



ATMO
sphere

business case

natural refrigerants

June 16 & 17, 2016 – Chicago



Global overview of Natural Refrigerants

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Chief Operating Officer shecco

GLOBAL SUCCESS STORIES

01



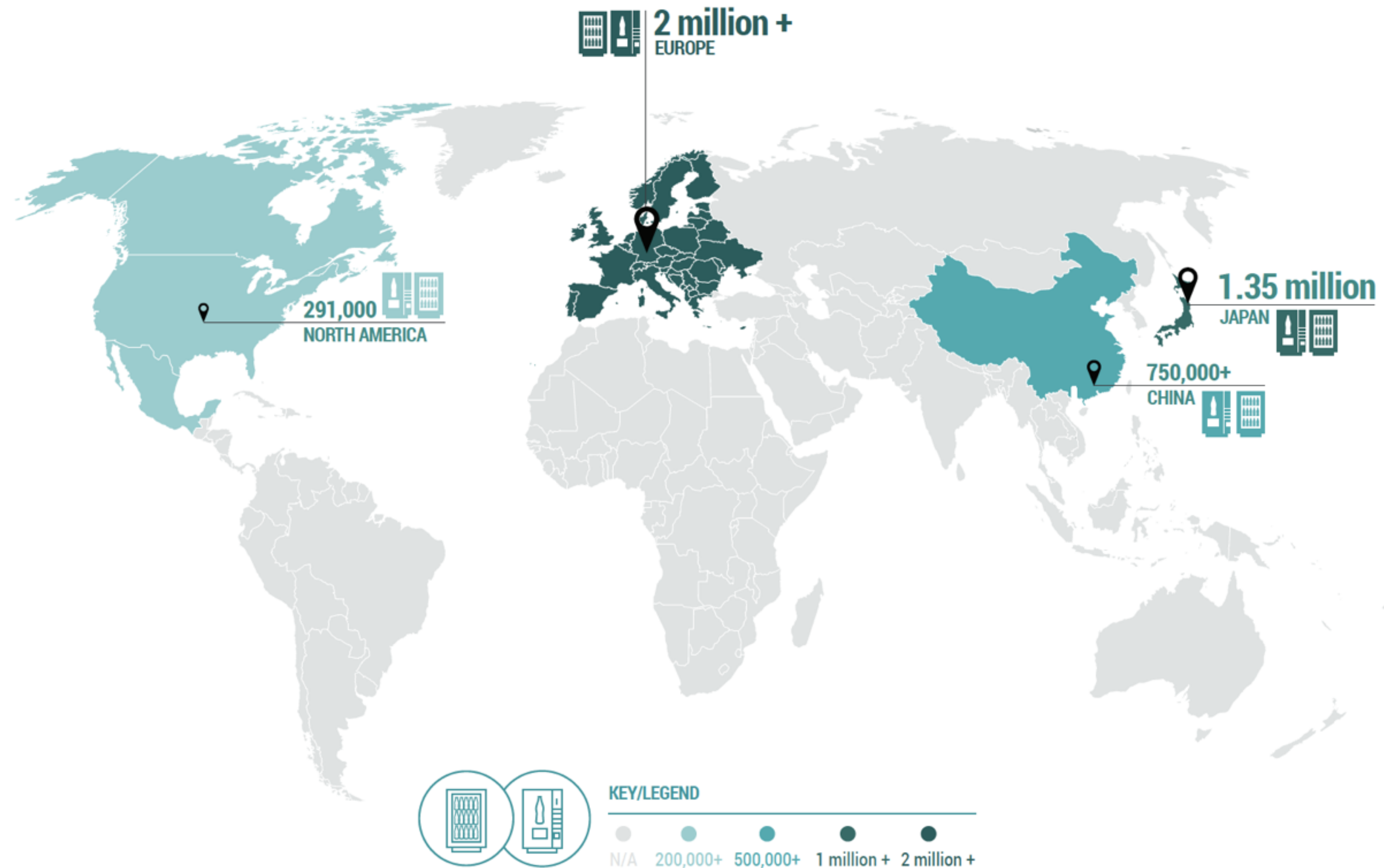


More than 700 million domestic refrigerators already use hydrocarbons today

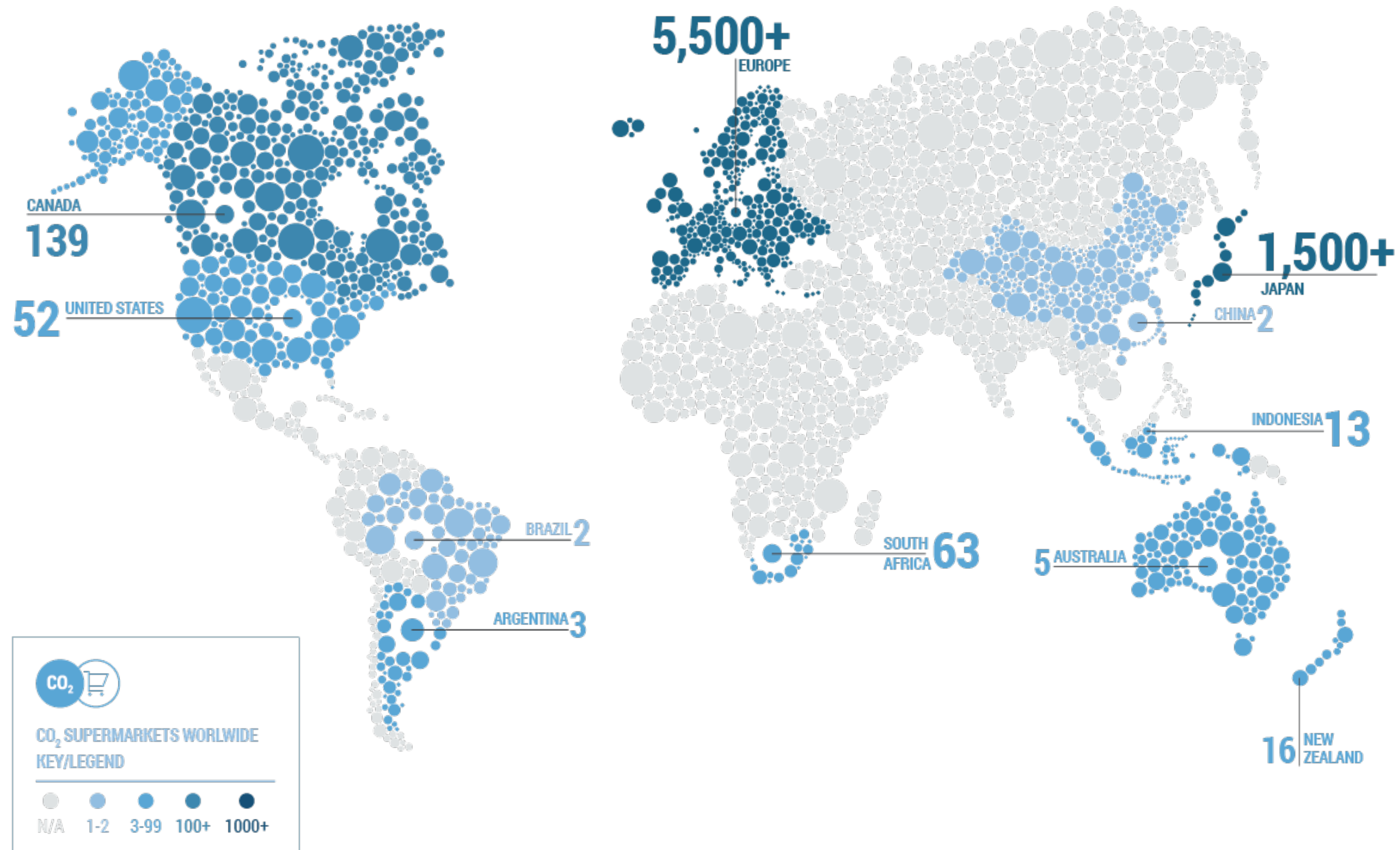
HC is the standard for 50% global production of new domestic refrigeration equipment

