Abstract

Data Centers Heat Reuse

Heat reuse in data centers is an ideal opportunity to increase your sustainability, become carbon and water neutral, and, in general, make a positive impact on society and communities.

However, there are three levels of challenges to be considered:

- Technical aspects: how to capture, handle, deliver and measure the heat
- Regulatory aspects: are there financial incentives? Are there regulations that facilitate/mandate heat reuse?
- Practical aspects: who are the stakeholders? Are the goals aligned?

The OCP heat reuse work group facilitates discussions on how define those challenges and works hard to discover the best possible solutions.

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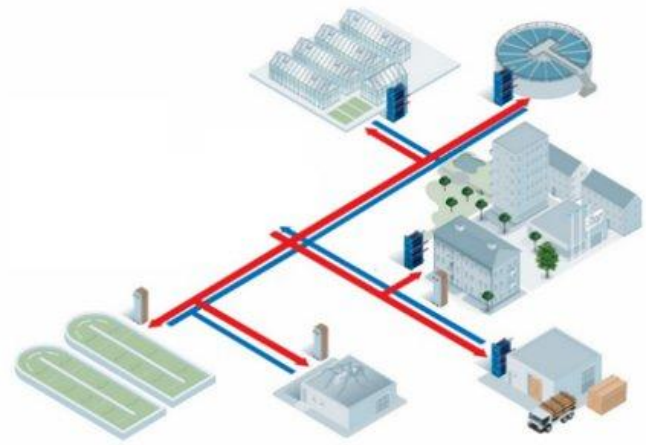
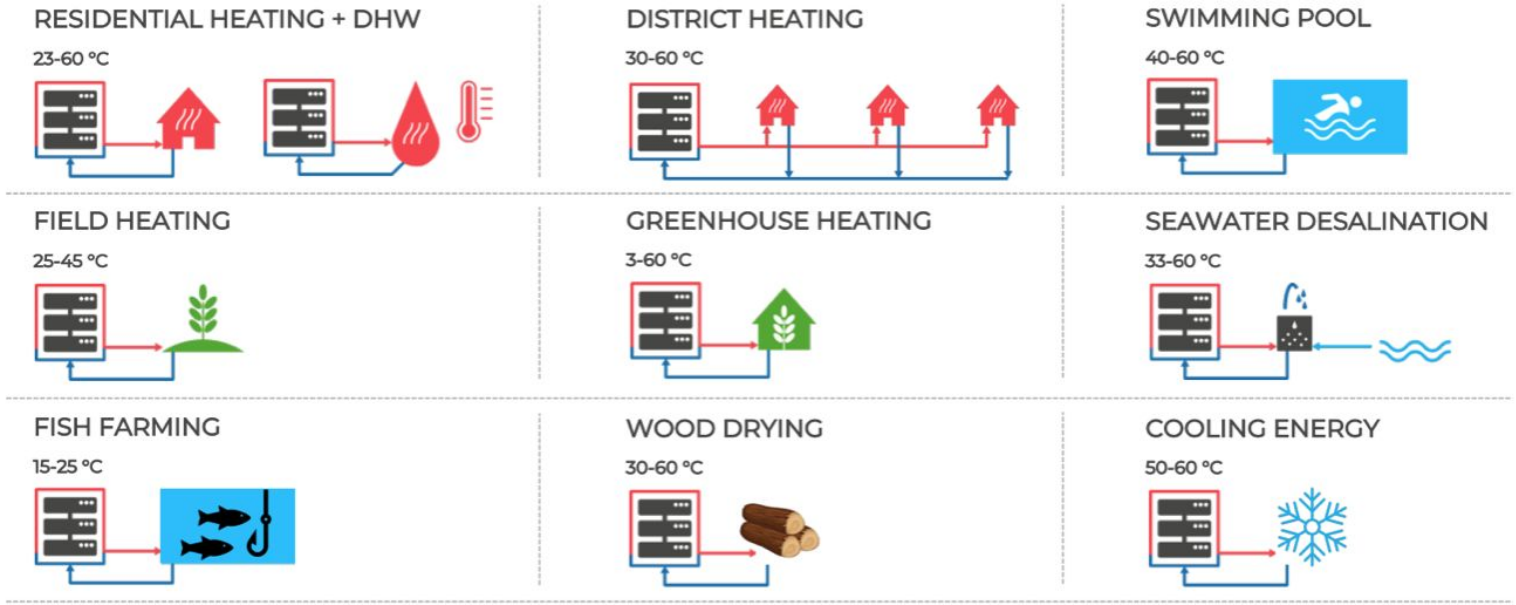
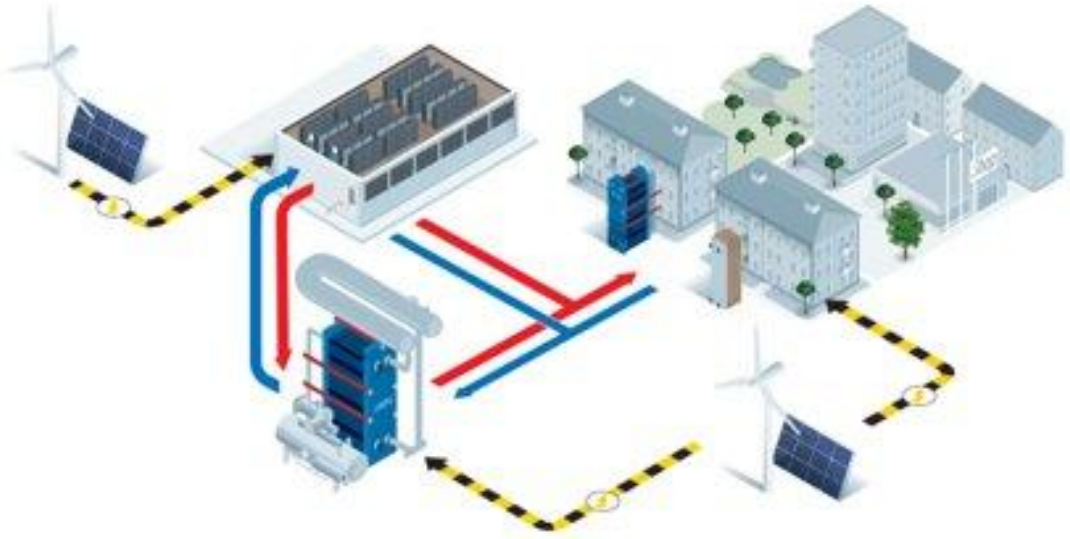




