



Our continuous challenges
for the use of natural refrigerant based technologies
in the industrial sectors

By

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ABOUT **MAYEKAWA**

MAYEKAWA MFG. CO., LTD.

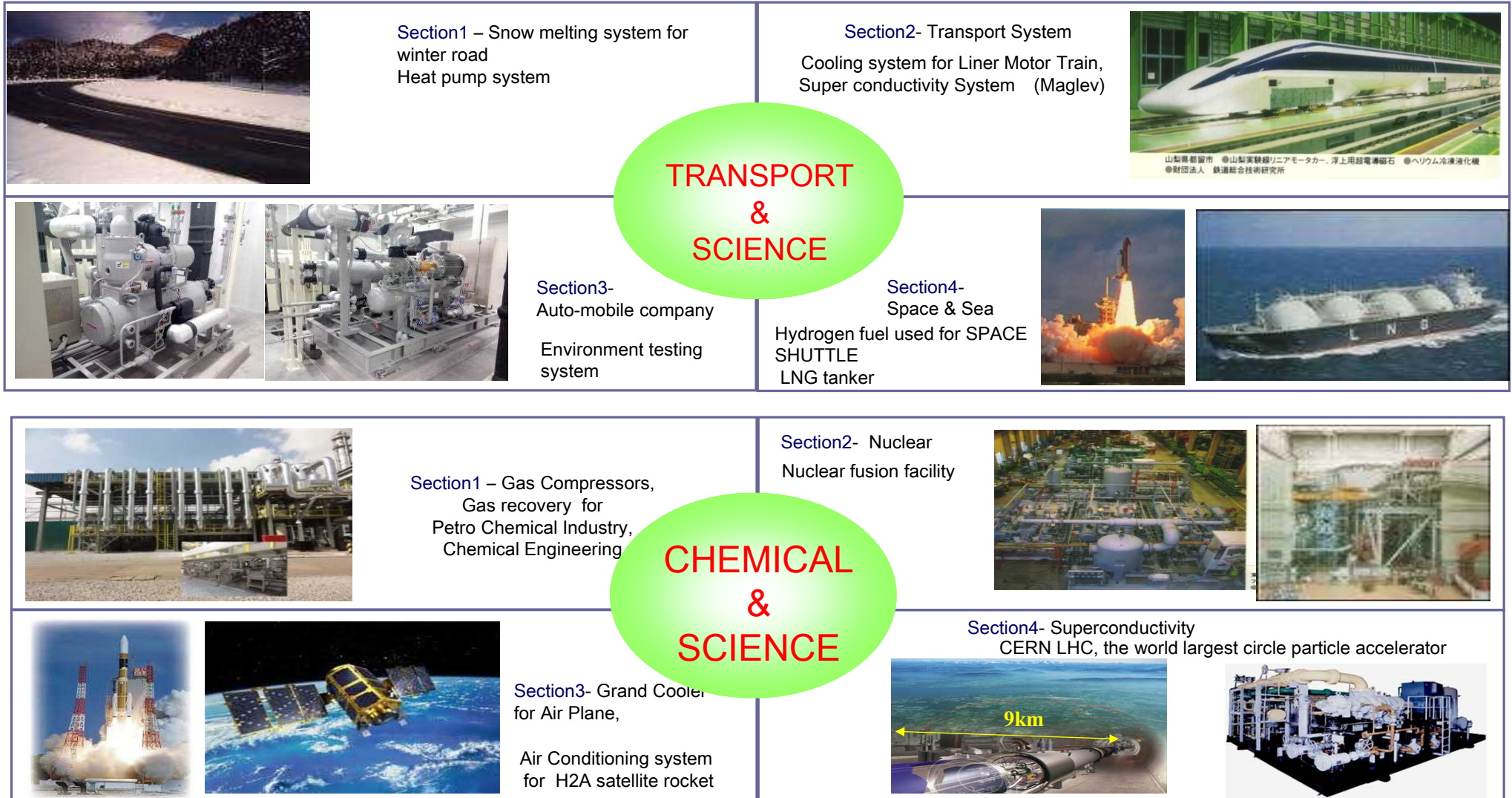
Founded : May **1924**
Capital : **1 billion yen**
Headquarters : **Tokyo JAPAN**
employees : **Over 5,000**
Business places : **40 countries**
(with 100 office)
Factory : **Overseas x 7**
Plants in Japan : **Japan x 3**
President : **SHIN MAEKAWA**











