



TECHNOLOGY and MARKET TRENDS

Industrial Refrigeration

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TECHNOLOGY and MARKET TRENDS Industrial Refrigeration



World Leader in Industrial Refrigeration
Mission : Food Safety and Sustainability

Headquarters in Tokyo JAPAN
Over 3300 collaborators
8 factories
Branches in more than 40 countries

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MARKET and TECHNOLOGY TRENDS
Industrial Refrigeration

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The context

Also refrigeration is related to global events

- **Population & food**
- **Energy & pollution**
- **Geo-politics & economy**



Furthermore,

New “game changing” evolutions are ahead

- **Fossil fuels – threaten world stability**
- **Interconnectivity – always, everywhere**
- **Centralized vertical organizations ?**



Market trends for Industrial Refrigeration

1. Agro

Chilling, cooling and freezing of food at large

- Food production increases
- **Need for dramatic decrease of spoiled food**
- Frozen food market potential
- Domestic > Industrial prepared meals

Trend : Ever MORE Refrigeration



Agro and Refrigerants

Ammonia :

Oldest common used refrigerant
Historically most used refrigerant
Accounts for most of CFC/HCFC conversions
Recently followed by HFC's

CO2 :

Settling in negative temperature applications

HC & Air :

Very low temperature applications

Water : Adsorption





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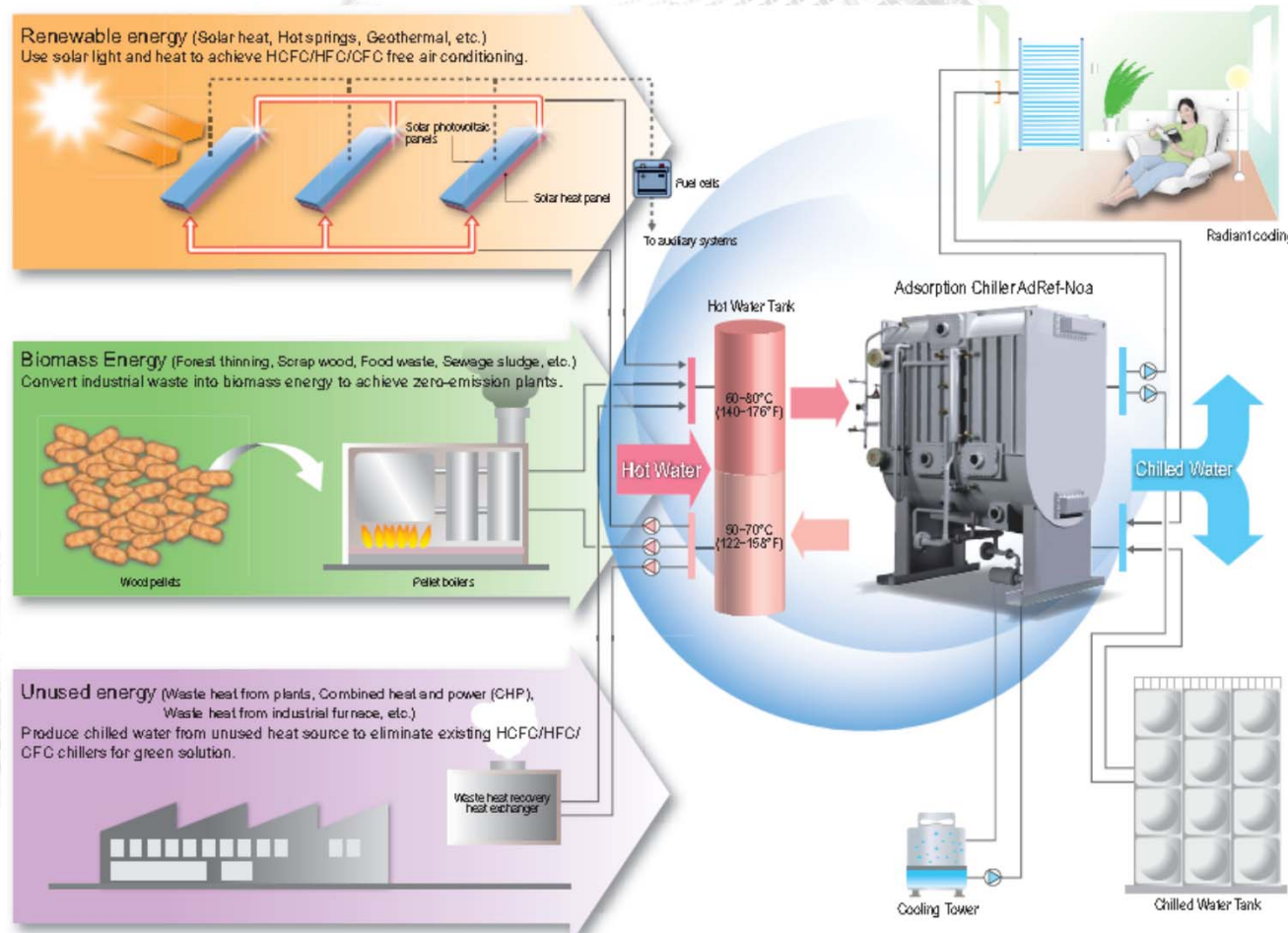
Pascal Air system



