ATMO EU sphere
Solutions for Europe
natural refrigerants

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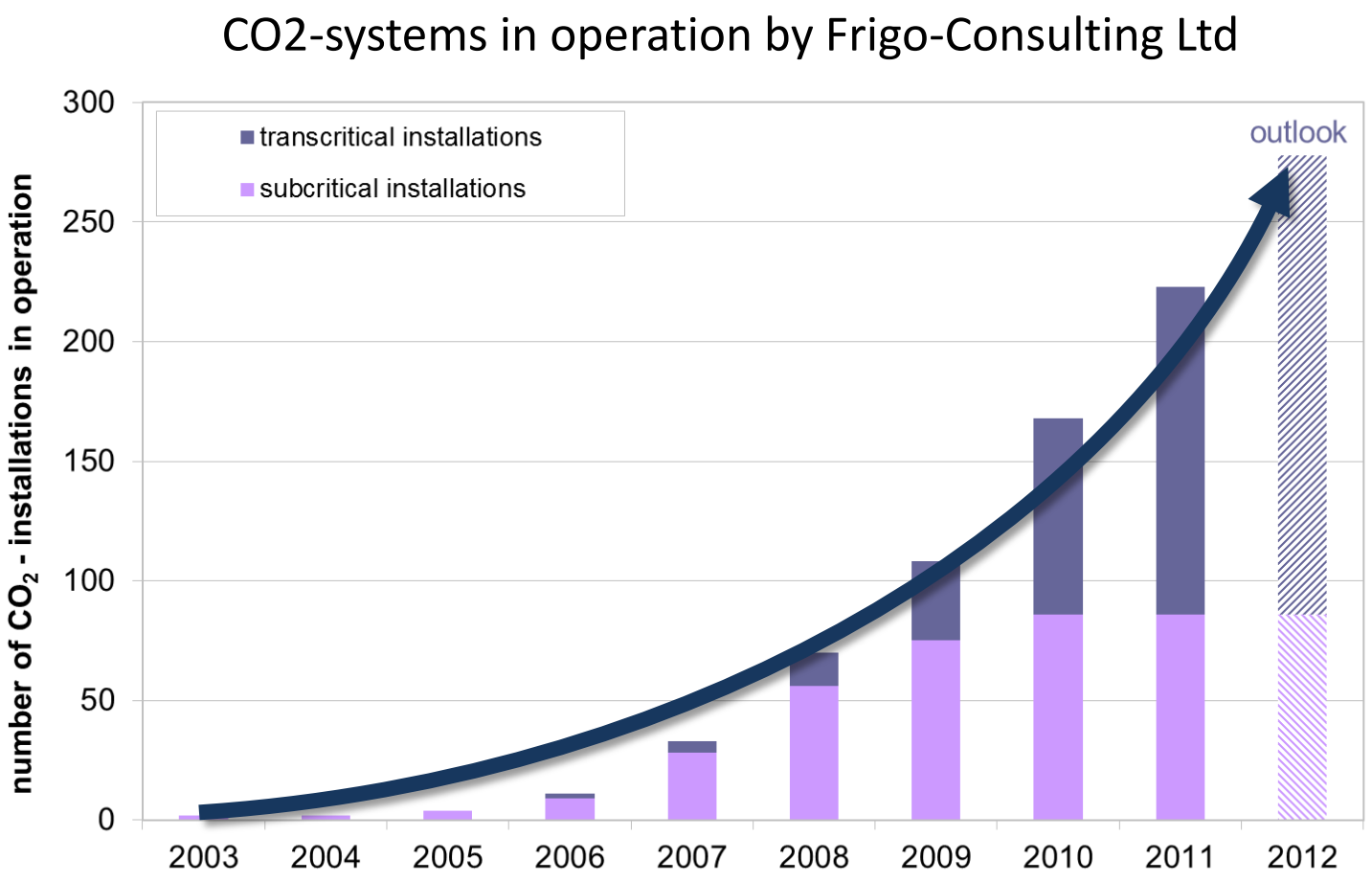
ATMOsphere Europe 2012

