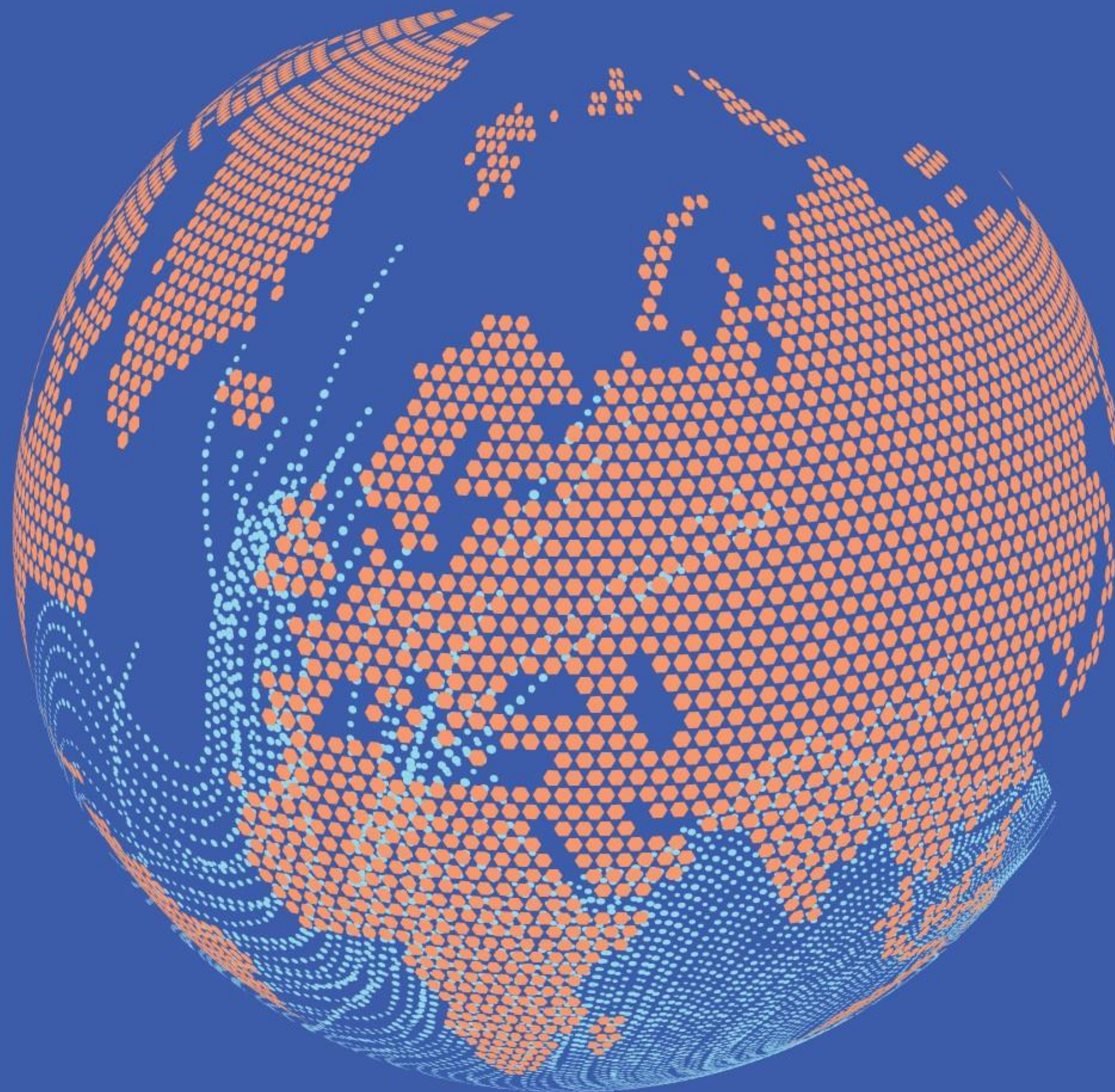




Business Case for
Natural Refrigerants

28-29 SEPT. 2021
BRUSSELS





The roadmap to carbon neutrality in Food & Beverage

#GoNatRefs

Open Can Cooler - Evolution:

	2007	2009	2011	2017	2021	2007 vs 2021
Net Vol./Gross Vol. (1)	58%		44%		65%	+ 0,7
Cans Capacity (250ml)	207		250		288	+ 39%
Footprint	0,462 m2		0,478 m2		0,422 m2	- 9%
Nr° Cans/m²	448		523		682	+ 52%
Total Display Area (1)	0,425 m2		0,560 m2		0,583 m2	+ 37%
Energy Consumption (2)	12,3 kWh/d	9,6 kWh/d	7,8 kWh/d	7,5 kWh/d	6,9 kWh/d (w/o advertising lights)	- 44%
EEI (3)	85,9	67,1	50	48	43,6	- 49%

(1) Net Volume and TDA values calculated according to ISO 23953-1 and 23953-2 standards

