



Business Case for
Natural Refrigerants

11-12/04/2018 – Beijing



Nestlé

Enhancing quality of life and contributing to a healthier future



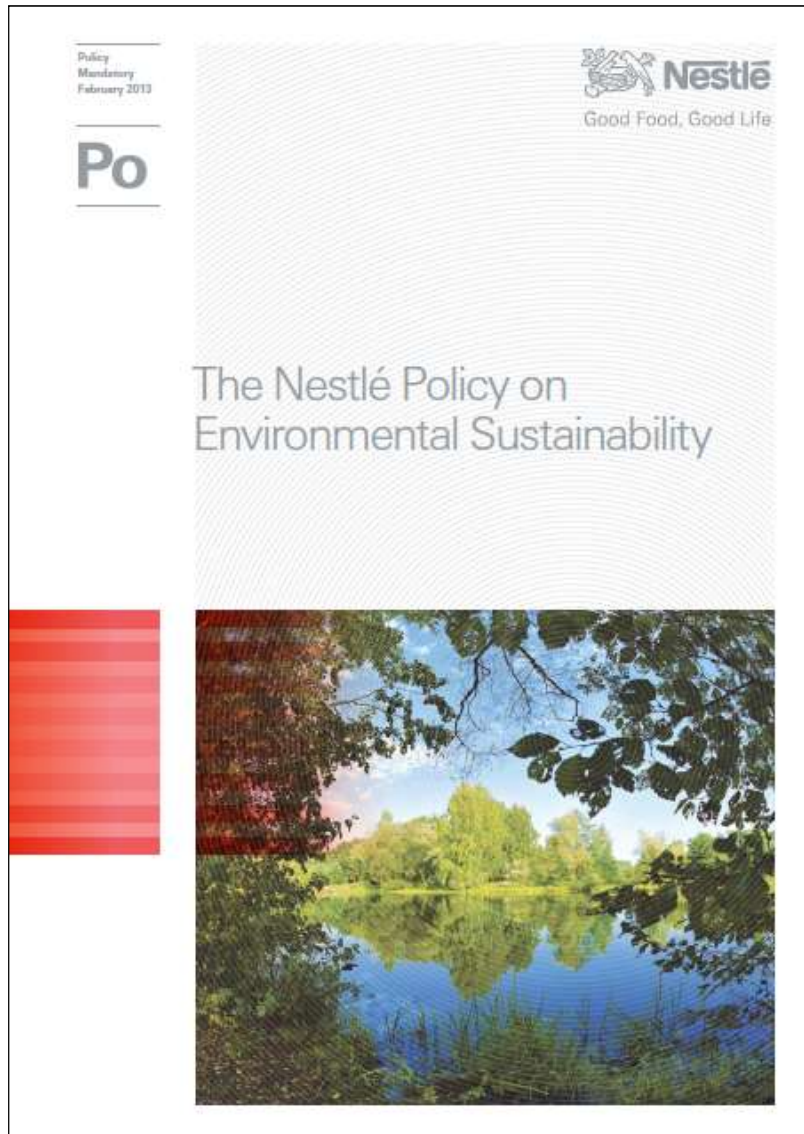
Sustainable Refrigeration In Nestlé

Presented by – Daiqian Zhang

Nestlé China Ltd.



- 335,000 employees in over 150 countries
- 436 factories in 85 countries
- Over 2,000 brands



3. Manufacturing

We use safe **natural refrigerant** alternatives for industrial refrigeration installations and implement new solutions to improve their performance.

5. Distribution

We support the development and use of safe and efficient **natural refrigerant** solutions for commercial applications and progressively phase out HFCs appliances.

Source: CSV report 2017

Web-link: www.nestle.com/csv



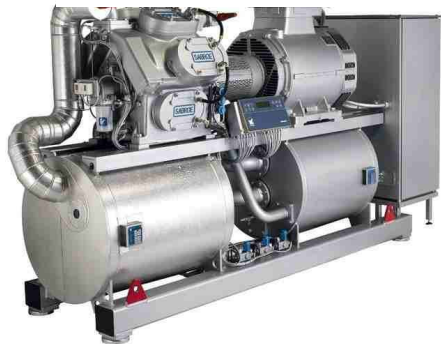
Deployment of Natural Refrigerants progressing

Industrial Refrigeration

Our objectives

- ⊕ **By 2020** – Expand the use of natural refrigerants, which do not harm the ozone layer and have a negligible impact on climate change, in our industrial refrigeration systems.

