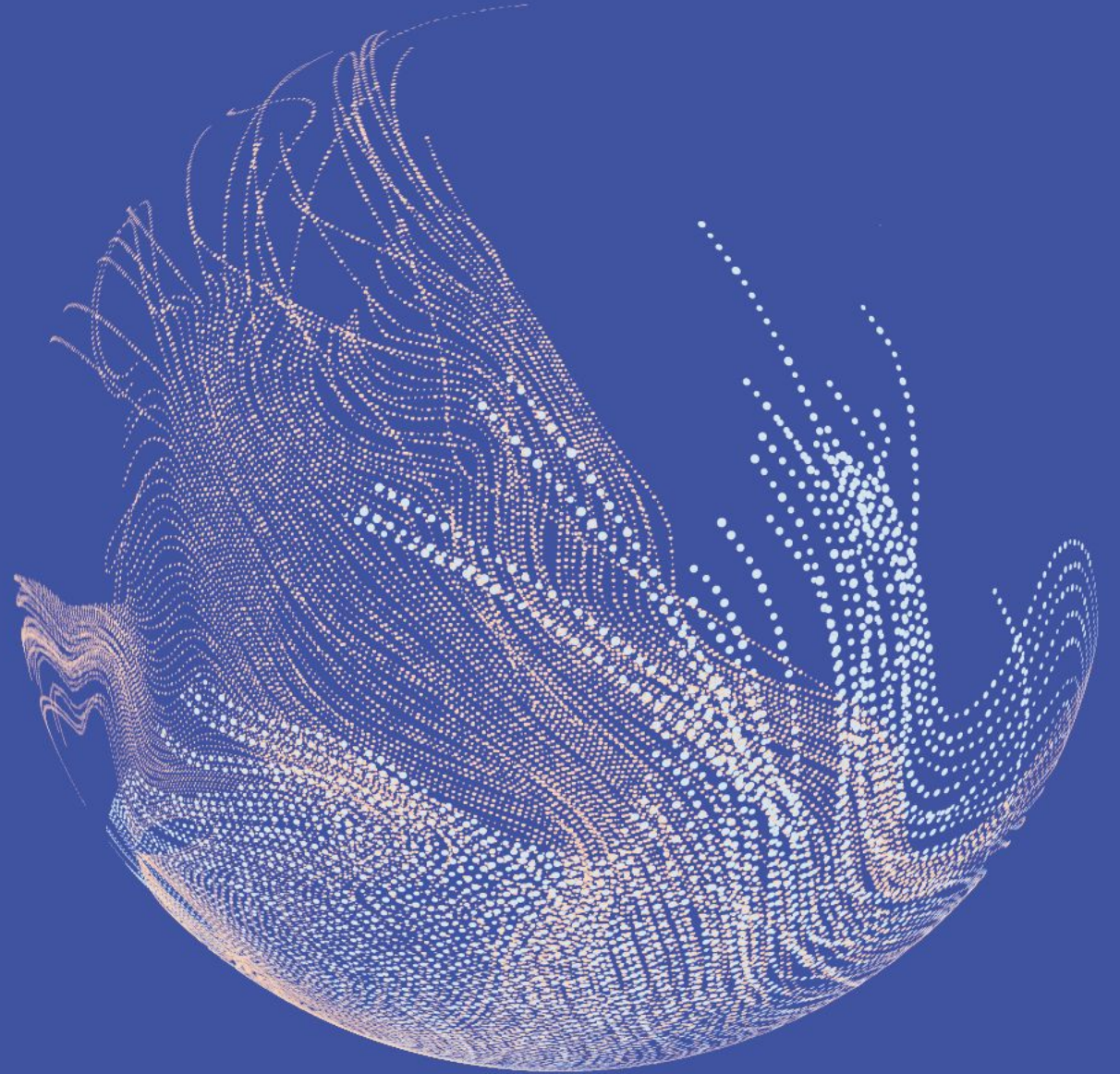




Business Case for
Natural Refrigerants

Brussels
19-20/09/2023





**Revolutionary, energy efficient cabinet
with variable speed compressor
for effective sale and display of ice cream**



**Marino Bassi – Embraco | Nidec
Key Account Sr. Advisor – Commercial Appliance Business**

**Robert Pędzik – ES SYSTEM K
Technical Director**

#GoNatRefs

2009 ES SYSTEM K
Story in the ice cream world has begun

LIMOSA CLASSIC IC CABINET

Base electricity consumption

Exclusive, classic ice cream cabinet

On-Off compressor

Embraco NJ2212GK (R452A)



Research & Development

**We all love ice cream
but there is no perfect cabinet!**



We found a solution!