By 2020, 75% of new production globally will use R600a/ R290

LIGHT-COMMERCIAL REFRIGERATION AROUND THE WORLD



CO₂ TRANSCRITICAL FOOD STORES AROUND THE WORLD



CO₂ TRANSCRITICAL EMERGING EXAMPLE: BRAZIL



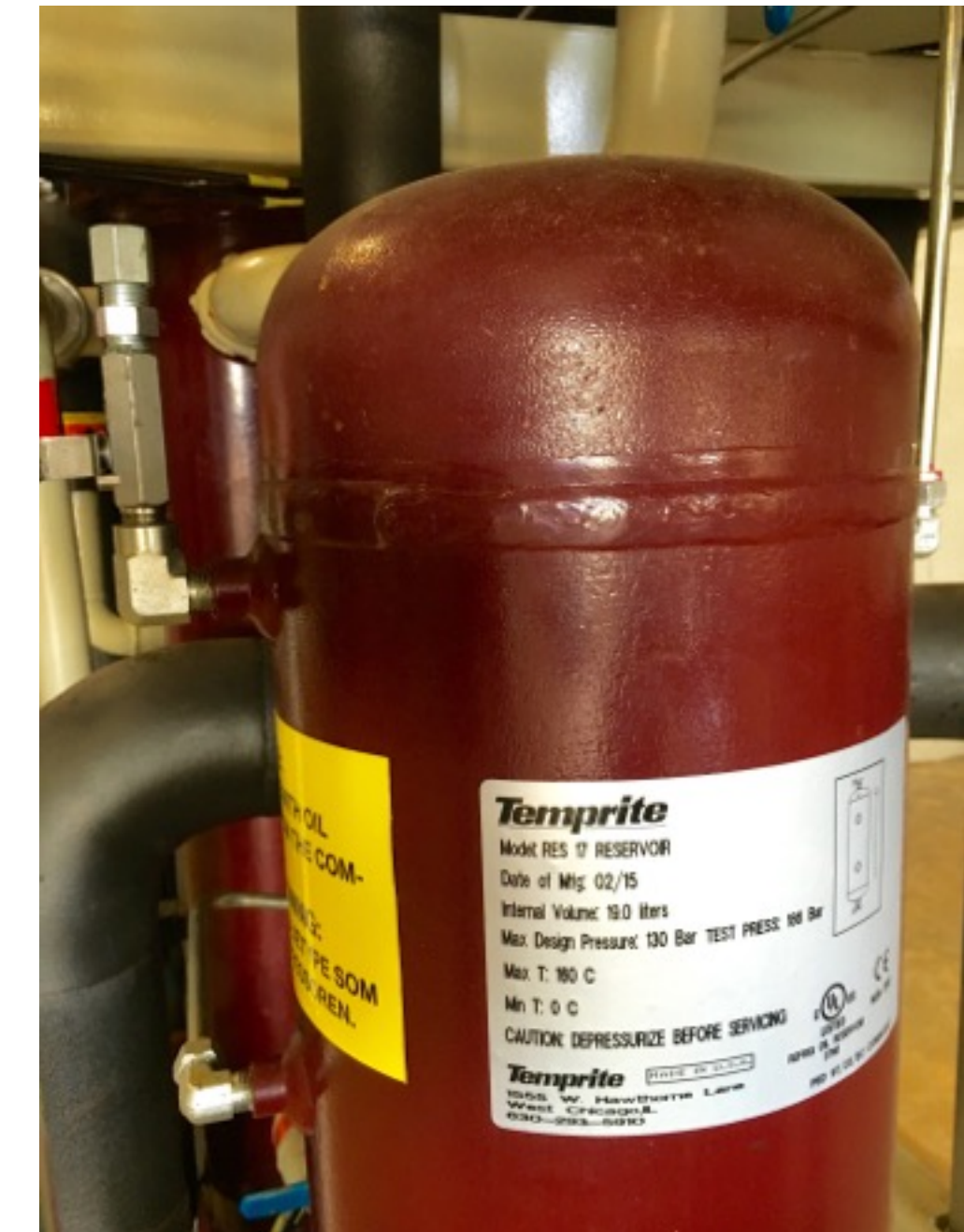
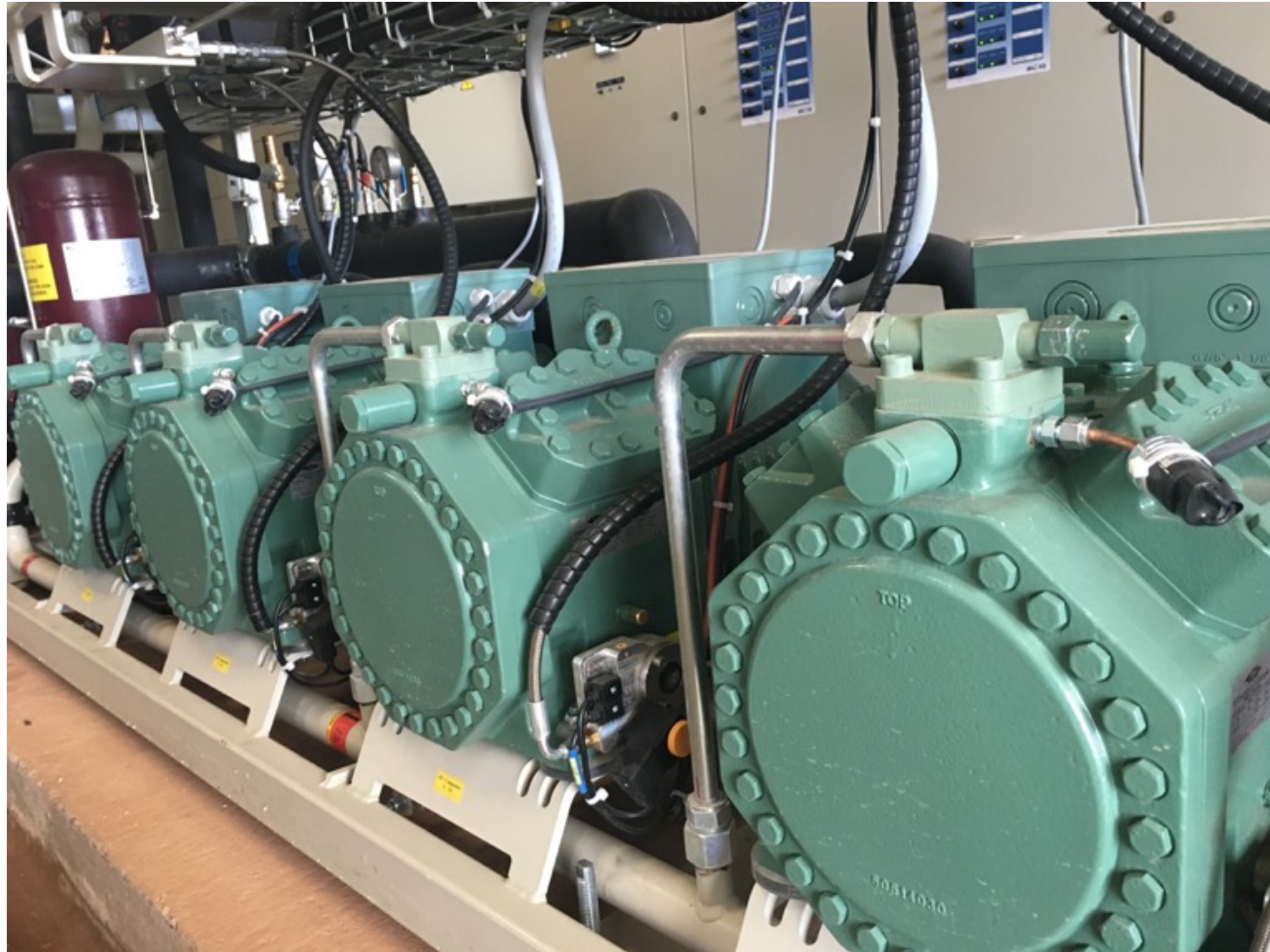
2nd CO₂ TC store in Brazil to open next week near São Paulo

