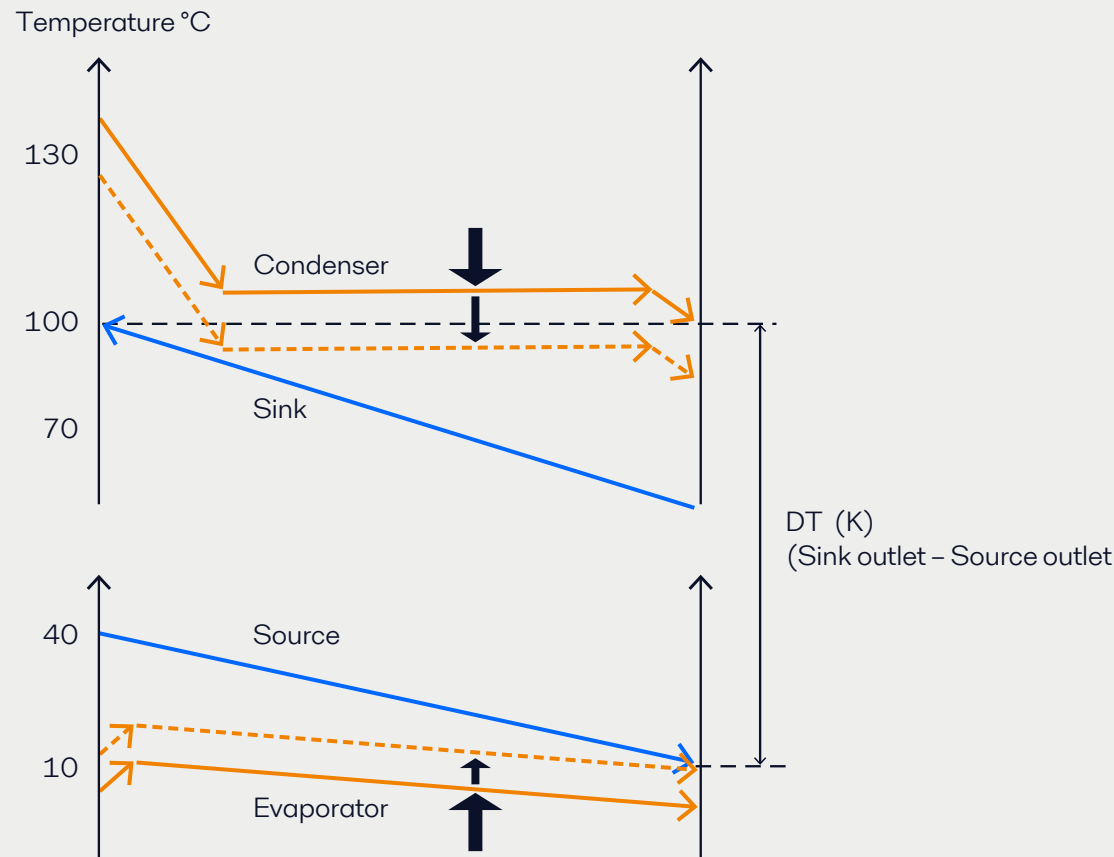


	Plate heat exchanger	Shell-and-tube
Weight ratio	1	6
Space ratio	1	7
Hold-up volume ratio	1	6



Sustainable supply

Alfa Laval is devoted to supply sustainable yet affordable heat exchanger solutions – the parameters we focus on:

Designed for **efficiency**- supporting high COP

Designed for **safe use with toxic or flammable refrigerants**

Designed for **compactness**

Assuring **long operational lifetime**

Reducing **carbon footprint** of components

Industrial heat pumps



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Successful customer stories

Greenhouse heating

Heat recovery from irrigation water ponds (UK)

20 Ha sustainable greenhouse complex powered through a combination of industrial heat pumps and CHP (Combined Heat & Power) gas engines.

The heat pump installation from IES Energy Aps consists of four ammonia heat pumps with max capacity of 33 MW with a COP of 4.4.

Recovering heat from the irrigation water collected in the large ponds the heat pumps are delivering annually 65,000 MWh of thermal heating reducing the CO₂eq emission by 12,600 tonnes.