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Adsorbtion cooling systems





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Adsorbtion cooling system



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Technological trends for Industrial Refrigeration

MAYEKAWA/Mycom

- 90 Years experience with NH₃
- About 40 years experience with CO₂ and HC's

Industrial Refrigeration = Mayekawa's core business

- New generation of screw & piston compressor blocks



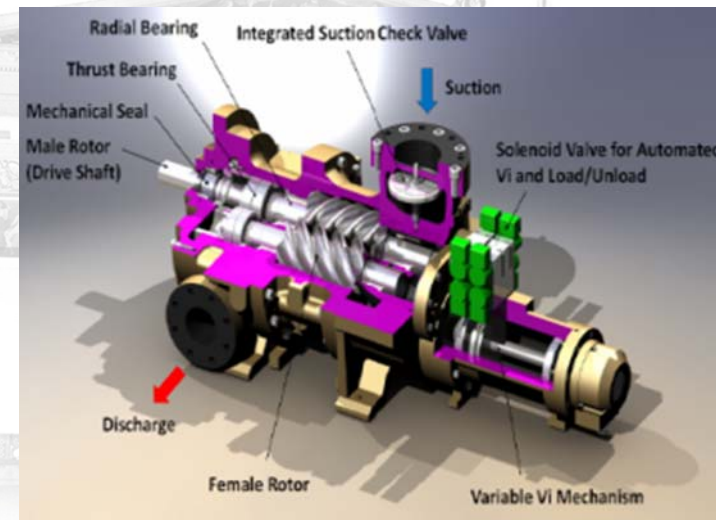
New screw compressor model-J



New profile rotors (5 × 6)
High efficiency +10%



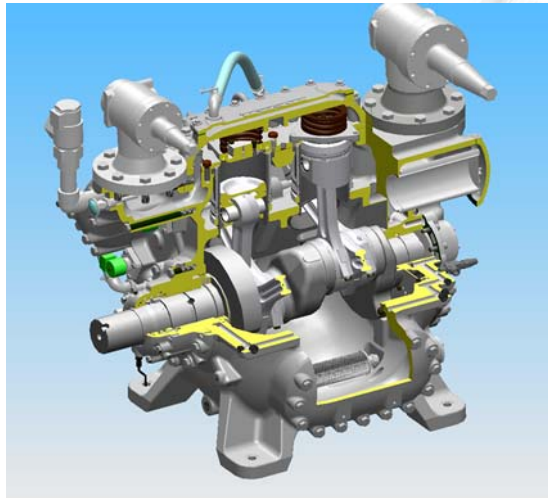
"Vi" automatic variable
Optimized operation control
Low vibration, low noise
Flanged motor





New piston compressor M-type

High efficiency : +10%
Wider operation range
Bigger capacities





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- 90 Years experience with NH₃
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Industrial Refrigeration = Mayekawa's core business

- New generation of screw & piston compressor blocks
- Hermetic and semi-hermetic compressors



& K-type



Ammonia semi-hermetic piston chiller



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Newton 3000 Modular Skid



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From trend to mainstream

Minimize refrigerant charge :

- Cascade systems
- Brine systems
- Innovative heat exchangers

Increase efficiency :

- Frequency control
- Indirect cooling
- Cascade cooling & cooling load separation



Trends for industrial heat pumps

1. NH3

Hot water temperatures up to 100° celcius

- Using condensing waste heat
- Using thermal heat (w/w)

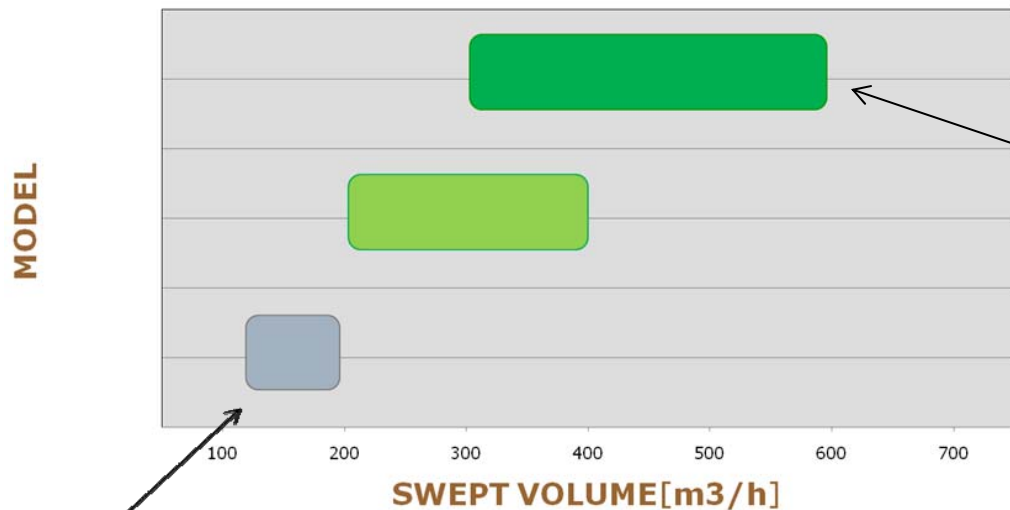
Applications:

