

Chillventa Specialist Forums 2024 Chillventa Fachforen 2024

CONNECTING
EXPERTS.





Shift your perspective

Industrial Heat Pump solutions
to decarbonize the F&B Industry
Focus: High temperatures

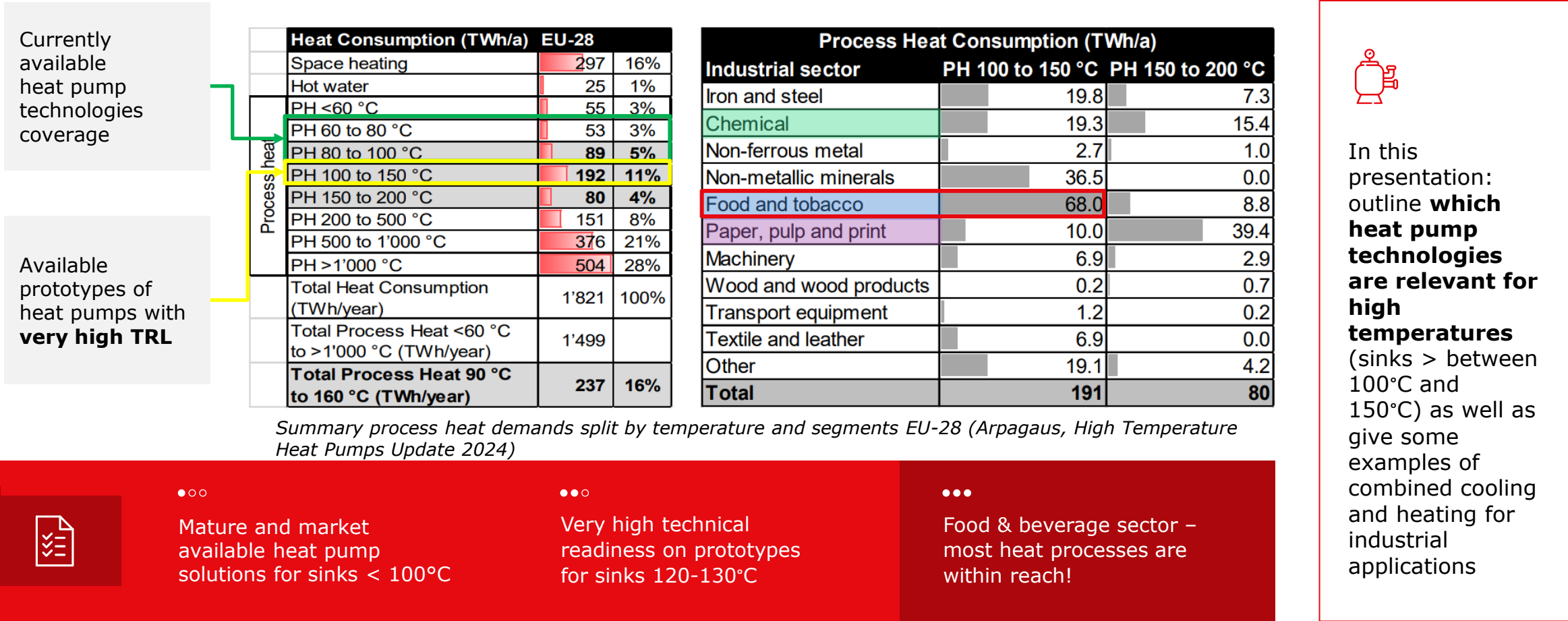


Ivan Rangelov

Industrial Heat Pumps Manager

Decarbonizing industry

Where to start?