(2) Energy Consumption values measured in climatic class 3 (25°C 60%RH) according to ISO23953-1 and ISO23953-2 standards

(3) Energy Efficiency Index calculated according to EU Directive

2021 – Open Can Cooler:

Equipped with Embraco **variable-speed compressor** with Smart Drop-in technology



44%
energy consumption reduction

5.420 kg CO₂ / 10yrs

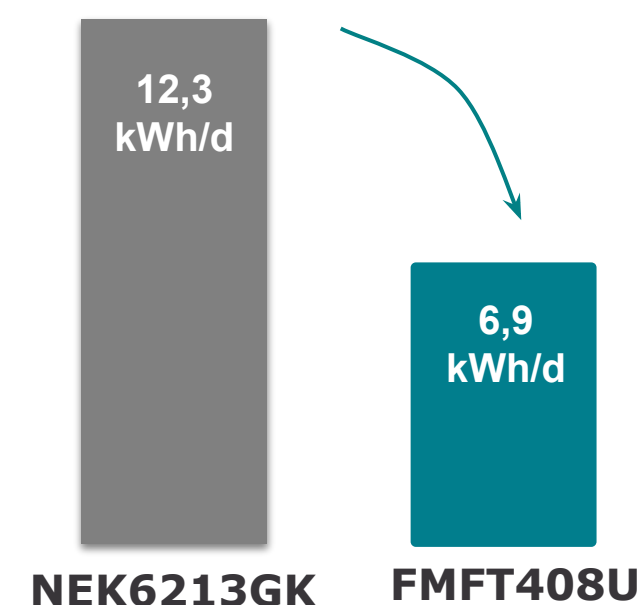
not emitted due to lower energy consumption

