
Adsorption Chillers in the data center
E2 HPC
Working Group
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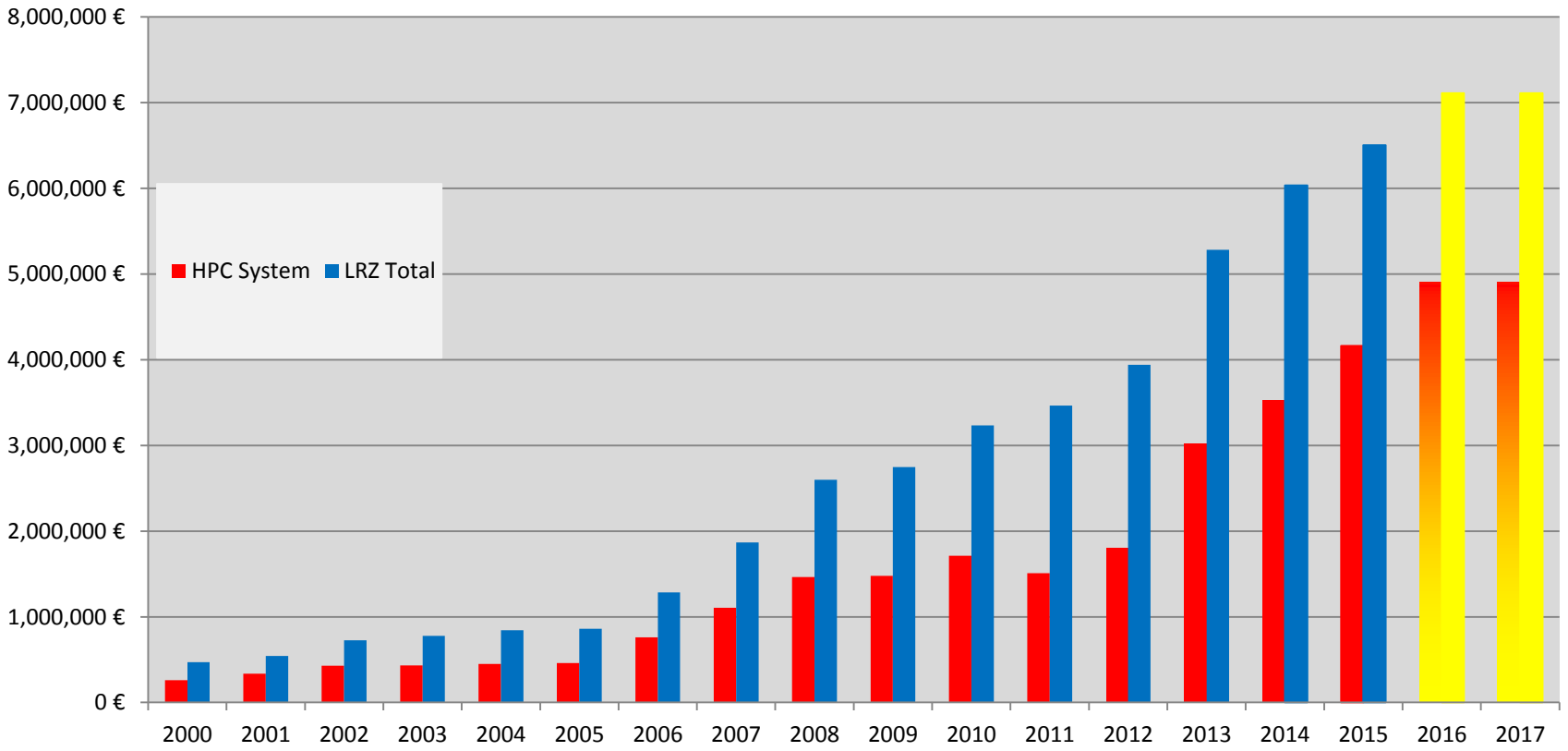
Can I future Profe my Data Center?

