Adsorption and Friends:

Development of flexible solutions for solar thermal cooling

Fahrenheit GmbH

Dr.-Ing. Ursula Wittstadt

12/03/2019, Frankfurt/Main

Workshop at ISH

"TOWARDS LOW CARBON HEATING AND COOLING IN BUILDINGS — THREE DIFFERENT PERSPECTIVES"

These projects have received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N. 818329 and N.723925

Principle of Adsorption Cooling

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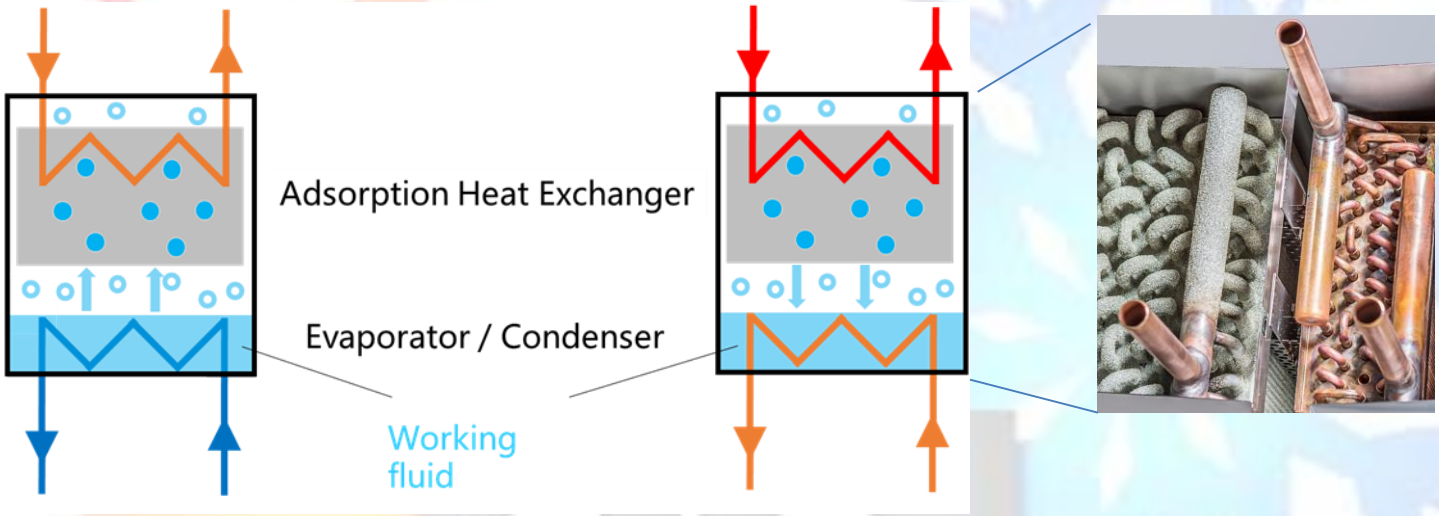
Principle of Adsorption Cooling



- No moving parts inside the modules
- Water as refrigerant
- No toxic or climate damaging substances

