Case Study : Project 2 Development Process

Project of Introducing High Efficiency Refrigerator to Food Industry Cold Storage & Frozen Food Processing Plant

PT Mayekawa Indonesia

VICKY OKTAVIANUS
MAYEKAWA MFG. CO., LTD.

Founded: Since 1924 (in Tokyo, Japan.)
Corporate offices: 3-14-15 Botan, Koto-ku, Tokyo 135-8482, Japan
Established in 1924
Capital: 1 billion yen
Employees: 4407 (12/2015 31, including group companies.)
President: Tadashi Maekawa
Operating Bases

Domestic Plant: Ibaraki / Nagano / Hiroshima
Overseas Plant: U.S.A. / Mexico / Brazil / Korea / Belgium

60 Domestic Offices / 3 Domestic Plants / 37 Countries / 93 Offices / 6 Plants

2015/9月 現在
Scope of Activity

We are involved in various industries, systems and products by contributing to facilitate eco-friendly and energy-saving production.
Sustainable Refrigeration Systems

- Zero Ozone Depletion Potential
- Energy saving
- Low Global Warming Potential
- Low Carbon

Natural Refrigerants
### Refrigerants and Product Solutions

<table>
<thead>
<tr>
<th>Temperature</th>
<th>NH₃</th>
<th>CO₂</th>
<th>HC</th>
<th>H₂O</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>120°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60°C</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>10°C</td>
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<tr>
<td>-15°C</td>
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<td>-40°C</td>
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<tr>
<td>-50°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-100°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**NATURAL FIVE**

Refrigerants and Product Solutions
Indirect Systems with NH3/CO2

Conventional Type
F-Gas Refrigeration system

Direct method
- Potential leak in storage room
- Requires large amount of F-Gas
- Simple system

Indirect method
- Least potential of leakage in storage room
- Uses very small amount of ammonia at 25kg
- A bit more complicated system

Safest Approach of NH3 Refrigeration Systems with NH3/CO2
(Indirect Systems)
Shaping Refrigeration Systems for Tomorrow
**Examples of upgrades**

<table>
<thead>
<tr>
<th>Name and Location</th>
<th>Capacity (m³)</th>
<th>Years in operation (years)</th>
<th>Previous equipment</th>
<th>Date upgraded (year)</th>
<th>Number of Newtons (units)</th>
<th>Reduction in electricity consumption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokyo Toyomi Refrigeration Co., Ltd., Funabashi distribution center</td>
<td>50,000</td>
<td>29</td>
<td>HCFC-22</td>
<td>First stage of work 2008</td>
<td>8</td>
<td>31.1</td>
</tr>
<tr>
<td>Niigata Reizo Co., Ltd.</td>
<td>11,100</td>
<td>33</td>
<td>HCFC-22</td>
<td>Second stage of work 2009</td>
<td>2</td>
<td>41.2</td>
</tr>
<tr>
<td>K.R.S. Corporation, Marugame office</td>
<td>18,100</td>
<td>27</td>
<td>HCFC-22</td>
<td>2009</td>
<td>2</td>
<td>24.9</td>
</tr>
<tr>
<td>Sensui Reizo Co., Ltd.</td>
<td>6,810</td>
<td>38</td>
<td>HCFC-22</td>
<td>2009</td>
<td>2</td>
<td>29.3</td>
</tr>
<tr>
<td>Maruha Nichiro Logistics, Inc., Funabashi logistics center</td>
<td>39,200</td>
<td>24</td>
<td>HCFC-22</td>
<td>2013</td>
<td>4</td>
<td>22.0</td>
</tr>
<tr>
<td>Maruha Nichiro Logistics, Inc., Chikuko logistics center</td>
<td>27,800</td>
<td>26</td>
<td>HCFC-22</td>
<td>2014</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td>Maruha Nichiro Logistics, Inc., Rokko logistics center</td>
<td>38,600</td>
<td>24</td>
<td>HCFC-22</td>
<td>2014</td>
<td>2</td>
<td>—</td>
</tr>
</tbody>
</table>

* The power consumption listed in this table are those for the entire cold storage facility, including office appliances, lighting, and conveyor equipment.

