2ND INTERNATIONAL CONFERENCE ON SMART ENERGY SYSTEMS AND 4TH GENERATION DISTRICT HEATING

AALBORG, 27-28 SEPTEMBER 2016

INCREASING DISTRICT HEATING EFFICIENCY WITH ULTRA LOW SUPPLY TEMPERATURES (35 °C)

KASPER QVIST
ENERGY PLANNER, SWECO

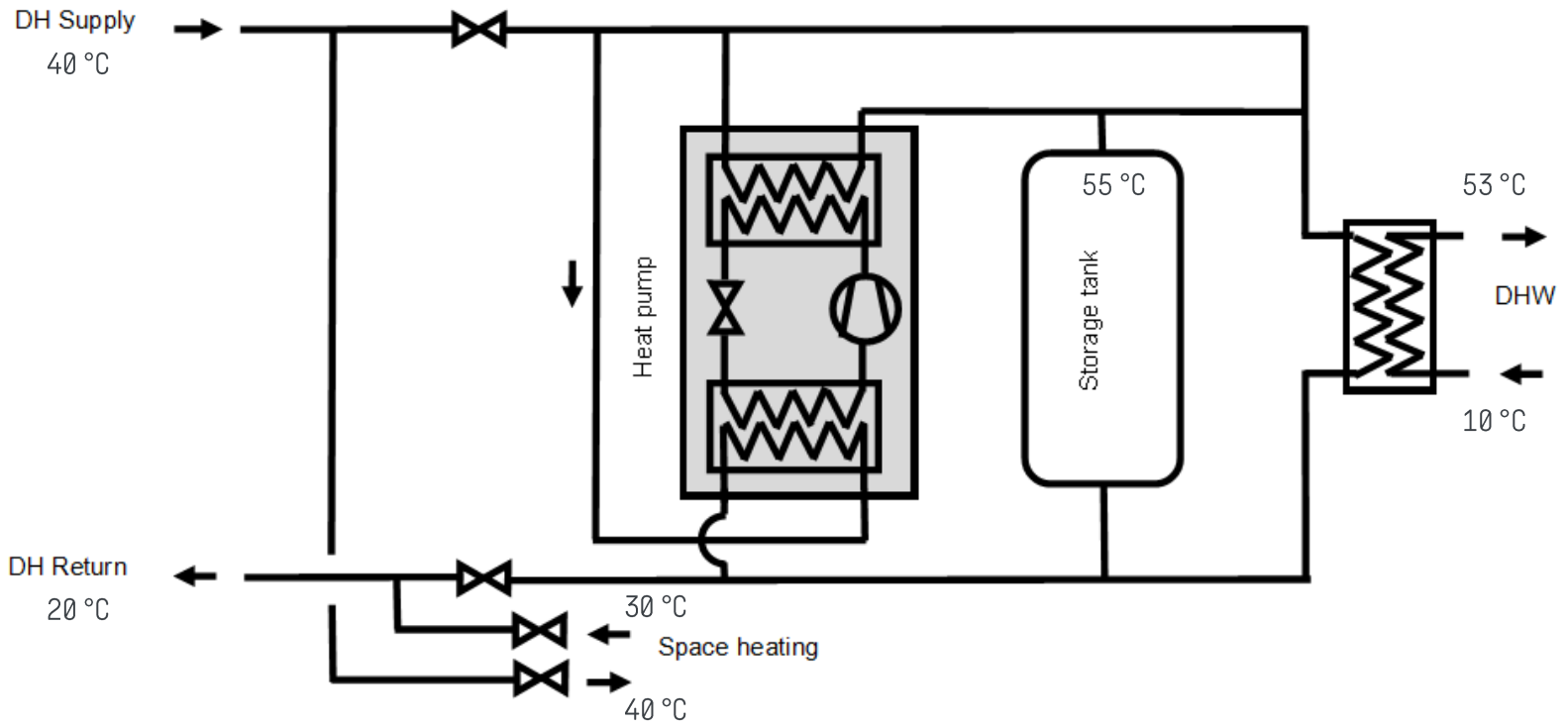
District heating trends

- District heating is becoming greener – more RE technologies applied
- District heating is challenged by individual heating technologies (heat pumps, solar heating, pellet furnaces etc.)
- New buildings are becoming more energy efficient:
  - More buildings have floor heating, eliminating need for high supply temperatures
  - High insulation standards make heat recovery systems for DHW production preferable thus reducing the demand for district heating
- Consequences:
  - Reduced demand for space heating
  - Altered shares of space heating and domestic hot water
  - Increasing heat loss in district heating grids as heat demand decreases unless temperatures are lowered

