



# Business Case for Natural Refrigerants

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June 12-14, 2018 – Long Beach



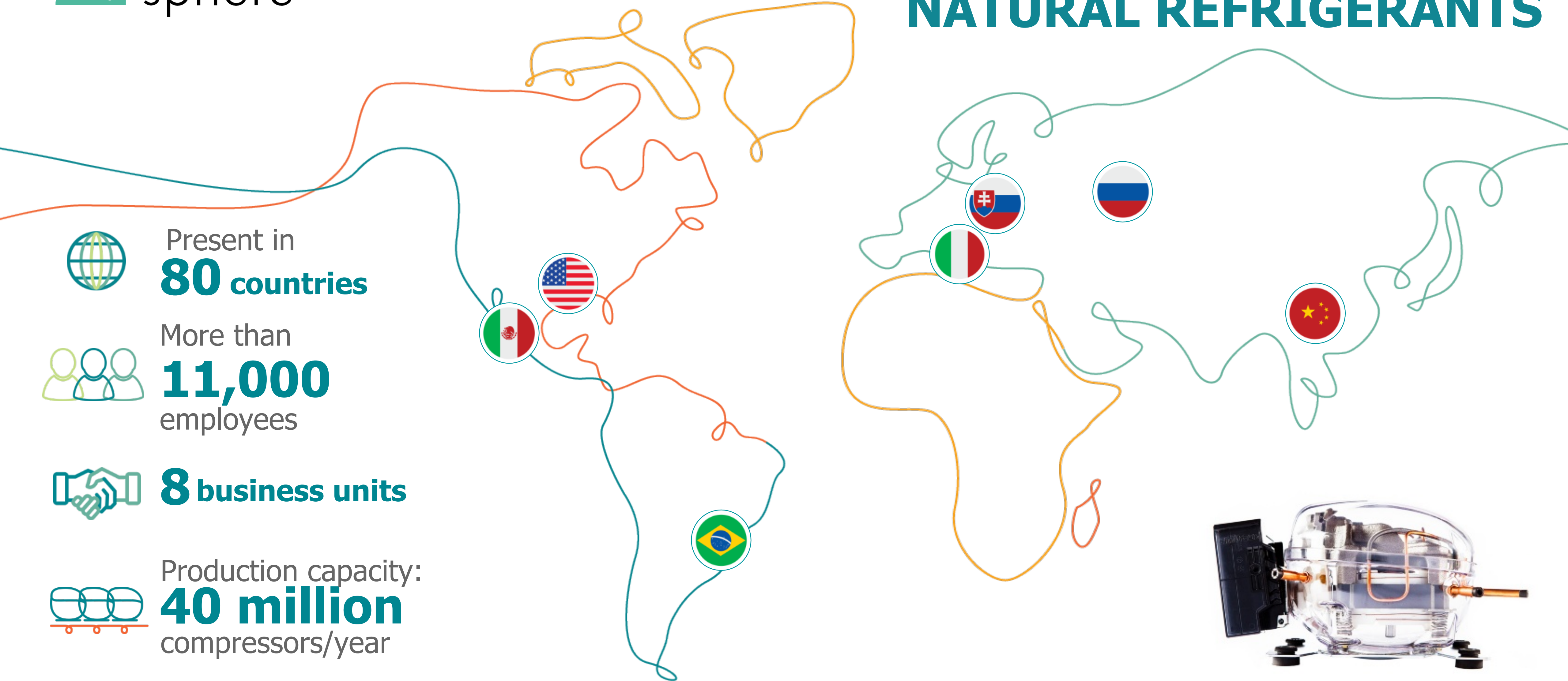
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**Market Trends Natural Refrigerants**