Our result in year 2017 : Tens of industrial refrigeration system with natural refrigerants has been installed in Nestlé world wide.



Commercial Refrigeration

Our objectives

- **By 2015** – All of our new ice cream chest freezers will use natural refrigerants.
- ⊕ **By 2016** – All of our new ice cream chest, upright and island freezers will use natural refrigerants.
- ⊕ **By 2020** – All new proprietary cold beverages dispensers of Nestlé Professional will use natural refrigerants.



Refrigerants in Nestlé: above 90% Natural in industrial refrigeration

As good result of our early phase-out and natural refrigerant strategy



Started in 1986 as an internal direction in manufacturing to “go natural”

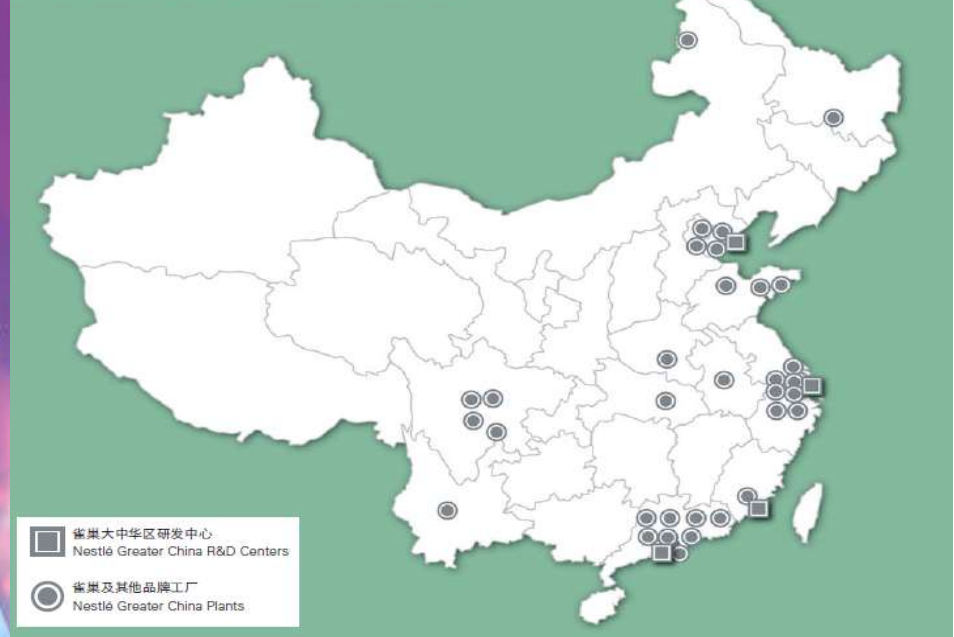


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Nestlé in Greater China Region

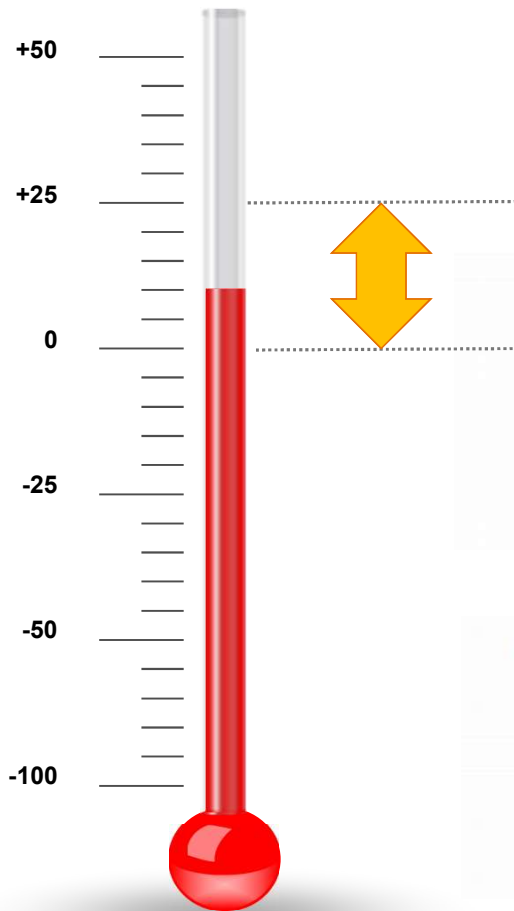


雀巢大中华区研发中心及产业基地
Nestlé Greater China R&D and Industrial Base



- 4 R&D centers
- 33 factories
- About 50,000 employees
- Second largest market of Nestlé worldwide