Business Activities

- **Manufacturing and sale of Industrial Refrigeration Compressors and various gas compressors, freezers, and food processing machines & robots**
- **Refrigeration Plant Engineering**
- **Consulting and After-Sales Service**

OUR BUSINESS FIELD



OUR BUSINESS FIELD

	<p>Section2- Air Conditioning System TOYAKO Summit in Japan. Building air conditioning</p> 	<p>Section1 Cold Distribution Center Cold Store, Cold Distribution center</p> 	
 <p>Cold Store Building A/C</p>			
	<p>Section3- Super Cold Storage (-60°C) Pacal Air with Air Cycle</p> 	<p>Section4- Chilled water Adsorption chiller with solar panel</p> 	
	<p>Section1 –Beverage and brewhouse Soft Drink, Brew house, Coffee and other Beverage Ice Cream, Pudding</p> 	<p>Section2- Food Processing Automated food delivery system</p> 	
 <p>Food & Drink</p>			
	<p>Section3- Chilled 6 Frozen Ready Meal Hamburger Patty Freezing Various Cooking & Freezing System</p> 	<p>Section4- Meat Processing Automated cutup robots</p> 	

INDONESIA
MALAYSIA
PHILIPPINES
SINGAPORE
THAILAND
VIETNAM
BANGLADESH
INDIA

Global Network



More than **40** countries
with **100** Branch office
7 overseas plants

Global Environment Issue

Ozone Depletion

Global Warming

Montreal Protocol

CFC : banned in 1996 **HCFC** : Limited from 2004
Totally Banned in 2020

Kyoto Protocol

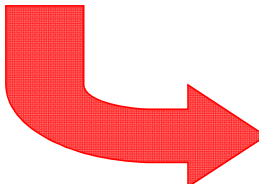
Reduction of global warming gas by 6% from 1990 level in the first period of 2008~2012). **HFC are the target**

Freon Recycling Rule:

CFC,HCFC,HFC

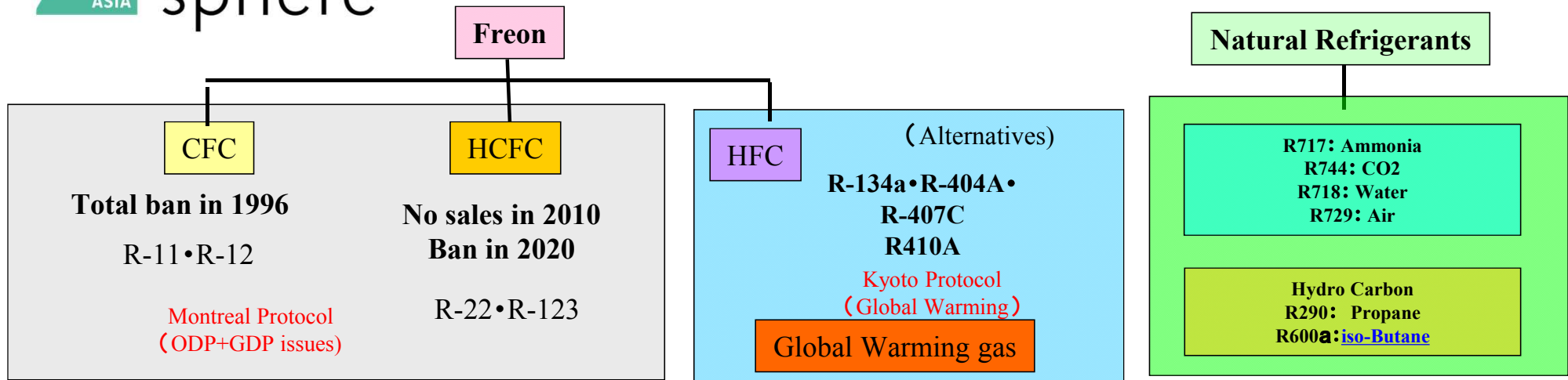
PRTR Rule (chemical gas): HCFC22,HCFC123, Ethylene glycol, etc.

