# Towards a 3R-Oriented, Sustainable Society: Legislation and Trends

Ministry of Economy, Trade and Industry

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# Forward

In the course of economic activities based on mass-production/consumption/disposal, Japan has been discharging an enormous amount of waste, about 450 million tons a year, and is currently facing various problems, such as a shortage of final disposal sites and the adverse environmental effects of inappropriate waste disposal, as well as concern over the depletion of mineral resources in the future. It has become an urgent task to establish a new economic system that is favorable for both the environment and the economy, which regards measures to cope with such environmental and resource constraints not as factors restricting economic growth, but as factors promoting it. It will be impossible to continue economic and social activities in a sustainable and progressive manner in the 21st century without dealing with these environmental and economic constraints appropriately.

Based on such awareness, Japan has been making active efforts to confront environmental and resource constraints by establishing appropriate laws. They include the Law for Promotion of Utilization of Recycled Resources in 1991; Containers and Packaging Recycling Law in 1995; Home Appliance Recycling Law in 1998; Fundamental Law for Establishing a Sound Material-Cycle Society, Law for Promotion of Effective Utilization of Resources, Construction Materials Recycling Law, Green Purchasing Law, and Food Recycling Law in 2000; and End-of-Life Vehicles Recycling Law in 2002. In accordance with these laws and policies and under the principle of discharger's responsibility, Japan has been working on smooth promotion of the 3Rs, reduction of waste generation, reuse of parts, and recycling of used products as raw materials, with the aim of decreasing the amount of natural resources utilized and mitigating the environmental burden.

The Ministry of Economy, Trade and Industry has been promoting measures to create a sustainable society emphasizing the 3Rs. This handbook features the outline of legislation concerning the creation of a sustainable society and the latest information on the 3Rs in individual fields. We hope that it will be helpful for those who engage in 3R-related activities.

# I Creation of a 3R-Oriented, Sustainable Society

## 1 The Need for Creating a Sustainable Society

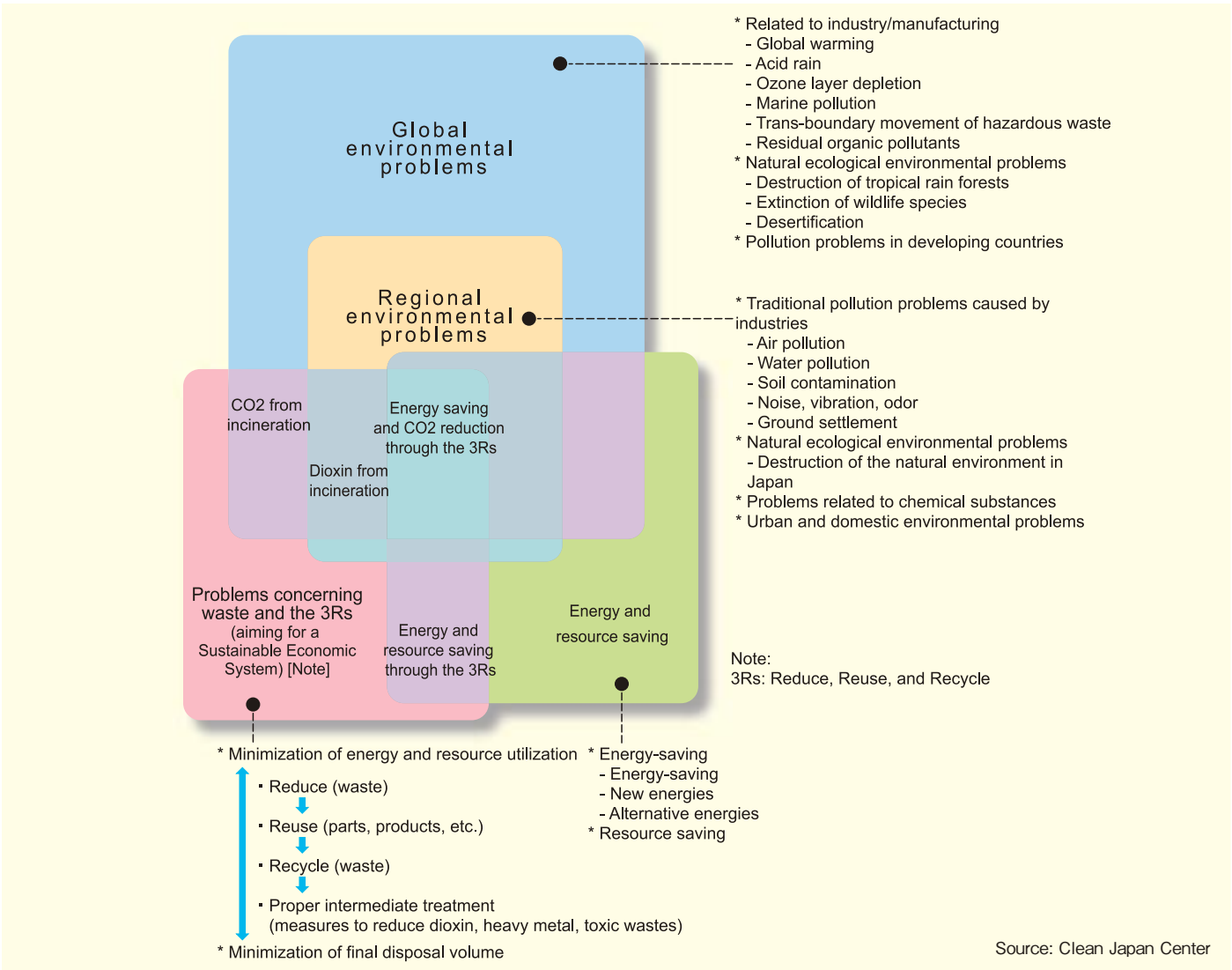
In the course of economic activities based on mass-production/consumption/disposal, Japan is facing various problems, such as a shortage of final disposal sites and the adverse environmental effects of hazardous substances, as well as concern over depletion of mineral resources in the future. There is the possibility that these environmental and resource constraints will restrict economic activities or reduce the size of the economy.

### (1) Environmental problems

In Japan, as much as 450 million tons of waste is generated every year, and the number of remaining sustainable years of final disposal sites is rapidly dwindling: 13.1 years for general waste and 4.5 years for industrial waste. Under these circumstances, it is necessary to promote measures concerning waste disposal and the 3Rs, including construction of waste disposal and recycling facilities.

Furthermore, environmental problems have recently expanded, due to industrial pollution on a global level, including long-term environmental effects of hazardous substances such as dioxin, PCB, and endocrine-disrupting chemicals, as well as global warming.

Fig. 1 Environmental Problems



### (2) Resource constraints

In the 20th century, human beings mined and consumed limited mineral resources such as oil and metal at a rapid pace. As a result, the current number of sustainable years is about 40 years for oil and about 50 years for copper.

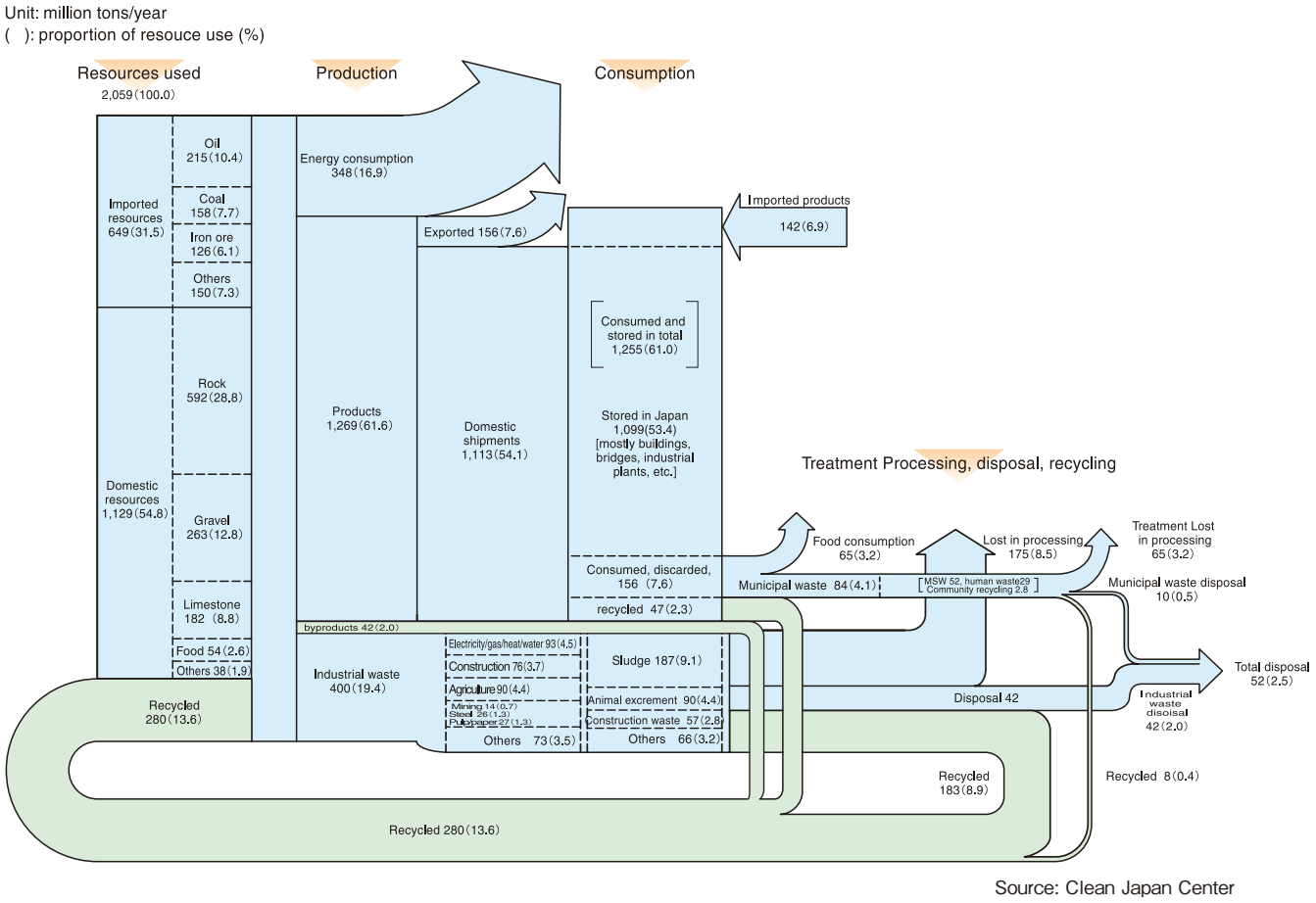
According to the overview of Japan's material balance, Japan utilized about 2.06 billion tons of resources in total, consuming 350 million tons of energy and discharging 400 million tons of waste in producing 1.27 billion tons of products. Most of the 1.10 billion tons of resources accumulated in Japan, which are utilized as roads, bridges, and buildings, will be industrial waste in about 10 years. Meanwhile, the amount of resources that were recycled and reused was about 280 million tons, accounting for only slightly over 10% of the total amount of resources utilized.

There is also a "hidden flow" of resources that are byproducts in the process of mining intended resources and discharged as wastes, such as the soil of mountains leveled for the purpose of mining aggregate used for civil engineering and construction, and surface soil or rocks removed for the purpose of mining raw mineral ores. The amount of those resources which are byproducts is estimated at about 1.13 billion tons at home and about 2.83 billion tons abroad.

As outlined above, in order to achieve sustainable development in the 21st century, Japan should take measures in relation to problems concerning waste and enforce the 3Rs as its top priority. It is an urgent task to establish a new economic system that is favorable for both the environment and the economy.

More specifically, for the sustainable development of Japan, it is essential to get out of the conventional economic system that is based on mass-production/consumption/disposal and create a Sustainable economic system and society, while promoting "environmentalization of industry" (incorporating measures for environmental and resource constraints into business activities) and "industrialization of the environment" (generating market value through measures for environmental and resource constraints) through effective use of the power of the private sector.

**Fig. 2 Japan's Material Balance (FY 2001)**




Source: Clean Japan Center

## 2 Present Situation of Waste in Japan

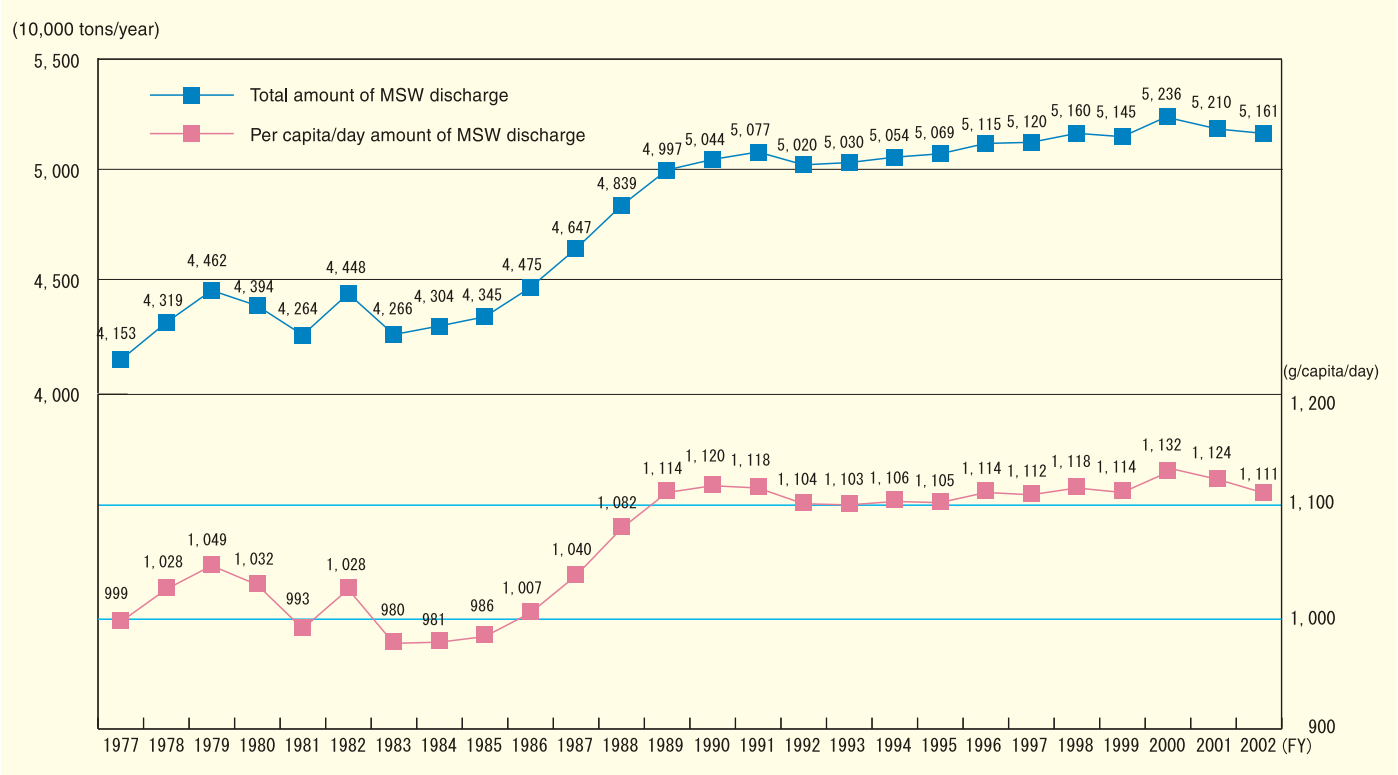
### Municipal Solid Waste (MSW)

#### [1] Total amount of municipal solid waste discharged

The total amount of municipal solid waste discharged (MSW: wastes discharged from households) in FY 2002 was 51.61 million tons, accounting for 139 times as much as the volume of the Tokyo Dome Stadium (0.3 tons per $m^3$), the per capita/day amount being 1,111g (see Fig. 3).

The total amount of MSW discharged and the per capita/day amount of discharge started to increase rapidly around FY1985, but remained almost flat during the period from FY1989 to FY2002. The downward trend seen after FY1979 was in line with the influence of the second oil shock, and the trend that went upward to reach a peak in FY1990 has flattened and subsequently seems to be in parallel with the bubble economy and its collapse. In the future, however, we should endeavor to reduce waste generation in an economic boom or bust.

Fig. 3 MSW Discharge




Note: Total MSW discharge = MSW collected + MSW directly delivered + MSW treated in-house. According to the "Basic Policy for Comprehensive and Systematic Promotion of Measures for Reduction and Other Proper Treatment of Waste" under the Waste Management Law, the amount of MSW discharged is calculated by deducting the "amount of MSW treated in-house" from the "total amount of MSW discharged" and adding "the amount of recyclable resources collected by citizen groups."

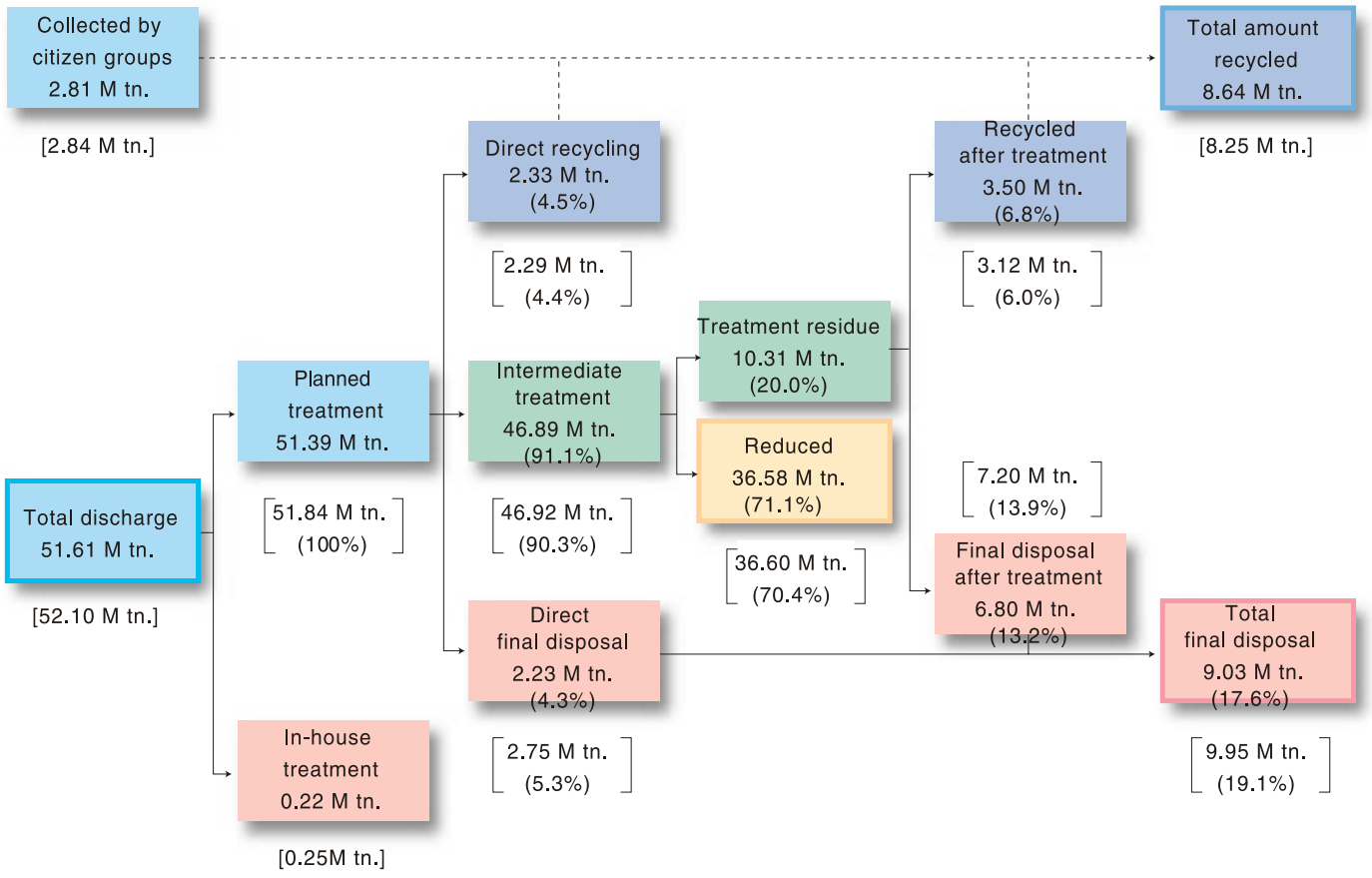
Source: Ministry of Environment, *Discharge and Treatment of MSW (in FY 2002)*, January 21, 2005 (revised)

### [2] Waste treatment

In the total amount of MSW treated in FY 2002, 46.89 million tons underwent intermediate treatment by municipalities such as incineration, comminution and selection, while 2.33 million tons were directly delivered to recycling industries, collectively accounting for 95.6% of the total amount of MSW treated (rate of waste reduced in treatment). Out of 46.89 million tons of MSW delivered to intermediate treatment facilities, 3.50 tons were reused after treatment. The total amount of MSW recycled, the sum of the amount of MSW recycled through intermediate treatment, the amount of MSW directly recycled, and the amount of recyclable resources recovered by citizen groups, was 8.64 million tons. Some 2.23 million tons of MSW were delivered to direct final disposal without going through intermediate treatment (direct landfill) and 36.58 million tons were reduced through intermediate treatment (see Fig. 4).

The share of MSW directly incinerated in the total amount of MSW treated increased considerably to FY1989 and it has continued to increase slightly since then. The share of MSW recycled through intermediate treatment has also been increasing slightly. Consequently, the share of direct final disposal (final landfill) of MSW has been decreasing (see Fig. 5).

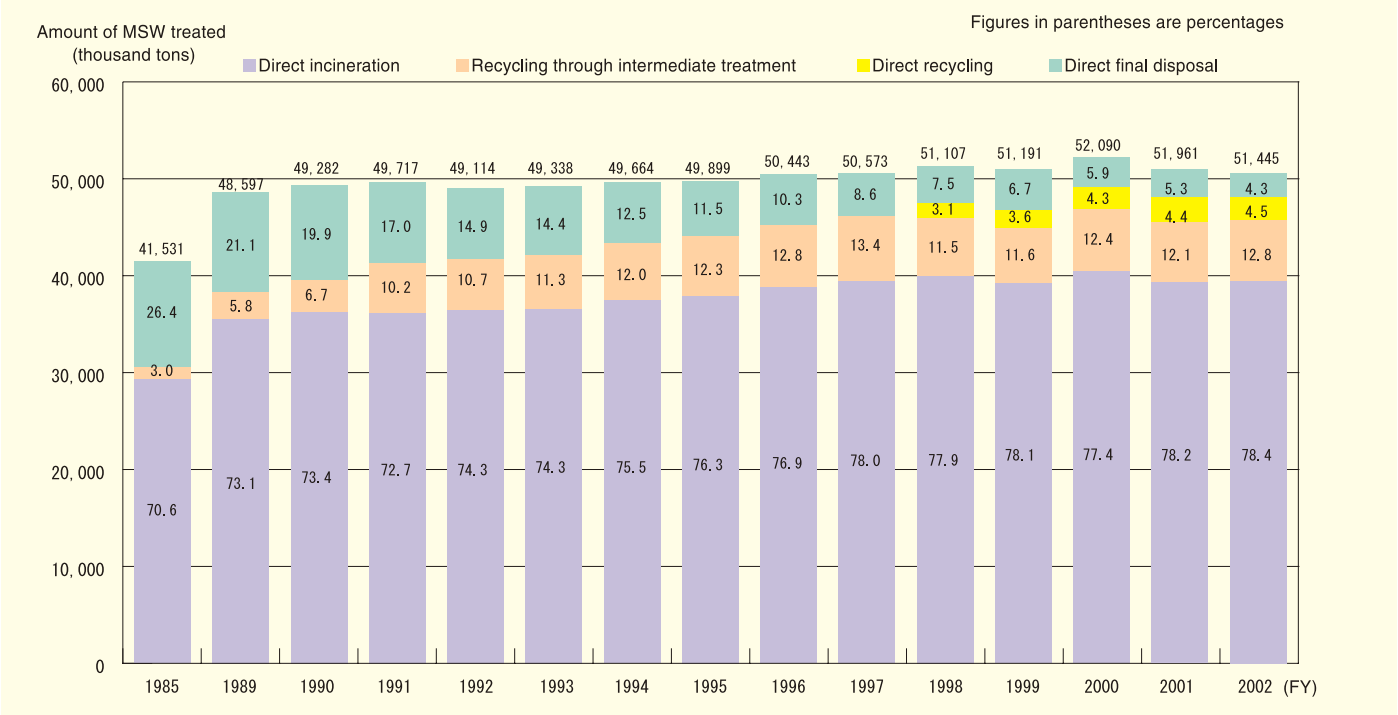
Fig. 4 Flow of MSW Treatment in Japan (FY 2002)




Notes: 1. The total amount of MSW treated does not correspond to the "amount of scheduled treatment" due to errors in measurement.
2. Rate of waste reduced in treatment (%) = [(intermediate treatment) + (directly recycling)] / (total MSW treated) x 100
[ ] : the amount of FY2001

Source: Ministry of Environment, *Discharge and Treatment of MSW (in FY 2002)*, January 21, 2005 (revised)

Fig. 5 Waste Treatment Methods



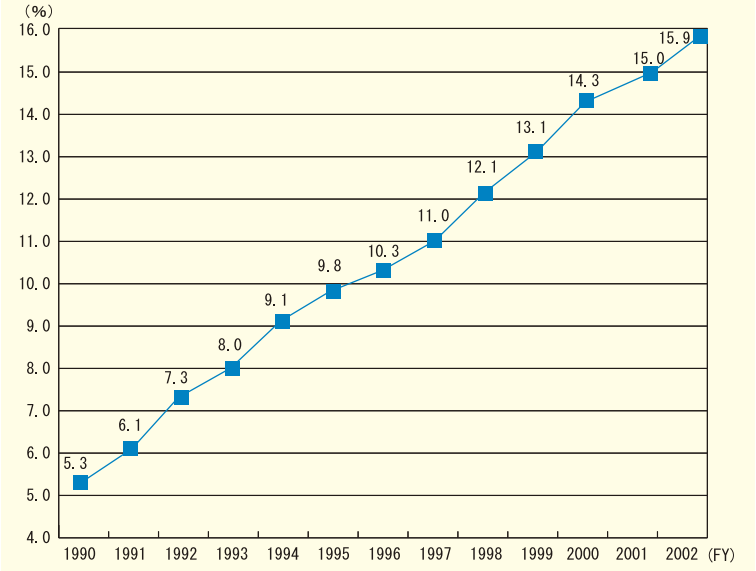

Notes: 1. Direct recycling is a category introduced in 1998, and refers to the amount of MSW that is directly delivered to recycling industries without going through recycling facilities.
2. Until FY1997, the amount of "direct recycling" was included in the amount of "recycling through intermediate treatment."

Source: Ministry of Environment, *Discharge and Treatment of MSW (in FY 2002)*, January 21, 2005 (revised)

## [3] Recycling

In FY 2002, 2.33 million tons of MSW were separately collected and directly recycled by municipalities, 3.5 million tons were recycled through intermediate treatment, and 2.81 million tons were collected by citizen groups for recycling. The total amount of MSW recycled, aggregating all of the above, was 8.64 million tons (see Fig. 4). The recycling rate was 15.9%, about three times higher than FY1990. Fig. 6 shows that the rise of the recycling rate was accelerated by the effect of the Containers and Packaging Recycling Law that partly came into force in 1997. However, recycling has yet to be promoted sufficiently for some kinds of MSW such as kitchen garbage.

