

Accelerating Efforts towards Carbon Neutrality in Japanese Industry

The Japan Refrigeration and Air Conditioning
Industries Association

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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: Yasumichi Tazunoki (from Mitsubishi Electric Co.)
- The number of the members: **168 companies** incl. associate members as of June 2023

Global Strategy Committee members:

Daikin Industries, Ltd., Fujitsu General Ltd., Hitachi-Johnson Controls Air Conditioning, Inc., Mayekawa MFG.Co.,Ltd., Mitsubishi Electric Co., Mitsubishi Heavy Industries Air-Conditioning & Thermal Systems Co., Ltd. , Panasonic Co., Sharp Co., Saginomiya Seisakusho, Inc., Toshiba Carrier Co.

- **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. Update on JRAIA's Key Activities

Energy Efficiency	<ul style="list-style-type: none"> 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.
Refrigerants	<ul style="list-style-type: none"> Publish the guideline for the refrigerant leak detection monitoring for Japan market. Discussion for the next designated products of F-Gas Act in Japan
Environment	<ul style="list-style-type: none"> Consideration of LCCP (Life Cycle Climate Performance) Action for environment related regulations especially in the EU; Ecodesign, F-Gas, PFAS, etc.
International Activities	<ul style="list-style-type: none"> ICARHMA meeting (International Council of Air Conditioning, Refrigeration, and Heating Manufacturers' Associations): Collaborate with 11 international industrial associations and contributed as advisory committee member for UNEP's RDL (Refrigerant Driving License) Three Industry Association Meeting (China-Korea-Japan): Annual meeting to discuss common issues. ASEAN5 + J Workshop: Exchange information on energy saving and refrigerant conversion including global environmental issues among industry associations of 5 ASEAN countries Seasonal Energy Efficiency(CSPF)Evaluation Method: Promotion in ASEAN countries

3. Industry's commitment to environmental issue

(i) Japan's HVAC&R market and refrigerant transition by product category

Product Category	No. of Units(k) & Y/Y (%)	Refrigerants
	2022FY	
Residential A/Cs	9145.7 (98.4%)	R32(almost 100%)
Commercial A/Cs	823.2 (100.5%)	R410A, R32(small size)
Residential H/P water heaters	704.4 (115.9%)	CO₂(almost 100%)
Gas engine-driven A/Cs	26.9 (100.4%)	R410A
Water chilling units	12.7 (98.1%)	R32 , R410A, R134A
Air to air heat exchangers	139.5 (97.2%)	NA
Commercial ref. cabinets	248.4 (91.2%)	R404A→R410A, CO₂(separate type) R290, R1234yf(self contained)
Condensing units	71.1 (89.0%)	R448A, R410A, CO₂
Refrigeration units	214.0 (106.6%)	R22→R404A, R410A

3. Industry's commitment to environmental issues

(ii) JRAIA's position on Carbon Neutrality

JRAIA will work towards the realization of CN2050 while considering S+3Es.

① HVAC&R industry's basic stance towards CN2050 :

- 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 product system 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.

