



MARKET AND POLICY TRENDS IN THE FOOD RETAIL & COLD CHAIN SECTOR IN THE ASIAN REGION

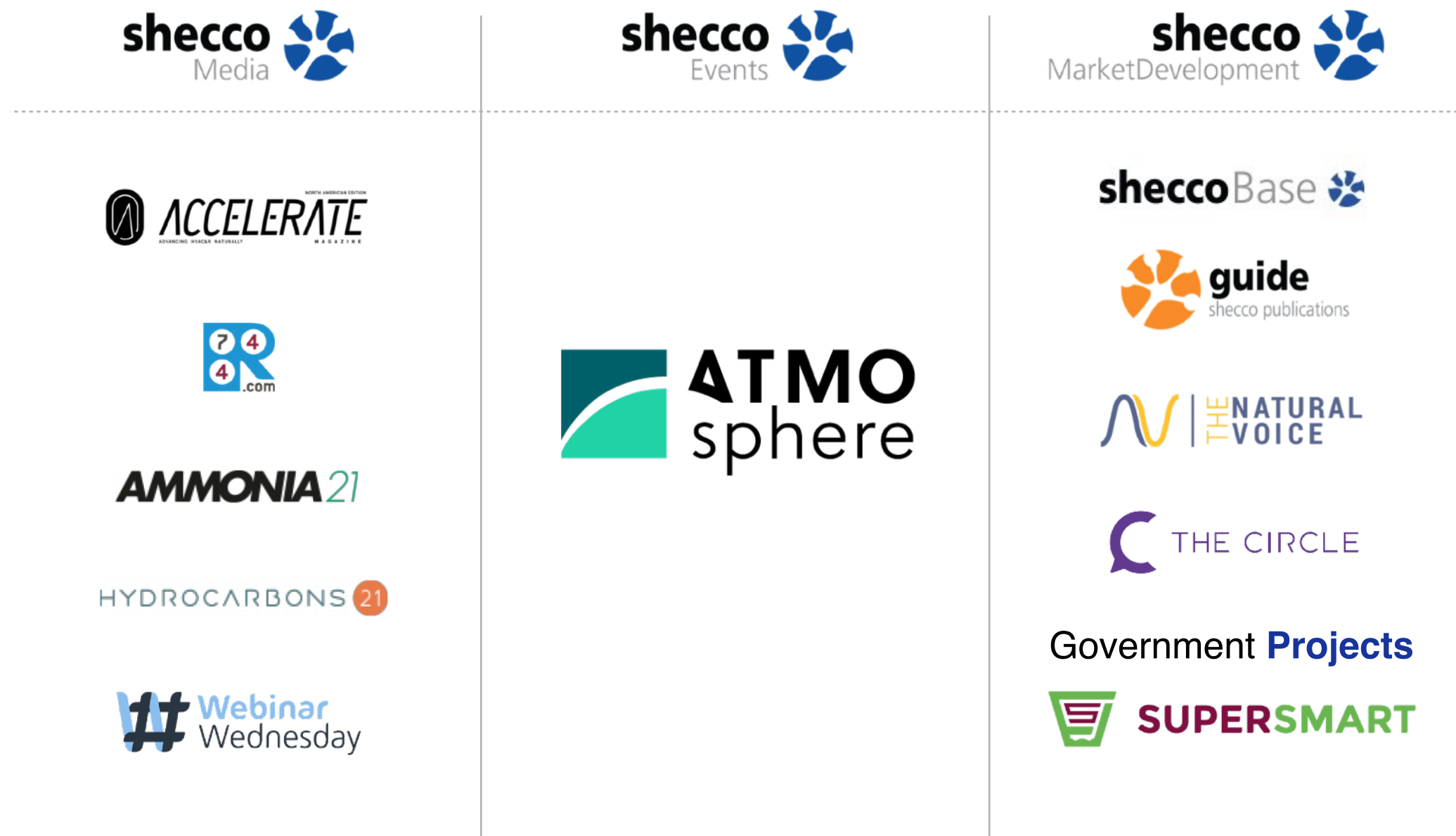
5th IIR Conference on Sustainability and the Cold Chain
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SHECCO OVERVIEW

Global market accelerator for natural refrigerant based technologies





SHECCOBASE



World's largest database on natural refrigerant-based technologies with millions of data points

- Original market research and analysis
- Information from key experts
- Extensive desk research



