

NATURAL REFRIGERANTS IN DIFFERENT INDUSTRIAL APPLICATIONS

MYCOM Compressor and Development



1924: Piston Compressor



1964: Screw Compressor



1978:
4°K Super Low temp.
Particle Accelerator
(Helium)



1981:
Nuclear
Fusion
(Helium)



1984:
Mag-Levi
Train
(Helium)



1989:
Rocket Fuel
(Hydrogen)



1993: Super GE
(Superconduct-
EL-Generator)



1958: Multi-Cylinder
Piston Compressor



Ethylene Plant



LNG/LPG Tanker



Organic (EOEG)



Inorganic:
(NH₃)



Pharma Plant

1924

1960

1970

1980

1985

1990

● More than 100.000 Screw and Piston Compressors have been installed over 100 countries.

CRYO-NUCLEAR-TECHNOLOGY

CERN, Genf, CH





PETROCHEMICAL



LINE-UP NATURAL 5

FIELD CASES

Mayekawa Mfg.Co,Ltd
Kunuaki Kawamura

Commitment on Natural Refrigerants



-  Semi-Hermetic Screw Compressor Unit
-  Commercial / Industrial Eco-Cute System
-  Adsorption Chiller
-  Commercial / Industrial
Air-Conditioning / Water-Supply Heat Pump
-  Dehumidifying Air Refrigerant System [Air Ref]

"Natural Five" Refrigerants and Product Solutions

Refrigerant (Natural Five)	NH ₃ R-717	CO ₂ R-744	HC Hydrocarbon	H ₂ O R-718	Air R-728
90°C		Utility hot water			
60°C	Utility hot water Heating		Utility hot water Heating HVAC	Heat recovery	
10°C	Chilled water Ice making	Chilled water Ice making		Chiller	
-15°C	Cold storage, Freezer, Fish boat				
-25°C	Specific Refrigeration needs				
-40°C	Freezer, Freeze-dry, Super Low temp storage				
-50°C					
-60°C			Cryogenics		Cryogenics
-100°C					
Notes	•Conventional system •National Projects	•Eco-Cute	•Nat'l Proj. •Butane + Propane	•Nat'l Proj. •Adsorption •Heat recovery	•Nat'l Proj. •Air-cycle

