Global policy trends for natural refrigerants

ATMOsphere Japan

Tokyo

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Marc Chasserot

Group CEO, shecco

OUTLOOK

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GLOBAL INITIATIVES

01

2016: Climate Change policy accelerating

- Paris Agreement: entered into force on 4 November 2016

- Kigali Amendment to the Montreal Protocol: agreed on 15 October 2016

… while time is ticking: 2016, the hottest year ever measured (since 1880)

2017 Priorities: finance, standards, training

UN LEVEL - PARIS AGREEMENT

- **Key target:** to prevent global temperature from rising more than 2 degrees celsius above industrial levels

- Each country submits their Nation Determined Contribution (NDC) to the Climate Change Secretariat, pledging their emissions reduction commitment

- Every 5 years: further emissions reduction can be scaled up

- Agreed on December 2015, entered into force on November 2016

- No direct bans on HVAC&R, **BUT** opportunities to access finance, link emissions reductions to natrefs, emissions trading, etc.

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

UNITED NATIONS NATIONS UNIES

POSTAL ADDRESS—ADRESSE POSTALE: UNITED NATIONS, N.Y. 10017
CABLE ADDRESS—ADRESSE TELEGRAPHIQUE: UNATIONS NEWYORK

Reference: C.N.735.2016.TREATIES-XXVII.7.d (Depositary Notification)

PARIS AGREEMENT

PARIS, 12 DECEMBER 2015

ENTRY INTO FORCE

The Secretary-General of the United Nations, acting in his capacity as depositary, communicates the following:

On 5 October 2016, the conditions for the entry into force of the above-mentioned Agreement were met. Accordingly, the Agreement shall enter into force on 4 November 2016, in accordance with its article 21, paragraph 1, which reads as follows:

"This Agreement shall enter into force on the thirtieth day after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 per cent of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession."

5 October 2016

PARIS AGREEMENT - NEXT STEPS

MARRAKECH COP22|CMP12
UN CLIMATE CHANGE CONFERENCE 2016

- COP22 was held in Marrakech in December 2016: focus on Implementation Mitigation and Finance

- In 2017: COP23 hosted by Fiji, held in Bonn, Germany. Focus on Oceans

- Finance to the Green Climate Fund expected to increase: possible **funding** opportunities for natural refrigerants as mitigation to climate change. Key is to demonstrate energy efficiency

Changing the HVAC&R Industry globally?

Kigali Amendment: the most practical step towards mitigating climate change.

- Clear message: HFCs on their way out **globally**
- Global phase down will span the next 30 years
- Phase-down affecting 18 substances - average GWP of 2500
- Multilateral Fund to come up with guidelines for Finance
- If fully implemented, it could stop global warming by 0.5 degrees
- Exemptions for high-ambient temperature countries still remain on the table

