

Eat Well, Live Well.



The Progress toward phase out of HFC/HCFC refrigerants



Ajinomoto Frozen Foods Co., Inc.

■ Company Overview: Ajinomoto Frozen Foods Co., Inc.



Headquarters address : 7-14-13, Ginza, Chuo-ku, Tokyo, Japan

Founded : December 23, 1970

Re-established : October 1, 2000

Capital : 9.5 billion JPY

(wholly owned by Ajinomoto Co., Inc.)

Amount of sales : 100 billion JPY (FY2017)

Business : R&D, production, and sales of frozen foods

Employees : Approx. 1,100



Domestic bases (Ajinomoto Frozen Foods Co., Inc.)

R&D department

Research & Development Center (Gunma)
Technology & Engineering Dept. (Saitama)

Production base (7 Plants)

Kanto Plant (Gunma)
Saitama Plant (Saitama)
Chiba Plant (Chiba)
Chubu Plant (Gifu)
Osaka Plant (Osaka)
Shikoku Plant (Kagawa)
Kyushu Plant (Saga)

Sales department (10 depts)

Sapporo, Sendai,
Ginza(Head Office), Shinagawa,
Nagoya, Osaka, Fukuoka, etc.



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Overseas bases

(The Ajinomoto Group, Frozen foods department)



AJINOMOTO FROZEN FOODS FRANCE S.A.S.
L'ABYRRE
125 MACARONS
PÂTISSERIES

Ajinomoto Jawo sp. z o. o.
Gyoza

Lianyungang Ajinomoto Ruyi Foods Co., Ltd.
Lianyungang Ajinomoto Frozen Foods Co., Ltd.
Xiamen Ajinomoto Life Ideal Foods Co., Ltd.

Ajinomoto Frozen Foods (Thailand) Co., Ltd.
Gyoza

Ajinomoto Betagro Specialty Foods Co., Ltd.

Ajinomoto Betagro Frozen Foods (Thailand) Co., Ltd.
Gyoza

Ajinomoto Foods North America, Inc
Ajinomoto Toyo Frozen Noodles, Inc.
Ling Ling
SHOYU RAMEN

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■ Progress toward HCFC phase-out



Since 2006, we have aimed to eliminate the use of Freon in all our domestic food processing factory freezer systems.

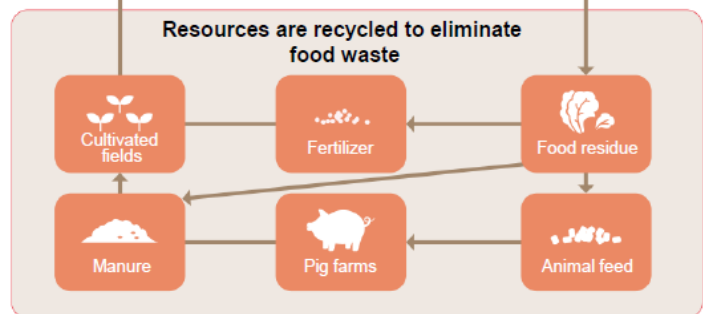
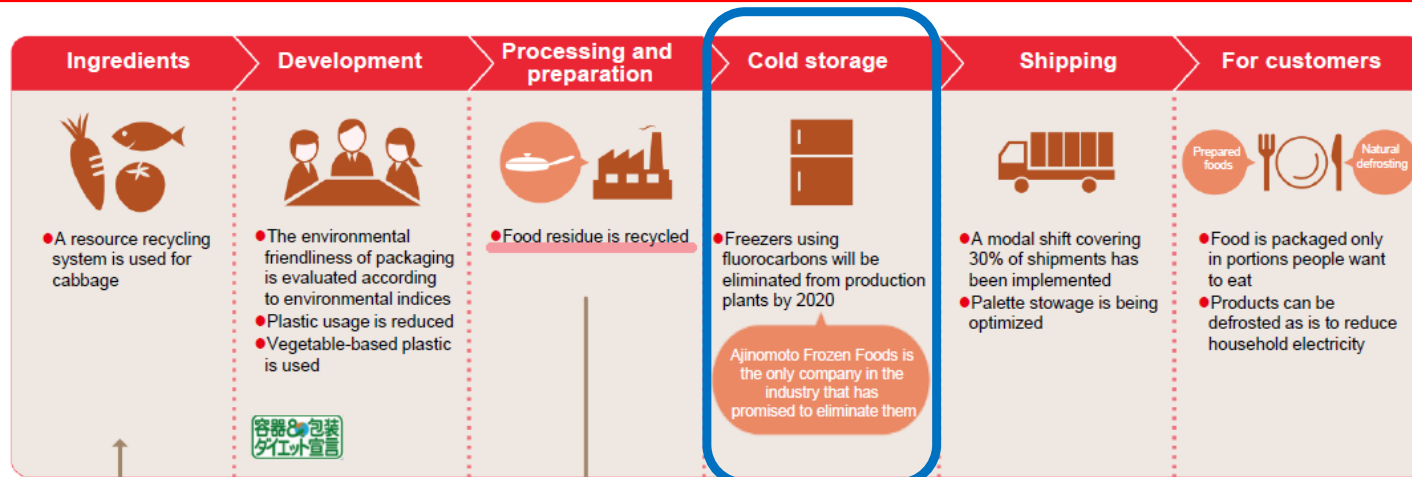
Because!