* The power consumption have been calculated based on bills from electricity companies.
**For cold storages**  
NewTon R / NewTon C

Comparison of the electric power consumption before and after switching to NewTon

Average reduction of 27.8%

- **Power consumption (kWh)**
  - 2012 (Before replacement)
  - 2013 (After replacement with four NewTon R3000s)
  - Reduction (%)

* Electricity consumption is for the whole factory (including elevators and lighting)
* Capacity 39,200 m³

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**For ice arenas**  
NewTon S

Energy saving achieved by switching from R22 equipment to NewTon F

Example of use with frozen cooked food

Comparison of electricity consumption by the cooling equipment used in the production of 1 ton of frozen food

- **Power consumption (kWh)**
- **Rate of reduction (%)**

* The two facilities are three-sheet curling facilities in the same area

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**For freezers**  
NewTon F

- **Power consumption (kWh/ton)**
- **Rate of reduction (%)**

* In the comparison, the R22 equipment and NewTon F were each used in combination with a freezer.

N.B. The volume of electricity consumed may vary according to food product type, temperature upon introduction into the equipment, and freezer type.
“NewTon” for ASEAN Demonstration Site: P.T. ADIB Global Supplies

Energy Efficient Refrigeration Technology

Entity: Mayekawa Mfg CO. Ltd

Joint Crediting Mechanism

Host Country: Indonesia

JCM Project for Cold Chain Industry in Indonesia with “NewTon”

This project was funded by the MOEJ in FY 2013 as the 1st project to Joint Crediting Mechanism.

Most advanced Japanese energy efficient non-fluorocarbon cooling system

NewTon R-6000

Energy Consumption reduction 570,000 kwh/year Estimated GHG reductions

Without consideration of HFC leakage emissions: 213 (tCO2/year) With consideration of HFC leakage emissions: 902 (tCO2/year)


JCM MRV (Monitoring, Reporting, Verification)

Note: The above diagram reflects a contractual model where the project proponent is independent from the project entity. The frame for "project participants" only shows an example. Other relationships are possible, such as a direct contractual relationship between project entity and the TPE.
JCM MRV – Monitoring

- National grid
- #2 Electricity meter (E_{\text{grid}})
  - (Used within factory)
- #1 Electricity meter (E_{\text{CPI}})
- Generator
  - #3 Elapsed time indicator (h_{\text{gen}})
- Cooling tower
- Refrigerator
- Evaporator
- Cold Storage
- Defrost Tank
- Pump

- Secondary Refrigerant (CO_{2e})
- Cooling water
- Defrost Water
- Monitoring points

Emission sources of the project
# Items & Points to be Reported:

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Monitoring Point</th>
<th>Unit</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amount of electricity consumption of refrigerator</td>
<td>Electricity Meter Equipped with Refrigerator</td>
<td>kWh</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Monthly grid electricity imported</td>
<td>Electricity Invoice from PLN (Electricity Provider)</td>
<td>kWh</td>
<td>Monthly</td>
</tr>
<tr>
<td>3</td>
<td>Elapsed time of onsite power generator</td>
<td>Elapsed Time Indicator</td>
<td>Hours</td>
<td>Daily</td>
</tr>
</tbody>
</table>
Verification process consists of:

- Document review
- On-Site Assessment
- Resolution of outstanding issues (if any)
Implementation Result

Comparison of electricity consumption before and after installation of NewTon at the Karawang Food Processing Plant

Average reduction rate results Approximately 40% (excluding May)

1. The energy in this table shows values for the entire cold-storage facility, including office equipment, lighting, and conveyance equipment.
2. Because the production volume for May 2014 was significantly different than other months, it has been excluded.

Results after adopting NewTon:

Power consumption per pallet has been reduced approximately 25 to 30%
Thank you for your attention.