[Read story](#)

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Data center heat recovery

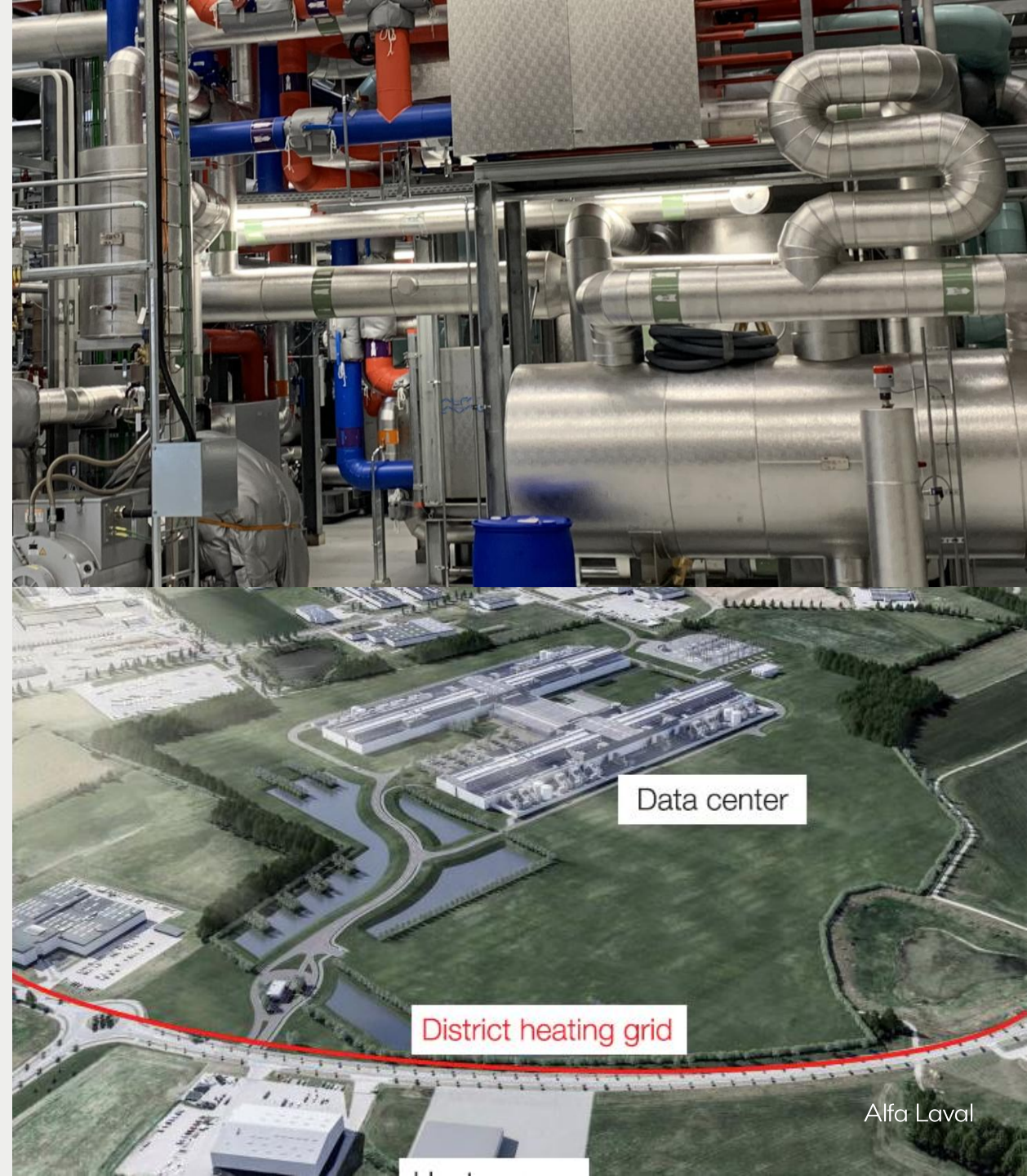
Leading social media giant is minimizing the energy, emissions, and water impact, beyond their operations (Denmark)

Sector coupling was made possible by a partnership with the local district heating company Fjernvarme fyn who were looking for new heat sources to phase out fossil fuels.

This heat recovery infrastructure will help recover 100,000 MWh of energy per year – enough to warm some 7,000 homes and reduce CO₂ emissions for these by 90%.

[Read story](#)

Industrial heat pumps



Sewage water heat recovery

Odense, Denmark

Since 2020, treated wastewater in Odense has been routed through an IES Energy A/S heat pump system instead of directly into the river.

The plant is delivering 60 MWh/year of heat with a COP of 4.0 reducing 128,000 tonnes of CO₂ emissions over 5 years.

This setup also reduces the discharge temperature to match the river's benefitting the aquatic environment.

[Read story](#)

Industrial heat pumps



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Alfa Laval offers

- ✓ Technology leadership in heat transfer
- ✓ Sustainable solutions
- ✓ Global and scalable supply
- ✓ Large installed base and proven success
- ✓ Sustainable performance throughout the life-cycle with complete service offering
- ✓ Partnerships

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