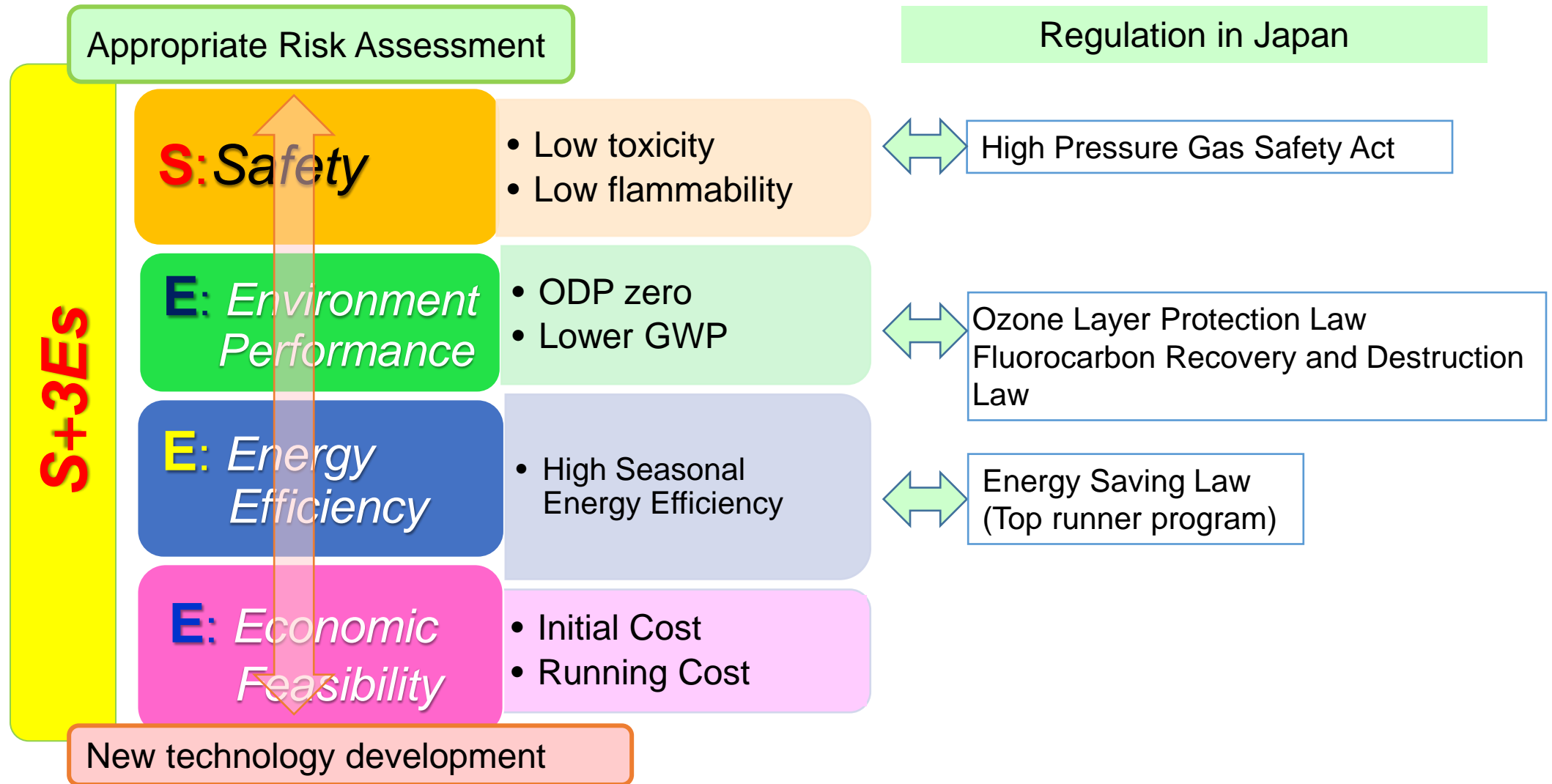
② Direction of response to CN2050 in HVAC&R sector : Basic principle : S+3Es

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.

3. Industry's commitment to environmental issues

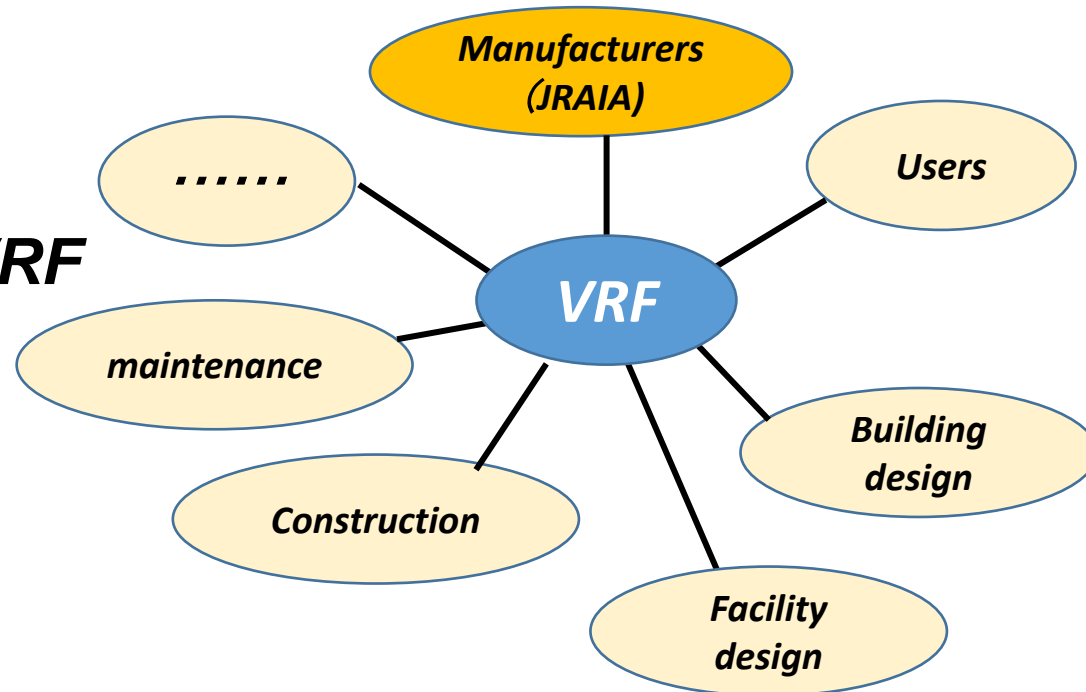
(iii) Important Issues to be considered in refrigerant conversion



