

**Chillventa Specialist Forums
2022
Chillventa Fachforen 2022**

**CONNECTING
EXPERTS.**





ETE EXTREME TEMPERATURE EFFICIENCY



We are facing two major problems these days:

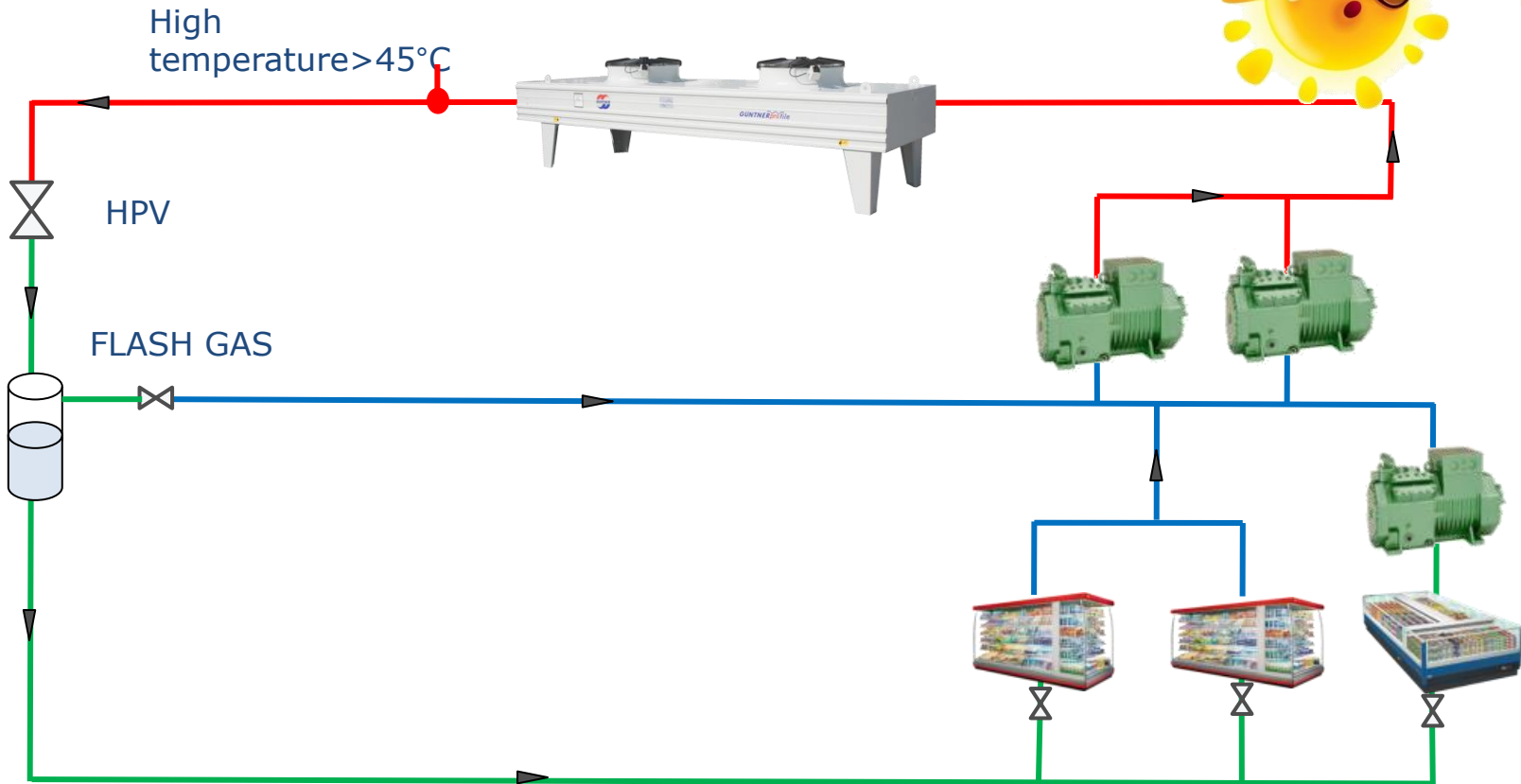
Energy costs are getting more
and more expensive



Climate change is real:
Temperatures are rising!

