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Establishing a sound material-cycle society

Creating economic development through the establishment of a sound material-cycle society

Ministry of the Environment
Government of Japan

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Section 1. A new economic style based on the 3Rs (3Rs: Reduction, Reuse and Recycling)

Increasing demands for our world's remaining natural resources have made it clear that Japan must work more closely with other nations to move for the establishment of a sound material-cycle society. It is evident that the present conventional style of mass production, mass consumption, and mass disposal of goods and materials employed by society is the direct cause of the exhaustion of natural resources centered on fossil fuels, global warming issues caused by Greenhouse gas, the destruction of nature by large scale extraction of resources and the inhibition of the natural material circulation found in nature. Each issue is creating serious problems at many levels and is fueling a vicious cycle of degradation.

Based on the current situation, it has become a pressing issue to realize the establishment of a sound material-cycle society, both nationally and internationally and to aim for the decreased consumption of natural resources and the reduction of environmental burden, with a focus on the construction of an everlasting and sustainable society; an integration of the commitment to aim for a low carbon society and harmonious coexistence with the natural world .

For example, in January 2008 Japan proposed a "Cool Earth Partnership" with a target of cutting by half the amount of carbon dioxide presently discharged around the world by Year 2050. To share this target, Japan set itself a long term target to reduce its own present carbon discharge by 60% to 80% before 2050, and aims to attain a low carbon society that can encourage the world to attain this target. When creating such a low carbon society, a new point of view will be required in order to construct a sound material-cycle society; existing socioeconomic activity must be transformed, which includes the prevention of exhaustion of natural resources by reducing the generation of wastes through all the steps of socioeconomic activities, from resources extraction, production, distribution, consumption to disposal or to use circulative resources, so as to reduce the environmental load to the greatest extent possible.

1. Looking to Year 2015

In Japan, in order to establish a sound material-cycle society, the relative policies have been comprehensively developed based on the Second Fundamental Plan for Establishing a sound material-cycle society. In this plan, several numerical targets are set and progress is assessed every year, with the target year of the plan being Year 2015. (See Table 1-1: Numerical targets (Material flow indicator) of Year 2015 in the Second Fundamental Plan for Establishing a sound material-Cycle Society. See also Table 1-2: Numerical targets (effort indices).) In Japan, Year 2015 can, therefore, be regarded as a "milestone" in the establishment of a sound material-cycle society. Although many indicators are showing good progress towards achievement of the Year 2015 goal, an optimistic outlook can not be taken when considering the present domestic and international economic situations.

Moreover, the results of a questionnaire survey show that, although the level of people's awareness concerning a sound material-cycle society is high, only a small number of people are actually taking concrete action. (See Table 1-3: Results on a Questionnaire Survey on the Construction of a sound material-cycle society.) The accomplishment of the goal of Year 2015 must be made as secure as possible, not only by letting participants take the initiative in what they can achieve through their own originality and mental attitude, but also by the expansion and establishment of a sound material-cycle society through the integration of a sound material-cycle society coupled with economic development.

Concerning the expansion and establishment of a sound material-cycle society, the "Significance of a sound material-cycle society" will be reaffirmed first of all in the following statements, as it is inevitable to promote the understanding of the necessity for construction of a sound material-cycle society by participants forming a sound material-cycle society. Then, in the next paragraph of "For Integration of a sound material-cycle society and Economic Development," an overview will be presented on the concrete actions required for each participant, construction of a sound material-cycle society and concrete tackling for achievement of economic growth.

Table 1-1 Numerical targets in fiscal year 2015 under the 2nd Fundamental Plan for Establishing a Sound Material-Cycle Society (material flow indicators)

Indicators	Targets
Resource productivity*1	420,000 yen/ton
Cyclical use rate*2	14 to 15%
Final disposal volume	23 million tons
Resource productivity excluding input of earth and rock resources	770,000 yen/ton
GHG emissions from waste (Cooperation with initiatives toward a low-carbon society)	7.8 million tons; CO_2 reduction*3

*1: Resource productivity = GDP / Natural resources input
*2: Cyclical use rate = Volume of cyclical use / (Volume of cyclical use + Natural resources input)
*3: The target year is fiscal year 2010.
Source: Ministry of the Environment

Table 1-2 Numerical targets in the 2nd Fundamental Plan for Establishing a Sound Material-Cycle Society (effort indices)

Classification		Indicators	Targets
(1) Reducing wastes, etc.			
	a. Reducing municipal waste	(a) Daily waste generation per person*1	Approx. 10% reduction from the FY 2000 level
		(b) Daily domestic waste generation per person	Approx. 20% reduction from the FY 2000 level
		(c) Total volume of business waste	Approx. 20% reduction from the FY 2000 level
	b. Reducing industrial waste	Final disposal volume of industrial waste	Approx. 60% reduction from the FY 2000 level (Approx. 80% reduction from the FY 1990 level)
(2) Changes in awareness of and attitude toward a sound material-cycle society			
	a. Have an awareness of waste reduction, cyclical use, and green purchasing		Approx. 90% (as the target result of questionnaire survey)
	b. Take specific action for waste reduction, cyclical use, and green purchasing		Approx. 50% (as the target result of questionnaire survey)
(3) Promoting sound material-cycle society business			
	a. Promoting green purchasing	Implementing organizational green purchasing	All local governments Listed companies*2: Approx. 50% Unlisted companies*3: Approx. 30%
	b. Promoting environmental business management	Number of acquisitions of Eco Action 21 Certificates	6,000
	c. Expanding sound material-cycle society business market	Market scale	Approx. twice the level of FY 2000

*1: Daily waste generation per person was calculated using the volume of municipal waste as the sum of wastes collected through scheduled collection and group collection, and wastes carried in.
*2: Companies listed in the First and Second Sections of the Tokyo Stock Exchange, Osaka Securities Exchange and Nagoya Stock Exchange
*3: Unlisted companies with 500 or more employees, and business establishments
Source: Ministry of the Environment

Table 1-3 Questionnaire survey results concerning awareness and attitude to establishing a sound material-cycle society

Questions concerning awareness	Pay attention to reduce waste, and keep recycling in mind (always, sometimes, to some extent)	93.8%
	Interested in the waste disposal problem (very much, to some extent)	86.1%
	Keep in mind purchasing eco-friendly products (always, as much as possible, occasionally)	81.7%
Questions concerning specific activities	Carry a Mybag and refuse plastic grocery bags, or refuse excessive packaging	64.3%
	Participate in collection of supermarket trays, mobile phones, etc., at shops	41.4%
	Buy and sell at secondhand goods shops, jumble sales or flea markets	23.8%
	Positively purchase recycled products made from recycled raw materials	14.1%
	Select shops that use simplified packaging, or businesses that do not use throwaway chopsticks, or disposable tableware	10.8%
	Buy products which use reusable containers, e.g. bottled milk	10.0%

Source: Ministry of the Environment

2. The significance of a sound material-cycle society

(1) Making possible sustainable development in Japan and the world

Following the slowing of the global economy in the latter half of fiscal 2008, prices of many circulative resources involving scrap iron, used papers, and PET bottle flakes fell sharply in the short term, and it is necessary to monitor this situation in the future (Figure 1-1: A Movement of the Prices of Circulative Resources). Because of expanding demand however, there will continue to be pressure to raise the prices of resources and energy in the long run, and this trend has affected circulative resources. Extraction of resources is expanding on a global basis, especially following a period of vigorous economic growth and population increase centering on Asia, and there is a considerable and increasing concern about the dependable supply of resources. (Figure 1-2: Ratio of Expected Accumulated Total Production Amounts Until Year 2015 or 2050 in Relation to the Proved Extractable Reserve Amounts (an estimate)).

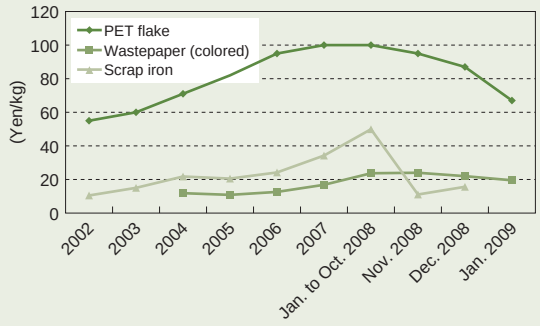
Due to its scarce natural resources, Japan has taken an approach to economic growth which is not over reliant on natural resources but rather encourages more efficient use of them, or in other words, has taken a decoupling policy for economic growth and natural resources input (a situation where the increasing rate of natural resources input is lower than that of economic growth), and this has enabled our country to maintain and strengthen her international competitiveness. Considering the present situation, where the waste disposal issue is escalating globally and concerns for the stable supply of natural resources are increasing with the international economic growth and population increase centered on Asia, there is now a pressing issue internationally to promote more aggressively our advanced approach for a sound material-cycle society involving promotion of the 3Rs movement to which Japan has committed.

(2) Reduction of greenhouse gas and disposal costs

Various greenhouse gases are generated along with the processing of waste disposal. For instance, when waste disposal is incinerated, carbon dioxide, methane, and nitrous oxide gasses are generated. Moreover, methane will be generated in the final disposal site where organic wastes are dumped. The emission amount of greenhouse gasses caused by incineration and dumping is around 45 million tons a year (carbon dioxide equivalent), and it corresponds to 3.3% of the total amount of greenhouse gas of our country. Moreover, it should be noted that carbon dioxide gas will be discharged by use of fossil fuel in the collection and transportation of waste disposal: In addition, garbage processing business expenditure has reached about 1.9 trillion yen a year.

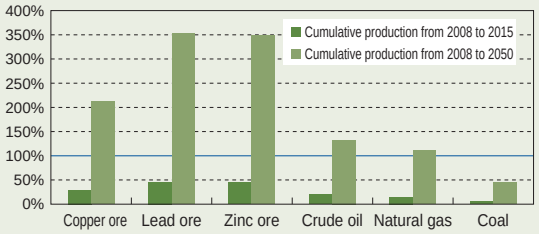
Reduction of the amount of waste disposal leads to the reduction of greenhouse gas and disposal costs. For example, in Year 2005, Yokohama City increased the classification numbers of waste disposal from 5 segregations and 7 items to 10 segregations and 15 items, and also decided to recycle plastic containers and packaging materials, in addition to waste paper instead of incinerating them. As a result, compared to fiscal 2001 municipal waste was reduced by 34% in fiscal 2005, This also led to the reduction of 750 thousand tons of carbon-dioxide emission as well as an enormous reduction in costs, including 110 billion yen saved by the cancellation of reconstruction plans for two incineration factories in the city, and a three billion yen reduction in the annual operating expenses of factories in the city.

Figure 1-1 A Movement of the Prices of Circulative Resources



Source: Created by the Ministry of the Environment, based on data from the Japan Ferrous Raw Materials Association, Waste PET Bottles Recycling Council, and Paper Recycling Promotion Center

Figure 1-2 Ratio of Expected Accumulated Total Production Amounts Until Year 2015 or 2050 in Relation to the Proved Extractable Reserve Amounts (an estimate)



Source: Created by the Ministry of the Environment, based on data from Mineral Commodities Summaries, Metal Mining Data Book, and BP Statistical Review of World Energy.

Column

The promotion effect of recycling and heat recovery

If incineration and dumping are carried out without recycling and heat recovery, it is estimated that greenhouse gas emissions will be increased from 60 to 90 million tons[*1], energy consumption will increase by 580 PJ[*2], natural resources consumption will increase by 180 million tons[*3], and dumping will increase from 120 to 150 million tons[*4]. From these results, it is clear that the promotion of recycling and heat recovery has a massive impact on the reduction of greenhouse gas, consumption of natural resources, and the amount of dumping.

*1 Equivalent to 4.4 – 6.6% of the total national emissions of greenhouse gas in Japanese Fiscal 2005

*2 Equivalent to 3.7% of the grand total amount of energy consumption in Japanese Fiscal 2005

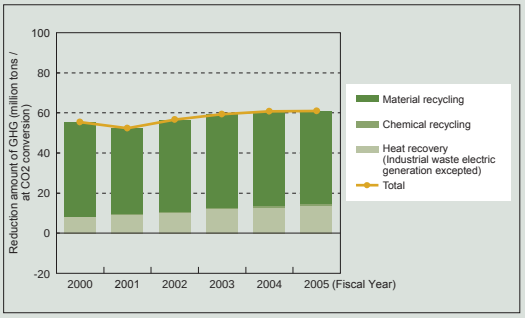
*3 Equivalent to 11% of the total input of natural resources in Japanese Fiscal 2005

*4 Equivalent to 400 - 500% of the grand total disposal amount in Japanese Fiscal 2005

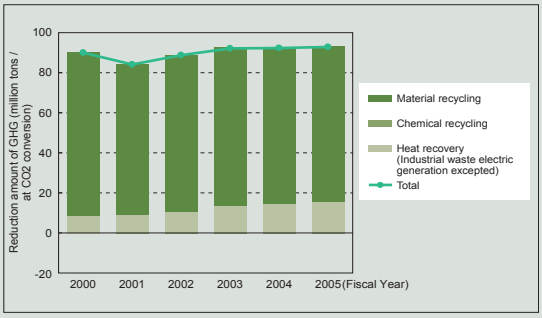
In this estimation, if recycling and heat recovery are not carried out, flammable circulative resources such as biomass circulative resources and fossil circulative resources are assumed in general to be disposed of by incineration (case 1) or by dumping (case 2). With reference to electric power generation by municipal waste and use of waste heat derived from municipal waste at incineration sites, only incineration is assumed as a way of disposal because incineration is necessary whether recycling or heat recovery are carried out or not. In the case of metals and nonmetal minerals, only dumping is assumed to be carried out, as it is not possible for them to be incinerated.

Column Figure 1 Effects of the Promotion of Recycling and Heat Recovery

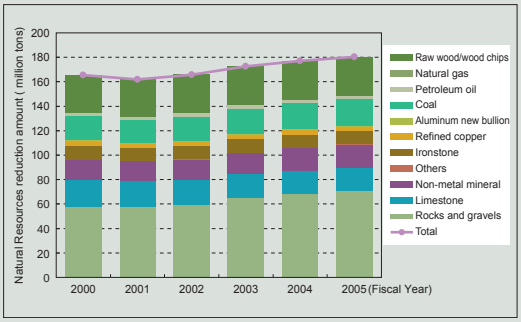
■ GHG Reduction Effect (GHG: Green House Gas) (Case 1)



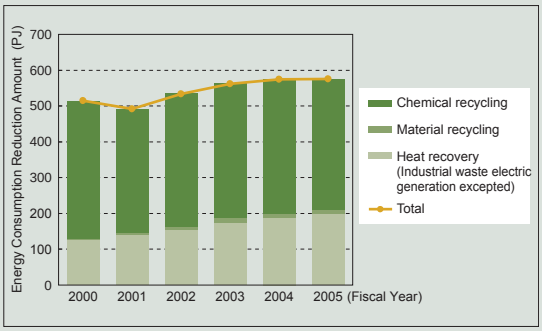
■ GHG Reduction Effect (GHG: Green House Gas) (Case 2)



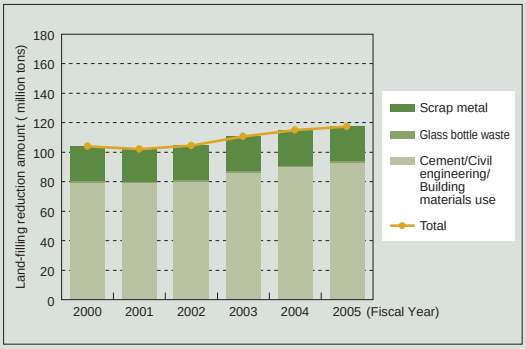
■ Natural Resources Reduction Effect (Common to Case 1 and Case 2)



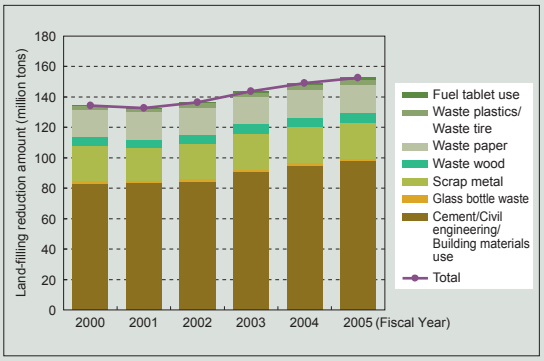
■ Energy Consumption Reduction Effect (Common to Case 1 and Case 2)



■ Land-filling reduction effect (Case 1)



■ Land-filling reduction effect (Case 2)



Source: Ministry of the Environment

(3) Conservation of the Natural Environment for a Sustainable Society

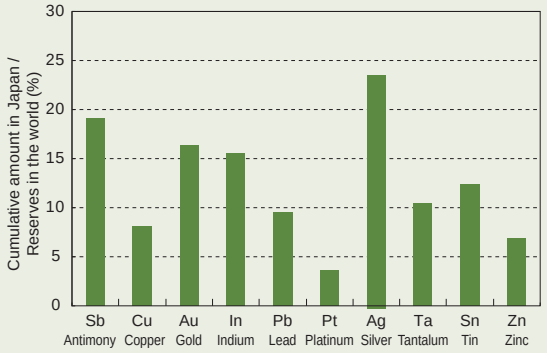
Along with such socioeconomic activity as resource gathering, it is necessary to consider those materials that are collected and excavated but disposed, because they are not the primary resource to be used. These are known as the "Hidden Flow/TMR(Total Material Requirement)" because they themselves do not appear in the statistics and therefore are less-visible. In these circumstances, the same approach as the idea of the "Ecological Rucksack" described by the Wuppertal Institute, Germany is used; this implies the total input amount of first-order raw material and energy necessary through the whole life-cycle of a specified commodity – the first-order raw material here contains surface soil and the rock dug-up at the mining stage.

Reducing the collection of new resources from the natural world, and promoting the cyclical use of resources will lead to a decrease in this hidden flow.

Deforestation, the decrease of wild animal habitats and territory, water pollution, salt pollution and damage to the health of local people have all been reported in relation to the mining of rare metals which are used for electronics parts. On the other hand, the ratio of metals accumulated in the so-called urban mine, such as domestic electronics parts in relation to the total world reserves varies depending on the metal, from a few percent to twenty percent or so. (Figure 1-3: The Amount of Japanese Reserves of the Various Metals found in Electronic Parts, Compared to World Reserves.) Therefore, it can be said that the recovery and reuse of rare metals from used products is a necessary activity for the maintenance of a sustainable natural environment and living environment.