Future Proofing Our Data Centers

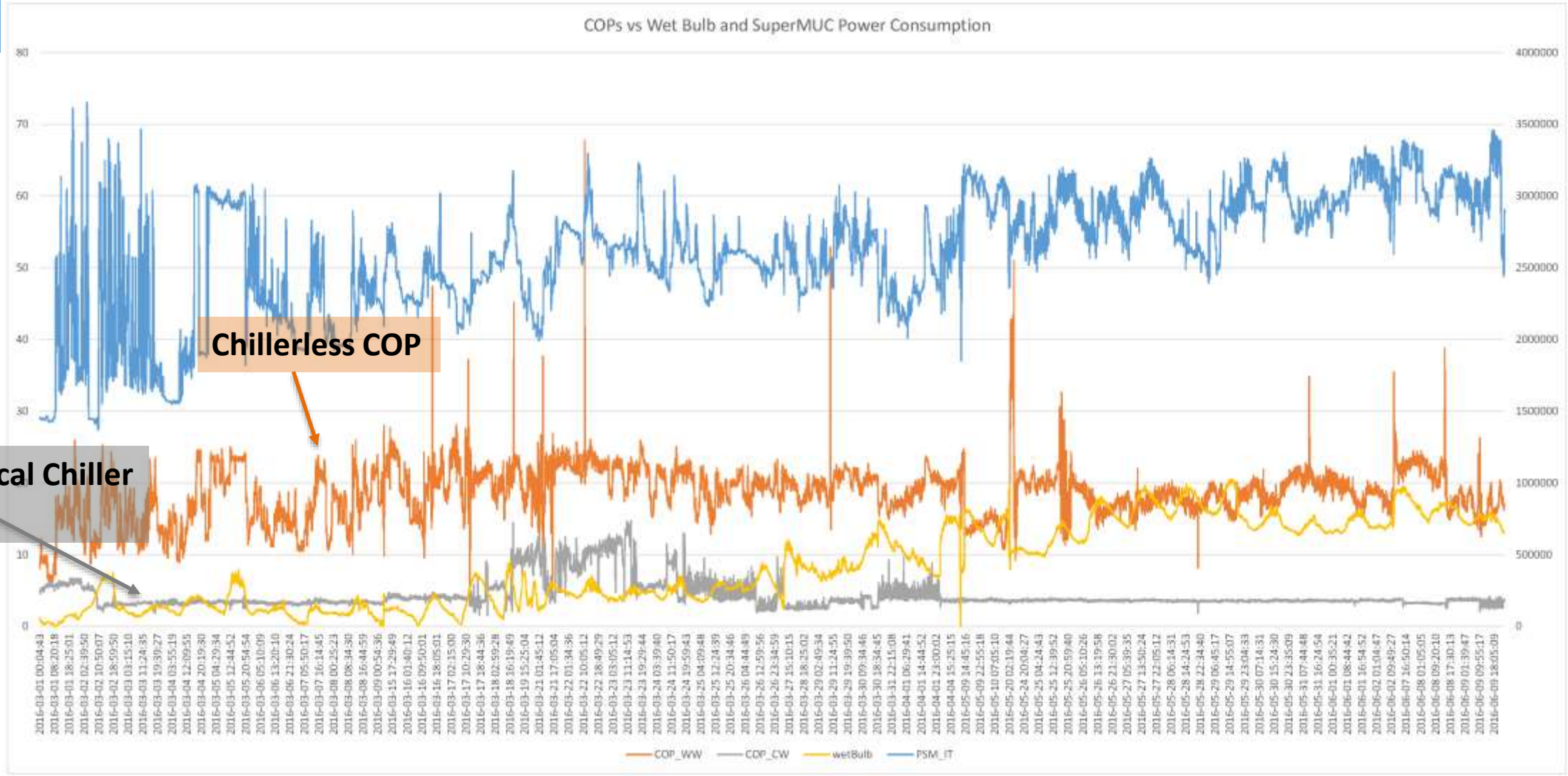
- DC life expectancy: 10 – 20 years
- Reduce operating costs over lifetime
- Operate as much IT as possible

Energy as Costs Driver



Can‘t live on W3 alone

- HT-DLC (W3-4)
  - not 100% IT heat captured
- Still need for cold water
  - Storage (W1-W2 water)
  - Humidity control
  - Crag (Room air conditioning)

