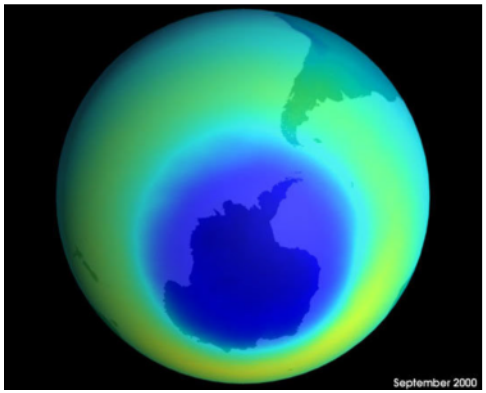

Japan's Measures for the Emission Control of Fluorinated Gases

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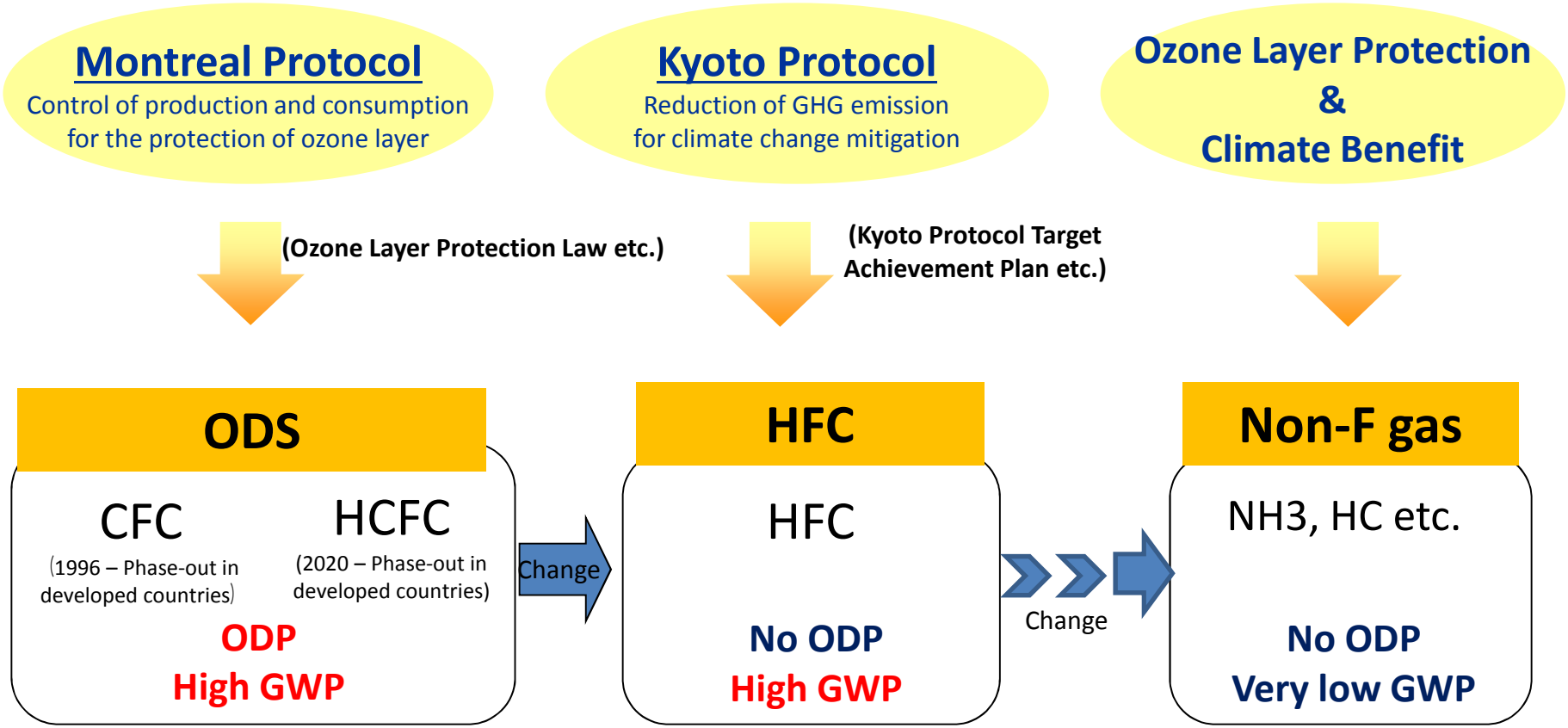

