CONGRESS + EXPO
NUREMBERG, 22–23.10.2019
Industrial | Commercial | Residential
Heating & Cooling | Components & Equipment

hp-summit.de
Heatpumps

Agenda

• SRM Introduction

• Selection Criteria
  • Environmental Criteria
  • Site Criteria
  • Commercial Criteria
  • Technical Criteria

• Tender/Decision Process
SRM is founded in Sweden, presenting the world’s 1st double rotating steam turbine

SRM invents the screw compressor

RefComp is founded in Lonigo (Italy)

Snowman is founded, achieving leadership in ice making machines by 2014

IPO of Snowman at Shenzhen Stock Exchange

Snowman becomes majority SRM sharehoder

Snowman acquires RefComp

Production of ind./com. Comp. at SRM Italy
Heatpumps

High Pressure Compressor SRH

- Design pressure: 63 bar
- SRH high pressure compressor for
  - high temperature heat-pumps with ammonia
  - CO2/NH3 cascade systems

Displacement (m³/h@50Hz)

12 series: 123°-161
16 series: 160°-222
18 series: 395°-480
20 series: 640°-854
26 series: 1185°-1409
28 series: 1640°-2017
34 series: 2360°-2770

condensing temperature

evaporation temperature
Heatpumps

Products SRH

NH3 Heatpumps
- Single stage
- Booster systems

CO2 Heatpumps
- Single stage

h/p stage
l/p stage
Environmental Criteria

CO2 Footprint
Pooling of demand
Heatpump with Natural Refrigerants (NH3, CO2) vs. Combustion boiler
=> Climate Change Mitigation

<table>
<thead>
<tr>
<th></th>
<th>CO2/1MW/h</th>
<th>operating hours</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>light oil</td>
<td>0,28 kg</td>
<td>8736</td>
<td>2.446 kg</td>
</tr>
<tr>
<td>gas</td>
<td>0,22 kg</td>
<td>8736</td>
<td>1.922 kg</td>
</tr>
<tr>
<td>fire wood</td>
<td>0,39 kg</td>
<td>8736</td>
<td>3.407 kg</td>
</tr>
<tr>
<td>electricity</td>
<td>0 kg</td>
<td>8736</td>
<td>0 kg</td>
</tr>
</tbody>
</table>

Source: Umweltbundesamt (Federal EPA) and www.erneuerbare_energien_und_klimaschutz.de

Electricity generated by non CO2 emmitting process
CO2 Emmission of Production is not considered
Site/Project Criteria

Political Issues

- local content
- local service provider for installation, repair and maintenance
- local source of fuel
  - bio mass
  - Coal
- green attitude
- scare of Ammonia leakage => semi-hermetic compressor, plate in shell hx
Site/Project Criteria

Load profile

• capacity
• part load operation => screw higher rpm range
• process security
  • multiple systems
  • traditional systems for back up
    • bio-mass
    • conventional fuel
Technical Criteria

• Required temperature of water => Tc, district heating 90 °C
• Required Te due to heat sources
  • geo-thermal water e.g. 22 °C => Te: +20 °C
  • sea water e.g. 12 °C => Te: +10 °C

lift (Tc-Te) => e.g. 20-93 = 73K => screw compressor

• Refrigerant => natural refrigerant excludes turbine
• Capacity => excludes small compressor solutions like commercial piston, scroll
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Commercial/Financial Criteria

• selling price of heating
• cost of electricity
• installation cost => single/multiple systems
• service cost
  • scheduled services
  • overhauls
• operating cost
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Commercial/Financial Criteria

- risk analysis
  - assessment of technologies employed
    - screw vs piston
      - failure rate of piston due to plenty of moving parts
      - pulsation, vibration => potential damage to heat exchangers
    - single vs multiple compressor solutions => multiple failure risk
  - selling price of heating vs. electricity cost => matching agreements?

=> life cycle cost
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Tender/Decision Process

- Investor
- General contractor
- Refrigeration contractor
- System supplier
- Operator
Heatpumps

Tender/Decision Process

first idea → budget → location search → DA approval → gen. contractor → refrig. contractor → system

60% sale of capacity

production → commissioning

6 m. → 6 m. → 3 m. → 3 m. → 4 m. → 4 m. → ??? → 3 m. → 3 m.

3 to 4 years
The inventor of screw compressor technology

Heatpumps

Environmental Criteria
Heatpumps operating with sustainably sourced electricity can be a tool for Climate Change Mitigation

Site/Project Criteria
Political issues can influence the form, size and way of operation of heatpumps
The Load Profile will influence the selection of compressor technology and amount of compressors

Technical Criteria
Required temperature output and used heatsources plus selected refrigerants can be decisive for compressor technology

Commercial/Financial Criteria
Hard cost and revenue facts, but also anticipation of risk will merge into life cycle cost

Tender/Decision Process
From idea to realization a whole lot of stake holders from investors to service providers are interacting in a process which can easily take 4 years
EUROPEAN HEAT PUMP SUMMIT
POWERED BY CHILLVENTA

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