KIGALI AMENDMENT: CHEMICALS TO PHASE DOWN

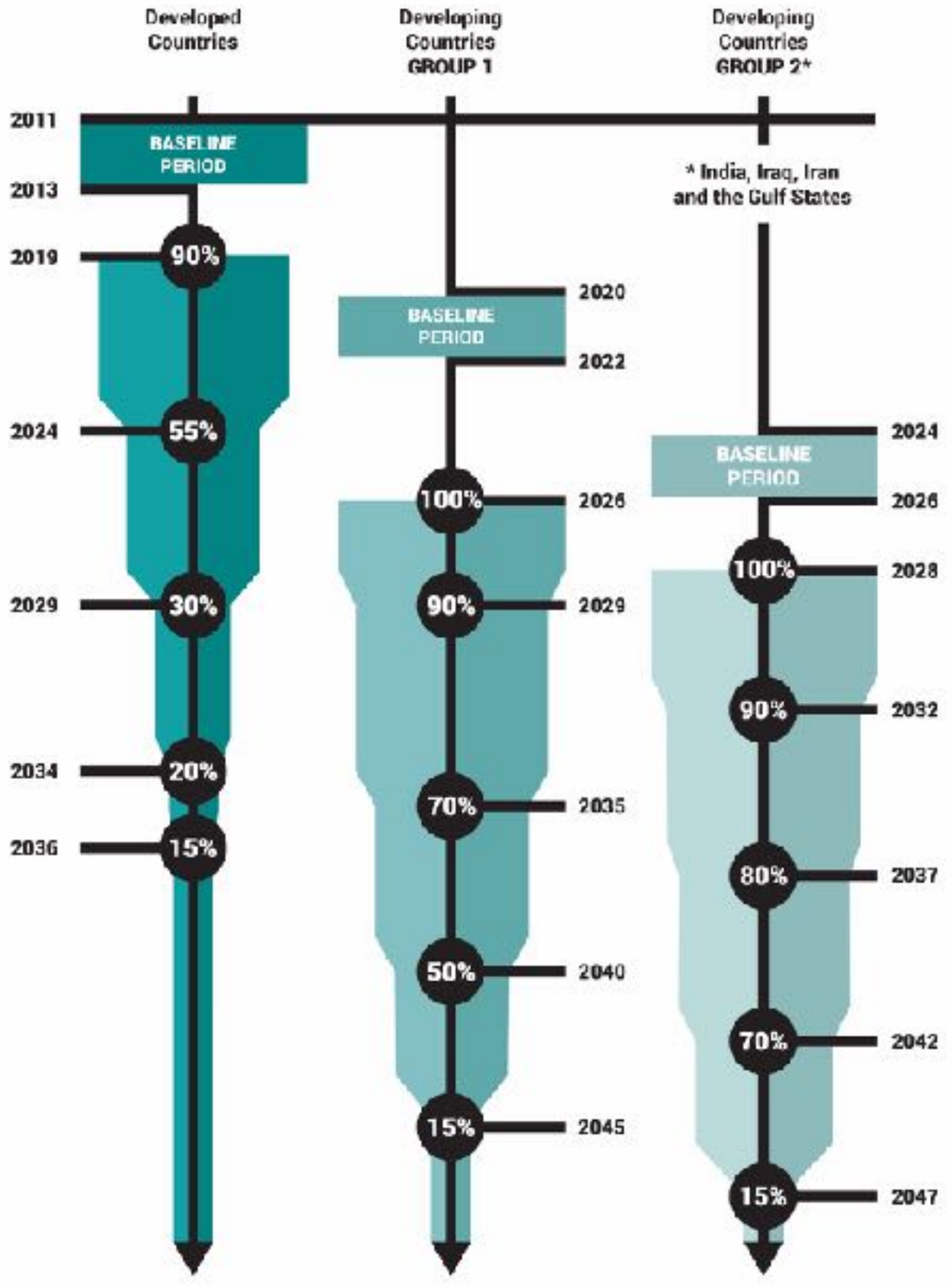
Group		*100-year Global Warming Potential*
Group I		
CHF_2CHF_2	HFC-134	1,100
CH_2FCF_3	HFC-134a	1,430
CH_2FCHF_2	HFC-143	353
$CHF_2CH_2CF_3$	HFC-245fa	1,030
$CF_3CH_2CF_2CH_3$	HFC-365mfc	794
CF_3CHFCF_3	HFC-227ea	3,220
$CH_2FCF_2CF_3$	HFC-236cb	1,340
CHF_2CHFCF_3	HFC-236ea	1,370
$CF_3CH_2CF_3$	HFC-236fa	9,810
$CH_2FCF_2CHF_2$	HFC-245ca	693
$CF_3CHFCHFCF_2CF_3$	HFC-43-10mee	1,640
CH_2F_2	HFC-32	675
CHF_2CF_3	HFC-125	3,500
CH_3CF_3	HFC-143a	4,470
CH_3F	HFC-41	92
CH_2FCH_2F	HFC-152	53
CH_3CHF_2	HFC-152a	124
CH_3CH_2F	HFC-161	12

KIGALI AMENDMENT: PHASE DOWN SCHEDULE

slow phase-down, until 2047

Amendment not as ambitious as expected

No definition of low GWP = lack of clarity regarding alternatives



Entry into force: **By 1 January 2019 latest** (following ratification by 20 parties to the Montreal Protocol)

