

Handbook on Resource Recycling Legislation and 3R Trends in 2003

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 ton a year, and is currently facing various problems, such as a shortage of final disposal facilities and 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 both for the environment and economy, regarding 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 – Law for Promotion of Utilization of Recycled Resources in 1991; Containers and Packaging Recycling Law in 1995; Home Appliance Recycling Law in 1998; Basic Law for Promoting the Creation of a Recycling-Oriented 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 migrating environmental burden.

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

I. Creation of a Recycling-Oriented Society

1. Necessity for Creating a Recycling-Oriented Society

In the course of economic activities based on mass-production/consumption/disposal, Japan is facing various problems, such as a shortage of final waste disposal facilities and 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 tons of waste is produced every year, and the number of remaining sustainable years of waste disposal facilities is becoming stringent accordingly, 12.2 years for general waste and 3.9 years for industrial waste. Under these circumstances, it is necessary to promote measures concerning waste disposal and the 3Rs, including construction of waste disposal facilities and recycling facilities.

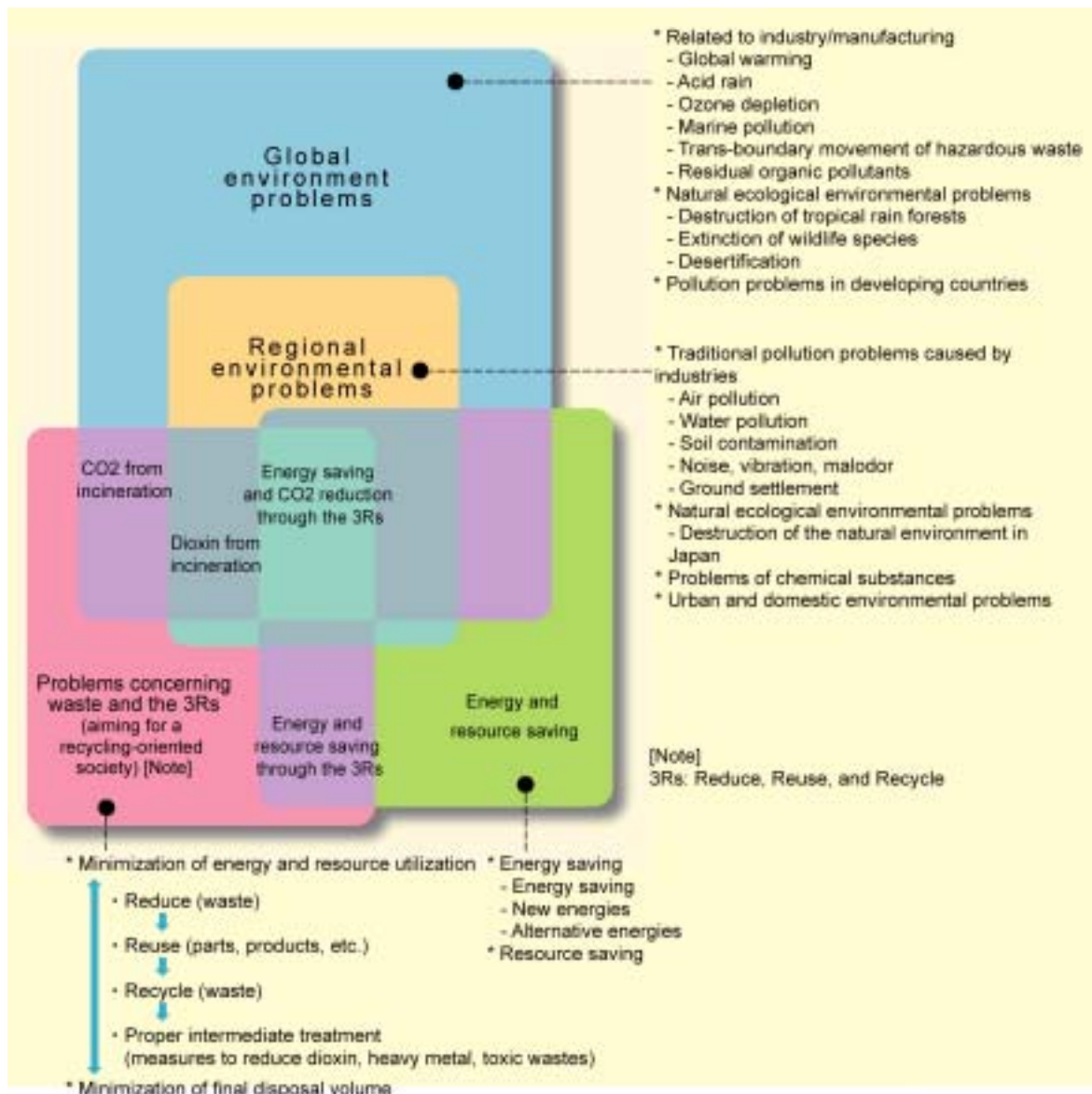
Furthermore, environmental problems have recently expanded, due to industrial pollution, to a global level, including long-term environmental effects of hazardous substances such as dioxin, PCB, and endocrine-disrupting chemicals, as well as global warming.

(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 2.04 billion tons of resources in total, consuming 350 million tons of energy and discharging 410 million tons of waste for producing 1.28 billion tons of products. Most of the 1.05 billion tons of resources accumulated in Japan, which are utilized as roads, bridges, and buildings, will be industrial waste in about 10 years. On the other hand, the amount of resources that were recycled and reused was about 270 million tons, only accounting for slightly over 10% of the total amount of resources utilized.

Fig. 1 Environmental Problems



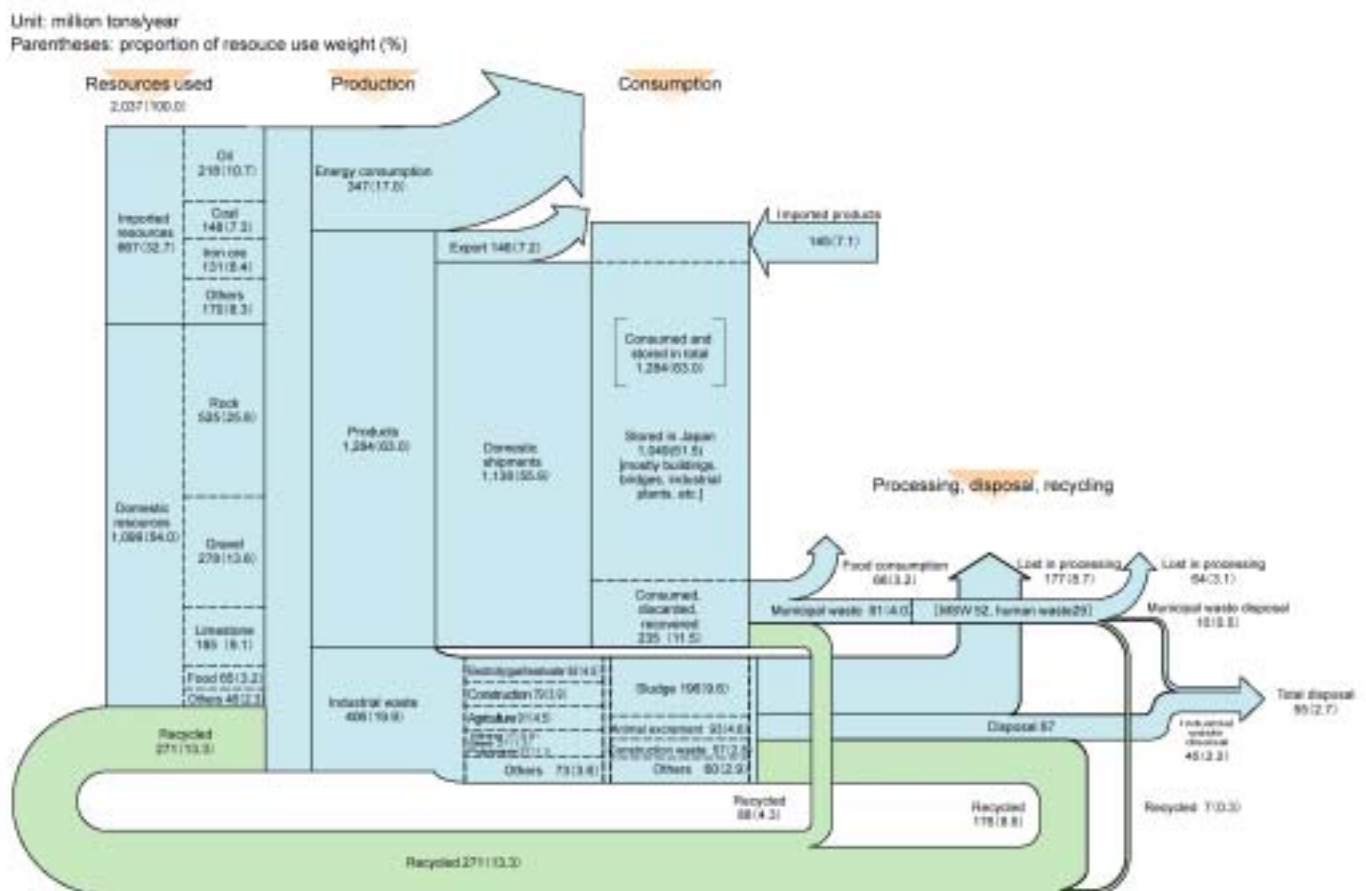
Source: Clean Japan Center (<http://www.cjc.or.jp>)

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. By estimate, the amount of those resources which are byproducts is about 1.09 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 against 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 both for the environment and the economy.

More specifically, for 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 recycling-oriented 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)” with effective use of the power of the private sector.

Fig. 2 Japan's Material Balance (FY 2000)



Source: Clean Japan Center

2. Present Situation of Waste in Japan

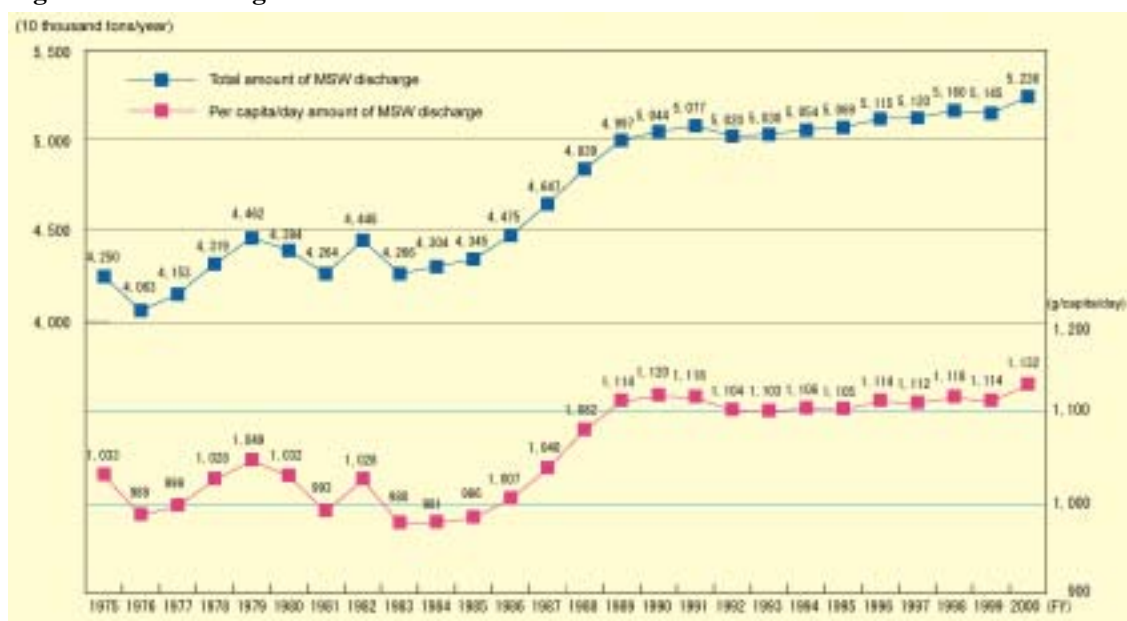
Municipal Solid Waste (MSW)

[1] Total amount of municipal solid waste discharged

The total amount of municipal solid waste discharged (MSW: wastes discharged from households) in FY 2000 was 52.36 million tons, accounting for 114 times as much as the volume of the Tokyo Dome Stadium (0.3 tons per m³), the per capita/day amount being 1,132g (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 FY2000. 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 been flat 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 in-house treated. 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 defined as being calculated by deducting the “amount of MSW in-house treated” from the “total amount of MSW discharged” and adding “the amount of recyclable waste recovered by citizen groups.”

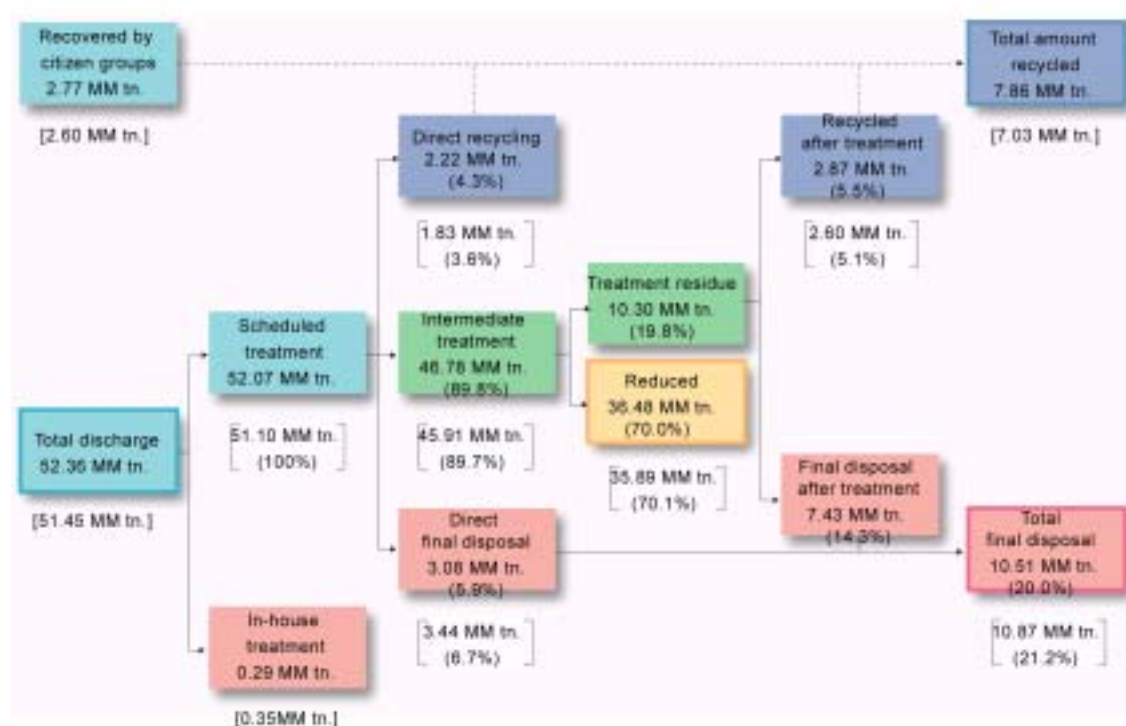
Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003 (revised)

[2] Waste treatment

In the total amount of MSW treated in FY 2000, 46.78 million tons went through intermediate treatments by municipalities such as incineration, comminution and selection, 2.22 million tons were directly delivered to recycling industries, collectively accounting for 94.1% of the total amount of MSW treated (rate of waste reduced in treatment). Out of 46.78 million tons of MSW delivered to intermediate treatment facilities, 2.87 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 7.86 million tons. 3.08 million tons of MSW were delivered to direct final disposal without going through intermediate treatment (direct landfill) and 36.48 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 during the period from FY1975 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 2000)

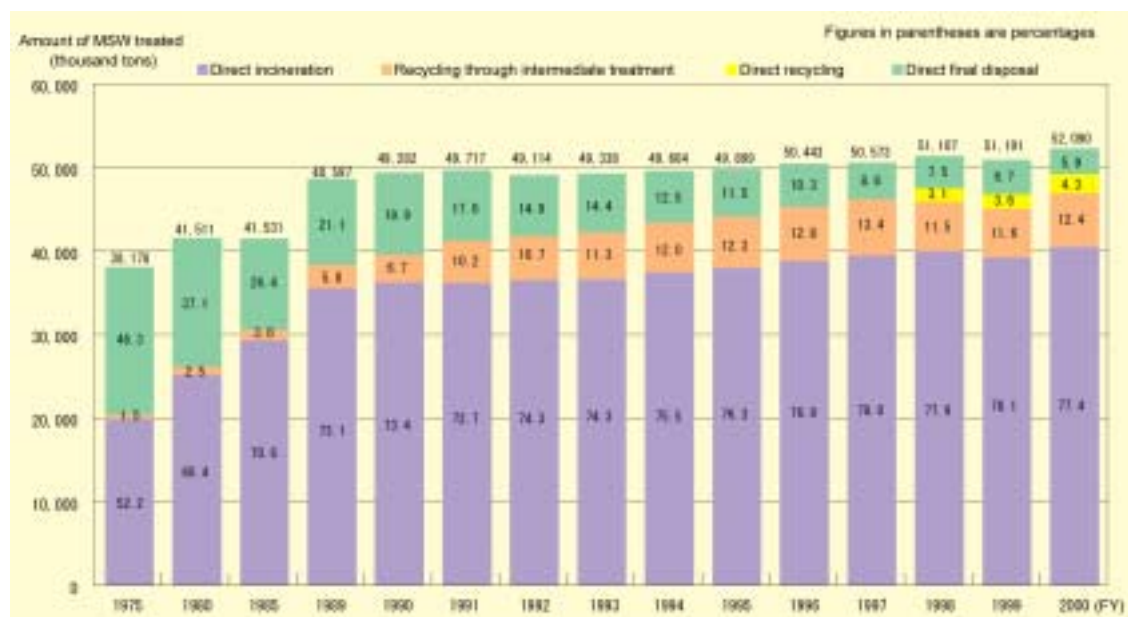


Note: 1. The total amount of MSW treated does not correspond to the “amount of scheduled treatment” due to errors in measurement.

2. Rate of waste reduced in treatment (%) = [(intermediate treatment) + (directly recycling)] / (total MSW treated) x 100

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003 (revised)

Fig. 5 Waste Treatment Methods



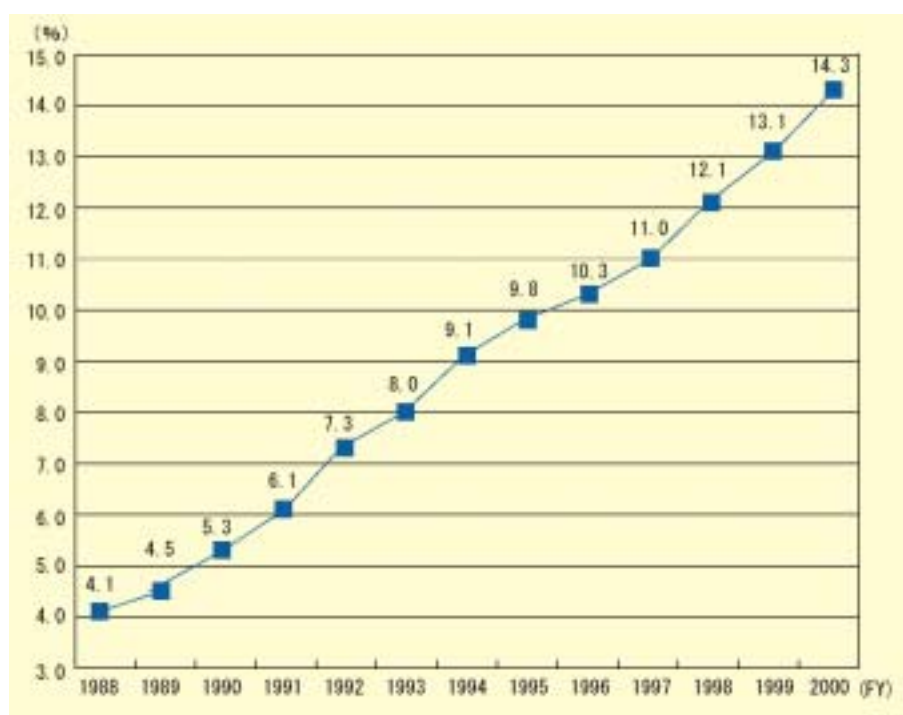
Note: 1. Direct recycling is a category introduced in 1998, which refers to the amount of MSW that is directly delivered to recycling industries without going through recycling facilities.
 2. Until FY1997, the amount of “direct recycling” was included in the amount of “recycling through intermediate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

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003 (revised)

[3] Recycling

In FY 2000, 2.22 million tons of MSW were separately collected and recycled by municipalities (directly recycled), 2.87 million tons were recycled through intermediate treatment, and 2.77 million tons, were collected by citizen groups for recycling. The total amount of MSW recycled, aggregating all of them, was 7.86 million tons (see Fig. 4). The recycling rate was 14.3%, about three times higher than FY1988. 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:

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

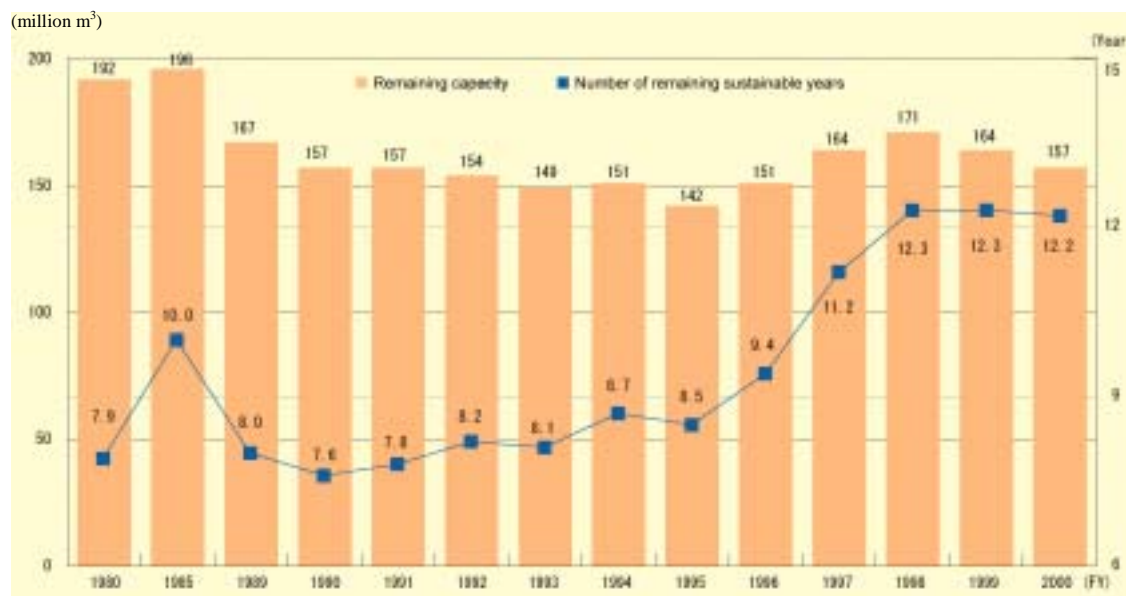
The amount of “MSW recycled after intermediate treatment” is the amount of iron, aluminum, etc. recovered and recycled through treatment of recyclable waste and bulky waste.

