

# operating results of CO<sub>2</sub>/NH<sub>3</sub> refrigeration system ( C-LTS CO<sub>2</sub>/NH<sub>3</sub> condensing unit)

2016/2/10



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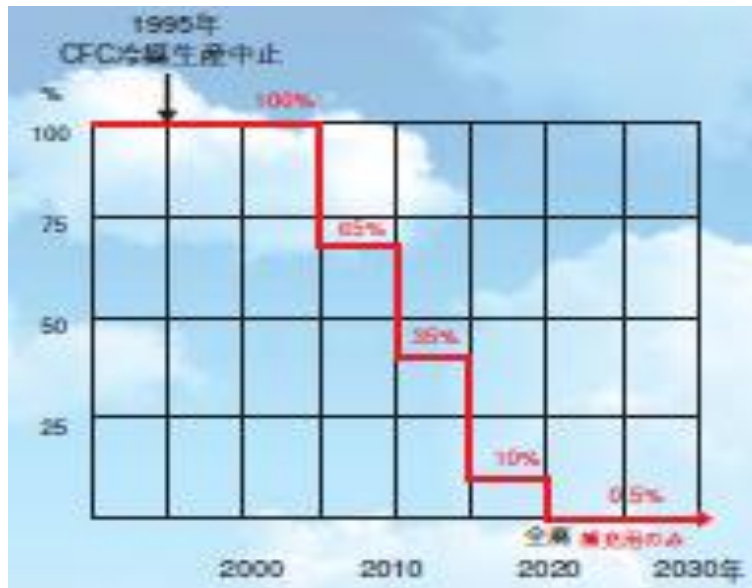
## For Ozon layer protection

“Montreal Protocol” regulates production, consumption and trade of Ozon-Depleting Substances.

Production of R-12 was discontinued at 1995 in developed country.

Production and using of R-22 and HCFC will be abolished from 2020 in developed country and 2030 in developing country.

In this kind of situation , many companies(cold storage , food companies) start to consider whether to introduce natural refrigerant condensing unit in Japan.



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## 2. Overview of C-LTS(CO2/NH3 condensing unit)

### 1. About C-LTS

C-LTS is a condensing unit using natural refrigerants(CO2 and NH3) for refrigeration equipment.

Now C-LTS is in used refrigeration industries such as cold storage and freezing foods.



C-LTS

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## 2. Overview of C-LTS(CO2/NH3 condensing unit)

### 1. Saving energy

C-LTS uses two kinds of refrigerants, NH3 and CO2.

C-LTS enables us to reduce energy consumption by using these refrigerants efficiently.

### 2. Safety use

NH3 leakage is so dangerous in such a small country as Japan.

In Japan, refrigerated warehouses are mainly located in ...

1. **Thickly housed area**
2. **Littoral industrial clusters**

High risk for Workers, neighborhoods, freights.