GLOBAL POLICY

1

POLICY: KIGALI AMENDMENT

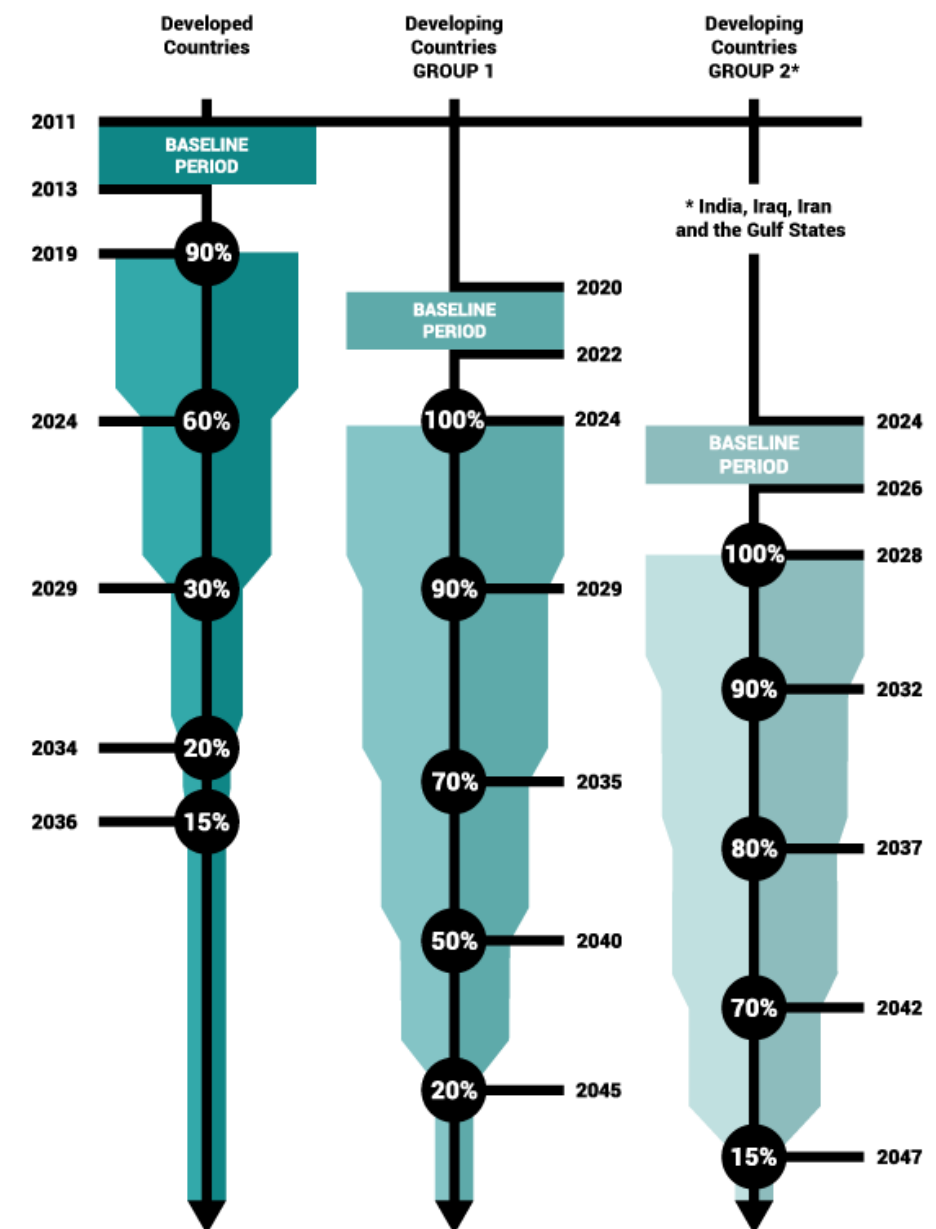
Global phase-down of HFCs by 85% by late 2040s - first reductions by developed countries as of 2019, by most developing countries as of 2024

> **0.4°C warming avoided by 2100**; energy efficiency gains could significantly increase climate impact

Entry into force: **1 January 2019** (24 countries ratified so far)

Top priorities:

- Standards for flammable refrigerants - revision of international standards needed
- Guidelines for finance to developing countries (negotiated by end 2018) - enabling activities, funding for leapfrogging, ...
- MLF to negotiate finance for 'maintaining or enhancing' energy efficiency