Heat Reuse Workgroup



01	**Technical Aspects**	• How to capture the heat • How to measure the heat • How to transfer the heat • How to deliver the heat
02	**Sustainability & Regulatory**	• Self imposed sustainability goals • Incentives (Financial or other) • Regulations/Mandates
03	**Practical Aspects**	• Who are the stakeholders? • Are the different stakeholders goals and targets aligned?

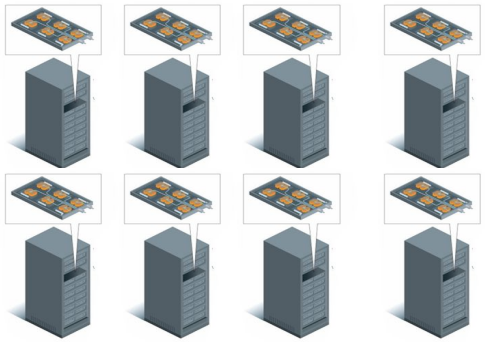
Technical Aspects

Service-Level Agreement
SLA

Data Center

Heat Host

Heat Source



Technology Cooling System

Technology Cooling Water/Fluid

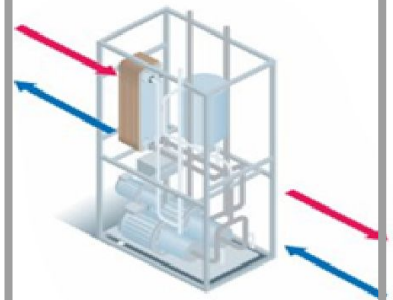
TCS

50 C

45 C

Coolant Distribution System or Facility

CDU



Facility Cooling System

Facility Cooling Water/Fluid

FCS

48 C

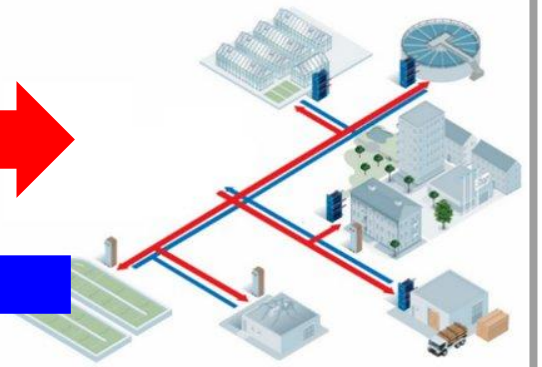
?? C

Heat Pump

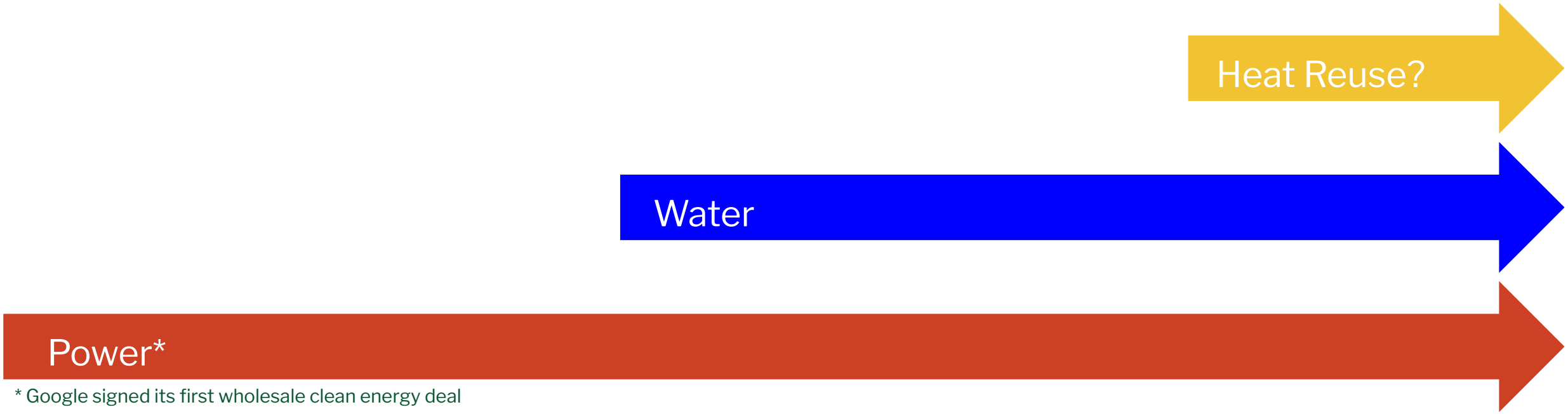
80 C

?? C

Heat Host

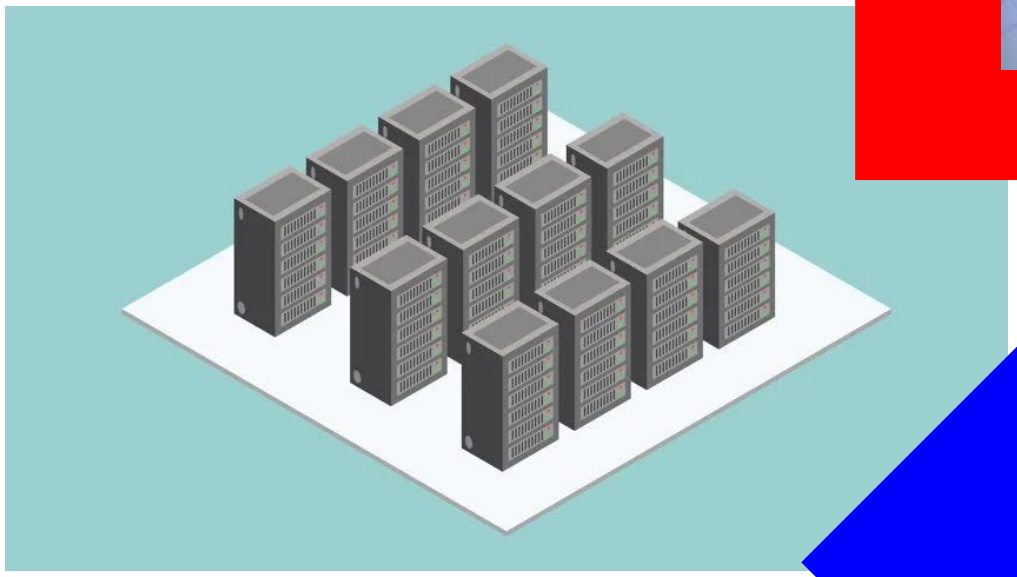


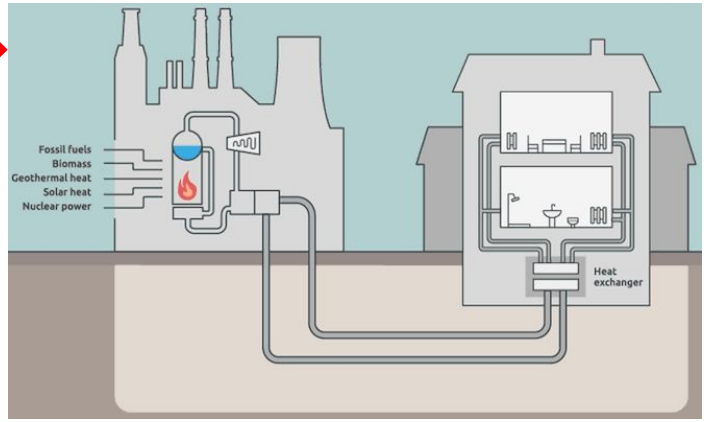
Sustainability & Regulatory Aspects

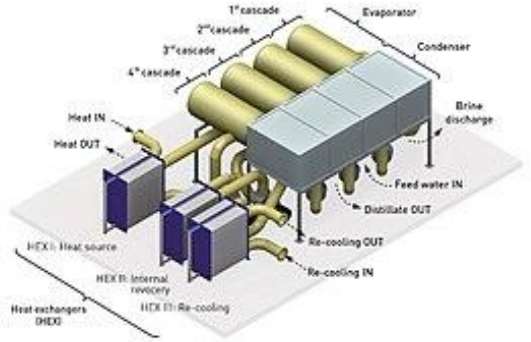


* Google signed its first wholesale clean energy deal

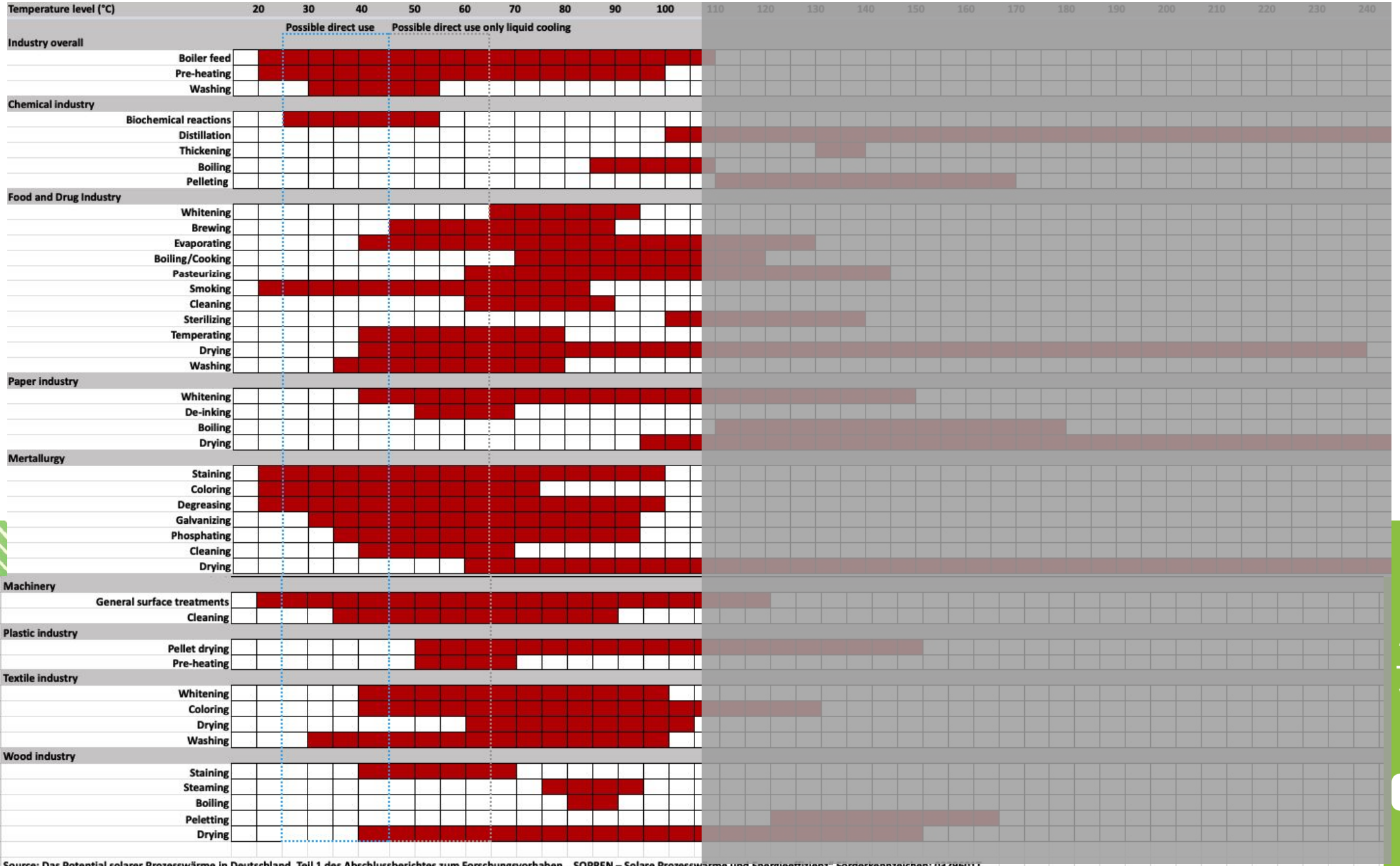
Practical Aspects







	Industrial	Agriculture	Costal (Sea)	Costal (lake and rivers)	High Density Urban	Intermediate Density Urban	Low Density Populated Areas
Industry General							
Chemical Industry							
Paper Industry							
Metallurgy							
Machinery							
Plastic Industry							
Textile Industry							
Wood Industry							
Industrial Laundries							
Waste Water							
Food & Drug Industry							
Green Houses							
Fish Farming							
Biomass Drying							
District Energy							
Swimming Pools							
Hospitals/Hotels							
Desalination							
Heat Storage in aquifer							



