Laws and Regulation for Fluorocarbons in Japan

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1. Current situation of Fluorocarbons

2. Necessary measures to reduce emission of HFCs

3. Comprehensive measures for reducing high GWP HFCs in newly revised law

4. Labelling and voluntary plan

5. Developing technologies

6. More
1. Current situation of Fluorocarbons
The universal issues to be addressed proactively

Progress of international regulations and measures over F-gases

**CFC, HCFC**
- **CFC-12**
  - ODP=1.0
  - GWP=10,900
- **HCFC-22**
  - ODP=0.055
  - GWP=1,810

**HFC**
- **HFC-134a**
  - ODP=0
  - GWP=1,430
- **HFC-410a**
  - ODP=0
  - GWP=2,090
- **HFO**
- **Blend**

**Protection of Ozone Layer**
- Montreal Protocol
- Vienna Convention

**Prevention of Global Warming**
- Kyoto Protocol
- UNFCCC

**New Measures Needed**
- Proposed Amendment to the Montreal Protocol

**Lower GWP HFC Natural Refrigerant**
- CO2
- NH3
- Air
- HC

**A projection of increasing amount of HFCs emissions**
Ozone Layer Protection Law and its achievements

Scheme of the Law

- Regulated substances
  - All ODSs under the Montreal Protocol
- Production control
  - Production License
- Trade control (Foreign Exchange and Foreign Trade Law)
  1. Export license - preventing export to non-parties
  2. Import license (Import Quota System)

CFC Phase-out accomplished in 1996.
HCFC Phase-out will be accomplished in 2020.

The progress to reduce consumption of HCFC.

“The Earth’s protective ozone layer is on track to recover by the middle of the century”
(10.Sep.2014)
2. Necessary measures to reduce emission of HFCs
Projected increase of Fluorocarbons emissions in refrigeration & air conditioning sector

Base year level (51mil.t-CO2)

Target of Kyoto Protocol (31mil.t-CO2)

Average Emission (24mil.t-CO2)

Industrial Voluntary Action Plans

Emission of HFC refrigerants from AC & refrigerators

The first commitment period of Kyoto Protocol
Possible target of designated products and equipment using fluorocarbons

(HFC emission)
Ratio of fluorocarbon emissions from whole products life cycle including manufacturing, usage and destruction (2012)

(HFC stock amount)
Ratio of fluorocarbon amount used in products under operation (2012)

Source: inventory report of greenhouse gases by METI
※Based on GWP values for the second commitment period - Kyoto Protocol
※Subject to change depending on considered categories of designated products.
3. Comprehensive measures for reducing high GWP HFCs in newly revised law
Direction of the measures on fluorocarbons (HFCs)

**Concerns**

1. Prospective rapid increase of HFC emission
2. Significant leakage during operation
3. Low rate of recovery
4. Technical development and commercialization of low-GWP/non-fluorocarbon products
5. Global movement of strengthening the regulations on high-GWP fluorocarbons

**Measures**

Comprehensive measures required over the life cycle from production of fluorocarbons to disposal in addition to recovery/disposal under current law

1. Phase-down of fluorocarbons (measures by gas makers)
2. Promotion of low-GWP/non-fluorocarbon products or equipment (conversion by manufacturers)
3. Preventing fluorocarbons from leaking out of commercial air-conditioning and refrigeration in use (management by users)
4. Filling by registered operators and recycling by licensed operators etc.

Revised law enforcement (April 2015)
Newly Revised Law Covers whole Life Cycle

Launched from April 2015

Target 43.4 mil-tCO2 (2020), 36.5 mil-tCO2 (2025)

(1) Phase-down HFCs

(2) Promote low GWP products

(3) Prevent leakage from commercial equipment

Manufacturers of HFCs

Manufacturers of products containing HFCs

Approved recyclers

Approved destructors

Low GWP HFCs

Natural Refrigerant

Refrigerator

Air conditioner

Insulators

Dust blowers

Products with alternatives

Users of products

Supermarkets

Periodical check

Maintenance

Report of leakage

Registered re-fillers/recovery operators

Scope of previous Law

(1) Phase-down HFCs

(2) Promote low GWP products

(3) Prevent leakage from commercial equipment
Measures for conducting HFCs phase-down

