



# Business Case for Natural Refrigerants

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**11-12/04/2018 – Beijing**



## High Efficiency Transcritical CO<sub>2</sub> Commercial Refrigeration Solution for All Climates

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# INTRODUCTION

Fortune Ranking  
Top **50** Enterprise



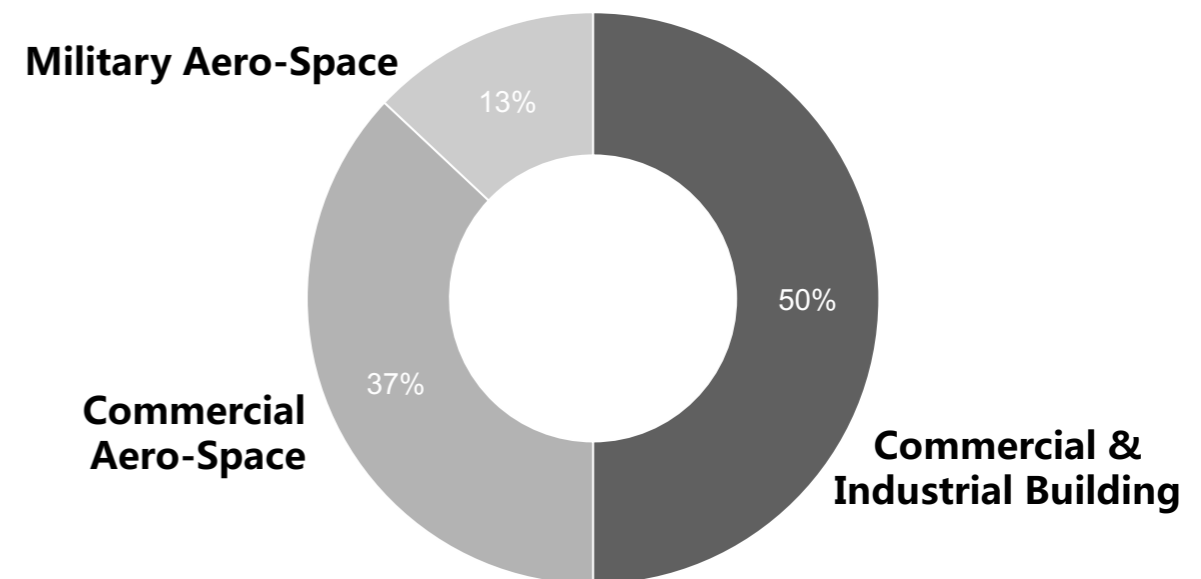
Employees: **204,700**



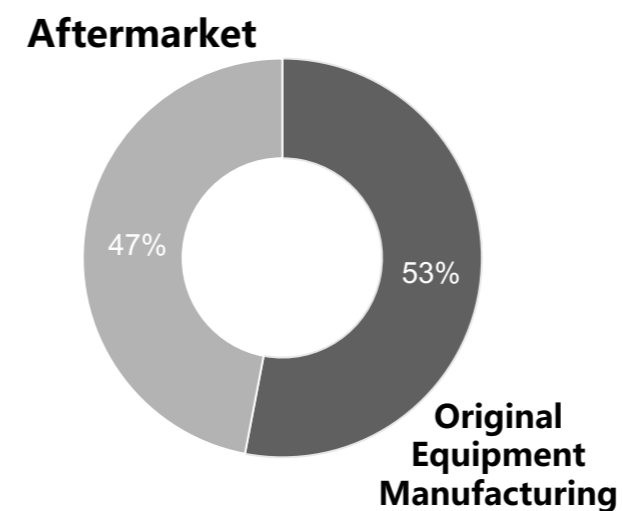
2017 Net Sales: **60B**



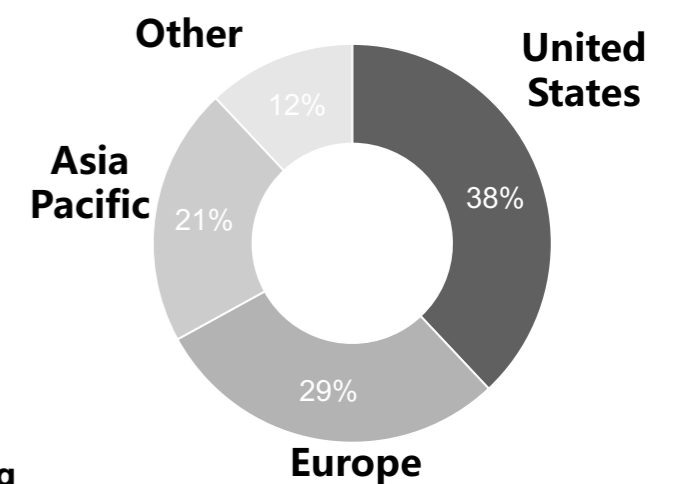