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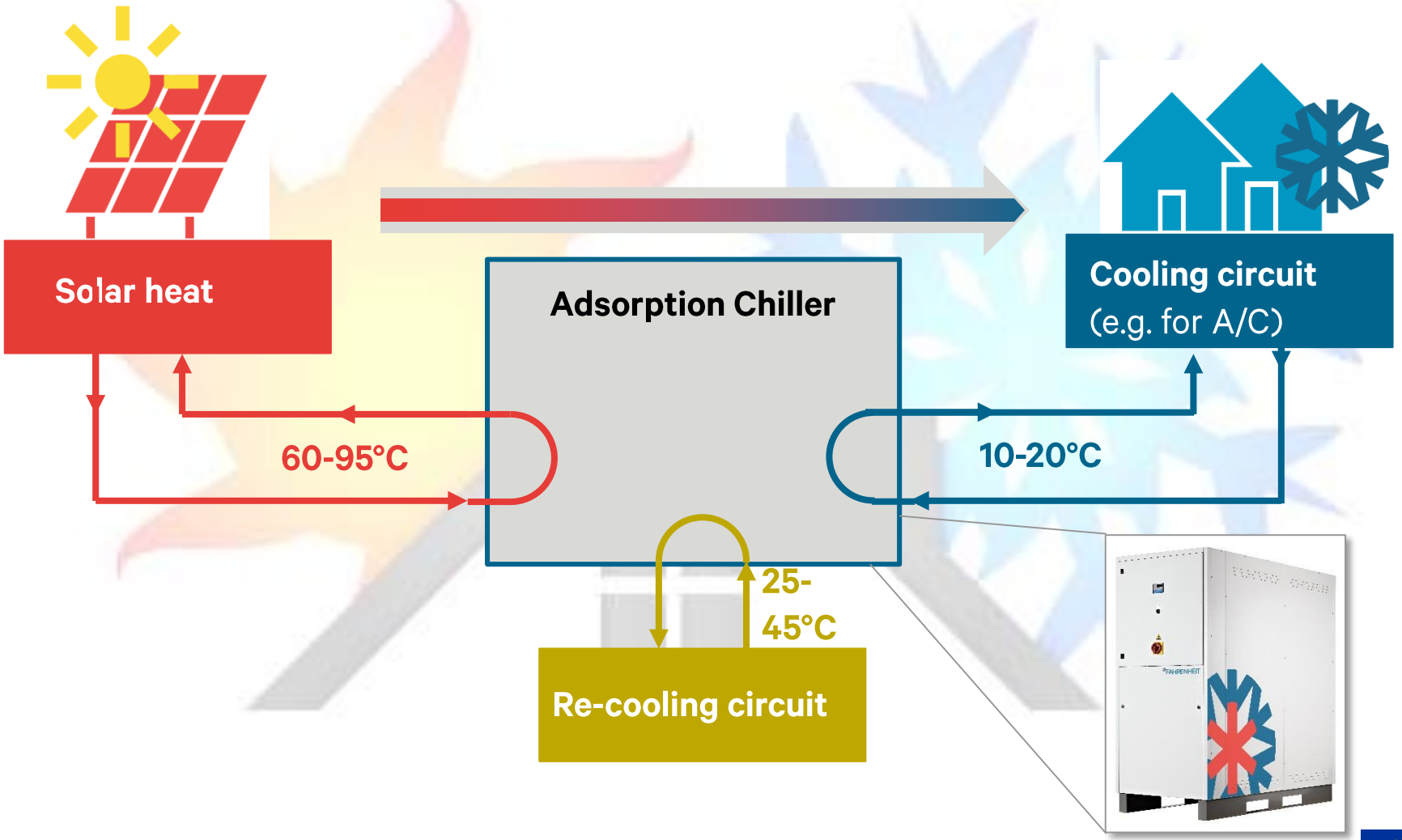
Application: solar thermal cooling

Solar cooling converts warm water into cold water.



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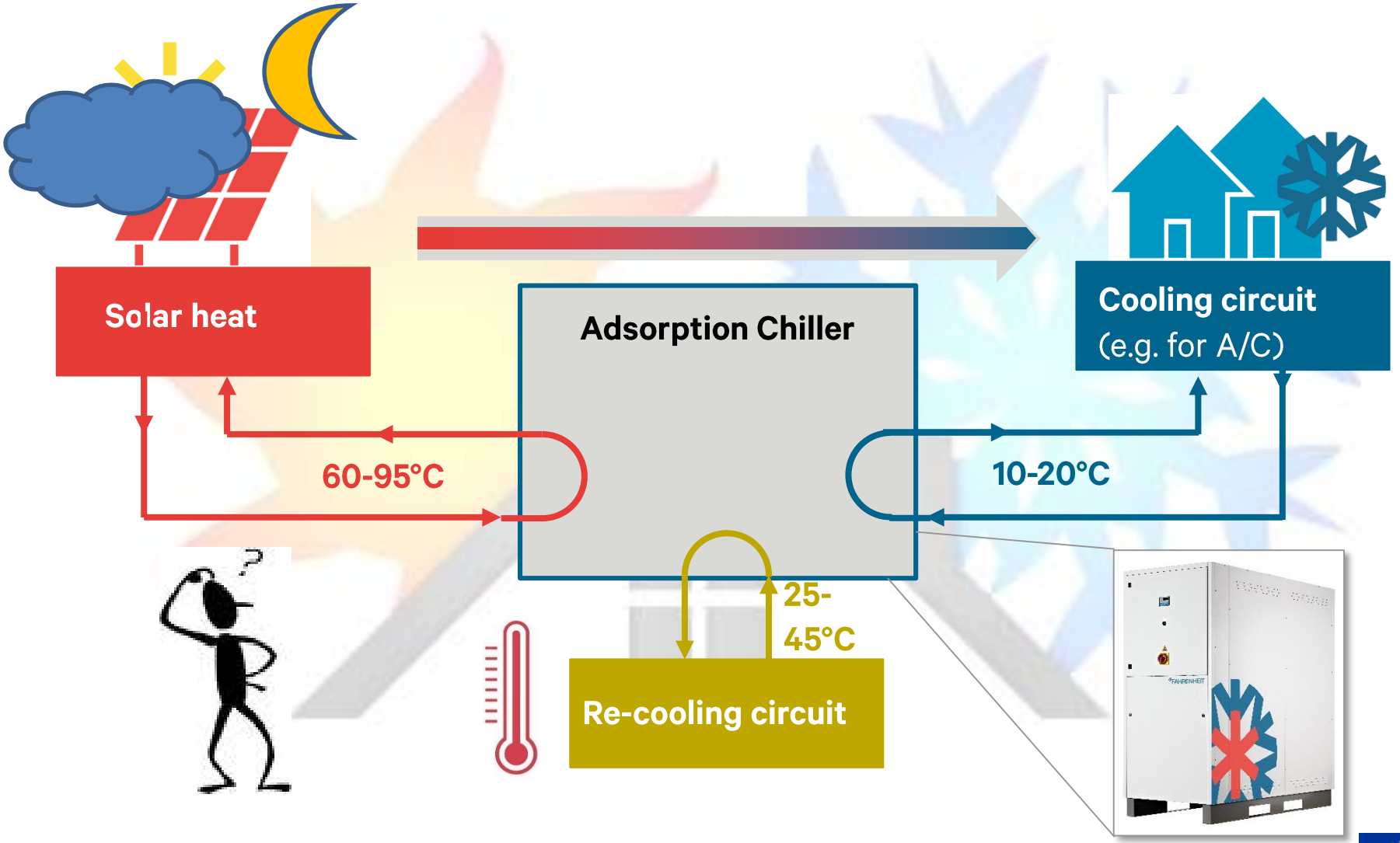
Application: Solar thermal cooling

