

Environment and Ecology

Waste management 1



A new garbage disposal facility commenced operation on October 1, 2021.

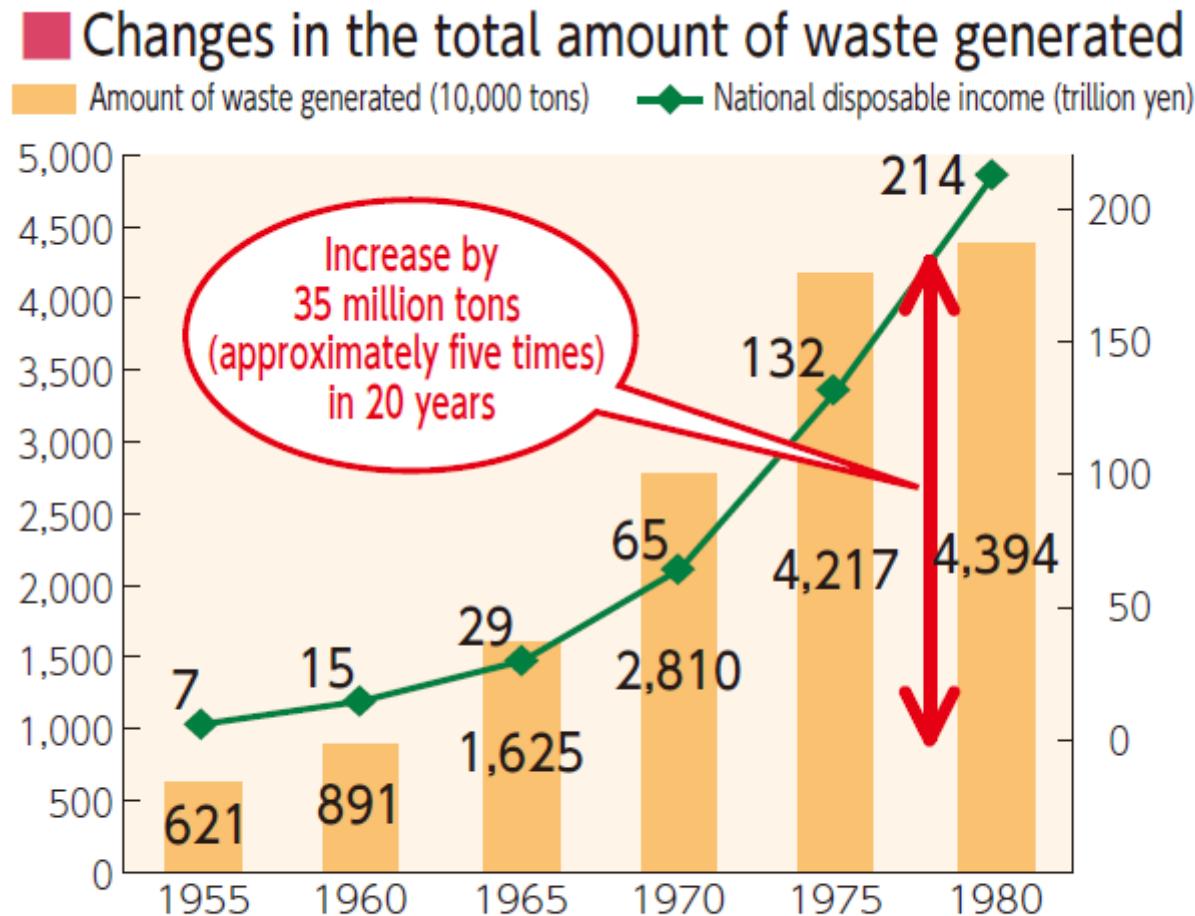
Hiroshima-Chuo Ecopark

(Processing facility for burnable garbage)

Gasification melting furnace 1700～1800°C

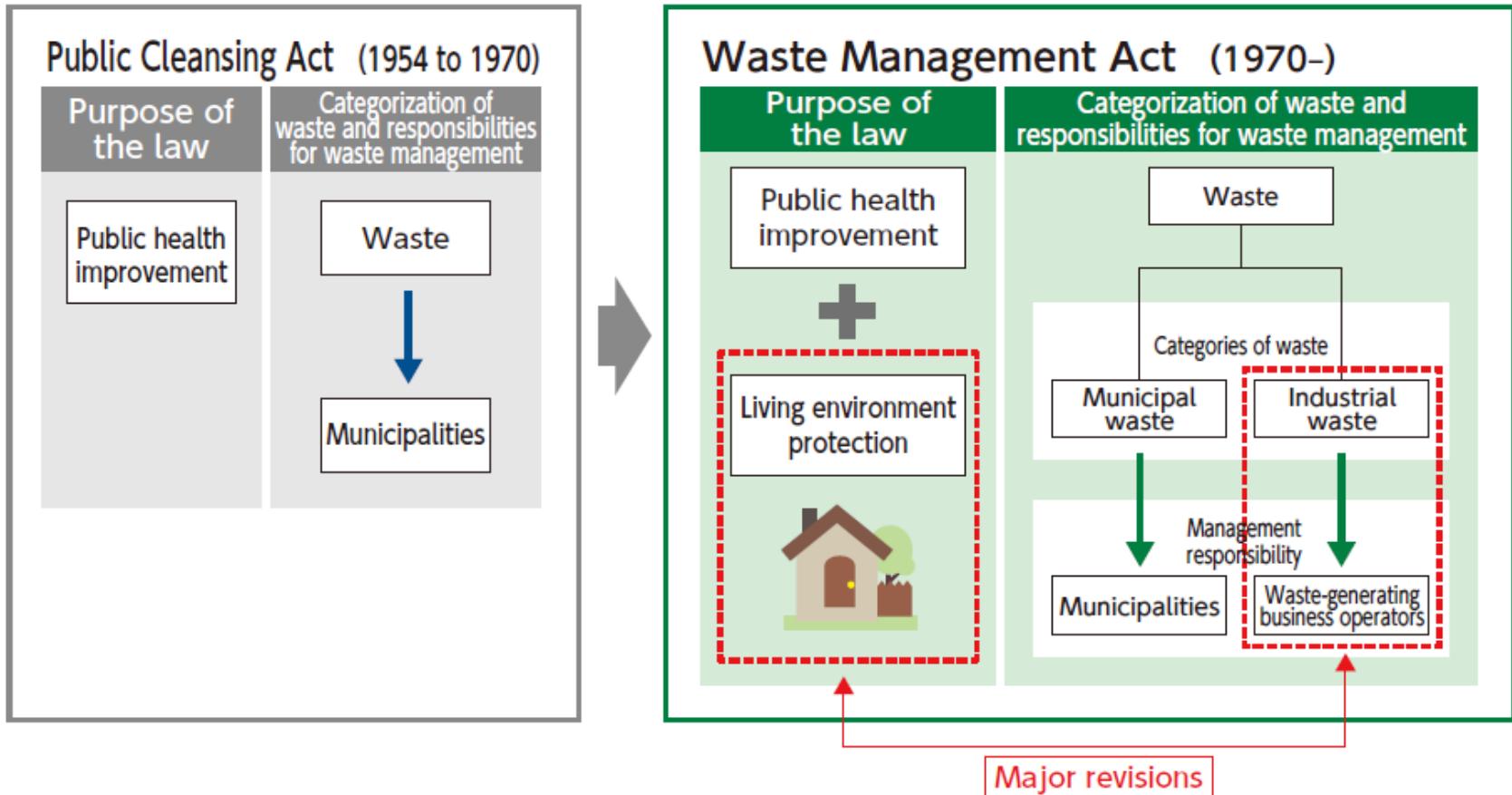


The total amount of waste has increased rapidly



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

Japanese government enacted the Waste Management Act in 1970 .



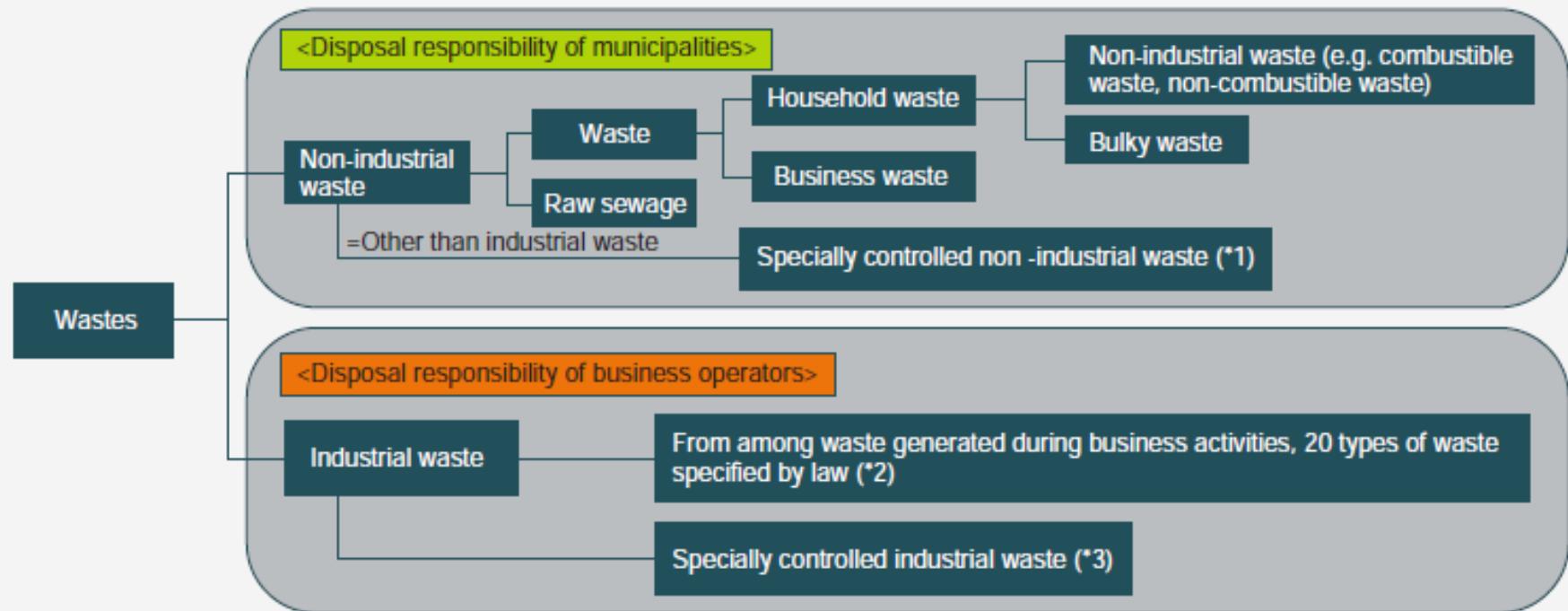
History and Current State of Waste Management in Japan,
Ministry of the Environment (2014)

Industrial waste

and

Non-industrial waste
(Municipal waste)

Figure 2-11 Segregation of Wastes



Note 1: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious

Note 2: Cinders, sludge, waste oil, waste alkali, waste plastics, waste paper, waste wood, waste fiber, animal offal and plant waste, solid animal waste, waste rubber, scrap metal, waste glass, waste concrete and ceramic, slag, debris, animal excreta, carcasses, soot and dust, any other items that are processed to dispose of the above 19 types of industrial waste, and imported waste