EUROPE: F-GAS REGULATION

2016: 7% cut in HFC quotas

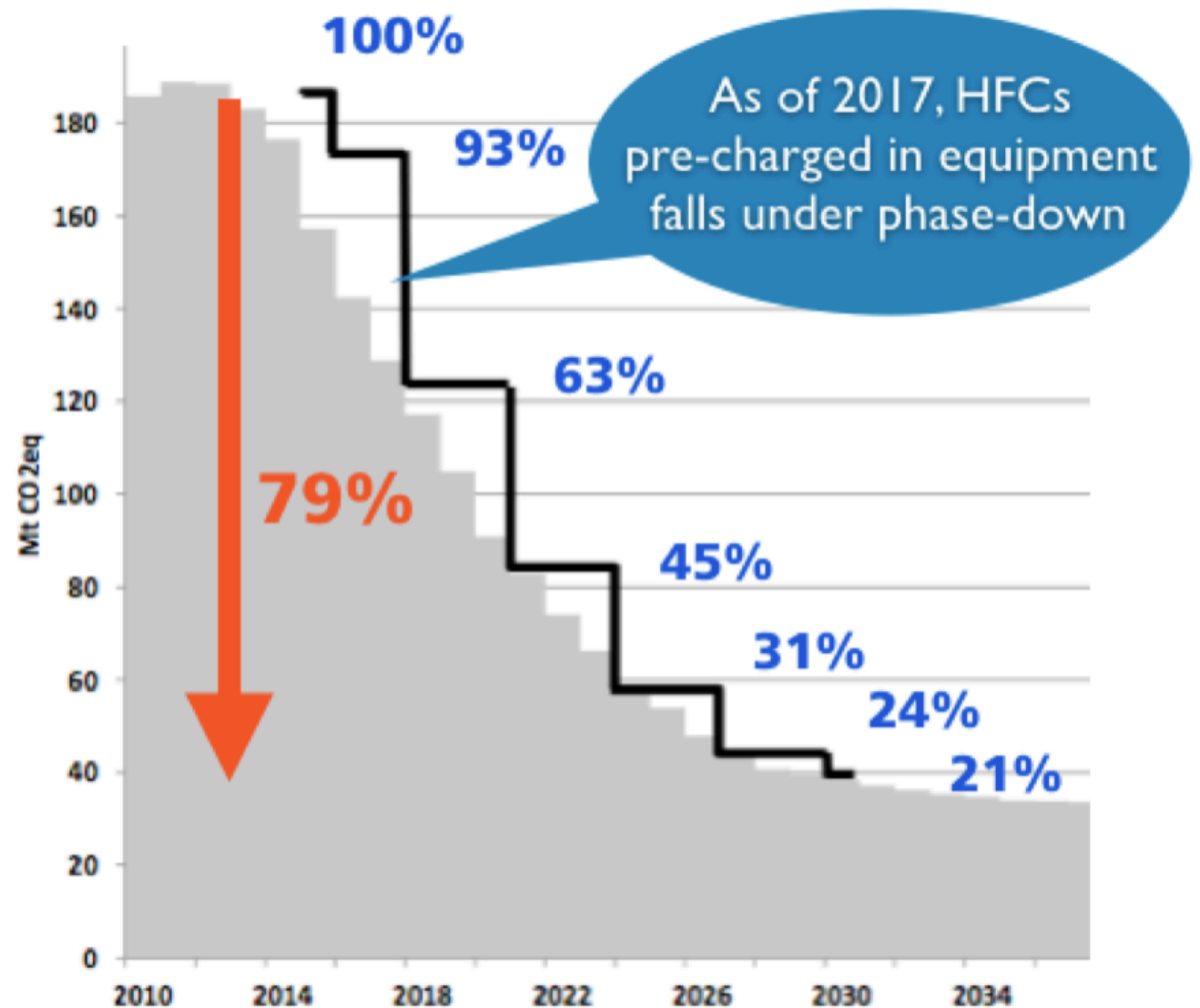
2017: HFCs pre-charged in equipment covered under phase-down

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

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

+ national level: several countries implemented or plan to implement (France) HFC tax; others encourage natrefts through incentives

NO negative impact on manufacturers & buyers of natural refrigerant-based equipment





STANDARDS: KEY DEBATE FOR HYDROCARBONS



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

—> revisions are on-going, potentially opening up opportunities for HCs globally

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 beginning of 2019

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:
- United Nations Development Programme (UNDP)
- Chinese Ministry of Environmental Protection, Foreign Economic Office (MEP-FECO)



JAPAN: NATURAL REFRIGERANT SUBSIDIES

¥6.4 billion (€47 million) NatRef subsidies

Japan Ministry of Environment

“We would like to continue to grant these subsidies, together with your support, to move to natural refrigerants.”