Priorities: standards (initiated by China), access to finance, exemptions

Next Key Meetings

- 11-14 July 2017: Workshop on **standards for low GWP alternatives** to HFCs (Bangkok, Thailand)

- 20-24 November: 29th Meeting of the Parties of the Montreal Protocol (Montreal, Canada)

EUROPE

02

EU F-GAS REGULATION: KEY ELEMENTS

Entered into force in 2015

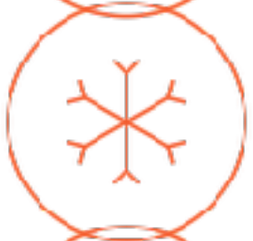
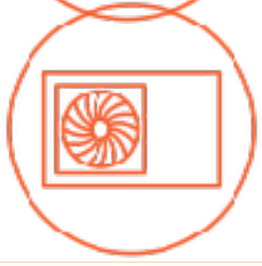
Introduced a number of measures to limit F-gas emissions

Aims to reduce HFC emissions by 79% by 2030 (compared to 2009-2012)

= the average GWP of HFCs will have to fall from today's 2,000 to about 400 by 2030 across all sectors

Key elements of the F-Gas Regulation

EU F-GAS REGULATION: HFC BANS

	Sector	GWP limit	Year
	Domestic refrigeration	150	2015
	Stationary refrigeration (except < -50°C)	2500	2020
	Hermetically sealed commercial refrigeration	**150**	**2022**
	Centralized commercial refrigeration (≥40kW), except in the primary refrigerant circuit of cascade systems where f-gases with a GWP<1500 may be used	**150**	**2022**
	Movable room AC	**150**	**2020**
	Single split AC (< 3kg of f-gases)	750	2025

EU の F ガス規制における HFC の使用規制

対象機器	GWP規制値	禁止開始年
家庭用冷凍庫・冷蔵庫	150	2015
定置式冷凍・冷蔵機器（-50°C未満を除く）	2,500	2020
業務用冷凍・冷蔵用機器（密閉型）	150	2022
40kW以上のマルチパックセントラル方式冷凍機（二元冷凍システムの第一段は GWP1500 まで使用可能）	150	2022
移動式家庭用エアコン	150	2022
マルチ以外のスプリットエアコン（充填量3Kg 未満）	750	2025

EUROPE: AMBITIOUS POLICY DRIVING CHANGE

Report reveals early effects of the EU F-Gas Regulation

Looks at the **impacts on the European businesses** (qualitative & quantitative analysis)

Evaluates the **effects on other legislative frameworks**, incl. Montreal Protocol