Introduction of Environment Tax, Freon Tax to industries



Demand for use of Natural Refrigerant has increased

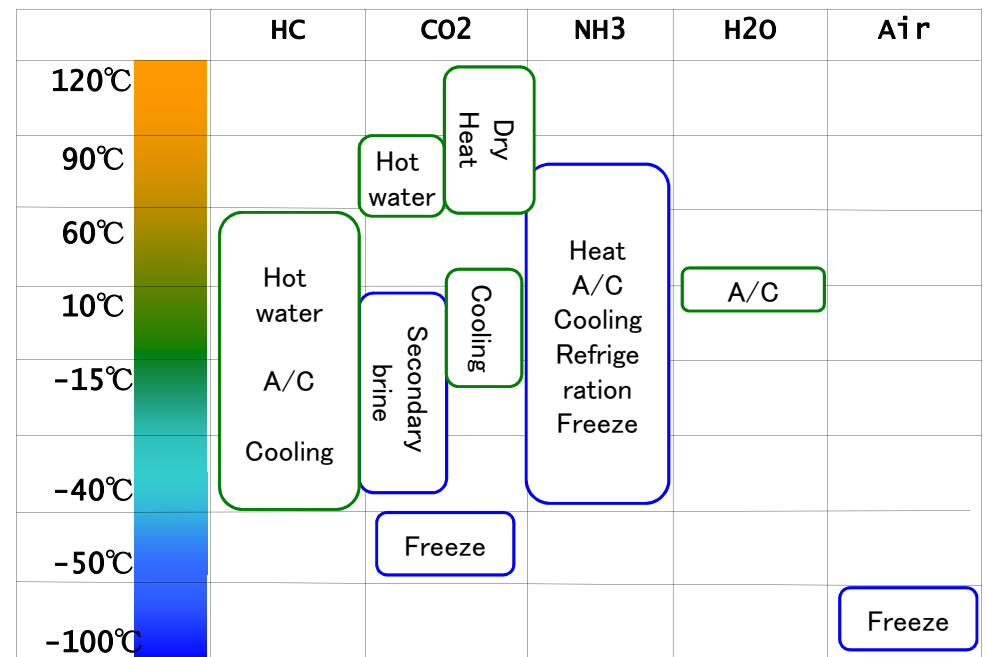
FUTURE REFRIGERANTS HAS CHANGED



Refrigerant Groups	Banned Freon CFC			Limited Freon HCFC	Alternative Freon HFC				Natural Refrigerant Natural Fives		
	R11	R12	R502	R22	R134a	R404A	R407C	R410A	R717 NH3	R744 CO2	R600a Iso butane
Refrigerants	R11	R12	R502	R22	R134a	R404A	R407C	R410A	R717 NH3	R744 CO2	R600a Iso butane
ODP	1.0	1.0	0.33	0.055	0	0	0	0	0	0	0
GWP	4000	8100	5800	1700	1300	3780	1650	1980	<1	1	3
Characters	<ul style="list-style-type: none"> • Big ODP • Use by refrigerator, car air conditioning • banned in 1995 			<ul style="list-style-type: none"> • Per Montreal Protocol • will be banned in 2020 • Price will go up 	<ul style="list-style-type: none"> • Instable gas • No ODP • Specified as GWP gas by Kyoto Protocol • Anticipated to be regulated by authority 				<ul style="list-style-type: none"> • Natural • Almost zero ODP and GWP 		

Stop GLOBAL WARMING

Mayekawa provides environmentally friendly refrigeration technology by using natural refrigeration, without losing efficiency.



NATURAL FIVE

HC



Heat pump package system for buildingz air conditioning with hydro carbon refrigeration

CO₂



“UNIMO”, a CO₂ heat pump system for industrial use. (hot water / hot air)

NH₃



“NewTon”, NH₃/CO₂ refrigeration system for cold store and food processing factory.