efficiency analysis and comparison of innovative CO2-refrigertion systems

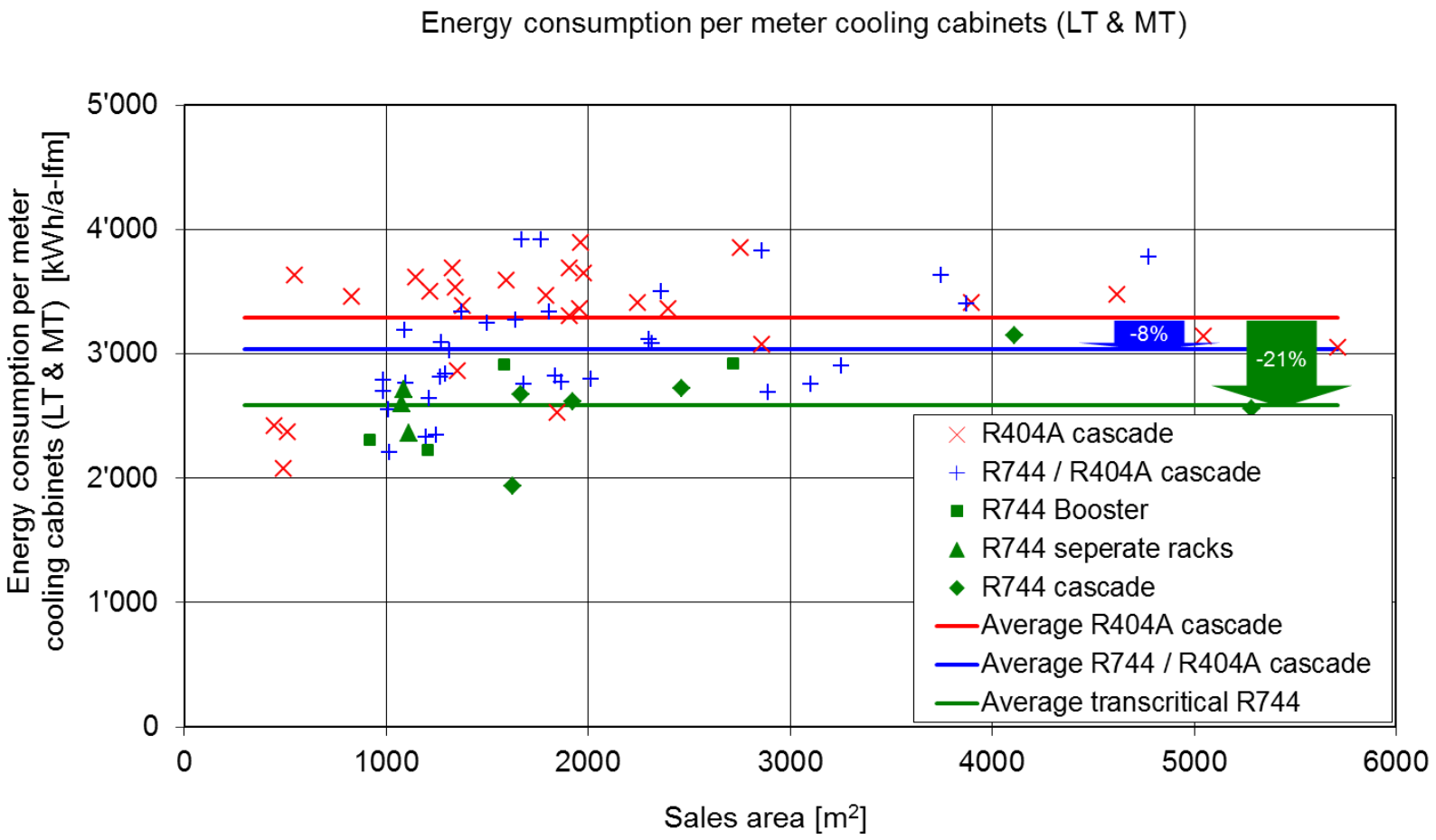
07.11.2012

Jonas Schönenberger

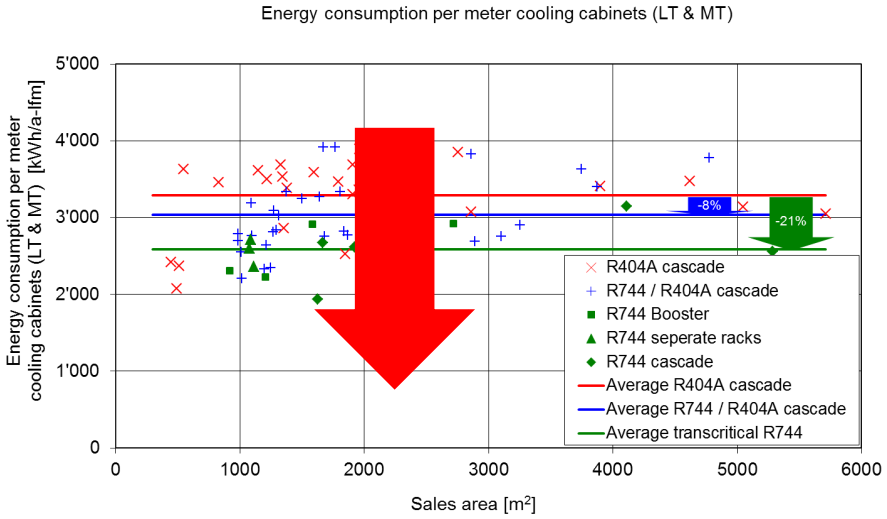
CO_2 commercial references



CO_2 efficiency increase



CO_2 efficiency increase



