



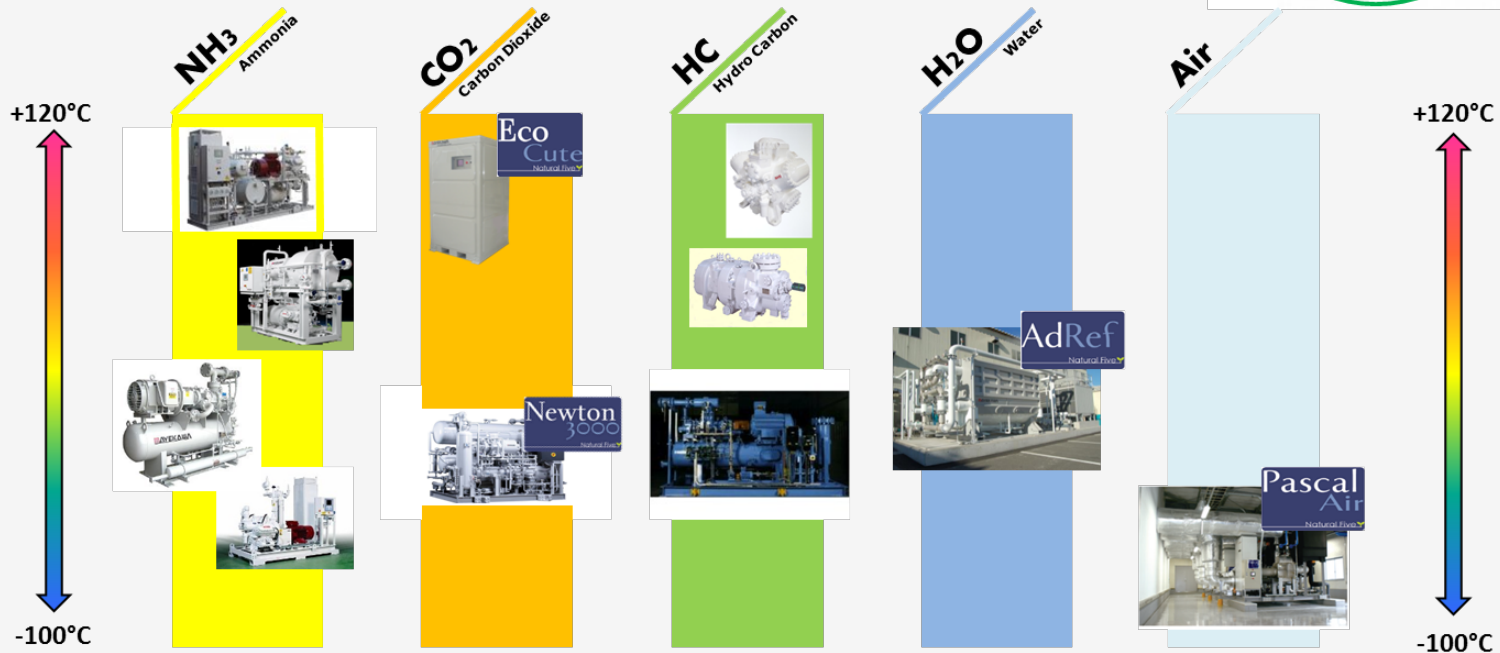
Industrial refrigeration application and technology trends

Eric DELFORGE
Corporate Business & Policy Officer
MAYEKAWA EUROPE



Industrial Refrigeration & Heat Pump solutions provider

Natural five refrigerants 





Industrial refrigeration : application and technology trends



Process industry cooling

Highly Controlled environments:

- *allow for ATEX applications > HC's*
- *Propylene & Propane availability*

Ammonia equally strong

*R22 phase out : important transition
opportunities*

Industrial refrigeration

Ammonia:

- *Historically most common used refrigerant*
- *Accounts for most HCFC&HFC conversions*

CO₂:

Settling in negative temperature applications

HC & Air: *very low temperature applications*

Technological trends

Screw vs. reciprocating

Pistons: COP ↗ & Capex ↘

Latest generation Pistons : opex ↘

Minimize refrigerant charge

Cascade systems

Innovative heat exchangers

NH₃/CO₂ hybride chiller



Technological trends

Increase efficiency

Frequency control, PM motors

Advanced valve control systems

Multi-stage systems (compound compressors)