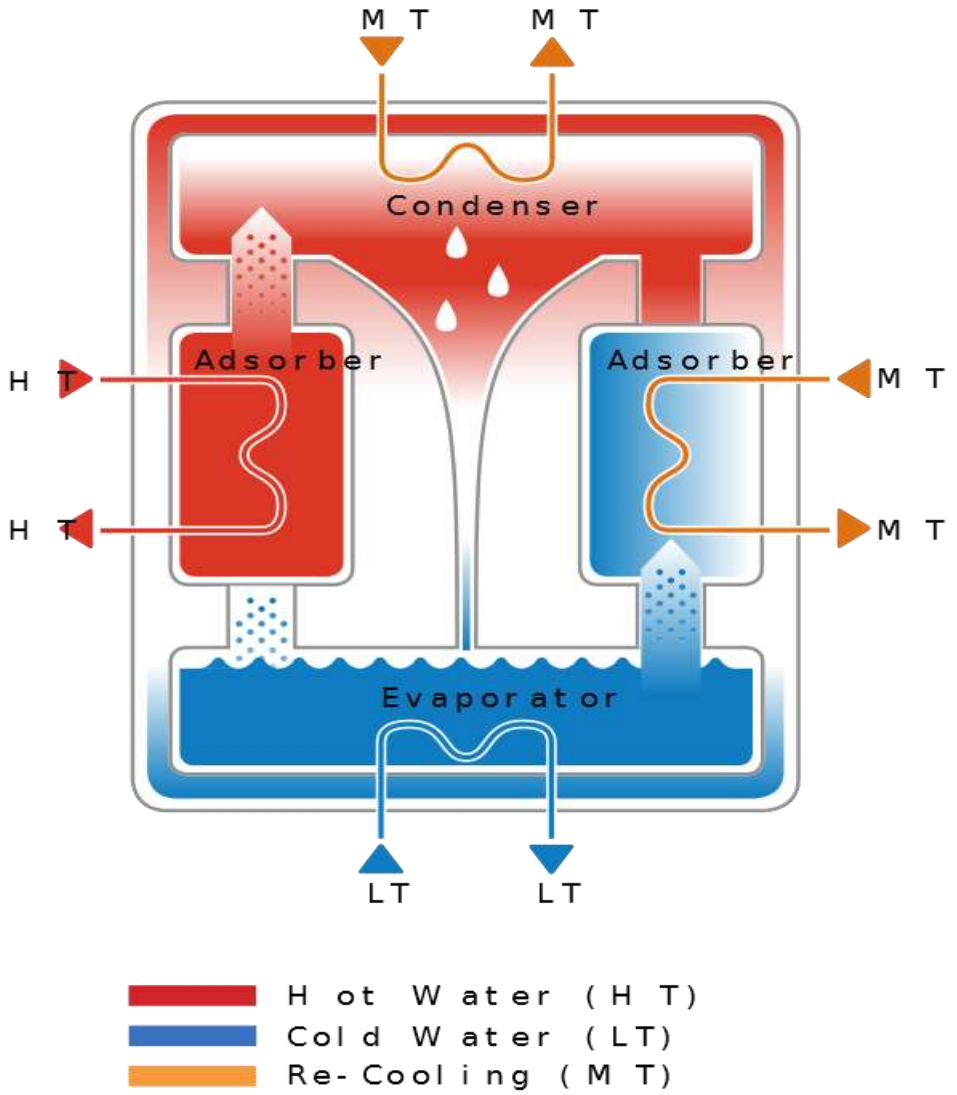

COPs vs Wet Bulb and SuperMUC Power Consumption
Chillerless COP
Mechanical Chiller COP
COP_WW
COP_CW
wetBulb
PSM_IT

