

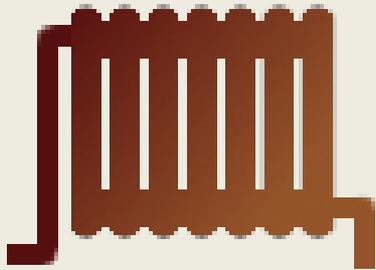
2nd International Conference on Smart Energy Systems and 4th
Generation District Heating, Aalborg, 27-28 September 2016



PRACTICAL EXPERIENCES WITH LOW-TEMPERATURE DISTRICT HEATING

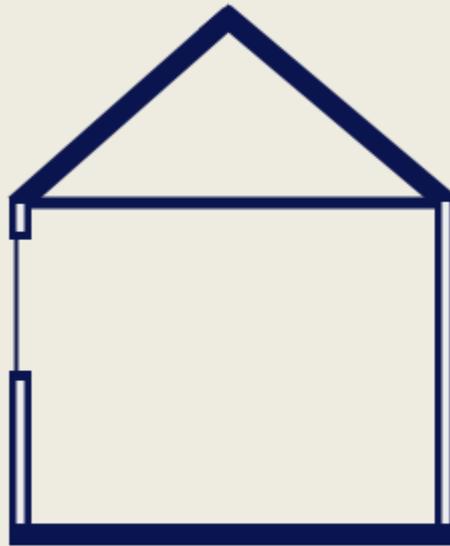
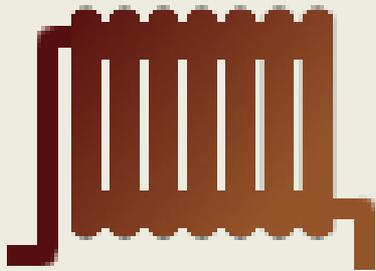
- Space heating in 5 existing single-family houses from the 1930s

How to deliver:



Space heating

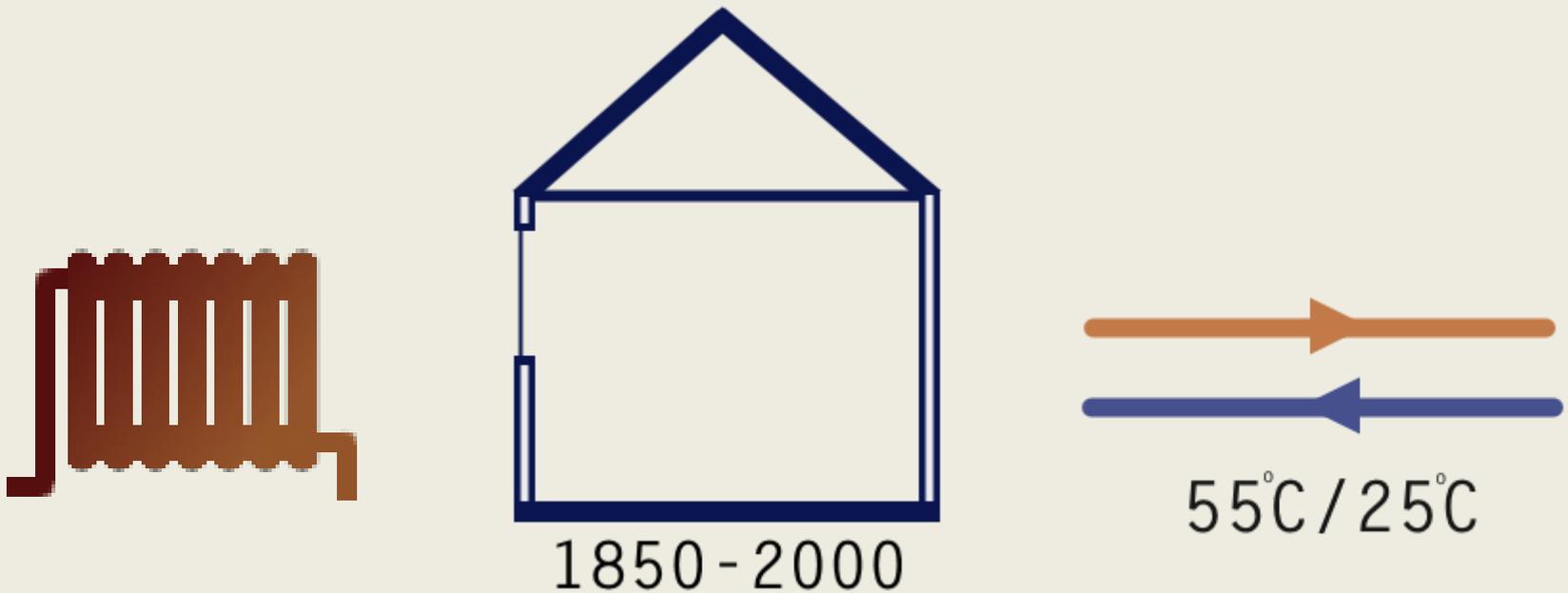
How to deliver:



1850 - 2000

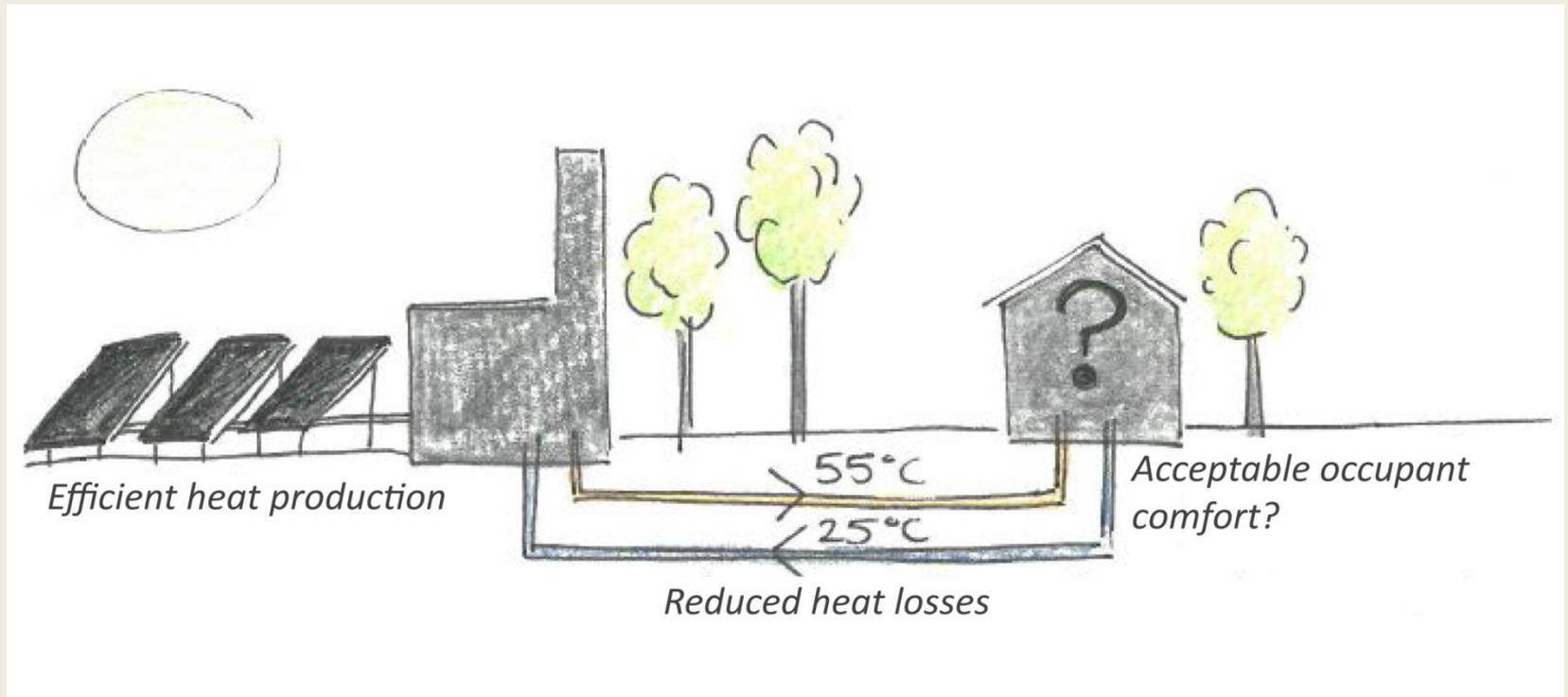
Space heating for existing buildings

How to deliver:

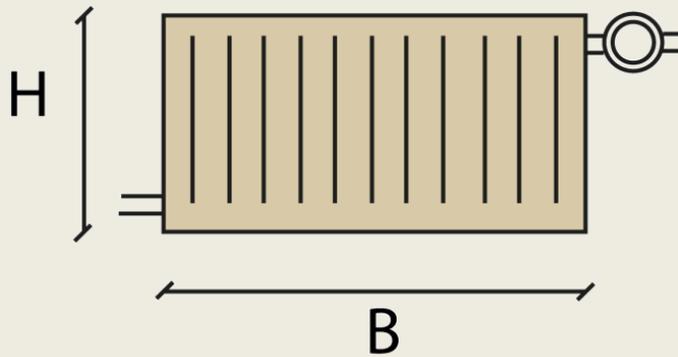


Space heating for existing buildings with low-temperature district heating

Importance of buildings

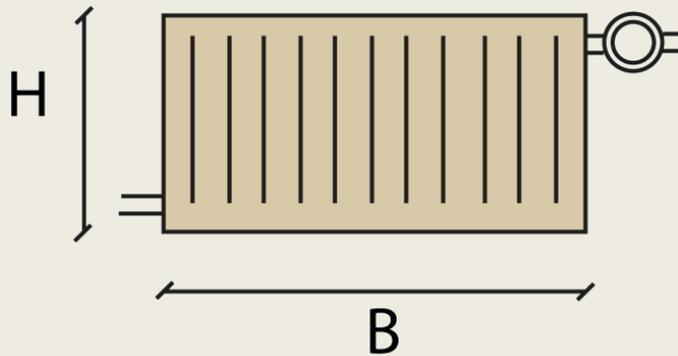


Importance of space heating



Radiators over-dimensioned

Importance of space heating



Radiators over-dimensioned



Return temperature is not always low!

In this study:

55°C



Low supply temperature

In this study:

55°C
→



Low supply temperature

Monitor operation of
the heating system

In this study:

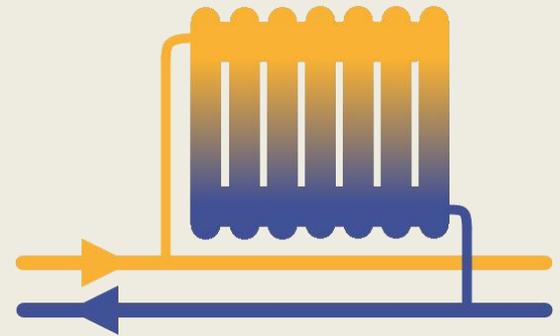
55°C



Low supply temperature

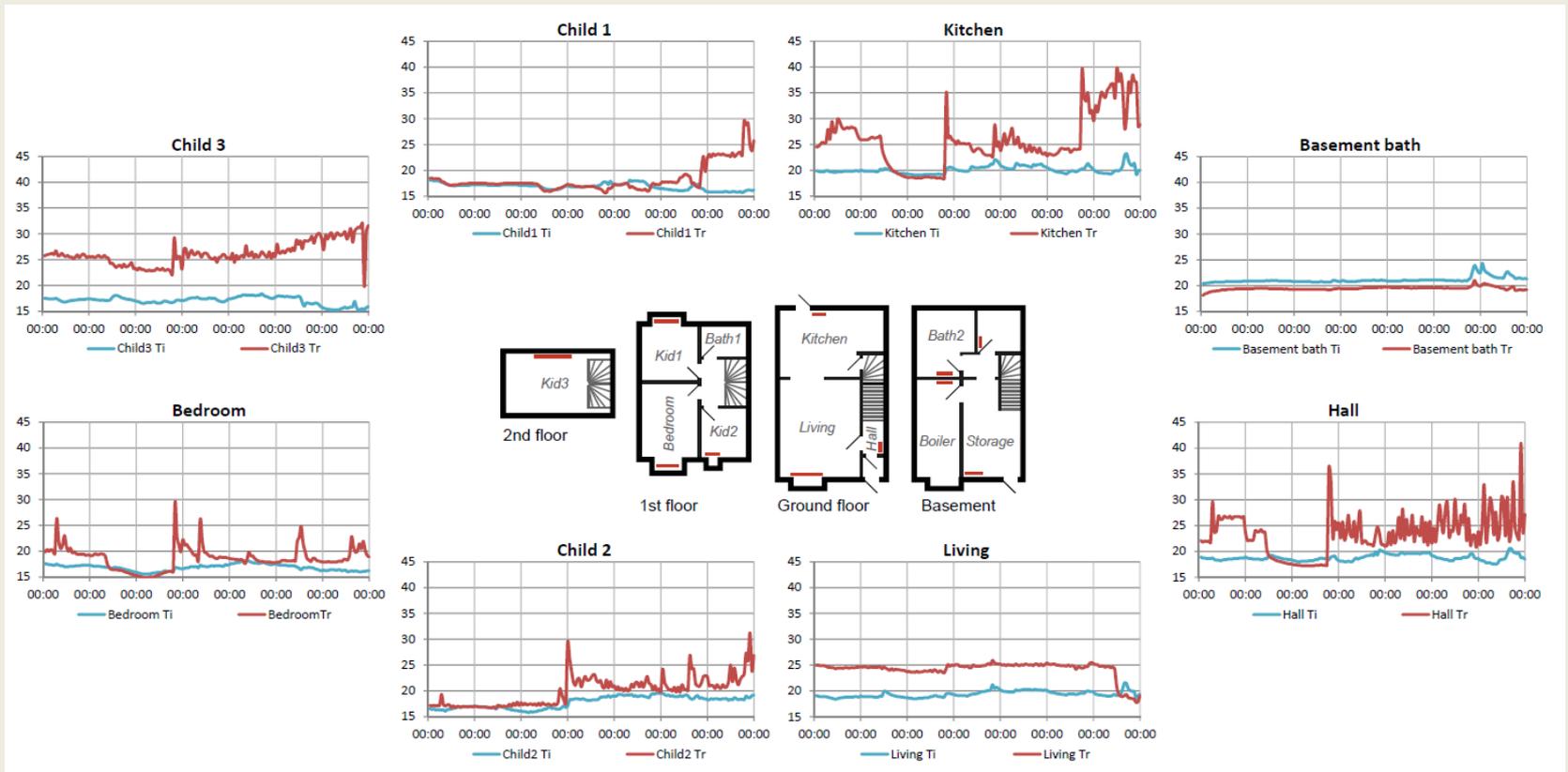


Monitor operation of
the heating system

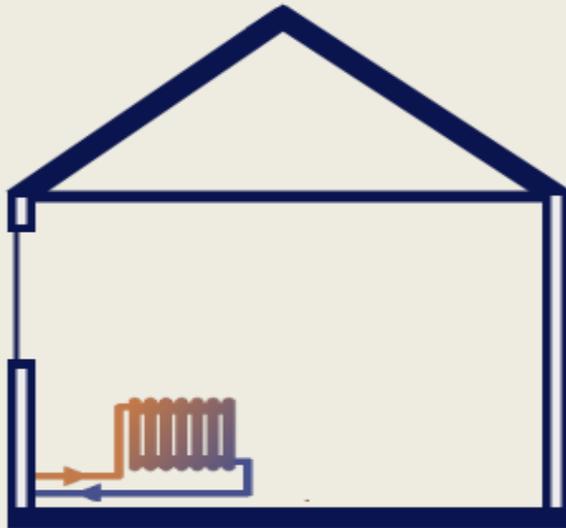


Barriers to obtain a low
return temperature

Monitoring

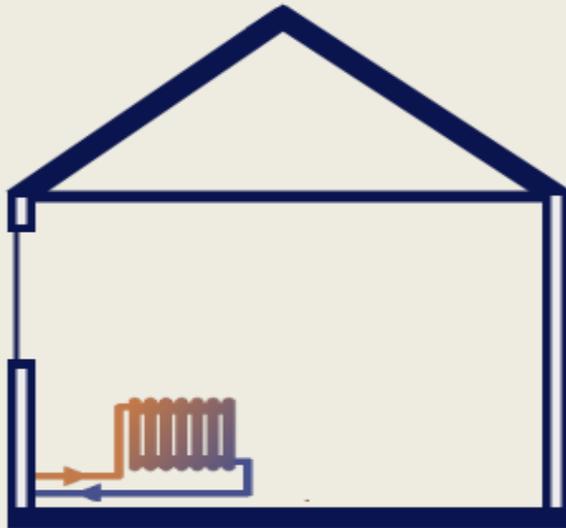


Monitoring

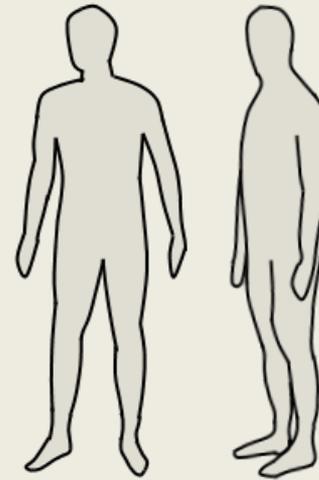


Visiting houses

Monitoring

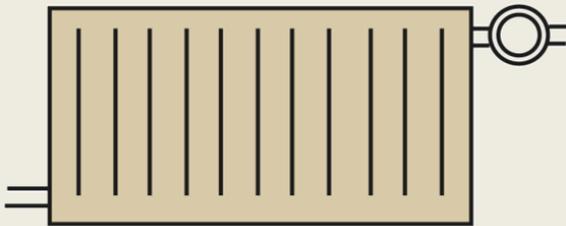


Visiting houses



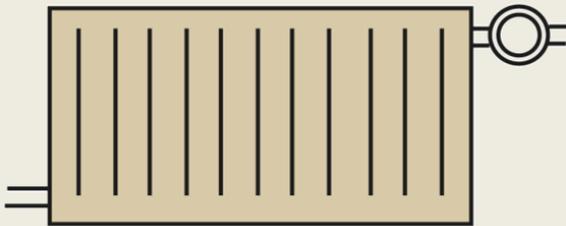
Talking to occupants

1 Thermostatic valves



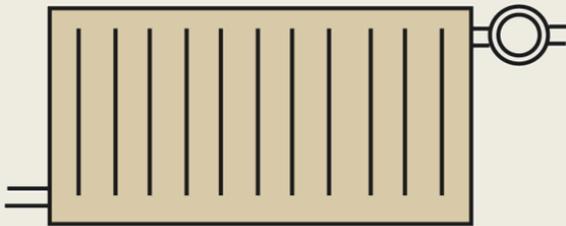
- Old valves (no flow limitation, poor regulation)

1 Thermostatic valves



- Old valves (no flow limitation, poor regulation)
- Design and maintenance

1 Thermostatic valves



- Old valves (no flow limitation, poor regulation)
- Design and maintenance
- Poor balancing between rooms

2 Indoor temperatures and comfort



- Indoor temperature preferences

2 Indoor temperatures and comfort



- Indoor temperature preferences
- Problems leading to increased set-points

2 Indoor temperatures and comfort



- Indoor temperature preferences
- Problems leading to increased set-points
- Open doors

