Accelerating Efforts towards Carbon Neutrality 2050 in Japanese Industry

The Japan Refrigeration and Air Conditioning Industries Association

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JRAIA 一般社団法人 日本冷凍空調工業会
The Japan Refrigeration and Air Conditioning Industry Association

Today’s Topics:

1. Who is JRAIA?
2. Market Trend
3. Regulatory trends in Japan (refrigeration and ACs sector)
4. JRAIA keynote – Key Activities & Outlook
5. JRAIA’s Principle
6. Industry's commitment to environmental issue
7. International Activities

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1. Who is JRAIA?

JRAIA(Japan Refrigeration and Air Conditioning Industries Association)

- **Established in Feb. 1949**
- Minato city, Tokyo (located in front of Tokyo Tower)
- Chairman: Katsuyuki Sawai (from DAIKIN Industries, Ltd.)
- The number of the members:
  173 companies incl. associate members as of Oct. 2025
- **Business Fields:**
  - Air conditioning (residential, commercial, automotive)
  - Refrigeration (commercial, industrial, transport)
  - Ventilation
  - Heat pump system (HP water heaters)
  - Refrigerants
  - Parts
- www.jraia.or.jp/english

2. Market Trends

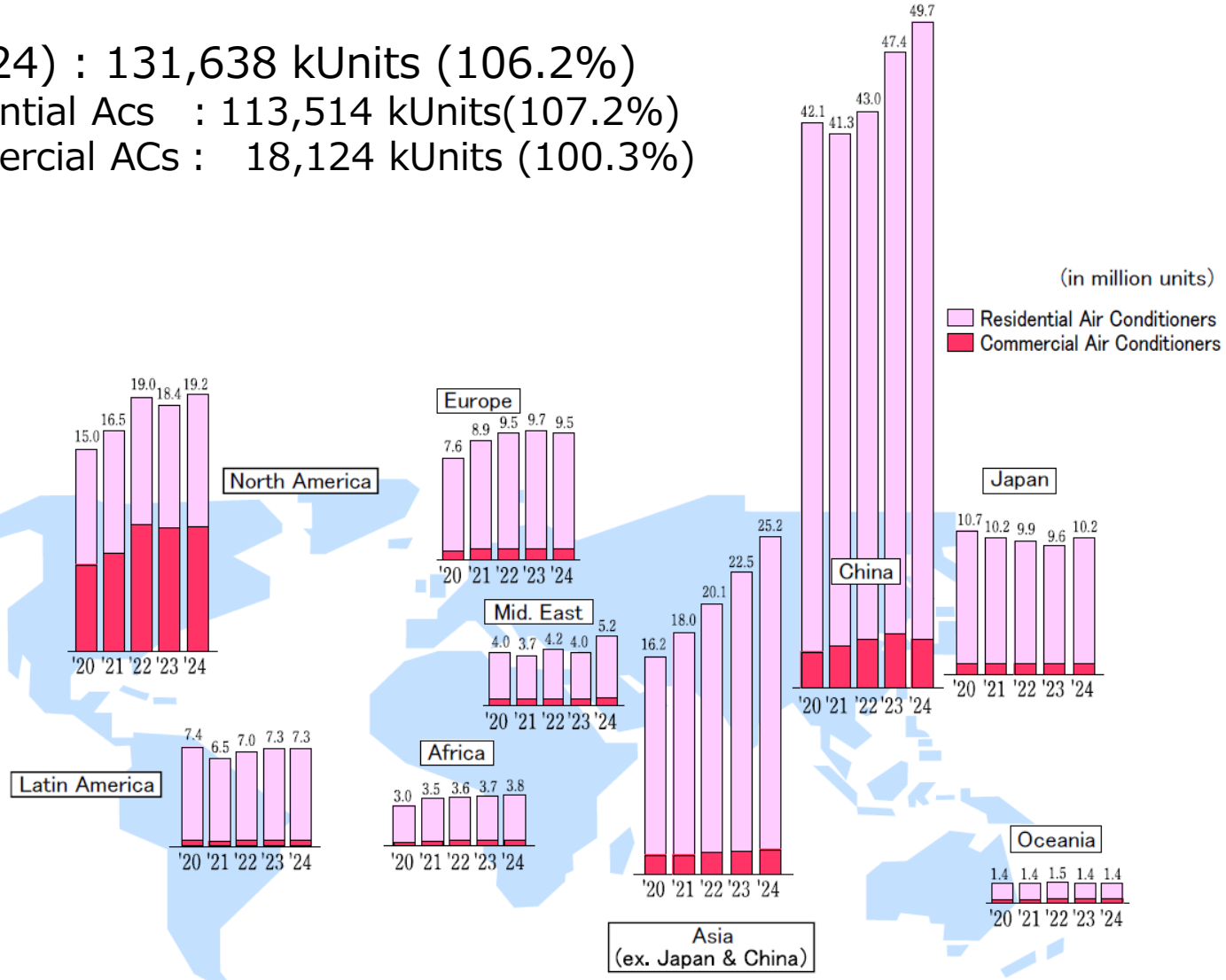
1) Sales volume for each product group (2024 fiscal year (Apr.-Mar.))