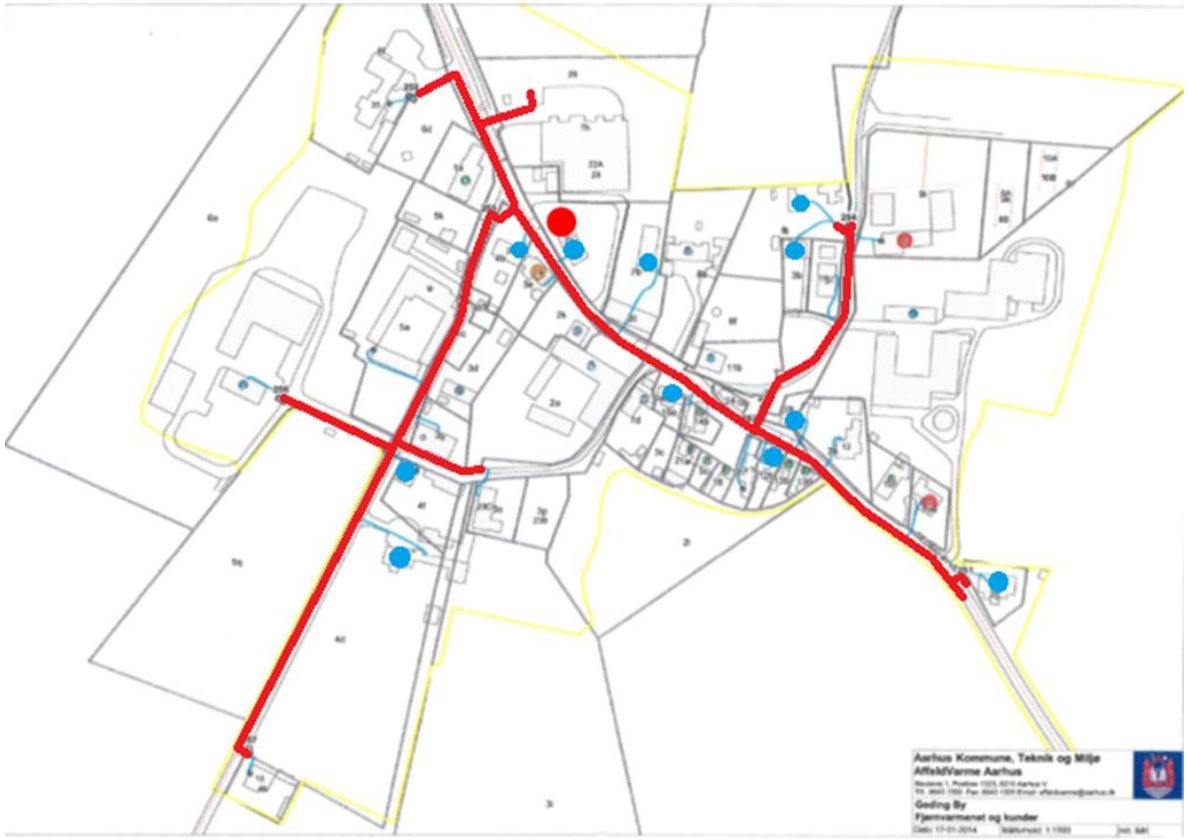
What is Ultra Low Temperature District Heating?

- Traditional district heating: 70-80 / 40 °C
- Low temperature district heating: 55-60 / 35 °C
- Ultra low temperature district heating: 35-45 / 25 °C
  - Link between temperature for space heating and domestic hot water is eliminated