## Products



## Function



## Geography



# INTRODUCTION

# Commercial Refrigeration

Serving Customers in over



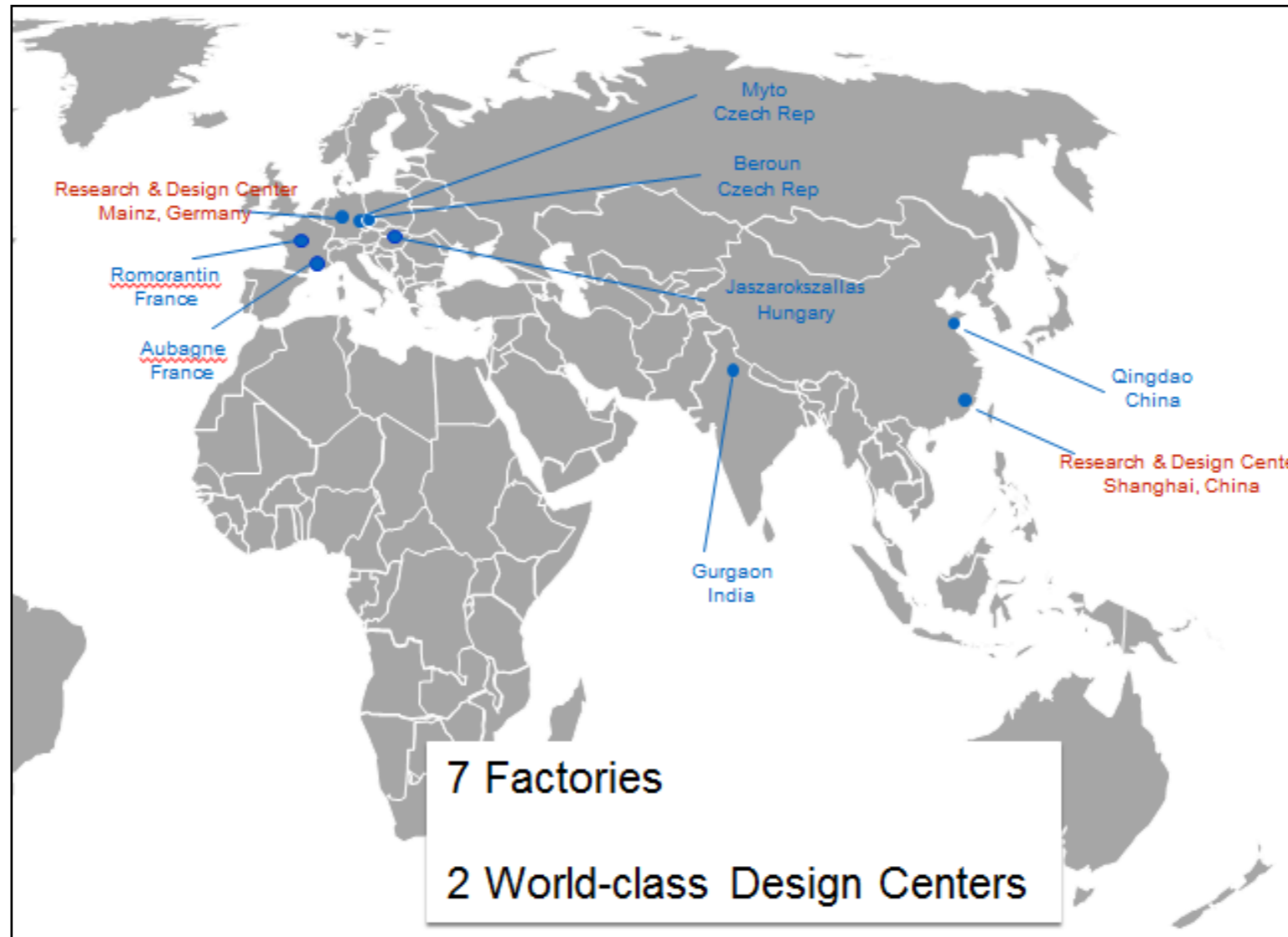
**4,350**  
Employees



**81**  
Branches

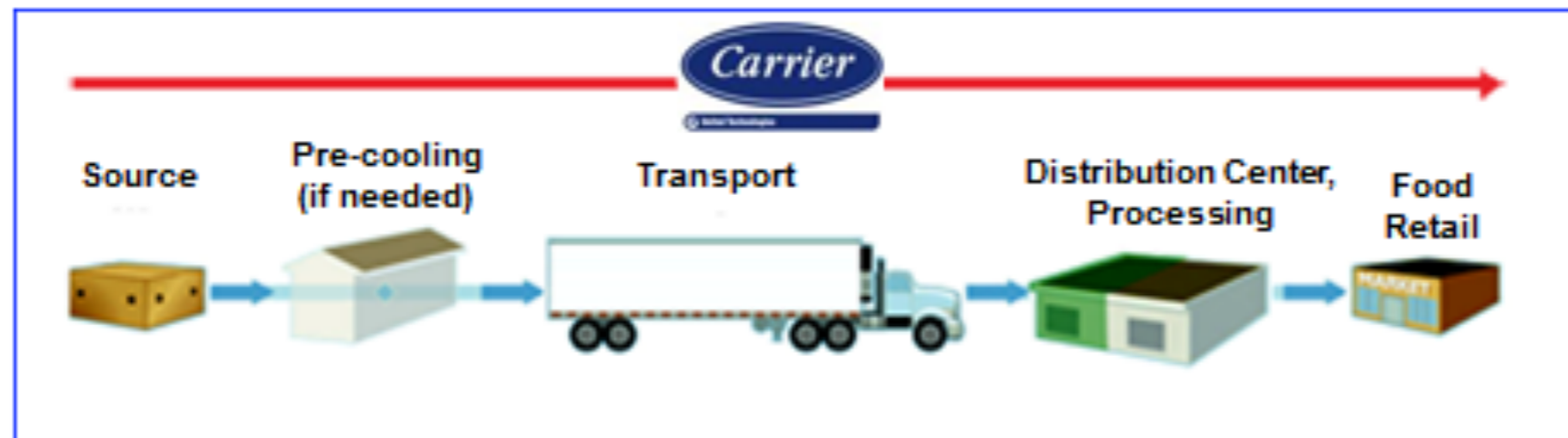


**50** Countries

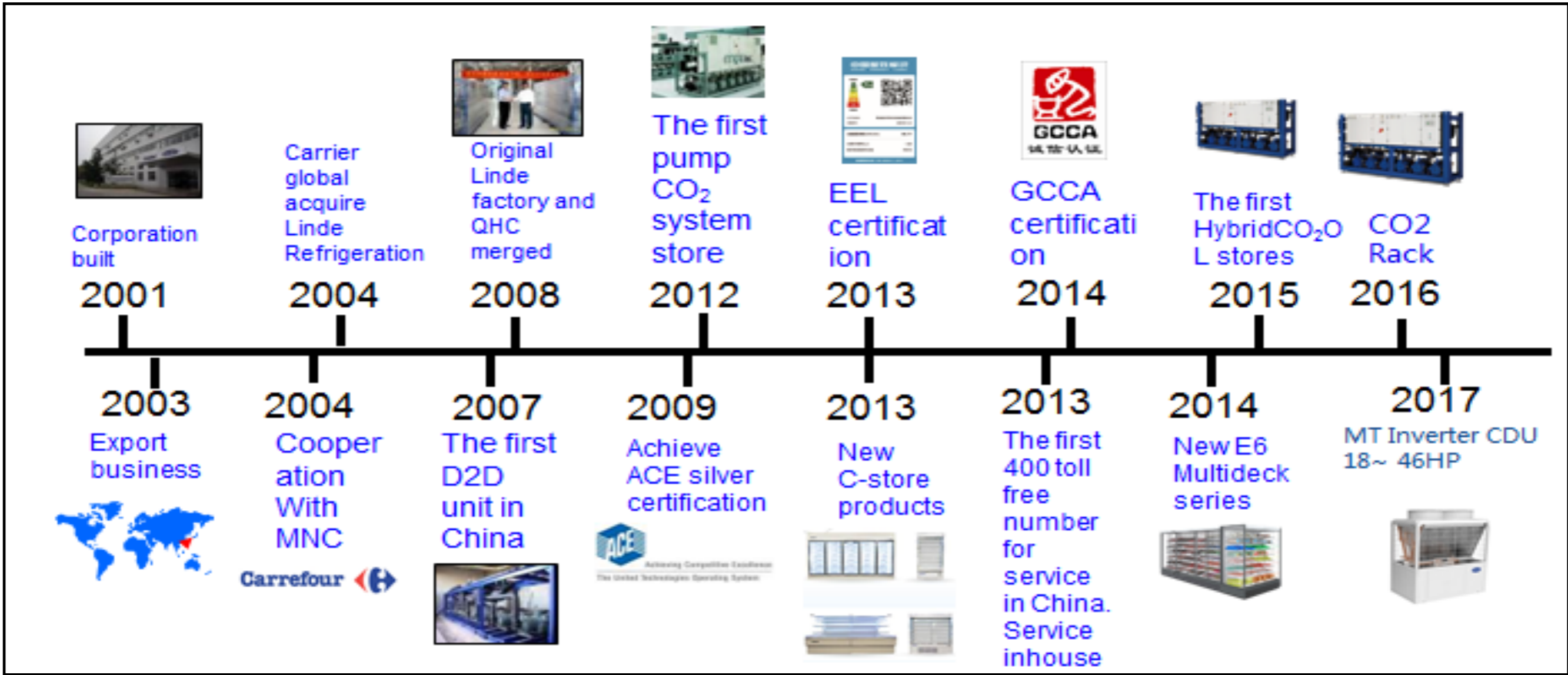


**ATMO**  
sphere  
**INTRODUCTI**  
**ON**

**Haier** *Carrier*  
**Qingdao Haier Carrier**



# Qingdao Haier Carrier



# OVERVIEW OF NATURAL REFRIGERANT-BASED SOLUTIONS

HybridCOOL<sub>2</sub>



Localized since 2015

COOLtec<sub>2</sub>