Additionally, in the end garbage must be dumped in a final disposal site. The environmental load cannot be reduced to zero, whatever methods are chosen for construction of the final disposal site, such as by landfill reclamation in a mountain side or on a flatland, or by sea-surface reclamation in tidal mudflats or at the seaside. Therefore, it is necessary to prolong the existing life of final disposal sites by decreasing the final disposal amount of disposal waste and to the greatest possible extent impose restraints on the construction of new final disposal sites.

Figure 1-3 The Amount of Japanese Reserves of the Various Metals found in Electronic Parts, Compared to World Reserves



Note: The data for the reserves was taken from the 2007 edition of the Mineral Commodity summaries published by the U.S. Bureau of Mines.
Source: National Institute for Materials Science

Nagoya City, for example, has promoted several initiatives including recovery of resources from plastics and paper containers and packaging and installation of designated packaging bags, and has chosen not to construct a final disposal site in order to preserve the Fujimae Mudflat. Recently throughout the whole city interested shops are beginning to charge for shopping bags, and service vehicles equipped with Reusable tableware and dish washing machines can be hired for event sites, so that the reduction of garbage and carbon dioxide emissions can be attained. As a result, when comparing Year 2007 to Year 1999, the amount of waste disposal was decreased to seventy percent, dumped waste decreased to forty percent and recovery of resources increased 2.8 times. Further, the Fujimae Mudflat was made a Ramsar Convention Treaty Wetland in Year 2002, and two centers were inaugurated in Year 2005, the "Fujimae Activity Center" (a facility for studying the mudflats and offering a hands-on nature experience) and the "Inenaga Visitor Center" (a facility for general and comprehensive environmental education). Each year, in total sixty thousand people visit the centers for sightseeing and education.

3. For integration of a sound material-cycle society and economic development

If community-based industries expand and employment opportunities increase through each participant's activity for the establishment of a sound material-cycle society, people can be trained to take on the responsibility for the creation of a sound material-cycle society in the region and can become driving forces for regional revitalization. When we consider that there are potentially enormous economic and employment opportunities in the world's leading 3Rs and waste-disposal technologies that our country possesses, it is more than possible to both simultaneously realize economic recovery/employment creation and the establishment of a sound material-cycle society, as well as to combine and integrate nationwide environmental conservation and economic growth. As a road map in that direction we are to overview both the activities needed by each participant, and the formation of a Regional Circulation Zone connected to regional development, and we shall consider approaches in the business community connecting the arterial industries with the venous industries, as well as to consider the challenges associated with the merging of the arterial and venous industries.

(1) Concrete activities needed by each participant

It is necessary for the activities of each participant in the establishment of a sound material-cycle society to be connected to the restrained consumption of those new natural resources necessary for socioeconomic activities. For that purpose, the following guidelines need to be promoted and set out "not to possess and use durable production goods just for oneself,"

Figure 1-4 Approaches to the Reduction of the Consumption Amount of Natural Resources

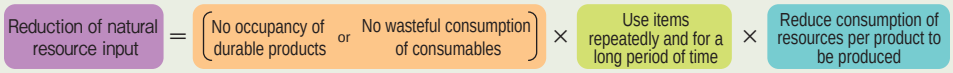


Table 1-4 Examples of specific activities to reduce natural resource consumption

Items	Specific activities (supplier side)	Specific activities (user side)
No occupancy of durable products	• Servicizing • Improving public transportation • Leasing distribution machinery and equipment	• Using public transportation • Sharing and renting
No wasteful consumption of consumables	• Producing and selling durables in appropriate volumes • Sale by measure/weight	• Reducing excessive consumption • Double-sided printing of documents • Paperless • Using downloads
Use items repeatedly and for a long period of time	• Prolong the life of items • Easy maintenance • Upgrading • Products for which only consumable parts are replaced • Long-term repair guarantees	• Long-term use and repair • Reform • Using a Mybag • Reducing use of disposable containers
Reduce consumption of resources per product to be manufactured	• Miniaturizing • Reducing weight and thickness • Simplifying (simplified packaging, refillable products) • Reducing processing loss, etc. • Multi-functioning • Alternative materials	• Green purchasing • Interested in eco-friendly products (companies) • Purchasing products with only needed functions

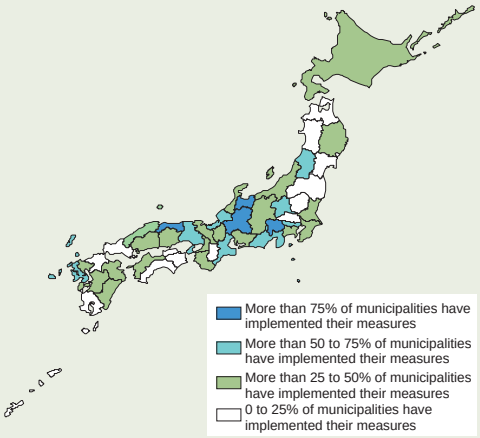
Source: Ministry of the Environment

"not to spend consumable supplies wastefully ," "use items repeatedly and for a long time", and "reduce the amount of resources consumed for the production of products." (Figure 1-4: Approaches to the Reduction of the Consumption Amount of Natural Resources. Table 1-4: Concrete Activity Examples for Reduction of the Consumption Amount of Natural Resources.)

For example, a "my bag" taken when out shopping and a container for refill products, when repeatedly used over a long time, will contribute to the reduction of consumption of natural resources including petroleum used for manufacturing new plastic shopping bags and product containers. This leads to a reduction of carbon dioxide exhaust. By refusing a standard sized plastic shopping bag, sixty-two grams of carbon dioxide emissions can be saved, the equivalent to the emission-reduction amount of five minutes idling in a car. Eighty percent of the prefectures and forty percent of the municipalities have already taken measures to reduce plastic shopping bags with the cooperation and coordination of citizens and businesses, and it is expected to expand the activity further. (Figure 1-5: Implementation Situation of Reduction of Plastic Bags at Municipal Basis Classified by Prefectures – As of November 1, 2008.)

It will be required to expand activity within the unified framework superseding the particular situation of those participant shops and business including convenience stores, and through educating social segments with low awareness of bringing a "my bag" such as young people on the way home from work. It is important to connect reform to the lifestyle of people, starting from the reduction of plastic shopping bags.

Figure 1-5 Implementation Situation of Reduction of Plastic Bags at Municipal Basis Classified by Prefectures – As of November 1, 2008



Source: Ministry of the Environment

(2) Formation of a Regional Circulation Zone connected to regional development

The basis of the cooperation and coordination of every participant necessary for establishment of a sound material-cycle society is the creation of the Regional Circulation Zone according to the nature of circulative resources and the characteristics of the region. This can be expected to be the driving power of the "regional revitalization" based on the independence and coexistence of the region.

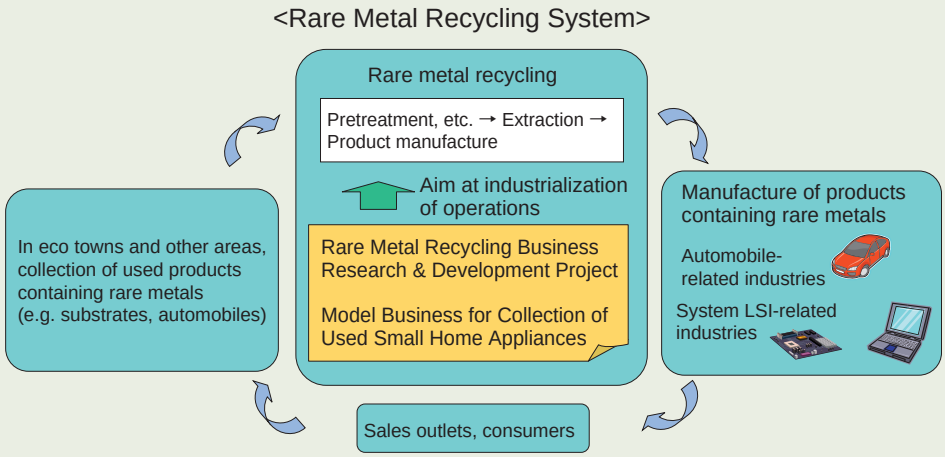
For example, where recycling businesses are gathered, the "eco-towns" of Omuta City and Kita-Kyushu City in Fukuoka

Prefecture have a huge potential ability to promote rare-metal recycling, and leading-edge research and developments on the extraction of rare-metals are taking place everywhere in both industry and academia. Demands on rare-metal are increasing relatively and as mentioned previously, the mining of natural resources has severe impacts on natural and ecological systems; it is a pressing issue to improve the collection system for used products containing rare-metals in cooperation with consumers. From out of this situation, a model business is underway; Omuta City has about thirty places, including supermarkets and communal facilities where collection boxes have been set up for cooperative citizens to bring in game machines, digital cameras, cellular phones and other used small home appliance products. (Figure 1-6: The Model Business in Fukuoka Prefecture for Collection of Used Small Home Appliances). However, because rare-metals are the most important resource for the securing of the resources of our country, there is a need to formulate a nationwide structure for the collection of rare-metals, and not just one project limited to a regional experiment.

Another example is a bioethanol manufacturing facility presented as one of the eco-town plans of Osaka Prefecture, for promoting a comprehensive approach for realization of a Low Carbon Society and Sound material-cycle society. Ethanol fuel is manufactured from waste material consisting of construction waste woods, waste paper and bean curd refuse and annually 40 to 50 thousand tons of such wastes are processed into fuel. This facility uses lignin as a boiler fuel, which is produced in the manufacturing process of ethanol, and sells it also as a Biomass Fuel. Further, beneficial use of the waste material and waste heat is achieved through steam generated in the process being converted to electric power to be used in the facility. (Figure 1-7: Manufacturing of Bioethanol out of Waste Wood).

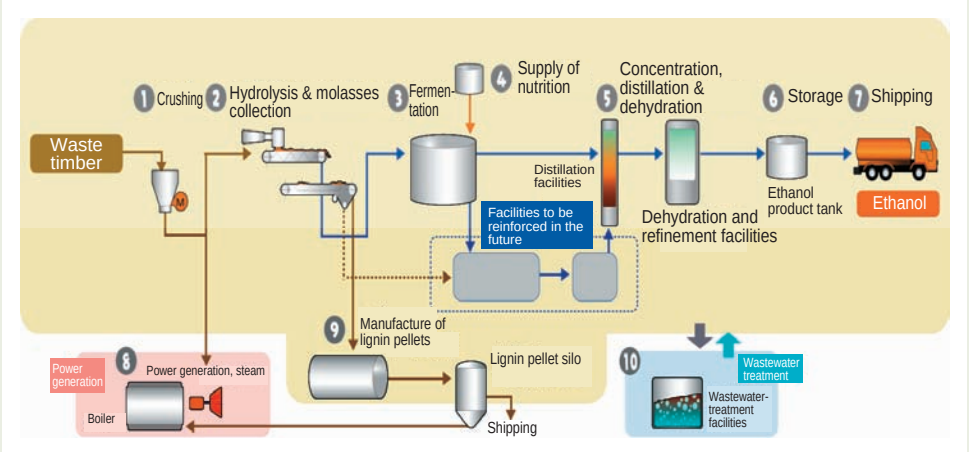
As indicated in the above-mentioned examples, there starts the construction of the Regional Circulation Zone suited for the characteristics of the region and the nature of circulative resources in many parts of the nation. From now on, in order that those advanced and first-rate projects can be maintained and expanded, it is important to construct mechanisms for strengthening cooperation among relevant participants such as citizens, NGO/NPO, universities, businesses and local municipal entities, and to continue to abide by and consider the perspective of colaboration with the Fundamental Plan for Establishing a sound material-cycle society and regional development, and spreading information of effective case examples.

Figure 1-6 The Model Business in Fukuoka Prefecture for Collection of Used Small Home Appliances



Source: Fukuoka Prefecture

Figure 1-7 Manufacturing of Bioethanol out of Waste Wood



Source: Bio Ethanol Japan

(3) Approaches in the business community connecting the arterial industries with the venous industries

An industry that manufactures products is called an arterial industry, while an industry that conducts Recycling and the proper disposing of those products at the time of disposal is a venous industry. In order that a sound material-cycle society can be constructed, it is necessary to unite arterial industry and venous industry in the circle of circulation, so as to convert themselves into an integrated new cyclical industry by linking the venous industry with the current arterial industry, and in addition to promote the proper disposal of wastes and 3Rs at each unit.

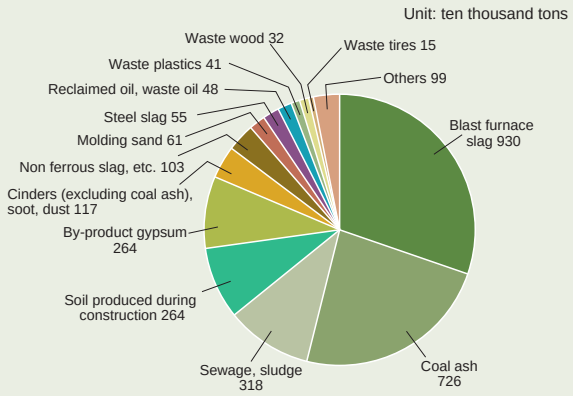
We will now introduce from among a variety of activities already started, an approach to the integration of an arterial industry and a venous industry, namely the Japanese cement industry and sewage system industry, and an approach to the distribution channels connecting an arterial industry and a venous industry.

In the cement industry, various waste and by-products generated by other industries such as scrap tires and coal ashes are being stably processed in large quantities. Recently, due to technological developments (Figure 1-8) wastes from households such as sewage sludge and non-industrial garbage incineration ashes can now be accepted. For instance, generally sewage sludge used to be dumped after incineration, however, the ratio of dumping is decreasing by the introduction of recycling processes for producing cement. Although heavy metals, chlorine, and phosphorus are found in sewage sludge, quality and environmental protection are maintained so as not to influence the quality of cement or the environment around the cement factory. Although production volume has fallen, due to the downturn in public investment and the recent economic trend, the cement industry is endeavoring to accept waste material so that they may contribute to build a sound material-cycle society. It is expected that the ratio of waste material contained within cement resources shall become higher, and stricter quality and environmental protection management will be needed so that the amount and types of possible waste material accepted may be increased in the future. (Figure 1-8: Breakdown of Waste Material and By-products contained in Cement).

Recently, the price of raw materials used for fertilizer has soared caused by economic development in the emerging nations, including China and India and the worldwide increase of grain production affected by the biofuel boom. The influence of such price-hiked fertilizers is also being felt in our country, as all phosphorus, which is a key ingredient of fertilizer, must be imported from abroad. Therefore attention is being paid to the recovery of phosphorus from waste material. It is claimed that a half of all imported phosphorus has been flowing into the sewage system in Japan and on the one hand, most of the recyclable sewage sludge has been used for construction material and on the other hand from now on, it will be necessary to promote the collection and utilization of phosphorus out of sewage water or sewage sludge. Referring to Gifu City, previously the incinerated ashes of sewage sludge were modified and used as bricks, but now after testing for detoxification and the possible collection of ashes as a phosphorus fertilizer, the city has started to build a facility for such processing in Year 2008 and after test operations is scheduled to manufacture, distribute and sell from Year 2010.

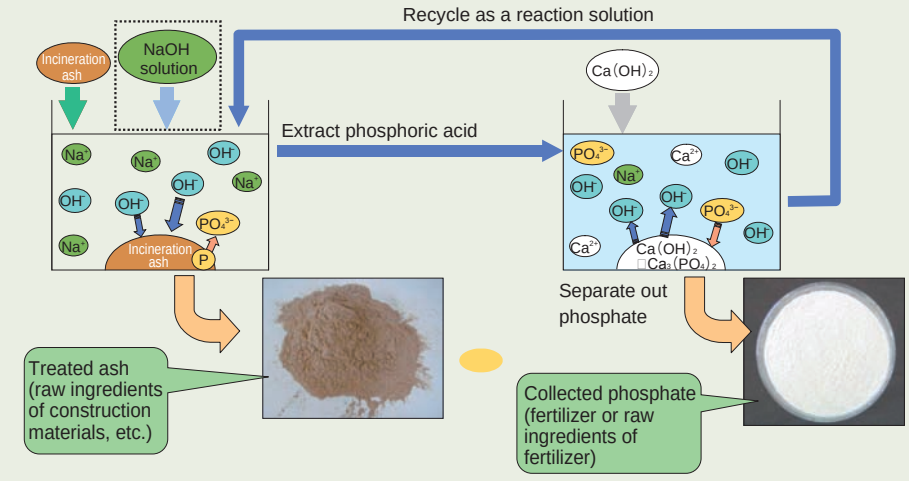
(Figure 1-9: Collection of Phosphorus from Incineration of Sewage Sludge).

Figure 1-8 Breakdown of Waste Material and By-products contained in Cement



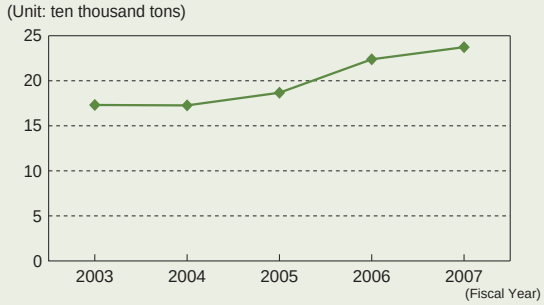
Source: Japan Cement Association

Figure 1-9 Collection of Phosphorus from Incineration of Sewage Sludge



Source: Gifu City

Figure 1-10 Transportation Volume by Railways from Local Municipal Entities



Note: The graph shows yearly totals of non-industrial waste incineration ash, non-industrial waste slag, and sludge from sewage disposal facilities. Dry cell batteries and fluorescent lights are not included.
Source: Japan Freight Railway Company

The role of distribution that ties the producer and the consumer is important for the development of cycloid type industries. In the same way as the arterial distribution system, when transporting waste material and circulative resources, it will be possible to build up a broad-based and efficient venous distribution system by combining transportation by trucks with that of ships and railways whose negative environmental load is low, and thus contribute to the foundation of a low carbon society. As the transportation of waste plastics, sewage sludge and incineration ashes to a cement plant, shredded tires as fuel to a paper-manufacturing company, shredder-dust to a metal recycling factory and PCB waste to a disposing facility are developing well, the volume of transportation of waste materials by railway from local municipal entities to factories are showing an upward trend. (Figure 1-10: Transportation Volume by Railways from Local Municipal Entities).

This is a transportation method attracting attention for its low environmental load.