Long term goal: Remove need for mechanical Chillers

Possible solution

Off-set C paid for

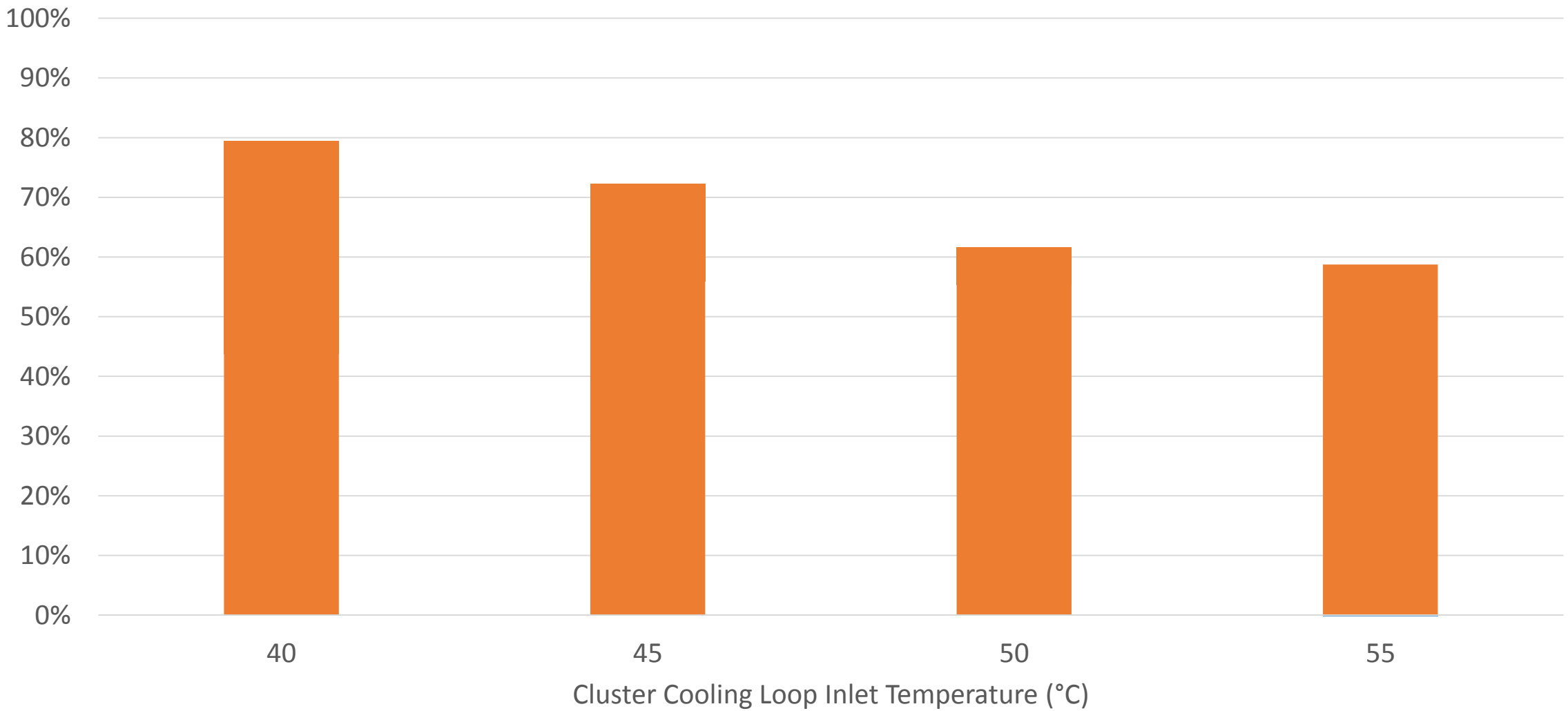
Adsorption Chiller 101

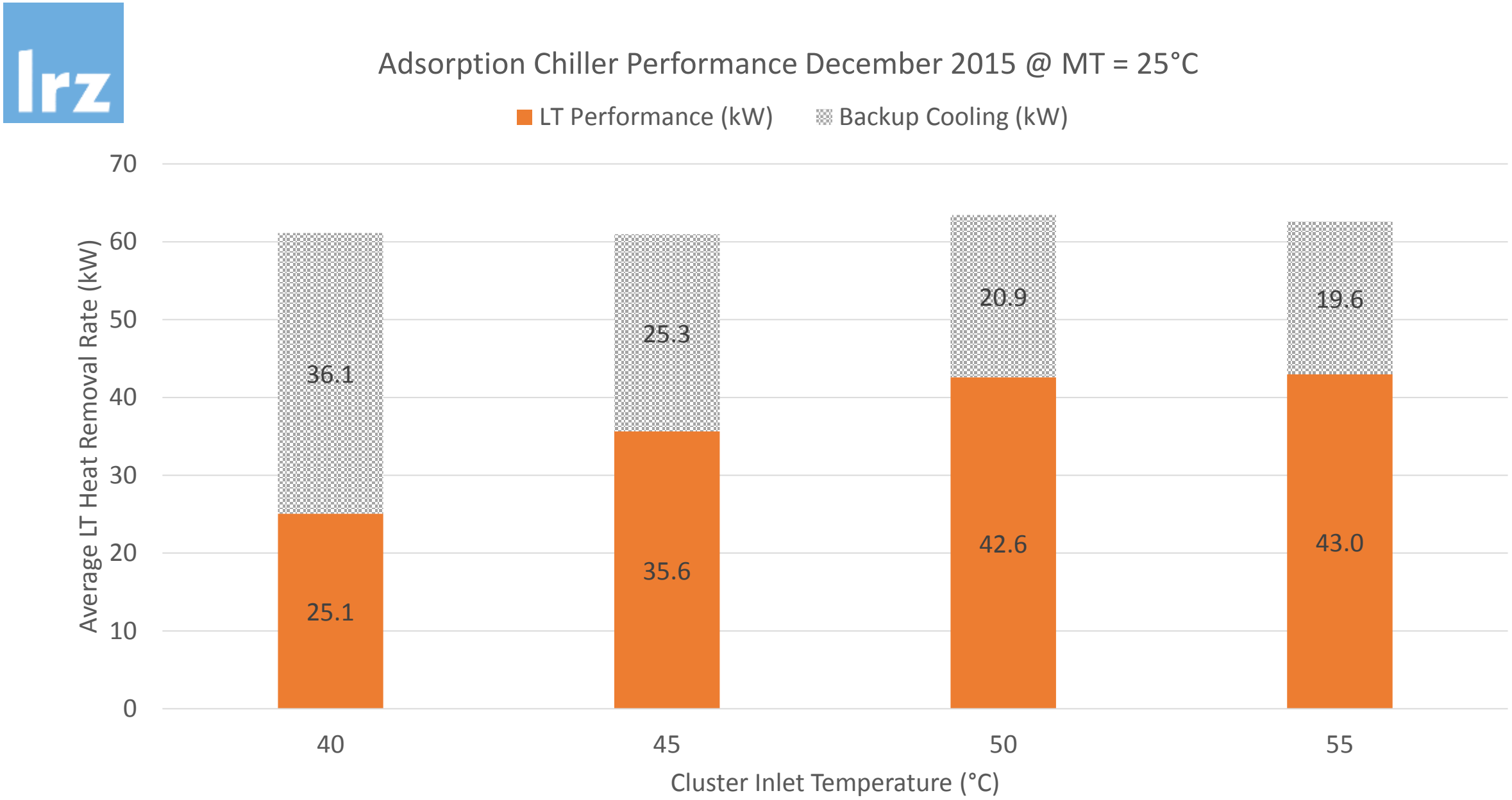


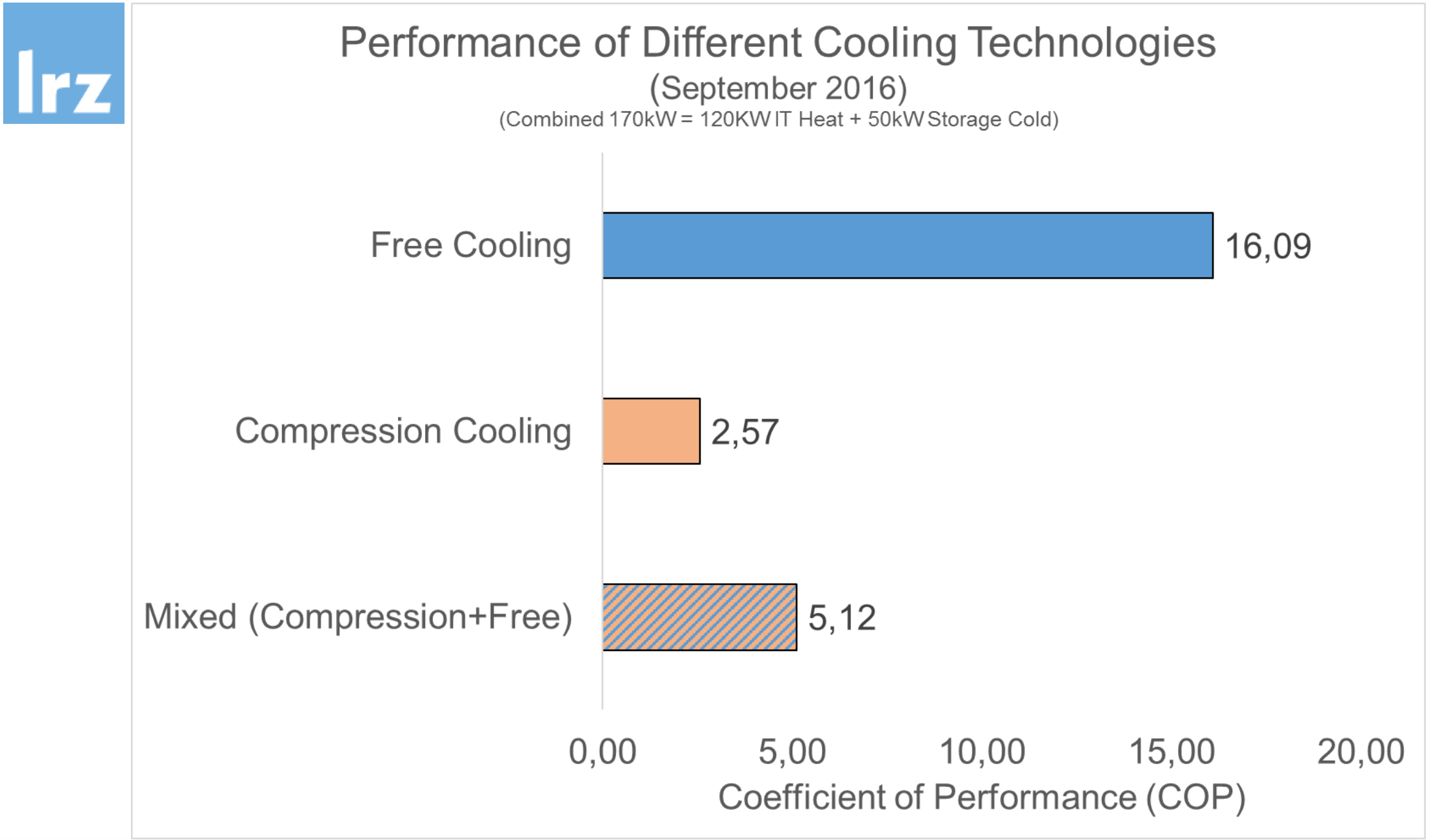
CooLMUC-2 and Adsorptions Chiller

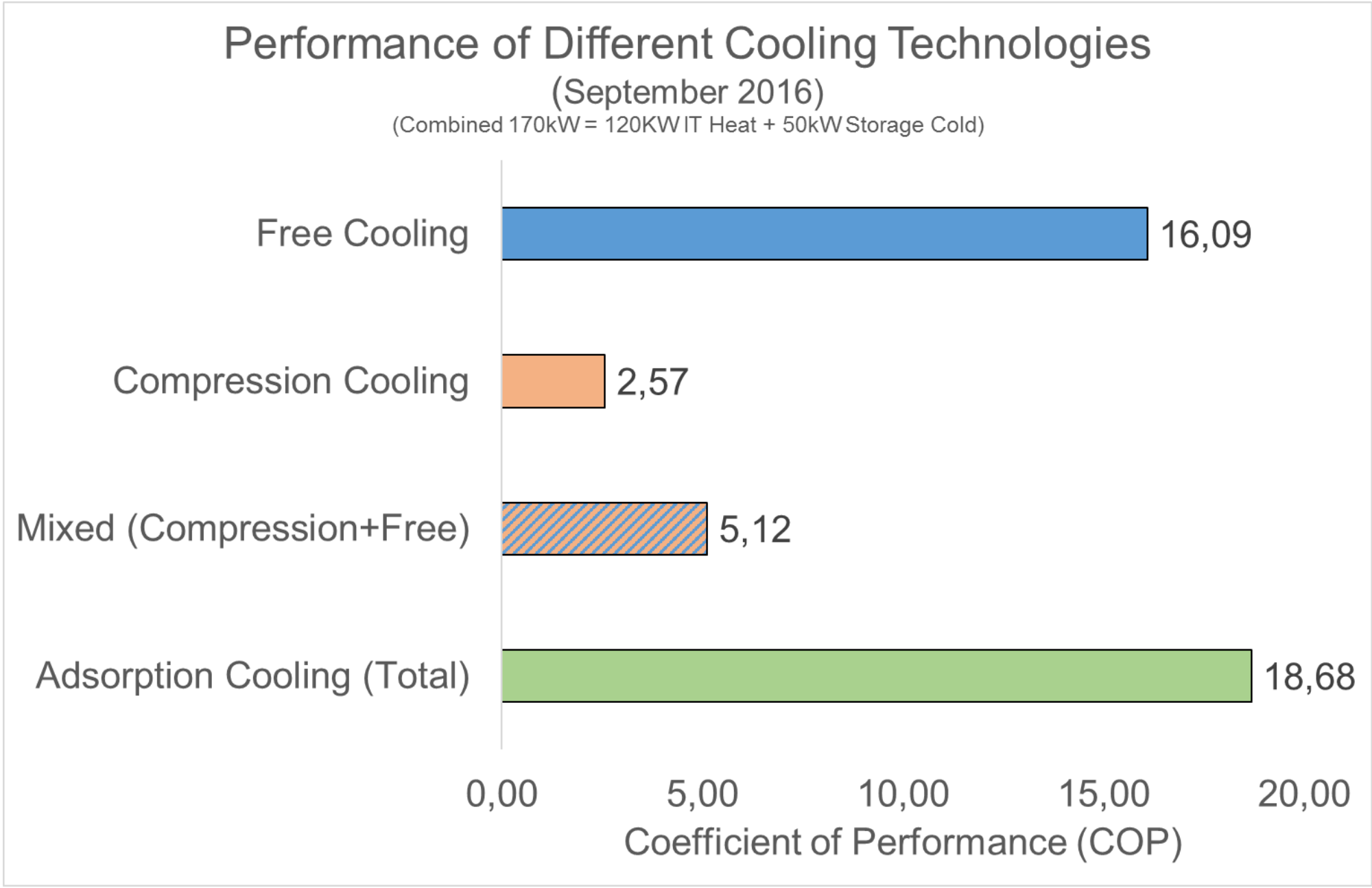
For technical details and a description of adsorption chilling visit:

Emerging Technology Booth - ArCTIC


CooLMUC-2 Heat Transfer to hot Water Cooling Curcuit
