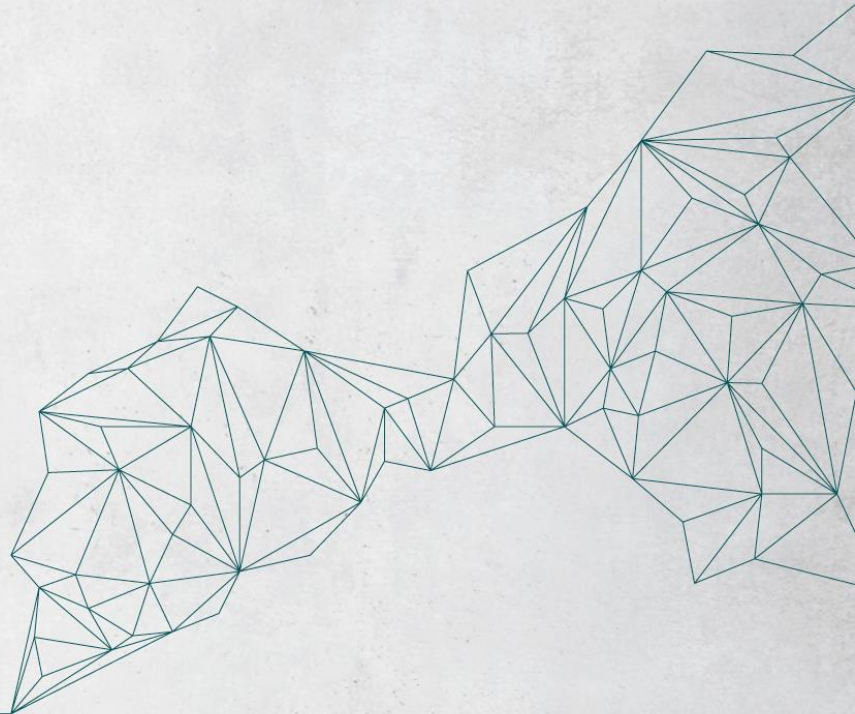


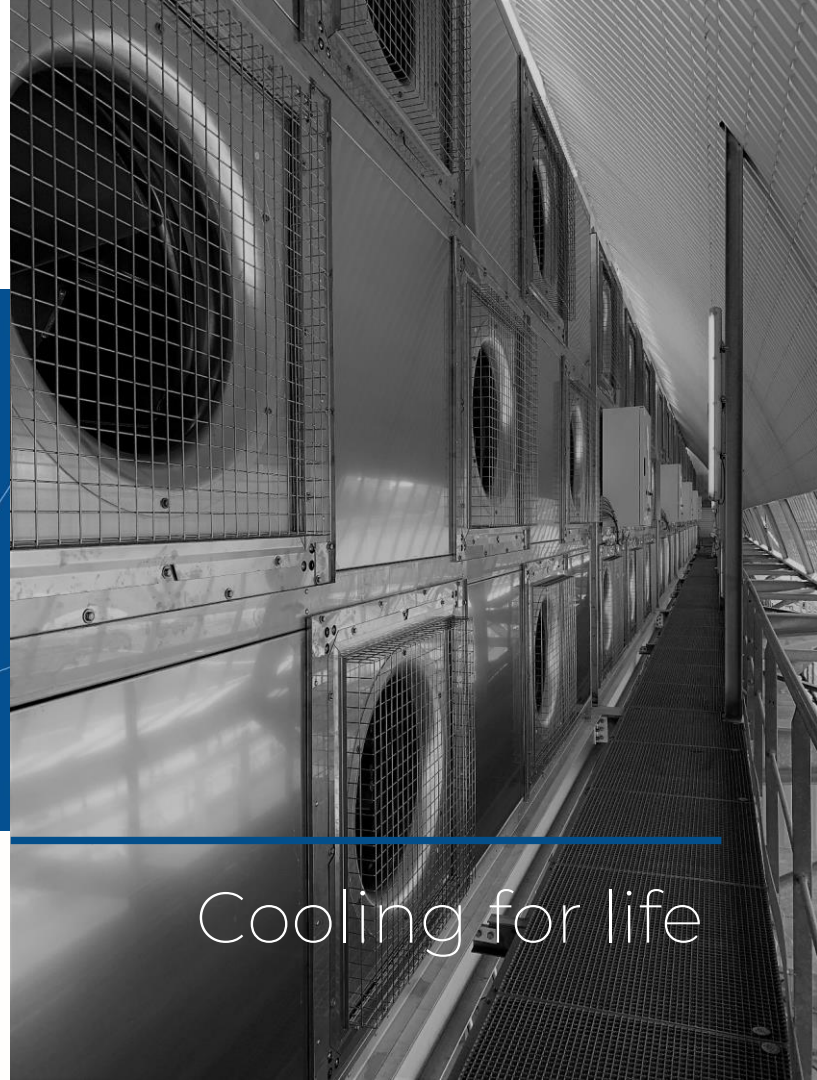
Specialist Forums 2022
Fachforen 2022

**CONNECTING
EXPERTS.**

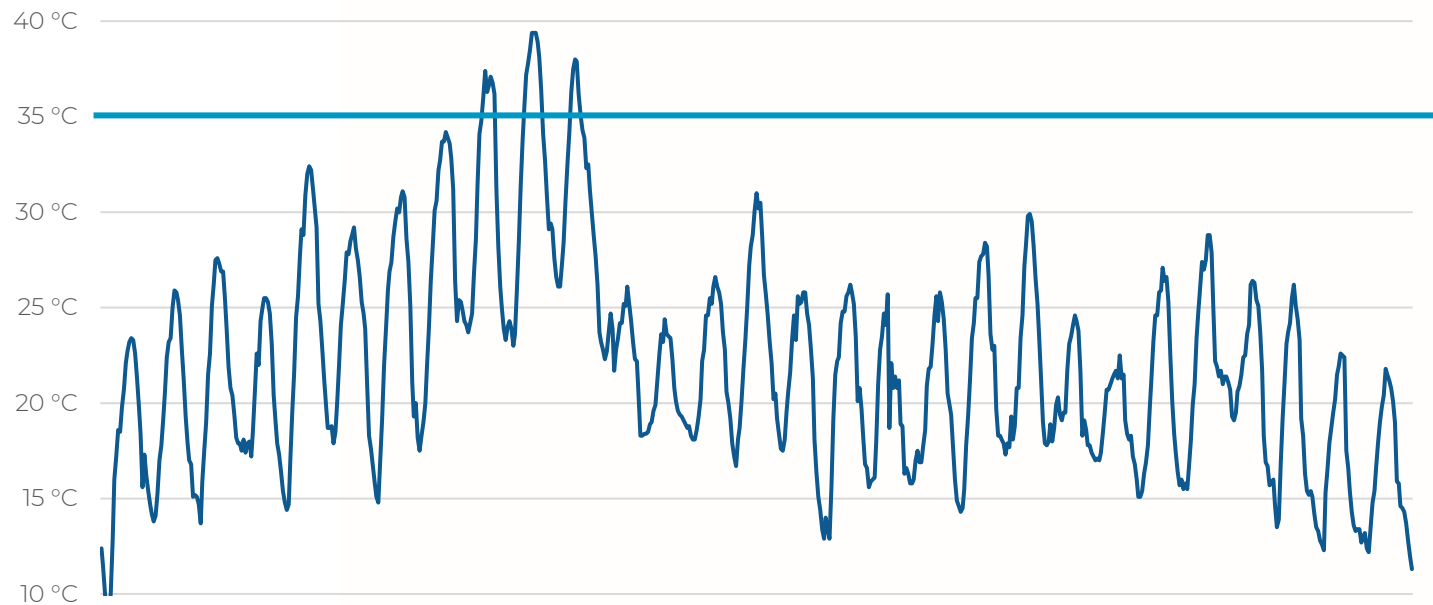


