

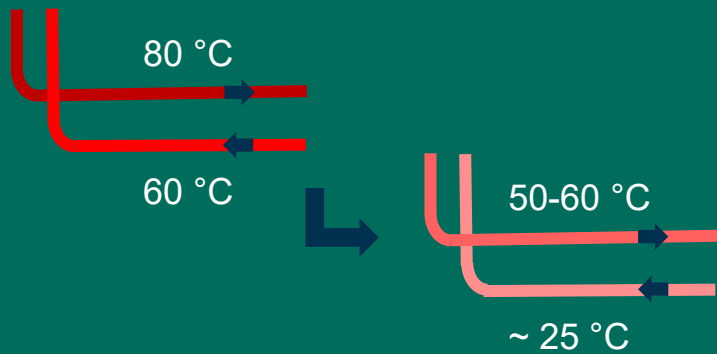
High Temperature District Cooling –

Possibilities and challenges based on an existing system and its connected buildings

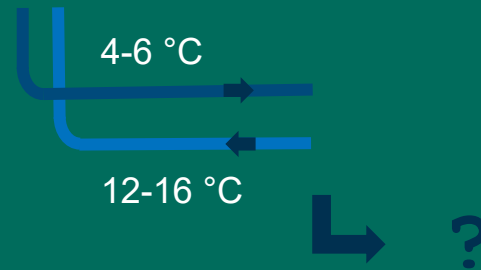
Maria Jangsten, PhD Student
Chalmers University of Technology
Gothenburg, Sweden

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Copenhagen, 10-11 September 2019
#SESAAU2019