Note 3: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious

Source: Ministry of the Environment

1. Industrial waste

産業廃棄物

20 types

**Figure 2-4 The Amount of Generation of Wastes, etc.
in 2007**

Unit: million tons

Other than sum total
Sum total of waste
97 (16%)

Waste
51 (9%)

Raw sewage
23 (4%)

Generation of
wastes, etc.
in 2007
591

Sum total of waste
494 (84%)

Industrial waste
419 (71%)

Source: Ministry of the Environment

Figure 2-16 Industrial waste generation by type
(fiscal year 2007)

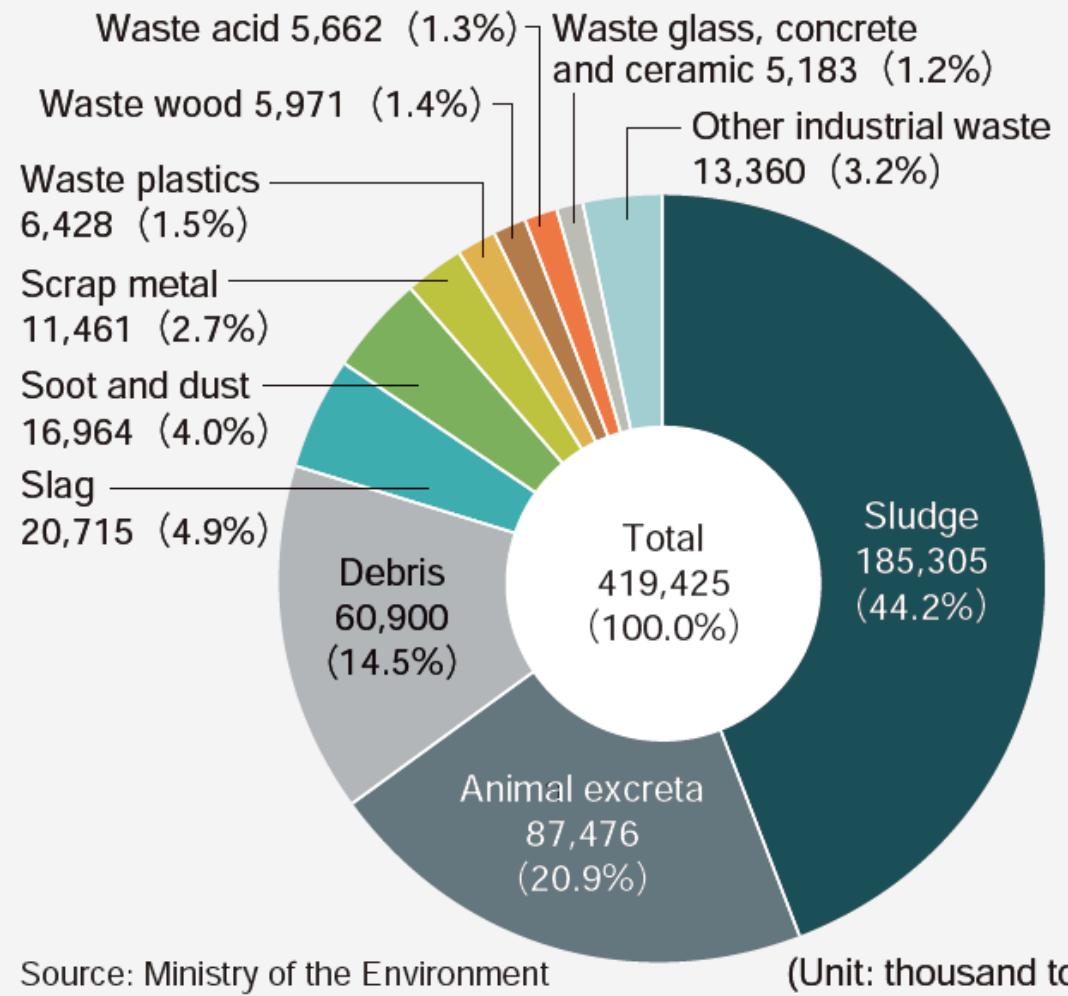
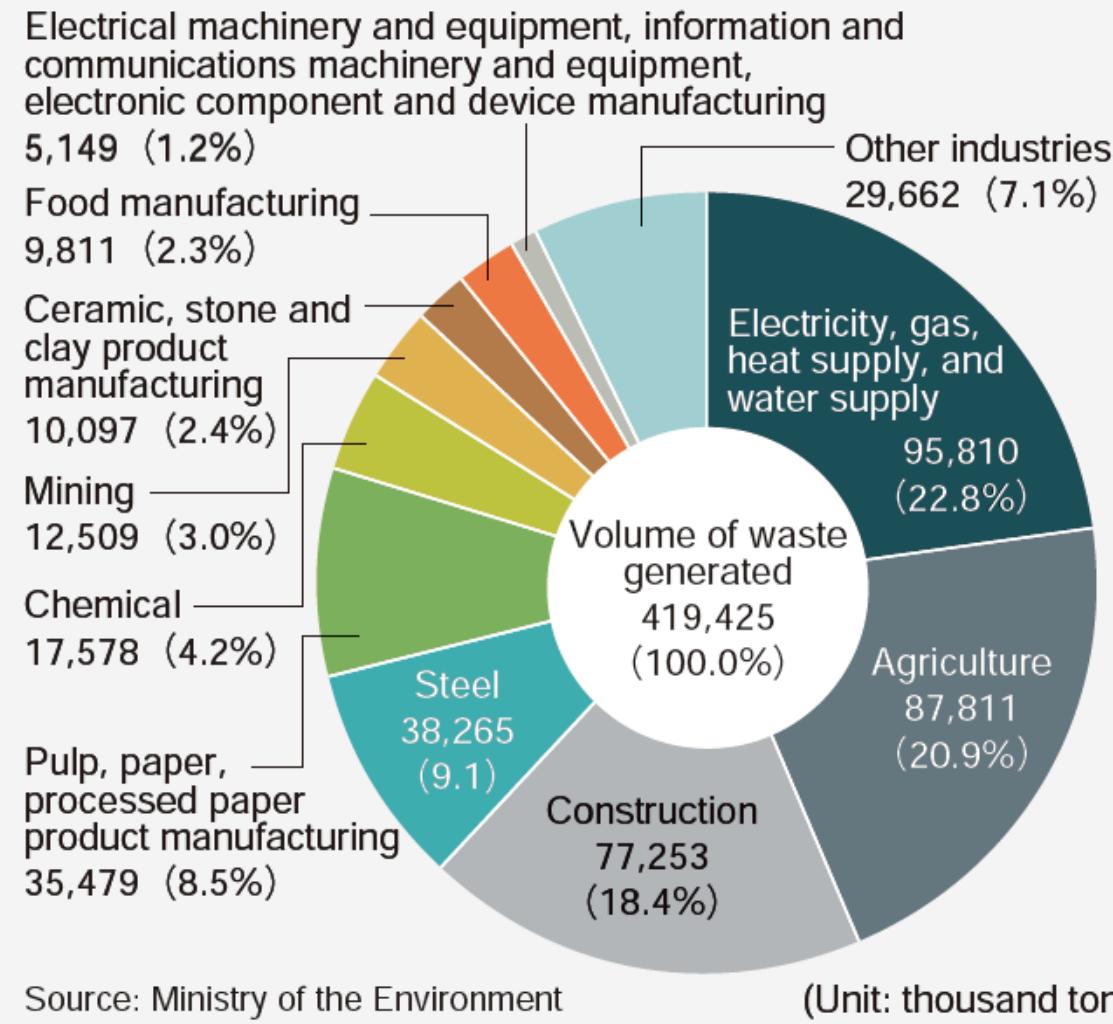
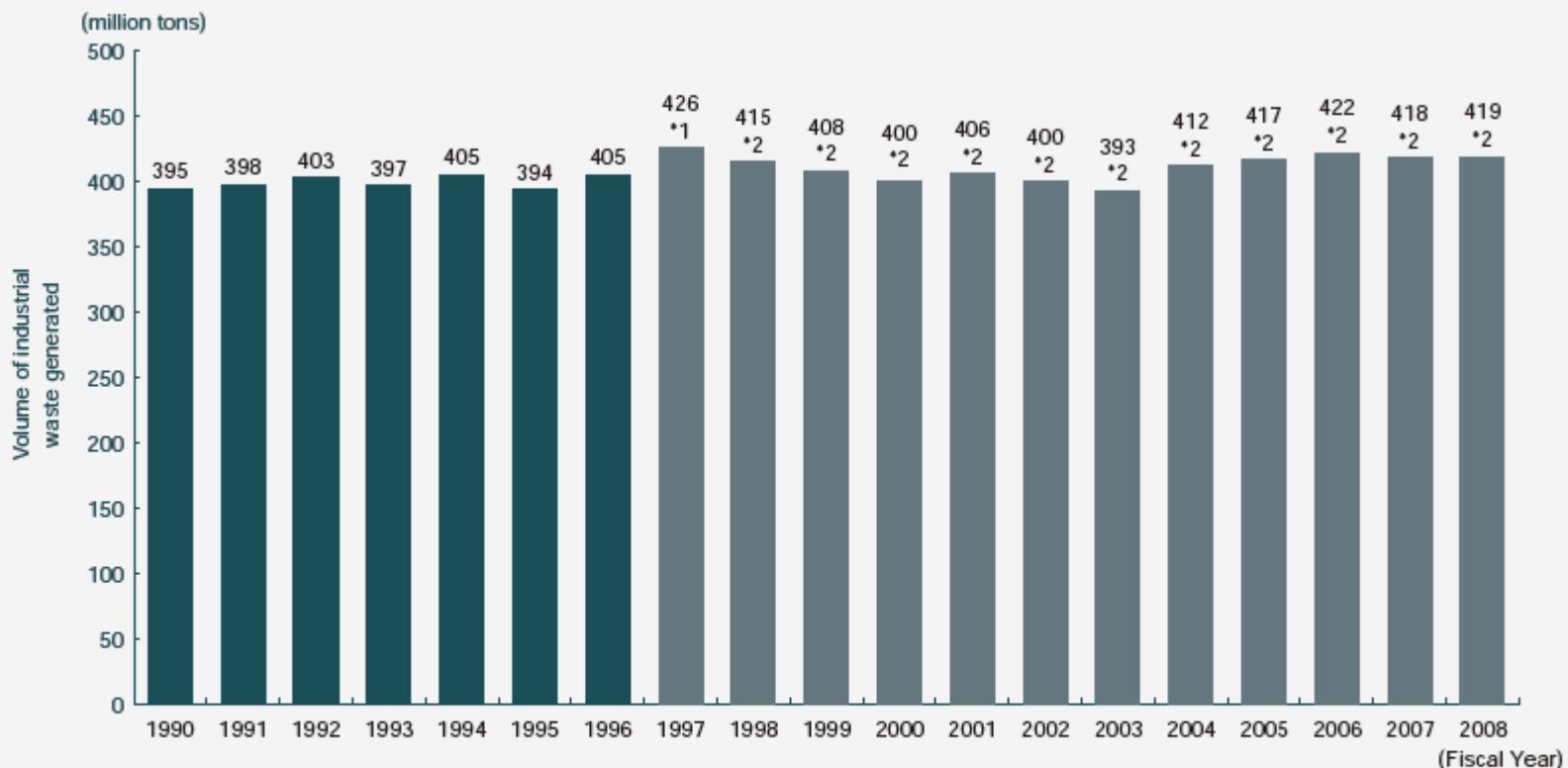


Figure 2-15 Industrial waste generation by industry (fiscal year 2007)



Establishing a sound material-cycle society,
Ministry of the Environment (2010)

Figure 2-37 Changes to the exhaust amount of industrial wastes



Note: From 1996 onward the method to estimate the volume of waste generated was partially amended.