Product Category	No. of Units(k) 2024FY	Y/Y (%)
Residential A/Cs	9,414.2	107.3
Commercial A/Cs	850.7	105.5
Residential H/P water heaters	664.5	107.7
Gas engine-driven A/Cs	26.5	100.3
Water chilling units	13.3	103.4
Air to air heat exchangers	127.6	100.3
Commercial ref. cabinets	256.2	104.4
Condensing units	63.7	101.2
Refrigeration units	22.4	106.0

2. Market Trends

2) Trends of air conditioner sales in the global market

World Demand(2024) : 131,638 kUnits (106.2%)
Residential Acs : 113,514 kUnits(107.2%)
Commercial ACs : 18,124 kUnits (100.3%)



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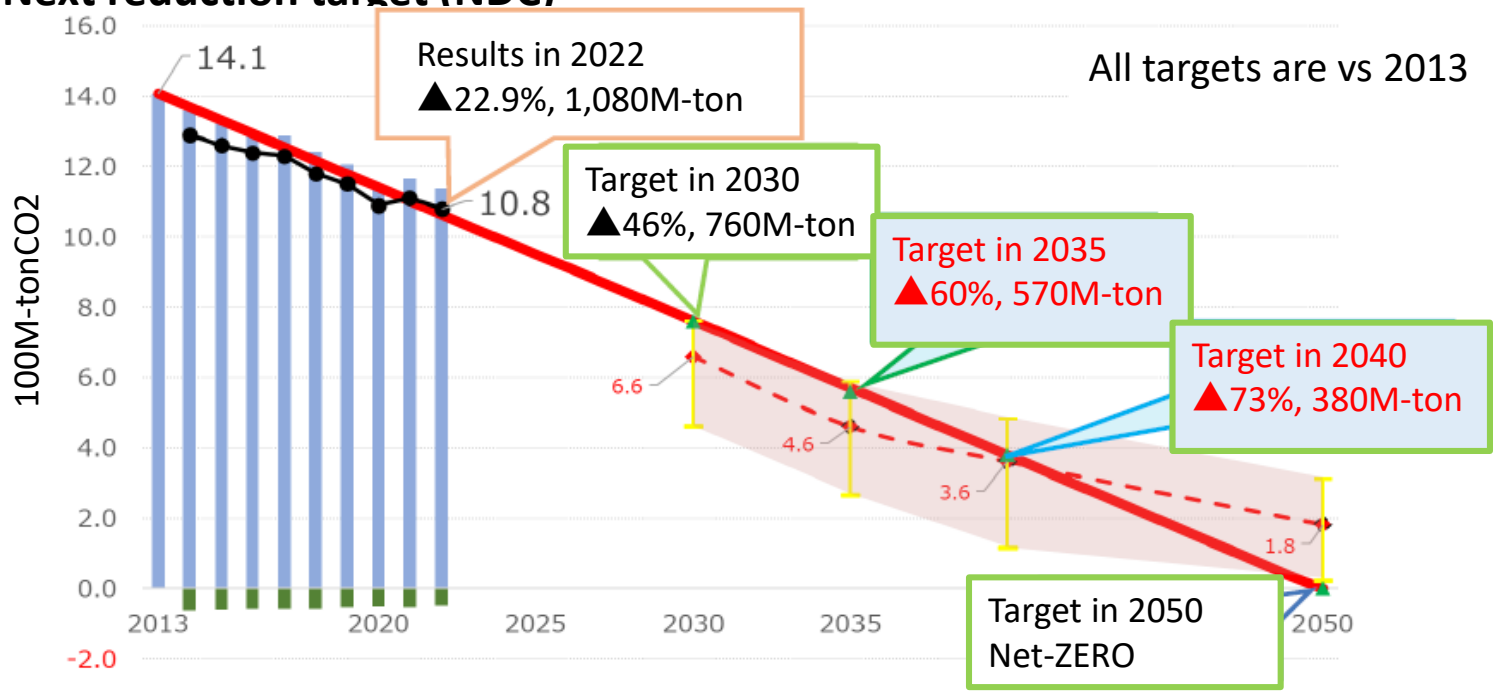
3. Regulatory trends in Japan (refrigeration and ACs sector)

1) The latest Japanese government environmental policies (1)

① "Plan for Global Warming Countermeasures" (Cabinet decision on February 18, 2025; revised for the first time in four years)

Next reduction target (NDC)



- We will steadily move forward on a linear path linking our 2030 target with net zero by 2050.
- As for the next NDC, we will set ambitious targets consistent with the 1.5℃ target, aiming to reduce greenhouse gas emissions **by 60% and 73% from 2013 levels in 2035 and 2040**, respectively.

