Session 1: Smart Energy Systems

Balancing District Heating to increase uptake of low temperature surplus heat sources

12th September 2017
Planning, Practical and Economic challenges

Preconditions and assumptions - Electricity prices operational economic

![Electricity prices and operational economic prognosis graph](chart.png)
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Preconditions and assumptions - Electricity prices socioeconomic

![Historical electricity prices and socioeconomic prognosis chart](image)
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Preconditions and assumptions - COP

![Heat Pump Efficiency Graph](image)

- Source = 30°C
- Source = 25°C

+ Type, Location and size of Heat Pumps?
## Planning, Practical and Economic challenges

### Scenarios

<table>
<thead>
<tr>
<th>Scenarios</th>
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<tbody>
<tr>
<td>Natural Gas CHP</td>
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<td>Natural Gas DH</td>
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<td>Heat pump at source</td>
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<td>Heat pump’s in City</td>
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<td>Temperature 80/40</td>
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<td>Temperature 60/30</td>
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<td>Temperature 55/30</td>
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\[
\text{COP}_{\text{system}} = 8,34
\]
1. Two zones (65/30 and 55/30)
2. Local Heat Pump boost inner city
3. Local Mini Heat Pump boost larger consumers
4. Change from indirect to direct connections of building blocks
5. Limited changes to City transmission net
6. Limited changes to supply pipes, pumps and flow measuring for one sub-zone
7. Rental model for consumer installations now including low temperature unit
Planning, Practical and Economic challenges

Conclusion / next steps

1. Optimize net and user installations for lower temperatures
2. Prioritize renovation and investments
3. Further discussions on preconditions and assumptions
4. Ownership, operation and maintenance agreements
5. Optimize transmission lines, pump stations, heat pumps and local zones
6. Negotiations for supply of surplus heat from industries and companies in the city
NIRAS as leading expert in exploiting *surplus heat*

NIRAS as leading expert in planning, design and implementing *low temperature district heating*

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