Source: Das Potential solarer Prozesswärme in Deutschland, Teil 1 des Abschlussberichtes zum Forschungsvorhaben, „SOPREN – Solare Prozesswärme und Energieeffizienz" Förderkennzeichen: 03296011
Authors: C. Lauterbach, B. Schmitt, K. Vajen, Institut für Thermische Energietechnik, Universität Kassel
Abbildung 6-2: Geeignete Prozesse zur Einbindung solarer Prozesswärme (Aidonis et al., 2005, Müller et al., 2004, Schweiger et al., 2001 und eigene Recherchen)
Translation and adapted for the OCP workstream Heat reuse
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwior66BvNr2AhVryoUKHam9C7QQFnoECAYQAQ&url=https%3A%2F%2Fwww.uni-kassel.de%2Fmaschinenbau%2Findex.php%3FeID%3DdumpFile%26t%3Df%26f%3D1162%26token%3D6decd85623a42cfa6

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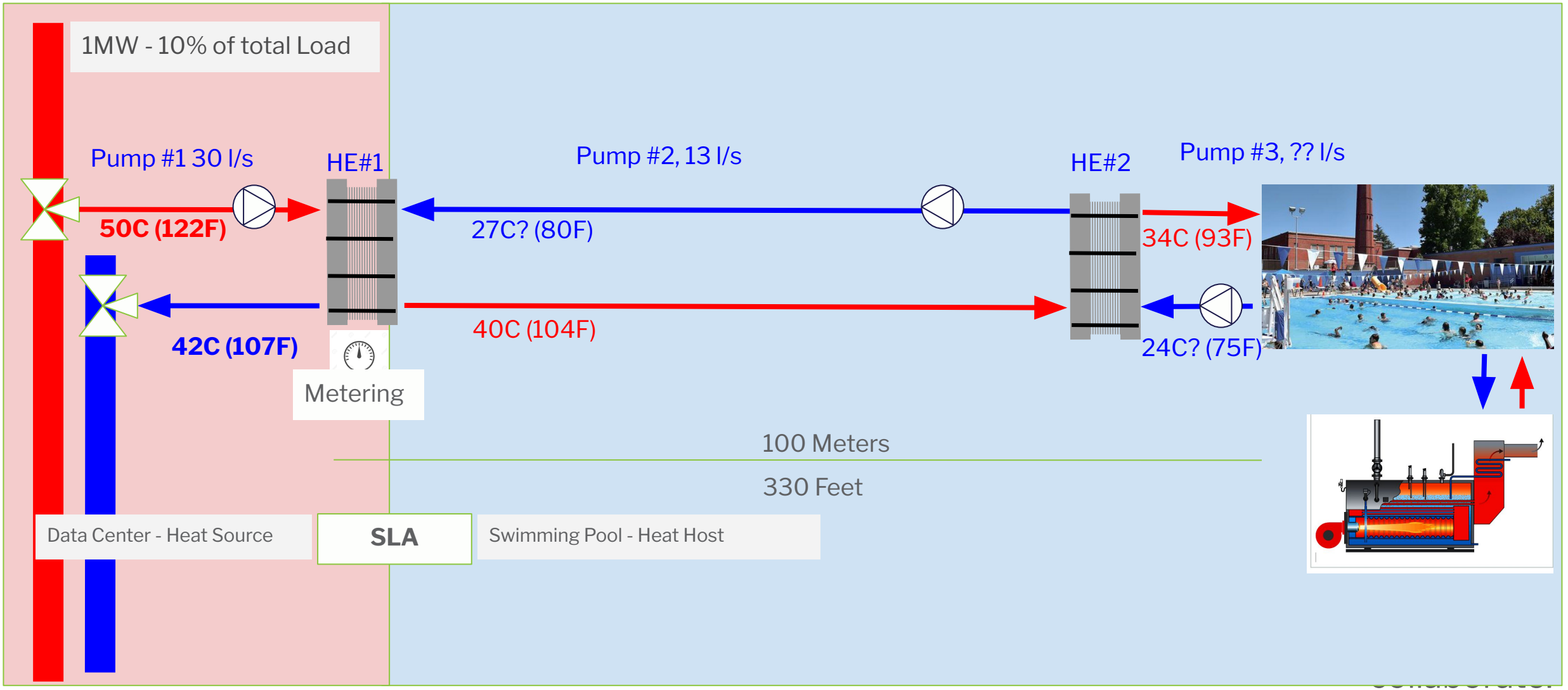
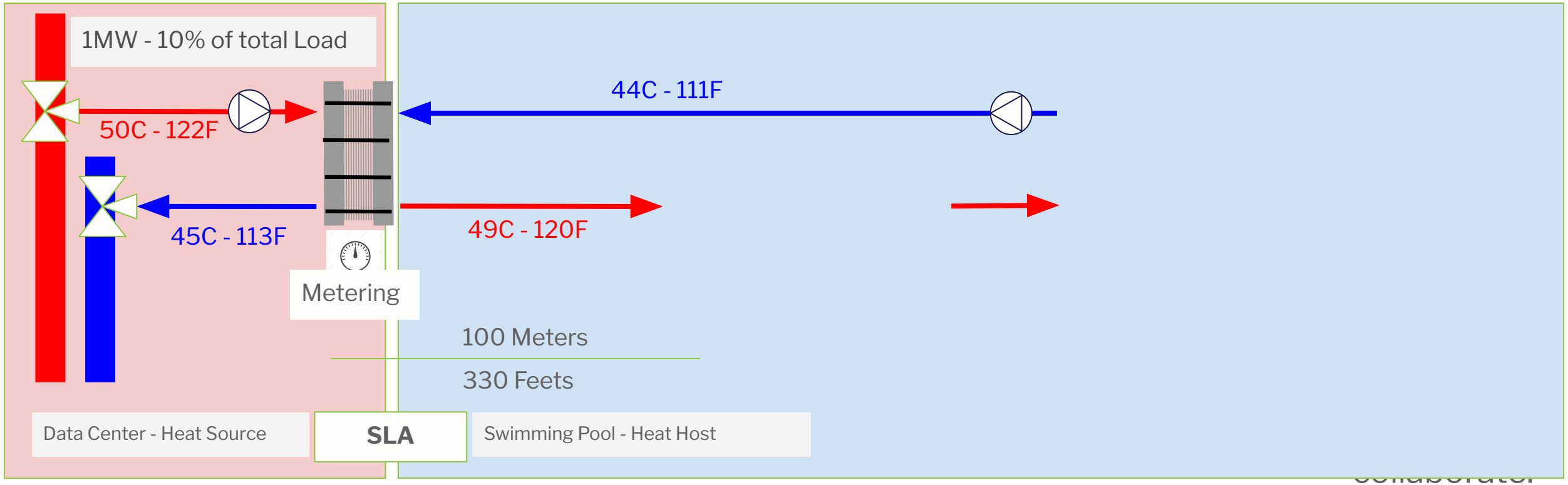
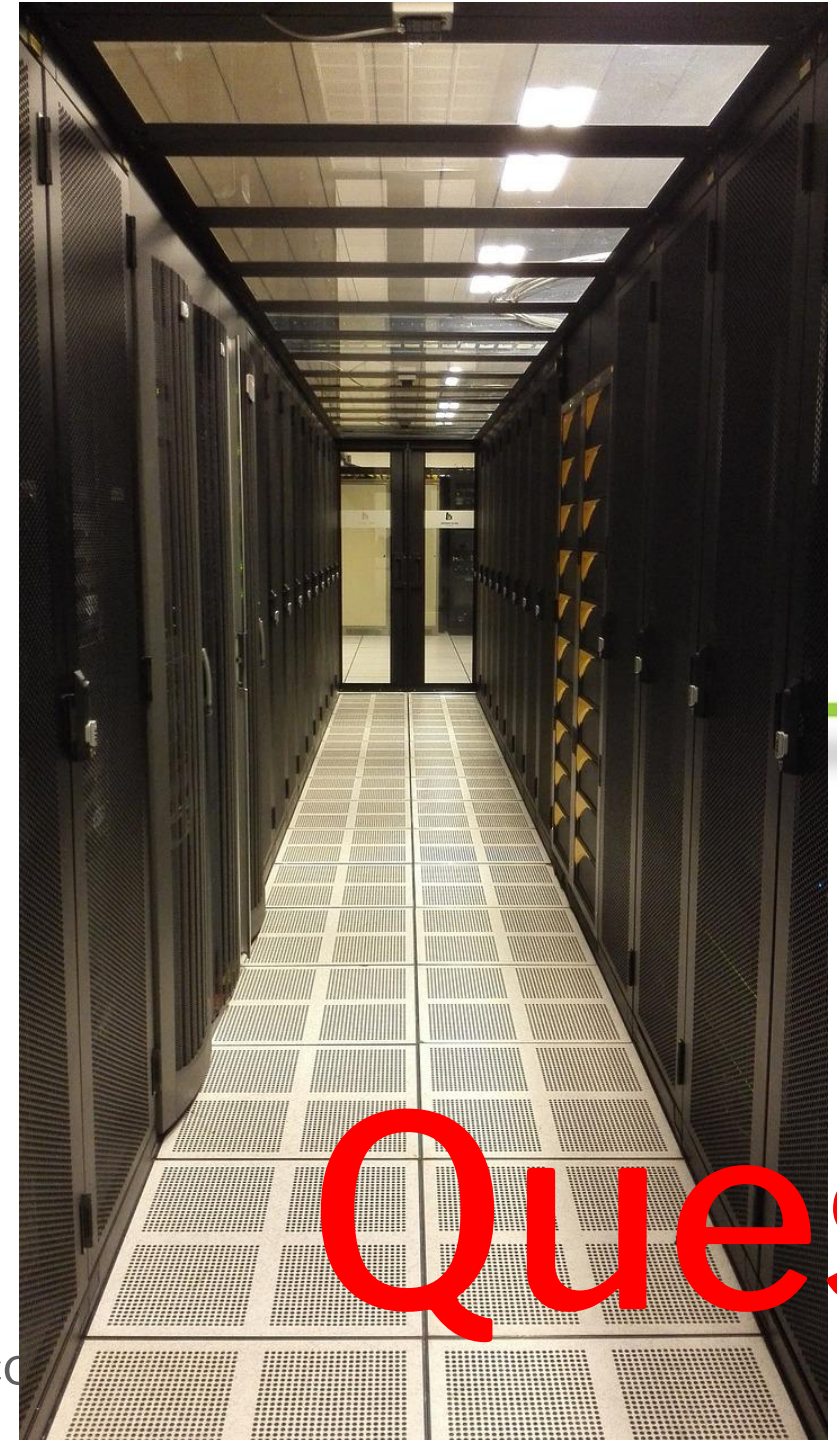

1MW - 10% of total Load
Pump #1 30 l/s
HE#1
Pump #2, 13 l/s
HE#2
Pump #3, ?? l/s
50C (122F)
27C? (80F)
34C (93F)
42C (107F)
40C (104F)
24C? (75F)
Metering
100 Meters
330 Feet
Data Center - Heat Source
SLA
Swimming Pool - Heat Host

Case 2 - Heat Source + Heat Pump + Adsorption Chiller
TBD - Capex, Opex, ROI

45C Source, 45Kw Input gives 160Kw of heat and 120 Kw of cooling (with ad. chiller) (to be checked)



collaborate!
contribute



Questions?

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