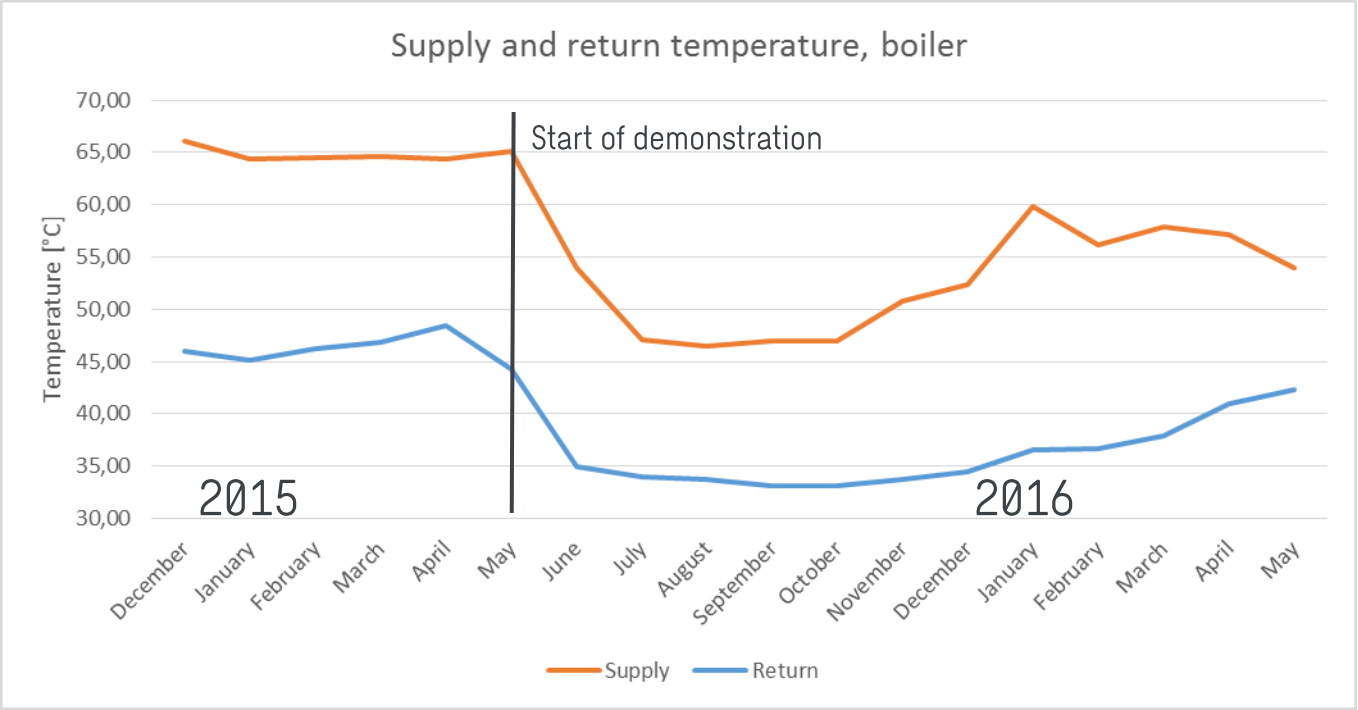
Micro Booster concept



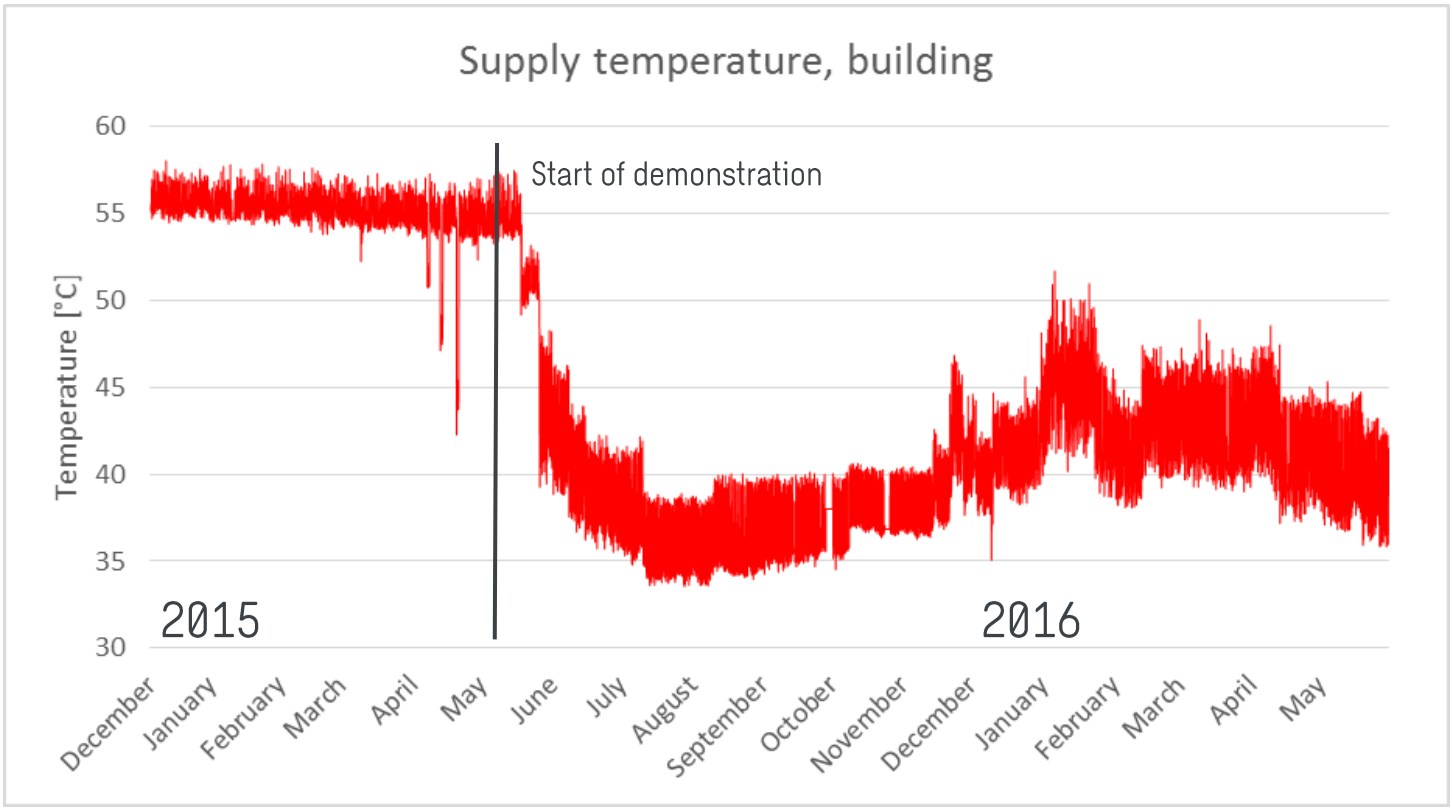
Demonstration project in Geding (Aarhus)