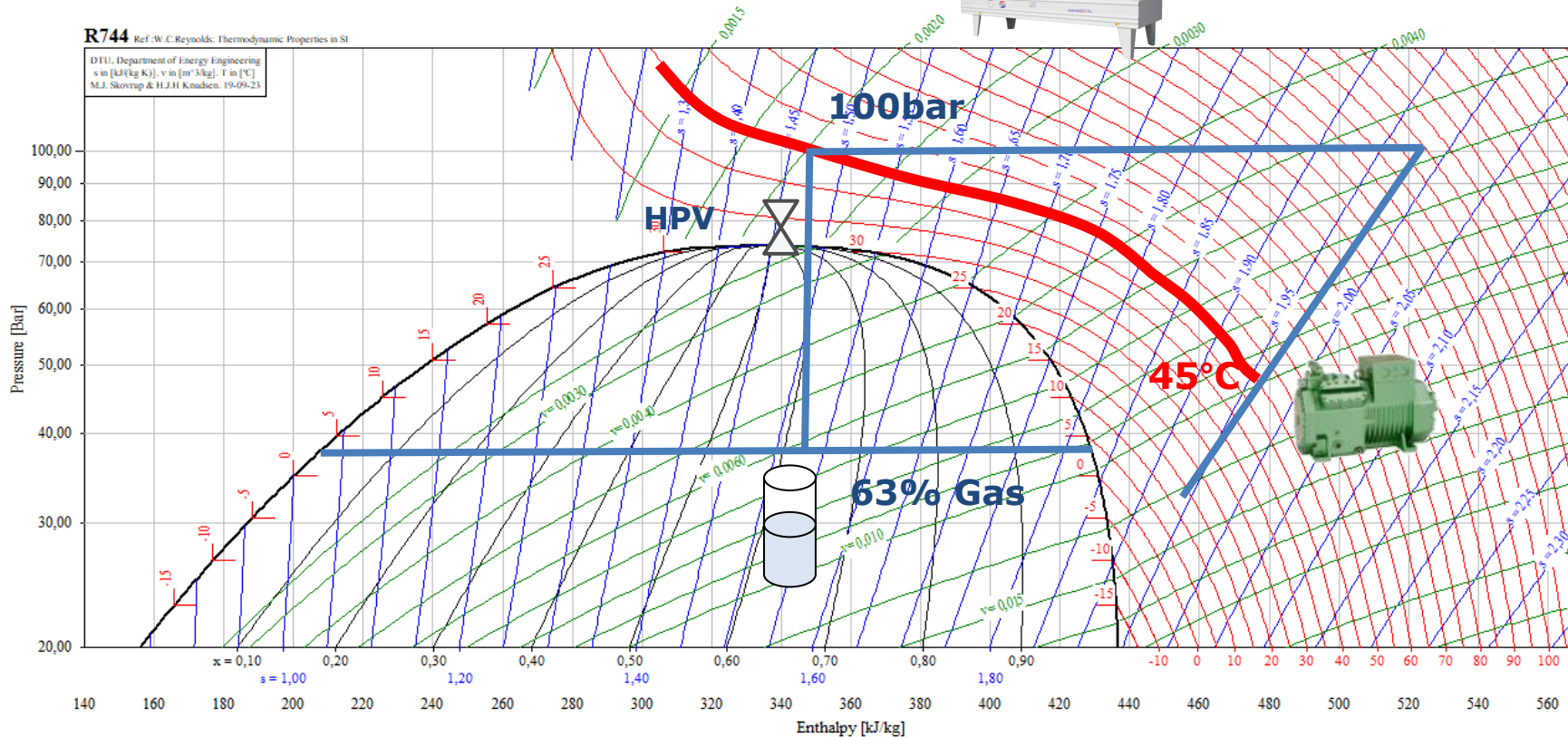


IT SUBCOOLING



R744 Ref: W.C.Reynolds: Thermodynamic Properties in SI

DTU, Department of Energy Engineering
s in [kJ/(kg K)], v in [m³/kg], T in [°C]
M.J. Skovrup & H.J.H. Knudsen, 19-09-23