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003 (revised)

[4] Final disposal facilities

As of FY 2000, there were 2,077 final disposal facilities for MSW. The remaining capacity was 157.2 million m³ and the national estimated number of remaining sustainable years was 12.2 years. As the distribution of final disposal facilities 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 Facilities for MSW



Note:

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

(Weight of landfill waste = 0.8163)

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003 (revised)

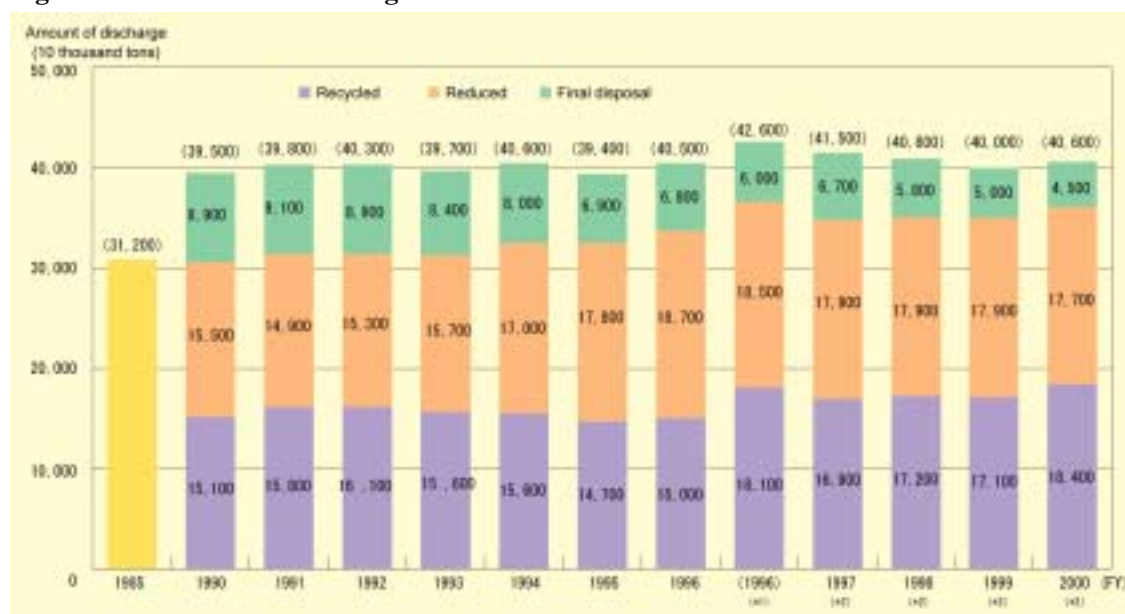
Industrial Waste

[1] Total amount of industrial waste discharged

The total amount of industrial waste discharged in Japan in FY 2000 was about 400 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, 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 2000 (45 million tons) and the remaining capacity of final disposal facilities as of April 2001, the national average number of remaining sustainable years of final disposal facilities is 3.9 years, which reveals that we are facing a severe situation.

Fig. 8 Industrial Waste Discharge



- Note:
1. The amount of discharge* 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** for FY 1997 and after is calculated under the same conditions as the previous amount*.

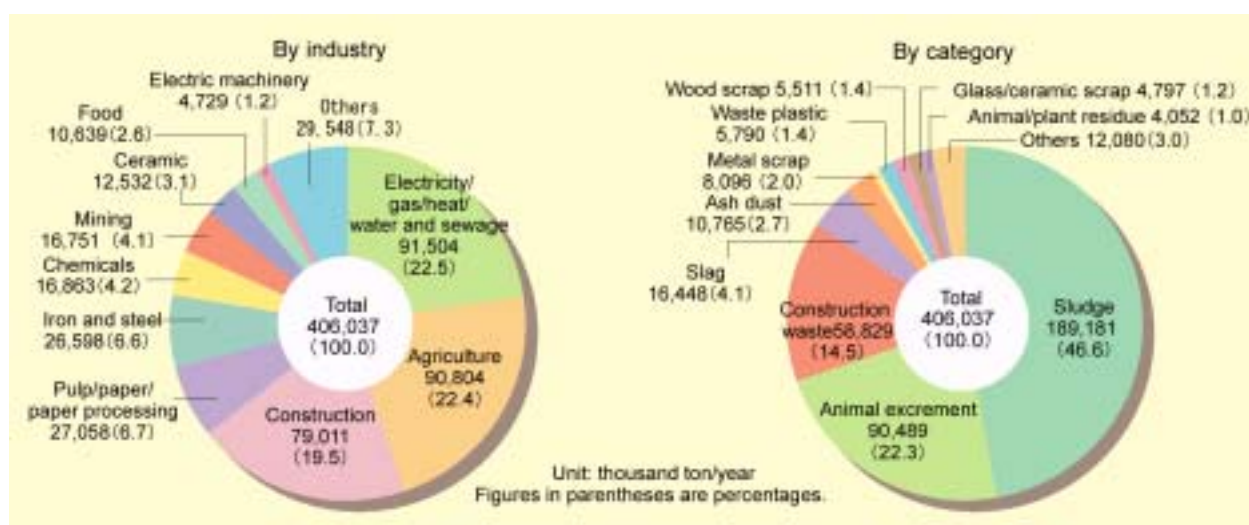
Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of Industrial Waste (in FY 2000)*, January 24, 2003 (revised)

[2] Amount of discharge by industry and by category

The amount of discharge by four industries, electricity/gas/heat/water and sewage, agriculture, construction, and pulp/paper/paper processing, accounted for about 70% 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 2000)



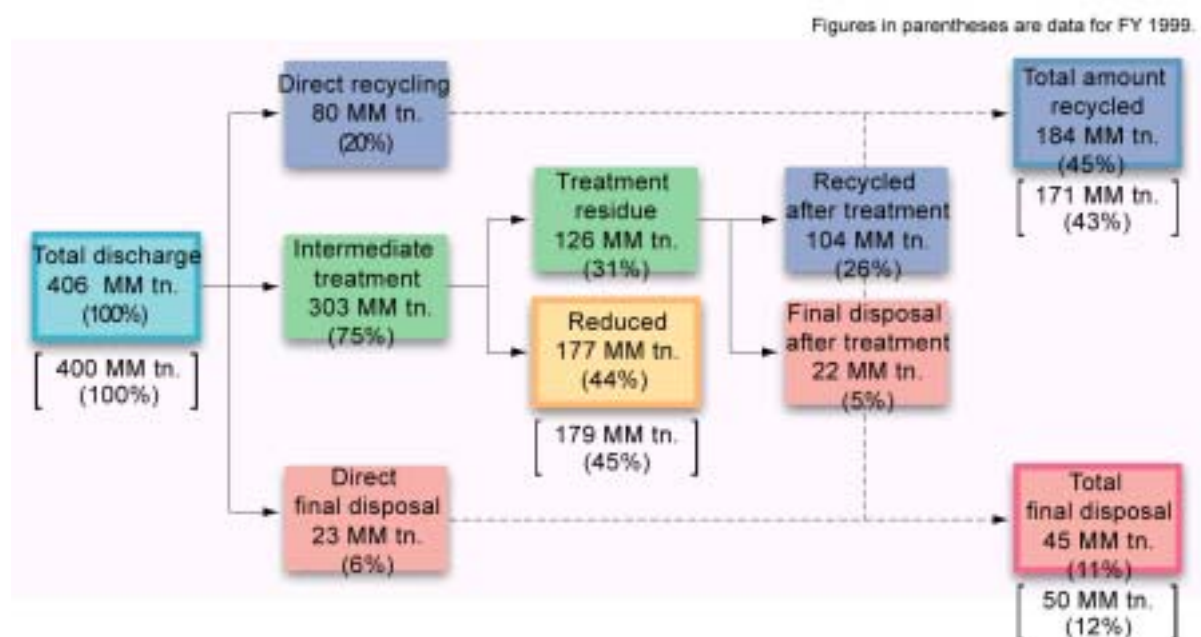
Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of Industrial Waste (in FY 2000)*, January 24, 2003 (revised)

[3] Flow of Industrial waste treatment

Of the total amount of industrial waste discharged (about 460 million tons), about 80 million tons were directly recycled (20% of the total), and about 330 million tons were delivered to intermediate treatment, which were further reduced to about 126 million tons and then recycled or finally disposed (see Fig. 10).

Finally, 45% of the total amount of industrial waste discharged was recycled and 11% was finally disposed (see Fig. 10).

Fig. 10 Flow of Industrial Waste Treatment in Japan (FY 2000)



Note: 1. The aggregate total may not correspond to the total amount because figures for individual amounts are rounded off.

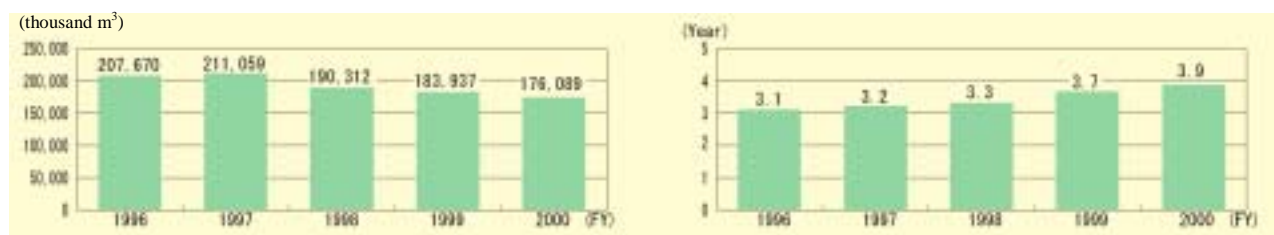
2. Figures in parentheses are data for FY 1999.

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of Industrial Waste (in FY 2000)*, January 24, 2003 (revised)

[4] Final disposal facilities

As of FY 2000, the remaining capacity of final disposal facilities for industrial waste was about 100,007,609 m³, decreasing by about 7.85 million m³ (4%) from the previous year. The national average number of remaining sustainable years of final disposal facilities was 3.9 years.

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



Note: Number of remaining sustainable years = Remaining capacity (m³) / amount of final disposal (tons)
(Conversion ratio between ton and m³ = 1)

Source: Ministry of Environment (<http://www.env.go.jp>), *Discharge and Treatment of MSW (in FY 2000)*, January 24, 2003

II. Legislation and Policies to Create a Recycling-Oriented Society

1. Legislative System

In more than ten years since the “Law for Promotion of Utilization of Recycled Resources (amended to the Law for Promotion of 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 Vehicle Recycling Law ” was promulgated (see Fig. 12).

Under these laws, as well as the “Guidelines for Waste Treatment and Recycling By Commodity and Business” developed by the METI Industrial Structure Council (see page 55), measures are being taken to cover all types of waste (see Fig. 13).

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 gather and publish such data.

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

Basic Law for Promoting the Creation of a Recycling-Oriented 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

Basic Plan for Promoting the Creation of a Recycling-Oriented Society: Basis of other national plans

<Proper waste management>

<Promotion of recycling>

Amended in April 2001

[Establishment of a general scheme]

Put into force in April 2001

Waste Management Law

Law for Promotion of Effective Utilization of Resources

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

1. Prevention and recycling of byproducts
2. Utilization of recycled resources and parts
3. Product designing and manufacturing in consideration of the 3Rs
4. Product labeling for selected collection of waste
5. Self-collection and recycling of used products
6. Promotion of effective utilization of byproducts

[Regulations in accordance with the characteristics of specific products]

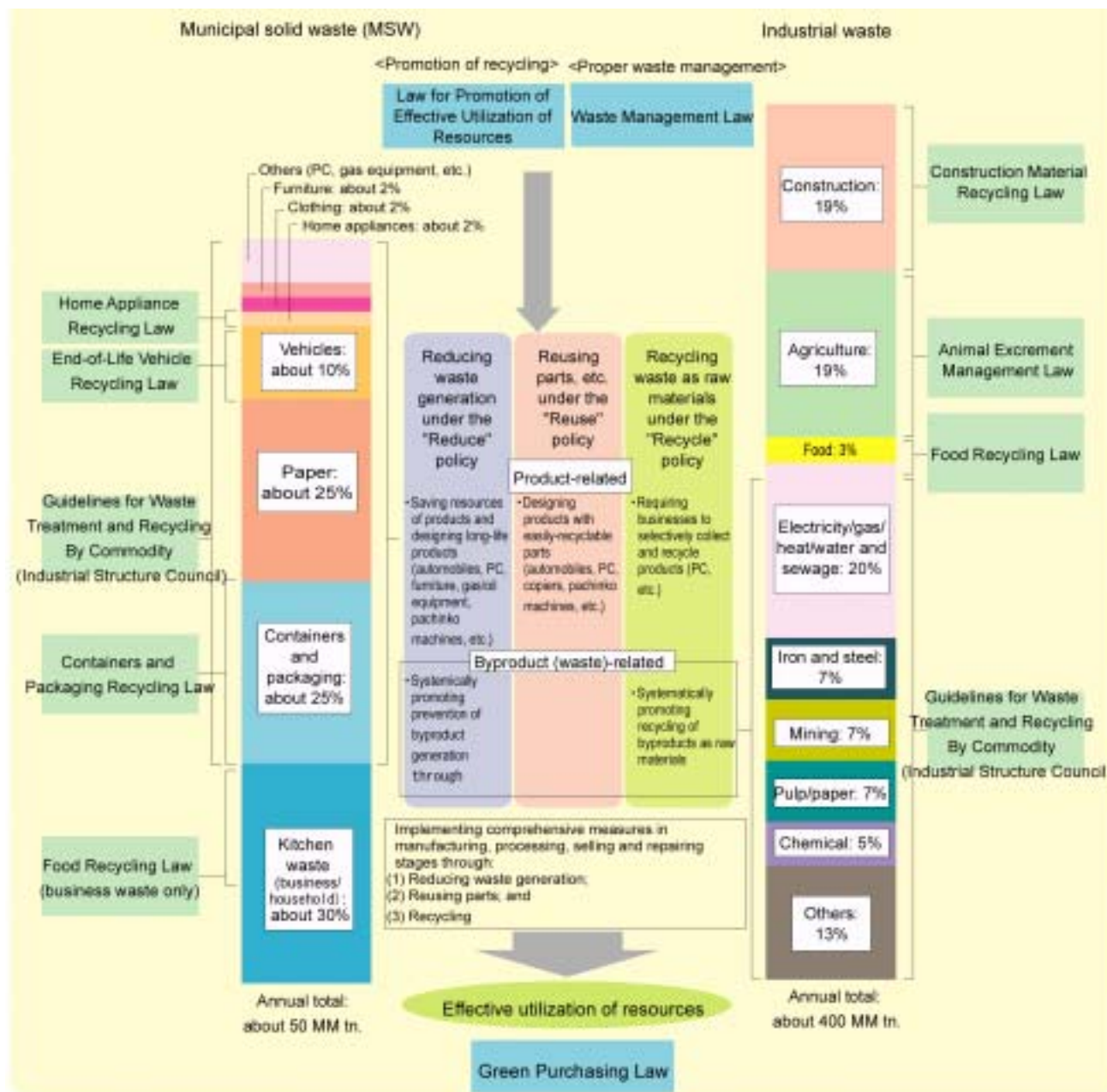
Containers and Packaging Recycling Law	Home Appliance Recycling Law	Food Recycling Law	Construction Material Recycling Law	End-of-Life Vehicle Recycling Law
Put into force in April 2000	Put into force in April 2001	Put into force in May 2001	Put into force in May 2002	Scheduled to be put into force at the end of FY 2004 (Partially put into force in January 2003)
<p>Selected discharge of waste by consumers</p> <p>Collection of containers and packaging by municipalities</p> <p>Commercial recycling of containers and packaging by businesses that manufacture and use them</p>	<p>Consumers bearing collection and recycling costs</p> <p>Retailers taking back used home appliances from consumers</p> <p>Manufacturers commercially recycling used home appliances</p>	<p>Businesses that manufacture, process and sell food products taking charge of recycling food waste</p>	<p>Construction contractors taking charge of:</p> <ul style="list-style-type: none"> - Sorting dismantled construction materials; and - Recycling construction material waste 	<p>Manufacturers taking back and recycling shredder dust</p> <p>Related businesses taking back and providing end-of-life vehicle</p>

Green Purchasing Law

[The national government shall take the initiative in promoting procurement of recycled products.]

Put into force in April 2001

Fig. 13 Laws and Guidelines to Control Waste



2. Basic Law for Promoting the Creation of a Recycling-Oriented Society

[1] Title of the law: Basic Law for Promoting the Creation of a Recycling-Oriented Society

[2] Date put into force: January 2001 (promulgated in June 2000)

[3] Purpose: Providing a basic framework and clarifying the process for creating a recycling-oriented 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 recycling-oriented society (see Fig. 14).

(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 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. Among others, it clearly stipulates that businesses and citizens shall assume the discharger responsibility, while regarding the extended producer responsibility as a general principle.

Fig. 14 Framework of the Basic Law for Promoting the Creation of a Recycling-Oriented Society

Creation of a recycling-oriented society

A recycling-oriented society is a society realizing reduction in consumption of natural resources as well as 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 recycling-oriented society, thereby promoting the creation of a sustainable society with minimal impact on the environment.
- Promoting measures in the following priority order: [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	Local governments	Businesses	Citizens
- Formulating and implementing basic general policies	- Implementing measures for resource recycling and waste disposal - Formulating and implementing policies in accordance with natural and social conditions	- 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)	- Using products for a longer period - Using recycled products - Cooperating in selected collection

Basic Plan for Promoting the Creation of a Recycling-Oriented Society

- Setting out basic policies for creating a recycling-oriented society and measures to be taken comprehensively and systematically to this end.

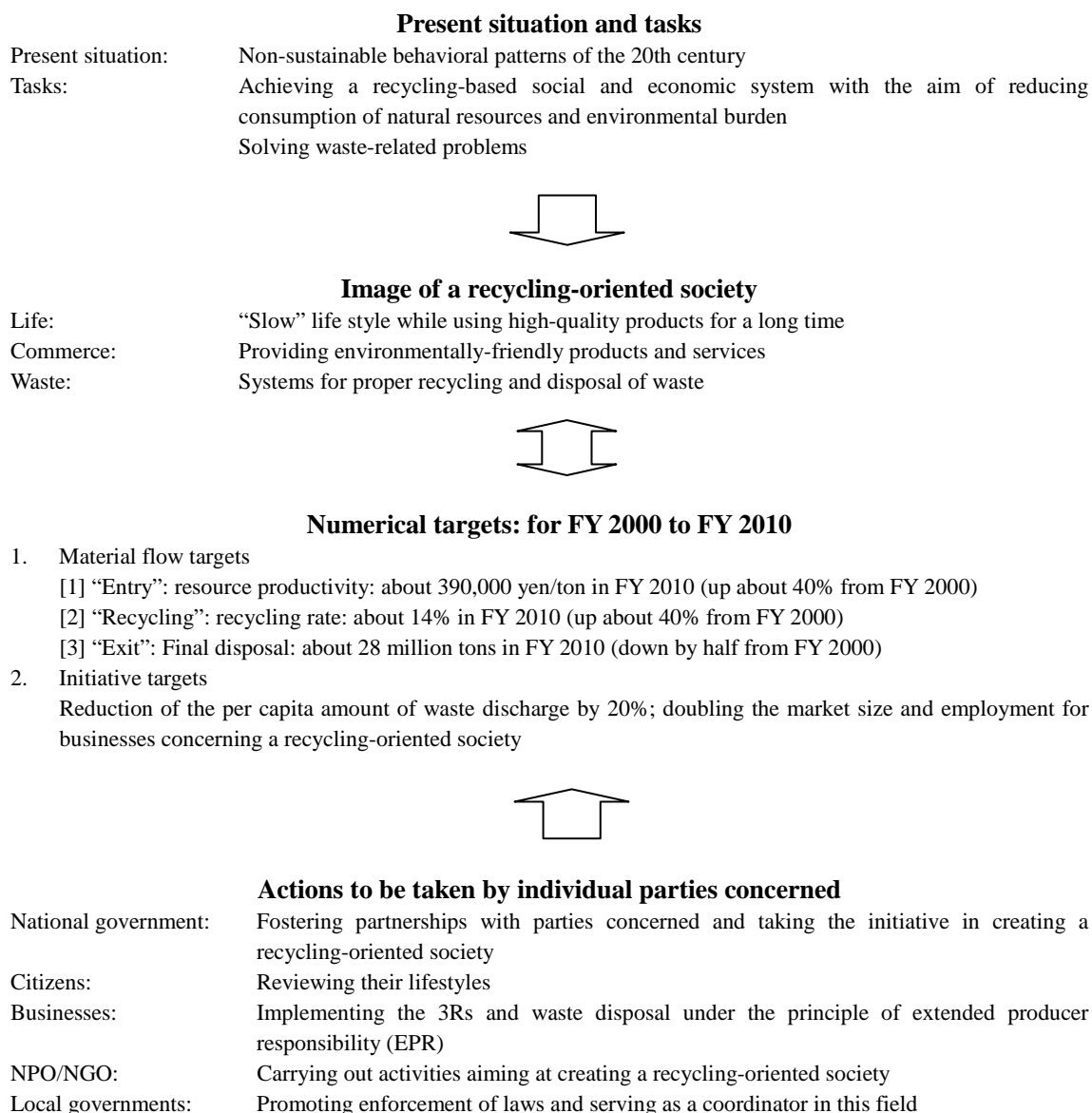
Basic policies for creating a recycling-oriented society

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

(3) Basic Plan for Promoting the Creation of a Recycling-Oriented Society

The Basic Plan for Promoting the Creation of a Recycling-Oriented Society was developed in March 2003.