- Sho Nakamura, Japan Ministry of the Environment



LIGHT COMMERCIAL REFRIGERATION

2

CONSUMER BRANDS CHOOSING NATURAL REFRIGERANTS



Increasing number of **consumer brands** choosing HCs for their point of sale equipment - often targeting global procurement 100%

5.5 million units using natural refrigerants collectively installed - hydrocarbons (mostly) and CO₂

=> **33 million tonnes of avoided CO₂** (equivalent emissions of more than 6.7 million passenger cars over one year)

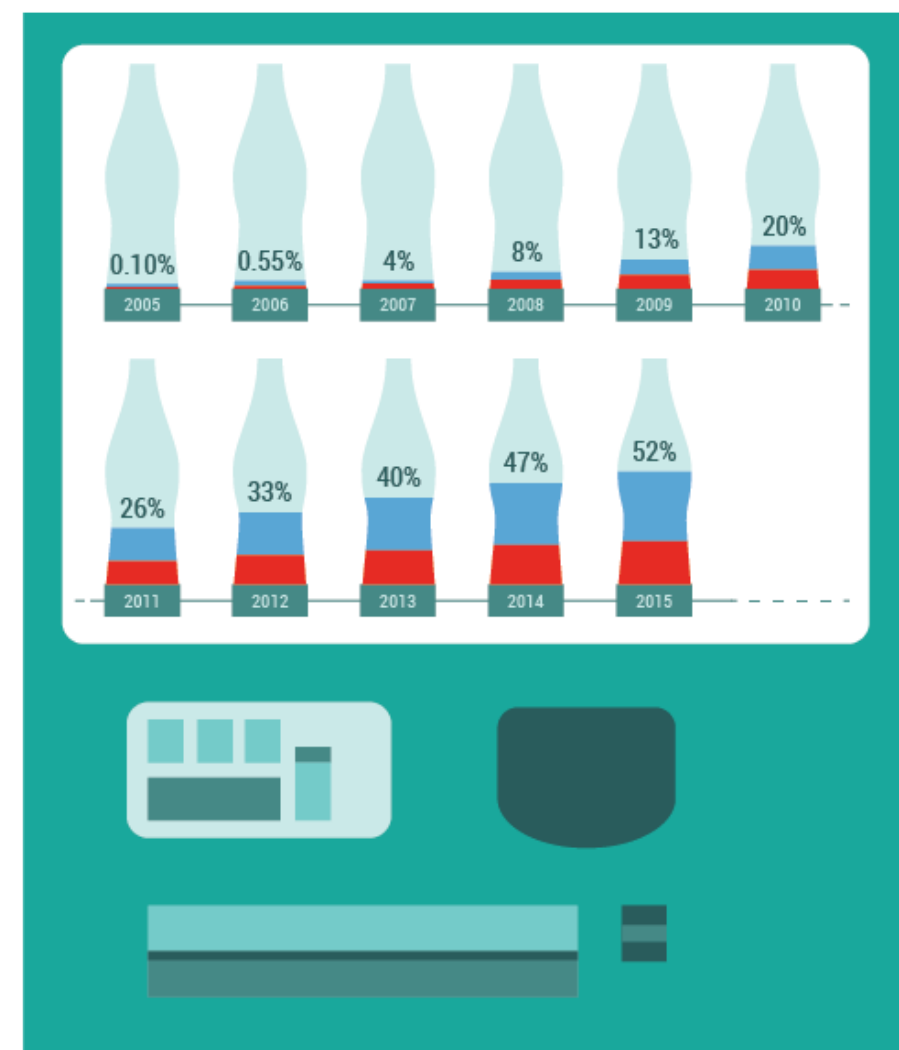
NATURAL REFRIGERANT VENDING MACHINES (2017)

JAPAN: 1.35+ million beverage vending machines in Japan use either hydrocarbons or CO₂ - world's highest number per capita