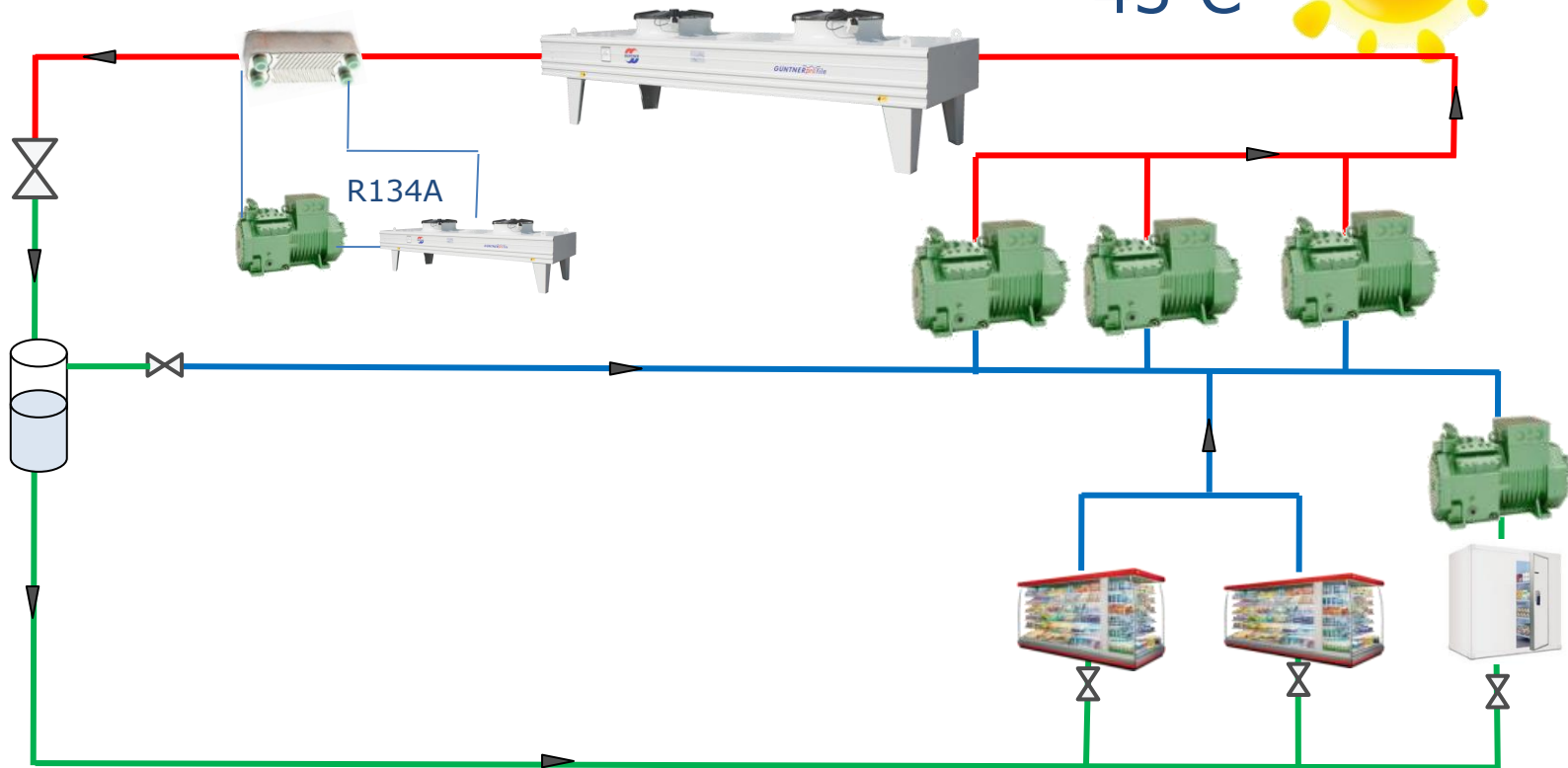


MECHANICAL SUBCOOLING WITH R134A UNIT: 2021

Temperature $< 37^{\circ}\text{C}$

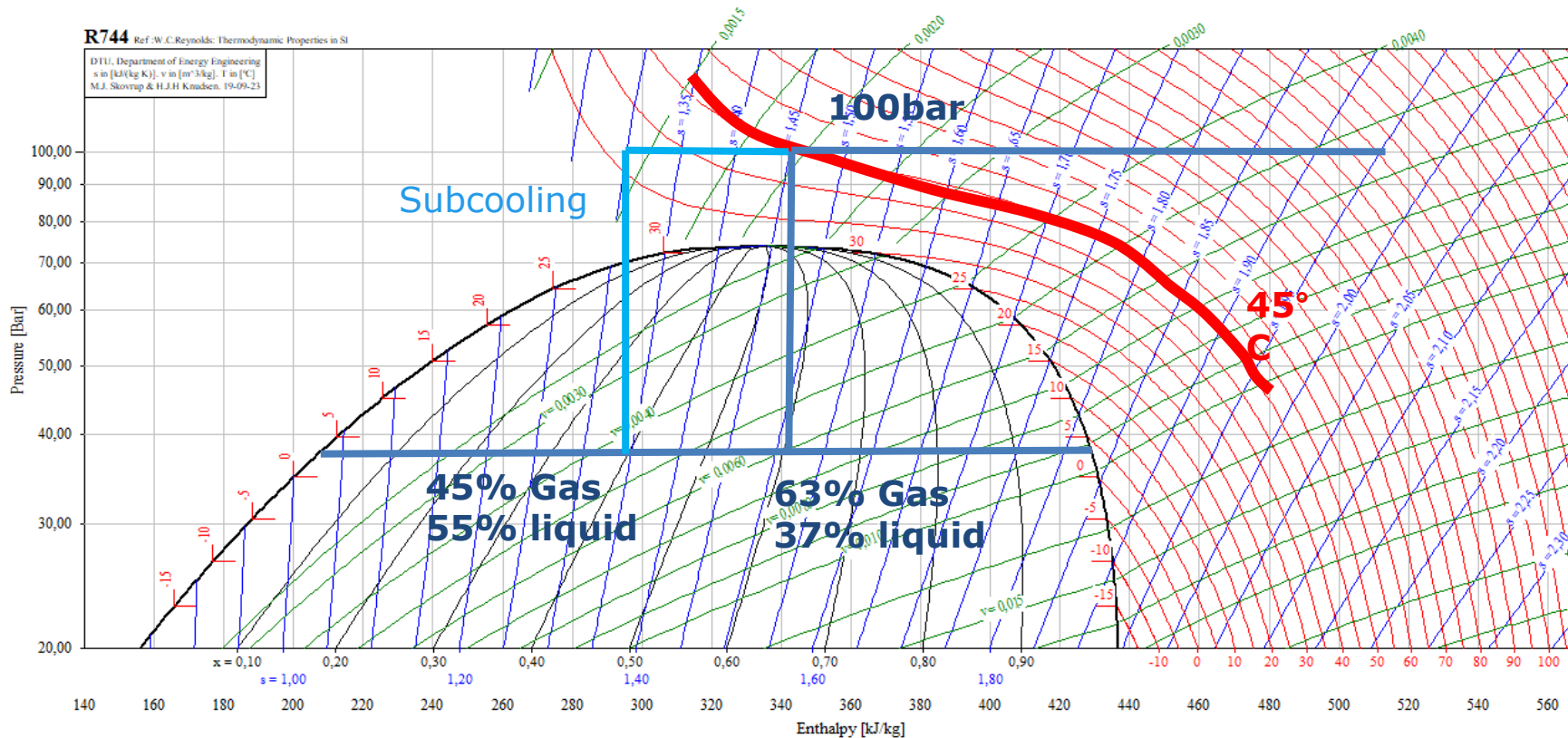
