

Space heating with ultra-low-temperature district heating

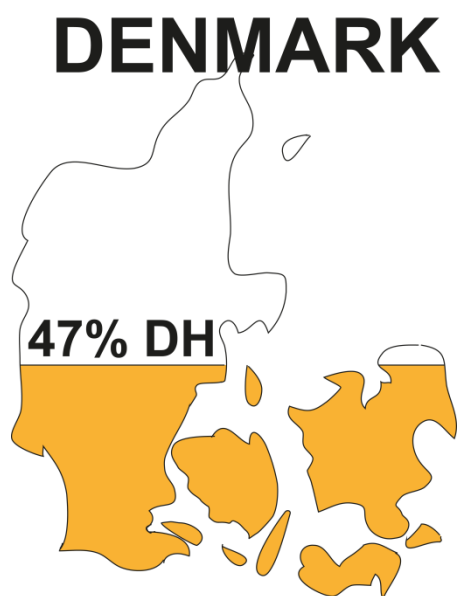
- A study of four single-family houses from the 1980s

6th September 2016

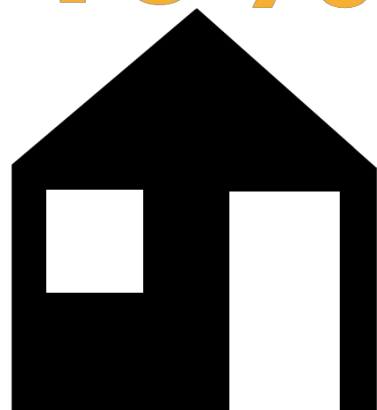
Dorte Skaarup Østergaard

Technical University of Denmark