Montreal Protocol
Control of production and consumption for the protection of ozone layer
Kyoto Protocol
Reduction of GHG emission for climate change mitigation
Ozone Layer Protection & Climate Benefit
(Ozone Layer Protection Law etc.)
(Kyoto Protocol Target Achievement Plan etc.)
ODS
CFC
(1996 – Phase-out in developed countries)
HCFC
(2020 – Phase-out in developed countries)
ODP
High GWP
Change
HFC
HFC
No ODP
High GWP
Change
Non-F gas
NH3, HC etc.
No ODP
Very low GWP

Opportunities for Reducing the Emissions of Fluorocarbons from Refrigeration

Characteristics of emission

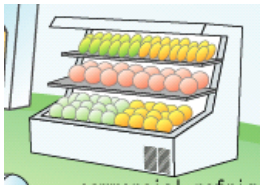
- Emission occurs in the assemble stage, the operation stage, and the disposal stage.
- Disposal emissions will occur after a long time of usage.

Opportunities for emission reduction

- To introduce alternative refrigerant (hydrocarbon, ammonia, CO2, etc.) through the promotion of green procurement and subsidies)
- To prevent leakage
- To recover the refrigerant during servicing and at the end of life of the equipment (legislation)

Japan's Legislations for the Recovery & Destruction of Fluorocarbons

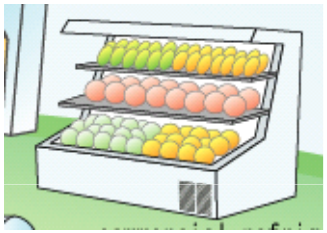
LAWS	*TARGET SECTORS*
Fluorocarbons Recovery & Destruction Law	Commercial Refrigerators Commercial A/Cs
End-of-Life Vehicle Recycling Law	Mobile A/Cs (Automobiles)
Home Appliances Recycling Law	Domestic Refrigerators Domestic A/Cs (+TVs, Washing Machines)



Fluorocarbons Recovery & Destruction Law

- *Promulgated in 2001. Came into effect in 2002. Amended in June 2006.*
- *Obliges the end users of commercial refrigerators and air-conditioners to ensure the recovery of the refrigerant (i.e. CFC, HCFC, HFC) from the equipment during the servicing and at the end of life by recovery operators.*
- *Obliges the recovery operators to ensure the destruction of the recovered refrigerant by destruction operators, unless they reuse it.*

Fluorocarbons Recovery & Destruction Law
~Commercial Refrigerators and A/Cs~



Servicing operators

End Users

Fee

Fluorocarbons

Fee

Fee
(could be paid via third party)

Fluorocarbons

Consignees
(Building dismantlers, Waste disposal operators)

Fluorocarbons

Registration

Recovery operators

Local Governments

Annual report

Annual report

Fluorocarbons

Fee

Permission

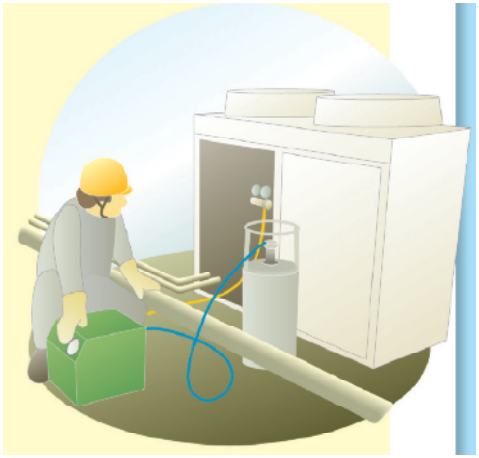
Destruction operators

National Government
(MOE & METI)

Annual report

Recovery Operators & Destruction Operators

- Around 30,000 recovery operators are registered with the local governments.
- Industrial association carries out the technician training and sets up recovery centers.



- 74 destruction operators are licensed by the national government (METI&MOE).
- Application for license should provide details on the technology to be used, the methods of management, destruction efficiency, etc. and should be renewed every 5 years.
- Several destruction technologies are in operation.