25 family homes of varying standards (1900-2015)



Demonstration project in Geding (Aarhus)

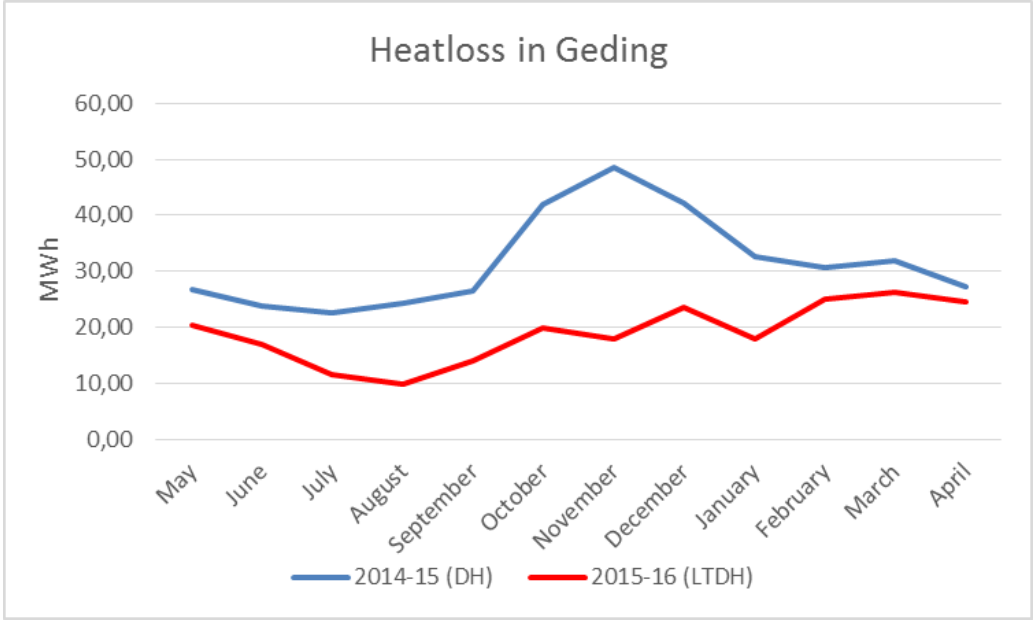


Demonstration project in Geding (Aarhus)