Column

An implementation example in the industrial world for establishment of a sound material-cycle society

Responding to the call of the Japan Business Federation, the industrial world is, on an autonomous basis and in a positive manner through preparation of environmental voluntary action plans, working on the further promotion of 3Rs including the reduction of Industrial Waste disposal volumes, and aiming at the establishment of a sound material-cycle society through preparation of environmental voluntary action plans.

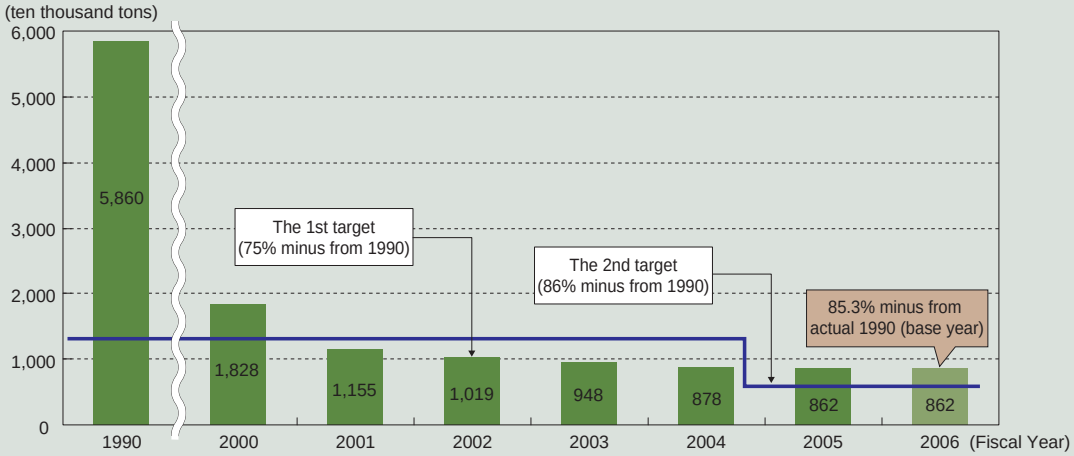
As a part of the activities, in December 1999, the Japan Business Federation set a goal for industry as a whole that "the final disposal volume of Industrial Waste in Year 2010 must be reduced by 75% of the actual volume of Year 1990" (the First Target). Through various endeavors, in Year 2002 industry successfully achieved the First Target ahead of schedule, and for several years running they have achieved the set targets. In March 2007, the target of Year 2010 was revised to reduce by 86% of the actual volume as of Year 1990 (the Second Target), with the resolution that they would "never increase the final disposal volume of Industrial Waste, regardless of any change to the economic situation in the future."

The Japan Business Federation promotes an autonomous approach to industry and at the same time follows-up the state of implementation by industry every year and aims to improve the transparency of activities. According to the survey results in Year 2008, the final disposal volume of Industrial Waste of all industries in fiscal 2007 was 8.62 million tons, with which an 85.3% reduction was achieved compared to fiscal 1990.

(1) Iron and steel industry

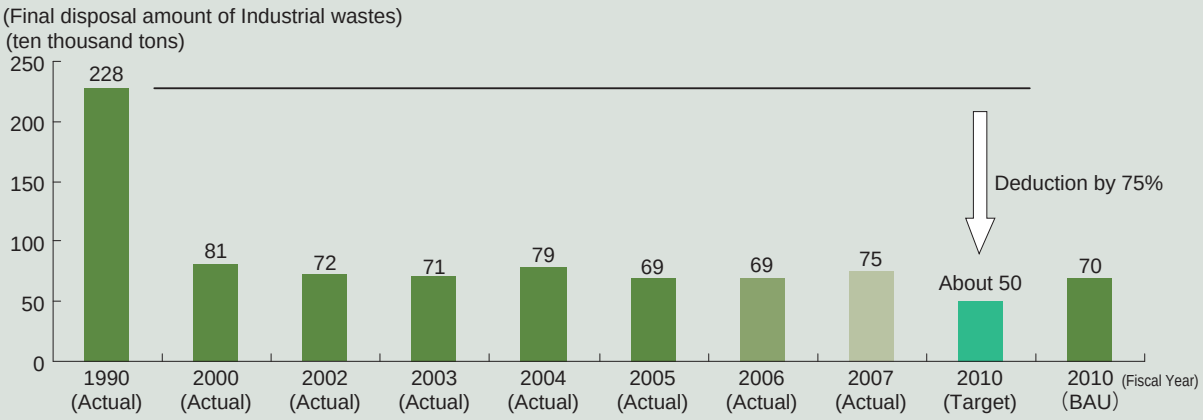
In the iron and steel industry, about 99% of the by-products involved in the production of steel are recycled, for use as cement raw material, civil engineering material and road building material. In addition, the Recycling rate of steel cans has met the target of "85% and more for

Column Figure 2 The final disposal volume of industrial waste of all industries



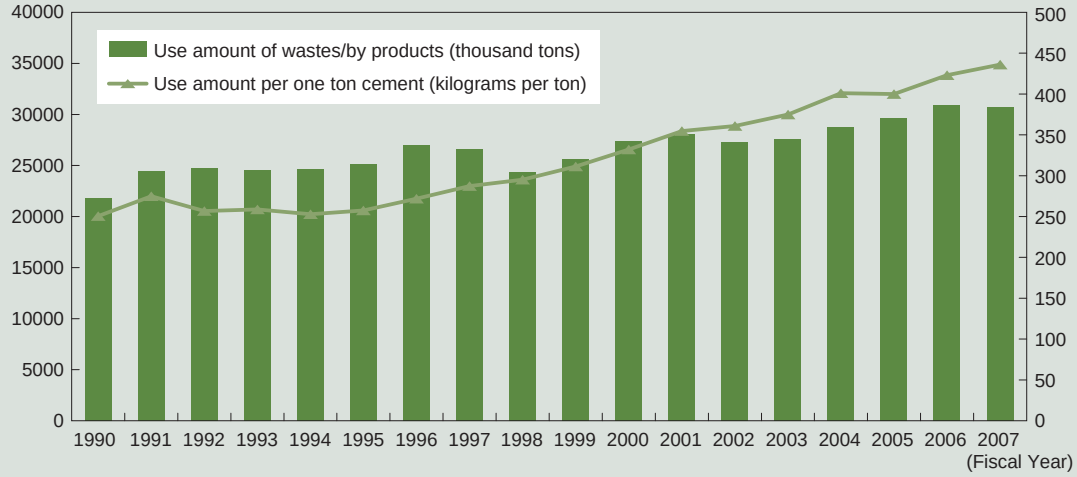
Source: The Japan Business Federation - Results of the Follow-up Survey Fiscal 2008, Concerning the Voluntary Action Plan on the Environment. [Building a recycling society series]

Column Figure 3 Iron and Steel Industry



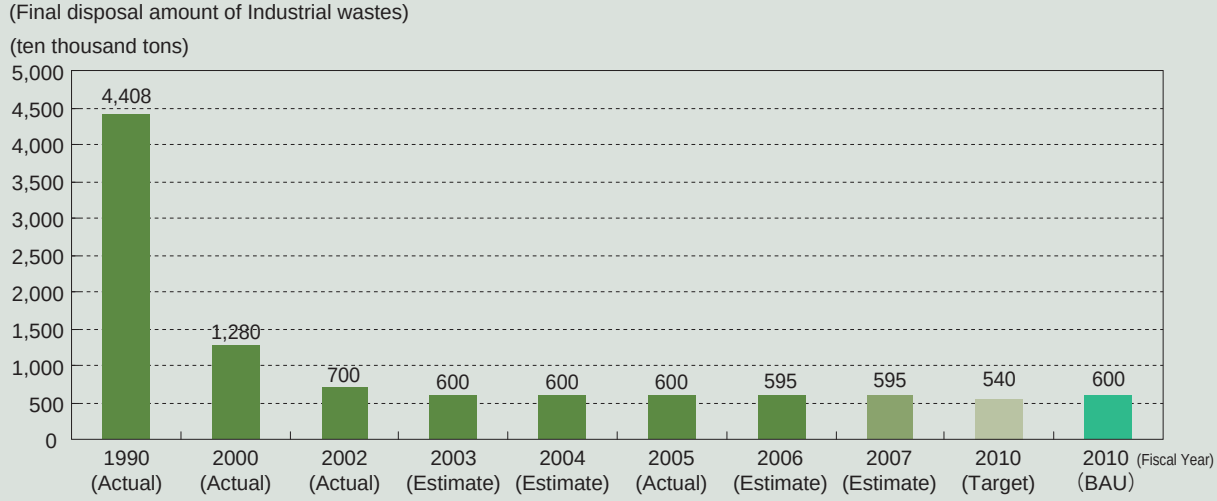
Source: The Japan Iron and Steel Federation

Column Figure 4 Cement Manufacturing Industry



Source: Japan Cement Association

Column Figure 5 Construction Industry



Source: Japan Federation of Construction Contractors; Japan Civil Engineering Contractors Association, Inc.; Building Contractors Society

seven years in a row," this is a guideline of the Industrial Structure Council of the Ministry of the Economy, and is the top-ranking in the world.

The final disposal volume of steel by-products in fiscal 2007 rose to 750 thousand tons, with an increase of about 60 thousand tons compared to the preceding year. Concerning iron and steel slag, which is the greater part of the by-products, infrastructure development for recycling use has been implemented, such as by installation of the JIS standard and assignment as a specified procurement item based on the Law on Promoting Green Purchasing. By making use of these results, cultivation of further demand has been promoted and recycling of dust and sludge within steel factories has been further promoted. Moreover further recycling endeavors have been promoted, including the continued research and development on use in sea areas for achievement of the reduced target.

(2) Cement manufacturing industry

The cement industry, by making the most use of cement manufacturing processes, has accepted various wastes and by-products from other businesses, such as the iron and steel industry (various types of slag), the electric utility industry (desulfurization plaster), the construction industry (construction waste soil), the tire industry (scrap tires), the metal casting industry (casting sand), and the local municipal entity (sewage sludge and incineration ash). In fiscal 2007, the acceptance of about 30.72 million tons of wastes and by-products was achieved. The industry contributes to the saving of natural resources, to the prolonged continuation of Final Disposal Sites and energy conservation and carbon dioxide reduction throughout all of Japan by making use of them as raw materials and an energy substitute in cement manufacturing. The amount of energy used for disposal can be decreased for example, by recycling sewage sludge for cement material rather than by incinerating in a specialized furnace and dumping the ashes. Additionally in a cement factory, a project is now underway which uses the wastes from ordinary households as a cement raw material, and this could contribute to the reduction of carbon dioxide accompanying incineration.

(3) Construction industry

In the construction industry, the approaches and systems based on the Construction Material Recycling Act have been promoted in a positive manner, because of the high proportion of construction waste accounting for the generation and the final disposal volume of Industrial Waste.

Construction waste has different characteristics from general wastes, because construction work takes place in a temporary construction site and the type generated and the volume of waste generation differs at each site. Therefore, the Construction Nine Groups By-Products Counter-measures Conference has been originally preparing and using the Common Articles of Agreement and Manifest so that it is suitable for the characteristics of the construction industry.

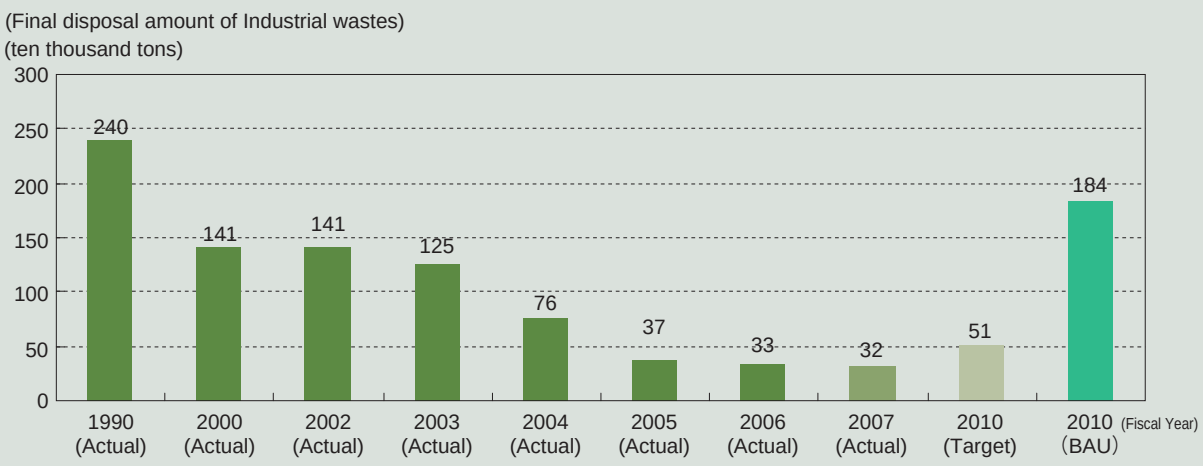
Moreover, although the recycling of asphalt･concrete mass and concrete mass have been considerably promoted for efficient use of resources and establishment of a sound material-cycle society, it is expected the industry is expecting to further promote the recycling of waste wood, mixed waste, polluted sludge, waste plaster board and waste plastics generated by construction.

(4) Electric Power Industry

The amount of waste generation of the electric power industry in fiscal 2007 was 10.62 million tons, an increase on the previous year. On the other hand, the amount of recycling of the waste in the same year was 10.3 million tons with an increase on the previous year. As a result, the recycling ratio was 97%, which exceeded the target ratio of 95% continuing from the previous year, the final disposal volume of industrial waste remained at the same level.

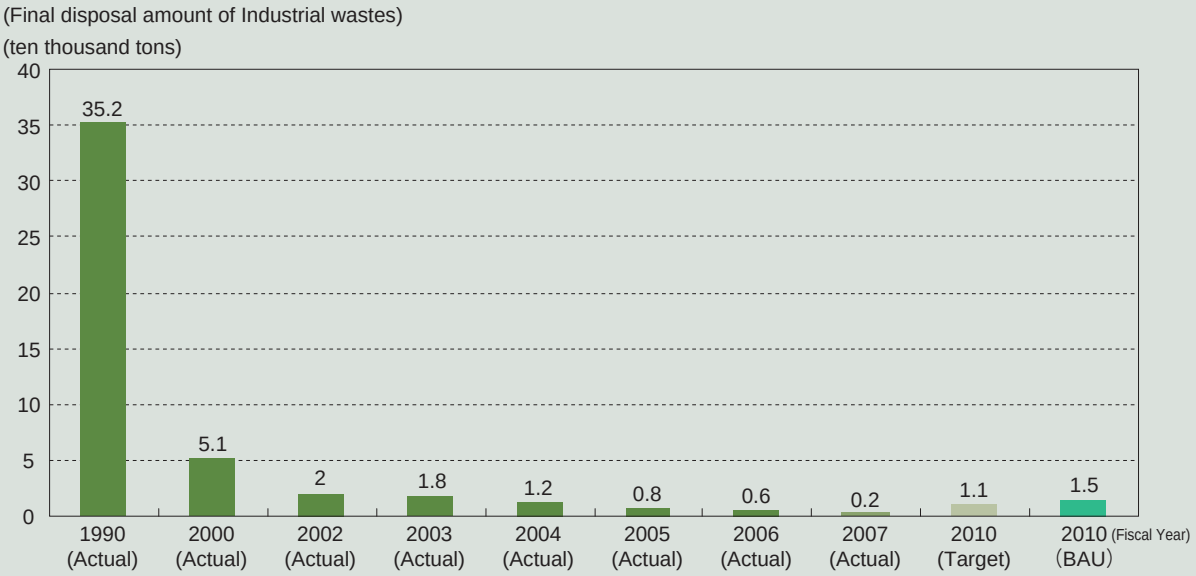
The industry will "Try to achieve a recycling ratio of

Column Figure 6 Electric Power Industry



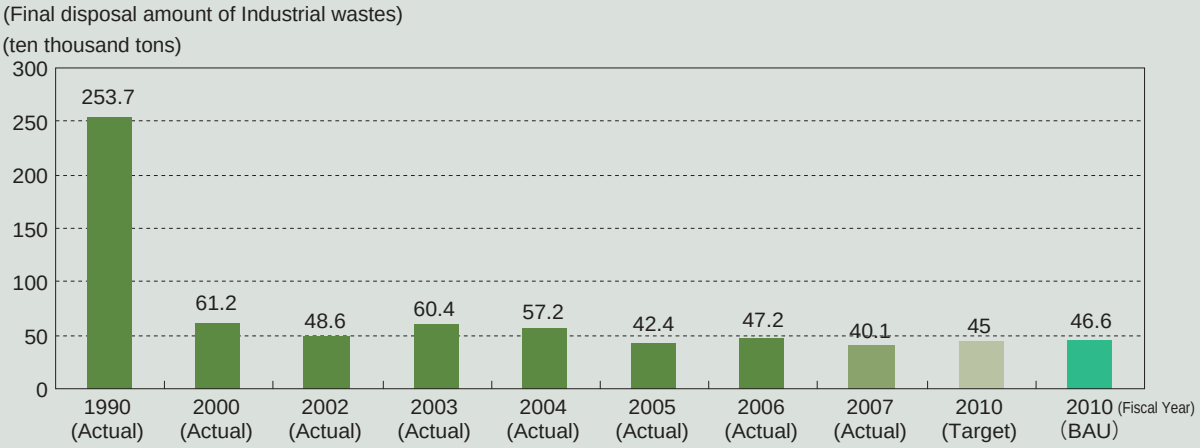
Source: The Federation of Electric Power Companies of Japan

Column Figure 7 Automobile Manufacturing Industry



Source: Japan Automobile Manufacturing Association, Inc.

Column Figure 8 Paper Manufacturing Industry



Source: Japan Paper Association

more than 95% in fiscal 2010," besides decreasing the final disposal volume of industrial waste.

(5) Automobile manufacturing industry

In the automotive manufacture industry, the amount of waste generation in fiscal 2007 was about 2.659 million tons, with an increase of 4.4% on the previous year. On the other hand, the recycling amount of waste was about 2.657 million tons, resulting in a 99.9% recycling ratio of waste.

The industry is mainly promoting recycling of waste plastics as an approach to Reductions in Final Disposal Amount, and is carrying out the generation control of waste such as reducing plastic containers. It is also promoting the reexamination of designs in order to eliminate waste generated in the manufacturing process of the products and the scrapping of cars, including the adoption of recyclable materials, indication of material parts and designs facilitating easy disassembly.

(6) Paper manufacturing industry

In the paper manufacturing industry, in fiscal 2007 the waste generation amount has increased to 6.832 million tons, 217 thousand tons more than the previous year, as the generation of organic sludge has increased with the improvement of the waste paper utilization rate. On the other hand, the final disposal amount was reduced by 71 thousand tons from the previous year to 401 thousand tons, following the increase of the recycling amount by 226 thousand tons on the previous year giving a total of 2.816 million tons.

