

The refrigeration and air conditioning industry's efforts to address environmental issues in Japan

The Japan Refrigeration and Air Conditioning Industry Association

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Today's Topics:

1. Who is JRAIA?
2. Market Trends
3. Regulatory trends in Japan (refrigeration and ACs sector)
4. Industry's commitment to environmental issue
5. VRF system using A2L refrigerant
6. HFC Recovery and Reclamation

1. Who is JRAIA?

JRAIA(Japan **R**efrigeration and **A**ir Conditioning **I**ndustries **A**ssociation)

- **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:
172 companies incl. associate members as of Apr. 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) Overview and related industry activities

- ① Shipment trends for each product (details on next page)
Under the circumstance that COVID19 almost over,
overall trends are recovering (almost stable)
- ② Latest status of industry association activities
 - The issues facing industry associations continues to increase, including the balance refrigerant conversion and energy efficiency.
 - Information gathering and dissemination from overseas is also on the rise, and their influence is also growing.
- ③ Impact on industry-related events
 - Due to the impact of COVID-19, the HVAC&R JAPAN was cancelled in 2020 and scaled down in 2022, but in 2024, the event recorded the highest number of visitors ever, demonstrating the high expectations placed on the industry.
 - New products such as the R32 VRF were released (announced at the previous HVAC&R JAPAN), and new products are expected to appear at the next exhibition.

2. Market Trends

2) Sales volume for each product group (2024 calendar year (Jan.-Dec.))

Product Category	No. of Units(k) 2024CY	Y/Y (%)
Residential A/Cs	9,353.9	106.5
Commercial A/Cs	831.5	103.2
Residential H/P water heaters	664.8	105.3
Gas engine-driven A/Cs	26.4	100.8
Water chilling units	13.1	99.5
Air to air heat exchangers	130.5	99.6
Commercial ref. cabinets	256.4	104.6
Condensing units	63.7	99.7
Refrigeration units	21.9	97.2