Source: Ministry of Environment(Feb. 2025); https://www.env.go.jp/content/000291668.pdf (in Japanese)

3. Regulatory trends in Japan (refrigeration and ACs sector)

1) The latest Japanese government environmental policies (2)

[Reference] Targets and guidelines for greenhouse gas emission reductions and removals

	2013 Results	2030FY Target (vs 2013FY)	2040FY Target (vs 2013FY)
GHG emissions and removals	1,407	760 (▲46%※3)	380 (▲73%)
Energy-related CO_2	1,235	677 (▲45%)	～ 360～370 (▲70～71%)
Industry	463	289 (▲38%)	～ 180～200 (▲57～61%)
Commercial and others	235	115 (▲51%)	40～50 (▲79～83%)
Residential	209	71 (▲66%)	40～60 (▲71～81%)
Transport	224	146 (▲35%)	40～80 (▲64～82%)
Energy conversion	106	56 (▲47%)	10～20 (▲81～91%)
Non-energy-related CO_2	82.2	70.0 (▲15%)	59 (▲29%)
Methan(CH4)	32.7	29.1 (▲11%)	25 (▲25%)
NO2	19.9	16.5 (▲17%)	14 (▲31%)
Four gases incl. HFC	37.2	20.9 (▲44%)	11 (▲72%)
Sink	-	▲47.7 (-)	▲ 84 (-) ※4

Source: Ministry of Environment(Feb. 2025); https://www.env.go.jp/content/000338678.pdf

3. Regulatory trends in Japan (refrigeration and ACs sector)

1) The latest Japanese government environmental policies (3)

Japan's Key Measures under the Global Warming Countermeasures Plan

Toward the Next NDC Target (2030 and Beyond)

Industry, Business & Transport

- Upgrade to cutting-edge energy-saving equipment in factories
- Support SMEs for energy conservation
- Lifecycle CO_2 reduction in the automobile industry
- Decarbonize logistics, aviation, and shipping via next-generation fuels

Regions & Lifestyles

- Establish 100+ Decarbonization Leading Regions by FY2030
- Promote low-carbon lifestyles (energy-efficient housing, food-loss reduction)
- Support adoption of high-insulation windows, efficient water heaters, EVs, and perovskite PV
- Lead by example through government & public facilities
- Promote value-chain-wide decarbonization

Source: Ministry of Environment(Feb. 2025); https://www.env.go.jp/content/000338677.pdf

3. Regulatory trends in Japan (refrigeration and ACs sector)

1) The latest Japanese government environmental policies (4)

② "7th Basic Energy Plan" (Cabinet decision on February 18, 2025; 6th in 2021))

The principle of **S+3Es (safety, stable supply, economic efficiency, environmental compatibility)**

- Key Message

  Japan pursues **safe, stable, and sustainable energy**.

  Energy conservation, electrification, and innovation lead the way to 2050.

- Core direction

  Safety first, then stable and affordable energy and promote energy efficiency across all sectors.

  Accelerate **electrification and non-fossil fuel use** **and focus on CO_2 reduction per cost** (rational approach).

- Policy Action

  Support factories upgrading to **high-efficiency systems**.

  Encourage homes to use **high-performance** **windows &** **water heaters**.

  Expand **Top Runner** **& Benchmark programs**.

  Strengthen **regional energy-saving networks**.

- Enabling Technologies

  Ensure flexibility with **storage batteries and** **demand response** (DR).

  Promote **smart grid and advanced supply-demand control**.

  Integrate **renewables** while maintaining reliability.

Source: Ministry of Economy, Trade and Industry(Feb. 2025);
https://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/7th_outline.pdf

3. Regulatory trends in Japan (refrigeration and ACs sector)

2) Regulations in the refrigeration and air conditioning sector

Latest developments regarding the Fluorocarbons Emissions and Proper Management Act

(status of the joint meeting of the Fluorocarbons Working Group of government committees)

➢ **Policy Background:** Goal: CN 2050 Milestones: Reduction Targets for FY2030 & FY2035
Context: Five years since revised Fluorocarbons Act enforcement

■ **Faucet:** Steady implementation of the Kigali Amendment
Strict implementation of quotas under the Act on the Protection of the Ozone Layer.