Because organic sludge is incinerated as a fuel and the collected thermal energy is reused in the factory, in order to monitor positive approaches to effective heat use a specific target has been set up starting from fiscal 2007; it uses the ratio of the amount of effectively used heat (recycling heat amount + used heat amount) against the generated heat amount. (The result of the effective use ratio as of fiscal 2007 was 94.1%).

(4) Challenges involved in the integration of arterial industry and venous industry

As shown above the use of circulative resources has advanced. However, there is a possibility that while demand for relatively less expensive waste will be increased when the price of natural resources soar, use of waste material will decrease if the price of natural resources decline. Moreover, as the supply of circulative resources is basically affected by the circumstances of the generation side of the waste equation, without paying due consideration to its end-user, it is not easy to say that the balance of supply and demand is well maintained. Additionally, there is a problem that it is necessary to keep the quality of circulative resources stable for specific product manufacture.

In addition, use of waste material may be a factor for cost reduction, however in terms of quality, it is generally difficult for products using waste materials to exceed ones made only of natural resources. To achieve equal quality it is necessary to extract impure substances or remove stains contained in circulative resources, which adversely may lead to higher production costs. In the standardization system, such as JIS, there are many cases where circulative resources are not supposed to be used for products. On this point, some problems have been solved already in the Environmental JIS. It is also essential to raise consumer awareness, and encourage them not to demand excessive quality in cyclic products such as recycled paper.

4. A vision of a sound material-cycle society considering Year 2050

There are several prior conditions in realizing a sustainable socioeconomics. Herman Daly, an economist, propounded the following three principles so that the earth can be maintained in a stable state. (1) For a renewable resource, the sustainable rate of use can be no greater than the rate of generation. (2) For a nonrenewable resource, the sustainable rate of use can be no greater than the rate at which a renewable resource, used sustainably, can be substituted for it. (3) For a pollutant, the sustainable rate of emission can be no greater than the rate at which the pollutant can be absorbed by the environment.

It may be said that our challenge for the low-carbon society with a long-term target of reducing the emission of Greenhouse gas by 60 to 80 % from the present by 2050 is the competitive struggle for those human beings in existence to achieve a balanced state for the earth.

The same rhetoric can be applied to the establishment of a sound material-cycle society. In the situation today, where the waste issue is escalating globally, and anxiety for the stable supply of resources is becoming stronger, in addition to each participant's concrete activities to ensure the efficient use of natural resources, cyclical use of resources and promotion of the use of renewable resources, what is needed most strongly is a revolution in the socioeconomic system, based on the reconstruction of various recycling systems at every stage of production, distribution, consumption/use and abandonment/disposal, and the actual achievement of charging for garbage disposal. As a result, economic growth and contribution to local revitalization are expected. We are now in a position of "not allowing any delay" when aiming for the sustainable Year 2050, and passing the "milestone" year of 2015, the year regarded as the target in the Second Fundamental Plan for Establishing a sound material-cycle society.

Column

Examples approaches of citizens and civilian organizations for establishment of a sound material-cycle society.

There are now already several advanced approaches, and we now introduce some leading-edge examples, in fiscal 2007 as follows. 1. The "Citizen made town environment of Genki Grand-prix." Sponsored by the Specified Nonprofit Activities Corporation, known as the Genki Network for creating a sustainable society. 2. The Award by the Minister of the Environment to the "Promoter who has established a sound material-cycle society" in the 3Rs movement. 3. The "Container and Packaging 3Rs promotion Award by the Ministry of Environment" to a packaging and container 3Rs movement. 4. The "Food Recycling Promotion Award by the Ministry of Environment" to a food recycling promotion movement.

1. The "Citizen made town environment of Genki Grand-prix"

The Specified Nonprofit Activities Corporation, known as the Genki Network for creating a sustainable society founded a "Citizen made town environment Genki Grand-prix Award" in Year 2001 and began to give the award to those entities promoting leading-edge activities.

(1) Grand-prix of Year 2008

Subject name: "A Sustainable Food and Environment Promotion Project Made by the Circle/Harmony of the Community"

Group name: Hokkaido Nakashibetsu Agricultural High School- Agricultural Club, in Nakashibetsu -Machi, Nakashibetsu-Gun, Hokkaido

Employing a slogan of "Making our hometown a world-class dairy farming village!," and aiming to attain the sustainable development of "our roots" as one of the foremost dairy areas in Japan, they are developing activities to study, manufacture and disseminate information about the "food and environment" of the region. They have built a network of people, including infants and school children who will lead the next generation, ex-

panding the circle and harmony of minds, studying the hometown village of my hometown, participating in regional development aiming to create a sustainable region, implementing a dietary education system, installing cyclical style dairy farming, starting to improve the image of dairy areas and promoting local production for local consumption activities.

2. The Award by the Minister of the Environment, "Promoter to establish a sound material-cycle society" in the 3Rs movement.

The "Promoter to establish a sound material-cycle society" award will be given to a participant, a corporation or an entity who has contributed a remarkable achievement to the proper promotion of Reduce, Reuse and Recycle of waste generation, in order to make a public recognition and commemoration to help promote the establishment of a sound material-cycle society, beginning Year 2006.

In fiscal 2008, six participants, fourteen entities and forty-nine corporations were given prizes, and the awards ceremony was conducted at the award rally of the "3rd National Convention for Promotion of 3Rs," held in Yamagata City. Several examples of the promotions awarded are now given.

(1) Award given to the "Promoter to establish a sound material-cycle society" in the 3Rs movement for an entity, Year 2008

Nagai City: The Rainbow Plan Promotion Conference (Nagai-City, Yamagata Prefecture)

A regional recycling system has been established and promoted by the conference, with coordination and cooperative labor among the citizens, farmers and the local municipals, where kitchen garbage from about five thousand homes in the central area of Nagai City are segregated and collected, composted, and then used in the growing of agricultural products on city farm land using the composted fertilizer with restraints on the use of agricultural chemicals and chemical fertilizer; such products are sold and consumed locally at home dining tables or used by school catering in the region.

(2) Award given to the "Promoter to establish a sound material-cycle society" in the 3Rs movement for a corporation, Year 2008

Name of the company: Limited Private Company San-in Create, Yonago City, Tottori Prefecture

Since Year 1990, the company has promoted the conservation of the environment by the reduction of industry waste and effective utilization of resources, employing a slogan of "Be kind to the earth and take good care of resources!," with the cooperation of local municipal entities and schools, where the company recycles collected waste plastics to manufacture construction and container products and recycled plastic fuel, also developed an oil reducing device in order to reuse the oil collected from waste expanded polystyrene for the thermal source fuel of the incinerator and other recycling equipment used in the factory site.

3. The "Container and Packaging 3Rs promotion Award by the Ministry of Environment"

Starting from Year 2006, the "Container and Packaging 3Rs promotion Award by the Ministry of Environment" has been set-up, so as to encourage and spread activities for the promotion of 3Rs in container and packing waste, exceptional promotion examples and manufactured goods contributing to the promotion of 3Rs for containers and packing have been awarded every year, in the three categories of the "Regional coordination and cooperative labors division," the "Retail shop division," and the "Products division."

(1) The Year 2008 Grand Prix in the "Regional coordination and cooperative labors division"

Subject name: "A National Campaign Group for Reduction of Plastic Shopping Bags (Rejibukuro Herashitai Zenkoku Undo)"

Group name: The Liaison Council of National Life and School (Zenkoku Seikatsu Gakko Renraku Kyougikai), Chiyoda-Ku, Tokyo

For many years the council have continued the movement to reduce plastic shopping bags, and so that ordinary people may participate in the campaign, from July 2007 in cooperation with other citizens' organizations started the first nation-wide promotion "A National Campaign Group for Reduction of Plastic Shopping Bags."

A system was set up so that as evidence of refusing to receive a plastic shopping bag, a consumer participating in the campaign received a stamp from a retail shop on a "Campaign Group for Reduction of Plastic Shopping Bags Card" and then mailed the card to the campaign office. Although there was no monetary reward for the consumer, more than six thousand cooperating retail shops, thirteen towns, four wards, six cities and ten prefectures nationwide have participated in the promotion of the campaign, resulting in about 8.7 million cards being mailed to the campaign office and when including the reduction figures of the corporations and local municipal entities, more than 180 million plastic shopping bags were reduced.

(2) The Grand Prix in the "Retail shop division," of Year 2008

Business name: "ECO Promotion Service"

Company name: The Koseisha Company Limited, Sapporo-City, Hokkaido

The company has promoted and developed the "ECO Promotion Service" in order to contribute to the protection of the environment, by introducing ecological points of view and ideas, in such ways as a trial for returning clean clothes on a hanger with no plastic bag.

(3) The Grand Prix in the "Products division," of Year 2008

Product name: "Nose Sansui Mountain Water" and "Nose Sansui Oolong Tea"

Company name: The Nose Sake Brewing Company Limited, Nose-Machi, Nose-Gun, Osaka Prefecture

The company has been working to promote the introduction of a returnable drink bottle, and has newly developed a decorative, returnable one-liter bottle for oolong tea. The company provides the oolong tea as a replacement for the oolong tea in plastic bottles, and has began to sell by home delivery to houses nearby and to eating and drinking places as a commodity that contributes to the reduction of plastic bottle waste, by practicing and establishing a reuse system within the area.

4. The Food Recycling Promotion Award by Ministry of Environment

By prize-giving and introducing to the whole of the country examples of outstanding advancement of the reclamation of food circulative resources and heat recovery, as well as restraint and reduction of food waste generation by food related businesses, the Ministry of the Environment has been encouraging, educating and spreading further promotion of the establishment of a sound material-cycle society.

(1) The Grand Prix in the "The Food Recycling Promotion Award by Ministry of Environment" of Year 2008

Subject name: Entity Name: ECO Feed circulative Business Cooperative Association, a federation between The Biomass Green Company Limited and The Kanazawa Sangyo Company Limited, Kasai-City, Hyogo Prefecture

As an approach to the business operations of local production for a local consumption style food circulative recycling system with industry, local municipal government, academic and agricultural cooperation, they manufacture eco feed (recycled feeding stuff) by making use of vegetable waste, bread crumbs, expired food collected from the food supermarkets and food factories. The feed is sold to pig farmers and assorted feed factories, to be used for producing "marbled pork" as a local food product for local consumption, which is sold in local food supermarkets.

Section 2. Current Situation of the generation, circulative use and disposal of waste

With a central focus on those waste and recycling activities that are working for the establishment of a Sound Material-Cycle Society, here is a detailed description of the situation of the generation, circulative use and disposal of wastes, national countermeasures and individual activities, as well as international measures for the establishment of a Sound Material-Cycle Society.

1. The material flow of our country

(1) The material flow of our country

As a first step to the establishment of a Sound Material-Cycle Society, it is essential to know the amount of resources we are collecting, consuming and dumping.

Moreover, in order that a Sound Material-Cycle Society can be established, the Second "Fundamental Plan for Establishing a Sound Material-Cycle Society (A Cabinet decision in March 2008, hereafter called the "Fundamental Plan for a Sound Material-Cycle Society"), has set new goals for the indexes concerning the "Entrance", "Exit" and "Circulation" of materials, this refers to the three different sections of the material flow (meaning the flow of materials and goods), where appropriate and balanced measures for reduction, reuse, recycling and disposal of resources should be developed.

In the following, based on the Material Flow Accounts (MFA) used for the understanding of the entire flow of materials in the economy of our country, we are going to give an overview of the total flow of materials, the problems highlighted in our analysis and the present situation of the goals of the material flow set-up in the Fundamental Plan for a Sound Material-Cycle Society.

A. A general view of the material flow of our country

When we examine the material flow of our country in Fiscal 2006, there were 18.2 billion tons of total material input, and 750 million, about a half, were used in the construction of buildings and infrastructures. Moreover, 170 million tons were exported as products, 490 million tons were used in the energy consumption and manufacturing process and 580 million tons of wastes were generated. Out of these items, 230 million tons were subjected to cyclical use, equivalent to 12.5 % of the total material input amount. (Figure 2-1).

Details of the material flow of our country are as follows.

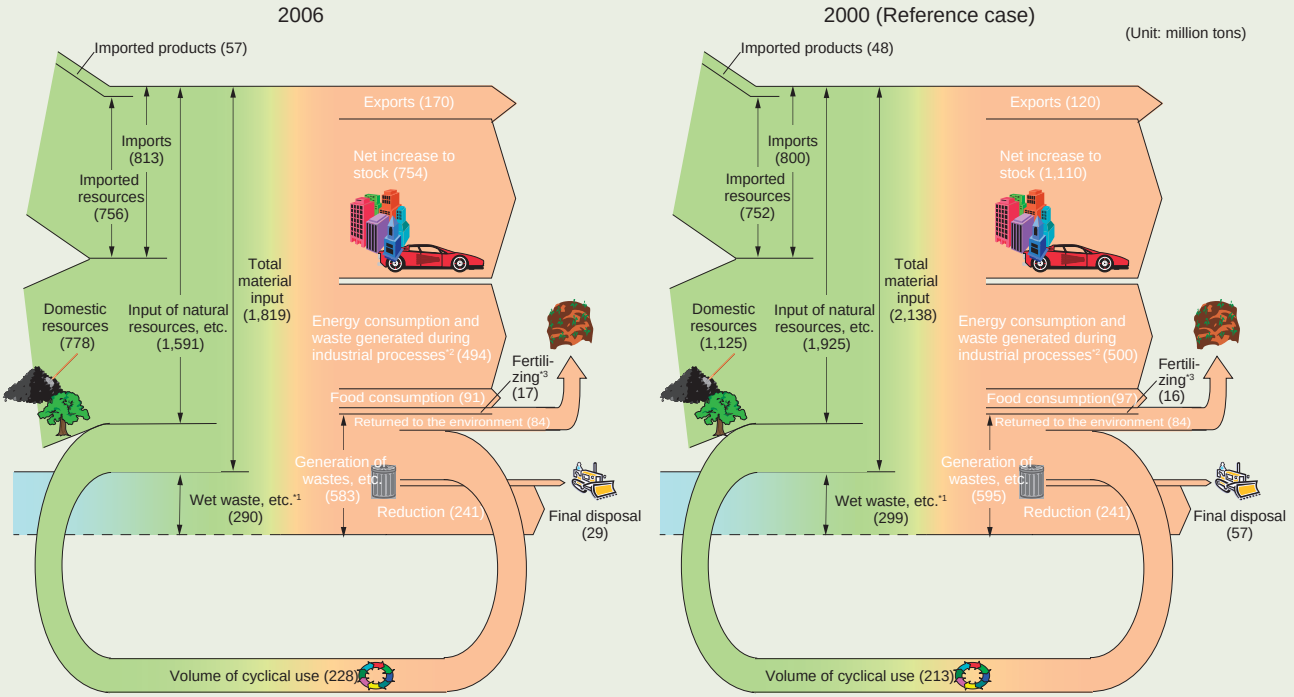
(a) Considering the "Total Material Input Amount"

The total material input amount for fiscal 2006 was 1.82 billion tons, which was 85% of the 2.14 billion tons for fiscal 2000. The decrease of the total material input is largely affected by the decrease of nonmetal mineral type resources caused by the reduction in public works projects. From now on, consumption control of the amount of natural resources input is inevitable, inclusive of exhaustible natural resources such as metal and fossil materials, sustainable development is supposedly impossible without further efforts from each participant.

(b) "Natural Resources Input Amount"

The natural resources input amount means the total amount of natural resources derived from domestic production or imports plus the amount of imported products; they

Figure 2-1 The Material Flow of Our Country



Note 1: Wet waste, etc.: Water taken in socioeconomic activities and water content included in waste (e.g. sludge, animal waste, raw sewage, waste acid, or waste alkali); and input of earth and sand as a result of economic activities (e.g. sludge generated by the mining, construction and waterworks industries and slag from the mining industry)
Note 2: Energy consumption and waste generated during industrial processes: An estimation of water, etc., included in raw materials and released during the manufacturing processes of industrial products
Note 3: Fertilizing: Sprayed fertilizer is not actually accumulated and will be decomposed in the soil; therefore, particularly it has been taken out from the net increase to stock.
Source: Ministry of Environment

are also known as the Direct Material Input (DMI).

The natural resources input amount estimated for fiscal 2006 was 1.59 billion tons as a total of domestic production and import (780 million tons domestic production + 810 million tons imports). This is about 82% of the 1.93 billion tons for fiscal 2000 (1.13 billion domestic production + 800 million tons imports).

Moreover, the natural resources input amount does not include the hidden flow, or the amount of material other than the targeted material collected/excavated or generated as wastes in the process of collection of the resource. It is thought it will be necessary to improve Resource Productivity, considering the TMR that includes the hidden flow and the energy resources used at each stage of resource collection, and to further lower the collection level of resources from the present rate. As TMR data relies mostly on estimates, we are going to accumulate know-how through international opinion exchanges.

(c) Amounts of inlet flow and outflow of the resources and products

The amount of materials in the form of products and goods exiting our country is about one fifth, compared with the amount of resources and products entering. The burden of nitrogen-compounds released into our public water areas and underground water, for example, is much more than other countries are experiencing and so huge because enormous amounts of nitrogen have been imported in the form of food and feeding stuff; the situation is such that the natural nitrogen circulation in those areas might have been destroyed.

From the international viewpoint, this can be called a state where proper material circulation has not been secured.

(d) “Cyclical use amount”

The amount of cyclical use is 230 million tons, while the Total Material Input Amount is 1.82 billion tons. The amount of cyclical use is presently measured by weight, however, it is also necessary to understand the recycling situation by adding the qualitative point of view, including investigations on the impact of the environmental burden from the point of life-cycle and recycling with higher value-added (or, closed recycle).

(e) Amount of waste generation

The amount of waste generation still remains at a high level. It is important in terms of ensuring proper material circulation to hold down the generation of waste and eventually the discharge into the environment.

(f) Amount of energy consumption

Global warming derived chiefly from the carbon dioxide emissions of fossil fuel resources is a critical problem which may have a serious effect on the living habitat of human beings. As the amount of energy consumption of our country is

as high as 490 million tons or so, further promotion of energy consumption streamlining is inevitable.