Danish DH systems



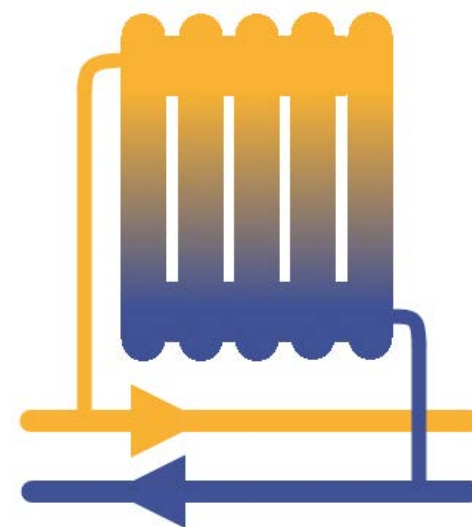
40%



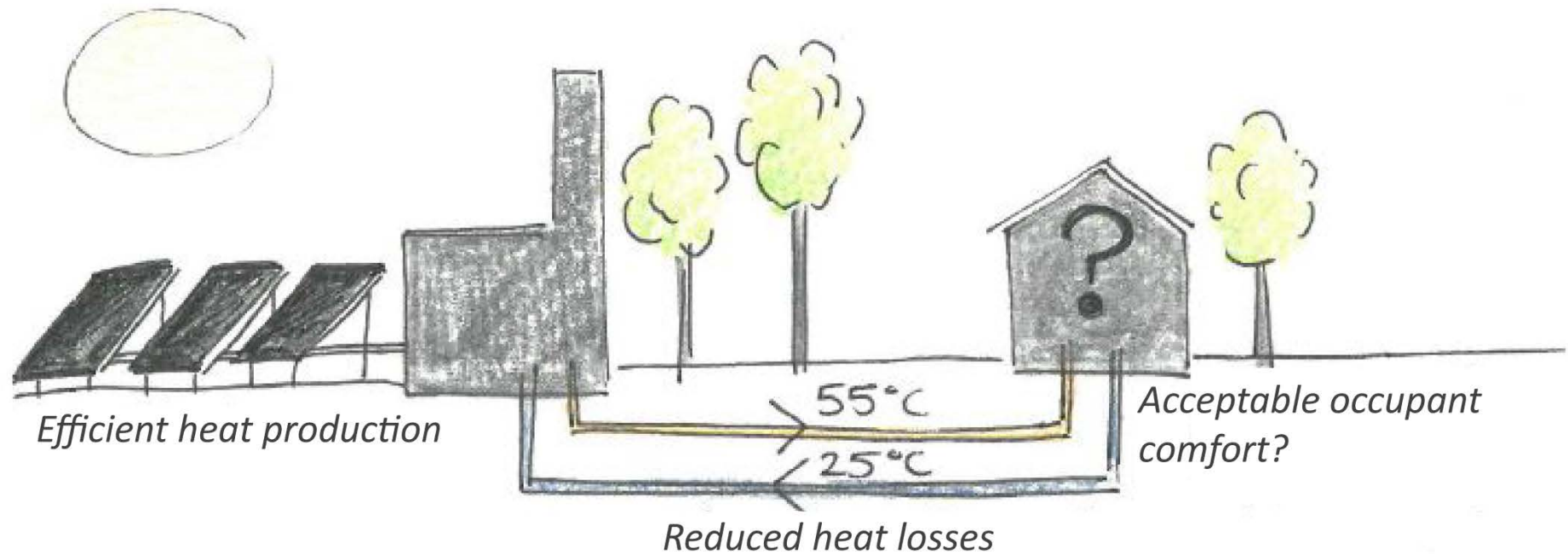
70°C



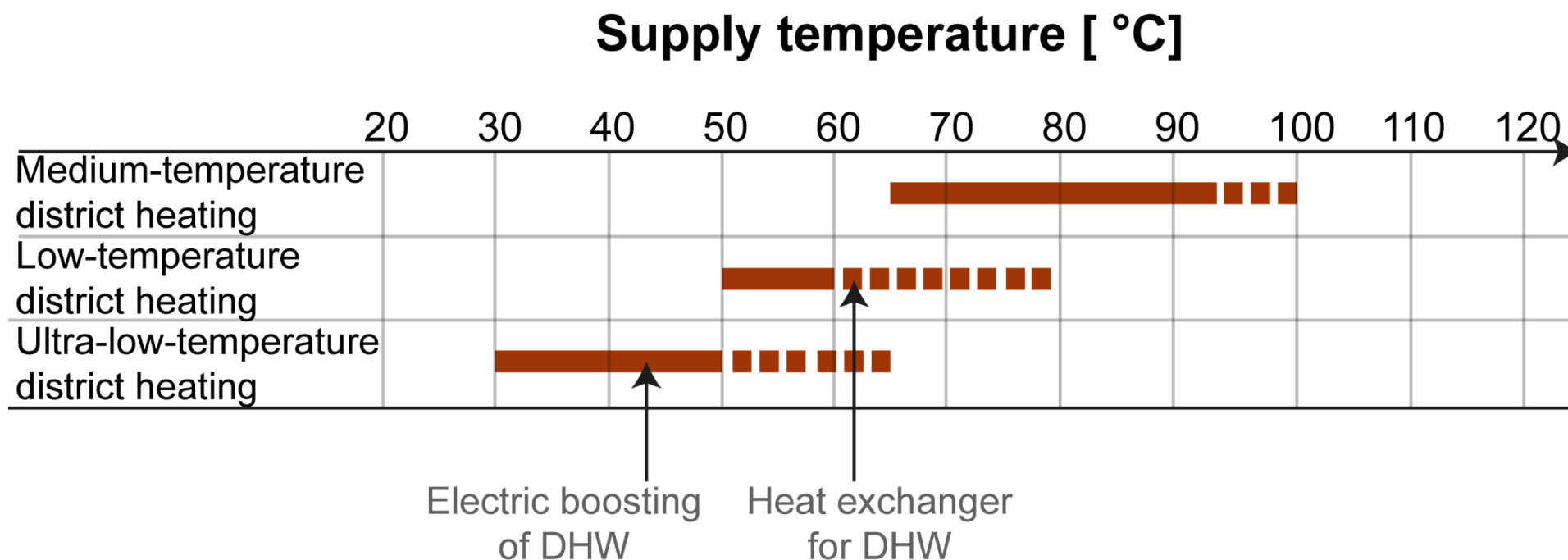
40°C



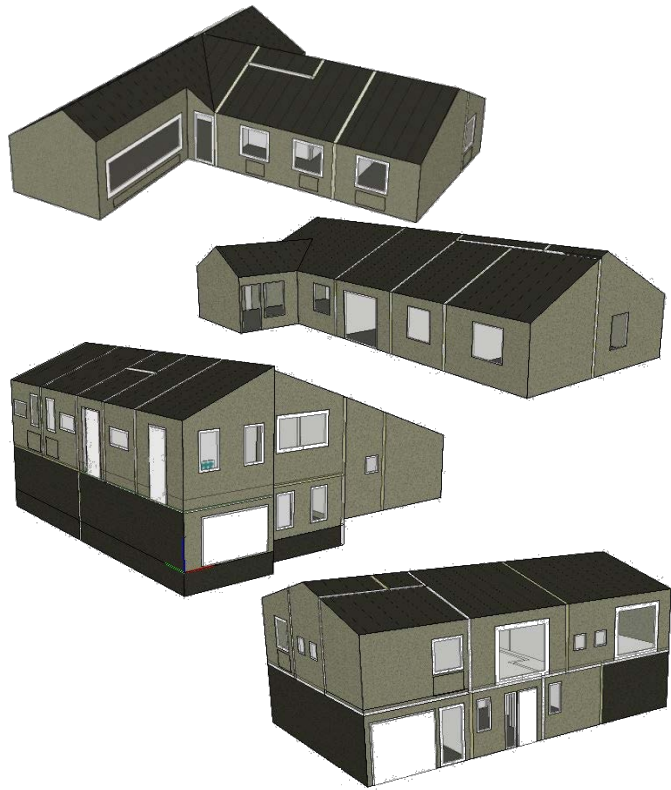
Why low-temperature district heating?



Definition of DH temperatures