MiniCOOLcompact



MaxiCOOL



COOLheat

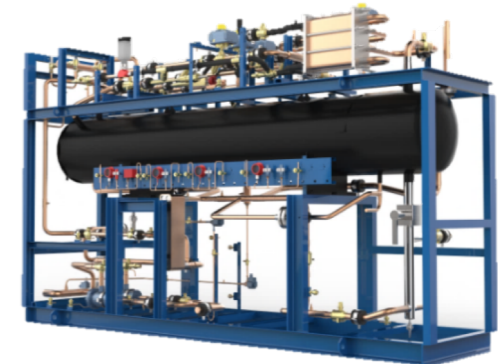


COOLtec<sub>2</sub> Evo



Compressor rack

+



High-efficiency skid

# OVERVIEW OF NATURAL REFRIGERANT-BASED SOLUTIONS



Optimized CO<sub>2</sub> turnkey solution



## BUSINESS IN CHINA

Cascade CO<sub>2</sub> projects installed in China

- 19 stores installed to date
- Main customers in supermarket application



# OPPORTUNITIES AND CHALLENGES IN CHINA

➤ **Warm Climate**  
(>15 °C average)



  
Modulating ejector

  
Economizer cycle

Annual savings potential<sup>1</sup> of up to 20% for the rack or 14% for a complete store versus standard CO<sub>2</sub>OLtec<sup>2</sup>

➤ **Mild Climate**  
(8°C-15°C average)



  
Modulating ejector

  
Economizer cycle

  
Heat recovery

Annual savings potential<sup>1</sup> of up to 12% for the rack or 8% for a complete store versus standard CO<sub>2</sub>OLtec<sup>2</sup>. **With additional technologies modelling indicate potential rack energy savings of up to 20%.**

➤ **COLD Climate**  
(<8 °C average)