H₂O



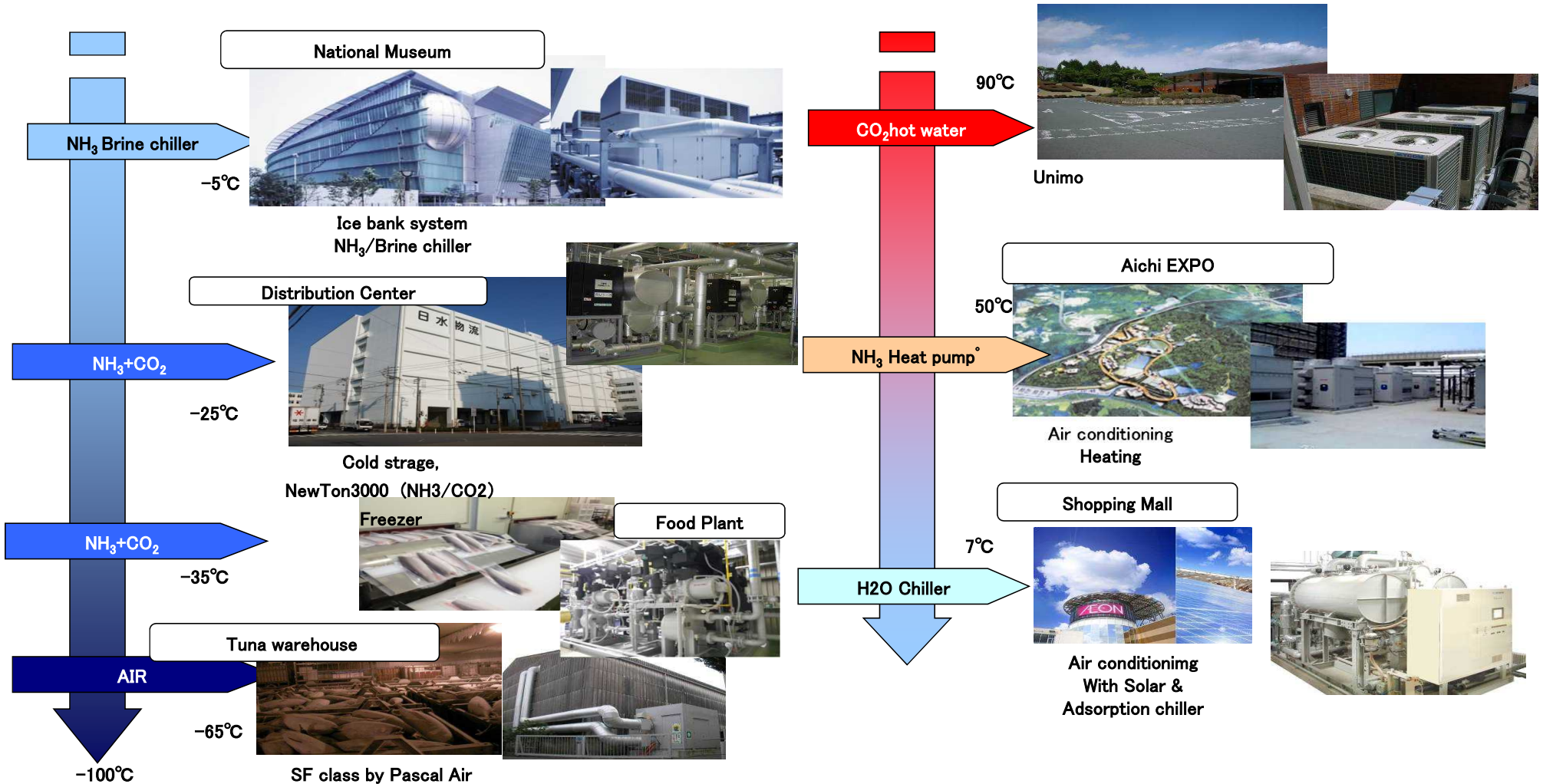
“ADREF NOA”, Adsorption chiller

AIR



“PASCAL AIR”, air cycle system for replacing R22/R23 cascade system

NATURAL FIVE APPLICATION



Recent Market **Trends**

- R717 – widely used and historically, the most common refrigerant used in HCFC/HFC conversions
- CO₂ – setting the standard in commercial refrigeration applications
 - application range is widening
- Air – very low temperature applications

Technology **Trends** / Efficiency

- VSD control
- Permanent magnet motors
- Electronic valve control systems
- Multi stage systems

