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Recovery of Clean Water
Waste Management System in Japan

Water & Waste Eng.
2020/06/19

名古屋大学減災連携研究センター
Disaster Mitigation Research Center, NAGOYA UNIVERSITY

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Recovery of clean water; laws, regulations and technology for water pollution control

- the historical background of water pollution and the conditions of under which the Minamata and Itai-itai diseases occurred are explained.
- the purpose of laws; to prevent water pollution
- more stringent prefectural standards, wastewater treatment systems and technologies for improving of water quality, and monitoring systems by telemeter.

Solid Waste Management System in Japan

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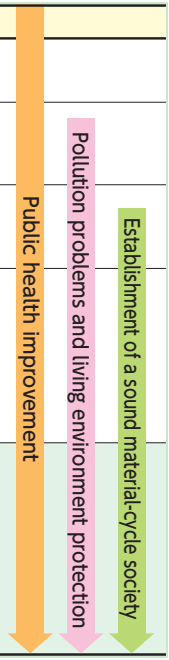
History of legal systems regarding the development of a sound material-cycle society

Period	Major issues	Laws enacted
Post-war period to the 1950s	• Waste management for environmental sanitation • Maintenance of a healthy and comfortable living environment	• Public Cleansing Act (1954)
1960s to 1970s	• Increase in the amount of industrial waste and emergence of pollution problems as a result of rapid economic growth • Waste management for environmental protection	• Act on Emergency Measures concerning the Development of Living Environment Facilities (1963) • Waste Management Act (1970) • Revision of the Waste Management Act (1976)
1980s	• Promotion of the development of waste management facilities • Environmental protection required for waste management	• Wide-area Coastal Environment Development Center Act (1981) • Private Sewerage System Act (Johkasoh Law) (1983)
1990s	• Waste generation control and recycling • Establishment of various recycling systems • Management of hazardous substances (including dioxins) • Introduction of a proper waste management system to cope with diversification in the type and nature of waste	• Revision of the Waste Management Act (1991) • Act to Promote the Development of Specified Facilities for the Disposal of Industrial Waste (1992) • Japanese Basel Act (1992) • Basic Environment Act (1993) • Containers and Packaging Recycling Act (1995) • Revision of the Waste Management Act (1997) • Home Appliance Recycling Act (1998) • Act on Special Measures against Dioxins (1999)
2000–	• Promotion of 3R measures aimed at the establishment of a sound material-cycle society • Enhancement of industrial waste management • Enhancement of illegal dumping regulations	• Basic Act for Establishing a Sound Material-CycleSociety (2000) • Construction Recycling Act (2000) • Food Recycling Act (2000) • Revision of the Waste Management Act (2000) • Act on Special Measures concerning Promotion of Proper Treatment of PCB Wastes (2001) • Automobile Recycling Act (2002) • Act on Special Measures concerning Removal of Environmental Problems Caused by Specified Industrial Wastes (2003) • Revision of the Waste Management Act (2003 to 2006, 2010) • Small Home Appliance Recycling Act (2013)



Situation subsequent to the Meiji Restoration Late 19th to early 20th centuries

- In Japan at the beginning of modernization, waste was treated by waste generators themselves or by private waste treatment operators who collected waste and selected valuables to sell them for profit.
- Waste was often discarded by waste treatment operators on roadsides or vacant lots and was piled up in unsanitary conditions.
- In addition, as a result of increasing contact between humans and objects, various infectious diseases spread.
- It became important to maintain the cleanliness of entire towns, including waste dump sites that provided breeding grounds for flies, mosquitoes and rats. — The improvement of public health

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Measures implemented to solve problems

> The Waste Cleaning Act, 1900

- The collection and disposal of waste as the obligation of municipalities
- Waste treatment operators under the supervision of government organizations to establish a waste administration system.
- The act stated that waste should be incinerated if possible.

Post-war period (1945 to 1950s)

- During the post-war period, Japan faced the need to deal with urban waste the amount of which continued to increase rapidly as a result of economic development and urban population concentration.
- At the time, waste was dumped into rivers and the ocean or piled up in the open, causing public health problems.
- Waste was manually collected from homes by carts, and due to the limits of human power, including the narrow range of action, it became more and more difficult to cope with the rapid increase in the amount of waste by using manual collection methods.
- Transporting waste to incineration sites or landfills

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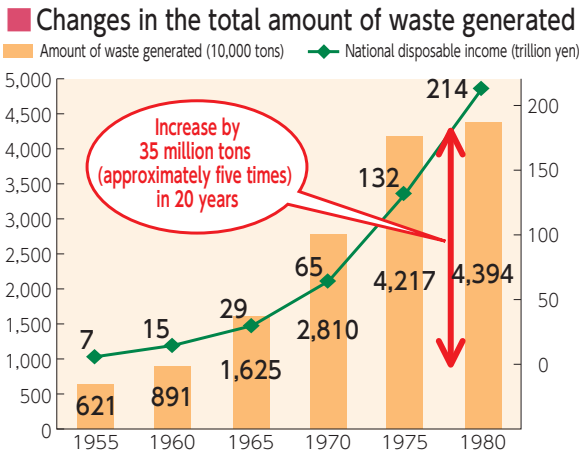
Measures implemented to solve problems in post-war period

The Public Cleansing Act, 1954

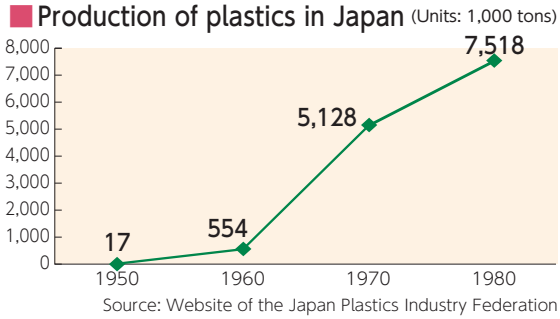
- In addition to the conventional system of waste collection and disposal by municipalities, this act also defined the obligation of national and prefectural governments to provide financial and technological support to municipalities as well as the obligation of residents to cooperate with municipalities in collecting and disposing of waste.

The Act on Emergency Measures concerning the Development of Living Environment Facilities, 1963

Rapid economic growth period (1960s to 1970s)



Source: Compiled from MOE, Waste Management in Japan (annual editions) and Cabinet Office, National Accounts Statistics (annual editions)



Source: Website of the Japan Plastics Industry Federation

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Japanese Experiences of Industrial Pollution

- Itai-itai disease(1912): River water pollution from mining, heavy metals such as cadmium
- Minamata disease(1956): Water pollution from plant, food containing methylmercury compounds
- Niigata Minamata disease(1965): Water pollution from plant, methlymercury compounds
- Yokkaichi asthma(1961): Air pollution from petrochemical plants, sulfur dioxide

Minamata disease & Itai-Itai disease

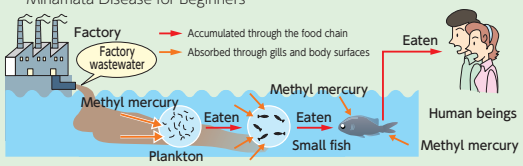
Minamata disease

The occurrence of Minamata disease was first confirmed in 1956. The disease was caused by methyl mercury discharged from a chemical factory (Chisso Corporation Minamata Factory) in Kumamoto Prefecture's Minamata City. Methyl mercury discharged into the sea was bioconcentrated in fish and shellfish through the food chain, damaging the health of those who ate contaminated seafood. Major symptoms of Minamata disease include sensory impairment of limbs, ataxia, constriction of the visual field, hearing impairment, and speech disorders. Some patients with severe symptoms became comatose and died.

Also, methyl mercury absorbed into a pregnant mother's body was sometimes incorporated through the umbilical cord into the fetus in her womb, resulting in the birth of a baby with congenital symptoms of Minamata disease (fetal Minamata disease patient). The total number of patients certified as suffering from Minamata disease was 2,275 as of October 2013. Similar health damage was also caused by organic mercury compounds discharged from Showa Denko's factory in the Agano River Basin in Niigata Prefecture (Niigata Minamata disease).

Chisso Corporation Minamata Factory during the 1950s
Photo courtesy of the Minamata Disease Municipal Museum

Source: Figure compiled from Kumamoto Prefecture, Knowledge of Minamata Disease for Beginners

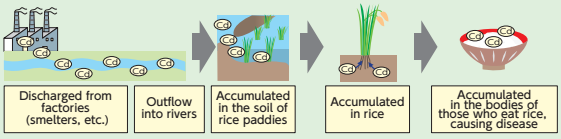


Itai-Itai disease

Cadmium discharged from the Kamioka Mine in Gifu Prefecture (Mitsui Mining & Smelting Co., Ltd.'s Kamioka Plant) contaminated rice paddies in the lower basin of the Jinzu River, causing disease among those who ate rice grown in the area. Itai-Itai disease is believed to have started around the Taisho period; it attracted public attention in 1955, when it was first reported in a newspaper.

Itai-Itai disease is caused by chronic cadmium poisoning, which initially damages kidneys and then causes osteomalacia (a disease that creates a defect in the system that hardens bones, preventing normal bone development). Symptoms of the disease include pain in the waist, shoulders, or knees. As the disease becomes more severe, the patient repeatedly breaks bones; eventually, the patient becomes incapable of moving around on his own due to pain felt throughout his entire body. The name of the disease is said to derive from the cry of pain ("Itai itai," meaning "It hurts" in Japanese) raised by the patient suffering from unendurable pain. A total of 196 patients were certified as suffering from Itai-itai disease between 1967, when the first Itai-itai disease patient was certified as such, and the end of 2011.