800,000+ CO₂ vending machines in the market

Natural refrigerants make up over **50% of the market**

From 0.1% to 52% market share in just 10 years

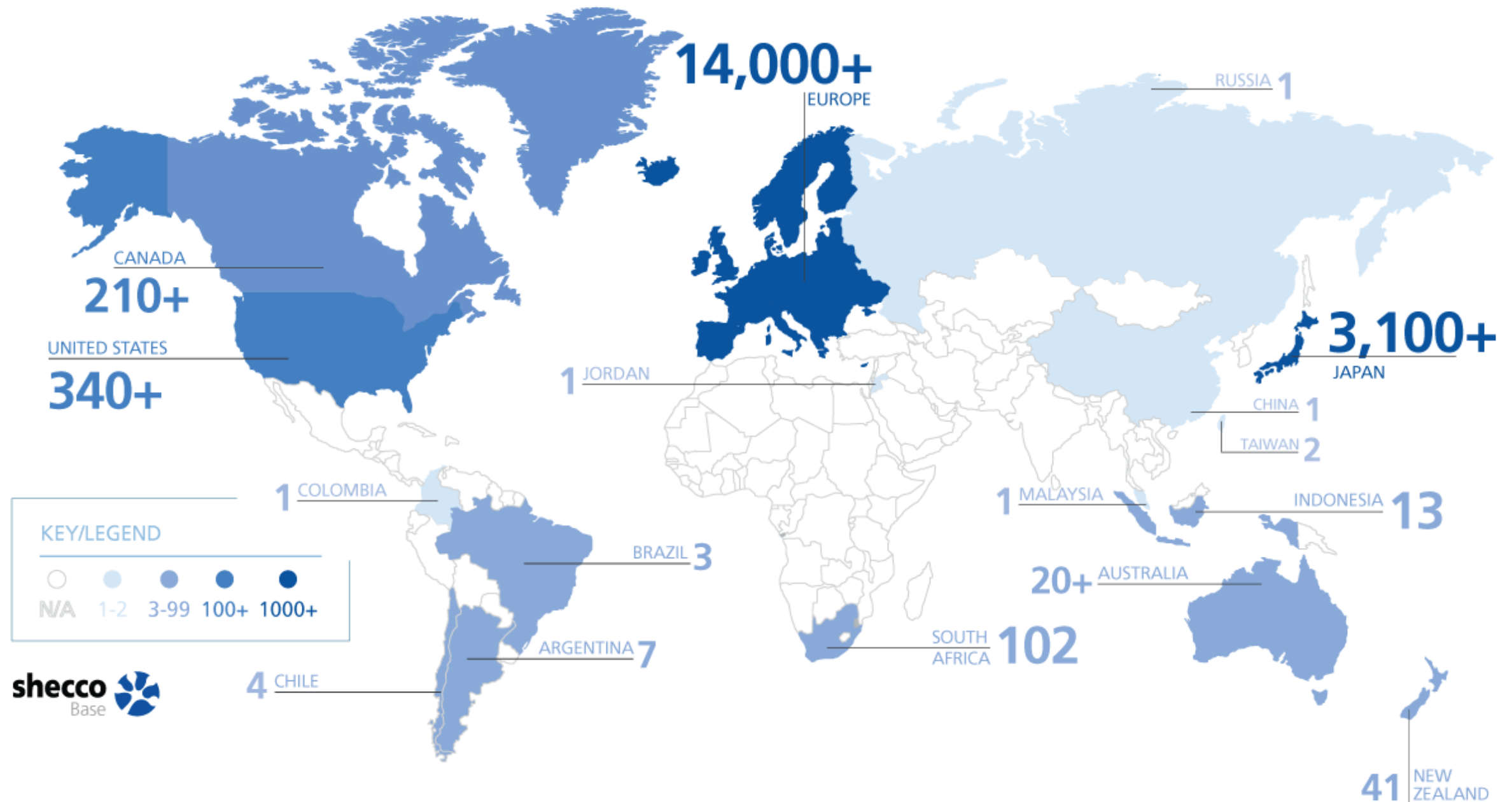


COMMERCIAL REFRIGERATION

3