Utility features

Looks like a smartphone
for the ice cream

Visual access
to the ice cream

Ergonomic conditions
for operating the cabinet



reddot award 2018
honourable mention

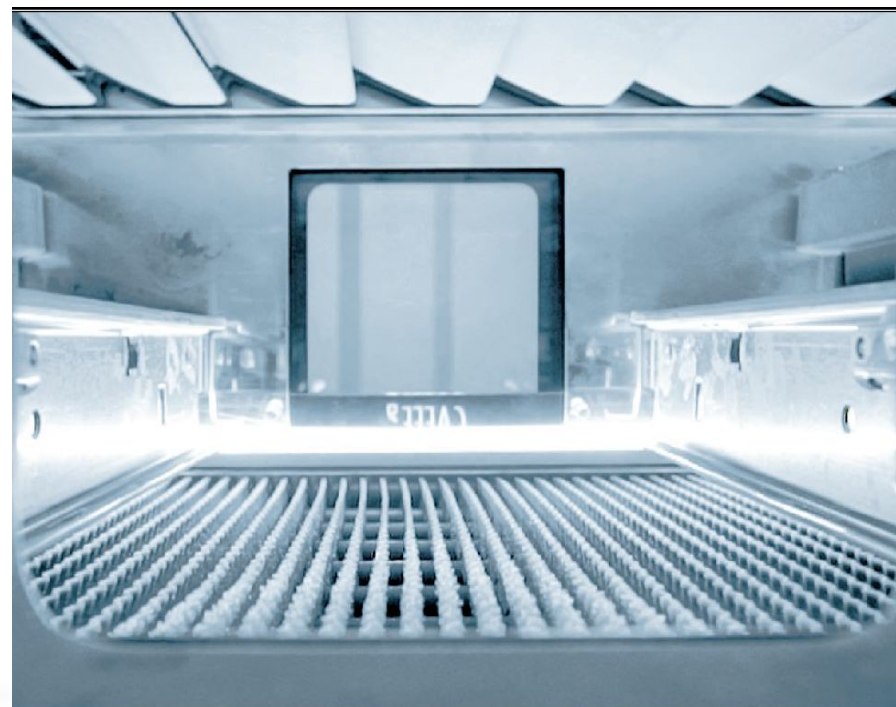


Technical features

**Completely hermetic,
hygienic & high insulated
storage space**

Static circulation

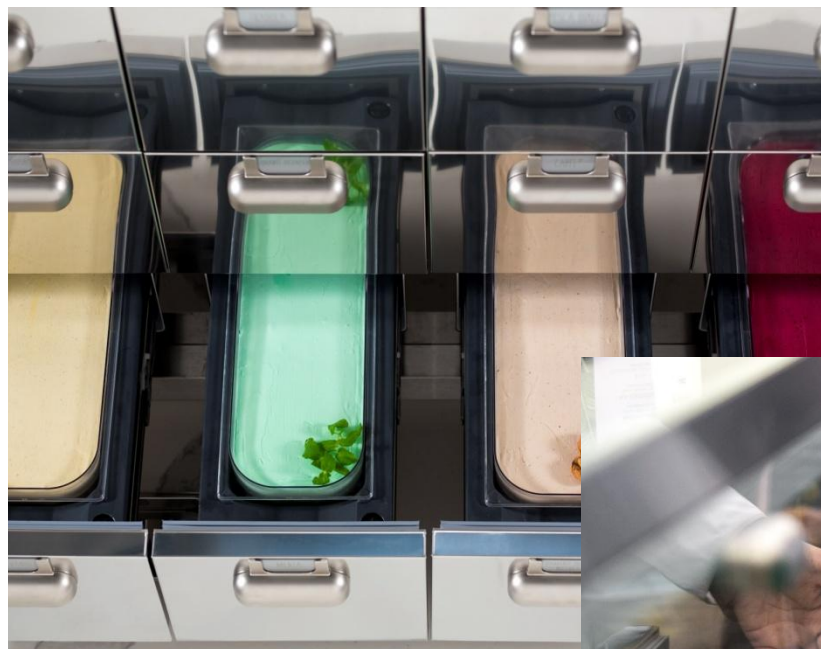
**Individual evaporator
for each level of displayed
products**