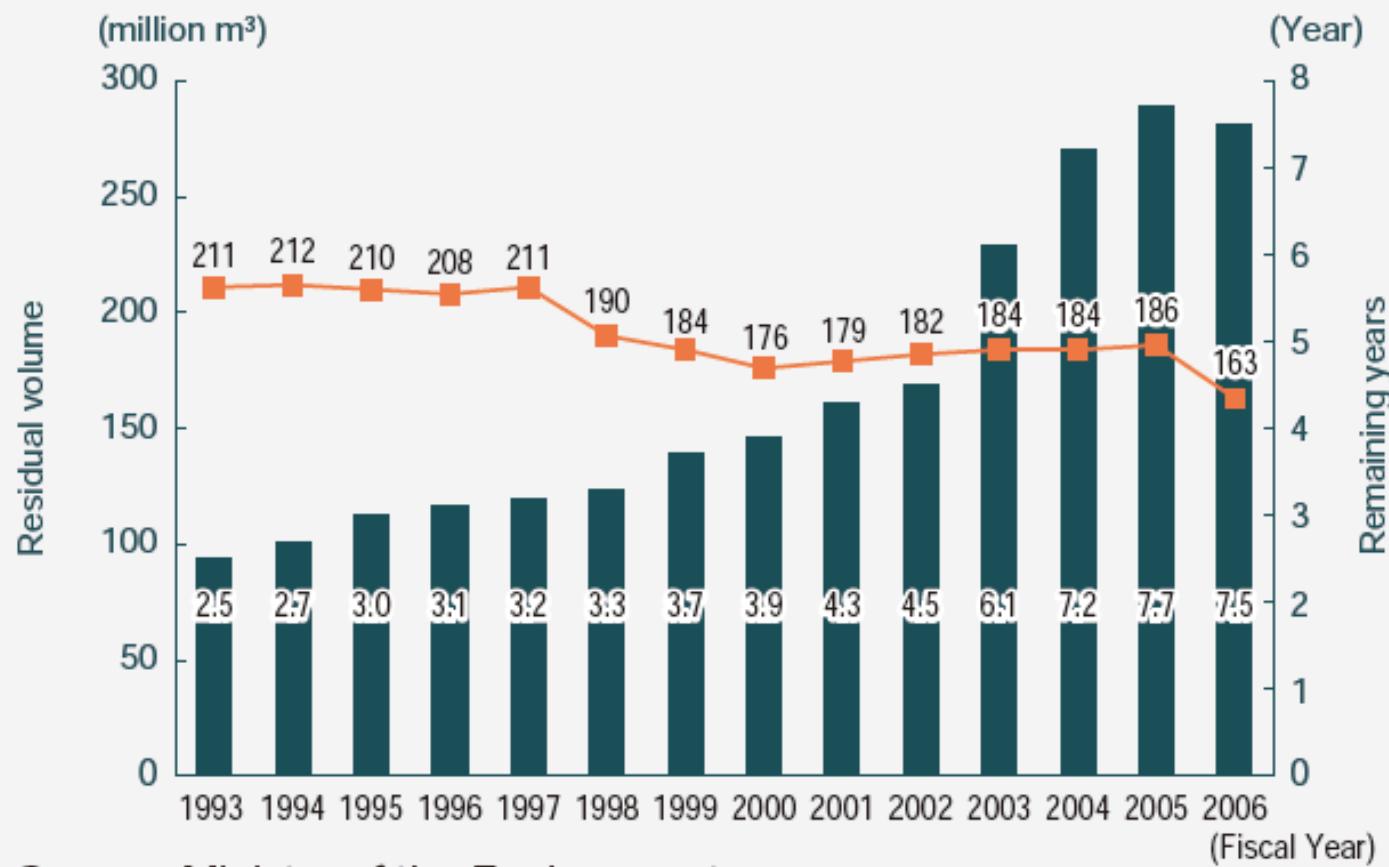
*1: In accordance with the Basic Guidelines of Japan for the Promotion of Measures against Dioxins (decided by the Ministerial Conference on Dioxin Policy), in September 1999 the Government established waste reduction targets with an aim of attainment in fiscal year 2010; the volume of waste generated in fiscal year 1996 is given in relation to this target.

*2: The volume generated from 1997 onward is calculated based on the same precondition applied in *1.

*3: 19 types of industrial waste as stipulated by the Waste Disposal and Public Cleansing Law are covered by this graph.

Source: Ministry of the Environment

Figure 2-45 Changes to residual volume and remaining years of final disposal sites (industrial waste)



Source: Ministry of the Environment

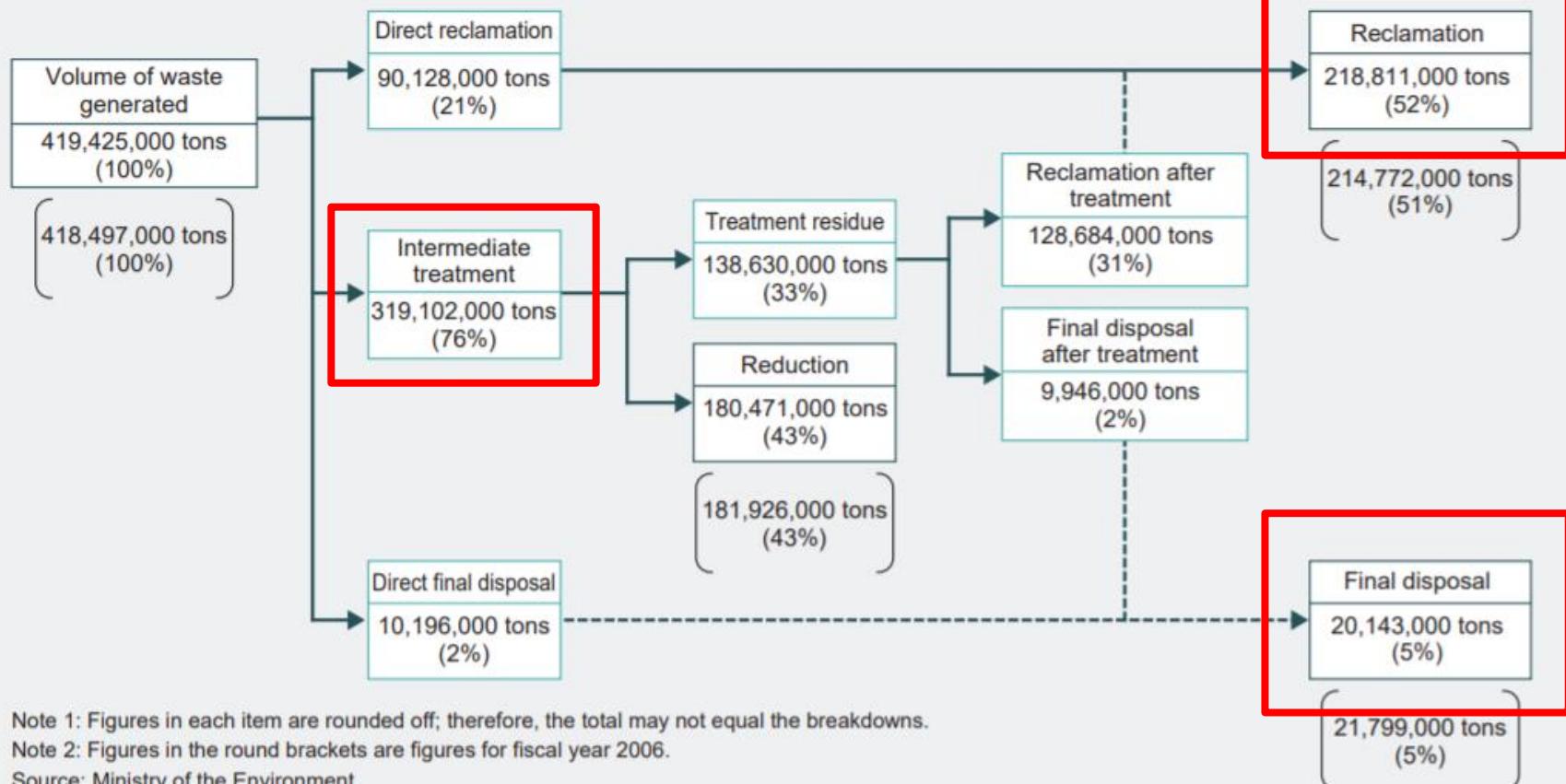
Remaining years =

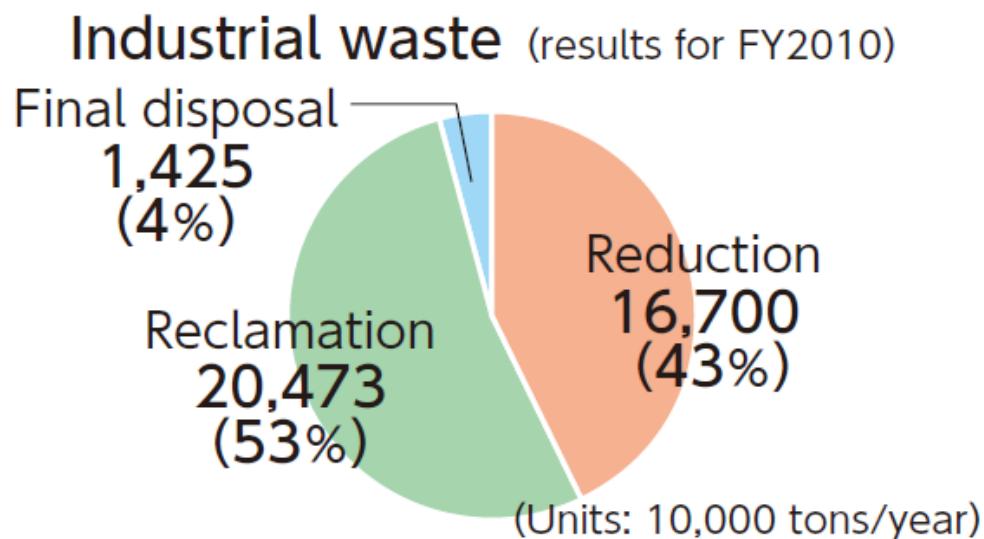
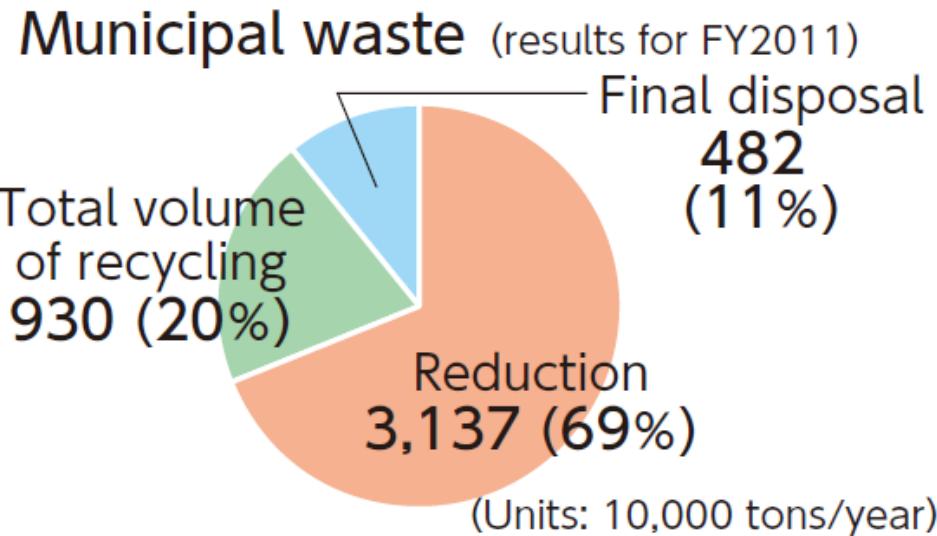
Residual volume / Annual amount of final disposal

Establishing a sound material-cycle society,
Ministry of the Environment (2010)

Figure 2-14 Industrial waste treatment flow (fiscal year 2007)

Figures in the square brackets are figures for fiscal year 2006.