Fig. 15 Outline of the Basic Plan for Promoting the Creation of a Recycling-Oriented Society



Source: Central Environment Council

(4) Extended producer responsibility

In discussions on 3R-related policies and systems, “Extended Producer Responsibility (EPR)” is often used as a core concept.

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

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

[1] Definition	<p>“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”</p> <p>This approach is characteristic in the following points.</p> <p>(a) The responsibility is transferred from local governments to the producer</p> <p>(b) Producers consider environmental impacts when designing their products.</p>
[2] Primary function	Transfer of the financial and/or physical responsibility of waste management from local governments and the general taxpayer to the producer.
[3] Major	<p>(a) Source reduction (natural resource conservation/material conservation)</p> <p>(b) Waste prevention</p> <p>(c) Design of more environmentally compatible products</p> <p>(d) Closure of material use loops to promote sustainable development</p>
[4] Effect	<p>A pressure point can be provided to drive upstream changes in materials selection and in the design aspects of a product.</p> <p>Appropriate signals can be sent to the producer to internalize a substantial portion of the environmental externalities from the final disposal of the product.</p>
[5] Sharing responsibility	Sharing responsibility among parties concerned in the product chain from production to disposal is an inherent key of EPR.
[6] Specific policy instruments and measures	<p>(a) Take-back and recycling of products</p> <p>(b) Deposit/refund scheme</p> <p>(c) Material taxes as earmarked taxes</p> <p>(d) Advance disposal fee</p> <p>(e) Criteria for the user of recycled products</p> <p>(f) Leasing</p>
[7] EPR and PPP	<p>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.</p> <p>On the other hand, EPR seeks to solve problems by holding producers responsible for the entire life cycle of a product.</p> <p>There can be nothing consistent between EPR and PPP by appropriately defining their roles.</p>

Source: OECD, “Extended Producer Responsibility: Guidance Manual for Governments (2001)” (arranged 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 selected collection, and development of a system for self-collection and recycling by manufacturers.

(1) Responsibilities of parties concerned

[1] Businesses

- Ensuring rational use of raw materials with the aim of reducing used products and byproducts.
- Using recyclable resources and parts
- Promoting the use of used products and byproducts as recyclable resources and parts

* “Recyclable resources”: used products or byproducts (waste) generated in plants that can be used as raw materials

“Recyclable parts”: Used products that can be used as parts of other products

[2] Consumers

- Using products for a longer time
- Using products containing recycled resources
- Cooperating for selected collection
- Cooperating with measures taken by the national and local governments as well as 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 understanding among 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 industries

Required to reduce generation of byproducts (by ensuring rational use of raw materials and promoting use of byproducts 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 resource-reusing industries

Required to use recyclable resources and parts

- Paper manufacturing
- Glass container manufacturing
- Construction
- Rigid PVC pipes and pipe fitting manufacturing
- Copier manufacturing

[3] Specified resource-saved products

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, cloths dryers)
- Personal computers (including CRT and liquid crystal displays)
- Pachinko machines (including rotary type)
- Metal furniture (metal cupboards, 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 reuse-promoted products

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

- Automobiles
- Home appliances (television sets, air conditioners, refrigerators, washing machines, microwave ovens, cloths dryers)
- Personal computers (including CRT and liquid crystal displays)
- Pachinko machines (including rotary type)
- Copiers
- Metal furniture (metal cupboards, 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 units, power tools, guiding lights, fire-alarm systems, security-alarm systems, electric-assisted bicycles, electric-powered wheelchairs, personal computers, printers, mobile data collection devices, cordless phones, facsimile machines, telephone switchboards, communication devices for mobile phones, communication devices for MCA systems, communication devices for simplified radio transmission, armature radio equipment, video cameras, headphone stereo sets, electric vacuum cleaners, electric shavers, electric toothbrushes, emergency lighting equipment, blood-pressure meters, infusion instruments, electric massaging equipment, electric therapy tools for home use, electric bubble generators, electric toys)

[5] Specified labeled products

Required to be labeled to facilitate selected collection

Steel cans, aluminum cans (soft drinks and alcohol)



PET bottles
(soft drinks, soy sauce, alcohol)



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



Paper containers and packaging
(excluding paper containers using no
- aluminum and corrugated cardboard
- containers for drinks)



Plastic containers and packaging
(excluding PET bottles for soft drinks,
soy sauce, alcohol)



Compact rechargeable batteries (compact sealed lead batteries, sealed nickel-cadmium batteries, sealed nickel-metal-hydrate 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 CRT and liquid crystal displays)

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

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

- 29 items including electric power units and electric tools (same as those in which compact rechargeable batteries are used in the category of specified reuse-promoted products)

[7] Specified byproducts

Required to promote the use of byproducts as recyclable resources

- Coal ash generated by the electricity industry
- Soil and sand, slabs of concrete and asphalt, and lumber generated by the construction industry

4. Waste Management Law

[1] Title of the law: Law Concerning Waste Management and Public Cleaning (Waste Management Law)

[2] Date put into force: January 2001 (promulgated in June 2000)

[3] Purpose: Aiming at securing an agreeable living environment and improving 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, licensing for engaging in waste disposal business, licensing for establishing waste disposal facilities, and setting of the waste disposal criteria (see Fig. 16).

(1) Definition of waste

The law defines “waste” as “municipal solid waste, bulky waste, burnt residue, sludge, excreta, oil waste, acid waste, alkali waste, animal bodies and other solid or liquid waste materials or unnecessary things.” 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 burnt residue, sludge, animal excrement discharged in the livestock industry, oil waste, acid waste, alkali waste, 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 take responsibility to properly manage 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 the final disposal in accordance with the “Manifesto (waste management sheet).”

[3] Businesses discharging a vast quantity of waste (businesses that discharged more than 1,000 tons of industrial waste or more than 50 tons of special industrial waste in the previous year) will need to develop a waste disposal plan.

[4] Except for incineration under the waste disposal criteria, 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 if violating the prohibition.

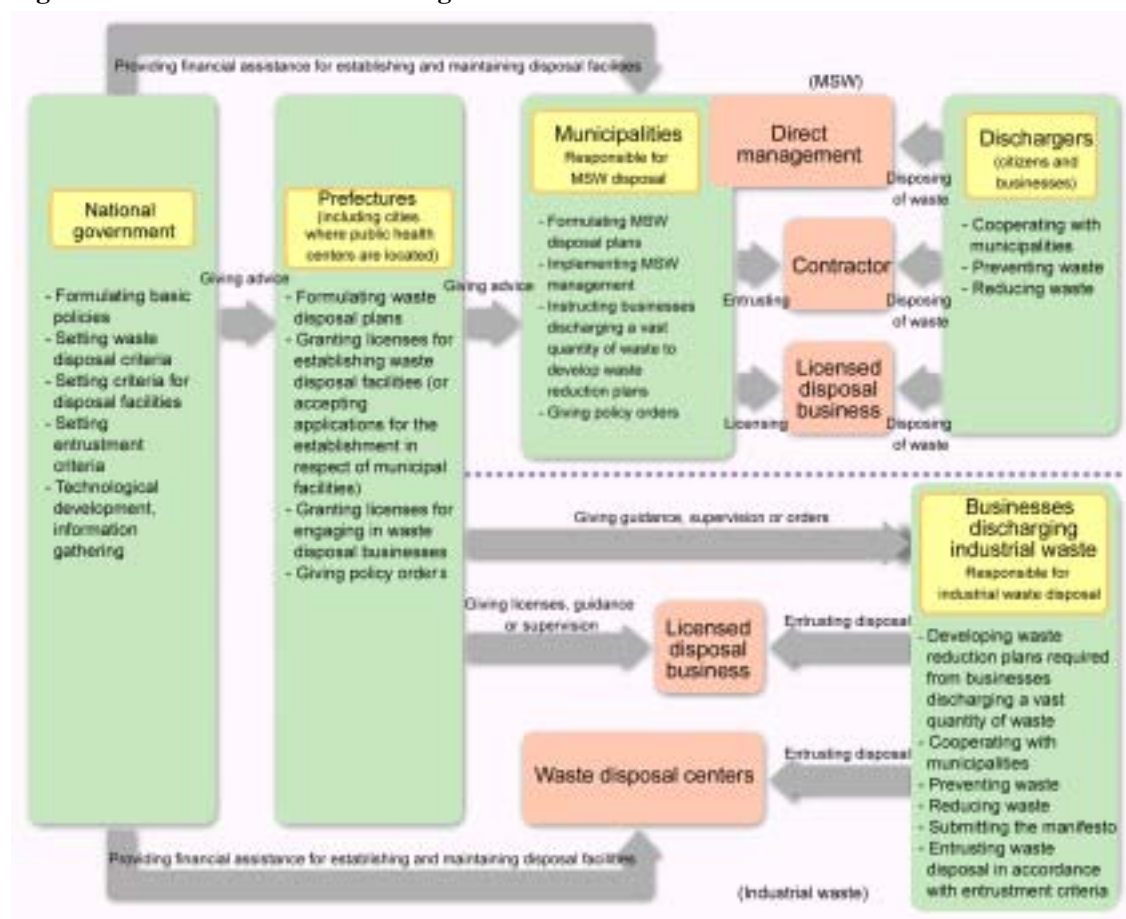
(3) Licensing for the establishment of disposal facilities

Businesses shall obtain a license 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 special schemes, the Wide-Area Disposal and Recycling Designation Scheme and the Disposal and Recycling Approval Scheme (see Table 2).

Fig. 16 Flow under the Waste Management Law



Source: Ministry of Environment (<http://www.env.go.jp>), *White Paper on Recycling-Oriented Society* (2002)

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

	Wide-Area Disposal and Recycling Designation Scheme	Disposal and Recycling Approval Scheme
Detail of the scheme	<ul style="list-style-type: none"> - Businesses carrying out disposal and recycling of designated waste materials that meet certain requirements shall not be required to obtain a license for engaging in a waste disposal business. 	<ul style="list-style-type: none"> - 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	<p><MSW></p> <ul style="list-style-type: none"> - Those designated by the Minister of Environment as waste for wide-area recycling (waste sprung mattress) - Those designated by the Minister of Environment as waste to be collected and transported by transportation businesses under the Home Appliance Recycling Law - Those designated by the Minister of Environment as waste to be managed by manufacturers that are expected to cooperate in the recycling (used PCs, rechargeable battery waste) - Used tires: it is not necessary to obtain a license for engaging in MSW disposal if certain requirements are met such as obtaining a license for engaging in industrial waste disposal <p><Industrial waste></p> <ul style="list-style-type: none"> - Those designated by the Minister of Environment as waste for wide-area recycling (used PCs, plaster boards, used pachinko machines, etc.) 	<p><MSW></p> <ul style="list-style-type: none"> - Used rubber tires (recycled as raw materials for cement) - Plastic waste (recycled as iron-making reducer) - Meat and bone waste (recycled as raw materials for cement) <p><Industrial waste></p> <ul style="list-style-type: none"> - Used rubber tires (recycled as raw materials for cement) - Plastic waste (recycled as iron-making reducer) - Construction inorganic sludge (recycled as materials for building super (high-standard) levees)

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 the 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 Fig. 18 and 19).

(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 styrofoam trays and plastic bags), and “packaging” subject to the law include 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 removed from the products shall be excluded.

Examples: CD cases, camera cases

(3) Businesses to be regulated

The law specifies 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



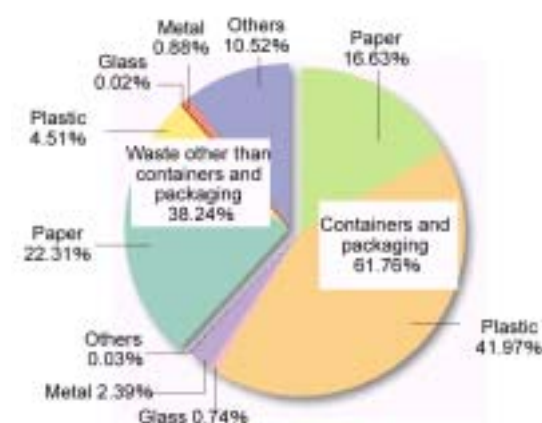
Entrustment to the specified corporation

The Japan Containers and Packaging Recycling Association is a body designated under the Containers and Packaging Recycling Law as engaging in, by entrustment of specified manufacturers/users, recycling containers and packaging selectively collected by municipalities. Specified manufacturers/users shall be regarded as recycling containers and packaging by concluding 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 those to be recycled by businesses that are excluded from the application of the law).

60% of domestic waste are containers and packaging

In Japan, the amount of waste discharged from households per annum is 52.36 million tons (in 2000), in which waste from containers and packaging account for about 60% in terms of volume.

Fig. 17 Share of Waste from Containers and Packaging in the Total Amount of Domestic Waste (in terms of volume)



Source: Ministry of Environment (<http://www.env.go.jp>), *White Paper on Environment (2002)*

Fig. 18 Three Recycling Routes

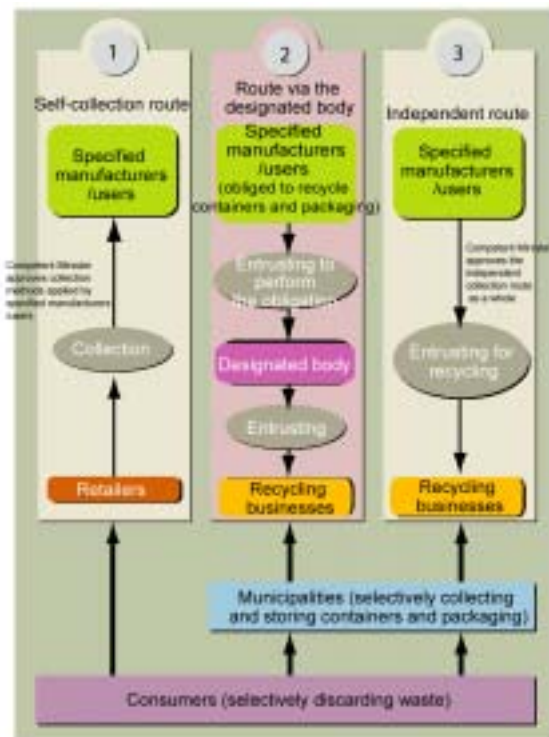


Fig. 19 Scheme under the Containers and Packaging Recycling Law (route via the designated body; PET bottles)

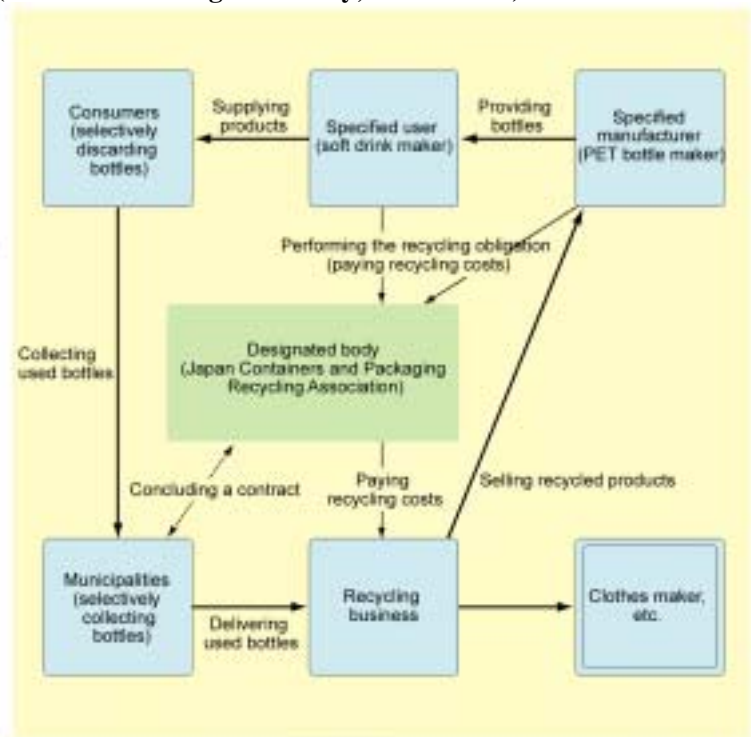


Fig. 20 Recycling Methods for Waste from Containers and Packaging under the Recycling Obligation

Category	Recycling method	Recycled products
Glass bottles	Crushed into cullets	<ul style="list-style-type: none"> ● Glass containers ● Construction and civil engineering materials
PET bottles	Palletized Polyester raw materials	<ul style="list-style-type: none"> ● Textiles ● Plastic sheets ● PET bottles
Paper containers and packaging	Sorted by paper-making material + RDF Used for manufacturing construction boards or woven stuff of crushed recycled paper + RDF	<ul style="list-style-type: none"> ● Paperboards ● Recycled paperboards ● Refuse derived fuel
Plastic containers and packaging styrofoam trays	Plastic raw materials Liquefaction blast furnace reducing agent gasification Chemical raw materials for the coke oven	<ul style="list-style-type: none"> ● Plastic products including stationary and daily commodities ● Industrial raw materials

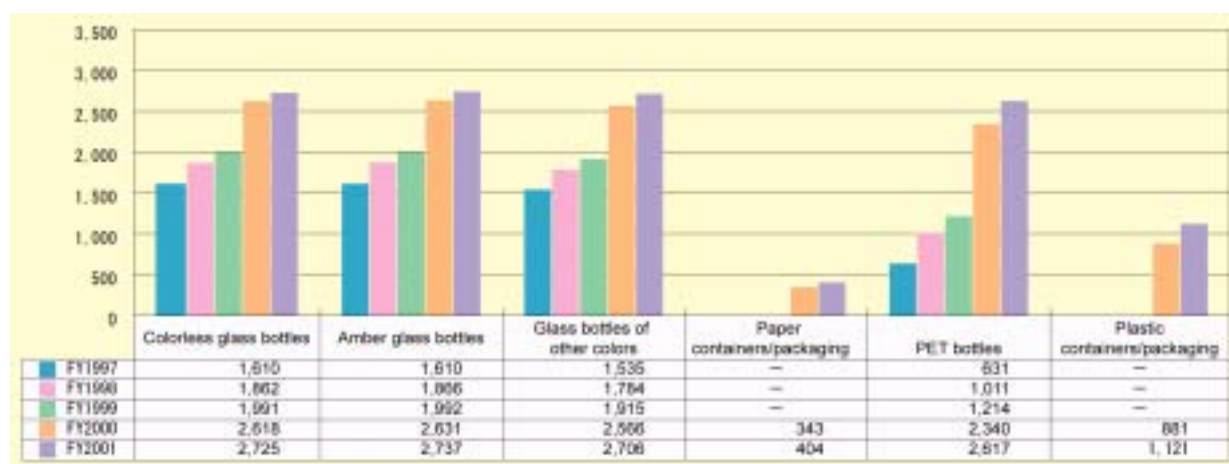
* Steel cans, aluminum cans, paper cartons, and corrugated fiberboard are subject to the Containers and Packaging Recycling Law, but they have yet to be subject to the recycling obligation.

Present Situation of Recycling

Among a total of 3,246 municipalities in Japan (at the end of March 2002), the number of those carrying out sorted collection and recycling under the Containers and Packaging Recycling Law has been increasing constantly, mainly with respect to the items included in the scope of regulation by the law in 1997 (see Fig. 21). The ratio of municipalities carrying out sorted collection and recycling to the total number of municipalities was 84% for glass bottles, 12% for paper containers/packaging, 81% for PET bottles and 35% 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 selectively collected in FY2001 was 162,000 tons (see Fig. 22), of which the collection rate exceeded 40% (see Fig. 52). The volume of PET bottles selectively collected and then recycled was 156,000 tons (see Fig. 23), of which 95,000 tons (see Fig. 24(d)) were recycled and sold via the designated body (see Fig. 19). With respect to paper containers/packaging and plastic containers/packaging, which were included in the scope of regulation in 2000, the volume of those selectively collected in FY2001 was 50,000 tons and 197,000 tons (see Fig. 22), while the volume of those recycled was 45,000 tons and 180,000 tons (see Fig. 23), of which 21,000 tons and 118,000 tons (see Fig. 24(e)(f)) were recycled and sold via the designated body, respectively.

