



NATURAL REFRIGERANT-BASED SOLUTIONS FOR COMMERCIAL REFRIGERATION – GLOBAL TRENDS AND LATEST DEVELOPMENTS

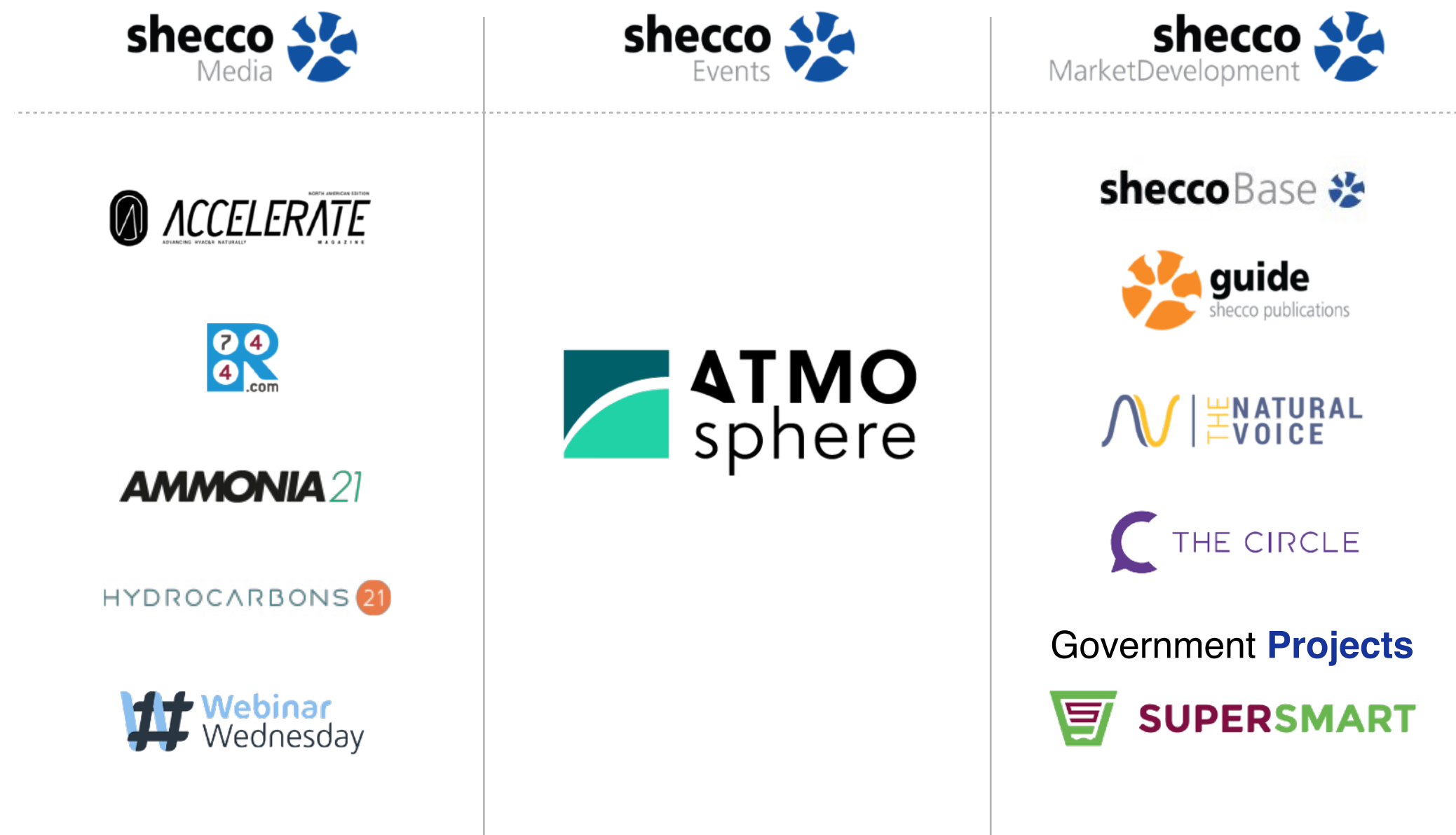
2018 Ozone2Climate Industry Roundtable: Side-Session on Cold Chain Technologies
April 9, 2018