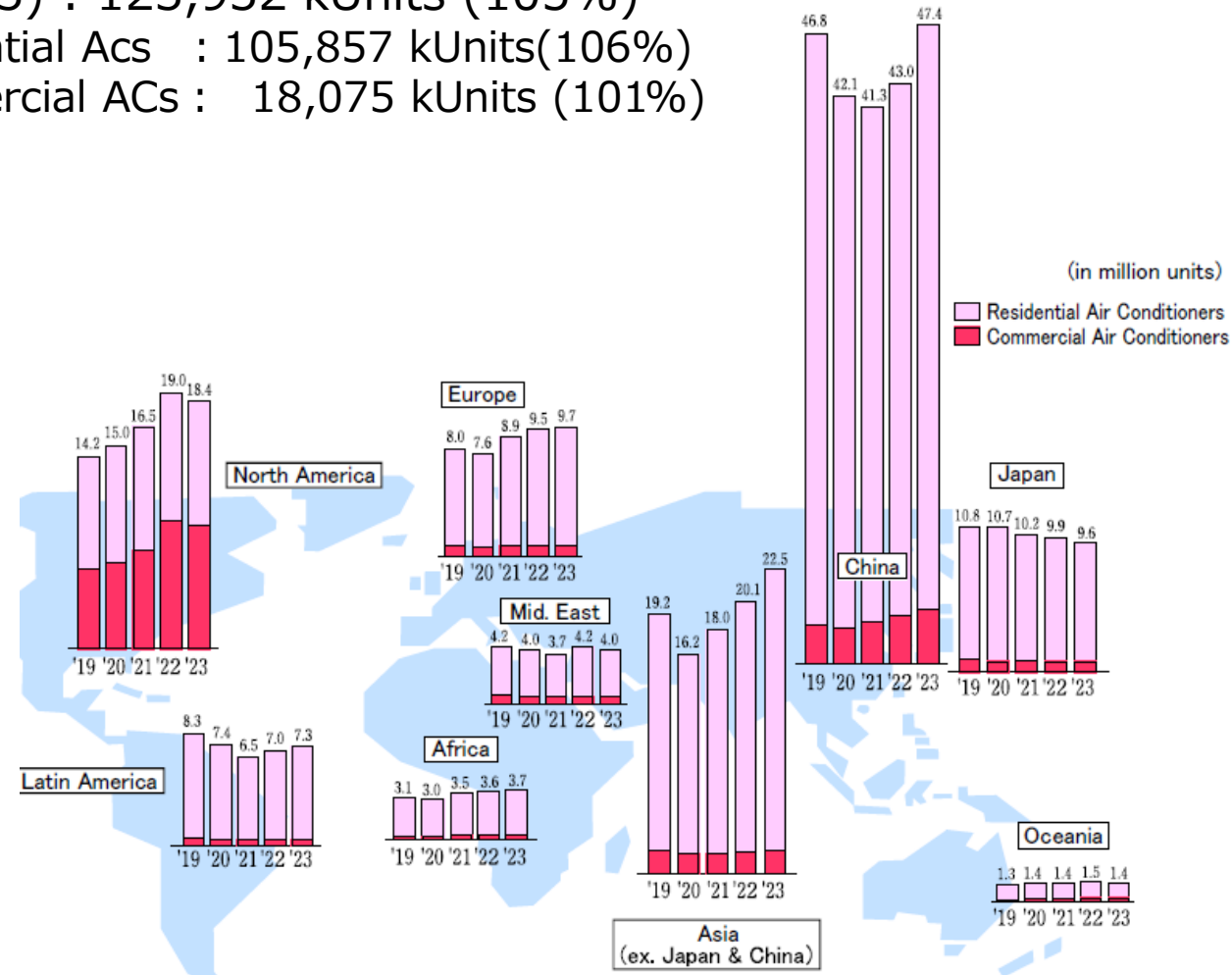
2. Market Trends

3) Trends of air conditioner sales in the global market

World Demand(2023) : 123,932 kUnits (105%)

Residential Acs : 105,857 kUnits(106%)

Commercial ACs : 18,075 kUnits (101%)