Fig. 21 Number of Municipalities Carrying Out Sorted Collection



Note: “Plastic containers/packaging” means all kinds of plastic containers and packaging, including white (styrofoam) trays.

Source: Ministry of Environment (<http://www.env.go.jp>)

Fig. 22 Volume of Containers and Packaging Collected

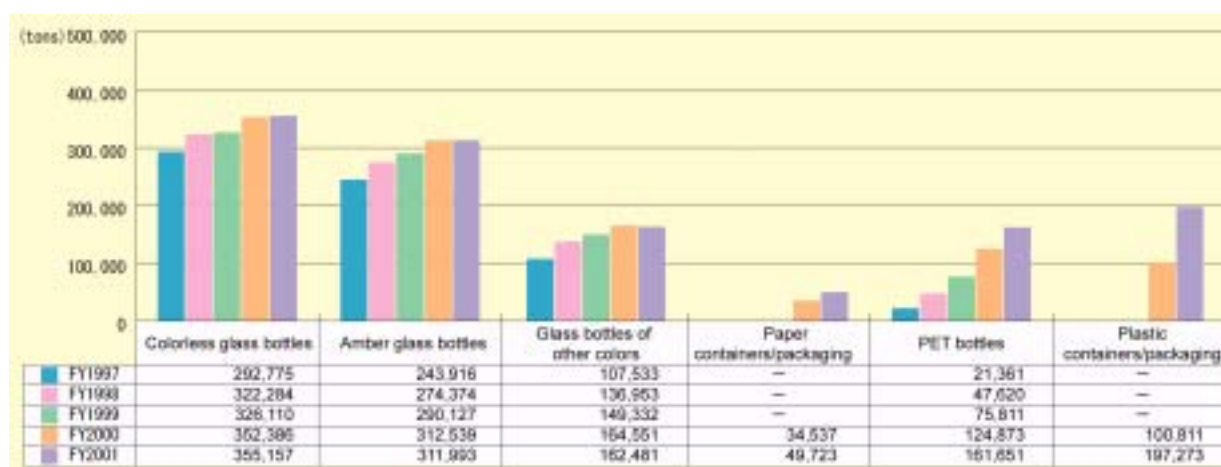
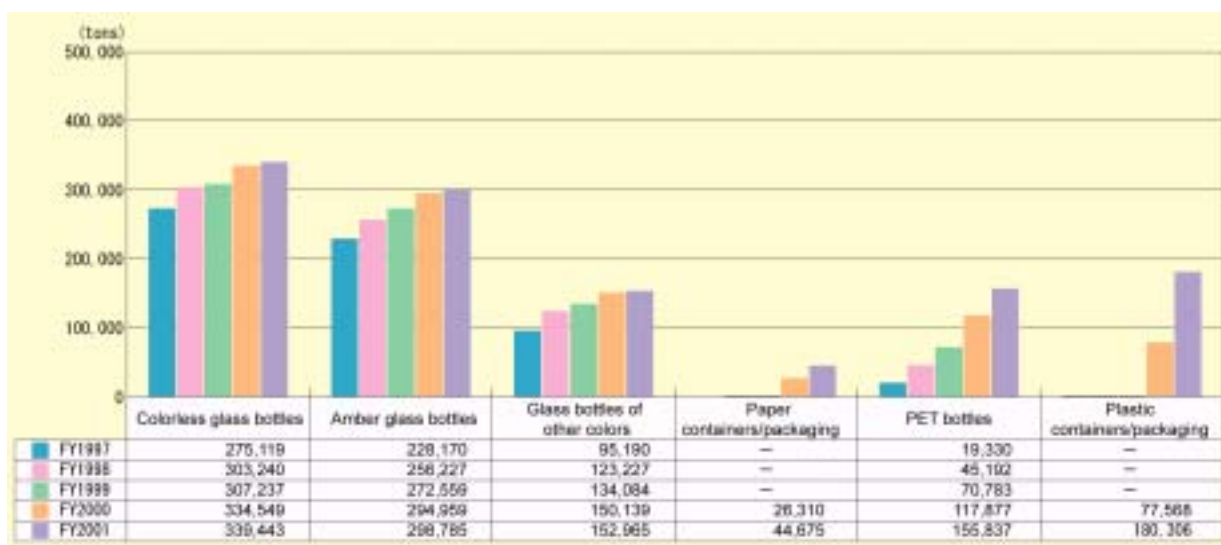


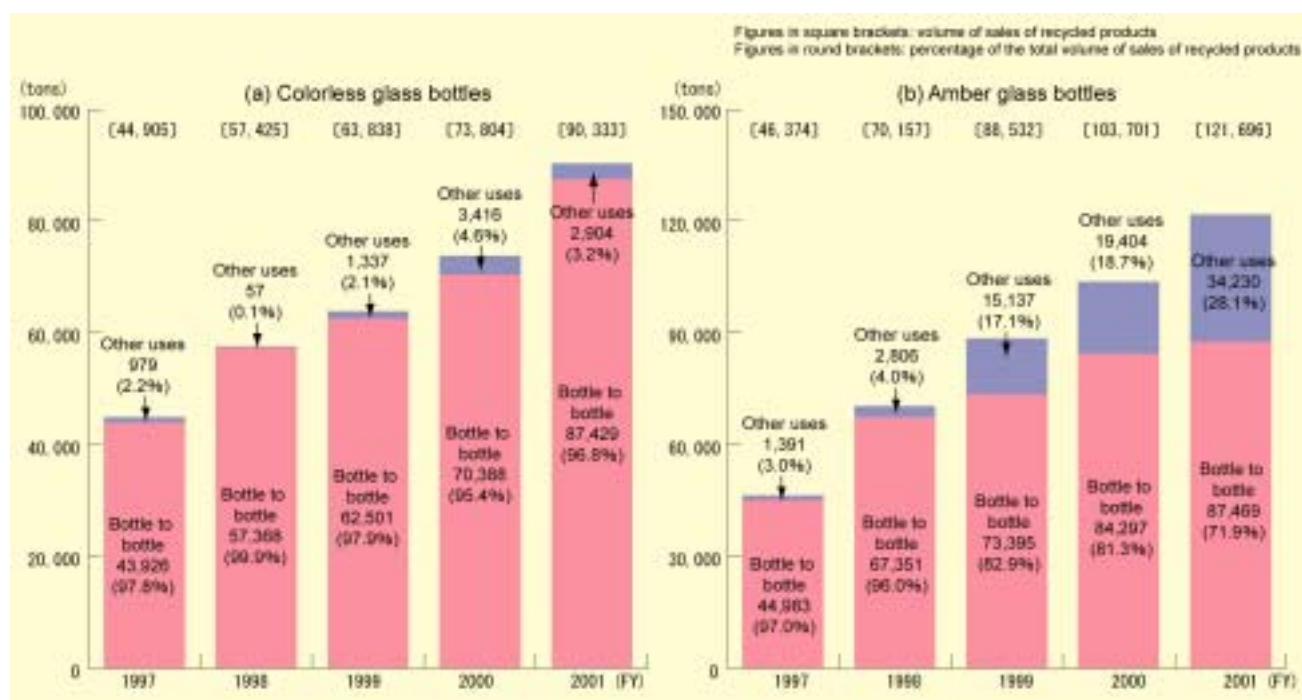
Fig. 23 Volume of Containers and Packaging Recycled (Volume of Those Delivered to Recycling Businesses)

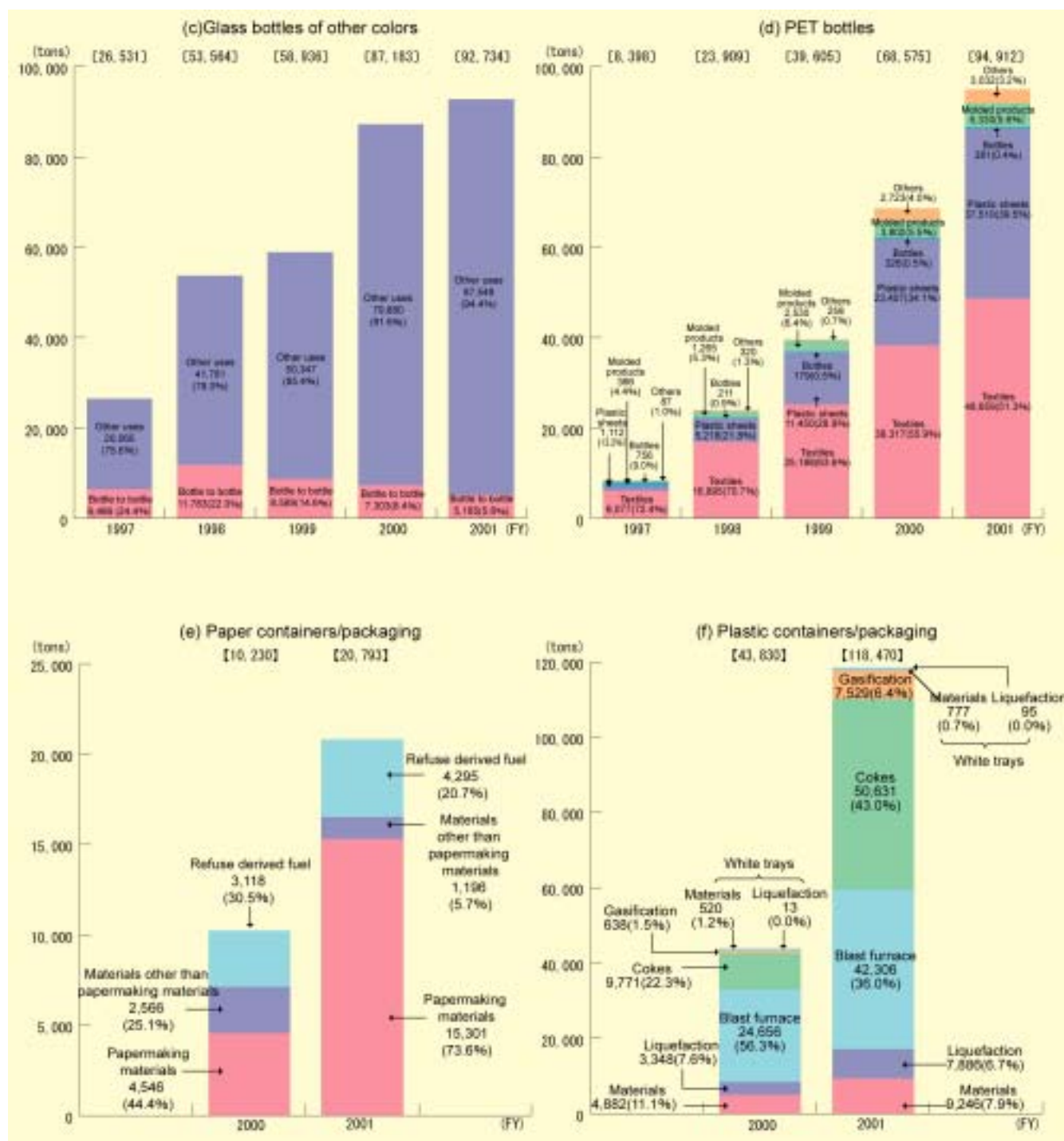


Note: “Volume of containers and packaging recycled” means the volume delivered by municipalities to recycling businesses in accordance with recycling plans.

Source: Ministry of Environment

Fig. 24 Trend of the Volume of Containers and Packaging Recycled via the Designated Body and the Use of Recycled Products





Source: Japan Containers and Packaging Recycling Association (<http://www.jcpra.or.jp>)

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 discharged from households, with the aim of promoting waste reduction and recycling.

Outline of the law

The law provides for the 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. 25).

(1) Home appliances to be regulated

[1] Air conditioners

[2] Television sets (limited to CRT-types)

[3] Refrigerators

[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 having manufactured 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 collecting, transporting and recycling these home appliances (recycling fees)

[2] Home appliance retailers

(Those having sold home appliances shall collect and transport them.)

- Taking back home appliances, which they have sold, from businesses that discharge them
- Taking back home appliances at the request of consumers who buy new ones in the replacement of old ones
- Issuing home appliance recycling coupons* to manufacturers and the specified corporation and their copies to dischargers

[3] Consumers

(Those having used home appliances shall pay for recycling costs)

- Proper delivery
- 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 (manufactures whose production volume is not more than 900,000 for air conditioners, 900,000 for television sets, 450,000 for refrigerators and 450,000 for washing machines)

[5] Municipalities

- Delivering home appliances, which they have collected, to manufacturers and the specified corporation, 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.

Fig. 25 Flow of Recycling of Used Home Appliances

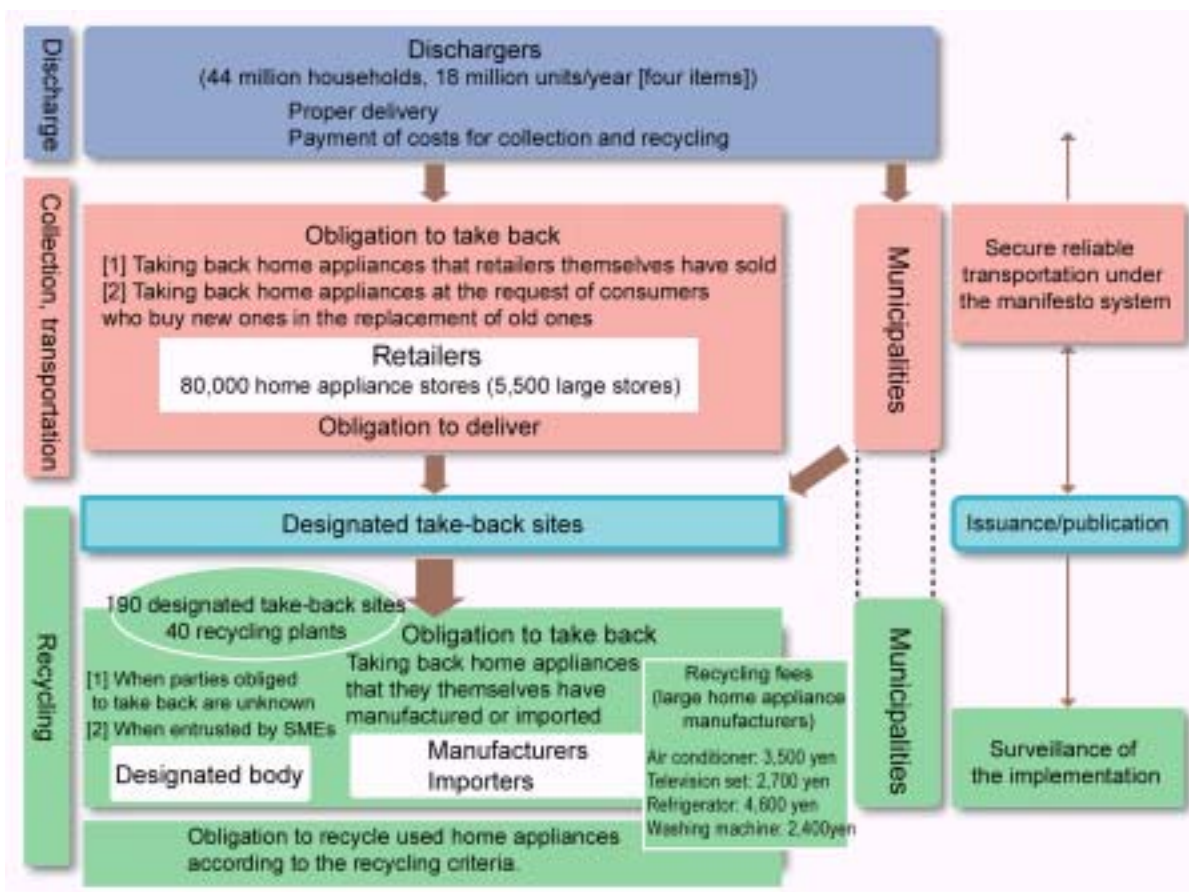
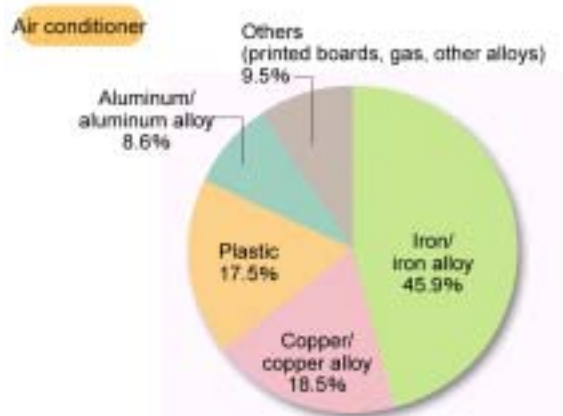
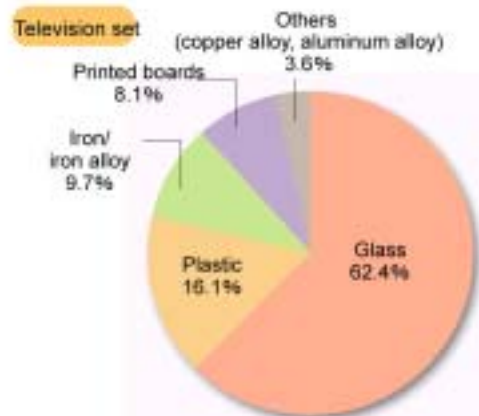


Fig. 26 Composition of Home Appliances



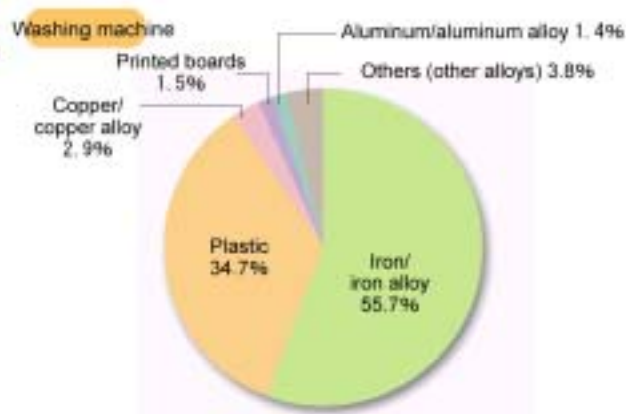
The ratio of metal content, such as expensive copper-based or aluminum-based metal, is higher than the other three items.



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.



Measures are being taken to collect CFC and HCFC, the latter being four times more abundant than CFC.



Removing and disposing of motors

Present Situation of Recycling

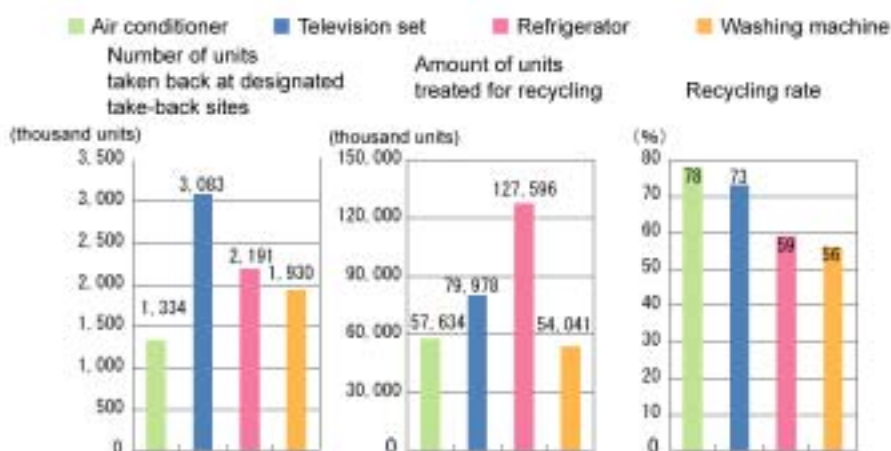
Among used home appliances discharged from households, by estimate, about 18 million units of air conditioners, television sets, refrigerators and washing machines, the four items included in the scope of regulation by the law in April 2001, are discharged annually. Up to now, 70.8% of such used home appliances were treated and disposed of as waste, 4.9% were sold in Japan as secondhand goods and 24.3% were exported as secondhand 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 40 recycling plants for home appliances. In FY 2001, manufacturers/importers or the designated body took back a total of about 8.54 million units of the four items at take-back sites, and the recycling rates for the four items were 56% to 78% (see Fig. 27). All these recycling rates exceeded the target levels under the Home Appliance Recycling Law (see page 37). Among the 8.54 million units mentioned above, the designated body, for the four items mentioned, took about 460,000 units back.

In FY2001, about 11 million units were expected to be taken back. The difference between this number and the actual number of units taken back (about 8.54 million) seems to be caused by the prolonged use of home appliances upon the enforcement of the law and the expansion of the secondhand markets while only about 130,000 units seems to have been illegally discarded. Furthermore, according to the surveys targeting 276 and 2,392 municipalities respectively, the number of home appliances illegally discarded is unlikely to increase significantly.

In the recycling stage, iron, copper, aluminum and glass are recycled as valuable materials (see Fig. 29), while CFC is used as a refrigerant for air conditioners and refrigerators are also collected and decomposed.