REPORT ON F-GAS REGULATION: KEY FINDINGS

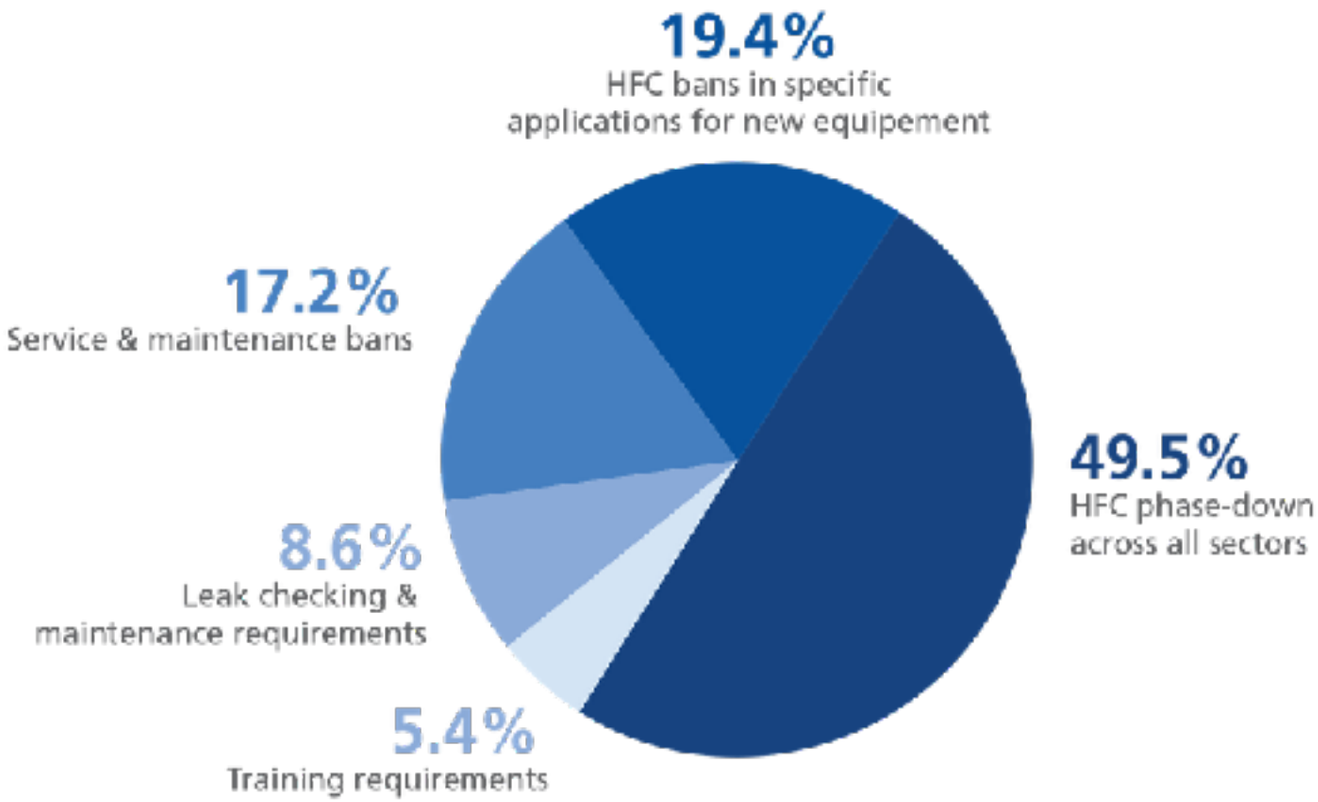
230 industry representatives participated in survey for the F-Gas Report

Industry took **early action**: 73% of respondents before the F-Gas Regulation came into force

HFC phase-down is seen as the most significant game-changer for the industry overall

sector-specific HFC bans seen as the most effective measure driving the industry forward

F-Gas Regulation measures that the industry believes to have the most significant impact on HFC reduction



Next Steps

Review process of the Regulation kicked off end 2016

Review may result in **extended list of HFC bans** in other applications

European Commission currently considering options. In November 2016 it published reports on:

- standards

- training

NORTH AMERICA

03

US: UNCERTAINTY AT FEDERAL LEVEL

New US Administration under Trump: what it means for the Industry?

- Head of EPA (Scott Pruitt): leading advocate against action on climate change
- Head of DOE (Rick Perry): ties to oil sector, climate sceptic

Open questions / risks

- Ratification of Paris Agreement?
- Ratification of Kigali Amendment?
- Role of EPA in enforcement of legislation?
- Investment in renewables, climate change programmes?
- Future of Clean Air Act?

US: CALIFORNIA LEADING THE WAY

California seizing the opportunity to lead with most progressive measures:

- Regulating HFC emissions since 2011
- In 2016 California reviewed plans targeting a 40% reduction below 2013 levels by 2030 (short-lived climate pollutant strategy)
- **Prohibition on sale of new refrigerants with high GWP (>2500) as of 2020**:
- **High GWP refrigerant prohibitions in <u>new</u> stationary systems**: GWP > 150 in refrigeration (as of 2021), GWP > 750 in AC considered (as of 2022)
- **Financial incentives (tbc)**: to motivate early adopters of low GWP refrigeration in commercial refrigeration

US: NEXT KEY STEPS

- **CARB** (California Air Resources Board) Public Hearing on 23, 24 March 2017 on proposed short-lived climate pollutant strategy: key to approval of final draft strategy.