Heat recuperation

Hot gas recuperation vs. Low Tc

Technological trends

system safety

Introduction semi-hermetic compressor/motor

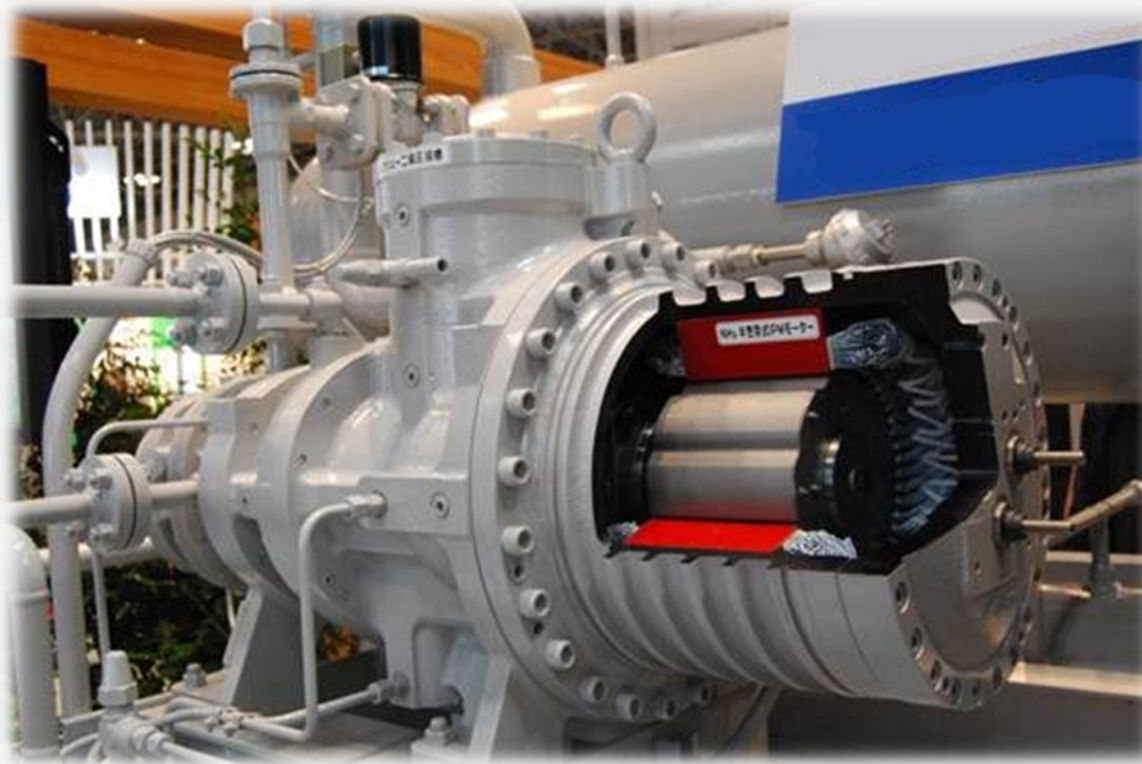
- *Eliminate potential leaks*

Motor allignment advantages

Ammonia semi-hermetic piston chiller



Ammonia semi-hermetic screw compressor



Industrial heat pump trends

NH3 : hot water temperatures up to 90°C

- *Using condensing waste heat*
- *Using stable thermal heat source*

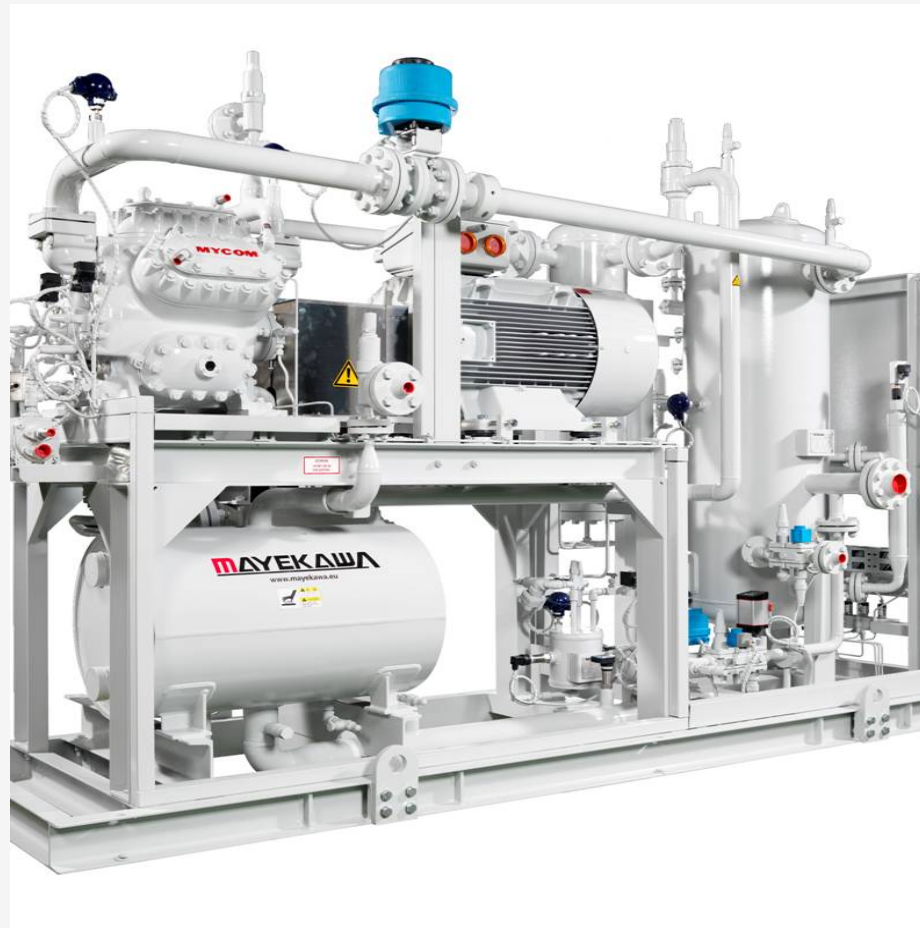
HC : allowing to exceed 120°C temperatures

