Regulations on Mercury in Japan

31 July 2018

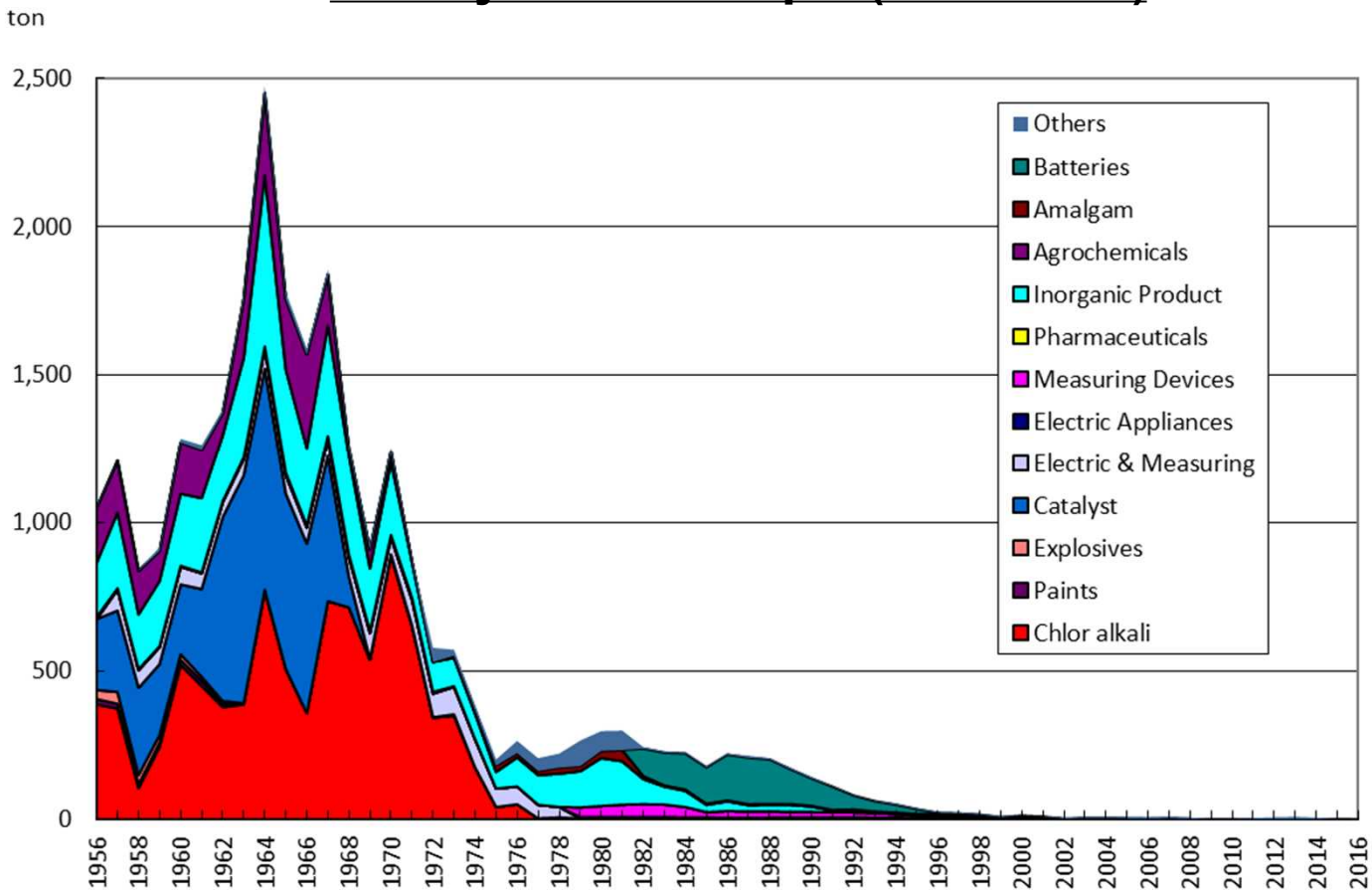
Office of Mercury Management,
Ministry of the Environment, Japan

1. Basic Mercury Status in Japan

Mercury Use in Japan

○ **Mercury demand in Japan sharply decreased after reaching a peak in 1964.**

Mercury demand in Japan (1956 ~ 2016)



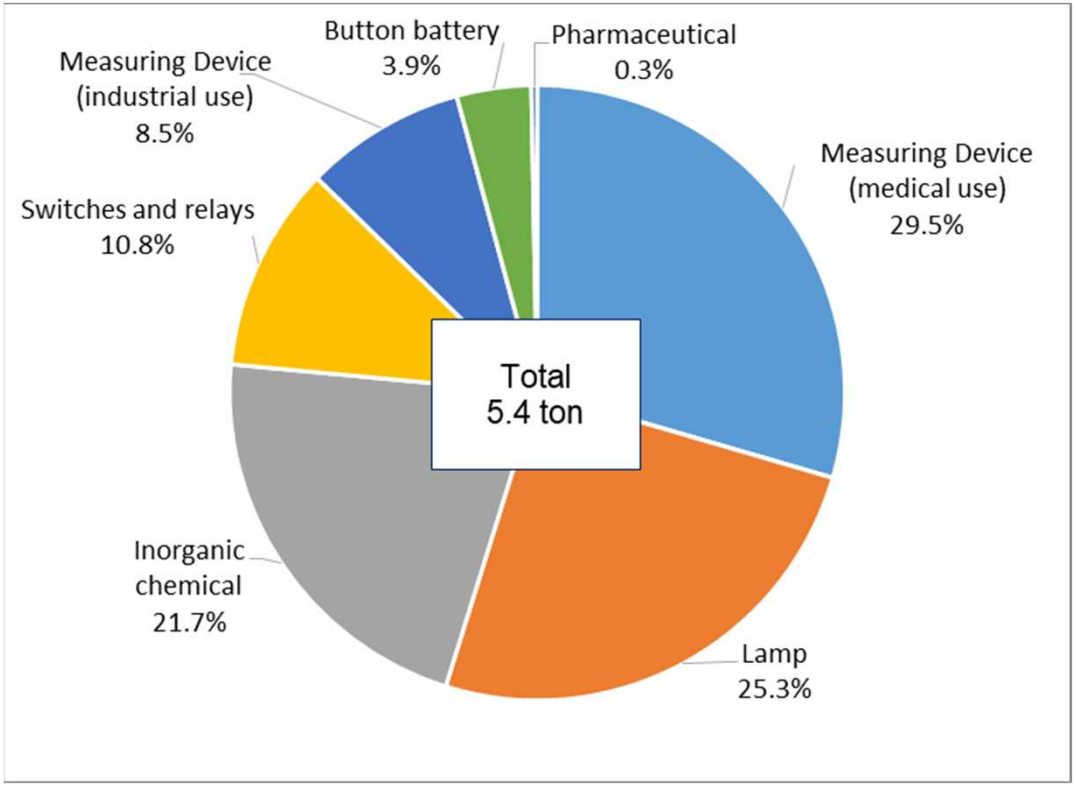
Note: Fluorescent lamps are included as measuring devices from 1957 to 1973, as electric appliances since 1979.

Source: Yearbook of Minerals and Non-ferrous Metals Statistics

Mercury Use in Japan

○ **Currently, about 5 tons of mercury are used per year (for measuring devise,lamps, and inorganic chemicals ･･･ etc.)**