Degree Celsius



+4~7°C Chilled water for processing cooling



+4~7°C Chilled water for Humidity & Temp control in hygienic zones



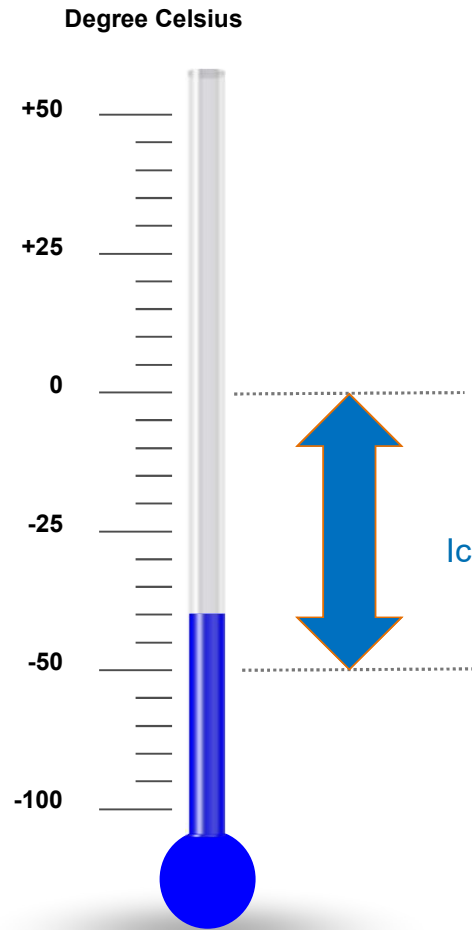
+0~2°C ice water water for dairy and nutrition processing cooling

- Low charge ammonia package chiller provided 4~7°C chilled water are widely used for a variety of product catalogues for processing cooling, Humidity & Temperature control in all hygienic zones, office air handling etc.
- Build-up ammonia system provide 0~2°C ice water for dairy and nutrition processing cooling



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Refrigeration in Nestlé China Negative temperature cooling applications



Ice cream freezing in -45°C hardening tunnel



-25°C cold store for Ice cream storing



-18°C cold store for raw materials storing

- Large build-up ammonia system for ice cream freezing, storing.
- Ammonia/CO2 cascade system for ice cream storing.
- CO2 cold store for raw materials storing.

Sustainable refrigeration in Nestlé China



Ammonia refrigeration system in Guangzhou factory



Ammonia refrigeration system in Tianjin factory



Ammonia refrigeration system in HongKong factory



Ammonia refrigeration system in Shuangcheng factory

- Large build-up ammonia system in Nestlé GuangZhou, TianJin, HongKong, Shuangcheng etc. factories
- Ammonia charging for each individual system varies from 7.8 tons to 26.5 tons

Sustainable refrigeration in Nestlé China



Packaged ammonia chiller in
Qingdao coffee factory



Packaged ammonia chiller in
Shanghai TOTOLE FIRST factory



Packaged ammonia chiller in
Taizhou factory

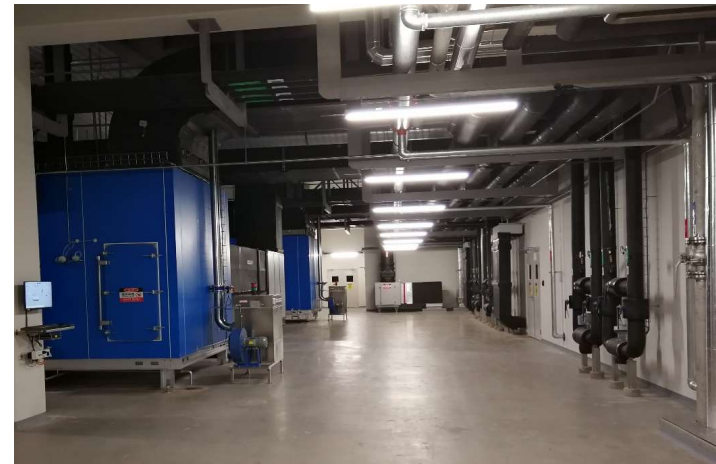


Packaged ammonia chiller in
Tianjin water factory

- Packaged ammonia chiller in Qingdao, Taizhou, Shanghai, Tianjin factories.
- Ammonia charging for each individual system varies from 40kg to 230 kg
- Cooling capacity for each individual system varies from 120kW to 1600 kW