(relative to Cluster Power Consumption)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
40
45
50
55
Cluster Cooling Loop Inlet Temperature (°C)


Adsorption Chiller Performance December 2015 @ MT = 25°C
LT Performance (kW)
Backup Cooling (kW)
Average LT Heat Removal Rate (kW)
70
60
50
40
30
20
10
0
36.1
25.1
25.3
35.6
20.9
42.6
19.6
43.0
40
45
50
55
Cluster Inlet Temperature (°C)


Performance of Different Cooling Technologies
(September 2016)
(Combined 170kW = 120KW IT Heat + 50kW Storage Cold)
Free Cooling
16,09
Compression Cooling
2,57
Mixed (Compression+Free)
5,12
0,00
5,00
10,00
15,00
20,00
Coefficient of Performance (COP)


Performance of Different Cooling Technologies
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(Combined 170kW = 120KW IT Heat + 50kW Storage Cold)
Free Cooling
16,09
Compression Cooling
2,57
Mixed (Compression+Free)
5,12
Adsorption Cooling (Total)
18,68
0,00
5,00
10,00
15,00
20,00
Coefficient of Performance (COP)

Future Proofing your Data Center 1/2

- Think: „Heat Re-Use“
- Think: Direct Liquid Cooling

Future Proofing your Data Center 2/2

- Think: High Temperature Direct Liquid Cooling (HT- DLC)

- **Plan for liquid cooling**

Community Activities Required 1/2

- Plan for post PUE=1 era
- Standard liquid cooled rack

Community Activities Required 2/2

- Standard data center liquid cooling connections

- Standard liquid cooling re-use connections

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Thank you!
Please save your questions
for the end of the session.
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