Retailer: Atacadão (Carrefour group)

68000 ft² of commercial surface



CO₂ TRANSCRITICAL EMERGING EXAMPLE: BRAZIL



TRENDS IN NORTH AMERICA

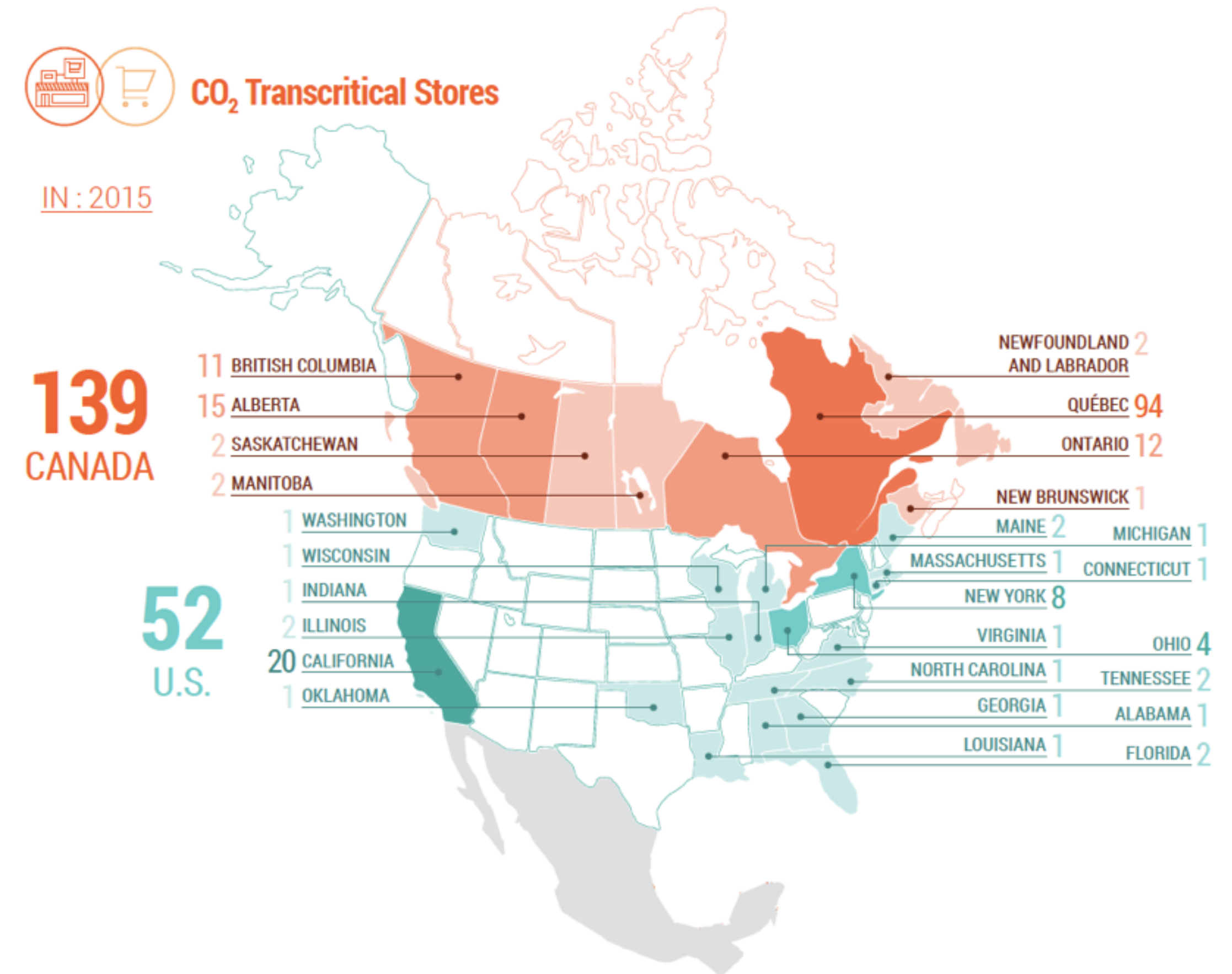
02





with approx. 200 CO₂ TC stores North America is still an emerging market

the further south the less CO₂ TC systems are installed = higher share of CO₂ cascade solutions in the south