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shecco

SHECCO OVERVIEW

Global market accelerator for natural refrigerant based technologies



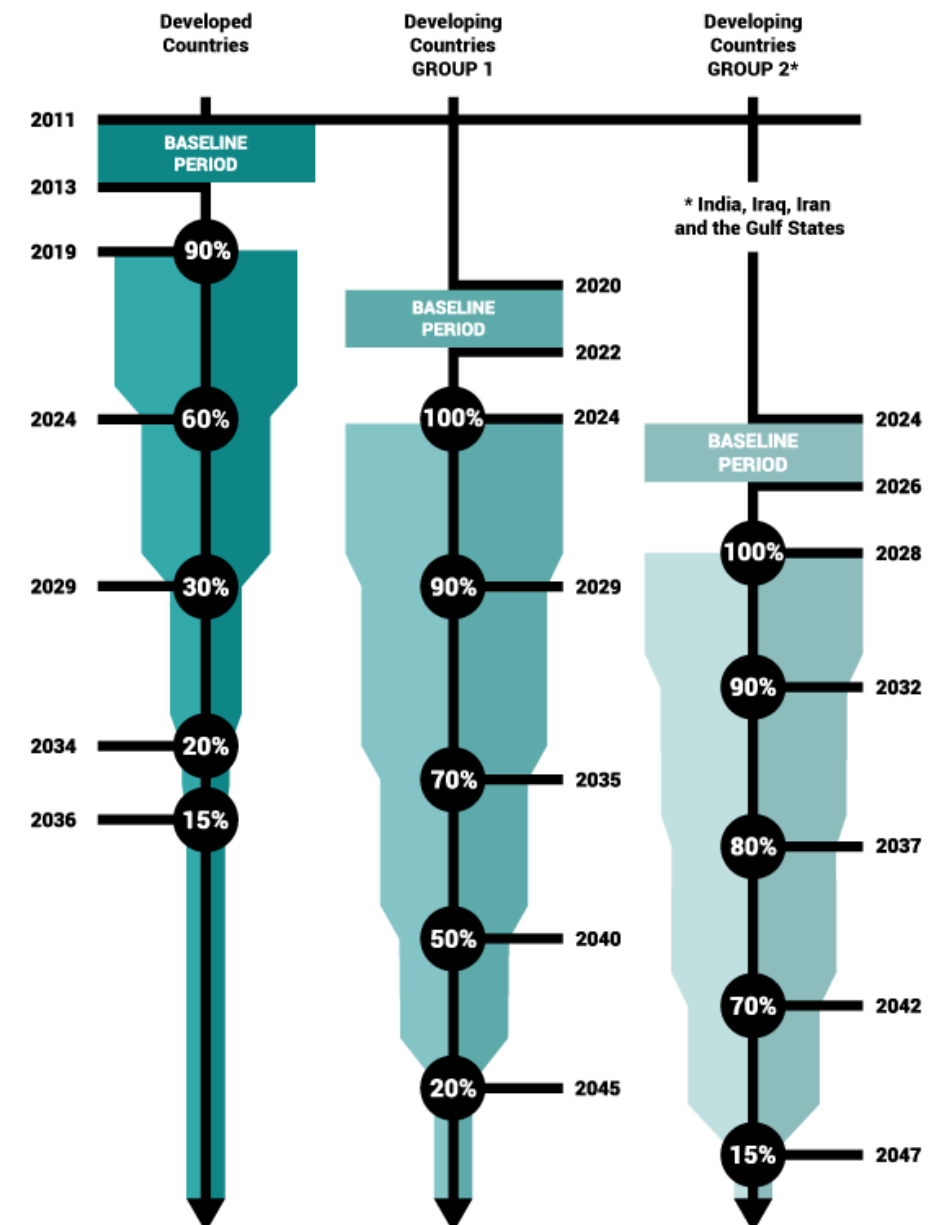
GLOBAL POLICY

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POLICY: KIGALI AMENDMENT