2. Municipal waste

(Non-industrial)

一般廃棄物



How to Dispose of Household Garbage (Higashihiroshima City)



From October 1, 2021

Please separate your garbage correctly, in order to reduce waste and support recycling. (Please also see the reverse of this sheet.)

For collection days, please check the Household Garbage Collection Schedule. This information is also available on the City website.

Type	Items	Examples	Notes	Bags	Size
Burnable 燃やかれるごみ	Kitchen waste, small pieces of wood, paper, cloth, rubber, leather, aluminum foil, crayons, paints, ice packs, desiccants, hand warmers, plastic items including small amounts of metal		<ul style="list-style-type: none"> Carefully drain off all water from raw/kitchen waste. Break skewers or other thin pointed objects into small parts. Soak cooking oil into cloth or newspaper before disposal. Wrap pet droppings in newspaper before disposal. Small amounts of garden waste (pruned wood, weeds, etc) can be disposed of in designated garbage bags. Remove earth from weeds, etc. Large amounts of garden waste should be taken directly to a garbage processing center. Depending on the amount, you may need to purchase a disposal coupon at the counter of the center. Do not dispose of non-burnable oversized garbage, bottles, cans, etc. in burnable garbage. 'Small amounts of metal' refers to screws, nuts, etc. 	Designated Garbage Bags (Orange)	Garbage of a size that will fit in the bag
Dangerous 危険ごみ	Glass, pottery, mirrors, knives (sharp items)		<p>If there are large amounts, please take the garbage directly to a garbage processing center (see overleaf for details).</p> <ul style="list-style-type: none"> If the designated garbage bag looks likely to split, take measures to avoid this. For example, wrap the garbage in newspaper, put it in a second (double) bag, etc. Knives should be wrapped in newspaper, and marked 'kiken' (キケン) before being disposed of. Glass and pottery too large to fit in a designated garbage bag should be disposed of as 'Oversized burnable' garbage. 		
Hazardous 廻避ごみ	Fluorescent tubes, light bulbs, batteries, mercury thermometers, small rechargeable batteries		<ul style="list-style-type: none"> Dispose of fluorescent lights and light bulbs so that they do not break. These items can be disposed of in their paper cases, but be sure to put them into a designated garbage bag. When disposing of batteries and fluorescent lights in the same designated garbage, put the batteries in a small bag first, so that the fluorescent lights do not smash. Please do not bundle items together with tape, etc. Return small rechargeable batteries to electric appliance stores for recycling, or wrap the metal parts with insulating tape, and dispose of them as garbage, in an insulated state. <p>Recyclable items carry the mark on the right:</p>		

● PTAs and local children's groups are involved in recycling activities. Please cooperate.
 ● There are collection boxes for used lighters and batteries in the City Office, branch offices, etc.

● Please cooperate in keeping garbage stations clean and tidy.

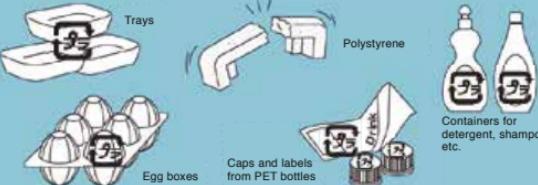
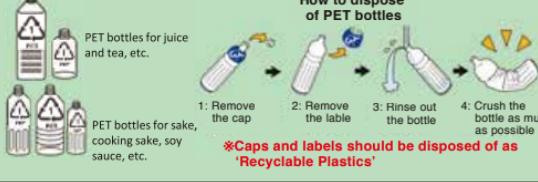
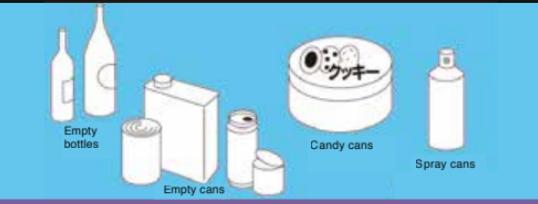
Enc

Inquiries

Waste Management Division, Higashihiroshima City Office 082-420-05
 Regional Promotion Division, Kurose Branch Office 0823-82-02
 Regional Promotion Division, Fukutomi Branch Office 082-435-22

ill fit into a designated garbage bag

Designated Garbage Bags (Purple)

Recyclable Plastics リサイクルプラスチック	Plastic and vinyl containers with the 'plastic' mark (see below), polystyrene 		<ul style="list-style-type: none"> Confirm that the item has a recyclable plastic mark. Use all the contents, rinse out the container, and remove any dirt. Break up large pieces of polystyrene into smaller pieces and put them in a bag. Please do not use double bags. Items which cannot be cleaned out fully and items where powder residues remain should be disposed of as 'Burnable' garbage. Items without a recyclable plastic mark that are made only of plastic should be disposed of as 'Other Plastics'.
Other Plastics その他プラスチック	Items made of plastic only , other than Recyclable Plastics.		<ul style="list-style-type: none"> Items which cannot be cleaned out fully and items where powder residues remain should be disposed of as 'Burnable' garbage. Items with a recyclable plastic mark should be disposed of as 'Recyclable Plastics'.
PET Bottles ペットボトル	Plastic bottles for drink, alcohol, soy sauce, cooking sake, seasonings, etc., with the PET bottle mark (see right) 		<ul style="list-style-type: none"> Remove the cap and label and dispose of them as 'Recyclable Plastics'. Rinse out the bottle. Crush PET bottles as much as possible. Dispose of containers for cooking oil, sauces, salad dressings (those including oil), etc. as 'Recyclable Plastics' if they have a recyclable plastic mark.
Bottles & Cans 瓶・缶	Glass bottles, cans (There is no need to separate cans and bottles)		<ul style="list-style-type: none"> There is a danger that spray cans, aerosols, gas canisters (cassettes), etc., may explode, causing fire or damage. Therefore please ensure that the contents are completely used up, and that all the gas has been emptied from the can, etc. Empty the can, etc., outside, following the instructions shown on the item. Return returnable bottles (beer bottles, etc.) to the shop where you bought them. Rinse out the bottle or can thoroughly and remove the cap before disposal. If the cap is metal, dispose of it in the same garbage bag. Broken bottles, etc. should be disposed of as 'Dangerous' garbage. Never dispose of bottles in which chemicals, medicines, or pesticides are still remaining.

operate in reducing waste by leaving newspapers, magazines, fabrics, bottles, aluminium and steel ranch offices and sub-branch offices.

| cans, cardboard, etc., for them to collect, instead of disposing of these items as garbage.

News-papers 新聞紙	Newspapers (including flyers inserted inside newspapers)		<ul style="list-style-type: none"> Separate ① newspapers (including fliers), ② magazines and miscellaneous paper, and ③ cardboard, and dispose of ① on newspaper collection days, and ② and ③ on magazine & cardboard collection days. Make a stack of about 20cm in height and firmly tie it with string in a cross. Do not use gummed tape or bags, etc. Do not mix newspapers and magazines together. If you have a bundle of fliers only, they can be disposed of as magazines. Remove any clips, plastic, CDs, etc. from magazines and miscellaneous paper/cardboard. Heat-sensitive paper (receipts, faxes, etc.), carbon copies, photographs, paper treated to make it water-resistant, aluminum- or vinyl-coated paper, laminated postcards, and gold and silver paper should be disposed of as burnable garbage. Fold up cardboard into a size smaller than 50x100cm before bundling it together. 	Tie with string	Less than 20 cm	
Magazines, misc. paper, cardboard 雑誌・雑がみ・紙一類	Magazines (notebooks, pamphlets, books, etc.) Misc. paper (candy boxes, tissue boxes, wrapping paper) Cardboard		<ul style="list-style-type: none"> Mattresses, etc., containing springs should all be disposed of as 'Burnable oversized' garbage. Empty all the drawers when disposing of desks or chests. It is not necessary to remove mirrors on the insides of doors. Futons, carpets, reed screens, etc., which will not fit into a designated garbage bag should be tied with string. Items small enough to fit into a designated garbage bag should be tied with string and disposed of as 'Burnable' garbage. Electrically-reclining sofas, floor chairs, etc., should be disposed of as 'Non-burnable Oversized' garbage. 	Less than 180 cm x 100 cm x 200 cm		
Oversized Garbage 超大物ごみ		Oversized Burnable 燃やせる粗大ごみ	Wooden furniture, beds, etc. (including those with springs), glass, pottery and mirrors that will not fit inside a designated garbage bag , other items (large bags, floor chairs, etc.)		<ul style="list-style-type: none"> Electrical appliances not covered by the Home Appliance Recycling Laws can be disposed as 'Non-burnable Oversized' garbage. Dispose of fluorescent bulbs and batteries, etc. from light fittings as 'Toxic' garbage. Do not put anything inside large cans, etc. There is the danger that heaters, etc., may explode or cause fires. Please ensure that there is no fuel remaining, and that batteries, etc., have been removed. Please cancel anti-theft registration for bicycles. Frying pans, cords and small items such as wires should be put together in a transparent or semi-transparent bag before being disposed of in a designated garbage bag. 	Less than 150 cm x 120 cm x 200 cm
		Oversized Non-Burnable 燃やせない粗大ごみ	Household electrical appliances (except those covered by recycling laws), metal items (not sharp items), bicycles, etc., hard plastic items that are too large to fit into a designated garbage bag, large plastic containers			

Please see overleaf for more information.



■ Garbage that cannot be disposed of ■

The following cannot be disposed of at municipal facilities, even if broken up. They cannot be taken directly to a facility. See the table below for disposal methods.



