Heating and Cooling with Natural Refrigerants – a Way to Decarbonization

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Agenda

- A statement by Ursula von der Leyen
- Why decarbonisation?
- There is still a long way
- One of the ways to go
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A statement

Our most pressing challenge is keeping our planet healthy. This is the greatest responsibility and opportunity of our times. **I want Europe to become the first climate-neutral continent in the world by 2050.** To make this happen, we must take bold steps together. Our current goal of **reducing our emissions by 40% by 2030 is not enough**.

Ursula von der Leyen

Why decarbonisation?

- Air pollution is a problem
- CO2 emissions has to stop
- Wider use of electricity
- New legislation demands change

- About 40% of all energy is used for space heating
- Industry can increase efficiency by using heat pumps and reduce the consumption of energy

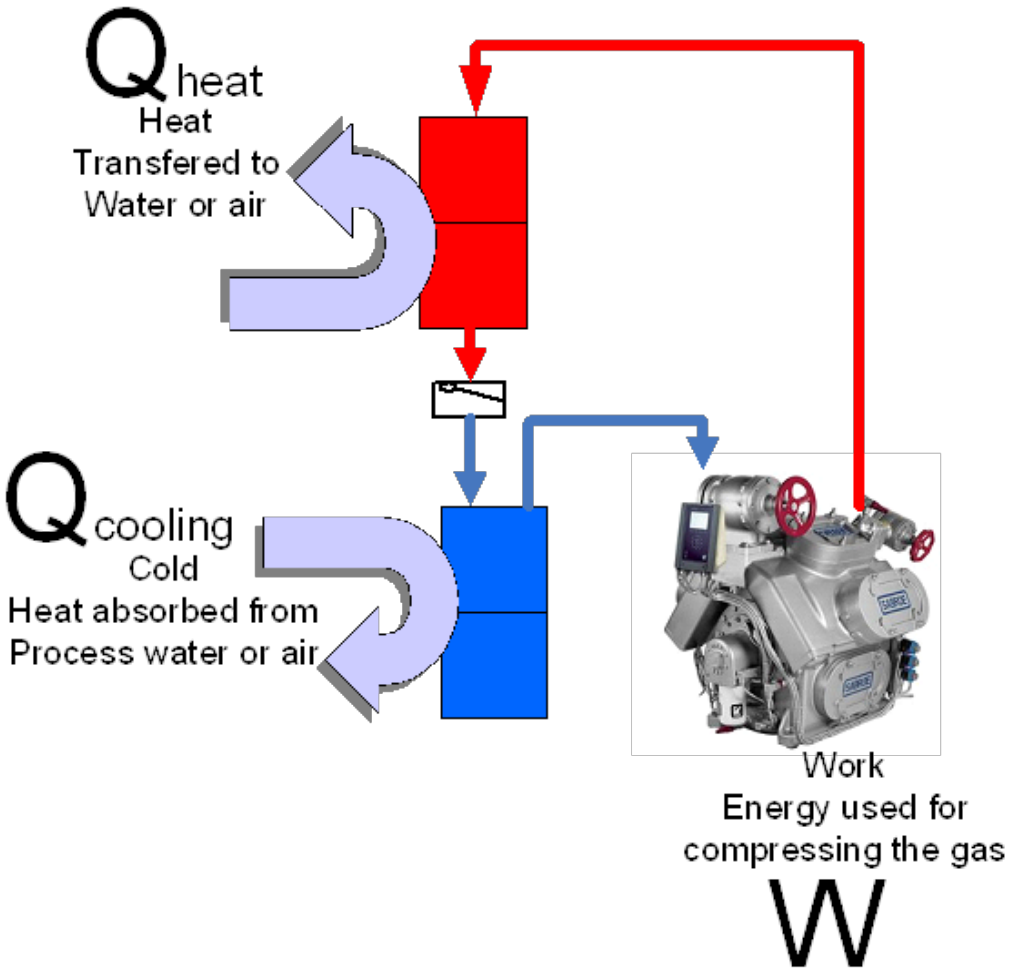
There is still a long way

- For some countries there is still a long way to go before the obligation to the Paris aggreement is met
- There has been presented a lot data but the time is running
- Good ideas has to be implemented