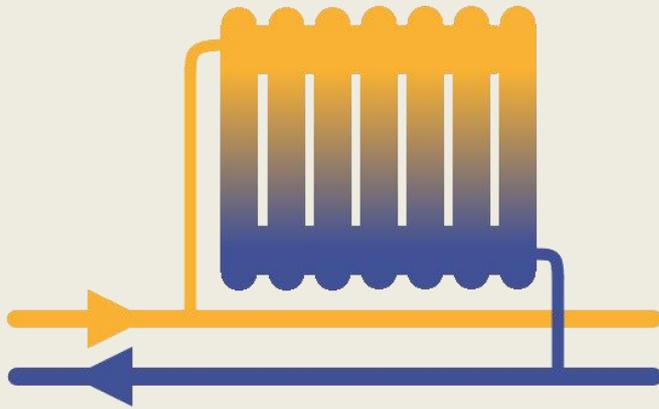
2

Indoor temperatures and comfort



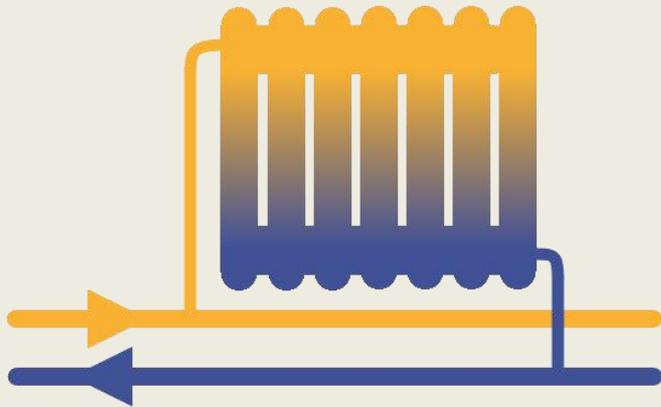
- Indoor temperature preferences
- Problems leading to increased set-points
- Open doors
- Energy saving behaviour

3 Heating system design



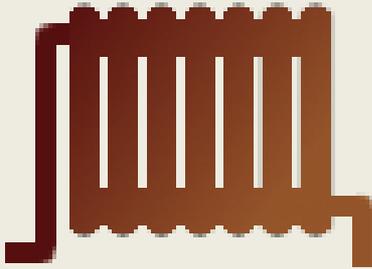
- Cabinets and concealers

3 Heating system design



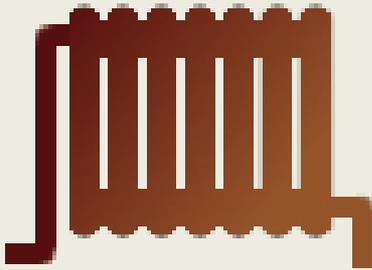
- Cabinets and concealers
- Radiator dimensions

Solutions

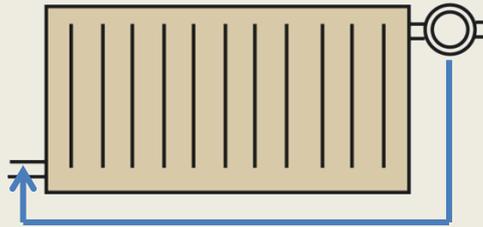


Replace critical
radiators

Solutions

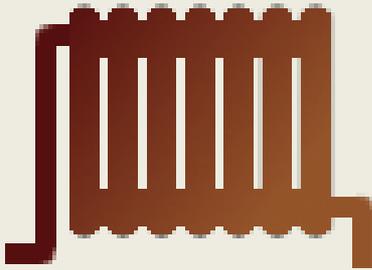


Replace critical radiators

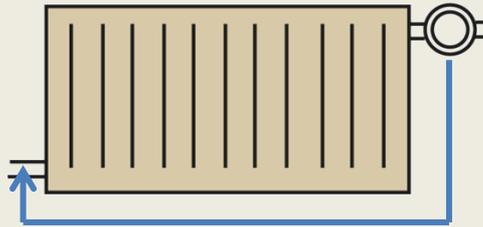


New thermostatic valve

Solutions



Replace critical radiators



New thermostatic valve



Service, guidance, feedback

QUESTIONS?



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Technical University of Denmark