3. Industry's commitment to environmental issues (iv) VRF

*Further consideration of **S+3Es** including risk assessment and discussion amongst all stakeholders is necessary for VRF*

Stakeholder



Related regulations and standards : **Safety measures:**

1. High Pressure Gas Safety Act
2. Product Standards of JRAIA(JRA 4070)
3. Guideline of JRAIA(JRA GL16)

1. Regulation of refrigerant filling amount (upper limit)
 2. Installation of mechanical ventilation equipment
 3. Installation of shut-off device
- ※ (2 or 3)+ Installation of detection and alarm device

3. Industry's commitment to environmental issues

(v) LCCP (Life Cycle Climate Performance)

JRAIA LCCP Evaluation WG

LCCP evaluation for residential use ACs using R22, R290, R410A, R32, R454C

➤ Evaluate the followings in addition to evaluation based on IEA Annex 54

- ① System performance simulation with accurate test verification of refrigerants
- ② Equipment operation time (calculated from IoT, big data, and outside air temperature)
- ③ Amount of refrigerant leakage

➤ Evaluate electricity demand scenarios for each temperature regions in order to be utilized globally
(Covering tropical / subtropical / moderate / cold region)

➤ Incorporate well-balanced consideration of S+3Es

Action items and next steps

May 14th IEA Heat Pump Conference Paper Submission, Presentation

Aug ICR2023 International Conference (@Paris) Annex54 Workshop

Nov Progress report at The International Symposium on New Refrigerants and Environmental Technology 2023 @ Kobe, Japan



4. Laws and regulations in Japan(HVAC sector)

(i) Latest Japanese government's environmental policy

① Cabinet decision on the "Plan for Global Warming Countermeasures" (22nd Oct.2021)

	Fiscal year	Targets and estimates in fiscal year		Reduction Ratio	Conventional target (Reduction Ratio)
	2013	2030			
(Unit: Million t-CO ₂)					
Greenhouse gas emissions and removals	14.08	7.60	▲46%	▲26%	
Energy-related CO ₂	12.35	6.77	▲45%	▲25%	
Industry	4.63	2.89	▲38%	▲7%	
Commercial and others	2.38	1.16	▲51%	▲40%	
Residential	2.08	0.70	▲66%	▲39%	
Transport	2.24	1.46	▲35%	▲27%	
Energy conversion	1.06	0.56	▲47%	▲27%	
Non-energy-related CO ₂ (CH ₄ , N ₂ O)	1.34	1.15	▲14%	▲8%	
Four gases incl. HFC etc.	0.39	0.22	▲44%	▲25%	
Greenhouse gas removals	-	▲0.48	-	-	

4. Laws and regulations in Japan(HVAC sector)

(i) Latest Japanese government's environmental policy

② Cabinet decision on "the 6th Strategic Energy Plan"

(22nd Oct. 2021)

- The 10th anniversary of the Great East Japan Earthquake
- Confirmation of basic policy of **S + 3Es**
(Safety, Energy Security, Economic Efficiency, Environment)
- **"2050 Carbon Neutrality"**
- Business / housing sector
 - Building Energy Conservation Law
 - Strengthen **"Top Runner Programs"**
in building materials and equipment.

4. Laws and regulations in Japan(HVAC sector)

(ii) Overview of Legislation in Japan

Legislation on refrigerants

“Ozone Layer Protection Act” (revised in 2018)

- Regulation on production and consumption of CFC/HCFC/HFCs (abbr. OLP Act)
- National law to be ratified the Kigali agreement to the Montreal Protocol.

“Act on Rational Use and Proper Management of Fluorocarbons” (revised in 2021)

- Regulation on emission of CFC/HCFC/HFCs (abbr. Fgas Act)
- Target GWP and year for each product group .

“High Pressure Gas Safety Act” (revised in 2016)

- Regulation on safety of flammable (toxic) gas
- Method of safe use of products and refrigerants
- A2L refrigerants are included as “particular inert gas”

Legislation on energy efficiency

“Global Warming Countermeasure Plan”

- Regulation on emission of energy origin CO2

“Act on the Rational Use of Energy(Saving Energy Act)” (revised every 3-5 yr)

- **Top Runner Program has been revised in 2022 (Target year for RAC (Wall-hung type) : 2027)**

4. Laws and regulations in Japan(HVAC sector)

(iii) Japan's Energy Conservation Regulation: Top Runner Program

Review of Energy Efficiency Target Year for each product categories

Approved by METI's WG (Air Conditioner & Electric Water Heater Judgment Criteria WG, on 8 Feb 2023):

➤ Residential-use Air Conditioners :

- Energy Efficiency Target Year

Wall-mounted type (single-split ACs): **2027**

other types (include multi-split ACs): **2029**

- Reviewed classification (including new class for equipment in cold regions)

➤ Heat pump water heaters

- Energy Efficiency Target Year : **2025**

Thank you for your attention