Fig. 6 Recycling Rate




Note: $$\text{Recycling rate} = \frac{\text{(MSW directly recycled + MSW recycled after intermediate treatment + MSW collected by citizen groups)}}{\text{Total MSW treated and MSW collected by citizen groups}}$$

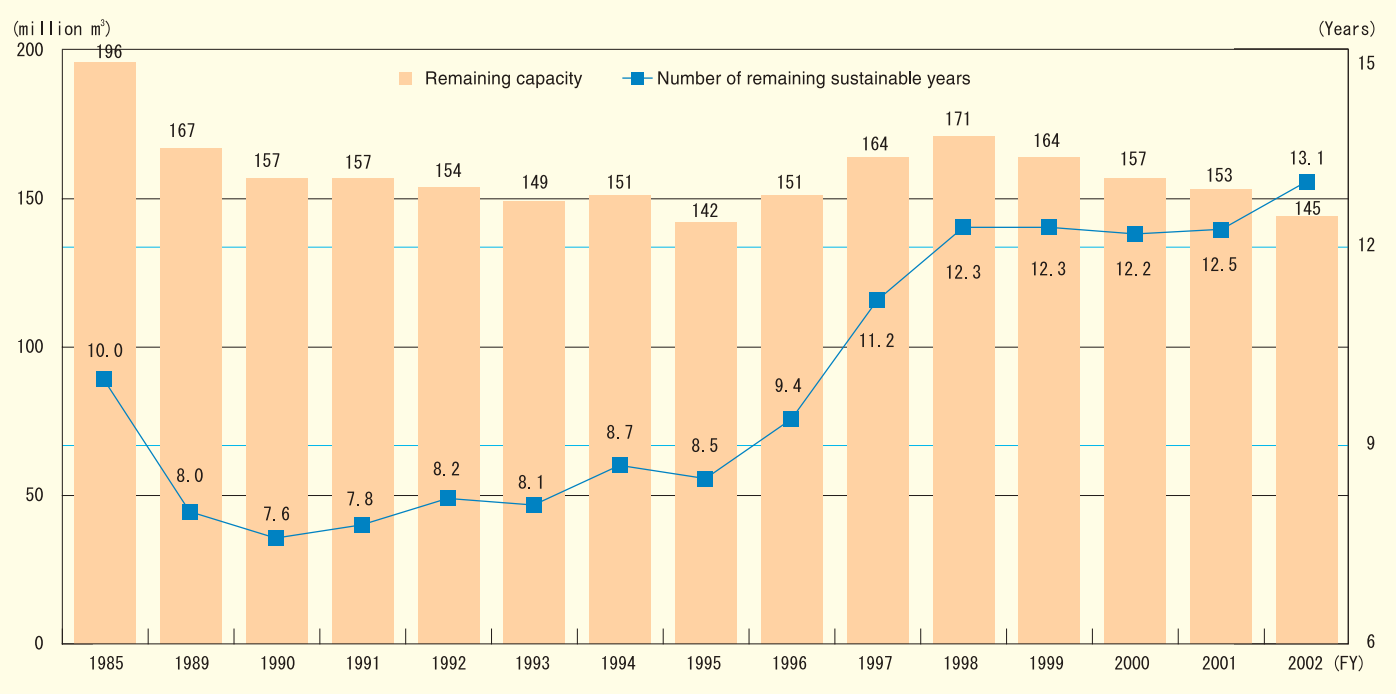
The amount of "MSW recycled after intermediate treatment" is the amount of iron, aluminum, etc. recovered and recycled through treatment of recyclable waste and bulky waste.

Source: Ministry of Environment, *Discharge and Treatment of MSW (in FY 2002)*, January 21, 2005 (revised)

### [4] Final disposal sites

As of FY 2002, there were 2,048 final disposal sites for MSW. The remaining capacity was 144.8 million $m^3$ and the national estimated number of remaining sustainable years was 13.1 years. As the distribution of final disposal sites is regionally uneven, the number of remaining sustainable years may differ among regions (see Fig. 7).

**Fig. 7 Remaining Capacity and Number of Remaining Sustainable Years of Final Disposal Sites for MSW**




Note:

$$\text{Number of remaining sustainable years} = \frac{\text{Remaining capacity at the end of the fiscal year}}{\text{(Total final disposal in the fiscal year / Weight of landfill waste)}}$$

(Weight of landfill waste = 0.8163)

Source: Ministry of Environment, *Discharge and Treatment of MSW (in FY 2002)*, January 21, 2005 (revised)

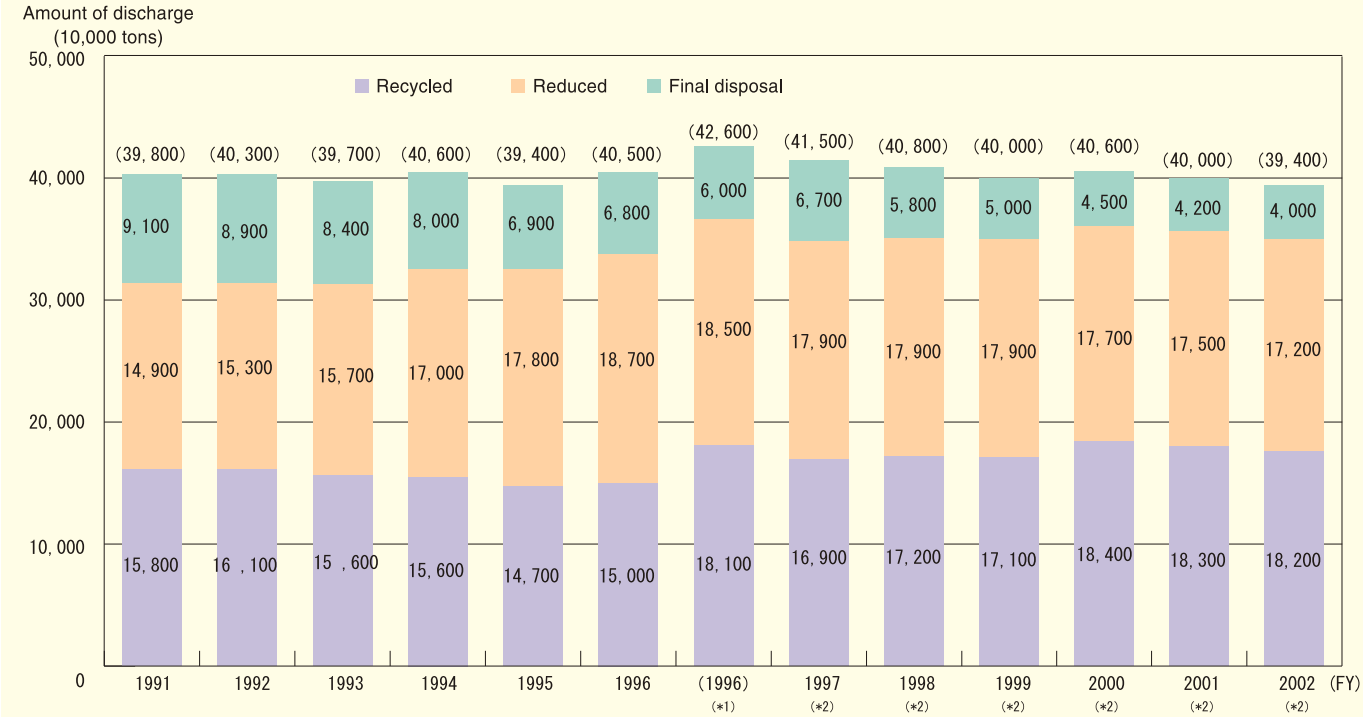
## Industrial Waste

### [1] Total amount of industrial waste discharged

The total amount of industrial waste discharged in Japan in FY 2002 was about 393 million tons, remaining almost flat since FY 1990. The amount of industrial waste recycled has not fluctuated significantly, while the amount of industrial waste reduced through intermediate treatment has been increasing gradually, and therefore the amount of final disposal has been decreasing gradually (see Fig. 8).

Based on the estimate by the Ministry of Environment as to the amount of final disposal in FY 2001 (42 million tons) and the remaining capacity of final disposal facilities as of April 2002, the national average number of remaining sustainable years of final disposal facilities is 4.3 years. Thus we are facing a severe situation.

Fig. 8 Industrial Waste Discharge




Notes: 1. The amount of discharge(*1) shown above is the amount in FY 1996 according to the "target amount of waste reduction" set by the government to be achieved by FY 2010 (decided by the government on September 28, 1999) under the Basic Policy for Measures against Dioxin (decided by the Ministerial Meeting on Measures Against Dioxin).

2. The amount of discharge(*2) for FY 1997 and after is calculated under the same conditions as the previous amount*.

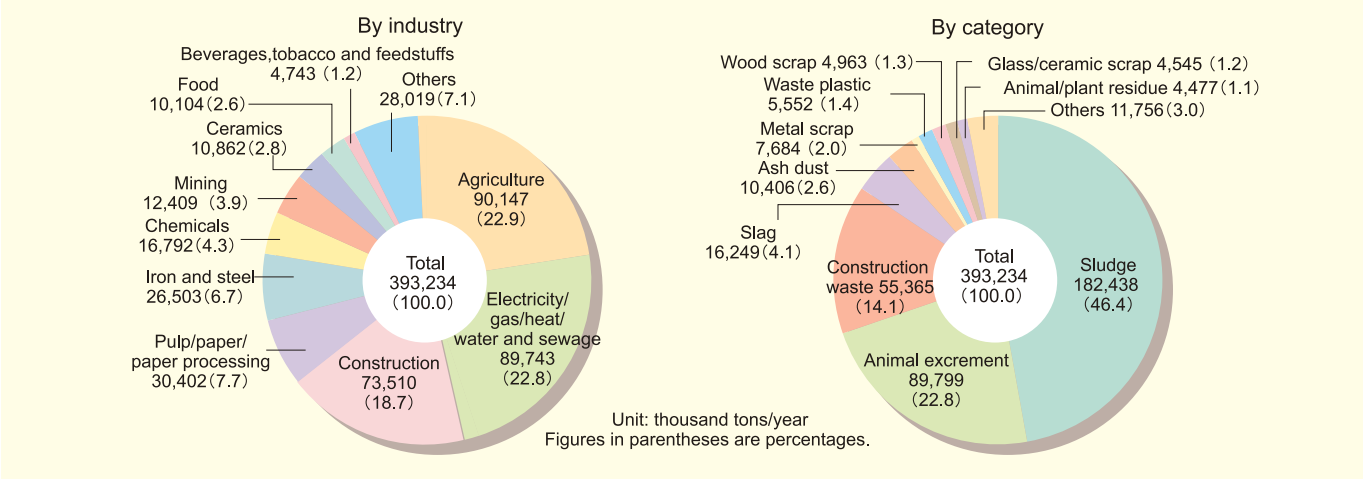
Source: Ministry of Environment, *Discharge and Treatment of Industrial Waste (in FY 2002)*, January 21, 2005 (revised)

### [2] Amount of discharge by industry and by category

The amount of discharge by six industries: electricity/gas/heat/water and sewage, agriculture, construction, pulp/paper/paper processing, iron and steel, and chemicals accounted for about 80% of the total amount of industrial waste discharged (see Fig. 9).

In terms of category, sludge, animal excrement, and construction waste accounted for about 80% of the total amount of industrial waste discharged (see Fig. 9).

Fig. 9 Amount of Industrial Waste Discharged by Industry and Category (FY 2002)



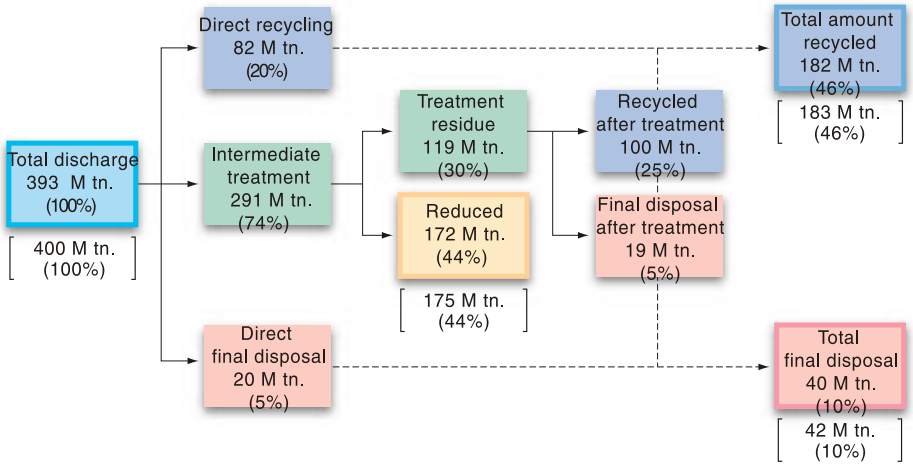

Source: Ministry of Environment , *Discharge and Treatment of Industrial Waste (in FY 2002)*, January 21, 2005 (revised)

### [3] Flow of Industrial waste treatment

Of the total amount of industrial waste discharged (about 393 million tons), about 82 million tons were directly recycled (20% of the total), and about 291 million tons were delivered to intermediate treatment, which were further reduced to about 119 million tons and then recycled or finally disposed (see Fig. 10).

Finally, 46% of the total amount of industrial waste discharged was recycled and 10% was finally disposed (see Fig. 10).

**Fig. 10 Flow of Industrial Waste Treatment in Japan (FY 2002)**



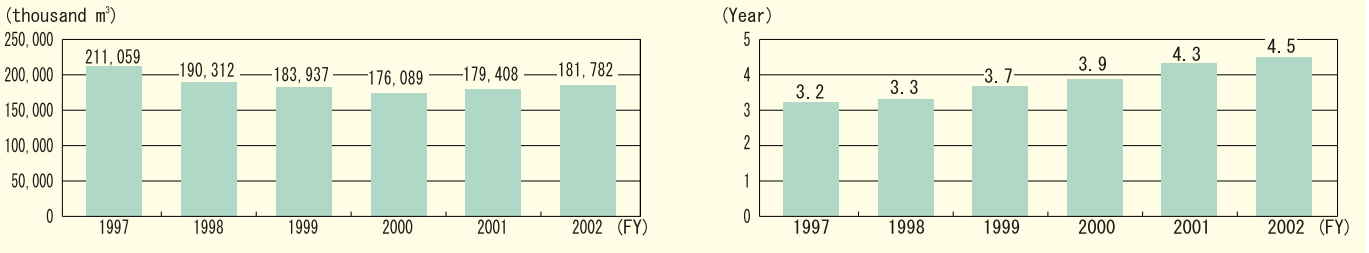

Notes: 1. The aggregate total may not correspond to the total amount because figures for individual amounts are rounded off.
2. Figures in parentheses are data for FY 2001.

Source: Ministry of Environment, *Discharge and Treatment of Industrial Waste (in FY 2002)*, January 21, 2005 (revised)

### [4] Final disposal Sites

As of April 1, 2003, the remaining capacity of final disposal sites for industrial waste was about 181,782 thousand $m^3$, an increase of about 2.37 million $m^3$ (1.3%) over the previous year. The national average number of remaining sustainable years of final disposal sites was 4.5 years.

**Fig. 11 Remaining Capacity and Number of Remaining Sustainable Years of Final Disposal Sites for Industrial Waste**




Notes: Number of remaining sustainable years = Remaining capacity($m^3$)/amount of final disposal (tons) (conversion ratio between ton and $m^3$=1)

Source: Ministry of Environment, *Discharge and Treatment of Industrial Waste (in FY 2002)*, January 21, 2005 (revised)

# Ⅱ Legislation and Policies to Promote Creation of a 3R-Oriented Society

## 1 Legislative System

In the more than ten years since the "Law for Promotion of Utilization of Recycled Resources (amended to the Law for Promotion of Effective Utilization of Resources)" came into force in 1991, practices and policies concerning waste reduction and promotion of recycling have been generally reviewed, and a legislative system is currently being developed in this field. In 2002, the "End-of-Life Vehicles Recycling Law " was promulgated (see Fig. 12).

Fig. 12 Legislative System for Promoting the Creation of a 3R-Oriented Society

**Fundamental Law for Establishing a Sound Material-Cycle Society (basic framework law)**

Put into force in January 2001
[To ensure material recycling in society; to reduce consumption of natural resources; to reduce environmental burden]
- Basic principles
- Obligations of the national and local governments, businesses and citizens
- Measures to be taken by the national government

Fundamental Plan for Establishing a Sound Material-Cycle Society: Basis of other national plans

<Proper waste management> <Promotion of recycling>

[Establishment of a general scheme]

**Waste Management Law** (Amended in December 2003)

1. Proper waste management
2. Regulations for setting up waste disposal facilities
3. Regulations on waste disposal businesses
4. Establishment of standards for waste management
5. Measures to control improper disposal
6. Development of facilities through participation of the public sector

**Law for Promotion of Effective Utilization of Resources** (Put into force in April 2001)

1. Reduction and recycling of by-products
2. Utilization of recyclable resources and reusable parts
3. Product designing and manufacturing with awareness of the 3Rs
4. Product labeling for separate collection of waste
5. voluntary take-back and recycling of used products
6. Promotion of effective utilization of by-products

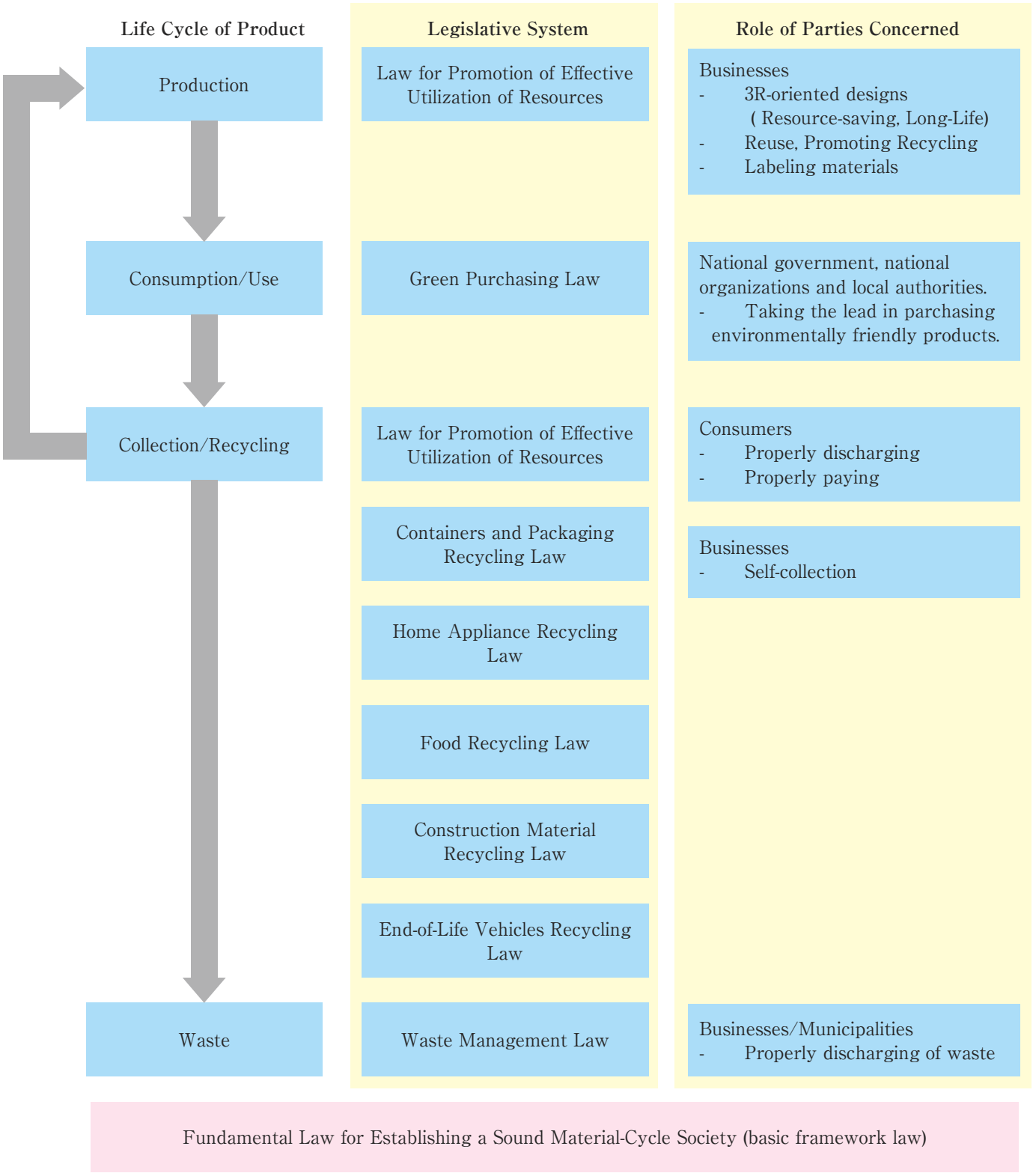
[Regulations in accordance with the characteristics of specific products]

| Containers and Packaging Recycling Law | Home Appliance Recycling Law | Food Recycling Law | Construction Material Recycling Law | End-of-Life Vehicles Recycling Law |
|---|---|---|---|---|
| Put into force in April 2000 | Put into force in April 2001 | Put into force in May 2001 | Put into force in May 2002 | Put into force in January 2005 (Partially put into force in January 2003) |
| Selected discharge of waste by consumers<br><br>Collection of containers and packaging by municipalities<br><br>Recycling of containers and packaging by businesses that manufacture and use them | Consumers bear collection and recycling costs<br><br>Retailers take back used home appliances from consumers<br><br>Manufacturers recycle used home appliances | Businesses that manufacture, process and sell food products take charge of recycling food waste | Construction contractors take charge of:<br>- Sorting dismantled construction materials; and<br>- Recycling construction material waste | Car owners bear recycling cost<br><br>Manufacturers take back and recycle fluorocarbons, air bags and shredder dust<br><br>Related businesses take back and provide end-of-life vehicles |

**Green Purchasing Law**

[The national government shall take the initiative in promoting procurement of recycled products, etc.]
Put into force in April 2001

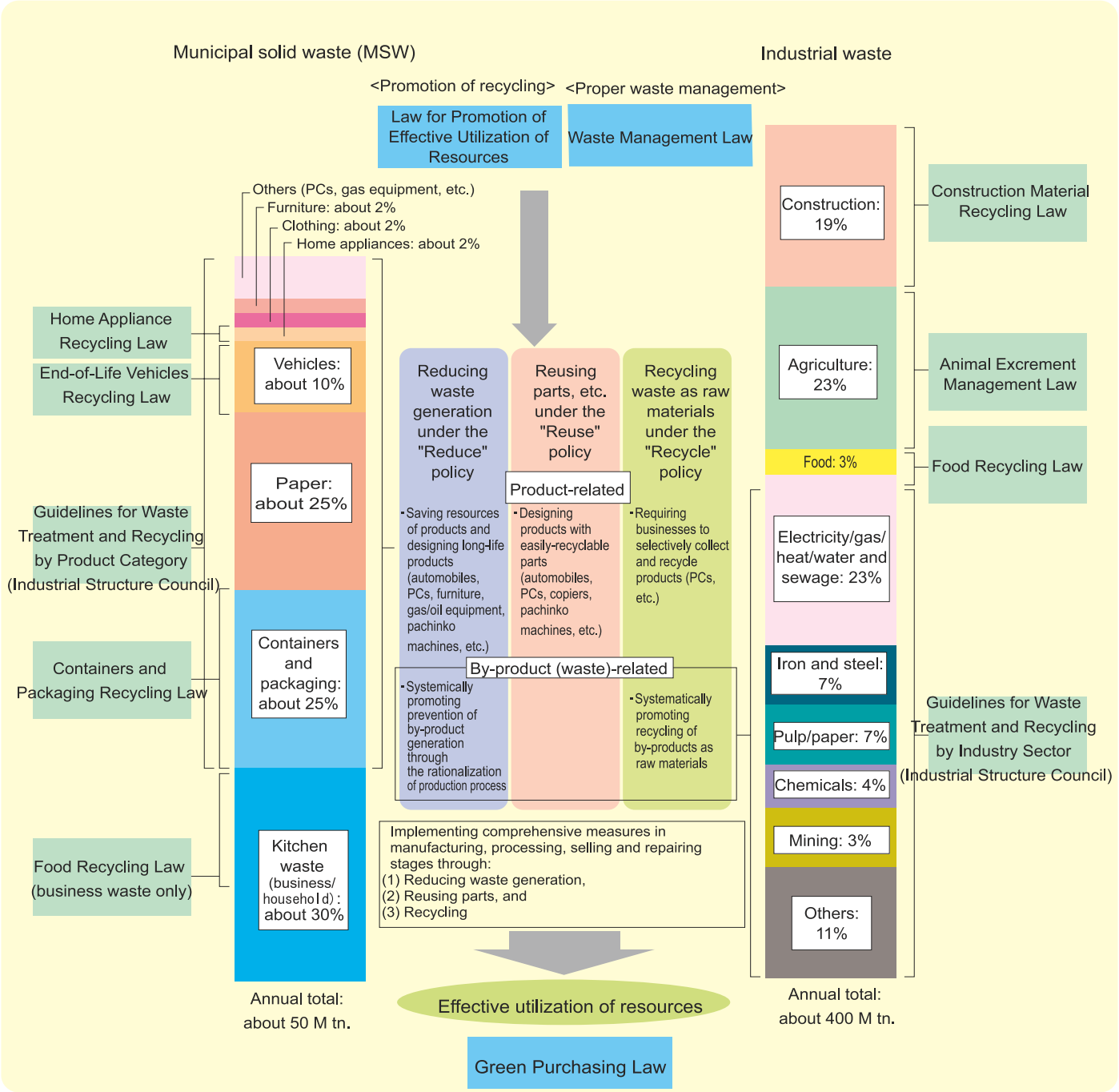
Fig. 13 Legislative System in Line with the Life Cycle of Product



Under these laws, as well as the "Guidelines for Waste Treatment and Recycling (By Product Category and Industry Sector)" developed by the METI Industrial Structure Council (see page 39), measures are being taken to cover all types of waste (see Fig. 14).

For the purpose of controlling environmental pollution caused by business and industrial activities, the Soil Contamination Countermeasures Law was promulgated in 2002 and put into force in January 2003. With respect to chemical substances, the "Law for Promoting Management of Release of Chemical Substances" was promulgated in 1999, and the system for reporting release and transfer of chemical substances was introduced. Under this system, which corresponds to the Pollutant Release and Transfer Register (PRTR) System implemented by the OECD, businesses identify the amount of various kinds of toxic chemical substances released into the environment, as well as the amount of such substances contained in waste and transferred out of their property, and report these amounts to the national government, which gathers and publishes such data.

Fig. 14 Laws and Guidelines to Control Waste



## 2 Fundamental Law for Establishing a Sound Material-Cycle Society

[1] Title of the law: Fundamental Law for Establishing a Sound Material-Cycle Society
[2] Date put into force: January 2001 (promulgated in June 2000)
[3] Purpose: Providing a basic framework and clarifying the process for establishing a sound material-cycle society

**Outline of the Law**

The law provides for individual roles to be played by citizens, businesses, municipalities and the national government in establishing a sound material-cycle society (see Fig. 15).

**(1) Subjects to be regulated**

The law states that it shall be applicable to "waste" in general, valuable or valueless, and that efforts should be made to prevent products from generating waste materials and to promote recycling of such waste materials generated by focusing on their utility as "recyclable resources."

**(2) Parties to be regulated**

The law attributes responsibility to the national and local governments, businesses and citizens. It clearly stipulates that businesses and citizens shall assume the discharger responsibility, while regarding the extended producer responsibility as a general principle.

Fig. 15 Framework of Fundamental Law for Establishing a Sound Material-Cycle Society

**Establishing a sound material-cycle society**

A sound material-cycle society is a society that realizes a reduction in consumption of natural resources as well as the environmental burden through:
[1] Preventing waste generation;
[2] Promoting recycling (reuse, material recycling, thermal recycling) of recyclable resources; and
[3] Ensuring proper disposal of waste.

Recyclable resources are defined as waste materials that are useful, regardless of value.

**Basic principles**

- Encouraging voluntary and positive implementation of actions to create a sound material-cycle society, thereby promoting the creation of a sustainable society with minimal impact on the environment.
- Promoting measures in the following order of priority: [1] Reduction of waste generation, [2] Reuse of parts, [3] Material recycling, [4] Thermal recycling, [5] Proper disposal
- Achieving close liaison with measures to ensure proper circulation of substances in the natural world.

**Responsibilities**

**National government**
- Formulating and implementing basic general policies

**Local governments**
- Implementing measures for resource recycling and waste disposal
- Formulating and implementing policies in accordance with natural and social conditions

**Businesses**
- Taking responsibility for proper management of recyclable resources (discharger responsibility)
- Designing recycling-oriented products and containers and taking back and recycling products and containers (extended producer responsibility)

**Citizens**
- Using products for a longer period
- Using recycled products
- Cooperating in separated collection

**Basic Plan for establishing a sound material-cycle society**

- Setting out basic policies for establishing a sound material-cycle society and measures to be taken comprehensively and systematically to this end.