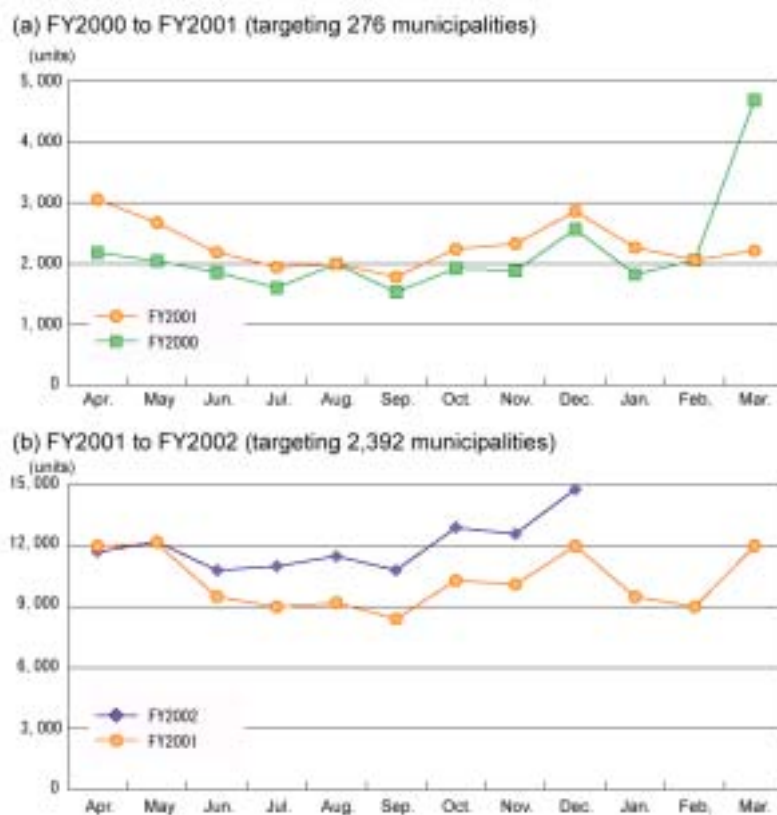
Fig. 27 Recycling by Manufacturers/Importers and the Designated Body (FY2001)



Source: Association for Electric Home Appliances (<http://www.aeha.or.jp>)

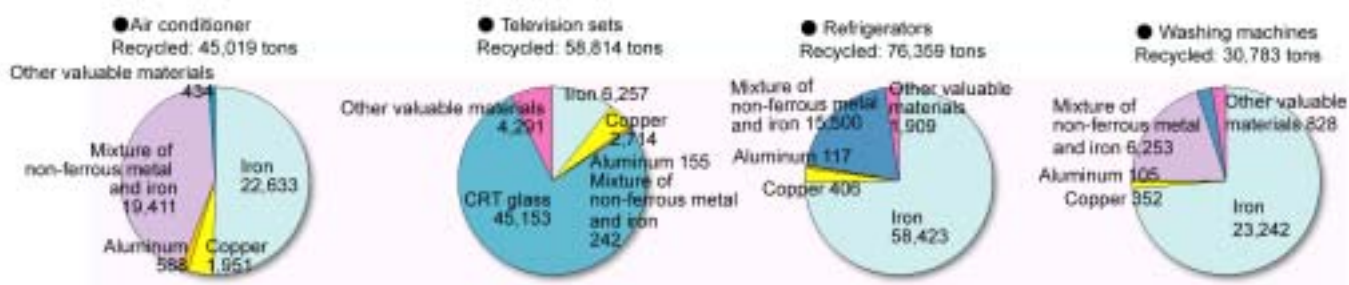
$$\text{Recycling rate} = \frac{\text{Weight of materials recycled}}{\text{Weight of units treated for recycling}}$$

Fig. 28 Trend of the Number of Units Illegally Discarded (total of four items)



Source: Ministry of Environment (<http://www.env.go.jp>)

Fig. 29 Weight of Materials Recycled by Manufacturers/Importers and the Designated Body (FY 2001)



Note: 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 (<http://www.aeha.or.jp>)

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: 2004 (promulgated in July 2002)

[3] Purpose: Clarifying the role-sharing between car manufacturers, ELV collecting businesses, CFC collecting/destructing businesses, and car owners, with the aim of ensuring recycling and proper disposal of ELVs.

Outline of the law

The law provides for the role-sharing between car owners, ELV collecting businesses, car manufacturers, CFC collecting businesses and auto dismantling/shredding businesses, as well as necessary recycling costs (see Fig. 31).

(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

Delivering end-of-life vehicles to ELV collecting businesses (new/used car dealers, auto repair shops and auto dismantling businesses) that are registered with local authorities

[2] ELV collecting businesses

Taking back ELVs from owners and then delivering them to CFC collecting businesses or auto dismantling businesses

[3] Car manufacturers/importers

Collecting and recycling CFC, airbags, and shredder dust from ELVs

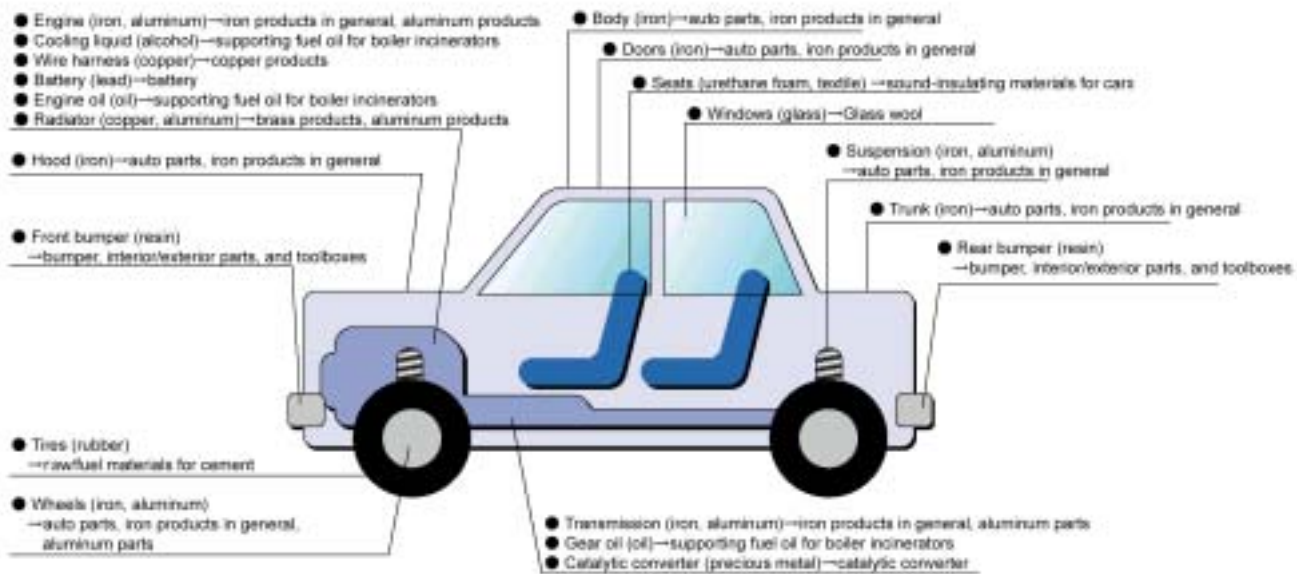
(3) Payment of recycling fee

[1] Fees shall, in principle, be paid upon purchasing new cars. With respect to cars that have already been sold, fees shall be paid by the first motor vehicle inspection after the law is put into force.

[2] The amount of recycling fee is under discussion between manufacturers and importers. It will be indicated by type of vehicle.

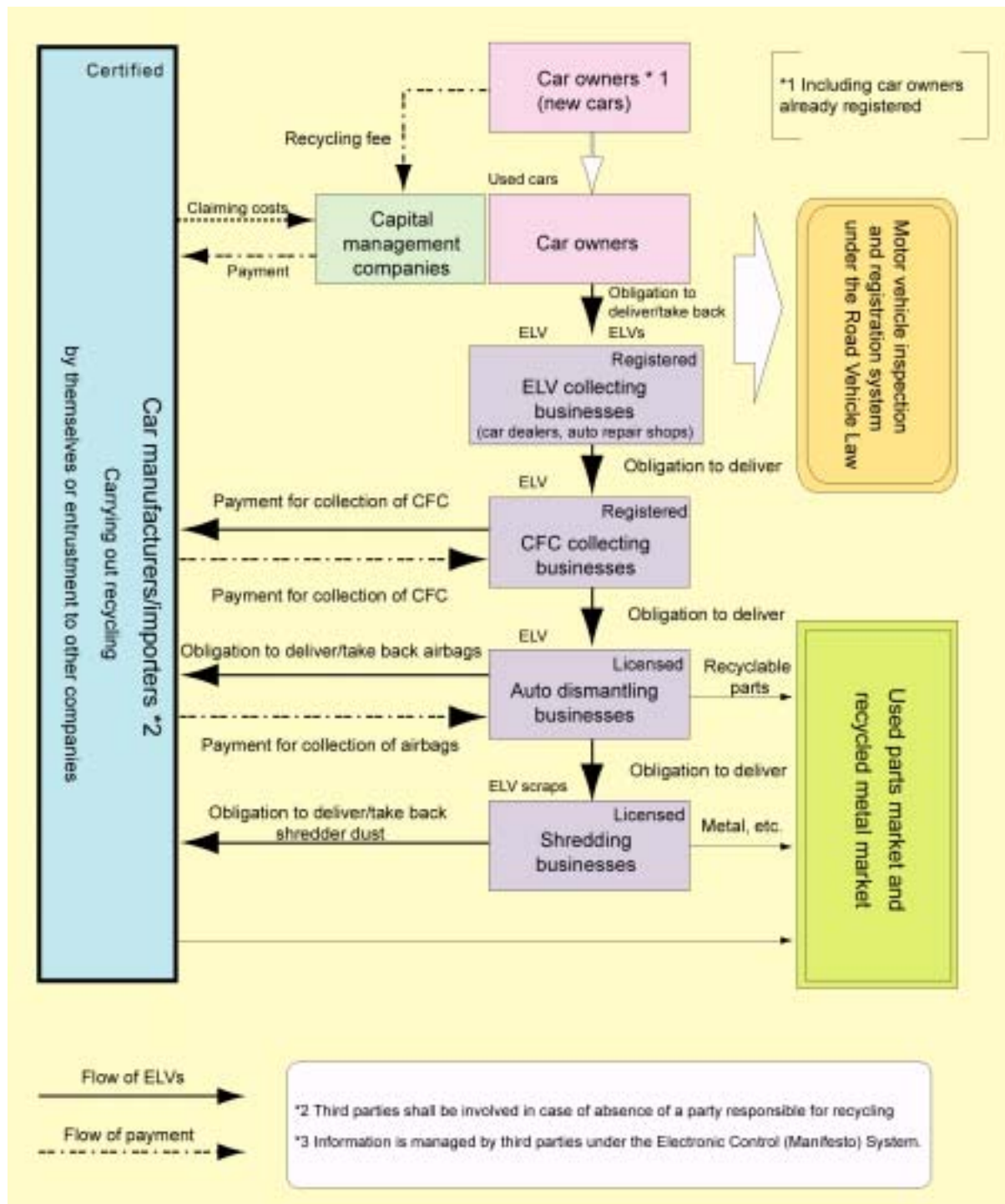
* Recycling fees shall be managed by capital management companies designated by the national government, until they are needed.

Fig. 30 Recycling Uses of ELV



Source: Japan Automobile Manufacturers Association

Fig. 31 Concept of the ELV Recycling Law



Source: Industrial Structure Council, July 18, 2002

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: Promoting sorting and recycling of concrete waste materials, asphalt waste materials, 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 building demolition businesses and the contractual procedures to be followed by the client and the prime contractor for construction works (see Fig. 35).

(1) Construction works to be regulated

Type of construction	Standard size
Demolition of a building	80m ²
Construction of a new building or extension	500m ²
Repairing or remodeling (reforming) of a building	100 million yen
Other construction work (civil engineering)	5 million yen

Note:

1. Demolition work means demolishing parts from a building, such as a foundation, foundation piles, walls, posts, roof trusses, bases, diagonal members, floor covers, roof plates or horizontal members, which are to 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 a part of a building or constructing a 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).

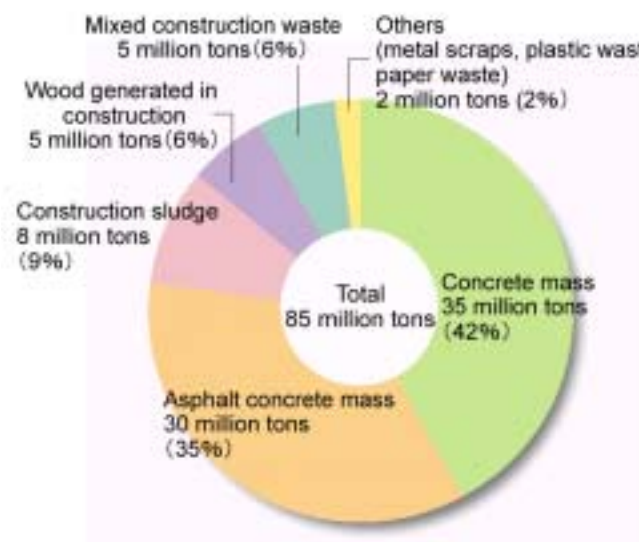
(2) Construction materials to be regulated

- 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 50km away from the nearest recycling facility.

These materials account for about 80% of the total amount of construction waste (see Fig. 32).

Fig. 32 Amount of Construction Waste Discharged, by type of material (FY2000)



Source: Ministry of Land, Infrastructure and Transportation

Fig. 33 Example of Recycling of Wood Waste

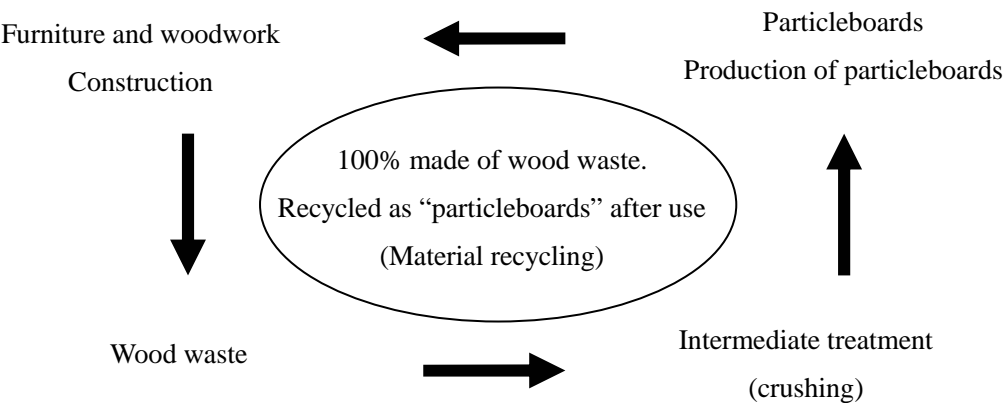
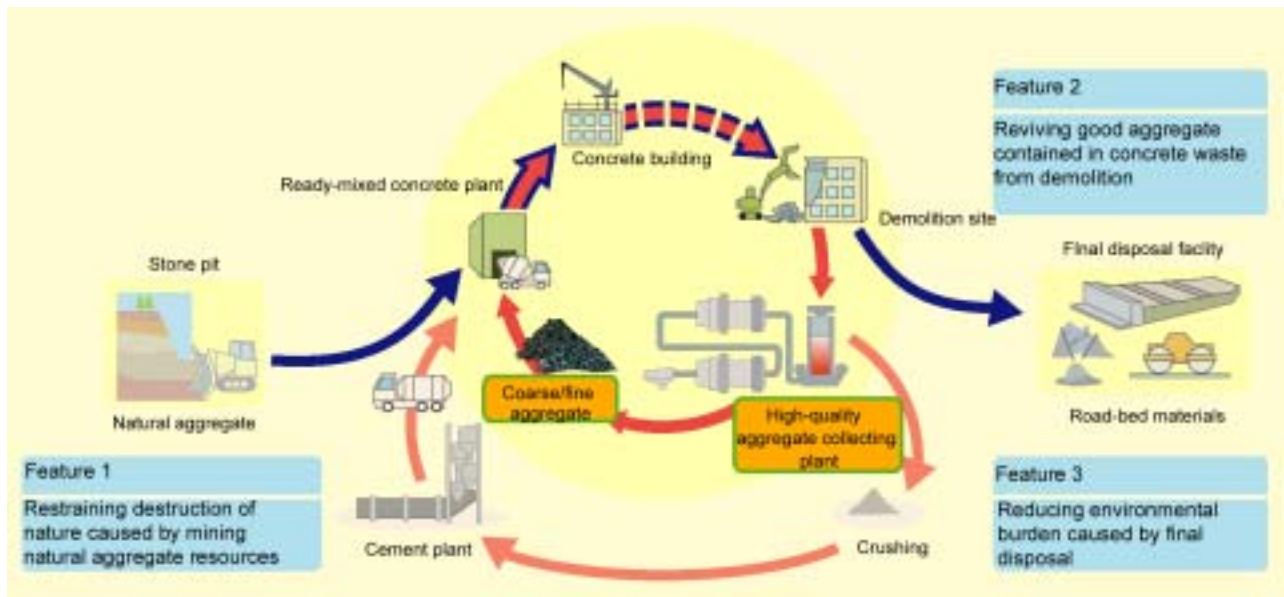
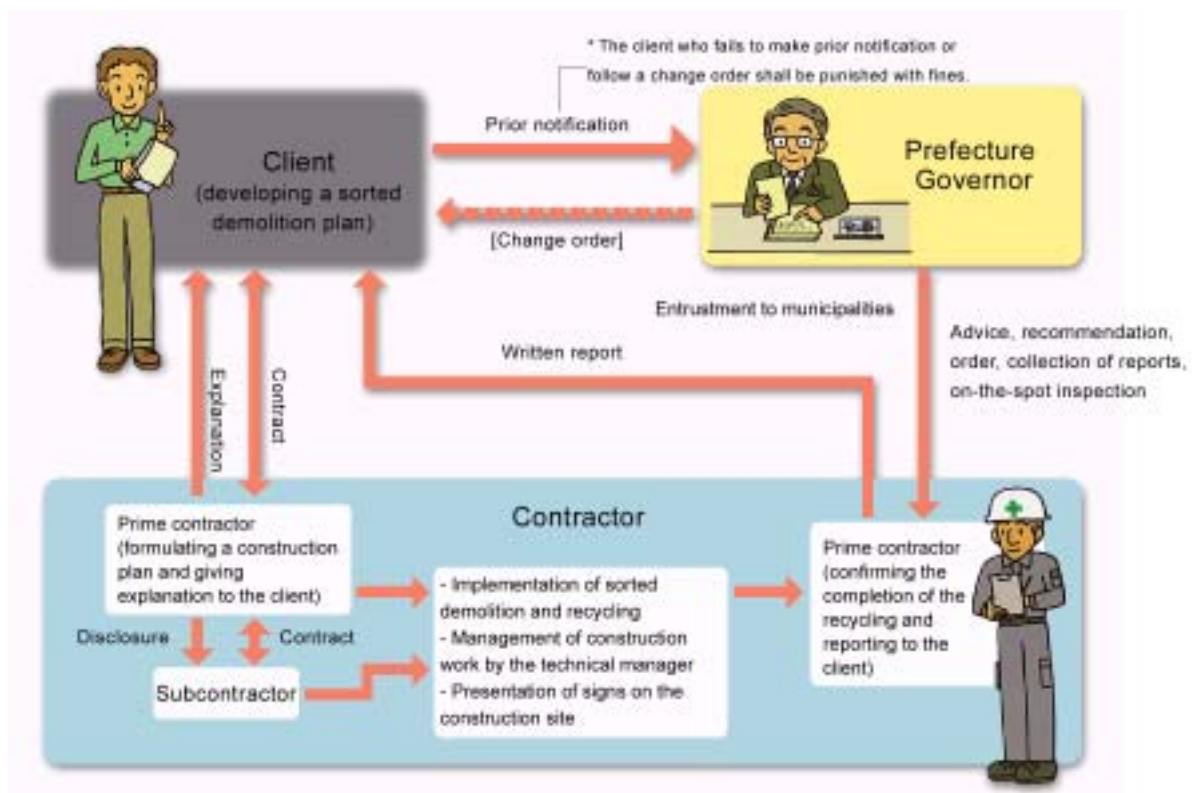


Fig. 34 Example of Recycling of Concrete Aggregate



(3) Client and prime contractor

Fig. 35 Flow of Sorted Demolition and Recycling: from placement of order to implementation



Source: Committee for the Promotion of Recycling of Construction Byproducts, *Sorting and Recycling* (2002)

9. Food Recycling Law

[1] Title of the law: Law for Promotion of Utilization of Recyclable Food Resources (Food Recycling Law)

[2] Date put into force: May 2001 (promulgated in June 2000)

[3] Purpose: Preventing and reducing food waste discharged from food-related businesses, thereby decreasing the amount of final disposal, as well as promoting recycling of such waste as fertilizer or feedstuff.

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

[2] Leftover 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 engaging in manufacturing/processing wholesaling or retail sales of food products

* Food manufacturers, greengroceries, department stores, supermarkets

[2] Restaurants and other food-service businesses

* Cafeterias, restaurants, hotels, Japanese-style hotels, wedding centers, restaurant ships

(3) Responsibilities of food-related businesses

Food-related businesses engaging in manufacturing and distributing food products or providing restaurant services shall carry out recycling of food waste (through prevention of waste generation, reuse, and reduction of final disposal).

Those discharging 100 tons or more food waste annually shall promote recycling in accordance with the “judgment criteria.”

