Get DC off the ground

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Global Drivers

- **HFC phase down** - Global commitment
  - Kigali amendment to the Montreal protocol Nov-2016
- **Global impact – UN projection**
  - Up to 0.5 °C due to HFC
  - Up to 0.5 °C due to efficiency
- **Business Impact**
  - Existing equipment become obsolete
  - Chillers becomes more expensive

- **Global Air-Condition demand – IEA projection**
  - Energy demand expected to **triple** by 2050
  - Stock in buildings will grow to 5.6 billion by 2050, up from 1.6 billion
  - 20% of electricity used in buildings, 10% of total demand
EU Drivers

- Directives under implementation
  - Building, Efficiency, Renewable => Level Playing Field
  - F-gas directives (phase down of HFC)
- Electricity grids;
  - Off loading and Balancing
- Customer:
  - Reliable, Flexible, Simple, Cost & Energy Efficient
- Energy Utility:
  - Full service provider

Example Sweden

- >30% of EUs DC
- DC >25% market share
- 50% expansion to 2030 (1,5 TWh)
- Same drivers as last rapid expansion (96-06)
DC an energy-efficiency infrastructure solution

- DC up to 10 times more efficient
- EU average 4-5 times more efficient
- Mix of
  - Waste heat driven absorption
  - Free cooling (air and water)
  - Chillers/Heatpumps
  - Day/Night Storage
- Off loading and balancing the Electricity Grids

- Best Practice example – Linköping
  - Started -97 triggered by CFC/HCFC phase out
  - Today 100% Kigali compliant
  - Decided expansion 100% to 2030

<table>
<thead>
<tr>
<th>Project</th>
<th>Energy Efficiency multiple</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>1</td>
<td>Conventional Chillers and Split systems</td>
</tr>
<tr>
<td>Lusail, Qatar</td>
<td>2</td>
<td>Centralised chillers</td>
</tr>
<tr>
<td>Västerås</td>
<td>3-4</td>
<td>MIX: heatpump cooling/absorption/lake free cooling</td>
</tr>
<tr>
<td>Gothenburg</td>
<td>4-5</td>
<td>MIX: chillers/absorption/sea water free cooling</td>
</tr>
<tr>
<td>Linköping</td>
<td>5-6</td>
<td>MIX: NH3 chillers/absorption/river free cooling</td>
</tr>
<tr>
<td>Stockholm, Sweden</td>
<td>5-6</td>
<td>MIX: heatpump cooling/sea water free cooling</td>
</tr>
<tr>
<td>Maldives</td>
<td>&gt;10</td>
<td>SWAC (deep sea water cooling)</td>
</tr>
</tbody>
</table>
Critical Success Factors

The path to a successful district cooling development:

- Develop a master plan for the city
  **BUT**
- Phase the development to avoid technical and financial risks

The path to a successful project requires:

- A solid Project Management Structure
- A clear Project Management Process – to be followed
- Including A standardized and implemented Governance Model

With a

- Committed Executive Management and a
- Development team with clear responsibility and mandate
Project Management Structure

- A path to a success requires genuine knowledge about Business Project Management:
  - Market
  - Technique/engineering
  - Finance
  - Organization
  - Risk management

- Understanding exactly how each project phase should be governed and developed, adapted in detail and tailored in accordance with the local preconditions and requests.

![Project Management Structure Diagram]
The Project Management process consists of stages with defined tollgates after each phase.

The Project Management Process ensures:

- **Process optimization** - Increase efficiency in design, build, transfer and operation processes
- **Profitability** - Increase financial profitability
- **Speed** - Cut the development & realization time
- **Risks Decrease** - financial, market, technical and environmental risks
- **Governance** - Over all high level of business control

Speed = €
Governance model

- Standardized and implemented Project Steering & Control model & tools

- Secure Off takers and Permits as early in the development process as possible
Thank you!

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