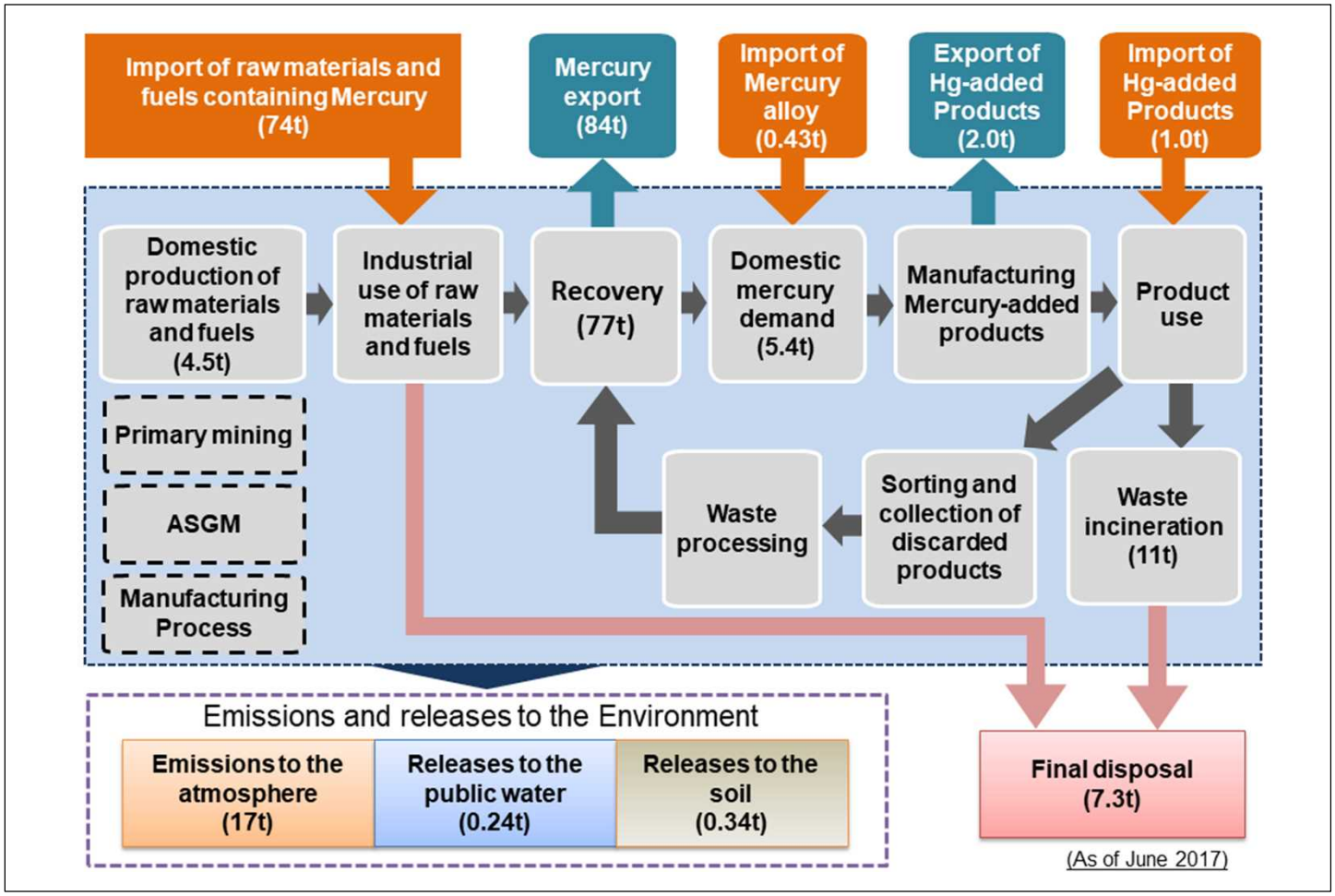
Mercury demand in Japan (2014)



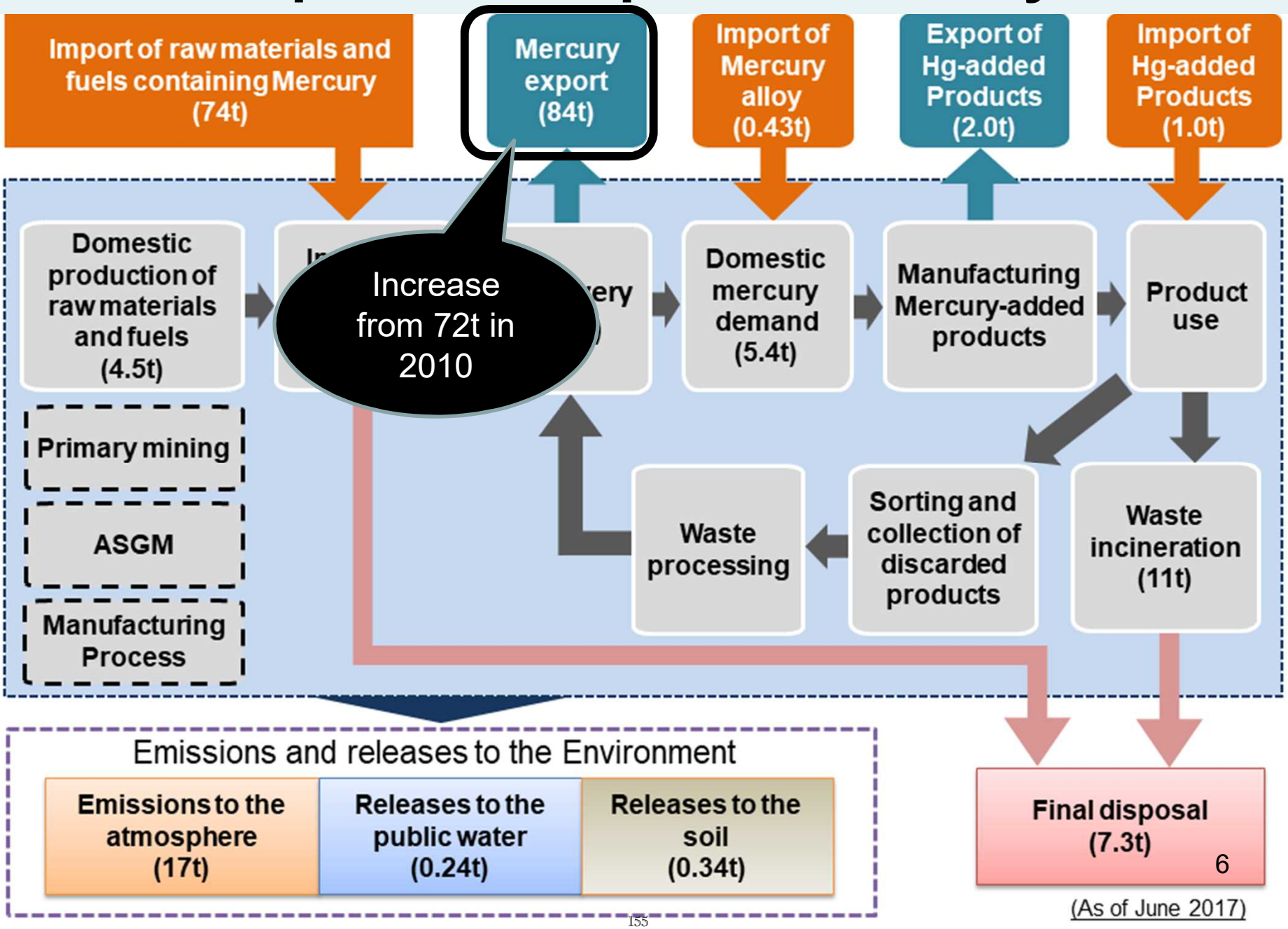
Source: Mercury Material Flow in Japan (2014)

Mercury Material Flow in Japan

1. To get the overall picture of the domestic flow of mercury
2. To identify the area where political measures should be taken
3. To review the effectiveness of policy measures