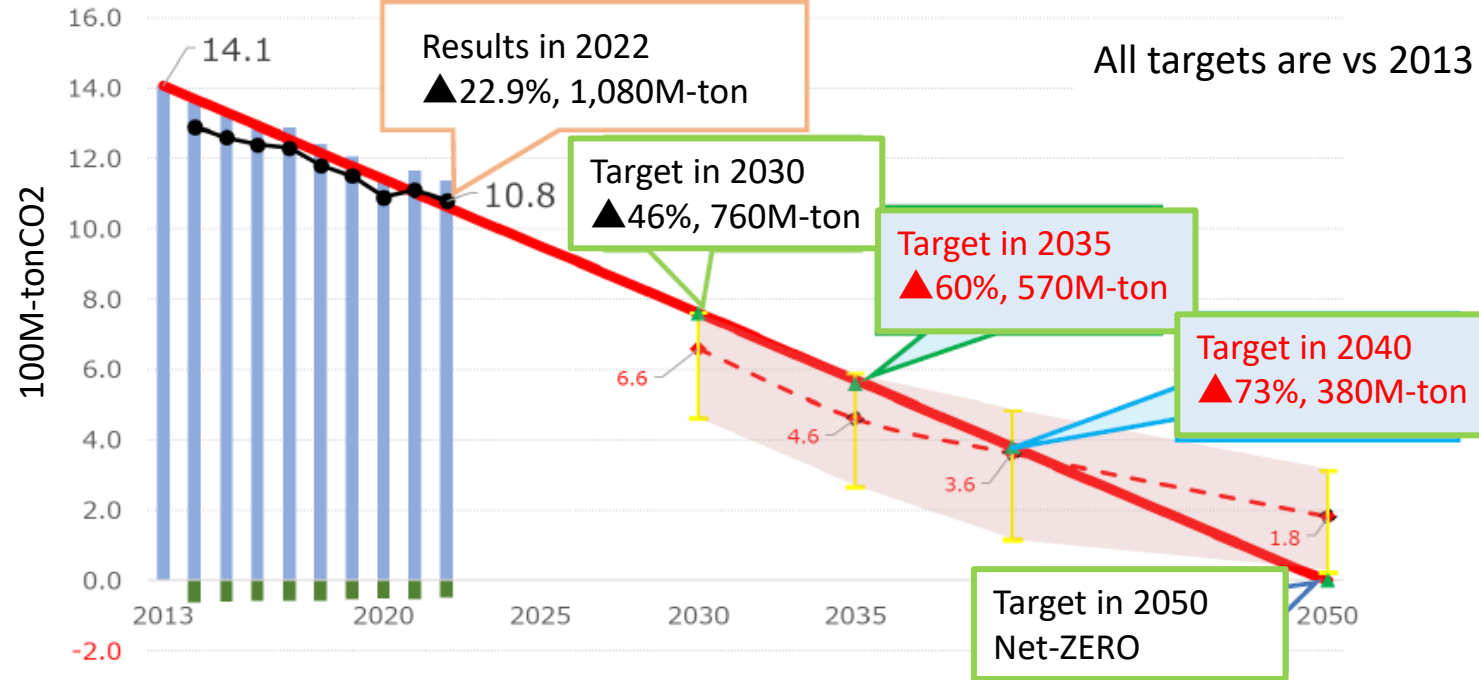


3. Regulatory trends in Japan (refrigeration and ACs sector)

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 and unswervingly 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°C target, aiming to reduce greenhouse gas emissions by 60% and 73% from 2013 levels in 2035 and 2040, respectively.

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

1) The latest Japanese government environmental policies (2)

Major measures and policies to be included in the Global Warming Countermeasures Plan to achieve the next NDC

◆ Industry, business, transportation, etc.

- Support for updating to **cutting-edge equipment in factories, etc., and energy conservation support** for small and medium-sized enterprises
- Reduction of CO2 emissions throughout the lifecycle of the automobile industry from manufacturing to disposal, decarbonization of the logistics industry, and utilization of next-generation fuels in the aviation and shipping industries

◆ Regions and lifestyles

- Accelerating regional decarbonization to contribute to regional revitalization
→ Creating more than 100 "decarbonization pioneering regions" by FY2030
- Shifting to a decarbonized lifestyle, such as energy-saving housing and reducing food waste
- Supporting the introduction of highly insulated windows, **highly efficient water heaters**, commercial EVs, perovskite solar cells, etc., and creating demand by leading the introduction of these to government offices and other facilities of the national and local governments
- Promoting decarbonization of the entire value chain

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

1) The latest Japanese government environmental policies (3)

[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%)	約360～370 (▲70～71%)
Industry	463	289 (▲38%)	約180～200 (▲57～61%)
Commercial and others	235	115 (▲51%)	約40～50 (▲79～83%)
Residential	209	71 (▲66%)	約40～60 (▲71～81%)
Transport	224	146 (▲35%)	約40～80 (▲64～82%)
Energy conversion	106	56 (▲47%)	約10～20 (▲81～91%)
Non-energy-related CO ₂	82.2	70.0 (▲15%)	約59 (▲29%)
Methan(CH ₄)	32.7	29.1 (▲11%)	約25 (▲25%)
NO ₂	19.9	16.5 (▲17%)	約14 (▲31%)
Four gases incl. HFC	37.2	20.9 (▲44%)	約11 (▲72%)
Sink	-	▲47.7 (-)	▲約84 (-) ※4

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))

➤ Basic perspective of energy policy (S+3E)

- The principle of **S+3Es (Safety, Energy security, Economic efficiency, Environmental compatibility)**, which is the essence of energy policy, will be maintained.
- Safety will be the most important premise, and a stable supply of energy will be prioritized, while efforts will be made **to improve economic efficiency and environmental compatibility.**

➤ Energy conservation and non-fossil fuel conversion

- **The importance of thorough energy conservation remains unchanged** in terms of promoting a shift to a supply-demand structure that can withstand an energy crisis.
- In addition, electrification and non-fossil fuel conversion will be more important than ever in the future as we move forward with emission reduction measures toward 2050. **Economically rational initiatives should be introduced from the perspective of how much CO2 can be reduced.**
- As demand for electricity is expected to increase due to the progress of DX and GX, we will support factories and other facilities in updating to cutting-edge equipment, and promote energy conservation in homes and other areas through both systems and support, such as the spread of high-performance windows and water heaters. We will continuously review the top runner system and benchmark system, and enhance the energy conservation support system in the region.

➤ Other keywords

- **By ensuring adjustment power through** storage batteries and **DR (demand response)**, and by promoting the sophistication of grid and supply-demand operations, flexibility in response to the variability of renewable energy will also be ensured.