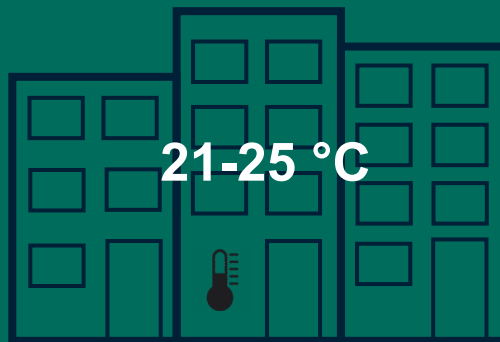
District Heating



District Cooling

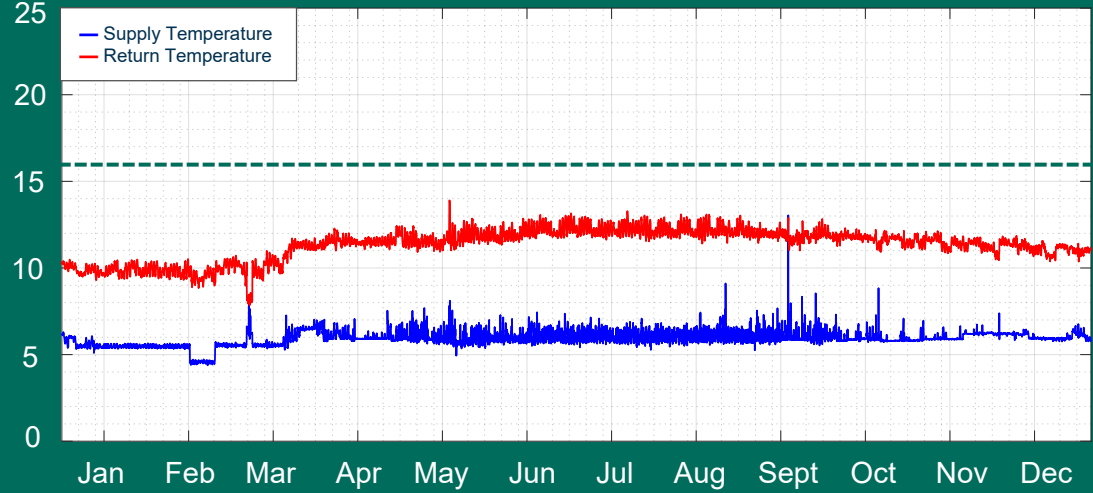


Buildings



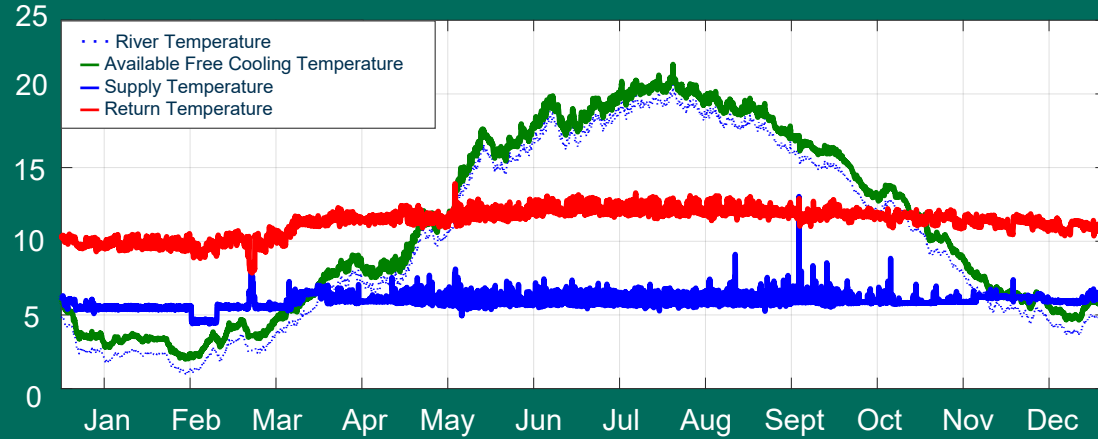
District Cooling Temperatures in Gothenburg and “Low Delta-T Syndrome”

Temperature
[°C]



“Low Delta-T Syndrome” Reduces Free Cooling

Temperature
[°C]



“Low Delta-T Syndrome” Reduces Free Cooling

Temperature

[°C]

25

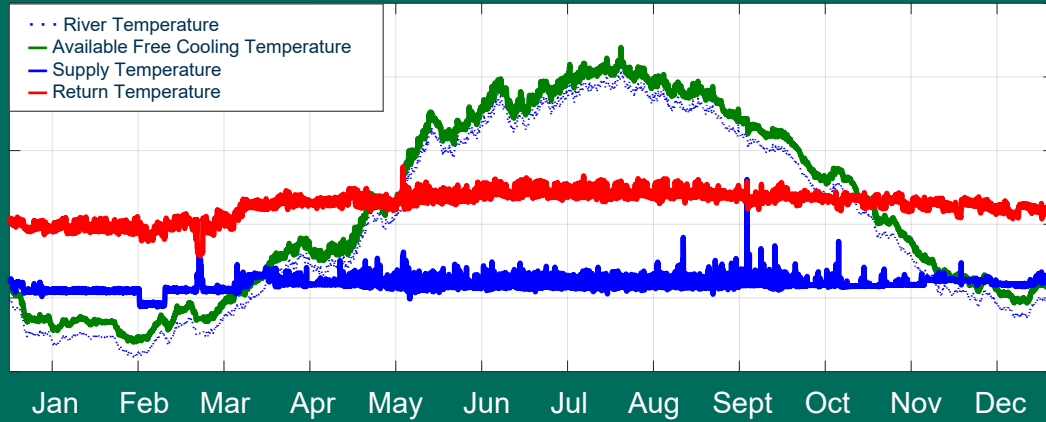
20

15

10

5

0



Cooling Power

[MW]