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Confédération suisse
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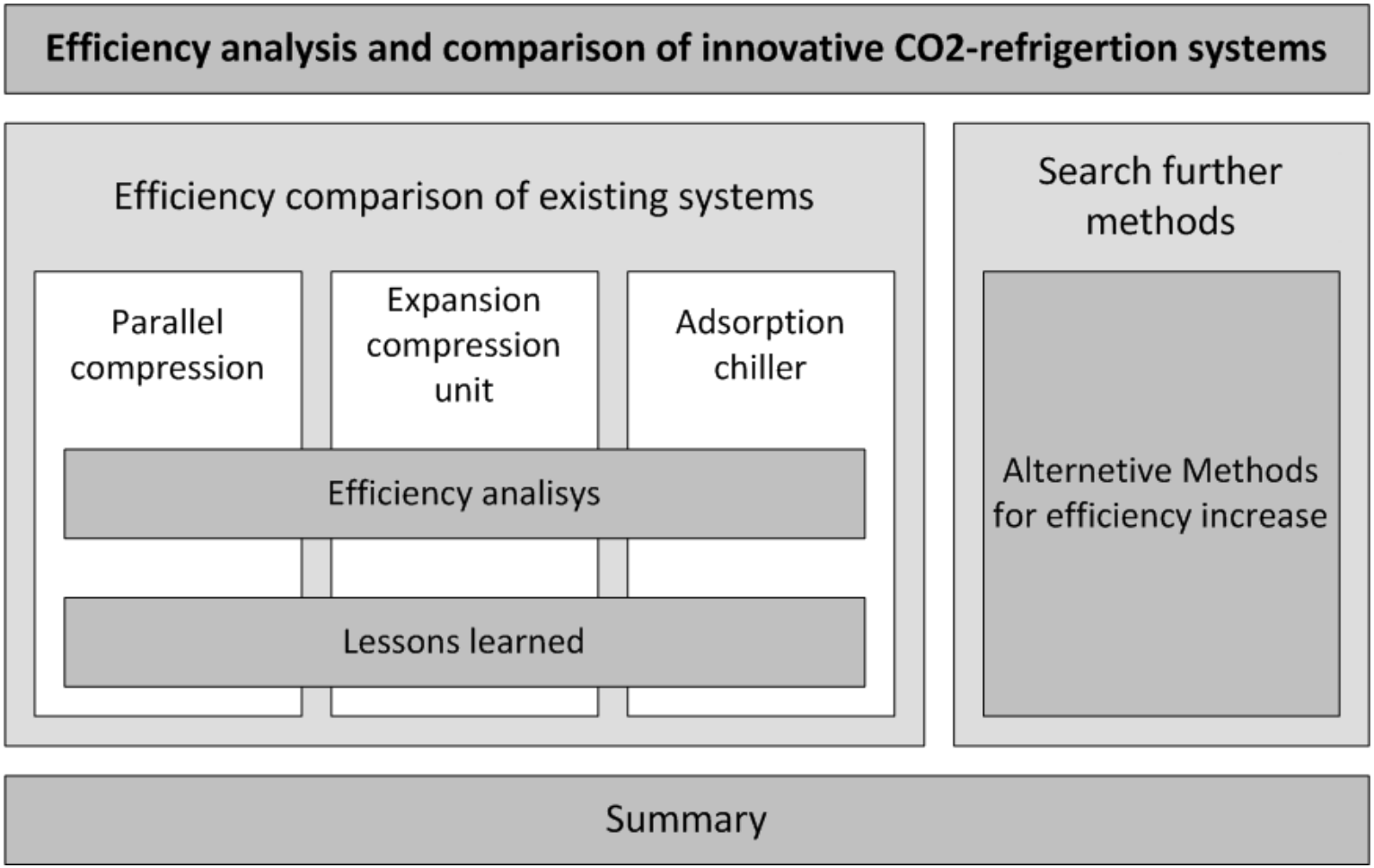
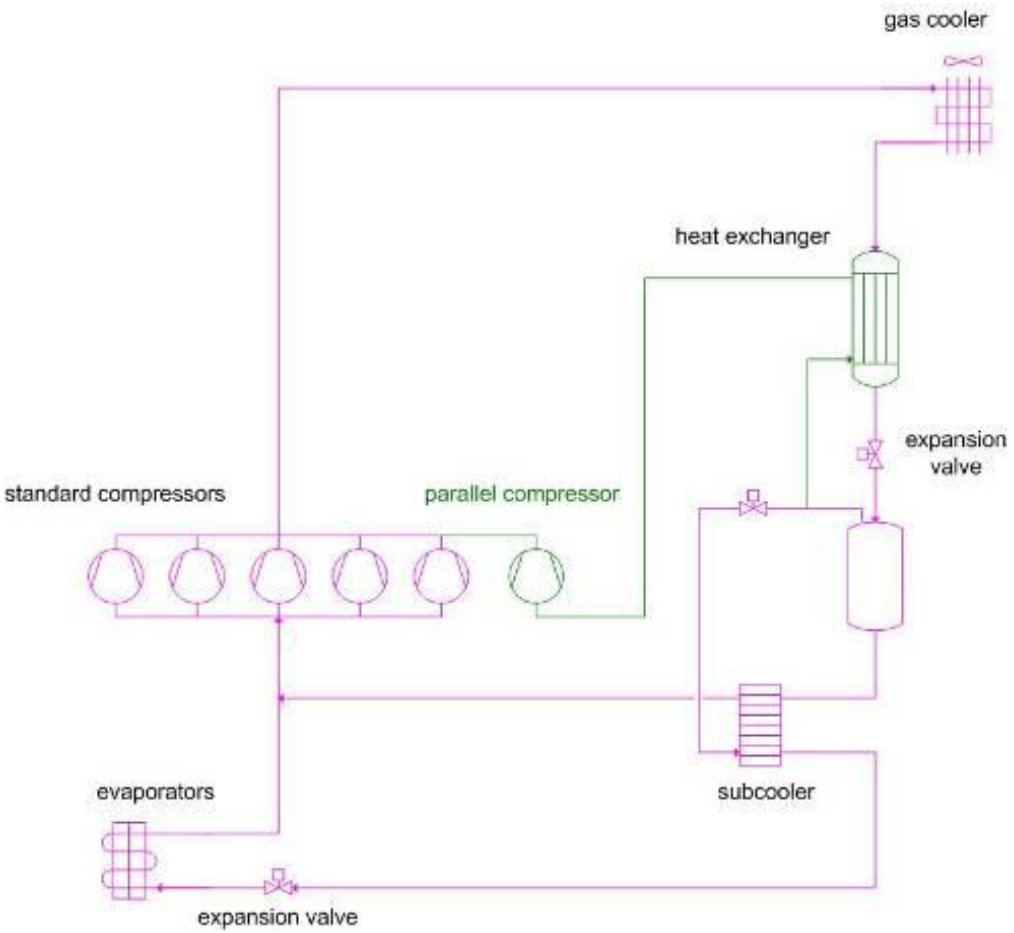
Bundesamt für Energie BFE
Office fédéral de l'énergie OFEN