FIELD CASES

NH₃



Ammonia





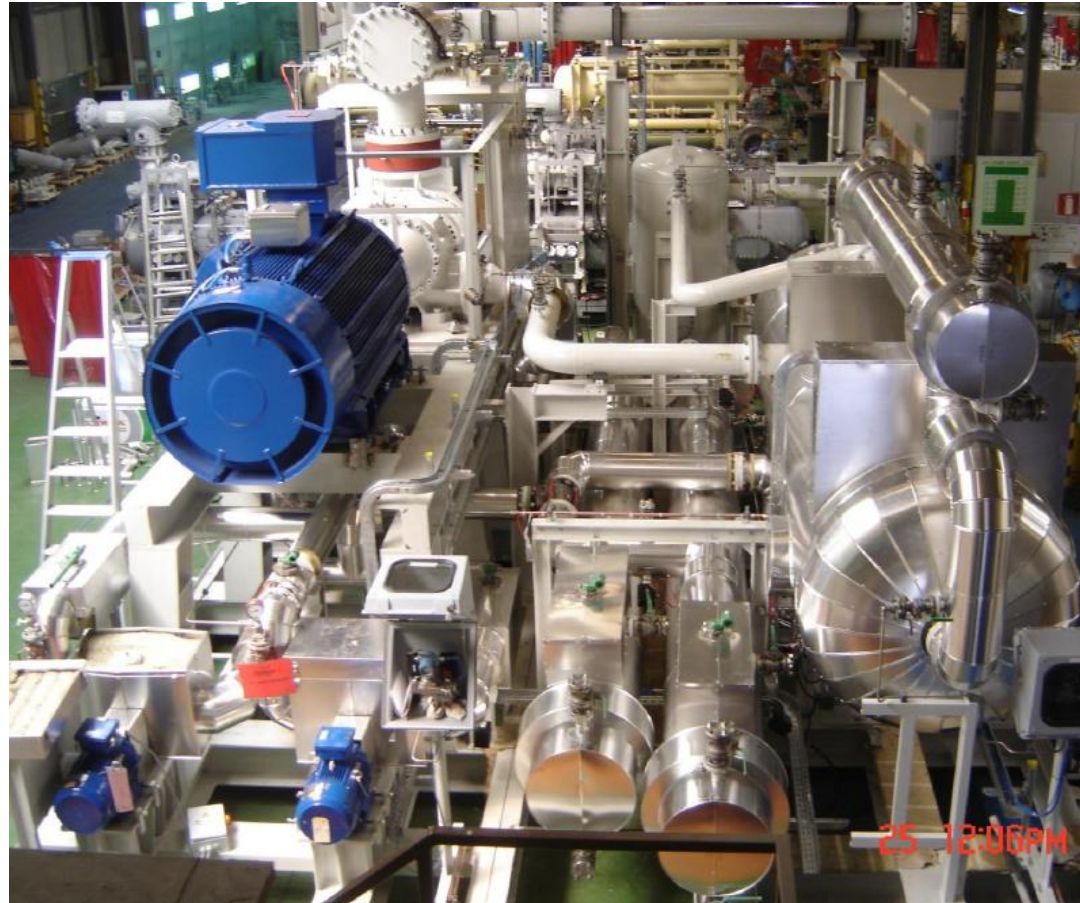
CO₂

- CO₂ Compression Refrigeration

**Carbon dioxide**



HC



Hydrocarbon

Hydrocarbon Refrigerant Packaged Unit

2005
~2007 NEDO [Energy-Saving Non-Freon Air-Conditioning and Refirgeration System]

[[Industrial Technology Development Subsidizing Company]]



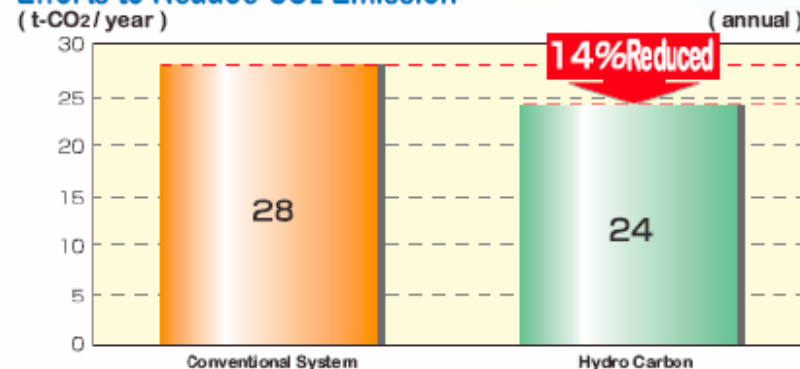
14% Reduction of CO2 Emission

Cooling C O P	COP=3.7 (Air-Cooled)
Heating C O P	COP=3.7 (Air-Source)
Supplying Water C O P	COP=3.3 (Supplying temperature 65°C, air-source)

Targets: Commercial / Industrial Air-Conditioning, Water-Supply

Supply Temperature	Applications	Suitable Markets
70°C	65°C Hot Water-Supply / Heating System	Food factories, hotels
50°C	45°C Heating System	Office buildings, factories
0°C	+7°C Chilled Water Chiller System	Office buildings, factories
-5°C	+2°C Chilled Water Chiller / Supercool Ice Making System	Food factories
-15°C	Ice on Coil Ice Thermal Storage System	Food factories