Import and Export of Mercury



Policy Implications

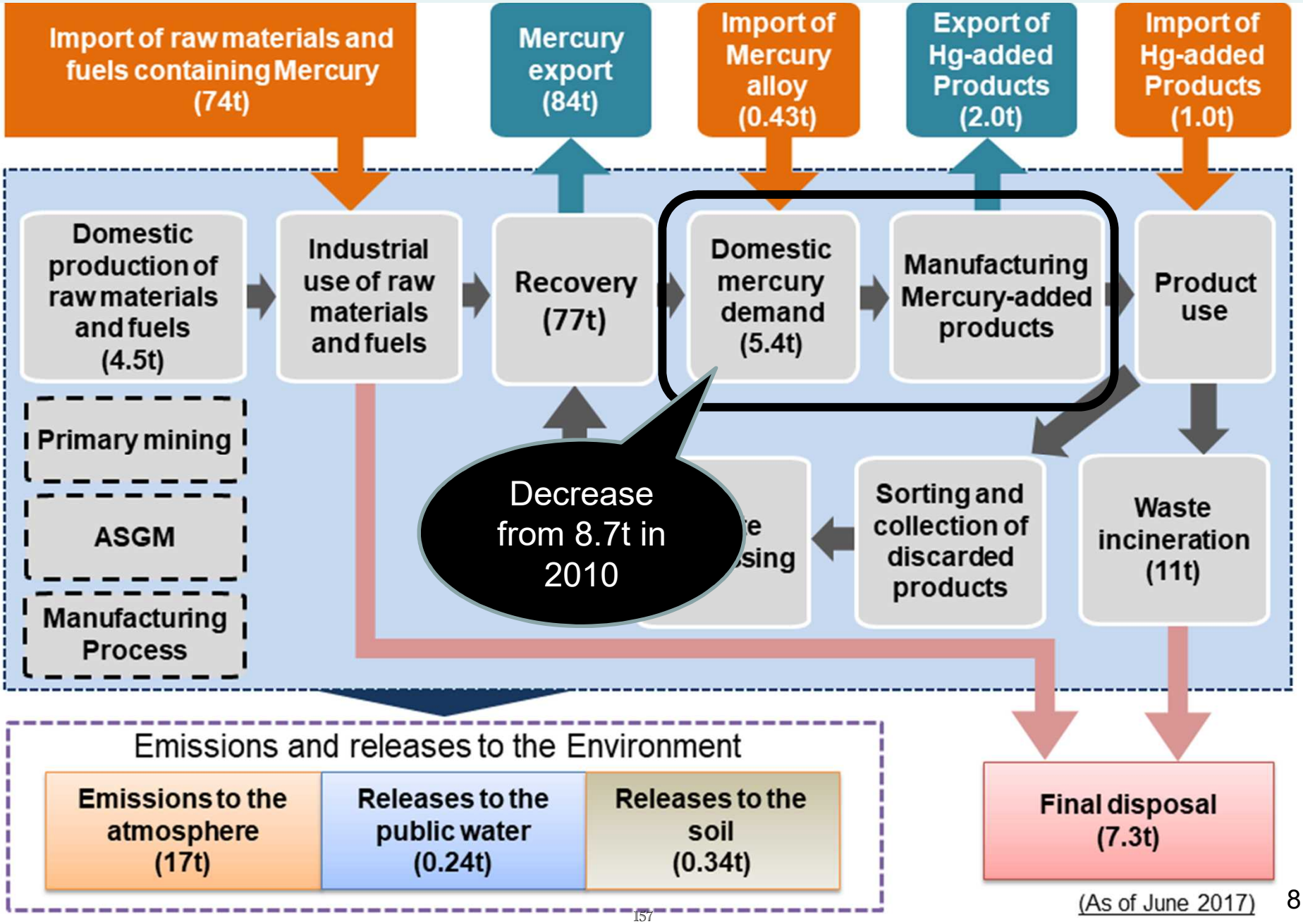
The amount of mercury export greatly exceeds the amount of mercury import

➔ The development of mercury export regulations are essential, considering the impact of exported mercury

➔ Reporting is crucial to prevent inappropriate use of mercury in the importing country

(Foreign Exchange and Foreign Trade Act)

Mercury-added Products



(As of June 2017)

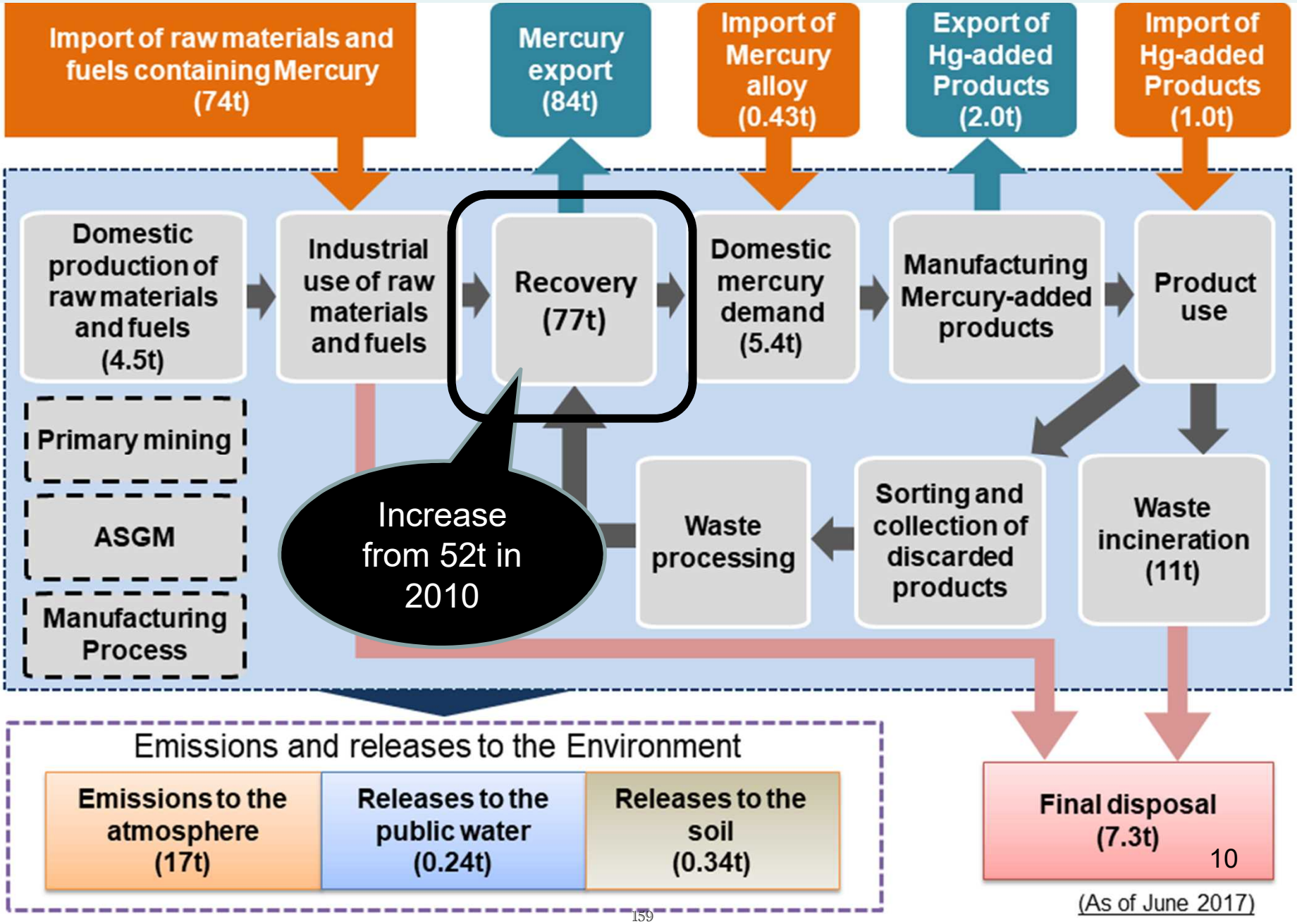
Policy Implications

Decrease in the amount of mercury used for producing mercury-added products

➔Less demand to mercury-added products, or producing less or no mercury for the same quality of the products.

➔We will examine the effectiveness of the regulation in the future. (e.g. addition to specified list)

Mercury Recovery from Wastes



Policy Implications

It is likely that wastes would continue to be generated in the future, even when the manufacture of mercury-added products is prohibited.

➔ Effective collection of discarded products should be further promoted by stakeholders, such as municipalities and industries.

In Japan, primary mercury mining does not exist, and also there is very little mercury import. Therefore, the domestic mercury demand (5.4 tons) is met by waste-recovered mercury (77 tons).

➔ After the Minamata Convention enters into force, the mercury demand is expected to decline, resulting in dis-incentives to recover mercury from waste.

➔ A framework for appropriate management of materials with high mercury concentrations (e.g. sludge generated from non-ferrous metal industry) must be discussed (e.g. long-term monitoring, institutional arrangement).

2. Outline of Domestic Regulations in Japan

Domestic Legal Framework in Japan

Primary mercury mining (para 3 of Art. 3)
Amendment of Mining Act & Establishment of a new act
(Not practiced)

Emissions / releases to the environment

Emissions to the atmosphere (Art. 8)
Amendment of Air Pollution Control Act

Releases to land and water (Art. 9)
Water Pollution Control Act

Development of inventories (para 7 of Art. 8, para 6 of Art. 9)

Mercury trade

Trade of mercury (paras 6 & 8 of Art. 3)
Amendment of the Foreign Exchange and Foreign Trade Act, etc.

Trade of mercury-added products (Art. 4)
Amendment of the Foreign Exchange and Foreign Trade Act, etc.