  
Modulating ejector

  
Economizer cycle

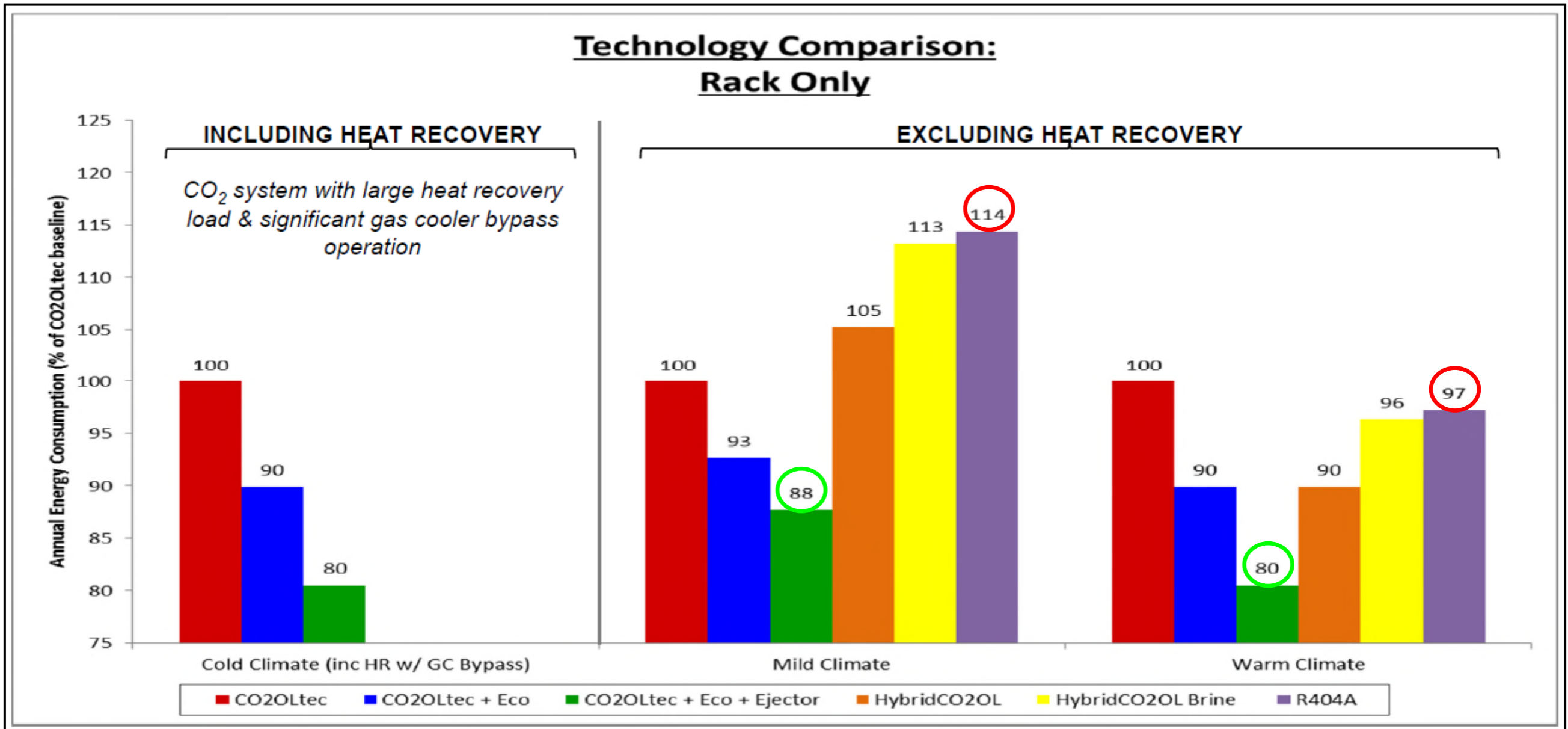
  
Heat recovery

Annual savings potential<sup>1</sup> of up to 20% for the rack or 14% for a complete store, versus standard CO<sub>2</sub>OLtec<sup>2</sup> with large heat recovery load & significant gas cooler bypass operation.