Centralized chilled water distribution system in Qingdao factory



Air handling Units in Taizhou factory



Centralized chilled water distribution system in Taizhou factory



Chilled water fan /coil units used for offices

- Centralized Chilled water system + AHU+ Fan/coil system for air conditioning



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Safer natural refrigerant CO2 refrigeration system in Nestlé China



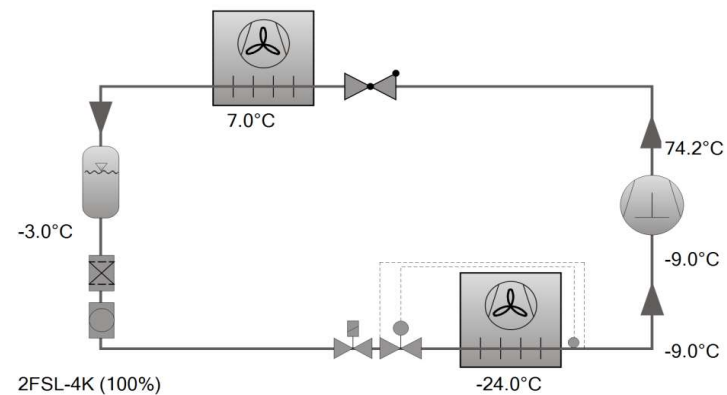
3 (-18°C) fish oil cold rooms in Shuangcheng factory



Co2 compressors /condenser cooled by 2°C chilled water



Co2 evaporators inside of cold rooms



Co2 system working principle

- -18°C fish oil cold stores with total storing area 150m² in Shuangcheng Dairy and Nutrition factory
- CO2 subcritical system (cooled by +2C ice water)



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Safer natural refrigerant CO2 refrigeration system in Nestlé China



Co2 compressor room



Co2 valve stations for cold store

- -25°C CO2 ice cream cold store with 4400 pallets storing capacity in Guangzhou factory
- Ammonia / CO2 cascade refrigeration system
- Defrosting: CO2 hot gas (sensible heat only)

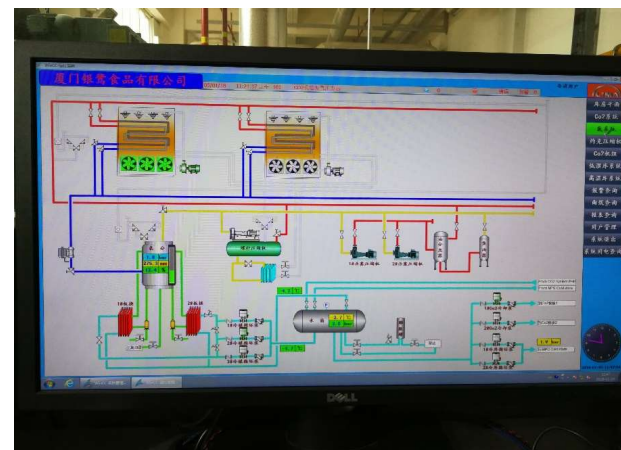


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Safer natural refrigerant CO2 refrigeration system in Nestlé China



