

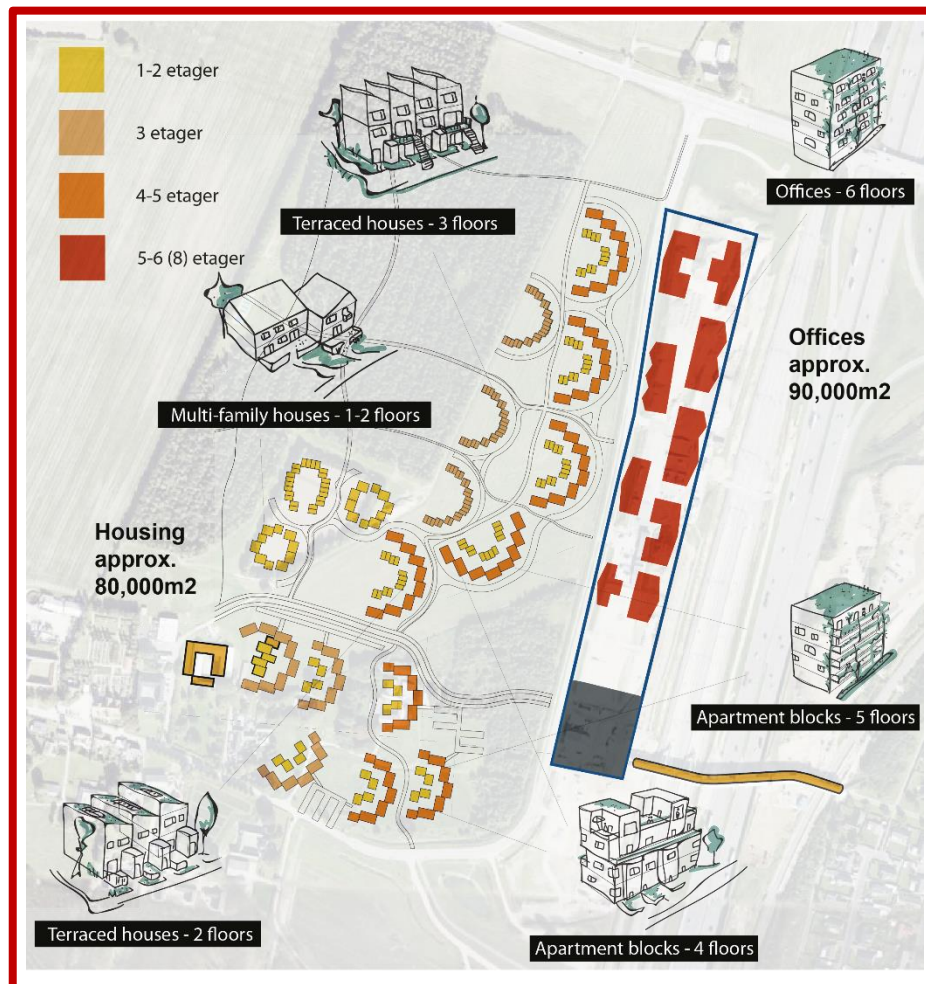
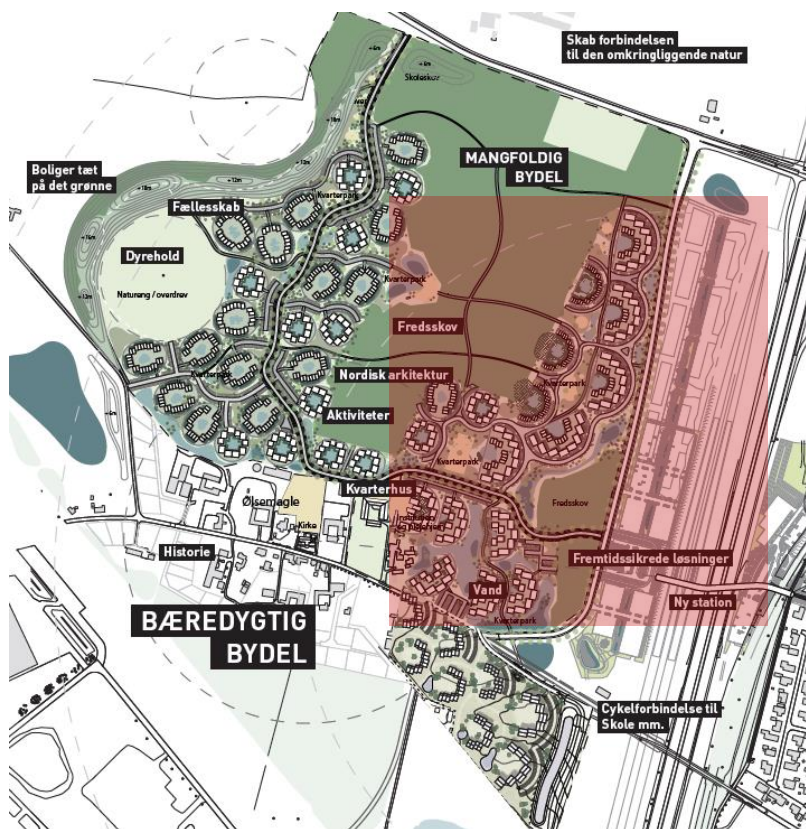
KOHESYS