...but not always!



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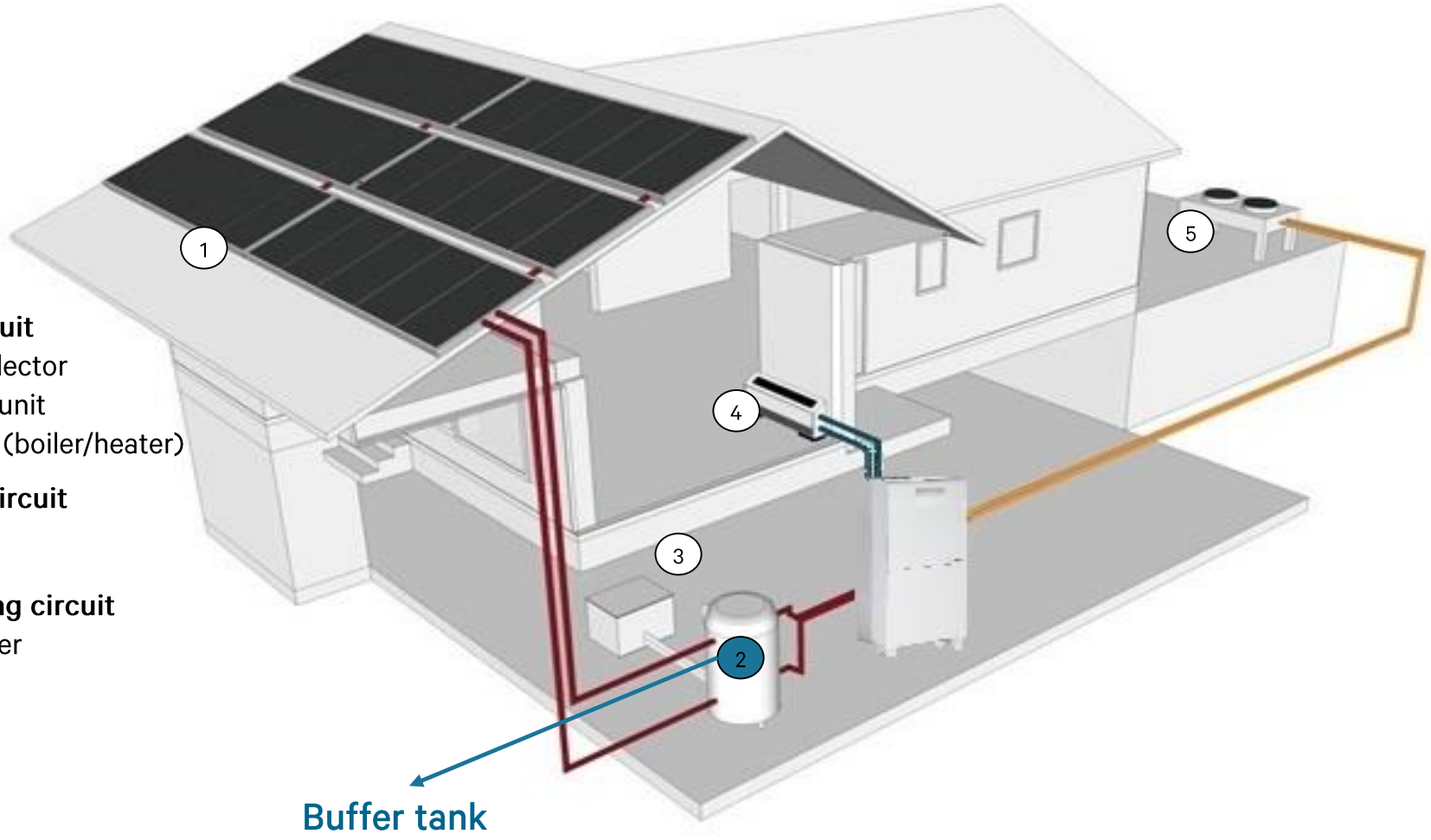
Application: Solar thermal cooling