- Industrial hot water
- District heating

Succes : dependents on Gas vs. Electricity price evolutions



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Heating AND Cooling, best of both worlds



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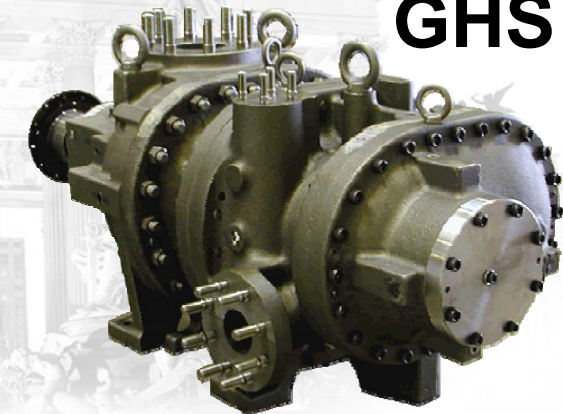


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MYCOM screw compressor heat pump



GHS

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Trends for industrial heat pumps

1. NH3

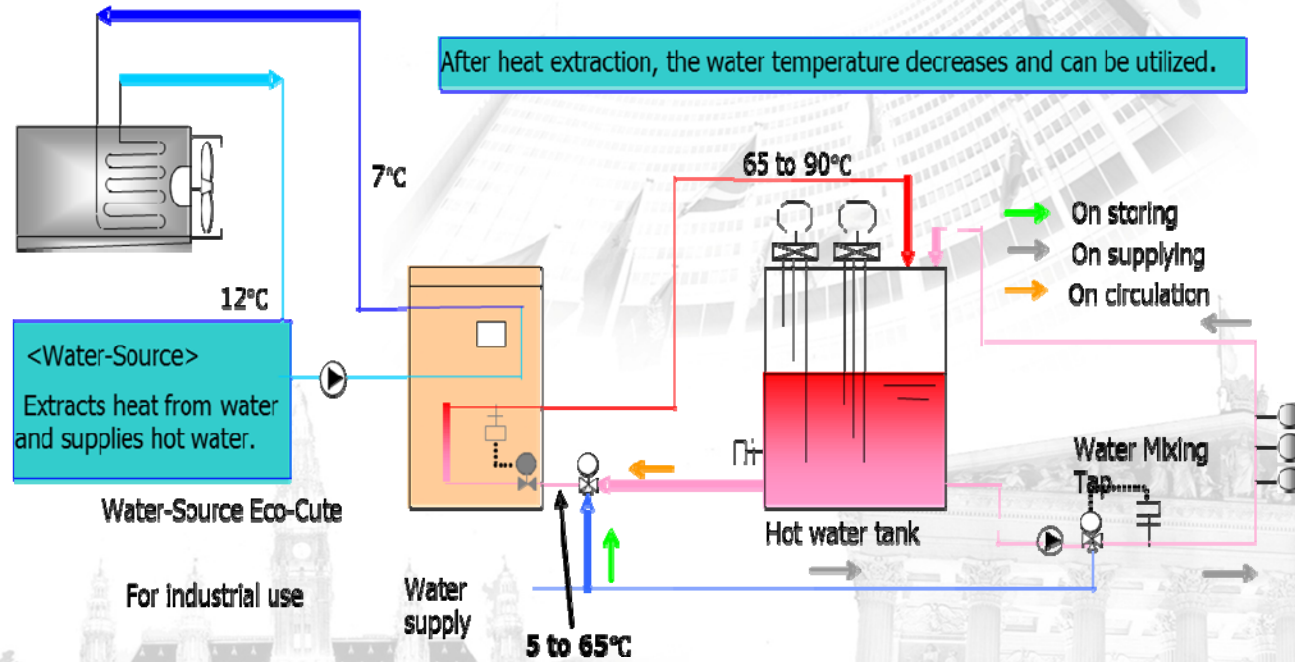
2. CO2



3. HC's : high temperatures > 120° celsius



Eco-cute heat pump





Finally...

- More than 80% of article 5 countries have Mayekawa Compressor units installed on naturel refrigerants.
- The knowledge and experience to operate and service natural refrigerant refrigeration installations is present in the field.
- Technology based on Natural Refrigerants will continue to become more efficient and cost effective.
- Food safety and sustainable entrepreneurship are key to Mayekawa, it's customers and end-users.



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Thank you very much for your attention

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A Revolution in Efficiency

At MAYEKAWA, the pursuit of advanced technology never ceases.

M-Series

J-Series

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