37th Euroheat & Power Congress
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Renewable Smart Cooling for Urban Europe
Ingo Wagner, Euroheat & Power

Organised by
REnewable Smart Cooling for Urban Europe (RESCUE)

- Addresses key challenges for the further development of District Cooling
- Will enable local communities to reap the environmental and economic benefits of District Cooling
- Project duration: 01 June 2012 to 30 November 2014
- Target groups: Local governments, utility companies, owners and investors of large buildings, financing sector
- Target Countries: EU27, especially: Italy, Spain, Denmark, Sweden, Finland, Germany, France, Austria, Poland, Slovenia, Croatia
The consortium

- 8 Project partners, including energy agencies, associations of municipalities and energy companies, as well as technical experts from 5 countries:
  - Technische Universität Dresden (TUD) – coordinator
  - Capital Cooling (CCES), SE
  - Climespace (Climespace), FR
  - Helsinki Energy (Helen), FI
  - AGFW (AGFW), DE
  - Euroheat & Power (EHP), BE
  - ICLEI European Secretariat (ICLEI Europe), DE
  - Regional Energy Agency of Liguria (ARE Liguria SpA), IT
European cooling index (ECI) in a contour map computed from information from 80 urban locations in Europe

Source: EcoHeatCool
Total: 3 TWh
Cooling source

Free cooling

Heat (absorption cooling)

Electricity (Compressor chillers, Heat pumps, ...)

Cold storage

Air

Water
lake, river, sea, underground water

DH system

Waste incineration

Combined Heat & Power

(Industrial) Waste heat
<table>
<thead>
<tr>
<th>Cooling solution</th>
<th>PEF</th>
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</thead>
<tbody>
<tr>
<td><strong>Conventional individual solution</strong></td>
<td></td>
</tr>
<tr>
<td>Conventional central and decentral on-site cooling systems</td>
<td>1,7 - 0,7</td>
</tr>
<tr>
<td>Conventional cooling systems combined with ground water usage</td>
<td>0,8 - 0,4</td>
</tr>
<tr>
<td><strong>District Cooling system</strong></td>
<td></td>
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<tr>
<td>Modern industrial chiller with heat recovery in a District Heating grid</td>
<td>0,5 - 0,3</td>
</tr>
<tr>
<td>Industrial chillers combined with free cooling</td>
<td>0,3 - 0,1</td>
</tr>
<tr>
<td>Free cooling</td>
<td>0,1 - 0,06</td>
</tr>
<tr>
<td>Sorption chillers utilizing waste heat or direct use of renewable energy sources</td>
<td>0,13 - 0,07</td>
</tr>
</tbody>
</table>

*PEF= Primary Energy Factor*
ANNUAL CO₂ SAVINGS DUE TO DISTRICT COOLING

- in 2010
- in 2020

Gothenburg
21,400 t of CO₂
55,000 t of CO₂

Stockholm
123,000 t of CO₂
178,500 t of CO₂

Amsterdam
13,000 t of CO₂
45,000 t of CO₂

Paris
62,400 t of CO₂
138,700 t of CO₂

Vienna
9,500 t of CO₂
61,000 t of CO₂

Helsinki
25,000 t of CO₂
60,000 t of CO₂

Barcelona
10,800 t of CO₂
25,200 t of CO₂

Euroheat&Power
Total cost local solution as against a 15 MW district cooling system.
Why DH for DC

DH infrastructure is dimensioned for winter operation, in summer operation its capacity is not fully used!
How to realise District Cooling
Key success factors

- Top management that believes in DC and are prepared to take risk developing it
- Dedicated and specialised personnel with the right know how to develop DC
- Good local conditions for DC
- Strong market focus and right pricing
- Experience in DC
Main barriers

- Lack of awareness
- Lack of interest from the LA and top management
- Production fixation instead of smart usage of energy (Low Primary Energy)
- Financial issues
- Building regulations/ building code
Gothenburg is Sweden’s second largest city with a population of 480 thousand people.

The project customer, Göteborg Energi, is the local energy supplier and has a turnover of 350 million EUR.

The District Cooling project in Gothenburg had a business size of 100 MW serving approximately 2 million m² of building area.

The network has increased the output from 40 to 120 increase in MW.

Avoiding 10 MEUR of power infrastructure investments.

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>District Cooling</th>
<th>Customers Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling energy demand (MWh/yr)</td>
<td>110 000</td>
<td>110 000</td>
</tr>
<tr>
<td>SSEER</td>
<td>19.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Electrical energy demand (MWh/yr)</td>
<td>6 340</td>
<td>33 330</td>
</tr>
<tr>
<td>Emission CO₂ (tons/yr)</td>
<td>3 918</td>
<td>20 598</td>
</tr>
<tr>
<td>Refrigerant HFC (tons)</td>
<td>17 160</td>
<td>33 000</td>
</tr>
<tr>
<td>Refrigerant leakage (tons/yr)</td>
<td>0.172</td>
<td>2 508</td>
</tr>
</tbody>
</table>

*Both the Stockholm and Gothenburg case have proven to be highly successful from both commercial and social perspectives. The know-how and experience that Capital Cooling brought to the projects was vital for its realization.*
Thank you!