



Business Case for
Natural Refrigerants

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Hydrocarbon compressors trend on light commercial refrigeration

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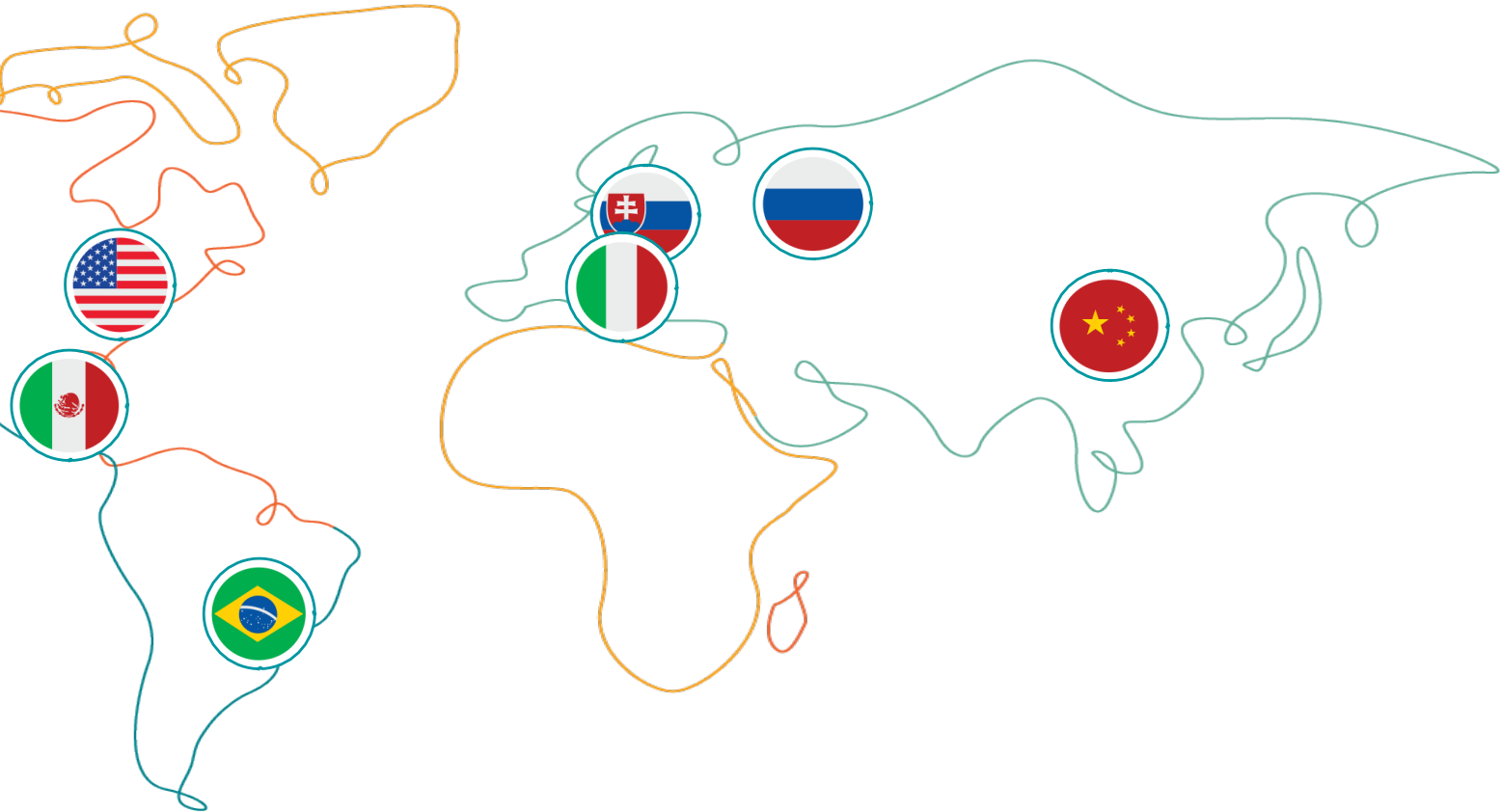
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Overview

Present in
80 countries
More than
11,000
employees

7 business units

Production capacity:
40 million
compressors/year





REFRIGERANTS

Phase-out roadmap

- Europe F-Gas ban
- US should follow Europe
- Asian OEM's adapting to this scenario for export

Propane Charge Limitation

- IEC working to increase charge limits to 500g
- UL may follow IEC decision
- Industry working to increase capacity/charge ratio