Source: Excerpt from the Ministry of Economy, Trade and Industry

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

2) Regulations in the refrigeration and air conditioning sector

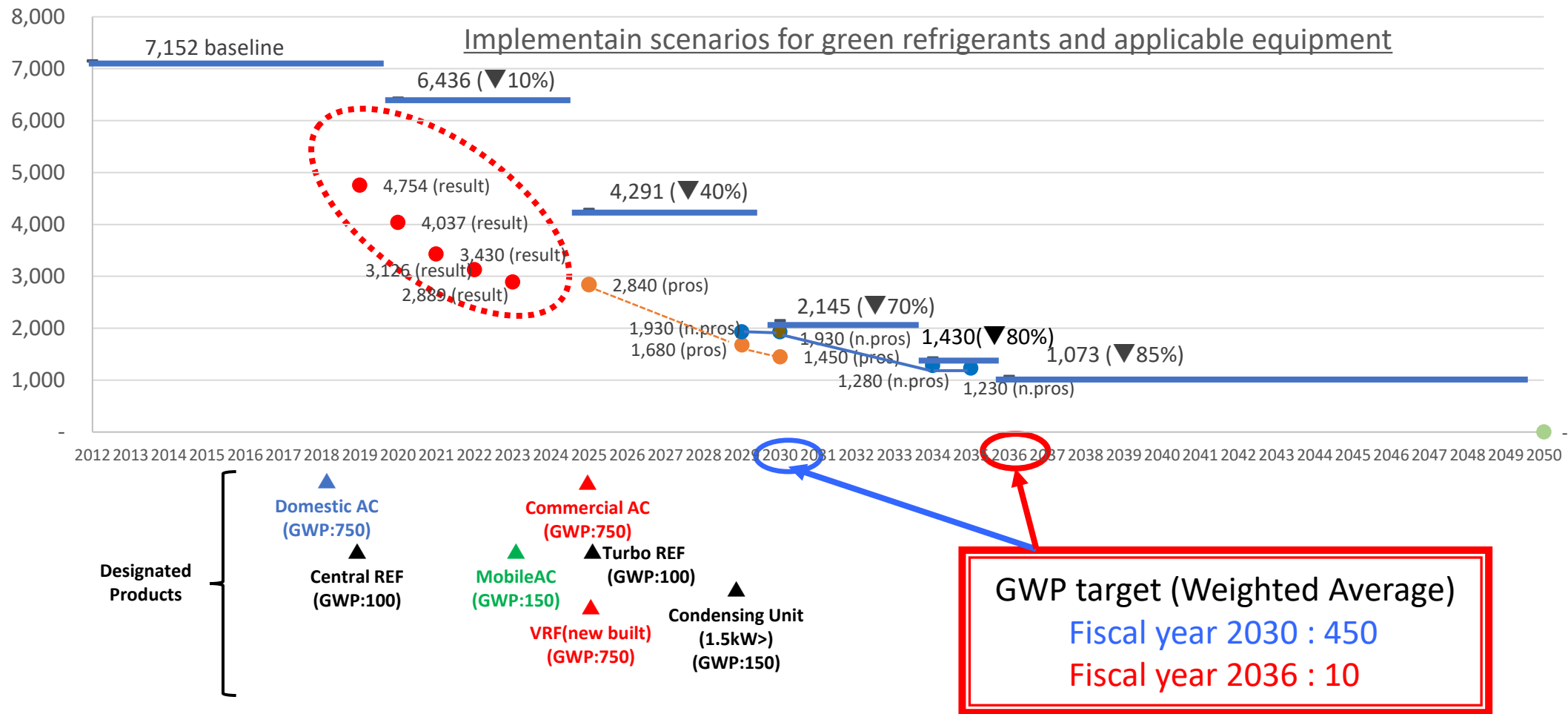
③ Latest developments regarding the Fluorocarbons Emissions and Proper Management Act