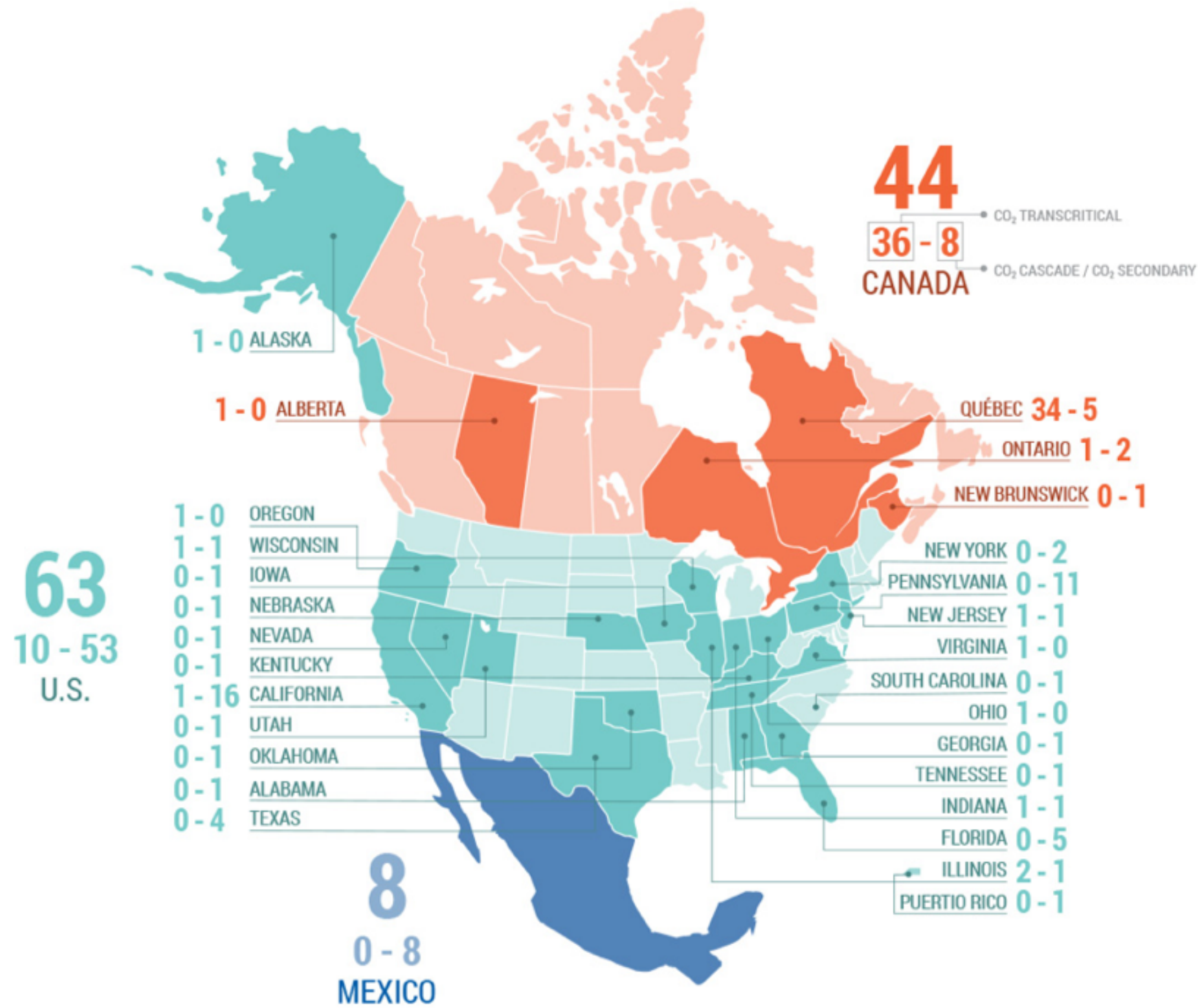


source: shecco, 2015

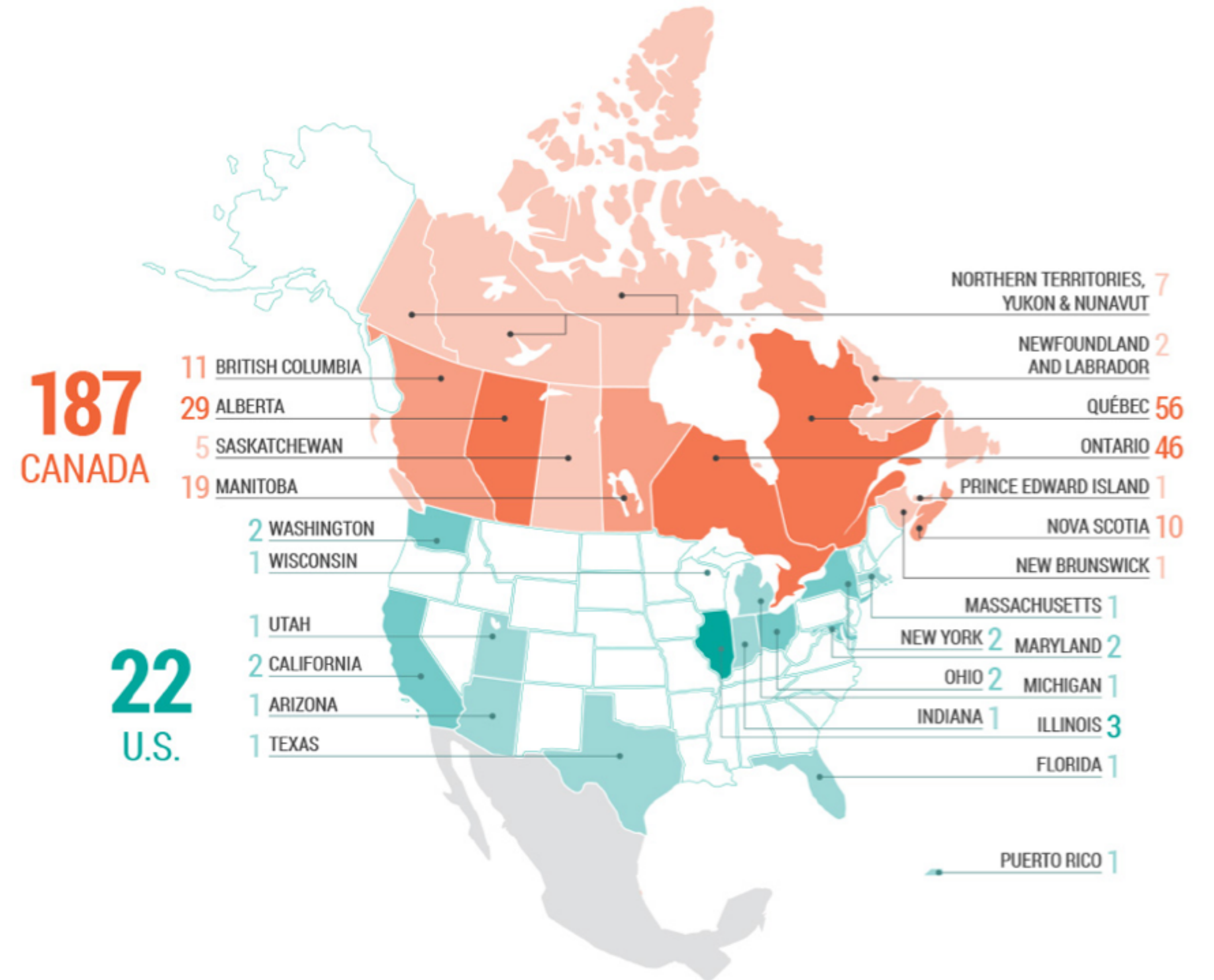
INDUSTRIAL NEXT-GENERATION REFRIGERATION SYSTEMS IN NA



CO₂



NH3



EUROPE

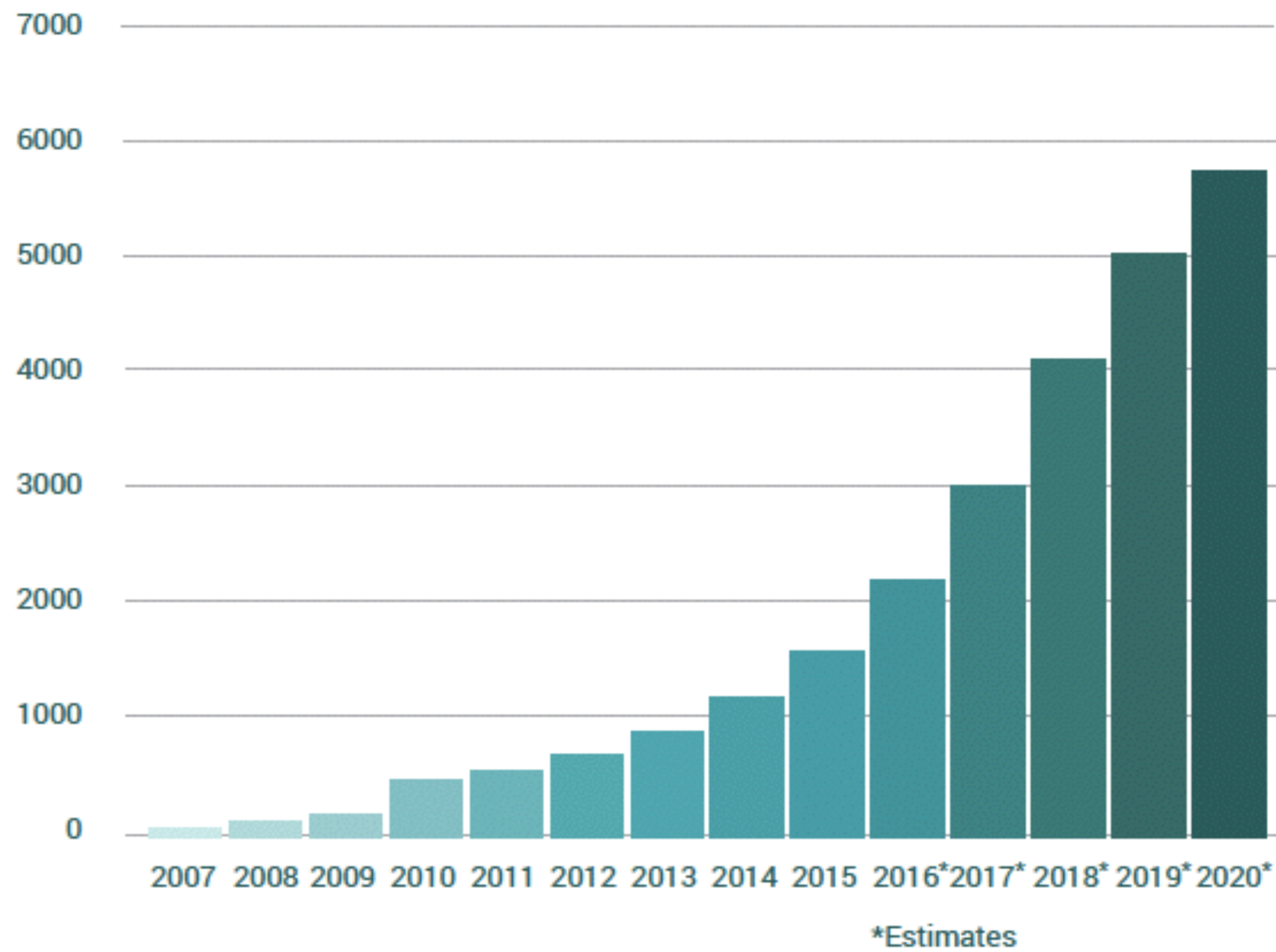