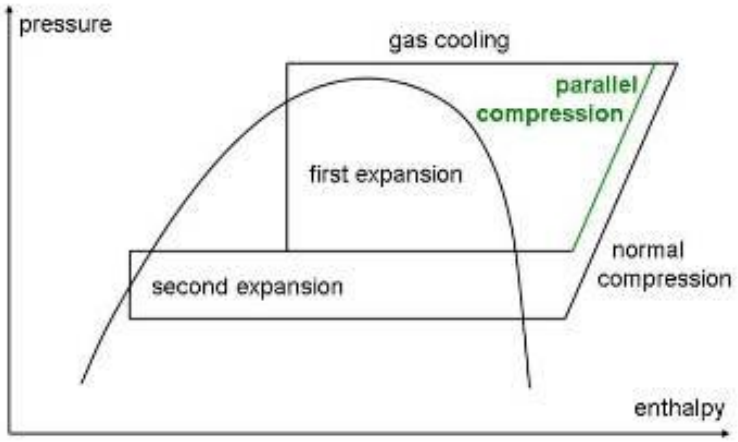
- Efficiency analysis of existing innovations
- Search further methods to increase efficiency

Content

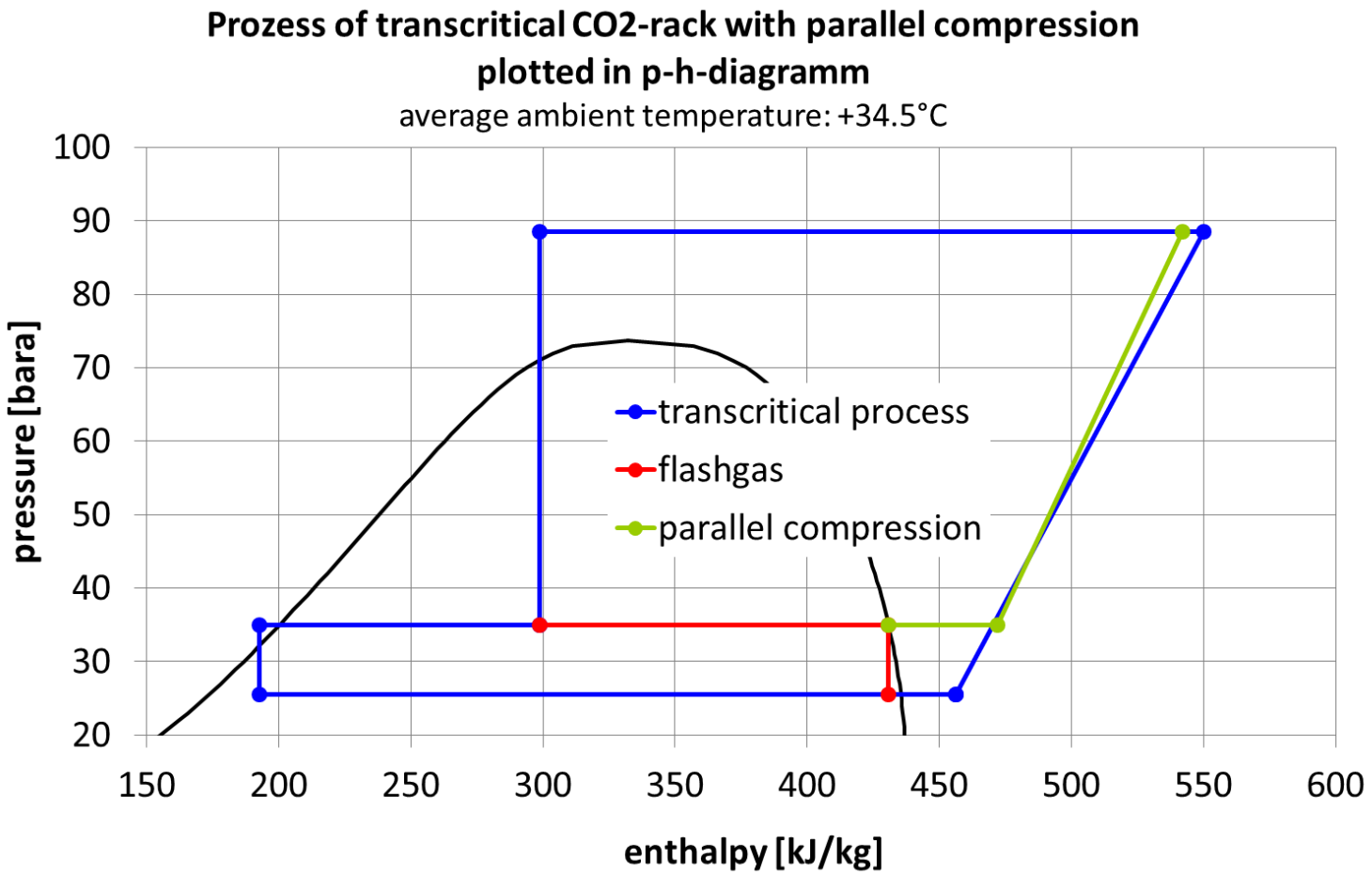

Efficiency analysis and comparison of innovative CO2-refrigertion systems
Efficiency comparison of existing systems
Parallel compression
Expansion compression unit
Adsorption chiller
Efficiency analisys
Lessons learned
Search further methods
Alternetive Methods for efficiency increase
Summary