Global phase-down of HFCs by 85% by late 2040s

- HFCs no longer seen as long-term viable solution



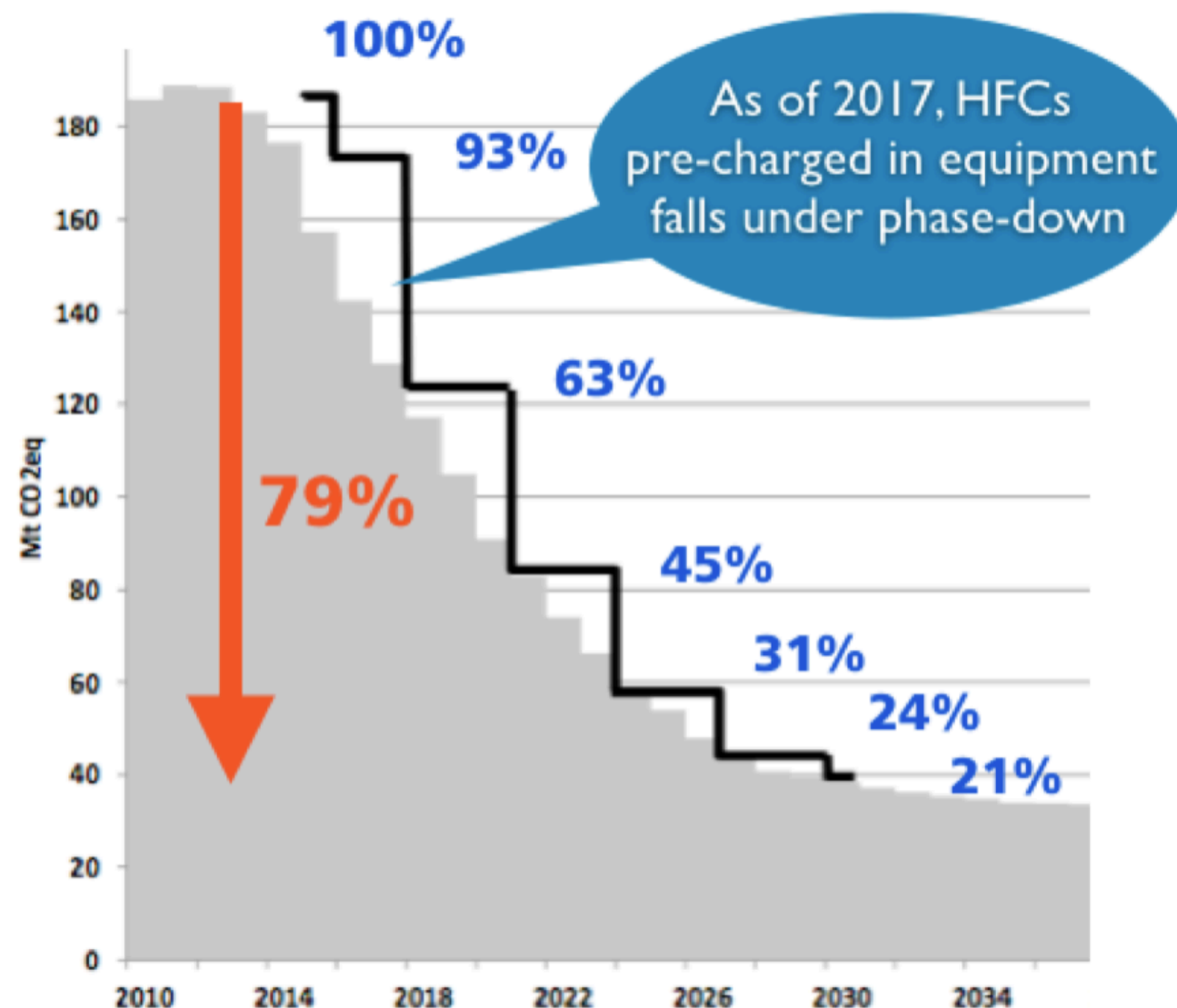
EUROPE: F-GAS REGULATION

2018-2020: 37% cut in HFC-quotas - major impact on HFC prices:

- 5x increase in 2017
- 20x increase expected in 2018

Bans on HFCs with GWP > 150
approaching soon

- **2022** - hermetically sealed refrigerators and freezers for commercial use
- **2022** - multipack central systems for commercial use > 40kW

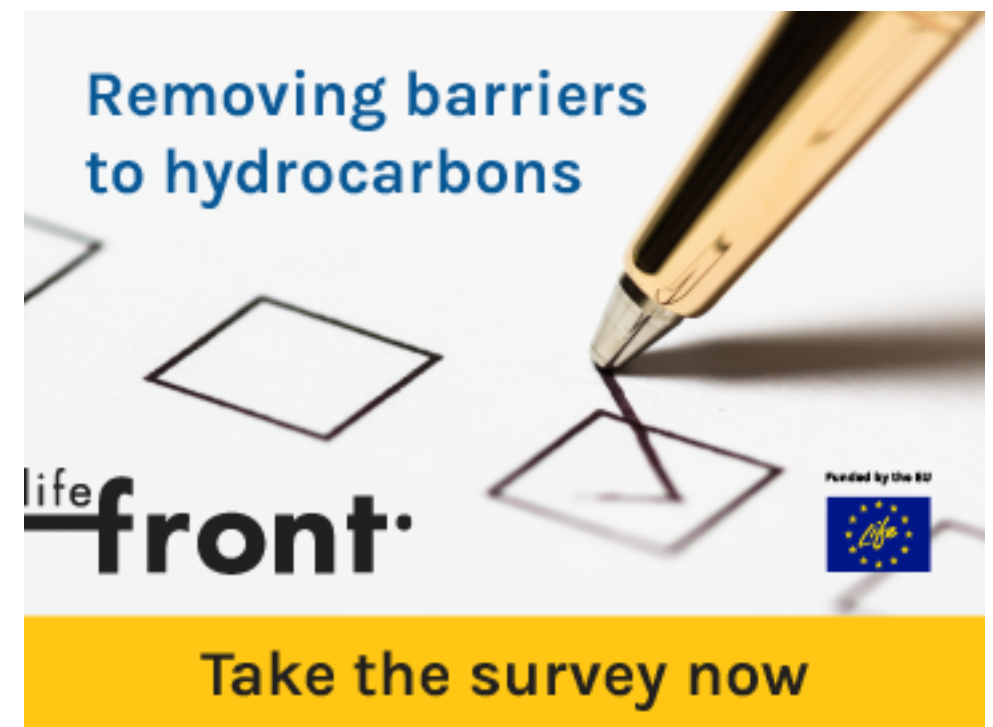


STANDARDS: KEY DEBATE FOR HYDROCARBONS

International standards - barrier for wider uptake of energy efficient hydrocarbon-based equipment