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

- Main agenda: (FY2025: Setting **outlook for reductions in fluorocarbon consumption for FY2030 and FY2035**) Status report five years after the implementation of the Fluorocarbons Law and discussion on how to address future issues.
- Direction towards carbon neutrality by 2050 confirmed at the conference
- **Faucet:** Steady implementation of the Kigali Amendment
Strict implementation of quotas under the Act on the Protection of the Ozone Layer.
- **Upstream:** Expanding the use of green refrigerant equipment
Mainstreaming natural refrigerant equipment, developing ultra-low GWP refrigerants.
Further development of equipment compatible with green refrigerants.
- **Midstream:** Towards zero leakage during operation
Improve the accuracy of leakage detection using IoT technology, etc.
- **Downstream:** Achieving a 100% recovery rate
Implementing appropriate recycling and destruction systems, and building a closed circulation system for refrigerant recovery, recycling, and reuse in preparation for anticipated refrigerant replenishment shortages
- **Other:** Promoting international cooperation. Actively promoting the fluorocarbon initiative.

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

3) HFC reduction in Japan



4. 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.

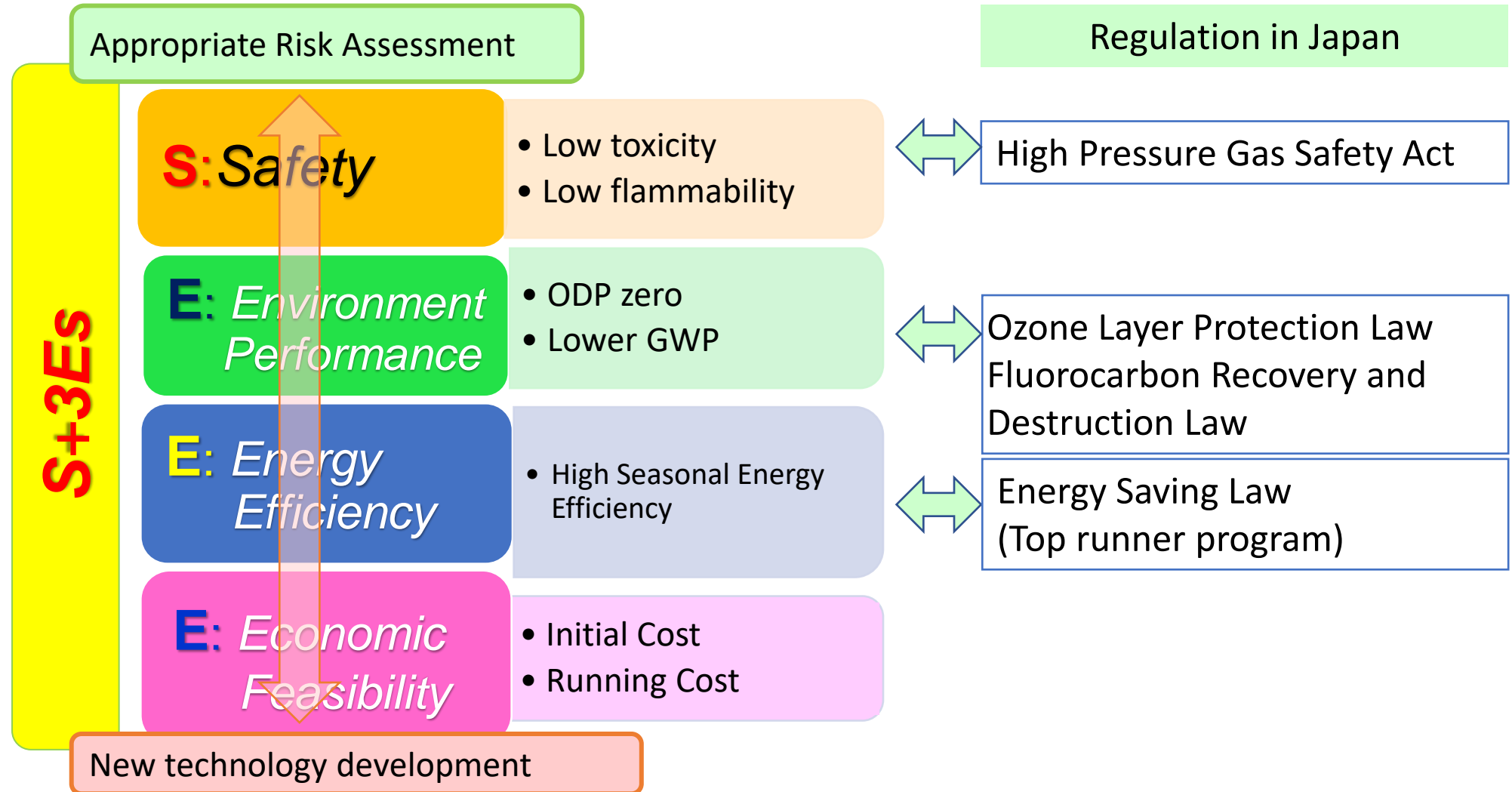
② Direction of response to Carbon Neutrality in HVAC&R sector : Basic principle : S + 3Es

