

Energy Efficiency Sector Project

The Latest Technology of Industrial Refrigeration Equipment

*Promoting Bilateral Mechanisms in Asia and the Pacific
A Workshop on the Joint Crediting Mechanism*

May 22, 2015

*PT. Mayekawa Indonesia
Suhaimi Sirad*

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1. Company Introduction

Company Profile

MAYEKAWA MFG. CO., LTD.

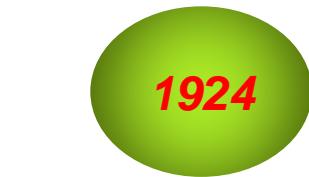
Established in: 1924
Capital: 1 billion yen
Sales: 1.1 billion U.S.D (group)
President: Tadashi Mayekawa
Employees: 2,300 in Japan
 1,500 overseas
Offices: 60 in Japan, 94 overseas
Plants: 3 in Japan, 6 overseas



Tokyo Head Office

Contents: Manufacture and sales of various kinds of gas compressors mainly **for industrial refrigeration, plant engineering and service engineering** related to agriculture, meat and seafood processing industries, food distribution and energy fields.

History



1924



1924
Vertical reciprocating
compressor



1958
Multi-cylinder
reciprocating
compressor



1978
Ultra low
temperature
accelerator



Offshore platform



Refrigerated
cargo vessel



1964
Screw compressor



1970

Freezer system for food



1980

Helium compressor
For maglev train

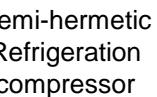


Chicken whole
leg deboning robot

1990



H2 gas compressor
for rocket fuel



2000

Semi-hermetic
Refrigeration
compressor



2015

Air cycle refrigeration
system



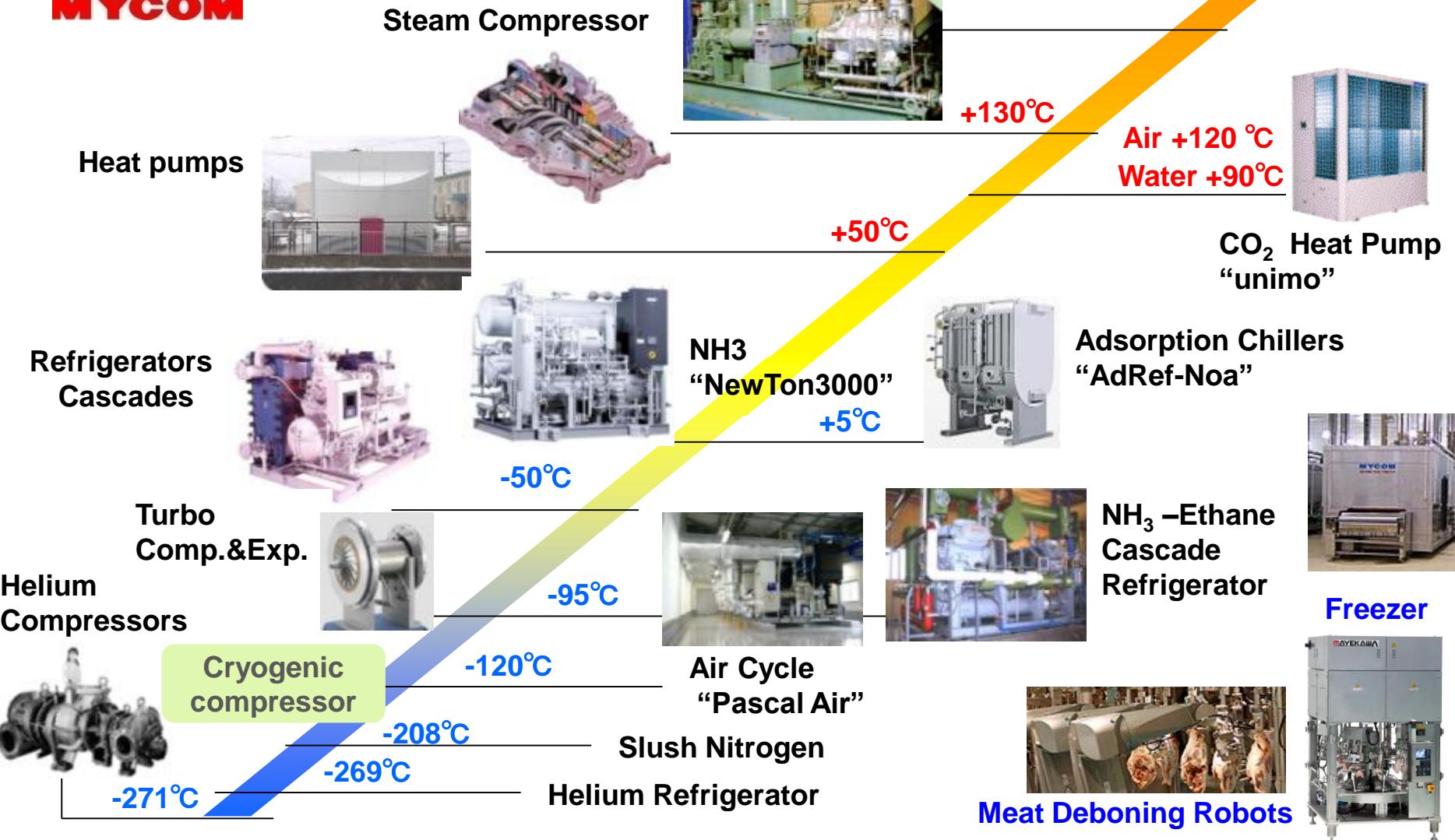
CO2 heat pump series



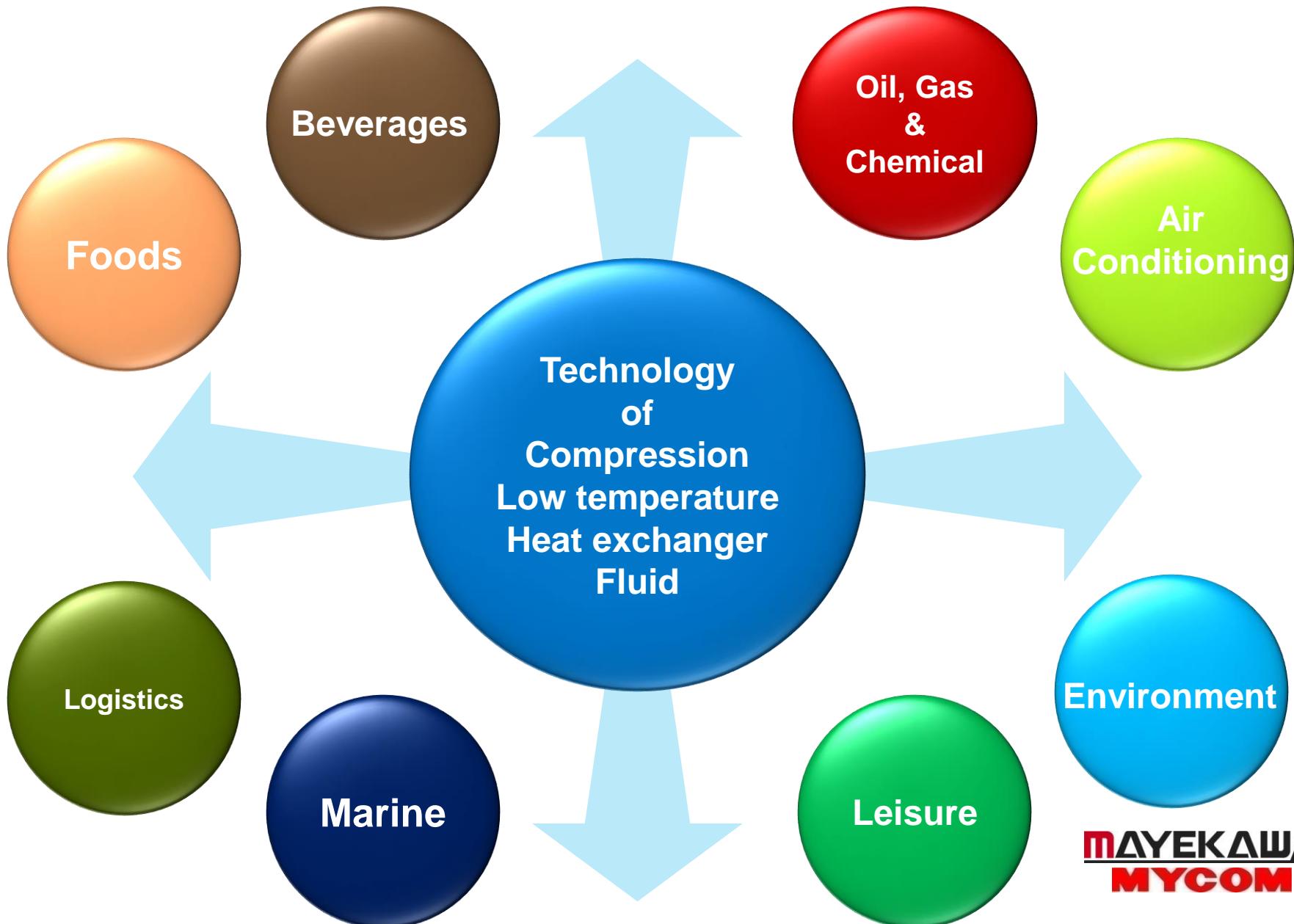