Mercury use

Manufacture of mercury-added products (Art. 4)
Establishment of a new act

Interim storage of mercury (Art. 10)
Establishment of a new act

Mercury use in manufacturing processes (Art. 5)
Establishment of a new act
(Not practiced)

ASGM (Art. 7)
Establishment of a new act
(Not practiced)

Disposal

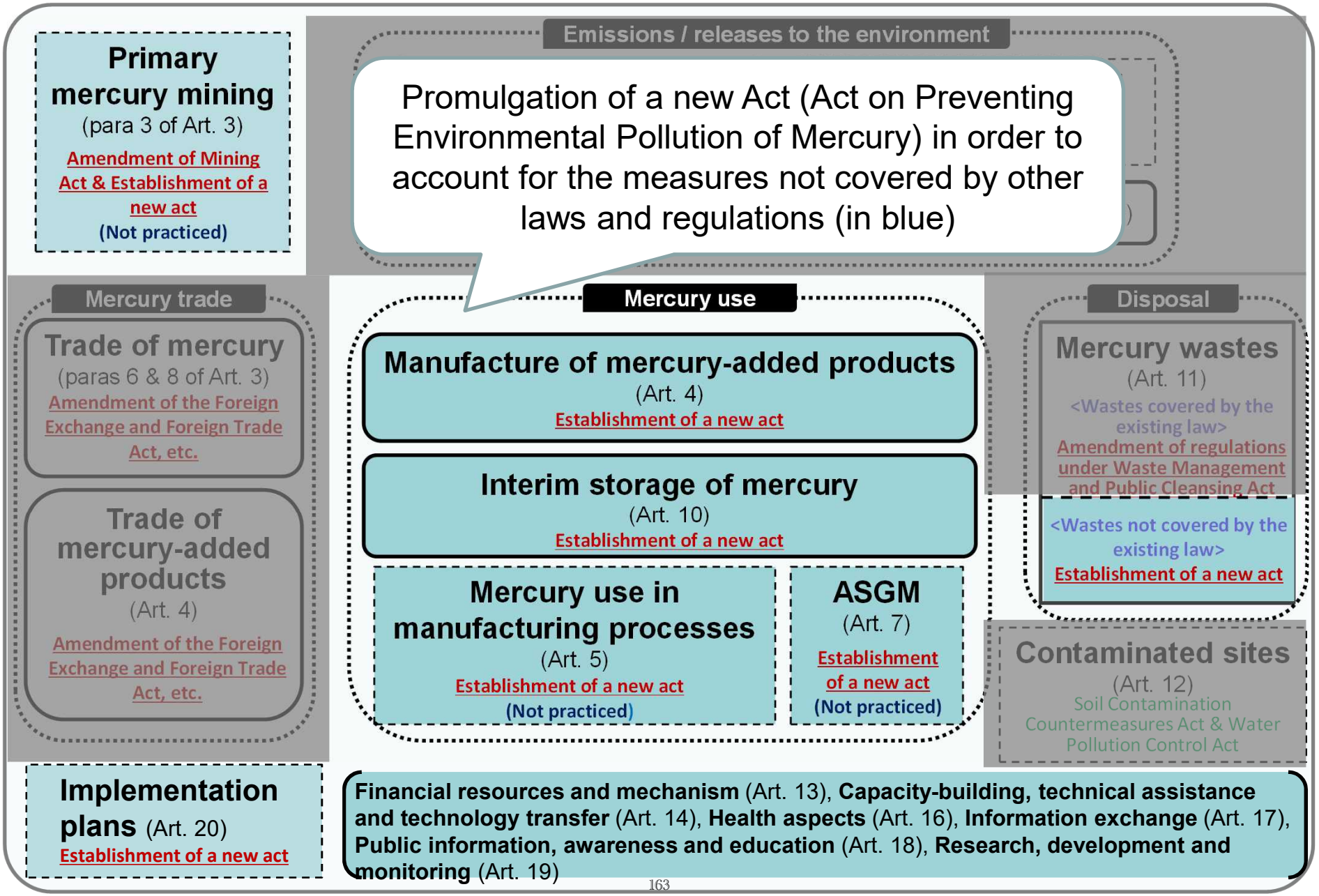
Mercury wastes (Art. 11)
<Wastes covered by the existing law>
Amendment of regulations under Waste Management and Public Cleansing Act
<Wastes not covered by the existing law>
Establishment of a new act

Contaminated sites (Art. 12)
Soil Contamination Countermeasures Act & Water Pollution Control Act

Implementation plans (Art. 20)
Establishment of a new act

Financial resources and mechanism (Art. 13), **Capacity-building, technical assistance and technology transfer** (Art. 14), **Health aspects** (Art. 16), **Information exchange** (Art. 17), **Public information, awareness and education** (Art. 18), **Research, development and monitoring** (Art. 19)

Act on Preventing Environmental Pollution of Mercury



Laws to Implement the Minamata Convention

Name	Descriptions
Act on Preventing Environmental Pollution of Mercury	**
Foreign Exchange and Foreign Trade Act	Export and import of mercury and mercury-added products
Air Pollution Control Act	Emissions
Waste Management and Public Cleansing Act	Mercury wastes
Mining Act	Mercury mining
Act on Promotion of Dental and Oral Health	Dental amalgam
Health Insurance Act, National Health Insurance Act	Dental amalgam
National Public Servants Mutual Aid Association Act, Local Public Officers, etc. Mutual Aid Association Act	Dental amalgam
Act on Assurance of Medical Care for Elderly People	Dental amalgam
Water Pollution Control Act	Releases, Contaminated sites
Act on the Control of Import, Export, etc. of Specified Hazardous Wastes and Other Wastes	Mercury wastes
Mining Safety Act	Mercury wastes, Contaminated sites
Soil Contamination Countermeasures Act	Contaminated sites

**: Various measures that do not fall under other legislations

2.1 Outline of Act on Preventing Environmental Pollution of Mercury

Structure of the Act

Chapter 1 General provisions
Chapter 2 National implementation plans on preventing mercury pollution

1. Primary mercury mining

Chapter 3 Prohibition of primary mercury mining

2. Mercury use

Chapter 4 Measures on manufacture and distribution in commerce of mercury-added products
Chapter 5 Measures on manufacturing processes in which mercury or mercury compounds are used
Chapter 6 Prohibition of gold extraction methods using mercury or mercury compounds
Chapter 7 Measures on storage of mercury or mercury compounds

3. Disposal

Chapter 8 Measures on management of recyclable materials containing mercury

Chapter 9 Miscellaneous provisions、 Chapter 10 Penal provisions

Chapter 1 General Provisions

＜Objective＞

○ To take measures, which cover the following areas, ensuring appropriate and smooth implementation of the Minamata Convention on Mercury in order to prevent environmental pollution of mercury in collaboration with internationally community

○To contribute to the protection of human health and the living environment through the control of emissions/releases of mercury to the environment, by coupling with Waste Management and Public Cleansing Act and other laws and regulations related to mercury.

Chapter 2 National Implementation Plans

○ Prepare the **"National implementation plan on preventing mercury pollution"** and follow up with measures that comprehensively address the total lifecycle of mercury

＊ Corresponds to "National Implementation Plan" under the Minamata Convention

【Issues addressed in the plan】

- ✓ Basic items to prevent mercury pollution
- ✓ Basic items regarding measures to be undertaken by the national and local governments, businesses and the public in order to prevent mercury pollution
- ✓ Other important issues in order to ensure an appropriate and smooth implementation of the Minamata Convention.

Chapter 3 Primary Mercury Mining

○ Prohibition of the mining of mercury ores（Article 4 of the Act)

＊ In Japan, all mines of mercury ores has already been shut down.

Chapter 4 Mercury-added Products

○ For mercury-added products, “Mercury-added products” and **“Specified mercury-added products”** have been defined.

○ In principle, the manufacture of the specified mercury-added products is prohibited (including assembling to other products). When the manufacture of the specified mercury-added product is intended, permission from the corresponding competent minister is required.

Early Phase-out and Lowering Thresholds

Product		Lower mercury contents	Earlier phase-out date（2020 in the Convention）
Batteries	Dry cell battery	No limit in the Convention (No use of mercury)	By the end of 2017 (Taking into account the dissemination period although dry cells are mercury free)
Batteries	Alkaline button battery	No limit in the Convention (No use of mercury)	Pursuant to the Convention (by the end of 2020) (Companies exist that cannot make mercury free)
Batteries	Silver oxide button battery	Further restriction from below 2% to 1%	By the end of 2017 (Taking into account dissemination period although the mercury concentrations have been achieved in general)
Batteries	Zinc-air button battery	Pursuant to the Convention (below 2 wt.%) (Concerns about safety and deterioration)	
Switches and relays		No limit in the Convention (No use of mercury)	Pursuant to the Convention (by the end of 2020) (Transition to mercury-free alternatives will take some time due to a variety of stakeholders)
Fluorescent lamps	Compact fluorescent lamps (CFLs) for general lighting	Pursuant to the Convention	By the end of 2017 (Taking into account dissemination period although the mercury contents have been achieved in general)
Fluorescent lamps	Linear fluorescent lamps (LFLs) for general lighting	Pursuant to the Convention	
Fluorescent lamps	Cold cathode fluorescent lamps (CCFL) and external electrode fluorescent lamp (EEFL) for electronic displays	Pursuant to the Convention	
Fluorescent lamps	General high pressure mercury vapor lamp (HPMV) for lighting	No limit in the Convention (No use of mercury)	Pursuant to the Convention (by the end of 2020) (Transition to mercury-free alternatives will take some time)