Source: Compiled from a figure on the website of the Toyama Prefectural Itai-Itai Disease Museum



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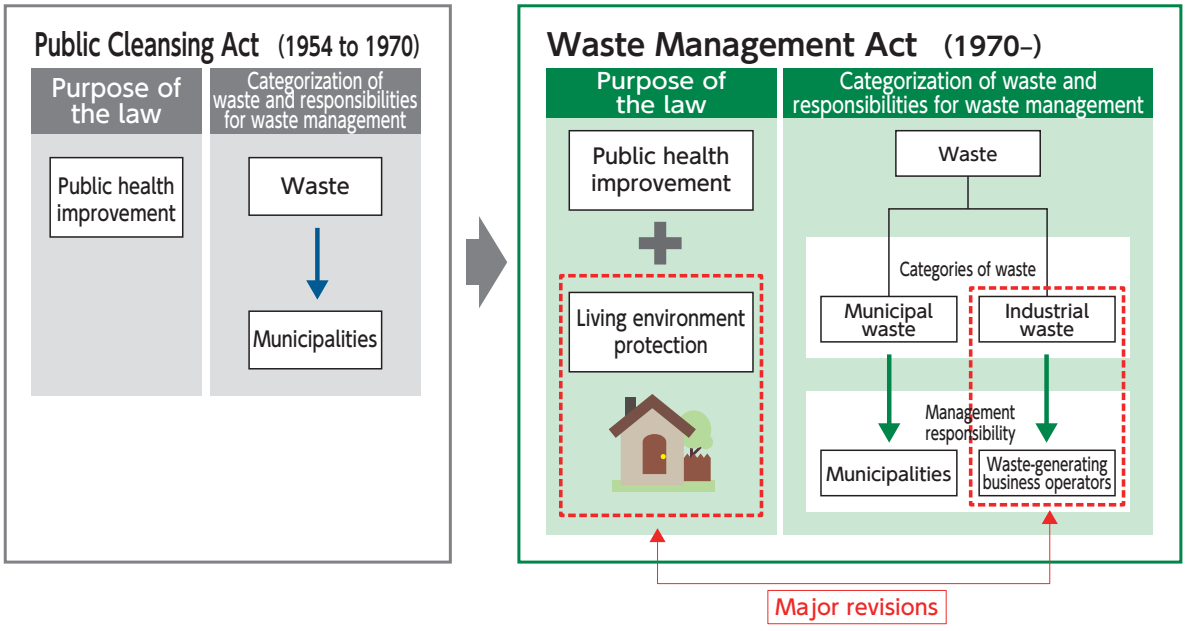
Development of basic systems for waste management



Basic principles of pollution prevention and regulations on the discharge of hazardous substances

<table>
<tr><th colspan="4">Soot dust</th><th>Sulfur oxides</th><th colspan="3">Hazardous substances</th></tr>
<tr><td colspan="4">Soot and other particulate matter</td><td rowspan="3">Emission standards for individual designated areas defined in enforcement regulations based on the K value</td><td colspan="3">Hydrogen chloride</td></tr>
<tr><td colspan="4">1968～1971</td><td colspan="3">1977～</td></tr>
<tr><td>Type of facility</td><td colspan="3">Emission standard (g/Nm³)</td><td>Type of facility</td><td colspan="2">Emission standard (mg/Nm³)</td></tr>
<tr><td>Sewage incineration furnace</td><td colspan="3">0.7</td><td></td><td>Waste incineration furnace</td><td colspan="2">700 (O²=12%Converted value)</td></tr>
<tr><td colspan="4">Soot dust</td><td rowspan="7"></td><td colspan="3">Nitrogen oxides</td></tr>
<tr><td colspan="4">1971～1982</td><td colspan="3">1977～1979</td></tr>
<tr><td rowspan="2">Type of facility</td><td rowspan="2">Size of facility (amount of exhaust gas)</td><td colspan="2">Emission standard (g/Nm³)</td><td>Type of facility</td><td>Size of facility (amount of exhaust gas)</td><td>Emission standard (ppm)</td></tr>
<tr><td>General</td><td>Special</td><td>Waste incineration furnace</td><td>40,000 Nm³ or more</td><td>250</td></tr>
<tr><td rowspan="2">Continuous furnace</td><td>40,000 Nm³ or more</td><td>0.2</td><td>0.1</td><td colspan="3" rowspan="2">*O²=12%Converted value</td></tr>
<tr><td>Less than 40,000 Nm³</td><td>0.7</td><td>0.2</td></tr>
<tr><td>Other furnaces</td><td>–</td><td>0.7</td><td>0.4</td></tr>
</table>

Source: Masaaki Osawa, Waste in Japan Based on Figures and Tables, website of the Japan Environmental Sanitation Center

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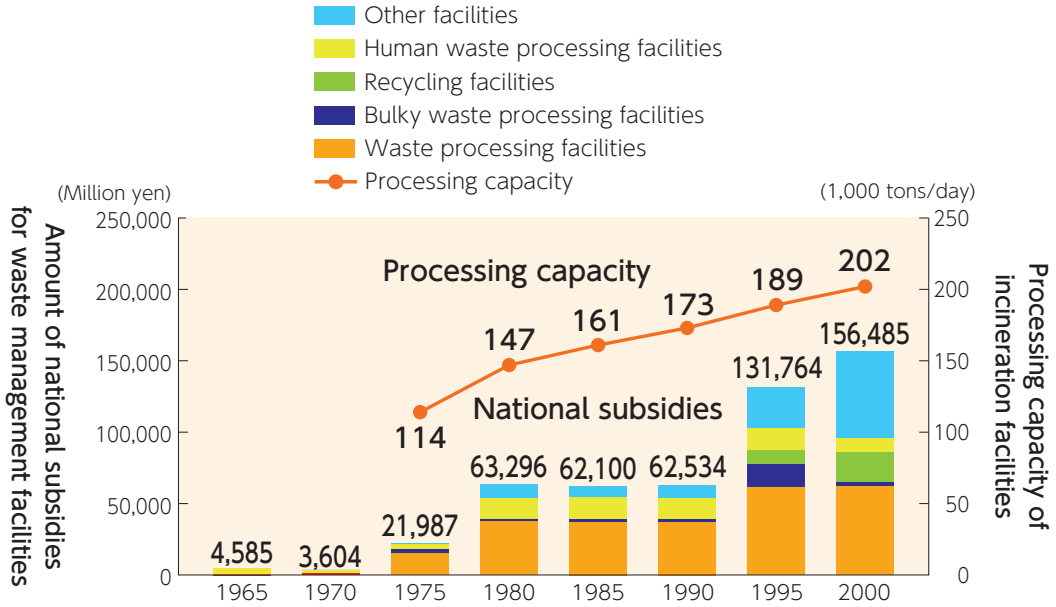
Promotion of proper waste management

National subsidies of waste management facilities and changes in the processing capability of incineration facilities

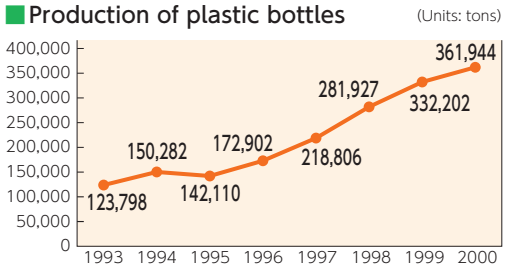


Source: Compiled from MOE, Waste Management in Japan (annual editions) and Japan Waste Management Association, FY2005 Manual for Waste Management Facility Development Operations

Rapid economic growth period to the bubble economy period (1980s to early 1990s)

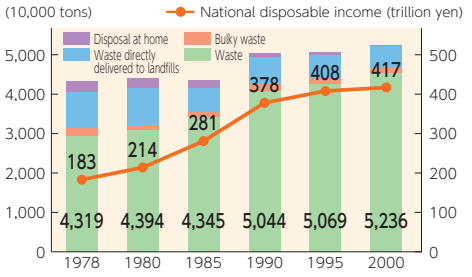
Expansion of waste problems in terms of both quality and quantity as a result of the bubble economy

Production of plastic bottles



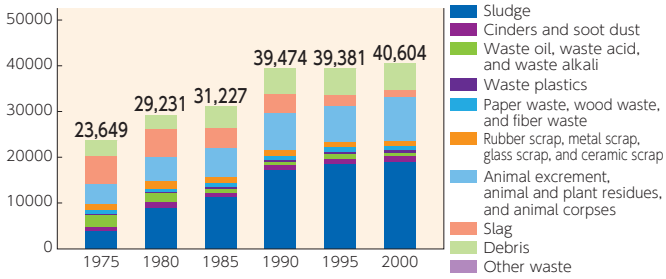
Source: Compiled based on figures on the website of the Council for PET Bottle Recycling

Changes in the total amount of municipal waste



Source: Compiled from MOE, Waste Management in Japan (annual editions) and Cabinet Office, National Accounts Statistics (annual editions)

Changes in the amount of industrial waste by type of waste (10,000 tons)



Source: MOE, Survey on the Discharge and Disposal of Industrial Waste (annual editions)

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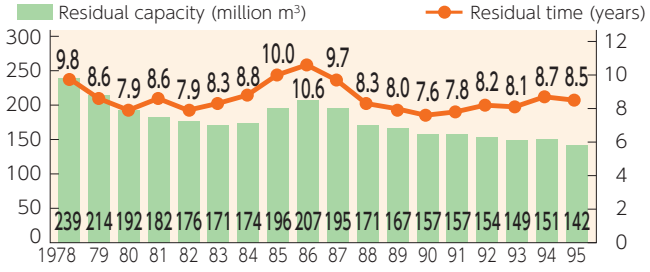
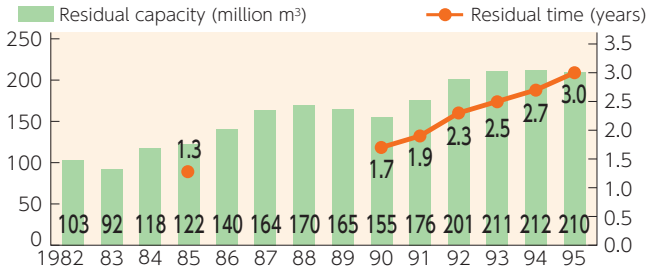
Serious shortage of landfills

Residual capacity and time of landfills (municipal waste)



Source: MOE, Waste Management in Japan (annual editions)

Residual capacity and time of landfills (industrial waste)



Source: Compiled from MOE, Survey on the Discharge and Disposal of Industrial Waste, and Ministry of Welfare, Survey on Government Organizations for Industrial Waste Management

Conflicts concerning waste management

	Number of municipalities	Number of conflicts	Landfills	Intermediate processing facilities	Human waste processing facilities
National total	3,268	368	279	97	5

Source: Masami Taguchi, Development of the War against Waste and Conflicts: Survey Research and Case Reports, Hon no Izumi Sha

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Large-scale illegal dumping and other problems

- The Waste Management Act placed the responsibility for industrial waste management on waste-generating business operators. However, there were business operators that lacked the sense of responsibility for covering the appropriate costs required for waste management.
- business operators outsourced waste management to waste treatment operators.
- illegal waste dumping and other unlawful operations.
- Restoring contaminated soil and surrounding environments required large amounts of funds.