**COMBINED DISTRICT HEATING AND COOLING –
WHICH SOLUTIONS ARE AVAILABLE AND ARE
THEY APPLICABLE IN A DANISH CONTEXT?**



7th International Conference on Smart Energy Systems - Copenhagen Sept. 2021

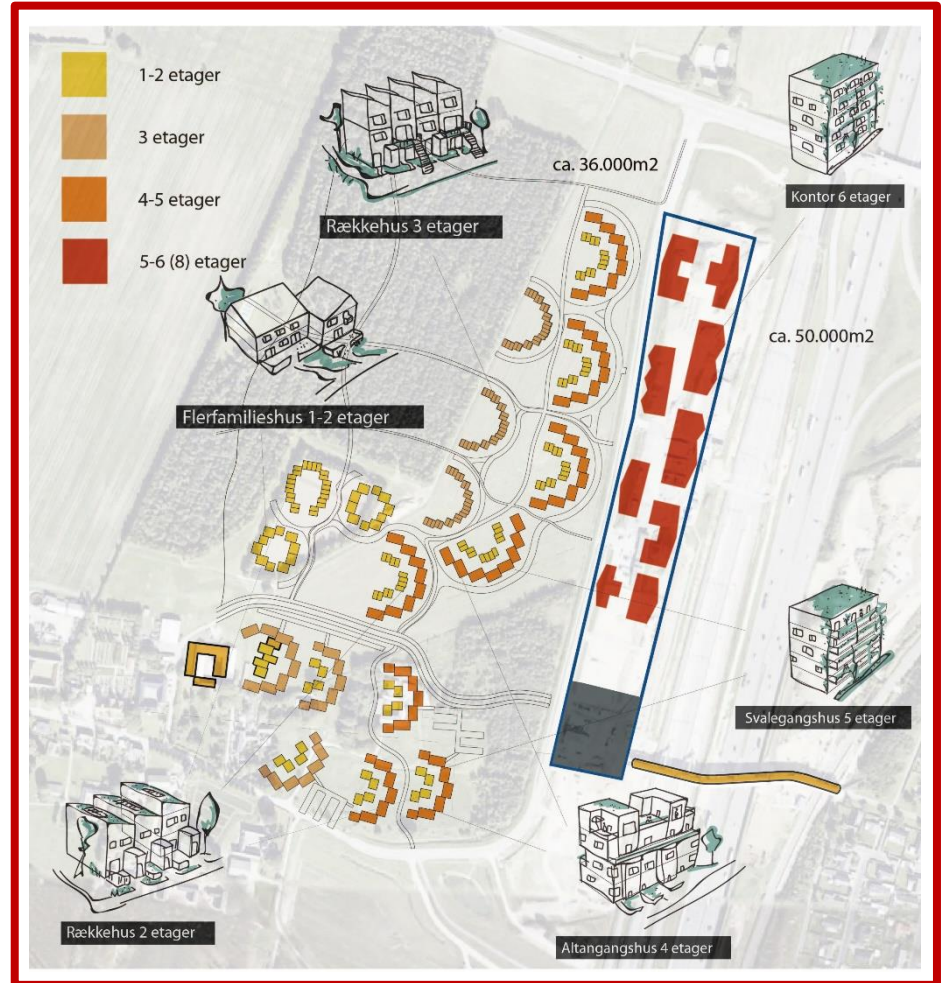
New built area in Køge Nord



Illustrations from and based on masterplan by COBE [COBE - Køge Nord Masterplanrevision – 2019]