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 CO₂ emissions).
- **Economic feasibility(E)** : A reasonable price (cost) that balances the above three items is essential to promote market diffusion.

4. Industry's commitment to environmental issue

2) Important Issues to be considered in refrigerant conversion



4. Industry's commitment to environmental issue

3) Refrigerant conversion support

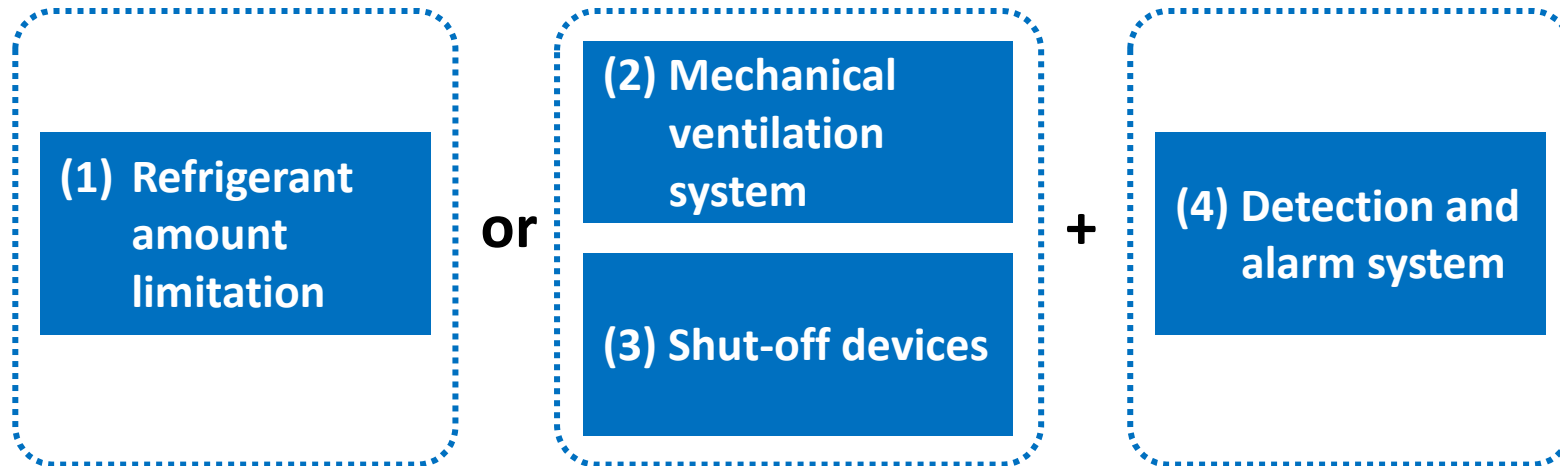
- **New designated products (Industrial Structure Council Fluorocarbon Working Group meeting to be held in March 2024 (Held on March 25th))**
 - Central air conditioners that use volumetric compression refrigeration
 - Gas engine heat pump air conditioners (limited to new installations and those requiring 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"**
 - 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 home air conditioning, etc."
 - ❑ R&D item 2: "Development of equipment compatible with low GWP refrigerants (home/commercial air conditioners, refrigerated/freezer show cases, etc.)"
- **Response to the "midstream and downstream"**
 - 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.

5. VRF system using A2L refrigerant

1) The way for safety measures (1)

Appropriate measures to prevent ignition (Industry Guide line; GL-16, GL-20)

- To prevent ignition in the event of refrigerant gas leakage, **one of the measures specified in (1) through (3) must be taken.**
- If measures (2) or (3) is selected, (4) must be installed.
(4) is not permitted as a stand alone measures in Japan.