IEC 60335-2-89 for commercial refrigeration

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

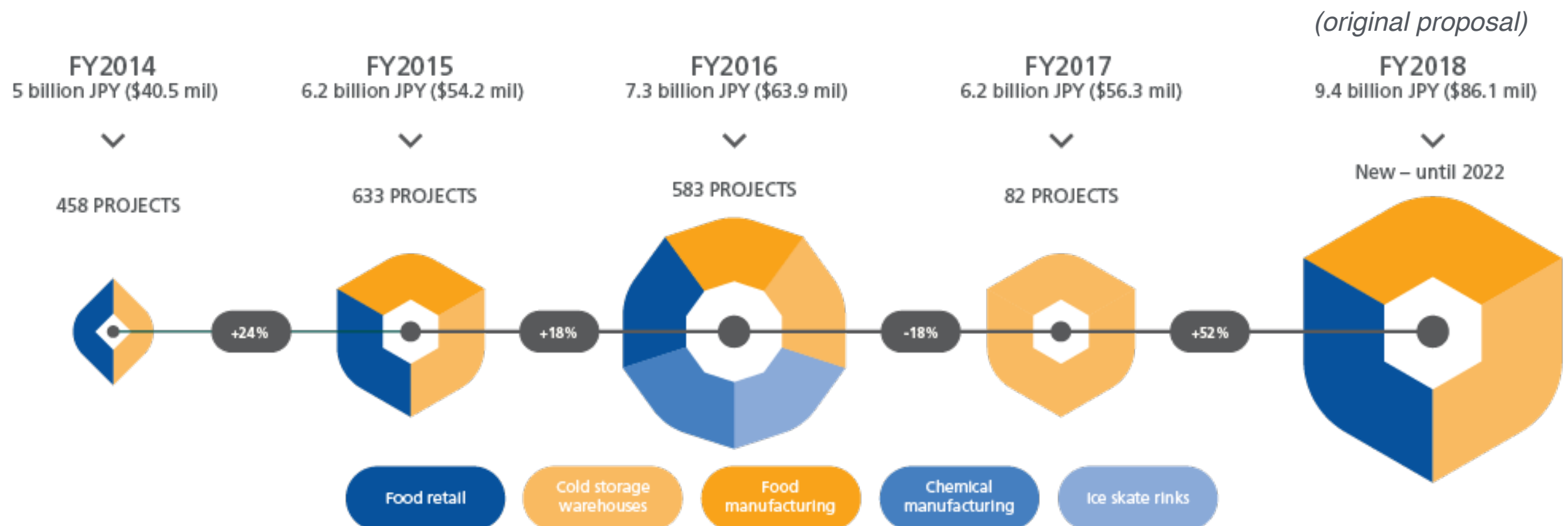


<http://www.surveygizmo.com/s3/4150423/LIFE-FRONT-WP3-2-Survey>

JAPAN: NATURAL REFRIGERANT SUBSIDIES

World-largest subsidy 60 million USD for End Users installing Natural Refrigerants in FY2018

- food retail (**supermarkets & convenience stores**)
- food processing & cold stores



CHINA: CO₂ DEMONSTRATION PROJECT

Hong Fu Supermarkets

- **First locally-owned** Chinese food retail chain to install a **CO₂ subcritical** system in China
- September 2017
- Demonstration project supported by: **UNDP, UNEP** & Chinese Ministry of Environmental Protection, Foreign Economic Office (**MEP-FECO**)



MIDDLE EAST'S FIRST CO₂ SUPERMARKET OPENS IN JORDAN

The first transcritical CO₂ supermarket in the Middle East

- 2000 m² Al-Salam supermarket in Amman, the capital of Jordan
- parallel compression and multi-ejector technology
- supported by Jordan Ministry of Environment
- funded by Climate and Clean Air Coalition (CCAC)
- implemented by the United Nations Industrial Development Organization (UNIDO)



The project implements the first transcritical CO₂ refrigeration system in the entire region in a supermarket and is truly state-of-the-art technology.”

– Sulafa Mdanat, UNIDO's Country Representative in Jordan

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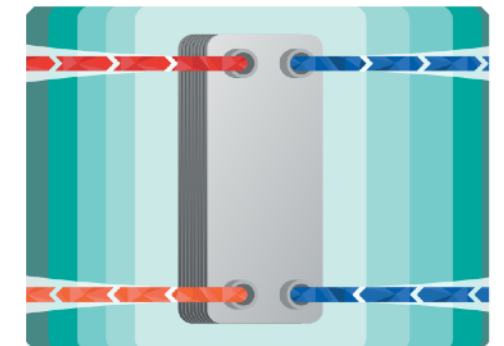
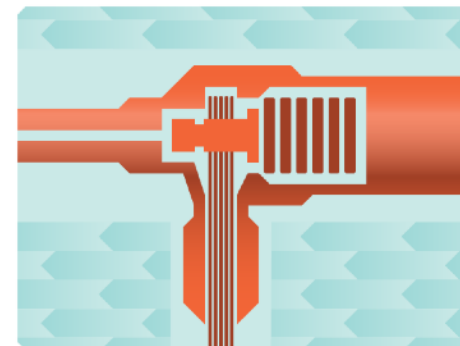
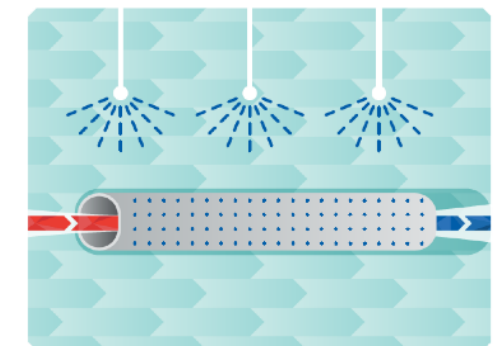
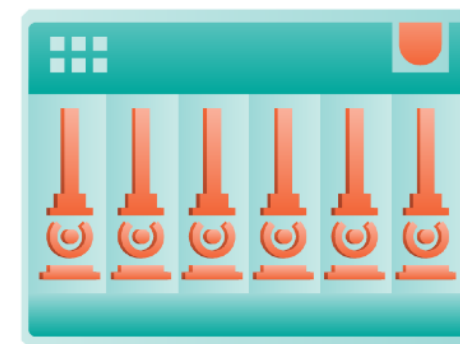