High temperature $> 45^{\circ}\text{C}$

43°C



R744 Ref. W.C.Reynolds: Thermodynamic Properties in SI

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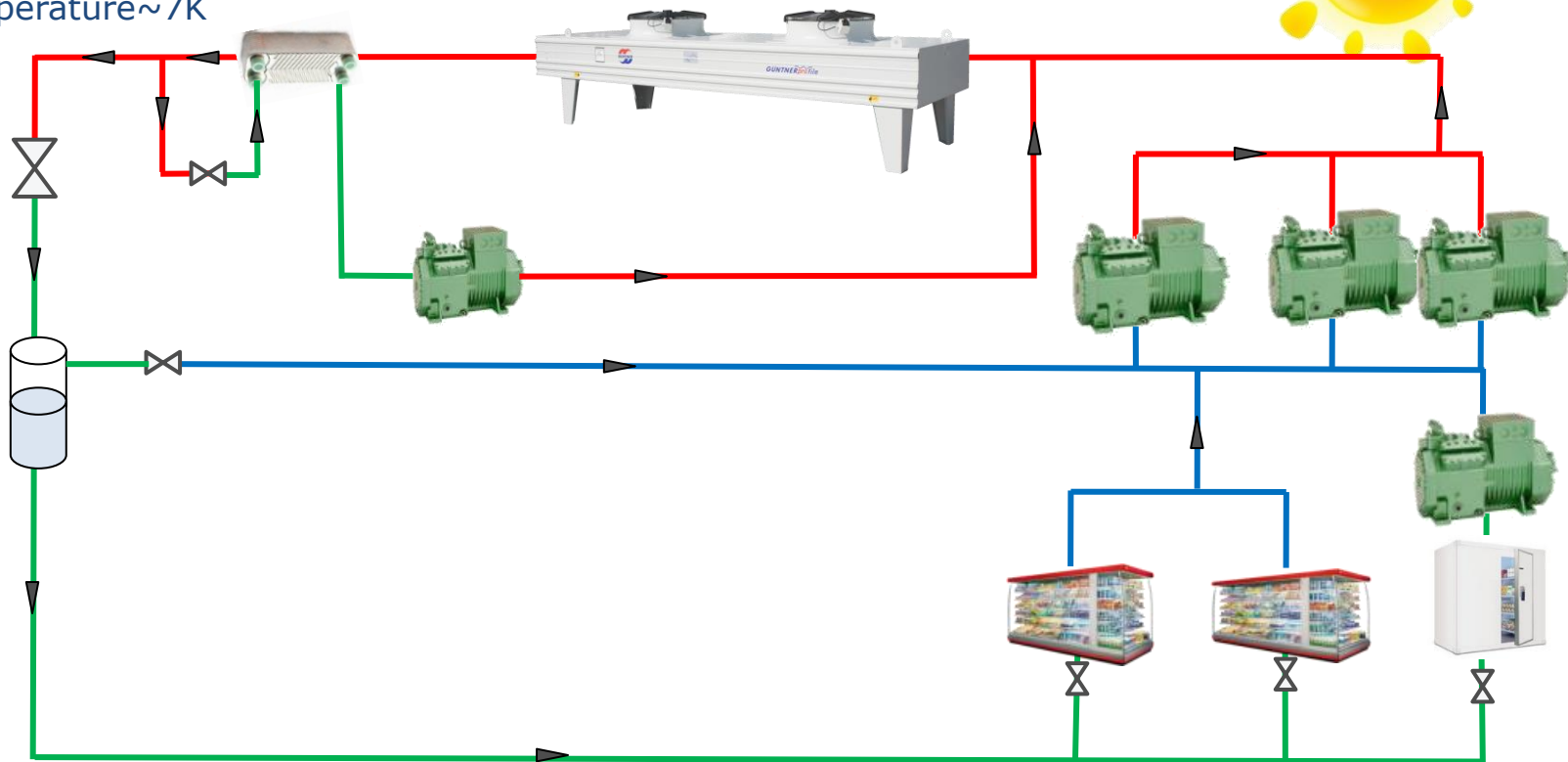