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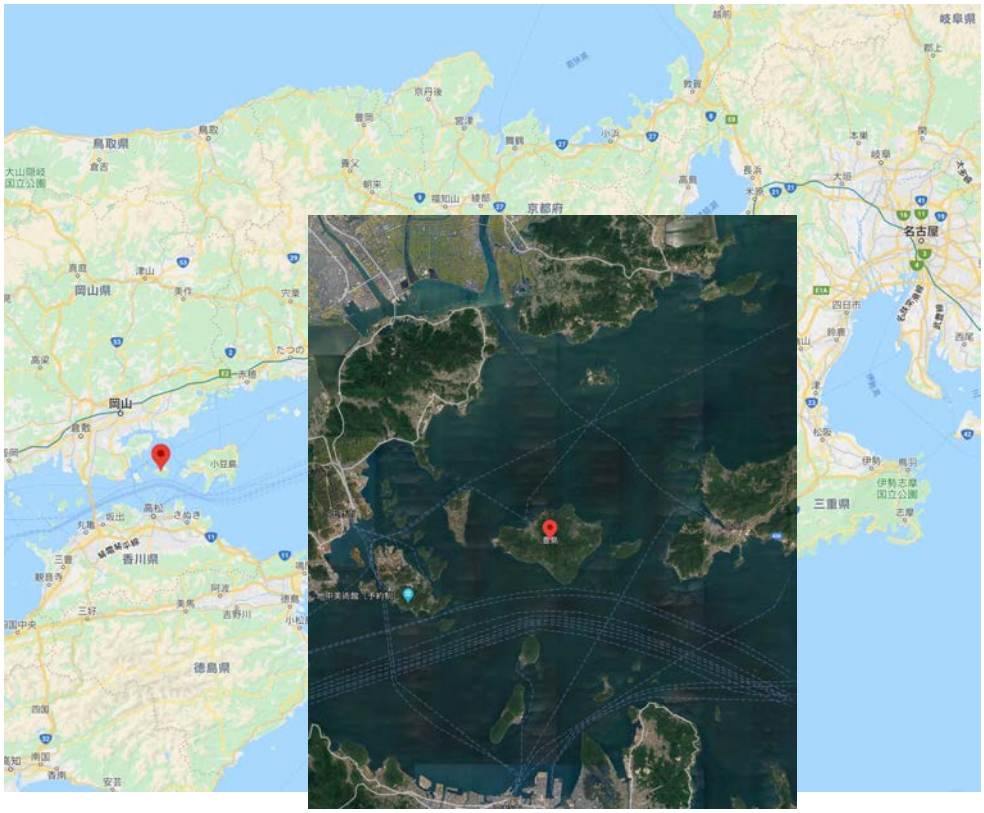
Teshima Island Illegal Dumping



Restoration Project of Teshima Island Illegal Dumping

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Before and After Project

After the restoration project of Teshima Island

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Restoration Project

- Constructing a water insulating wall for the prevention of ocean pollution
- Purification of underground water and leachate
- Excavation and adjustment of wastes and contaminated soil
- Loading wastes and soil into container trucks
- Incineration and melting of wastes and soil
- Extreme flue gas treatment
- Effective utilization of by-products such as fly ash and slag
- Recycling of wastewater from plants and rainwater, efficient use of waste heat, and solar power generation

Problems regarding dioxins generated by waste incineration facilities

— Dioxins are considered to have negative effects on the human body based on case studies conducted overseas. They were reported to have been detected from fly ash of waste incineration facilities in Japan. As a result of such reports, public attention was directed to measures to control dioxin emissions in waste incineration facilities around the end of 1983. Subsequently, effects of dioxins on mothers' milk were reported at an international conference held in Kyoto in 1994: and high-concentration soil contamination in areas around waste incineration facilities was reported in and around Saitama Prefecture's Tokorozawa City.

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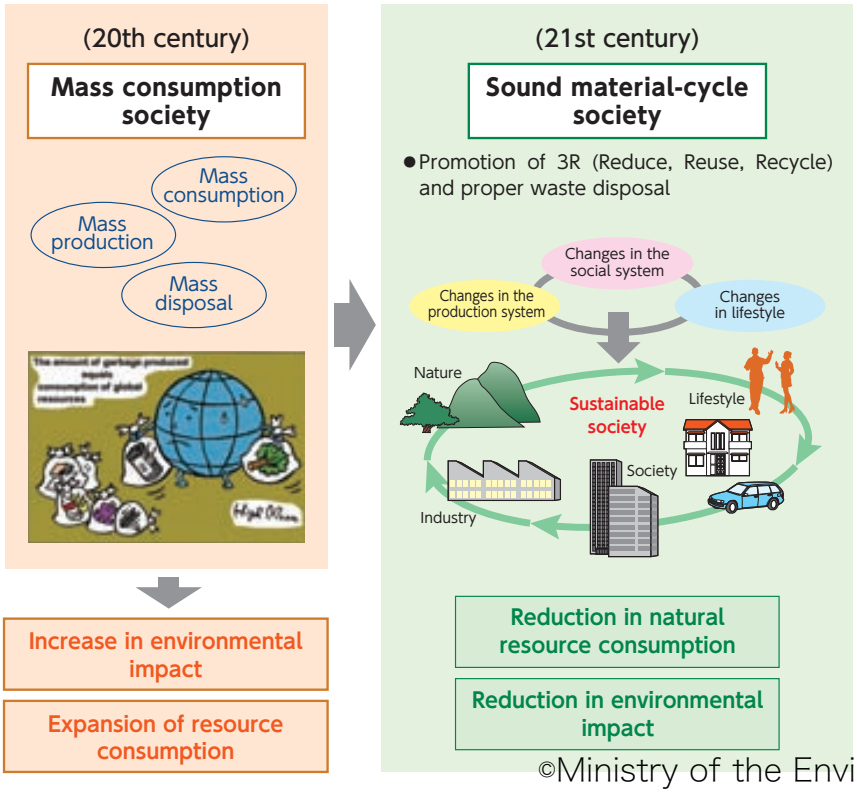
Promotion of the establishment of a sound material-cycle society



Measures Regarding Waste Management and 3R

Promotion of understanding among consumers

- Waste Reduction Promotion National Conference and a comprehensive waste reduction strategy
- Awareness-raising programs for waste reduction
- Recycling programs rooted in local communities

Sorted collection of recyclable waste

- Initiatives for promoting sorted waste collection
- Cooperation of residents & Group collection

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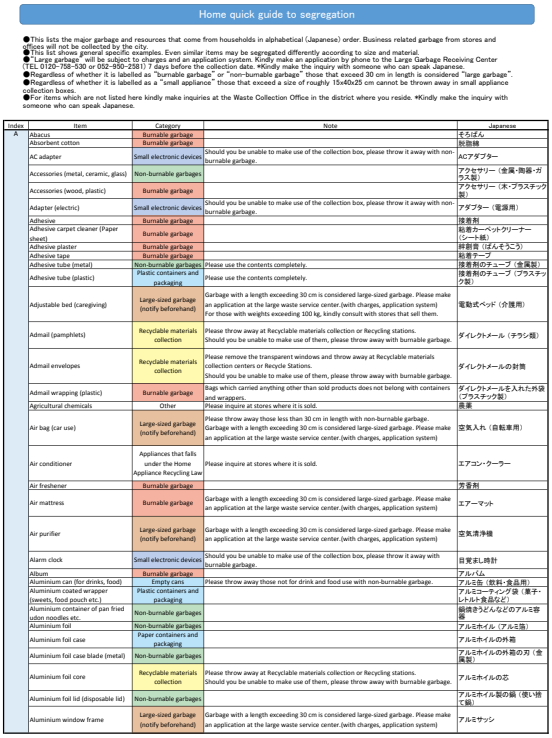
Home quick guide to segregation

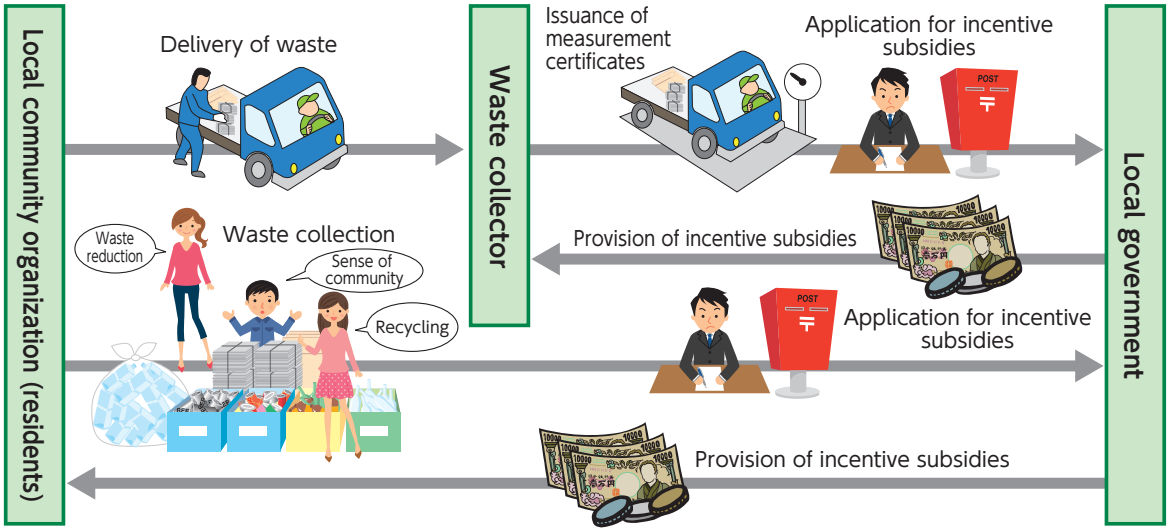


Home quick guide to segregation

●This lists the major garbage and resources that come from households in alphabetical (Japanese) order. Business related garbage from stores and offices will not be collected by the city.
●This list shows general specific examples. Even similar items may be segregated differently according to size and material.
●"Large garbage" will be subject to charges and an application system. Kindly make an application by phone to the Large Garbage Receiving Center (TEL 0120-758-530 or 052-950-2581) 7 days before the collection date. ※Kindly make the inquiry with someone who can speak Japanese.
●Regardless of whether it is labelled as "burnable garbage" or "non-burnable garbage" those that exceed 30 cm in length is considered "large garbage".
●Regardless of whether it is labelled as a "small appliance" those that exceed a size of roughly 15×40×25 cm cannot be thrown away in small appliance collection boxes.
●For items which are not listed here kindly make inquiries at the Waste Collection Office in the district where you reside. ※Kindly make the inquiry with someone who can speak Japanese.