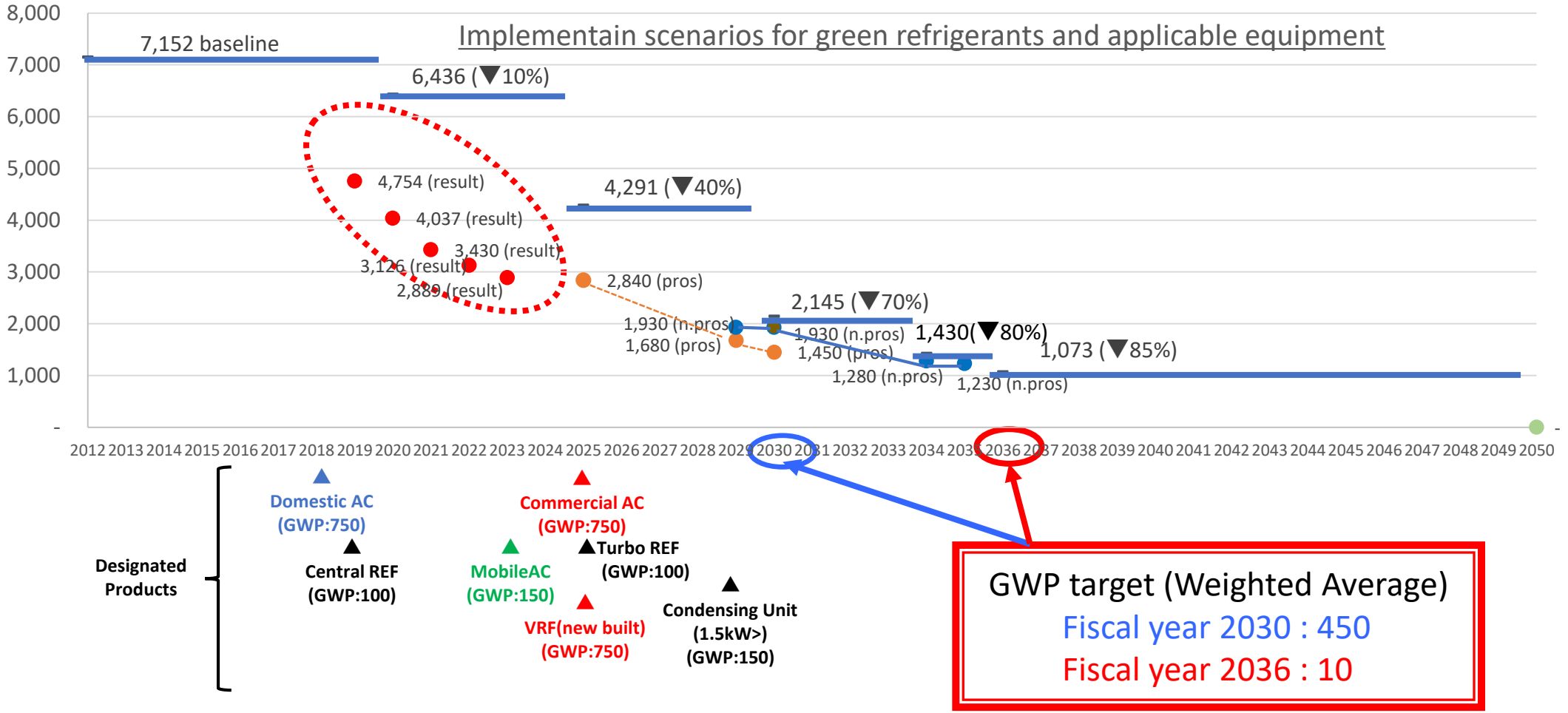
■ **Upstream:**
- Expand green refrigerant equipment
- Promote natural and ultra-low-GWP refrigerants
- Support R&D for next-generation refrigerants

■ **Midstream:**
- Target: Zero leakage during operation
- Leverage IoT / AI for precise leak detection
- Encourage advanced maintenance practices

■ **Downstream:**
- Achieve 100% recovery rate
- Strengthen recycling and destruction systems
- Build closed-loop refrigerant circulation

3. Regulatory trends in Japan (refrigeration and ACs sector)

3) HFC reduction in Japan



2025-3-25 by materials of Government of Japan METI Council

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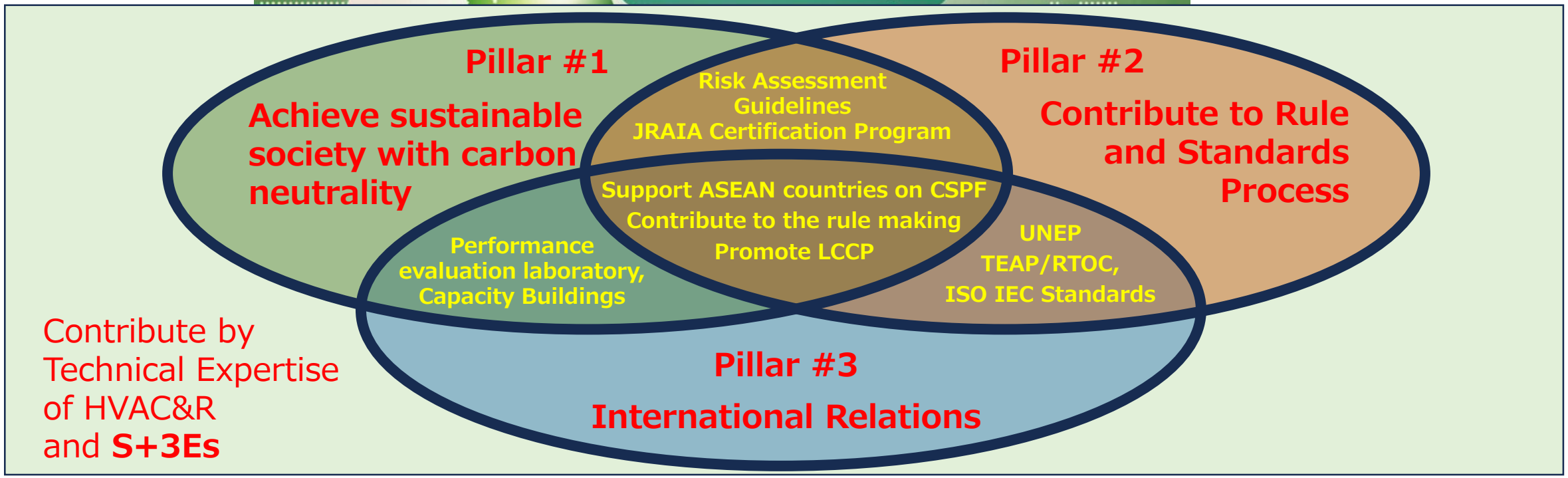
4. JRAIA Keynote 2025 — Key Activities & Outlook

