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Business Case for Natural Refrigerants

04/09/2018 – Singapore

Embraco Plug n' Cool

A new concept in refrigeration

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Why Plug N' Cool?

- ENVIRONMENTALLY FRIENDLY REFRIGERANT R-290
- POTENTIAL INTERNAL VOLUME INCREASE
- ZERO REFRIGERANT LEAKAGE
- IT DOESN'T NEED A MACHINE ROOM
- QUICK AND EASY MAINTENANCE
- LAYOUT FLEXIBILITY
- LOW ENERGY CONSUMPTION
- FASTER AND SIMPLER INSTALLATION

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EMBRACO PLUG N' COOL
A SUPERMARKET CASE STUDY

ATMOsphere Asia/ Singapore / 4 September, 2018

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EMBRACO PLUG N' COOL
A SUPERMARKET CASE STUDY

About Mig Supermarket:

A family owned supermarket chain with **7 stores**	Located in the south of Brazil	More than 40 years of tradition

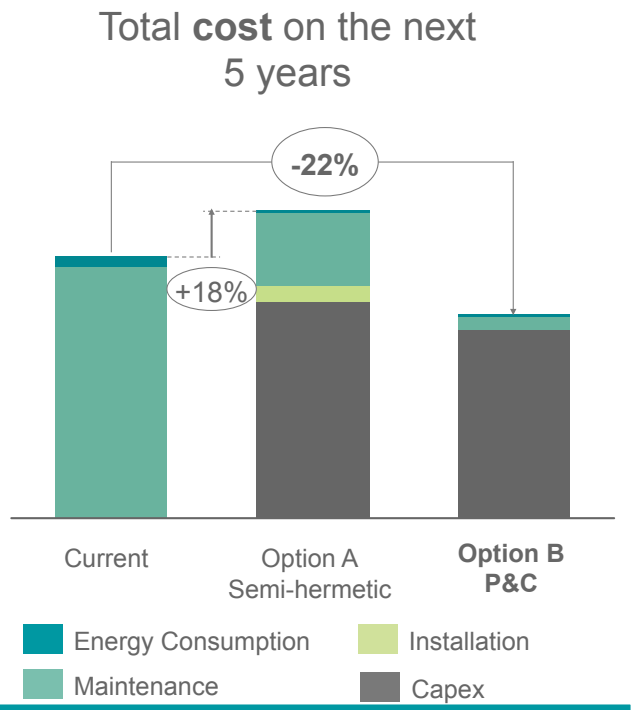
In a **1600 m² store**, Mig decided to retrofit its refrigerated area with environmentally-friendly cabinets.

Grocery Store Requirements

Qualitative Analysis

Needs	*Solution Configuration Refrigerant*	**Current Semi-herm. R22**	**Option A Semi-herm. CO2**	**Option B Plug n' Cool R290**
Improve store's aesthetics new stores = more sales		✗	✓	✓
Be greener		✗	✓	✓
Increase merchandizing area desirable		✗	✗	✓

Financials



Embraco Plug n' Cool was the chosen option

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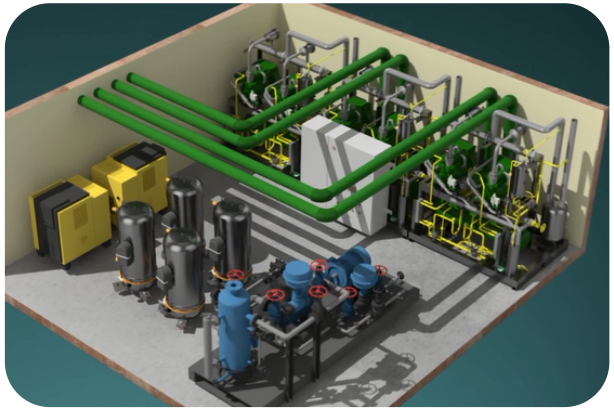
How it was

- Reach-ins and islands without doors, with remote refrigeration
- 2 compressors (R22)
- 40 m² exposition area



The solution

- Cabinets with doors, refrigerated by Embraco Plug n' Cool
- 26 compressors (R290)
- 53.3 m² exposition area

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CASE STUDY RESULTS

Food Preservation

Installation & Maintenance

Environmental Impact

Total Cost of Ownership & Energy Efficiency

Results
Food Preservation

Improved food preservation

Due to the doors and the Plug n' Cool technology, an important **improvement** in **food preservation** was **perceived by the end-user**.

"We are now using this self-contained refrigeration system, and also doors. So, we perceived a significant **improvement in the quality of the cold** inside the cabinet.