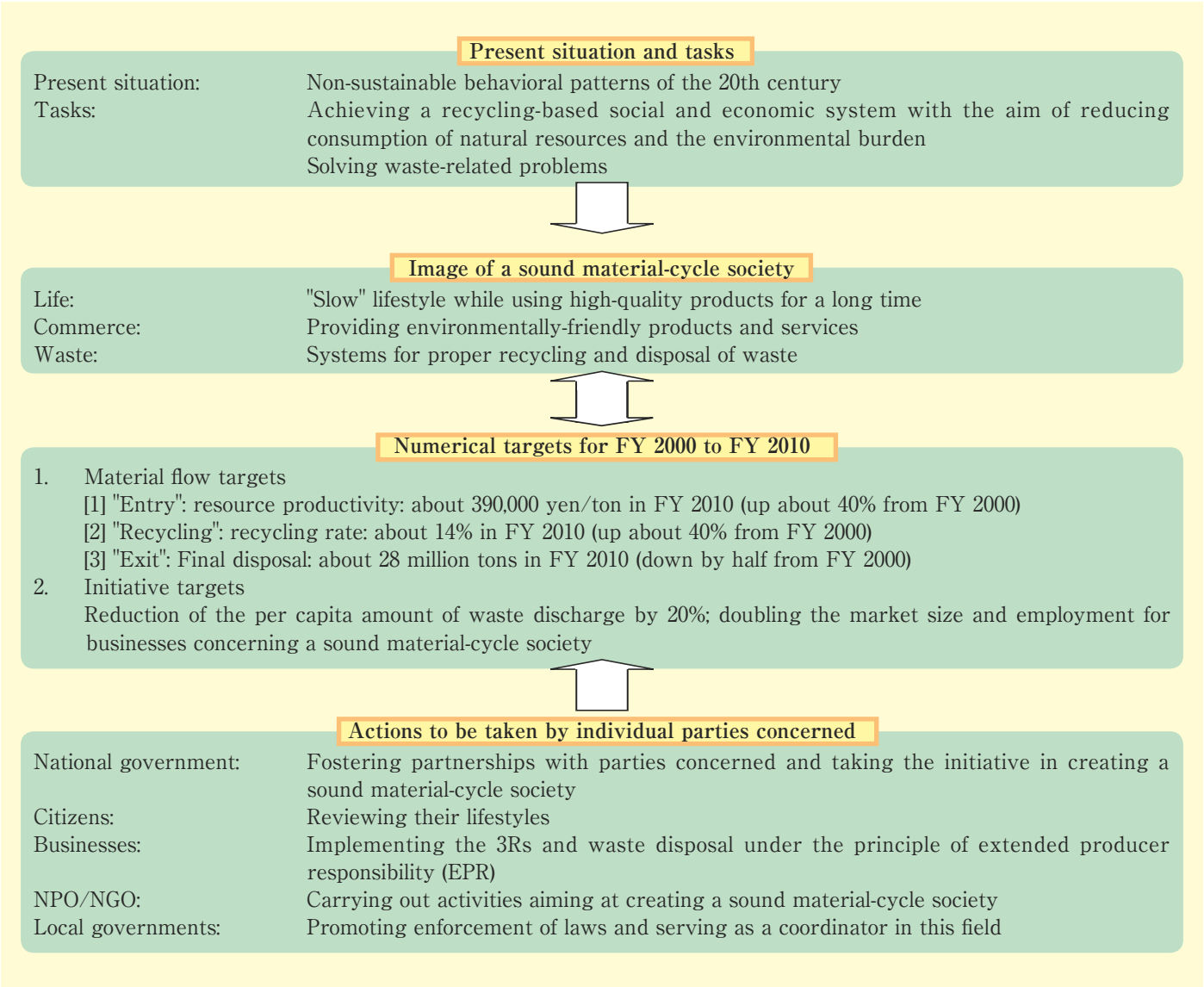
**Basic policies for establishing a sound material-cycle society**

- Taking measures to reduce waste generation
- Encouraging local governments to develop proper policies
- Promoting pre-assessment of products and containers
- Conducting surveys
- Taking economic measures for waste reduction
- Establishing public facilities
- Promoting the use of recycled products
- Encouraging voluntary initiatives by private-sector organizations
- Taking measures to eliminate obstacles to environmental conservation
- Taking measures for international cooperation
- Taking measures for proper recycling and disposal of waste
- Promoting education and training
- Tackling obstacles to environmental conservation
- Promoting science and technology
- Supporting measures taken by local governments

### (3) Basic Plan for Establishing a Sound Material-Cycle Society

The Basic Plan for Establishing a Sound Material-Cycle Society was developed in March 2003.

Fig. 16 Outline of the Basic Plan for Establishing a Sound Material-Cycle Society




Source: Central Environment Council

### (4) Extended producer responsibility

In discussions on 3R-related policies and systems, "Extended Producer Responsibility (EPR)" is often used.

Extended producer responsibility means that producers bear a certain degree of responsibility for proper recycling and management of the products that they produced even after the products are used and disposed of.

More specifically, in order to contribute to prevention of waste generation as well as recycling and proper disposal of recyclable resources, producers are required to [1] design recycling-oriented products, [2] indicate the materials or ingredients of products, and [3] take back and recycle designated products after they are disposed of.

Having studied extended producer responsibility as an environmental policy approach since 1994, the OECD developed and published a guidance manual for OECD members in 2001.

Table 1 Extended Producer Responsibility under the OECD "Extended Producer Responsibility: Guidance Manual for Governments"

| | |
|---|---|
| [1] Definition | "An environmental policy approach in which a producer's responsibility, physical and/or financial, for a product is extended to the post-consumer stage of a product's life cycle". This approach has the following features:<br>(a) The responsibility is transferred from local governments to the producer.<br>(b) Producers consider the environmental impact when designing their products. |
| [2] Primary effect | Transfer the financial and/or physical responsibility of waste management from local governments and the general taxpayer to the producer, encourage positive changes in material selection and in the design aspects of a product.<br>Appropriate signals can be sent to the producer to internalize a substantial portion of the external environmental cost of the product. |
| [3] Major Objective | (a) Source reduction (natural resource conservation/material conservation)<br>(b) Waste prevention<br>(c) Design of more environmentally compatible products<br>(d) Closure of material-use loops to promote sustainable development |
| [4] Sharing responsibility | Sharing responsibility among parties concerned in the product chain from production to disposal is an inherent key of EPR. |
| [5] Specific policy instruments and measures | (a) Take-back and recycling of products<br>(b) Deposit/refund scheme<br>(c) Material taxes as earmarked taxes<br>(d) Advance disposal fee<br>(e) Criteria for users of recycled products<br>(f) Leasing |
| [6] EPR and PPP | The Polluter Pays Principle (PPP) states that the polluter should bear the expenses of preventing and controlling pollution to ensure that the environment is in an acceptable state.<br>In contrast, EPR seeks to solve problems by holding producers responsible for the entire life cycle of a product. Inconsistency between EPR and PPP can be completely prevented by clearly defining their roles. |

Source: OECD, *Extended Producer Responsibility: Guidance Manual for Governments (2001)* (compiled by the Clean Japan Center)

## 3 Law for Promotion of Effective Utilization of Resources

[1] Title of the law: Law for Promotion of Effective Utilization of Resources
[2] Date put into force: April 2001 (promulgated in June 2000)
[3] Purpose: Comprehensively promoting reduction of waste, reuse of parts, and recycling of used products as raw materials

**Outline of the Law**

The law provides for measures to be taken by businesses, such as 3R-related measures in the production stage, 3R consideration in the product designing stage, labeling for separated collection, and development of a system for self-collection and recycling by manufacturers.

### (1) Responsibilities of parties concerned

[1] Businesses
- Rationalize use of raw materials with the aim of reducing used products and by-products.
- Using recyclable resources and reusable parts
- Promoting the use of used products and by-products as recyclable resources and reusable parts

* "Recyclable resources": Used products or by-products (waste) generated in plants that can be used as raw materials
"Reusable parts": Used goods that can be used as the parts or part of the products

[2] Consumers
- Using products as long as possible
- Using products containing recyclable resources
- Cooperating for separated collection
- Cooperating with measures taken by the national and local governments as well as by businesses

[3] National and local governments
- Taking financial measures
- Promoting the use of recyclable resources in procurement
- Promoting science and technology development
- Endeavoring to gain the understanding of the public

### (2) Industries and products to be regulated

The law requires that businesses take measures to apply the 3Rs (reduction, reuse and recycling) under specific criteria (ministerial ordinances) with respect to 10 designated/specified industries and 69 product items (covering about 50% of municipal and industrial waste).

[1] Designated resources-saving industry

Required to reduce generation of by-products (by ensuring rational use of raw materials and promoting use of by-products as recyclable resources)

- Pulp and paper

- Inorganic chemical manufacturing (excluding salt manufacturing) and organic chemical manufacturing

- Iron-making and steel-making/rolling

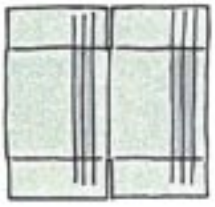
- Primary copper smelting and refining

- Automobile manufacturing (including motorized bicycle manufacturing)

## [2] Designated resources-reutilizing industry

Required to use recyclable resources and reusable parts

- Paper manufacturing



- Glass container manufacturing

- Construction

- Rigid PVC pipes and pipe fitting manufacturing

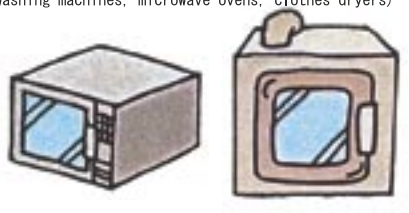
- Copier manufacturing

## [3] Specified resources-saved product

Required to ensure rational use of raw materials, prolong product life and reduce generation of used products

- Automobiles

- Home appliances
(television sets, air conditioners, refrigerators, washing machines, microwave ovens, clothes dryers)

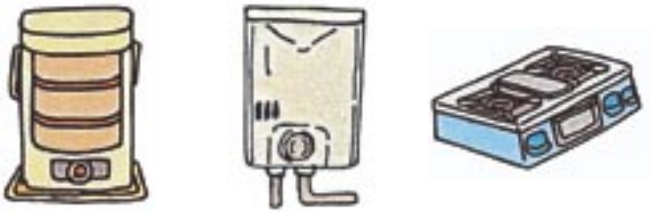


- Personal computers
(including CRTs and liquid crystal displays)

- Pachinko machines
(including rotary type)

- Metal furniture
(metal storage furniture, shelves, office desks and swivel chairs)

- Gas and oil appliances
(oil heaters, gas cookers with grills, switch-on gas water heaters, bath heaters with gas burners, oil-fired water heaters)



## [4] Specified resources-Reutilized Product

Required to promote the use of recyclable resources or reusable parts (designing and manufacturing products that can be easily reused or recycled)

- Automobiles

- Home appliances
(television sets, air conditioners, refrigerators, washing machines, microwave ovens, clothes dryers)

- Personal computers
(including CRTs and liquid crystal displays)

- Pachinko machines
(including rotary type)

- Copying machines

- Metal furniture
(metal storage furniture shelves, office desks and swivel chairs)

- Gas and oil appliances
(oil heaters, gas cookers with grills, switch-on gas water heaters, bath heaters with gas burners, oil-fired water heaters)

- Bathroom units and kitchen systems

– Devices using compact rechargeable batteries
(electric power supply devices, power tools, guide lights, fire alarm systems, security alarm devices, electric assisted bicycles, electric powered wheelchairs, printers, Portable data collecting devices, cordless phones, facsimile devices, telephone switchboards, communication devices for mobile phones, communication devices for MCA systems, communication devices for simplicity radio transmission, radio sets for amateurs, video cameras, headphone stereos, electric vacuum cleaners, electric shavers, electric toothbrushes, emergency lighting devices sphygmomanometers, infusion instruments, electric massagers, Household electric therapeutic apparatuses, electric bubble generators, electric toys)





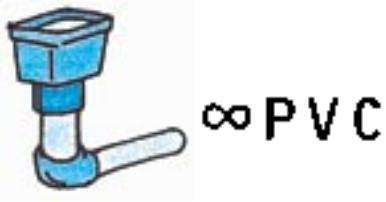

## [5] Specified labeled product

Required to be labeled to facilitate separated collection

● Steel cans, aluminum cans (beverages and liquors)


● PET bottles(beverages, liquors, soy sauce)

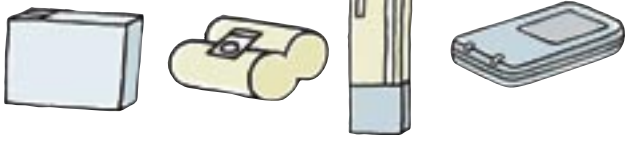

● PVC construction materials
(rigid PVC pipes, spouting and window frames, PVC flooring and wallpaper)

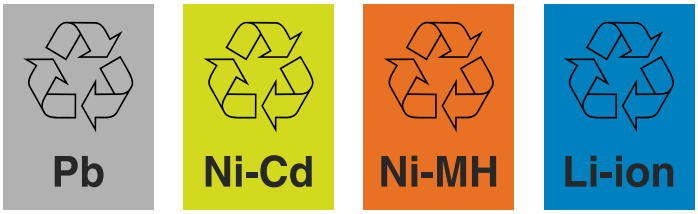



● Paper containers and packaging
(excluding paper-packs for beverages, which do not use aluminum and containers and packaging made of corrugated cardboard)


● Plastic containers and packaging
(excluding PET bottles for beverages liquors, soy sauce)


● Compact rechargeable batteries
(compact sealed lead batteries, sealed nickel-cadmium batteries, sealed nickel-metal-hydride batteries, lithium batteries)

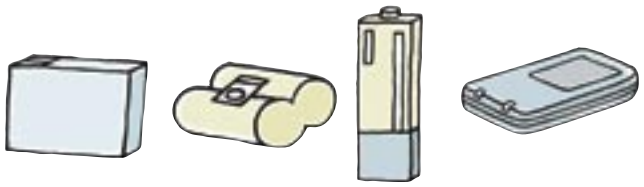




## [6] Specified resource-recycled products

Required to promote self-collection and recycling

- Compact rechargeable batteries
  (compact sealed lead batteries, sealed nickel-cadmium batteries, sealed nickel-metal-hydride batteries, lithium batteries)

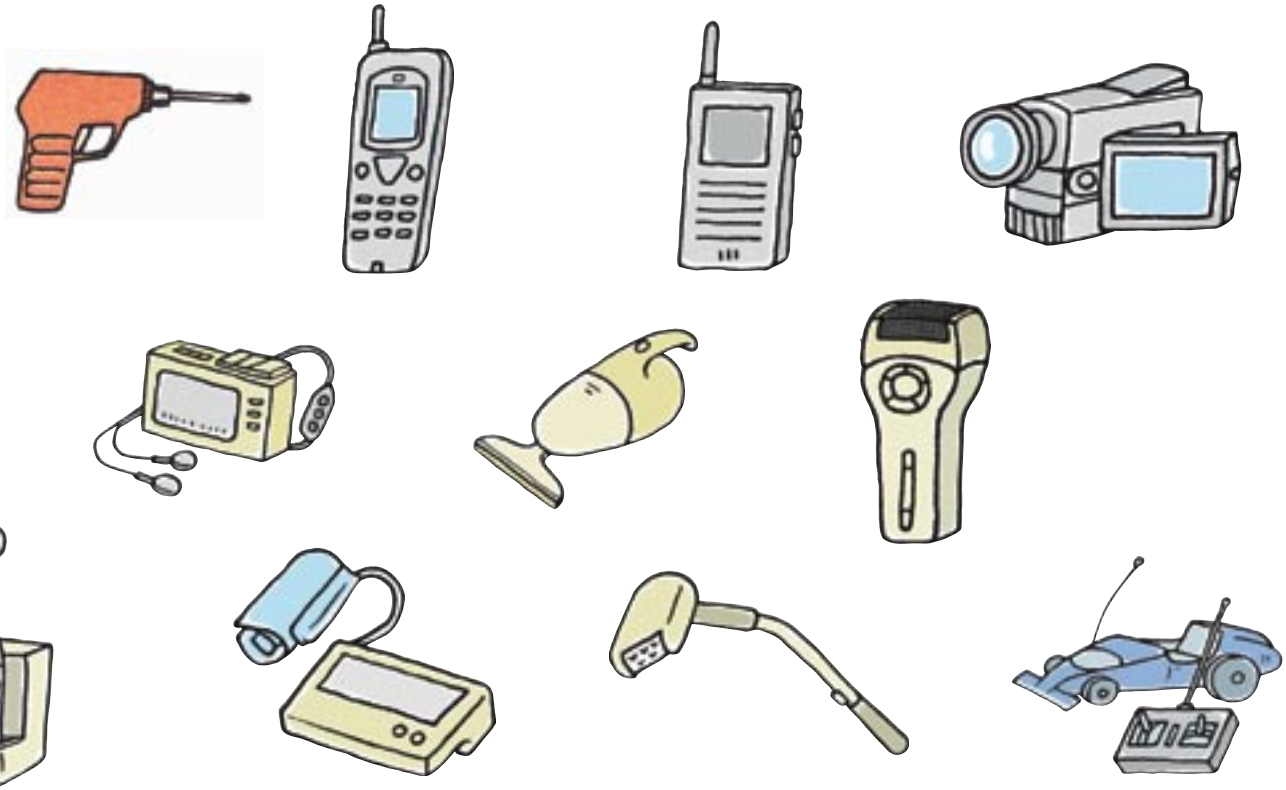


- Personal computers
  (including CRTs and liquid crystal displays)

* Devices in which compact rechargeable batteries (specified resources-recycled products) are used as parts

Required to promote self-collection and recycling of compact rechargeable batteries

- 29 items including electric power supply devices and power tools (The same as those in which compact rechargeable batteries are used in the category of specified resources-reutilized products)



## [7] Specified by-product

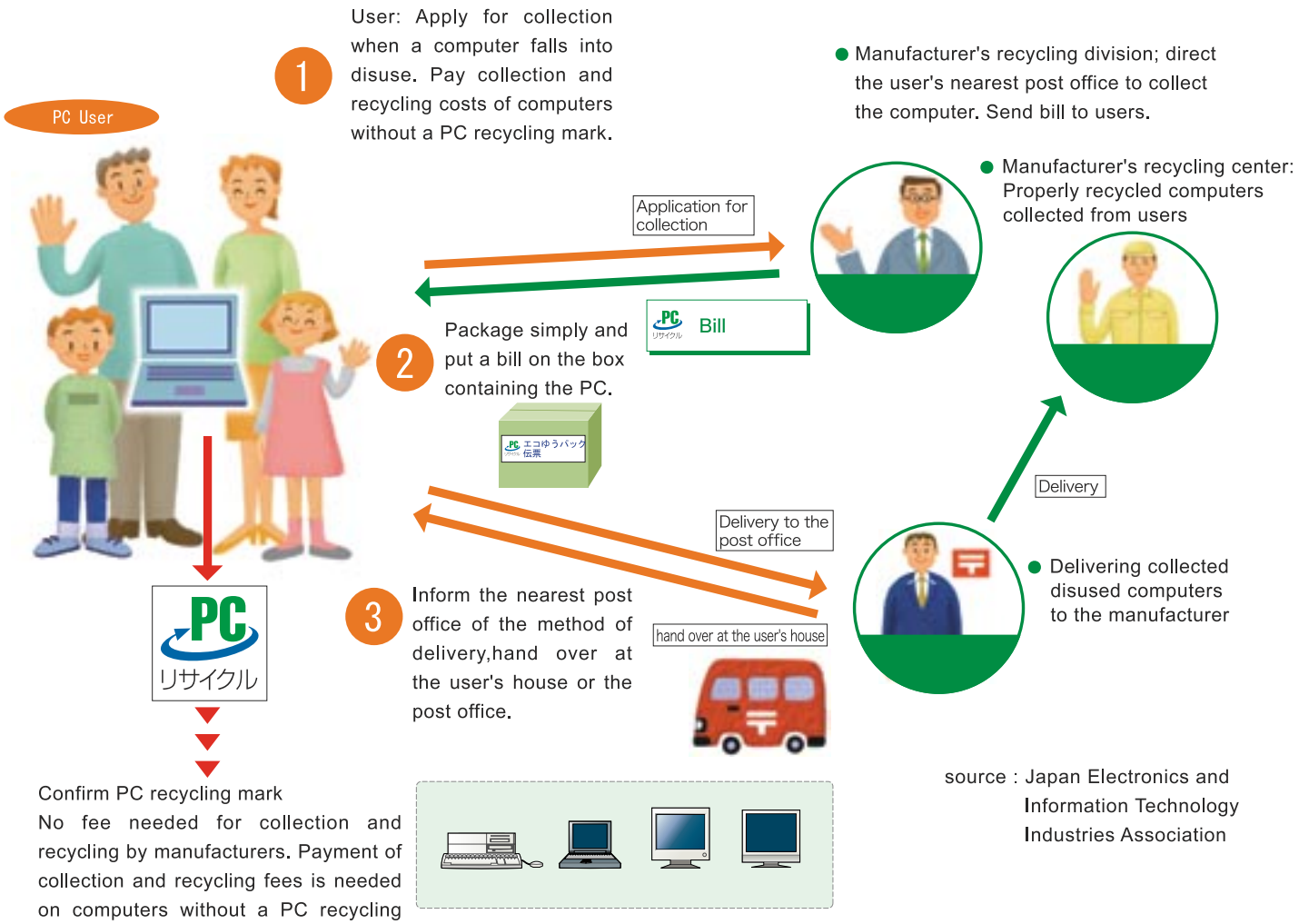
Required to promote the use of by-products as recyclable resources

- Coal ash generated by the electricity industry

- Soil and sand, concrete lumps, asphalt-concrete lumps or lumbers generated by the construction industry

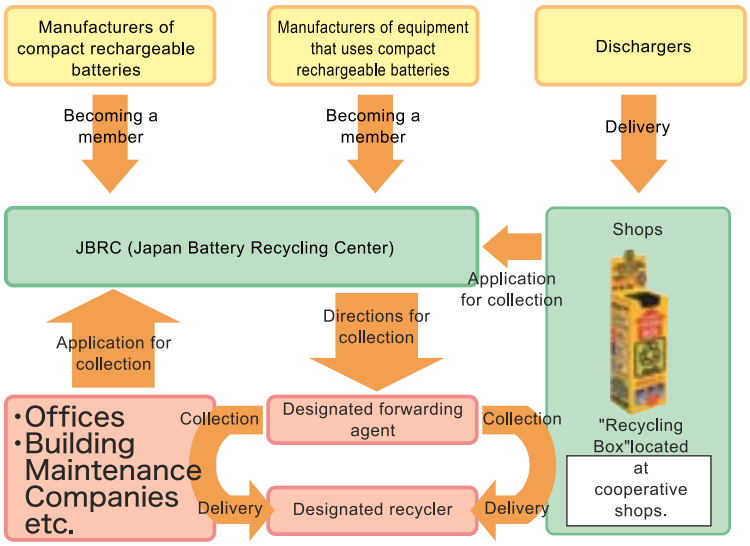
Fig. 17 Flow of Collecting and Recycling System of Home-use Computers

In case of manufacturers participating in promoting PC 3R by Japan Electronics and Information Technology Industries Association.




source : Japan Electronics and Information Technology Industries Association

Fig. 18 Flow of the Collecting and Recycling System of Compact Rechargeable Batteries



## 4 Waste Management Law

[1] Title of the law: Waste Management and Public Cleaning Law (Waste Management Law)
[2] Date put into force: December 2003 (promulgated in June 2003)
[3] Purpose: To preserve the living environment and improve public health by preventing waste generation, promoting proper waste management (transportation, disposal, recycling, etc.) and maintaining a clean living environment.

**Outline of the law**

The law provides for the definition of waste, permission for engaging in the waste disposal business, permission for establishing waste disposal facilities, and setting of the waste disposal criteria (see Fig. 19).

**(1) Definition of waste**

The law defines "waste" as "refuse, bulky refuse, ashes, sludge, excreta, waste oil, waste acid, waste alkali, carcasses and other filthy and unnecessary matter, which are in solid or liquid state." In other words, "waste" means things that become useless because they can no longer be used by their owners or sold to others for value.

Whether a thing falls under the definition of waste is comprehensively judged in light of its nature, the condition of its discharge, the ordinary way of handling it, whether it has any commercial value, and its owner's intention. For example, if used tires are piled up in an open field and left untouched for as long as about 180 days, they are regarded as waste.

Among waste materials discharged in business activities, 20 kinds of waste materials, such as ashes, sludge, animal excrement discharged in the livestock industry, waste oil, waste acid, waste alkali, and animal bodies discharged in the livestock industry, are defined as industrial waste, and other kinds of waste materials are defined as municipal solid waste.

**(2) Responsibilities of businesses**

[1] Businesses shall bear the responsibility of properly managing waste materials generated in their activities or entrust such management in writing to licensed waste disposal businesses.
[2] Businesses are also required to follow the flow of waste materials that they discharge until their final disposal in accordance with the "Manifest" (waste management sheet).
[3] Businesses discharging a vast quantity of waste (businesses that discharged 1,000 tons or more of industrial waste or 50 tons or more of specially controlled industrial waste in the previous year) need to develop a waste disposal plan.
[4] Except for incineration under the waste disposal standards, (incineration under) other laws or ordinances, or incineration inevitable for public interests or social custom, businesses shall be prohibited from incinerating waste and shall be punished for violating this prohibition.

**(3) Permission of disposal facilities**

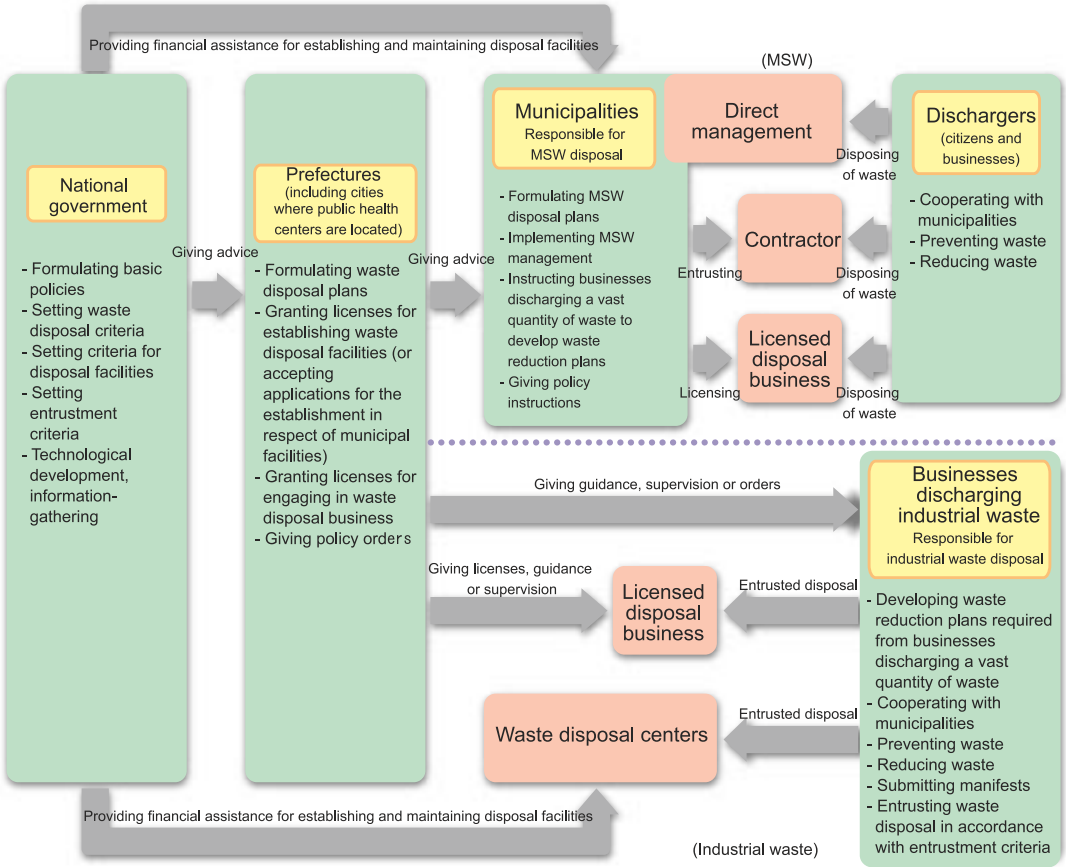
Businesses shall obtain a permission for establishing a waste disposal facility under this law even in the case of engaging in recycling provided under the Home Appliance Recycling Law or the Containers and Packaging Recycling Law.

**(4) Special schemes**

Licenses for engaging in a waste disposal business or establishing waste disposal facilities shall not be required under two special schemes, National Permit System and the Disposal and Recycling Approval Scheme (see Table 2).

The National Permit System was created as an enhanced version of the original Wide-Area Disposal and Recycling Designation Scheme, with the aim of promoting better waste management (based on the amended law, which entered into effect on 1 December, 2003).

Fig. 19 Flow under the Waste Management Law




Source: Ministry of Environment, *White Paper on Recycling-Oriented Society (2002)*

Table 2 Outline of the Special Schemes for Waste Disposal Businesses and Facilities

| | National Permit System | Disposal and Recycling Approval Scheme |
|---|---|---|
| Details of the scheme | - Under this system, local waste management permits are not necessary for entities that have received authorization from the Minister of the Environment as businesses that conduct waste management over a wide area. | - Businesses approved by the Minister of Environment as carrying out disposal and recycling of designated waste materials in accordance with the criteria shall not be required to obtain a license for engaging in a waste disposal business or for establishing waste disposal facilities. |
| Waste materials subject to the scheme | Waste that falls under either of the following categories:<br>1. Items that are not likely to have a harmful impact on the human living environment as a result of their decomposing easily under normal transport conditions, evaporating, or otherwise undergoing changes in their physical properties.<br>2. For products that have become waste, if entities that conduct manufacturing, processing or sales operations of the said products also conduct treatment of said waste items, a reduction in the volume of said waste, and other proper management can be ensured.<br><br>MSW<br>- Waste spring mattresses<br>- Waste personal computers<br>- Waste rechargeable batteries<br>Stipulated by notice of the Ministry of the Environment | MSW<br>- Used rubber tires (recycled as raw materials for cement)<br>- Plastic waste (recycled as iron-making reducer)<br>- Meat and bone waste (recycled as raw materials for cement)<br><br>Industrial waste<br>- Used rubber tires (recycled as raw materials for cement)<br>- Plastic waste (recycled as iron-making reducer)<br>- Construction inorganic sludge (recycled as materials for building super (high-standard) levees<br>- Sludge containing silicon (recycled deoxidizer for fused steel) |

## 5 Containers and Packaging Recycling Law

[1] Title of the law: Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Containers and Packaging Recycling Law)
[2] Date put into force: December 1995 (promulgated in June 1995)
[3] Purpose: Clarifying the role-sharing in managing waste of containers and packaging discharged as MSW from households, i.e., consumers sorting waste materials when discarding them, municipalities carrying out sorted collection, and businesses recycling collected waste, with the aim of ensuring proper management of waste and effective use of resources through reduction of MSW and adequate use of recyclable resources.

