

EUROPEAN HEAT PUMP SUMMIT

POWERED BY CHILLVENTA

CONGRESS + EXPO
NUREMBERG, 22–23.10.2019

Industrial | Commercial | Residential
Heating & Cooling | Components & Equipment

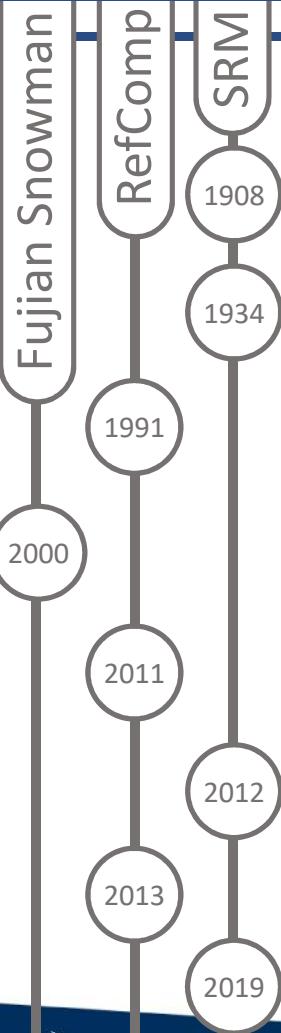
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Agenda

- SRM Introduction
- Selection Criteria
 - Environmental Criteria
 - Site Criteria
 - Commercial Criteria
 - Technical Criteria
- Tender/Decision Process

SRM: 85 YEARS EXPERIENCE IN COMPRESSORS



1908 SRM is founded in Sweden, presenting the world's 1st double rotating steam turbine

1934 SRM invents the screw compressor

1991 RefComp is founded in Lonigo (Italy)

2000 Snowman is founded, achieving leadership in ice making machines by 2014

2011 IPO of Snowman at Shenzhen Stock Exchange

2012 Snowman becomes majority SRM shareholder

2013 Snowman acquires RefComp

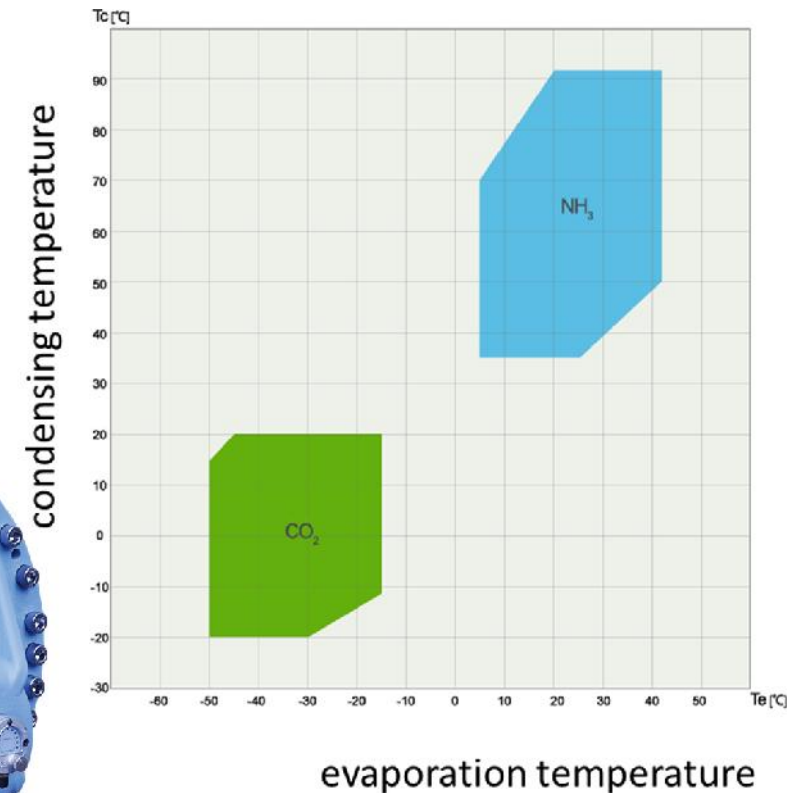
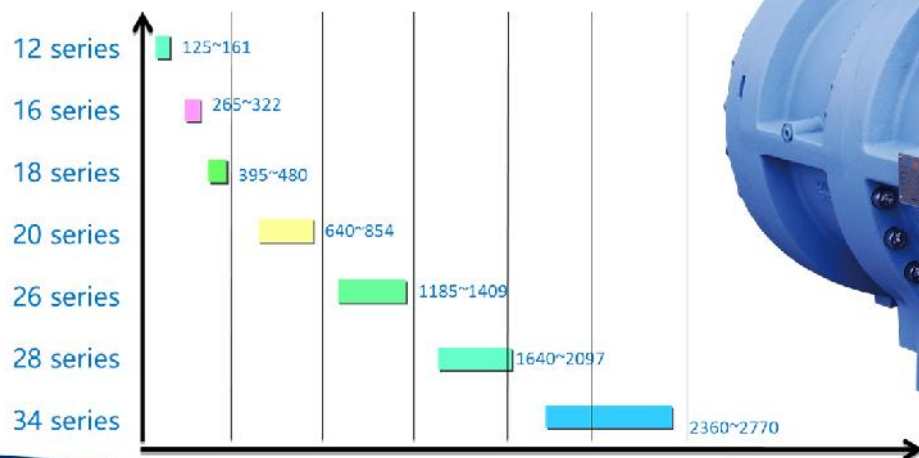
2019 Production of ind./com. Comp. at SRM Italy