Early Phase-out and Lowering Thresholds

Product	Lower mercury contents	Earlier phase-out date（2020 in the Convention）
Cosmetics	Further restriction from below 1ppm to non-use of mercury	By the end of 2017 (Taking into account the dissemination period although the products have been mercury free)
Agricultural chemicals (pesticides, biocides)	No limit in the Convention (No use of mercury)	By the end of 2017 (Taking into account the dissemination period although the products have been mercury free)
Pharmaceutical products (biocides, topical antiseptics)	No limit in the Convention (No use of mercury)	Pursuant to the Convention (by the end of 2020) (Transition to mercury-free alternatives will take some time due to a variety of stakeholders)
Non-electronic measuring devices (barometer, hygrometer, manometer, thermometer, sphygmomanometer)	No limit in the Convention (No use of mercury)	Pursuant to the Convention (by the end of 2020) (Medical devices (sphygmomanometer, fever thermometer): need some time for the adjustment of medical practices) (Industrial devices: need some time for the transition to mercury-free alternatives because those products are produced by small and medium-sized enterprises)

Mercury contents, phase-out dates, and specified mercury-added products will be reviewed based on the status of industry's initiatives and trends of technical development (including market monitoring by conducting sample purchase and identification of trends of technical development by domestic companies).

Mercury-added Products for New Purposes

○ Stipulation of measures for controlling the manufacture of mercury-added products for new purposes (**new mercury-added products**) in future.

- ✓ Manufacture or sale of such new mercury-added products shall not be allowed except when their use contributes to the protection of human health and the living environment.
- ✓ When the manufacture or sale of a new mercury-added is being considered, a self assessment to determine whether the use of the product contributes to the protection of human health and the living environment shall be carried out, and the notification to the competent minister should be carried out.

Chapter 5 Manufacturing Processes

○ Prohibition of the use of mercury or mercury compounds in manufacturing processes requiring regulation determined by the cabinet order

✓Manufacturing processes subject to regulation have already been abolished in Japan.

Chapter 6 Using Mercury for Gold Extraction

○ Prohibition of the extraction of gold from gold ores using mercury or mercury compound

＊ In Japan, extraction of gold using mercury is not carried out .

Chapter 7 Storage of Mercury

○ For environmentally sound management of mercury and mercury compounds, to require individuals storing the target materials to carry out storage according to **guidelines** specified by the government.

Target: Mercury, mercury (I) chloride, mercury (II) oxide, mercury (II) sulphate, mercury (II) nitrate, cinnabar and mercury sulphide. Mercury concentration of at least 95 per cent by weight (cinnabar ore to be stipulated appropriately)

Target of the guidelines: Individuals currently storing mercury and mercury compounds

Contents of the guidelines:

- ✓ Store in a container (or packaging) with no possibility of scattering, leakage or seepage
- ✓ Display the name, components and the content in the container (or packaging) and the storage place (warehouse)
- ✓ While storing, use facility that can be locked or use a durable fence
- ✓ When contracting out the storage of mercury and mercury compounds, pass on information indicating that the storage items are covered by this act.

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Chapter 7 Storage of Mercury

○ When storing more than a specified amount of mercury, periodically report on the status to the competent minister

- **Requirements of periodic reporting**:

  When at least 30kg of target chemicals is stored

- **Individuals subject to periodic reporting**:

  Individuals currently storing target mercury or mercury compounds (when the storage is contracted out, the contractor is responsible)

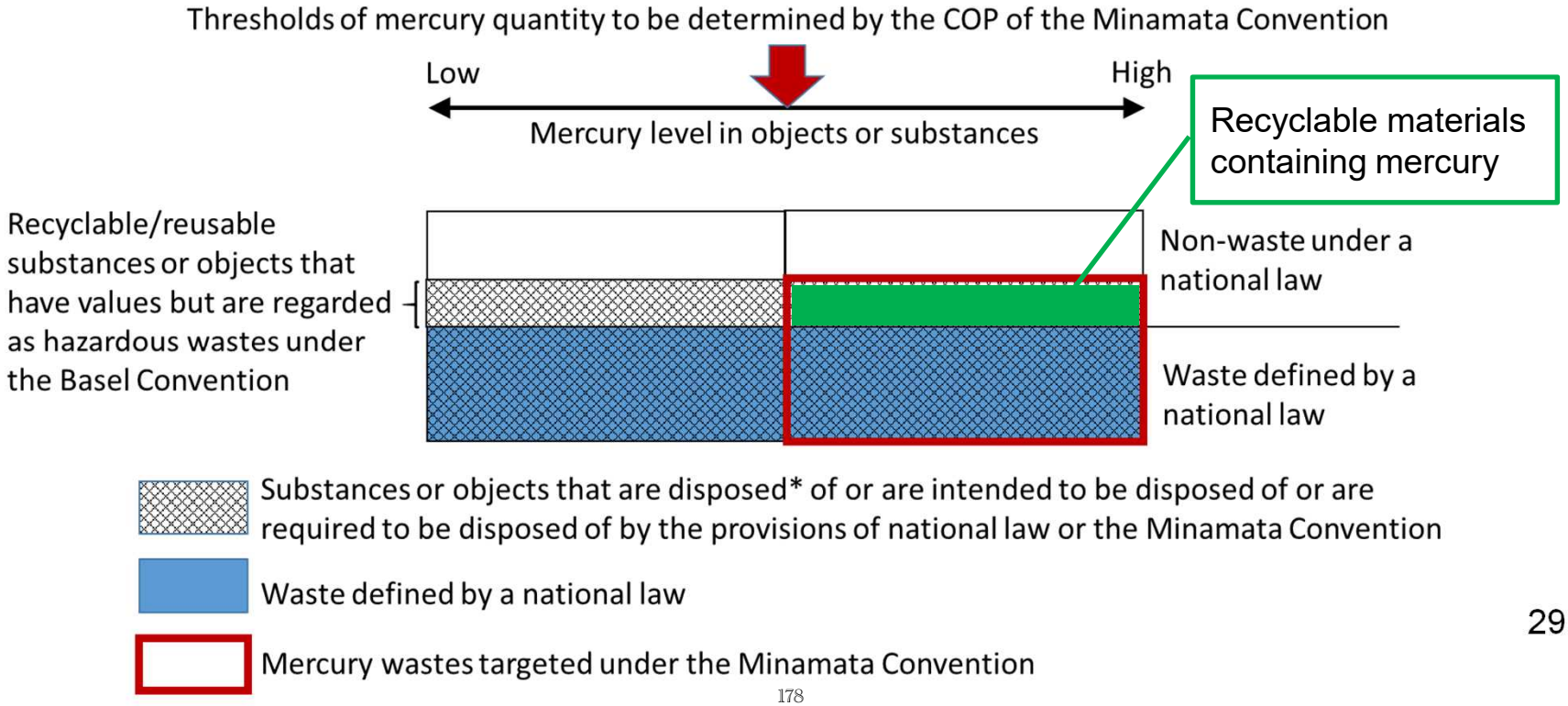
- **Reporting items and method**:

  Annual reporting on the state of storage, purpose of storage, annual balance, amount used by usage, amount transferred to waste under the Waste Management and Cleansing Act

Chapter 8 Recyclable Materials Containing Mercury

○ Mercury waste according to the Minamata Convention includes items not classified as waste by the Waste Management and Public Cleansing Act of Japan (e.g. non-ferrous metallurgical smelting sludge)

→ **"Recyclable materials containing mercury"** is defined to ensure compliance with the Minamata Convention.



Chapter 8 Recyclable Materials Containing Mercury

○ Require individuals managing recyclable resources containing mercury to adhere to guidelines specified by the government

Targets of the guidelines:

Individuals managing recyclable resources containing mercury (when the storage, transportation etc. is contracted out, require the contractor to adhere to the same guidelines)

Content of the guidelines

1）Guidelines common to management as a whole:

- Prevent scattering and spill
- Ensure that no impact to the protection of the living environment occurs due to foul smell, noise or vibration
- When contracting out storage or transportation, pass on all the relevant information so that the contractor can also take necessary measures specified by the guidelines
- When handing over to other individuals resulting in change of ownership, pass on information indicating that the material being handled is recyclable resource containing mercury.