COMMERCIAL REFRIGERATION

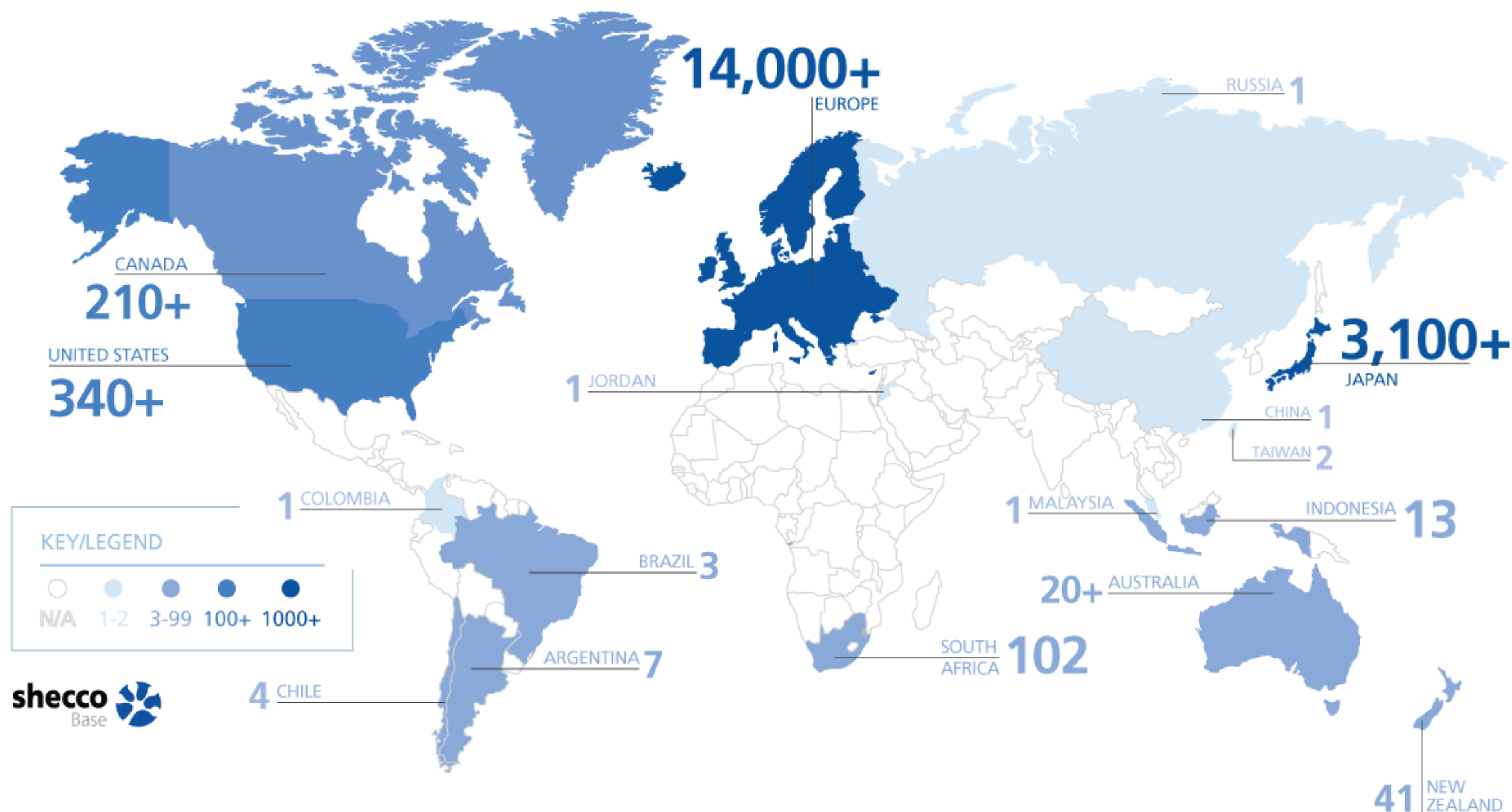
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KEY TREND: CO₂ COST OF EQUIPMENT DECREASING