1998
Nagano Olympic
Winter Games

Mayekawa Products from -271°C to +180°C

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Business Fields



Around the World



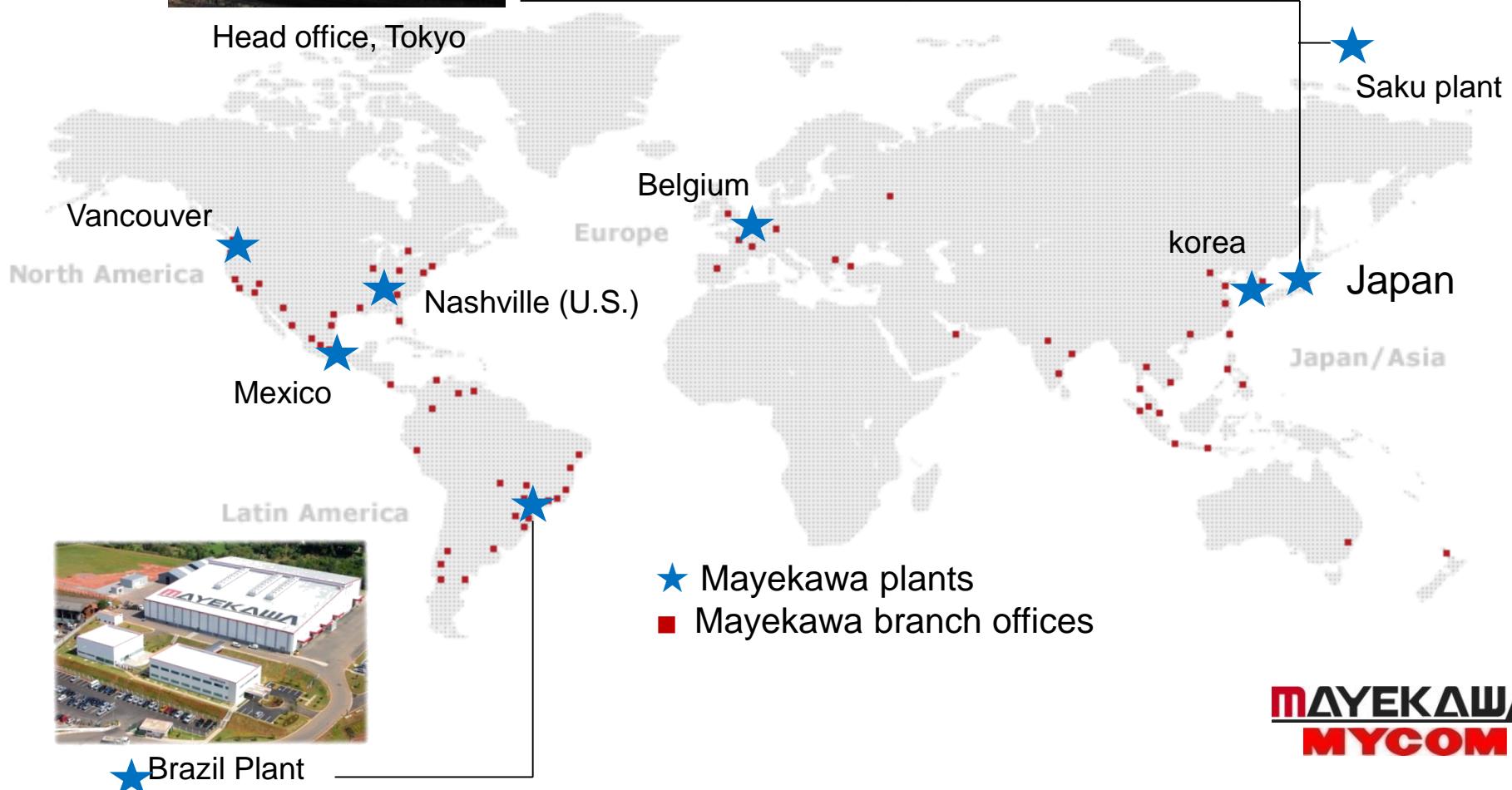
Head office, Tokyo



★ Moriya plant



★ Higashihiroshima plant



★ Brazil Plant

Company Profile / Indonesia

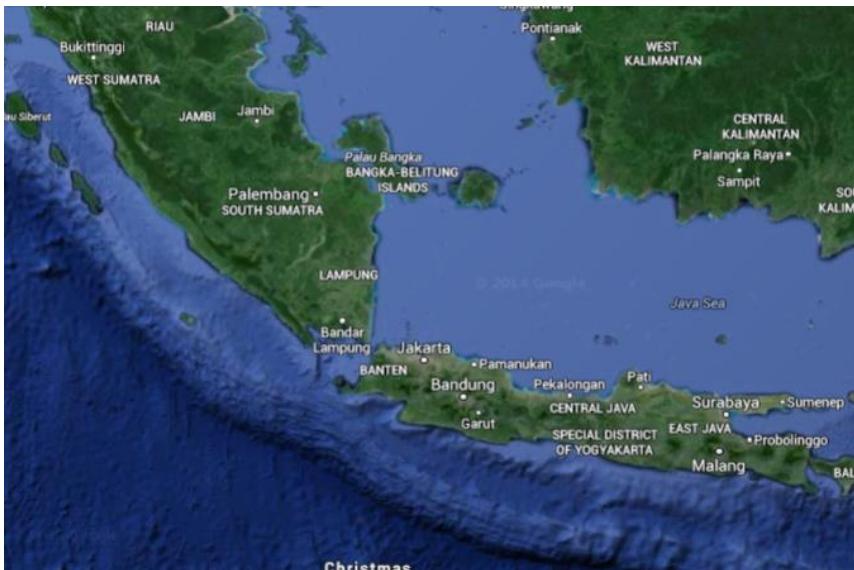
PT. MAYEKAWA INDONESIA

Founded : September 1985

Headquarters : Graha Pratama Building,
Floor 3A JI. M T. Haryono Kav. 15 Jakarta

No. of employees : 81

Branch offices : Surabaya, Medan



Business Activities

- Sales of MYCOM COMPRESSORS & HEAT PUMPS
- Supply of Food Machinery (robot)
- After-Sales Service (Component)
- After-Sales Service (System)
- Refrigeration Engineering & Installation
- Refrigeration consultant

Project Reference in Major Cold Stores in Indonesia

User	Installed Year	Location	Capacity	System
PT. Maluku Fishery	1977	Ambon		
PT. Maluku Fishery	1984	Ambon		
PT. Charoen Pokphand Indonesia	1996	Cikande, West Java		NH3 Pump
PT Nofmas Chemical Industries	1996	Bekasi, West Java		R22 DX
PT Sukanda Jaya	1997	Cibitung, MM 2100		NH3 Pump
PT Sukanda Jaya	2004	Cibitung, MM 2100		NH3 Pump
PT Central Pertiwi Bratasena	2005	Lampung, Sumatra		NH3 Pump
PT. Kiat Ananda Phase I	2008	Bantar Gebang	19,500 M ³	NH3 Pump
PT. Diamond Cold Storage	2010	Cibitung, MM2100	68,200 M ³	NH3 Pump
PT. Sukanda Djaya	2010	Cibitung, MM2100	95,000 M ³	NH3 Pump
PT. Kiat Ananda Phase II	2009	Bantar Gebang	65,500 M ³	NH3 Pump