**Outline of the law**

The law provides for a collection and recycling system in which municipalities take charge of carrying out sorted collection of containers and packaging (sorted and discarded by consumers) and businesses take charge of recycling such collected containers and packaging (see Figs. 21 and 22).

**(1) Containers and packaging**

"Containers" means things in which products are contained (including bags), and "packaging" means things used to wrap products.

The Containers and Packaging Recycling Law defines containers and packaging as "containers and packaging for commercial products, which become unnecessary when the said products have been consumed or when the said containers and packaging have been removed from the products."

**(2) Containers and packaging subject to the law**

"Containers" subject to the law include glass containers, PET bottles, paper containers, plastic containers (including styrene foam trays and plastic bags), and "packaging" subject to the law includes packaging and wrapping materials, all of which are discharged from households, under the following conditions.
[1] Those that can generally be regarded as containers or packaging, based on socially accepted ideas, shall be subject to the law.
Examples: Caps of PET bottles, covers of pudding cups, wrapping film used for food trays
[2] Those used for providing services rather than used as containers or packaging of products shall be excluded.
Examples: Bags used for cleaning services, containers used for home delivery services
[3] Those that are still necessary even when the products are removed from them shall be excluded.
Examples: CD cases, camera cases

**(3) Businesses to be regulated**

The law specifies that businesses (manufacturers/users) that are to be regulated are obliged to recycle containers and packaging.

**[1] Manufacturers of products that use containers and packaging**
Manufacturers of food, soft drinks, alcohol, soap, paint, medicine, cosmetics

**[2] Manufacturers of containers**
Manufacturers of bottles, PET bottles, paper bags and other bags

**[3] Retailers and wholesalers**
Businesses using containers and packaging when selling products

**[4] Importers**
Businesses importing containers, importing products in containers or packaging, or using containers or packaging for imported products

**[5] Schools, religious organizations, and restaurants that provide take-out services**

□ Entrustment to the designated body

The Japan Containers and Packaging Recycling Association is a body designated under the Containers and Packaging Recycling Law as engaging in recycling containers and packaging collected separately by municipalities, by entrustment of designated manufacturers/users. Designated manufacturers/users shall be regarded as recycling containers and packaging when they conclude a recycling contract with the designated body to perform their obligation under the contract. The designated body shall also be entrusted by municipalities to recycle containers and packaging on behalf of the municipalities (recycling these to be recycled by businesses that are excluded from the application of the law).

● 60% of domestic waste is from containers and packaging

In Japan, the amount of waste per annum is 52.10 million tons (in 2001), of which waste discharged from households is 34.8 million tons, accounting for 66.8%. Containers and packaging discharged from households account for about 60% of domestic waste in terms of volume.

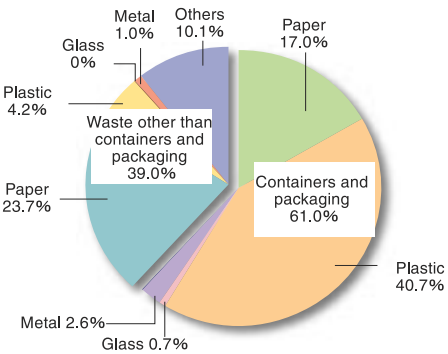



Fig. 20 Share of Waste from Containers and Packaging in the Total Amount of Household Waste (in terms of volume)
Source: Ministry of Environment, White Paper on Environment (2003)

Fig. 21 Three Recycling Routes

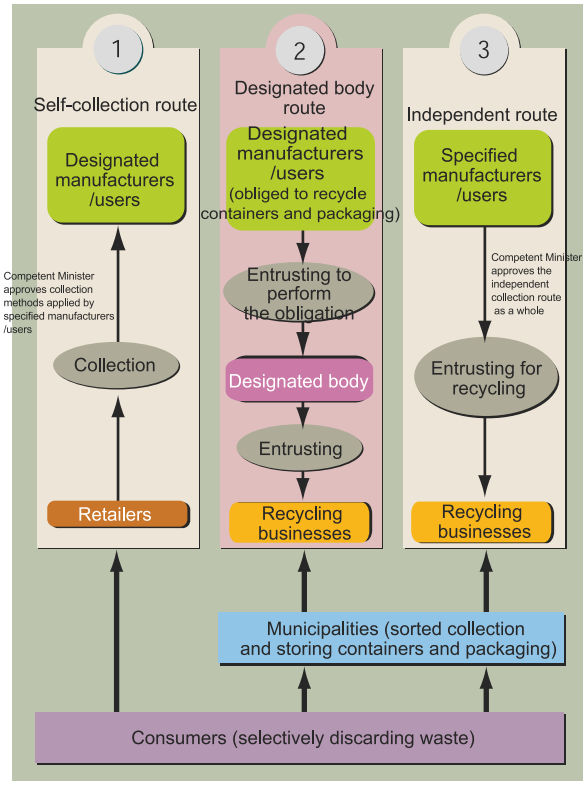



Fig. 22 Scheme under the Containers and Packaging Recycling Law (Designated body route; PET bottles)

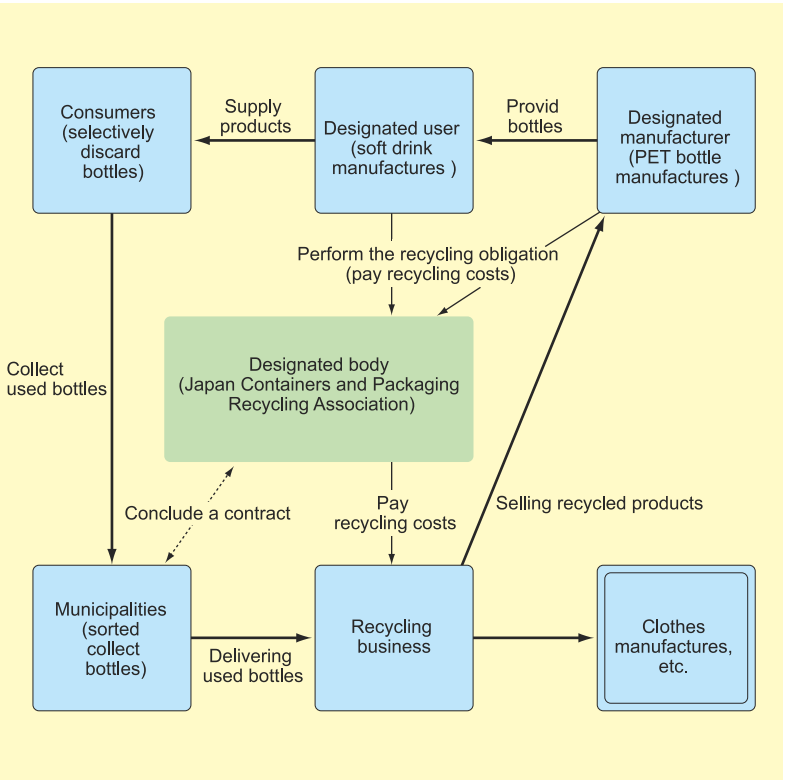



Fig. 23 Methods for Recycling Waste from Containers and Packaging under the Recycling Obligation

| Category | Recycling method | Examples of Recycled products |
|---|---|---|
| Glass bottles | Crushed into cullets | ● Glass containers<br>● Construction and civil engineering materials |
| PET bottles | Pelletized, etc<br>Polyester raw materials | ● Fibers<br>● Plastic sheets<br>● PET bottles |
| Paper containers and packaging | Sorted by paper-making material + RDF<br>Used for manufacturing construction boards or materal woven from crushed recycled paper + RDF | ● Paperboards<br>● Construction materials<br>● Refuse-derived fuel |
| Plastic containers and packaging | Raw materials for plastic products<br>Liquefaction<br>Blast furnace reducing agent<br>Gasification<br>Coal materials substitute for the coke oven | ● Plastic products including imitation wood and palettes<br>● Industrial raw materials |

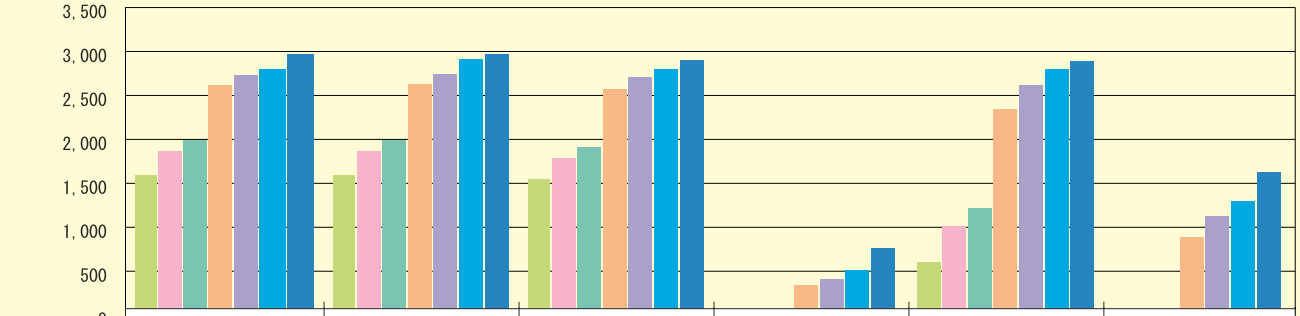
* Steel cans, aluminum cans, paper cartons, and corrugated cardboard are subject to the Containers and Packaging Recycling Law, but they have yet to be subject to the recycling obligation.

## Present Situation of Recycling

Of a total of 3,155 municipalities in Japan (at the end of March 2004), the number of those carrying out sorted collection and recycling under the Containers and Packaging Recycling Law has been increasing steadily, mainly with respect to the items included in the scope of regulation by the law in 1997 (see Fig. 24). The ratio of municipalities carrying out sorted collection and recycling to the total number of municipalities was 92 % for glass bottles, 24 % for paper containers/packaging, 92 % for PET bottles and 53 % for plastic containers/packaging, all of these four items being subject to the sorted collection and recycling under the law.

The volume of PET bottles collected separately in FY2002 was 212,000 tons (see Fig. 25), of which the collection rate exceeded 45 % (see Fig. 58). The volume of PET bottles collected and then recycled was 205,000 tons (see Fig. 26), of which 124,000 tons (see Fig. 27(d)) were recycled and sold via the designated body (see Fig. 22). With respect to paper containers/packaging and plastic containers/packaging, which were included in the scope of regulation in 2000, the volume of those separately collected in FY2003 was 77,000 tons and 402,000 tons (see Fig. 25), while the volume of those recycled was 70,000 tons and 385,000 tons (see Fig. 26), of which 30,000 tons and 256,000 tons (see Fig. 27(e)(f)) were recycled and sold via the designated body, respectively.

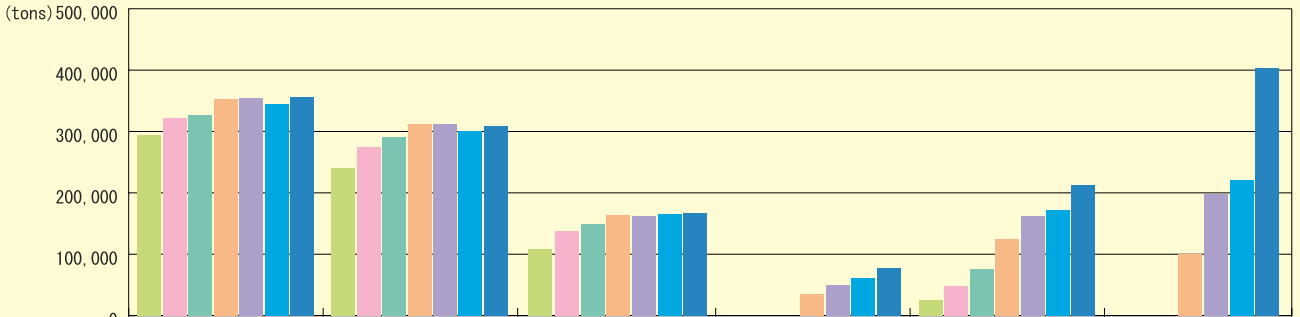
Fig. 24 Number of Municipalities Carrying Out Sorted Collection




| | Colorless glass bottles | Amber glass bottles | Glass bottles of other colors | Paper containers/packaging | PET bottles | Plastic containers/packaging |
|---|---|---|---|---|---|---|
| FY1997 | 1,610 | 1,610 | 1,535 | — | 631 | — |
| FY1998 | 1,862 | 1,866 | 1,784 | — | 1,011 | — |
| FY1999 | 1,991 | 1,992 | 1,915 | — | 1,214 | — |
| FY2000 | 2,618 | 2,631 | 2,566 | 343 | 2,340 | 881 |
| FY2001 | 2,725 | 2,737 | 2,706 | 404 | 2,617 | 1, 121 |
| FY2002 | 2,795 | 2,807 | 2,740 | 525 | 2,747 | 1, 306 |
| FY2003 | 2,911 | 2,922 | 2,872 | 748 | 2,891 | 1, 685 |

Note: "Plastic containers/packaging" means all kinds of plastic containers and packaging, including white (styrofoam) trays.
Source: Ministry of Environment

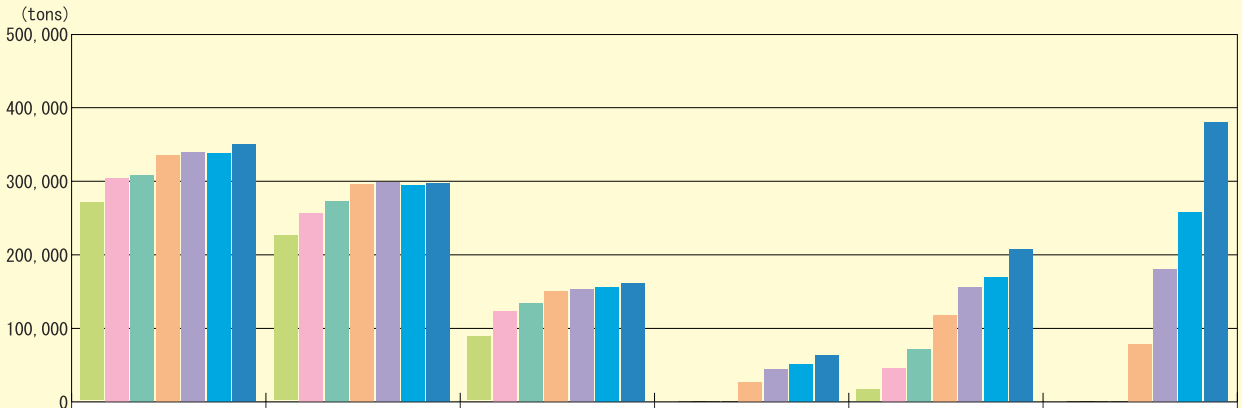
Fig. 25 Volume of Containers and Packaging Collected




| | Colorless glass bottles | Amber glass bottles | Glass bottles of other colors | Paper containers/packaging | PET bottles | Plastic containers/packaging |
|---|---|---|---|---|---|---|
| FY1997 | 292,775 | 243,916 | 107,533 | — | 21,361 | — |
| FY1998 | 322,284 | 274,374 | 136,953 | — | 47,620 | — |
| FY1999 | 326,110 | 290,127 | 149,332 | — | 75,811 | — |
| FY2000 | 352,386 | 312,539 | 164,551 | 34,537 | 124,873 | 100,811 |
| FY2001 | 355,157 | 311,993 | 162,481 | 49,723 | 161,651 | 197,273 |
| FY2002 | 348,698 | 304,172 | 163,903 | 57,977 | 188,194 | 282,561 |
| FY2003 | 356,977 | 309,857 | 165,011 | 76,878 | 211,753 | 401,697 |

Source: Ministry of Environment

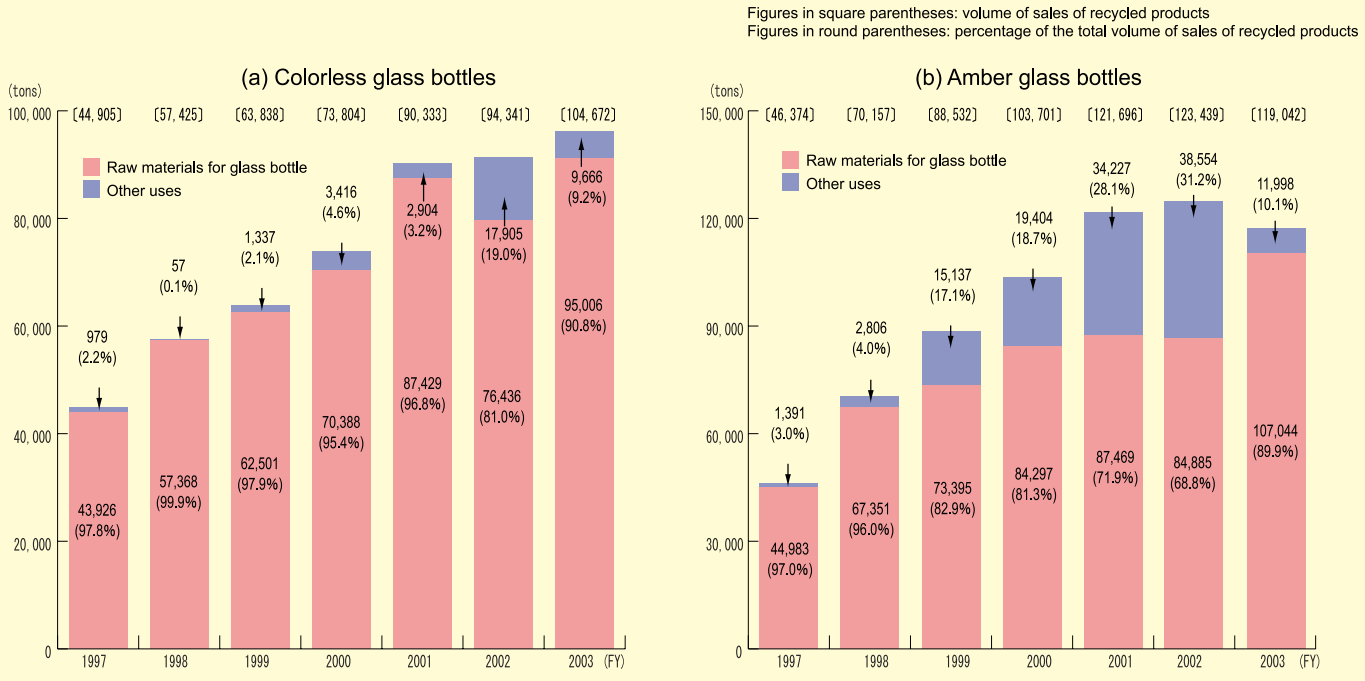
Fig. 26 Volume of Containers and Packaging Recycled (Volume of Those Delivered to Recycling Businesses)



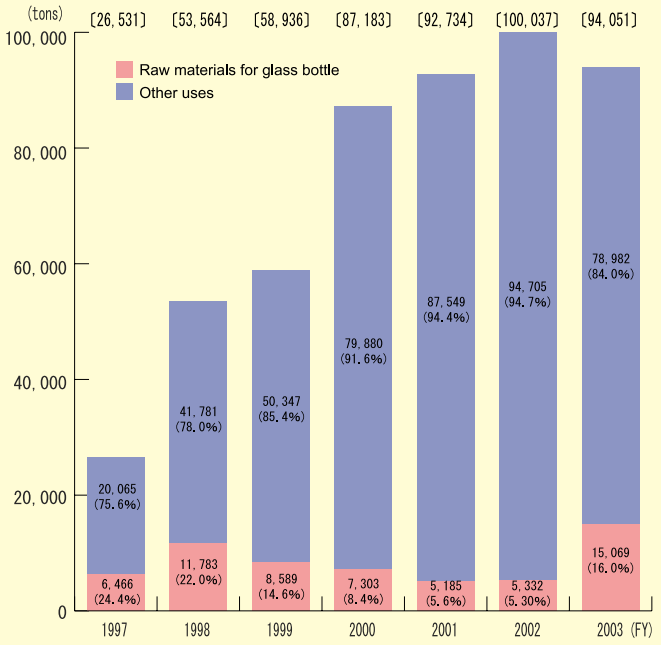

| | Colorless glass bottles | Amber glass bottles | Glass bottles of other colors | Paper containers/packaging | PET bottles | Plastic containers/packaging |
|---|---|---|---|---|---|---|
| FY1997 | 275,119 | 228,170 | 95,190 | — | 19,330 | — |
| FY1998 | 303,240 | 256,227 | 123,227 | — | 45,192 | — |
| FY1999 | 307,237 | 272,559 | 134,084 | — | 70,783 | — |
| FY2000 | 334,549 | 294,959 | 150,139 | 26,310 | 117,877 | 77,568 |
| FY2001 | 339,443 | 298,785 | 152,965 | 44,675 | 155,837 | 180,306 |
| FY2002 | 337,888 | 293,240 | 156,856 | 54,145 | 183,427 | 268,640 |
| FY2003 | 345,208 | 297,510 | 157,217 | 69,508 | 204,993 | 384,865 |

Note: "Volume of containers and packaging recycled" means the volume delivered by municipalities to recycling businesses in accordance with recycling plans.
Source: Ministry of Environment

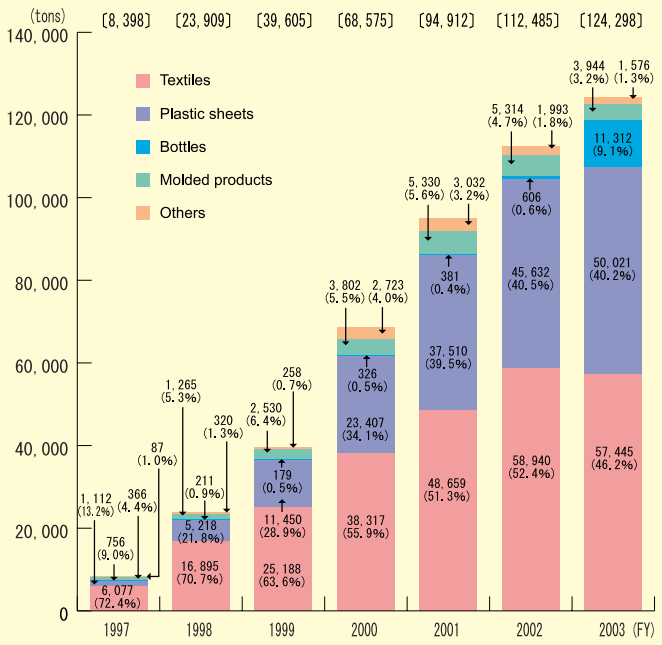
Fig. 27 Trends in the Volume of Containers and Packaging Recycled via the Designated Body and the Use of Recycled Products



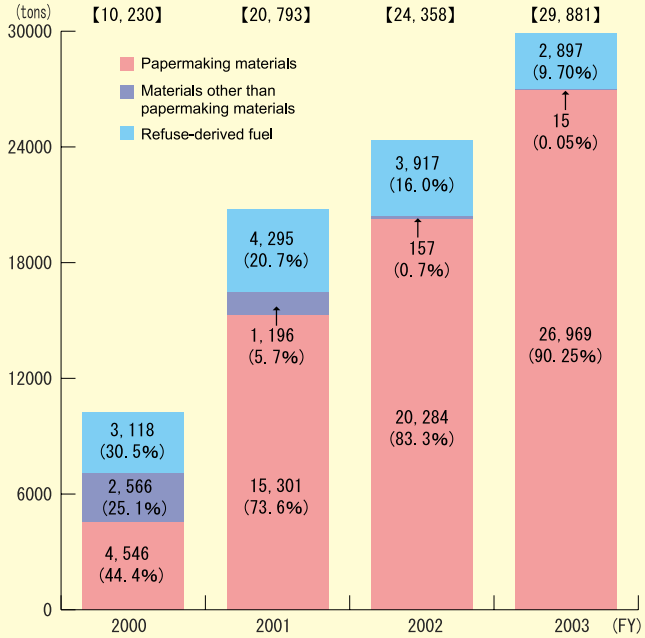
(c) Glass bottles of other colors



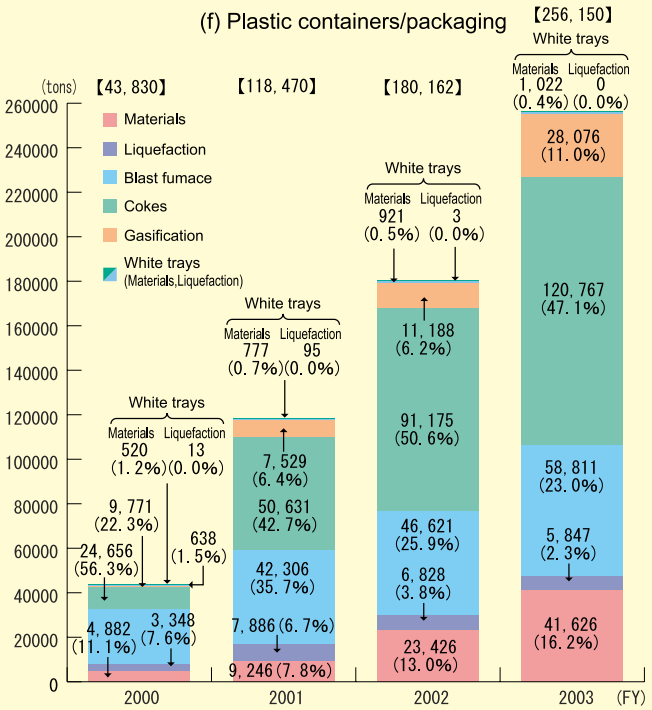

(d) PET bottles




(e) Paper containers/packaging




(f) Plastic containers/packaging




Source: Japan Containers and Packaging Recycling Association

## 6 Home Appliance Recycling Law

### Overview

[1] Title of the law: Law for Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law)
[2] Date put into force: April 2001 (promulgated in June 1998)
[3] Purpose: Clarifying the role-sharing between consumers, retailers and home appliance manufacturers in managing used home appliances disposed of by households, with the aim of promoting waste reduction and recycling.

### Outline of the law

The law provides for a collection and recycling system in which home appliance retailers take charge of collecting used home appliances and home appliance manufacturers take charge of recycling collected appliances (see Fig. 28).

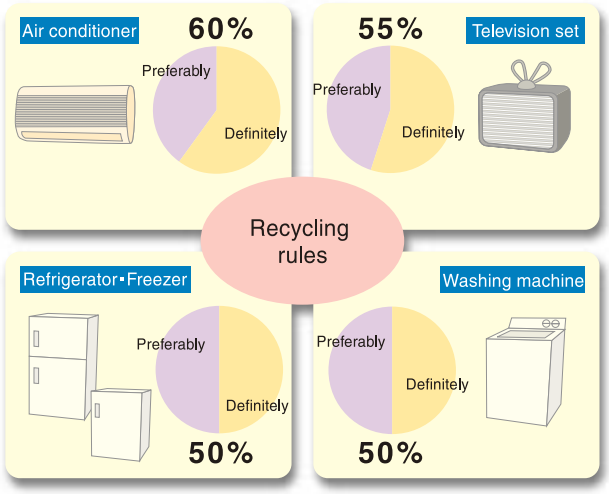
#### (1) Home appliances to be regulated

[1] Air conditioners
[2] Television sets (limited to CRT-types)
[3] Refrigerators, freezers
[4] Washing machines

#### (2) Recycling

"Recycling" means removing parts and materials from used home appliances and reusing them as parts or raw materials for new products or assigning them, with or without charge, to those who will reuse them. "Recycling" includes thermal recycling or using waste as fuel. However, it is currently required to satisfy a certain recycling level only in terms of recycling of waste as parts or raw materials of new products.