Televisions



Fridges and freezers



Washing machines and dryers



Air conditioners



Household fire extinguishers



Motorbikes and scooters (mopeds)



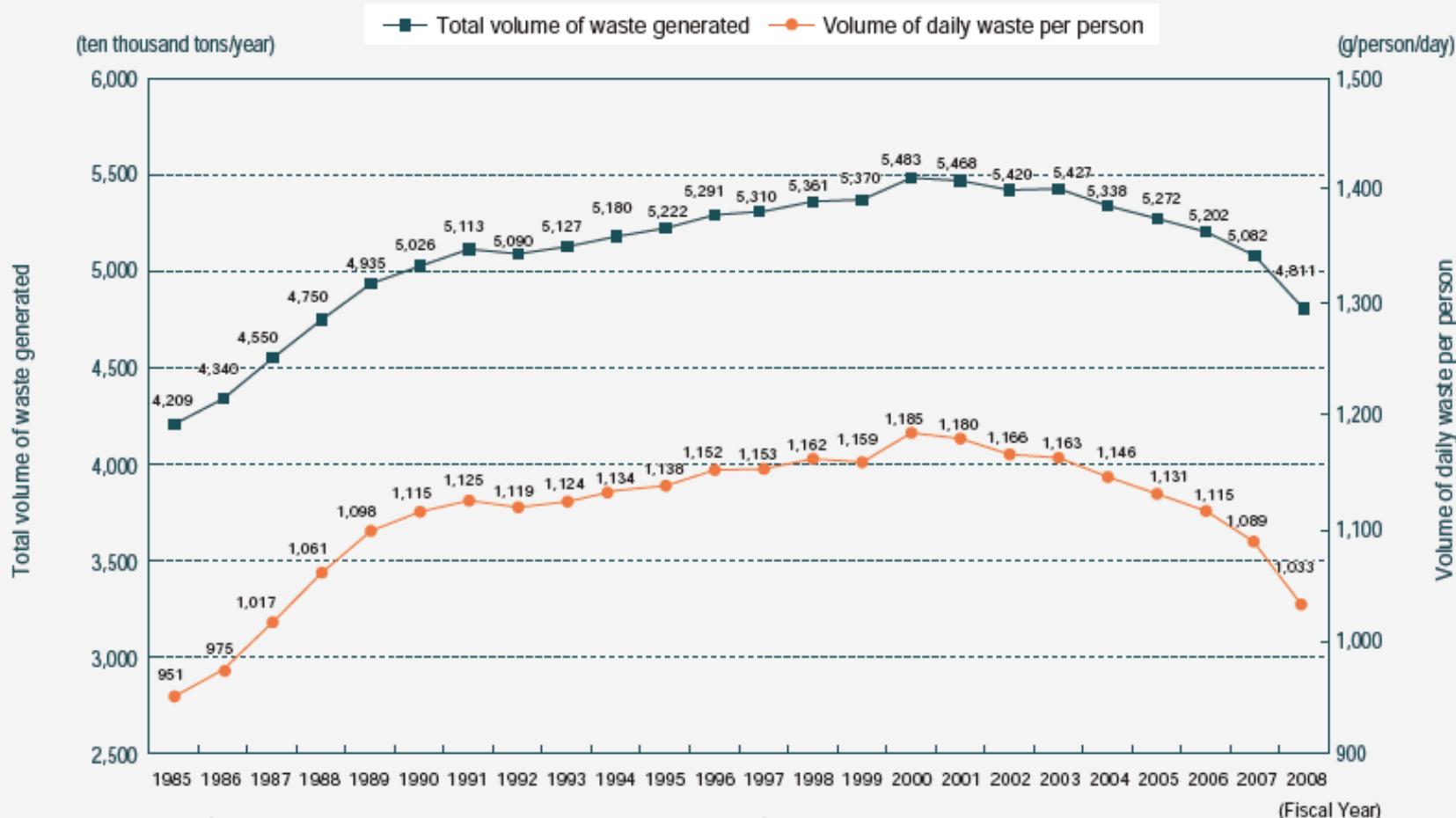
Computers

2. Municipal waste

(Non-industrial)

一般廃棄物

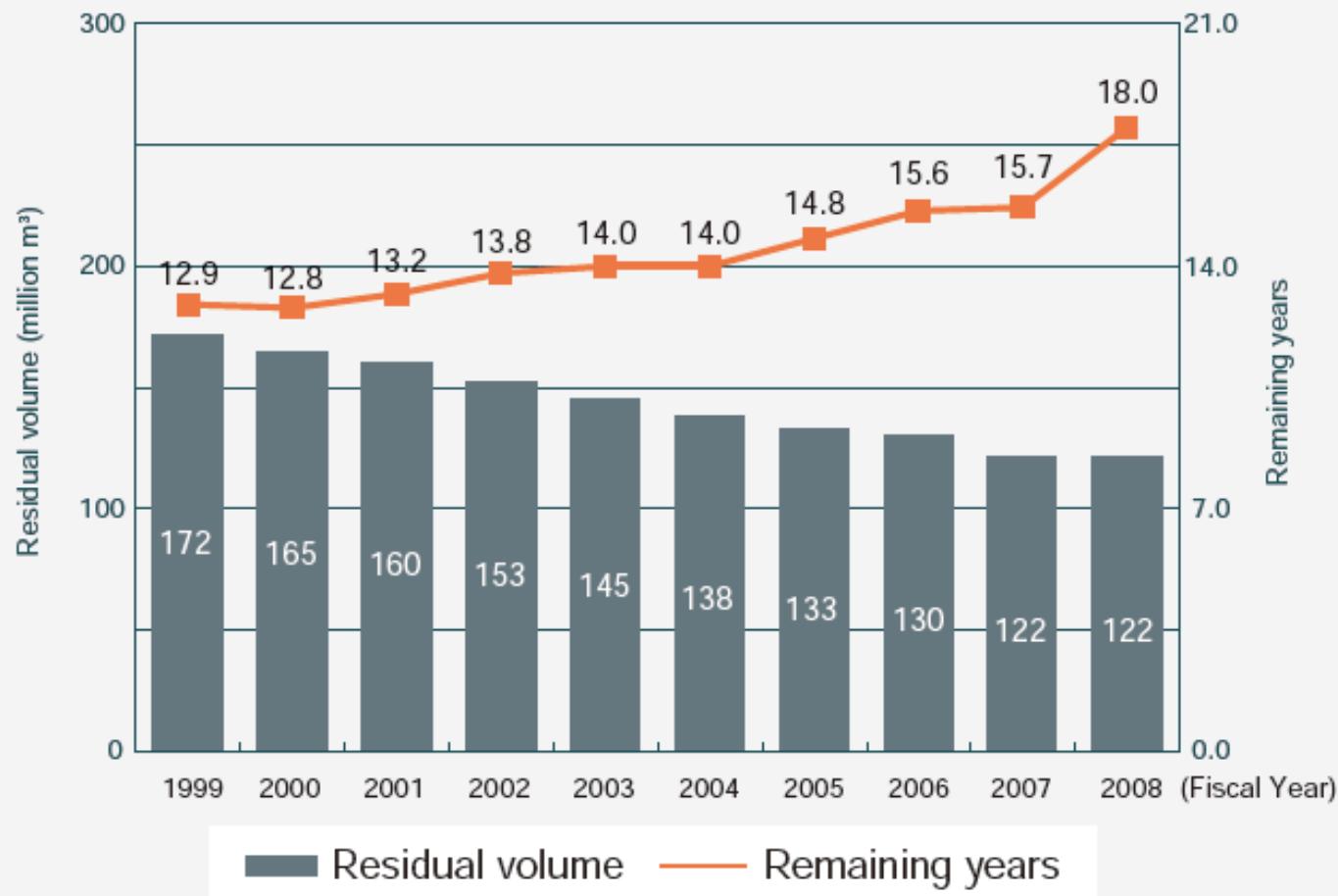
Figure 2-33 Changes to total waste generation and daily waste per person



Note: Total volume of waste generated = Designed collection volume + Volume of waste directly brought in +
Volume of group collection of recyclable waste

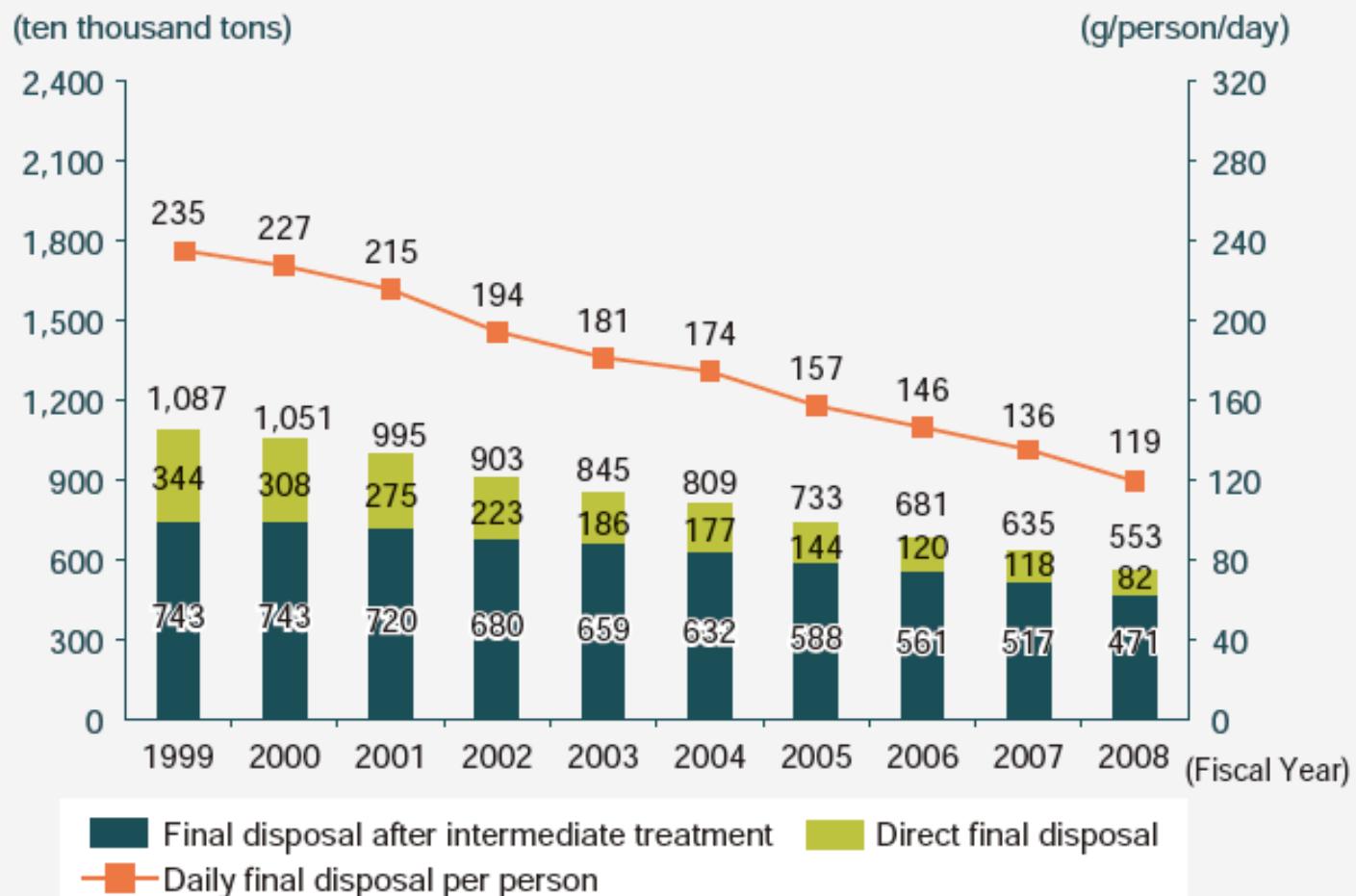
Source: Ministry of the Environment

Figure 2-43 Changes to residual volume and remaining years of final disposal sites (municipal waste)



Source: Ministry of the Environment

Figure 2-42 Changes to final disposal and daily final disposal per person



Source: Ministry of the Environment

1. Cost
2. Limit of final disposal sites
3. Environmental impacts
4. Consumption of natural resources

Key word

Microplastics

Small pieces of plastic (less than 5 mm in length) that pollute the environment. These include microfibers from clothing, microbeads, plastic pellets, and particles created from the degradation of larger plastic products.