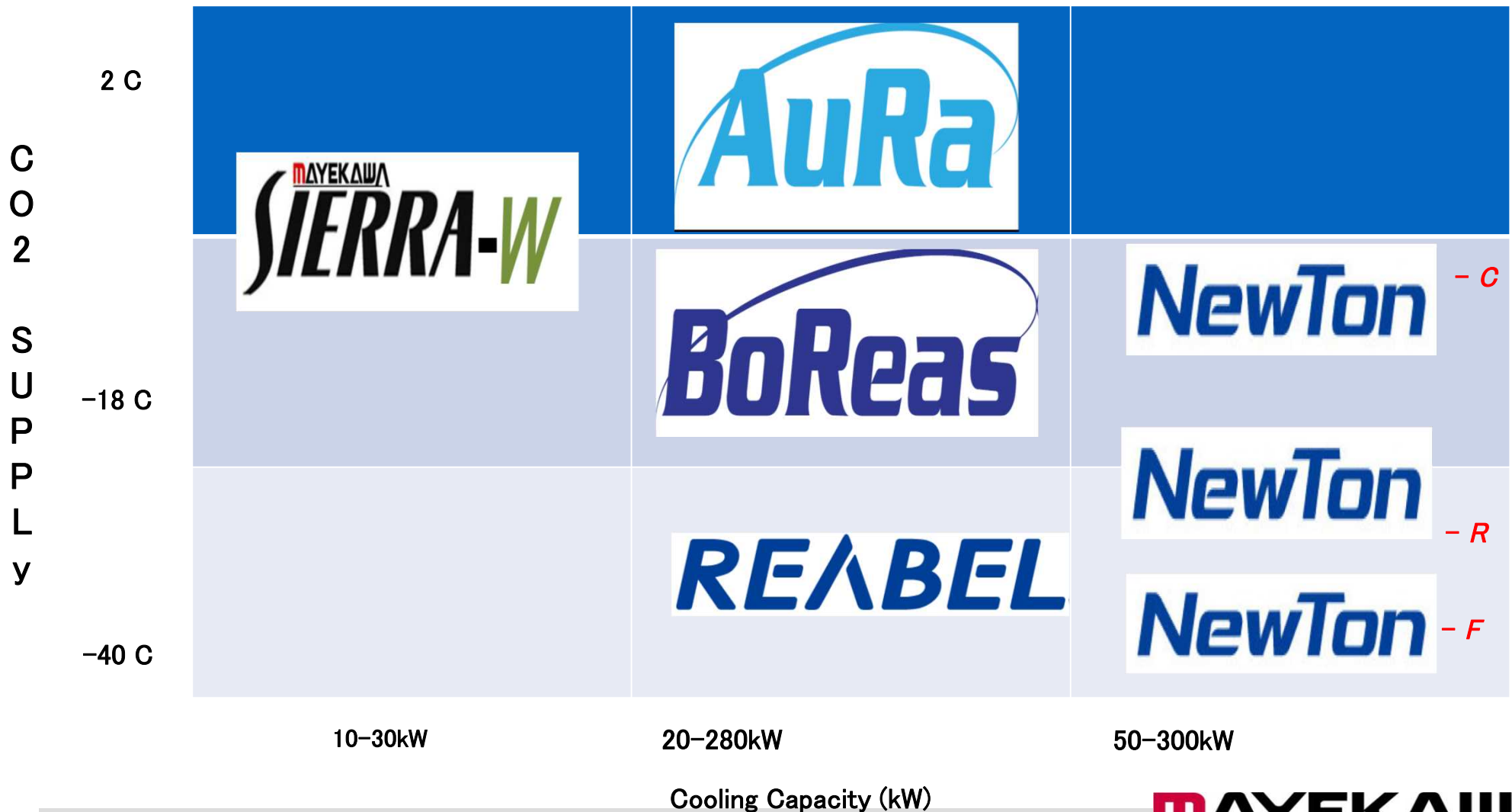
Technology **Trends** / Heat Recovery

- Hot gas usage vs Low T_c
- Heat pump applications (waste heat, stable thermal heat sources)

System **Safety**

- Low charge systems
- Use of semi-hermetic compressors/motors to eliminate potential leaks
- Motor alignment advantages using semi-hermetic compressors
- Reliable full automated monitoring system with IoT technology

Our NH3/CO2 Secondary Chiller Package Product Overview



Overview of Mayekawa's NH₃/CO₂ Circulation System**NewTon****Shaping Refrigeration Systems for Tomorrow****Low Temperature Semi Hermetic Screw Package**