Project Reference in Major Cold Stores in Indonesia

User	Installed Year	Location	Capacity	System
PT. Kiat Ananda Phase III	2010	Bantar Gebang	89,000 M ³	NH3 Pump
PT. Mega International	2012	Cibitung, MM2100	162,500 M ³	NH3 Pump
PT. Marine Cipta	2012	Surabaya, East Java	7,000 M ³	NH3 Pump
PT. Charoen Pokphand Indonesia	2012	Ngoro I	7,800 M ³	NH3 Pump
PT. Charoen Pokphand Indonesia	2013	Ngoro II	31,600 M ³	NH3 Pump
PT. Charoen Pokphand Indonesia	2014	Bandung	6,000 M ³	NH3 Pump
PT. Adib Global Suplies Phase I	2014	Bantar Gebang	17,500 M ³	NH3/CO2 Pump
PT. Ananda Solusindo	2014	Bantar Gebang	192,000 M ³	NH3 Pump
PT. Dua Putera	2014	Bekasi	82,000 M ³	NH3 Pump
PT. Adib Global Suplies Phase II	2014	Bantar Gebang	22,000 M ³	NH3/CO2 Pump
PT. Sukanda Djaya	2014	Cibitung	23,500 M ³	NH3 Pump
PT. Charoen Pokphand Indonesia	2014	Makasar	6,000 M ³	NH3 Pump

Project Reference in Indonesia

CUSTOMER NAME	: PT. Adib Global Suplies
LOCATION	: Bantar Gebang
ESTABLISH	: 2014
INDUSTRY	: Logistics
CAPACITY	: 17,500 m3
SYSTEM	: NH3/CO2 Pump
TEMPERATURE	: -25 deg.C



CUSTOMER NAME	: PT. Kiat Ananda
LOCATION	: Bantar Gebang
ESTABLISH	: 2009
INDUSTRY	: Logistics
CAPACITY	: 65,500 m3
SYSTEM	: NH3 Pump
TEMPERATURE	: -25 deg.C

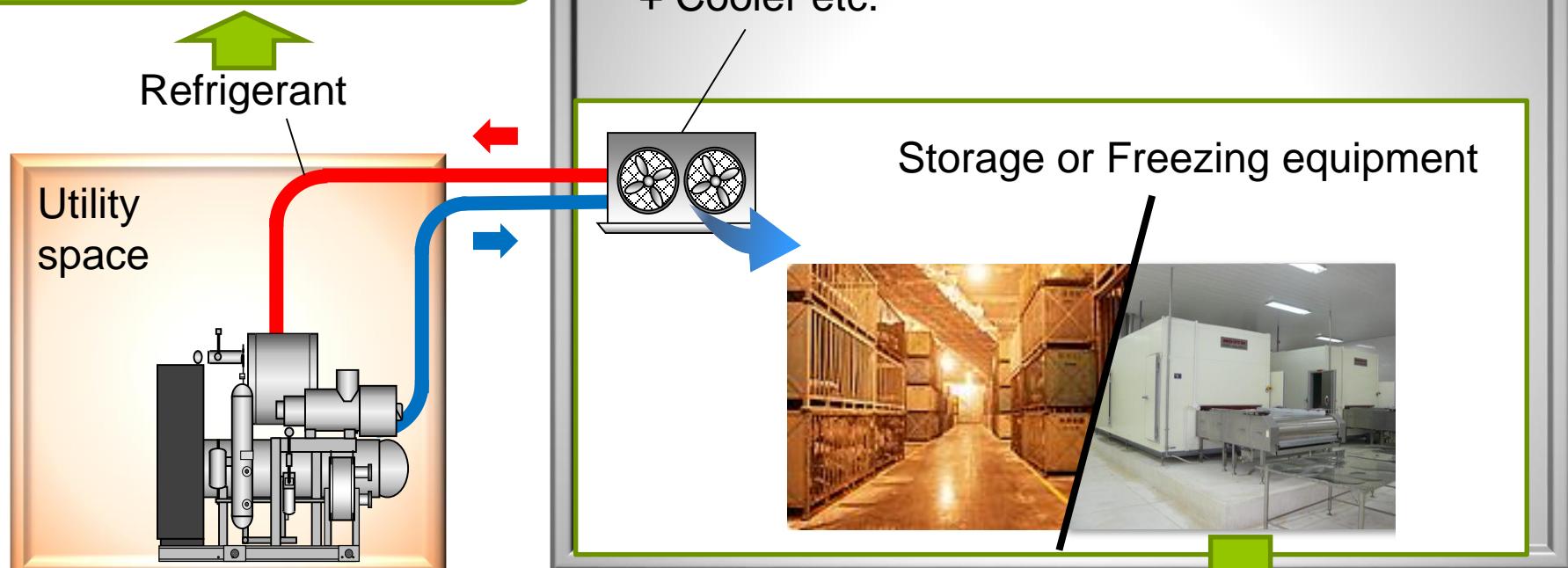


2. Latest Refrigeration Equipment

Refrigeration and Cooling/Freezing Equipment

2. Latest refrigeration equipment

- 2.1 Refrigerants review
- 2.2 Natural refrigerants "Natural five"



refrigeration equipment

2. Latest refrigeration equipment

- 2.3 NH₃/CO₂ System (-25°C)
- 2.4 Air cycle System(-60°C)

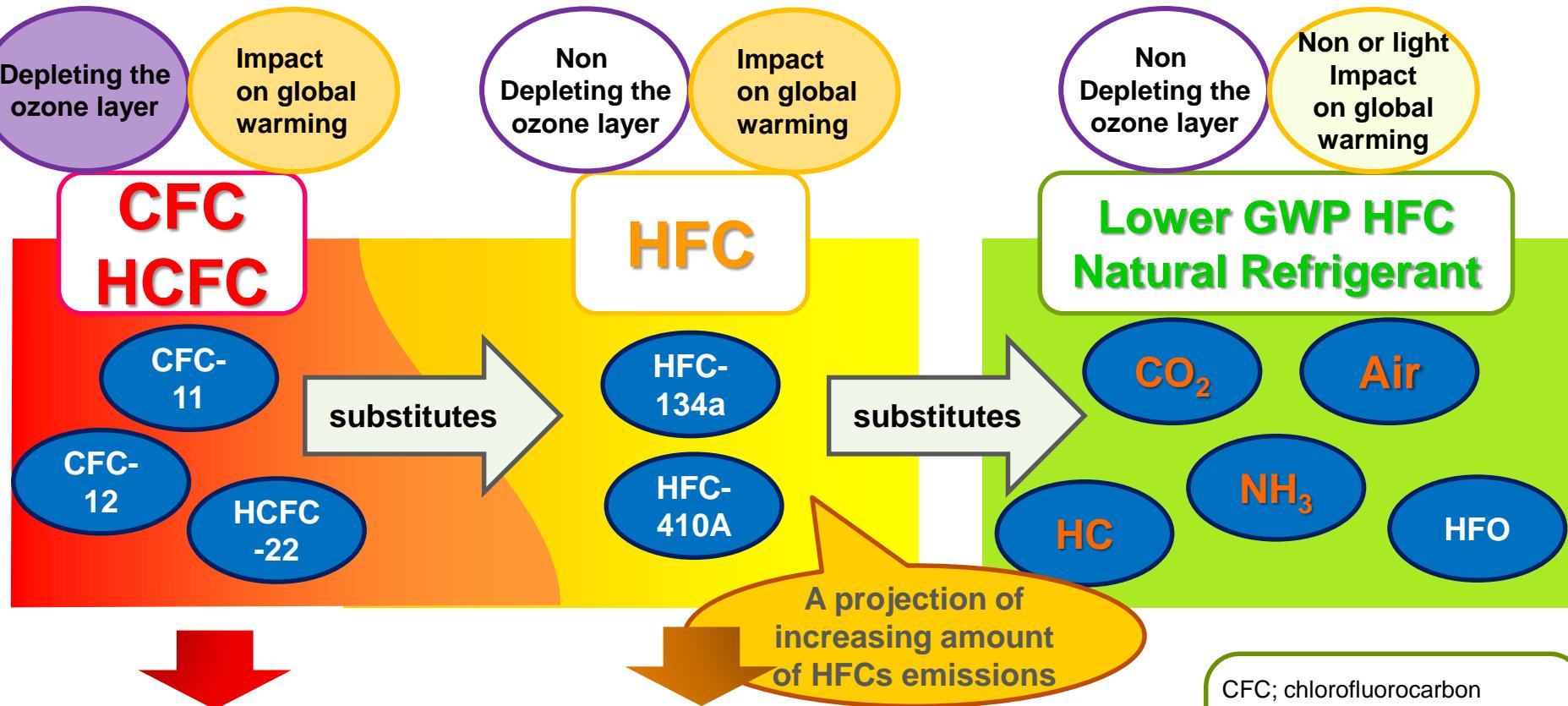
3.2 Food freezing system

2. Latest Refrigeration Equipment

2.1 Refrigerants review

Natural Refrigerants “***Natural Five***”

Progress of international regulations and measures over F-gases



Protection of Ozone layer

- Montreal Protocol
- Vienna Convention

Prevention of Global Warming

- Kyoto Protocol
- UNFCCC
- Proposed Amendment to the Montreal Protocol

CFC; chlorofluorocarbon
HCFC; hydrochlorofluorocarbon
HFC; hydrofluorocarbon
HFO; hydro fluoro olefins