2）Guidelines specific to storage:

- Store in containers (or packaging) with no chance of scattering, leakage or seepage
- While storing, use facility that can be locked or use a durable fence
- Display “recyclable resource containing mercury” in the container (or packaging) and the storage place (warehouse)

Chapter 8 Recyclable Materials Containing Mercury

○ Individual managing “recyclable resource containing mercury ” to carry out periodic reporting to the competent minister

- Individuals with obligation to carry out periodic reporting: Individuals managing “recyclable resource containing mercury ” (When contracting out storage or transportation, the individual carrying out the management to report the state of transportation and storage being carried out by the contractor)
- Reporting items and method: Annual reporting on the state of management, purpose, annual balance, amount disposed of by type of disposal operation (or amount used by type of usage) and amount transferred to waste under the Waste Management and Cleansing Act

∗ Even if certain substance transfers from “recyclable resource containing mercury” to waste under the Waste Management and Cleansing Act, the amount disposed of recyclable materials containing mercury can be precisely identified.

2.2 Outline of Mercury Waste Management in Japan

Waste Management Laws and Regulations

- ***Waste Management and Cleansing Act***
  - ✓ Defines "Wastes" as "solids or liquid that are litter, bulky wastes, burnt residues, sludge, feces, waste oil, waste acid, waste alkali, dead animals, and other filth or unwanted objects (except for radioactive materials)".
  - ✓ Basically, valueless materials are covered.

Basel Convention

"Wastes" is defined as "substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law", which shall apply to mercury wastes.

- ***Law for the Control of Export, Import & Others of Specified Hazardous Wastes and Other Wastes***
  - ✓ "Wastes" is defined same as the Basel Convention.
  - ✓ Basically, wastes whose mercury concentration is 0.1 wt% or higher are covered.

Japan's policy on mercury wastes

a) Wastes consisting of mercury or mercury compounds

- Establishment of new treatment method and final disposal
- Consideration of ensuring long-term management in an environmentally sound manner

b) Wastes contaminated with mercury or mercury compounds

- Obligation of mercury recovery from highly contaminated wastes

c) Wastes containing mercury or mercury compounds (Waste mercury-added products)

- Strengthening of treatment methods
- Obligation of mercury recovery from those containing elemental mercury
- Promotion of collection as mercury wastes

Category of mercury wastes in Japan

New Newly added by the latest amendments

＜Specially Controlled Waste＞

○**Municipal wastes consisting of mercury or mercury compounds** New

・Mercury recovered from waste mercury-added products discarded from households

○**Industrial wastes consisting of mercury or mercury compounds** New

・Waste mercury or mercury compounds discharged from specified facilities

・Mercury recovered from waste mercury-added products discarded from non-households

・Treated waste mercury for final disposal (excluding residues generated from purifying waste mercury)

○**Wastes contaminated with mercury or mercury compounds**

・Waste(*) whose leachate contains at least 0.005 Hg-mg/L.

＜Industrial Waste＞

○“Dust and others containing mercury” New

・Waste(*) contaminated with mercury with a concentration of at least 15 Hg-mg/kg

○“Industrial wastes of mercury-added products” New

・Specific products such as fluorescent lamps, pesticide, manometers etc.

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(*) burnt residues, dust, sludge, waste acid, waste alkali, and slag

Waste Incineration Facility in Japan

Almost all combustible wastes are burnt in incineration facilities.

<Management standard>

- Burning temperature : ≥ 800 degrees Celsius
- Residence time: ≥ 2 seconds

<Emission standard on Mercury> New

- Flue Gas (μg/Nm^3)

	New	Existing
Grate area is >2m^3 or incineration capacity is 200kg/h	≤30	≤50
Treating wastes with high Hg concentration	≤50	≤100

- Wastewater

  Total mercury: ≤0.005mg/L

  Alkyl mercury: Not detected

Waste Incineration Facility

Reference : Basel Convention Technical Guidelines on Incineration on land

Waste Landfill in Japan

Three types of waste landfills

Type of landfill	Waste to be disposed
Non-leachate-controlled (for stable wastes)	Industrial Wastes – Plastics, Rubber, Metals, Glass, Concrete, Ceramics, and Debris except hazardous waste
Leachate-controlled	Municipal Wastes Industrial Wastes not exceeding the elution std.
Isolated	Industrial Wastes exceeding the elution std. (0.005mg/L)

<Effluent Standard>

・Wastewater (treated leachate)

Total mercury: ≤0.005mg/L

Alkyl mercury: not detected

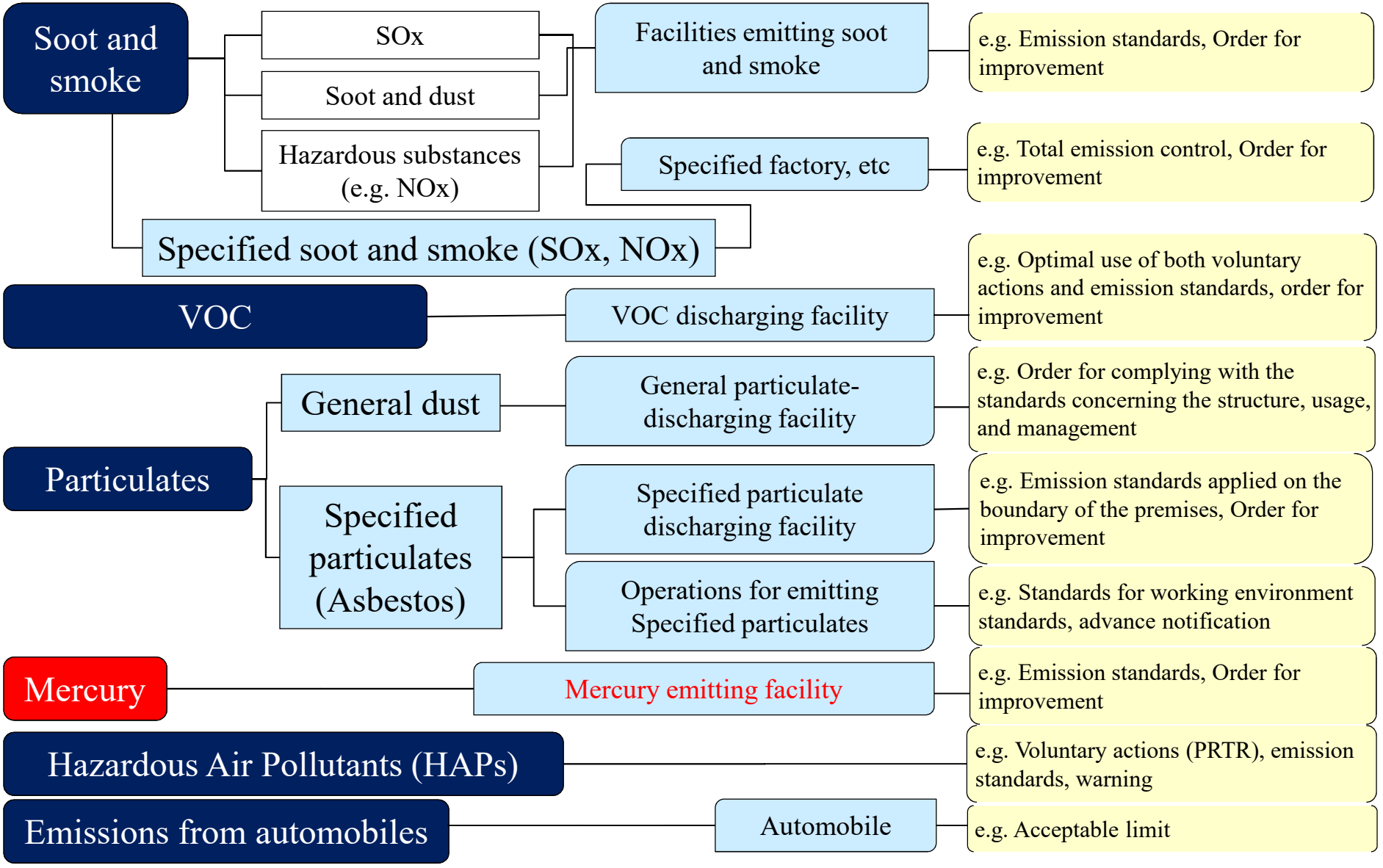
Cf. National environmental standard on total mercury for public water is ≤0.0005mg/L