(g) The reduction of Greenhouse Gas from waste sector

The "Kyoto Protocol Target Achievement Plan" has set objectives concerning waste-related measures to reduce the emissions of Greenhouse Gas, and it aims to reduce about 7.8 million tons (carbon dioxide equivalent) in Year 2010. The Greenhouse Gas emission derived from wastes mounted to 44.8 billion tons (carbon dioxide equivalent) in Year 2006, which is about 3.3 % of the total amount of Greenhouse Gas emissions (1.34 billion tons carbon dioxide equivalent) of Japan. The reduction amount of Greenhouse Gas emission by recycling of waste to reused fuel and by electric power generation using waste was about 15 million tons (carbon dioxide equivalent) in Year 2005, therefore it is reasonable to assume that the amount of emissions derived from wastes is starting to decrease when those Greenhouse Gas emissions mentioned above are deducted. (Figure 2-2)

The waste reduction has a large effect on the reduction of the amount of Greenhouse Gas emission. The reduce of waste generation contributes to the decrease of Greenhouse Gas generation accompanied by incineration and land fill. It is important to reuse and recycle until nothing is left of any wastes, and to make the most efficient use of the energy contained in flammable waste that must be either incinerated or land filled.

Concerning the power generation facilities/heat utilizing facilities of private businesses, monetary support has been given for the improvement of higher efficient energy utilization which will contribute as a counter-measure to global warming. Having also executed demonstration experiments for the suspension of white smoke prevention equipment, we have made the results well known, because improvements to the operation/maintenance methods in waste disposal facilities can contribute to counter global warming. We also chose and publicized an activity in a model area engaged in the utilization of Biomass derived from wastes, giving high marks for the value of the whole system.

Moreover, in the industrial waste disposal business segment, in November 2007, the National Federation of Industrial Waste Management Association drew up environmental voluntary action plans to reduce the Greenhouse Gas emitted along with the processing of industrial waste; the plans also gave the target to be attained and the measures for achievement of the target (revised in March 2008).

It is important to continue making advances both for the establishment of a Sound Material-Cycle Society and for a low carbon society.

B. General view of circulative use in our country

Next, the current state of the circulative use of our country in fiscal 2006 is shown in the Figure 2-3. It shows that 583 million tons of waste are generated annually, 228 million tons are put to circulative use by reuse or recycling, 241 million tons are reduced by incineration or dehydration; this leaves only 0.29 million tons for final disposal.

Details are shown in the following.

(a) Flow of the circulative resources of our country in fiscal 2006

a. Generation stage

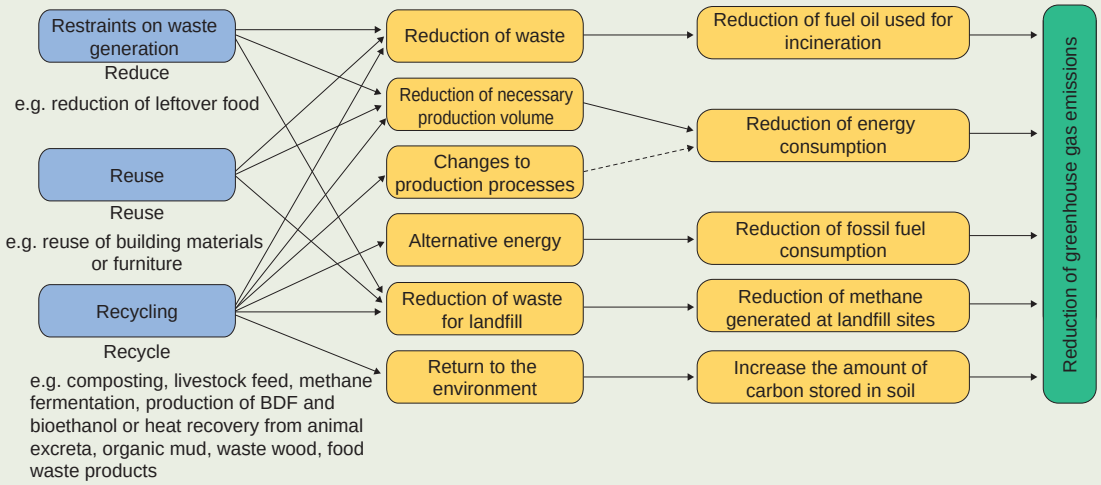
In fiscal 2006, the amount generated as waste was 583 million tons. Among these, municipal wastes accounted for 77 million tons (52 million tons of garbage and 25 million tons of night soil), industrial wastes were 418 million tons and other by-products, and other wastes were 87 million tons. (Figure 2-4)

When examined according to characteristics, biomass chiefly consisting of organic sludge and human waste, livestock excrement, and animal or plant residue is by far the largest with 320 million tons, non-metal mineral type materials (soil and stone) consisting of nonorganic polluted sludge and slag accounts for 210 million tons, metal consisting of iron and non-ferrous metal is 37 million tons, and fossil type materials consisting of plastics and paraffin liquid is 15 million tons.

b. Natural reduction stage

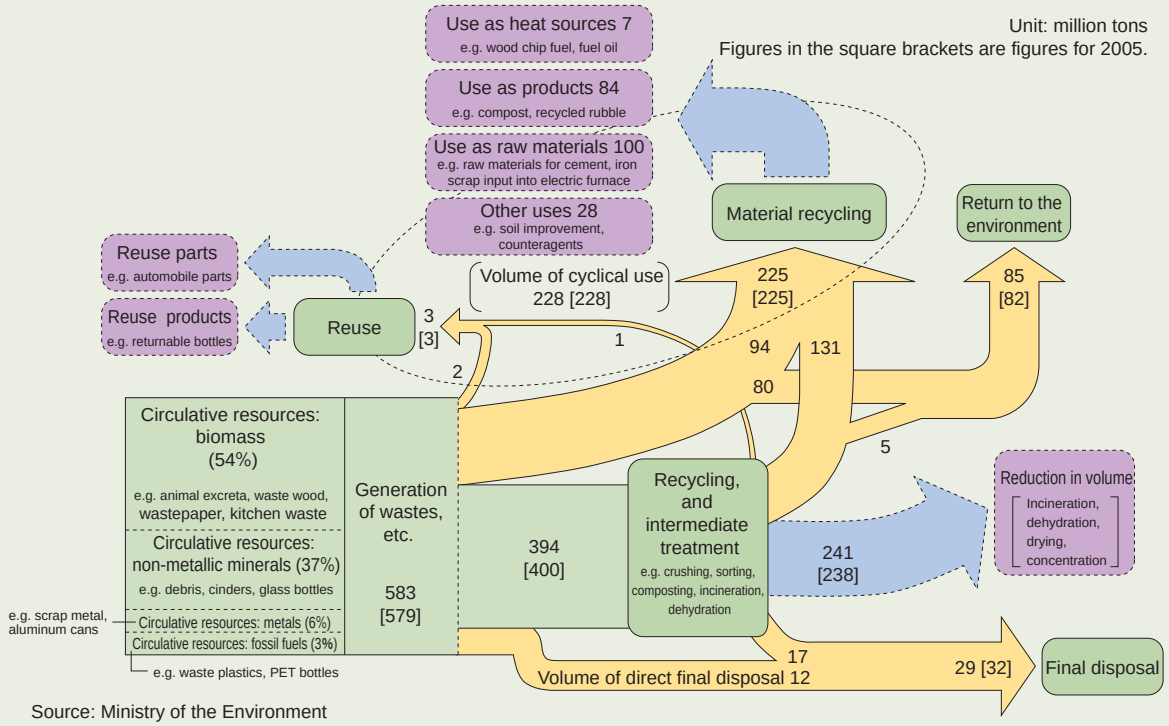
The amount of wastes was 85 million tons, which were

Figure 2-2 The Relation of Reduction of the Amount of Waste Disposal with the Amount of Greenhouse Gas Emission



Source: Ministry of the Environment

Figure 2-3 The Flow of the Circulative Resources of Our Country in 2006



Source: Ministry of the Environment

exhausted as by-products deriving from cattle production and agriculture, such as livestock excrement, rice straw, wheat straw and rice husk, and later returned to farmland as fertilizer.

c. Recycling/reusing stage

The amount of circulative resources reused in fiscal 2006 was 3 million tons; this does not include resources sold as used commodities.

The reused articles referred to are made up of reused tires and returnable bottles such as beer bottles and milk bottles.

d. Circulation and recycling stage

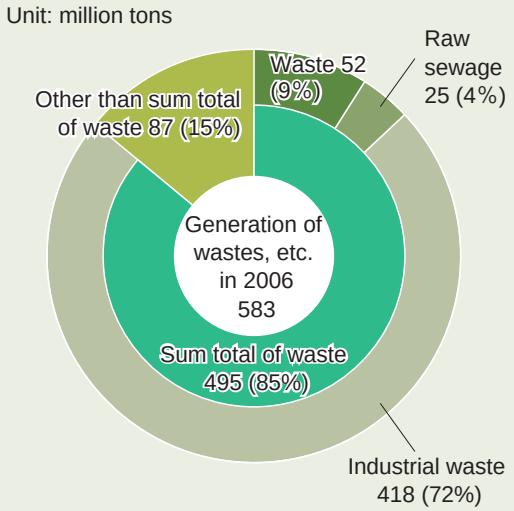
The total of circulative resources reused directly and resources reused after intermediate processing or recycling processing were carried out, amount to 225 million tons circulative resources being recycled. This means 39% of generated wastes were recycled: this figure includes waste oil and waste wood reused as fuel.

The most typical items are 58 million tons of debris that are reused as alternative material of nonmetal mineral resources (reclaimed broken stone or reclaimed asphalt mixture) and 50 million tons of slag that are similarly reused as alternative materials of nonmetal mineral resources (raw materials and fuels of cement and road bed materials).

e. Heat recovery (energy recovery)

When considering the amount of wastes subject to heat recovery during incineration disposal, the major part of municipal waste is used for heat recovery in the form of electric power, steam or heated water, and the electric power generated by the recovered heat in the incineration facilities amounted to 7.2 billion kWh. (Refer to Chapter 3 Section 2, 4(2))

Figure 2-4 The Amount of Generation of Wastes, etc. in 2006



Source: Ministry of the Environment

(b) Characteristics of utilization of each circulative resource

It is important also to check the breakdown of circulative resources, for example, the increase or decrease of nonmetal mineral type resources such as soil and rocks may have a large impact on the total amount of natural resources input in the material flow, because such resources represent the major part, also the increase of biomass type resources is desirable when they are collected with careful consideration to the environment so that sustainable use is possible. The breakdown of the total amount of natural resources input by characteris-

tic and by nation are shown in the Figure 2-5 and Figure 2-6.

In addition, the characteristics of how the circulative resources generated in our country are cyclically used are shown as follows in four classifications. (Figure 2-7)

a. Biomass type circulative resources

The biomass type circulative resources account for 54% of the entire amount of waste generation. Their contents are livestock excrement, organic sludge derived from water processing in the sewage works or manufacturing, wood wastes derived from construction sites and the manufacturing process of wood products, and household kitchen waste (garbage).

Because biomass type circulative resources contain a high proportion of water and organic substances, it is characteristic that the rate of reduction volume during incineration and dehydration is high, with the natural reduction rate to generation being 27%, the cyclical use rate 16%, the volume reduction rate 54% and a final disposal rate of 3%. The major usage of cyclical use is for compost and feed in agriculture.

Besides this, polluted mud is used for brick, and wood waste for reproduction wood board.

The input amount of biomass type resources in our country is 190 million tons; the amount of cyclical use is 50 million tons, therefore, the proportion of the cyclical use in the total material input of biomass type resources is 20%.

When looking to increase the cyclical use of biomass type circulative resources and decrease the amount of final disposal, it is useful to consider the following factors, the expansion of acceptance of fertilizer and feed in the agriculture area, the transformation to energy in methane fermentation facilities, and the promotion of the reduction of residual substances by incineration.

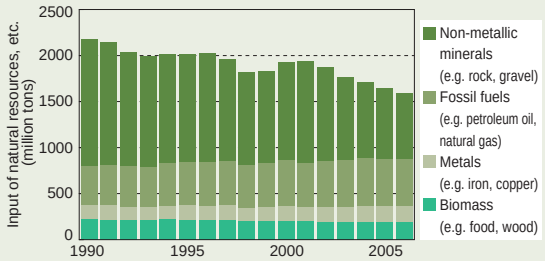
b. Nonmetal mineral type circulative resources

Nonmetal mineral (soil and rocks) type circulative resources account for 37% of the entire amount of generation of wastes. Their contents are, debris from construction sites, slag from the iron and steel manufacturing/non-ferrous metal/cast metal industries, non-organic sludge from construction sites and water purification plants, and glass bottles from households and restaurants.

As nonmetal mineral type circulative resources are inorganic material with a stable nature, about 60% are recycled; the cyclical use rate compared to generation is 64%, the reduction rate is 29% and the final disposal rate is 7%, but on the contrary, however, the final disposal rate is rather high. The major cyclical use is in civil engineering and construction such as materials for road base and cement. The input amount of nonmetal mineral type resources in our country is 710 million tons, the amount of cyclical use is 140 million tons, therefore, the proportion of cyclical use against the total material input of nonmetal mineral type resources is 16%.

When looking to increase the amount of nonmetal mineral type circulative resources and decrease the amount of final disposal, factors to consider are expanding the acceptance of such materials in civil engineering and construction e.g. road base material and cement material as fertilizer. However, demand for civil engineering and construction is and will be on a declining trend in the future, it will be necessary to examine the expansion of cyclical use in other areas and to contemplate the examination of reduction strategies for final disposal.

Figure 2-5 The Breakdown of Natural Resources, etc.



Source: Ministry of the Environment

c. Metal type circulative resources

Metal type circulative resources account for 6% of the entire amount of generation of wastes. Their contents are, scrap material from construction sites, scrap metal from iron and steel manufacturing/non-ferrous metal industries, metal processing scrap from machinery and appliances manufacturing industries, and such used household products as metal cans and home electric appliances.

As metal type circulative resources are stable in nature and contain almost no water and collection/recycling systems have been established for many years; a characteristic point is the rate of cyclical use is relatively high, with a cyclical use rate compared to generation of 97%, the reduction rate is 0% and the final disposal rate is 3%. Typical usages are electrical furnace iron manufacturing, and metal resources input for non-ferrous metal refining. The input amount of metal type resources in our country is 170 million tons; the amount of cyclical use is 40 million tons, therefore, the proportion of cyclical use against the total material input of metal type resources is 17%.

When looking to increase the amount of metal type circulative resources and decrease the amount of final disposal, factors to consider are the promotion of the collection and recycling of those metals in products which have not been used for cyclical use.

d. Fossil type circulative resources

Fossil type circulative resources account for 3% of the entire amount of generation of wastes. They consist of waste oil from various manufacturing industries, plastics processing waste from plastic article manufacturing industries and machinery and appliance manufacturing industries, and used plastic articles from households and various industries.

As the characteristic point of fossil type circulative resources is a relatively high reduction rate in the incineration process, the cyclical use rate compared with generation is 35%, the reduction rate is 48% and the final disposal rate is 17%. Typical use of these circulative resources is as building materials for construction and as a reducing agent of iron ore and an alternative to coke in the shaft furnaces of the iron and steel industry. Occasionally they are recycled as plastics material, however, as presently different grade resins and additives are contained in cyclical used waste plastics, they are mostly used by cascading (downsize recycling). The input

Figure 2-6 Natural Resources: Breakdowns of Domestic Extraction and Imports

Source: Ministry of the Environment

amount of fossil type resources in our country is 510 million tons; the amount of cyclical use is 5 million tons, therefore, the proportion of cyclical use against the total material input of fossil type resources is 1%.

When looking to increase the amount of fossil type circulative resources and decrease the amount of final disposal, factors to consider are to expand the collection of used products and to develop engineering to enable recycling, through the drafting of legislation, such as the “Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging”(abbreviated to: Containers and Packaging Recycling Law) and the “Law for the Recycling of Specified Kinds of Home Appliances”(abbreviated to : Home Appliances Recycling Law).

C. Target setting for the material flow index of our country

The Second Fundamental Plan for Establishing a Sound Material-Cycle Society has set new targets for the three indices concerning the “Entrance”, “Exit” and “Circulation” of the material flow.

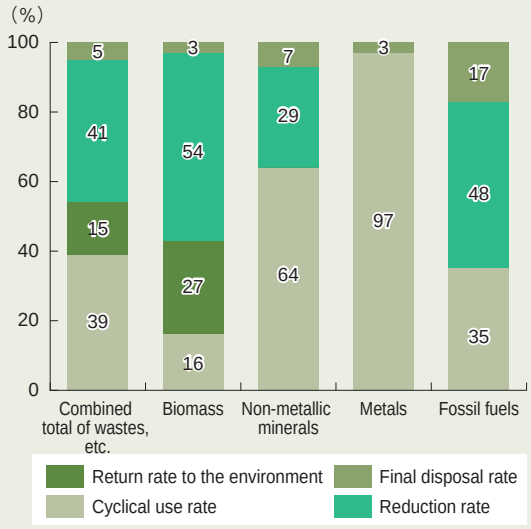
The target year of each index is assumed to be fiscal 2015. The latest achievements for each index is as follows.