Comparison of different recooling system under the aspect of carbon footprint

Dipl.-Ing. (FH) Andreas Binder
Product Management



Summer 2019 in FRA



💧 Temperature: Ø 22,14 °C – max. 39,4 °C



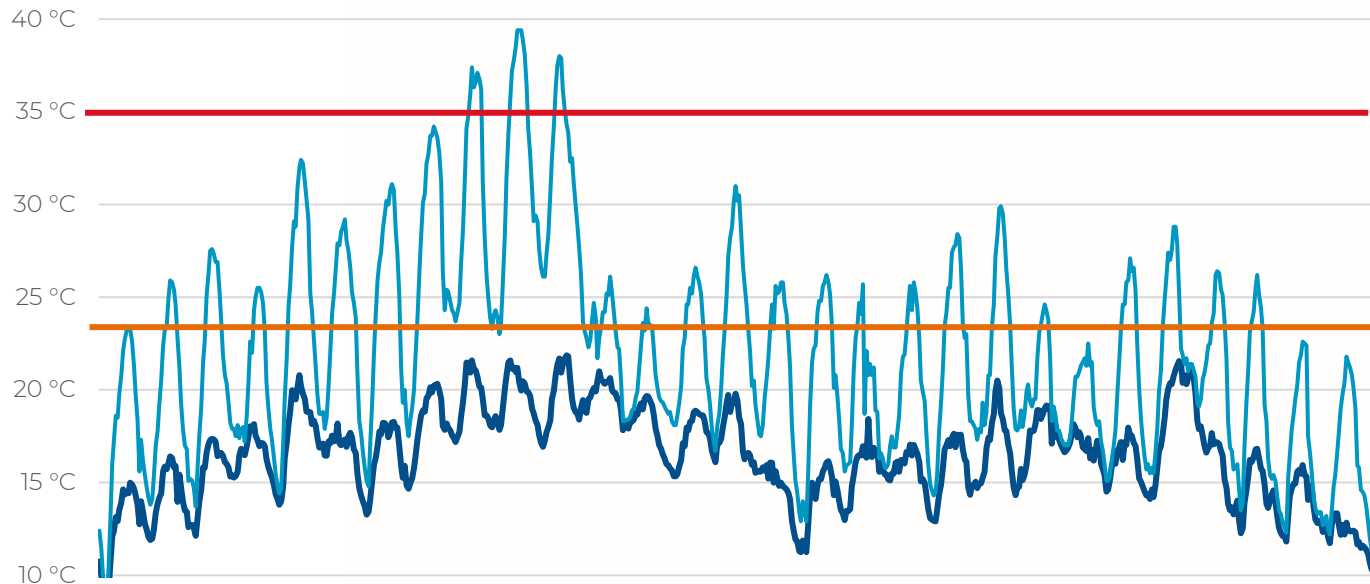
Open cooling tower



Adiabatic dry cooler



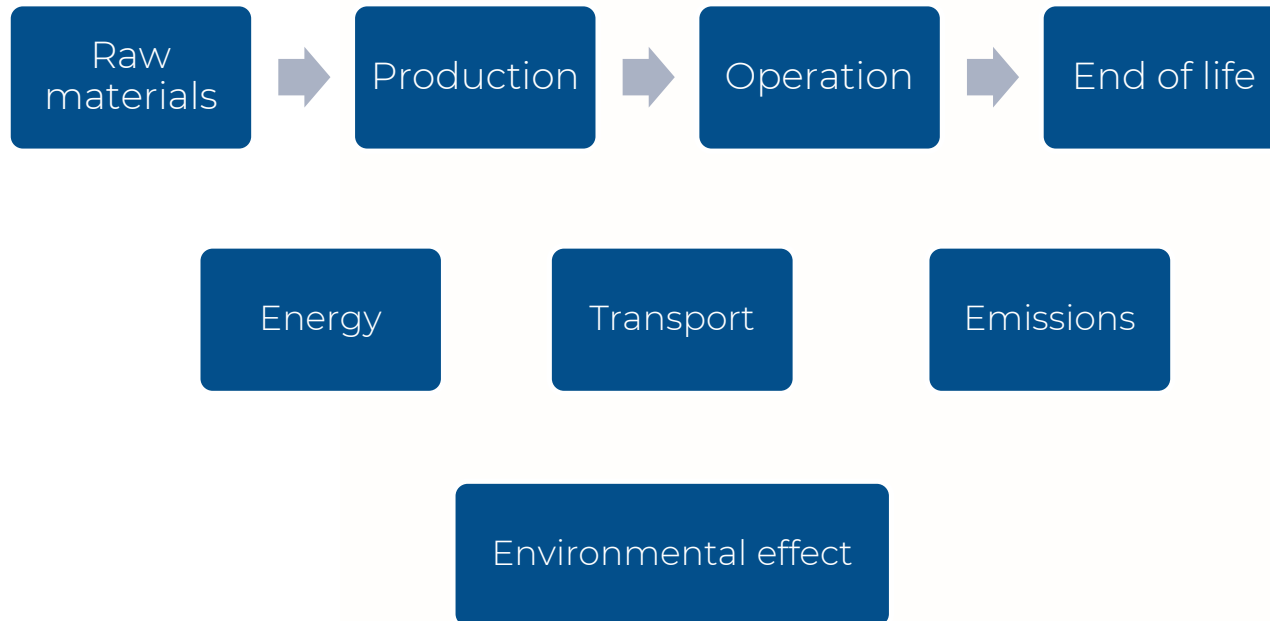
Dry / Wet Bulb Temperature



💧 Temperature: Ø 22,14 °C – max. 39,4 °C