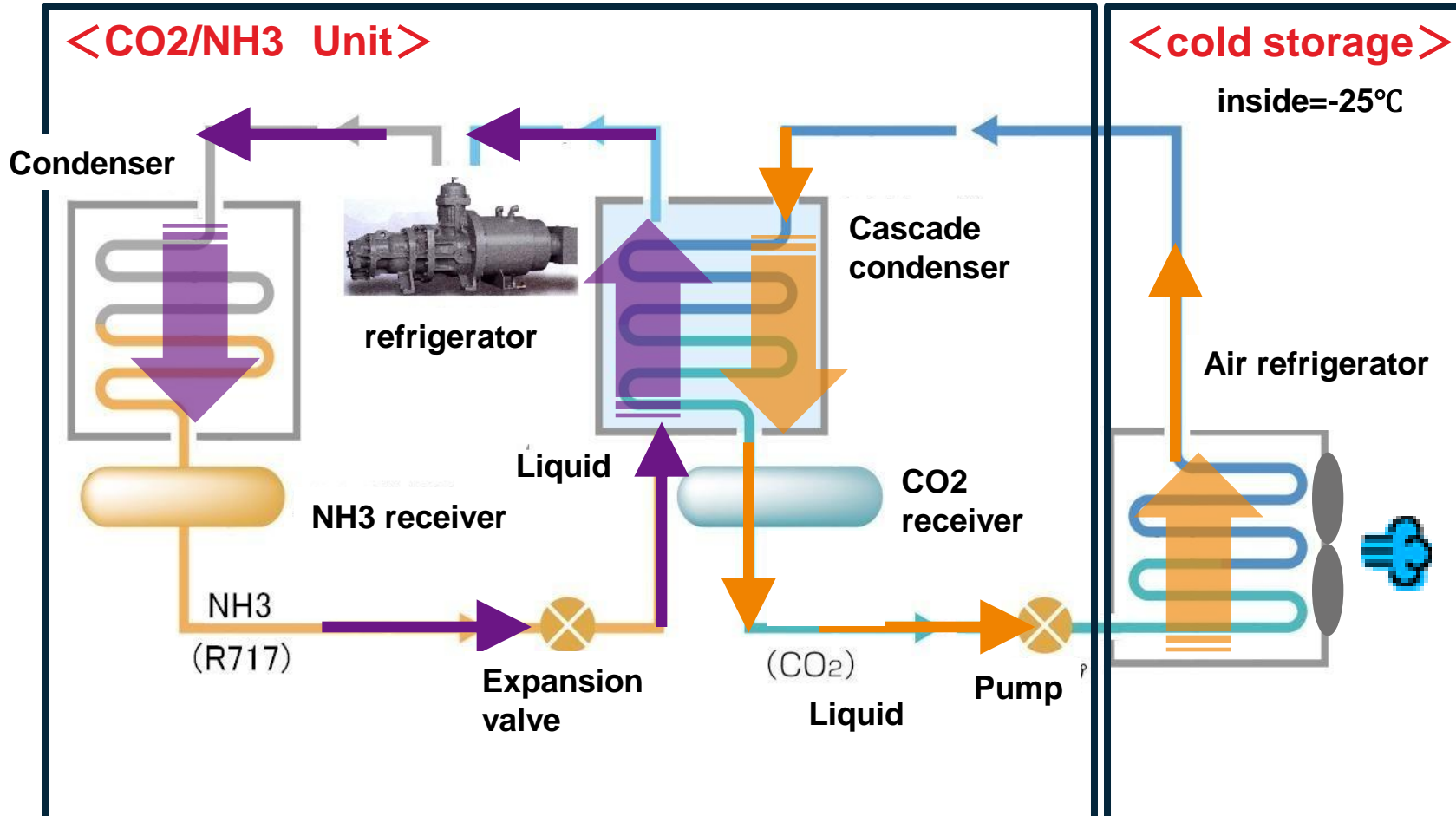
C-LTS enables us to reduce risk of using NH3.



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## 2. Overview of C-LTS(CO2/NH3 condensing unit)

○ Refrigerant cycle and specification ○



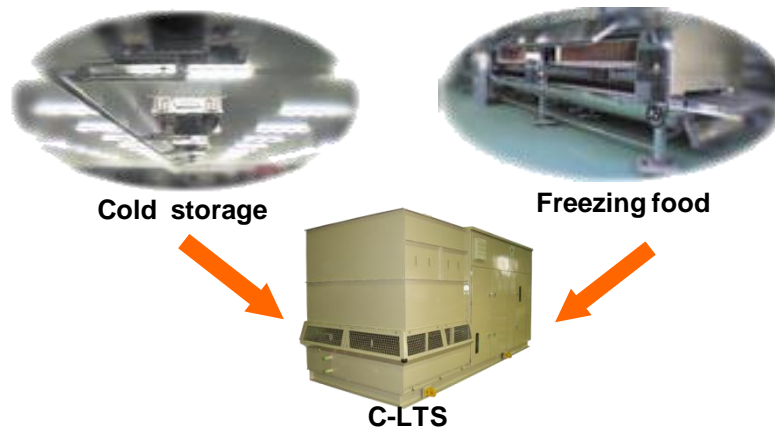
### 3. Line up

C-LTS has several kinds of units

(freezing area approx.  $-25^{\circ}\text{C}$  : 5 units, refrigerating area approx.  $+10^{\circ}\text{C}$  : 3 units).

We can choose from following line up depending on each needs.

Condensation System	C-LTS (freezing area approx. $-25^{\circ}\text{C}$ )					C-LTS (refrigerating area approx. $+10^{\circ}\text{C}$ )		
	24kW	37kW	45kW	100kW	125kW	37kW	45kW	125kW
Water cooling	●	●	●	●	●	●	●	●
Evaporative condenser	●	●	●	●	●	●	●	●
Coefficient of performance	<b>2.04</b>	<b>2.19</b>	<b>2.19</b>	<b>2.21</b>	<b>2.21</b>	<b>3.76</b>	<b>3.82</b>	<b>3.75</b>



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# 4. Case studies

Following list shows electric consumption of each companies which adopt C-LTS.