Example Food & Beverage site

Brewery process diagram



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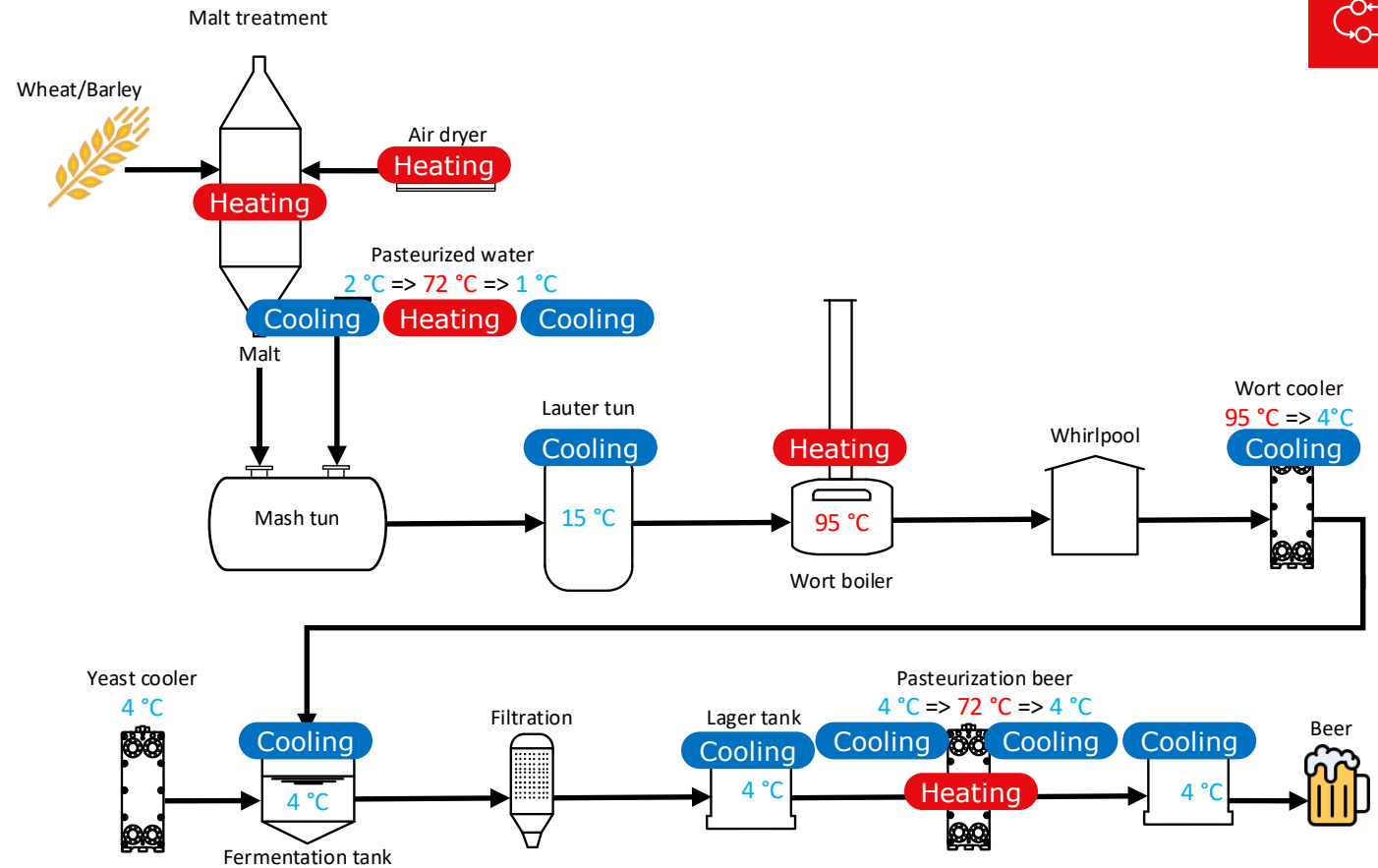
Multiple consecutive cooling and heating processes

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Traditionally: cooling & process heating disconnected. Fossils are burned for process heat

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Decarbonize: We can connect cooling and process heat, and disconnect from fossils!