Index	Item	Category	Note	Japanese
A	Abacus	Burnable garbage		そろばん
	Absorbent cotton	Burnable garbage		脱脂綿
	AC adapter	Small electronic devices	Should you be unable to make use of the collection box, please throw it away with non-burnable garbage.	ACアダプター
	Accessories (metal, ceramic, glass)	Non-burnable garbages		アクセサリー（金属・陶器・ガラス製）
	Accessories (wood, plastic)	Burnable garbage		アクセサリー（木・プラスチック製）
	Adapter (electric)	Small electronic devices	Should you be unable to make use of the collection box, please throw it away with non-burnable garbage.	アダプター（電源用）
	Adhesive	Burnable garbage		接着剤
	Adhesive carpet cleaner (Paper sheet)	Burnable garbage		粘着カーペットクリーナー（シート紙）
	Adhesive plaster	Burnable garbage		絆創膏（ばんそうこう）
	Adhesive tape	Burnable garbage		粘着テープ
	Adhesive tube (metal)	Non-burnable garbages	Please use the contents completely.	接着剤のチューブ（金属製）
	Adhesive tube (plastic)	Plastic containers and packaging	Please use the contents completely.	接着剤のチューブ（プラスチック製）
	Adjustable bed (caregiving)	Large-sized garbage (notify beforehand)	Garbage with a length exceeding 30 cm is considered large-sized garbage. Please make an application at the large waste service center.(with charges, application system) For those with weights exceeding 100 kg, kindly consult with stores that sell them.	電動式ベッド（介護用）
	Admail (pamphlets)	Recyclable materials collection	Please throw away at Recyclable materials collection or Recycling stations. Should you be unable to make use of them, please throw away with burnable garbage.	ダイレクトメール（チラシ類）
	Admail envelopes	Recyclable materials collection	Please remove the transparent windows and throw away at Recyclable materials collection centers or Recycle Stations. Should you be unable to make use of them, please throw away with burnable garbage.	ダイレクトメールの封筒
	Admail wrapping (plastic)	Burnable garbage	Bags which carried anything other than sold products does not belong with containers and wrappers.	ダイレクトメールを入れた外袋（プラスチック製）
	Agricultural chemicals	Other	Please inquire at stores where it is sold.	農薬
	Air bag (car use)	Large-sized garbage (notify beforehand)	Please throw away those less than 30 cm in length with non-burnable garbage. Garbage with a length exceeding 30 cm is considered large-sized garbage. Please make an application at the large waste service center.(with charges, application system)	空気入れ（自転車用）
	Air conditioner	Appliances that falls under the Home Appliance Recycling Law	Please inquire at stores where it is sold.	エアコン・クーラー
	Air freshener	Burnable garbage		芳香剤
	Air mattress	Burnable garbage	Garbage with a length exceeding 30 cm is considered large-sized garbage. Please make an application at the large waste service center.(with charges, application system)	エアーマット
	Air purifier	Large-sized garbage (notify beforehand)	Garbage with a length exceeding 30 cm is considered large-sized garbage. Please make an application at the large waste service center.(with charges, application system)	空気清浄機
	Alarm clock	Small electronic devices	Should you be unable to make use of the collection box, please throw it away with burnable garbage.	目覚まし時計
	Album	Burnable garbage		アルバム
	Aluminium can (for drinks, food)	Empty cans	Please throw away those not for drink and food use with non-burnable garbage.	アルミ缶（飲料・食品用）
	Aluminium coated wrapper (sweets, food pouch etc.)	Plastic containers and packaging		アルミコーティング袋（菓子・レトルト食品など）
	Aluminium container of pan fried udon noodles etc.	Non-burnable garbages		焼きうどんなどのアルミ容器
	Aluminium foil	Non-burnable garbages		アルミホイル（アルミ箔）
	Aluminium foil case	Paper containers and packaging		アルミホイルの外箱
	Aluminium foil case blade (metal)	Non-burnable garbages		アルミホイルの外箱の刃（金属製）
	Aluminium foil core	Recyclable materials collection	Please throw away at Recyclable materials collection or Recycling stations. Should you be unable to make use of them, please throw away with burnable garbage.	アルミホイルの芯
	Aluminium foil lid (disposable lid)	Non-burnable garbages		アルミホイル製の鍋（使い捨て鍋）
	Aluminium window frame	Large-sized garbage (notify beforehand)	Garbage with a length exceeding 30 cm is considered large-sized garbage. Please make an application at the large waste service center.(with charges, application system)	アルミサッシ

Group Collection



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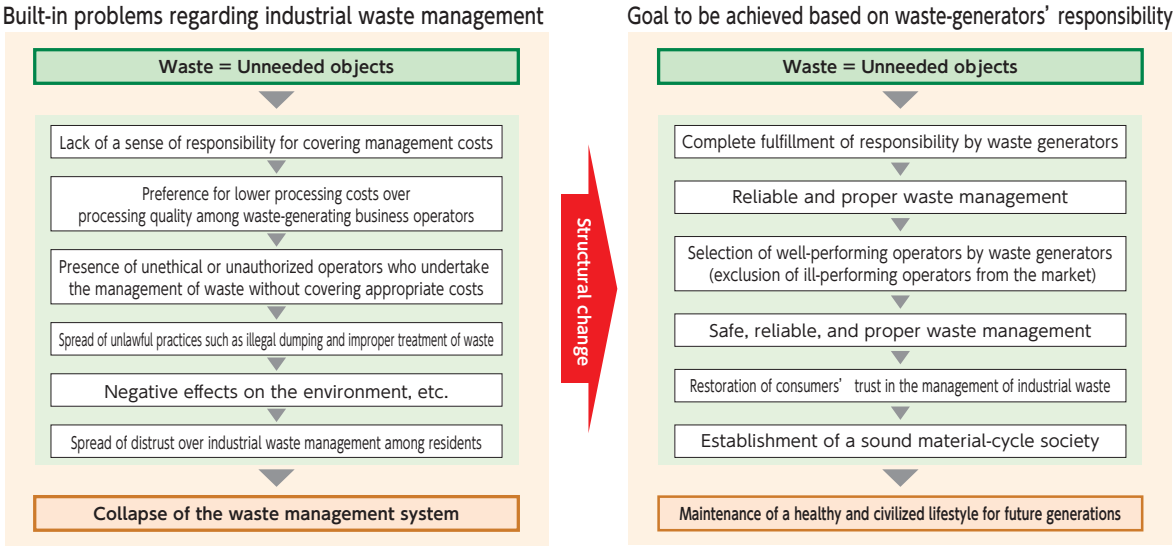
Enhancement of regulations on industrial waste

- **Major targets of the reform of the industrial waste management structure based on the revised Waste Management Act**
  - Ensuring the fulfillment of responsibility by waste-generating business operators
  - Preventing improper waste management
  - Providing appropriate waste management facilities

Structural change



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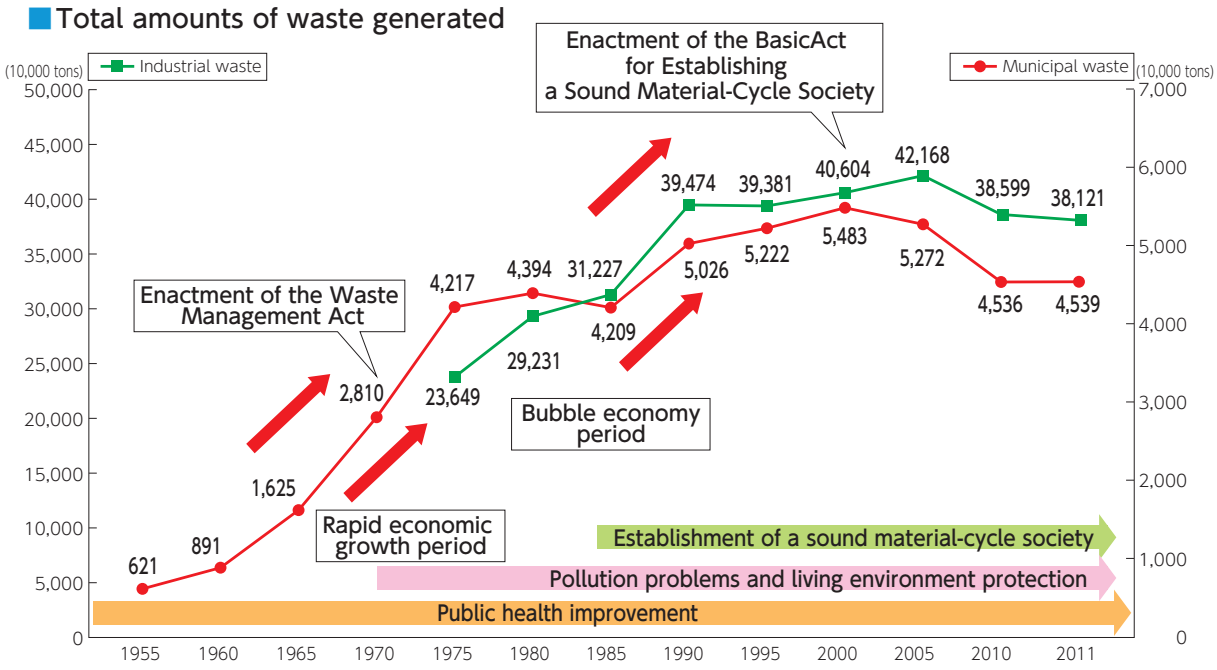
Dioxin emission control

- **Survey research and technological development through industry-academia-government collaboration**
- **Exhaust gas emission control and the development of waste incineration facilities**
  - As a result of development of emission control technologies and waste incineration facilities as well as of the tightening of control regulations, dioxin emission from waste incineration facilities were reduced in 2011 by approximately 99% compared to the level of 1997.