Efforts to Reduce CO2 Emission



Case Study

40USRT Chilled Water Supply Machine
Chilled Water Temperature : 7°C

Power Consumption

< Conventional System >
R134a
Chilled Water Supply Machine
43kW

< Hydro Carbon >
36kW









H₂O

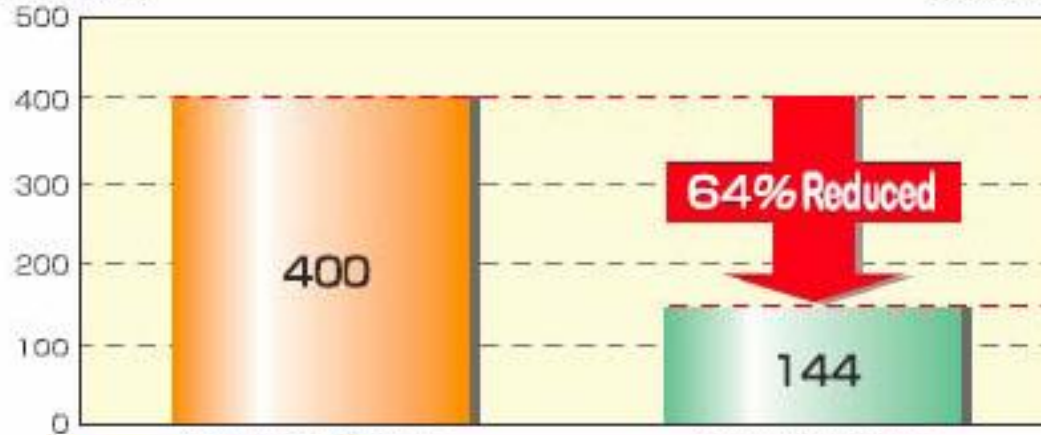


Water

Efforts to Reduce CO₂ Emission

(t-CO₂/year)

(Annual)



Case Study

100USRT Industrial Process Cooling
Cold Water Temperature : 9 °C

Power Consumption

<Conventional System>
R134a Cooling Water

100kW

<Adsorption Chiller>

36kW



AIR

- Air Cycle Refrigeration System
- For Low Temperature Applications
-50 ~ -120 °C

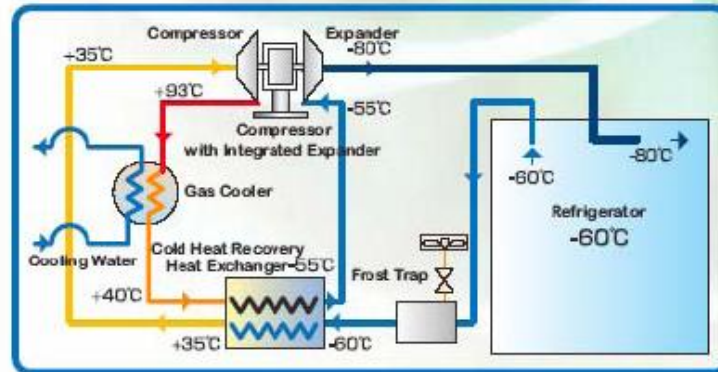
AIR

Air Cycle Refrigeration Packaged Unit

2003 Developed at [Technical Strategy for Rationalization of Energy Consumption Project]
~2005 NEDO



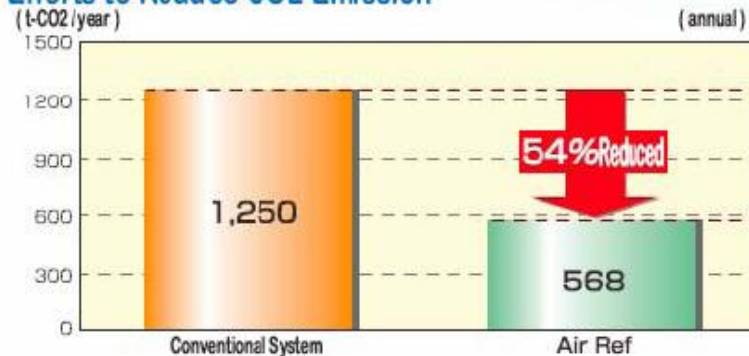
54% Reduction of CO2 Emission



Target: Ultra cold refrigerator for tunas and bonitos, rapid freezer, frost-破碎 etc.

- Using [Air] as the ultimate natural refrigerant, [Air Ref] is safe and eco-/people-friendly.
- Due to the turbo compressor with integrated expander, high COP can be achieved, saving energy by 50% comparing the conventional types.
- Due to its low operating pressure, exempt from legal regulations.
- Directly cooling the air, Air Ref does not require a fan coil unit or piping for refrigerant in the storage.
- Dehumidifying agent reduces frosting in the storage. Defrosting is not required.

Efforts to Reduce CO2 Emission



Case Study

2,000 ton Refrigerator
Interior Temperature : -60°C

Power Consumption

< Conventional System >
R22 2 Stage Compression Refrigerator

281kW

< Air Ref >

128kW

**THANKS FOR YOUR
ATTENTION!**

WORLDWIDE

- 35 countries / 122 offices
- 8 production plants



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