



ATMO
sphere

business case

natural refrigerants

June 16 & 17, 2016 – Chicago

Embraco Plug'n Cool

A new concept in refrigeration



embraco

REFRIGERATOR MANUFACTURER
Turbo air

ELETRÓFRIO
Refrigeração




ENVIRONMENTALLY FRIENDLY REFRIGERANT R-290


POTENTIAL INTERNAL VOLUME INCREASE



ZERO REFRIGERANT LEAKAGE


IT DOESN'T NEED A MACHINE ROOM


LAYOUT FLEXIBILITY


QUICK AND EASY MAINTENANCE


LOW ENERGY CONSUMPTION


PROJECT DESIGN TIME OPTIMIZATION



Specially designed for:

Supermarket



Specially designed for:

**Professional
kitchen cabinet**

Supermarket

CHALLENGES

1 Large refrigerant charge
(typically 3000lbs for a 45K store)

2 Lack of flexibility in the display area
Equipment can't be moved around/product changes for seasonal changes.

3 Installation

- *High complexity >> demands refrigerant technicians >> \$\$\$*
- *High labor content*
- *High material cost >> Long copper runs are costly >> \$\$\$*

4 Maintenance

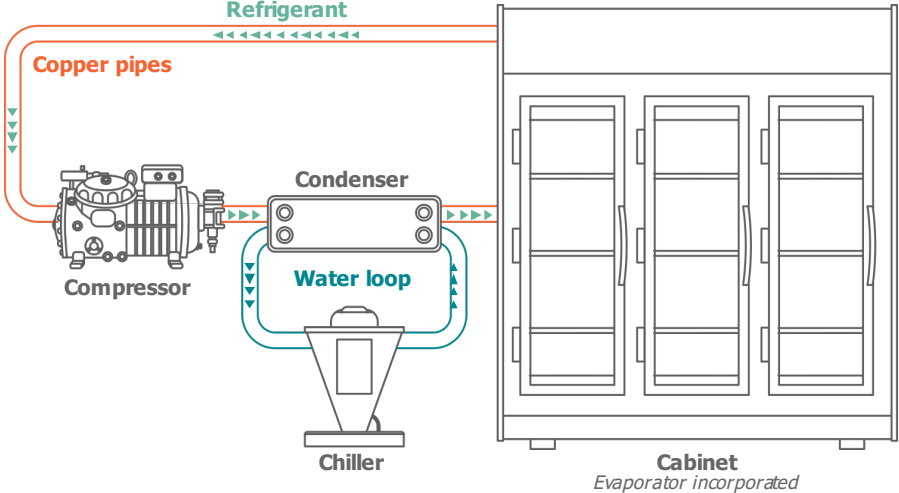
- *Highly specialized >> demands refrigerant technicians >> \$\$\$*
- *Technicians working in the sales area interfering with shoppers*
- *High refrigerant leak rate >> 10-25% annually*



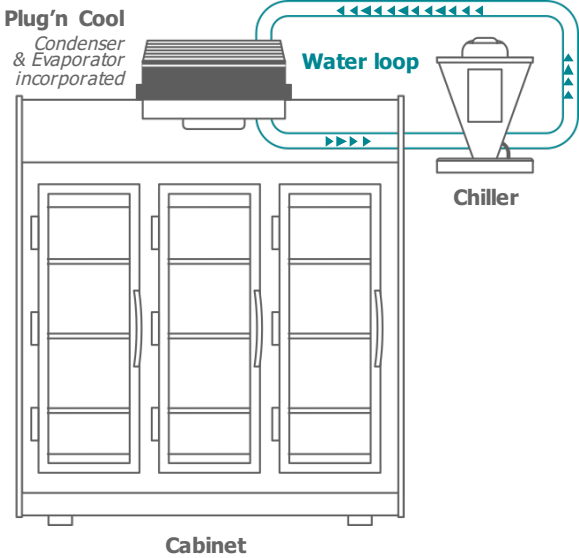
Case Study

ELETROFRIO GREEN LINE

Remote refrigeration



Embraco Fullmotion Plug'n Cool



Case Study

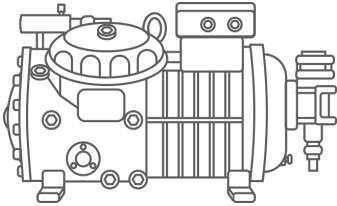
ELETRÓFRIO GREEN LINE

Remote refrigeration

	MBP	LBP
NUMBER OF COMPRESSORS	2	2
TOTAL CAPACITY (BTU/H)	20592	17794
CONDENSER	WATER COOLED	
REFRIGERANT	R404A	
CONFIGURATION	DIRECT EXPANSION	

Embraco Fullmotion Plug'n Cool

	MBP	LBP	
NUMBER OF COMPRESSORS	12	12	NUMBER OF COMPRESSORS
TOTAL CAPACITY (BTU/H)	20592	17794	TOTAL CAPACITY (BTU/H)
CONDENSER	WATER COOLED		CONDENSER
REFRIGERANT	R290		REFRIGERANT
CONFIGURATION	SELF-CONTAINED		CONFIGURATION



The case study analyzed reach-ins using remote refrigeration with direct expansion vs. the same equipment using Embraco Fullmotion Plug n' Cool, in a **supermarket** with an area of **2150 ft²**.