GWP; Global Warming Potential

CFC Phase-out accomplished in 2005

HCFC Phase-out will be accomplished at the end of 2019(non-A5)
2029(A5)

Natural Refrigerants

Five environmentally friendly Natural refrigerants



NH₃

Ammonia

CO₂

*Carbon
dioxide*

H₂O

Water

HC

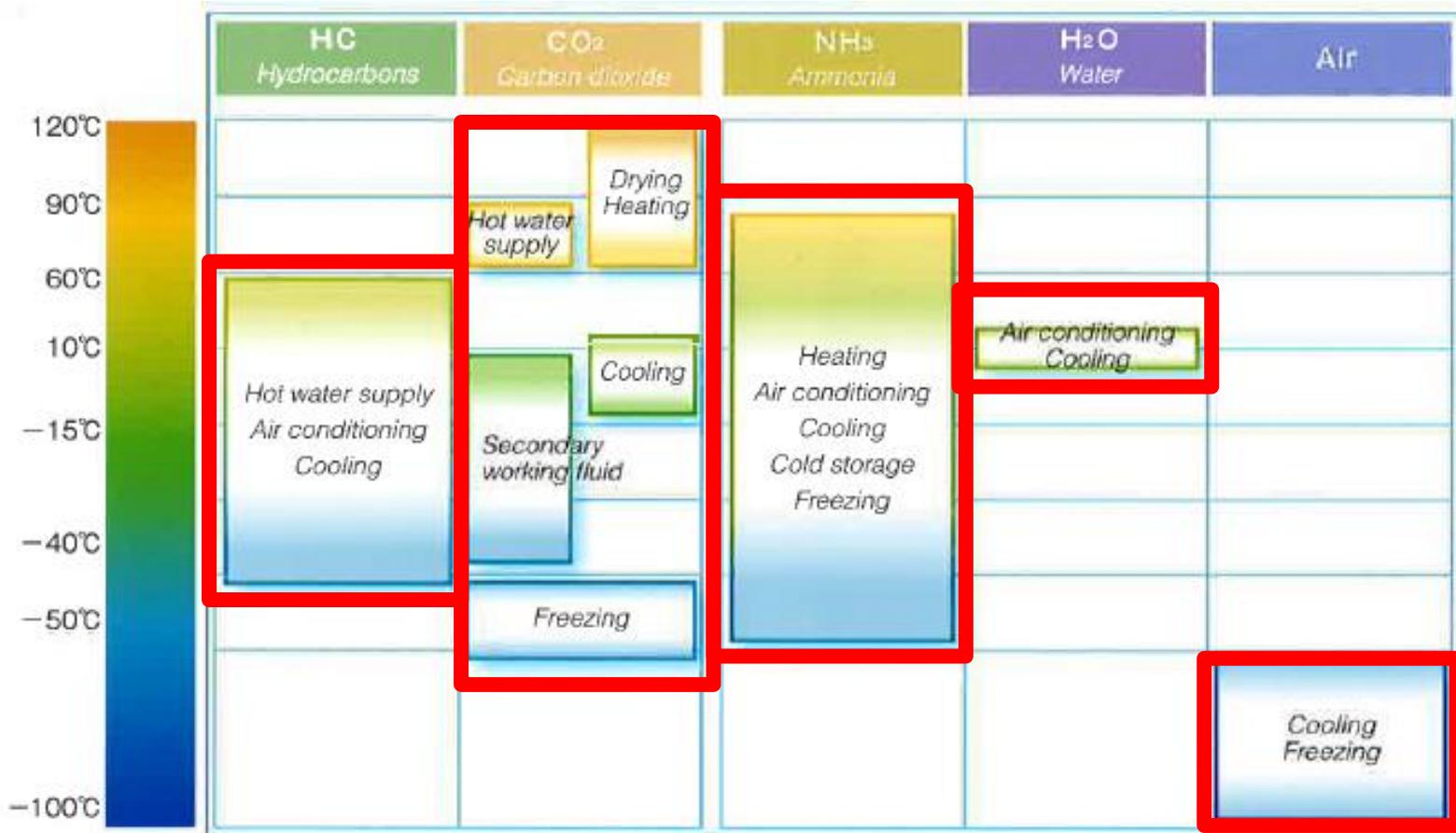
*Hydrocarbons
(Propane, Isobutane)*

Air

Five using environment-friendly natural refrigerants, “Natural Five”, to protect the Ozone Layer and prevent global warming.

Applications using Natural Refrigerants

Applicable temperature of “Natural Five”



Five environmentally friendly natural refrigerants applied to refrigeration, air conditioning, heating and hot water supply

Mayekawa Products using Natural Five

Air



Air cycle refrigeration system
“Pascal Air”

NH₃



Semi-hermetic refrigeration
package
“NewTon” series

CO₂



CO₂ Heat pump series

H₂O



Adsorption chiller
“AdRef-Noa”

(5°C~15°C)

HC



Air-conditioning/
Water-supply
Heat pump

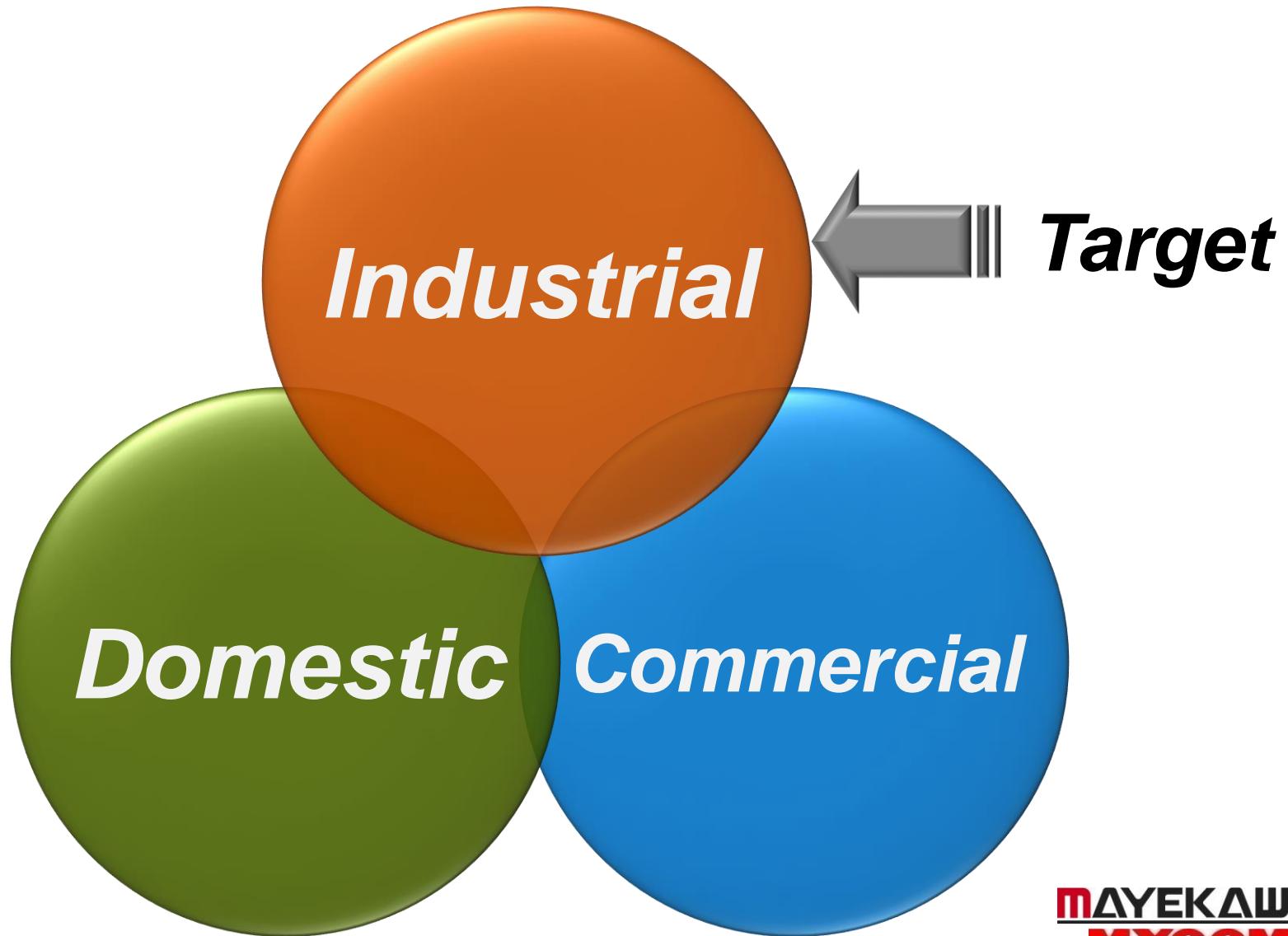
(7°C~65°C)