Technical features

Reduction of the drying effect
degradation of the product's
surface layer

Homogeneous product
temperature thanks to glycol
drawers





Technical features

**Very low energy
consumption**



Technical features

INSU Concept

>50% less energy consumption

thanks to the new design
and an On-Off compressor

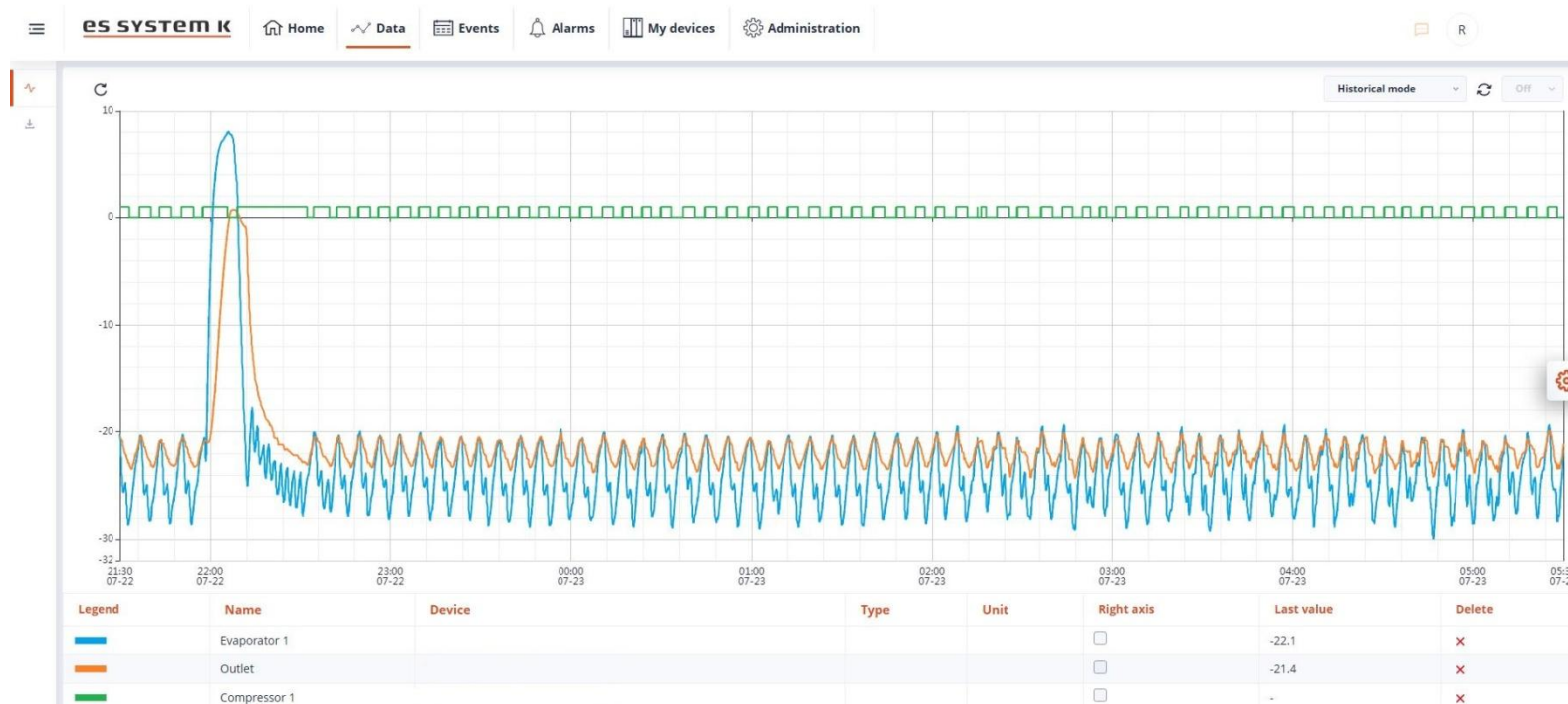
Embraco NT2192GK (R452A)

INSU Green - first release

additional 10% less electricity consumption

thanks to the natural refrigerant
and an On-Off compressor

Embraco NT2180U (R290)