14

12

10

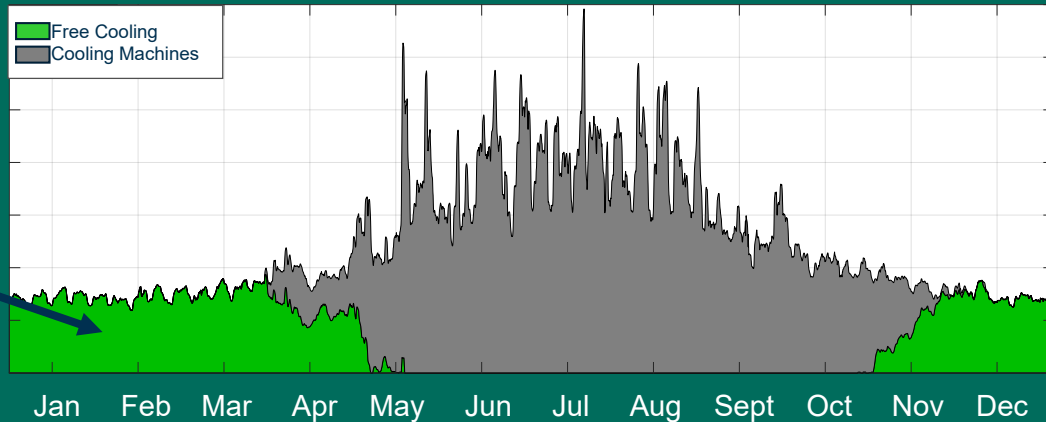
8

6

4

2

0



28.1 %
Free Cooling

6 % Increased Free Cooling if “Low Delta-T Syndrome” Resolved

Temperature

[°C]

25

20

15

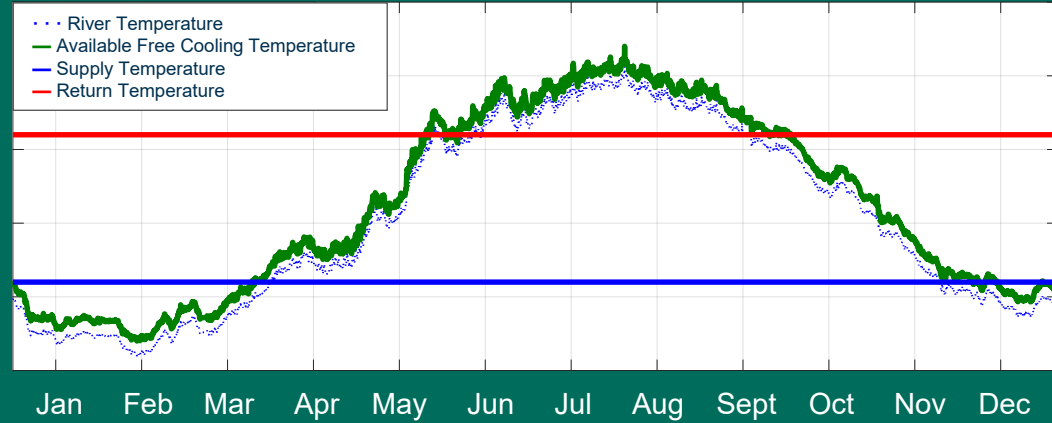
10

5

0

• • • River Temperature
— Available Free Cooling Temperature
— Supply Temperature
— Return Temperature

Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec



6 % Increased Free Cooling if “Low Delta-T Syndrome” Resolved

Temperature

[°C]

25

20

15

10

5

0



Cooling Power

[MW]