Destruction Technologies

Multipurpose technology

- Rotary kiln incinerators
- Cement kiln incinerators
- Municipal solid waste incinerators

Smaller capital cost and simpler technology

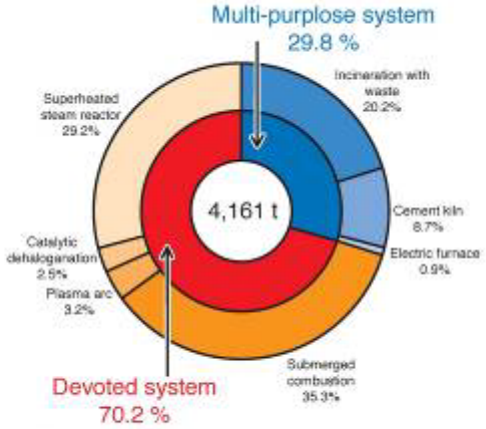
Devoted technology

- Superheated steam reaction
- Plasma
- Liquid injection incineration
- Catalytic reaction

Higher capacity of destruction
(advantage of scale)

Destruction Technologies in Operation

Destruction method	Superheated steam technology
Capacity	25kg/h (with two reaction chambers)
Disposable substances	CFC,HCFC,HFC
Alkali for neutralization	$Ca(OH)_2$
Residual waste	Solid CaF_2
Consumables	Stainless steel cylindrical chamber needs to be replaced periodically
Indicative equipment cost (for information purposes only)	50 million JPY



Quantity of fluorocarbons destroyed in Japan (FY2007)

Destruction method	Rotary kiln technology (with 10m length kiln)
Capacity	20kg/h
Disposable substances	CFC,HCFC,HFC (and waste oil, medical waste, etc.)
Alkali for Neutralization	$CaCl_2$, NaOH
Residual waste	Solid CaF_2
Indicative equipment cost (for information purposes only)	650 million JPY (new construction) When an existing rotary kiln is modified (with the attachment of a gas injection equipment), modification is possible at a cost of approx. 3 million JPY, excluding labor cost.

Destruction method	Catalyst technology
Capacity	6kg/h
Disposable substances	CFC,HCFC,HFC
Alkali for neutralization	$Ca(OH)_2$
Residual waste	CaF_2
Indicative equipment cost (for information purposes only)	35 million JPY

Location of the 74 destruction facilities in operation in Japan (as of 9.2009)

Destruction method	Cement kiln technology
Capacity	30kg/h -- 50kg/h
Disposable substances	CFC,HCFC,HFC
Alkali for neutralization	Not necessary (neutralized in the cement production process)
Residual waste	None (absorbed in the cement products)
Indicative equipment cost (for information purposes only)	777 million JPY (new construction) When an existing cement kiln is modified (with the attachment of a gas injection equipment), modification is possible at a cost of approx. 3 million JPY, excluding labor cost.

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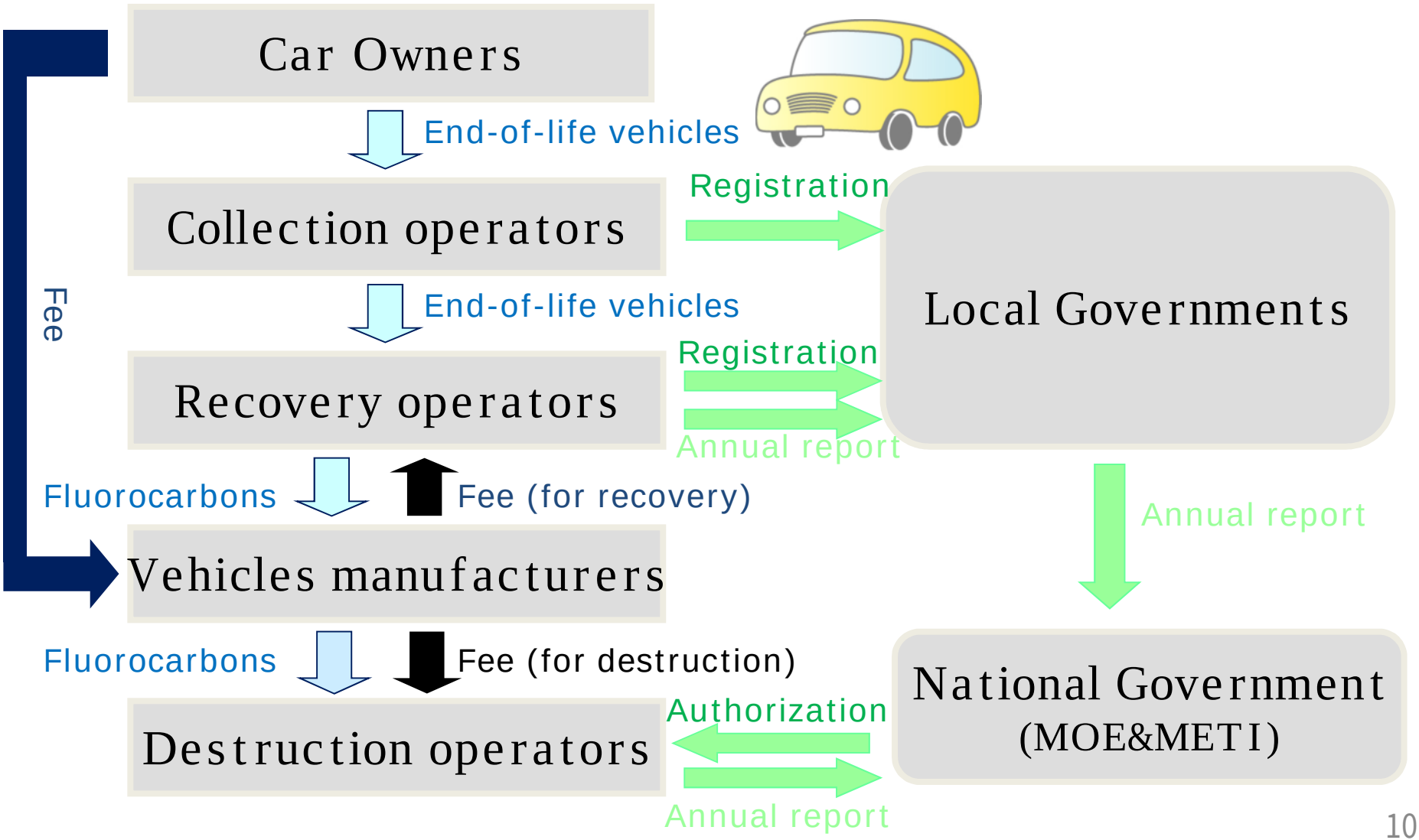
URL : http://www.env.go.jp/en/