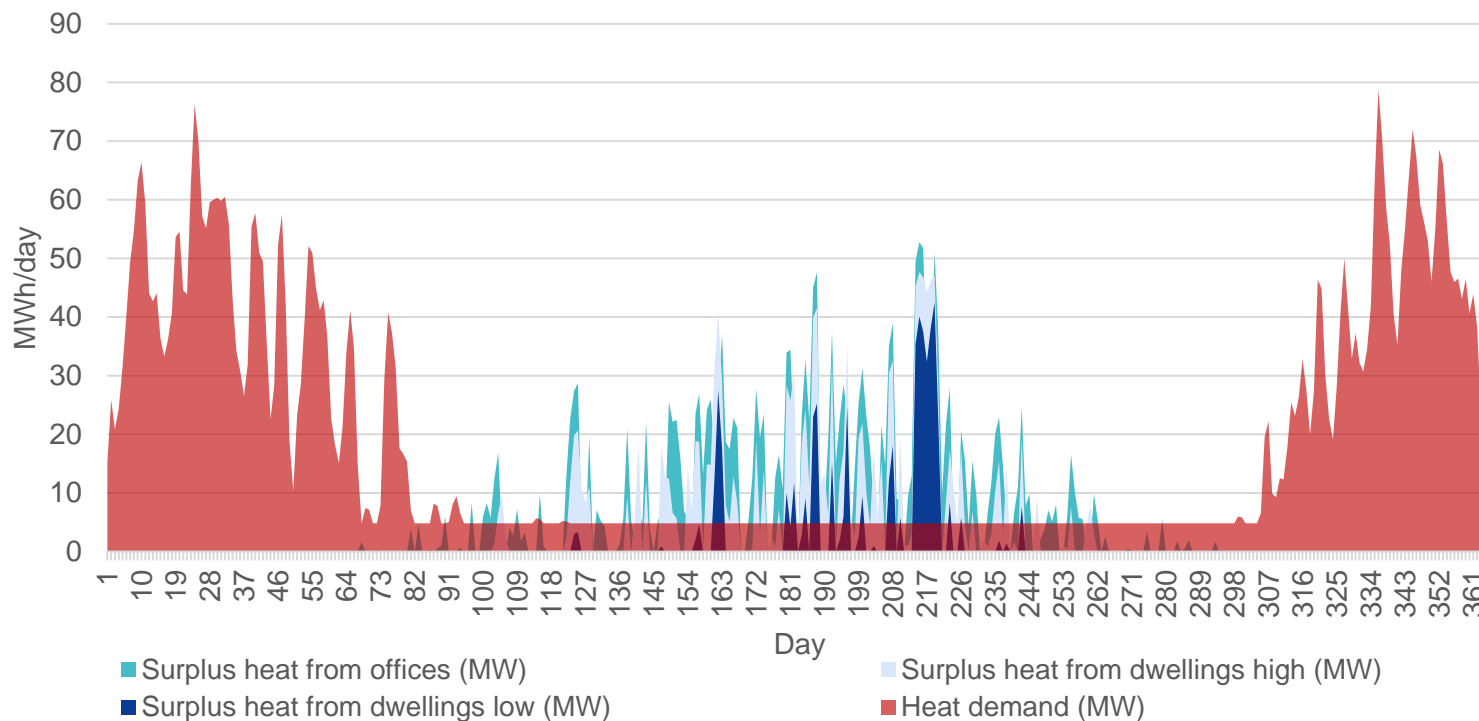
Boundary conditions

- Surplus heat at around 15 °C
- Surplus heat from datacentre at around 30-35 °C
- Close by existing district heating network (area planned for district heating supply)
- Drinking water sensitive area → no ATES or BTES