14

12

10

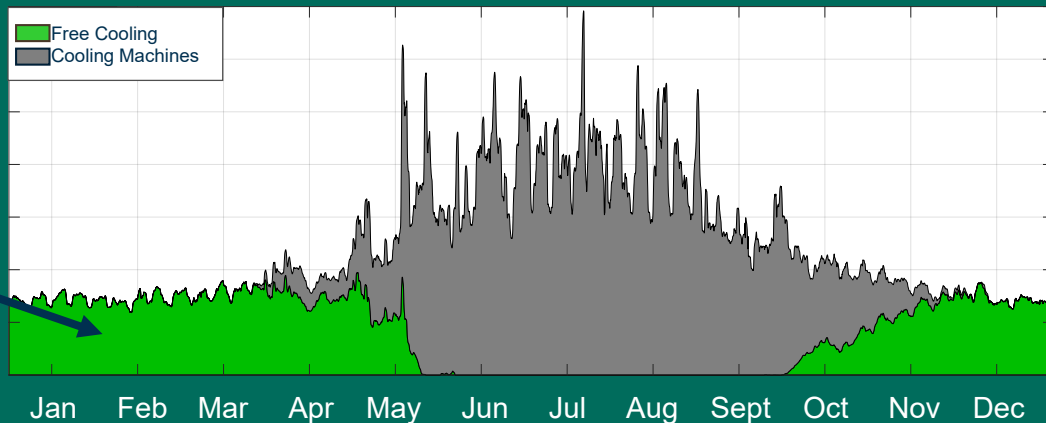
8

6

4

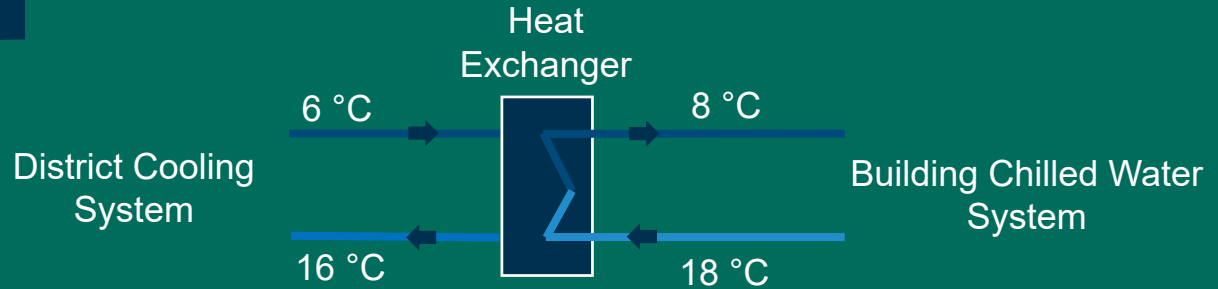
2

0

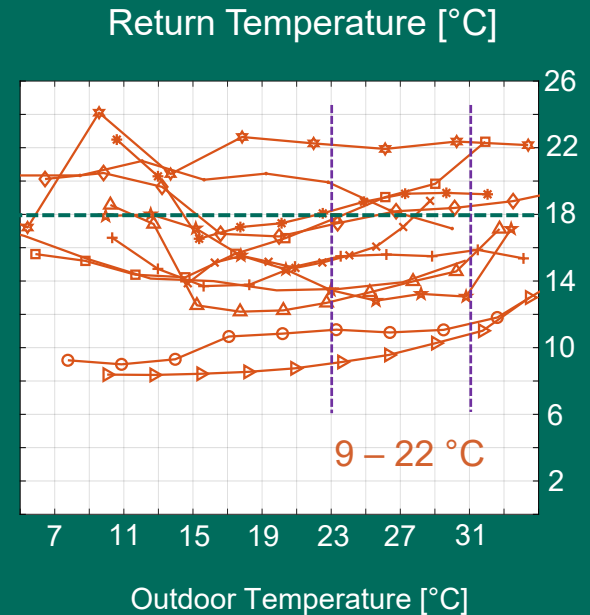
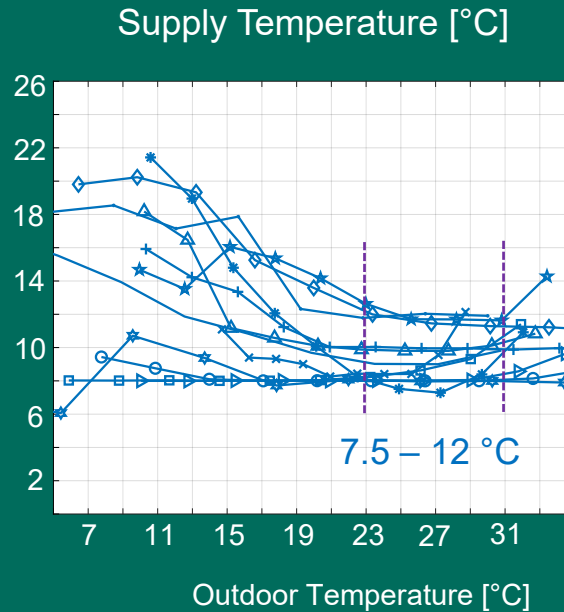