5. VRF system using A2L refrigerant

1) The way for safety measures (2)

Appropriate measures to prevent combustion (excluding refrigerant amount restrictions (1))

When refrigerant leak is detected, ((2) or (3)) and (4) shall be activated.

(2) Ventilator

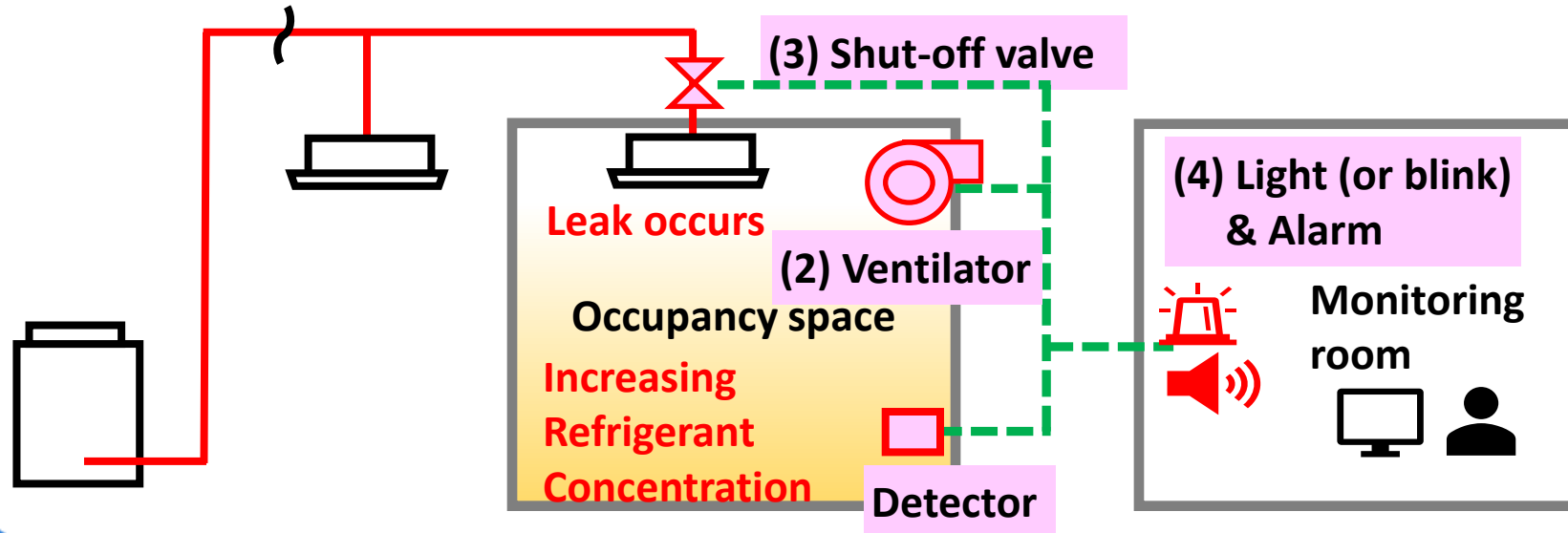
Continue operation at all times, or automatically operate when detects refrigerant leakage.

(3) Shut-off valve

Shut off the refrigerant circuit by signal from the detector.

(4) Alarm

Light or blink with alarm sound



5. VRF system using A2L refrigerant

2) Standards and Guideline for VRF

➤ Revision of standards and guidelines related to VRF

<Purpose of this revision>

In response to the enforcement of the target value (750) and target year (2025) for the environmental impact of designated products under the Act on Rational Use and Proper Management of Fluorocarbons for some VRF models, **we will review issues that have been an issue for each stakeholder when selecting, designing, and installing commercial air conditioners that use A2L refrigerants**, such as clarifying the requirements of the guidelines and correcting the contents.