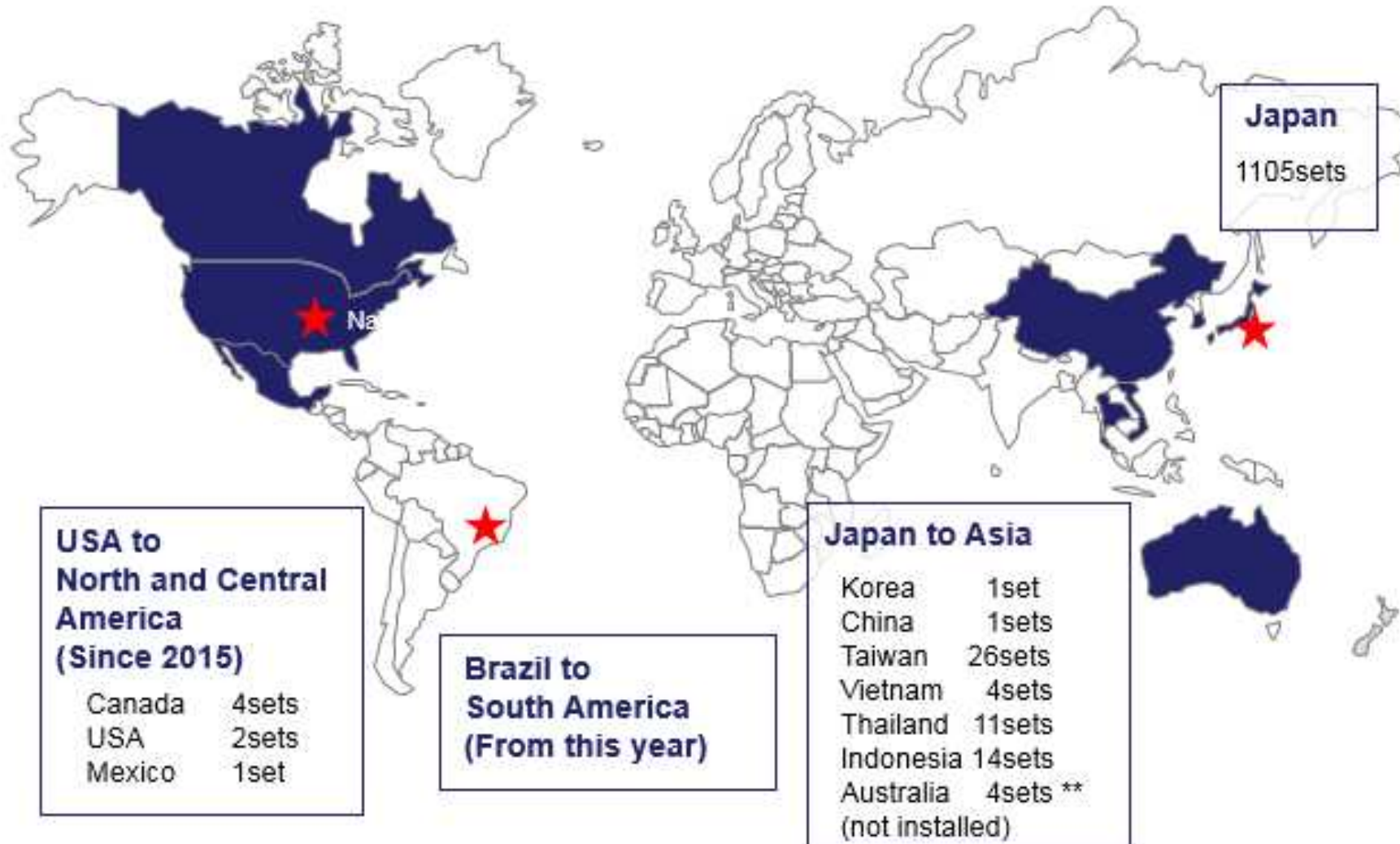
- -25C to -42C CO₂ Supply Temperature range
- 50kW to 300kW Capacity range – single compressor
- Internally Compounded Twin Screw Design
- IPM Motor with Integrated VFD
- High Performance Plate and Shell Heat Exchangers
- Low NH₃ Charge with optimized flooded control

Medium Temperature Semi Hermetic Screw Package

- -10C to 2C CO₂ Supply Temperature range
- 140kW to 240kW Capacity range – single compressor
- Single Stage Twin Screw Design
- IPM Motor with Integrated VFD
- High Performance Plate and Shell Heat Exchangers



Installations /NH3/CO2 Circulation Svstem



Our **Challenges**

- Implementation of strict F gas restriction, legislation and acknowledgement by end users
- Longer term view required by end users
- Training requirements
- Investment by end users
- Government support/funding of energy efficient and natural refrigerant projects



ATMO
sphere

Thank you very much!