Example: Residential building



Drive circuit
1 Solar collector
2 Storage unit
3 Back-up (boiler/heater)

Cooling circuit
4 Fan Coil

Re-cooling circuit
5 Re-cooler

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Application: Solar thermal cooling

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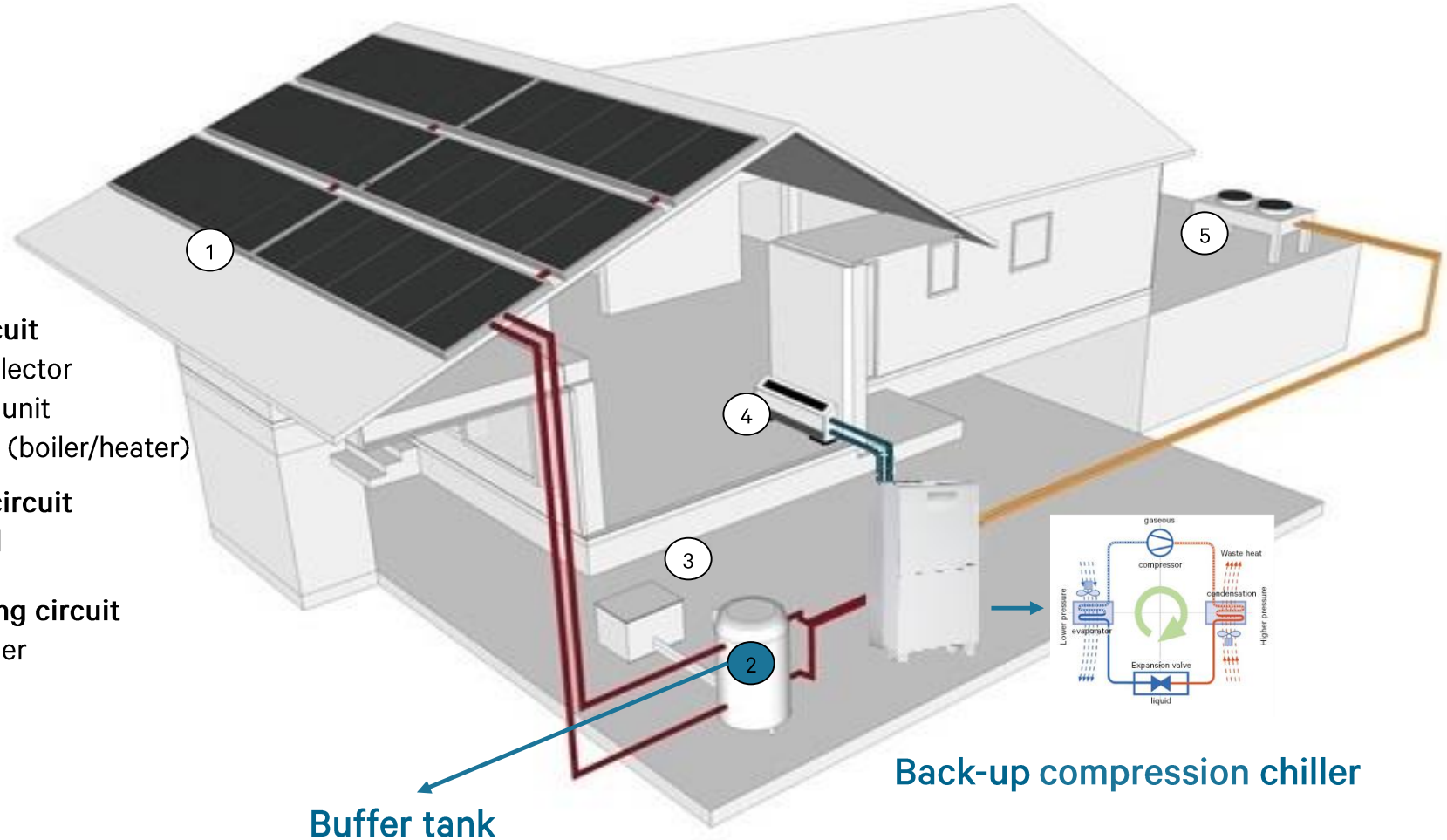