Microplastics are ingested and accumulated in the bodies of many aquatic organisms. Their impact on the ecosystem has yet to be fully determined.

We should look after our limited resources.

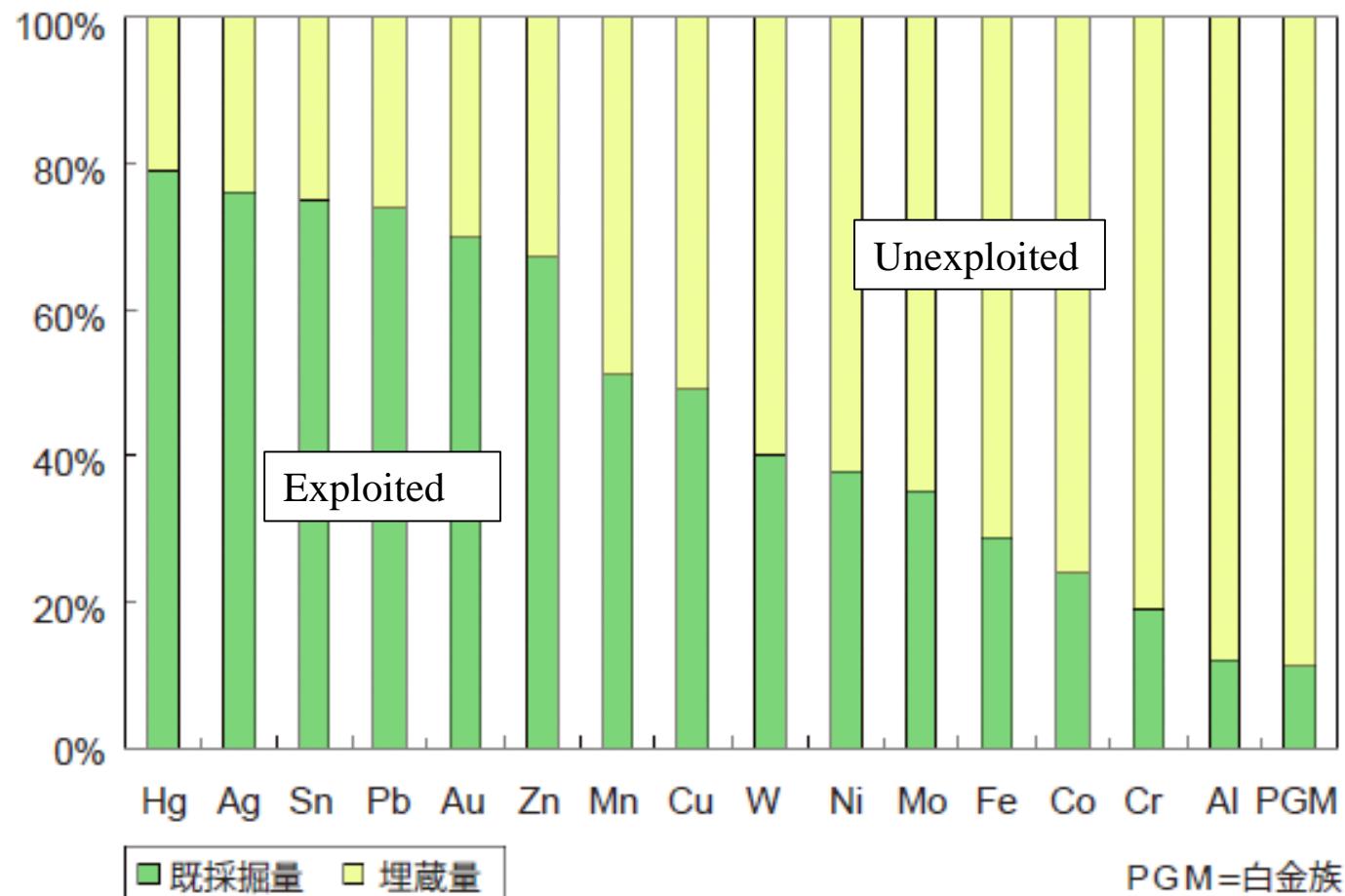
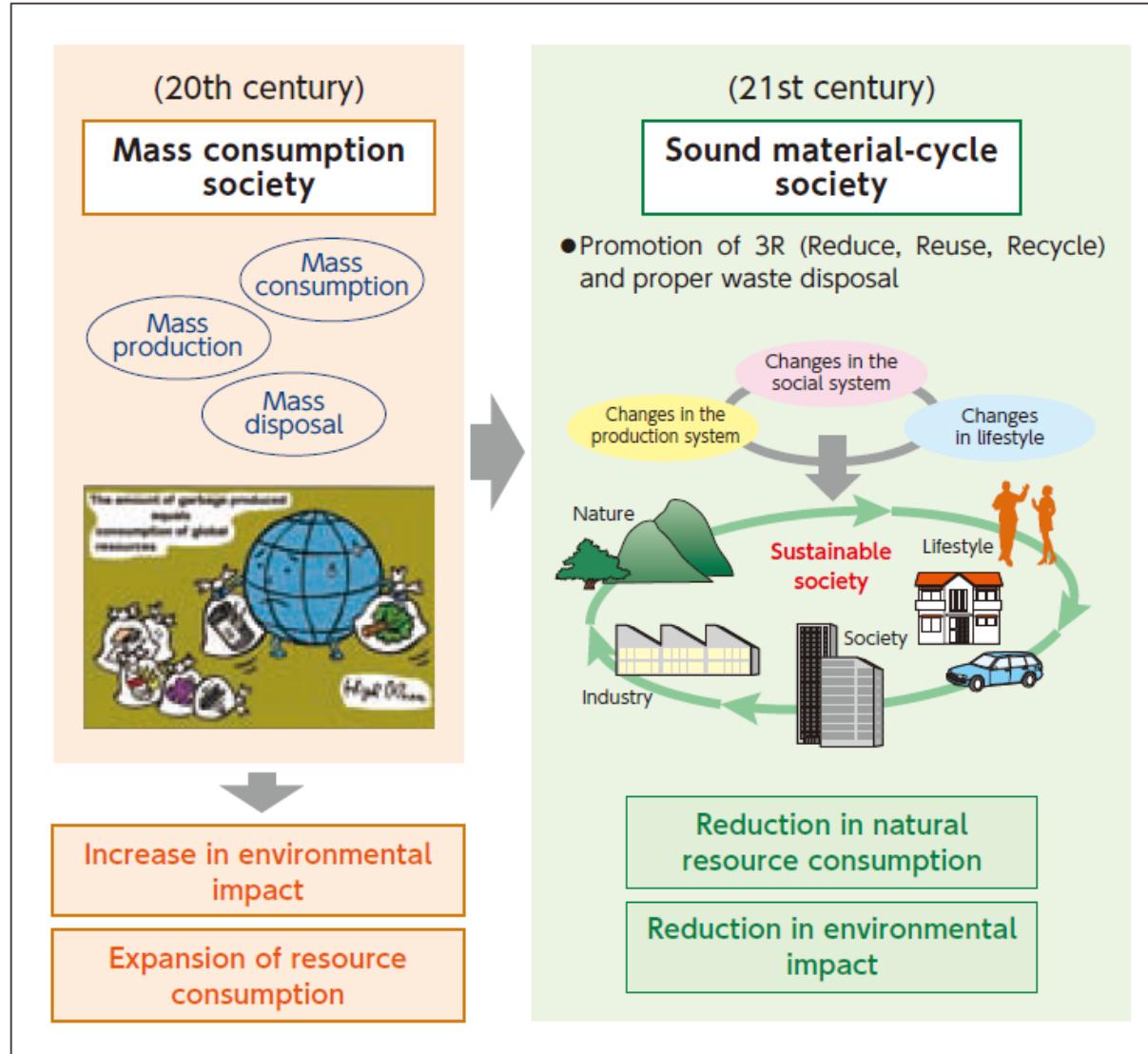


図1

Exploited vs. unexploited proportion of mineral resources
(西山 孝著「資源経済学のすすめ」中公新書1993年より)

Japan is undertaking the transition to a sound material-cycle society.



Source for the illustration: Website of the Miyako Ecology Center

History and Current State of Waste Management in Japan,
Ministry of the Environment (2014)