[Aiming at increasing the recycling rate to 20% by FY2006]

[1] Prevention: preventing generation of food waste

[2] Recycling: using food waste as fertilizer, feedstuff, oil and fat products or raw material for methane.

- Fertilizer: compost made by aerobic fermentation, organic fertilizer made by drying
- Feedstuff: feed for livestock or aquarium fish made by pressure steaming, aerobic fermentation or dehydration through frying
- Oil and fat products: frying 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 to generate power

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

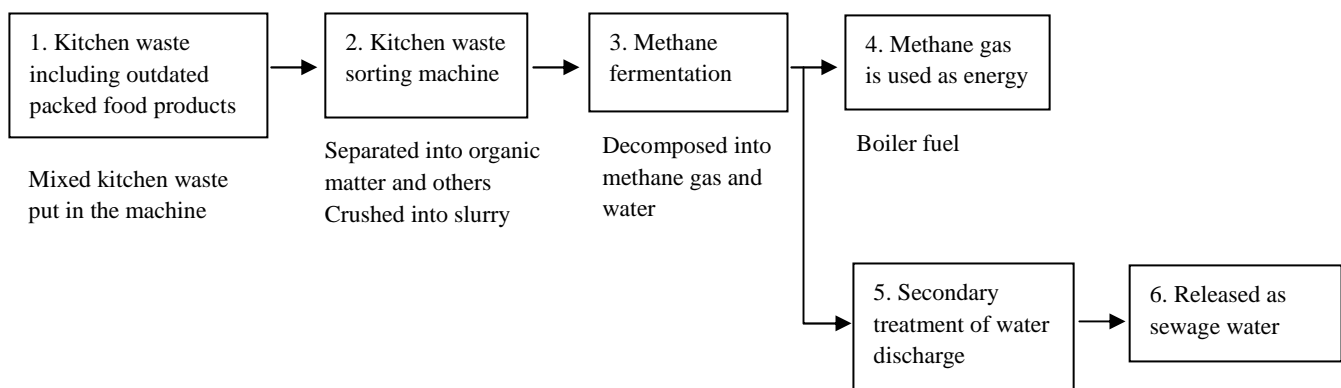
(4) Responsibility of consumers

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

(5) Responsibility of the national and local governments

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

Waste disposal system by methane fermentation

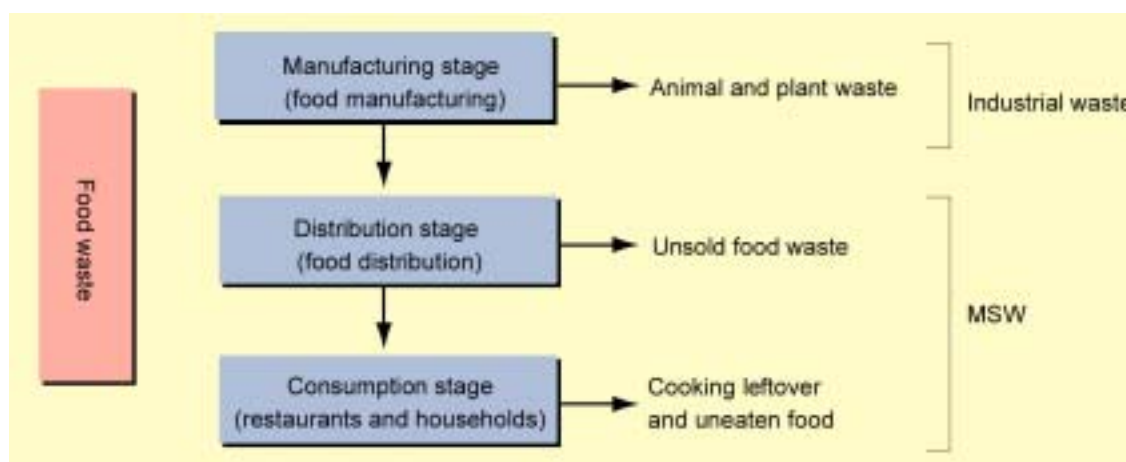


Generation of food waste

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)

Fig. 36 Generation of Food Waste



Source: Ministry of Agriculture, Forestry and Fisheries (<http://www.maff.go.jp>), Law for Promotion of Utilization of Recyclable Food Resources

Amount of food waste generated and recycled

Table 3 Amount of Food Waste Generated and Recycled

	Waste generated (10 thousand tons)	Disposed (10 thousand tons)				
		Dumped into landfill	Recycled			
			Fertilizer	Feedstuff	Others	Total
MSW	1,600	1,595 (99.7%)	5 (0.3%)	—	—	5 (0.3%)
Business waste	600					
Household waste	1,000					
Industrial waste	340	177 (52%)	47 (14%)	104 (31%)	12 (3%)	163 (48%)
Total industrial waste		775 (83%)	49 (5%)	104 (11%)	12 (1%)	165 (17%)
By deducting the amount of household MSW from the total	940					
Total	1,940	1,772 (91%)	52 (3%)	104 (5%)	12 (1%)	168 (9%)

Note: Estimated by the Ministry of Agriculture, Forestry and Fisheries based on the data provided by the Ministry of Health and Welfare (FY1996)

Source: Ministry of Agriculture, Forestry and Fisheries (<http://www.maff.go.jp>), Law for Promotion of Utilization of Recyclable Food Resources

10. Green Purchasing Law

[1] Title of the law: Law for Promotion of Procurement of Recycled Products by the National Organizations and Local Authorities (Green Purchasing Law)

[2] Date put into force: April 201 (promulgated in May 2000)

[3] Purpose: Creating and developing markets for recycled products and other products that can reduce environmental impact.

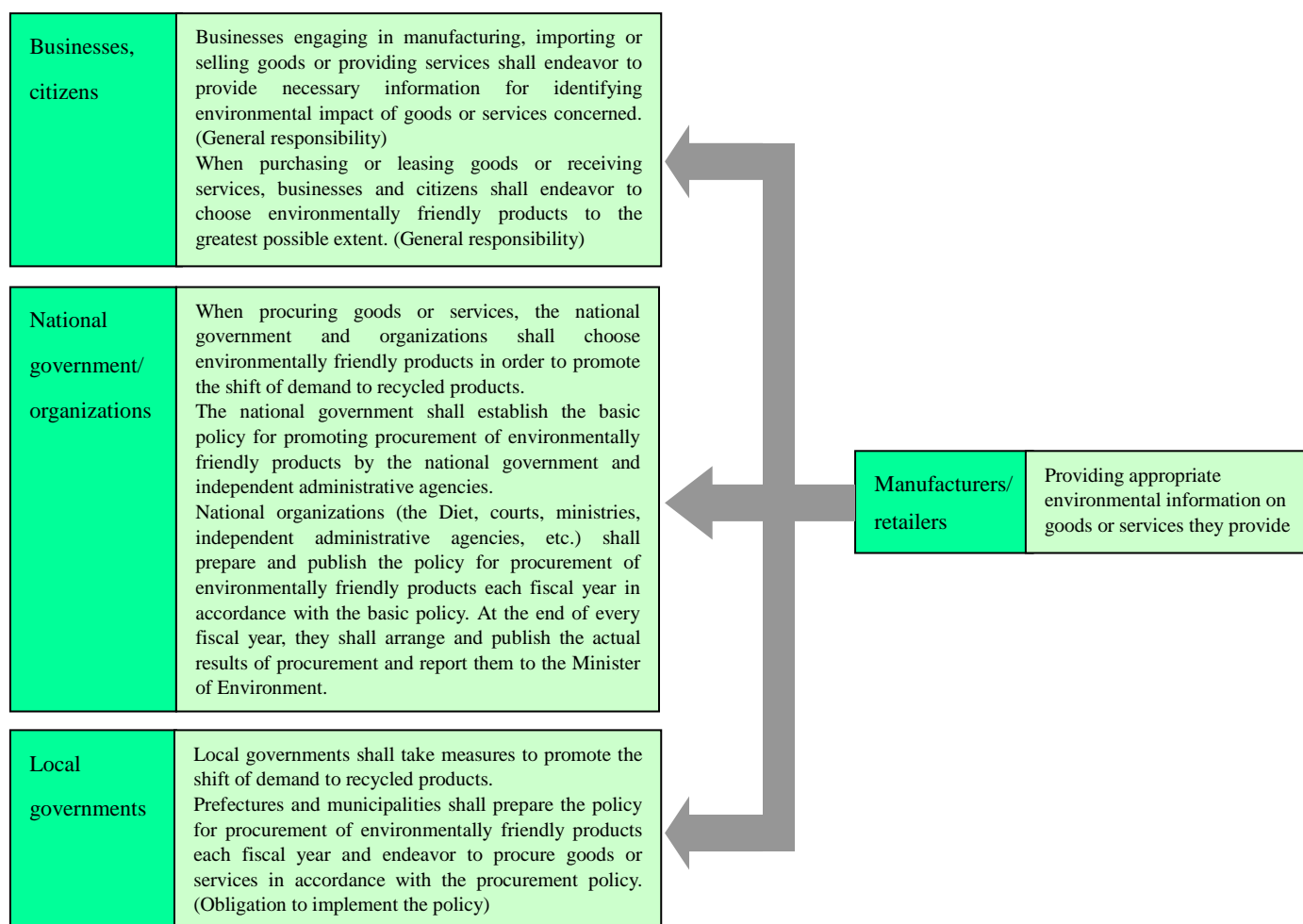
Outline of the law

The law provides that the national government, national organizations and local authorities shall take the lead in purchasing environmentally friendly products, while businesses shall choose environmentally friendly products when purchasing goods to the greatest possible extent (see Fig. 37).

(1) Specific procurement articles

The law specifies the types of environmentally friendly products on which priority should be placed in procurement and judgment criteria with respect to 152 articles (see Table 4).

Fig. 37 Green Purchasing Law



Green procurement

Green procurement generally means that, when purchasing raw materials, manufactures preferentially choose environmentally friendly products or procure products from manufacturers that give environmental consideration. 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. Among others, 18 large information/communication device manufacturers unified their green procurement criteria in 2000 and included heavy metals and halogen compounds such as cadmium (Cd), lead (Pb), mercury (Hg) and hexavalent chromium (Cr⁶⁺), 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 EU) in July 2006 to prohibit home appliances and communication devices from containing Pb, Hg, Cd, Cr⁶⁺ 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 Specific Procurement Items and criteria (152 in total)

Category	Specific procurement item (Cabinet decision on February 15, 2002)	Criteria
Paper	9 items including communication paper (copy paper, diazo-type paper, OCR paper), printing paper, sanitary paper (toilet paper, facial tissue)	Composition of recycled paper Whiteness degree, etc.
Stationary	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)
Equipment	10 items including chairs, desks, shelves, coat hooks, umbrella stands, blackboards	
OA equipment	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 apparatus, fluorescent light tubes	
Vehicles	Automobiles (natural gas cars, hybrid cars) ETC devices, VICS devices	Emission gas, fuel consumption
Uniform Working wear	Uniform, working wear	Use of resin recycled from PET bottles
Interior goods Bed clothing	Carpets, curtains, blankets, futon, bed frames, mattresses	
Working gloves	Working gloves	
Facilities	Photovoltaic generation systems, fuel batteries, solar thermal systems, kitchen waste disposers	Use of solar energy Reduction of kitchen waste
Public works	Public works [1] Recycled materials (26 items including recycled wood boards, tiles, mixed cement, recycled aggregates, undercoat, permeable concrete, heat insulating window sashes/doors, automatic water taps, light control systems, sewage sludge fertilizer [2] Construction machinery (low-emission type, low-noise type)	
Services	Energy saving diagnosis, cafeterias, printing, tire repair exclusively for automobiles	Contents of technical qualification and diagnosis, kitchen waste disposal, composition of recycled paper, tire repair

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

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

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

In the Guidelines for Waste Treatment and Recycling (by Commodity/Business), 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 commodities and 10 businesses. After repeated revisions for improvement and enhancement of the contents, they were revised in July 2001 for the sixth time to regulate 35 commodities and 18 businesses in total.

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

(1) Guidelines by commodity (35 commodities)

Paper	Glass bottles	Steel cans	Aluminum cans, etc.
Plastics	Automobiles	Motorbikes	Tires
Bicycles	Home electrical appliances	Spring mattresses	Large furniture
Carpet	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	

For details, see the booklet on the “Guidelines for Waste Treatment and Recycling (by Commodity)” published by the Clean Japan Center.

(2) Guidelines by business (18 businesses)

Iron and steel	Paper/pulp manufacturing	Chemicals	Glass sheet manufacturing
Textiles	Nonferrous metal manufacturing	Electricity	Automobile manufacturing
Car parts manufacturing	Electronic/electric device manufacturing	Oil refinery	Distribution
Leasing	Cement manufacturing	Rubber product manufacturing	Coal mining
Gas	Factory-produced housing manufacturing	For details, see the booklet on the “Guidelines for Waste Treatment and Recycling (by Business)” published by the Clean Japan Center.	

12. Environmental Labels and Identification Marks

According to ISO 14020 and JIS Q 14020, “environmental labels and declarations” function as claims indicating 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 environmental friendliness of products in comparison with other similar products in light of the entire life cycle with respect to specific kinds of commodities, and certify products as environmentally friendly products 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 (<http://www.jeas.or.jp>).

Fig. 38 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 available as a symbol indicating “Recyclable” or “Recycled Content.”

Fig. 39 Mobius Loop



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

Fig. 40 Identification Marks

Products recycled from PET bottles



Council for PET Bottle Recycling
(<http://www.petbottle.rec.gr.jp>)

Products made of recycled paper (Green Mark)



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

Products made of recycled paper



(100% made of recycled paper)
Council for Gomi Zero Partnership
(<http://www.gomizero.jp>)

Products made of recycled paper from milk cartons



Japan Milk Carton Recycling Association
(<http://www.packren.org>)

Paper containers



Committee for Milk Container Environmental Issues
(<http://www.yokankyo.jp>)

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 environmental impact of products through the entire life cycle, from gathering of resources to manufacturing, use, and disposal/recycling, 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 (<http://www.jemai.or.jp>).

Fig. 41 Eco-Leaf



13. 3R-Oriented Designs

In July 1994, the Industrial Structure Council developed the “Guidelines for Pre-Evaluation Manuals in Product Designing to Contribute to the Promotion etc. of the Use of Recycled Resources” as a reference for manufacturers to prepare pre-evaluation manuals in consideration of promotion of recycling of used products, use of recycled 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 designing under their own guidelines.

Product assessment (pre-evaluation) originally means that manufacturers, prior to production, investigate, estimate and evaluate 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 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)	Jul. 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)	Mar. 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)	Sep. 1998	“Designing Guidelines for Recycling of Television Sets” established
	Mar. 2001	“Product Assessment Manual: Electric Home Appliances” revised (to include 3R programs)
Japan Office Institutional Furniture Association (http://www.joifa.or.jp)	Apr. 2001	“Guidelines on Environmental Measures for Office Furniture” revised (to include 3R programs)
	Apr. 2001	“Product Assessment Manual: Metal Furniture” established
	Jun. 2002	“JOIFA Environmental Self-Action Plan” revised
Japan Luminaires Association (http://www.jlassn.or.jp)	Sep. 2001	“Product Assessment Manual: Luminaires” revised (to include 3R programs)
Japan Game Machine Association	Jul. 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)	Sep. 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)	Mar. 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)	Mar. 2001	“Assessment Guidelines: Gas/Kerosene Appliances” revised (to include 3R programs)
Japan Association of Kitchen & Bath Japan Reinforced Plastics Society; (Bath Tub Division) (http://www.jrps.or.jp) Japan Bath Unit Association	Jun. 2001	“Product Assessment Manual: Bath Units” established (including 3R programs)
Japan Association of Kitchen & Bath (http://www.kitchen-bath.jp)	Apr. 2001	“Product Assessment Manual: Kitchen Components” established (including 3R programs)
Japan Electric Lamp Manufacturers Association	Jul. 1992	“Product Assessment Manual: Lamps and Stabilizers”
Japan Vending Machine Manufacturers Association (http://www.jvma.or.jp)	Mar. 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)	Mar. 2001	“Product Environmental Assessment Guidelines for Cellular Phones/PHS” established

Note: Based on the interviews with industrial associations concerned.

Source: Industrial Structure Council, July 18, 2000 (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

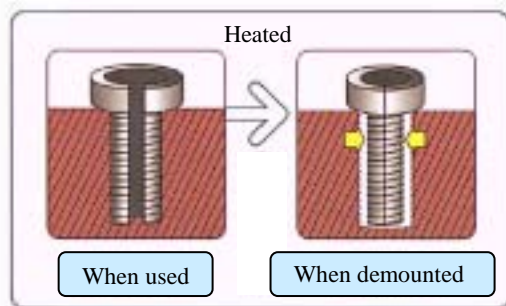
Company C designs office chairs that can easily be dismantled by using single materials and indicate as much materials as possible, thereby promoting recycling of materials.

[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.

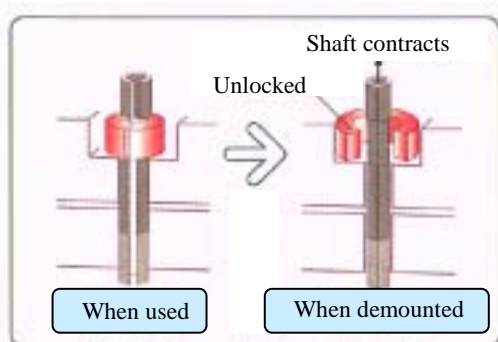
Fig. 44 Easily-Demountable Screws

- Easily-demountable screw 1

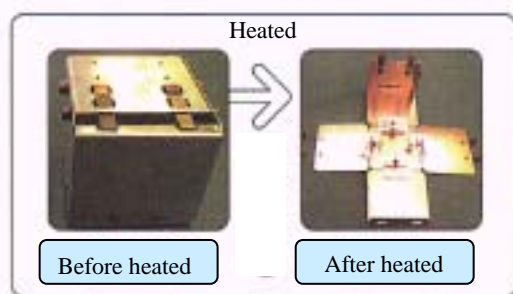


This pipe-like screw is made of shape-memory alloy and has a slit in it. When heated, it contracts and its diameter decreases, becoming demountable.

- 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 without manpower.

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, soy 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. 46).

The cullet use rate has been increasing year by year since FY1990 and had already reached 82.0% by FY2001, exceeding the 80%-level that was expected to be achieved by FY2005 under the Law for Promotion of Effective Utilization of Resources (see Fig. 45). The amount of glass bottles selectively collected and recycled under the Containers and Packaging Recycling Law was 790,000 tons (FY2001).

Fig. 45 Amount of Glass Bottles Produced, Amount of Cullets Used and Cullet Use Rate



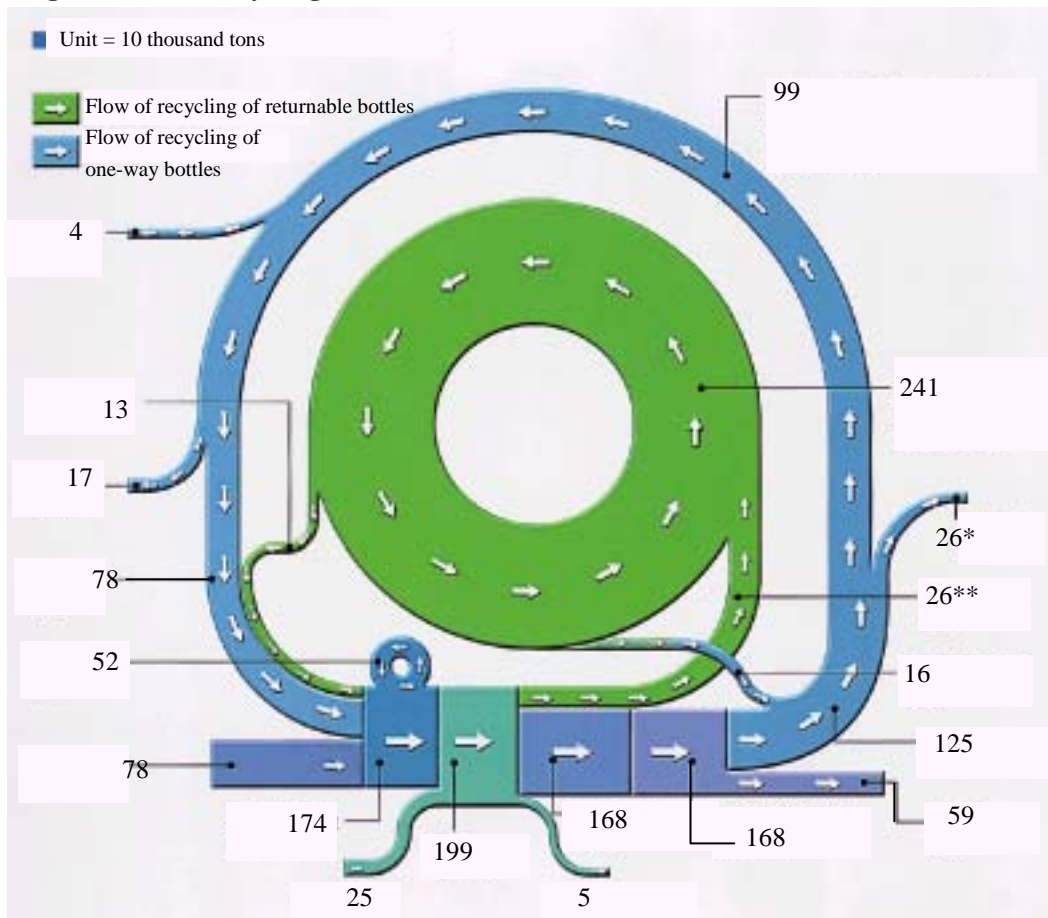
Note: Cullets are made by crushing glass bottles that are collected as recyclable waste and sorted by color.