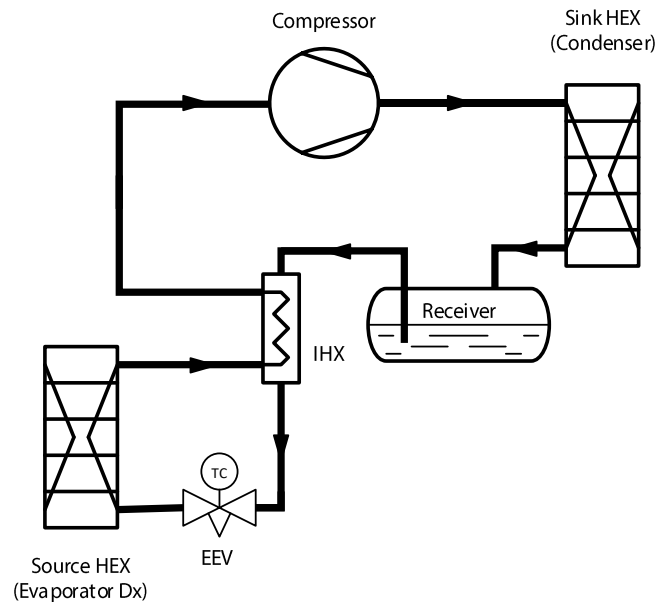


Simplified process diagram in Brewery

Cooling & process heating in a brewery

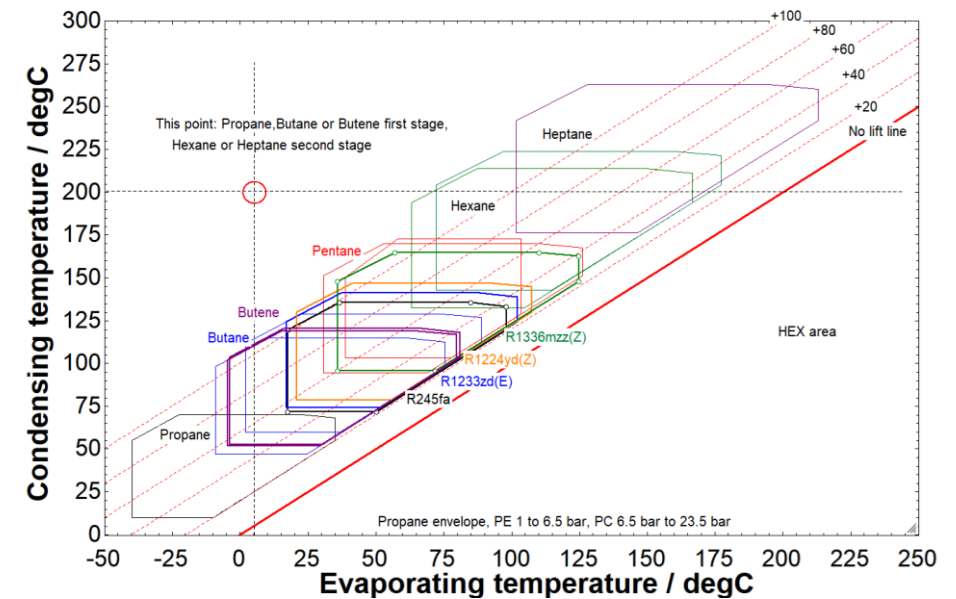
How to connect cooling and process heating systems?

Generic one-stage system



- Typical max lift 80-90 K
- Combinations are necessary to cover cooling and heating processes

How to combine cascades?



Flexible solutions for new projects

Reference new project: Hydrocarbon system only

Brewery application – process cooling, heating and steam generation

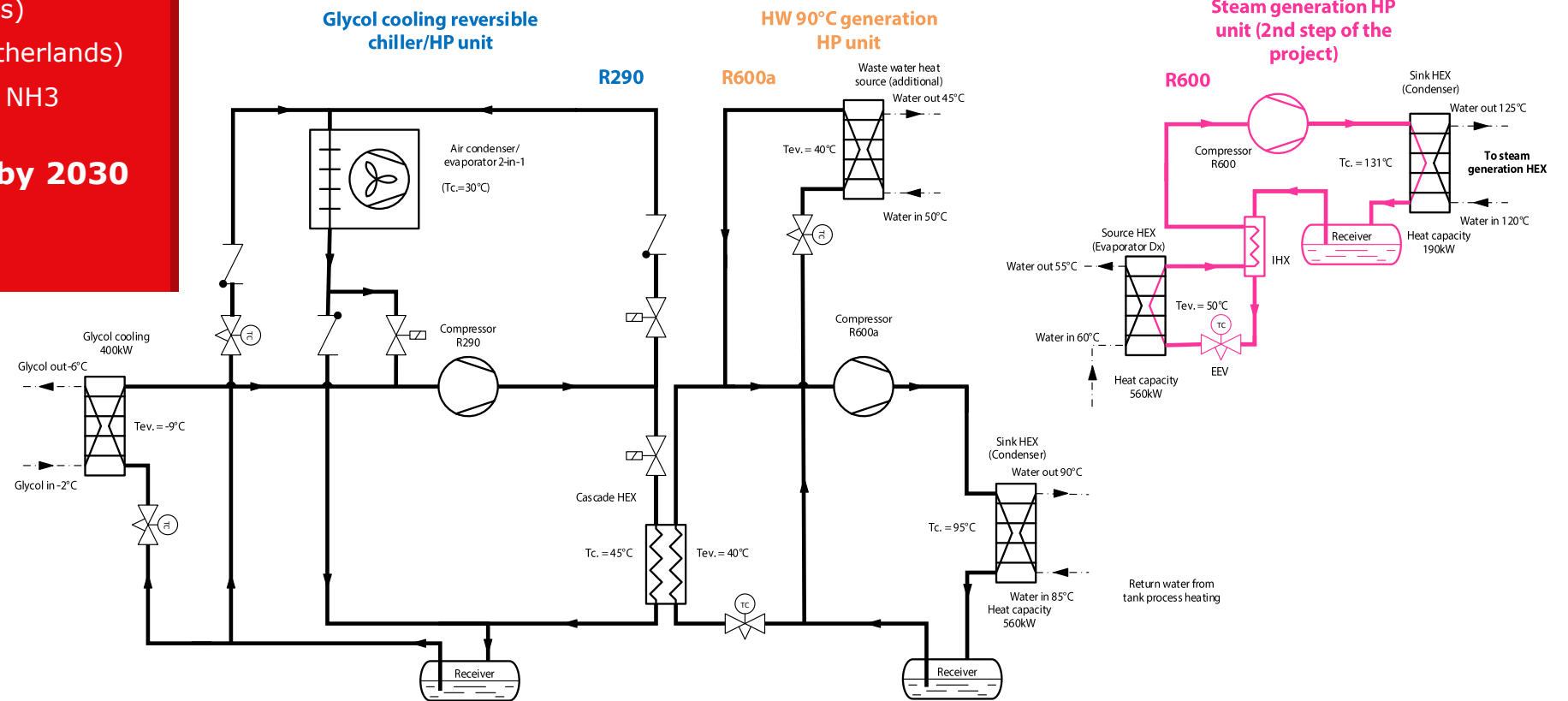
End user: Gulpener (Netherlands)