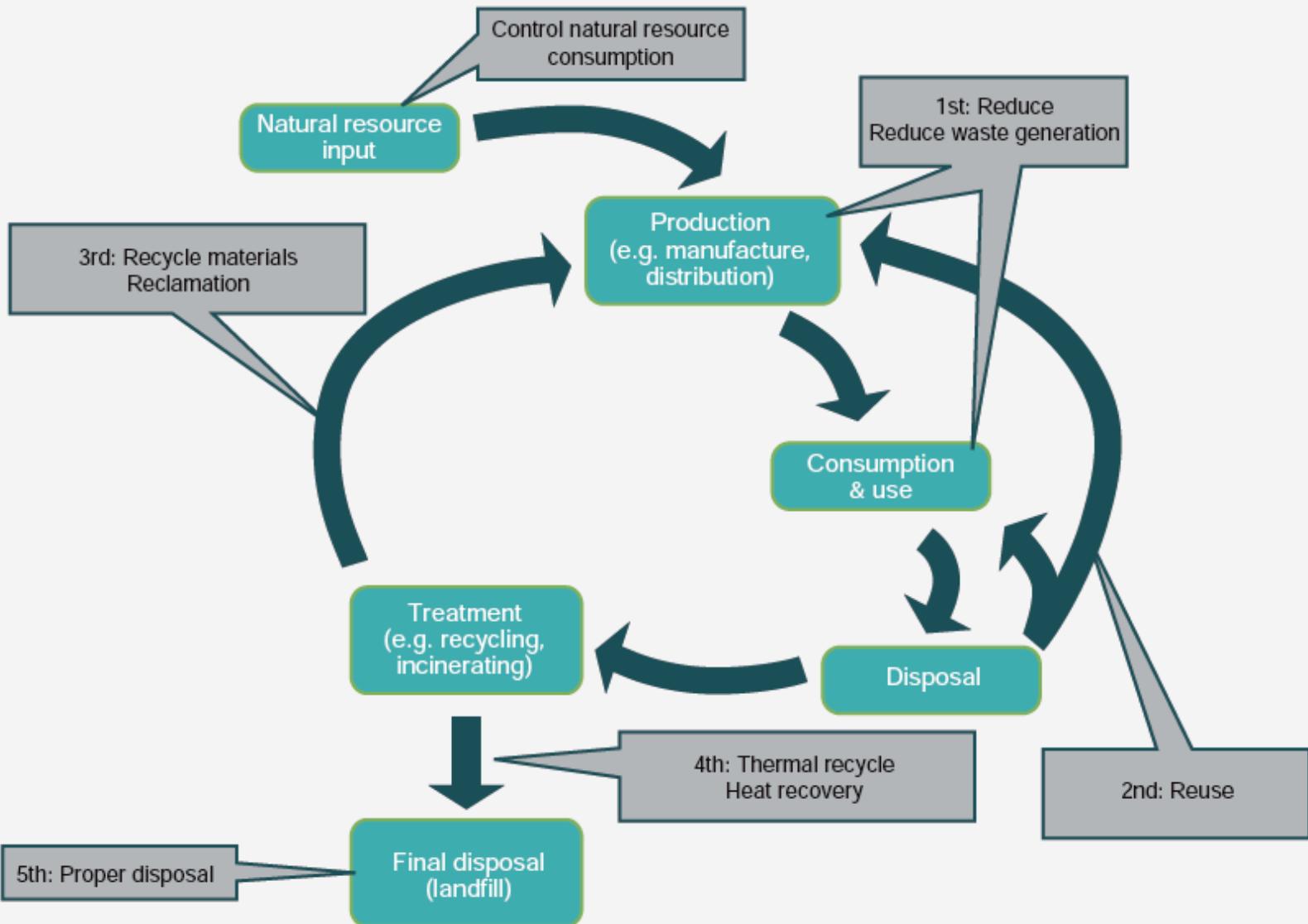
Basic Law for Establishing a Recycling-Based Society

(Fundamental Law for Establishing a Sound
Material-Cycle Society)

循環型社会形成推進基本法

was enforced in January 2001

Figure 3-1 Flowchart for a sound material-cycle society



Source: Ministry of the Environment

3R

- 1. Reduce waste generation**
- 2. Reuse**
- 3. Recycle**
- 4. Thermal recycle (Heat recovery)**
- 5. Proper disposal**

1. Reduce

Reduce waste, by-products, etc.

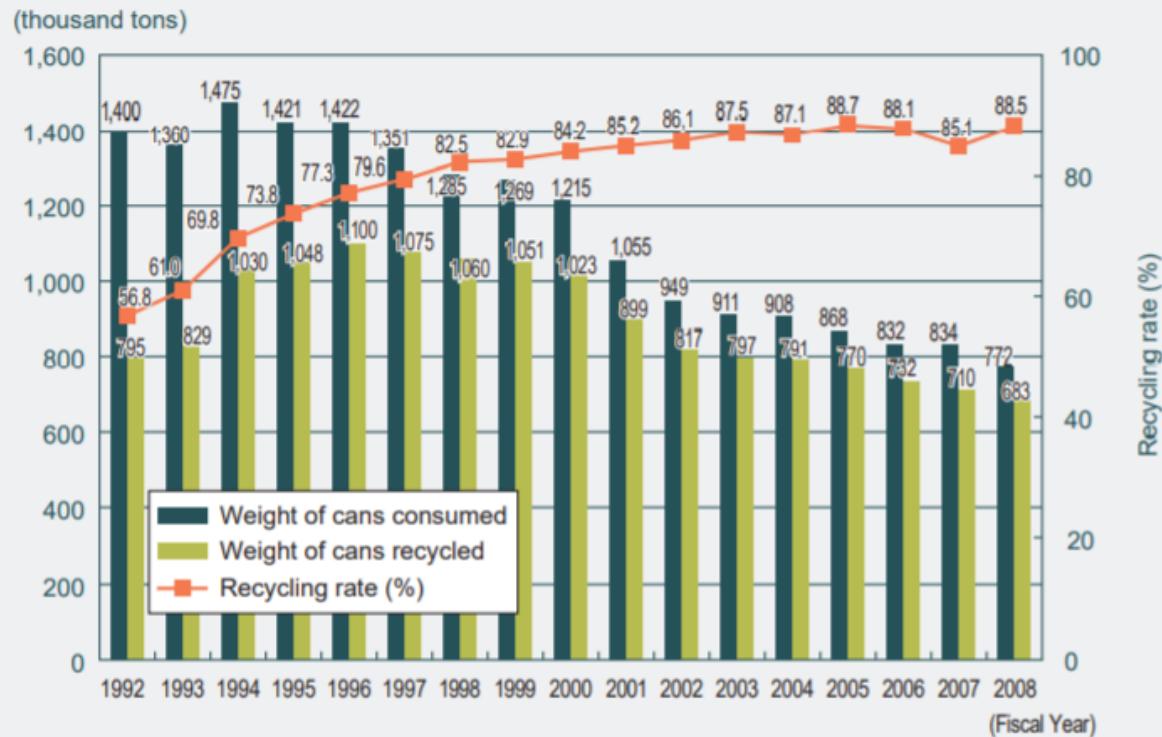
2. Reuse

Use things repeatedly.

3. Recycle (Material Recycling)

Recycle things that cannot be reused.

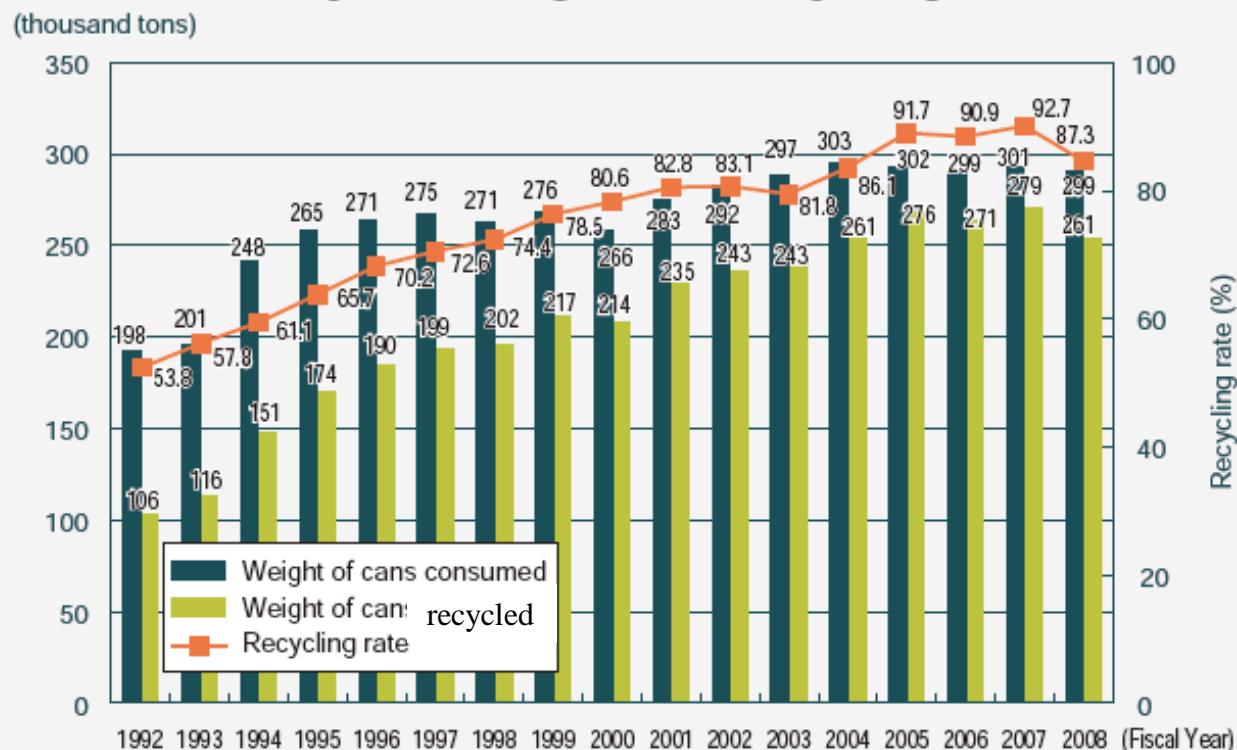
Figure 2-21 Steel cans: consumption weight, recycled weight and recycling rate



Note: Steel can recycling rate (%) = Weight of steel cans recycled (t) / Weight of steel cans consumed (t)

Source: Japan Steel Can Recycling Association

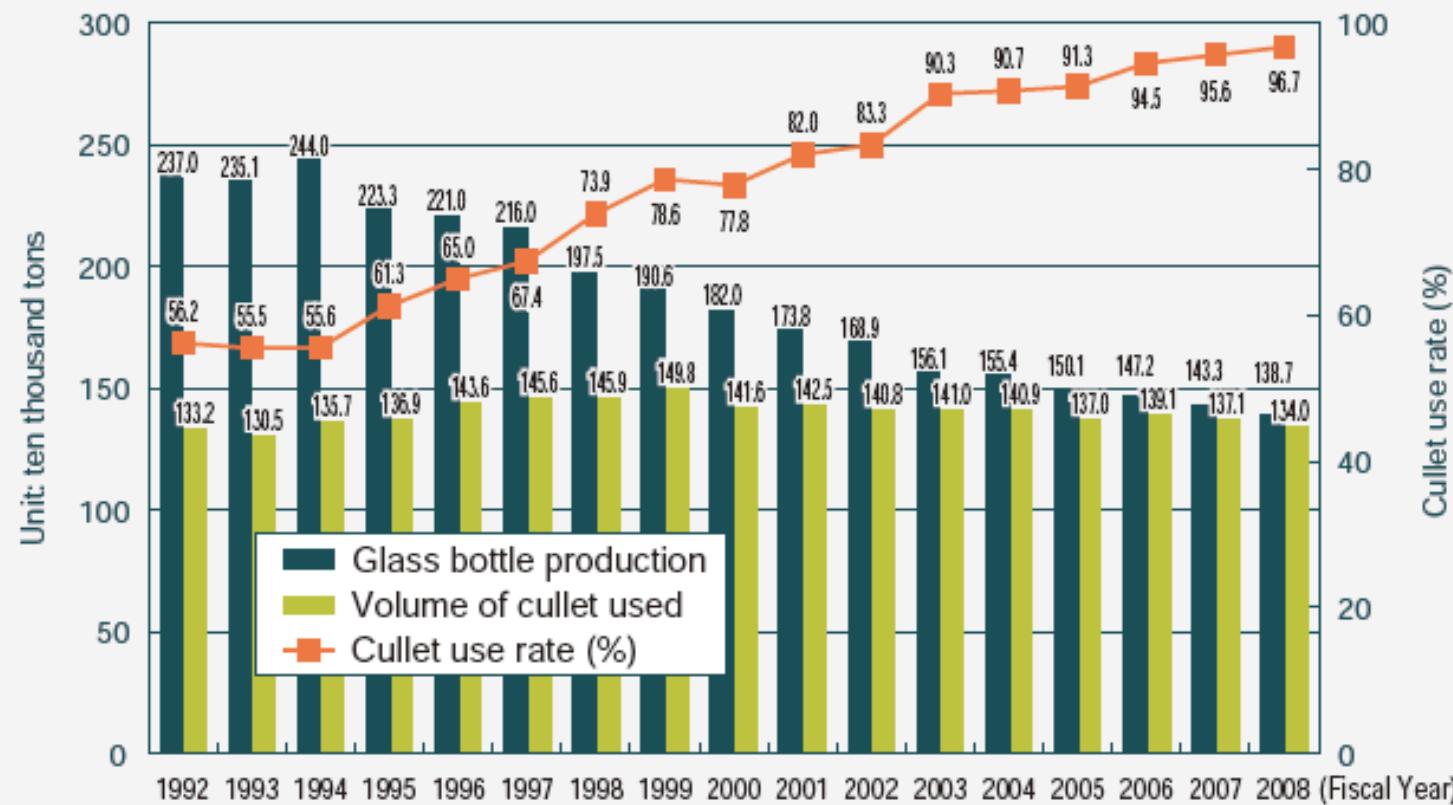
Figure 2-22 Aluminum cans: consumption weight, recycled weight and recycling rate