Amount of waste generated



Source: Compiled from MOE, Waste Management in Japan: Survey on the Discharge and Disposal of Industrial Waste (annual editions)

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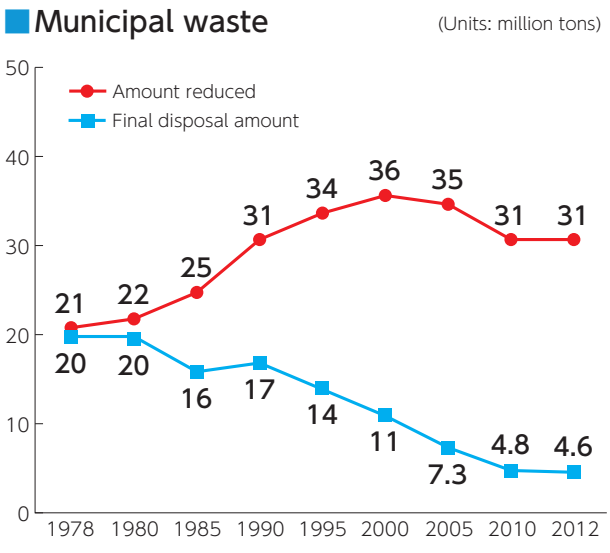
Amounts of final waste disposal and waste reduction



Source: Compiled from MOE, Waste Management in Japan (annual editions)

Source: Compiled from MOE, Survey on the Discharge and Disposal of Industrial Waste (annual editions)

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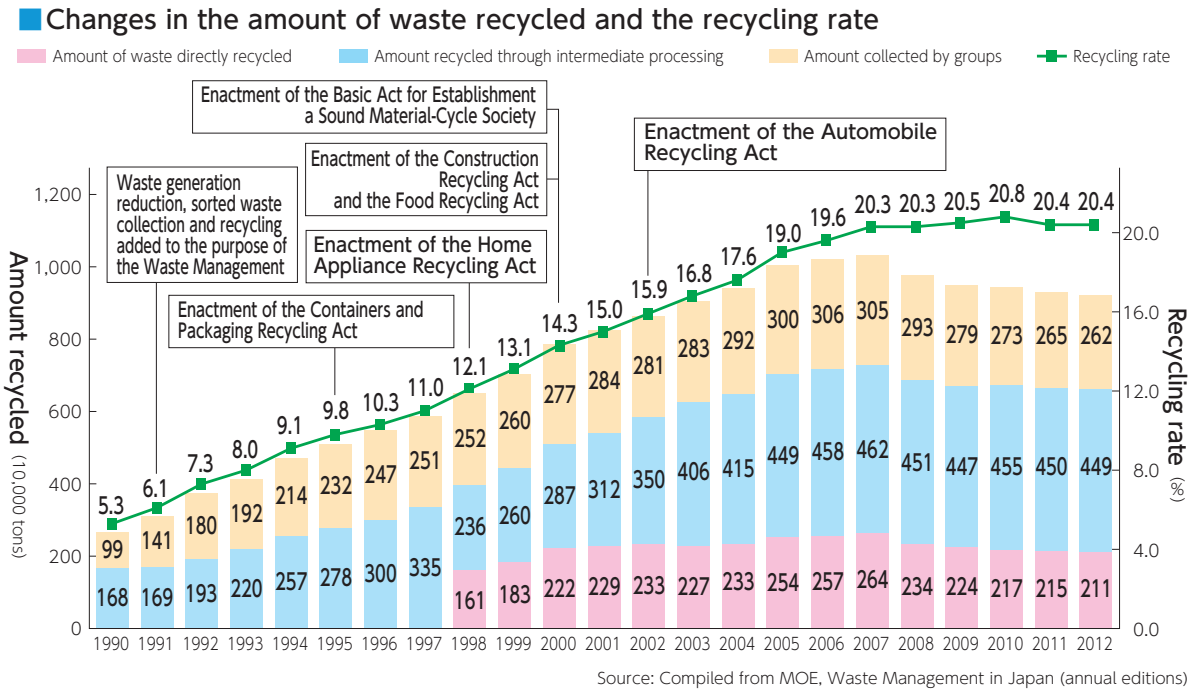
Amount of Municipal waste recycled & the recycling rate



Source: Compiled from MOE, Waste Management in Japan (annual editions)

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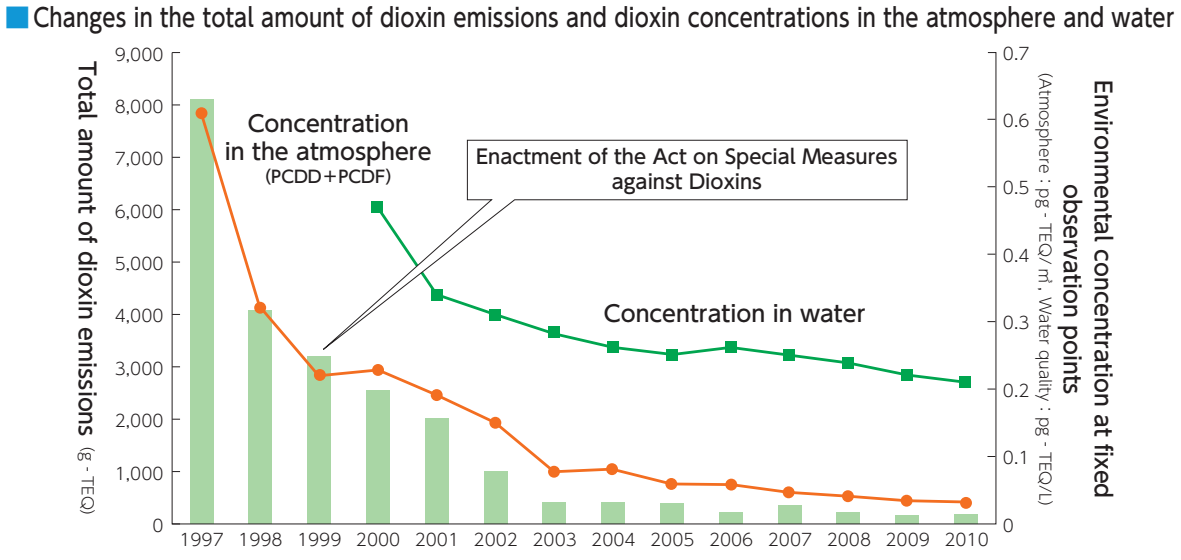
Amount of Dioxin emissions



Source: MOE pamphlet, Dioxins 2012

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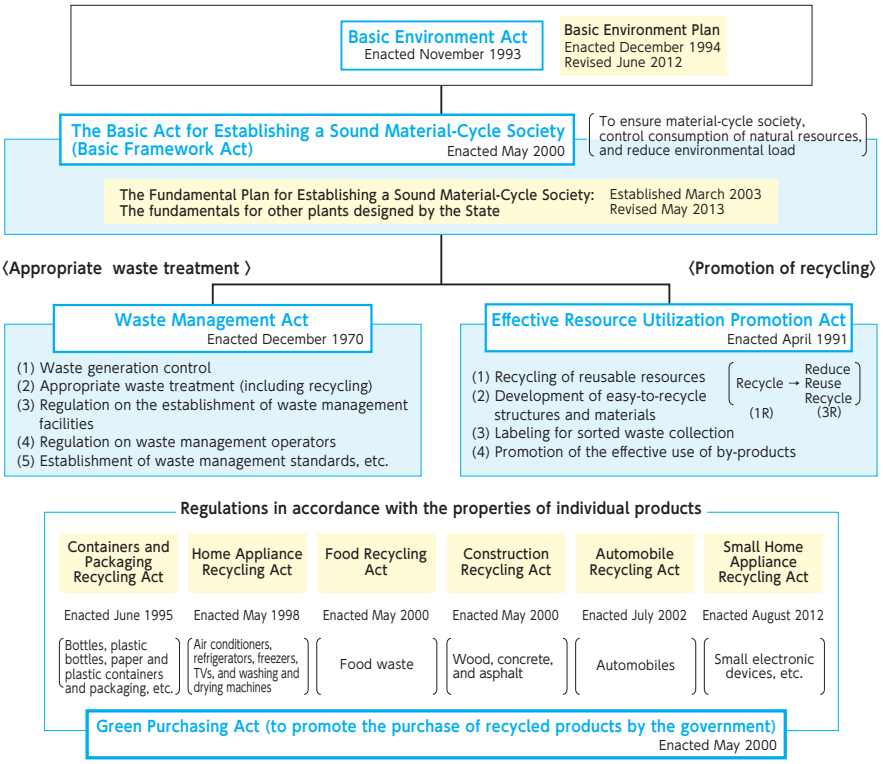
Waste Management and 3R