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2. Latest Refrigeration Equipment

2.2 NH₃/CO₂ System (-25°C)

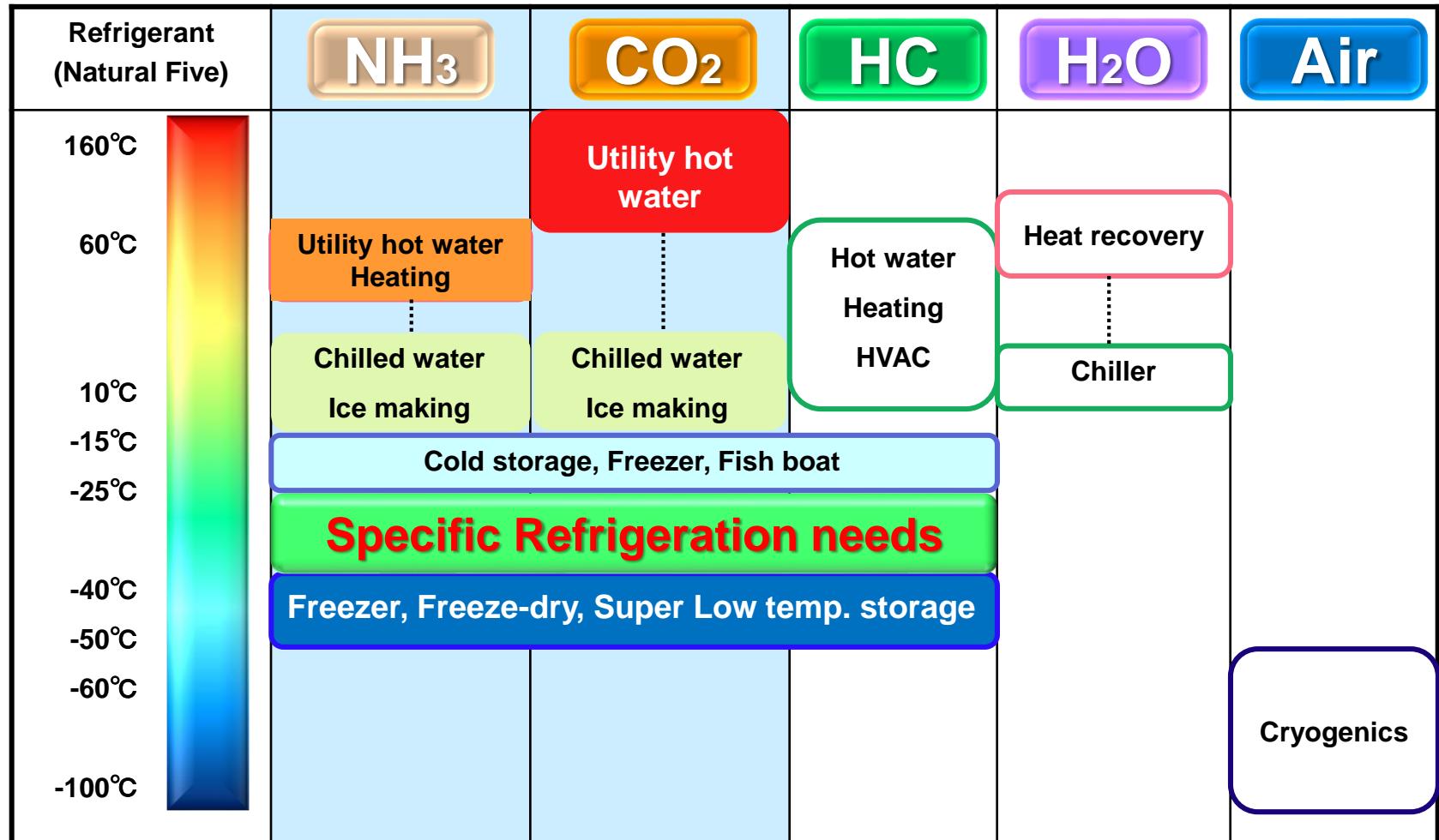
Industrial Refrigeration with Natural Refrigerants



Requirements for Industrial Refrigeration

- **Long Life ;**
Long operation time (6000-8000hr/y)
- **High Efficiency**
- **High Reliability**

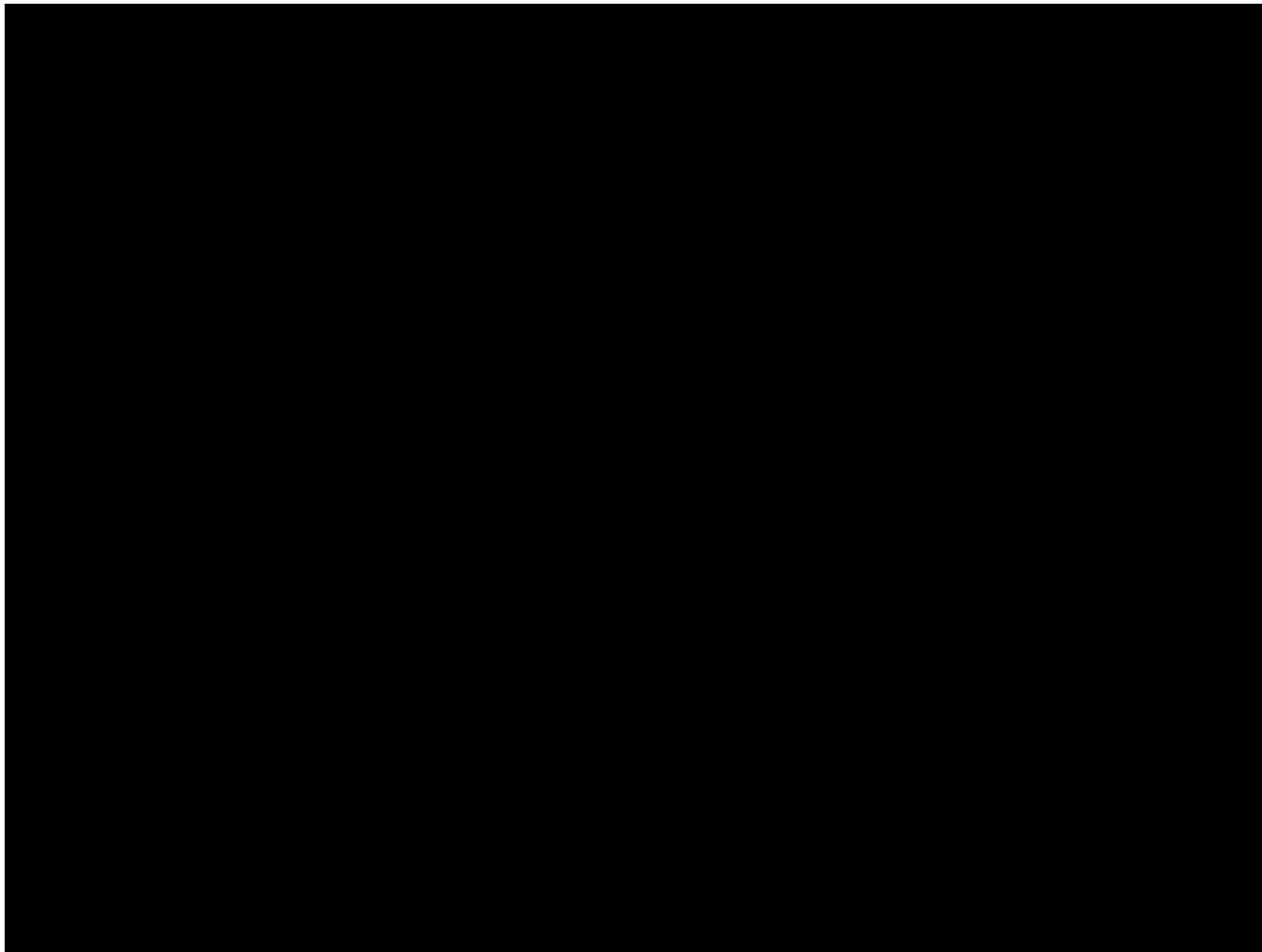
“Natural Five” Refrigerants and Product Solutions