TRANSCRITICAL CO₂ STORES GROWING GLOBALLY

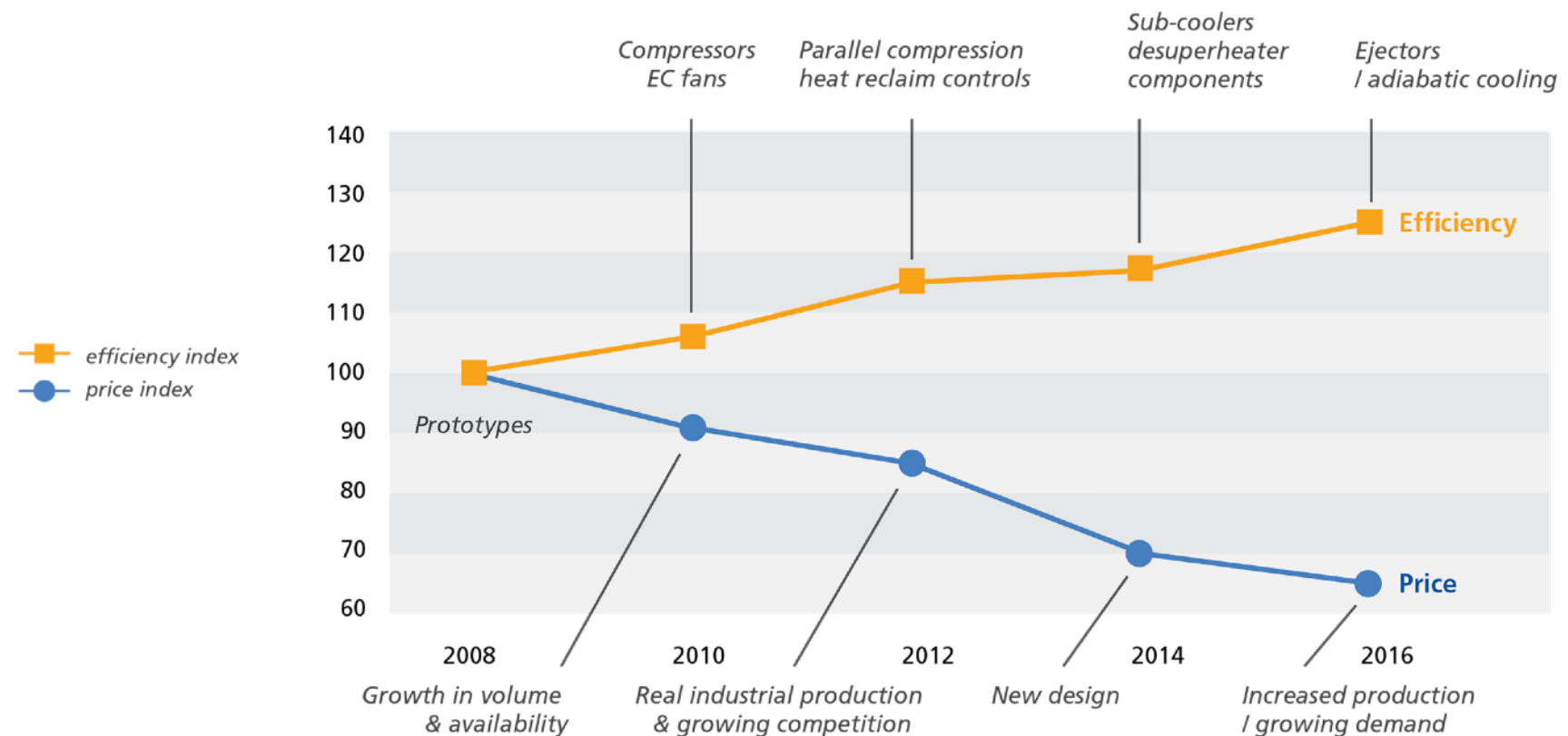


KEY TREND: CO₂ COST OF EQUIPMENT DECREASING

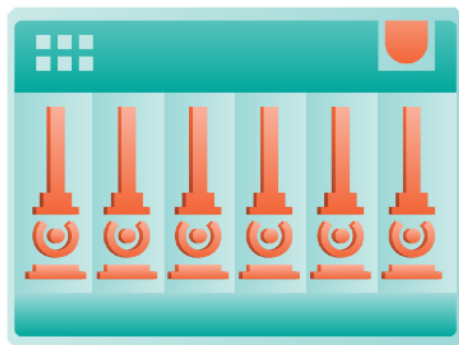
The cost of equipment is becoming comparable to systems using HFCs