Demonstration project in Geding (Aarhus)

- Annual heat loss has been reduced by 40 %
- Varying between a 63 % reduction in November to a 9 % reduction in April
- Preliminary test in April 2015 so reduction potential could be higher



Main Benefits

- Significantly reduced heat loss (30-50 %)
- Unlinking temperature requirement for space heating and domestic hot water, respectively
- No issues with legionella due to storage tank on the primary side
- Better and more efficient integration of RES (solar, large heat pumps, excess heat, geothermal heat etc.)
- Heat from the existing DH return pipe can supply new areas
  – Cost-effective capacity expansion
- Significant reduction of return temperature
  – Better utilization of primary fuel (e.g. flue gas condensation)

Some disadvantages

- More expensive unit
- Requires more space
- Lower ΔT results in reduced capacity in the district heating grid
- Heat pump electricity consumption

Conclusions

- Great perspectives in contributing to the development and competitiveness of district heating compared to individual alternatives

- Several possibilities for integration
  - RE technologies
  - Existing district heating systems
  - Combined with district cooling supply

- Additional cost of the unit cannot be outweighed by the reduced heat loss alone – other system benefits have to be included
  - Higher heat production efficiency
  - Capacity expansion of the existing district heating grid

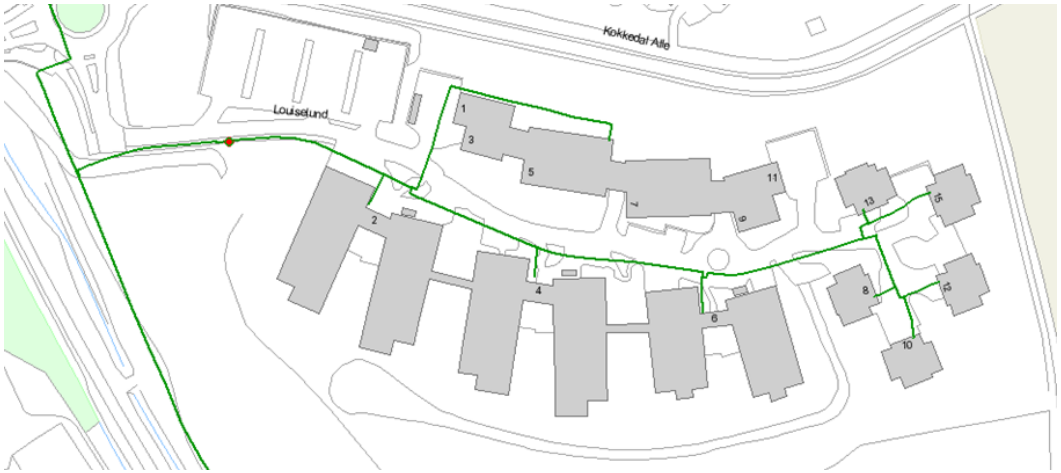
- Generally benefits outweigh disadvantages

- DH-unit not in mass production yet

Ongoing demonstration project – Louiselund in Hørsholm

- Upscaling the concept for family houses to apartment blocks

- The nursing home Louiselund
  - 90 sheltered homes
  - 43 senior homes
  - Floor heating for space heating
  - Has its ”own” district heating pipe from the main distribution pipe with 9 outlets



New demonstration project – Ultra Low Temperature District Heating in new buildings

SWECO have been awarded funding for a new project to demonstrate ultra low temperature district heating in new buildings.

The project starts ultimo 2016 and also includes technologies for reducing district heating grid costs.

Project partners:
- SWECO (Project Manager)
- I/S Norfors (utility company)
- Thermaflex (pipe supplier)
- Demonstration host

The technology is available and proven to be reliable

Now we need a commercial breakthrough

Contact:

Kasper Qvist
Tlf.: 8210 5141; Mobile: 9137 7347
Kasper.Qvist@sweco.dk

Christian Nørr Jacobsen
Tlf.: 4348 6855; Mobile: 2723 6855
ChristianNorr.Jacobsen@sweco.dk

Johnny Iversen
Tlf.: 7220 7207; Mobile: 2723 6073
Johnny.Iversen@sweco.dk

SWECO