03





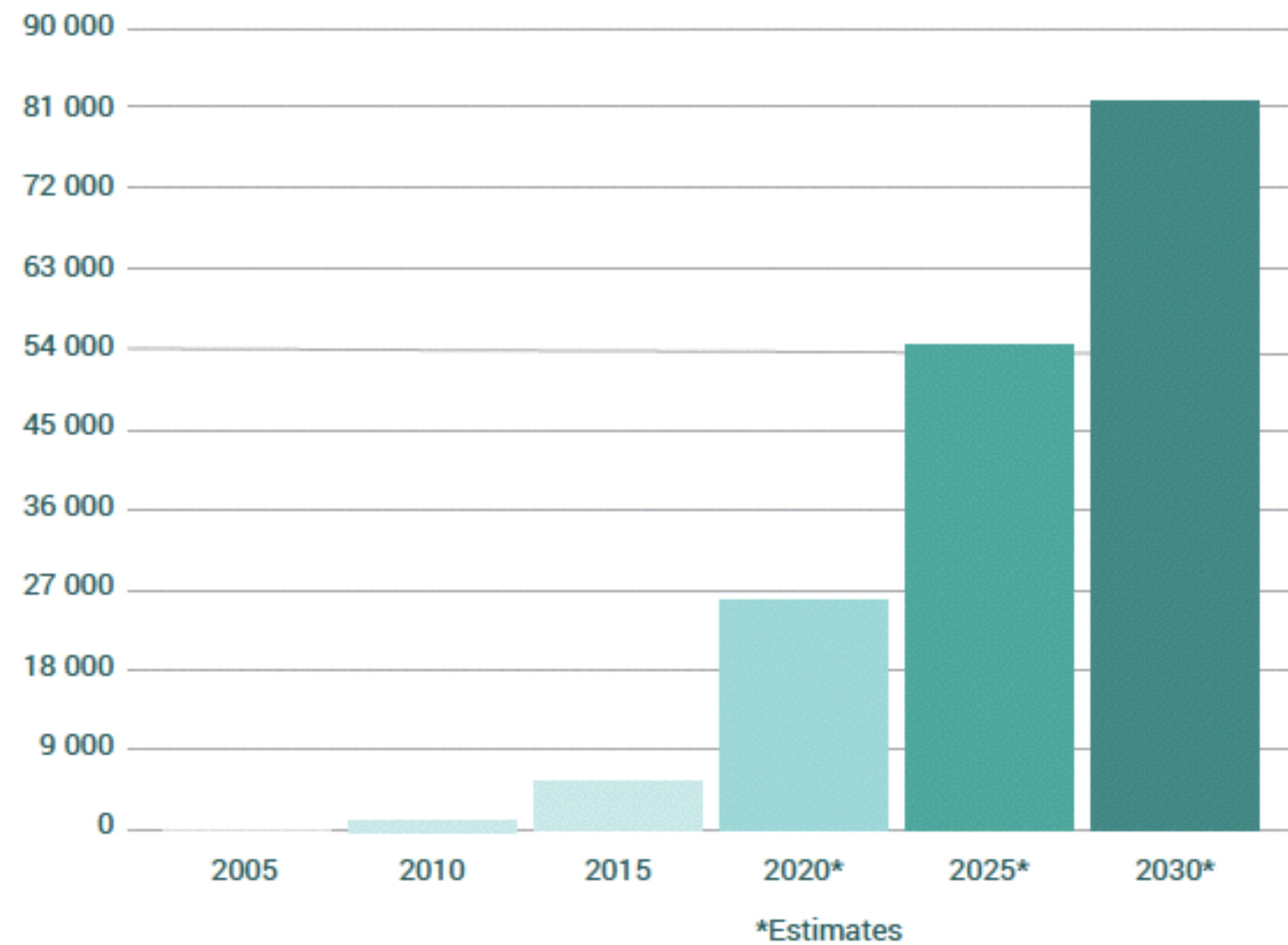
new

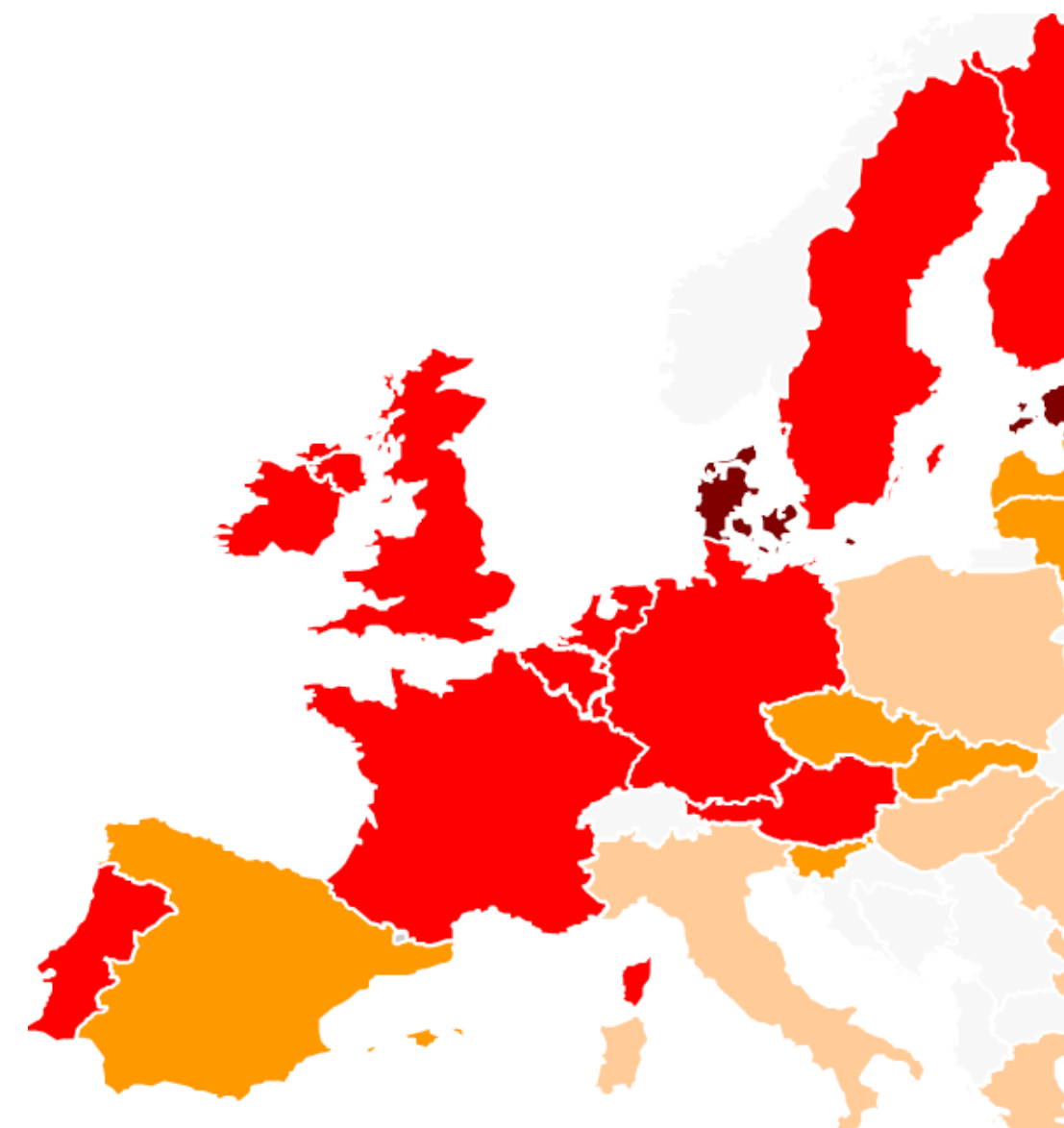
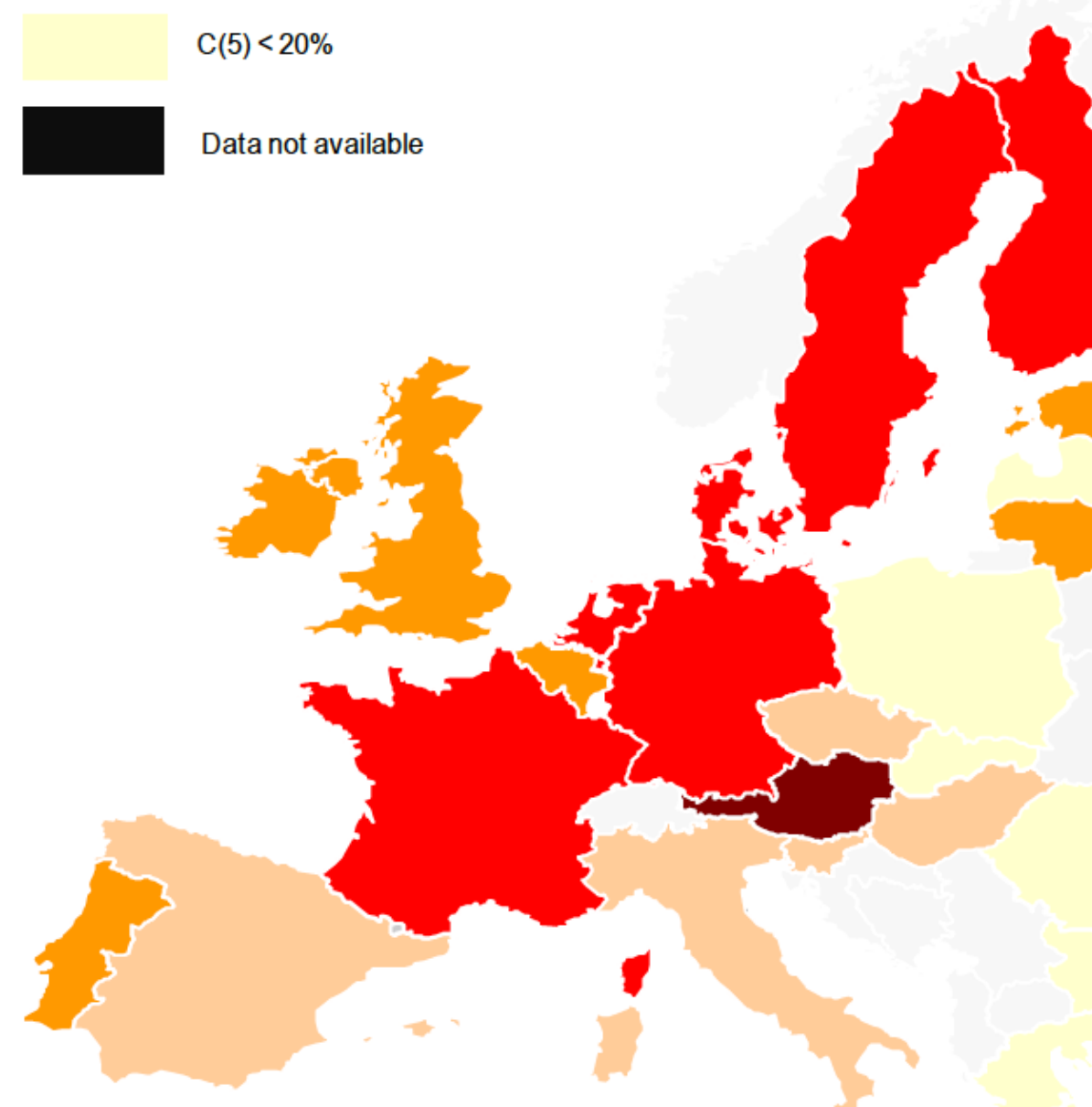
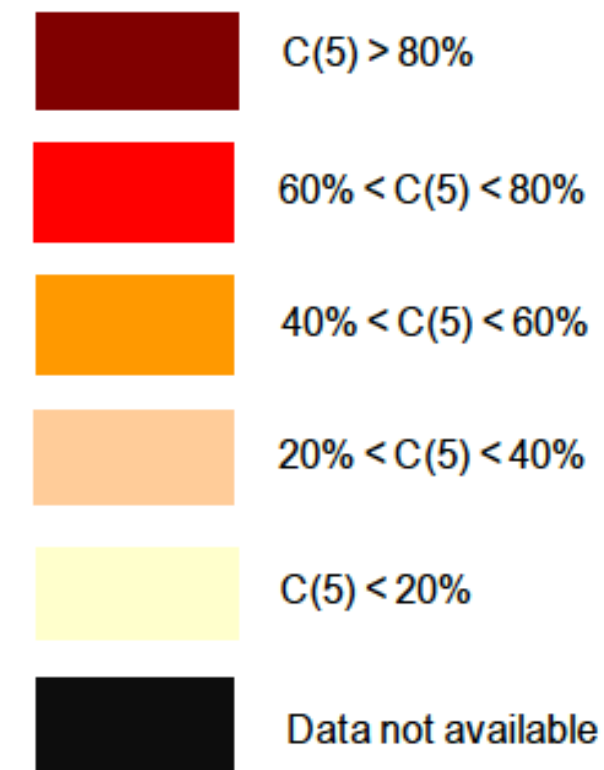
CO₂ stores in EUROPE 2007 - 2020



total

CO₂ stores in EUROPE 2005 - 2030





A 2014 shecco survey among large food retailers in North and West Europe showed 83% already used CO₂ refrigerant in centralised systems