In sectors where **HFC alternatives are growing in availability, prices are falling** - in commercial refrigeration same as HFC technology or 5-10% higher

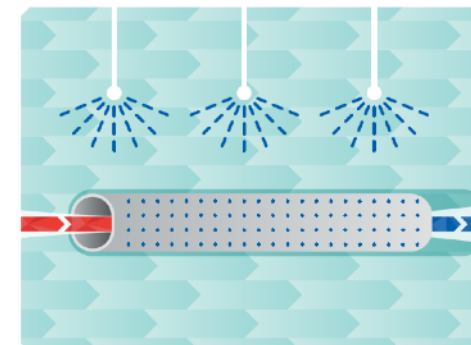
Each year, reported higher energy efficiency, lower prices as technology reaches mass production



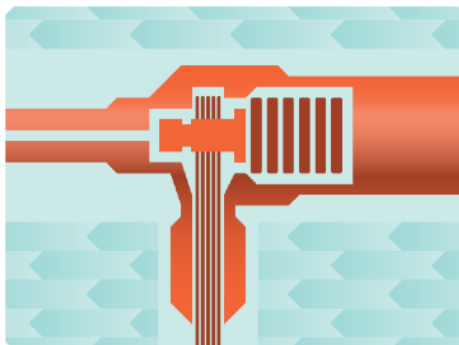
KEY TREND: SOLUTIONS FOR WARM CLIMATES



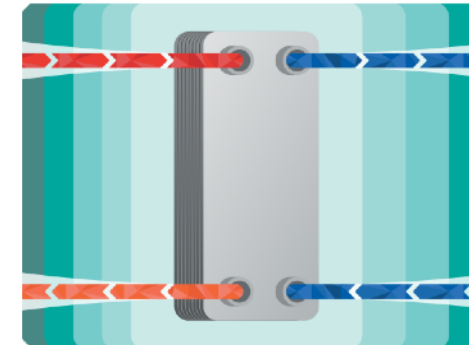
Parallel Compression



Adiabatic Cooling



Ejector



Sub coolers

KEY TECH TREND: CO₂ RACK SYSTEM



Highly competitive evolving market for suppliers providing CO₂ solutions

KEY TECH TREND: CONDENSING UNITS



- **Japan** - leader in CO₂ condensing units for smaller store formats
- **Europe** traditionally working with large capacity CO₂ racks, but several manufacturers introduced small systems
- **Competition increasing**: more efficiency, lower prices



CHINA



First major CO₂ transcritical store opened January 2018

METRO Beijing Lishuiqiao wholesale store

- Centralised transcritical CO₂ rack system
- Parallel compression, waste heat, and two-stage gas cooling
- Goal: transcritical systems in all its new Chinese stores by 2025
- Currently 40+ subcritical CO₂ supermarkets in China (HFC/CO₂ cascades)



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AUSTRALIA



Expansion of CO₂ use in Australia

- Currently over 450+ cascade CO₂ installations
- 6 CO₂ liquid recirculation plants
- 20+ transcritical CO₂ installations
- **As of March 2018, 1st ejector system running**



SOUTHEAST ASIA AND EUROPE



Introduction of CO₂ unit to overseas

Verification test & Installation started at

Asian and European local stores



Source: Panasonic presentation ATMOsphere Japan 2018

HYDROCARBONS GROWTH

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

Market estimate by early 2017 - Figures reported by AHT (market leader):

1,500,000+ units worldwide

- over 300,000+ units manufactured per year



HYDROCARBON END USERS

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

US-based Target Corp.

Self-contained display cases using propane (R290) in more than 1,000 stores

54% energy savings





EMERGING TECHNOLOGIES



Emerging technologies: Will hydrocarbon or CO₂ based plug-in systems with water-loop become a competitor to centralized CO₂ plants?



CASE STUDY: NH₃/CO₂



NH₃/CO₂ Supermarket retailer
in the US saving 30% on
energy bills



CASE STUDY: PROPANE/CO₂

US-based organic/natural food retailer

First in the U.S. to test a centralised propane/CO₂ cascade system





CONCLUDING REMARKS



- **Competition between Ammonia, Hydrocarbon and CO₂ 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
- **2018: Key year** to develop together the market for natural refrigerants



5th IIR Conference on Sustainability and the Cold Chain

April 6-8, 2018 Beijing



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THANK YOU!