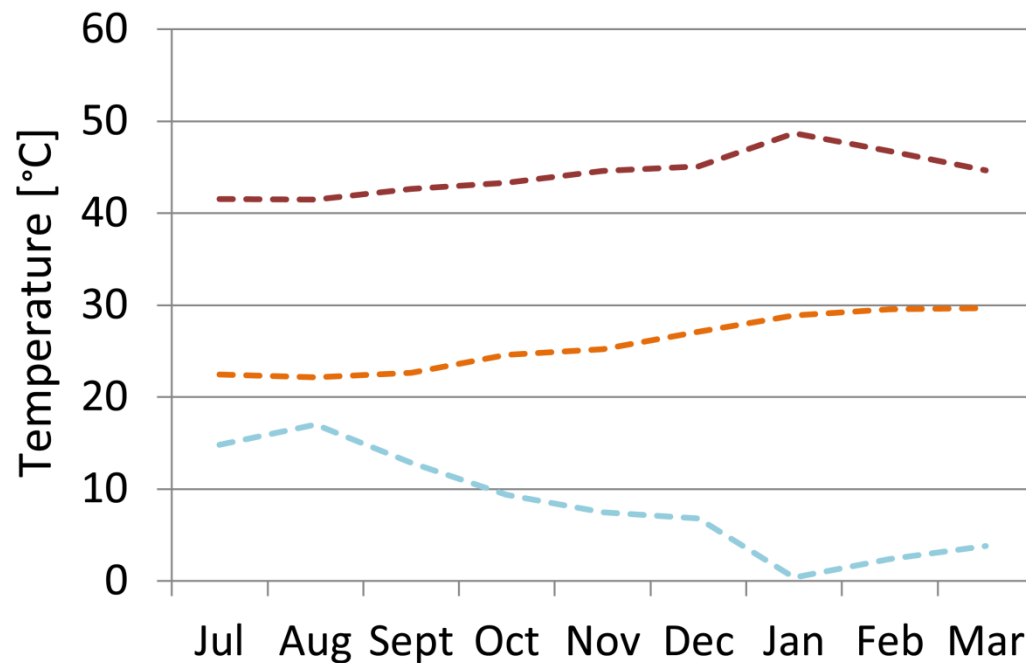
Description of case houses



- Typical Danish houses from the 1980s
- Heat consumption 80-120 kWh/m² per year
- Heated floor areas around 150m²
- Main heating source: standard hydraulic radiators with thermostatic radiator valves
- Direct district heating