Energy Efficiency	
	・Active involvement in the technical group of ISO for next generation performance evaluation method ・Action for energy efficiency related regulations and standards in Japan, EU, etc. ・Actions for improving energy efficiency in each product, (e.g., Top Runner program).
Refrigerants	
	・Publish the guideline for the refrigerant leak detection monitoring for Japan market. ・Discussion for the next designated products of F-Gas Act in Japan ・Participation in the NEDO project “Development of High-Efficiency Refrigeration and Air Conditioning Technologies for the Practical Application of Next-Generation Low-GWP Refrigerants.”
Advancing Decarbonization	
	・Consideration of LCCP (Life Cycle Climate Performance)/Carbon Footprint (CFP) Studies on CO_2 reduction from a “system” perspective (not just individual equipment), such as Building WLC and cold chains. →Harmonization of APF / BEI metrics
Strengthening Global Collaboration	
	・Partnership with international associations (ICARHMA, CRAA, KRAIA, ASEAN) •3 Industry Association Meeting(with China, Korea) •ASEAN5+ J Workshop ・Action for envi. related regulations especially in the EU.(Ecodesign, F-Gas, PFAS, etc.) ・Response to envi. regulations in the United States.(AIM Act compliance, state-specific regulations)

5. JRAIA's Principle

Three Pillars of Key Activities



Contribute by Technical Expertise of HVAC&R and **S+3Es**

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6. Industry's commitment to environmental issue

1) JRAIA's position on Japanese Government Environment Policy

JRAIA will work towards the realization of Carbon Neutrality while considering S+3Es.

① HVAC&R industry's basic stance towards Carbon Neutrality :

- Aim to expand the use of heat pump technology and products that are also highly efficient from the perspective of utilizing renewable energy.
- Use the designated products to reduce HFCs as much as possible and explore the possibility of safe use of lower GWP, e.g. "Green refrigerants" such as natural refrigerants and ultra low-GWP refrigerants.