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)



Heatpumps



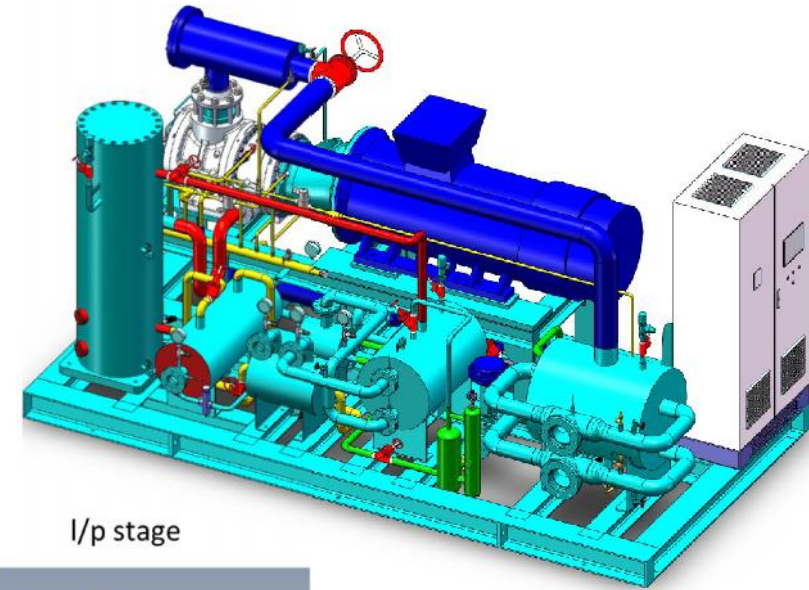
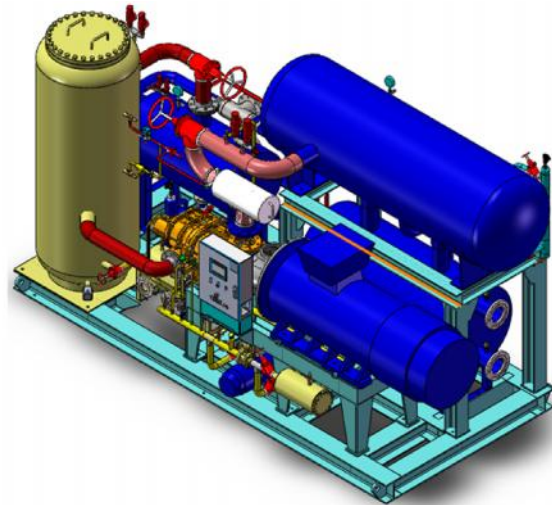
Products SRH

NH3 Heatpumps

- Single stage
- Booster systems

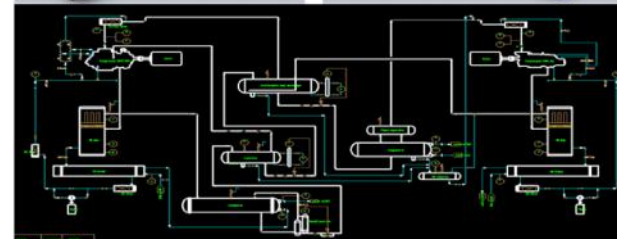
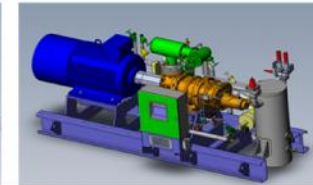
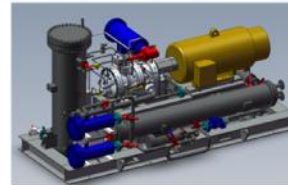
CO2 Heatpumps