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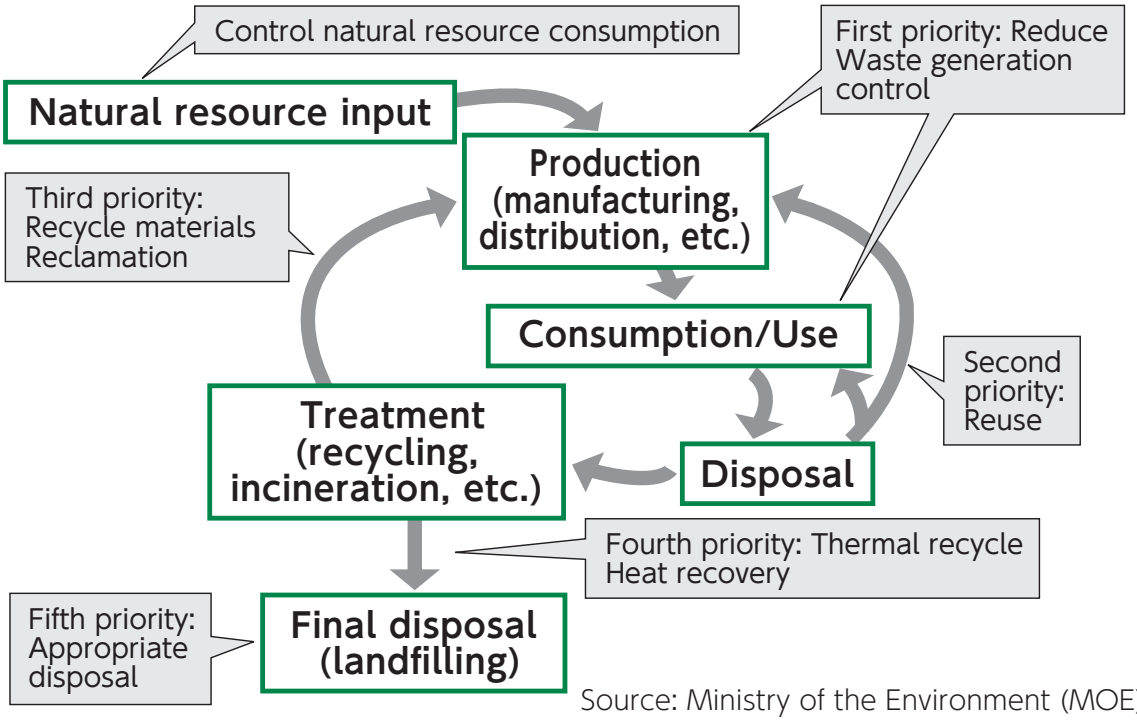
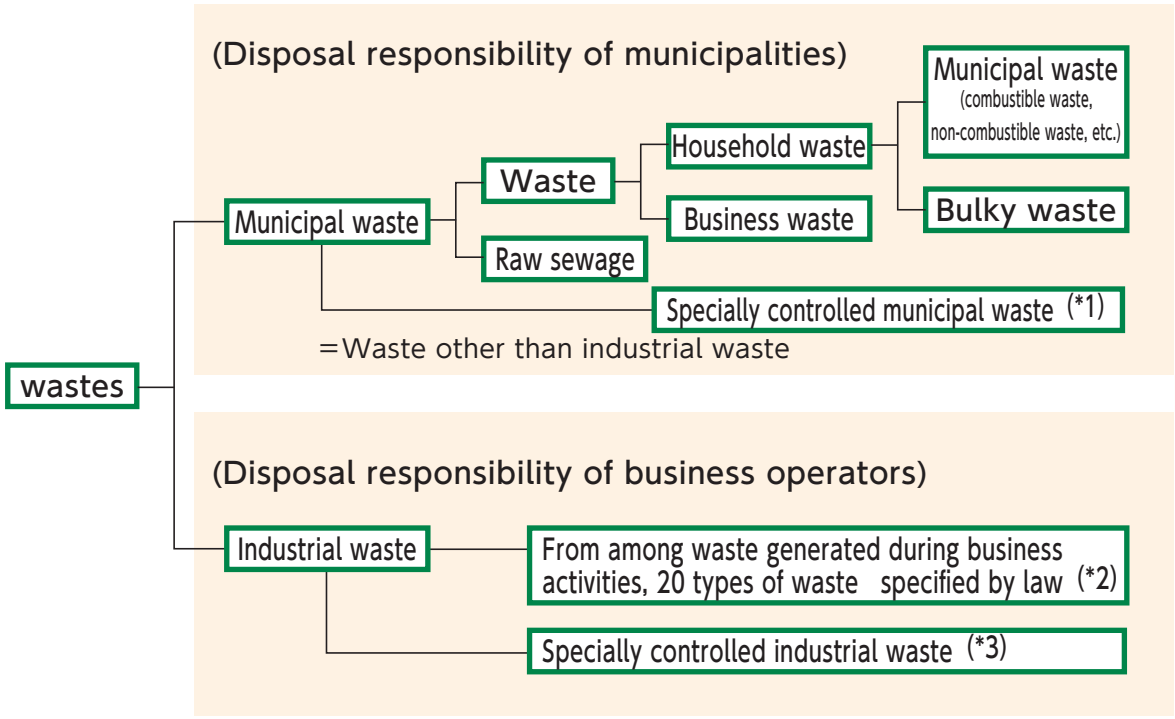
Vision of a sound material-cycle society



Source: Ministry of the Environment (MOE)

Categories of waste



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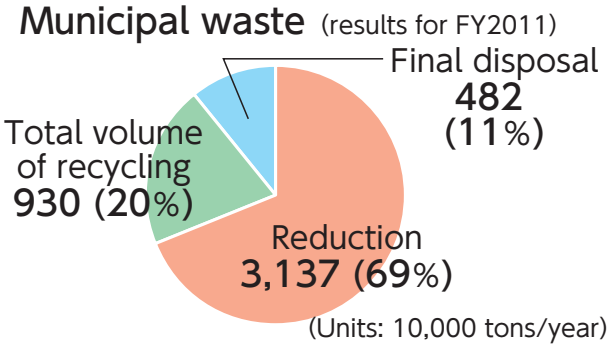
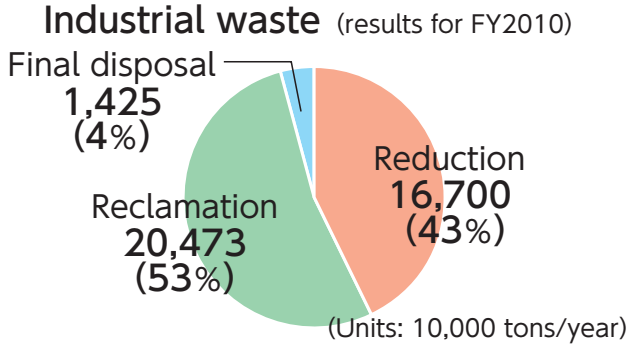
Treatment of waste





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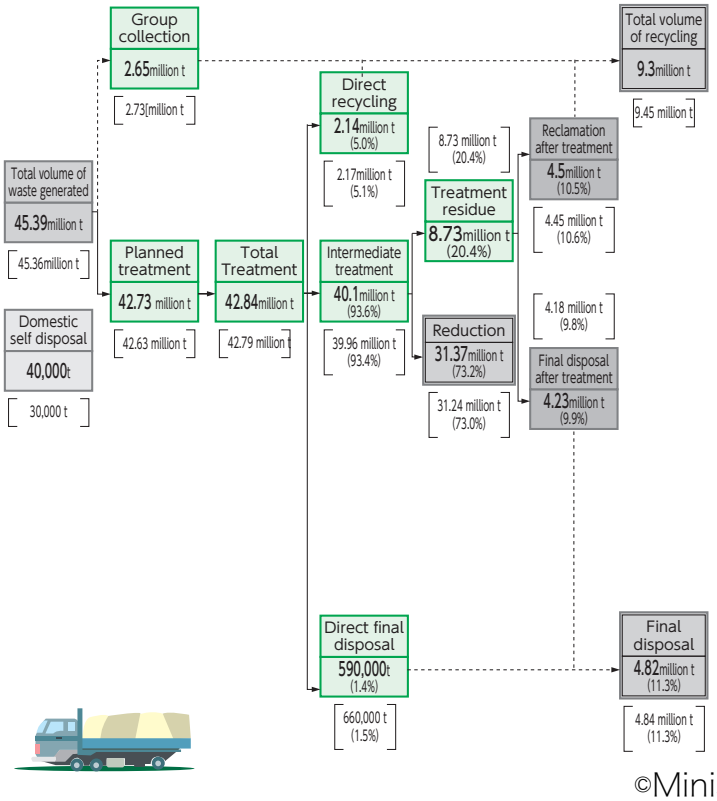
Flow of appropriate waste treatment
Municipal waste treatment



Figures in square brackets are results for FY2010.

* Sums of figures may not match totals as a result of rounding.

* Figures in parentheses show percent of the total amount of waste processed (same with figures for FY2010).

Note 1: Due to an error in planning or other factors, the volume of planned treatment does not equal the total volume of waste treated(=volume of intermediate treatment + volume of direct final disposal + volume of direct recycling).

2: Processing reduction rate (%) = [Intermediate treatment + Direct recycling] / Total Treatment×100

3: "Direct recycling" refers to waste that is received directly by reclaiming operators and not through facilities for recycling; this item was newly established in the fiscal year 1998 survey, and until fiscal year 1997 it would seem to have been recorded in the "intermediate treatment,e.g. recycling" category.

