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NatRef trends in South Africa and around the world

ATMOsphere Network
FRIGAIR, 7 June 2018

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POLICY TRENDS

01

EUROPE: F-GAS REGULATION

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2016: 7% cut in HFC quotas

2017: HFCs pre-charged in equipment covered under phase-down

2018-2020: 37% cut in HFC-quotas

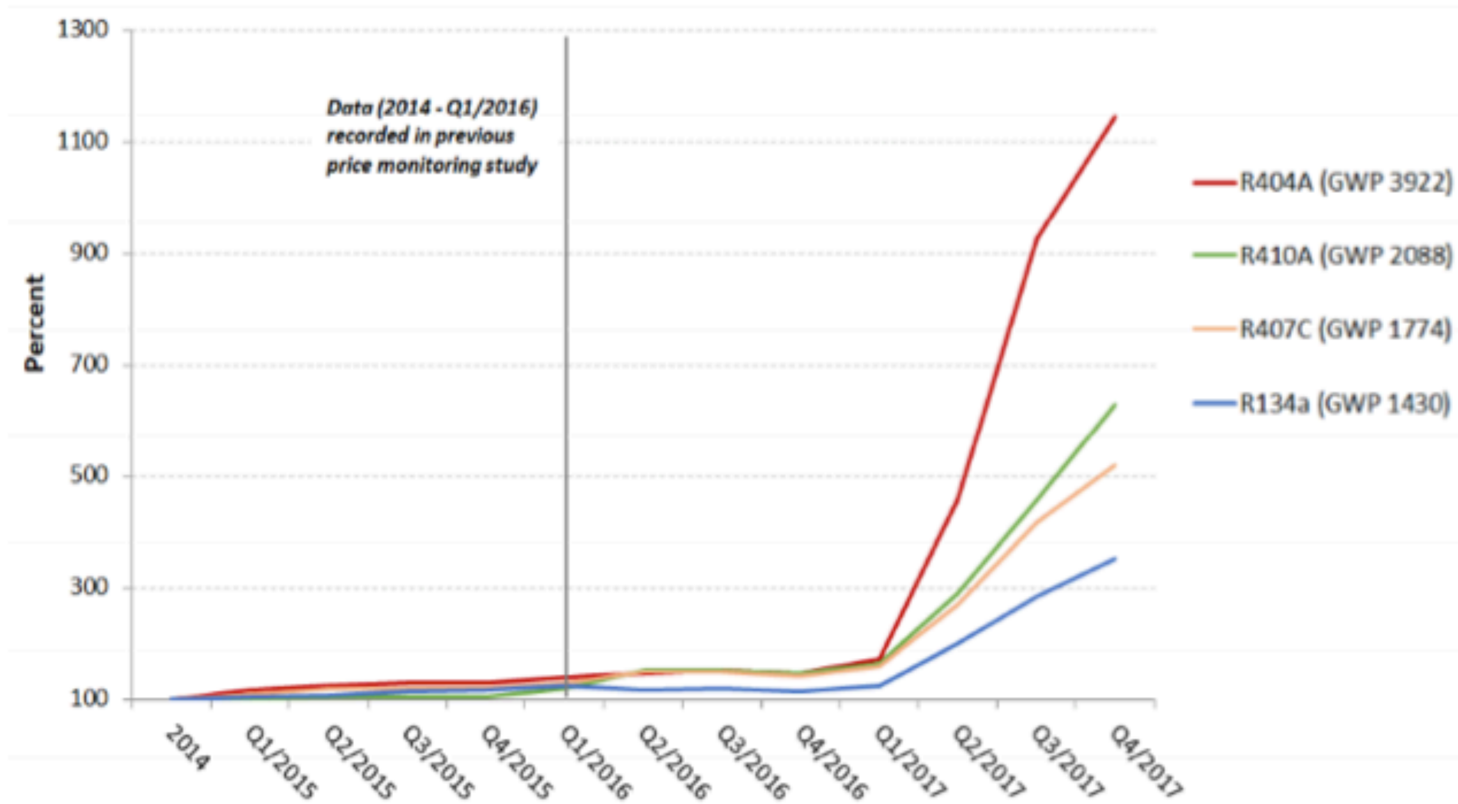
- **Strong price signal: 20x increase** expected, prices growing proportionally to GWP