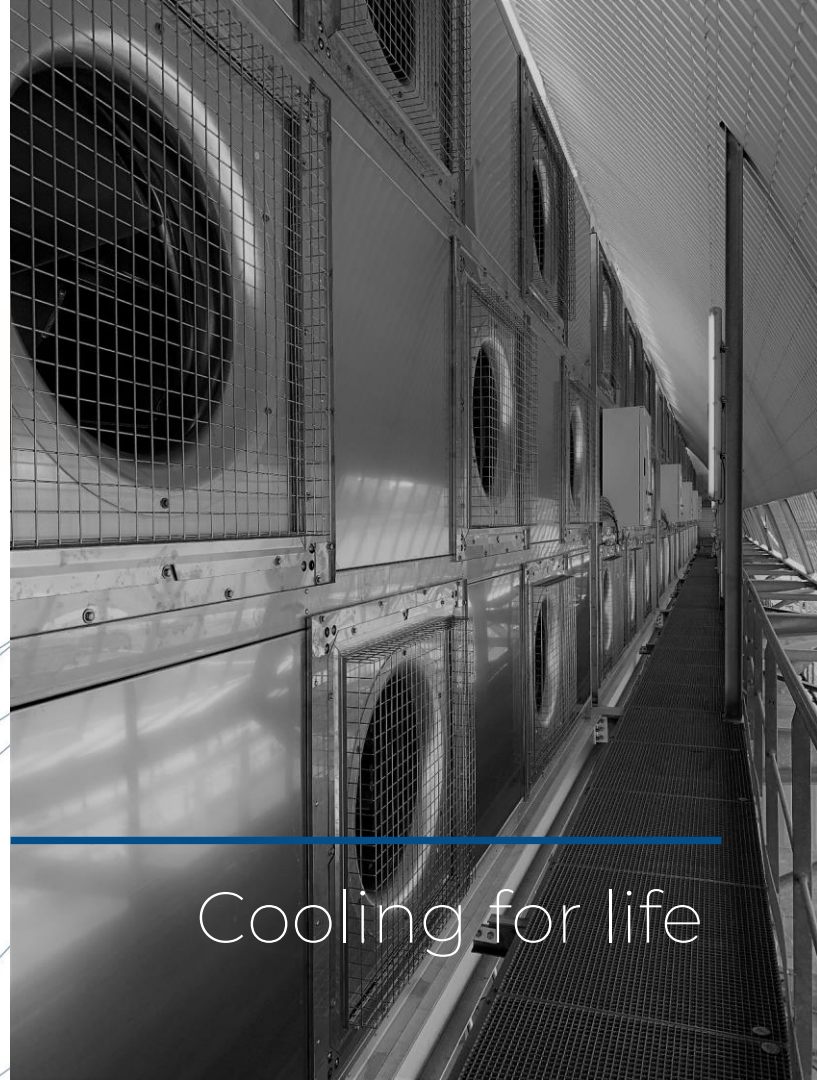
💧 Wet bulb: Ø 16,5 °C – max. 21,9 °C

Überblick



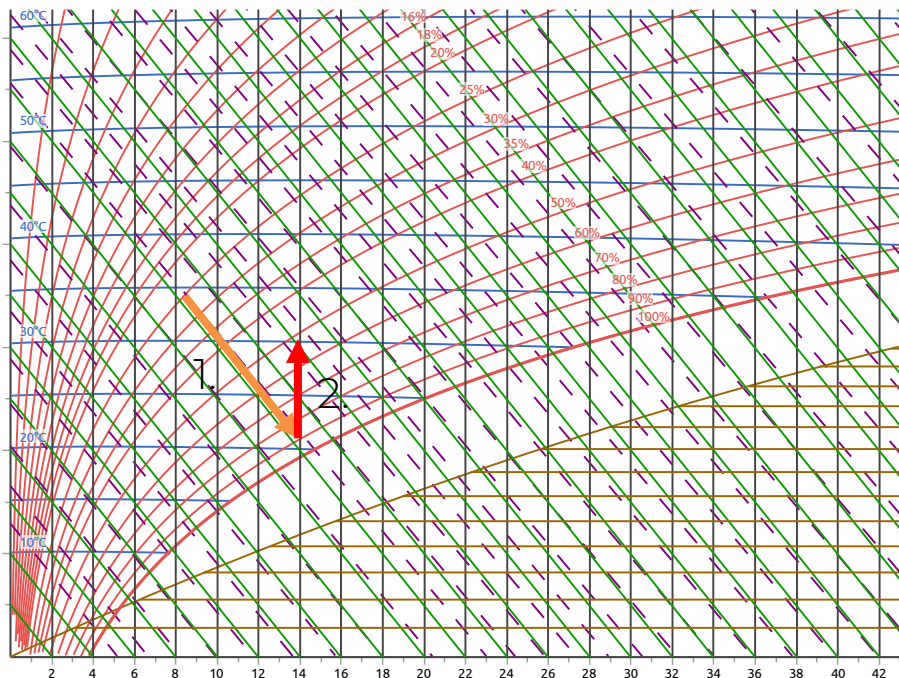
Theory

Adiabat vs. Open

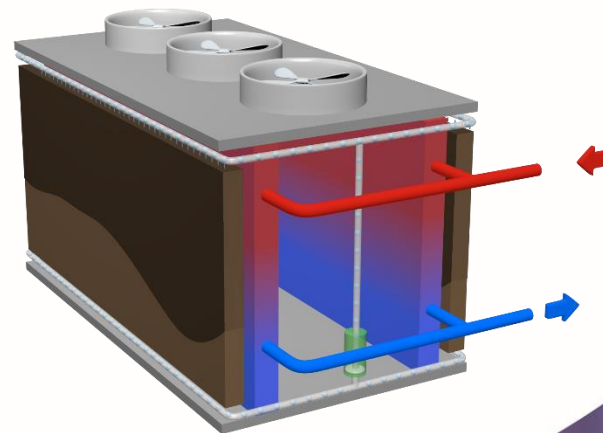