Parallel compression





Parallel compression: efficiency analysis



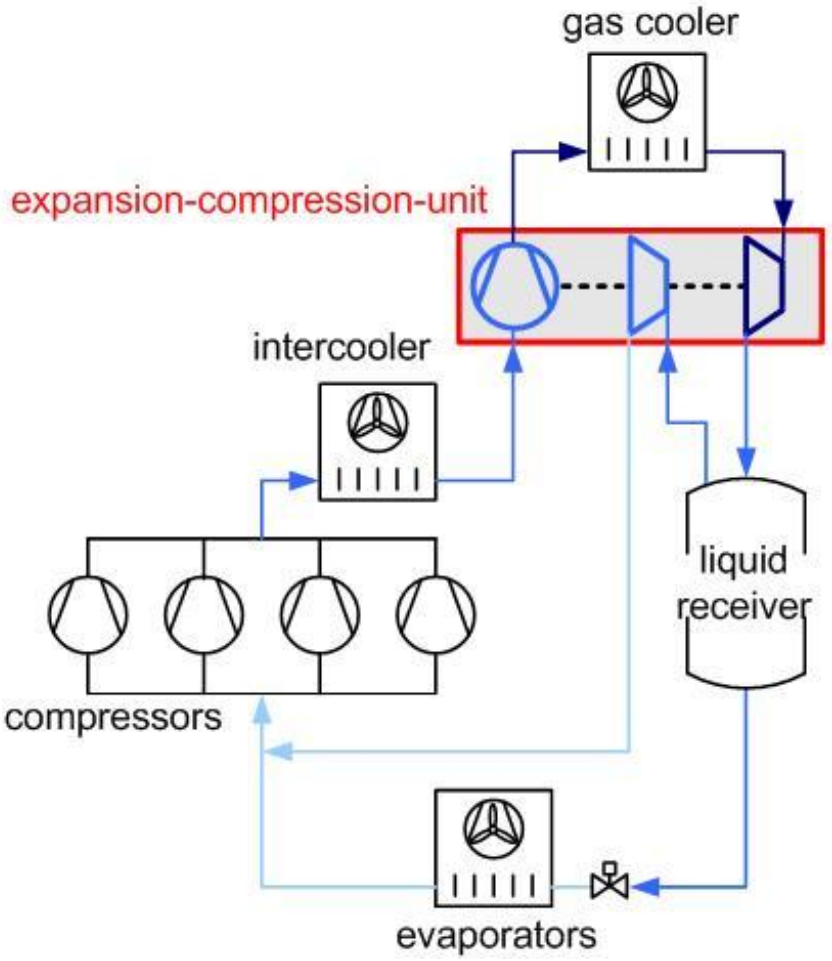
Parallel compression: lessons learned

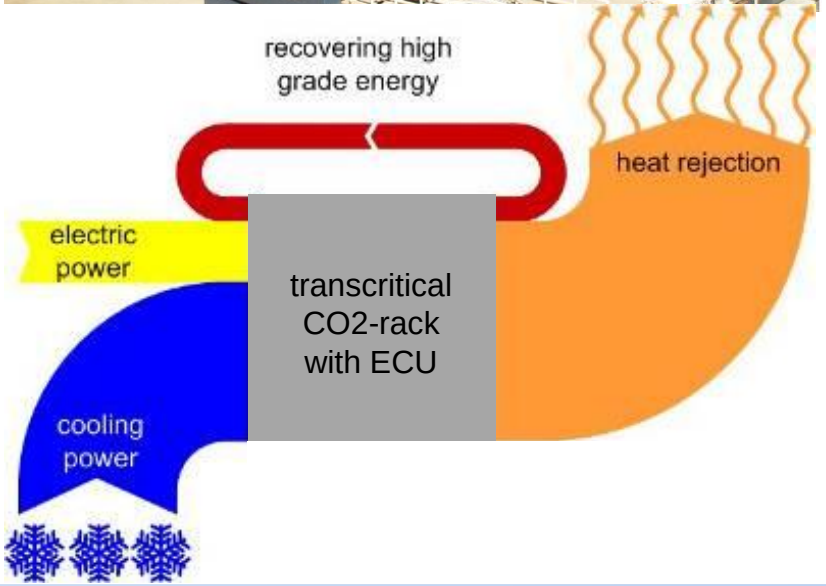
- Effective way to increase efficiency
- System based on standard components
- High operational safety

special attention:

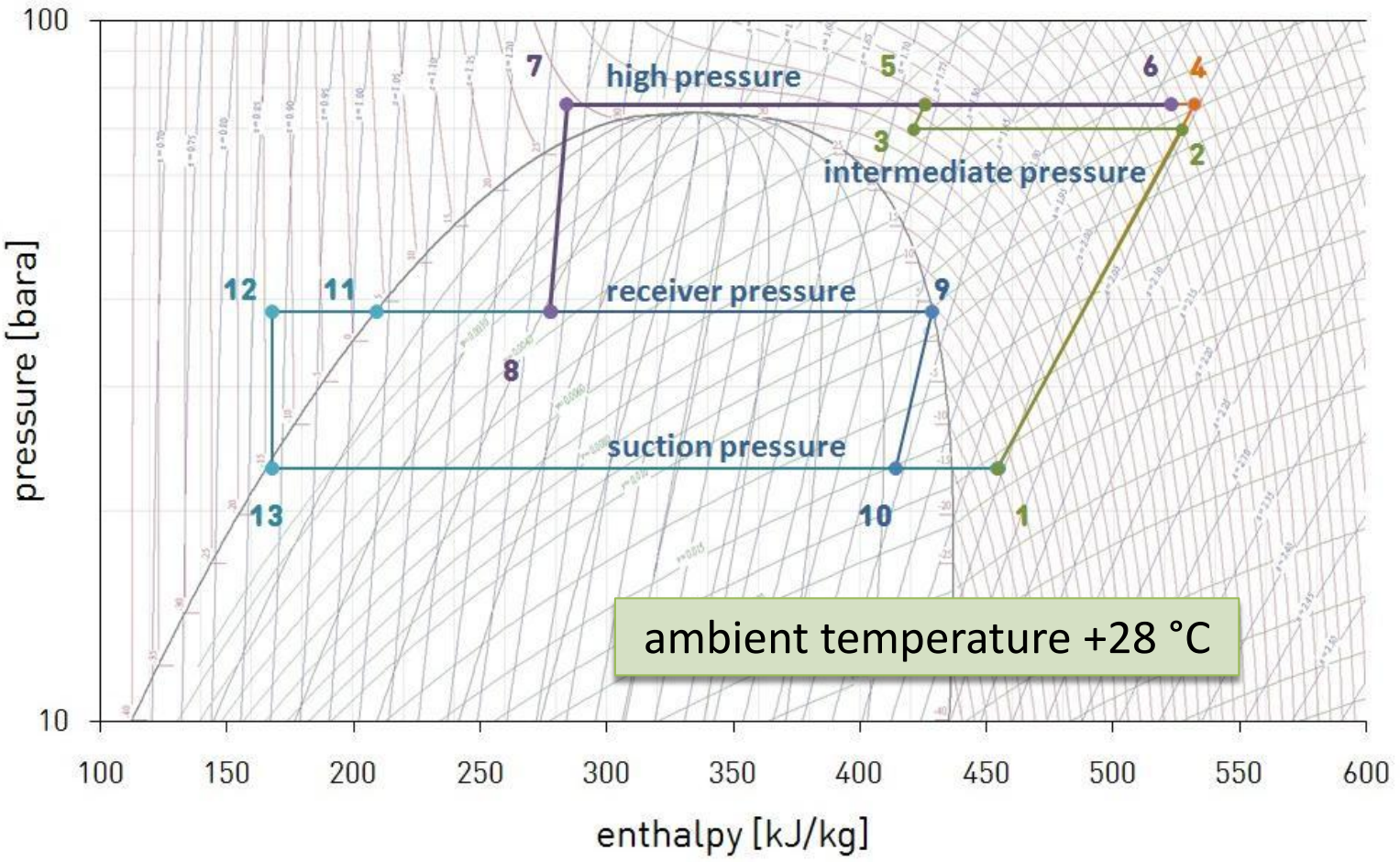
- Suction gas superheat of parallel compressor
- Take into account part load characteristics

Expansion compression unit (ECU)