Waste Landfill

Reference :Practical Sourcebook on Mercury Waste Storage and Disposal

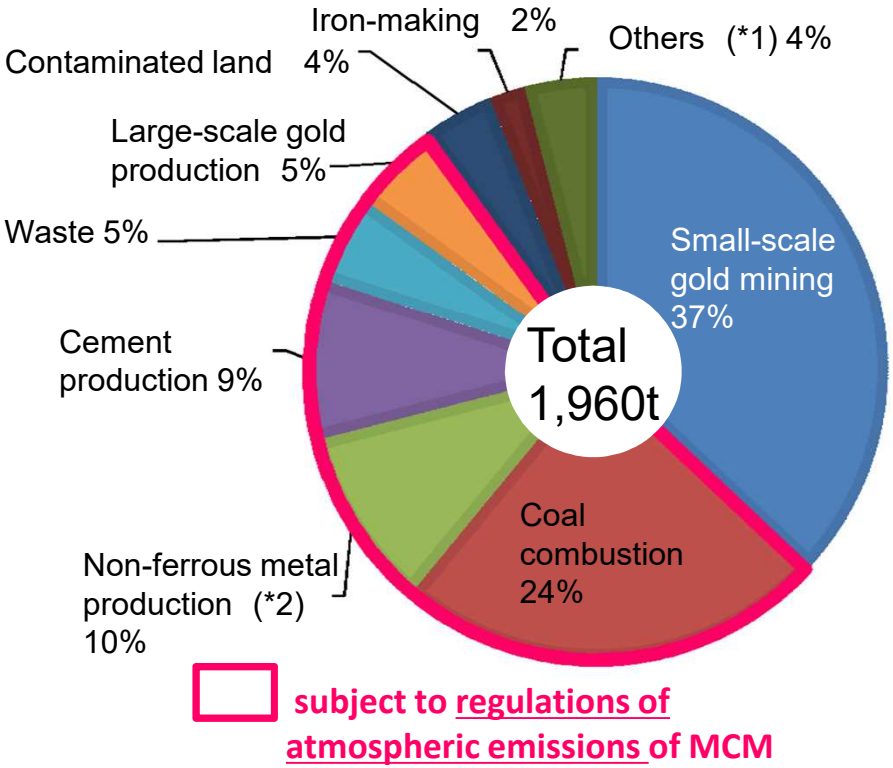
2.3 Outline of Air Quality Protection Measures in Japan

Structure of the APCA



Current Status of Mercury Emission to Air

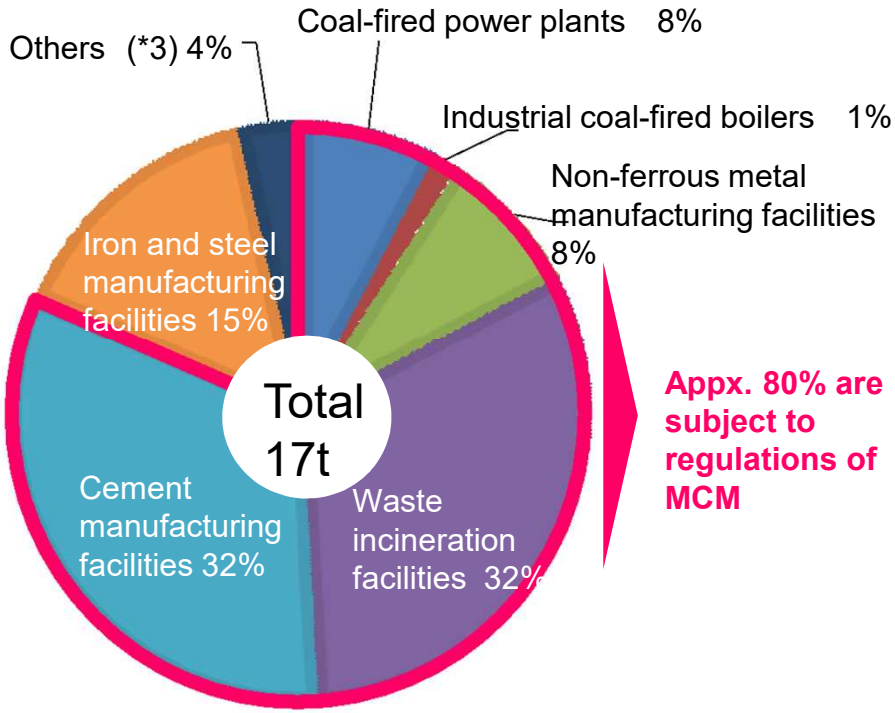
Amount of Atmospheric Emissions in the world by Source (2010)



*1 Chlor-alkali industry (1%) Mercury mining (1%) Oil refining (1%) Oil and natural gas combustion (1%) Dental amalgam (<1%)
*2 Aluminum, copper, lead, zinc

(Source) Global Mercury Assessment (UNEP 2013)

Amount of Atmospheric Emissions in Japan by Source (FY2014)



*3 Manufacturing lime products, oil refining, etc.

(Source) Inventory of Atmospheric Mercury Emissions (FY2014)

Principles for establishing emission standards

1. **Reduction of the total amount of mercury circulating in the environment**

   The objective is rather to reduce the total amount of mercury circulating in the environment under the Minamata Convention, than preventing impacts on human health caused by direct inhalation of mercury in the atmosphere (*The current concentration level of mercury in the atmosphere under the general environment is substantially lower than the level required to take measures to reduce risks on human health).

2. **Standards should consider the average emission level under business-as-usual circumstances**

   The amount of mercury emissions is influenced by the mercury content of raw materials and fuels (*A temporal increase of emission above the standard is not considered as violation).

3. **The emission standards are determined based on the Best Available Techniques (BAT)**

   The emission standard assumes different BAT according to the type of facility.

4. **The newly constructed facilities and existing facilities have different emission standards**

   The existing facilities shall be treated as new facilities when they are re-established to an significant extent.

Emission Standards for Regulated Facilities

Sources under the Minamata Convention	Mercury discharging facilities under the APCA[1]		Emission standards (μg/Nm^3)		Actual emissions (μg/Nm^3) (the average concentration)	
			New	Existing	Measured by MOE Method	Measured by others
Coal-fired power plants; Coal-fired industrial boilers	Coal-burning boiler Large-scale coal-mix burning boiler		8	10	0.1-4.4 (1.2)	0.1-13 (1.2)
	Small-scale coal-mix burning boiler[2]		10	15	<0.1-16 (1.9)	0.1-6.2 (1.3)
Smelting and roasting processes used in the production of non-ferrous metals (copper, lead, zinc, and industrial gold)	Primary smelting	Copper or industrial gold	15	30	Copper <0.1-1.2 (0.5)	Copper <0.1-18 (2.4)
		Lead or zinc	30	50	Zinc 0.1-39 (9.4)	Zinc 0.4-150 (26)
	Secondary smelting	Copper, lead, or zinc	100	400	Copper 0.1-360 (66) Lead <0.1-2300 (29) Zinc <0.1-1100 (90)	Copper 33-710 (370) Lead 1.8-2000 (563) Zinc 0.5-1600 (280)
		Industrial gold	30	50	Gold <0.1-11 (2.0)	Gold 430
Waste incineration facilities	Waste incinerator (general, industrial, and sewage sludge)		30	50	<0.1-380 (11)	<0.1-300 (17)
	Incinerator for mercury contaminated sludge, etc.		50	100	---	12-200 (84)
Cement clinker production facilities	Combustion furnace used for cement production		50	80[3]	0.9-260 (46)	0.2-220 (39)

1 An exempted scale for a soot and smoke discharging facility under the Air Pollution Control Law shall apply mutatis mutandis. An exempted scale is not established for the incinerator of mercury contaminated sludge.

2 Boiler of which the combustion ability of the burner is below 100,000L/h, if either its grate area is above 10m^2 or the combustion ability of the burner is above 50L/h (equivalent to fuel oil).