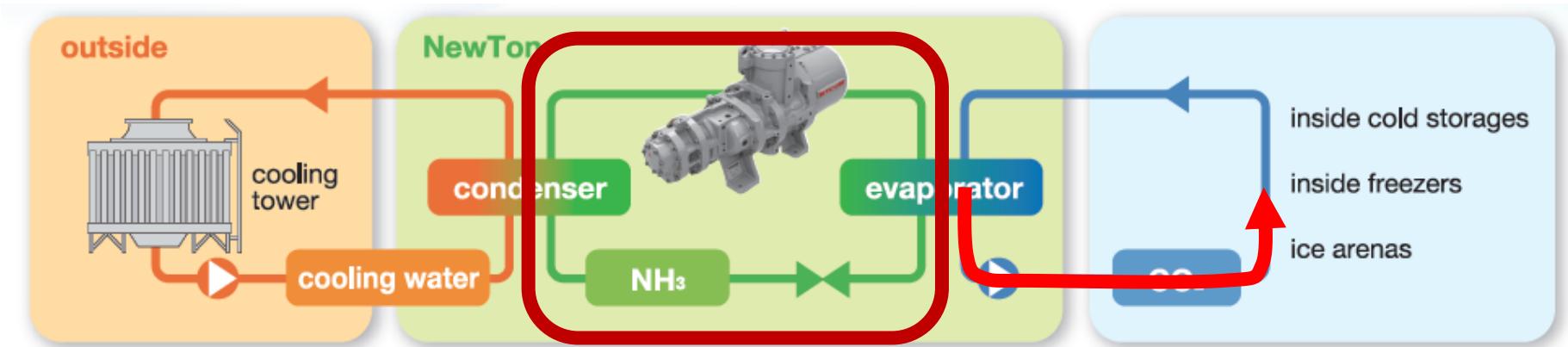
Semi-hermetic Refrigeration Package



Mayekawa NewTon 3000 (Movie)



Concept of “Newton” system



“NewTon” system holds ammonia completely only in the machine room so that it can achieve safety.

Energy
saving

Safety

Easy
maintenance

New-type NH₃ Screw Compressor

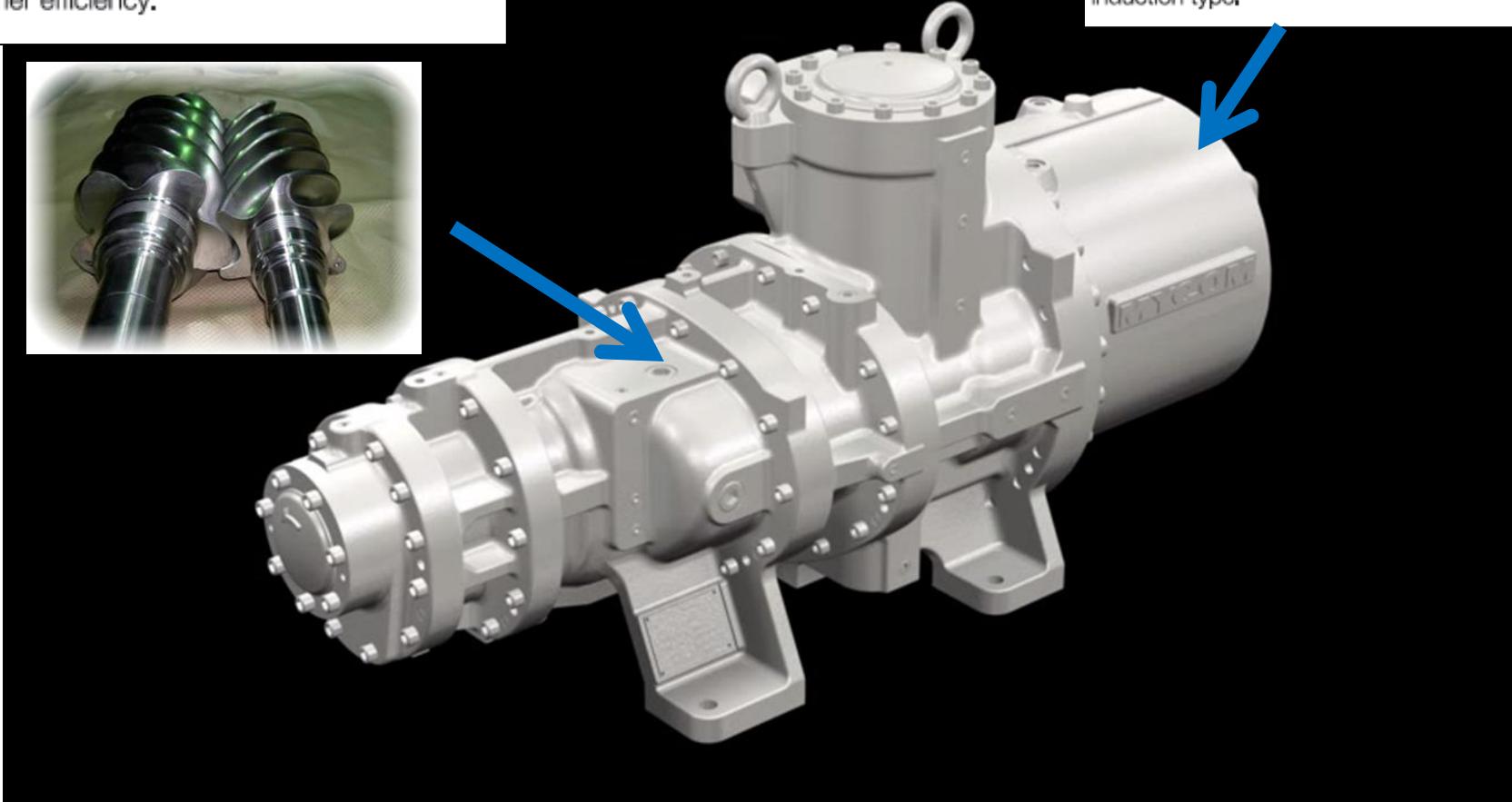
New Profile

We developed a new profile for rotors with advanced machining technology enabling it to reduce internal leakage and achieve higher efficiency.

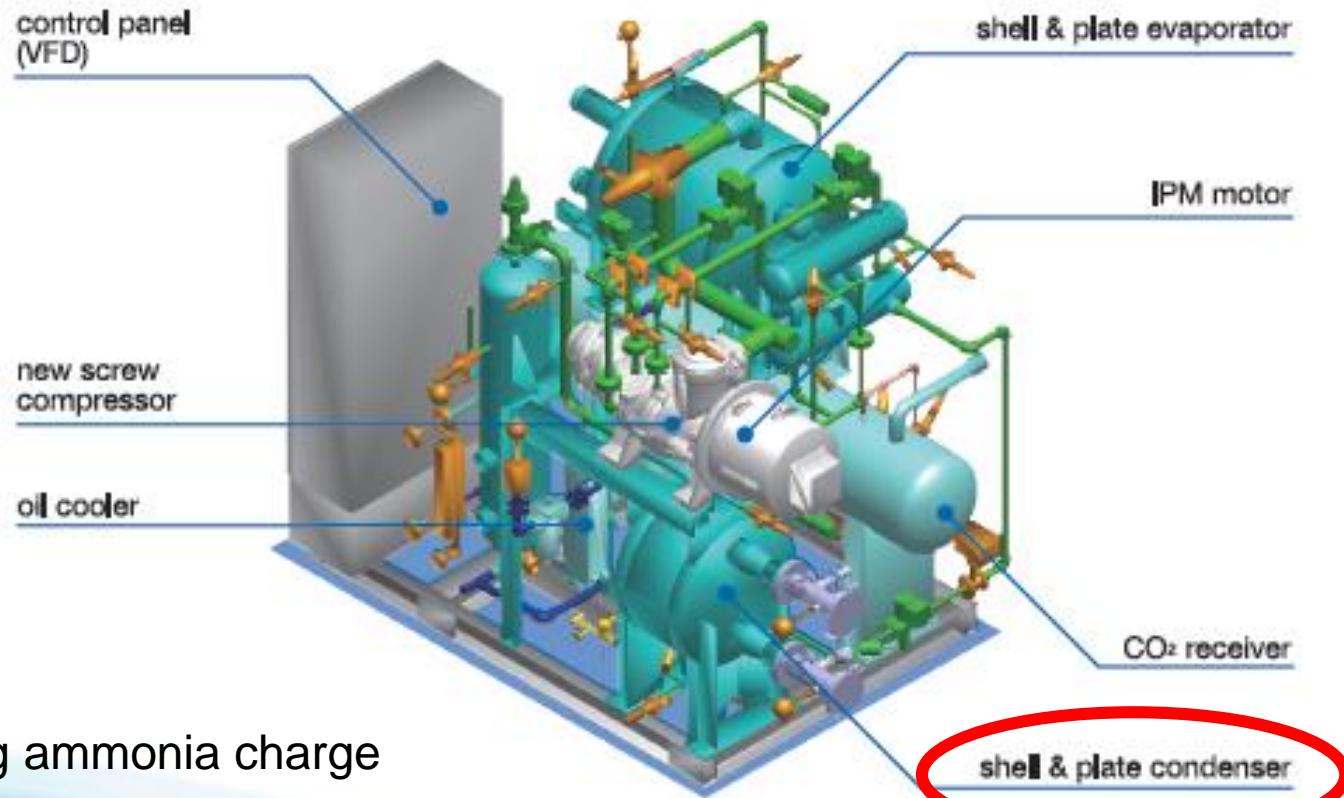


Interior Permanent Magnet (IPM) motor

In order to improve the drive efficiency the system employs IPM motor, achieving higher efficiency by 5 to 10 % than conventional induction type.