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

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

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

Fig. 46 Flow of Recycling of Glass Bottles (FY2001)



4: Amount of secondary waste; 13: Bottler cullets; 17: For other uses; 78: Bottle cullets; 52: Cullets from plants; 83: Virgin 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. 47 Ratio of Cullets Supplied for Other Uses (FY2001)



Source: Glass Bottle Recycling Association

2. Steel Cans

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

The weight of steel cans collected in 2001 was about 900,000 tons and the recycling rate was 85.2%, exceeding the 85%-level targeted in the Guidelines for Waste Treatment and Recycling by Commodity (see Fig. 48). 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 selectively collected has improved and more steel manufacturers have become willing to reuse such scraps.

The number of drink cans consumed in 2001 was 34.7 billion, of which 49.9% 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. 49).

Fig. 48 Weight of Steels Cans Consumed, Weight of Cans Collected and Recycling Rate



- Note:
1. Data for 1998 and before is 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.

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

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

Fig. 49 Flow of Recycling of Steel Cans (estimate in 2001) (Unit: thousand tons)



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

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. 50) 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] Spreading of sorted collection;
- [2] Sufficient users of recycled cans; and
- [3] Easiness in recycling aluminum cans.

In FY2001, the amount of aluminum cans recycled was 235,000 tons and the recycling rate was 82.8%, exceeding the 80%-level that was expected to be achieved by 2002 under the Guidelines for Waste Treatment and Recycling by Commodity. The weight of aluminum cans reused as materials was 159,000 tons and the can-to-can rate was 67.8%, exceeding the 80%-level that was expected to be achieved by 2002 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. 50 and 51).

Fig. 50 Weight of Aluminum Cans Consumed, Weight of Cans Recycled (Collected) and Recycling Rate



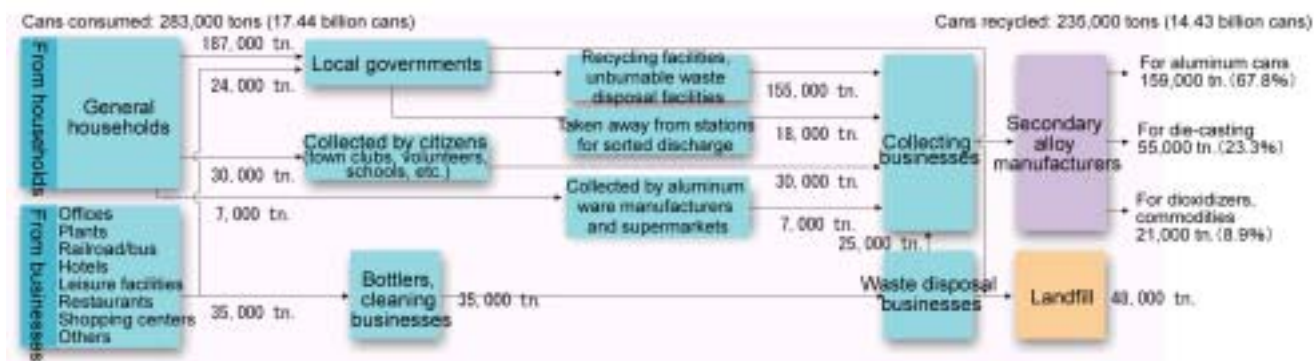
Note:

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

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

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

Fig. 51 Flow of Recycling of Aluminum Cans (FY2001)



- Note:
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 the Association's estimation.
 2. The breakdown of the amount of aluminum cans recycled via local governments (155,000 tons) is as follows:
 - Amount of products recycled from cans selectively collected by local governments: 130,000 tons (based on the announcement by the Ministry of Environment and the survey arranged by the Association)
 - Amount of shreds collected from crushed unburnable waste: 6,000 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)

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>)

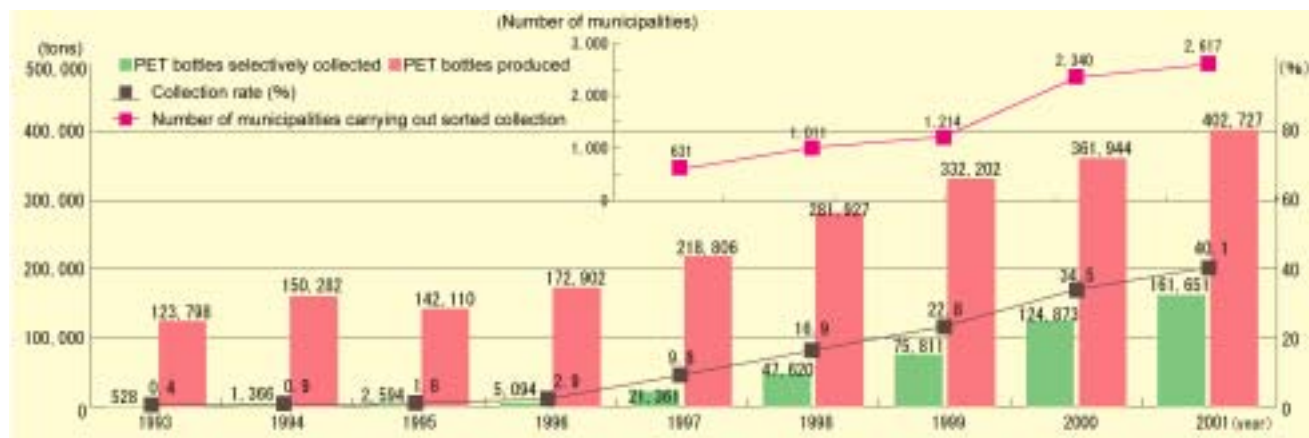
PET bottles used for soft drink, soy sauce and alcohol are to be labeled under the Law for Promotion of Effective Utilization of Resources (see page 25). The majority, 94%, of such PET bottles is used for soft drink, 3% for soy sauce and 3% for alcohol. 40,000 tons of PET bottles were also produced for seasoning, cosmetics, and detergents (in 2001).

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 selectively collected and the collection rate have been increasing rapidly as the amount of PET bottles produced for soft drink increases and the number of municipalities carrying out sorted collection of PET bottles under the Containers and Packaging Recycling Law increases significantly (see Fig. 52).

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. 18), about 95,000 tons of resin was recycled (in FY2001), of which about 51% was used for carpets and other textile products and about 40% as sheets for egg cartons (see Fig. 53 and 54). Retailers also recovered PET bottles independently (see Fig. 18).

Efforts are being made to materialize the bottle-to-bottle recycling by chemical decomposition by the end of FY2003. The aim of this technology is to decompose used PET bottles into materials for PET resin such as monomer (dimethyl terephthalate or bis(hydroxyethyl) terephthalate), and polymerize these materials again to make PET resin for PET bottles. It is an important method to improve recycling of PET bottles.

Fig. 52 Amount of PET Bottles Produced, Amount of Bottles Selectively Collected, Collection Rate, and Number of Municipalities Carrying Out Sorted Collection



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

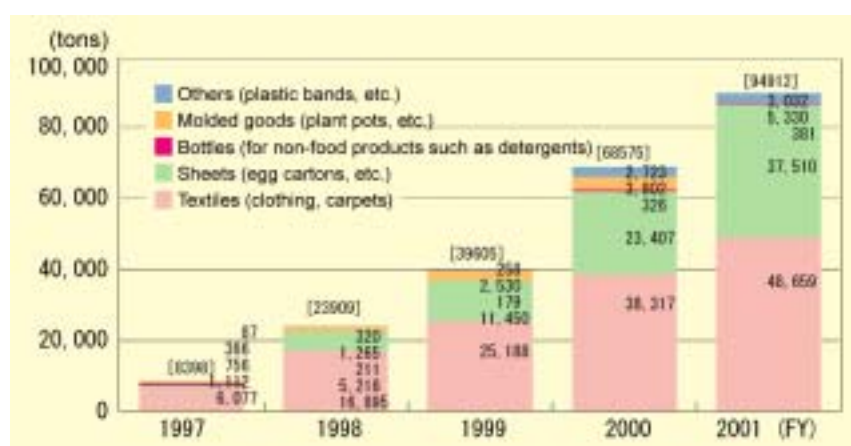
$$\text{Collection rate} = \frac{\text{Amount selectively collected}}{\text{Amount produced}}$$

Source: Council for PET Bottle Recycling (<http://www.petbottle-rec.gr.jp>)

Fig. 53 Products Recycled from PET Bottles

Source: Council for PET Bottle Recycling

Fig. 54 Amount and Use of Products Recycled from PET Bottles



Source: Japan Containers and Packaging Recycling Association (<http://www.jcpra.or.jp>)

5. Plastics

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

What should be specially mentioned with respect to recycling of plastic waste is as follows.

[1] The effective use rate reached 53%.

[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 2001 was 5.28 million tons as MSW and 4.89 million tons as industrial waste. Of the 5.35 million tons of plastic waste effectively used, 1.47 million tons were used as raw materials (material recycling), 210,000 tons were used for liquefaction, gasification or blast furnacing (chemical recycling), the majority of both (1.68 million tons) being recycled under the Containers and Packaging Recycling Law, 290,000 tons were used as refuse derived fuel (RDF) including raw material/fuel for cement (thermal recycling), 2.07 million tons were incinerated for power generation from waste (thermal recycling), and 1.32 million tons were incinerated for heat application (thermal recycling). Of the 1.47 million tons used as plastic materials, 600,000 tons were contained in finished products (the remaining 870,000 tons were production/processing waste), the majority of which was used in PET bottles (178,000 tons), followed by polyethylene foam including trays (76,000 tons) and PVC tubes/connections (16,000 tons). On the other hand, the amount of plastic scraps exported in 2001 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 are also 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.

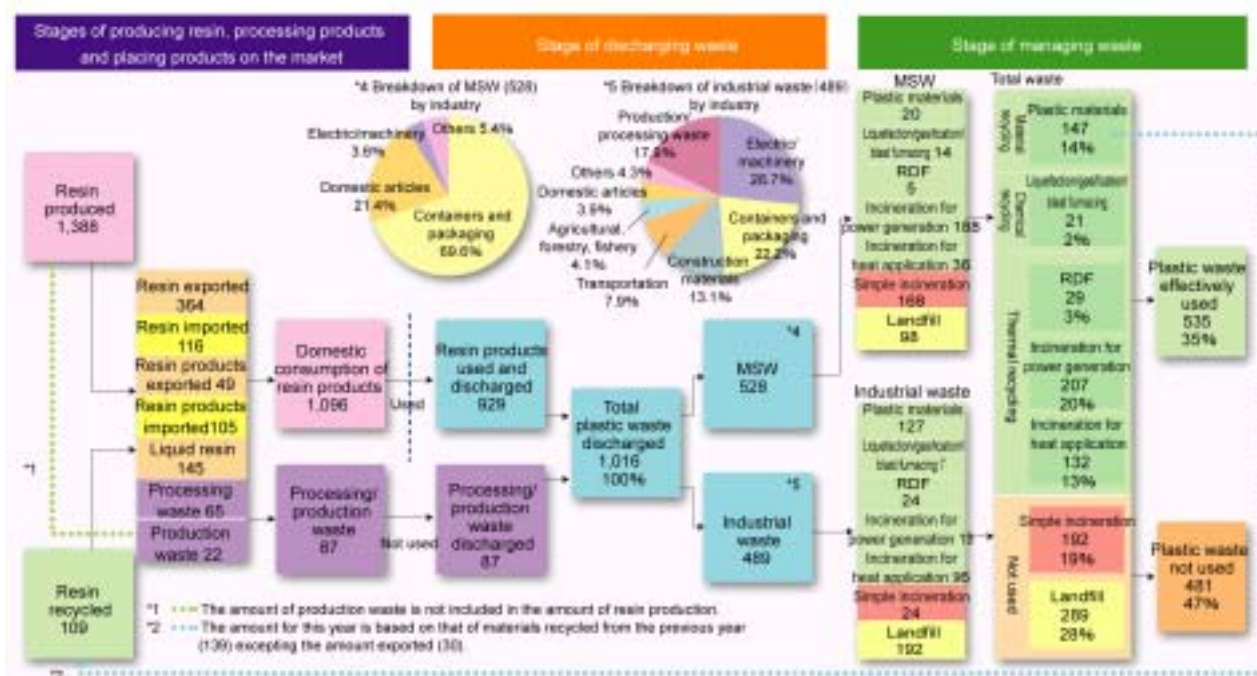
Fig. 55 Amount of Plastics Produced and Discharged



Note: 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 (<http://www.pwmi.or.jp>)

Fig. 56 Flow of Recycling of Plastic Waste (2001) (Unit: 10 thousand tons)



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

6. Styrofoam

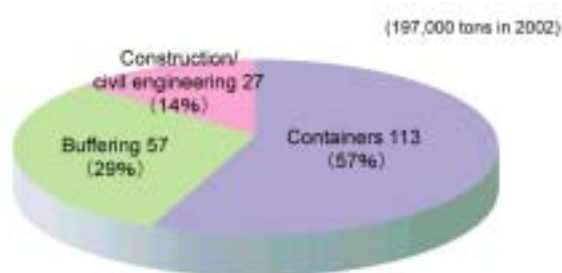
Japan Expanded Polystyrene Recycling Association
(<http://www.jepsra.gr.jp>)

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. 58), of which 57% is used for containers for fresh fish or vegetables/fruits, 29% for buffering, and the rest for construction/civil engineering (see Fig. 57).

EPS waste is collected through wholesale markets, large home appliances 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 68,800 tons (material recycling) with the material recycling rate at 39.1% in 2002. Collected EPS waste is recycled as ingot (about 80% is exported), reused as packaging, videocassettes or synthetic wood after palletized, or used as mortar additives after crushed. 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. 58).

Fig. 57 Amount of EPS Supplied, by use (thousand tons/year)



Source: Japan Expanded Polystyrene Recycling Association

Fig. 58 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 (<http://www.jepsra.gr.jp>)

(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. 56).

PSP food containers are mainly discharged from households and selectively 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 industries concerned or by individual tray manufacturers at supermarkets or packaging stores in cooperation with such stores (self-collection system; see Fig. 18). The rate of self-collected PSP trays exceeds 19% of the amount of production (Source: Japan Polystyrene Foamed Sheet Industry Association; <http://www.jasfa.jp>)

(3) **XSP**: It is used as heat insulating construction materials and discharged from construction works.

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.

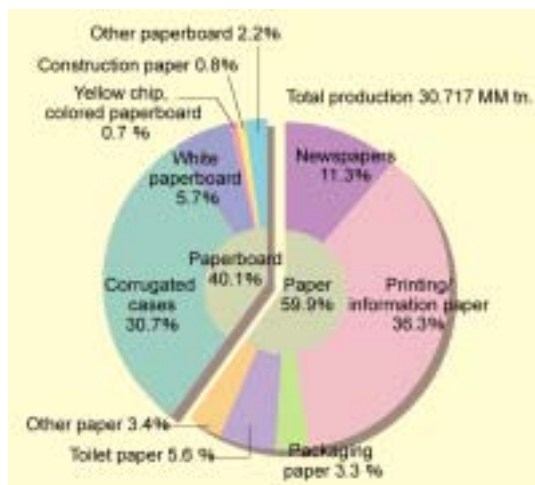
In 2001, the production of paper/paperboard reached 30.72 million tons, the majority of which is consumed domestically (see Fig. 59).

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 (engaging in collecting mainly industrial waste) or specialized purchasers. In 2001, 19.12 million tons of used paper was collected and about 17.78 million tons of recycled paper was consumed (see Fig. 60). Both the paper collection rate and the paper recycling rate (rate of used paper to the total papermaking raw materials) have been increasing year by year, reaching 61.5% and 58.0% in 2001 respectively (see Fig. 61).

Under the Containers and Packaging Recycling Law, 49,723 tons of used paper containers were selectively collected by municipalities (see Fig. 19) and 44,675 tons were recycled in 2001 (Source: Ministry of Environment (<http://www.env.go.jp>)).

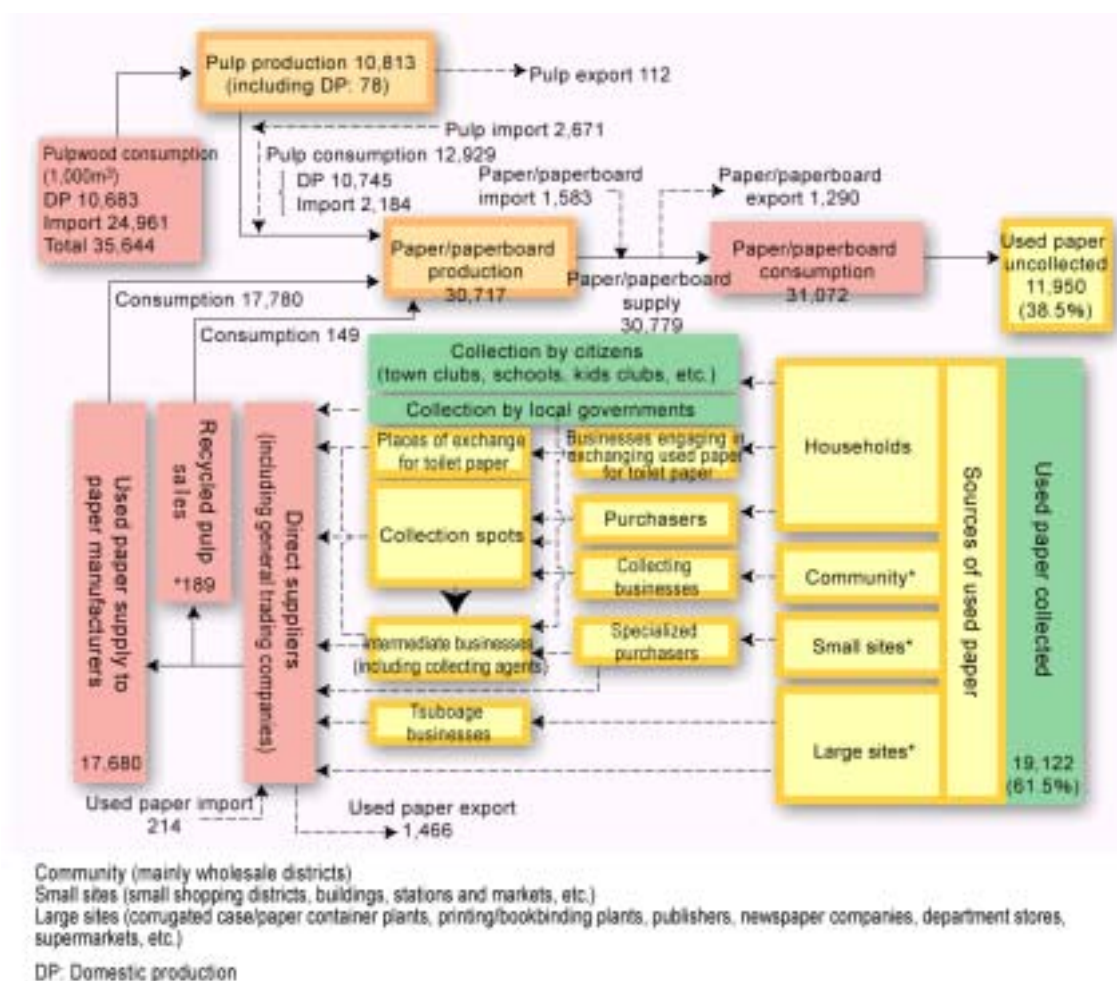
Recycled paper is used for many kinds of paper products such as toilet paper and telephone books. About 80% of the total amount of recycled paper is used for corrugated cases, newspapers, and magazines. Slightly less than 1% of the total recycled paper is also used as trays for eggs or vegetables/fruits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

Fig. 59 Paper production by type of paper (2001)



Source: Annual Report of Statistics on Paper/Pulp

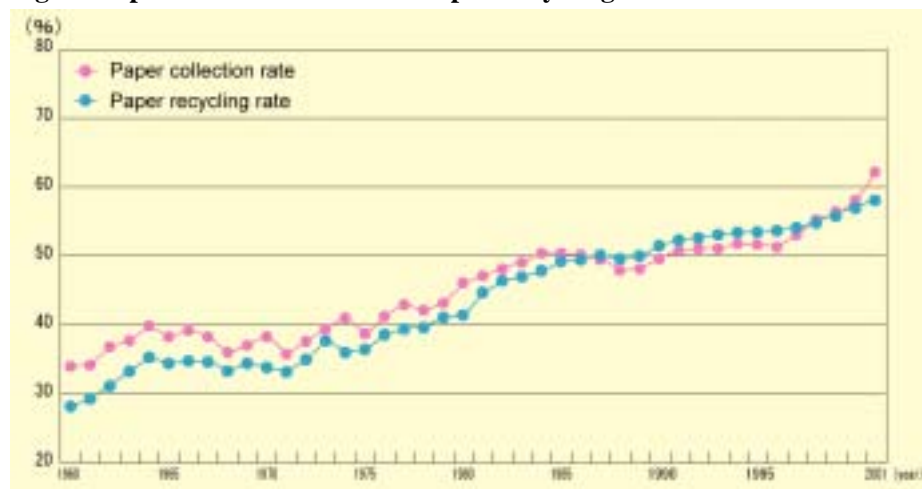
Fig. 60 Generation and Distribution of Recycled Paper (2001: thousand tons/%)



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

Source: Paper Recycling Promotion Center (<http://www.prpc.or.jp>), *Annual Report of Statistics on Paper/Pulp*; *Japanese Trade Monthly Sheet*

Fig. 61 Paper Collection Rate and Paper Recycling Rate



Note:

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

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

Delivery to manufactures* include the amount of recycled pulp delivered (converted into recycled paper).