More ideal

INSU- for special Ice Cream

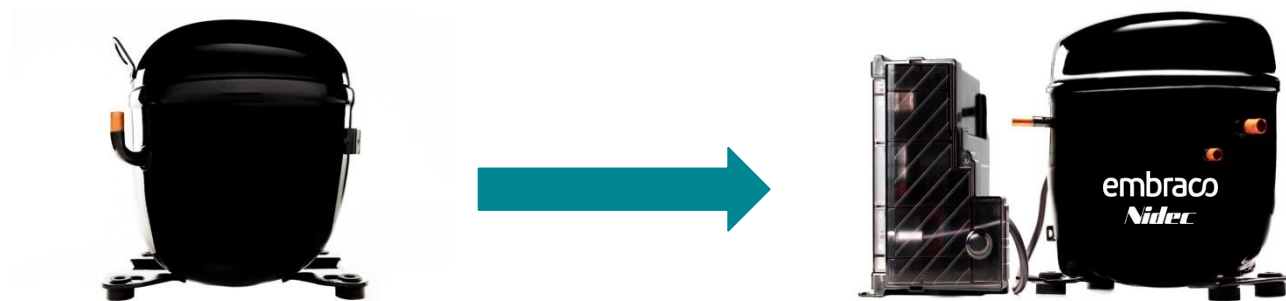
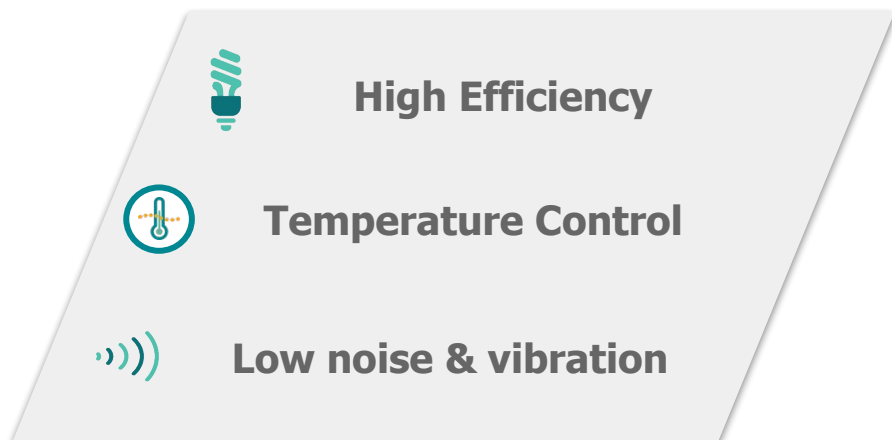
**higher thermal stabilization,
additional 20% less electricity
consumption**

thanks to the variable speed of
the compressor **Embraco
FMFT415U (R290)**



Applying the Variable Speed Technology

Switching from Standard Efficiency HFC On-Off to the **Premium Efficiency Variable Speed R290 FMFT415U Compressor**



On-Off	COMPRESSOR SPECS	VCC
NT2192GK	Model	FMFT415U
Fixed Speed	Type	Variable Speed
R452A	Refrigerant	R290
22,4 cc	Displacement	14,8 cc
1,47 W/W	Efficiency	1,84 W/W *
Thermostat	Control Mode	Frequency

Test Conditions: ASHRAE LBP

*: COP at 3000 RPM. Further improvement is obtained thanks to the speed regulation on the appliance.

Applying the Variable Speed Technology

Variable Speed Compressor provides **greater savings** and **acoustic comfort** when running at **low speed**.

To achieve these conditions, it is necessary to **fine tune the control logic**, an **integrated system** of **hardware components** and **software algorithms**.

Embraco VCC has 3 control modes:

- **SDI (smart drop-in)**: where the **control algorithm** is embedded into the inverter
- **Frequency control**: an external controller controls the inverter
- **Serial control**: a communication protocol to exchange feedback on compressor operation.

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Variable Speed Technology is the Solution for Commercial Refrigeration

Connect to Smart Shop Control

INSU Smart

additional 15% less electricity consumption and avoiding unconscious waste

thanks to the tuning cooling system, controlled by ES SYSTEM K IoT control module with an algorithm for control of the variable speed of the compressor Embraco FMT415U (R290)