ECU: efficiency analysis



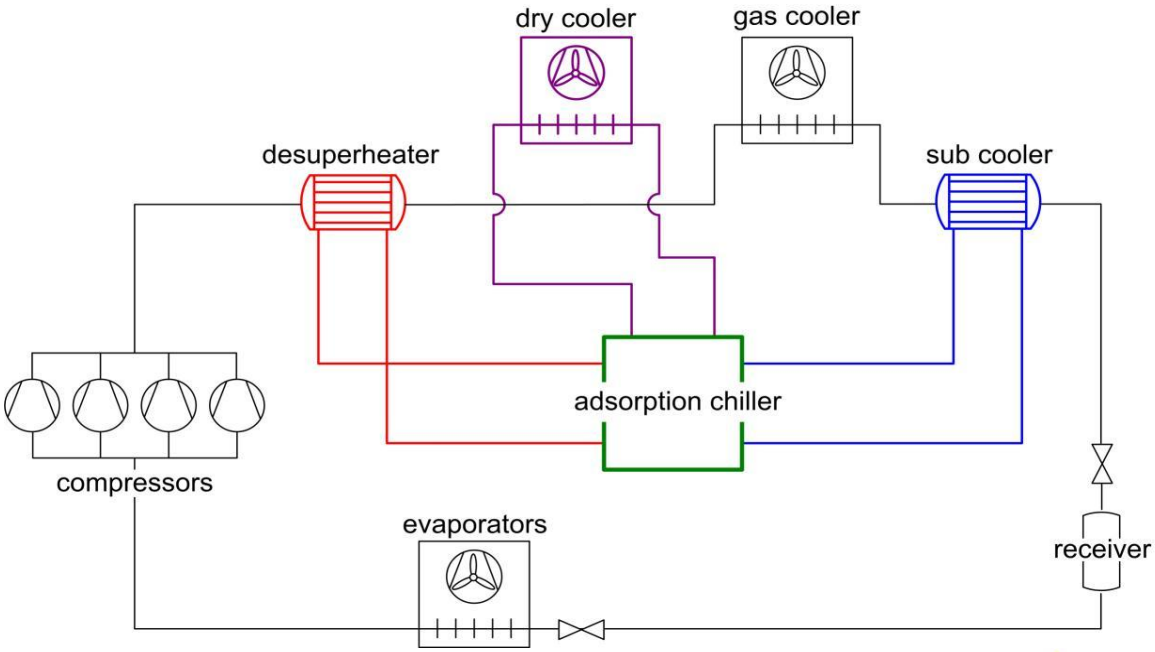
ECU: lessons learned

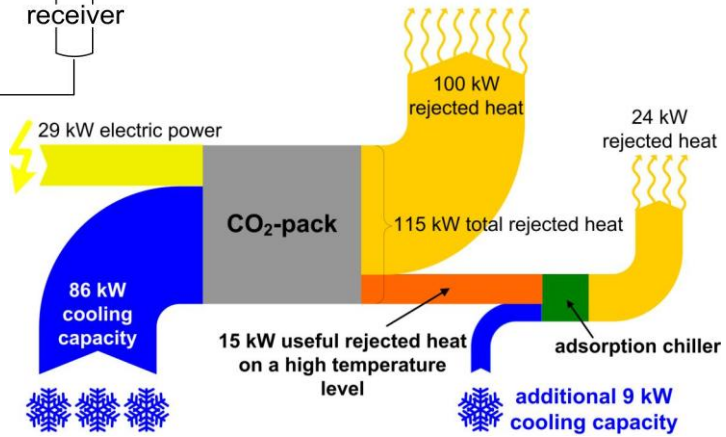
- Useful at high ambient temperatures
- Currently still in the prototype stage
- High cost for implementation

special attention:

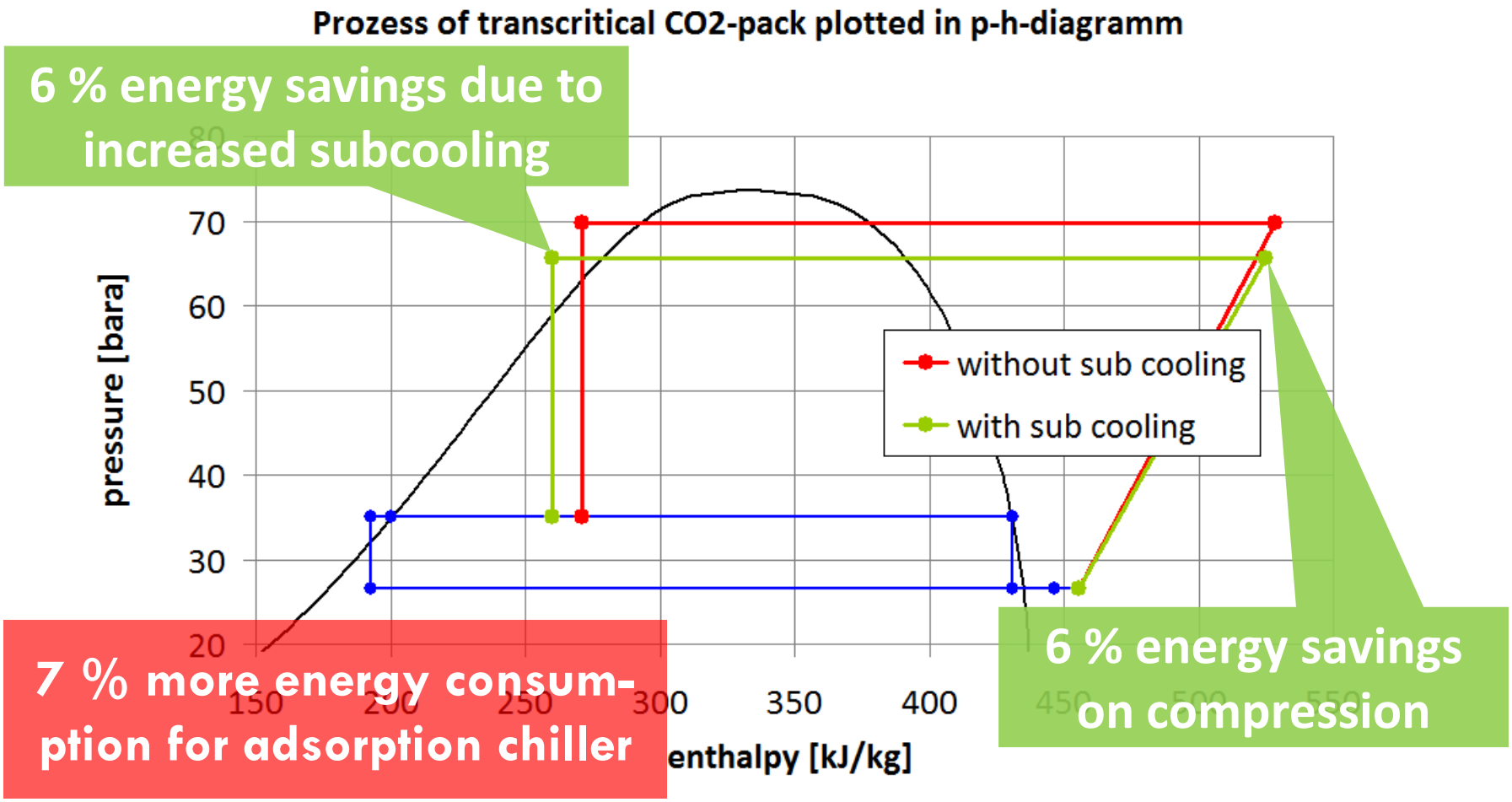
- control of mass flow
- oil return and distribution
- pulsation of fluids
- plant dynamics