NH₃/CO₂ cooling system “NewTon”



Minimizing ammonia charge

Employing indirect cooling method enables ammonia to be contained only in a machine room, plus ammonia charge volume in this product 25kg to max. 75kg for each package.

We employed compact and high performance shell & plate heat exchangers on both condenser and evaporator to enable them to exchange heat even with a small differential temperature.

“NewTon” series

Use application	Model	
Cold storage	NewTon R-3000, R-6000, R-8000	Inside temperature; -25°C
	NewTon C	Loading room
Freezer	NewTon F-300, F-600, F-800	Inside temperature; -35°C
Ice rink for skating / curling	NewTon S	



NewTon R-3000, NewTon F-300



NewTon C, NewTon S

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Installations of “NewTon” in Japan

Customer	Volume (m³)	Newton sets	installed
Nissui Logistics / Kawasaki	35,000	3	2008
Toyo Suisan / Nagoya	80,000	9	2009
Hosui / Atsugi	20,000	2	2010
Yokohama Reito / Osaka	68,000	8	2011
Coop / Onomichi	75,000	8	2012
Matsuoka / Kawasaki	200,000	11	2013
Nichirei Log. / Kawasaki	100,000	1	2013
Maruha-Nichiro Log. Net. / Kawasaki	75,000	6	2014

500 units are running.



Nissui Log. / Kawasaki



Toyo Suisan / Nagoya



Yokohama Reito / Osaka



Coop / Onomichi

Case ; Cold storage building and machine room



NewTon R-8000 - 5 sets
NewTon F-600 - 1 set
NewTon C - 4 sets
NewTon B - 1 set

Case ; Cold storage and Loading room



Cold storage room (-25°C)



Loading room (0°C)

Power reduction through renewal with “NewTon”

Customer	Volume	Period in use	Refrigerant formerly used		Power reduction (%)
	(m ³)	(year)	Refrig.	Comp.	
Tokyo Toyomi	45,000	29	HCFC-22	Screw	31.1
Niigata Reizo	10,000	33	HCFC-22	Recip.	41.2
QP “Kewpie”	16,250	27	HCFC-22	Recip.	24.9
Sensui Reizo	6,125	38	HCFC-22	Screw	29.3
Ajinomoto	7,500	25	HCFC-22	Recip.	28.0
Grico	30,000	30	HCFC-22	Screw	19.8
Showa Reizo	32,500	22	HCFC-22	Recip.	28.0
AMB Funabashi	30,000	25	NH ₃ /Brine	Recip.	34.0

2. Latest Refrigeration Equipment

2.3 Air Cycle System (-60°C)

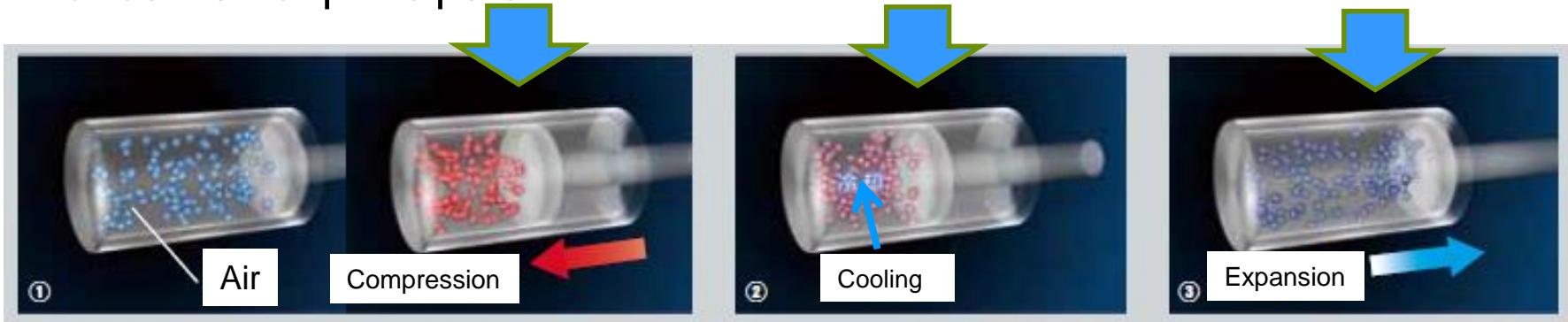
Air Cycle Refrigeration Package Unit



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Basic Concept of Air cycle refrigeration

Fundamental principals



A gas generates heat when compressed. By cooling such a compressed gas and then expanding it, the gas gets lower than the initial condition. Utilizing the behavior, this system can create a super-low temperature with range from -50°C to -100°C.

Energy saving

Safety

Environment-friendly

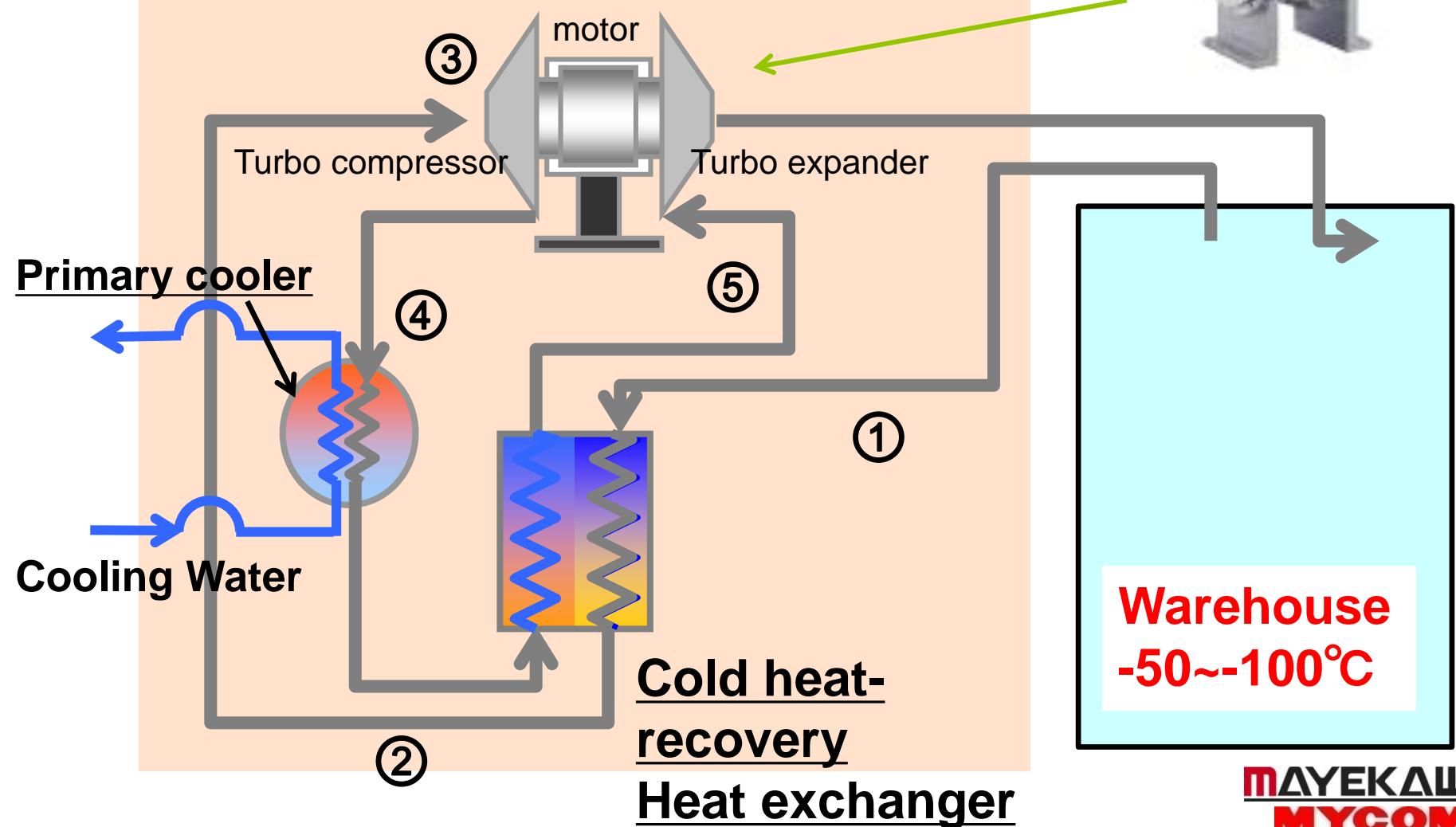
Low working pressures
Non-Toxic or Non-flammable
Safety regulations not required