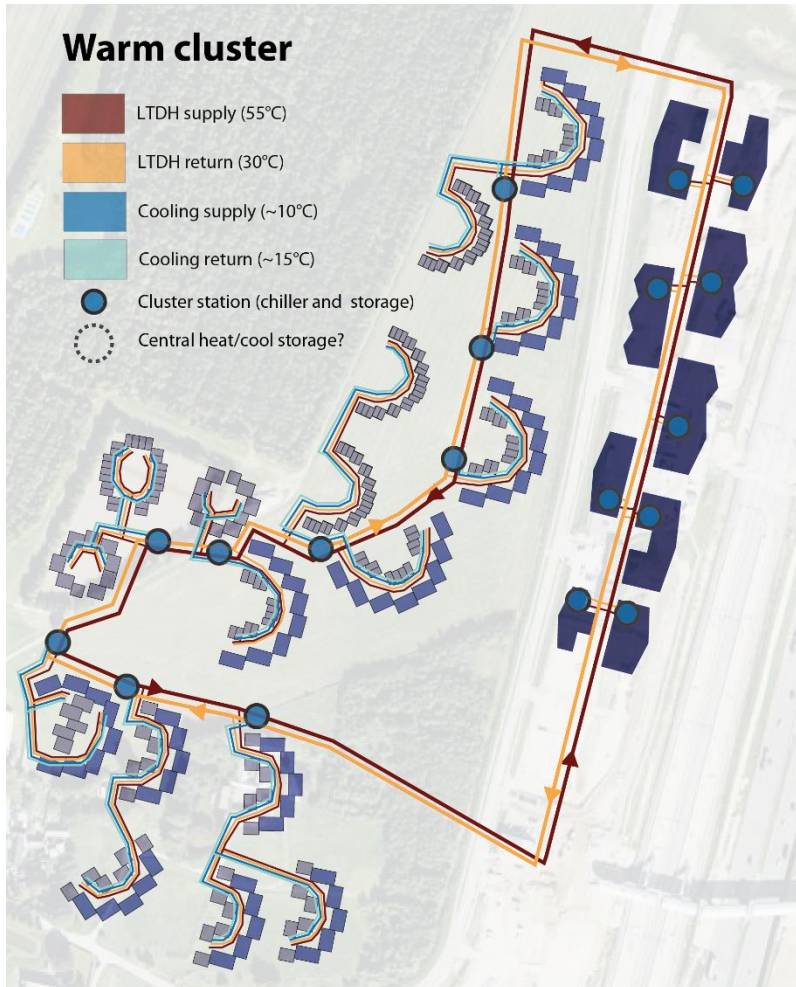
Cooling vs. Heating demand

PRELIMINARY



Annual energy demands in kWh/m ² per year					
Space Heating	Domestic hot water housing	Domestic hot water offices	Cooling dwellings low	Cooling dwellings high	Cooling offices
28.5	16.3	5	4.9	14.1	18.4

Scenario 1



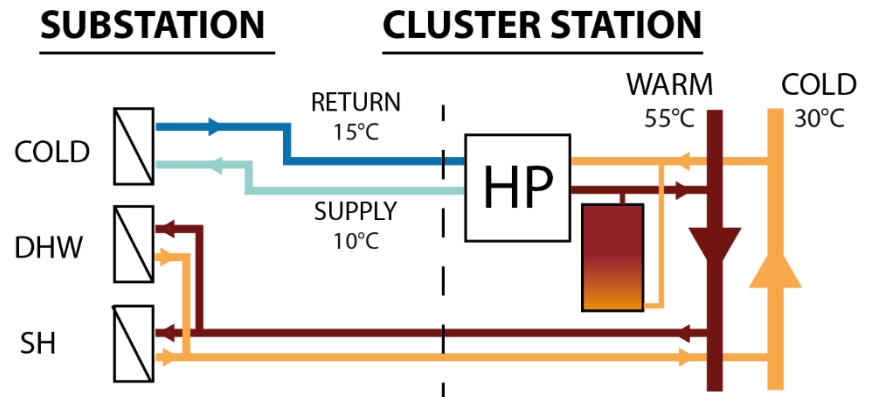
Heating direct – cooling through central chiller
(Existing district heating as source)