- **Utilities** in California: Funding of energy efficient technologies to reduce pressure on energy grids

- **EPA:** Review of the proposed ban on high GWP (R404A, R410A, R134a, and R407C), following publication in September 2016 of a draft list under SNAP (Significant New Alternatives Policy (SNAP)

- **DOE:** March 27, 2017. New Energy Efficiency standards on new stand alone commercial refrigeration equipment comes into force.

SNAP

U.S. DEPARTMENT OF ENERGY

CANADA: TARGETING HFC PHASE DOWN

Canada implementing HFC phase-down until 2030, including reporting obligations

Plans to introduce nation wide carbon pricing in 2018

Canada's Proposed GWP Limits, by Product

PRODUCT	USE	DATE	MAXIMUM GWP OF REFRIGERANT
Stand-alone medium-temperature refrigeration system with internal temperature at or above 0°C.	Commercial or industrial	Jan.1 2020	700
	Residential	Jan.1 2025	150
Stand-alone low-temperature refrig-eration or industrial system with internal temperature of less than 0°C but not less than -50°C.	Commercial or industrial	Jan.1 2020	1.500
	Residential	Jan.1 2025	150
Centralized refrigeration system with a capacity greater than 20 kW, maintaining an internal temperature greater than or equal to -50°C.	Commercial or industrial	Jan.1 2020	1,500
Condensing unit with a capacity less than or equal to 20 kW, maintaining an internal temperature greater than or equal to -50°C.	Commercial or industrial	Jan.1 2020	2,200
Chiller that has a compressor, an evaporator and a secondary coolant (not an absorption chiller).	Commercial or industrial	Jan.1 2025	700
Mobile refrigeration system	Commercial or industrial	Jan.1 2025	2,200

CHINA

04

CHINA MOVING AHEAD QUICKLY

- Air pollution and air quality has become a priority for the Chinese Government.

- China singed and ratified the Paris Agreement

- At MOP28 China put forward a Conference Room Paper to review **standards** (IEC 60335-2-40), focus on pressure, flammability, toxicity

- Chinese Government currently reviewing list of acceptable alternatives to HCFCs before final publication: opportunity to leapfrog to natural refrigerants