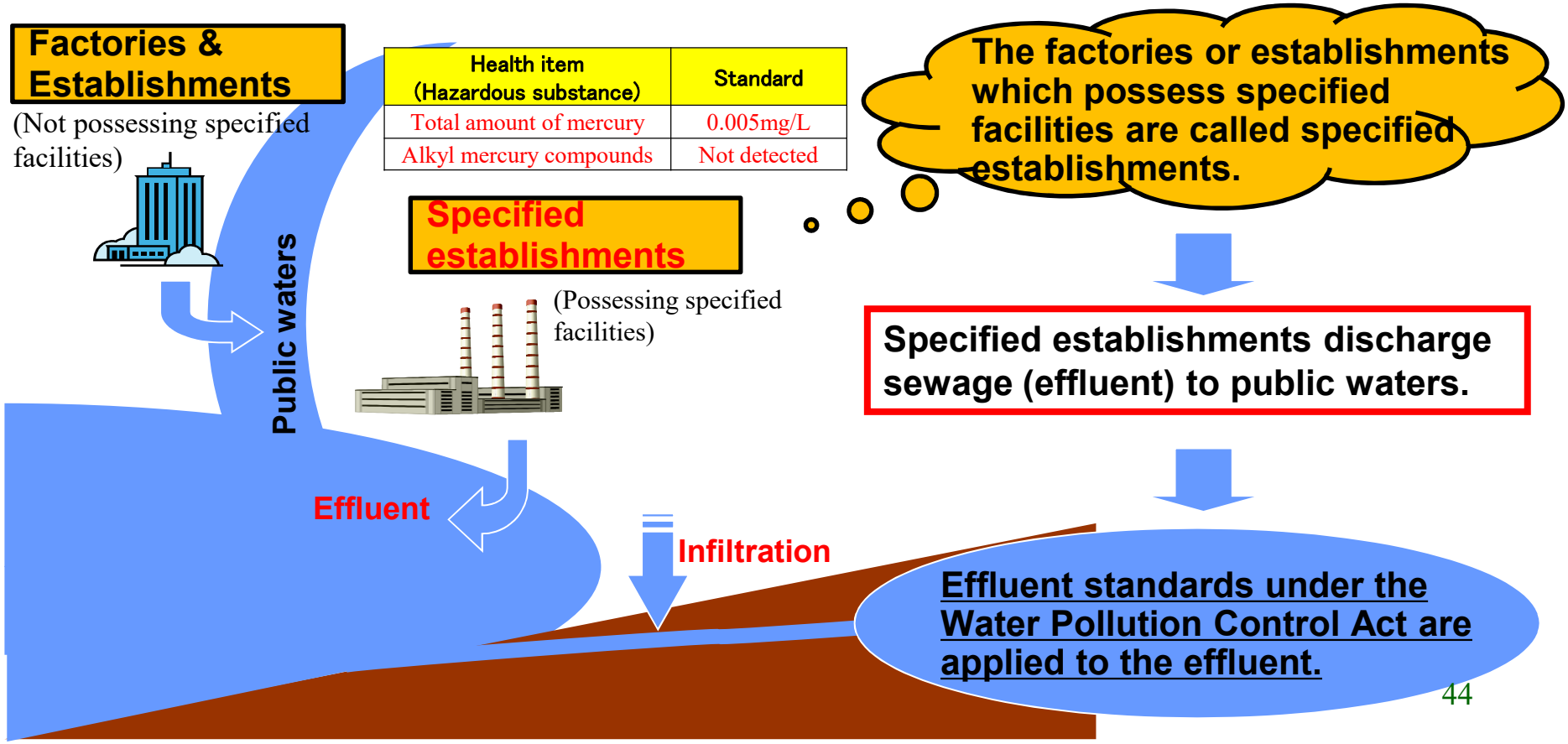
3 140μg/Nm^3 for those limestones used as a material of which the quantity of mercury content is above 0.05 mg-Hg/kg (weight ratio).

2.4 Outline of Water Pollution Prevention Act

Uniform National Effluent Standards

Uniform National Effluent Standards (Concentration Regulation)

- ✓ The Act stipulates effluent standards that are uniform across all industries for the specified establishments throughout the country.
- ✓ The control is carried out using the so-called "direct penalty system" by which penalties can be applied simply because of excess concentrations.



Overview of Water Pollution Prevention Act

Nationwide regulations on factories or commercial facilities

Regulation prior to the establishment of the facilities:

✓ Report installation or change of specified facility【Order to change plan】

Regulation during operation:

✓ Effluent regulations【Penalty】

✓ On-site inspections【Order remedy】

✓ Regulation of infiltrating into groundwater【Order to take measures】

Emergency measures :

✓ Emergency measures & report of accidents【Order to take emergency measures】

Water Quality Monitoring at Public Water Area by prefectural governments

Domestic Waste Water Control

Total pollutant load control in enclosed coastal seas

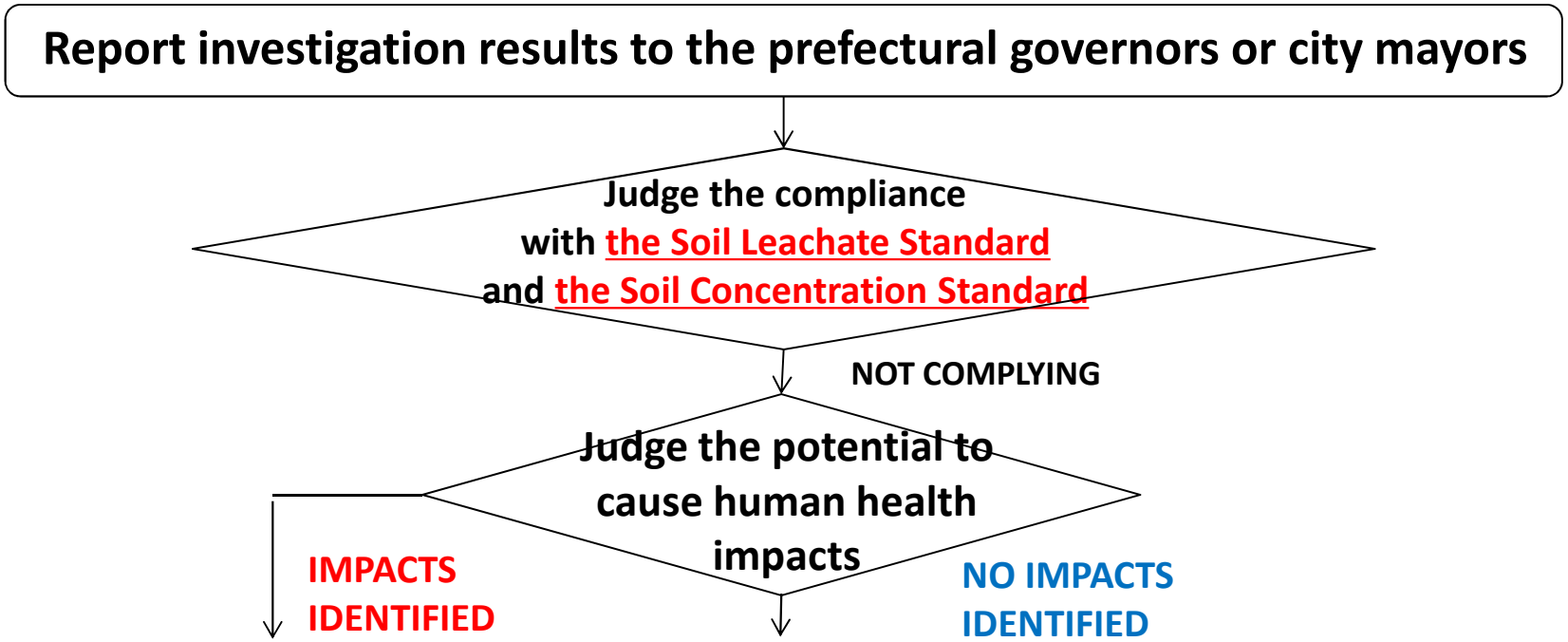
2.5 Outline of Soil Contamination Countermeasure Act

Soil Leachate Standards

○ There are soil leachate standard and soil concentration standard with Mercury and its compounds.

Designated hazardous substances (Article 2 of the Act)		Designation standard (Article 5 of the Act)	
		Soil Leachate Standard	Soil Concentration Standard
Class 2 (Heavy metal)	Cadmium and its compounds	≤ 0.01mg / L	≤ 150mg / kg
	Hexavalent Chromium compounds	≤ 0.05mg / L	≤ 250mg / kg
	Cyanides compounds	<detection limit	As isolated cyanides ≤ 50mg / kg
	Mercury and its compounds	≤ 0.0005mg /L Alkyl Mercury Less than detection limit	≤ 15mg / kg
	Selenium and its compounds	≤ 0.01mg / L	≤ 150mg / kg
	Lead and its compounds	≤ 0.01mg / L	≤ 150mg / kg
	Arsenic and its compounds	≤ 0.01mg / L	≤ 150mg / kg
	Fluorine and its compounds	≤ 0.8mg / L	≤ 4000mg / kg
	Boron and its compounds	≤ 1mg / L	≤ 4000mg / kg

Soil Contamination Countermeasures Act



Area which requires action

- ✓ As the zone has the potential to cause human health impacts,
- ✓ countermeasures including removing contamination is required
- ✓ Prohibition for altering the characteristics of land

Area which requires notification in changing land form

- ✓ As this zone has no potential to cause human health impacts,
- ✓ it is unnecessary to conduct measures to remove contamination
- ✓ A notification is necessary when there are plans to change the form