Growth of hypermarkets to slow down, but convenience stores will grow for the next years = more standardised solutions will be needed also for refrigeration systems

JAPAN

04





5 million

CO₂ heat pumps

400-500k units
per year

Eco Cute has been a run-away success, with
strong government support

**98% of all new residential HP
water heaters**

10 million expected by 2020

*source: shecco Japan K.K. status: February 2015

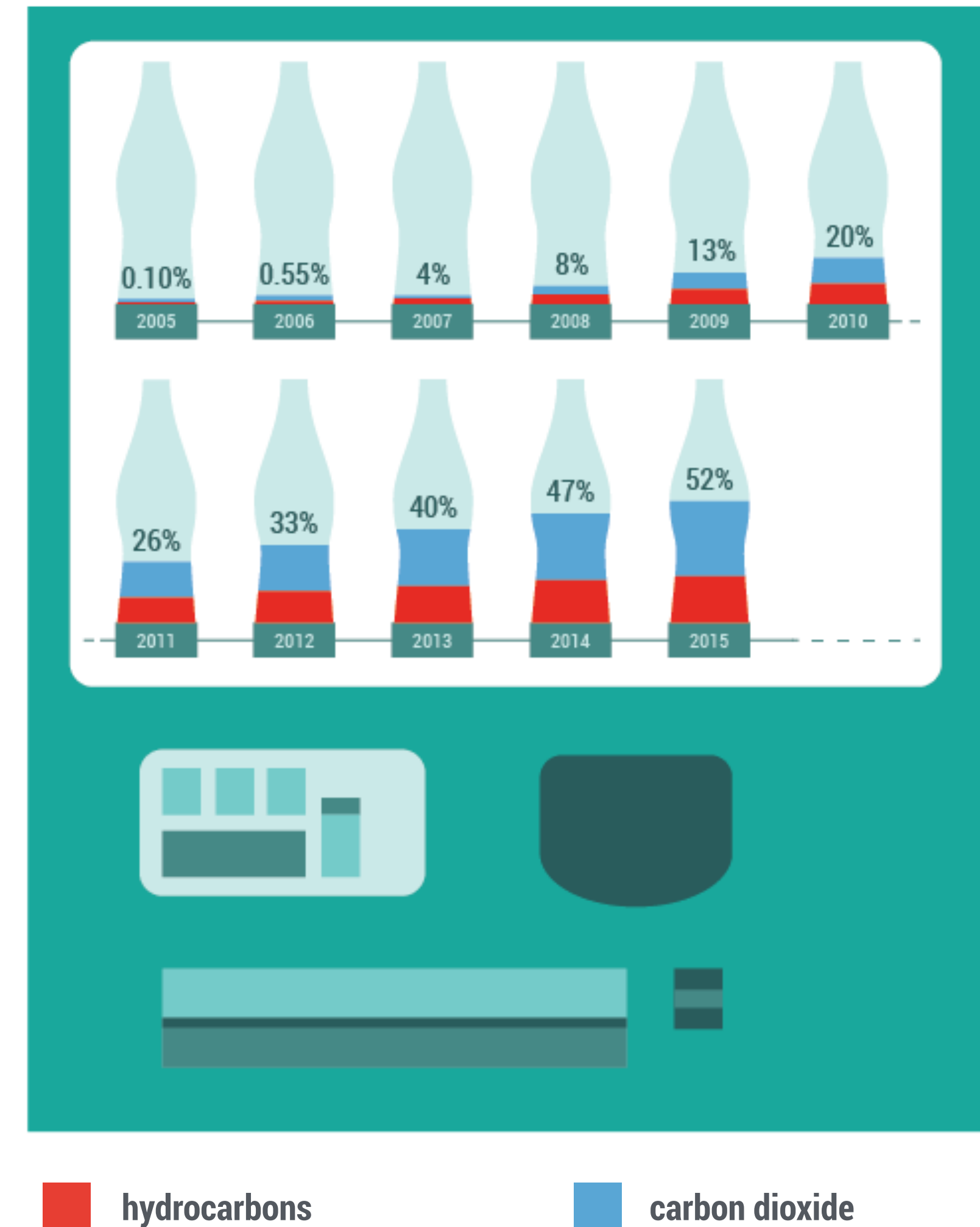


1.35 million beverage vending machines in Japan use either hydrocarbons or CO₂

natural refrigerants make up over 50% of the market

from 0.1% to 52% market share in just 10 years !
= a clear Japanese success story

BUT: Japan has not made similar progress in NR use for small plug-in units - a major trend in other world regions (especially for HC)





From 190 CO₂ stores to 1,500+
in just 2 years -
CO₂ TC growing rapidly in Japan

out of that 1,463 are small CVS
(less than 10 kW capacity)

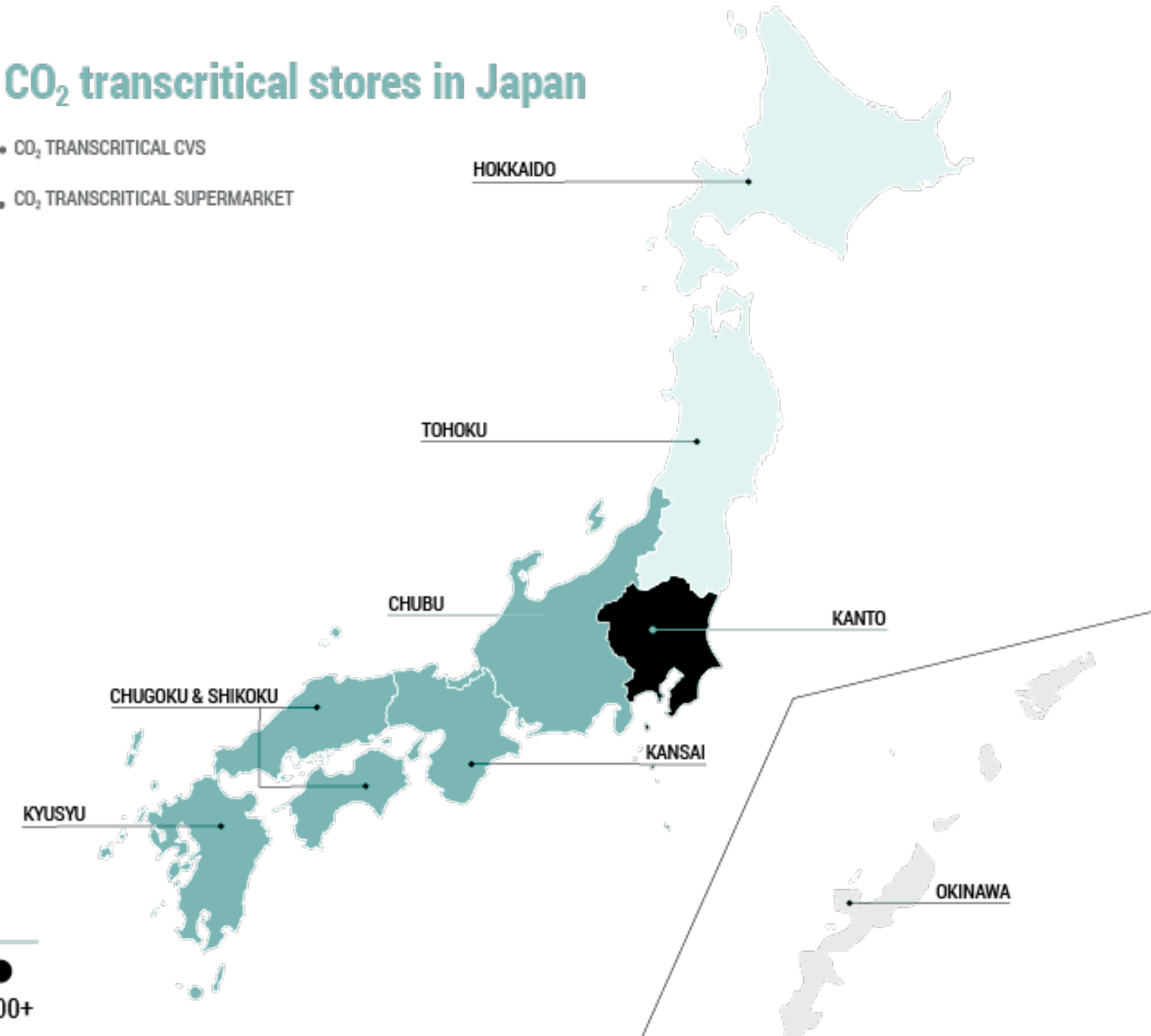
= 4% of stores from Japan's
three leading CVS brands