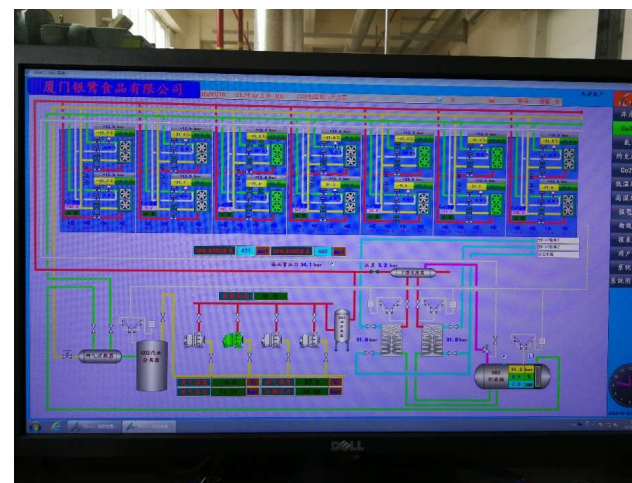
Overview of refrigeration plant room



AMMONIA/MPG system monitoring screen shot



Overview of refrigeration plant room



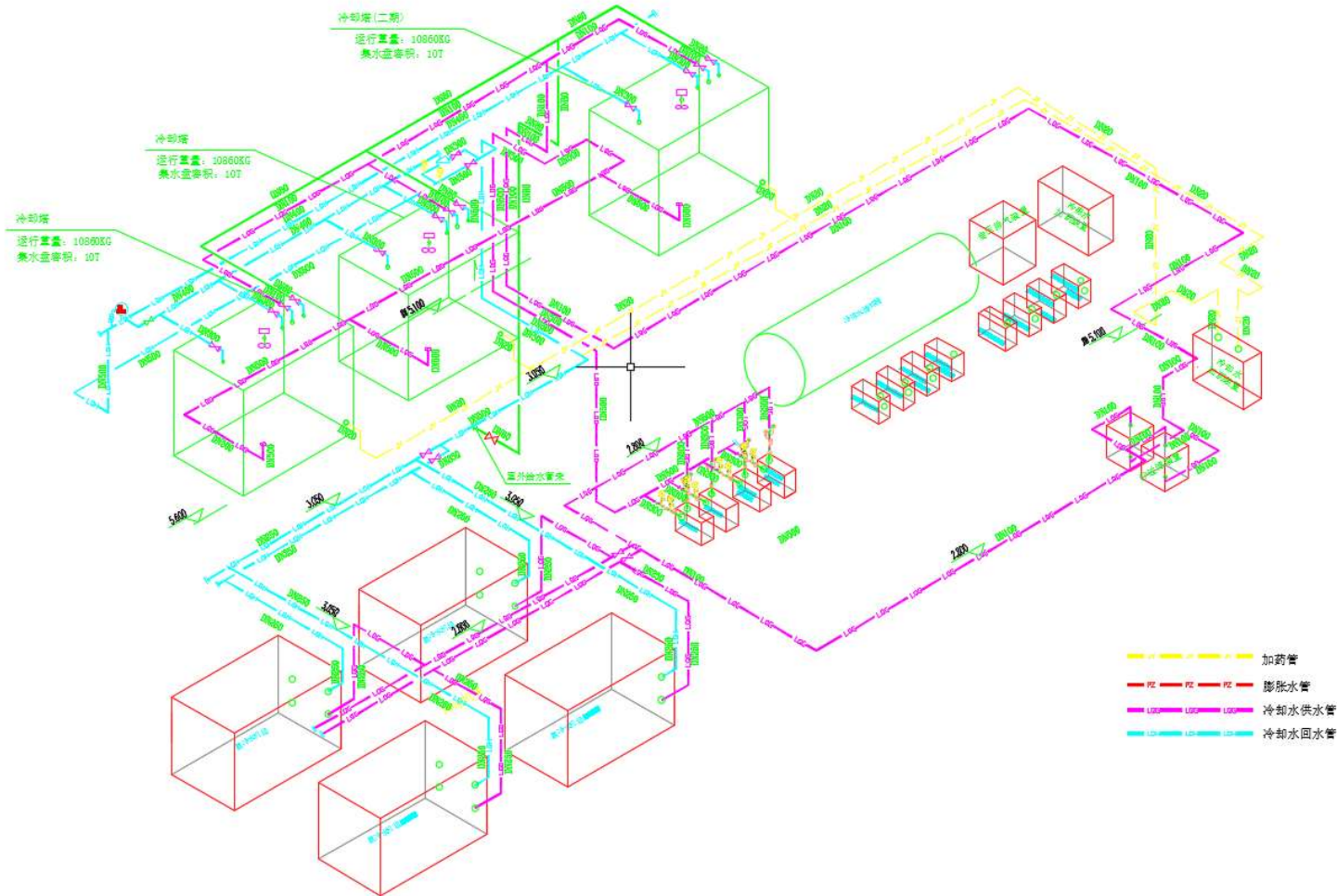
MPG/CO2 system monitoring screen shot

- Multiple temperature control cold rooms which consists 16 rooms for total 5000m2 storing and service area with temperature control varies from +15°C to -18°C in YINLU Xiamen factory
- Combined ammonia / 25% Propylene Glycol / CO2 refrigeration system
- Defrosting: CO2 hot gas (sensible heat only)



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On going project - Synthetic refrigerants phase out in Nestlé China



- Two sets ammonia packaged chiller with 1600 kW cooling capacity of each unit will be installed in Shanghai TOTOLE factory in year 2018
- Total 57 sets of refrigeration unit with synthetic refrigerant will be phase out after project phase 1



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Thank you very much!