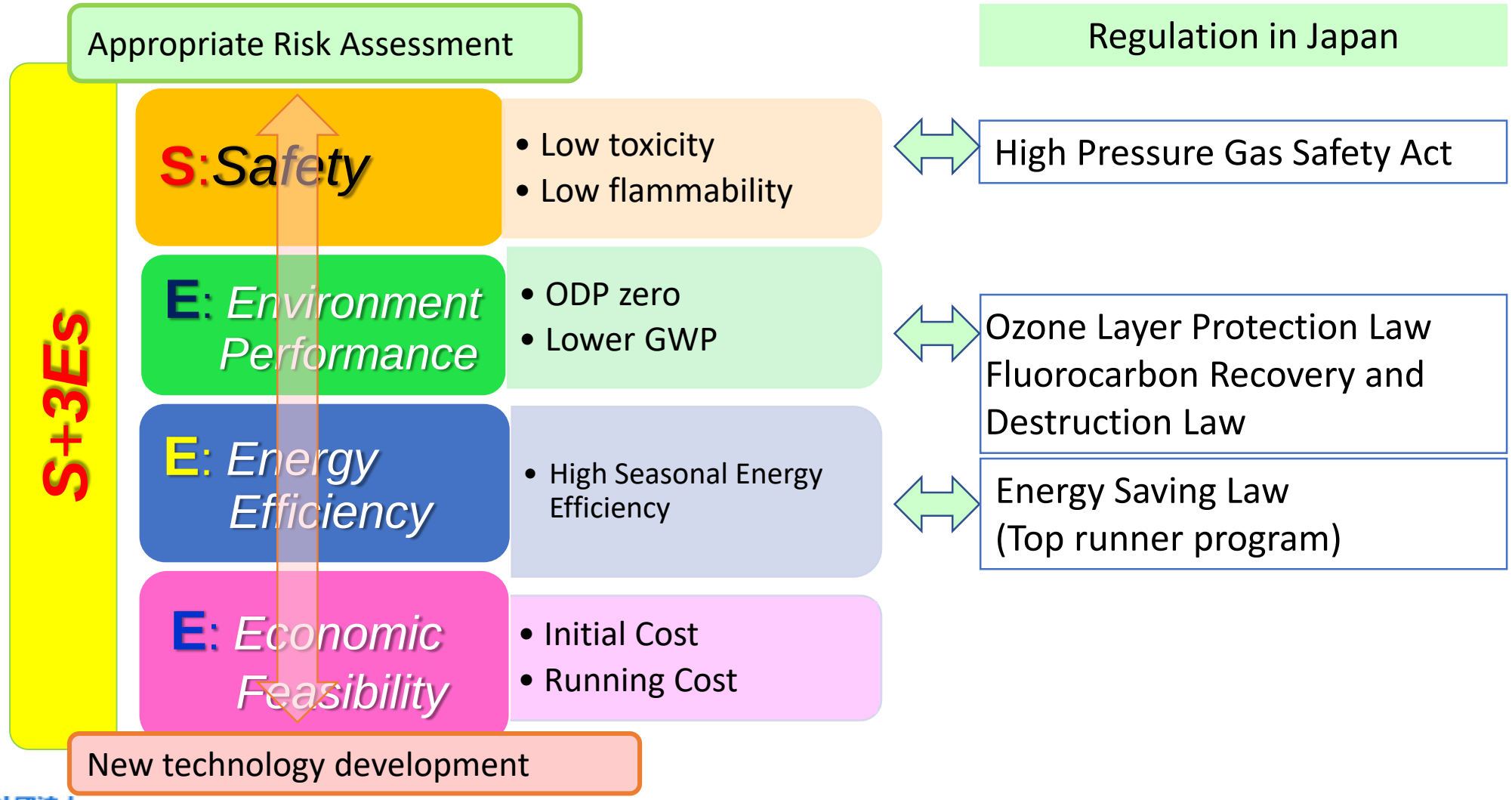
② Direction of response to Carbon Neutrality in HVAC&R sector : Basic principle : S + 3Es

Balanced target setting and target-driven activities on Safety plus Environment performance, Energy efficiency and Economic feasibility are important.

- ***Safety*(S)** : Ensure safety together with users(consumers), installers and other relevant stakeholders
- ***Environment performance*(E)** : Convert to lower GWP refrigerants from an environmental point of view.
- ***Energy efficiency*(E)** : Improve the efficiency of equipment systems from the perspective of improving energy efficiency (directly linked to the reduction of CO_2 emissions).
- ***Economic feasibility*(E)** : A reasonable price (cost) that balances the above three items is essential to promote market diffusion.

6. Industry's commitment to environmental issue

2) Important Issues to be considered in refrigerant conversion



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6. Industry's commitment to environmental issue

3) Refrigerant conversion support

➢ **New designated products (Industrial Structure Council Fluorocarbon Working Group meeting to be held in March 2024 (Held on March 25th))**

- Central air conditioners that use volumetric compression refrigeration
- Gas engine heat pump air conditioners (limited to new installations and those requiring the renewal of a complete set of refrigerant piping, etc.)
- Facility air conditioners(limited to new installations and those requiring the renewal of a complete set of refrigerant piping, etc.)
- Central refrigeration and freezing equipment

➢ **Response to "upstream"(Industrial Initiatives)**

- Participation in NEDO project: "Development of high-efficiency refrigeration and air conditioning technology for practical use of next-generation low GWP refrigerants" (FY2023-FY2027)

□ R&D item 1: "Development and evaluation of low GWP mixed refrigerants suitable for domestic air conditioners, etc."

□ R&D item 2: "Development of equipment compatible with low GWP refrigerants (domestic/commercial air conditioners, refrigerators/freezers show cases, etc.)"

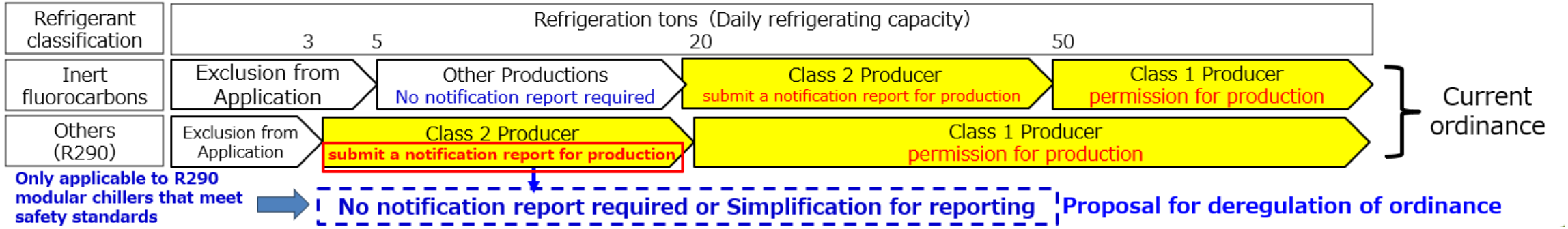
➢ **Response to the "midstream and downstream"(Industrial Initiatives)**

- Initiatives for recycled refrigerants
- Response to retrofitting (replacement of high-GWP refrigerants in equipment on the market with low-GWP refrigerants)
- Response to prevent leakage from existing equipment on the market.