34.2 %
Free Cooling

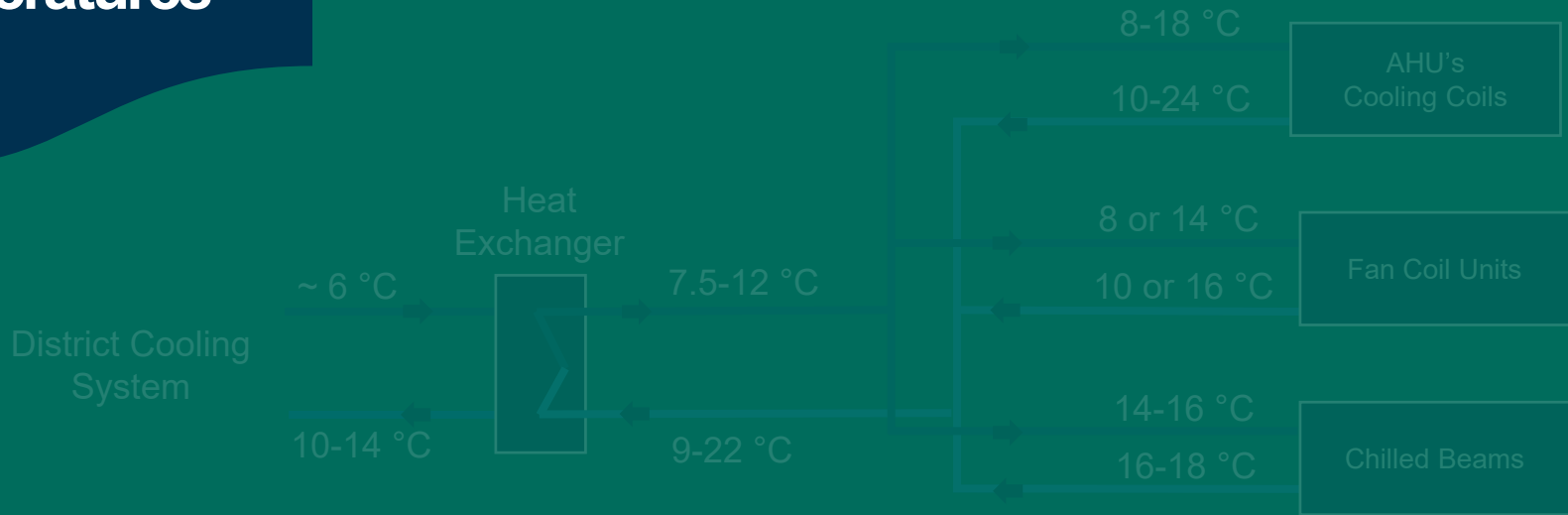
Building Chilled Water System – ideal temperatures



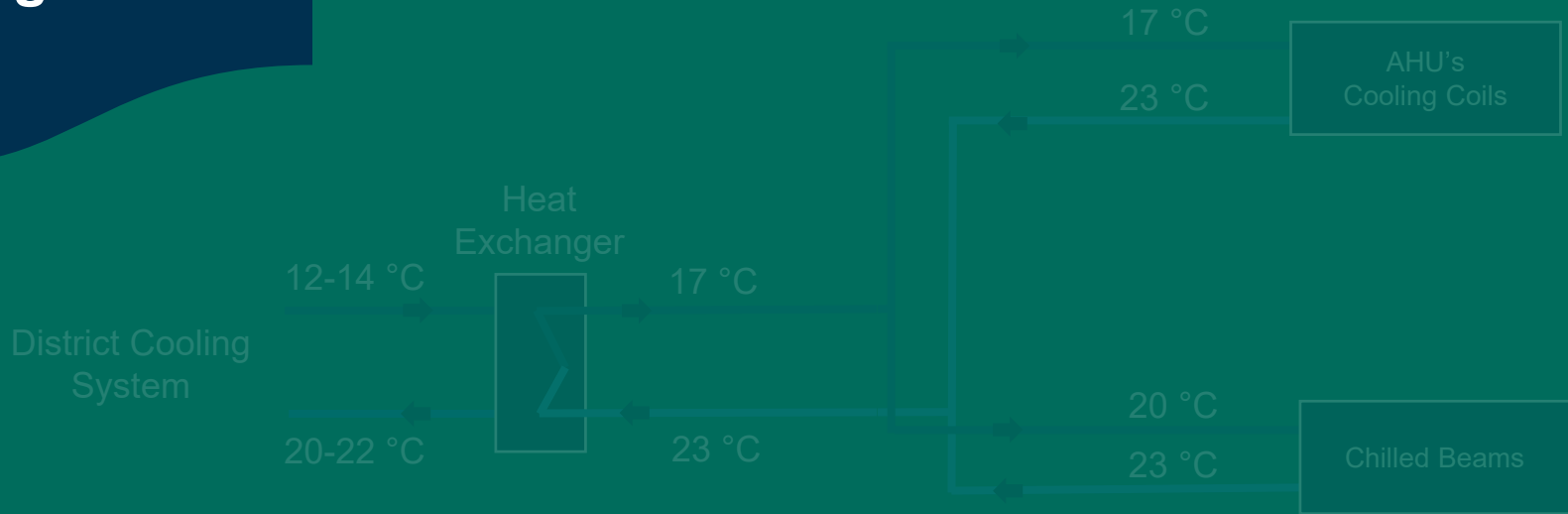
Building Chilled Water System – actual temperatures