- The cost of equipment is becoming **comparable to systems using HFCs** (developed markets)
- Each year, reported **higher energy efficiency**, lower prices as technology reaches **mass production**
- Solutions for warm climates **moving from test-phase to market-ready phase**, further penetration expected (ejectors, adiabatic gas coolers,...)
- **Availability** and **cost** in new markets China, SEA, Latin America a **remain challenge**



TRANSCRITICAL CO₂ STORES GROWING GLOBALLY (FEB 2018)



CHINA

First major CO₂ transcritical store opened January 2018

METRO Beijing Lishuiqiao wholesale store

- Centralised transcritical CO₂ rack system
- Parallel compression, waste heat reclaim, and two-stage gas cooling
- Goal: transcritical systems in all its new Chinese stores by 2025



<http://acceleratechina.com/>

PREPARING FOR MORE CO₂ IN CHINA FOOD RETAIL

- Currently **40+ subcritical CO₂ supermarkets** in China (HFC/CO₂ cascades)
- **First major CO₂ transcritical** in 2018, several more planned for 2018-2020 period
- Several **local CO₂ rack manufactures** - different stages of commercialization, support from established components suppliers
- European (HQ) system manufactures getting ready to supply CO₂ transcritical to Chinese market
- **10 CO₂ transcritical stores by 2020?**
- Challenges: **training, component availability & cost**



SOUTHEAST ASIA

2



Introduction of CO₂ unit to overseas

Verification test & Installation started at

Asian and European local stores



Denmark
Sweden
Norway
Belgium
July, 2017
Start of sales • installation

Malaysia
Malaysia, NRE support
“Multilateral fund
for the implemen-
-tation of
Montreal Protocol
May, 2017 opened

China
13 stores installation
Wuhan 3rd store
Sep, 2017 opened

Indonesia
13 stores
installation

Taiwan
Linkou Wenvi store
Jan. 2016 installation

FamilyMart
ATMOsphere Japan / Tokyo / 13 February, 2018

Jaya GROCER

Alfamidi
LAWSON STATION

Source: Panasonic presentation ATMOsphere Japan 2018

HYDROCARBONS GROWTH

Plug-in Units in Supermarkets with R290: A reality today

- global market estimate (April 2018) **2,000,000+** units worldwide
- Europe leader in R290 plug-ins since many years
- North America, Asia catching up
- estimated **4000+** R290 **plug-in cabinets** in Chinese supermarkets today



HYDROCARBON END USERS

Firstly driven by **European discount retailers** such as Lidl, Aldi,...now a global trend

- US-based **Target** self-contained display cases using propane (R290) in more than 1,000 stores



CONCLUDING REMARKS

- **Competition between Hydrocarbon and CO₂ (and ammonia) based systems** in commercial refrigeration expected to intensify - competition to increase performance & reduce cost
- **Cost** of equipment decreasing
- **Increasing solutions** for efficiency in warm climates
- **CO₂ transcritical stores** growing globally
- **Hydrocarbons (R290)** - a standard solutions available globally
- **Emerging technologies:** hydrocarbon or CO₂ based plug-in systems with **water-loop** become a competitor to centralized CO₂ plants?
- **2018: Key year** to develop together the market for natural refrigerants



<http://www.atmo.org/china2018>



<http://acceleratechina.com/>



THANK YOU!