Recycling level required under the law




#### (3) Responsibilities of parties concerned

[1] Home appliance manufacturers and importers
(Those who manufacture home appliances shall recycle them.)
- Taking back home appliances, which they have manufactured or imported, from retailers
- Recycling these home appliances
- Publishing the costs for recycling these home appliances (recycling fees)

[2] Home appliance retailers
(Those who sell home appliances shall collect and transport them.)
- Taking back home appliances, which they have sold, from businesses that dispose of them
- Taking back home appliances at the request of consumers who buy new ones to replace old ones
- Issuing home appliance recycling coupons* to manufacturers and the designated body and sending copies to dischargers
- Displaying the costs of collecting and transporting in shop windows

[3] Consumers
(Those who use home appliances shall pay for recycling costs.)
- Appropriate disposal
- Payment of costs for collection and recycling

[4] Designated body (Association for Electric Home Appliances)
- Recycling home appliances whose manufacturers are unknown or those entrusted by specific manufacturers (manufacturers whose production volume is less than 900,000 units for air conditioners, 900,000 units for television sets, 450,000 units for refrigerators, and 450,000 units for washing machines)

[5] Municipalities
- Delivering home appliances, which they have collected, to manufacturers and the designated body, as well as recycling them

* Association for Electric Home Appliances operates the home appliance recycling coupon system, which is convenient for paying and collecting recycling fees. Recycling fees may be paid and collected via retailers or by postal transfer.

## Present Situation of Recycling

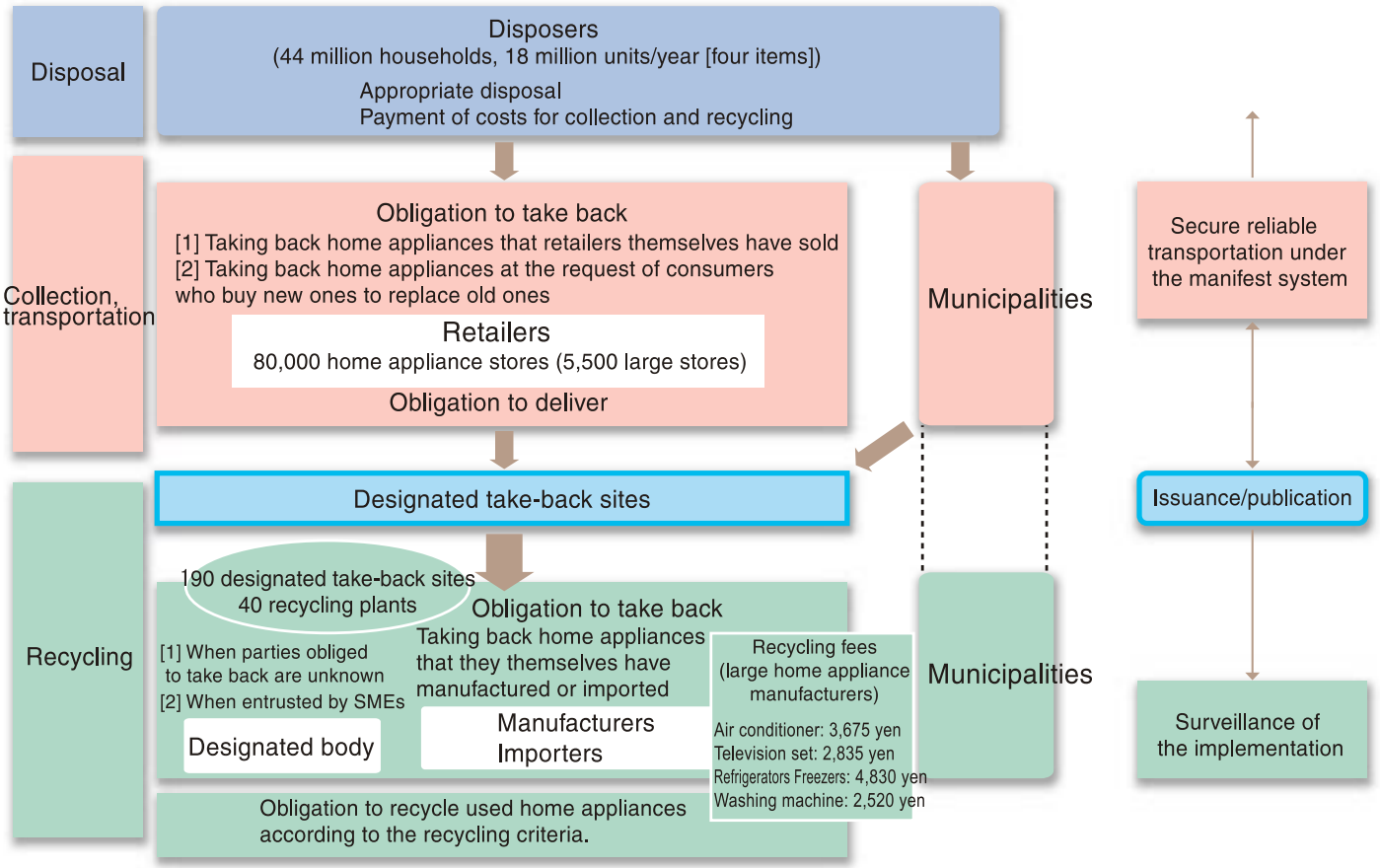
Among used home appliances disposed of by households, about 18 million units of air conditioners, television sets, refrigerators and washing machines, the four items included in the scope of regulation by the law in April 2001, are disposed of annually. Up to now, 70.8% of such used home appliances were treated and disposed of as waste, 4.9% were sold in Japan as secondhand goods and 24.3% were exported as second-hand goods.

Since the law was put into force, the four items have been taken back by retailers or municipalities, and then recycled by manufacturers/importers or the designated body (Association for Electric Home Appliances) at 41 recycling plants for home appliances. In FY 2003, manufacturers/importers or the designated body took back a total of about 10.46 million units of the four items at take-back sites, and the recycling rates for the four items were 65% to 81% (see Fig. 29). All these recycling rates exceeded the target levels under the Home Appliance Recycling Law (see page 30).

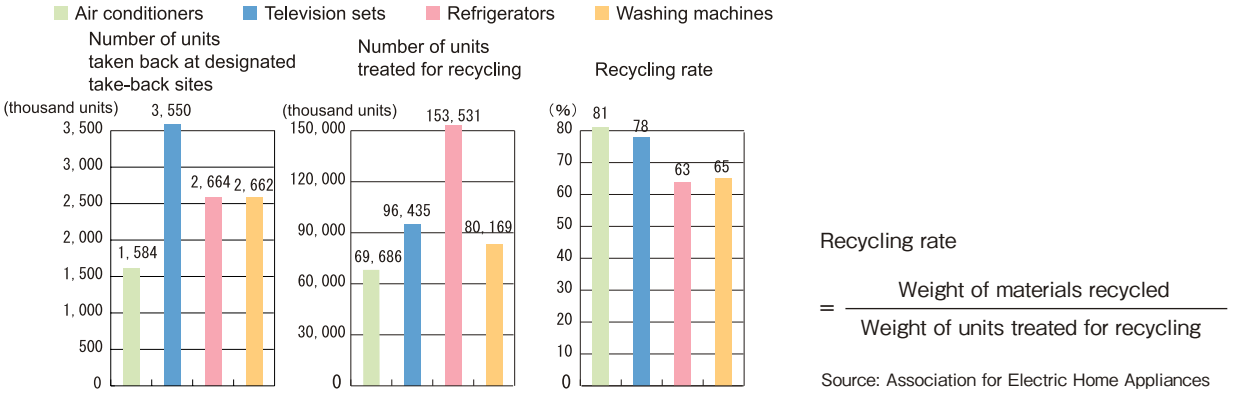
The ratio of home appliances illegally discarded to the number of units taken back has varied between 1% and 2% during the last few years. The total number of the four items illegally discarded in April - September 2003 was 85,930 (2,930 municipalities, 124.9 million people: 98% of total population). This was an increases of 12.4% compared to the same term of the previous year. Continued investigation of the actual situation is needed.

In the recycling stage, iron, copper, aluminum and glass are recycled as valuable materials (see Fig. 30),while CFCs are used as refrigerants for air conditioners, and refrigerators are also collected and decomposed.

Fig. 28 Flow of Recycling of Used Home Appliances



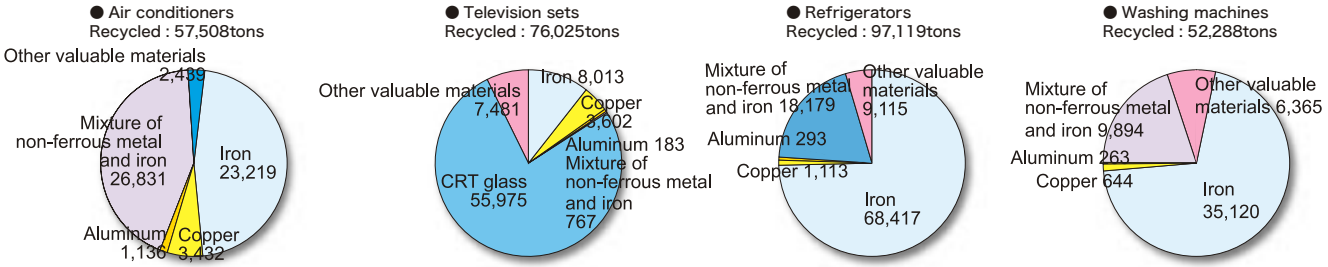
## Fig. 29 Recycling by Manufacturers/Importers and the Designated Body (FY2003)




Recycling rate = Weight of materials recycled / Weight of units treated for recycling

Source: Association for Electric Home Appliances

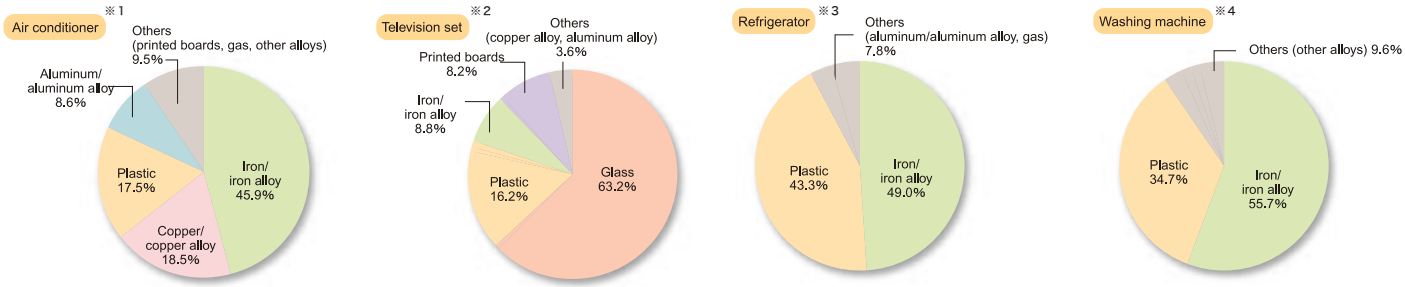
## Fig. 30 Weight of Materials Recycled by Manufacturers/Importers and the Designated Body (FY 2003)




Notes: 1. Total weight of parts and materials that have already been treated so as to be assignable, with or without charge, to those who will use them as parts or materials for new products
2. "Other valuable materials" include printed boards and other plastics.

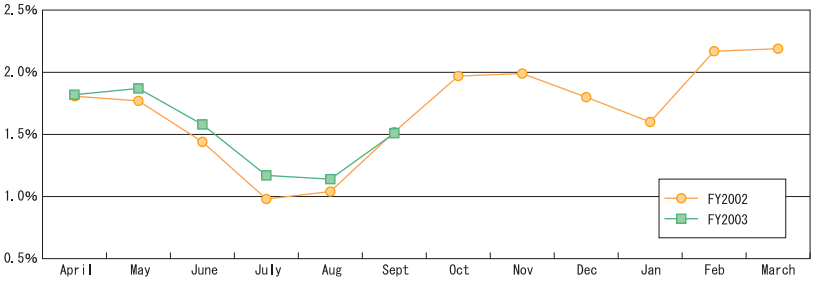
Source: Association for Electric Home Appliances

## Fig. 31 Composition of Home Appliances




※1 : The ratio of metal content, such as expensive copper-based or aluminum-based metal, is higher than the other three items.
※2 : Glass is separately removed, cathode-ray tubes are reused as cathode-ray tubes, and a slight amount of metal such as lead contained in printed boards is collected.
※3 : Measures are being taken to collect CFCs and HCFCs, the latter being four times more abundant than the former.
※4 : Removing and disposing of motors

## Fig. 32 Trends in the Number of Units Illegally Discarded (total of four items)




Source: Ministry of Environment

# 7 End-of-Life Vehicle Recycling Law

[1] Title of the law: Law on Recycling of End-of-Life Vehicles (ELV Recycling Law)
[2] Date put into force: January 1, 2005 (promulgated in July 2002)
[3] Purpose: construct a recycling system to ensure recycling and proper disposal of ELVs by role-sharing of businesses beginning with car manufacturers.

### Outline of the law

The law provides role-sharing between car owners, ELV-collecting businesses, car manufacturers, and car importers to build a recycling- oriented society in which waste is reduced and resources are used with care (see Fig. 33).

### (1) Vehicles to be regulated

All types of four-wheel vehicles (including large vehicles and commercial vehicles, such as trucks and buses)

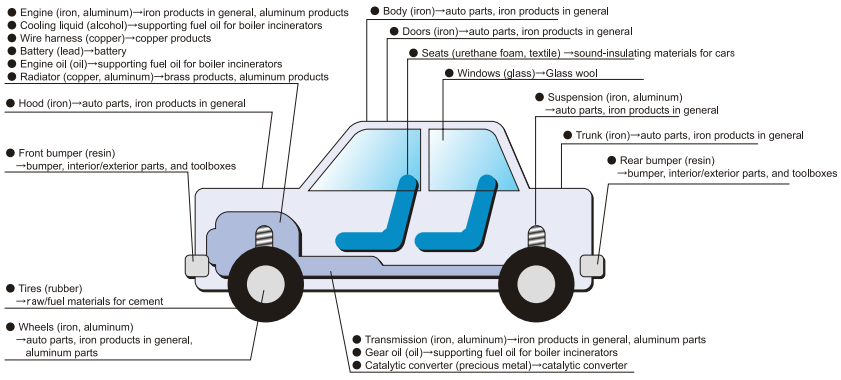
### (2) Responsibilities of the parties concerned

① Car owners (end users)
Payment of recycling fee, delivering end-of-life vehicles to ELV-collecting businesses that are registered with local authorities
② ELV - collecting businesses
Taking back ELVs from end users and then delivering them to CFC-collecting businesses and auto - dismantling businesses.
③ CFC - collecting businesses
Collecting fluorocarbons properly from ELVs in accordance with the recycling standards, and handing over ELVs to car manufacturers/importers
④ Auto dismantling businesses
Dismantling ELVs properly in accordance with the recycling standards, collecting airbags and handing over ELVs to car manufacturers/importers
⑤ Shredding businesses
Shredding dismantled ELVs (press, cutting and shredding) in accordance with the recycling standards, handing over shredder dust (waste remaining after shredding dismantled ELVs) to car manufacturers/importers
⑥ Car manufacturers/importers
Collecting and recycling CFCs, airbags and shredder dust from ELVs that are manufactured and imported by themselves.

### (3) Payment of recycling fee

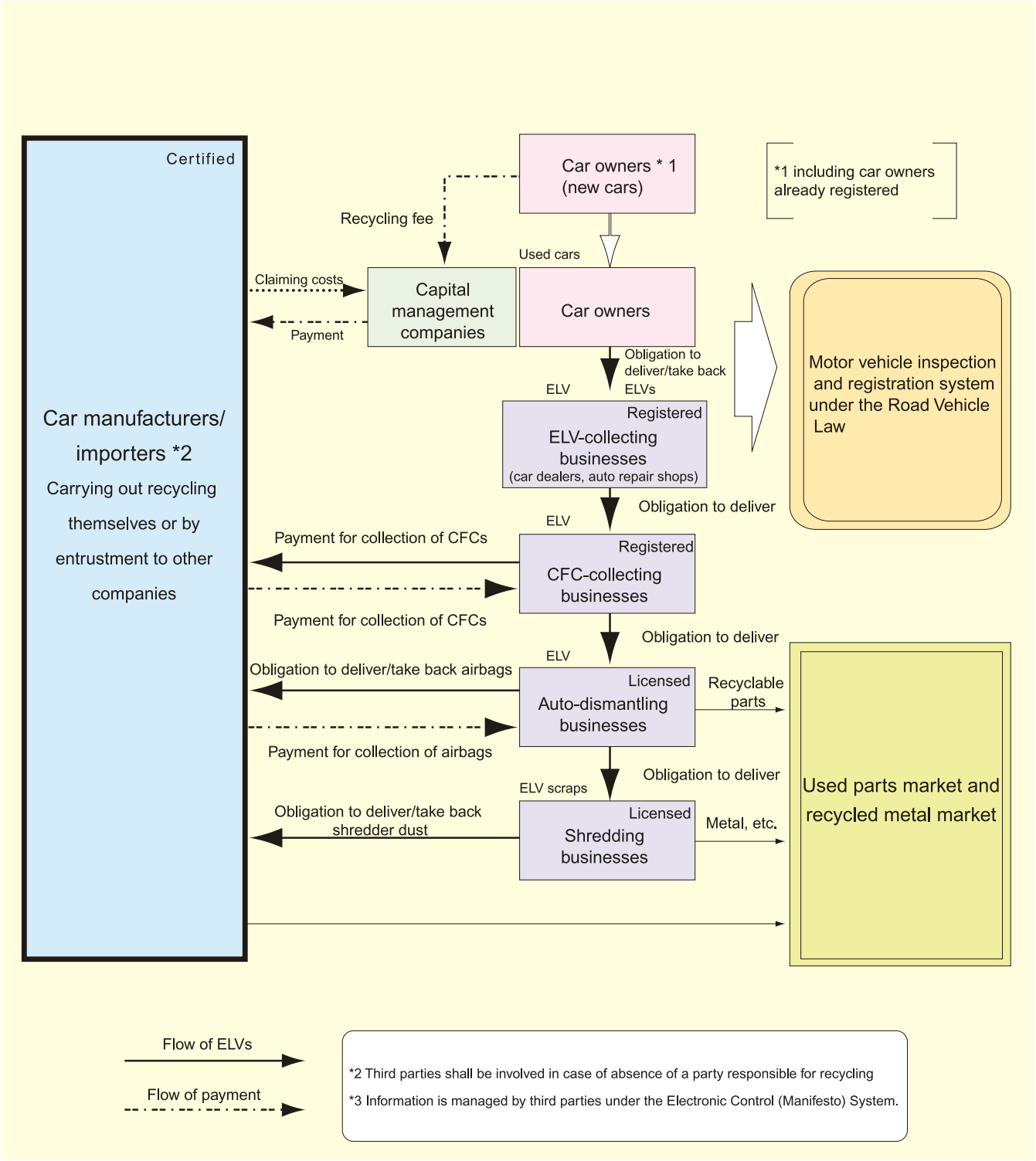
① Fees shall be paid upon purchasing new cars for those who purchase new cars from January 2005, and paid at the first periodic inspection of every in-use vehicle from January 2005 for those who already own cars. In the case of disposing of cars without undergoing a periodic inspection, fees shall be paid to ELV - collecting businesses when ELVs are handed over to them.
② Recycling fees are determined on every car by individual car manufacturers/importers, depending on the possibile quantity of shredder dust and CFCs, number of airbags and simplicity of taking off airbags.
③ The average fee for recycling shall be disclosed by car manufacturers/importers.

**Fig. 33 Recycling Uses of ELVs**




Source: Japan Automobile Manufacturers Association

Fig. 34 Concept of the ELV Recycling Law




Source: Ministry of Economy, Trade and Industry

# 8 Construction Material Recycling Law

[1] Title of the law: Law on Recycling Construction-Related Materials (Construction Material Recycling Law)
[2] Date put into force: May 2002 (promulgated in May 2000)
[3] Purpose: To promote sorting and recycling of concrete waste materials, asphalt waste materials, and wood waste which are discharged in the process of demolishing buildings

### Outline of the law

The law provides for the process of sorted demolition and recycling carried out by contractors and the contractual procedures to be followed by the client and the prime contractor for construction works (see Fig. 38) .

### (1) Construction works to be regulated

| Type of construction | Standard size |
|---|---|
| Demolition of a building | 80m$^2$ or more (total floor space) |
| Construction of a new building or extension | 500m$^2$ or more (total floor space) |
| Repairing or remodeling (renovating) of a building | 100 million yen or more (contracting fee) |
| Other construction work (civil engineering work) | 5 million yen or more (contracting fee) |

Notes: 1. Demolition work means demolishing parts of a building, such as the foundation, foundation piles, walls, posts, roof trusses, bases, diagonal framing, floor covers, roof plates or horizontal framing, which support the weight of the building or its live load, snow, wind pressure, earth pressure or hydraulic pressure, or earthquake or other vibration or impact.
2. Work for demolishing part of a building or constructing part of a new building or extension shall be subject to the regulation if the total floor area of the part concerned falls under the standard size. Reconstruction work shall be regarded as a combination of demolition and construction of a new building (or extension).

### (2) Construction materials to be regulated

- Concrete
- Construction materials consisting of concrete and iron
- Wood*
- Asphalt concrete

* It is allowable to reduce (incinerate) wood if the construction site is more than 50 km away from the nearest recycling facility.

● These materials account for about 80% of the total amount of construction waste (see Fig. 35).

Note: The aggregate total may not correspond to the total amount because figures for individual amounts are rounded off.
Source: Ministry of Land, Infrastructure and Transport

Fig. 35 Amount of Construction Waste Discharged, by Product Category (FY2002)

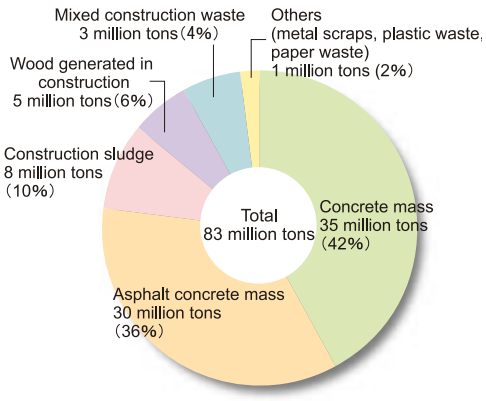
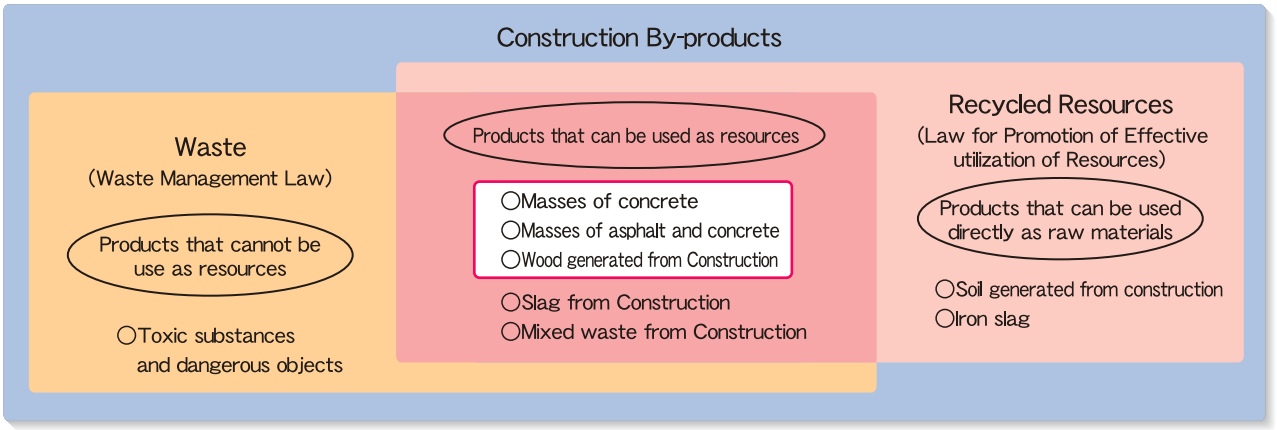


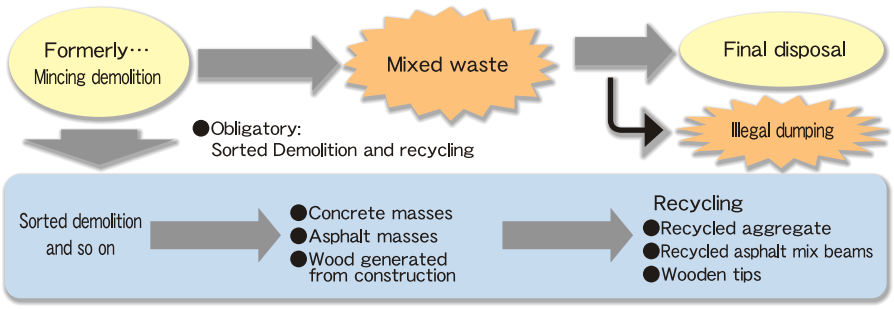

Fig. 36 Relationship Between Construction By-products, Recycled Resources and Waste




=Recycling of these items is mandatory under the Construction Material Recycling Law

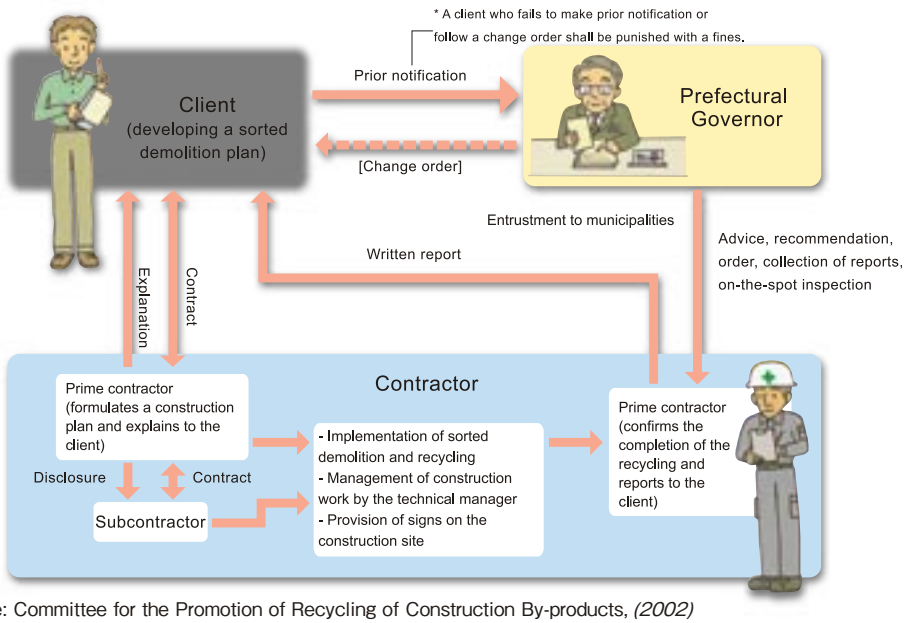
Construction by-products are products generated as byproducts from construction; they include recycled resources and waste.
Source: Committee for the Promotion of Recycling of Construction By-products, *(2004)*

Fig.37 Flow of Sorted Demolition and Recycling



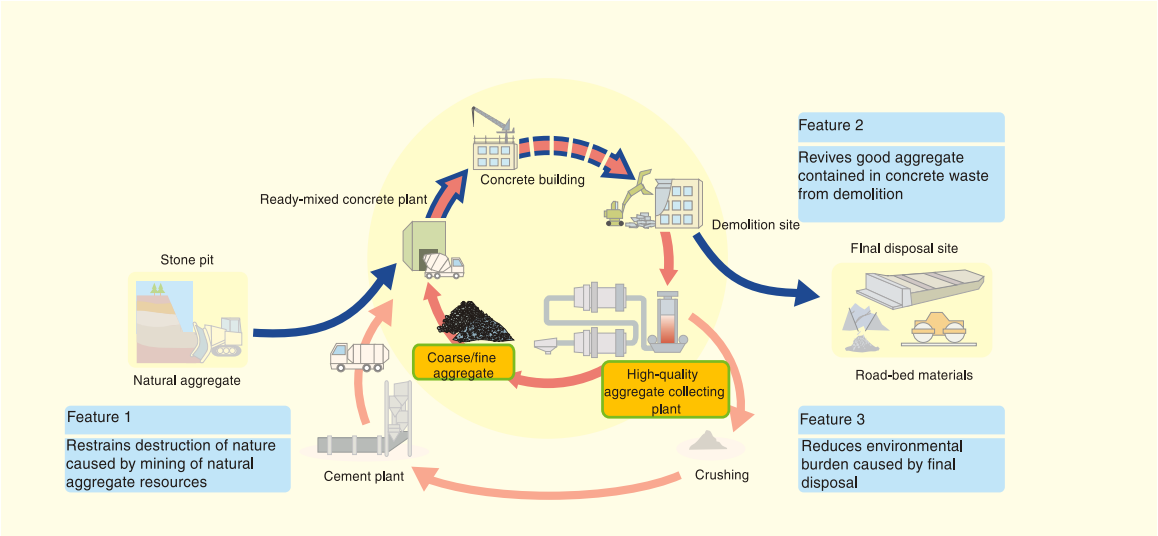

Source: Committee for the Promotion of Recycling of Construction By-products, *(2004)*

Fig. 38 Flow of Sorted Demolition and Recycling: from placement of order to implementation




Source: Committee for the Promotion of Recycling of Construction By-products, *(2002)*

Fig. 39 Example of Recycling of Concrete Aggregate



# 9 Food Recycling Law

[1] Title of the law: Law Concerning Promotion to Recover and Utilize Recyclable Food Resources (Food Recycling Law)
[2] Date put into force: May 2001 (promulgated in June 2000)
[3] Purpose: To prevent and reduce food waste discharged from food-related businesses, thereby decreasing the amount for final disposal, as well as to promote recycling of such waste as fertilizers and animal feeds.