Subcooling ETE: Extreme Temperature Efficiency

ETE : Outlet
temperature ~7K

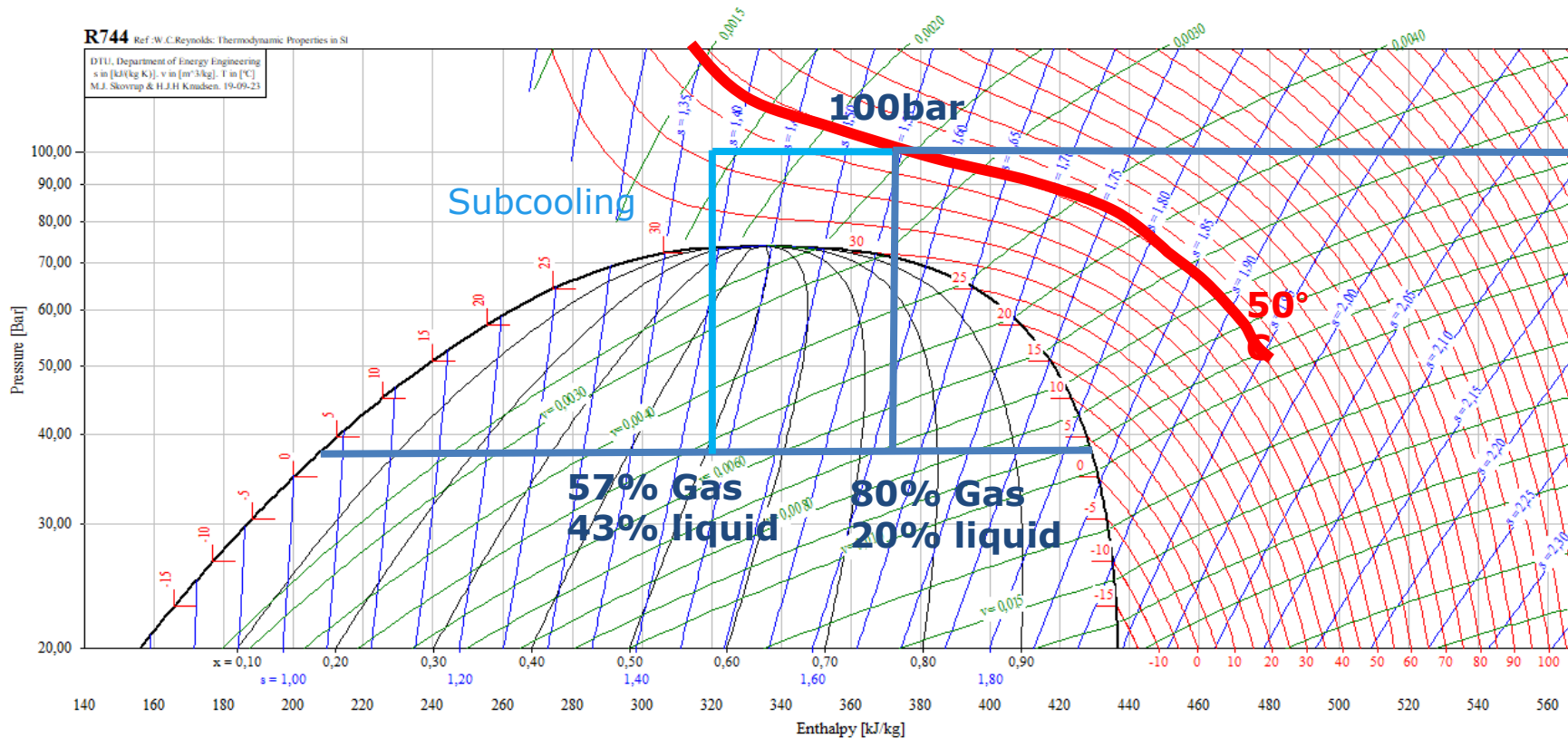
Sortie Gascooler >50°C

48°C ambient

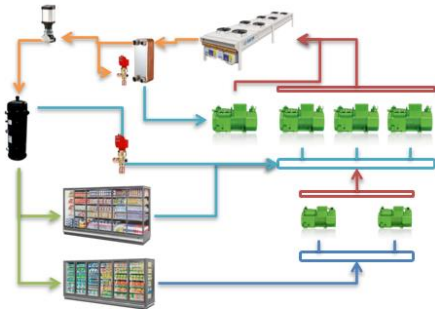


R744 Ref: W.C.Reynolds: Thermodynamic Properties in SI

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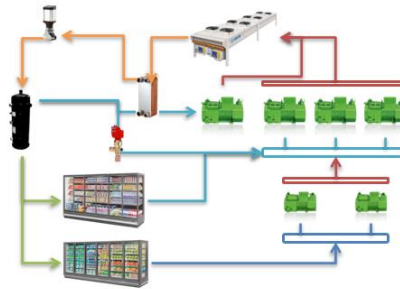