The government published a “target” with a guideline for manufacturers and importers of fluorocarbon gases on preparing and implementing an “HFCs phase-down program” reflecting the national target. Target: 43.4 mil-tCO2 (2020), 36.5 mil-tCO2 (2025)

Manufacturers and importers are required to conduct “HFCs phase-down programs” and report to the government on the development and production of lower GWP gases considering safety, energy efficiency, economic affordability etc.

The government will evaluate the reports from manufacturers and importers with support of a council and publish an annual report. If necessary, the government will require them to amend/improve their programs.
Manufacturers and importers of products and equipment will be required to replace high-GWP products with low-GWP or non-fluorocarbons for shipping, considering safety, energy efficiency, economic affordability etc.

(Example) Air conditioning

Index related to environmental impact

High-GWP

- Refrigerants GWP = A
- Volume of shipment A

Designated products

To reduce climate impact by converting to the lowest GWP among the designated products

Low-GWP

- Refrigerants GWP ⇒ Low-GWP/non-fluorocarbon
- Volume of shipment E unit

Target year

Evaluate accomplishments for each product category (weighted average)

Base year

Target value

- Refrigerants GWP ⇒ Low-GWP/non-fluorocarbon
- Volume of shipment F unit

Measures to promote low-GWP/non-fluorocarbons in designated products and equipment
### Target value and year for each designated product

<table>
<thead>
<tr>
<th>Designated products ※</th>
<th>Current refrigerant (GWP)</th>
<th>Target value (GWP)</th>
<th>Target year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room air conditioning</td>
<td>R410A(2090), R32(675)</td>
<td>750</td>
<td>2018</td>
</tr>
<tr>
<td>Commercial air conditioning (for offices and stores)</td>
<td>R410A(2090)</td>
<td>750</td>
<td>2020</td>
</tr>
<tr>
<td>Condensing unit and refrigerating unit (for separate type showcases, etc.)</td>
<td>R404A(3920), R410A(2090), R407C(1774), CO2(1)</td>
<td>1500</td>
<td>2025</td>
</tr>
<tr>
<td>Cold storage warehouses (for more than 50,000 m³)</td>
<td>R404A(3920), Ammonia (single digit)</td>
<td>100</td>
<td>2019</td>
</tr>
<tr>
<td>Mobile air conditioning</td>
<td>R134a(1430)</td>
<td>150</td>
<td>2023</td>
</tr>
<tr>
<td>Urethane foam (house construction materials)</td>
<td>HFC-245fa(1030), HFC-365mfc(795)</td>
<td>100</td>
<td>2020</td>
</tr>
<tr>
<td>Dust blowers</td>
<td>HFC-134a(1430), HFC-152a(124), CO2(1), DME(1)</td>
<td>10</td>
<td>2019</td>
</tr>
</tbody>
</table>

※ With some exceptions.
Proper management by users with periodical checks and professional repair/refilling

To prevent leakage, users are required to conduct periodical checks, to arrange for immediate repairs in case of leakage, and are prohibited from refilling without making repairs. Users are requested to maintain records and report cases of massive leakage.

- Periodical check
- Record
- Call a service immediately to arrange repair/refill as soon as leakage is found.
- "log book"
  - Type/amount of refrigeration used
  - Reports on maintenance including periodical checks & repair record, date & time, result etc.
- Disclose
- Explain cause of malfunction when leakage is identified.
- Repair/refilling
- Reporting leakage amount over 1,000 tons annually
- Government
- Maintenance operators (registered fillers & recovery operators)

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Promoting adequate use and recycling

In-use leakage & at disposal

Users are prohibited from using unregistered re-fillers/recovery operators for refilling/disposal.

Refill or recycle

Registered re-fillers/recovery operators are obliged to deliver collected fluorocarbons to registered recyclers or destructors or refill or recycle for users.