One of the ways to go

- Heat pumps is an old idea
- Old ideas can be refreshed
- Perhaps old ideas are not to so bad

- In industrial systems you can utilize both the cold and the warm side which benefits the bottom line



For higher temperatures

- Screening for the optimal solution
- Higher temperatures is over 90°C
- Ammonia is not the obvious solution in higher temperature heat pumps
- A number of hydrocarbon refrigerants are more relevant
- The number of fluorinated hydrocarbons is limited

An example

- R-718/R-717 HP

Facts:

One set provides about 1MW

Total installation: 12 sets

Final installation: TBD

Source temperature: 4°C to 17°C

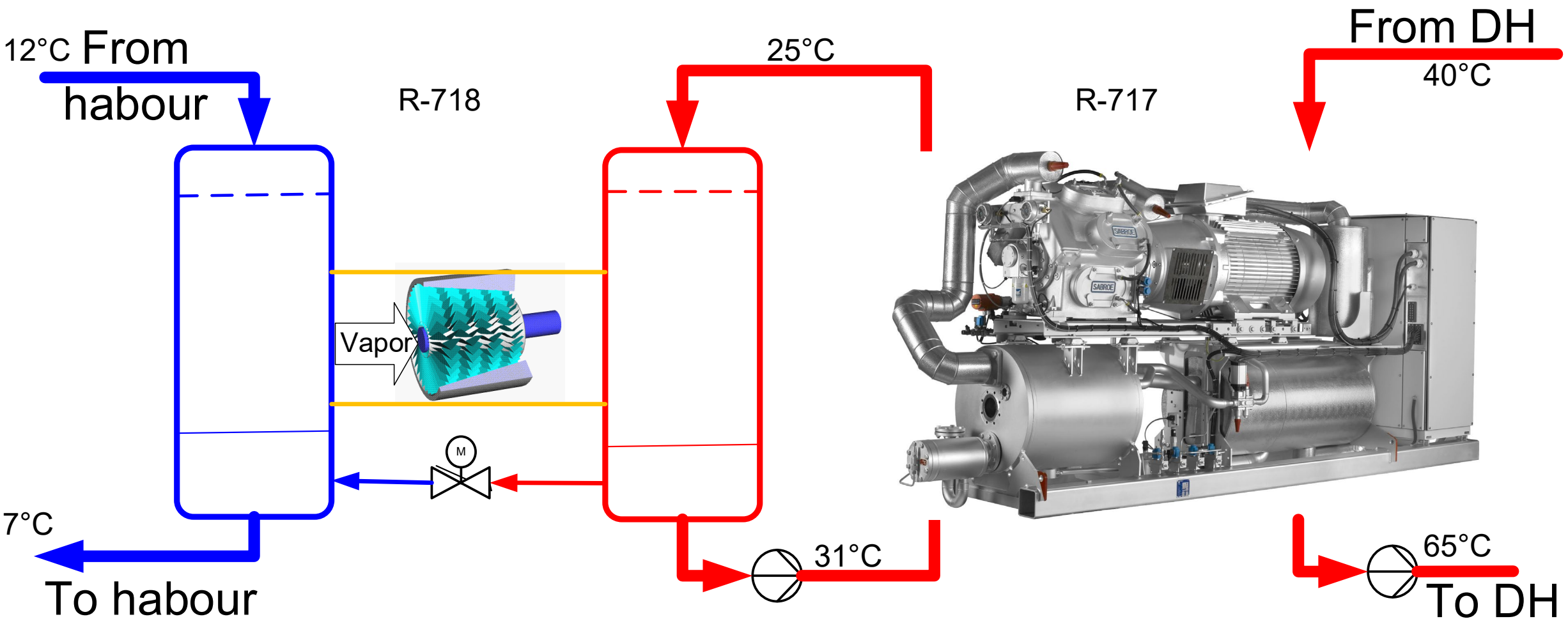
Outgoing temperature: 65°C

Total design requirement: 24MW

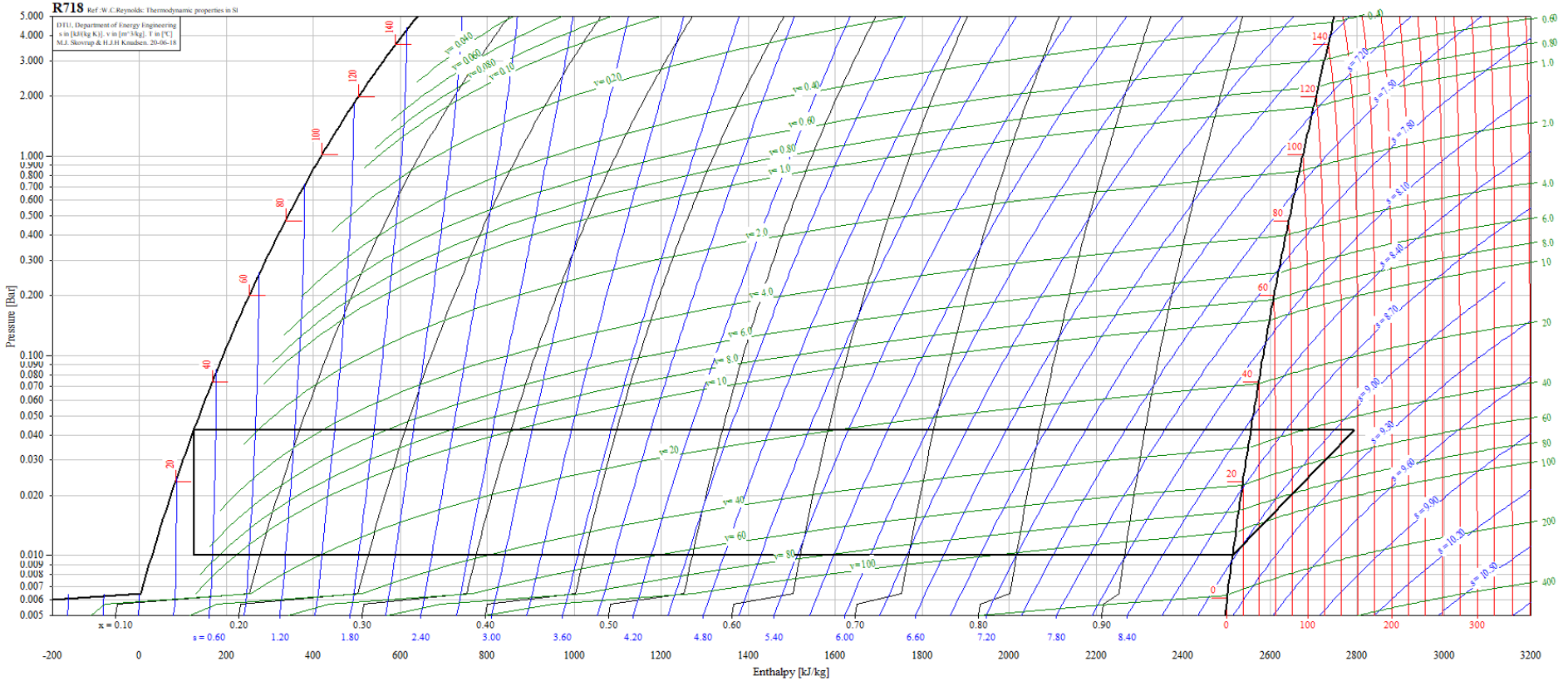
Project owner: Affald Varme Aarhus

Supported by: EU

The principle



Still well below atmospheric pressure



Decarbonisation

- Heat pums will play a role in the picture
- Also other technologies are needed
- Many bricks in the pussel need more development
- It has taken many years to get the modern district heating/cooling to were we are today
- It will also take time to implement all the new bits in the puzzel to decarbonise our current system

Conclusion

- Heat pumps will play a significant role in the future decarbonised district heating system
- District heating makes sense in areas with dense population where high installation cost are better managed in a central system
- In freestanding houses and buildings heat pumps of a suitable size will be the best option
- Heat pumps can use many different heat sources – it is just about spotting them
- **If we want Europe to become the first climate-neutral continent in the world by 2050 we have to get started – NOW!**

Thank you very much for your attention