2020: Ban on HFCs in stationary refrigeration (GWP > 2500)

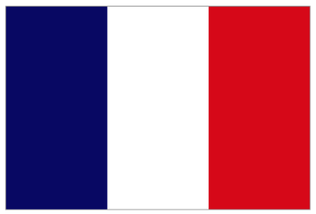
2020: Servicing ban in refrigeration equipment (HFCs with GWP > 2500)

2022: Ban on HFCs in commercial refrigeration (GWP > 150) - plug-in & centralised

Development of **purchase prices of various refrigerants** at service company level, indexed to 2014 prices (100%)



EUROPE: F-GAS POLICY AT NATIONAL LEVEL



- **France** - HFC tax proposal - **to be adopted in Finance bill 2019, will enter into force on January 2019**

-> Gradual tax, from €15/tCO_2-eq in 2019 to €70/CO_2-eq by 2022

- **Spain** - tax on f-gases with a GWP > 150 in 2015.
    - In 2018, the level is EUR 20/tCO_2-eq

- **Denmark -** tax on f-gases & HFC bans
    - Ban on the use of HFCs in new equipment since 1 January 2006 (the ban does not apply to existing equipment & to equipment with 0.15 - 10kg refrigerant charge)
    - Tax on the import of f-gases in bulk and on imported products - in 2018, the level of the tax is DKK 150

USA: HVAC&R INDUSTRY URGES TRUMP TO REFER KIGALI AMENDMENT TO SENATE

- May 15, 2018: 32 top executives of HVAC&R companies urged President Trump to submit the Kigali Amendment to the U.S. Senate for ratification.
- Includes Hillphoenix, Danfoss North America, Emerson, Johnson Controls, Lennox International and Structural Concepts
- Says ratification of Kigali will increase US manufacturing jobs by 33,000 & increase exports by USD 5 billion.
- Highlights risk of transferring the competitive advantage from America to other countries like China.

USA: CALIFORNIA'S LEADERSHIP

Short-Lived Climate Pollutant (SLCP) Reduction Strategy - approved in March 2017

- Aims to **reduce HFCs by 25%** below business-as-usual emissions **by 2020**; **by 40% by 2030**;
- Adoption into state regulations of SNAP Rule prohibitions of HFCs in stationary refrigeration and air conditioning on 23 March 2018

California Cooling Act - introduced on 7 Feb 2018 by **Senator Lara**

- Intent to restrict the use of high GWP refrigerants & to **introduce incentive** program for **lower GWP alternatives**

California legislation expected to eventually **influence federal level**

REMOVING BARRIERS FOR FLAMMABLE REFRIGERANTS

On-going revisions of international standards - potential to open up opportunities for hydrocarbons globally

IEC 30335-2-89 for **commercial refrigeration**

- Proposal to raise max. charge limit of flammable refrigerants (e.g. propane from 150g to 500g)
- Final amended standard expected beginning of 2019

IEC 60335-2-40 for AC and heat pumps

- Proposal to increase allowable charge size for flammable refrigerants by implementing various mitigation measures while keeping the max charge size
- Final amended standard expected in 2019-2022

MARKET TRENDS COMMERCIAL REFRIGERATION

02

CO_2 TRANSCRITICAL (TC) STORES (Feb 2018)