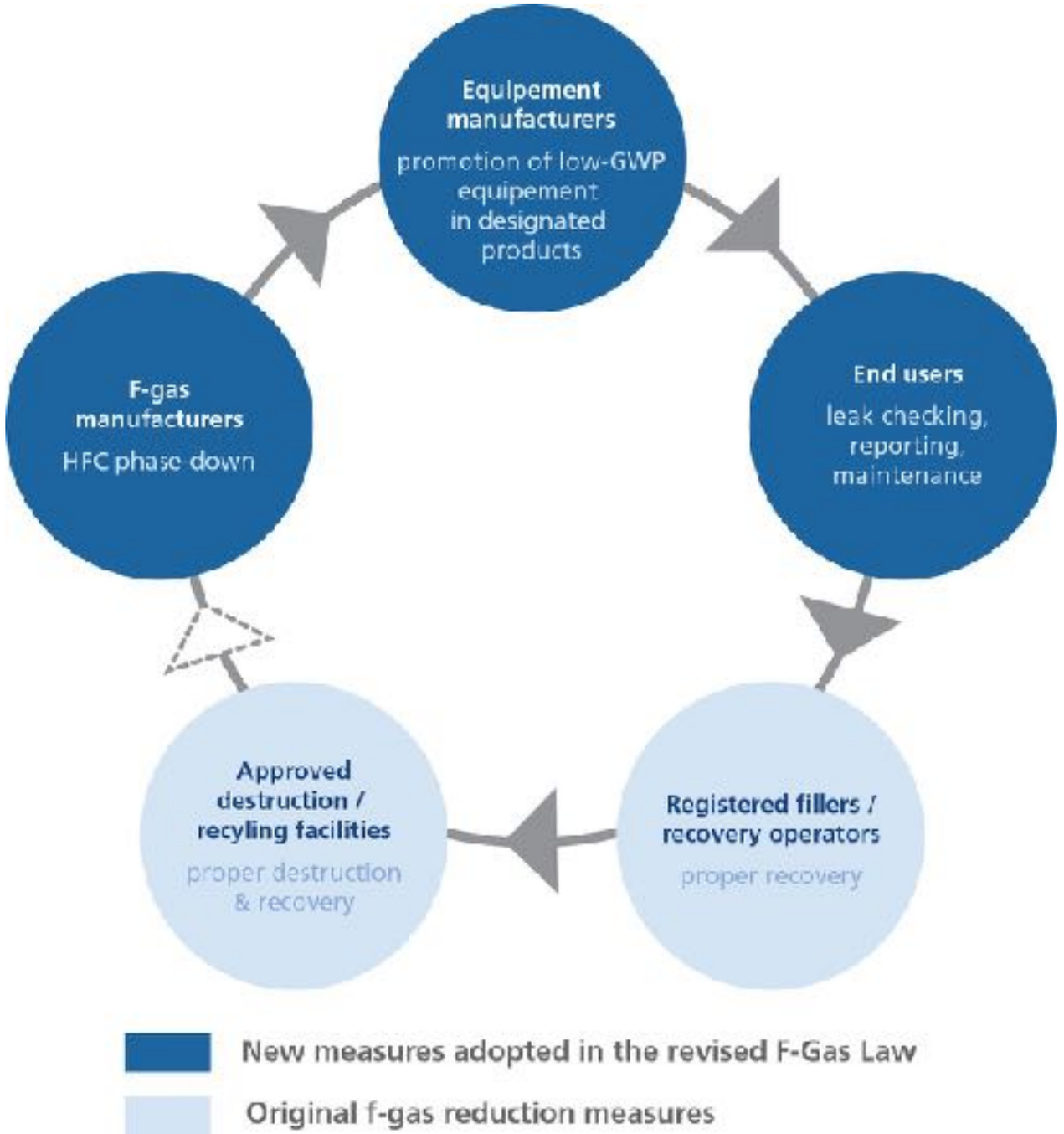
JAPAN

05

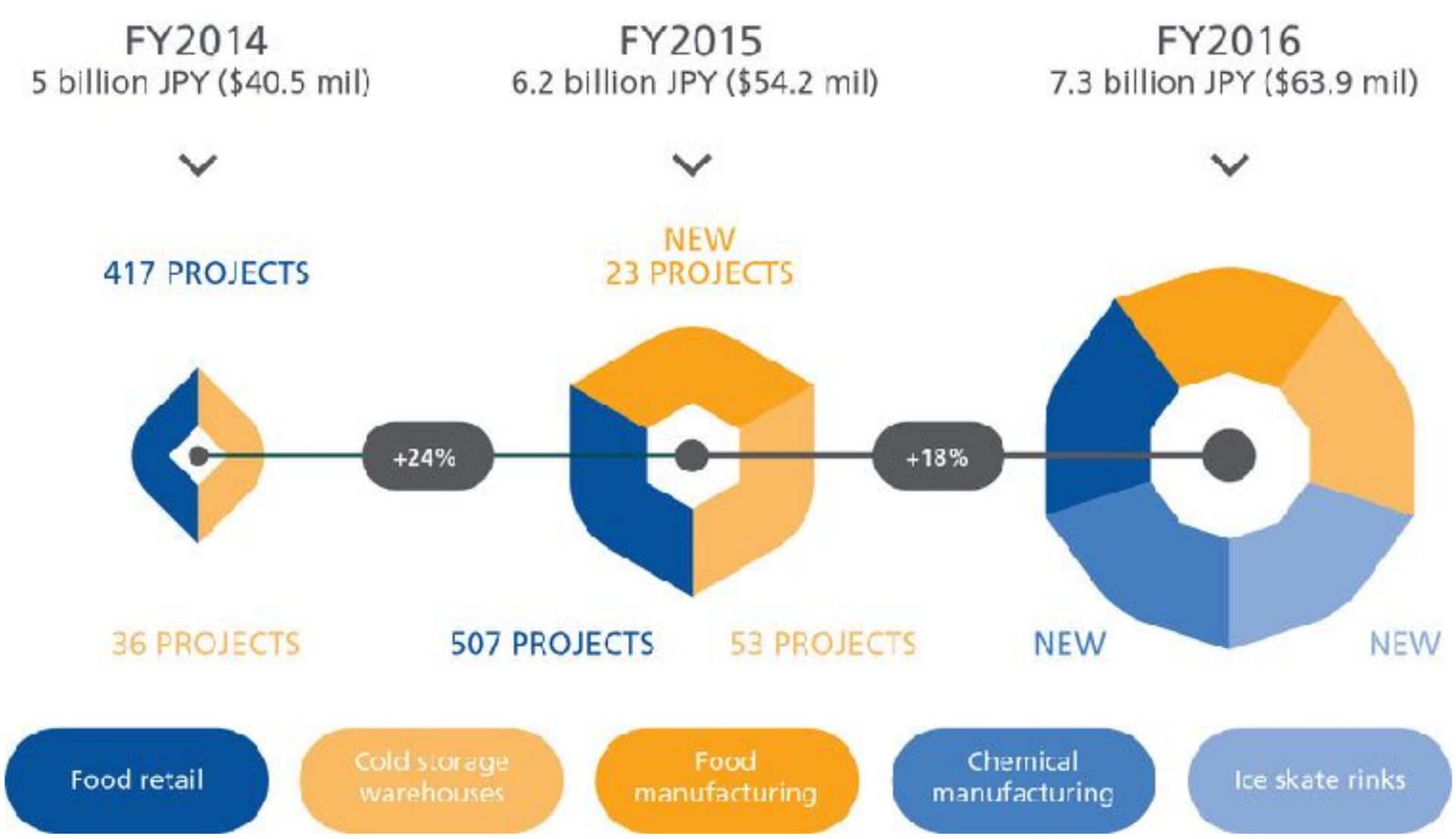
JAPAN: REVISED F-GAS REGULATIONS

From 2015, Japan revised F-Gas Regulations with more stringent requirements on:

- Manufactures and importers of F- gases or products containing F-gases
- Management of commercial air condition and refrigeration units
- Filling of air conditioners and refrigeration units with F-gases
- proper recycling of used fluorocarbons



JAPAN: SUBSIDIES INCREASING… BUT CHANGING FOCUS



For FY2017, subsidy of 6.3 billion JPY only for Industrial refrigeration (cold storage, warehouses).

FY2018 and onwards?

JAPAN: GWP TARGETS PER APPLICATION (NOT BANS)

	Designated products	Present refrigerant (GWP)	Target value (GWP)	Target year
	room air conditioning	R410a (2090) R32 (675)	750	2018
	commercial air conditioning (offices & stores)	R410a (2090)	750	2020
	**condensing units and refrigeration unit > 1.5kW**	R404a (3920) R410a (2090) R407c (1774) CO_2 (1)	**1500**	**2025**
	**cold storage warehouse (above 50,000 m³)**	R404a (3920) NH_3 (0)	**100**	**2019**
	mobile air conditioning	R134a (1430)	150	2023