Case Study

ELETROFRIO GREEN LINE



Installation time

Up to
70%
faster

5 days
instead of 15 to install
the equipment



Refrigerant charge

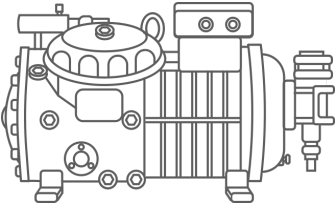
98%
of reduction

From 330 lb
to 6 lb



Technicians

No need
of refrigerant/brazing
technicians



Case Study

ELETROFRIO GREEN LINE

Remote refrigeration

GWP	3922
L – Leakage rate (kg/year)	45
n – Life time (years)	10
m – Refrigerant charge (kg)	330 lbs
a – Recycling factor (%)	0.95
E – Energy consumption (kWh/year)	164553 kWh
β – Emission from energy generation (kgCO2/kWh)	0.508

TEWI

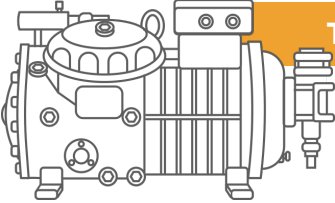
2,630,224

Embraco Fullmotion Plug'n Cool

3	GWP
0	L – Leakage rate (kg/year)
10	n – Life time (years)
6 lbs	m – Refrigerant charge (kg)
1.00	a – Recycling factor (%)
162641 kWh	E – Energy consumption (kWh/year)
0.508	β – Emission from energy generation (kgCO2/kWh)

826,225

TEWI



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



Case Study

ELETROFRIO GREEN LINE

Considering direct and indirect emissions:



10%
supermarkets
in USA

migrate to
a solution like
Plug'n Cool

-12,748,400
tons of CO₂
in 1 year

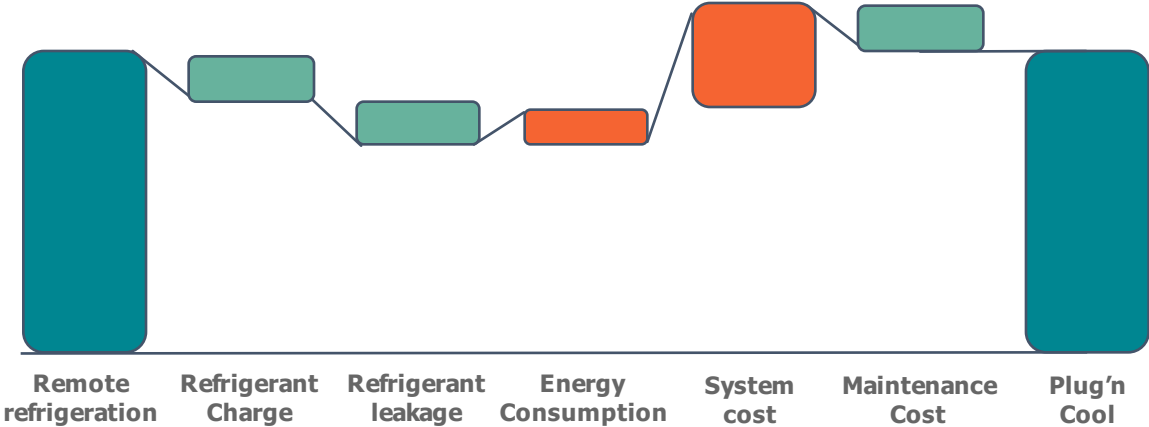
1,3 billion
gallons
of gasoline
consumed