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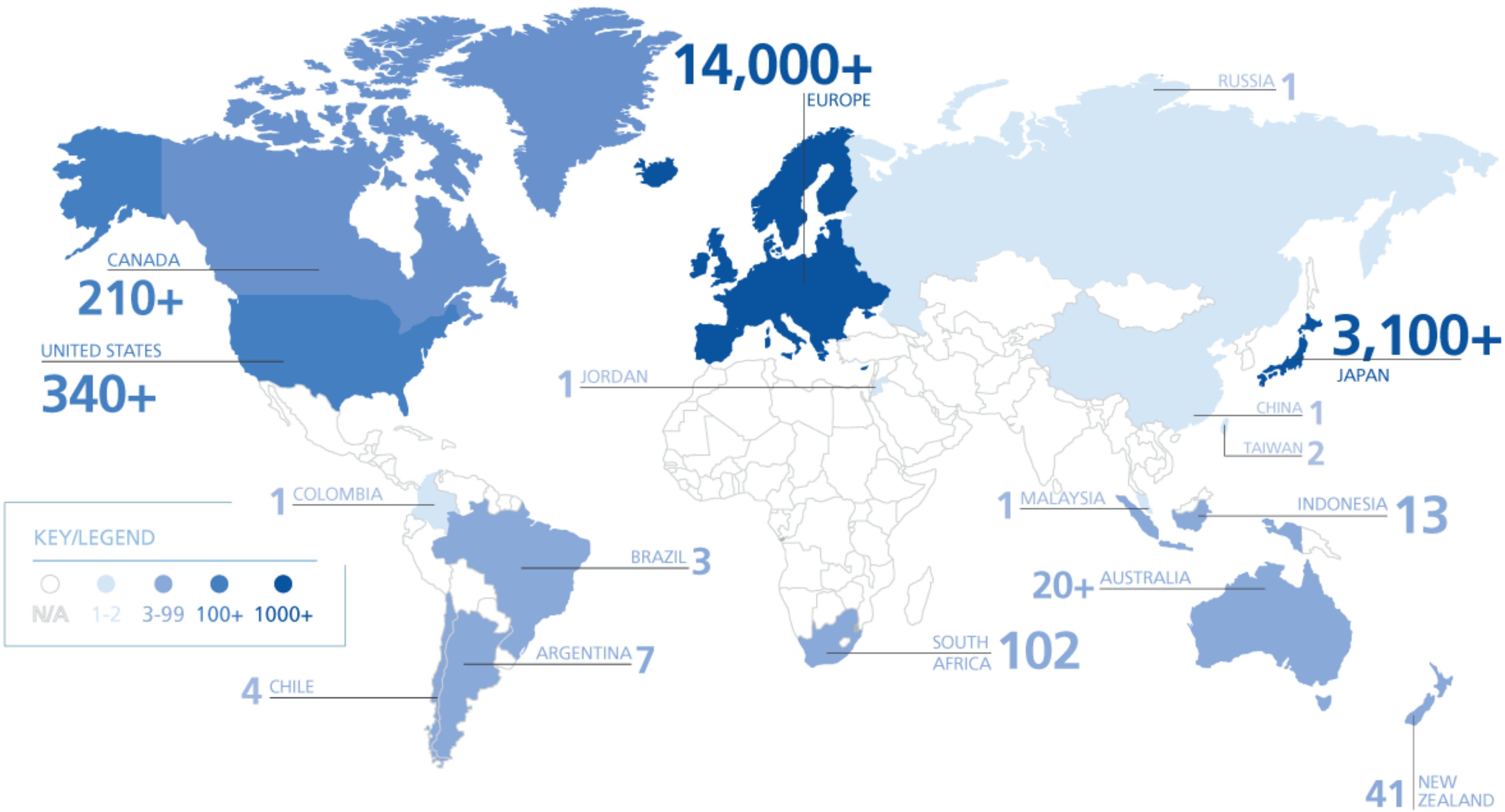
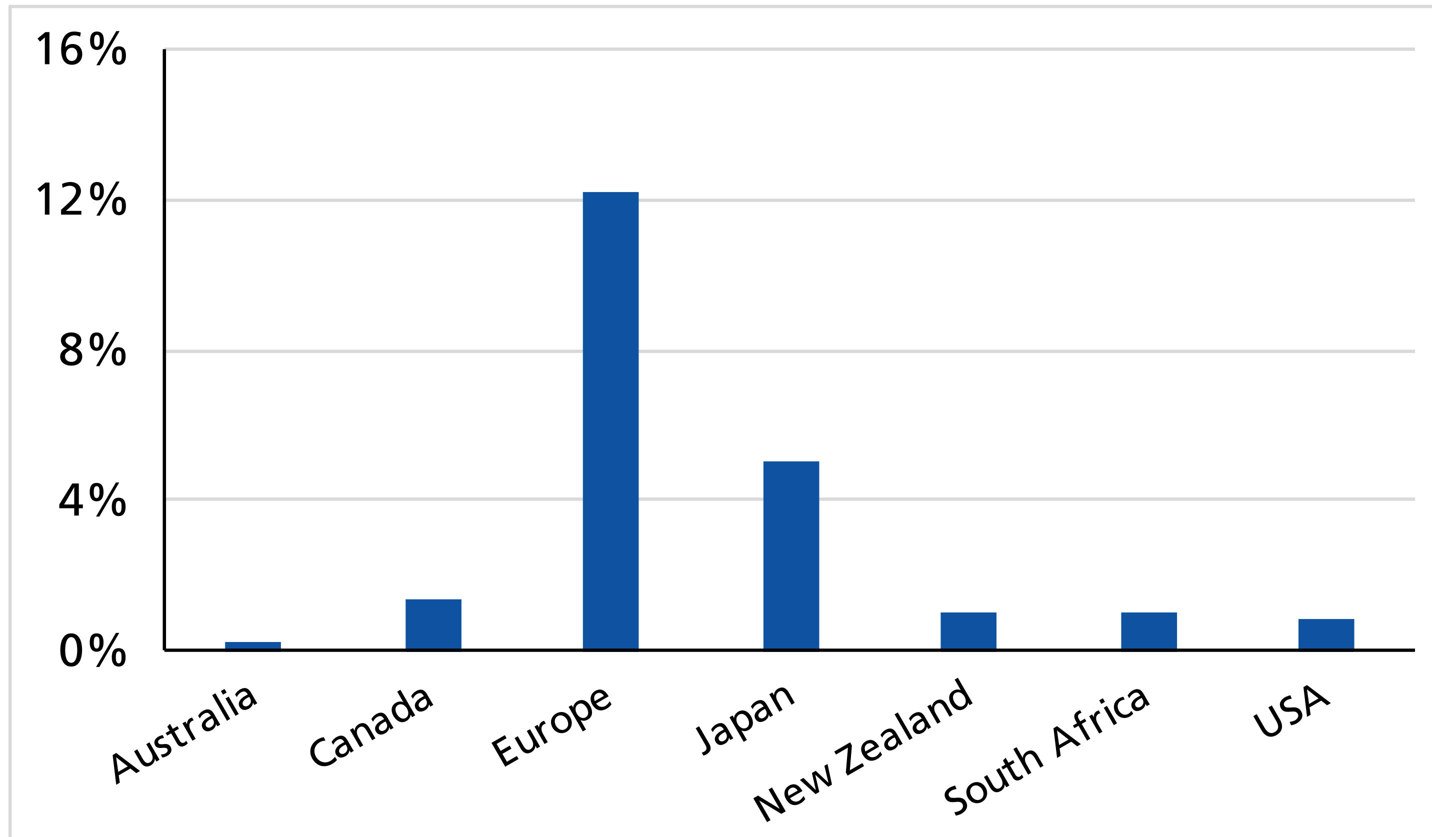