Cooling for life

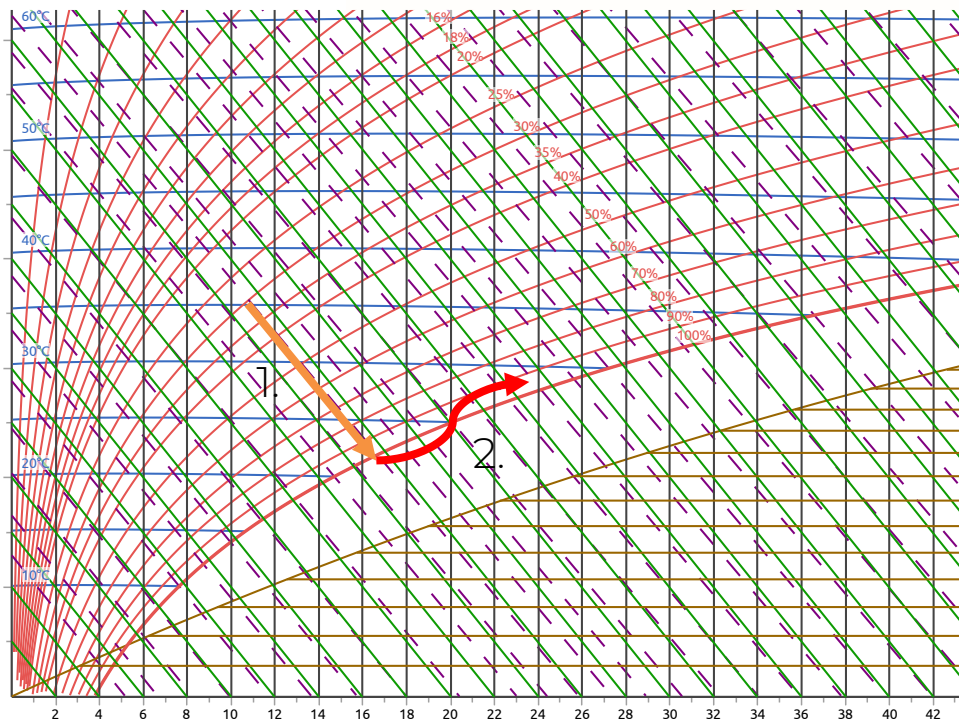
Mollier h,x diagram adiabatic cooler



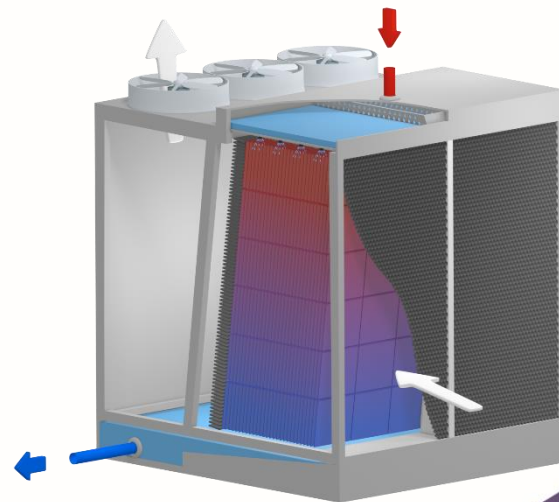
1. Humidification ~ 90 % r.h.
2. Air heater