No environmental load
GWP=0
ODP=0

Direct Air circulation system



Integrated turbo compressor & expander

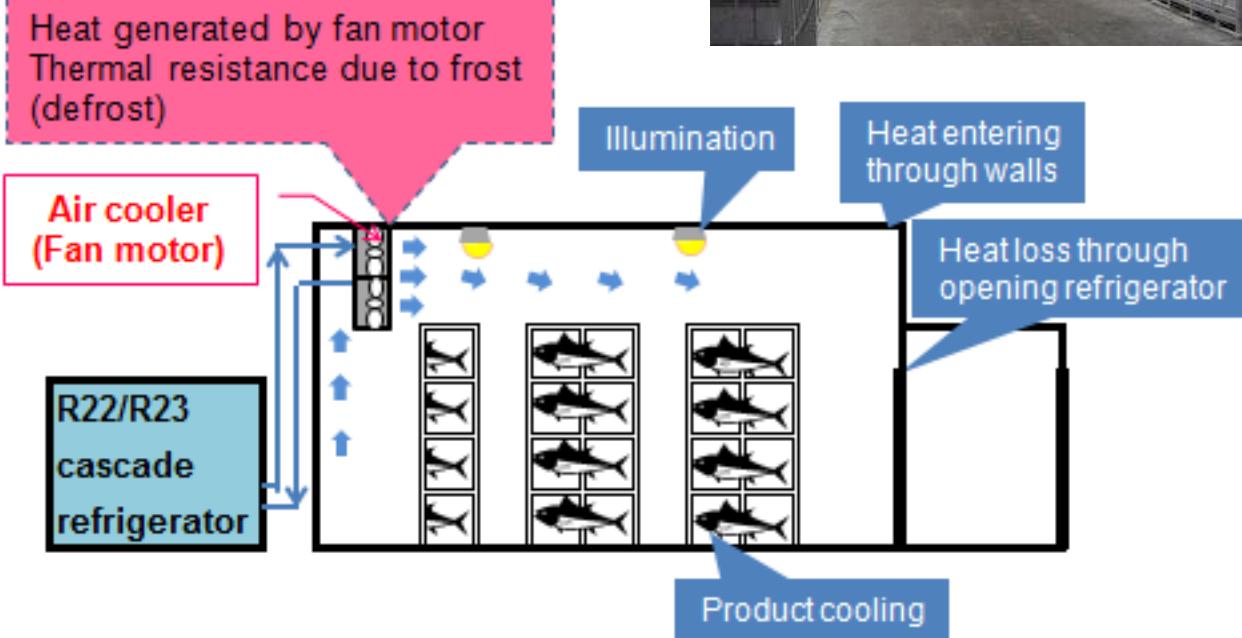


Conventional system

- *has air cooler and fan motor
- *defrost required



Frost

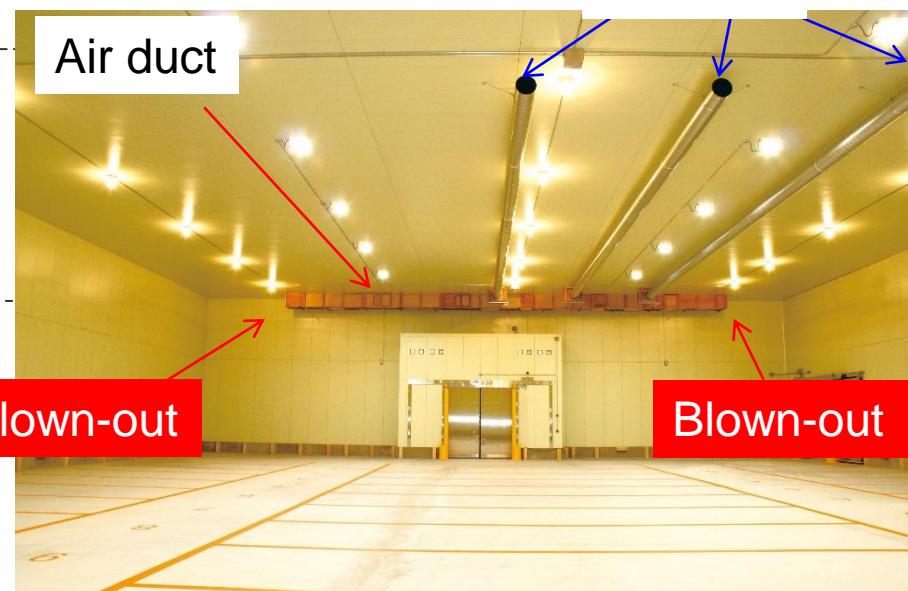


“Pascal Air” system

*No air cooler (No fan motor)

*No defrost

Air ducts easily installed

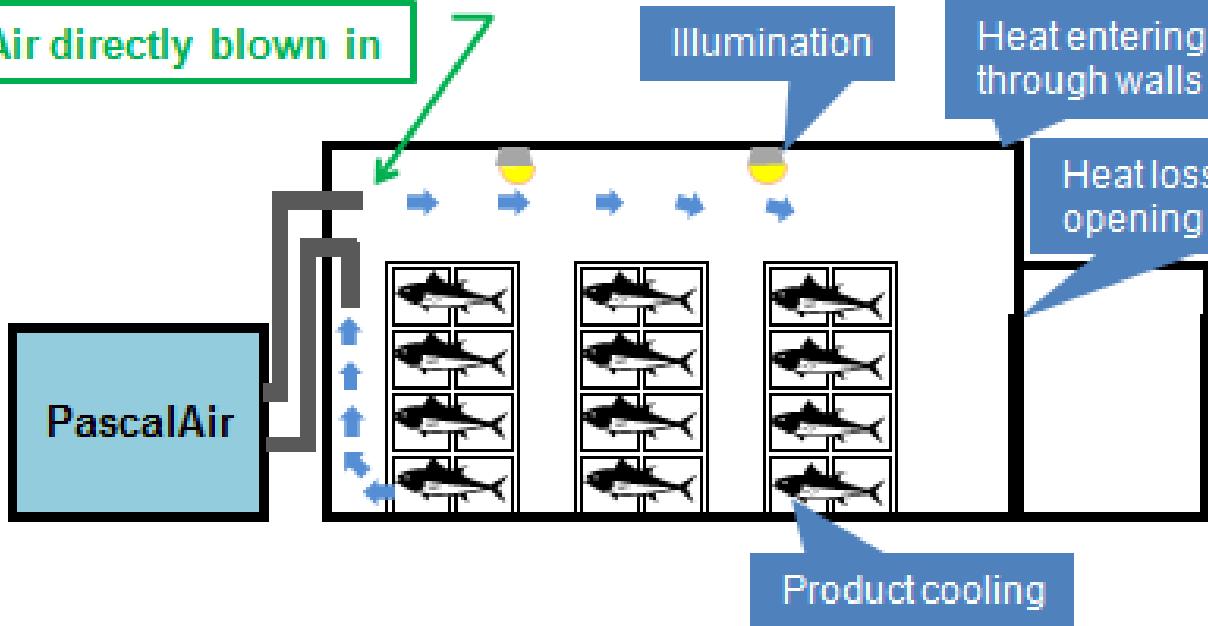


Air directly blown in

Illumination

Heat entering through walls

Heat loss through opening refrigerator



Comparison of “Pascal Air” system with conventional system

		Conventional system	<i>Pascal air</i> system
Cooling capacity	kW	47	30
Power required	kW	135	72
Temperature in the warehouse	°C	-60	-60
COP		0.35	0.42
Annual electric consumption	MWh/year	3,370	2,250

Over 30% energy-saving

“Pascal Air” system can be introduced Conventional markets

- super-low temperature cold storage
(ex. frozen tuna fish)
- freeze-drying process

New applications

- medical & pharmaceutical fields
- physical & chemistry fields



In Conclusion :-

- Refrigerants; “ Natural Five ”
- Latest Refrigeration Equipment
 - “NewTon” and “Pascal Air”

“Natural”, is What We Design For

**Thank you very much for
your attention**