+ Simple direct heat supply

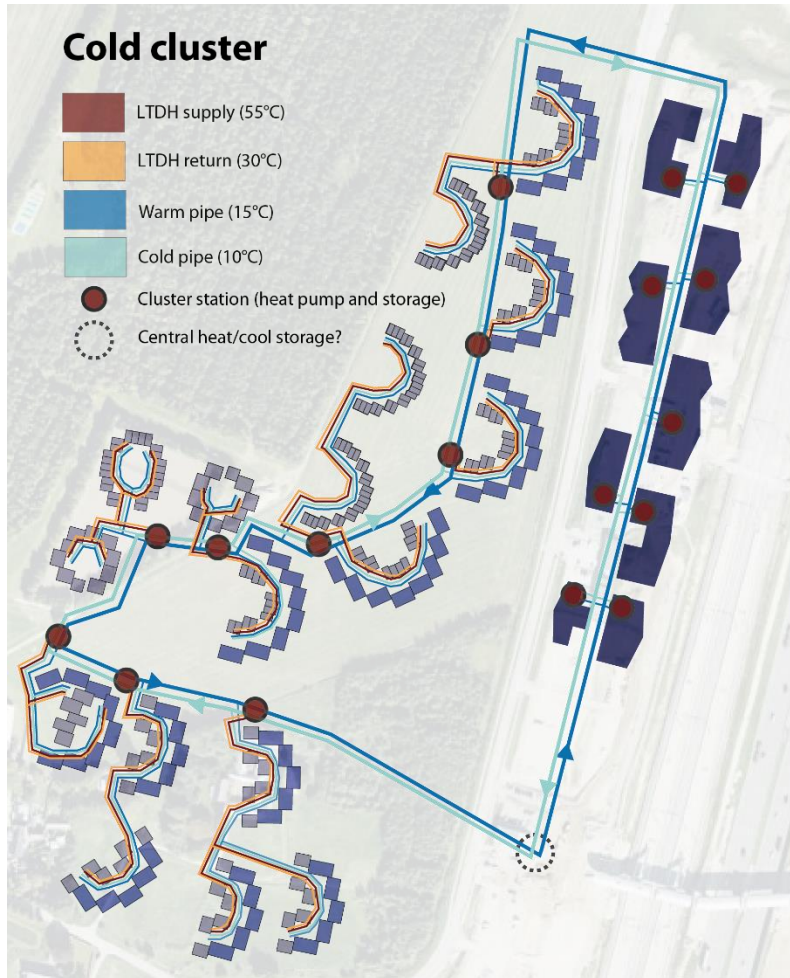
+ Optimized cooling network

÷ Electricity consumption in heat pump

÷ Too much surplus heat & no long term storage



Scenario 2



Cooling direct – heating through central heat pump (Surplus heat at 15 °C as source)