Mollier h,x diagramm open cooling tower



1. Humidification to ~ 100 % r.h.
2. Water/ Air mixture



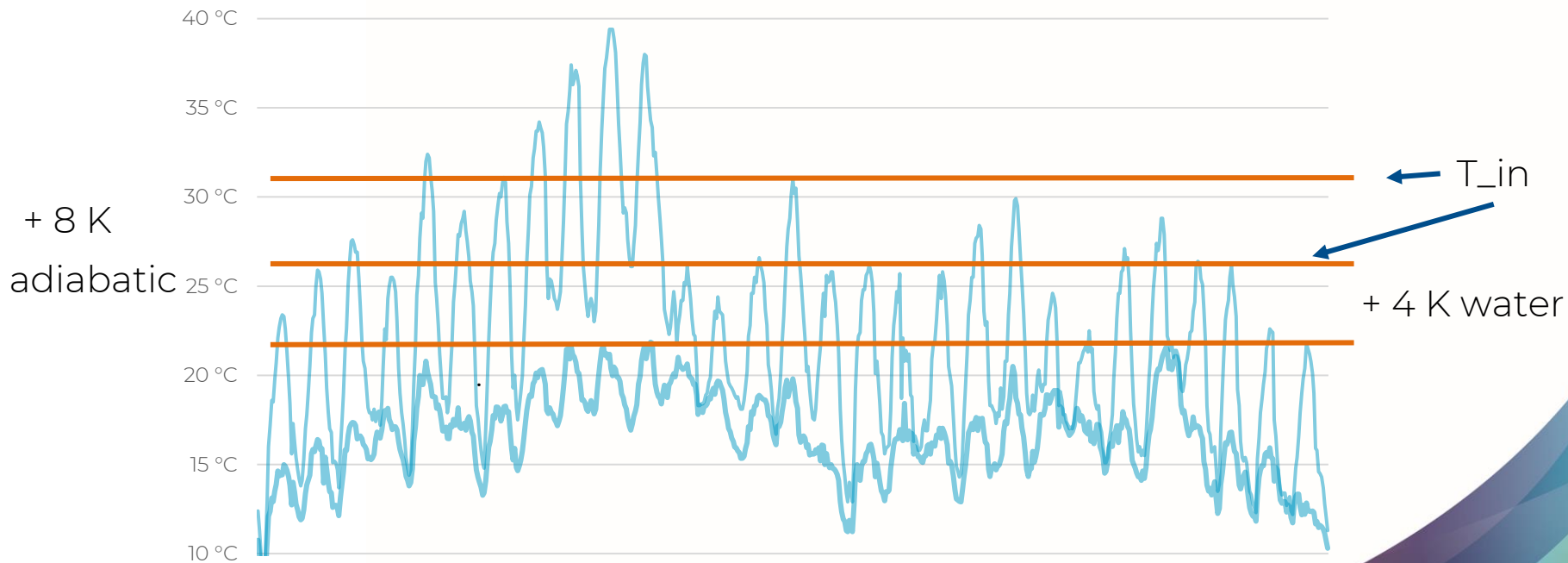
$R=Q/P_{\text{fan,el}}$ acc. Eurovent for dry coolers



Open cooling tower IE3
z.B. ERD R ~ 230

Open cooling tower EC:
e.g. X- TAR R ~ 2000

Wet cooling

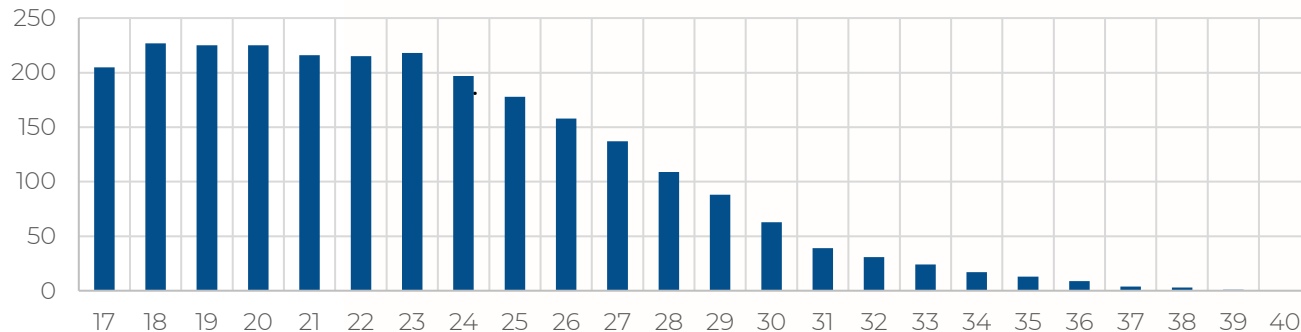


2016/2281 Comfort cooling water/ water

		Chiller		
Capacity	Air inlet	Wet bulb	Inlet	Outlet
	°C	°C	°C	°C
100%	35	24	30	35,0
74%	30	20,9	26	29,7
47%	25	17	22	24,4
21%	20	12	18	19,1