TECHNOLOGY

Cost/space benefit of CO2 Trans-critical

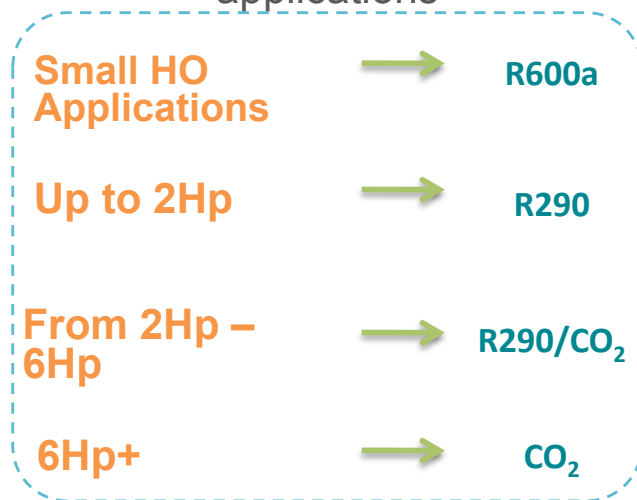
- CO2 trans-critical still seen by end users as expensive and space demanding vs. traditional solutions

Maintenance Costs

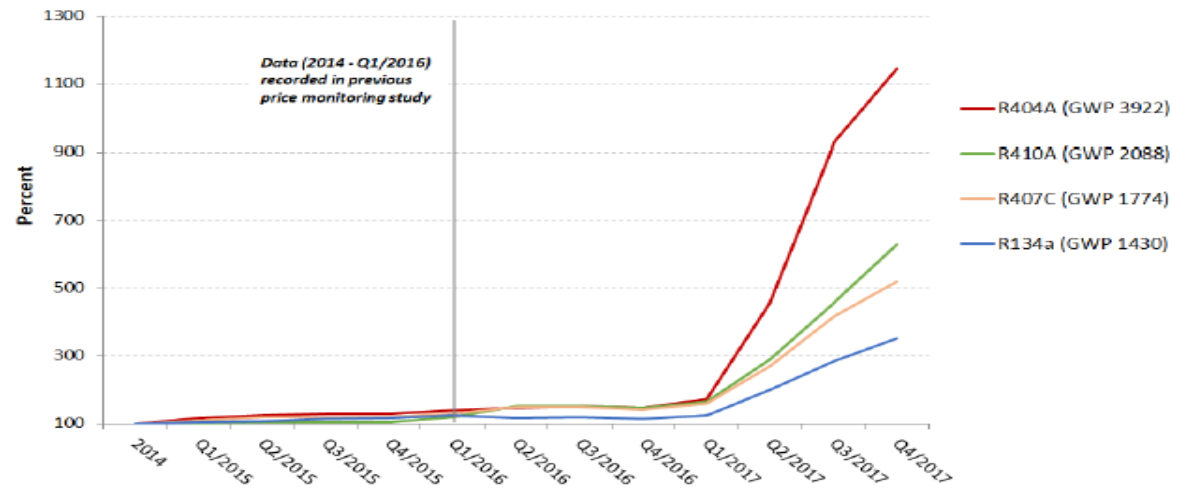
- Demand for refrigeration solutions which requires low skilled people for maintenance

Industry overview

Natural Refrigerants already can cover most of Commercial applications



HFC Refrigerants – Purchase prices evolution



Hydrocarbons

CHALLENGES

Lack of knowledge on safety
(service, end user)