Adsorption chiller





Adsorption chiller: efficiency analysis



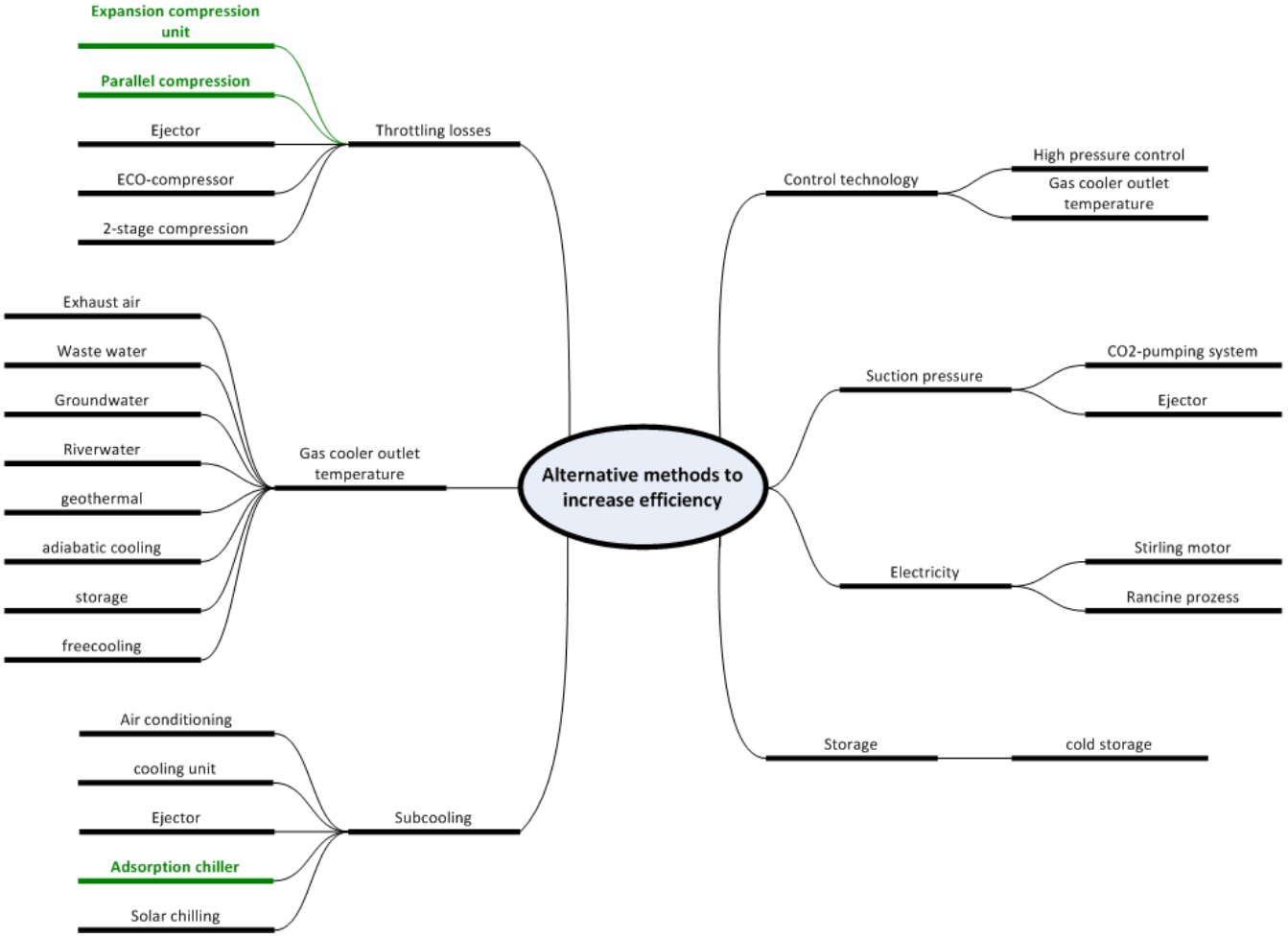
Adsorption chiller: lessons learned

- Useful at high ambient temperatures
- Enough waste heat needed to run adsorption chiller
- Combination with solar chilling
- Installation based on standard components
- Costs can be further reduced

special attention:

- System dynamic
- Indication: cold storage (buffer) nor required

Alternative methods



Summary

- Efficiency increase due to natural refrigerants
- Innovative transcirtical CO2-systems are successfuly in operation
- Further methods to optimize transcritical CO2-system
- Methods must be selected with regard to specific application requirements
- Observe system part load and system dynamic

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