Assumptions: constant mass flow, wet bulb temperature

Load profile comfort chiller



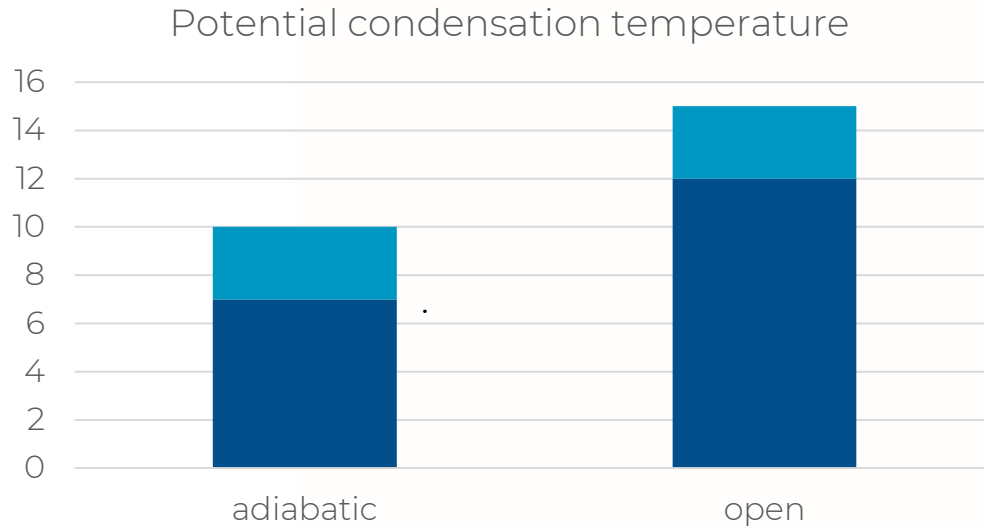
CO₂ + cost

- CO₂ Values based on infomrations sheet CO₂ factors:
Bundesförderung für Energie- und Ressourceneffizienz in der Wirtschaft
- Cost indication Germany: 0,39 €/kWh_{el} - 4 €/m³ water

	open	adiabatic
Wasser [l]	2172	1875
€	8688	7502
tCO ₂	0,717	0,619
El. Energie [kWh]	2715	28162
€	1059	10983
tCO ₂	0,994	10,31