OEM and installer: Servex (Netherlands)

Refurbishment of a 50-years-old NH3 system for glycol cooling

Ambition: fully fossil-free by 2030

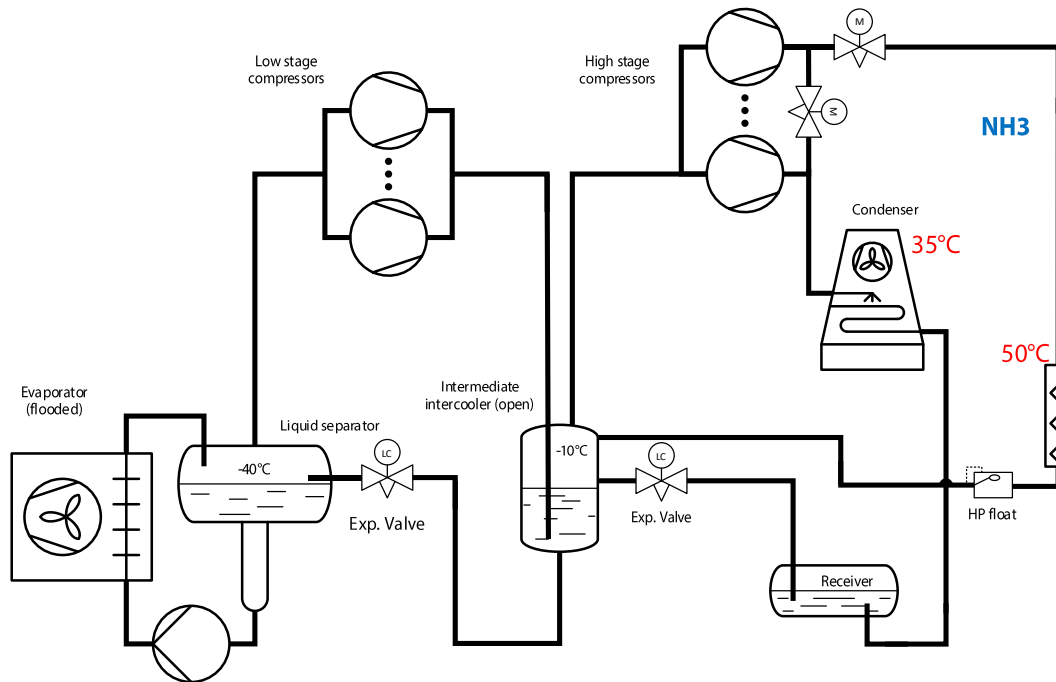
$T_{ev.} = 50^{\circ}\text{C} / T_{c.} = 131^{\circ}\text{C}$
 $\Rightarrow \text{COP}_{\text{comp}} = 2,05$