CO_2 TC STORES SHARE FROM TOTAL

The market is still in early adoption phase.

Based on estimations from the numbers of stores of major end-users:

- **CO_2 TC stores** account for **less than 10% of total stores** in Australia, Canada, Europe, Japan, New Zealand, South Africa and the USA.

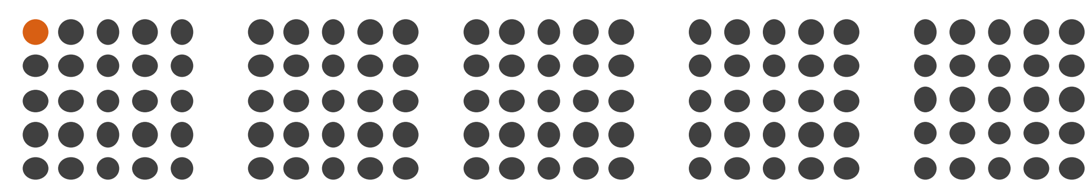


SHARE OF CO_2 TC STORES IN SOUTH AFRICA

Number of CO_2 TC stores: **110**

Estimated number of supermarkets (excl. convenience stores): **10,000**

CO_2 TC stores share from total: **1.1%**



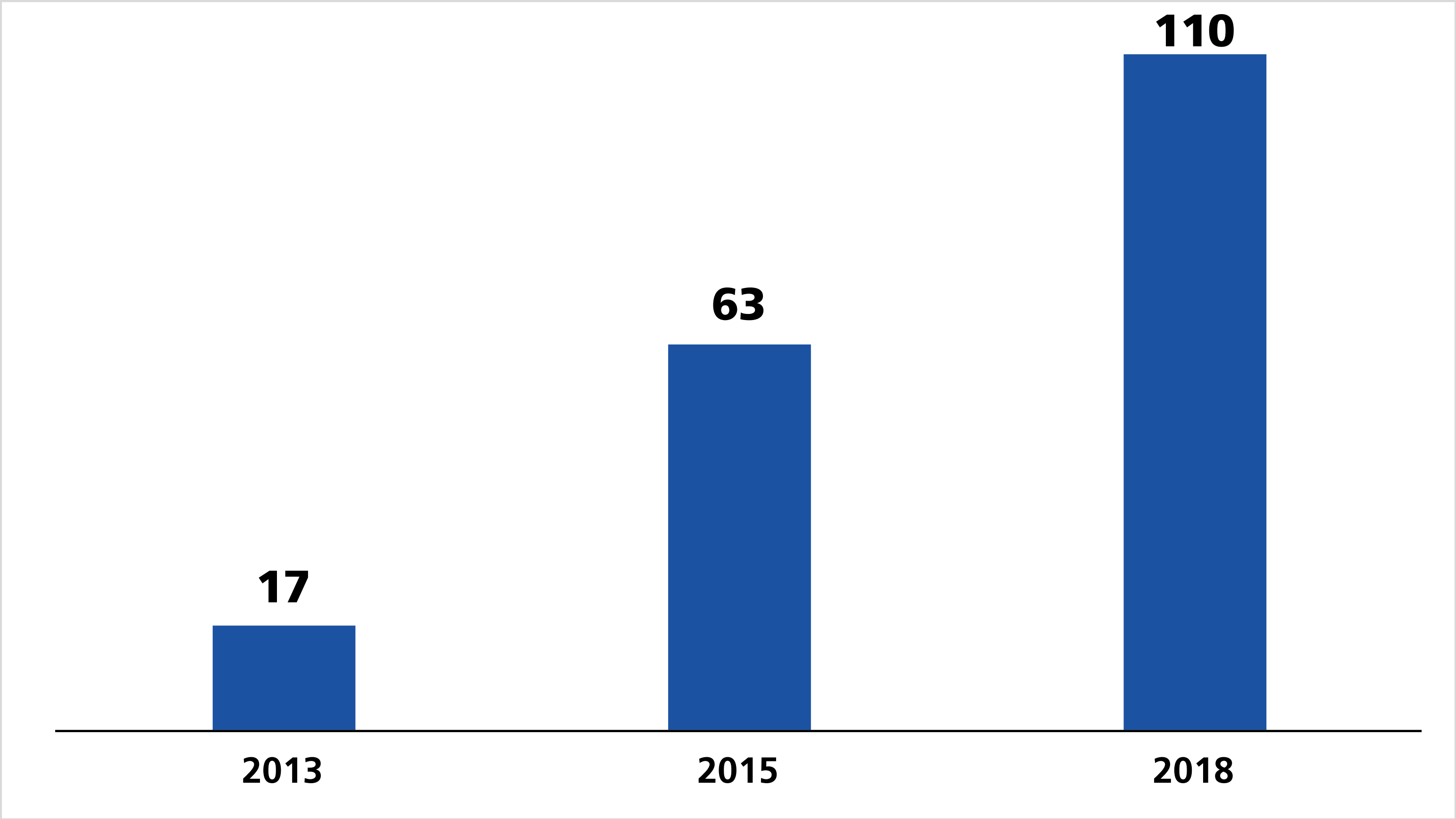
CO_2 TC:

1.1%

CO_2 TC IN SOUTH AFRICA

South Africa has experienced increased usage of CO_2 TC systems, mainly **driven by retailers** Woolworths and Makro using the systems in their supermarkets.

Growth in absence of strong incentives so far: far bigger potential ahead.



KEY TREND: CO_2 RACK SYSTEM

Highly **competitive evolving market** for suppliers providing CO_2 solutions

KEY TREND: CONDENSING UNITS / SMALLER SYSTEMS

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Japan - leader in CO_2 condensing units for smaller store formats

Europe traditionally working with large capacity CO_2 racks, but **several manufacturers** introduced small systems

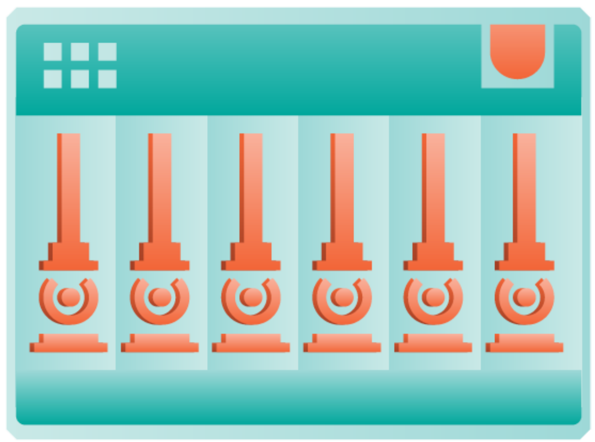
Besides CO_2, self-contained waterloop HC based refrigeration systems are a clear trend

Competition increasing: more efficiency, lower prices

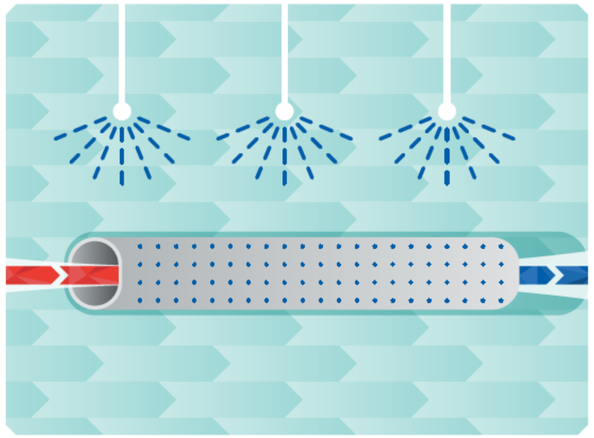
KEY TREND: SMALLER NH_3/CO_2 SYSTEMS

Growing line up of **small size NH_3/CO_2 systems** - potential to serve supermarkets?