1. **Tighten Freon regulation in Japan since 2001**
"Fluorocarbons Recovery and Destruction Law"
2. **HCFC Phase-out management plan by 2020**
"Montreal Protocol"
3. **Long-term risk considering to the BCP**

Our freezers using Freon in 2006 was approx. 30 units.

⇒ **We declared to replace Freon with natural refrigerant-based systems.**

■ Environmental sustainability



← Reducing food residue from production plants

Food residue produced in production plants is recycled as fertilizer and animal feed. Some of the vegetables used as ingredients are grown in fields in which the fertilizer is used.

All production plants in Japan have acquired ISO 14001 certification

■ Steps toward HCFC phase-out

① Before 2001: Refrigeration system using fluorocarbons

We have prevented Freon leaks company-wide toward to tighten law since 2001. At the same time, we started to discuss technological study to eliminate the use of Freon.

② In 2001: First installation of NH₃ direct expansion system at Shikoku plant

We provided safety measures against NH₃, to protect employees health and As a result, the installation and operation carried out successfully.

*NH₃ charge amount per compressor: Approx. 300kg.

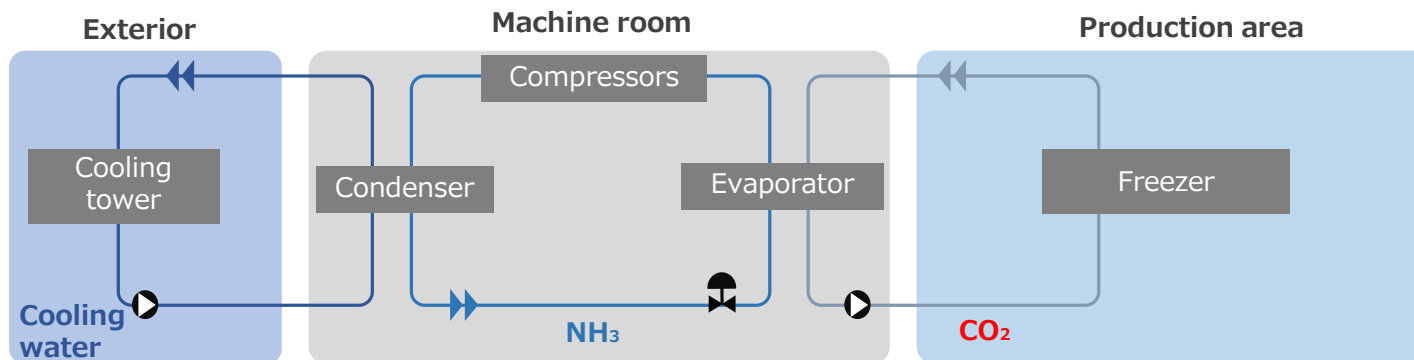


■ Steps toward HCFC phase-out

③ In 2004: First installation of NH₃/CO₂ indirect cooling system at Kyushu plant

NH₃/CO₂ system has less risk of causing harm to employees at the production area. With this system, NH₃ is used in machinery room only.

(NH₃ charge amount per compressor: 150kg)



■ Steps toward HCFC phase-out

④ In 2010: First installation of NH₃/CO₂ indirect cooling system “NewTon” at Chubu plant

New NH₃/CO₂ system “NewTon” has achieved much lower NH₃ charge amount than existing system at Kyushu plant. It enables energy-saving and cost reduction.

The installation was successful in Chubu plant in 2010.

Since then, “NewTon” have been installed at the other plants.

Significant reduction of NH₃ charge amount per compressor

300kg

FY 2001

NH₃ direct expansion






1/15
➔

21kg

FY 2010

NH₃/CO₂ (NewTon)



Use	Freezer	Freezer Freezing storage	Cold Air Generator	Precooling Equipment	Freezing storage
Supplier	MAYEKAWA MFG	MAYEKAWA MFG, Hachiyo Engineering	MAYEKAWA MFG	Nihon Netsugen Systems	Mitsubishi Heavy Industries
Refrigerant	NH3	NH3/CO2	NH3·CO2, Air	CO2	CO2
Room temperature	-35℃	-35℃	-70℃	+ 5℃	-25℃
Plant	Shikoku	Kanto, Saitama, Shikoku, Chubu,Kyushu	Chiba	Kyushu	Saitama
Picture					

■ Summary of HCFC phase-out

1) Priority for employees' safety

The installation of NH₃/CO₂ system achieved less risk of NH₃ leakage from freezer systems.