### Outline of the law

The law provides for measures to be taken by food-related businesses.

### (1) Food waste to be regulated

[1] Unsold or uneaten food waste generated in the process of distribution and consumption
[2] Leftover plant and animal food generated in the process of manufacturing, processing and cooking food products (excluding kitchen waste discharged from households)

### (2) Food-related businesses to be regulated

[1] Businesses engaged in manufacturing/processing food products for wholesale or retail sales
* e. g. Food manufacturers, greengrocerers, department stores, supermarkets
[2] Restaurants and other food-service businesses
* e. g. Cafeterias, restaurants, hotels, Japanese-style hotels, wedding centers, floating restaurants

### (3) Responsibilities of food-related businesses

All Food-related businesses engaged in manufacturing and distributing food products or providing restaurant services shall carry out recycling of food waste (through prevention of waste generation, and reduction of final disposal), and raise the recycling rate to 20 % higher.

Penalties shall be imposed on those discharging 100 tons or more of food waste annually shall in the case of not achieving this minimum 20 % rate.

[Aims to increase the recycling rate to 20% by FY2006]
[1] Prevention: preventing generation of food waste
[2] Recycling: using food waste as raw materials of fertilizer, animal feeds, oil and fat products or methane.
- Fertilizers: compost made by aerobic fermentation, organic fertilizer made by drying
- Animal feeds: feed for livestock or aquarium fish made by pressure steaming, aerobic fermentation or dehydration through frying
- Oil and fat products: cooking oil, soap
- Methane: biogas made by anaerobic fermentation of kitchen waste (composed of methane gas (about 60%) and carbon dioxide gas (about 40%)), used as fuel

[3] Reduction: reducing the amount of food waste by dehydration, drying, fermentation or carbonization (roasting)

### (4) Responsibility of consumers

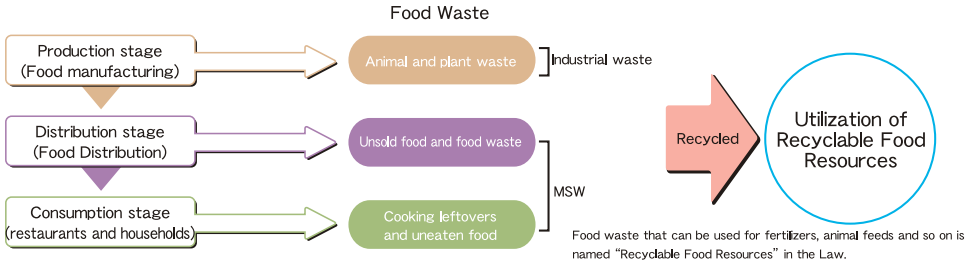
Consumers shall prevent generation of food waste by improving their methods of buying and cooking food and by using recycled products.

### (5) Responsibility of the national and local governments

The national and local governments shall implement measures to promote recycling of recyclable food resources.

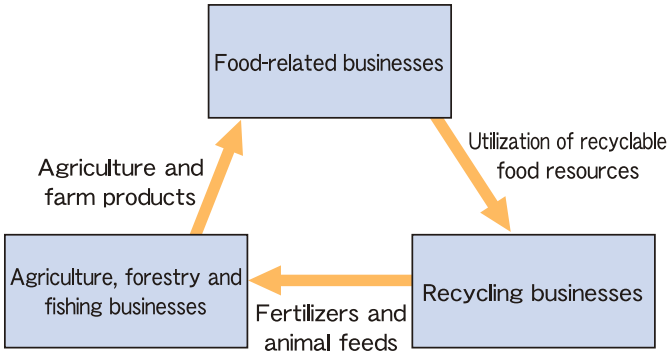
### Fig. 40 Generation of Food Waste

Food waste is discharged:
[1] as industrial waste from food manufacturers, or
[2] as MSW from (a) food distribution businesses and restaurants or
(b) households (household waste is excluded from the scope of regulation by the law)




Source: Ministry of Agriculture, Forestry and Fisheries, *"Food Recycling Law for Food-related Businesses"*

Fig. 41 Related Businesses and their Role in Food Recycling




**Food-related businesses**
Play the main role of recycling as dischaeger of food waste. The law requires that businesses take measures to recycle intentionally.

**Recycling businesses**
Businesses that recycle food waste and play the role of linking food-related businesses and users of fertilizers and animal feeds. The law requires that they provide proper imformation and carry out environmentally oriented activities.

**Agriculture, forestry and fishing businesses**
The law requires that use recycled fertilizers and animal feeds, and provide agriculture and farm products to food-related businesses for achieving recycling between food production and consumption.

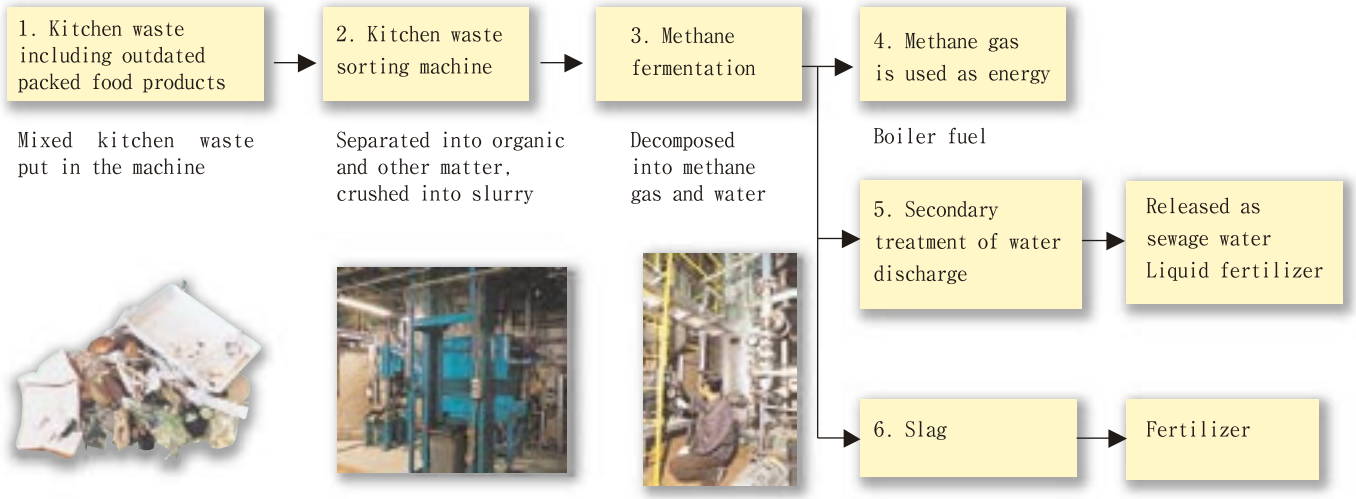
Source : Ministry of Agriculture, Forestry and Fisheries, "Food Recycling Law for Food-related Businesses"

Table 3 Amount of Food Waste Generated and Recycled

| | Waste generated a year (10,000 tons) | Reduction of generation ① | Reduction in quantities ② | Recycled ③ | Fertilizer | Animal feeds | Methane | Oil and fat products | recycling rate ①+②+③ |
|---|---|---|---|---|---|---|---|---|---|
| Food manufacturers | 464 | 4% | 8% | 48% (100) | (44) | (50) | (0) | (6) | 60% |
| Food wholesalers | 72 | 4% | 0% | 28% (100) | (40) | (56) | — | (5) | 32% |
| Food retailers | 236 | 4% | 2% | 17% (100) | (53) | (34) | — | (13) | 23% |
| Food-service businesses | 320 | 4% | 2% | 9% (100) | (43) | (40) | — | (18) | 14% |
| Total | 1,092 | 4% | 4% | 28% (100) | (44) | (47) | (0) | (8) | 37% |

Source : Ministry of Agriculture, Forestry and Fisheries, "Food Recycling Law for Food-related Businesses"

Fig.42 Waste disposal system by methane fermentation



# 10 Green Purchasing Law

[1] Title of the law: Law Concerning the Promotion of Eco-friendly Goods and Services by the State and Other Entities Authorities (Green Purchasing Law)
[2] Date put into force: April 2001 (promulgated in May 2000)
[3] Purpose: To create and develop markets for recycled products and other products with a reduced environmental impact.

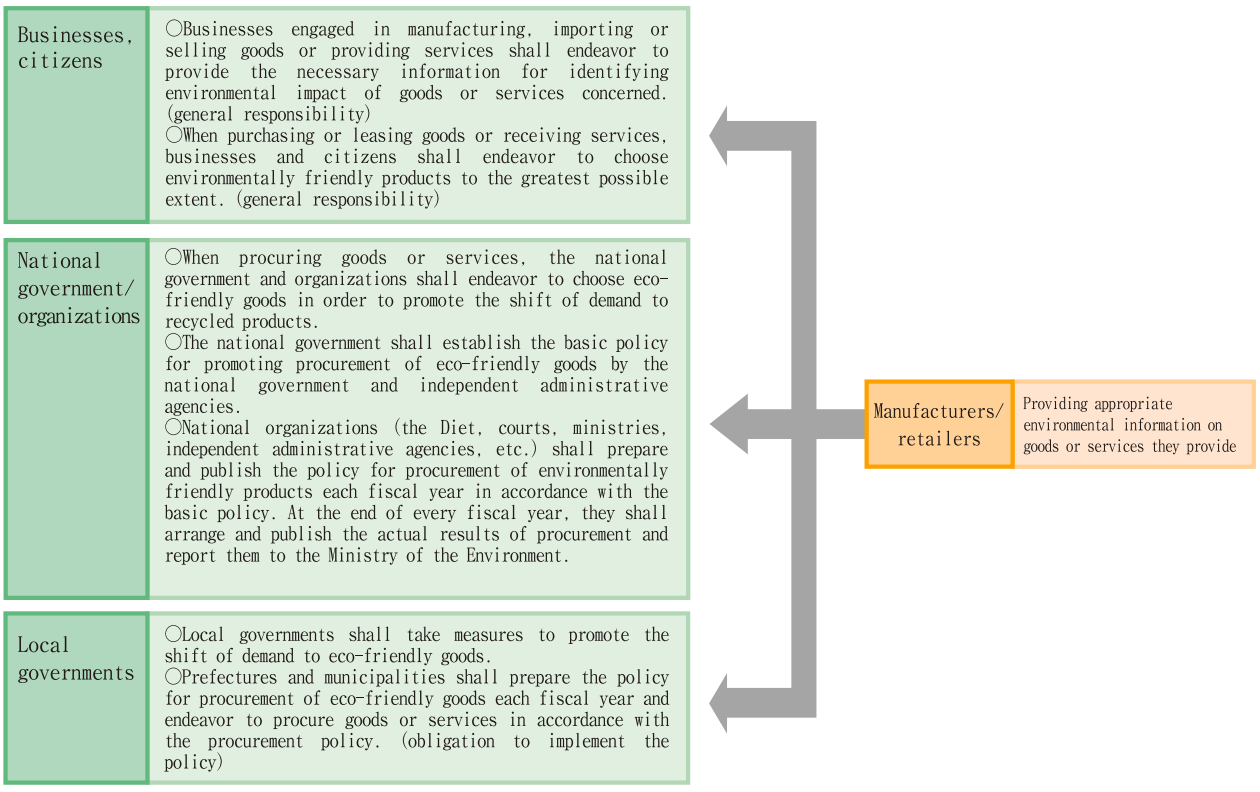
### Outline of the law

The law provides that the national government, national organizations and local authorities shall take the lead in purchasing eco-friendly goods, while businesses shall choose eco-friendly goods when purchasing goods, to the greatest possible extent (see Fig. 43).

### (1) Designated procurement items

The law designates the types of eco-friendly goods on which priority should be placed in procurement and judgment criteria with respect to 199 items (see Table 4).

Fig. 43 Green Purchasing Law




### Green procurement

Green procurement generally means that, when purchasing raw materials, manufacturers preferentially choose eco-friendly goods or procure products from manufacturers that implement environmental considerations. In other words, it means procuring materials and parts from manufacturers that have established systems for environmental management and prohibited substance management.

Large manufacturers have developed their own "green procurement criteria" and started taking measures accordingly. For example, 18 large information/communication device manufacturers unified their green procurement criteria in 2002 and included heavy metals and halogen compounds such as cadmium (Cd), lead (Pb), mercury (Hg) and hexavalent chromium ($Cr^{6+}$), which are contained in materials and parts, as common items to be disclosed.

Furthermore, the EU will enforce the RoHS Directive (regulating specific toxic substances contained in electronic equipment imported into the EU) in July 2006 to prohibit home appliances and communication devices from containing Pb, Hg, Cd, and $Cr^{6+}$ as well as two kinds of Br (bromine)-based flame retardants. Accordingly, some Japanese manufacturers have already started to implement green procurement in a stricter manner.

Table 4 Designated Procurement Items and Criteria (199 in total)

| Category | Designated procurement item (Cabinet Decision on March 16, 2004) | Criteria |
|---|---|---|
| Paper | 9 items including information paper (copy paper, diazo-type paper, OCR paper), printing paper, hygienic paper (toilet paper, facial tissue) | Composition of recycled paper<br>Degree of whiteness, etc. |
| Stationery | 66 items including mechanical pencils, ball point pens, scissors, glue, files, binders, desk mats, albums, binding cords, blackboard dusters, can/bottle crushing machines | Use of recycled materials (recycled plastic, thinned wood) |
| Office Furniture | 10 items including chairs, desks, shelves, coat hooks, umbrella stands, blackboards | |
| OA Machines | 10 items including copiers, computers, printers, facsimile machines, display devices | Energy efficiency |
| Home appliances | 6 items including refrigerators, air conditioners, television sets, VTR devices | |
| Lighting | Fluorescent lighting apparatuses, fluorescent light tubes | |
| Air conditioners | air conditioners, gas-heat pump systems, heaters | |
| Water heaters | 4 items including electric hot water heaters, gas-water heaters | |
| Vehicles | Automobiles (natural gas cars, hybrid cars)<br>ETC devices, VICS devices | Gas emissions, fuel consumption |
| Uniforms and Work clothes | Uniform, work clothes | Use of resin recycled from PET bottles |
| Interior fixtures and bedding | Carpets, curtains, blankets, futons, bed frames, mattresses | |
| Work gloves | Work gloves | |
| Other fiver goods | Tents, tarpaulins, protective netting | |
| Facilities | Photovoltaic generation systems, fuel batteries, solar thermal systems, kitchen waste disposers | Use of solar energy<br>Reduction of kitchen waste |
| Public works projects | Public works[1] Recycled materials (26 items including recycled wood boards, tiles, mixed cement, recycled aggregates, undercoats, eco-cement, permeable concrete, heat-insulating window sashes/doors, automatic water taps, light control systems, and sewage sludge fertilizer) [2] Construction machinery (low-emission type, low-noise type)[3] Method of construction (5 items including recycling of construction slag and concrete masses)[4] Special-purpose items (drainage paving, transparent paving and tree planting on the roof) | |
| Services | Energy-saving diagnoses, cafeterias, printing, tire retread, car repair | Contents of technical qualifications and diagnoses, kitchen waste disposal, composition of recycled paper, tire retread, use of recycled car parts |

Note: For green purchasing, environmental labels such as Eco-Mark (certified by the Japan Environment Association) and Eco-Leaf (used by the Japan Environmental Management Association for Industry) are important information sources to distinguish eco-friendly goods.

Source: Ministry of Environment, *White Paper on Recycling-Oriented Society (2003)*

## 11 METI Industrial Structure Council: Guidelines for Waste Treatment and Recycling

In the Guidelines for Waste Treatment and Recycling (by Product Category/Sector), the Industrial Structure Council indicates measures to be taken by businesses for waste treatment and recycling, with the aim of promoting voluntary actions.

The Guidelines were first developed in 1990 with respect to 14 product categories and 10 sectors. After repeated revisions for improvement and enhancement of the contents, they were revised in September 2003 for the seventh time to regulate 35 product categories and 18 sectors in total.

The Guidelines play two roles: [1] a collection of voluntary measures to be undertaken with respect to product categories and sectors that are not regulated under recycling-related laws, and [2] implementation guidelines with respect to product categories and sectors that are regulated under recycling-related laws. Industries aim at achieving the numerical targets for recycling set in the guidelines as quickly as possible.

### (1) Guidelines by product category (35 commodities)

| | | | |
|---|---|---|---|
| Paper | Glass bottles | Steel cans | Aluminum cans, etc. |
| Plastics | Automobiles | Motorbikes | Tires |
| Bicycles | Home electrical appliances | Spring mattresses | Large furniture |
| Carpets | Futons | Dry cell batteries | Small secondary batteries, etc. |
| Lead batteries for automobiles and two-wheel vehicles | Cassette gas cylinders | Aerosol cans | Small gas cylinders |
| Fire extinguishers | Pachinko game machines, etc. | Personal computers and peripheral devices | Copying machines |
| Gas and kerosene equipment | Textile products | Lubrication oil | Electric wires |
| Construction materials | Bath tubs and bathroom units | Kitchen components | Cellular phones and PHS |
| Fluorescent tubes | Vending machines | Single-use cameras | |

### (2) Guidelines by sector (18 businesses)

| | | | |
|---|---|---|---|
| Iron and steel | Paper/pulp manufacturing | Chemicals | Glass sheet manufacturing |
| Textiles | Nonferrous metal manufacturing | Electricity | Automobile manufacturing |
| Car part manufacturing | Electronic/electric device manufacturing | Oil refineries | Distribution |
| Leasing | Cement manufacturing | Rubber product manufacturing | Coal mining |
| Gas | Factory-produced housing manufacturing | | |

## 12 Environmental Labels and Identification Marks

According to ISO 14020 and JIS Q 14020, "environmental labels and declarations" function as indications of the environmental aspects of products and services, in the form of statements, symbols and graphics made on product or packaging labels, product literature, technical bulletins, advertising, publicity or similar applications.

### (1) Type I environmental labels

(Environmental labels in accordance with ISO 14020 issued in 1999 and JIS Q 14024 established in 2000; granted by third-party bodies)

Third-party accreditation bodies establish criteria for judging the environmental friendliness of products in comparison with other similar products in light of the entire life cycle for specific kinds of commodities, and certify some products as environmentally friendly in accordance with the criteria. Predetermined marks can be attached to certified products.

"Eco-Mark" in Japan and "Blue Angel" in Germany are included in Type I labels.

"Eco-Mark" is acknowledged by the Japan Environment Association.

Fig. 44 Eco-Mark


### (2) Type II environmental labels

(Environmental labels in accordance with ISO 14021 issued in 1999 and JIS Q 14021 established in 2000; self-declaration by businesses)

These labels are based on self-declarations by businesses of their environmental consideration, indicating how environmentally friendly their products are, in the form of statements, symbols or graphics. "Mobius Loop" is a symbol indicating "Recyclable" or "Recycled Content."

Fig. 45 Mobius Loop

Industrial associations and companies also use their own original identification marks to indicate recycled products and materials to be selectively collected.

Fig. 46 Identification Marks

**Products recycled from PET bottles**


Council for PET Bottle Recycling

**Products made of recycled paper (Green Mark)**

Paper Recycling Promotion Center

**Products made of recycled paper**


(100% made of recycled paper)
Council for Gomi Zero Partnership

**Products made of paper recycled from milk cartons**

Japan Milk Carton Recycling Association

**Paper containers**


Committee for Milk Container Environmental Issues

**Corrugated cases**

Corrugated Case Recycling Council

### (3) Type III environmental labels

(Under deliberation in accordance with ISO/TRI 14025; indication of qualitative environmental data)

These labels indicate qualitative data on the environmental impact of products through the entire life cycle, from gathering of resources to manufacturing, use, and disposal/recycling, calculated by the life cycle assessment (LCA) method and using predetermined environmental indicators.

As an example, Eco-Leaf is an environmental label that has been used in Japan since June 2000 by the Management Association for Industry.

Fig. 47 Eco-Leaf

# 13 3R-Oriented Designs

In July 1994, the Industrial Structure Council developed the "Guidelines for Preparing Pre-Evaluation Manuals in Product Designing to Contribute to the Promotion of the Use of Recycled Resources" as a reference for manufacturers to prepare pre-evaluation manuals for the promotion of recycling of used products, use of reusable parts, reduction of waste and facilitation of waste disposal.

Industrial associations developed "product assessment guidelines" applicable to their products in accordance with the Council Guidelines. They conduct pre-evaluation and promote 3R-oriented design under their own guidelines.

Product assessment (pre-evaluation) originally meant that manufacturers, prior to production, investigate, estimate and evaluate the safety and resource/environmental impact of their products in the stages of production, distribution, use, discharge, and recycling/disposal, and amend their product designs and production methods as necessary, thereby reducing the resource/environmental impact.

### (1) Product assessment guidelines applied by industrial associations

Table 5 Establishment/Revision of Product Assessment Guidelines of Industrial Associations

| Name of association | Condition of product assessment guidelines | |
|---|---|---|
| Japan Automobile Manufacturers Association (http://www.jama.or.jp) | July 1994 | Guidelines for Pre-Evaluation in the Product Designing Stage for Promotion of Recycling established |
| | Dec. 2001 | Judgment Criteria Guidelines on Prevention of Generation of Used Products/Use of Recycled Resources or Parts established |
| Japan Bicycle Promotion Institute (http://www.jbpi.or.jp) | March 2002 | Product Assessment Manual Guidelines on Manufacturing of Bicycles revised (to include 3R programs and the statements on electric-assisted bicycles) |
| Association for Electric Home Appliances (http://www.aeha.or.jp) | Sept. 1998 | Designing Guidelines for Recycling of Television Sets established |
| | March 2001 | Product Assessment Manual: Electric Home Appliances revised (to include 3R programs) |
| Japan Office Institutional Furniture Association (http://www.joifa.or.jp) | April 2001 | Guidelines on Environmental Measures for Office Furniture revised (to include 3R programs) |
| | April 2001 | Product Assessment Manual: Metal Furniture established |
| | June 2002 | JOIFA Environmental Self-Action Plan revised |
| Japan Luminaires Association (http://www.jlassn.or.jp) | Sept. 2001 | Product Assessment Manual: Luminaires revised (to include 3R programs) |
| Japan Game Machine Association | July 2001 | Product Assessment Manual revised (to include 3R programs) |
| Japan Electric Game Machine Association (Nichidenkyo) (http://www.nichidenkyo.or.jp) | Aug. 2001 | Product Assessment Manual revised (to include 3R programs) |
| Japan Electronics and Information Technology Industries Association (http://www.jeita.or.jp) | Sept. 2000 | Environmental Designing Assessment Guidelines for Information Processing Devices revised (to include 3R programs) |
| Japan Business Machine and Information System Industries Association (http://www.jbmia.or.jp) | March 2000 | Research Report on the Guidelines for Preparing Product Assessment Manual (copiers, etc.) established (including 3R programs) |
| Japan Industrial Association of Gas and Kerosene Appliances (http://www.jgka.or.jp) Japan Gas Association (http://www.gas.or.jp/default.html) | March 2003 | Assessment Guidelines: Gas/Kerosene Appliances revised (to include 3R programs) |
| Japan Association of Kitchen & Bath(http://www.kitchen-bath.jp) Japan Reinforced Plastics Society, (Bath Tub Division) (http://www.jrps.or.jp) Japan Bath Unit Association | June 2003 | Product Assessment Manual: Bath Units revised. |
| Japan Association of Kitchen & Bath (http://www.kitchen-bath.jp) | April 2001 | Product Assessment Manual: Kitchen Components established (including 3R programs) |

| | | |
|---|---|---|
| Japan Electric Lamp Manufacturers Association (http://www.jelma.or.jp) | July. 2002 | Product Assessment Manual: Lamps and Stabilizers revised (including 3R programs) |
| Japan Vending Machine Manufacturers Association (http://www.jvma.or.jp) | March. 2001 | Product Assessment Manual: Vending Machines revised (to include 3R programs) |
| Japan Clock & Watch Association (http://www.jcwa.or.jp) | Nov. 2001 | Assessment Guidelines for Designing of Clock Packaging reviewed |
| Communication and Information Network Association of Japan (http://www.ciaj.or.jp) | Feb. 2004 | Product Environmental Assessment Guidelines for Cellular Phones/PHS revised |
| Aerosol Industory Assosiation of Japan (http://www.aiaj.or.jp) | Aug. 2002 | Design Guidelines for Easily Recyclable Aerosol Containers |

Note: Based on interviews with the industrial associations concerned
Source: Industrial Structure Council, September 8, 2003 (revised)

### (2) Examples of 3R-oriented designs

#### [1] Recycling-oriented materials

In order to promote recycling of resin materials used for auto parts, Company A unifies part materials while encouraging more frequent use of easily-recyclable thermoplastic resin including polypropylene resin.

Company B uses easily-recyclable materials for personal computers, such as magnesium-alloy cases and halogen-free plastics.

#### [2] Recycling-oriented designs and material indication

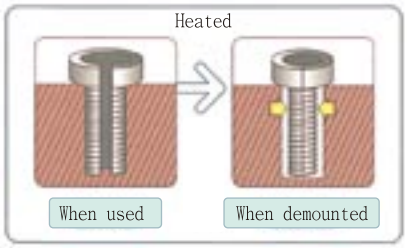
Company C designs office chairs that can easily be dismantled by using single materials and indicates as many materials as possible, thereby promoting the recycling of materials.

#### [3] Easily-demountable parts

Focusing on recycling, Company D has developed screws made of shape-memory alloy and resin, which can be demounted just by heating them. By using this technology, it is possible to remove screws from a product with less labor by heating them, thereby reducing the demounting time by half.

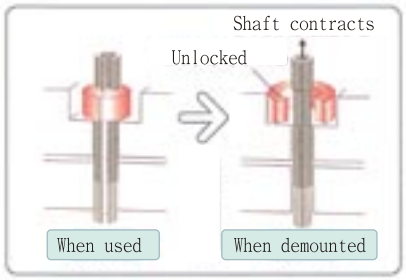
Fig. 50 Easily-Demountable Screws

Easily-demountable screw 1

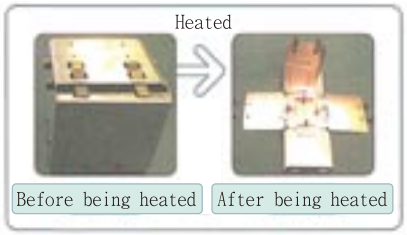



This pipe-like screw is made of shape-memory alloy and has a slit in it.
When heated, it contracts and its diameter decreases, becoming demountable.

- Easily-demountable screw 2




- Dismantling a cabinet that uses easily-demountable screws




By using screws that become demountable when heated, it is possible to dismantle a cabinet with little labor

# Ⅲ Present Situation of Recycling

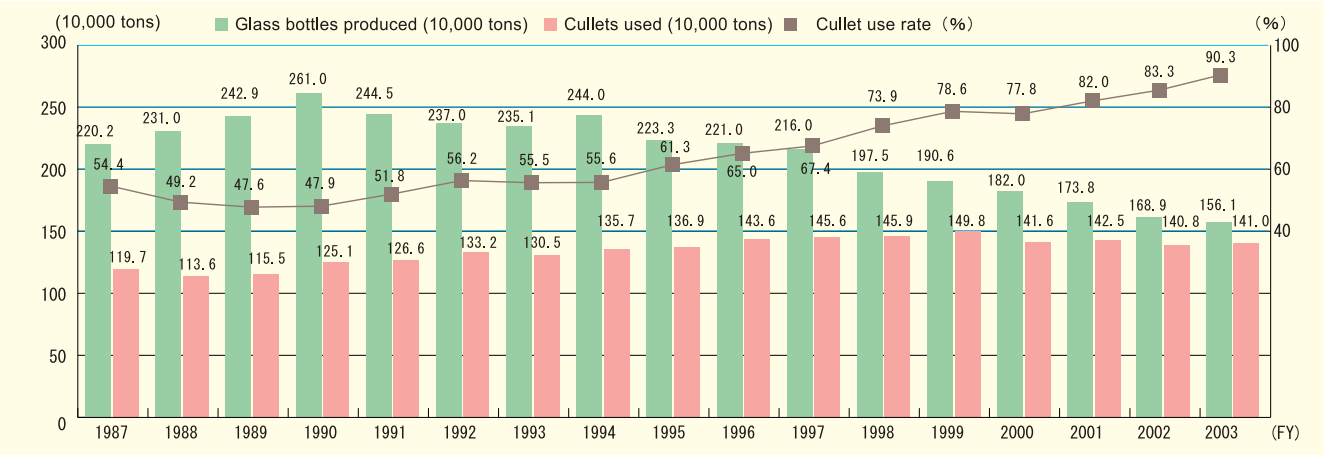
## 1 Glass Bottles

Glass Bottle Recycling Association (http://www.glass-recycle-as.gr.jp)

Glass bottles are recycled in two ways: by repeatedly using returnable bottles such as beer bottles, large-size bottles, and milk bottles, and by collecting one-way bottles, such as food/seasoning bottles, drink bottles, medicine/vitamin drink bottles, and reusing them as raw materials for glass bottles (cullets) (see Fig. 52).