Note: Aluminum can recycling rate (%) = Weight of aluminum cans recycled (t) / Weight of aluminum cans consumed (t)

Source: Created by the Ministry of the Environment, based on materials published by the Japan Aluminum Can Recycling Association

Figure 2-18 Glass bottle production and volume of cullet used



Source: Glass Bottle Recycling Promoter Association

Cullet: fragmented glass

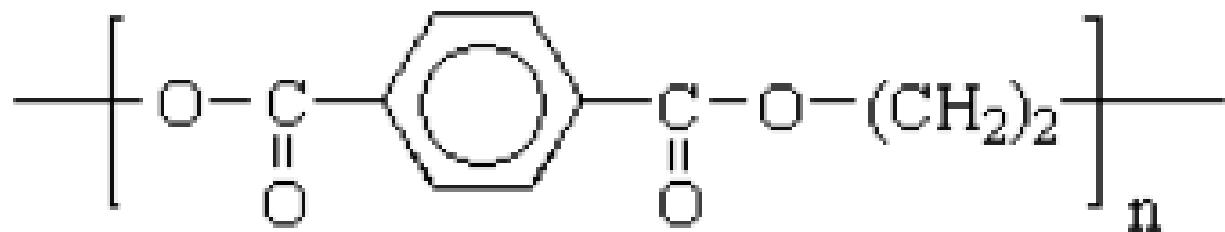
Establishing a sound material-cycle society,
Ministry of the Environment (2010)

The use of clear bottles and ‘ecology bottles’ promotes recycling of waste glass.

Ecology bottles: Bottles made from cullet of various color (excluding blown and transparent).



PET: ポリエチレンテレフタート (Polyethyleneterephthalate)



PET の化学式



PETボトルリサイクル推進協議会
The Council for PET Bottle Recycling

Cascade recycling (cascading)

and

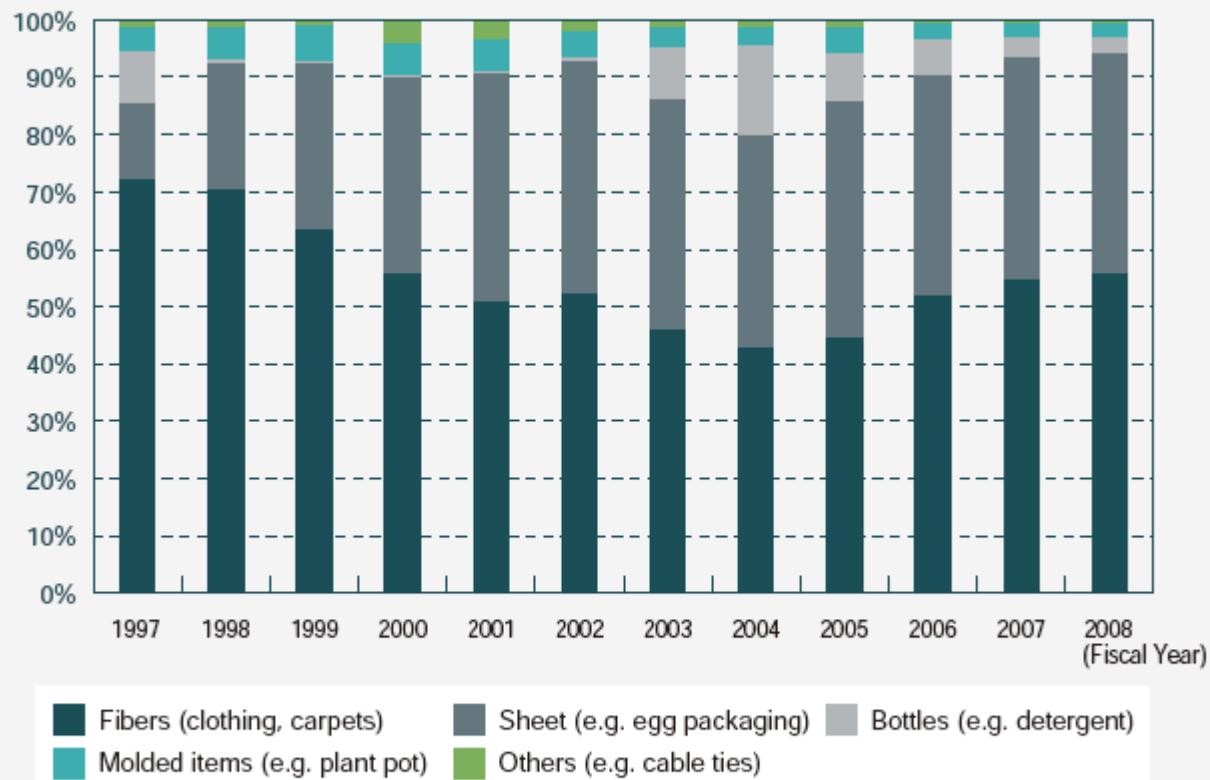
Horizontal recycling

Cascade recycling (cascading)

It is an open-loop recycling where the material is reused as a material, but it does not return to the original material because it is accompanied by deterioration and change in properties.

Cascade recycling

Figure 2-20 Changes to recycled PET resin use by type



Source: Created by the Ministry of the Environment, based on materials published by the Japan Containers And Packaging Recycling Association

4. Thermal recycle (Heat recovery)

Recover heat from things which cannot be recycled materially and which have no alternatives but incineration.

Categories of recycling

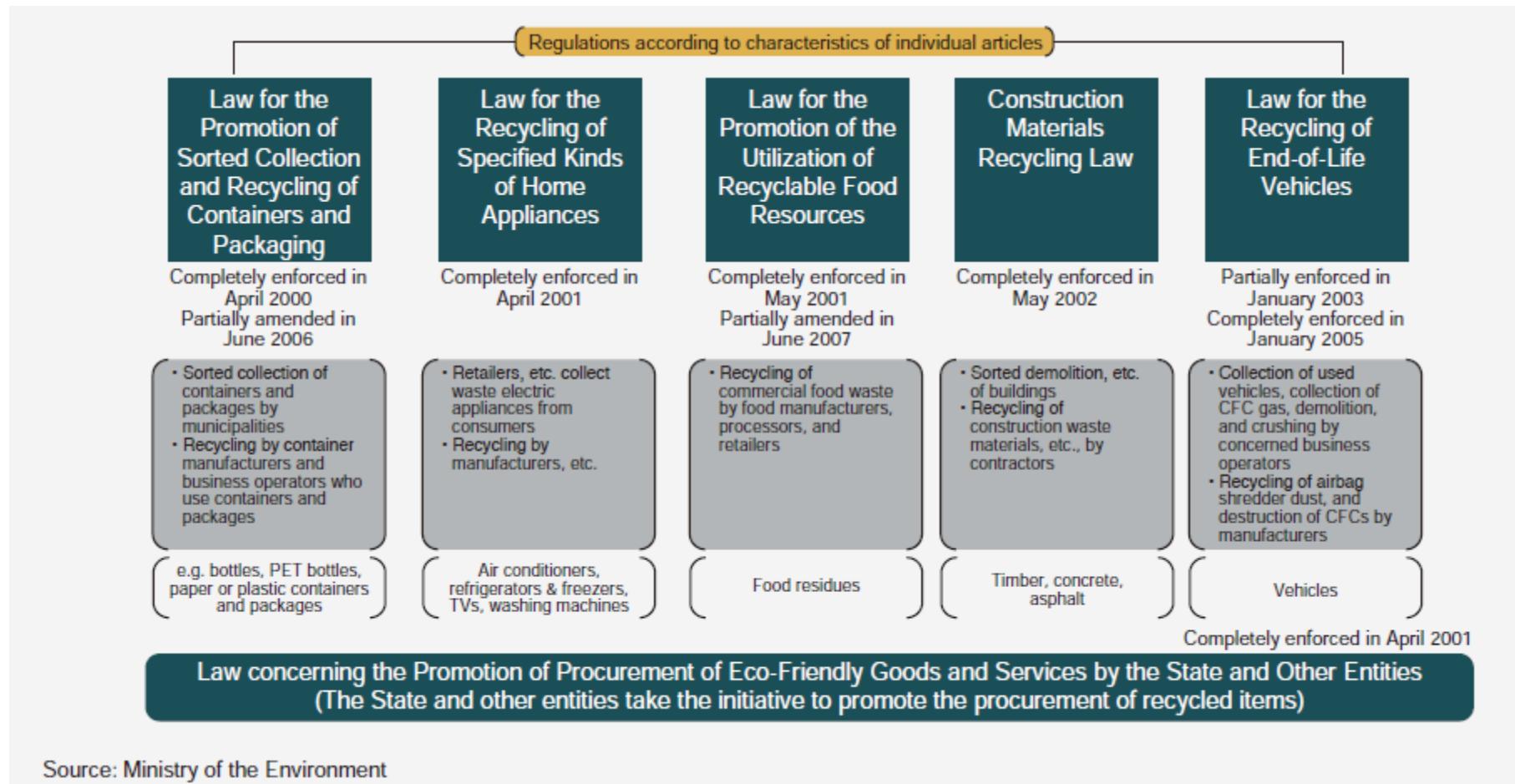
Japan	Germany	Example
Material recycle	Mechanical recycling	PET to PET Can to Can Recycled paper
Chemical recycle	Feedstock recycling	Monomer Blast furnace
Thermal recycle	Energy recovery	Incineration with power generation RDF

There are many different types of classification for recycling.
Each category of recycling is called differently depending on country.

RPF(Refuse Paper & Plastic Fuel) & RDF(Refuse Derived Fuel)

	Origin	Contamination	Water
RPF	Mainly industrial waste	Low	Low
RDF	Mainly municipal waste	High	High

Japan enacted several laws for waste management under the Basic Law for Establishing a Recycling-Based Society



Source: Ministry of the Environment