SOURCE: EPA greenhouse equivalency calculatorz

Case Study

ELETROFRIO GREEN LINE

TCO breakdown



Calculated data



Professional Kitchen Cabinet

CHALLENGES

- 1** High energy bills

- 2** Pull down must be fast

- 3** Complexity in serviceability

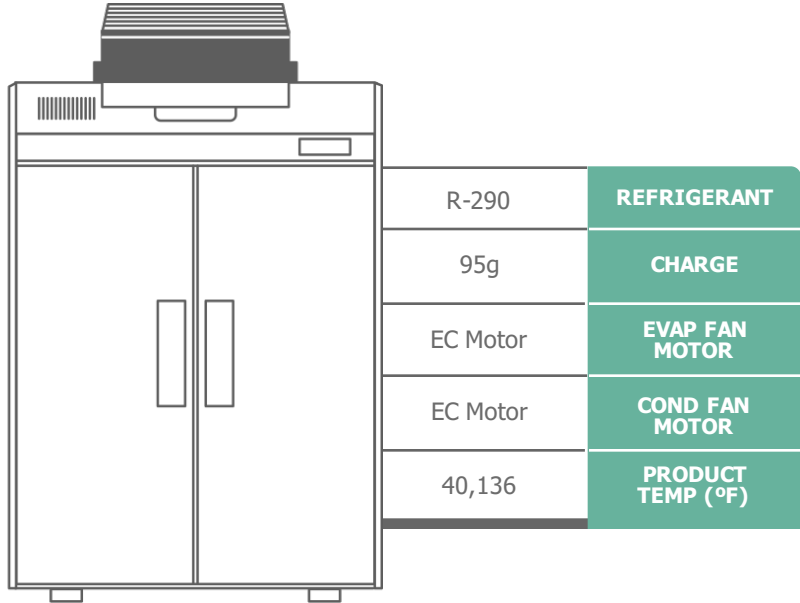
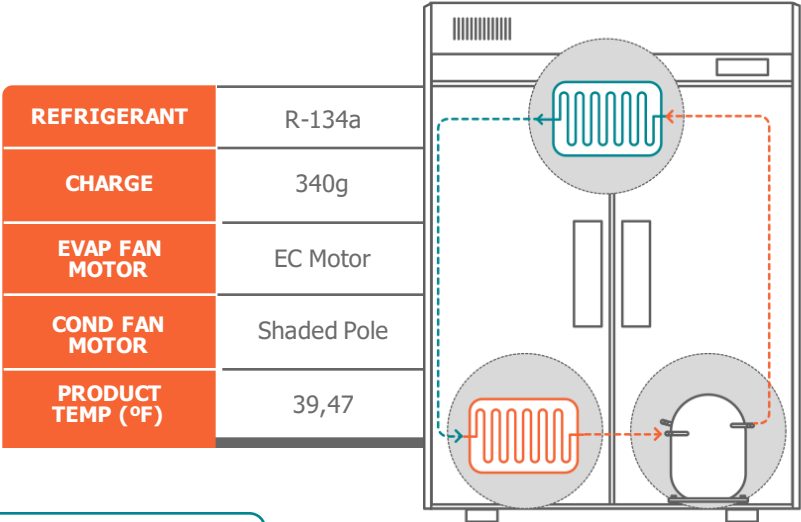


Case Study

TURBO AIR CABINET

Self-contained cooling solution

Embraco Fullmotion Plug'n Cool



Case Study

TURBO AIR CABINET



Maintenance

It can be done
in a few minutes



Energy consumption

10%
lower
than original configuration
(just drop-in –
no system optimization)
In compliance with DoE



Serviceability

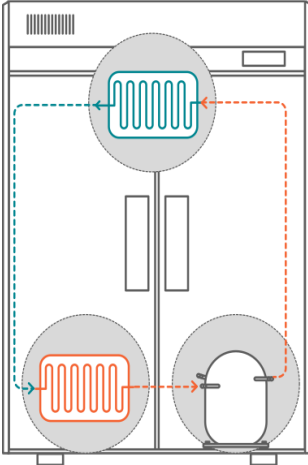
No need
of refrigerant/brazing
technicians



Case Study

TURBO AIR CABINET

Self-contained cooling solution



GWP	1430
L – Leakage rate (kg/year)	0,0034
n – Life time (years)	8
m – Refrigerant charge (kg)	0,340 kg
a – Recycling factor (%)	0
E – Energy consumption (kWh/year)	1239 kWh
β – Emission from energy generation (kgCO2/kWh)	0.508
TEWI	5560

Embraco Plug'n Cool

3	GWP
0.00095	L – Leakage rate (kg/year)
8	n – Life time (years)
0,095 kg	m – Refrigerant charge (kg)
0	a – Recycling factor (%)
1122 kWh	E – Energy consumption (kWh/year)
0.508	β – Emission from energy generation (kgCO2/kWh)
4560	TEWI

18%
less impact
on the environment
according to the
TEWI calculation

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



Innovate with Embraco Plug'n Cool

Know more at:

embraco.com/plugncool



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