User	Capacity	Electric power	Consumption	Consumption	Room	Equipments
	tonnage	consumption	rate (HCFC)	rate (C-LTS)	temperature	
	ton	kWh/year	kWh/ton year	kWh/ton year	°C	
'L' company (2013)	2,800	201,320	98	71.9	-25°C	C-LTS45kW × 1unit
'E' company (2014)	41,300	4,009,000	146	97.1	-23°C	C-LTS100kW × 3unit
'Y' company (2014)	23,000	1,550,000	99	67.4	-25°C	C-LTS125kW × 2unit
						C-LTS24kW × 1unit
'F' company (2015)	20,500	1,120,000	82	54.6	-25°C	C-LTS100kW × 2unit
'Y' company (2014)	16,800	1,140,000	93	67.9	-25°C	C-LTS45kW × 5unit

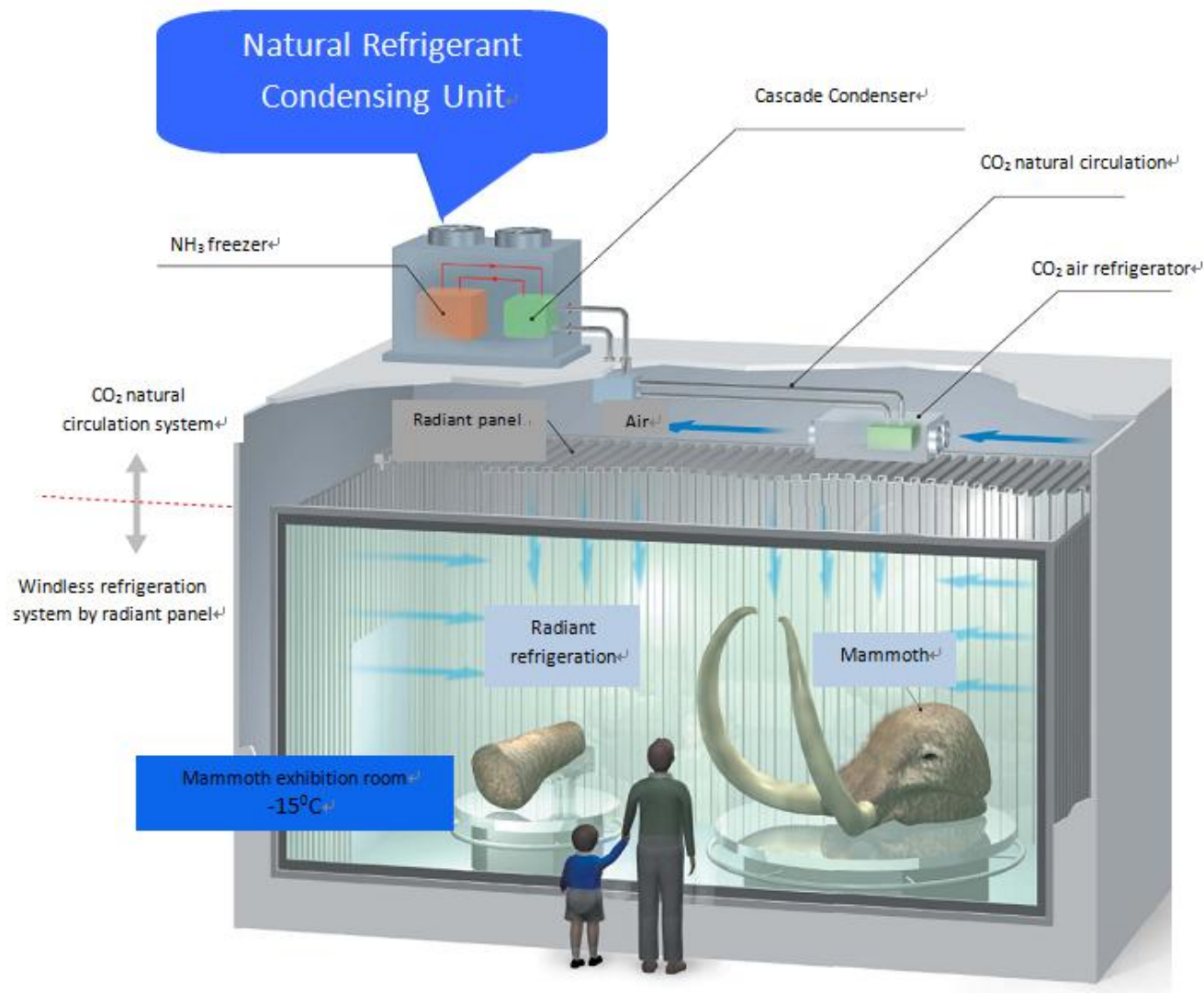
**Approx. 20%~30% saving energy !**

**Number of shipments : Approx. 100 units  
(schedule of next fiscal year)  
Total : Approx. 200 units**





# 5. "CO<sub>2</sub>/NH<sub>3</sub> Circulation System" refrigerated the Mammoth exhibition room for Expo at Aichi 2005.



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In Japan, Ministry of Environment is providing subsidies to install CO<sub>2</sub>/NH<sub>3</sub> Circulation system.

In future, natural refrigerant condensing unit is more and more important for refrigeration industry.



Thank you all very much  
for your attention