1) Resource productivity (equals to GDP/divided by the input of natural resources and others)

The target for resource productivity in the Year 2015 has been set as 420 thousand yen per ton. (Double the index of Year 1990; 210 thousand yen per ton; a 60% improvement on Year 2000; 260 thousand yen per ton.) In Year 2006 it was about 348 thousand yen per ton. (Figure 2-8)

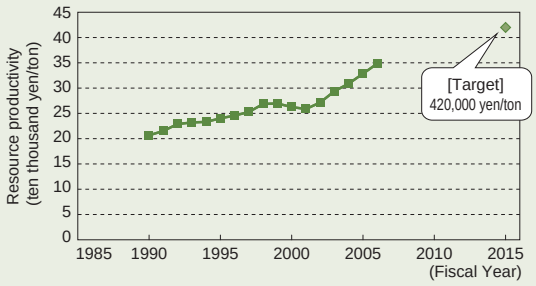
2) Cyclical use rate (equals the amount of recycling utili-

Figure 2-7 Cyclical Use and Disposal Status of Wastes, etc. (fiscal year 2006)



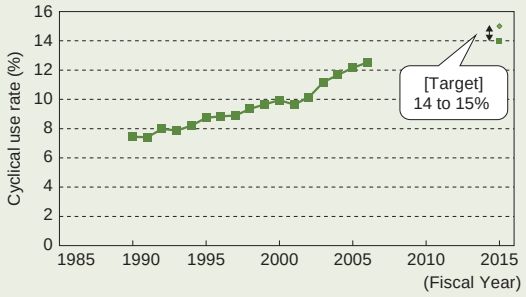
Source: Ministry of the Environment

Figure 2-8 Changes to Resource Productivity



Source: Ministry of the Environment

Figure 2-9 Changes to the Cyclical Use Rate



Source: Ministry of the Environment

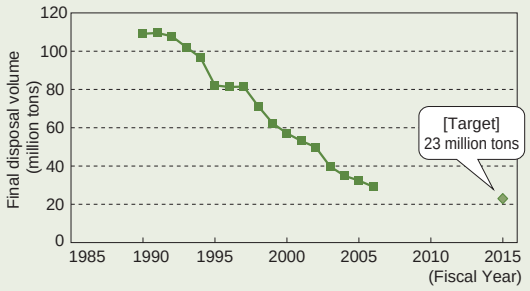
zation/divided by the amount of circulative utilization + input amount of natural resources and others)

The target of the recycling utilization rate in the Year 2015 has been set as about 14 to 15 %. (An 80% percent improvement from the index for Year 1990; about 8% for that year; a 40 to 50% improvement on Year 2000; about 10 % for that year.) Year 2006 was about 12.5% . (Figure 2-9)

3) The amount of final disposal (equals the amount of land filling of waste)

The target for final disposal in the Year 2015 has been set at around 23 million tons. (An 80% decrease on Year 1990; about 110 million tons for that year; a 60% decrease from Year 2000; about 56 million tons for that year.) Year 2006 was about 29 million tons. (Figure 2-10)

Figure 2-10 Changes to the Final Disposal Volume



Source: Ministry of the Environment

(2) Amount of waste generated

A. Classification of wastes

The "Waste Management and Public Cleaning Law" defines "wastes" as: unwanted materials or items which are no longer used personally or which are not delivered for value, and such materials or items can be described as, for example, garbage, bulky waste, burnt residue, polluted mud, feculence such as night soil and waste, either in solid or liquid form. Radioactive material and radioactive pollutants are not covered by the law, and are exempted from the terms of the law.

Wastes are divided into two broad classification; municipal wastes and industrial wastes. Industrial wastes refer to the twenty legally specified types of wastes derived from business activities and wastes imported from abroad.

Municipal wastes refers to wastes other than industrial wastes and consist mainly of night soil and domestic refuse or garbage, including business type wastes generated from offices and restaurants. (Figure 2-11).

B. Status of municipal wastes (garbage)

The amount of total emission of wastes*1 in fiscal 2006 was 52.04 million tons, or 1,116 grams daily per person; an overall decrease of 1.3% from the previous year.

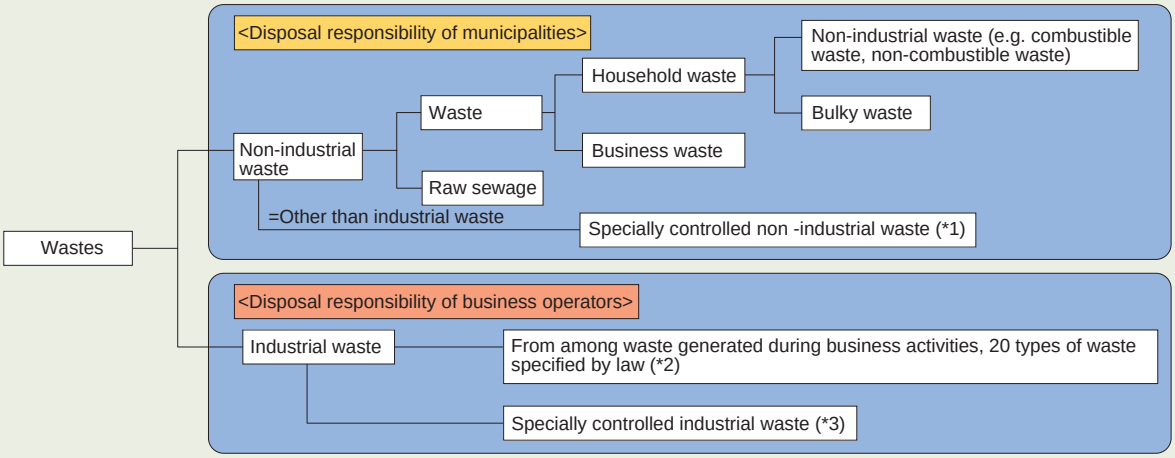
*1 "Amount of total emission of wastes"
="Amount of collected wastes + amount of carried in wastes + amount of collected wastes by groups"

When considering the proportion of wastes generated by daily life-related wastes and business-related wastes, the former accounts for 36.22 million tons (about 70%) and the latter for 15.82 million tons (about 30%). (Figure 2-12)

Wastes can also be divided into three broad categories; wastes recycled to resources directly or by intermediate processing, wastes whose volumes are reduced by incineration or other methods, and wastes directly landfilled with no processing. (Figure 2-13)

Wastes subject to any intermediate processing account for 45.25 million tons, about 92% of the total amount of disposed wastes. Intermediate processing facilities include, incineration facilities, recycling facilities, high-speed compost-

Figure 2-11 Segregation of Wastes



Note 1: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious
Note 2: Cinders, sludge, waste oil, waste alkali, waste plastics, waste paper, waste wood, waste fiber, animal offal and plant waste, solid animal waste, waste rubber, scrap metal, waste glass, waste concrete and ceramic, slag, debris, animal excreta, carcasses, soot and dust, any other items that are processed to dispose of the above 19 types of industrial waste, and imported waste
Note 3: Waste that may be harmful to human health and the living environment or is explosive, toxic, or infectious
Source: Ministry of the Environment

ing facilities, animal feed manufacturing facilities and methane recovery facilities. Out of the wastes brought into intermediate processing facilities, 4.59 million tons of wastes are reclaimed after processing, and when added to wastes directly recycled and collected by groups, the total amount of recycled wastes accounts for 10.22 million tons. The recycling ratio compared to the total of processed wastes increased from 5.3% in fiscal 1990 to 19.5% in fiscal 2006.

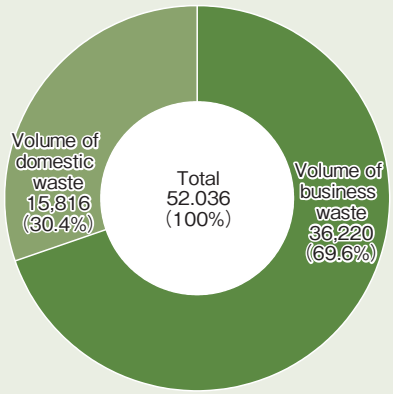
With regard to the amount of intermediate processing, wastes directly incinerated account for 38.07 million tons (a direct incineration ratio of 77.7% of the whole of processing), and the reduced amount of wastes in intermediate processing, mainly by incineration, accounts for 35.05 million tons (equivalent to 71.5 % of all processing). Recently incineration facilities have added electric power generators and heat supply facilities and the efficient use of heat is increasing in many places.

Meanwhile, the total amount of the wastes directly disposed of, incineration waste (such as soot and incinerated ash) and disposal waste from intermediate processing facilities equals the amount sent for landfill in final disposal sites. The amount of the wastes directly disposed of is almost 1.2 million tons, which equals 2.5% of the amount of total emissions. When the incineration and disposal waste are included, the total amount of final disposal is 6.81 million tons, and the amount of all categories is increasing year on year.

C. Status of municipal wastes disposal - night soil

The population using flush toilets in fiscal 2006 was 114.58 million, with 83.74 million connected to the public sewage systems, and 30.83 million using septic tanks for sewage (13.65 million septic tank users had a combined septic tank for kitchen and toilet waste). 13.21 million did not use the public sewage system of whom 12.98 million made use of planned collection systems and 220,000 used private

Figure 2-12 Proportion of Wastes Generated by Daily Life-related Wastes and Business-related Wastes (fiscal year 2006)

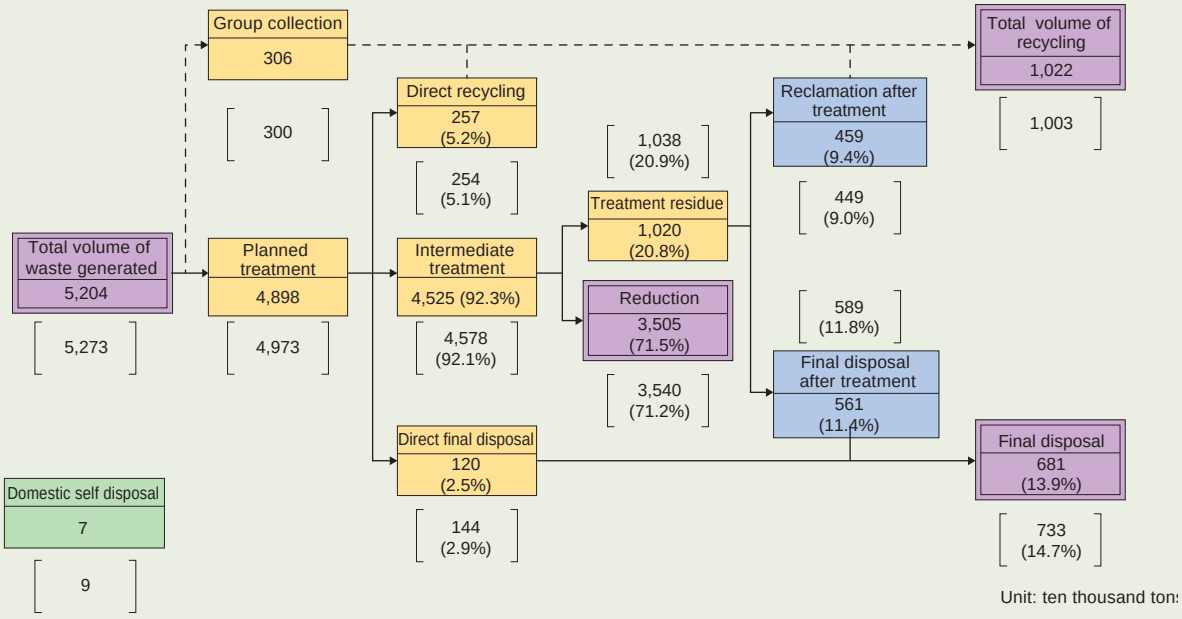


Note: Volume of group collection was classified into domestic waste.
Source: Ministry of the Environment

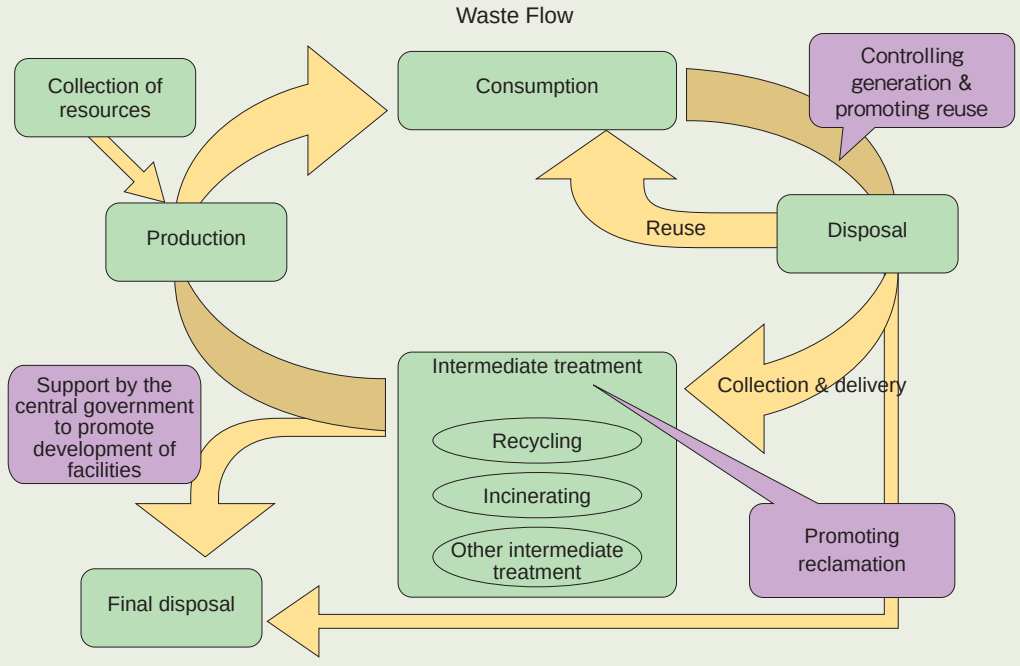
processing.

The amount of night soil and individual wastewater treatment facility sludge (the planned collection system) generated by about 40 percent of the total population (the total of non-public sewage system and septic tank systems) accounts for 25.95 million kiloliters, and is decreasing yearly. The major content is water; however, the value is huge when simply compared to the amount of regular wastes. By counting one kiloliter as one ton 23.95 million kiloliters of night soil and individual wastewater treatment facility sludge are being processed at human-waste treatment plants, 20,000 kiloliters in composting facilities and methane recovery facilities, 1.44 million kiloliters by discharge into sewage systems, 50,000 kiloliters used on farmland, 390,000 kiloliters by discharge into the ocean and 110,000 kiloliters in other ways.

Figure 2-13 Waste treatment flow in Japan (fiscal year 2006)



Note 1: Due to an error in planning or other factors, the volume of planned treatment does not equal the total volume of waste treated (= volume of intermediate treatment + volume of direct final disposal + volume of direct recycling).
Note 2: Figures in each item are rounded off; therefore, the total may not equal the breakdowns.
Note 3: Figures in the square brackets are figures for fiscal year 2005.
Note 4: "Direct recycling" refers to waste that is received directly by reclaiming operators and not through facilities for recycling; this item was newly established in the fiscal year 1998 survey, and until fiscal year 1997 it would seem to have been recorded in the "intermediate treatment, e.g. recycling" category.



Source: Ministry of the Environment

Please note, sewage sludge, generated by sewage treatment plants in the process of sewage disposal is counted as an industrial waste.

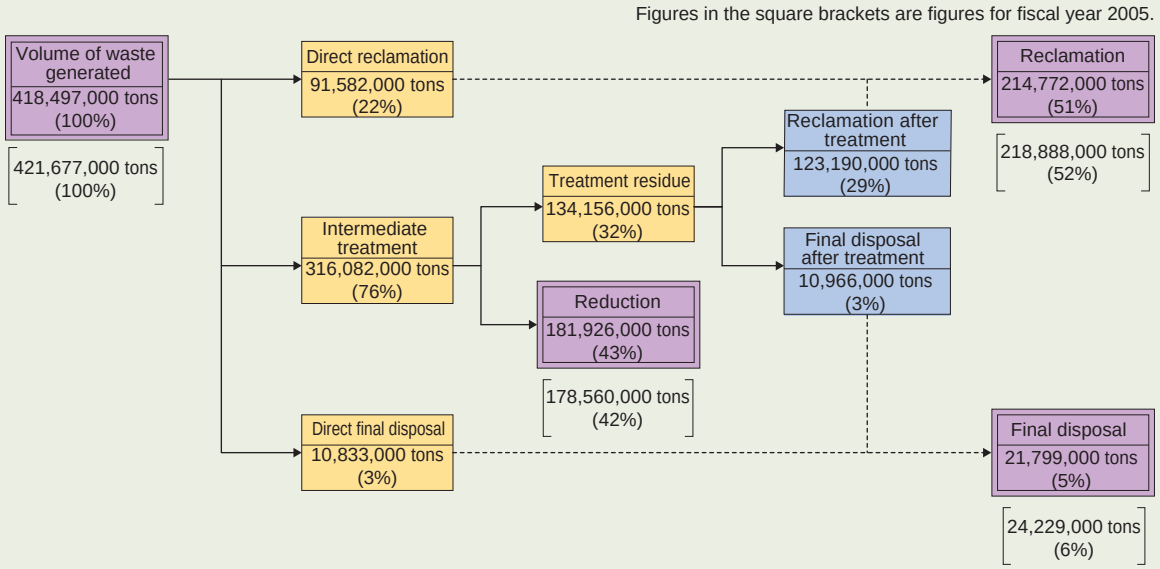
D. Status of industrial wastes disposal

The amount of total emission of industrial wastes across-the-country in fiscal 2006 was 418.5 million tons.

About 214.77 million tons (51% of the total amount) were reclaimed, about 181.93 million tons (43% of the total amount) were reduced by intermediate processing, and 21.8 million tons (5% of the total amount) were subject to final disposal. The amount of reclaiming refers to the total amount of directly reclaimed wastes plus recycled wastes generated from processed wastes produced by intermediate processing. The amount of final disposal refers to the total amount of wastes directly sent for final disposal plus wastes sent to final disposal after intermediate processing. (Figure 2-14)

When examining generated amounts of industrial wastes by business type, the major categories are in descending order, electric power generation, gas supply, heat supply, water

Figure 2-14 Industrial waste treatment flow (fiscal year 2006)

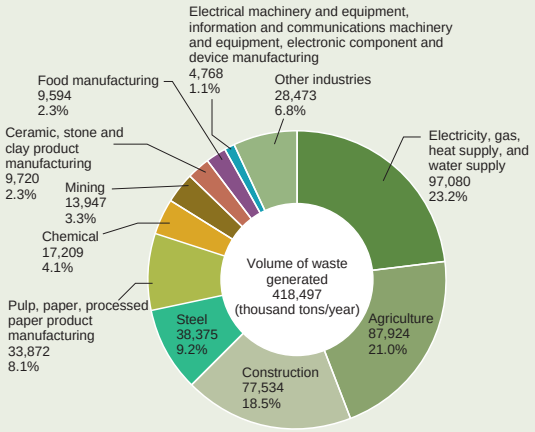


Note 1: Figures in each item are rounded off; therefore, the total may not equal the breakdowns.
Note 2: Figures in the round brackets are figures for fiscal year 2004.
Source: Ministry of the Environment

supply, agriculture, and construction business. The top three businesses account for about 60% of the total generated amount. (Figure 2-15)

When examining the generated amounts of industrial wastes by waste type, the largest category is polluted sludge with 40% of the total, followed by livestock excrement and debris; together they account for about 80% of the total generated amount. (Figure 2-16)

Figure 2-15 Industrial waste generation by industry (fiscal year 2006)



Source: Ministry of the Environment

(3) Status of circulative use of wastes

A. Container and packaging (glass bottles, PET bottles, plastics containers and packaging, paper containers and packaging)

The results of the sorted collection of wastes and material recycling into saleable products, based on the Containers and Packaging Recycling Law are shown in the Table 2-1. When examining the state of implementation in fiscal 2007, concerning the wastes targeted by the law, more than 90% percent of the municipalities are carrying out sorted collection, except for paper and plastics. The number of municipalities that have started the sorted collection of plastic containers and packaging, paper containers and packaging, and cardboard boxes added in the Law in fiscal 2000, is increasing steadily.