ETE – Extreme Temperature Efficiency :



- Quite no flash gas in the system.
- Suction pressure on satellite compressor >50bar = EXCELLENT COP
- No issue in transitional regime.
- **Increase of liquid CO₂ in the system: evaporators can run 100%.**

Parallel Compression :

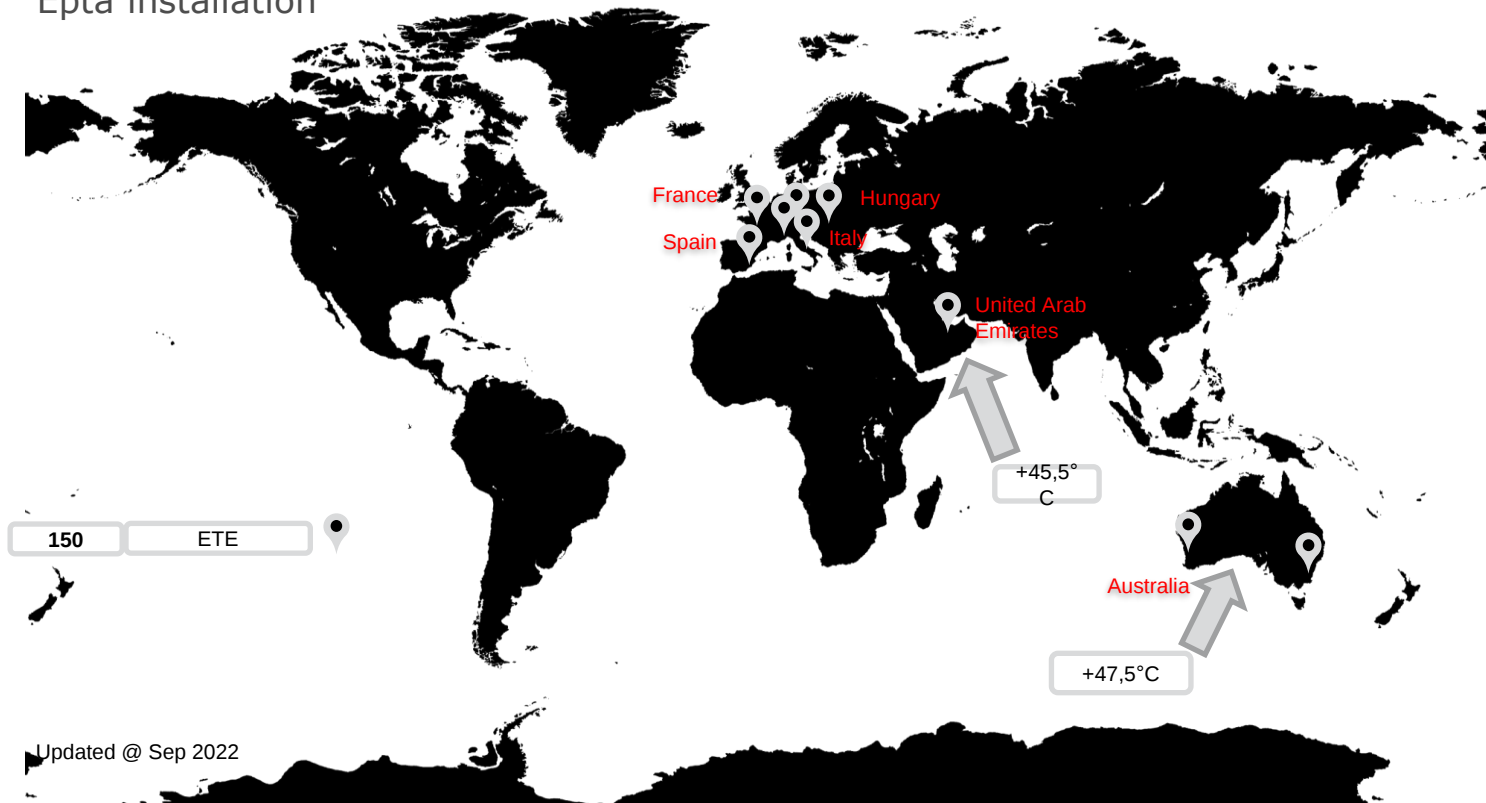


- Efficient flash gas recycling.
- Suction pressure on parallel compressor >37bar GOOD COP.
- Possible issues in transitional regime.
- The evaporators don't have 100% of refrigeration capacity available.
- **No positive impact on liquid refrigerant for evaporators.**