6. Industry's commitment to environmental issue

4) Risk assessment for A3 appliances

Risk assessment for A3 Chiller



Risk assessment for A3 Domestic ACs

- 【Usage】Leak detection even when not in operation, using fan to reduce concentration levels.
- 【Trans/Storage, Inst., Repair, Dismantle】Portable leak detector
- 【 Inst., Repair, Dismantle】Use brushless motor tools
- 【 Inst., Repair, Dismantle】Use antistatic tools, PPEs
- 【Storage, Inst.】Dedicated space (no-flame area for condenser)
- 【All】Education/Training (on use of flammable refrigerants)
- 【All】Odor/Smell added to refrigerant etc.

※Additional safety measures needed where required levels not met.

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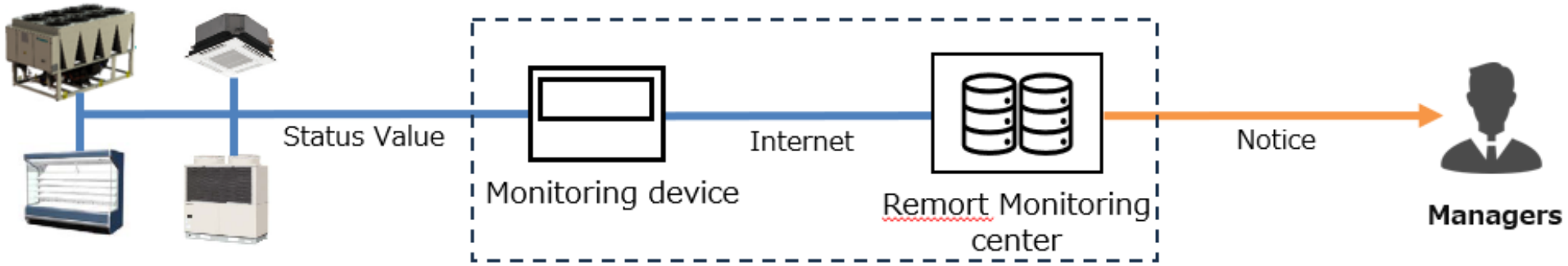
6. Industry's commitment to environmental issue

5) Constant monitoring system for detecting fluorocarbon leaks

① Replaced with a "constant monitoring system" that complies with JRA GL-17

Inspection	Target appliance	Capacity	Inspection interval
Simple inspection	All specified products	All	more than once in 3 months
Periodic inspection	Air conditioners	50kW or larger	more than once/year
		7.5kW or larger (smaller than 50kW)	more than once/3 years
	Refrigerators	7.5kW or larger	more than once/year

② An example of system configuration



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6. Industry's commitment to environmental issue

6) Roadmap for reducing LCCO2 emissions of buildings

1st step(2027～28):LCCO2 assessment and voluntary reduction

- Building owner's LCCO2 assessment and notification (e.g., new office buildings over 5,000 m2)
- Designer's explanation of LCCO2 assessment to building owners (e.g., new non-residential buildings over 2,000 m2)
- Third-party evaluation and display of LCCO2 assessment results (e.g., new construction and renovation of homes and buildings)
- Establishment of national guidelines (rules for LCCO2 calculation and assessment, establishment of CO2 emissions intensity for building materials and equipment, etc.)

2nd step(2030s～40s):Generalization of LCCO2 assessment and reduction measures (review to begin within three years of the system's launch)

- Expansion of notification requirements (approximately within five years of the system's launch) (e.g., expansion of applicable uses and scale)

3rd step(2040s～50):Strengthening LCCO2 reduction measures

- LCCO2 reduction measures
- Gradual strengthening of LCCO2 reduction measures

Source: Ministry of Land, Infrastructure, Transport and tourism(Sept. 2025
"Study Group on a System to Promote the Calculation and Evaluation of Life Cycle Carbon of Buildings"

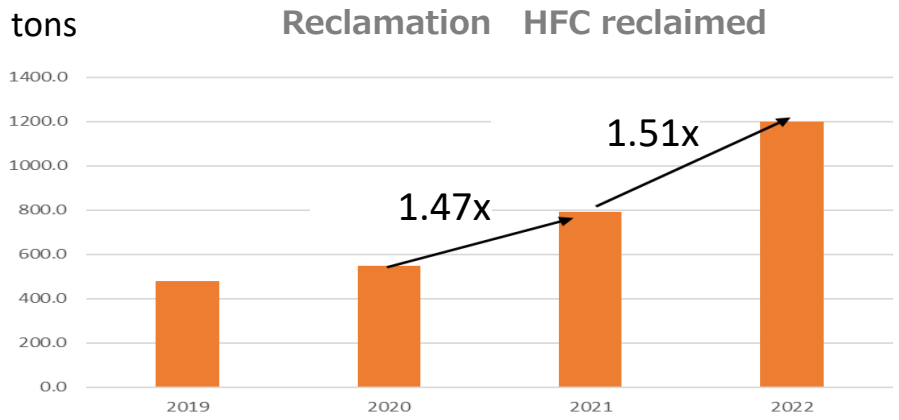
6. Industry's commitment to environmental issue