(a) Glass bottles

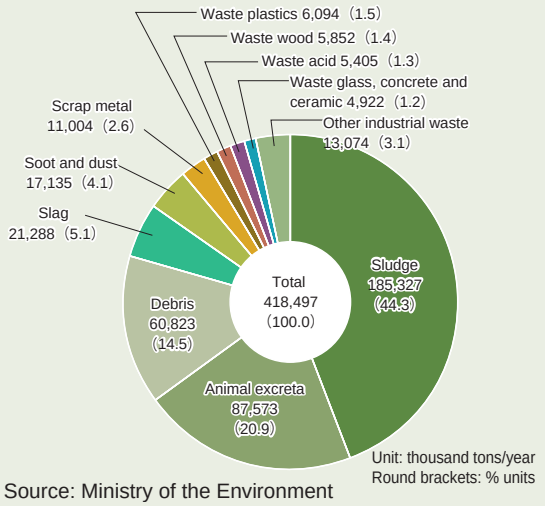
The amount of glass bottle production in fiscal 2007 was 1.433 million tons; generally there is a decreasing manufacturing trend. It is reasonable to assume consumer preference shifted from glass bottles which are mostly heavy and breakable, to other containers such as PET bottles which come in a wide variety of shapes and designs, and are light and easy to carry.

Please note, a target has been set to increase the utilization ratio of cullet in the manufacturing of glass containers to 90% before fiscal 2010, based on the "Law on Promotion of the Effective Utilization of Resources" (abbreviated: The Resources Effective Utilization Promotion Law.)

Glass bottles are categorized as one-way bottles for single use, and returnable bottles for repeated use after cleaning. The wasted one-way bottles are crushed to make cullet, which is recycled and used as materials for new bottles. Cullet is fragmented glass and the utilization ratio of cullet indicates the ratio of the amount of cullet compared with the amount of new materials in the manufacture of glass. (Figure 2-17)

In terms of the environment, returnable bottles are worthy of a mention, as when the entire life-cycle from manufacturing to collection and disposal is considered, and with the possibility of repeated use, they demonstrate a definite ener-

Figure 2-16 Industrial waste generation by type (fiscal year 2006)



Source: Ministry of the Environment

gy-saving effect, and are containers effectively contributing to measures to counter global warming.

(b) PET bottles

The growth rate of PET bottle sales remains steady, as the production of soft drink, accounting for about 90% of the usage of PET bottles, is increasing steadily every year.

The practice of recycling of PET bottles started with the beginning of sorted collection by municipalities in accord with the Containers and Packaging Recycling Law enforced in April 1997, and the collection ratio (the amount of the sorted collection compared with the amount of manufacturing of plastics used for PET bottles) in fiscal 1997 was only 9.8%; it had risen to 49.4 %, in fiscal 2007. When the amount of PET bottles collected chiefly by business units other than the municipal entities are included, the collection ratio accounts for 69.2%, according to the research conducted by the PET Bottles Recycling Promotion Association, a group of manufacturers of soft drink and PET bottles.

The number of municipalities that have adopted sorted collection systems increased from 631 in fiscal 1997 to 1,765 in fiscal 2007, about 97.2% of the total of municipalities.

Moreover, the recycling of bottles used for food (chiefly for beverages) which are then used again as a bottle containing food is commonly called “bottle to bottle,” and this technology (chemical recycling) was put to practical use in fiscal 2003. (Figure 2-18 and 2-19)

(c) Plastic containers and packaging

Plastic containers and packaging were newly targeted by the Containers and Packaging Recycling Law in fiscal 2000, and the beginning of segregated collection by the municipalities.

Sorted collection in fiscal 2007 was 644,000 tons, and it is expected this figure will increase as recycling systems become more common. The number of municipalities making the sorted collections in fiscal 2007 was 1,304, about 71.8% of the total of municipalities.

(d) Paper containers and packaging

Paper containers and packaging were newly targeted by the Containers and Packaging Recycling Law in fiscal 2000, along with plastic containers and packaging, and sorted collection by the municipalities began.

Sorted collection in fiscal 2007 was 83,000 tons, and the number of municipalities carrying out sorted collection is limited to only 696. The reason is this figure contains those municipalities that handle independent sorted collection of paper containers and packaging. This number does not include the collection of paper containers and packaging, even if sorted collection is actually taking place by making use of the collection routes of newspaper and magazines of the municipalities, which had already been implemented prior to the enforcement of the law.

(e) Steel cans

In recent years, the consumption weight of steel cans has dropped; 834,000 tons in fiscal 2007. The recycling rate (ratio of the amount of recycling, the amount collected and recycled as iron scrap, to the consumption weight) is 85.1% in fiscal 2007, according to the Steel Can Recycling Society. (Figure 2-20).

The background to this high figure is possibly the acceptance framework of steel cans has been firmly established.

(f) Aluminum cans

The consumption weight of aluminum cans has remained stable in recent years; 301,000 tons in fiscal 2007. The recycling rate (ratio of the weight of reclamation to the consumption weight) is 92.7% in fiscal 2007, according to the Aluminum Can Recycling Society. (Figure 2-21). In the same year, the recycling rate of collected aluminum cans to manufacture new cans (commonly known as “can to can”) was 62.7 %.

The background to this high figure is possibly the acceptance framework of aluminum cans has been firmly established, in the same way as steel cans.

(g) Paper cartons

Paper cartons (except for cartons containing aluminum) are used as containers for milk, soft drinks, and alcoholic beverages. The practical amount of sorted collection of paper cartons in fiscal 2007 was 17,000 tons, with 1,405 municipalities carrying out sorted collection for the year.

The amount of paper carton shipments for beverage in fiscal 2007 was 216,000 tons, with 194 tons used in domestic households, 10,000 tons in vending machines and restaurants, and 12,000 tons in school lunches.

The total amount of collections by municipalities, at counter shop and group collections were 56,000 tons; the recycling usages are for the manufacture of toilet paper, tissue paper and pressboard.

(h) Cardboard

Cardboard was newly targeted by the Containers and Packaging Recycling Law in fiscal 2000 and sorted collection by the municipalities began. The actual result of sorted collection in fiscal 2007 was 583,000 tons.

The number of municipalities carrying out sorted collec-

Table 2-1 Results of sorted collection and recycling in accordance with the Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging

Items	Fiscal Year	Estimated sorted collection (tons)	Actual sorted collection (tons)	Recycled (tons)	Number of municipalities with sorted collection		
					Number of municipalities	Rate (%)	Population coverage (%)
Glass containers: colorless	2007	393,557	332,417	322,444	1,736	95.6%	(98.8%)
	2006	392,074	339,019	328,775	1,732	94.8%	(98.6%)
	2005	450,584	341,748	327,796	1,753	95.1%	(98.3%)
	2004	442,140	346,671	334,659	2,815	92.2%	(96.8%)
	2003	431,395	356,977	345,208	2,911	92.3%	(97.5%)
	2002	505,175	348,698	337,888	2,795	86.4%	(94.7%)
	2001	483,879	355,157	339,443	2,725	83.9%	(93.8%)
	2000	458,559	352,386	334,549	2,618	81.1%	(92.6%)
	1999	542,451	326,110	307,237	1,991	61.2%	(86.3%)
	1998	486,025	322,284	303,240	1,862	57.2%	(84.6%)
	1997	406,133	292,775	275,119	1,610	49.5%	(76.8%)
Glass containers: brown	2007	336,928	290,570	279,896	1,741	95.9%	(98.8%)
	2006	335,137	292,323	281,799	1,736	95.0%	(98.6%)
	2005	387,520	293,825	281,524	1,760	95.4%	(98.4%)
	2004	380,735	301,262	291,868	2,826	92.6%	(98.1%)
	2003	372,004	309,857	297,510	2,922	92.6%	(97.6%)
	2002	405,634	304,172	293,240	2,807	86.8%	(94.8%)
	2001	388,351	311,993	298,785	2,737	84.3%	(93.8%)
	2000	369,346	312,539	294,959	2,631	81.5%	(92.7%)
	1999	369,894	290,127	272,559	1,992	61.3%	(86.4%)
	1998	358,012	274,374	256,227	1,866	57.3%	(84.6%)
	1997	299,536	243,916	228,170	1,610	49.5%	(77.0%)
Glass containers: other colors	2007	192,885	185,644	179,426	1,731	95.3%	(98.1%)
	2006	190,925	181,385	174,004	1,726	94.5%	(97.9%)
	2005	205,964	174,082	167,209	1,747	94.7%	(97.4%)
	2004	202,541	166,076	157,145	2,788	91.3%	(95.7%)
	2003	197,500	165,011	157,217	2,872	91.0%	(97.0%)
	2002	197,930	163,903	156,856	2,740	84.7%	(93.8%)
	2001	189,620	162,481	152,965	2,706	83.4%	(93.2%)
	2000	180,459	164,551	150,139	2,566	79.5%	(91.1%)
	1999	155,603	149,332	134,084	1,915	58.9%	(83.9%)
	1998	140,443	136,953	123,227	1,784	54.8%	(81.9%)
	1997	118,536	107,533	95,190	1,535	47.2%	(74.1%)
Paper containers and packages	2007	103,338	82,957	81,383	696	38.3%	(34.0%)
	2006	154,504	81,815	78,627	599	32.8%	(32.0%)
	2005	189,970	71,012	63,031	551	29.9%	(29.8%)
	2004	165,355	69,197	59,668	772	25.3%	(27.6%)
	2003	147,590	76,878	69,508	748	23.7%	(27.0%)
	2002	152,764	57,977	54,145	525	16.2%	(21.0%)
	2001	120,308	49,723	44,675	404	12.4%	(16.8%)
	2000	86,724	34,537	26,310	343	10.6%	(13.0%)
PET bottles	2007	299,752	283,441	277,015	1,765	97.2%	(99.1%)
	2006	284,779	268,266	261,265	1,752	95.9%	(99.0%)
	2005	243,070	251,962	244,026	1,747	94.7%	(97.4%)
	2004	229,089	238,469	231,377	2,796	91.6%	(96.6%)
	2003	214,209	211,753	204,993	2,891	91.6%	(96.5%)
	2002	198,672	188,194	183,427	2,747	84.9%	(93.5%)
	2001	172,605	161,651	155,837	2,617	80.6%	(91.8%)
	2000	103,491	124,873	117,877	2,340	72.5%	(86.9%)
	1999	59,263	75,811	70,783	1,214	37.3%	(67.4%)
	1998	44,590	47,620	45,192	1,011	31.1%	(62.0%)
	1997	21,180	21,361	19,330	631	19.4%	(41.8%)
Plastic containers and packages	2007	807,349	644,097	616,983	1,304	71.8%	(76.2%)
	2006	723,641	609,215	582,876	1,234	67.5%	(73.8%)
	2005	757,050	558,997	538,123	1,160	62.9%	(67.1%)
	2004	628,982	471,488	455,487	1,757	57.5%	(63.8%)
	2003	486,585	401,697	384,865	1,685	53.4%	(59.3%)
	2002	486,727	282,561	268,640	1,306	40.4%	(48.4%)
	2001	389,272	197,273	180,306	1,121	34.5%	(43.6%)
	2000	239,174	100,810	77,568	881	27.3%	(30.7%)
White trays	2007	10,841	4,900	4,444	720	39.6%	(33.3%)
	2006	9,504	4,325	4,051	696	38.1%	(32.5%)
	2005	14,439	4,581	4,162	690	37.4%	(32.3%)
	2004	12,556	3,933	3,633	1,050	34.4%	(26.4%)
	2003	10,214	4,217	3,993	1,013	32.1%	(23.1%)
	2002	14,882	3,552	3,239	800	24.7%	(22.0%)
	2001	11,865	3,402	3,011	726	22.4%	(20.4%)
	2000	8,277	3,039	2,499	612	19.0%	(15.3%)

Items	Fiscal Year	Estimated sorted collection (tons)	Actual sorted collection (tons)	Recycled (tons)	Number of municipalities with sorted collection		
					Number of municipalities	Rate (%)	Population coverage (%)
Steel containers	2007	388,507	275,353	270,312	1,795	98.8%	98.4%
	2006	388,178	304,578	299,058	1,793	98.1%	(98.2%)
	2005	522,123	329,535	321,245	1,826	99.0%	(98.4%)
	2004	515,802	362,207	355,106	2,995	98.1%	(97.3%)
	2003	507,815	393,650	387,875	3,116	98.8%	(98.5%)
	2002	620,045	419,667	415,364	3,123	96.5%	(97.7%)
	2001	598,648	461,357	450,229	3,104	95.6%	(97.3%)
	2000	576,461	484,752	476,177	3,065	94.9%	(96.9%)
	1999	636,099	471,127	456,892	2,625	80.7%	(91.8%)
	1998	590,858	471,638	461,347	2,572	79.0%	(91.4%)
	1997	526,701	464,662	443,506	2,411	74.1%	(86.4%)
Aluminum containers	2007	165,588	126,334	124,398	1,799	99.1%	(98.5%)
	2006	162,226	134,458	132,091	1,800	98.5%	(98.3%)
	2005	179,393	139,535	137,015	1,827	99.1%	(97.5%)
	2004	175,560	139,477	137,905	2,988	97.9%	(97.2%)
	2003	170,742	139,321	137,055	3,108	98.5%	(98.5%)
	2002	189,519	145,789	144,101	3,130	96.8%	(97.6%)
	2001	181,111	141,408	137,753	3,112	95.9%	(97.4%)
	2000	172,889	135,910	132,386	3,078	95.3%	(97.0%)
	1999	187,025	128,541	124,690	2,647	81.4%	(92.0%)
	1998	170,535	121,214	117,315	2,587	79.5%	(91.7%)
	1997	148,885	112,527	107,455	2,420	74.3%	(86.7%)
Corrugated cardboard boxes	2007	739,893	583,195	579,892	1,627	89.6%	(89.0%)
	2006	724,537	584,312	580,229	1,588	86.9%	(85.4%)
	2005	679,224	554,820	549,464	1,551	84.1%	(81.2%)
	2004	660,852	547,149	542,163	2,391	78.3%	(79.6%)
	2003	641,117	554,309	538,043	2,446	77.5%	(80.4%)
	2002	486,107	502,903	498,702	2,105	65.1%	(72.0%)
	2001	458,519	448,855	438,598	1,942	59.8%	(67.1%)
	2000	434,888	380,290	372,576	1,728	53.5%	(61.0%)
Drink cartons	2007	29,096	16,586	16,327	1,405	77.4%	(86.6%)
	2006	27,677	15,921	15,735	1,355	74.2%	(84.3%)
	2005	28,352	16,320	15,956	1,344	72.9%	(80.6%)
	2004	26,657	15,807	15,402	1,966	64.4%	(78.3%)
	2003	24,911	16,636	15,742	2,031	64.4%	(79.0%)
	2002	35,502	15,696	15,358	1,849	57.2%	(74.1%)
	2001	31,514	13,136	12,435	1,756	54.1%	(70.9%)
	2000	28,065	12,565	12,071	1,599	49.5%	(69.1%)
	1999	36,626	9,574	9,416	1,176	36.2%	(54.9%)
	1998	30,072	8,939	8,670	1,111	34.1%	(54.7%)
	1997	23,028	6,644	6,419	993	30.5%	(43.4%)
Total	2007	3,456,891	2,820,594	2,748,077	–	–	
	2006	3,383,677	2,811,293	2,734,460	–	–	
	2005	3,643,250	2,731,836	2,645,388	–	–	
	2004	3,427,713	2,657,803	2,580,780	–	–	
	2003	3,193,868	2,626,089	2,538,016	–	–	
	2002	3,278,075	2,429,560	2,367,721	–	–	
	2001	3,013,827	2,303,034	2,211,025	–	–	
	2000	2,650,056	2,103,213	1,994,612	–	–	
	1999	1,986,961	1,450,822	1,375,661	–	–	
	1998	1,820,535	1,383,022	1,315,218	–	–	
	1997	1,543,999	1,249,418	1,175,189	–	–	

* Above figures are rounded off; therefore, the total may not equal the breakdowns.
* "Plastic containers and packages" refers to all types of plastic containers and packages including white trays.
* The number of municipalities in the white trays category refers to the number of municipalities that carry out collection only for white trays.
* The total population nationwide at the end of March 2008 is 127.73 million.
* The number of municipalities at the end of March 2008 is 1,816 (including Tokyo 23 wards).
* All of "Annual estimated sorted collection," "Annual actual sorted collection," and "Annual volume recycled" include the volume independently treated by municipalities.

tion accounted for 1,627, which is substantially more than in the case of plastic containers and packaging and paper containers and packaging, which were made targets of the Containers and Packaging Recycling Law at the same time. The background to this high figure is possibly the acceptance framework of cardboard has been firmly established.

According to the Cardboard Recycling Association, used cardboard can be recycled into new cardboard about seven times.

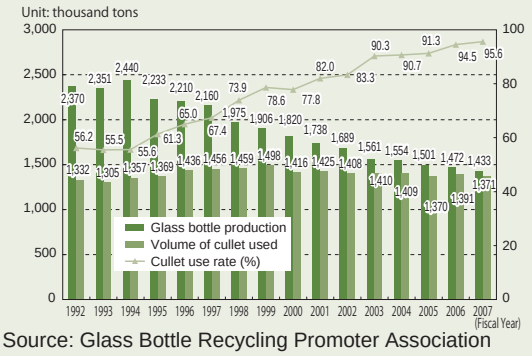
The consumption weight of cardboard was 8.887 million tons in fiscal 2007 and collected waste cardboard rose to 8.607 tons, the recycling rate (ratio of the weight of collected waste-paper to the consumption weight by manufacturers) was 114.3%. However, it is presumed there was an excessive import of recycled waste cardboard in fiscal 2007, the final recycling rate when considering this factor reduces to 100.09%.