Back-up compression chiller

Buffer tank

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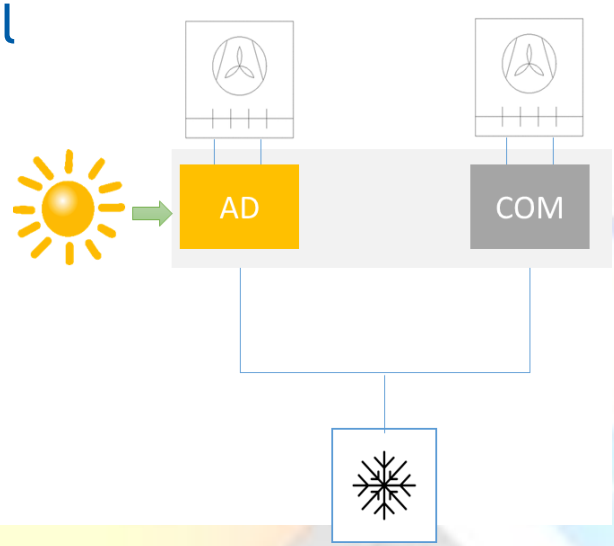
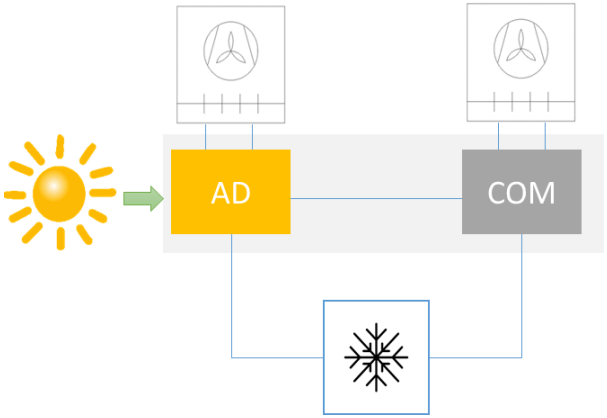
Layout for Hybrid systems

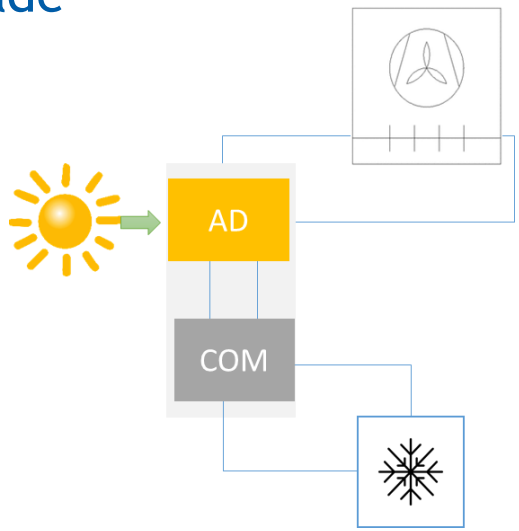
Parallel



Pre-cooling



Cascade



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What is important?

FLEXIBILITY!

- Climate, building standard, available space, temperature level of cooling etc. can differ a lot….

SILICA GEL-PORTFOLIO

eCoo 10	eCoo 10X	eCoo 20	eCoo 20X	eCoo 30	eCoo 30X	eCoo 40X	eCoo 20 HC 60 (HybridChiller)
16 kW	25 kW	33 kW	50 kW	50 kW	75 kW	100 kW	33 + 60 kW

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What developments are needed?

- Novel adsorbent material to increase the efficiency at high ambient temperature
- Optimization of sizing and operation strategies for the hybrid chiller system
- Refrigerants compliant with F-gas regulation (is water for the adsorption part, Butane, CO_2 for the compression chiller)
- Optimization of the hydraulic integration between adsorption and compression
- Reducing the footprint
- Design review to allow outdoor installation

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THANKS FOR YOUR TIME!!!

Dr.-Ing. Ursula Wittstadt

ursula.wittstadt@fahrenheit.cool

FAHRENHEIT GmbH

Siegfriedstr. 19
80803 Munich
Germany

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