Source: MOE, Environmental White Paper

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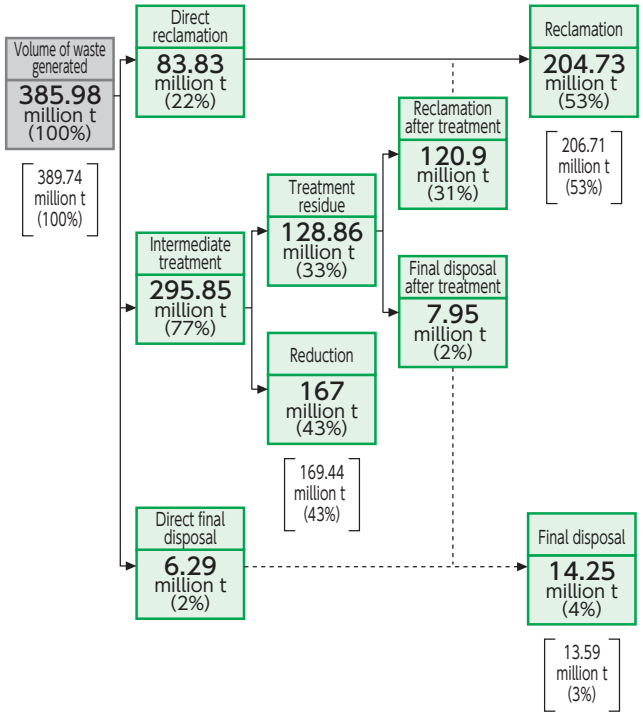
Flow of appropriate waste treatment
Industrial waste treatment



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Data on municipalities' waste management expenses and facilities (Kawasaki City, 1 million population)

Figure 1: Percentages of Waste-related Expenses Relative to the Annual Budget

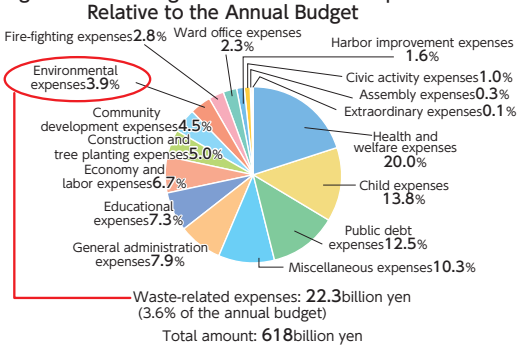

Figure 2: Breakdown of Expenses for Waste Management and Facility Maintenance (Units: 1,000 yen/year)

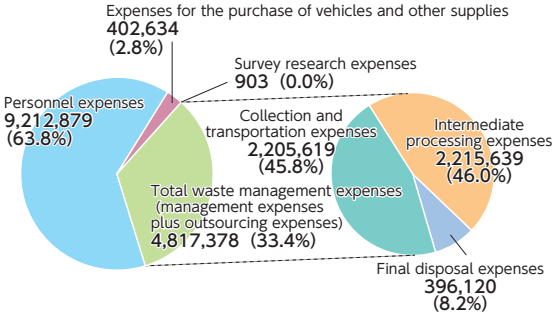

Figure 3: Waste Management Expenses by Type of Waste (Units: 1,000 yen/year)

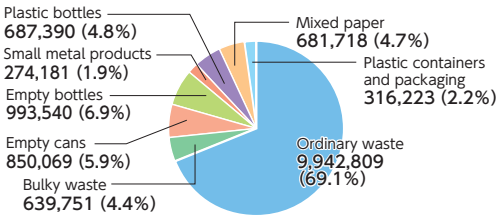

Table 1: Number and Performance of Municipal waste Management Facilities

	Incineration facilities	Bulky waste management facilities	Recycling facilities	Final disposal sites
Number of facilities	5	2	4	1
Management performance (t/year)	376,513	11,962	31,490	50,356

Source: Compiled from FY2011 Overview of Kanagawa Prefecture Municipal Waste Management

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Specific recycling acts

- Containers and Packaging Recycling Act, 1995
- Home Appliance Recycling Act, 1998
- Food Recycling Act, 2000
- Construction Recycling Act, 2000
- Automobile Recycling Act, 2002
- Small Home Appliance Recycling Act, 2012

Containers and Packaging Recycling Act, 1995

- **Targets:** Steel cans, Aluminum cans, Glass bottles, Cardboard, Paper cartons, Paper containers and packaging, Plastic bottles, Plastic containers and packaging
- Responsibilities of different entities
  - ✓ Consumers' responsibility: Sorted disposal
  - ✓ Municipalities' responsibility: Sorted collection
  - ✓ Business operators' responsibility: Recycling

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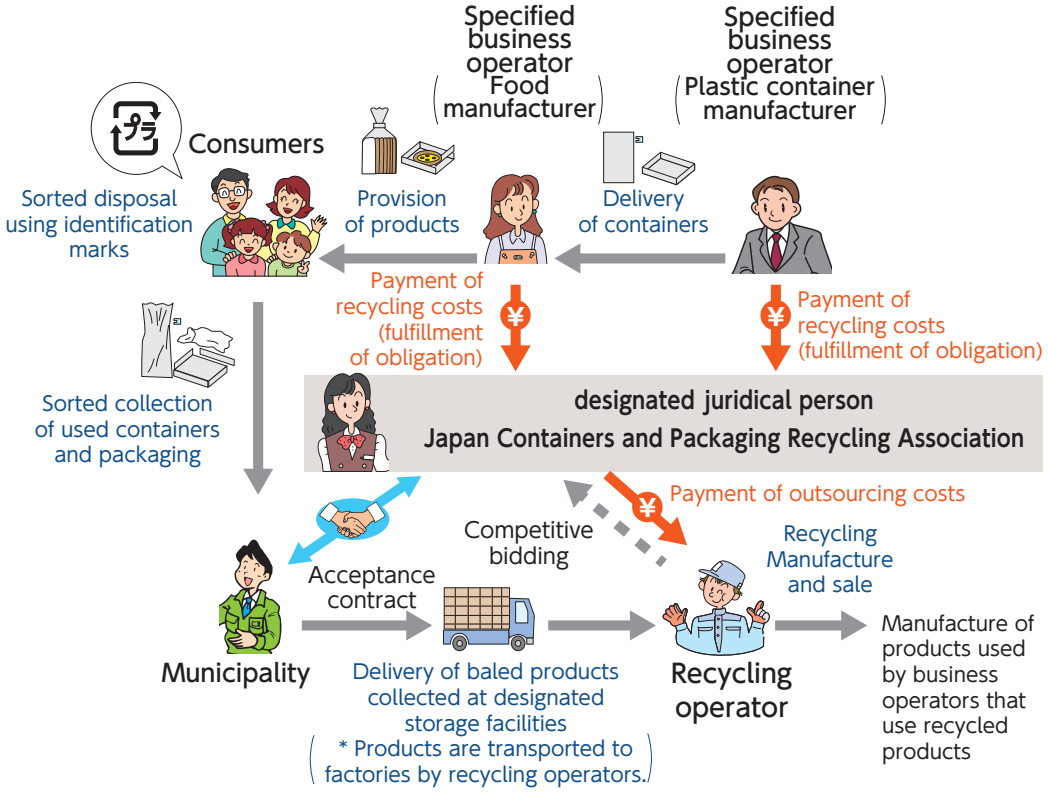
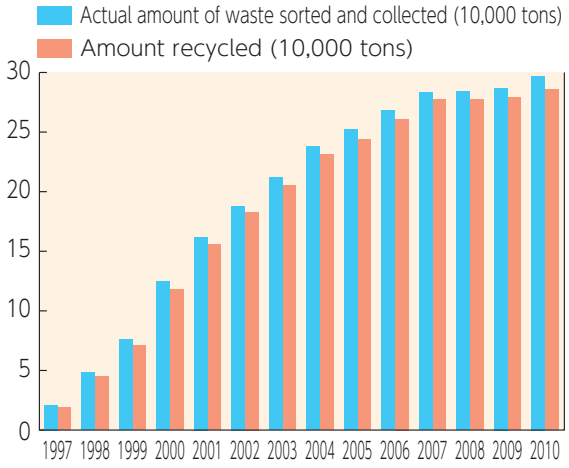
Flows of recycling costs and containers and packaging



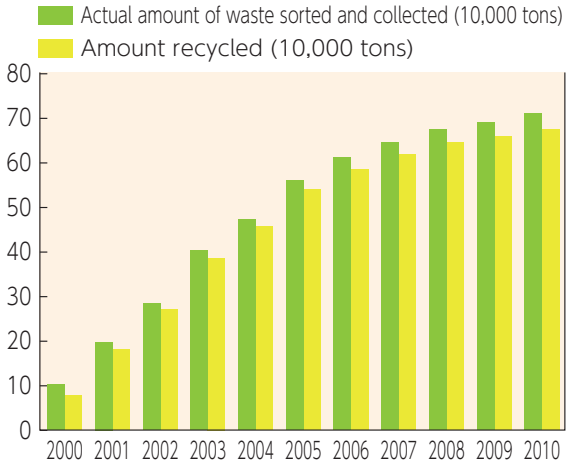
Source: Compiled from a figure on the website of the Japan Containers and Packaging Recycling Association

Actual amounts of waste sorted and collected and amounts recycled

Plastic bottles



Plastic containers and packaging



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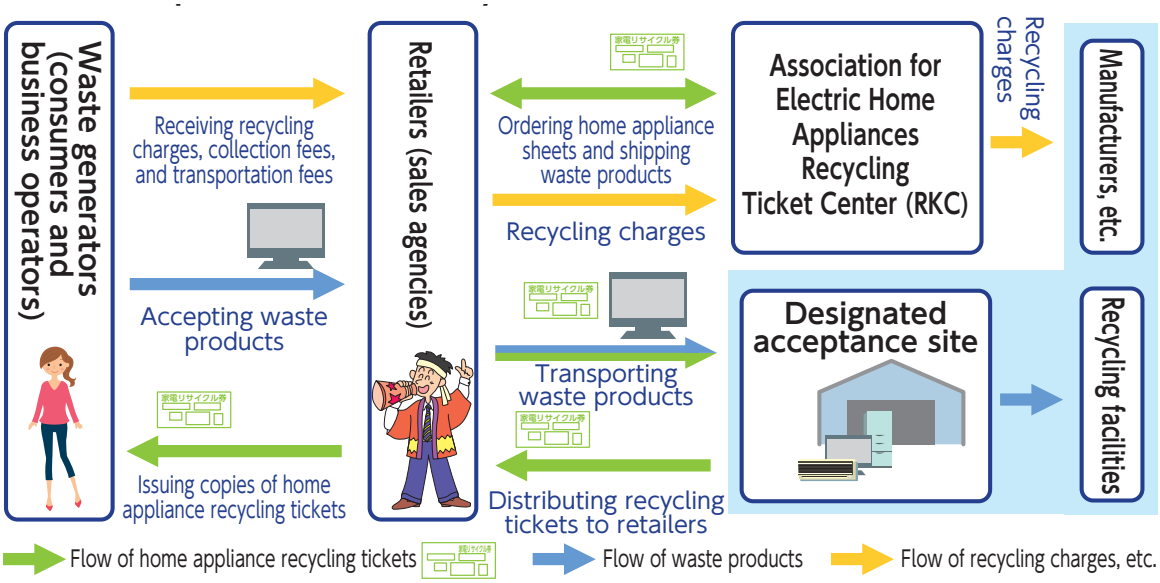
Home Appliance Recycling Act, 1998