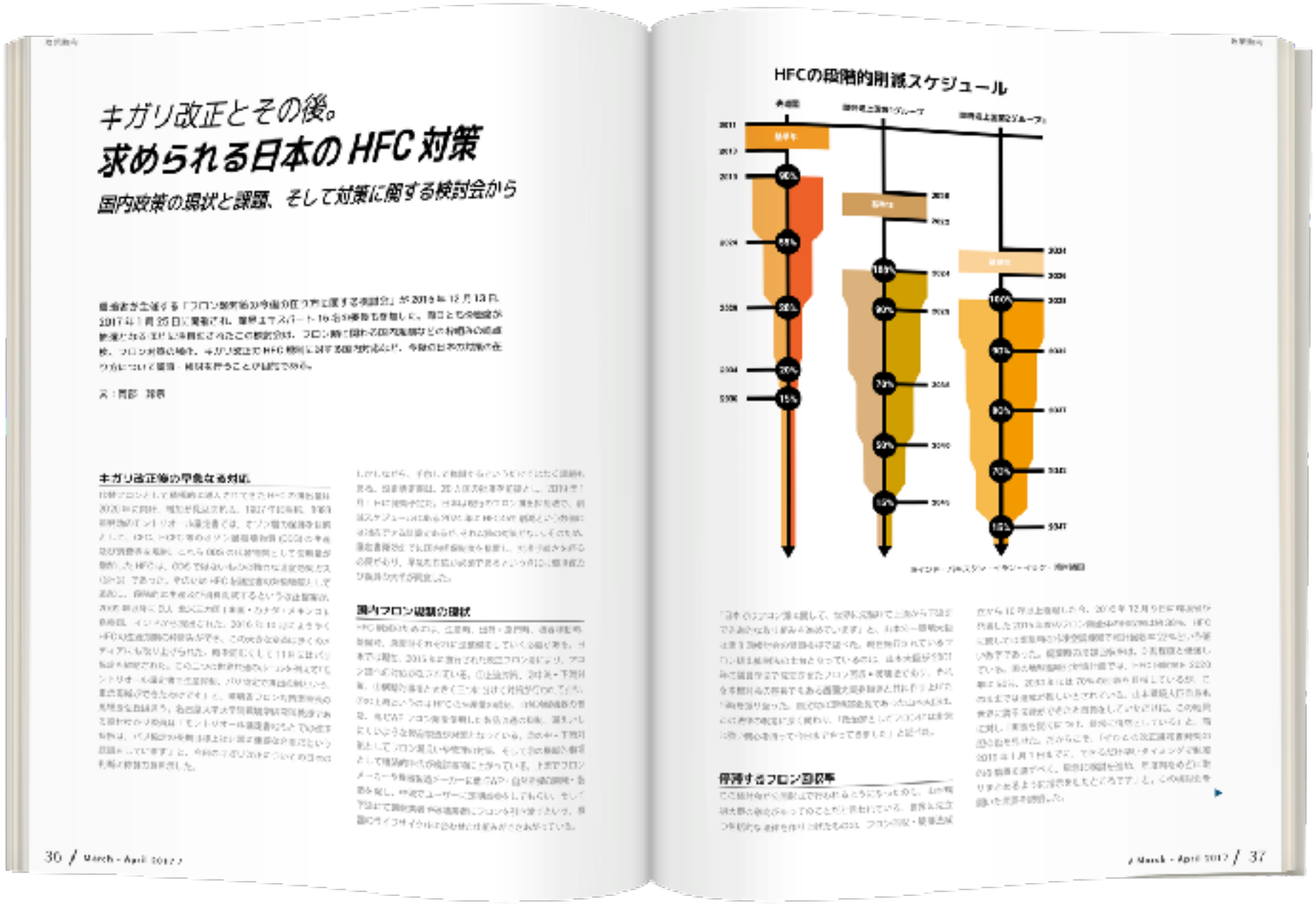
JAPAN: AFTER KIGALI… ?

Among new policy measures currently under review by Japanese government:

- Upstream measures related to
  - **Control of HFC production**
  - **Market uptake of energy efficient HFC-free systems**
  - **Control / ban of high GWP-based products**
    - Development of products with minimal leakage
- Cross-sectional economic measures
  - **Freon tax**
  - Deposit on f-gases…

Timeline: Informal discussion December 2016 ~ March 2017 & formal review of selected measures from April 2017 ~

JAPAN: ALL ABOUT CURRENT POLICY DISCUSSION



キガリ改正とその後。

求められる日本のHFC対策

国内政策の現状と課題、そして対策に関する検討会から

HFCの段階的削減スケジュール

キガリ改正後の早急なる対応

国内フロン規制の現状

停滞するフロン回収率

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Read more about current policy discussion in AJ#9 p.36

Closing remarks

- global HFC phase down is here = **opportunities for natural refrigerants**

- **swift policy action can facilitate leap frogging** and can avoid locking in the use of high GWP refrigerants & additional cost

- **Key topics in 2017 globally: Access to finance, standards, training**

- **Specific challenges in each market**

SHECCO USEFUL LINKS

Industry Platforms:

www.hydrocarbons21.com

www.R744.com

www.ammonia21.com

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http://publications.shecco.com

Accelerate Magazines:

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