Embraco - John Prall



# 20+ YEARS GLOBAL LEADER IN NATURAL REFRIGERANTS



Present in  
**80 countries**



More than  
**11,000**  
employees

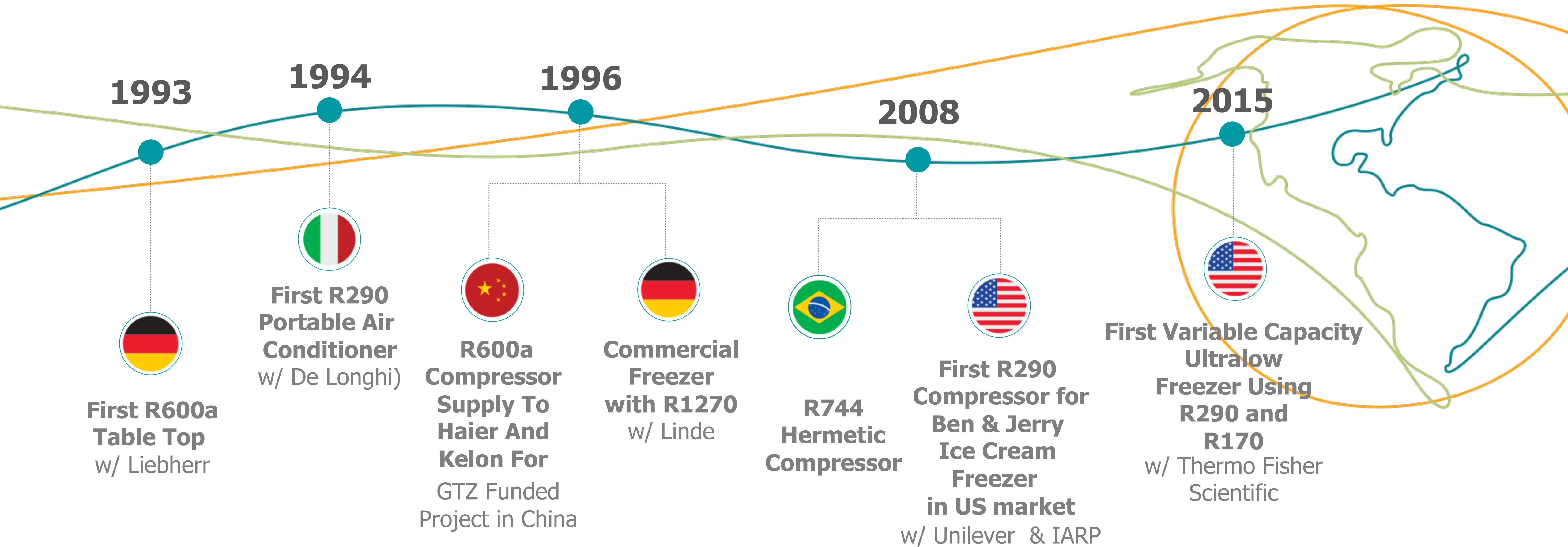


**8 business units**



Production capacity:  
**40 million**  
compressors/year





# FINAL SOLUTION COMPARISON



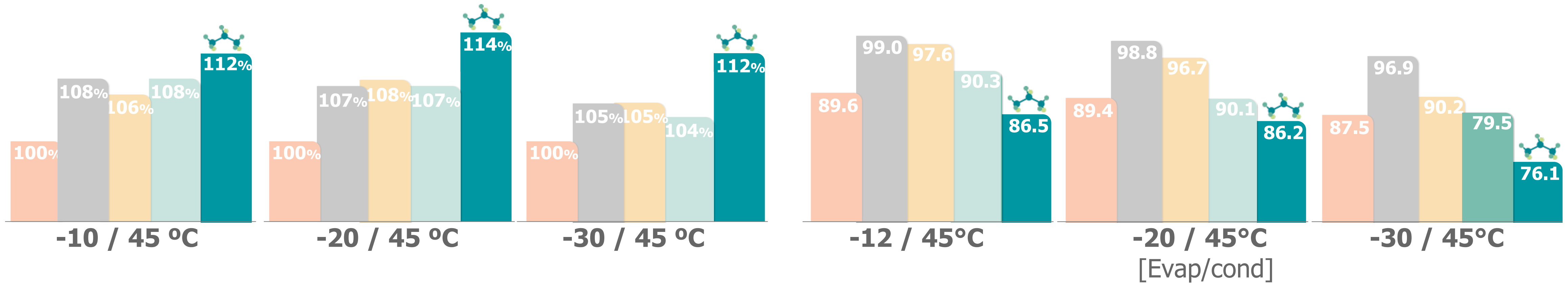
## EFFICIENCY COMPARISON

% / Superheating 22.2 °C / Middle point based



## THERMAL REGIME EVALUATION

°C / Superheating 22.2 °C / Dew point based



■ R404A   
 ■ A2L #1   
 ■ A2L #2   
 ■ A2L #3   
 ■ R290



**Propane (R290) is the best in efficiency and in thermal level**



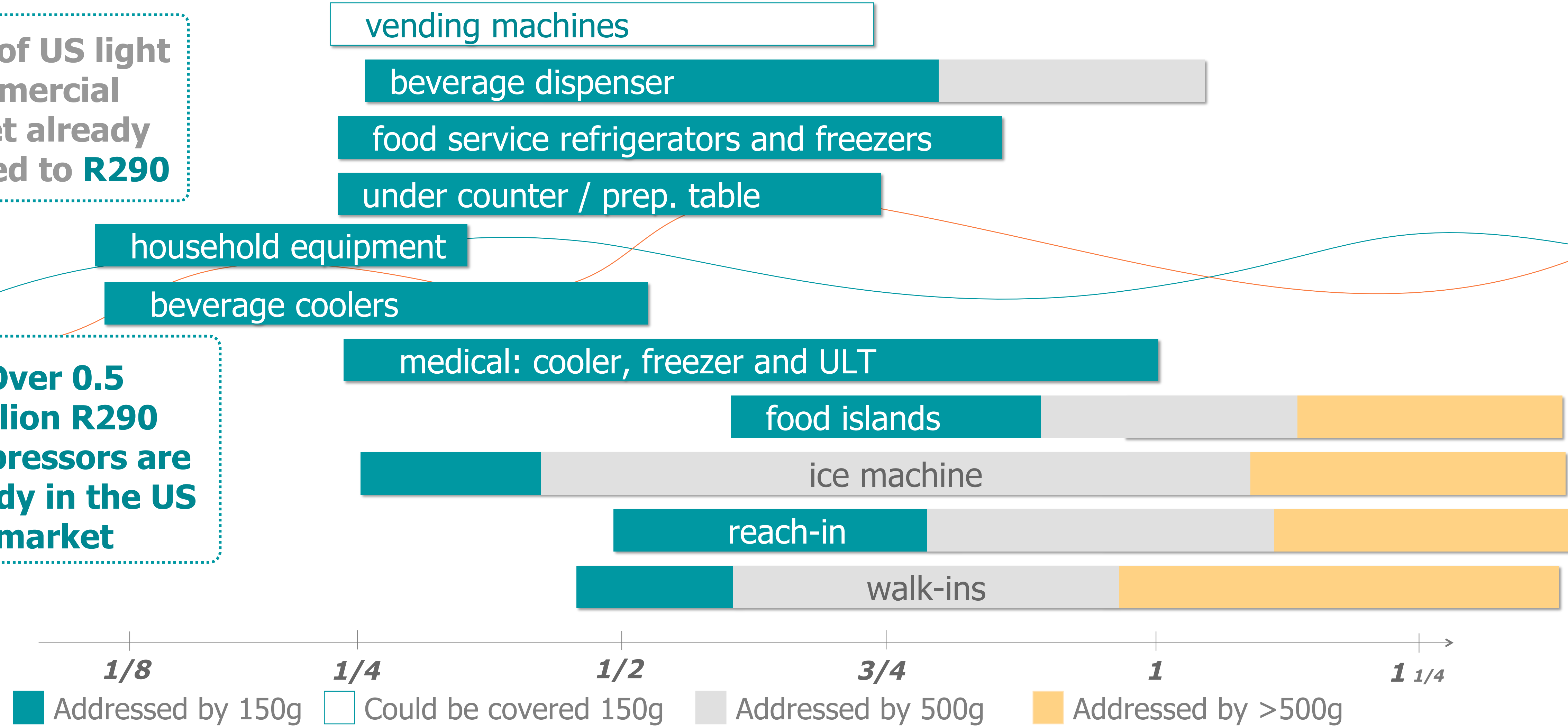
# HYDROCARBONS CHALLENGES: CHARGE LIMITATION

## APPLICATION OVERVIEW

~30% of US light commercial market already migrated to R290



Over 0.5 Million R290 compressors are already in the US market



# There are still legislative barriers for larger use of HC's

## Charge limit in HH *In US*

Increment of HH limit to 150 g in US

## Charge limit in CO *IEC / UL*

IEC/SC61C/WG4 is working on CO charge limit to be published in 2019.  
**USA ??**

## ASHRAE 15

Limits the use of flammable refrigerants in hallways and lobbies





ATMO  
sphere

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Thank you very much!