Measurements

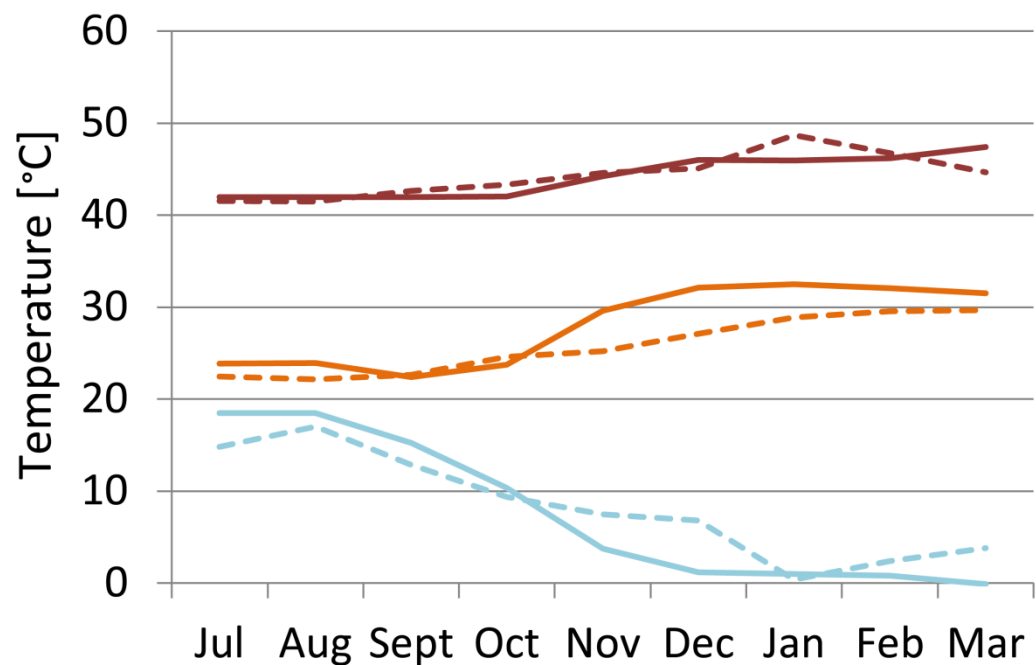
SUPPLY AND RETURN TEMPERATURES



----- Tsup_measure ----- Tret_measure ----- Tout_measure

Simulation

SUPPLY AND RETURN TEMPERATURES



----- Tsup_measure ----- Tret_measure ----- Tout_measure
—— Tsup_sim —— Tret_sim —— Tout_sim

Thermal comfort

45°C

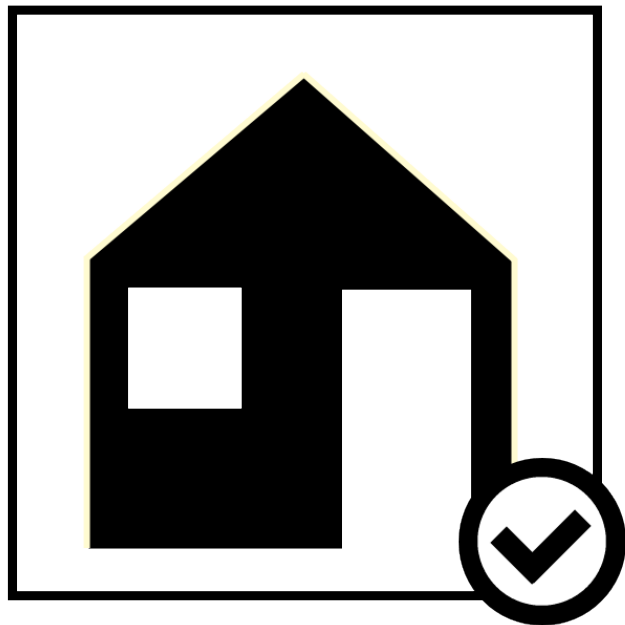


35°C



20-22°C

Conclusions



- There is a great potential to use low-temperature district heating in existing buildings
- In some cases the potential can be easy to realize!

Thank you for your attention!

Contact:

Dorte Skaarup Østergaard,

+45 45 25 18 80

Dskla@byg.dtu.dk