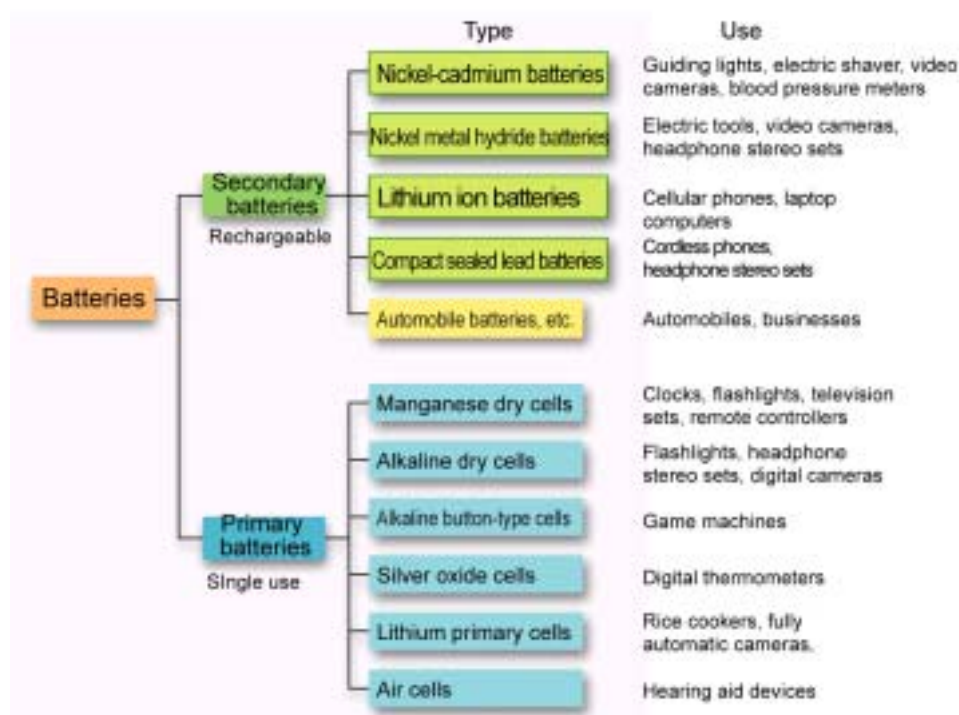
Source: Annual Report of Statistics on Paper/Pulp

8. Compact Rechargeable Batteries

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

There are many types of batteries/cells as shown in Fig. 62.

Fig. 62 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 manufacturers of equipment that uses such batteries (29 items; see page 25). Collection and recycling of compact rechargeable batteries is carried out by the Japan 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 electric appliance shops, supermarkets, mass retailers, and electric tool shops that are members of the “Rechargeable Battery Recycling Club,” 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 FY2001, 1,032 tons of such batteries were collected from 31,000 collection spots (see Fig. 64). The recycling rate differs among types of compact rechargeable batteries, ranging from 37% to 71% (FY2001).

Fig. 63 Collection of Compact Rechargeable Batteries

Put compact rechargeable batteries into the “Recycling Box” located at cooperative 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 Battery Recycling Center

Fig. 64 Amount of Compact Rechargeable Batteries Collected and the Number of Collection Spots



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

9. Vehicles

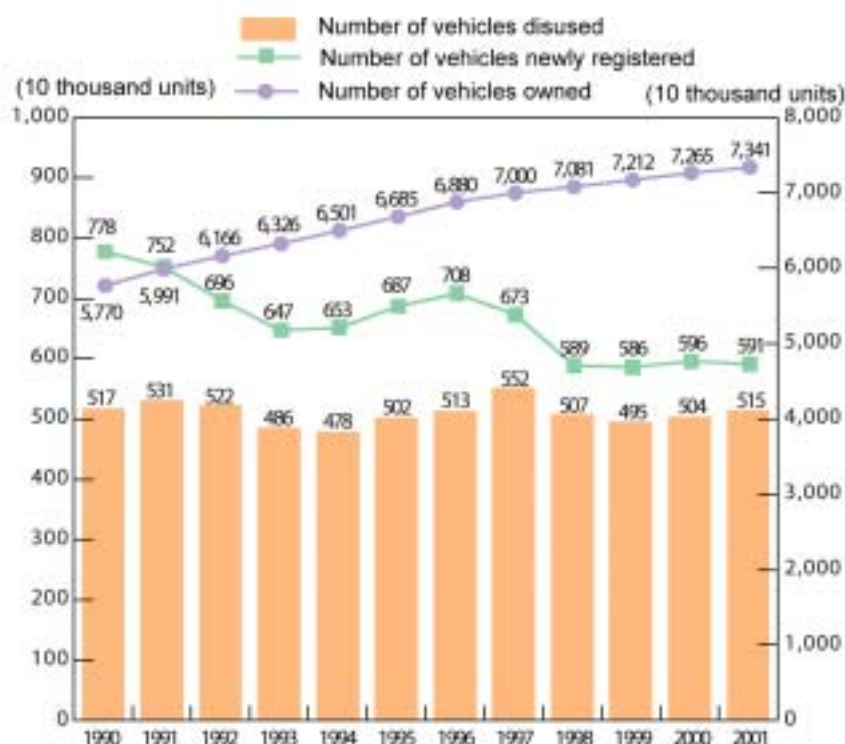
Japan Automobile Manufacturers Association
(<http://www.jama.or.jp>)

The number of vehicles owned was 73.41 million in 2001 while the number of vehicles disused has remained almost unchanged at around 5 million a year in the past decade (see Fig. 65). 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 75-80% (see Fig. 66). In May 1997, the Ministry of International Trade and Industry (current Ministry of Economy, Trade and Industry) published the “End-of-Life Vehicle Recycling Initiative,” setting 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.

End-of-life vehicles generate shredder dusts such as resin, glass, and rubber, which account for 20-25% of the weight of vehicles disused (see Fig. 66). Among others, resin accounts for about 34% in terms of weight and about 52% in terms of volume in the total amount of shredder dusts. Currently, due to the shortage of controlled-landfill as final disposal places for shredder dusts, it is a priority issue to reduce shredder dusts.

As the Law for Promotion of Effective Utilization of Resources includes automobiles in the specified resource-saved products and the specified reuse-promoted products, the automobile industry works on 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. Furthermore, the End-of-Life Vehicle Recycling Law established in 2000 will be fully put into force by 2004, and the movement toward recycling and proper disposal of end-of-life vehicles is being accelerated.

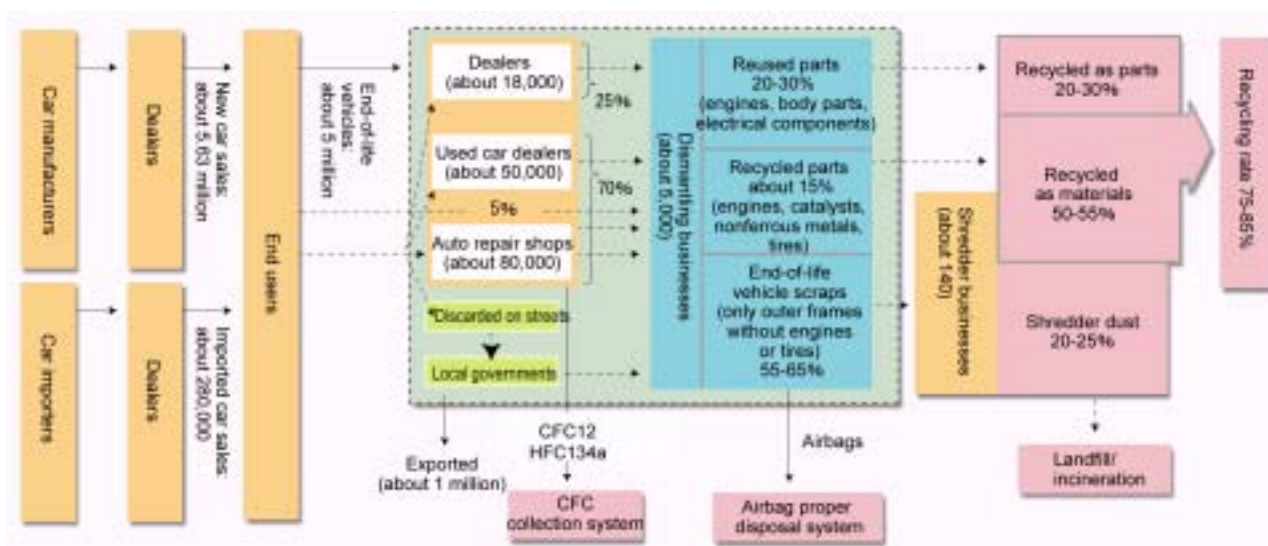
Fig. 65 Number of Vehicles Disused



Note: Number of vehicles disused = 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. 66 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 11.40 million units (3.07 millions produced + 8.33 millions imported) in 2000 (see Fig. 67).

Bicycles are largely divided into general bicycles, infant bicycles, and bicycles equipped with a driving assist device (electric-assisted bicycles). Electric-assisted bicycles that use sealed batteries (compact rechargeable batteries) are specified as reuse-promoted products (see page 25) and are designated as products containing specified resource-recycled parts (see page 26) under the Law for Promotion of Effective Utilization of Resources.

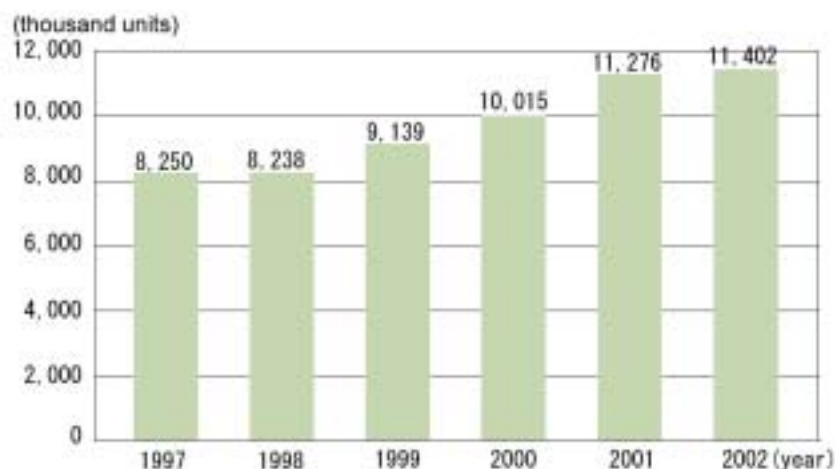
In March 2002, the bicycle industry established the policy for product assessment in the process of designing and manufacturing recycling-oriented products with the aim of implementing the 3Rs under the Law for Promotion of Effective Utilization of Resources and the Guidelines for Waste Treatment and 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 the survey in 1998 (see Fig. 68).

In the 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 dusts (12.9%), which revealed that 87.1% was recyclable. Metal materials, which are sorted out 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%).

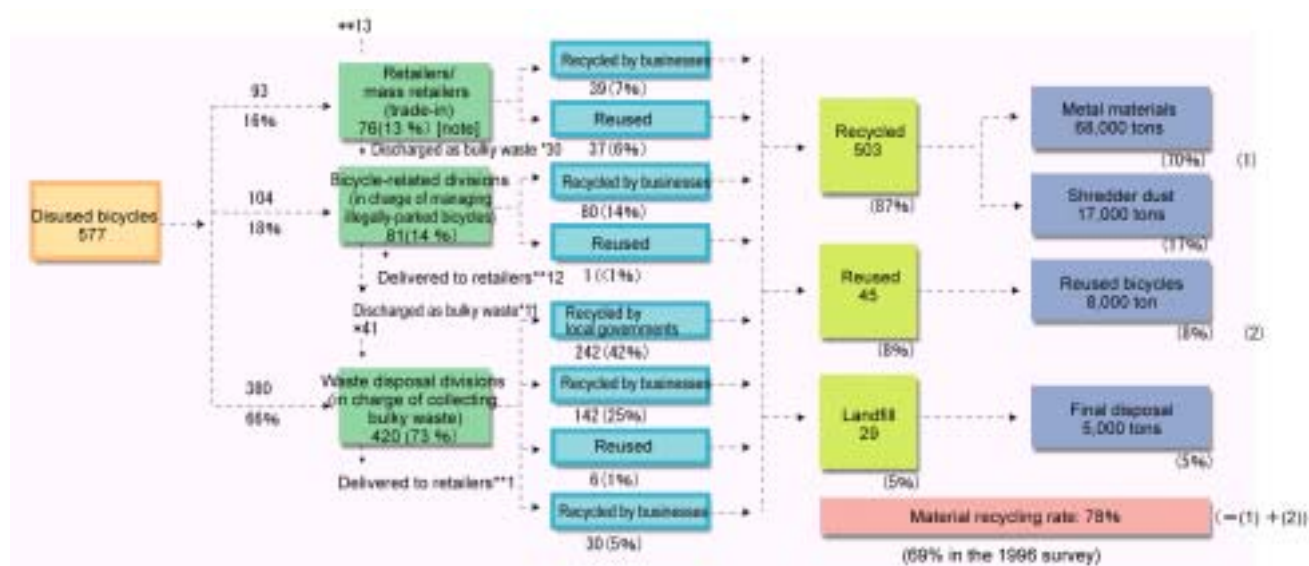
Fig. 67 Domestic Shipment of Bicycles



Note: 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 (<http://www.jbpi.or.jp>)

Fig. 68 Flow of Collection and Disposal of Disused Bicycles (1998) (Unit: 10 thousand 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

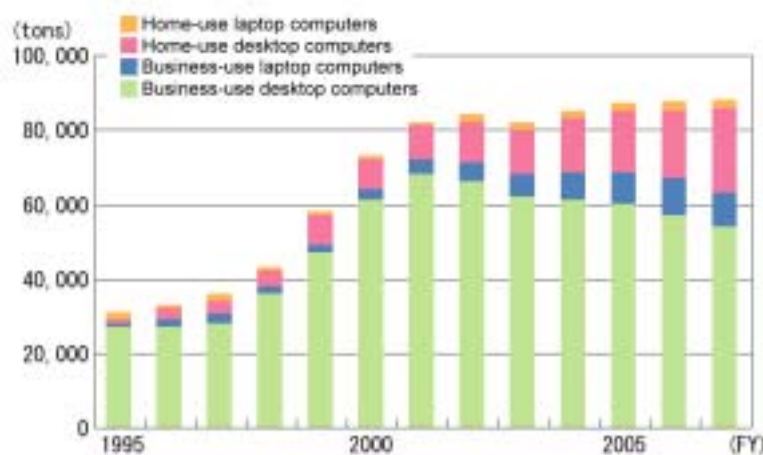
Along with the recent expansion of personal computers, the average period of use is 8.9 years for home-use computers, excluding those not used but stored (dead storage), and 5.8 years for business-use computers. By estimate based on this survey result, the amount of computers discharged in FY2000 was 640,000 tons for business use and 8,000 tons for home use, and the total amount was 720,000 tons. The total amount increased rapidly during the period from FY1997 to FY2001, and it is expected to be around 800,000 tons for the next period (see Fig. 69).

[2] Amount of collection

By estimate, among computers discharged from businesses, 7,000 tons are collected by manufacturers, 24,000 tons are returned to leasing/rental companies, 28,000 tons are directly delivered to final disposal businesses, and 5,000 tons are taken back by retailers/dealers. As for computers discharged from households, 7,000 tons are collected by local governments, and 1,000 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. 70).

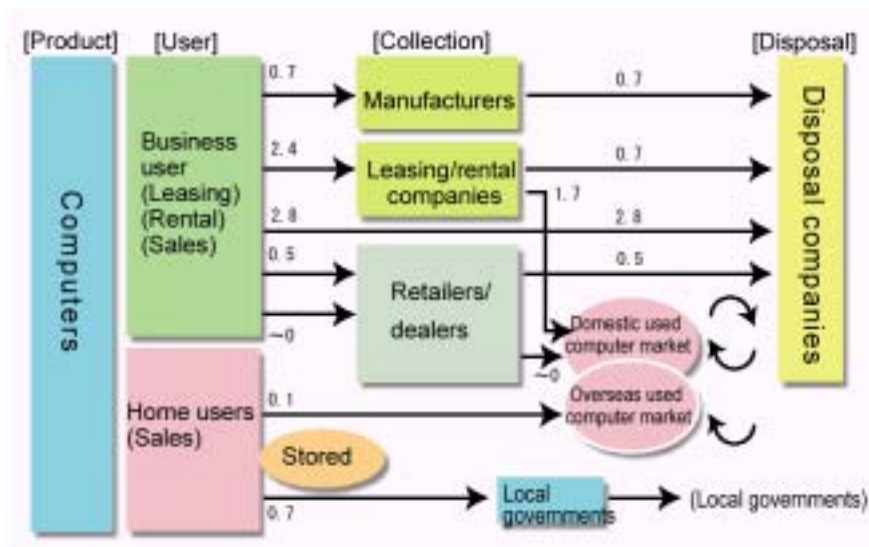
Since the Law for Promotion of Effective Utilization of Resources was put into force in April 2001, computer manufacturers have been required to design products in light of the 3Rs (reduce, reuse, and recycle) and also obliged to collect and recycle disused computers for business use (see pages 24 and 26). 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.

Fig. 69 Estimate Discharge of Disused Computers



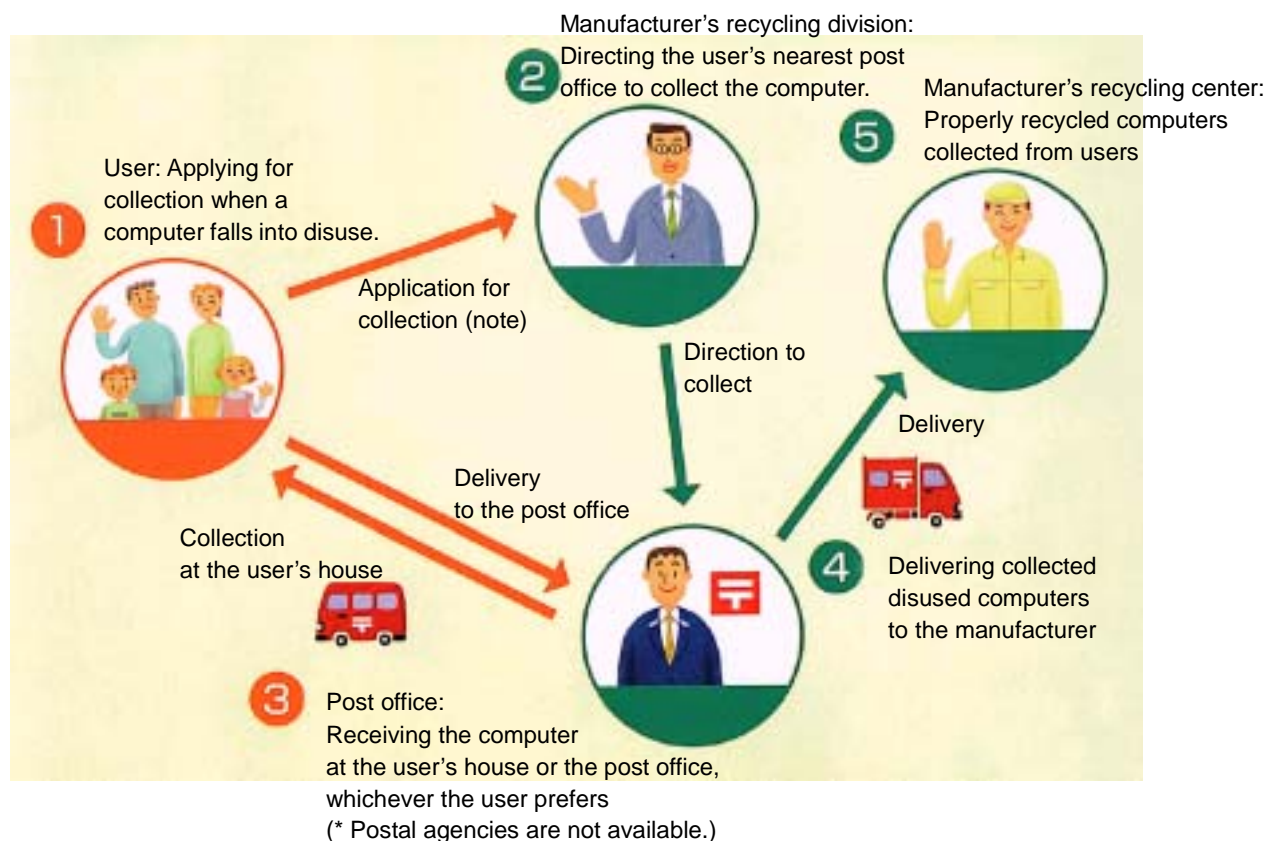
Source: Japan Electronics and Information Technology Industries Association

Fig. 70 Flow of Collection and Recycling of Disused Computers (2000) (Unit: 10 thousand tons)



Source: Japan Electronics and Information Technology Industries Association

Fig. 71 Home-Use Computer Recycling System



Note: A: Purchased before the PC recycling program started: application only
 B: Purchased after the PC recycling program started: application + payment of recycling costs
 * Please pay recycling fees as designated by the manufacturer.

Source: Japan Electronics and Information Technology Industries Association