- 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



	CO2/1MW/h		operating hours	CO2	
light oil	0,28	kg	8736	2.446	kg
gas	0,22	kg	8736	1.922	kg
fire wood	0,39	kg	8736	3.407	kg
electricity	0	kg	8736	0	kg

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

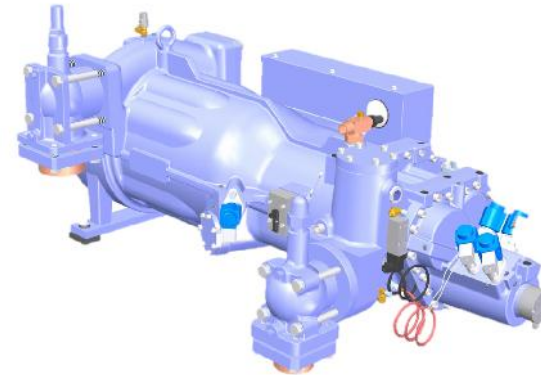
Electricity generated by non CO2 emitting process

CO2 Emission 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 => T_c , district heating $90\text{ }^\circ\text{C}$
- Required T_e due to heat sources

- geo-thermal water e.g. $22\text{ }^\circ\text{C}$ => $T_e: +20\text{ }^\circ\text{C}$

- sea water e.g. $12\text{ }^\circ\text{C}$ => $T_e: +10\text{ }^\circ\text{C}$

lift ($T_c - T_e$) => e.g. $20 - 93 = 73\text{K}$ => screw compressor

- Refrigerant => natural refrigerant excludes turbine
- Capacity => excludes small compressor solutions like commercial piston, scroll

Commercial/Financial Criteria

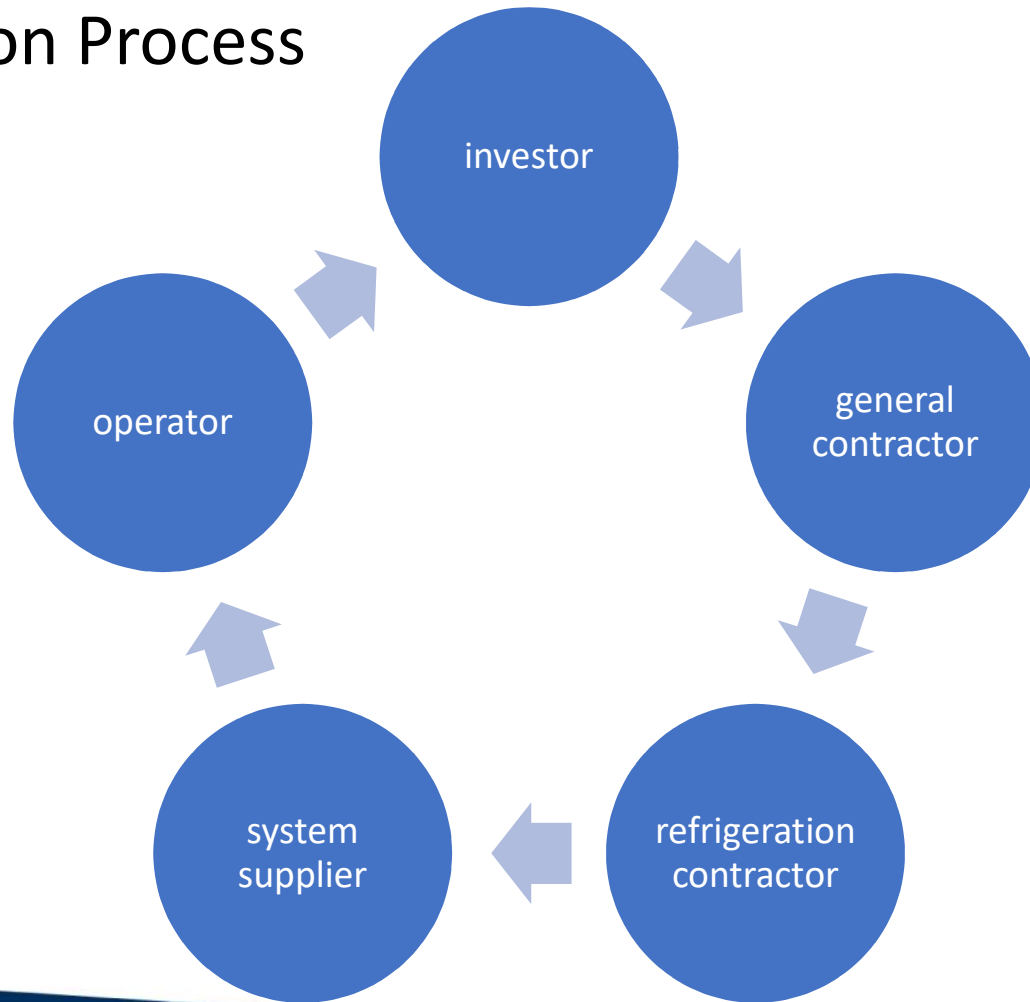
- selling price of heating
- cost of electricity
- installation cost => single/multiple systems
- service cost
 - scheduled services
 - overhauls
- operating cost