- Josué Miguel explains.

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Results
Installation Process

Installation time
up to **70% faster**

No need of **specialized labor**

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Results
Maintenance costs

Gas Leakage

Labor (specialized technicians)

Exchange suction and liquid filter oil

Less complexity on cleaning condensers

Savings
>$ 1300/month

*Based on a case study performed in a supermarket in the South of Brazil

Results
Peace of mind

“One of the most expressive benefits of Plug n’ Cool was the **maintenance and peace of mind**. Store managers and I had to be always alert because something could happen to the refrigeration system anytime.”

- Josué says.

Results
Environmental Impact

TEWI (Total Equivalent Warming Impact) is a measurement of the total CO2 emissions from an equipment during its operating lifetime.

	REMOTE SYSTEM	PLUG N' COOL P&C
GWP - Global Warming Potential	1810	3
L - Leakage rate (kg/year)	120	0.101
N - Life time (years)	10	8
M - Refrigerant charge (kg)	400 kgs	3 kgs
a - Recycling factor (%)	0.95	0
E - Energy consumption (kWh/year)	164 kWh	147 kWh
ß - Emission from energy gen. (kgCO2/kWh)	0.01	0.01
TEWI	2.224.600	11.800

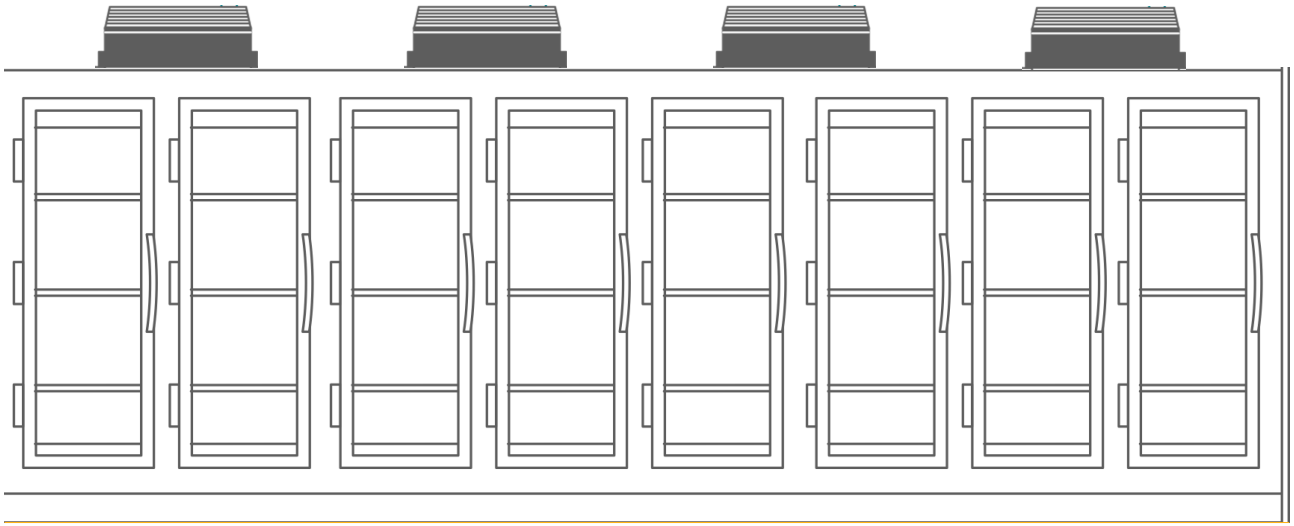
NATURAL REFRIGERANTS

99% of reduction on the environmental impact due to CO2 emissions

$$TEWI = GWP \cdot L \cdot n + GWP \cdot m \cdot (1-\alpha) + n \cdot E \cdot \beta$$

Results
Energy Efficiency

25% of increase on total exhibition area



32%

of reduction on energy consumption per m² of exhibition area

Results
Heat and Noise Perception

"**We feared** that migrating to a self-contained refrigeration solution would increase the **heat** inside the store and increase the **noise** as well...

...but thanks to the air flow and the position of the Plug n' Cool system on top of the equipment, **this didn't happen**."

– Josué Miguel

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"The success of this project has now convinced us to use this **green technology** in the other stores."

- Josué Miguel.

Why Plug n' Cool is relevant to Asia?

SEA is the region with world's highest **growth rates** until 2030

Energy demand will increase

Efficient and **practical solutions** are key!

Plug n' Cool brings top **energy efficiency** and **low noise** allied with **simple installation**, **low maintenance** and **optimized costs**


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Thank you for listening!