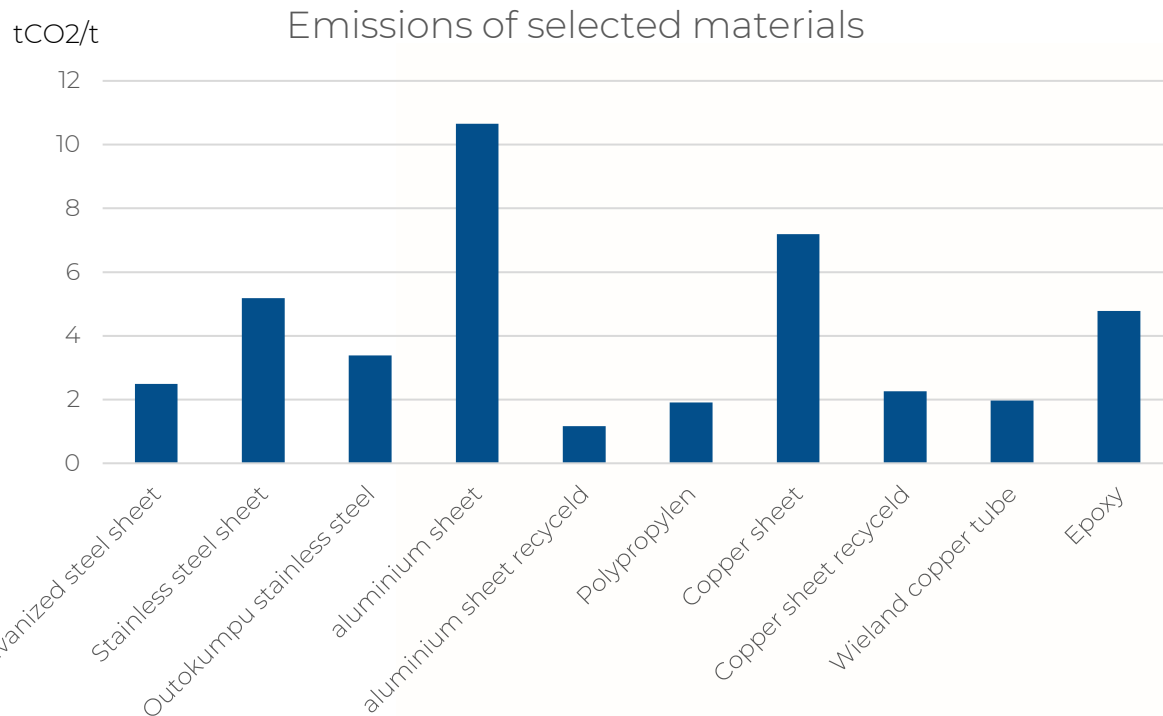
Advantage of lower temperature

- 💧 ~ 3% Energy saving per Kelvin lower condensation temperature



Which part of the footprint bring the components?





open	adiabatic
3770 kg	7330 kg

In particular scenarios we can go more into detail

- Local climate
- Pumps
- Water testing
- Water treatment
- ...

Open cooling tower



- Water treatment necessary
- Extremely energy efficient

Adiabatic dry cooler



- Cuts capacity peaks
- Fresh water can be used



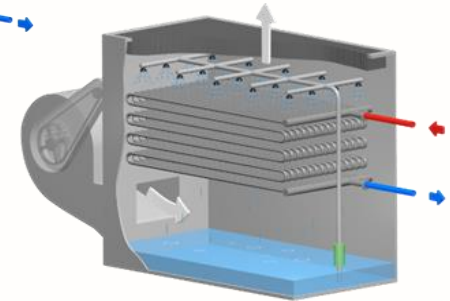
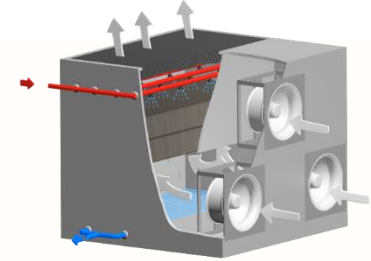
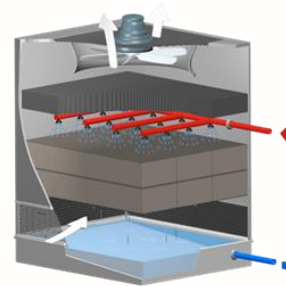
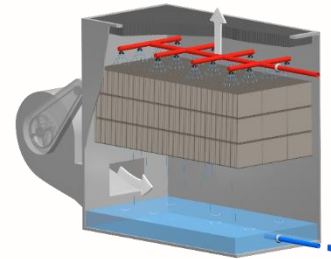
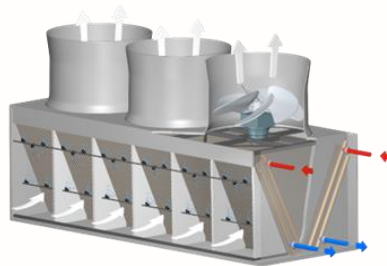
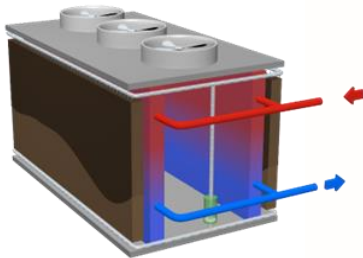
-  PRODUCTIONS
-  PARTNERS



www.cofinair.com

Produktportfolio

- Open Cooling Tower
- Closed cooling tower
- Hybrid cooler
- Adiabatic dry cooler
- Adiabatic NH₃ condenser



Thank you for your attention!

Dipl.-Ing. (FH) Andreas Binder
Product Management

Follow us on linkedin:
<https://www.linkedin.com/company/gohl-ktk/>

Visit us on our booth and have a coffee break
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[1] <https://hyde.neocities.org/>

[2] Bundesamt für Wirtschaft und Ausfuhrkontrolle: Informationsblatt CO₂-Faktoren

[3] Verordnung (EU) 2016/ 2281 DER KOMMISSION vom 30. November 2016 zur Durchführung der Richtlinie 2009/125/EG des Europäischen Parlaments und des Rates zur Schaffung eines Rahmens für die Festlegung von Anforderungen an die umweltgerechte Gestaltung energieverbrauchsrelevanter Produkte im Hinblick auf Luftheizungsprodukte, Kühlungsprodukte, Prozesskühler mit hoher Betriebstemperatur und Gebläsekonvektoren

[4] Eurovent Certita Certification SAS: Technical Certification rules of the Eurovent certified performance mark - Heat exchangers