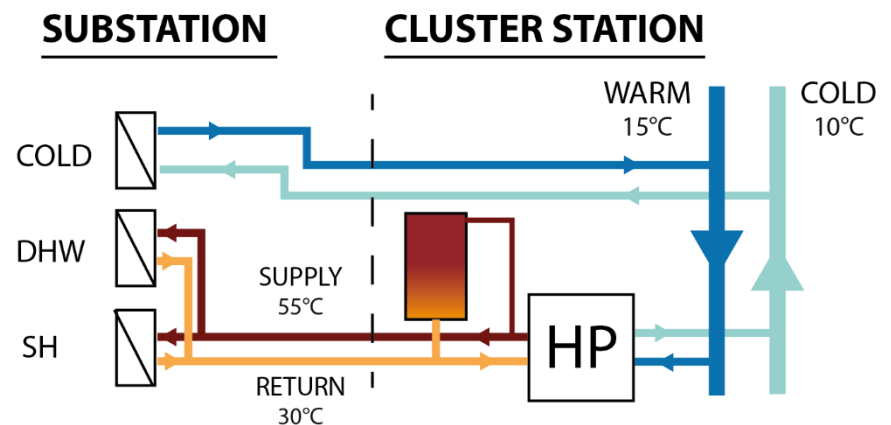
+ Make use of surplus heat source

+ Reduced heat loss from network

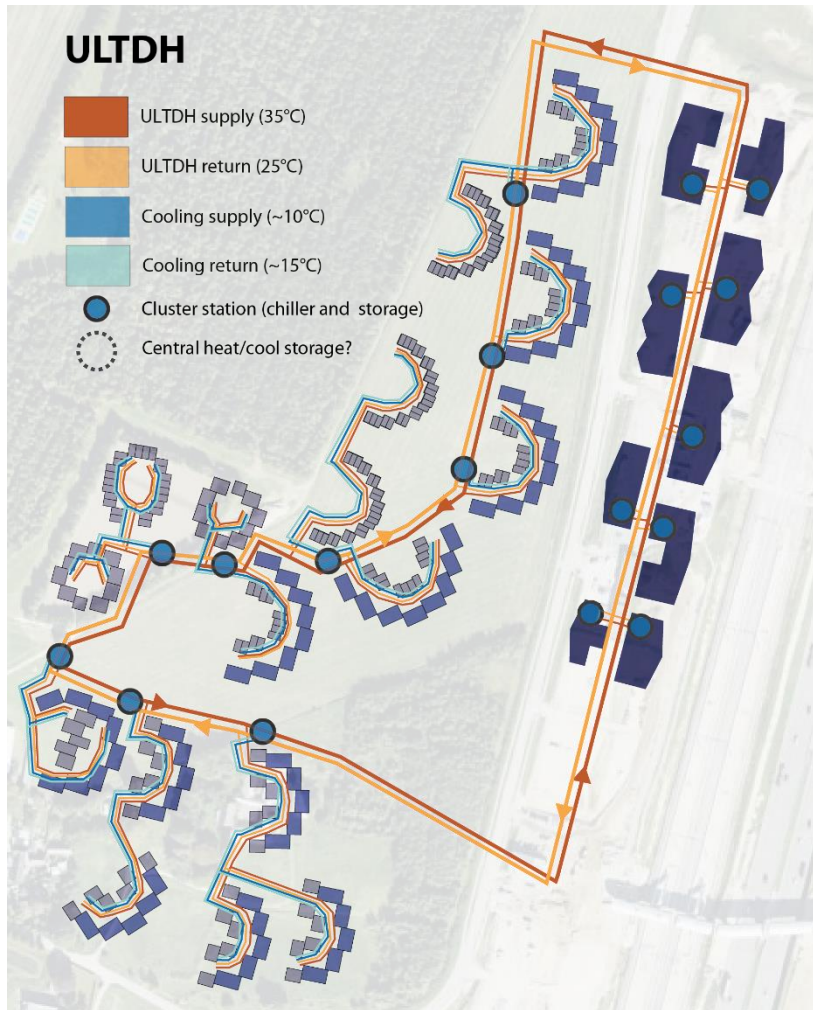
÷ Dependent on surplus heat temperature → need for central chiller to provide cooling?

÷ Too much surplus heat & no ATES or BTES

÷ Small deltaT in network?



Scenario 3



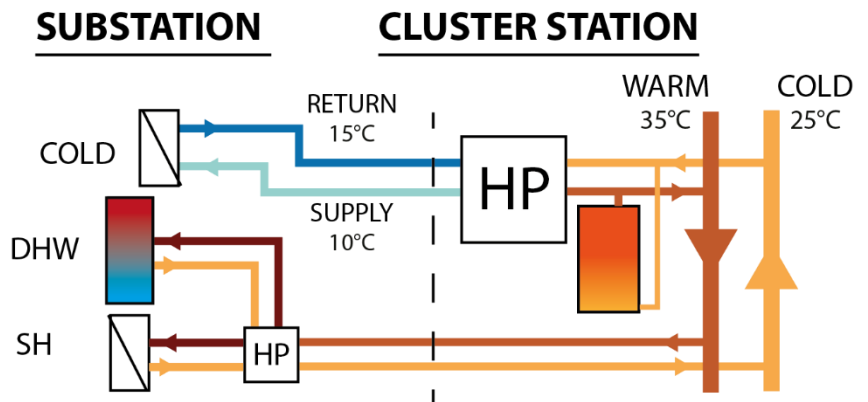
Cooling through central chiller – heating through heat pump (Surplus heat at 35°C as source)