TSC SYSTEM WITH ETE

Epta installation

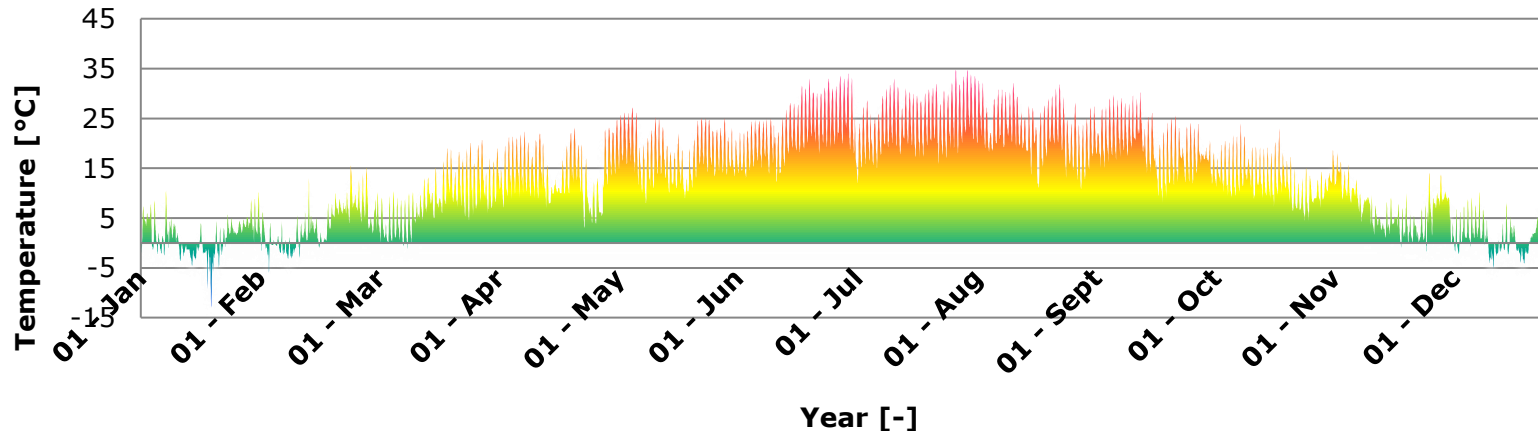


Updated @ Sep 2022

BOLOGNA - ITALY PROJEKT LIFE C4R

- Vending area: 6.500m²
- MT power loads: 150 kW
- SubCO₂ power: 47 kW

External Temperature Profile

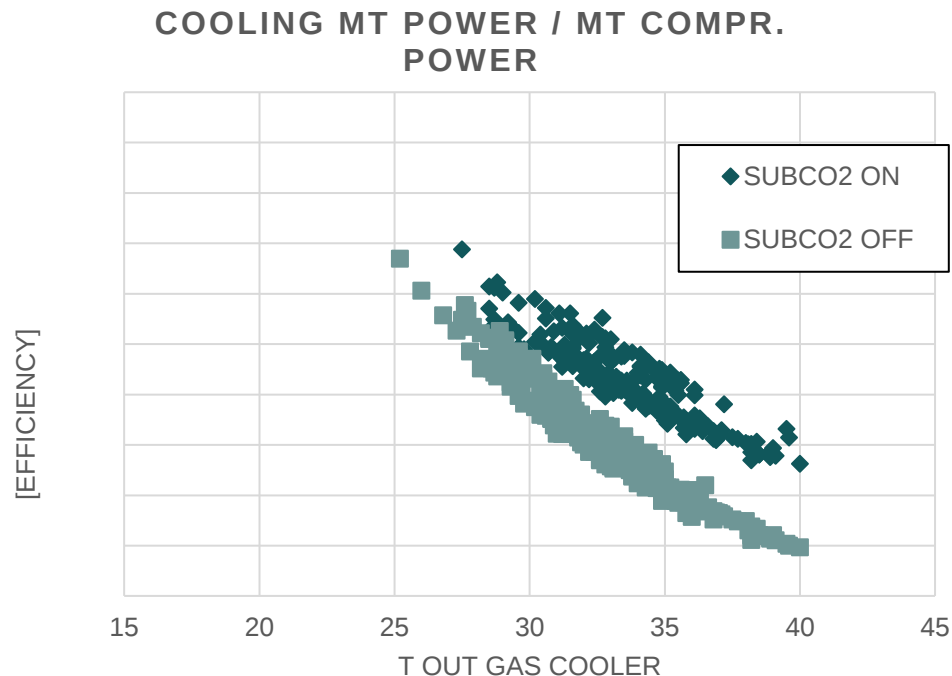


BOLOGNA - ITALY PROJEKT LIFE C4R

- Vending area: 6.500m²
- MT power loads: 150 kW
- SubCO₂ power: 47 kW
- Max Ext Temp: +41,5°C