1,500+ CO₂ transcritical stores in Japan

1,463 / 72
• CO₂ TRANSCRITICAL CVS
• CO₂ TRANSCRITICAL SUPERMARKET

KEY/LEGEND

1-2 50+ 100+ 500+



source: shecco, GUIDE Japan - State of the Industry 2016

CHINA

05

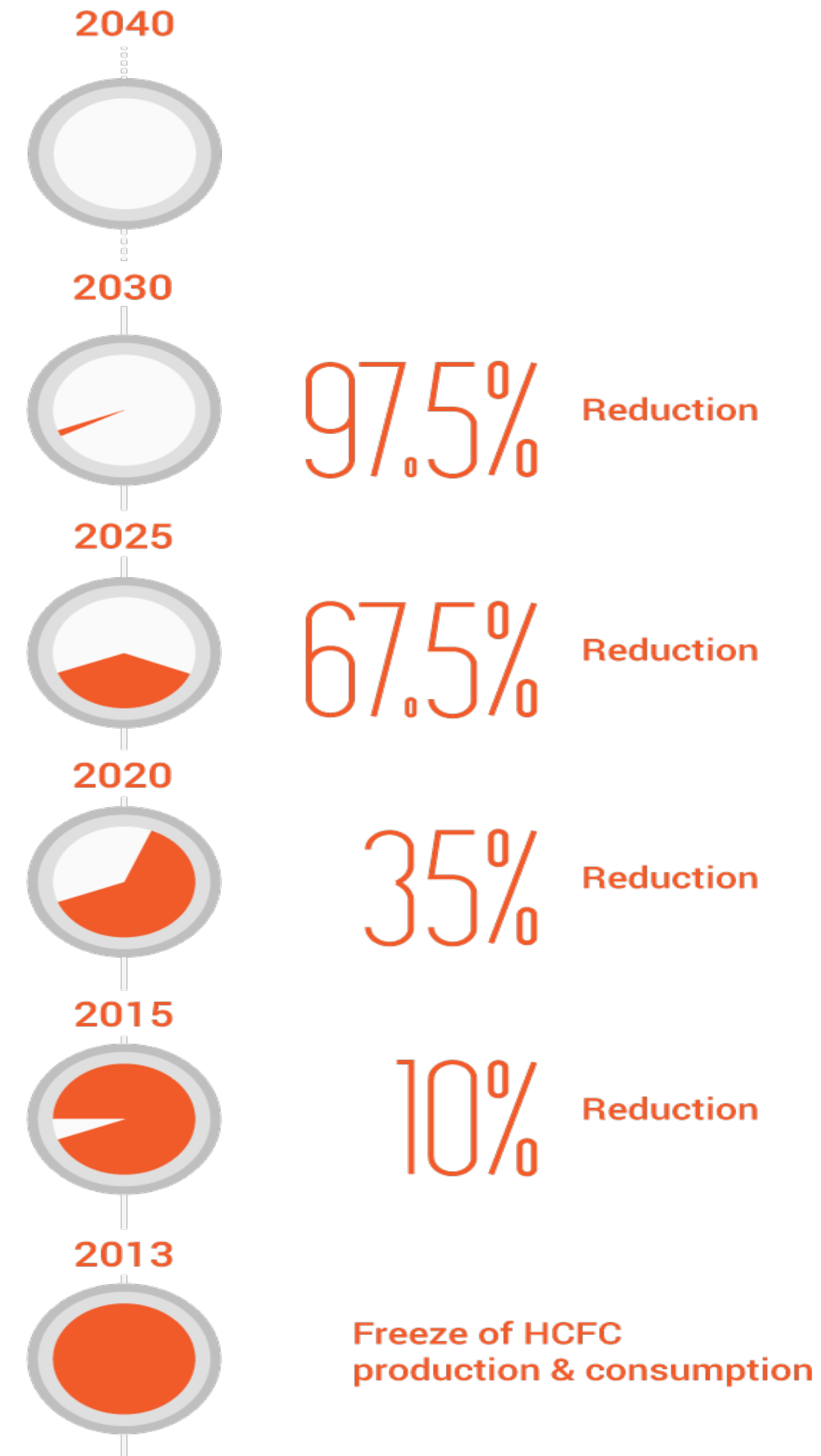




phase-out of production and consumption of HCFCs by 2030 = global impact

recommended list of substitutes to HCFCs listing natural refrigerants as main alternatives

increasing government support for natural refrigerants in several sectors, especially room AC, heat pumps, commercial & industrial refrigeration





400,000

HC stand alone cabinets



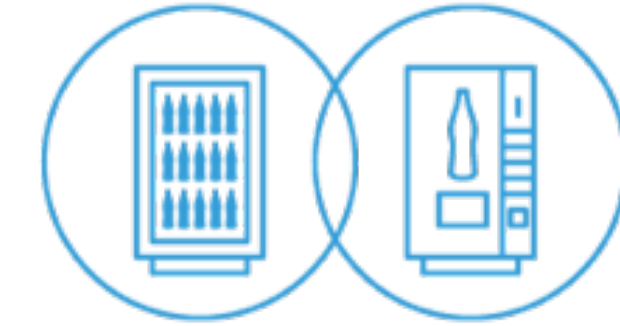
322,000

HC ice cream freezers



2,500

HC bottle coolers
& vending machines



25,000

CO₂ bottle coolers
& vending machines



GUIDES TO NATURAL REFRIGERANTS



China 2015



China Business Directory 2015



Europe 2014



North America 2015



Japan 2016 - launch:
May 2016

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