<sup>1</sup>Based on economizer + ejector cycle

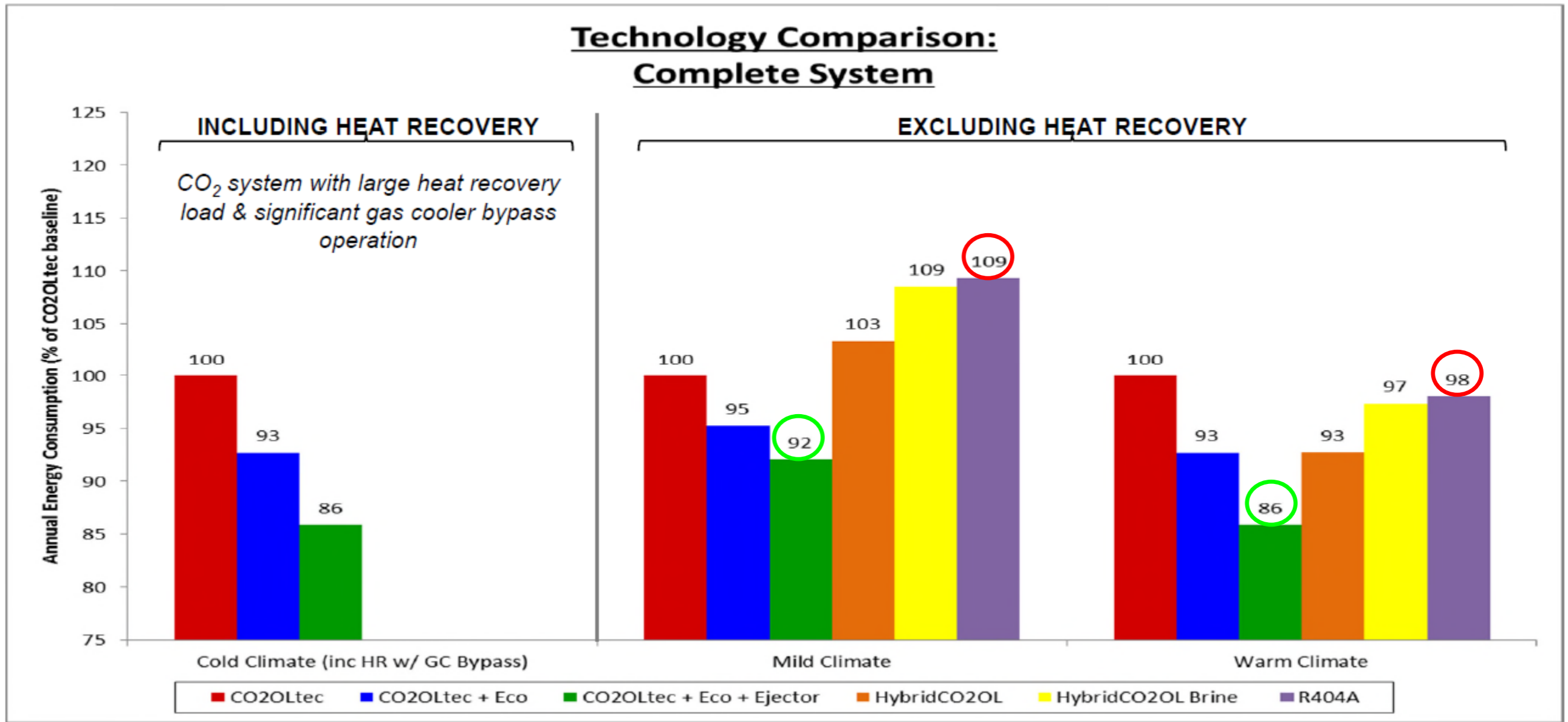
<sup>2</sup>Projected simulation based on 94m MT cabinets, 38m LT cabinets, 228m<sup>3</sup> MT coldroom, 55m<sup>3</sup> LT coldroom, MT cabinets w/ glass doors, EC fans, LED lighting. (Carrier e\*cube).

# OPPORTUNITIES AND CHALLENGES IN CHINA



- Projected simulation based on 94m MT cabinets, 38m LT cabinets, 228m<sup>3</sup> MT coldroom, 55m<sup>3</sup> LT coldroom. MT cabinets w/ glass doors, EC fans, LED lighting. (Carrier e\*cube).
- Temperature profiles: Warm Climate = Average Seville, Athens, Barcelona & Madrid (17°C avg.); Mild Climate = Berlin (10°C avg.); Cold Climate = Average Oslo, Stockholm, Helsinki (7°C avg.)
- HybridCO<sub>2</sub>OL = CO<sub>2</sub> LT + R134a MT

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## **FUTURE PLANS & NEXT STEPS**

Sustained evolution, continuous improvement

- **Technology:** HFC/CO<sub>2</sub> cascade → **full CO<sub>2</sub>**
- **Applications:** Supermarkets → **all formats**
- **Climates:** Certain climate → **all climates**

Next store in China: Metro CO<sub>2</sub> store



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**Thank you very much!**