F-gas factory

Approved recyclers

Approved destructors

Registered re-fillers/recovery operators

Approved recyclers

Approved destructors

In-use leakage & at disposal

Users are prohibited from using unregistered re-fillers/recovery operators for refilling/disposal.
4. Labeling and voluntary plan
Indications and labeling for the designated products, etc.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>To promote designated products using lower-GWP/natural refrigerants Labeling JIS can help users to understand environmental impact of the refrigerants in the products easily</th>
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</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Besides designated products, labeling showcase itself, so that consumers can recognize labeling in supermarkets, etc.</td>
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<tr>
<td>Included Items</td>
<td>① Display “non-F-gas using” or degree of achievement in relation to the target GWP value ② Target year and target GWP value ③ GWP value of the refrigerant used in the products</td>
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<td>Location of labeling</td>
<td>On the products themselves and catalogs, etc.</td>
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Regulated indication on the designated products + Labeling JIS in the catalogs, etc.

SELECT by users
Lower-GWP Natural refrigerant

Showcases are not currently categorized as designated products, but labels can be affixed to showcases.
Industrial Voluntary Action Plan for F-gases

Previous Plan (1995～2012)
18 industrial organizations strove and succeeded in achieving the first commitment period of the Kyoto Protocol.

New Plan (2013～2030)
14 industrial organizations are working on new measures to achieve the new targets for 2020, 2025 & 2030.
10 industrial organizations have voluntarily set more ambitious targets than their previous plans for the Kyoto Protocol.

◆ Prevention of emissions in the manufacturing process
◆ Conversion from F-gases to natural refrigerants
◆ Technology transfers, etc.

14 organizations
- Japan Fluorocarbon Manufacturers Association (JFMA)
- Japan Chemical Industry Association (JCIA)
- Japan Urethane Foam Association (JUFA)
- Aerosol Industry Association of Japan (AIAJ)
- The Federation of Pharmaceutical Manufacturers’ Association of Japan (FPMAJ)
- Air Soft Gun Kyoukai (ASGK)
- The Japan Refrigeration and Air conditioning Industry Association (JRAIA)
- Japan Association of Refrigeration and Air-Conditioning Contractors (JARAC)
- Japan Vending Machine Manufacturers Association (JVMA)
- Japan Automobile Manufacturers Association, Inc. (JAMA)
- Japan Electronics and Information Technology Industries Association (JEITA)
- The Japan Electrical Manufacturers’ Association (JEMA)
- The Federation of Electric Power Companies of Japan
- The Japan Magnesium Association

(In no particular order)
5. Developing technologies
Funding scheme for promoting Lower GWP alternatives including Natural Refrigerant Products.

Accelerating R&D (by NEDO)

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</table>

1. R&D of new alternative materials
   - Alternative CFC cleaning agent
   - Alternative refrigerant, blowing agent, CFC cleaning agent
   - Electronic device cleaning system using SF6 substitute gas
   - Electronic device etching systems and processes using alternative gas
   - SF6-free micro-structural control of magnesium alloy

2. R&D of recovery and destruction technologies
   - Recovery and recycling technologies for heat insulation materials
   - Resolution and destruction technologies for fluorinated gas

3. R&D of fluorocarbon-free technologies
   - Small-scale air-conditioning systems and freezing and refrigeration systems
   - High-efficiency and large-scale air-conditioning systems

Technologies to reduce F-gas emissions in the factory process

Industrial Voluntary Action Plans.
(main factor to decrease in emissions)
   - decrease in HFC-23 produced as a by-product of HCFC-22 manufacturers
   - decrease in PFCs emission from cleaning agents and solvents due to the use of alternatives
   - decrease in SF6 emission from electric equipment due to gas management systems, etc.

New Lower GWP Refrigerant

Company: Panasonic
6. More
The way forward

- Continuous adjustment reflecting circumstances;

1) Technology development
2) Market trends
3) Multilateral agreements (amendment)
4) International information (regulation)

- Encouraging awareness and capacity building

Any questions?
Thank you for your attention