(1) **JRA GL-16:** Facility guidelines for ensuring safety in the event of a refrigerant leak from commercial air conditioners using mildly flammable (A2L) refrigerants

(2) **JRA 4070:** Safety function requirements in the event of a refrigerant leak from commercial air conditioners using mildly flammable (A2L) refrigerants

5. VRF system using A2L refrigerant

3) Products to be launched in Japan

DAIKIN	Johnson Controls Hitachi AC	Mitsubishi Electric
<p>" VRV 7 " series</p>  <p>※Press release</p> <p><i>To be launched in Nov. 2024</i></p>	<p>" Flex Multi " series</p>  <p>※Press release</p> <p><i>To be launched in Jun. 2024</i></p>	<p>" Grand Multi " series</p>  <p>※Press release</p> <p><i>To be launched in Sep. 2024</i></p>

6. HFC Recovery and Reclamation

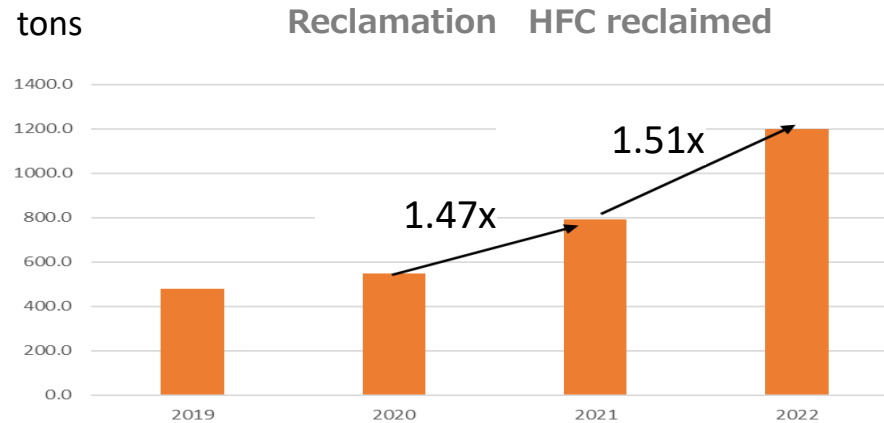
◆ Current status of reclamation of HFC in Japan

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

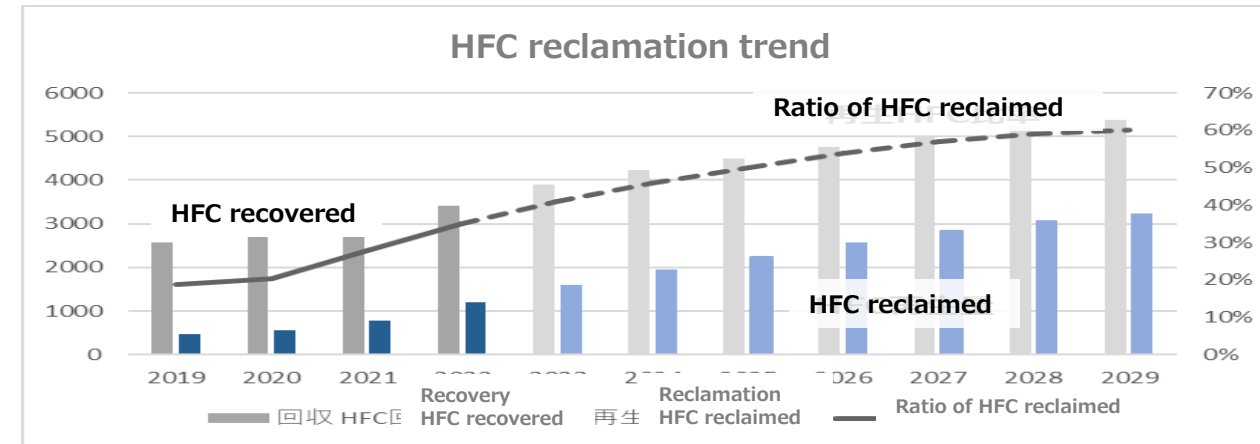
Improved from 40% to 44%. This might be the effect of the revised Act on Rational Use and Proper Management of Fluorocarbons?

(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??)



There is a possibility that the ratio of reclamation will increase to around 60% as a trend from the current situation.

Refrigerant reclamation is expected to increase from 480 tons in 2019 to 3,234 tons in 2029.

In that case, just under 30% of the consumption can be covered by the refrigerant reclaimed. While realizing a refrigerant circular economy, it also contributes to promoting the recovery of high-GWP refrigerants that are already on the market.

The End
Thank your kind attention!
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