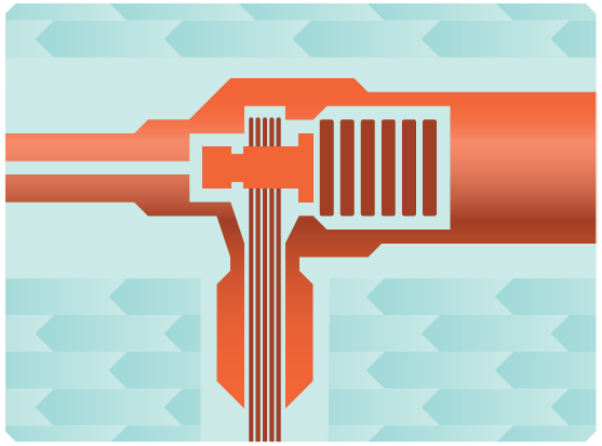
KEY TREND: SOLUTIONS FOR EFFICIENCY IN WARM CLIMATES



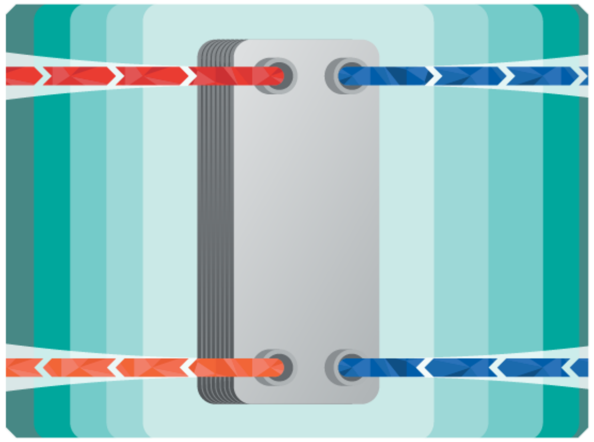
Parallel Compression



Adiabatic Cooling



Ejector



Sub coolers

HYDROCARBON PLUG-INS

Global market estimate (April 2018) = **2 mil units**

In early 2017 there were about **1.5 million** units globally

Major growth in Europe is expected between **2020-2022** due to the F-Gas Regulation HFC ban (GWP > 150) in hermetically sealed commercial ref equipment that enters into force in Jan 2022

Increase of HC charge limits in industry standards is key for the future uptake of hydrocarbons

MARKET TRENDS
INDUSTRIAL REFRIGERATION

03

COMPETITION BETWEEN DIFFERENT NR SYSTEMS HAS INCREASED

market traditionally dominated by **ammonia** and HFCs

NR cutting edge technologies becoming strong trend and competing:

- **ammonia low charge**
- **CO_2 transcritical**
- **NH_3/CO_2**

Key drivers:

increased safety - lower risk

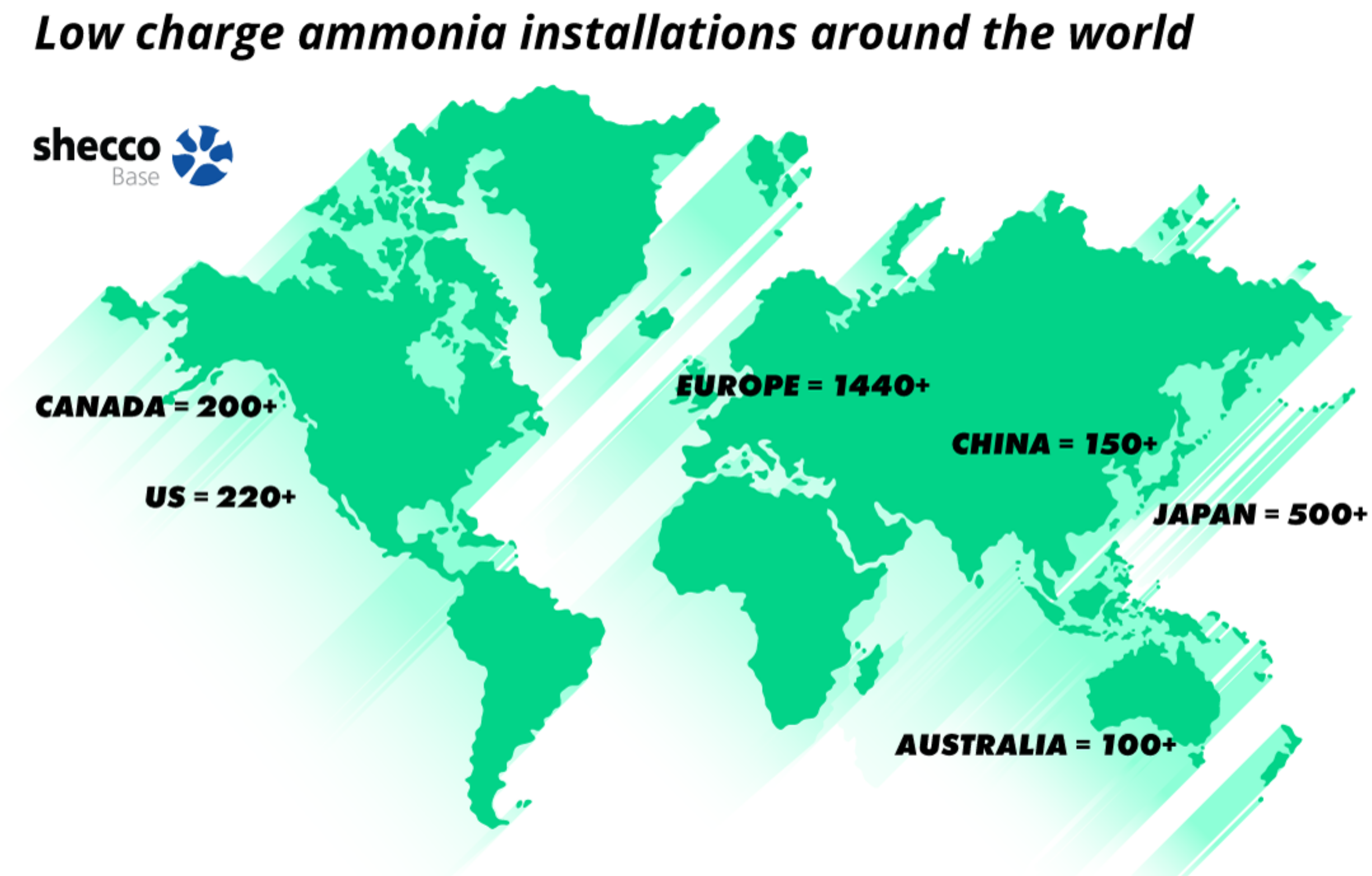
higher efficiency

easier servicing

return on investment for the end user

growing competition - prices pushed down, technology becoming more available

LOW-CHARGE AMMONIA



Key drivers:

Growing pressure to improve **safety** and increase **energy efficiency**

Simplified operation: **easier to service and maintain**

CO_2 IN INDUSTRIAL REFRIGERATION

CO_2 transcritical - gaining grounds in industrial refrigeration in different parts of the world:

- bigger capacity **compressors** + other components for larger applications becoming available from several key suppliers

- **Canada**: growing number of CO_2 TC installations in cold storage / food processing, mainly by 2 manufacturers (Carnot Refrigeration & Systems LMP); Quebec province supporting CO_2 uptake

- **Europe**: Demand for CO_2 in industrial refrigeration growing, several manufacturers providing CO_2 TC technology in commercial refrigeration expand to industrial sector

CONCLUSIONS

04

CONCLUSIONS

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Legislation is key in creating pressure in the industry overall to switch away from high GWP HFCs

Countries globally are moving forward with the **HFC phase down.**

Availability of natural refrigerant technologies is increasing = **competition to increase performance & reduce cost.**

Revision of standards has the potential to give a competitive advantage to hydrocarbon plug-ins

SHECCO USEFUL LINKS

Industry platforms

www.ammonia21.com

www.hydrocarbons21.com

www.R744.com

Accelerate magazines

www.accelerate.shecco.com

ATMOsphere events

www.ATMO.org

shecco publications

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