2) Expects saving energy cost

We achieved 20-30% of electric power consumption and 20-30% of CO₂ reduction, compared NH₃/CO₂ system to former fluorocarbons system.

3) Initial cost reduction

We sometimes achieved 5-15% reduction of initial investment cost for the refrigeration facilities and constructions by governmental subsidies.
(Our utilization of subsidies account for 20% of total replacement.)

Energy Saving



Cost Cutting



■ Promotion of HCFC phase-out

1) To save high initial cost

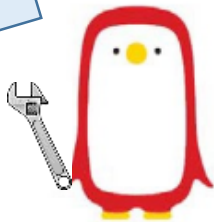
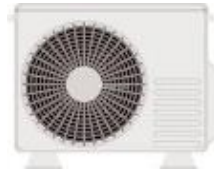
- ① Initial cost of Natural refrigeration system is **approx. 20-30% higher than fluorocarbons system.**
 - ⇒ Subsidies with **more flexible schedule** can be applied by **more companies.**
 - ⇒ **Increased subsidies can accelerate demand of natural refrigerant.**
- ② Less price competition between limited suppliers
 - ⇒ **With more suppliers, price can be suppressed.**



■ Promotion of HCFC phase-out

2) To improve performance & technology

- ① Market trends of the lower-capacity refrigeration systems using natural refrigerants, such as air-conditioners is invisible.
 - ② More energy-saved performance, higher efficiency, safer facilities are required.
 - ③ More flexible facilities to design lay-out : space-saving, without ancillary equipment, for outdoor use, etc.
- ⇒ For further vitalization of the natural refrigerants markets , development of technology, which is closer to consumers is required.



■ Promotion of HCFC phase-out

3) To shorten construction period

⇒ Advance construction is effective.

In that case, refrigeration systems are **necessary to transport to other space**.

We make **efficient use of limited space** in the plant.



■ Ajinomoto Group policy of phasing out HFC/HCFC refrigerants (FY2018 Amendment)

(1) Freezers and cold storages, except for air-conditioning system

1) Natural refrigerants or alternative ultra-low GWP (less than 150) refrigerants should be used for newly installed equipment or renewal.

2) For existing equipment;

HFC : Phase out completely by FY2030.

HCFC : Replace to natural refrigerants or alternative ultra-low GWP refrigerants by FY2020 in principle.

<In developed countries>

(2) Air-conditioning system

The lowest GWP refrigerants at that time should be selected for newly installed equipment or renewal.

*Relevant facilities: Equipment used in plants and distribution warehouses, transport equipment, large air conditioners using centrifugal chiller, air-conditioners

■ Progress and Plans (Freezer)

Freezer

	Unit	Refrigerant	FY2018	FY2020	FY2030
Domestic Plants	30	H C F C (R-22)	6	0	
		H F C (Alternative Freon)	0		
		Natural refrigerants HFO (GWP less than 150)	24	30	30
Overseas Plants	40	H C F C (R-22)	0		
		H F C (Alternative Freon)	6	6	0
		Natural refrigerants HFO (GWP less than 150)	34	34	40



Progress and Plans (Warehouse)

Freezing storage, Cold storage

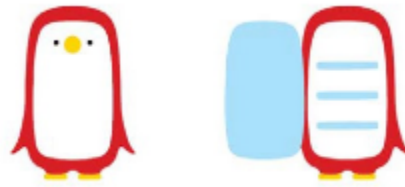
	Unit	Refrigerant	FY2018	FY2020	FY2030
Domestic Plants	75	H C F C (R-22)	24	0	
		H F C (Alternative Freon)	49	49	0
		Natural refrigerants HFO (GWP less than 150)	2	26	75
Overseas Plants	101	H C F C (R-22)	9	0	
		H F C (Alternative Freon)	42	42	0
		Natural refrigerants HFO (GWP less than 150)	50	59	101



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■ Conclusion



Various environmental problems, including recently increasing natural disasters have threaten our living environment.

As user, we have to complete shifting renewable energy and replacing to natural refrigerants, which are effective measures against global warming.

In addition, we expect manufacturers of refrigeration equipment to develop technology further, and request Japanese government to continue supporting us with subsidies for natural refrigerants-based systems installations.

We, the Ajinomoto group, will take the initiative to address the global deal with environmental problems and lead the industry.

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Thank you for listening



Ajinomoto Frozen Foods Co., Inc.