+ Make use of surplus heat source

+ Reduced heat loss from network

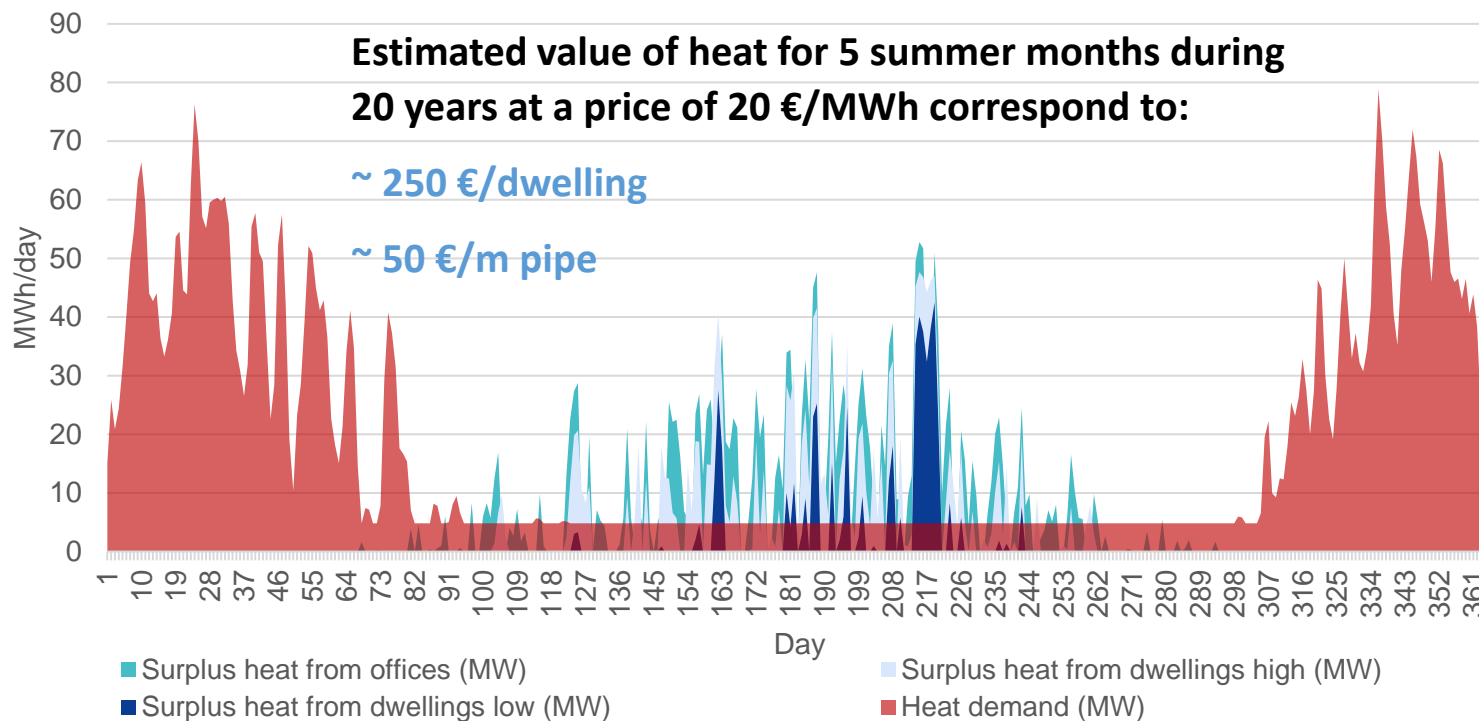
÷ Need for heat pump for heating and air conditioner for cooling (double equipment)

÷ Small delta T between sink and source can be difficult?



Surplus heat from cooling vs. Heat demand

PRELIMINARY



Annual energy demands in kWh/m ² per year					
Space Heating	Domestic hot water housing	Domestic hot water offices	Cooling dwellings low	Cooling dwellings high	Cooling offices
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Summary

- Available heat sources and boundary conditions are definable for the possible scenarios
- Cooling as a separate service – not only a source of surplus heat (is this reasonable?)
- ATES or BTES can have a central function for combined heating and cooling

MORE RESULTS LATER THIS YEAR AT WWW.KOHESYS.DK