The cullet use rate has been increasing every year since FY1990 and had already reached 90.3% by FY2003, exceeding the 85%-level that was expected to be achieved by FY2005 under the Law for Promotion of Effective Utilization of Resources (see Fig. 51). The amount of glass bottles selectively collected and recycled under the Containers and Packaging Recycling Law was 770,000 tons (FY2003).

Fig. 51 Amount of Glass Bottles Produced, Amount of Cullets Used and Cullet Use Rate



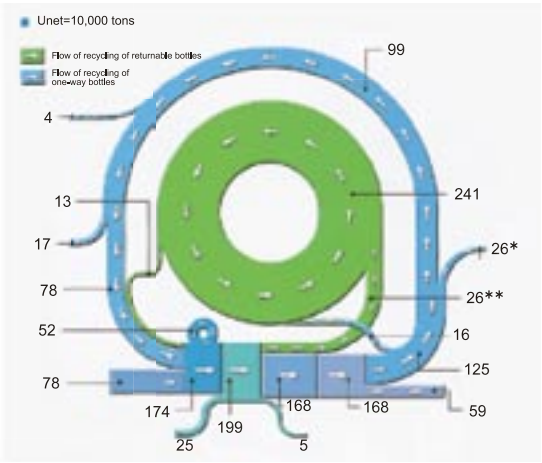

Note: Cullets are made by crushing glass bottles that are collected as recyclable waste and sorted by color.

$$\text{Cullet use rate} = \frac{\text{Amount of cullets used}}{\text{Amount of glass bottles produced}}$$

Amount of cullets used = amount of cullets used in plants + amount of cullets used in the community

Source: Japan Glass Bottle Association

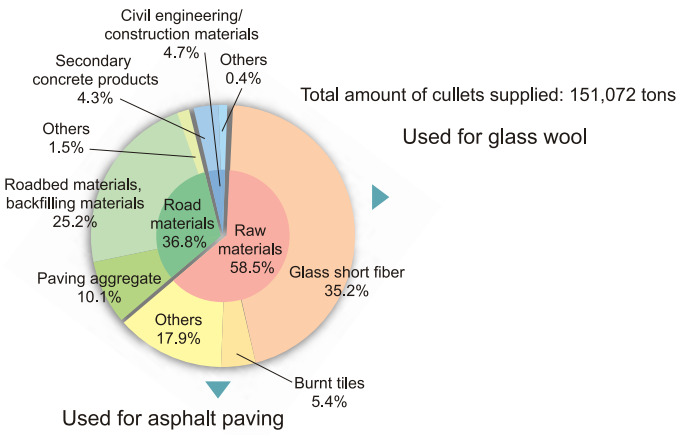
Fig. 52 Flow of Recycling of Glass Bottles (FY2001)




4: Amount of secondary waste, 13: Bottle cullets, 17: For other uses, 78: Bottle cullets, 52: Cullets from plants, 83: Raw materials, 174: Glass bottles produced, 25: Imports, 199: Products, 5: Exports, 168: One-way bottles, 59: Bottles uncollected, 125: Bottles collected, 16: Returnable bottles discharged, 26*: Primary waste, 26**: Returnable bottles, 241: Returnable bottles used, 73: Amount of returnable bottles, 99: Cullets collected from the community (source cullets) [77: Cullets collected from municipalities (34: Designated bodies, 43: Bodies other than those designated), 22: Cullets collected from businesses]

Source: Glass Bottle Recycling Association

Fig. 53 Ratio of Cullets Supplied for Other Uses (FY2003)




Source: Glass Bottle Recycling Association

## 2 Steel Cans

Japan Steel Can Recycling Association (http://www.rits.or.jp/steelcan/)

The weight of steel cans recycled in 2003 was about 800,000 tons and the recycling rate was 87.5%, exceeding the 85% level targeted in the Guidelines for Waste Treatment and Recycling by Product Categoly (see Fig. 54). Thus, recycling of steel cans is going smoothly, for the following reasons.

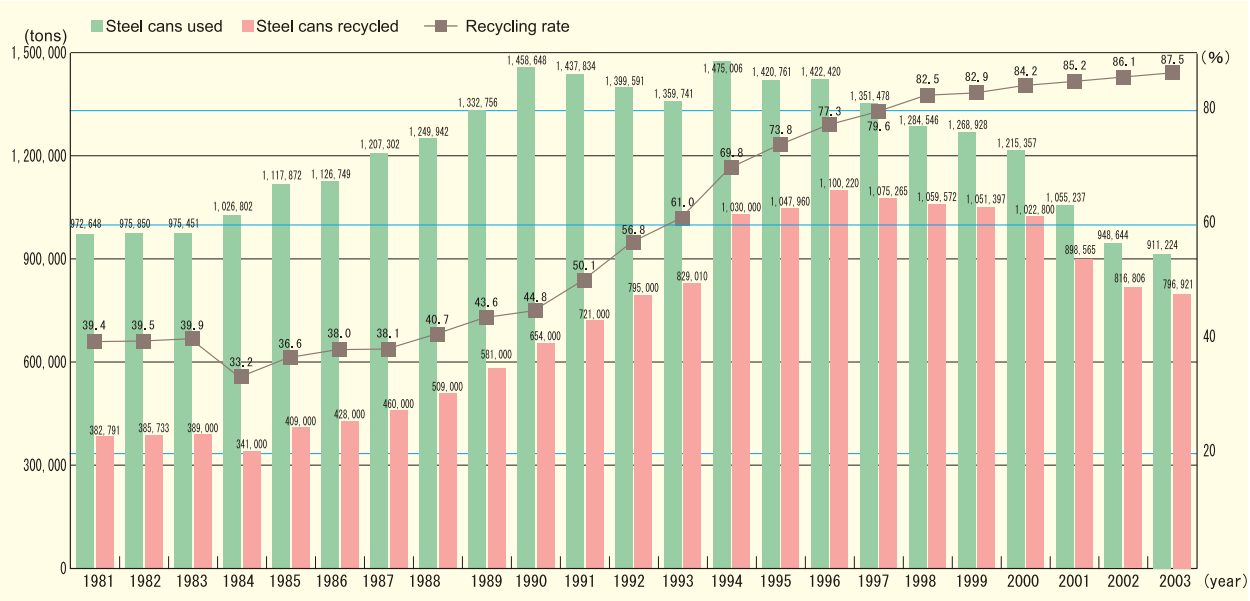
[1] With the understanding and cooperation of consumers, municipalities are making steady progress in reducing waste and promoting recycling.

[2] Since 1992, more recycling centers have been constructed and the amount of waste recycled has increased accordingly.

[3] The quality rating of scraps of steel cans separately collected has improved and more steel manufacturers have become willing to reuse such scraps.

The number of drink cans consumed in 2003 was 31 billion, of which 43% were steel cans. Steel cans are pressed into scraps and used as materials for electric and steel furnaces in iron-making plants. They are also used as materials for automobiles, home appliances, railroads, and ships as well as construction materials for buildings and bridges (see Fig. 55).

Fig. 54 Weight of Steels Cans Consumed, Weight of Cans Recycled and Recycling Rate



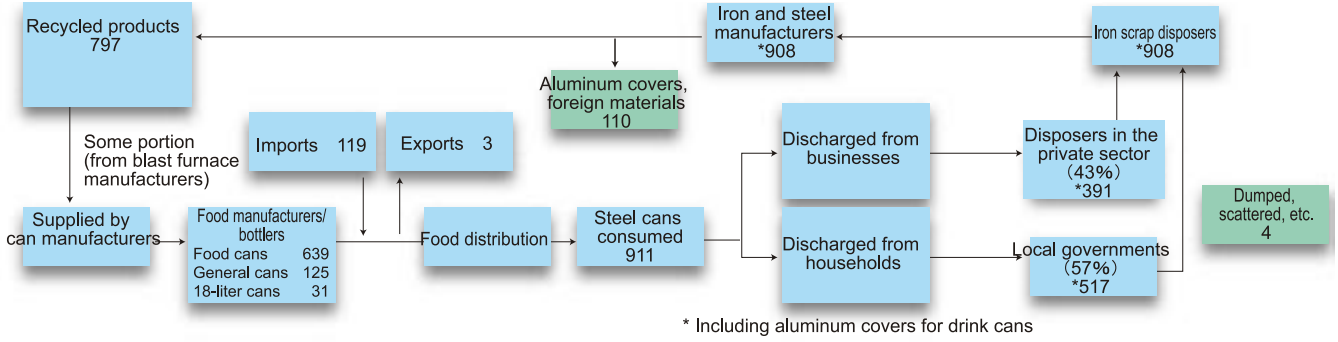

Notes: 1. Data up to 1998 are the amount of cans produced for the weight of cans consumed and the amount of can scraps used for the weight of cans collected.

2. Steel cans include food/drink cans, general cans, and 18-liter cans.

$$\text{Recycling rate} = \frac{\text{Weight of steel cans recycled}}{\text{Weight of steel cans consumed}}$$

Source: Japan Steel Can Recycling Association

Fig. 55 Flow of Recycling of Steel Cans (in 2003) (Unit: 1,000 tons)




Source: Japan Steel Can Recycling Association

# 3 Aluminum Cans

Japan Aluminum Can Recycling Association (http://www.alumi-can.or.jp)

The weight of aluminum cans consumed, the weight of cans recycled and the recycling rate have been increasing year by year (see Fig. 56) as the rate of canned beer and the rate of aluminum cans for drinks other than beer have been increasing. About 50% of the amount of drink cans consumed in 2001 were aluminum cans. The recycling rate of aluminum cans has been improving due to:

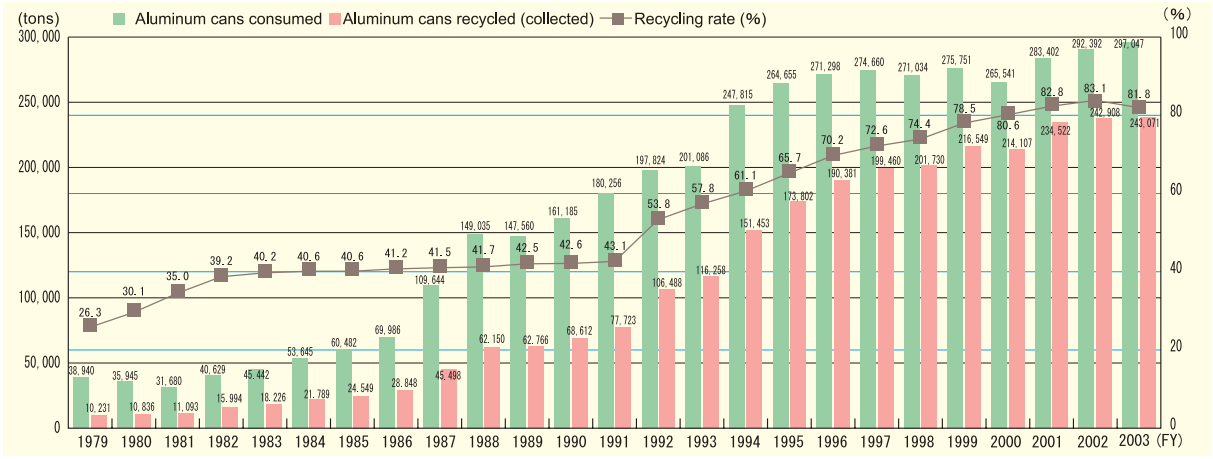
[1] the spread of sorted collection,

[2] the large number of users of recycled cans, and

[3] the ease of recycling aluminum cans.

In FY2003, the amount of aluminum cans recycled was 243,000 tons and the recycling rate was 81.8%, with businesses being asked for their cooperation and to conduce educational activities in order to achieve the 85% level set for by 2006 under the Guidelines for Waste Treatment and Recycling by Product Category. The weight of aluminum cans reused as materials was 155,000 tons and the can-to-can rate was 63.7%, exceeding the 55%-level that was expected to be achieved by 2006 under the Guidelines. Aluminum cans are also reused for automobile engine blocks, motor housings, deoxidizers for iron-making and materials for pots and frying pans (see Fig. 56 and 57).

**Fig. 56 Weight of Aluminum Cans Consumed, Weight of Cans Recycled (Collected), and Recycling Rate**

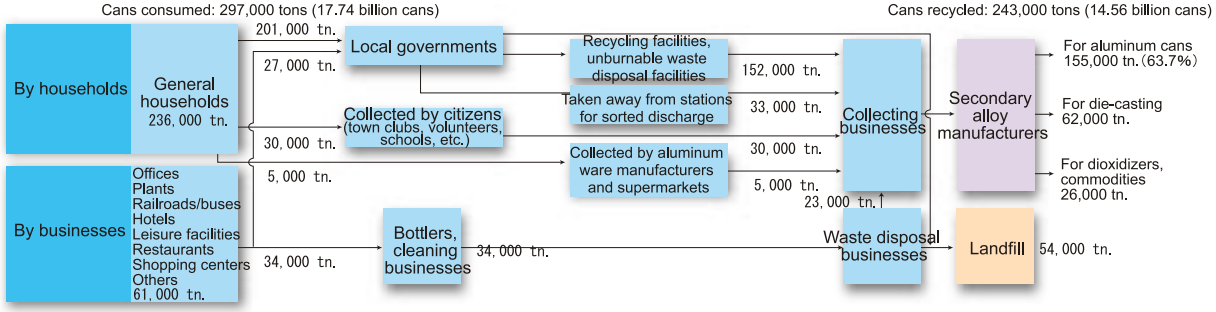



Note:

$$\text{Recycling rate} = \frac{\text{Weight of aluminum cans collected}}{\text{Weight of aluminum cans consumed}}$$

Source: Japan Aluminum Can Recycling Association

**Fig. 57 Flow of Recycling of Aluminum Cans (FY2003)**




Notes: 1. The total amount of aluminum cans recycled is based on the questionnaire survey targeting aluminum secondary alloy manufacturers, while the amount of cans recycled for each route is estimated by the Association.

2. The breakdown of the amount of aluminum cans recycled via local governments (152,000 tons) is as follows:

- Amount of products recycled from cans separately collected by local governments: 129,000 tons (based on the announcement by the Ministry of Environment and the survey conducted by the Association)
- Amount of shreds collected from crushed unburnable waste: 4,000 tons (based on the Association's questionnaire survey targeting aluminum secondary alloy manufacturers)
- Amount of aluminum cans not suitable for sorted collection: 19,000 tons (based on the Association's estimate)

$$\text{Can-to-can rate} = \frac{\text{Weight of cans reused for cans}}{\text{Weight of cans recycled}}$$

Source: Japan Aluminum Can Recycling Association

## 4 PET Bottles

Council for PET Bottle Recycling (http://www.petbottle-rec.gr.jp)Japan Containers and Packaging Recycling Association (http://www.jcpra.or.jp)

PET bottles used for soft drinks, soy sauce and alcohol are to be labeled under the Law for Promotion of Effective Utilization of Resources (see page 18). The majority, 95%, of such PET bottles is used for soft drinks, 3% for soy sauce and 2% for alcohol. Some 33,000 tons of PET bottles were also produced for seasoning, cosmetics, and detergents (in 2002).

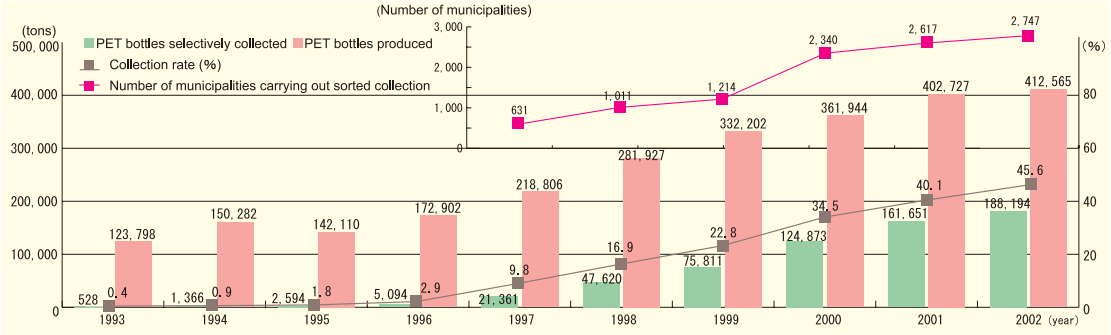
As for PET bottles that have been labeled since the Containers and Packaging Recycling Law was put into force in 1997, the amount of PET bottles produced, the amount of bottles separately collected and the collection rate have been increasing rapidly, as the amount of PET bottles produced for soft drinks increases and the number of municipalities carrying out sorted collection of PET bottles under the Containers and Packaging Recycling Law increases significantly (see Fig. 58).

The collection rate of PET bottles is 53.4% if the 32,000 tons recycled from businesses, which has been confirmed by the Council for PET Bottle Recycling, is added.

Through sorted collection of PET bottles, carried out by municipalities via the designated body under the Containers and Packaging Recycling Law (Japan Containers and Packaging Recycling Association: see Fig. 22), about 112,000 tons of resin was recycled (in FY2002), of which about 52% was used for carpets and other textile products, and about 41% as sheets for egg cartons (see Fig. 59 and 60). Retailers also recovered PET bottles independently (see Fig. 21).

Bottle-to-bottle recycling by chemical decomposition was actualized by 2003. The aim of this technology is to decompose used PET bottles into materials for PET resin such as monomers (dimethyl terephthalate or bishydroxyethyl terephthalate), and polymerize these materials again to make PET resin for PET bottles. It is an important method to improve the recycling of PET bottles.

**Fig. 58 Amount of PET Bottles Produced, Amount of Bottles Selectively Collected, Collection Rate, and Number of Municipalities Carrying Out Sorted Collection**




Notes: 1. The amount of bottles produced is based on data provided by the Council for PET Bottle Recycling.
2. The amount of bottles Separately collected and the number of municipalities carrying out sorted collection are based on data provided by the Ministry of Environment. (* The amount of bottles collected is the amount collected by municipalities.)
3. The amount of bottles produced and the amount of bottles Separately collected are only for bottles that are to be labeled under the law (bottles used for soft drinks, soy sauce and alcohol), excluding those used for seasoning, edible oil and detergents.

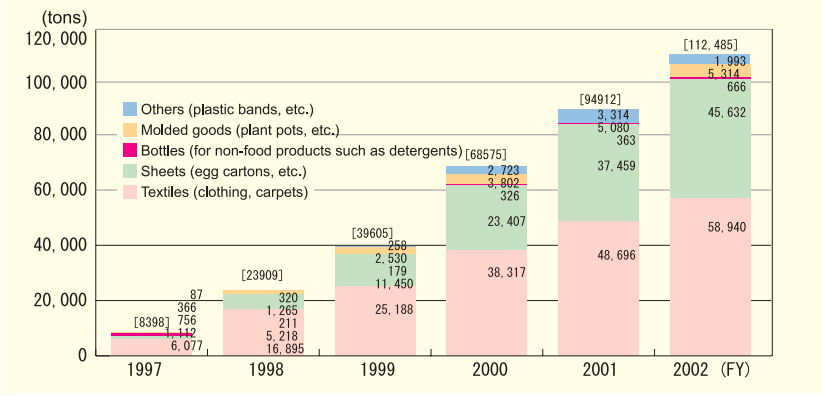
Source: Council for PET Bottle Recycling

$$\text{Collection rate} = \frac{\text{Amount selectively collected}}{\text{Amount produced}}$$

**Fig. 59 Products Recycled from PET Bottles**

Source: Council for PET Bottle Recycling

**Fig. 60 Amount and Use of Products Recycled from PET Bottles**




Source: Japan Containers and Packaging Recycling Association

# 5 Plastics

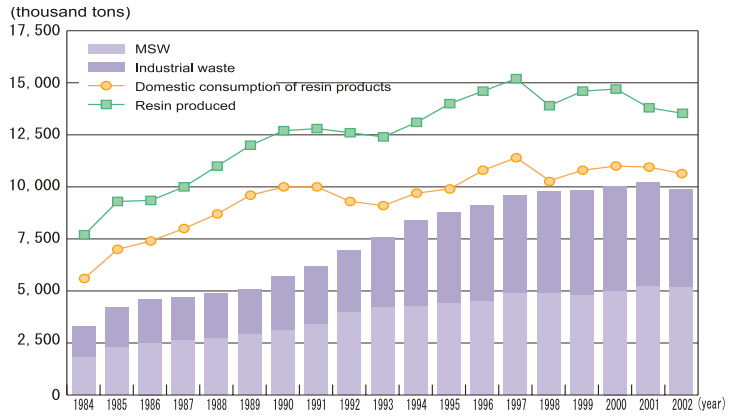
Plastic Waste Management Institute (http://www.pwmi.or.jp)

Some important points with respect to recycling of plastic waste are as follows.
[1] The effective use rate reached 55%.
[2] Due to the expansion of the Containers and Packaging Recycling Law and the improvement in municipalities' capacity to generate power from waste, the amount of plastics recycled has increased in terms of material, chemical and thermal recycling.
[3] Export of plastic scraps is increasing.

The amount of plastic waste generated in 2002 was 5.08 million tons as MSW and 4.82 million tons as industrial waste. Of the 5.42 million tons of plastic waste used effectively, 1.52 million tons were used as raw materials (material recycling), 250,000 tons were used for liquefaction, gasification or blast furnacing (chemical recycling), the majority of both (1.77 million tons) being recycled under the Containers and Packaging Recycling Law; 320,000 tons were used as refuse-derived fuel (RDF), including raw material/fuel for cement (thermal recycling); 2.05 million tons were incinerated for power generation from waste (thermal recycling), and 1.27 million tons were incinerated for heat application (thermal recycling). Of the 1.52 million tons used as plastic materials, 690,000 tons were contained in finished products (the remaining 830,000 tons were production/processing waste), the majority of which was used in PET bottles (220,000 tons), followed by polyethylene foam including trays (85,000 tons) and PVC tubes/connections (17,000 tons). Meanwhile, the amount of plastic scraps exported in 2002 was 390,000 tons, up 90,000 tons from the previous year, which indicates that the international recycling system is being established, with China taking a leading role.

Active movements toward waste reduction and reuse can also be seen in the plastic industry. Resin manufacturers and processing businesses are making concerted efforts for technological development, such as thinning PET bottles and shopping bags and unifying the grades for materials of car bumpers.

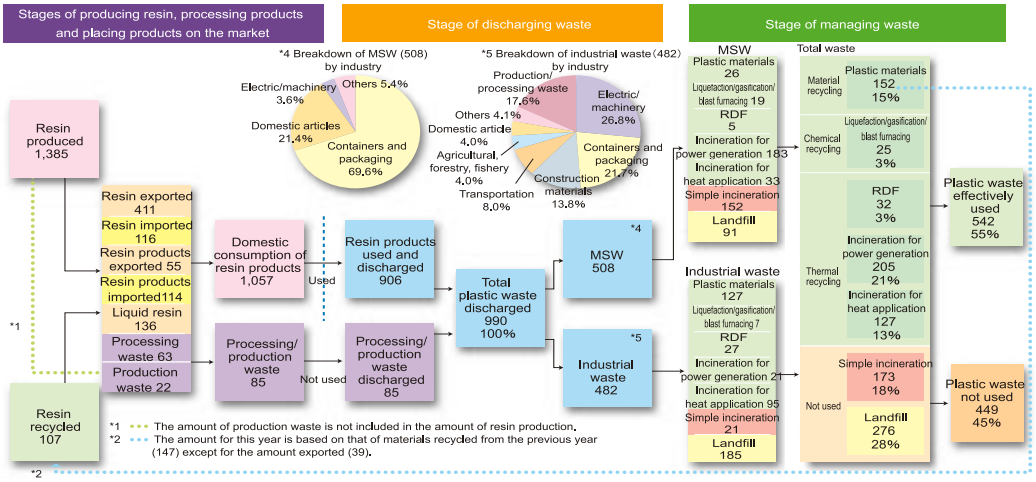
**Fig. 61 Amount of Plastics Produced and Discharged**




Notes: 1. The estimation method was changed in 1994: the amount of production/processing waste has been included in the total amount since then.
2. Domestic consumption of resin products = amount of resin produced - amount of resin exported + amount of resin imported - amount of liquid resin - amount of processing waste + amount of recycled resin input - amount of resin products exported and amount of resin products imported

Source: Plastic Waste Management Institute

**Fig. 62 Flow of Recycling of Plastic Waste (2002) (Unit: 10,000 tons)**




Note: The aggregate total may not correspond to the total amount because figures for individual amounts are rounded off.

Source: Plastic Waste Management Institute

## 6 Styrofoam

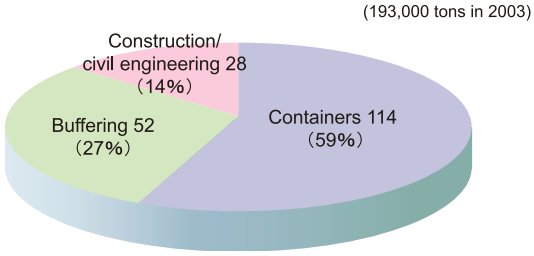
Japan Expanded Polystyrene Recycling Association (http://www.jepsra.gr.jp)

Styrofoam in a broad sense is divided into three types, according to the manufacturing method: expanded polystyrene (EPS) or styrofoam in a narrow sense; polystyrene paper (PSP); and extruded polystyrene (XPS). These three types of styrofoam are used and treated in final disposal differently.

(1) EPS: It is used for containers for agricultural or fishery products or buffer packaging for home appliances and OA equipment, and generally discharged from businesses. The amount of EPS supply decreased slightly from about 240,000 tons in 1991 to about 200,000 tons in 2002. The amount of domestic distribution has been about 170,000 to 180,000 tons (see Fig. 64), of which 57% is used for containers for fresh fish or vegetables/fruit, 29% for buffering, and the rest for construction/civil engineering (see Fig. 63).

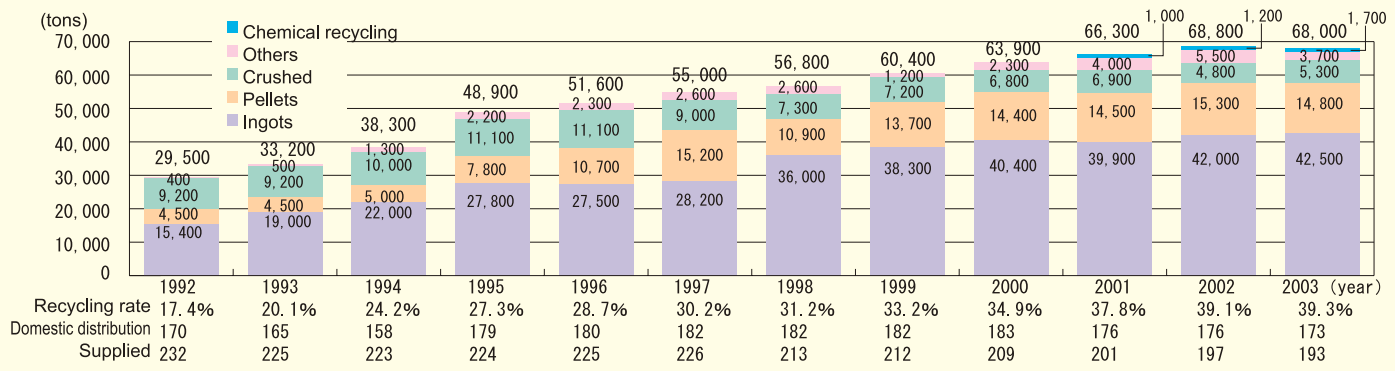
EPS waste is collected through wholesale markets, and large home appliance stores and supermarkets or by businesses engaging in intermediary treatment of industrial waste. The amount of EPS collected and recycled has been increasing year by year, reaching 68,000 tons (material recycling) with the material recycling rate at 39.3% in 2003. Collected EPS waste is recycled as ingots (about 80% is exported), reused as packaging, videocassettes or synthetic wood after being palletized, or used as mortar additives after crushing. Thermal recycling such as incineration for power generation was carried out for 25.6% of domestic distribution (2002). Chemical recycling, such as reduction in blast furnacing, liquefaction or gasification, also started in 2001 (see Fig. 64).