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Glass technology

INSU - ECO Glass

additional 10% less electricity consumption

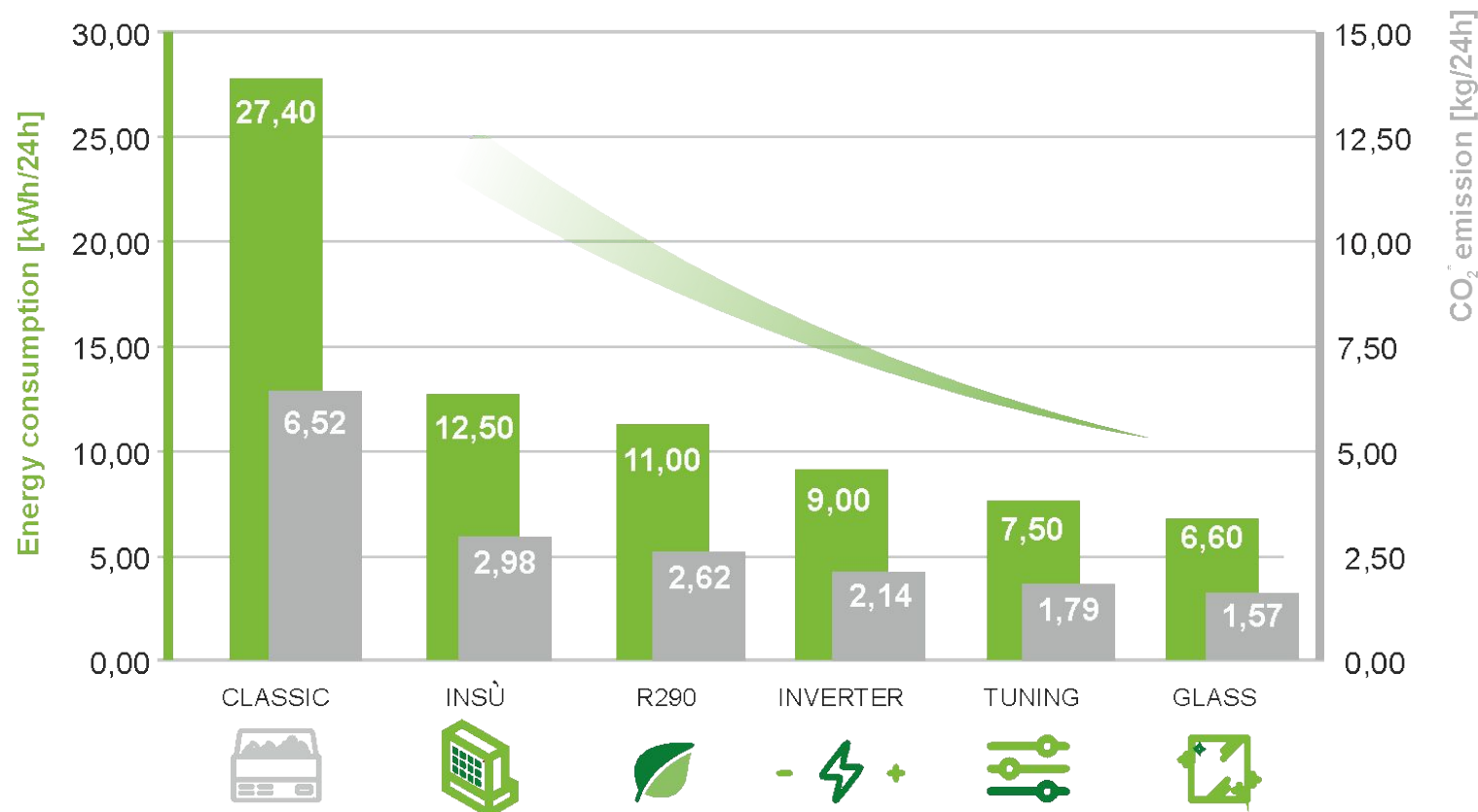
thanks to the new IG front Glass, which comes from the new investment - glass technology by ES SYSTEM K



Energy evolution and CO₂ reduction in years 2019-2023

Sustainable development

Dynamic reduction
of electricity consumption



* Electricity generation related greenhouse gases emission (average value is 0,238 kg/kWh, European Environment Agency updated up to 2021)

Sustainable development

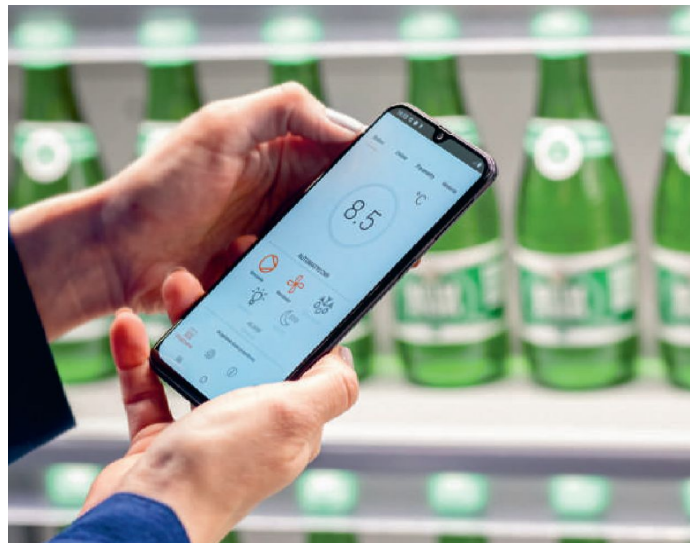
Actions against unconscious waste (Smart Shop Control)

Ecological refrigerants
(R290, CO₂)

Raw materials that are 100% recyclable

Hemp insulation
with a negative carbon footprint

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respecting
tomorrow

embraco
Nidec

es SYSTEM K



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Business Case for
Natural Refrigerants

**Thank you
for listening!**