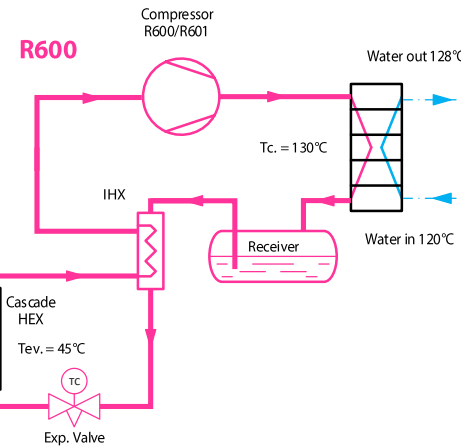
Refurbishment example: Hydrocarbons on top of an existing Refrigeration system

Brewery application – process cooling, heating and steam generation

Existing IRF: the good old two-stage NH₃ system



New "add-on" HP: cascade one-stage Hydrocarbon for steam generation on top



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Typical two-stage NH₃ IRF system in a F&B plant

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Add-on NH₃ HP => max. water 90-95°C

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Add on e.g. R600/R601 HP => hot water/steam out at 120°C/130°C



Good news: Yes! R600 in cascade "on top" of the standard NH₃ system can get us water out at 120°C



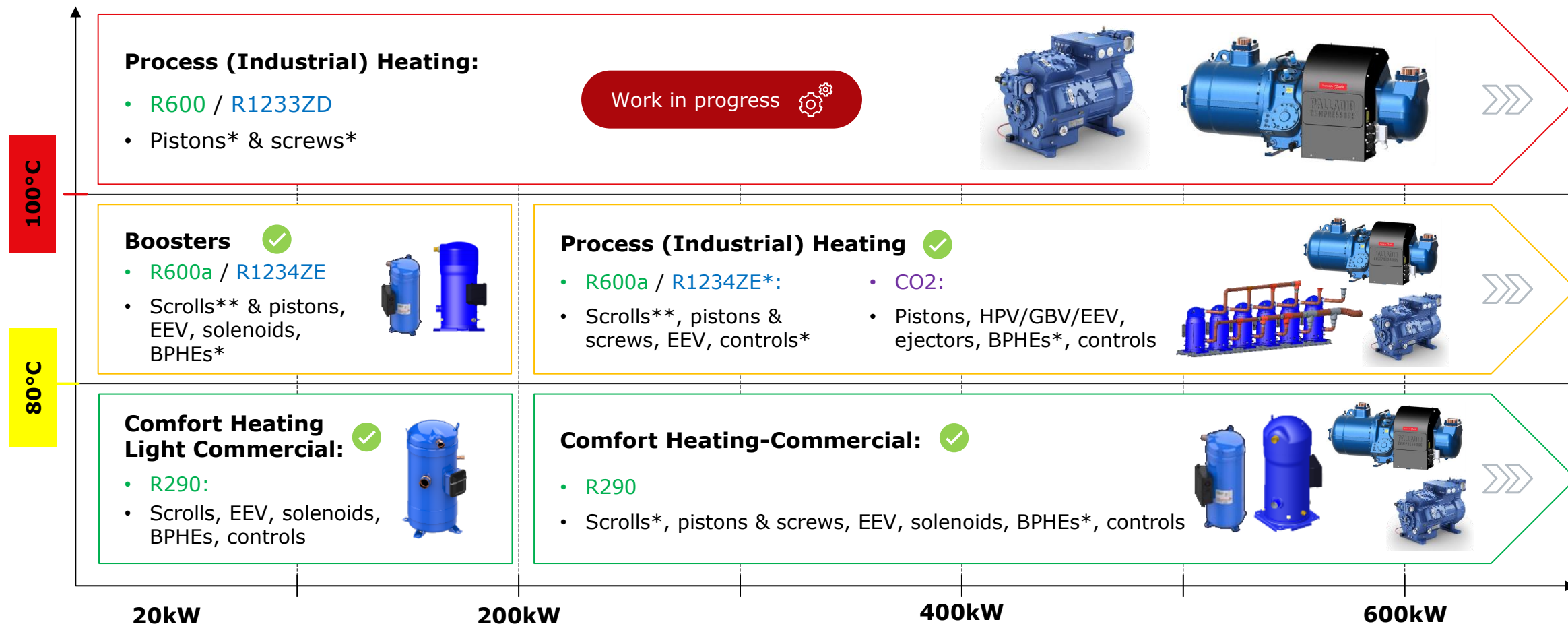
Bad news: We need to increase NH₃ condensing temperature to 45-50°C for a reasonable COP

Challenges:

- Cascade HEX temperature
- Capacity mismatch in existing system and steam generating heat pump
- Control

Danfoss heat pump solutions

Heat Supply



* Work in progress
** 2025



ENGINEERING **TOMORROW**

Thank you for your attention!
Let's meet at the **Danfoss Booth Hall 7, booth 251**

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