- **Targets:** Home air conditioners, TVs (cathode-ray tube, LCD, and plasma TVs), Refrigerators and freezers, Washing machines and dryers
- **Responsibilities of different entities**
  - ✓ Consumers' responsibility: Delivering waste home appliances to retailers and covering recycling costs
  - ✓ Home appliance retailers' responsibility: Accepting waste home appliances and delivering them to manufacturers
  - ✓ Home appliance manufacturers' responsibility: Recycling waste home appliances

Flows of recycling costs and waste home appliances



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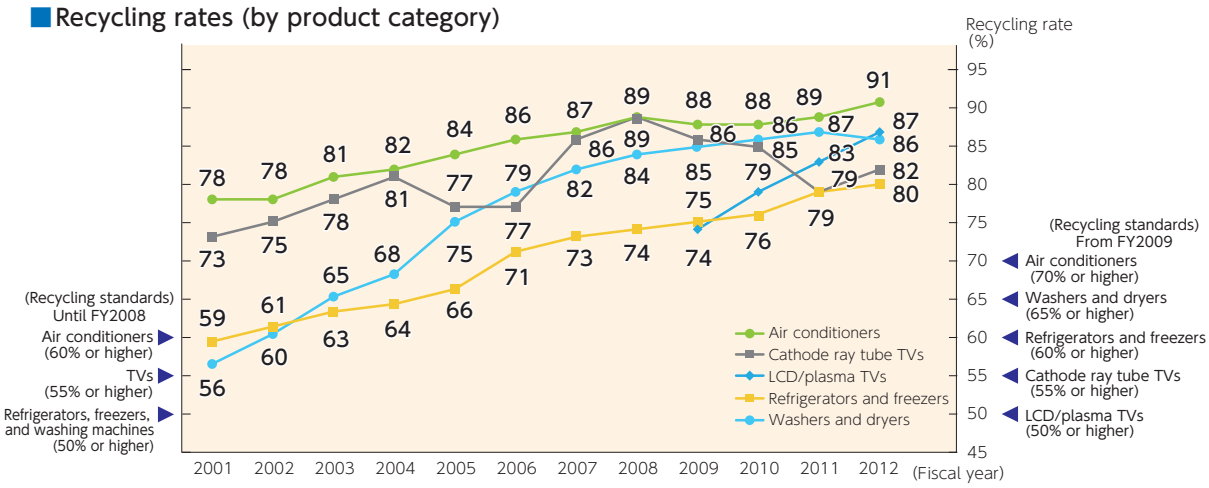
Recycling Rates by product category



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Ehomaki

What is Eho-maki

- According to the old lunar calendar of Japan, February 3rd is the day before the first day of spring. To ward off illness and misfortune, on this day Japanese families scatter roasted soy beans inside their homes and out of every window and door.
- In Japanese, the day is called 'Setsubun' which translates as 'bean scattering ceremony day'. Traditionally, this is also the day to eat 'Eho-maki'.
- Eho-maki are thick sushi rolls which is believed to bring good fortune if eaten while facing the year's "Eho", that is, good luck direction.

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Eho-maki

How to eat Eho-maki

- While you eat Eho-maki, you must be silent.
- Maru-kaburi-sushi (swallowing sushi)
- Traditional way to eat it: make a wish, close your eyes and eat the roll uncut, all while facing Eho, the year's good luck direction.
- The eating of Eho-maki without cutting reflects the idea of forming good relationships.
- There is no time setting when to eat Eho-maki

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History of Eho-maki

- Some people believe that the origin of Eho-maki is a custom followed at the end of the Edo Period in Osaka, of wishing good fortune for fisherman.
- It is also believed figuratively that Eho-maki resemble a demon's metal rod, and that demons can be stopped by eating the whole thing.

The custom of Eho-maki today

- The custom of Eho-maki has spread rapidly in Japan since 2003, when supermarkets and convenience stores began heavily advertising the event.
- According to a survey in 2002, only 53% of Japanese people were aware of what Eho-maki are, despite the long-standing custom.
- The custom of Eho-maki:
  - ✓ Mass production, (Mass) consumption, Mass disposal

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Problem of Eho-maki

Food Recycling Act, 2000

- **Targets:** Food waste, etc., Inedible residue generated in the manufacture and processing of food products, unsold or leftover food generated in the process of food distribution and consumption, etc.
- **Responsibilities of different entities**
  - ✓ Food-related business operators
    - Reducing food waste generation
    - Recycling food waste that can be used as recyclable food resources
    - Recovering heat when processing non-recyclable food waste
    - Taking measures to reduce food waste
  - ✓ Consumers
    - Reducing food waste generation by improving the way food is purchased or cooked
    - Promoting recycling through the use of recycled products

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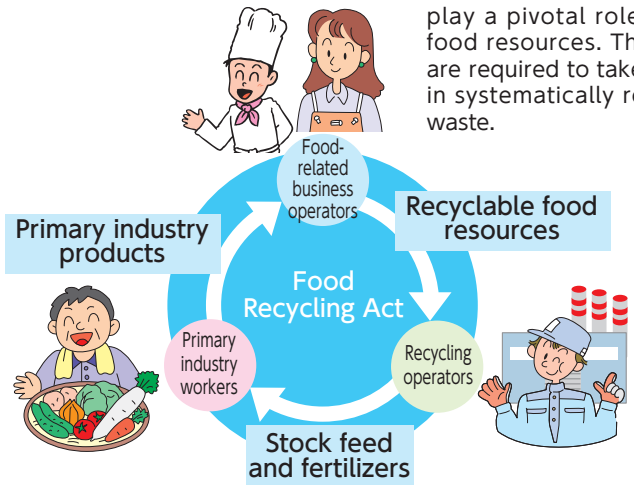
System for recycling food waste

As food waste generators, food-related business operators play a pivotal role in recycling food resources. Therefore, they are required to take the initiative in systematically recycling food waste.



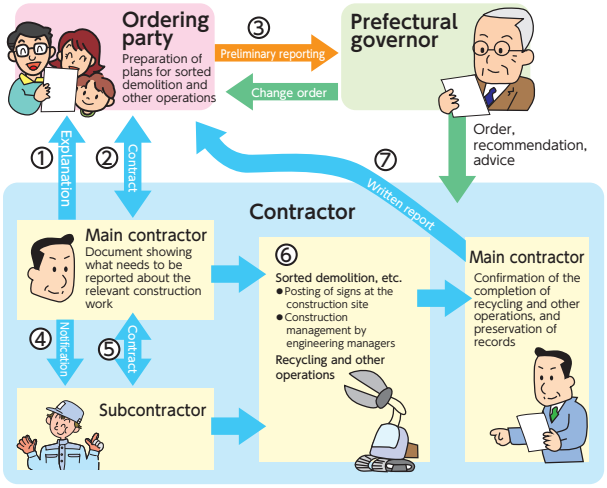
Primary industry workers are required to use recycled fertilizers and stock feed as much as possible to produce their products and provide such products to food-related business operators to ensure resource circulation between food production and consumption.

Recycling operators recycle recyclable food resources and play the role of connecting food-related business operators and users of fertilizers and stock feed. Recycling operators are required to provide information to other parties involved as well as to develop programs that are friendly to the environment in which we live.

Source: Compiled from a diagram on the Japan Food Industry Association's website

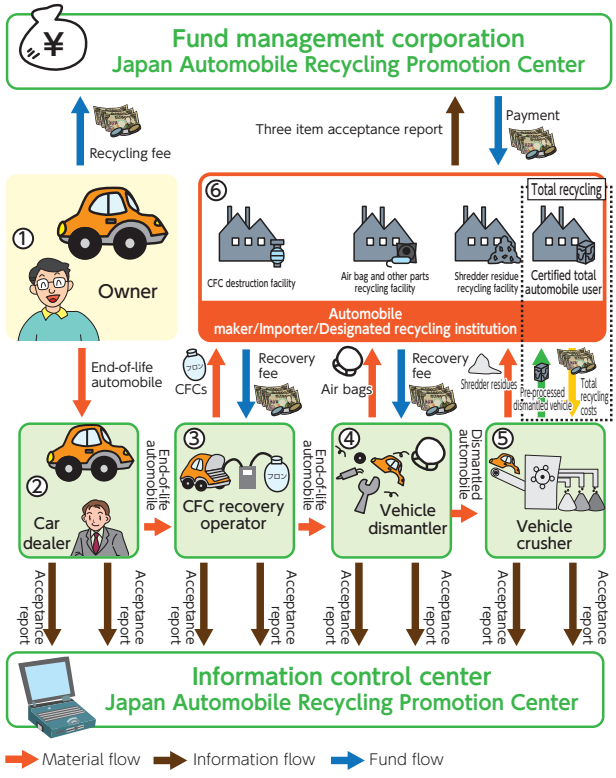
Construction Recycling Act, 2000

- **Targets:** Specified construction materials, (1) Concrete, (2) Construction materials composed of concrete and iron, (3) Wood, (4) Asphalt and concrete
- **Flow of sorted demolition and recycling**



Source: Compiled from a diagram in MOE's leaflet on the Construction Recycling Act

Automobile Recycling Act, 2002



■Rates of Recycling of Automobile Shredder Residues (ASR) and Other Automobile Parts by Automobile Makers and Other Operators

	Shredder residues	Air bags
Target	30 (FY2005-) 50 (FY2010-) 70 (FY2015-)	85
2004	49~69.1	91.6~100
2005	48.0~70.0	93.0~94.7
2006	63.7~75.0	93.5~95.1
2007	64.2~78.0	92.0~94.7
2008	72.4~80.5	94.1~94.9
2009	77.5~82.1	93.2~100
2010	79.9~87	93~100
2011	92~94	92~100

Source: METI and MOE, Implementation of the Automobile Recycling Act (2012)

Small Home Appliance Recycling Act, 2012

- **Targets:** Designated by government ordinance from among electronic devices and other electrical appliances used by general consumers in their daily lives, such as PCs, mobile phones, digital cameras, clocks and hair dryers, that can be efficiently collected and transported and particularly need to be recycled
- **Responsibilities of different entities**
  - ✓ General consumers
  - ✓ Municipalities
  - ✓ Certified operators
  - ✓ Waste-generating business operators
  - ✓ Retailers
  - ✓ Manufacturers

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Small Home Appliance Recycling System