Building Chilled Water System – subsystem temperatures



Building Chilled Water System – High Temperature Cooling



High Temperature Cooling in Buildings Enable More Free Cooling

Temperature
[°C]

25
20
15
10
5
0



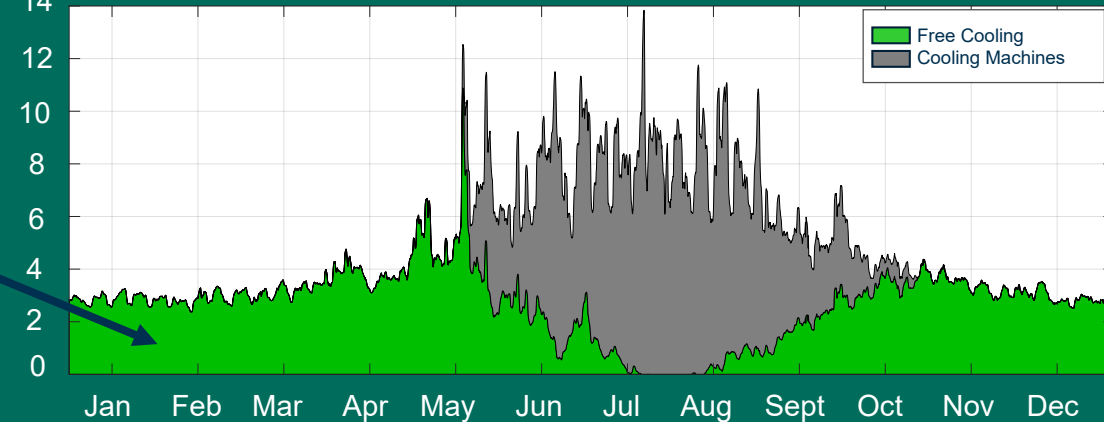
High Temperature Cooling in Buildings Enable More Free Cooling

Temperature

[°C]



Cooling Power
[MW]



54.5 %
Free Cooling

34.2 %
Free Cooling

design return 16 °C

28.1 %
Free Cooling

actual return 12 °C

Higher Temperatures

Challenges

Building return temperatures lower than 18 °C

Non-optimized building supply temperature set-points

Incentives for customers are needed

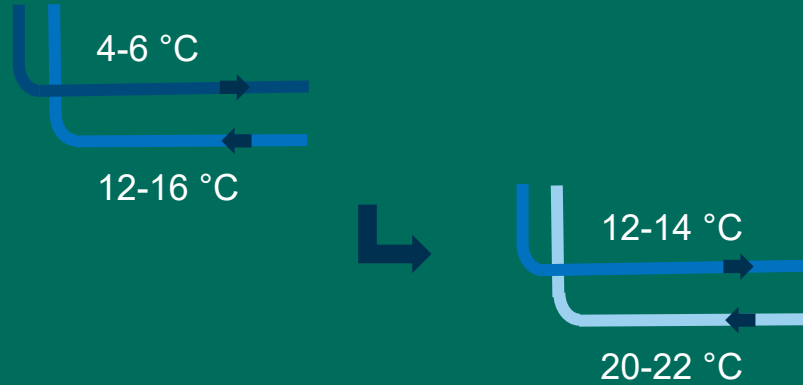
Possibilities

Existing building systems allowing for higher temperatures

Building supply temperature outdoor temperature compensated

Collaboration with customers for new building installations

High Temperature District Cooling



Thank you!

maria.jangsten@chalmers.se