**Fig. 63 Amount of EPS Supplied, by use (thousand tons/year)**




Source: Japan Expanded Polystyrene Recycling Association

**Fig. 64 Amount of EPS Recycled and Recycling Rate (Unit: thousand tons)**




Note:

$$\text{Material recycling rate} = \frac{\text{Amount recycled}}{\text{Domestic distribution}}$$

Source: Japan Expanded Polystyrene Recycling Association

(2) PSP: It is used for many kinds of food containers such as trays, noodle cups, *natto* containers, and packed-meal cases. The amount of PSP food containers produced annually is about 140,000 tons, accounting for about 0.3% of domestic waste. Some food containers are made of resin other than PSP. By estimate, the total amount of food containers accounts for about 7% of the domestic consumption of resin products (about 11 million tons) (see Fig. 62).

PSP food containers are mainly discharged from households and separately collected by municipalities as one of the commodities to be regulated under the Containers and Packaging Recycling Law. Food trays, a typical example of PSP food containers, are collected by the industries concerned or by individual tray manufacturers at supermarkets or packaging stores in cooperation with such stores (self-collection system; see Fig. 21). The rate of self-collected PSP trays exceeds 19% of the amount of production. (Source: Japan Polystyrene Foamed Sheet Industry Association)

(3) XSP: It is used as heat-insulating construction materials and discharged by construction operations

# 7 Paper

Paper Recycling Promotion Center (http://www.prpc.or.jp)

Since the Industrial Structure Council formulated the Action Plan for Promotion of Paper Recycling in January 2001, the parties concerned have been promoting paper recycling.

**Outline of the Action Plan for Promotion of Paper Recycling**

- Paper manufacturing businesses shall promote paper recycling with the aim of achieving the self-imposed goal to increase the paper-recycling rate to 60% by FY2005.
- Paper-using businesses shall collect and provide information necessary to develop easily recyclable paper products and to promote the use of recycled paper.
- The Paper Recycling Promotion Center shall increase awareness and provide information concerning paper recycling among consumers, businesses and local governments.
- The national government and the Paper Recycling Promotion Center shall promote recycling of paper containers/packaging and use of recycled paper for other products.

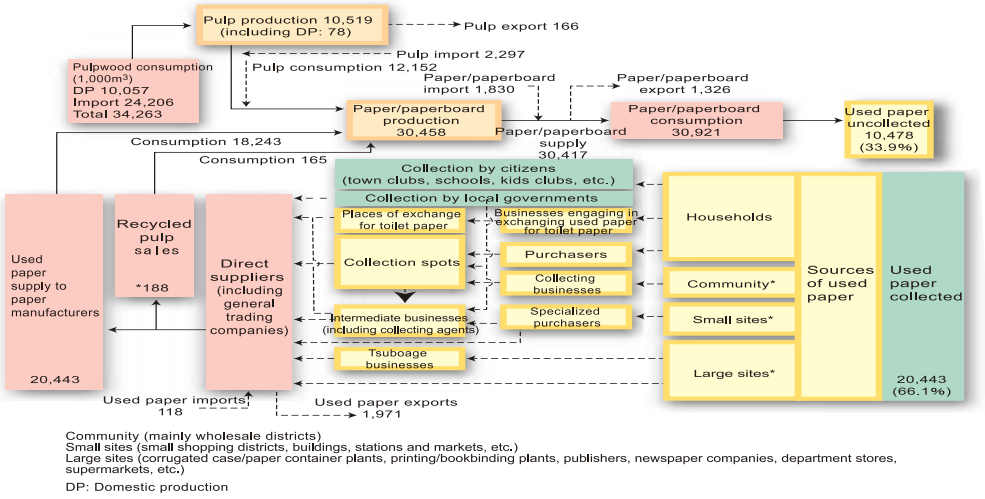
In 2003, the production of paper/paperboard reached 30.46 million tons, the majority of which is consumed domestically (see Fig. 65).

Used paper discharged from households is collected by citizens or at collection spots or places of exchange for toilet paper. Used paper discharged from industries is collected by *tsuboage* businesses (engaged in collecting mainly industrial waste) or specialized purchasers. In 2003, 20.44 million tons of used paper was collected and about 18.24 million tons of recycled paper was consumed (see Fig. 66). Both the paper collection rate and the paper recycling rate (rate of used paper to the total paper-making raw materials) have been increasing year by year, reaching 66.1% and 60.2% in 2003 respectively (see Fig. 67).

Under the Containers and Packaging Recycling Law, 49,723 tons of used paper containers were separately collected by municipalities (see Fig. 22) and 44,675 tons were recycled in 2001 (Source: Ministry of Environment).

Recycled paper is used for many kinds of paper products such as toilet paper and telephone books. About 80% of the total amount of recycled paper is used for corrugated cases, newspapers, and magazines. Slightly less than 1% of the total recycled paper is also used as trays for eggs or vegetables/fruit and heat-insulating construction materials.

**Fig. 66 Generation and Distribution of Recycled Paper (2003: thousand tons/%)**

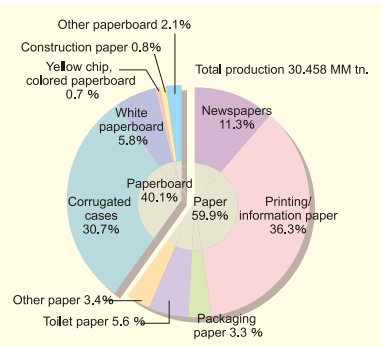



Community (mainly wholesale districts)
Small sites (small shopping districts, buildings, stations and markets, etc.)
Large sites (corrugated case/paper container plants, printing/bookbinding plants, publishers, newspaper companies, department stores, supermarkets, etc.)
DP: Domestic production

Note: Figure with * is estimated on the condition that 80% of used paper was recycled as pulp.

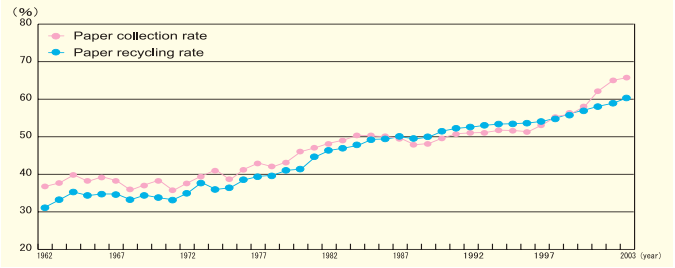
Source: Paper Recycling Promotion Center , *Annual Report of Statistics on Paper/Pulp; Japanese Trade Monthly Sheet*

**Fig. 65 Paper production by type of paper (2003)**




Source: Annual Report of Statistics on Paper/Pulp

**Fig. 67 Paper Collection Rate and Paper Recycling Rate**




Note:

$$\text{Paper collection rate} = \frac{\text{Recycled paper consumption + Rrecycled pulp consumption}}{\text{Total consumption of textile materials (pulp + recycled paper + recycled pulp + others)}}$$

$$\text{Paper recycling rate} = \frac{\text{Amount of used paper collected domestically (delivery to manufacturers* + export - import)}}{\text{Amount of paper/paperboard consumed domestically (supply from manufacturers* - export + import)}}$$

Delivery to manufacturers* includes the amount of recycled pulp delivered (converted into recycled paper).

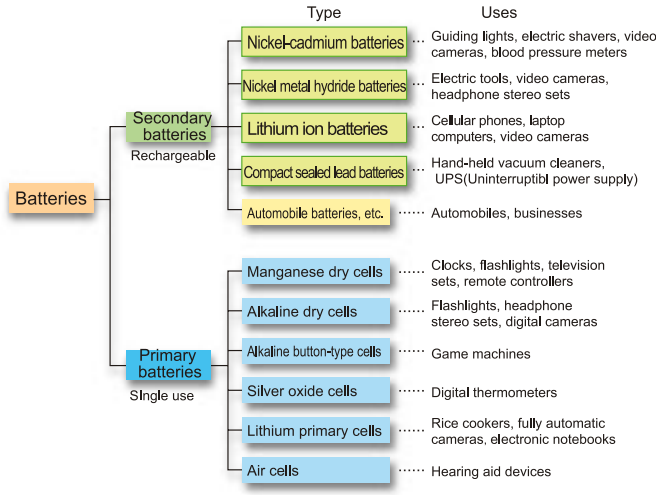
Source: Annual Report of Statistics on Paper/Pulp

# 8 Compact Rechargeable Batteries

Japan Battery Recycling Center (http://www.jbrc.com)

There are many types of batteries/cells, as shown in Fig. 68.

**Fig. 68 Types of Batteries/Cells**



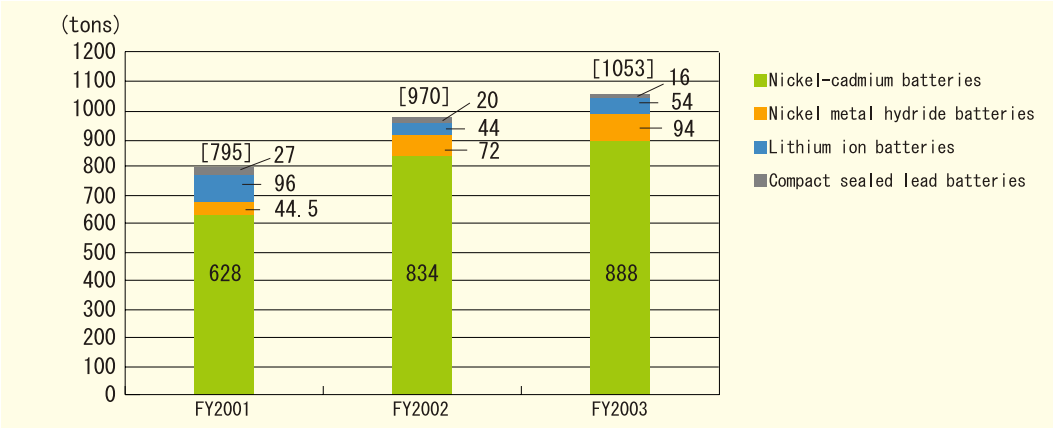

Among these types of batteries/cells, the Law for Promotion of Effective Utilization of Resources stipulates that compact rechargeable batteries (nickel-cadmium batteries, nickel metal hydride batteries, lithium ion batteries, and compact sealed lead batteries) shall be collected and recycled by manufacturers of compact rechargeable batteries, and collected by manufacturers of equipment that uses such batteries (29 items; see page 18). Collection and recycling of compact rechargeable batteries is carried out by the Japan Portable Rechargeable Battery Recycling Center (JBRC), which consists of manufacturers of compact rechargeable batteries and manufacturers of equipment that uses such batteries. Compact rechargeable batteries are collected from cooperative shops such as electric appliance home improvement retailers and bicycle shops, and registered businesses engaging in electric works and building maintenance, municipalities, and schools, and then converted by recycling contractors into nickel, cadmium, cobalt, lead, and iron. The amount of compact rechargeable batteries collected has been increasing year by year, and in FY2003, 1,052 tons of such batteries were collected from 37,900 collection spots (see Fig. 69). The recycling rate differs among types of compact rechargeable batteries, ranging from 51% to 78% (FY2003). JBRC collects nickel-cadmium batteries, nickel-metal hydride batteries, lithium ion batteries, and four home-use items (cellular phones, handphone stereo sets, video cameras and hand-held vacuum cleaners).

**Fig. 69 Collection of Compact Rechargeable Batteries**
**Put compact rechargeable batteries into the "Recycling Box" located at cooperating shops.**

Please put used compact rechargeable batteries into the recycling boxes located at shops that are members of the Rechargeable Battery Recycling Club. You can search for these collection spots on the JBRC Website.(http://www.jbrc.com).

Source: Japan Portable Rechargeable Battery Recycling Center

**Fig. 70 Amount of Compact Rechargeable Batteries Collected**




Source: Japan Portable Rechargeable Battery Recycling Center

# 9 Vehicles

Japan Automobile Manufacturers Association (http://www.jama.or.jp)

In 2002, the number of vehicles owned was 73.99 million while the number of disused vehicles has remained almost unchanged in the past decade at around 4 million a year (see Fig. 71). The recycling system for end-of-life vehicles has already been established in the form of infrastructure for collecting iron scraps. In this system, the collection rate is nearly 100% and the recycling rate has reached 80% (see Fig. 72). In May 1997, the Ministry of International Trade and Industry (the current Ministry of Economy, Trade and Industry) published the End-of-Life Vehicle Recycling Initiative, which set specific numerical targets such as improving the recycling rate for end-of-life vehicles to 95% or over by 2025 and reducing the amount of end-of-life vehicles dumped into landfill to 1/5 of the amount in 1996.

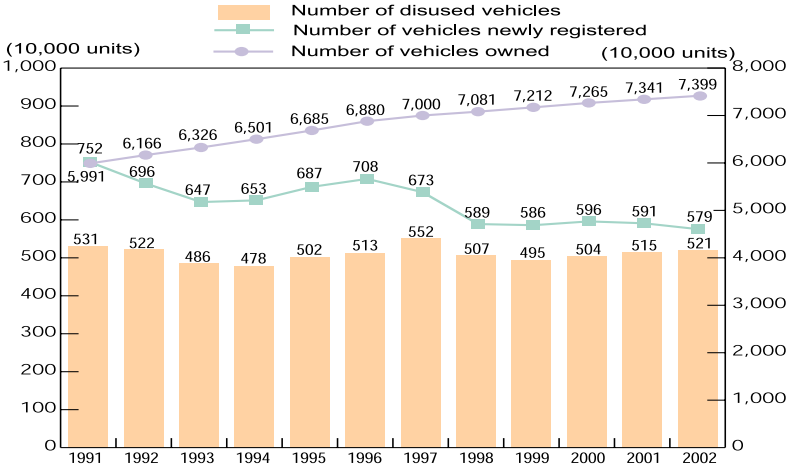
Shredder dust generated from end-of-life vehicles (waste remaining after shredding dismantled ELVs) was mainly used as landfill. But the shortage of final waste disposal facilities means we need to decrease the quantity of shredder dust used as landfill. Furthermore, fees are needed when car owners dispose of cars because of the rising landfill fee and changes in the fee for iron scraps. Under these circumstances,the recycling system of ELVs is in disarray,and there is concern about illegal disposal. It contributes to global warming when car air conditioners and CFCs are not treated properly. Airbags are an obstacle in car dismantling and need professional treatment.

In view of these circumstances,the End-of-life Vehicle Recycling Law will be enacted.

Preparations are underway for a smooth start to the Law in January 2005 by car manufacturers and related businesses.

As the Law for Promotion of Effective Utilization of Resources includes automobiles in the specified resource-saving products and the specified reuse-promoting products, the automobile industry works on the recycling of resin parts, development of recycling technology in consideration of the discarding stage, development of new materials and car structures that will contribute to recycling, and implementation of material marking.

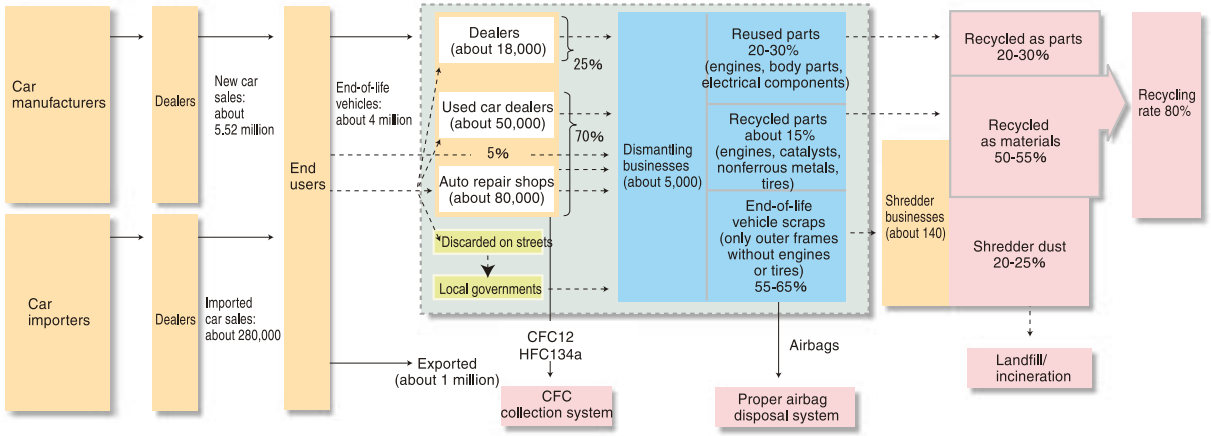
Fig. 71 Number of Disused Vehicles




Note: Number of disused vehicles = number of vehicles owned in the previous year + number of vehicles newly registered in the present year - number of vehicles owned in the present year

Source: Japan Automobile Manufacturers Association

Fig. 72 Flow of Recycling of End-of-Life Vehicles and the Current Recycling Rate




Note: The same business may operate as a dealer, used car dealer, or auto repair shop.

$$\text{End-of-life vehicle recycling rate} = \frac{\text{Weight of vehicles supplied for recycling}}{\text{Weight of vehicles collected}}$$

Source: Ministry of Economy, Trade and Industry

## 10 Bicycles

Japan Bicycle Promotion Institute (http://www.jbpi.or.jp)

The domestic shipment of bicycles has been increasing year by year, reaching 11.22 million units (2.52 millions produced + 8.70 millions imported) in 2003 (see Fig. 73).

Bicycles are largely divided into general bicycles, infant bicycles, and bicycles equipped with a driver assistance device (electric-assisted bicycles). Electric-assisted bicycles that use sealed batteries (compact rechargeable batteries) are specified as reuse-promoted products (see page 18) and are designated as products containing specified resource-recycling parts (see page 19) under the Law for Promotion of Effective Utilization of Resources.

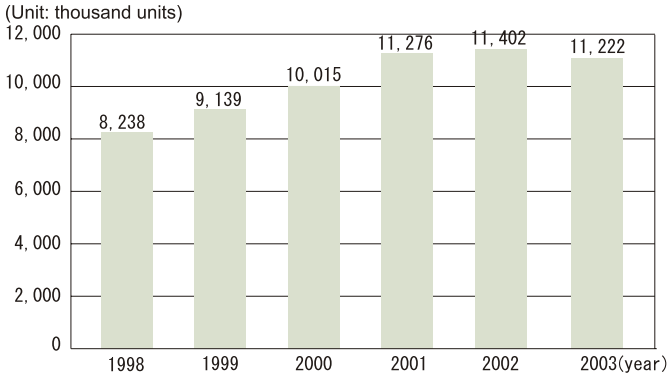
In March 2002, the bicycle industry established the policy for product assessment in the process of designing and manufacturing recycling-oriented products, with the aim of implementing the 3Rs under the Law for Promotion of Effective Utilization of Resources and the Guidelines for Waste Treatment and Recycling by Commodity, thereby promoting 3R programs in accordance with their own guidelines.

Currently, disused bicycles are collected and handled by local governments and bicycles shops. By estimate, the bicycle recycling rate was about 78%, according to a survey in 2003 (see Fig. 74).

In an experiment of recycling 100 units of disused bicycles at an intermediate treatment business, these bicycles were converted into metal materials (85%), nonferrous metals (2.1%), and shredder dust (12.9%), which revealed that 87.1% was recyclable. Metal materials, which are sorted as valuable materials, are dissolved at electric furnace manufacturers and converted into steel bars or reinforcing bars for reinforced concrete buildings, while nonferrous metals are recycled as aluminum alloy materials (dioxidizers), aluminum materials (aluminum cans), and stainless steel materials (kitchen sink). Shredder dust is dumped into controlled final disposal facilities.

Using basic data obtained from this experiment, the bicycle industry has set the rate of recyclable materials to the total weight of product as the recyclable rate (67%).

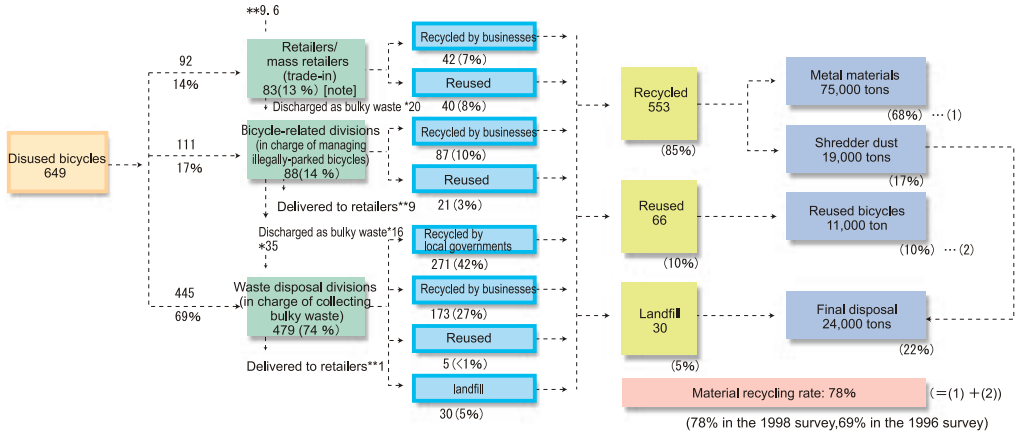
### Fig. 73 Domestic Shipment of Bicycles




Notes: 1. Domestic supply = sales - exports + imports - return of exports. However, as the majority of exports are used bicycles, the calculation method was changed in 2001 to: domestic supply = production + imports.
2. Data is based on the machinery statistics provided by the Ministry of Economy, Trade and Industry, the trade statistics provided by the Ministry of Finance, and the statistics provided by the Japan Bicycle Promotion Institute.

Source: Japan Bicycle Promotion Institute

### Fig. 74 Flow of Collection and Disposal of Disused Bicycles (2003) (Unit: 10,000 units; tons)




Note: The aggregate total may not correspond to the total amount because figures for individual amounts are rounded off.

Source: Japan Bicycle Promotion Institute

# 11 Personal Computers

Japan Electronics and Information Technology Industries Association (http://www.jbpi.or.jp [TOP]) (http://www.pc3r.jp [PC])

## [1] Amount of discharge

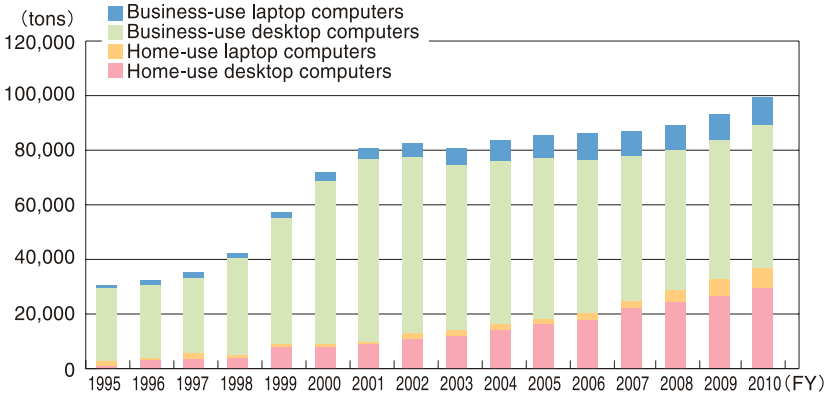
Along with the recent expansion of personal computers, the average period of use is 8.9 years for home-use computers, excluding those not used but stored (dead storage), and 5.8 years for business-use computers. By estimate based on this survey result, the amount of computers discharged in FY2002 was 705,000 tons for business use and 11,000 tons for home use, and the total amount was 815,000 tons. The total amount increased rapidly during the period from FY1997 to FY2001, and is expected to be a little over 800,000 tons for the next period (see Fig. 75). It is also expected to increase slightly due to the greats discharge of home-use computers.

## [2] Amount of collection

By estimate, among computers discharged from businesses, 7,000 tons are collected by manufacturers, 45,500 tons are returned to leasing/rental companies, 10,000 tons are directly delivered to final disposal businesses, and 8,000 tons are taken back by retailers/dealers. As for computers discharged from households, 7,500 tons are collected by local governments, and 3,500 tons are delivered to used computer dealers. Those not used but stored in households (dead storage) are not included in the flow of collection (see Fig. 76).

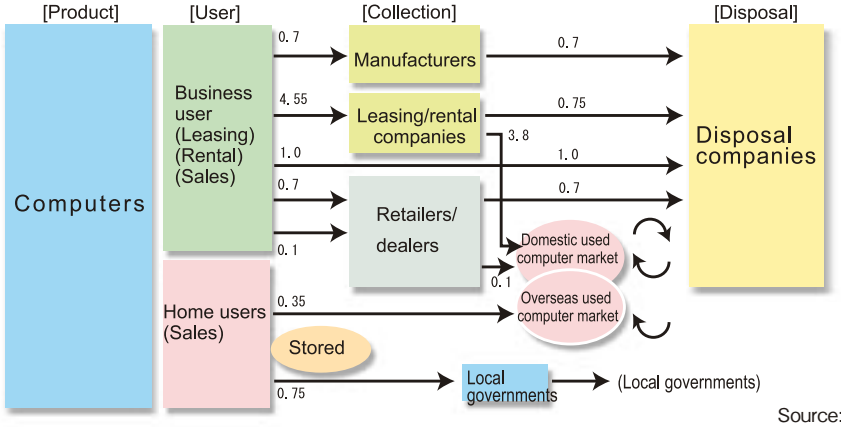
Since the Law for Promotion of Effective Utilization of Resources was put into force in April 2001, computer manufacturers have been required to design products that consider the 3Rs (reduce, reuse, and recycle), and are also obliged to collect and recycle disused computers for business use (see pages 17 and 19). Manufacturers have also been required to collect and recycle computers discharged from households since October 2003. Accordingly, computers sold on or after October 1, 2003, and discharged from households are, in principle, to be collected at designated collection spots, free of charge, and recycled. The number of computers collected from households reached a total of 79,800 in March 2004, since the manufacturers started to collect them in October 2003.

Fig. 75 Estimated Discharge of Disused Computers

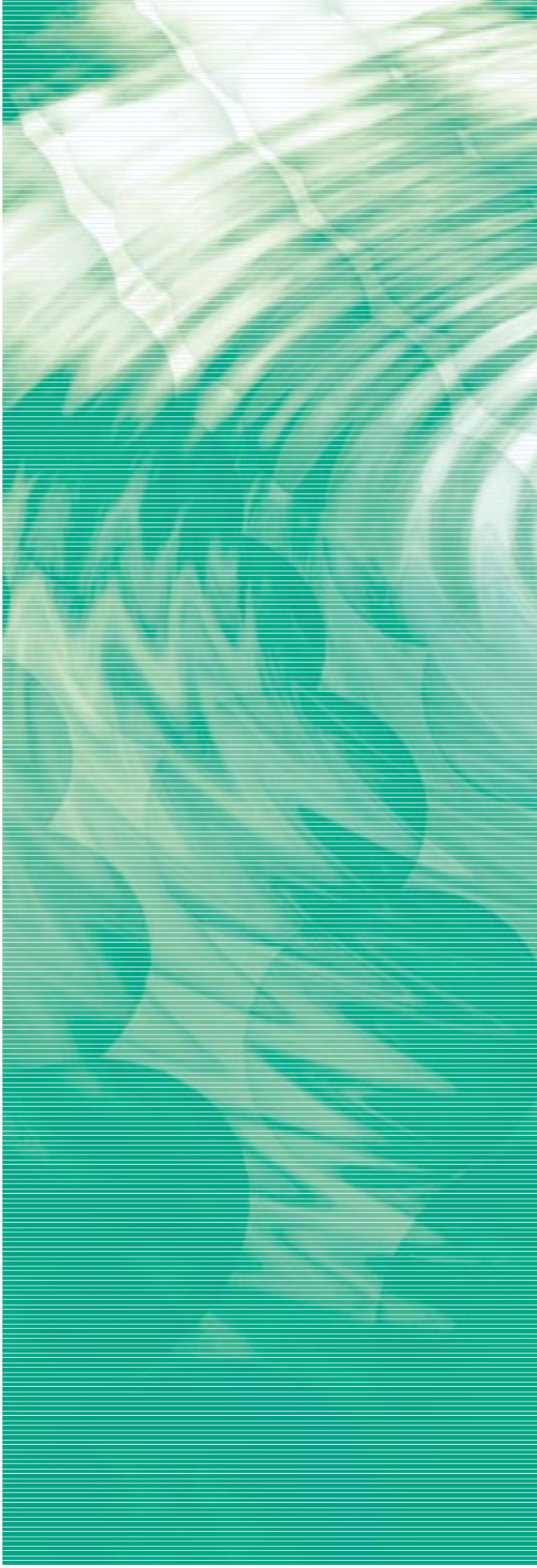



Source: Japan Electronics and Information Technology Industries Association

Fig. 76 Flow of Collection and Recycling of Disused Computers (2002) (Unit: 10,000 tons)




Source: Japan Electronics and Information Technology Industries Association



The 3R Logo
This is the logo created in 2003 by the Reduce, Reuse, Recycle Promotion Association to encourage active participation and cooperation in 3R activities.

Reduce Reuse Recycle

Design Concept: Making one step forward for people, the earth and the sky.
The Rs represent "reduce," "reuse" and "recycle." The three figures are taking one step forward, evoking a sense of progress. Orange represents people, green the earth, and blue the sky.

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Recycling Promotion Division
Industrial Science and Technology Policy and Environment Bureau
Ministry of Economy, Trade and Industry
1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8901, Japan
3r-info@meti.go.jp
http://www.meti.go.jp/policy/recycle/

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