7) Overview of HFCs Recovery and Reclamation in Japan

【Current status of reclamation of HFC】

Latest information and analysis
(Information published on February 1st)

Rapid expansion of HFC reclamation
- **Approximately 1200 tons were reclaimed in 2022**
- **51% increase from the previous year**
- **2.2 times increase in 2 years**



Estimation of the reasons

(1) Improved recovery rate
Improved from 40% to 44%. This might be the effect of the revised Act on Rational Use and Proper Management of Fluorocarbons?

(2) HFC ratio expands in the recovery
(Expanded from 52% to 63% in 2 years; natural flow)

(3) Recovered refrigerant is reclaimed
(Increased from 20% to 35% in 2 years. Awareness-raising activities have been successful??)

In Japan, refrigerant reclamation is projected to rise significantly, **potentially covering nearly 30% of consumption by 2029. This supports a circular economy and recovery of high-GWP refrigerants**. Japan's progress with refrigerant reclamation **shows it's worth thinking about for other countries too**.

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7. International Activities

1) ICARHMA Meeting:

- ICARHMA is a global association of air-conditioning and refrigeration industry organizations.
- 11 major national associations meets twice a year, and cooperate to discuss common industry issues worldwide, focusing on global environmental challenges.
- Participating organizations: AHRI (US), EPEE, Eurovent(EU), AREMA (Australia), CRAA (China), KRAIA (Korea), HRAI (Canada), ABRAVA (Brazil), ACAIRE (Columbia), RAMA (India), JRAIA(Japan)
- Most recent meeting was held this July in Prague, Czech. Rep.

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7. International Activities

2) United Nation's Environment Programme Meetings: MOP, OEWG

- At the Meetings of the Parties (MOP) to the **Montreal Protocol**, and the **Open-Ended Working Group (OEWG)** organized by **UNEP (United Nations Environment Programme)**, we gather information on issues related to our industry. When appropriate, we also organize **side events** hosted by our association.
- In cooperation with the **Ministry of Economy, Trade and Industry (METI)**, the **Ministry of the Environment (MOE)**, and other organizations, we actively promote Japan's regulatory developments and industry initiatives.

【Meetings where JRAIA held events】
MOP34 @Montreal, Canada （Nov 2022）
OEWG45 @Bangkok, Thailand （July 2023）
OEWG46 @ Montreal, Canada （July 2024）
OEWG47 @ Bangkok, Thailand （July 2025）

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7. International Activities

3) United States:

1)AIM Act (U.S. Federal): Technology Transition Rule under Subsection (h) mandating reclaimed refrigerants (Dec. 2023). JRAIA submitted comments.

2) State-Level GWP Regulations:

New York: In response to the proposed bill AB10577, which prohibits GWP regulations stricter than the AIM Act, JRAIA submitted a letter of support in line with AHRI (Sept. 2024).

California: Regarding SB1206, a proposed refrigerant regulation targeting low and ultra-low GWP alternatives, JRAIA responded to CARB's RFI (Request for information) on low-GWP refrigerants and held bilateral meeting with CARB (Sep–Oct 2024).

Canada: JRAIA submitted feedback on HFC regulation revisions to ECCC (Aug 2024).

3) PFAS (Maine): Provided comments on proposed PFAS product rules (Mar 2024, Jan 2025).

4) Collaboration with US counterpart : Collaborate closely with AHRI on U.S. regulatory responses.

7. International Activities

4) European Union:

1) F-Gas Revision (2024)

During the last F-Gas Regulation revision, JRAIA actively conveyed the opinion of Japan's HVAC&R sector to the Commission by engaging in direct dialogue with DG ENER officials in cooperation with the Japanese government, and by submitting comments.

2) Ecodesign Products

JRAIA subitted comments HVAC&R related products

3) PFAS Proposal

JRAIA is actively submitting comments during the consultation of PFAS proposal.

7. International Activities

5) Southeast Asia :

ASEAN5+J workshop (in Manila, Philippine; 4th Oct.2024 and in Kobe, Japan; 22nd Oct. 2025)

■ Participation in various industrial associations

(Indonesia, Malaysia, Philippines, Thailand, Vietnam, Japan)

■ Main subject:“ **Energy Efficiency, Safety, and Lower GWP Refrigerants**”

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8. Next Event by JRAIA

Thank you for your kind attention.

See you soon in Tokyo Big Site!!

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