Light commercial manufacturers
knowledge

HFC phase out not yet in place on
many countries

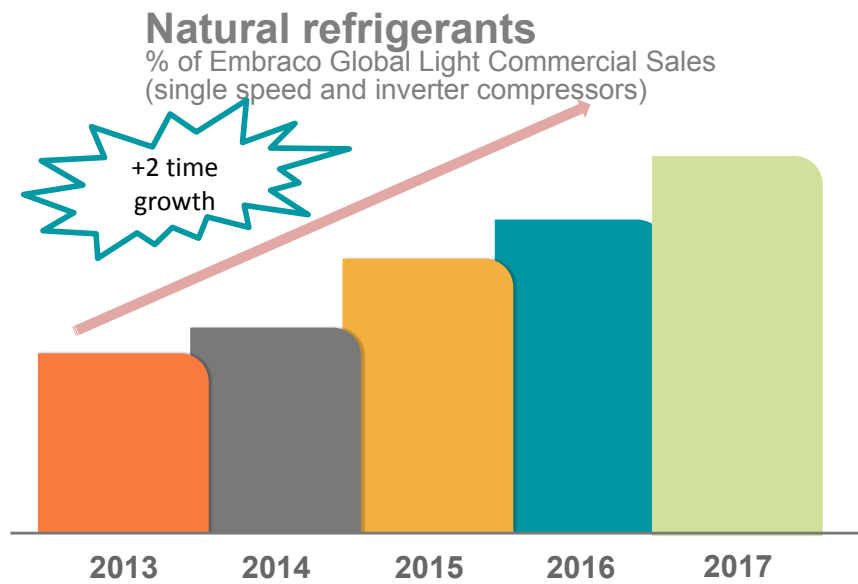
OPPORTUNITIES

Household refrigerators experience
worldwide

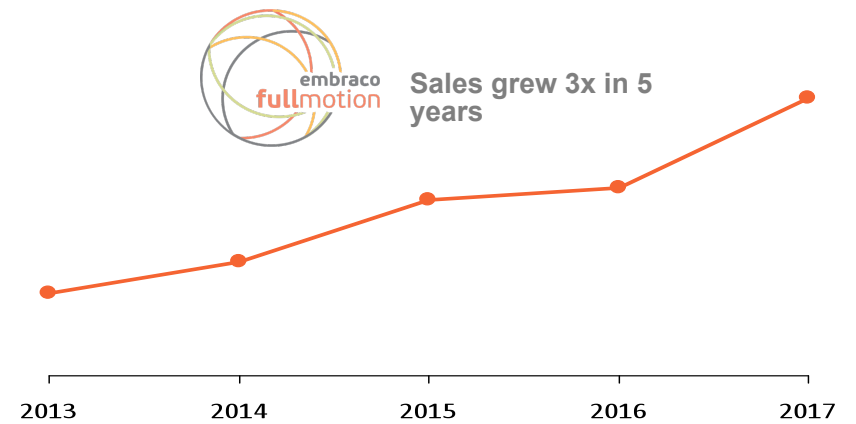
Several players already produce HC self
contained cabinets

HC performance advantages
perceived by end users
(energy saving, cooling speed, etc.)

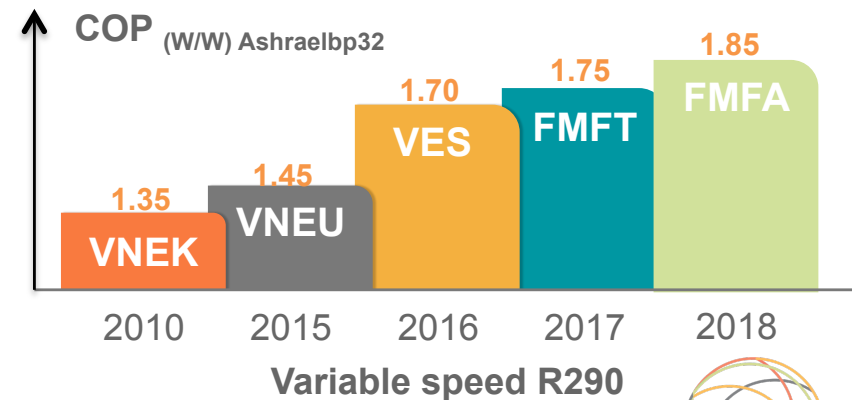
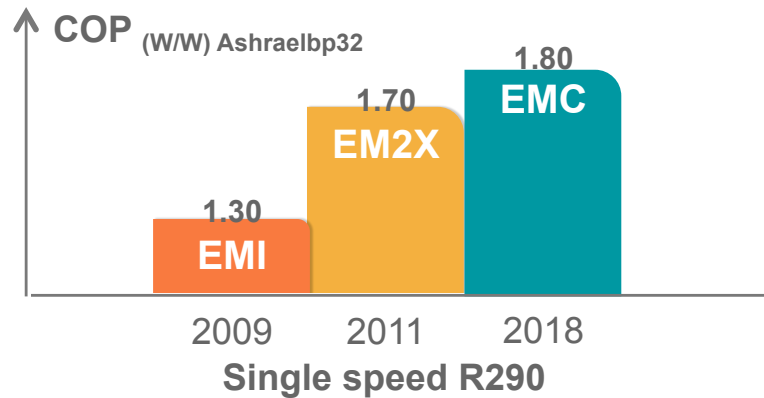
Business evolution – Global trends



Inverter compressor trend



Embraco Natural Refrigerants Platforms



Hydrocarbons (mainly R290) gets stronger every year, and Embraco is following this trend.



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Thank you!