- *Competition fossil fuel steam boilers*

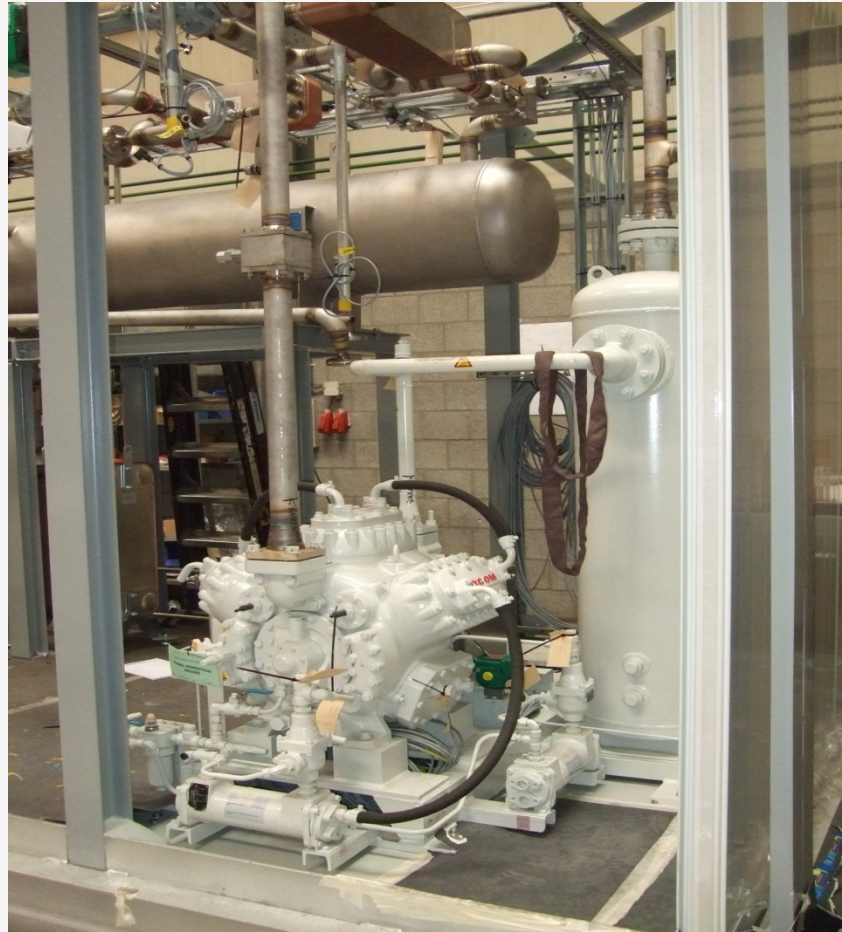
*Mayekawa Industrial Heatpump
Water chilling 10°C to 1°C / 1MW - 90°C hot water*



*Mayekawa Industrial Heatpump
500kW - 70°C hot water*



Butane Industrial heat pump / 120°C steam



Industrial refrigeration Short term challenges

ban R22 : transition turn-around

Investments: faster from project to start-up

Resource shortage : enhance training

Legislation : information & implementation

Industrial refrigeration, natural refrigerants & legislation

*Legislation on high & medium GDP refrigerants evolve much faster and
tend to be more restrictive worldwide*

*Industry needs a stable legislative environment
Capex life cycle is 20, 25, 30...years*

*Natural refrigerants based technology are the ideal solution for
sustainable industrial activities.*



n e t w o r k

natural refrigerants

17 July 2014 in Paris, France

Thank you very much!