assuming 0,275 kg CO₂e / kWh*

390 €/year

savings in the energy bill

assuming 200€ / MWh electricity cost*



* IBIS World Consulting Firm

Embraco compressors evolution path



→
+14%
COP

NEK6213GK

- R404A, fixed speed
- displacement = 12 cc
- COP = 1,43⁽⁵⁾



→
+43%
COP

NEK6213U

- R290, fixed speed
- displacement = 12 cc
- COP = 1,63⁽⁵⁾



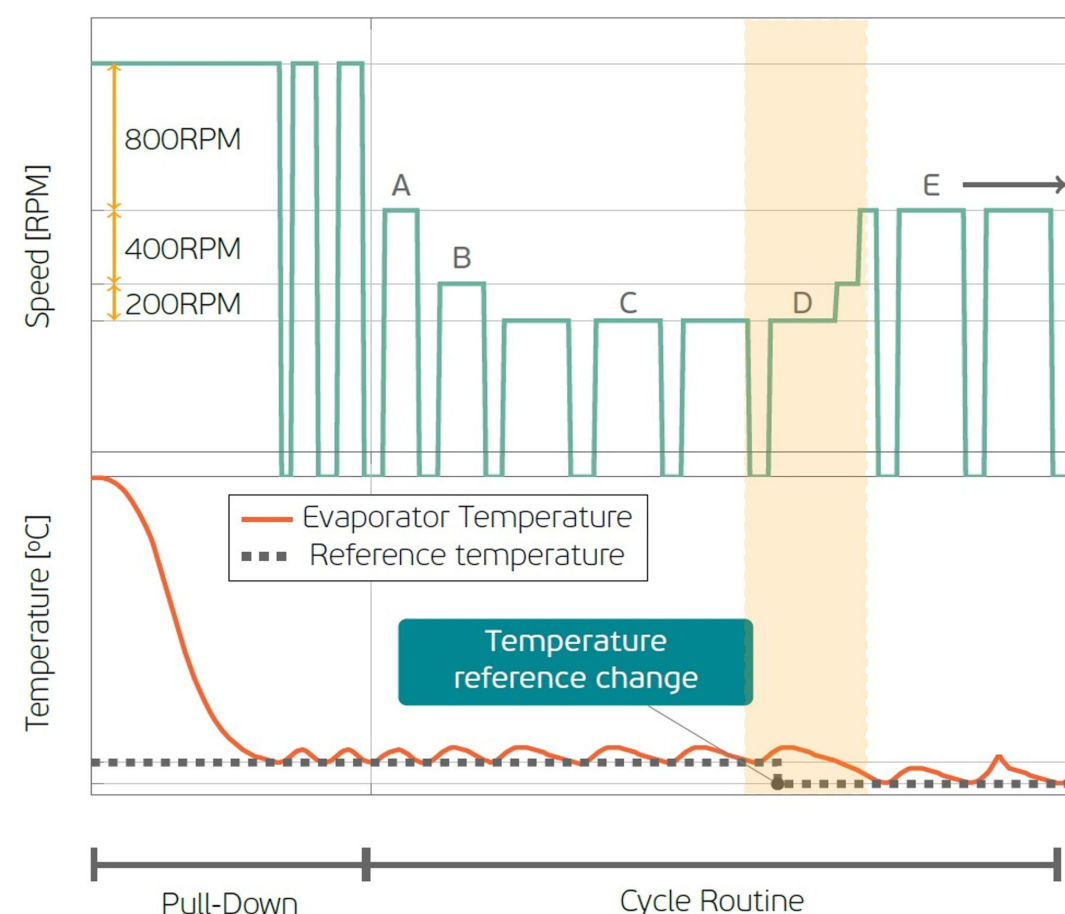
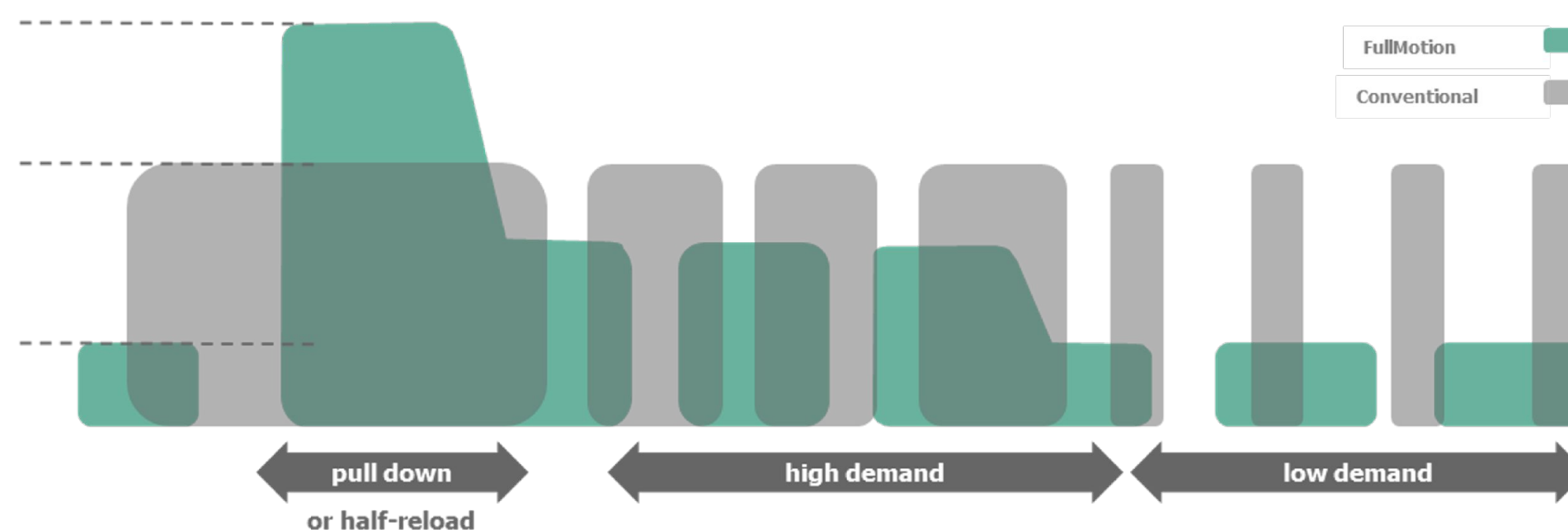
FMFT408U

- R290, variable speed
- displacement = 8 cc
- COP = 2,34⁽⁶⁾

⁽⁵⁾ Calculated in EN12900 MBP conditions

⁽⁶⁾ Calculated in EN12900 MBP conditions at 3000rpm

The VCC **adjusts to the demand** required by the refrigerator,
resulting in considerable energy consumption reduction compared to conventional compressors



Smart Drop-in is an advanced inverter control logic which allows:

- **customization** of the control routine according to the cabinet specific needs
- optimization of performance and **energy saving**
- use of standard **ON/OFF thermostats**

OFC Large 2021 application case – Parameters and targets

Control algorithm

1. Target Time On
2. Target Time On Time Out
3. Max Speed
4. Min Speed
5. Disturbance Detection
6. Minimum Speed Step

Embraco YouControl Solution

Impacts

- ✓ Optimize cooling capacity, maximizing COP in steady-state conditions
- ✓ Guarantee a fast pull-down and assure prompt reaction to heat load variations
- ✓ Avoid evaporator icing
- ✓ Always allow compressor operation in its pressures envelope

Open Can Cooler application case – Results

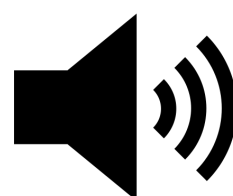


Positive impact on carbon footprint:

- **-52%** with respect to 2007 version
- **-8%** with respect to previous generation



Higher flexibility to withstand network voltage fluctuations



Noise level reduction:

- **62dBA** vs. 70dBA of sound power (comparison with previous generation)



Reduced stress on compressor mechanical and electrical parts



Business Case for
Natural Refrigerants

**Thank you
for listening.**