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?

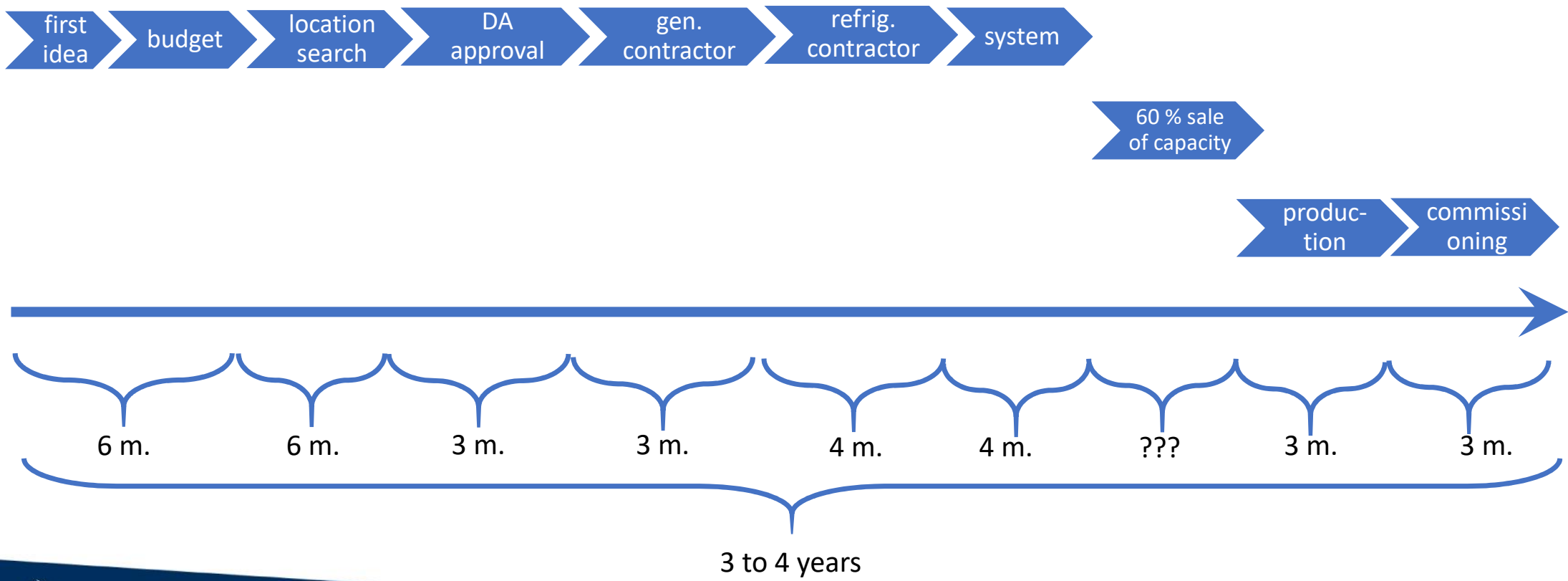
=> life cycle cost

Tender/Decision Process





Tender/Decision Process





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

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