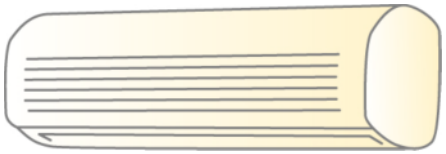
End-of-Life Vehicle Recycling Law

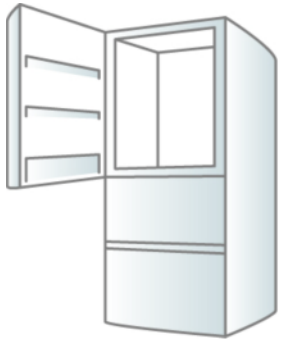
(Promulgated in 2002. Came into effect in 2005)



Home Appliance Recycling Law

(Promulgated in 1998. Came into effect in 2002)





Management through manifest system

End users

End-of-life home appliance → Fee (for collection & recycling)

Retailers

End-of-life home appliance → Fee (for recycling)

Manufacturers
Importers

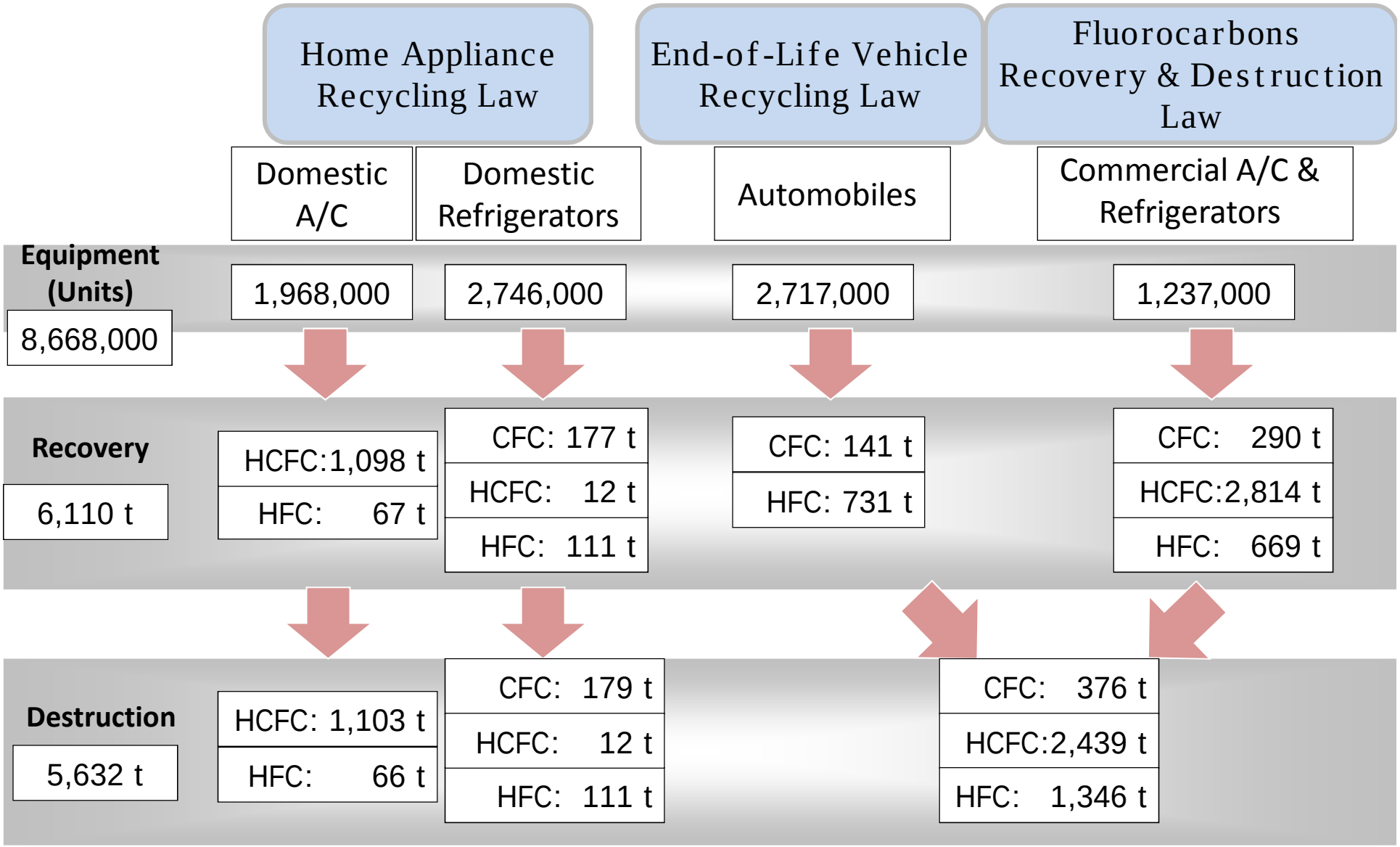
Recycle materials

Recover CFC/HCFC/HFC contained in refrigerators as refrigerant and foam insulator, and in air-conditioners as refrigerant

Recovered fluorocarbons → Fee

Destruction operators

Achievement of Recovery & Destruction (2008)



※ refrigerant only

Sharing the Experience with A5 Countries

Assistance for establishing ODS destruction capacity in Indonesia

Year: 2006-2007

Participating organizations: Japan (MOEJ, Indonesia (MOE) and Indonesian cement company

Outline: modify the cement manufacturing facility for the destruction of contaminated or surplus ODSs

- Sept 2006 : Visit to Japan for ODS Destruction Facility Benchmark
- Feb 2007 : ODS destruction facility completed, MOE Indonesia release trial permit.
- August 2007 : MOE Indonesia release permanent permit / Ministerial Decree for ODS Destruction facility

Flow Meter in feeding system

Cement Factory

Feedings Station for CFCs

Toward the *Institutionalization* of Complete Chains of F-gas Recovery, Reclamation and Disposal in Asia-Pacific

To continue, build on, and expand the cooperation with Indonesia for ODS disposal toward the goal of putting in place systemic and functional chains of F-gas recovery, reclamation where appropriate and disposal at the regional level.

- Capacity of laboratory testing (demonstration / training done in Indonesia)

- Standardization of procedures with accountable record keeping (manifest)
  - ✓Confiscated items: customs → disposal operators;
  - ✓Contaminated / unwanted items:
    Owners / servicing workshops → reclamation / disposal;
  - ✓International or long-distance transportation:
    Basel-compatible prior information procedure
- Independent but up to the standard for voluntary carbon market protocols

Next steps in Japan

- Advancement of Recovery of HFC refrigerants from refrigerators and A/Cs
  - ✓ Involvement and coordination of local governments etc.
  - ✓ Key role to be played by relevant industrial associations
- Development of the countermeasures to prevent, contain and minimize the refrigerant leakage from refrigerators and A/Cs
- Further promotion of alternatives (natural refrigerants etc.)

Thank you for your kind attention

More Information
http://www.env.go.jp/en/earth/