HIGHLIGHTS DURING THE WARM PERIOD

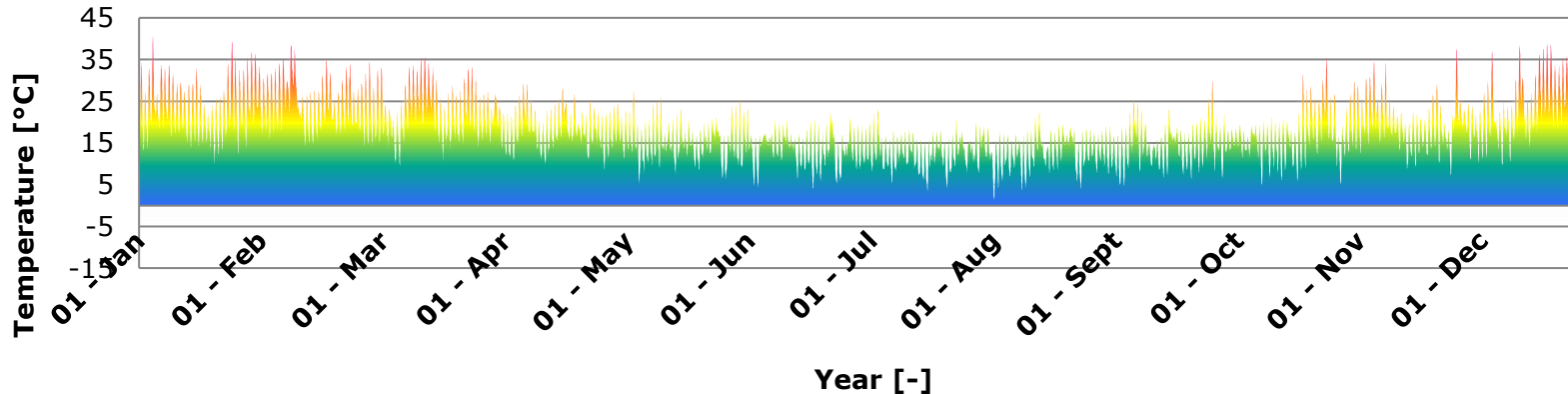
Saving flash gas mass flow [%]	-73%
Saving Pack energy [%]	-14%
Saving Power MT compr. [%]	-30%



ELLENBROOK – AUSTRALIA

- Vending area: 1.500m²
- MT power loads: 90 kW
- LT power loads: 5 kW
- Sub-cooling power: 34 kW

External Temperature Profile

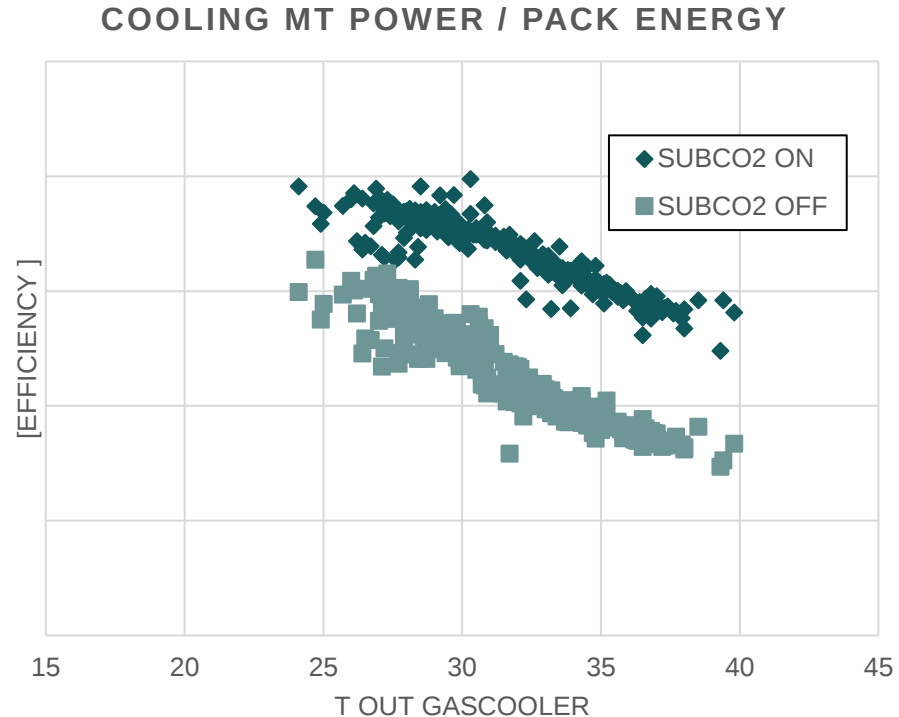


ELLENBROOK – AUSTRALIA

- Vending area: 1.500m²
- MT power loads: 90 kW
- LT power loads: 5 kW
- Max Ext Temp: +47,5°C

HIGHLIGHTS DURING THE WARM PERIOD

Saving flash gas mass flow [%]	-81%
Saving Pack energy [%]	-18%
Saving Power MT compr. [%]	-35%





THANK YOU

www.eptarefrigeration.com

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