B. Paper

The recycling rate and reuse rate of paper in fiscal 2007 were 74.5% and 61.5%, respectively. (Figure 2-22)

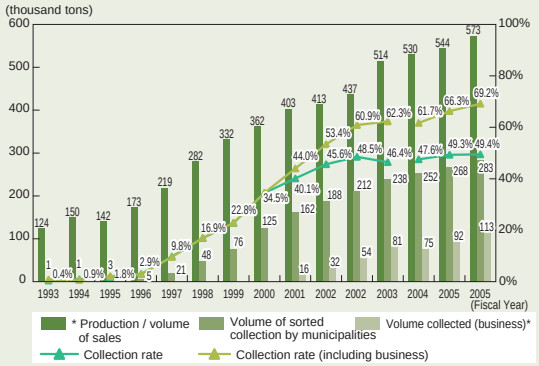
Although it is evident that there is a limit to the increase of

Figure 2-17 Glass bottle production and volume of cullet used



Source: Glass Bottle Recycling Promoter Association

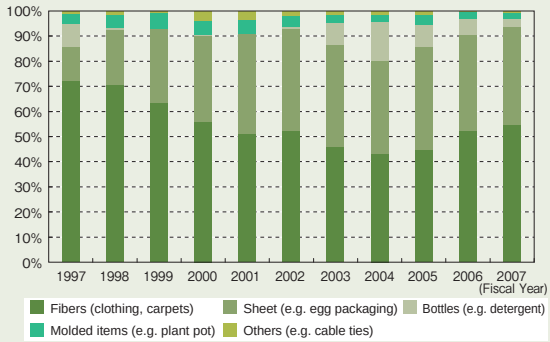
Figure 2-18 Changes to PET bottle production and volume of sorted collection



Source: Created by the Ministry of the Environment, based on materials published by the Council for PET Bottle Recycling

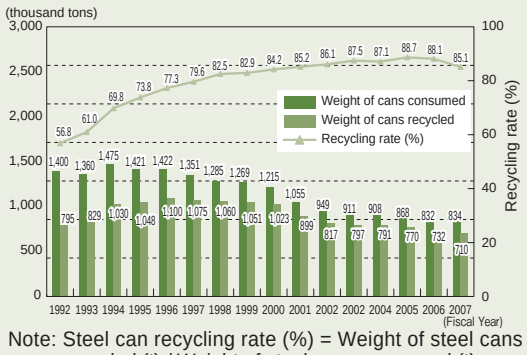
* Figures show production volume until fiscal year 2004, and the volume of sales for fiscal year 2005 and after.

Figure 2-19 Changes to recycled PET resin use by type



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

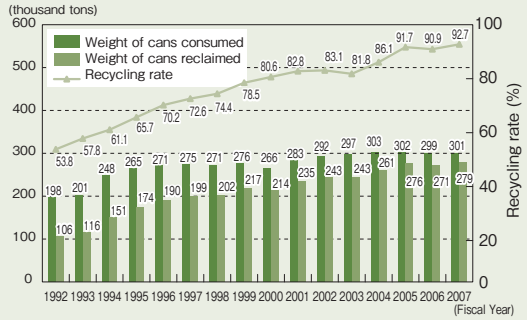
Figure 2-20 Steel cans: consumption weight, recycled weight and recycling rate



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

Source: Japan Steel Can Recycling Association

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



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

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

the recycling rate, because some paper such as toilet paper is impossible to collect and some paper such as for books will be kept for a long time, it is still necessary to continue the promotion of sorted collection and the use of recycled paper so that the recycling rate and reuse rate are improved.

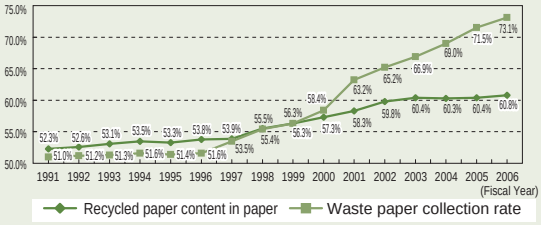
A target has been set to raise the recycling rate of paper manufactured in our country to at least 62% by fiscal 2010, in accordance with the Law for Promotion of Effective Utilization of Resources.

C. Plastics

Plastics, because they are easy to process and have a wide range of applications are used for many products.

According to the Plastics Processing Promotion Conference, the amount of plastics production was presumed to be 14.65 million tons in fiscal 2007, with an increase of domestic consumption and the amount of emissions compared to the previous year. Also the amount of disposal by recycling methods specified in the Containers and Packaging Recycling Law is increasing; the amount of effective utilization, along with the reclamation amount of industrial waste and the heat recovery amount are also increasing. The effective utilization rate, which is the ratio of amount of effective utilization compared with the amount of emission, has steadily improved to 73%. (Figure 2-33) In addition, it is presumed that the direct incineration rate is 15% and disposal by landfill rate is 13%.

Figure 2-22 Recycling Rate and Reuse Rate of Paper



Note: Due to a change in classification types, the calculation method of waste paper collection rate was changed in fiscal year 2000; concerning the export and import of paper and cardboard, some types that had been formerly classified as paper secondary products were reclassified as printing paper in the paper category.
Source: Paper Recycling Promotion Center

D. Home electric appliances

In general, disposed household electric appliances had been collected and processed by municipalities, but even though the necessity of recycling was especially high for the following four appliances, household air-conditioners, CRT-based televisions, refrigerators/freezers, and clothes washing machines, it was not easy for the municipalities to recycle these items. In consequence, such articles have been defined as specific household appliance wastes by the Home Appliance Recycling Law, which was enforced in April 2001 and manufacturing industries are now obliged to recycle such wastes into saleable products.

Out of all the materials used in the present production models of the above four household appliances, metals and glass are being treated, however from now on, it is necessary to promote the recycling of plastics, in keeping with the development of recycling technologies.

With the enforcement of the Home Appliance Recycling Law, manufacturing industries are now obliged to recycle the wastes from these four appliances into saleable products, and are promoting recycling. The recycling to salable products rate (except for the thermal recycling) is as follows: 60% or more for household air-conditioners, 55% or more for CRT-based televisions, 50% or more for refrigerators/freezers (freezers being added in April 2004) and 50% or more for clothes washing machines. The total number of these four appliances accepted at the specified collection sites was 12.11 million appliances in fiscal 2007, about a 4.3% increase on the previous year.

The recycling to salable products rates achieved by the manufacturing industries in fiscal 2007 were 87% for household air-conditioners, 86% for CRT-based televisions, 73% for refrigerators/freezers and 82% for clothes washing machines, all items exceeded the regulatory standards. (Figure 2-24), (Figure 2-25)

Starting from April 1, 2009, liquid crystal/plasma-panel televisions and clothes driers were added as subject appliances and middle-to-high quality plastics were added to the calculation criteria for the calculation of those recycling to salable products manufacturing industries are obliged to process; consequently, recycling to salable products rates were revised to 70% or more for household air-conditioners, 55% or more for CRT-based televisions, 50% or more for liquid crystal/plasma-panel televisions, 60% or more for refrigerators/freezers and 65% or more for clothes washing machines/clothes driers.

E. Construction waste

Construction waste accounts for about 20 percent of the industrial waste generated and for about 80 percent of illegal dumping. In the future, especially wastes from building debris are expected to increase, as the buildings built in the boom after 1965 face refurbishment.

The amount generated, consists of concrete lumps, asphalt concrete lumps and construction site wood, and accounts for about 80% of construction wastes, such generated materials must be recycled if the construction project exceeds a specified scale as stipulated in the "Law on Recycling of the Materials Involved in the Construction Works" (Law No. 104, Year 2000) (Abbreviated: "Construction Material Recycling Act"). It is inevitable that these three items will be recycled first. (Figure 2-26)

The recycling rate of concrete mass and asphalt concrete mass is greatly improved following the "Rules on the Present Operations Concerning the Use of Recycling Resources Involved in Public Works" prepared in March 1991 (which was revised to as the "Rules on the Obligation of Recycling" in June 2006) and measures taken by each Regional Development Bureau. The actual recycling rate of these articles in fiscal 2005 has already achieved the target of 95%, which was regulated for fiscal 2010 by the Construction Material Recycling Act.

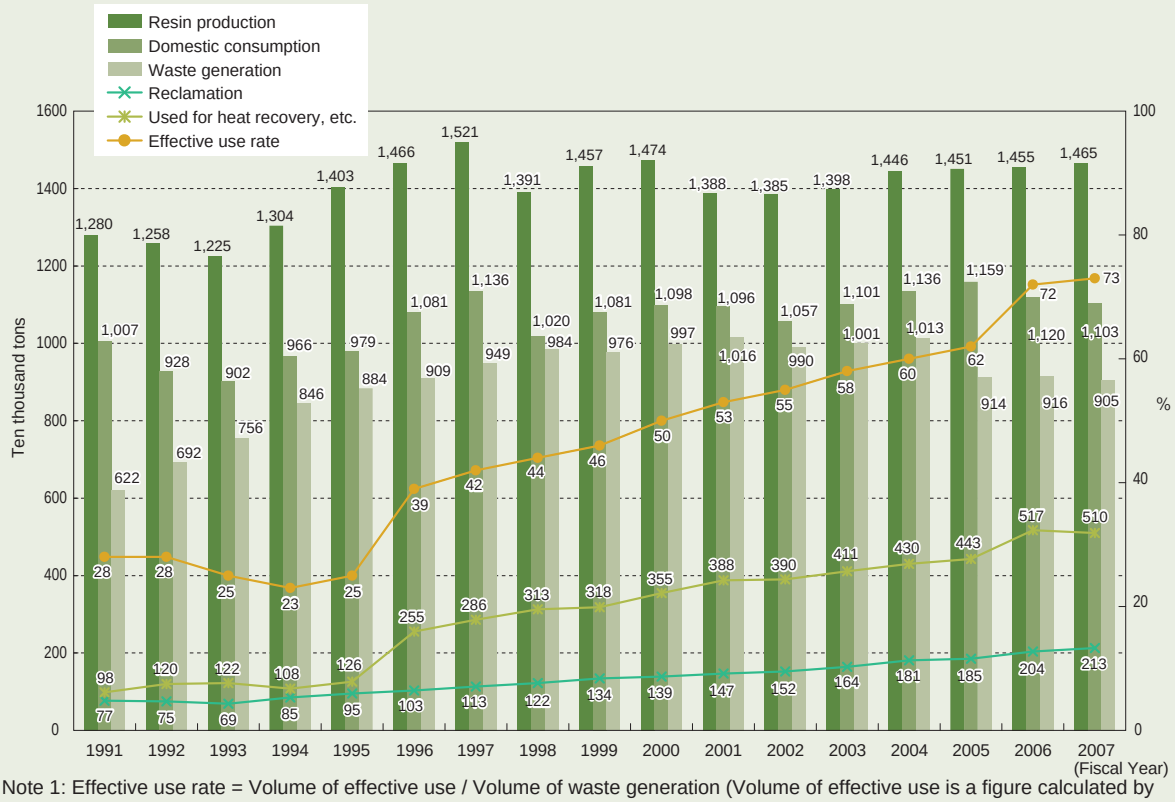
Concerning construction generated wood, good progress has been made to attain the targeted recycling rate of 95%, which was set up for fiscal 2010 (Figure 2-27). Concerning construction generated polluted mud, effective utilization of the mud is developing, following the "Guidelines on the Reclamation of the Construction Generated Polluted Mud," drawn up in June 2006.

Moreover, concerning construction generated mixed waste, it has been thought that the segregation of construction by-products suitable for recycling purposes will be effective, therefore, it has been considered that the establishment of a "combined collection system for small lot wastes" would be necessary to effectively collect in their sorted state such small amounts of diversified construction wastes for recycling. The "Conference for Establishment of a Combined Collection System for Small-Lot Construction By-Products in the Tokyo Metropolitan District" was set-up in June 2005, in order to promote the examination of the matter.

F. Construction generated soil

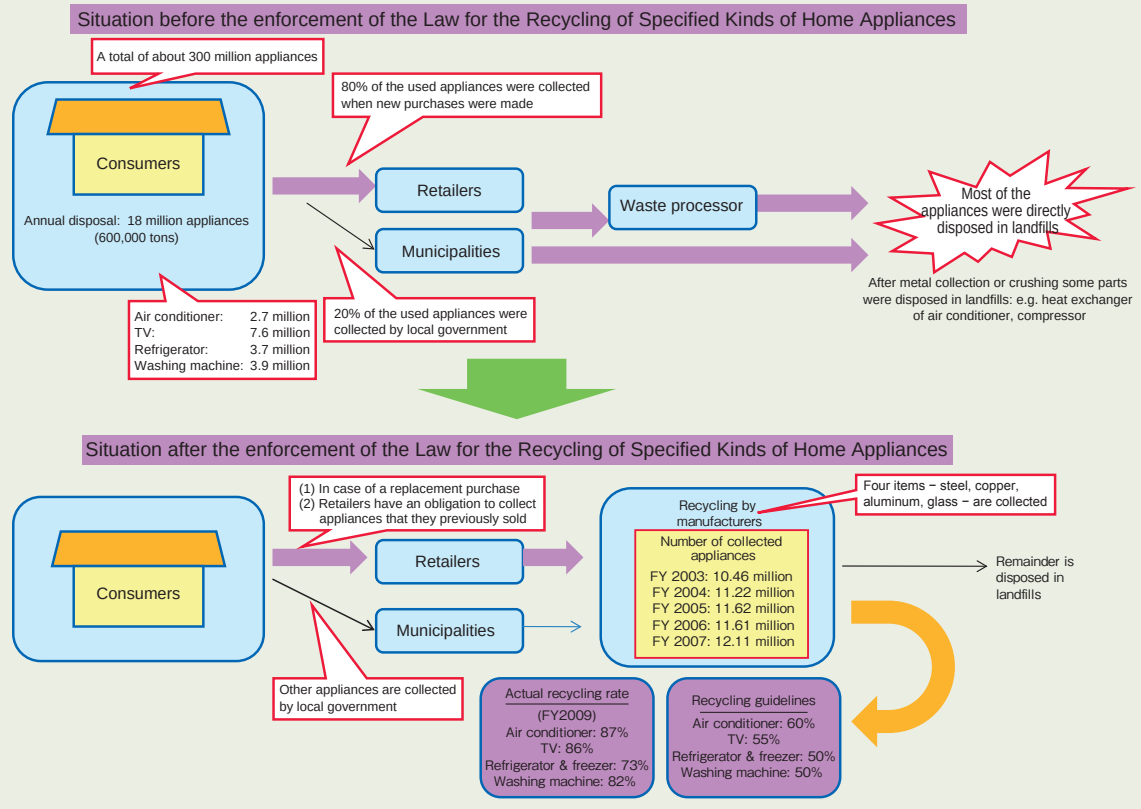
The actual amount of construction generated soil from construction sites was about 195 million cubic meters in fiscal 2005, 50 million cubic meters were reused for other constructions, a rate of 26%. On the other hand, while the amount of new materials taken out of the soil used for construction decreased by 11% from fiscal 2002, the reuse rate of construction generated soil in fiscal 2005 was 62.9%. It was not possible to achieve the target of 75%, which was set

Figure 2-23 Changes to plastic production, consumption, waste generation and reclamation



Note 1: Effective use rate = Volume of effective use / Volume of waste generation (Volume of effective use is a figure calculated by adding the volume of reclamation and the volume used for heat recovery, etc.)
Note 2: In fiscal year 1997, the calculation method was changed; unused resin, production loss, and processing loss were newly included in industrial waste.
Source: Created by the Ministry of the Environment, based on materials published by the Plastic Waste Management Institute

Figure 2-24 Status of waste home appliance treatment



Source: Ministry of the Environment, Ministry of Economy, Trade and Industry

Figure 2-25 Results of recycling rate of waste home appliances: four items (fiscal year 2007)

Items		Air conditioner	TV	Refrigerator & freezer	Washing machine
Number of appliances collected from designated sites	[thousand units]	1,890	4,613	2,725	2,884
Number of appliances recycled or processed	[thousand units]	1,872	4,542	2,724	2,879
Weight of appliances recycled or processed	[tons]	78,715	134,283	159,763	94,101
Weight of appliances recycled	[tons]	68,861	115,563	116,683	77,231
Recycling rate	[%]	87%	86%	73%	82%

Note 1: The number of appliances recycled or processed, and the weight of appliances recycled or processed refers to the total number and gross weight of waste home appliances to which recycling processing and the like was applied.
Note 2: All decimal figures are discarded.
Note 3: Regarding the number of appliances collected at designated sites and the number of appliances recycled or processed, if manufacturers or other operators carrying out recycling have not been assigned, due to an error in recording a control sheet or the like, such waste appliances are not included.

◆ Recycling status of parts and materials
○ Total weight of parts and materials when they are processed into a condition that allows them to be transferred, with or without cost, to manufacturers who will use them as materials for or parts of a product

Note: "Other valuables" refers to plastics.
Source: Ministry of the Environment, Ministry of Economy, Trade and Industry

in the "Construction Material Recycling Promotion Program 2002" for fiscal 2005. Various approaches are being developed to promote the reuse of construction generated soil in other constructions, based on the "Construction Material Recycling Promotion Program 2002" prepared by the Ministry of Land, Infrastructure, Transport and Tourism in April 2008.

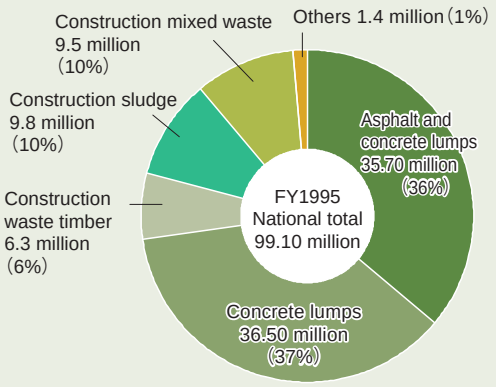
G. Food waste

Food wastes are animal or vegetable remains from each stage of manufacturing, distribution, and consumption of food, and more concretely, they are unsalable food produced in the process of manufacturing and distribution of fabricated food, left-over food in consumption and cooking waste.

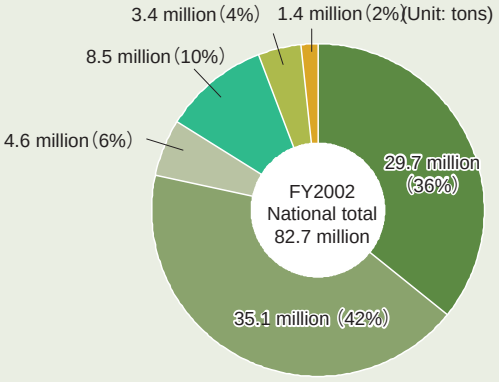
These food wastes are classified as industrial wastes when derived from food manufacturing processes and as municipal wastes when derived from domestic households, food distribution businesses and restaurants. The generated amounts are 3.01 million tons for industrial wastes, and 15.87 million tons for municipal wastes of which 10.45 million tons came from domestic households), giving a total of 18.88 million tons in fiscal 2006 (Table 2-27).

Food wastes derived from food manufacturing industries are relatively easy to be reclaimed, because it is easy to meet the required volume and their composition is stable, therefore

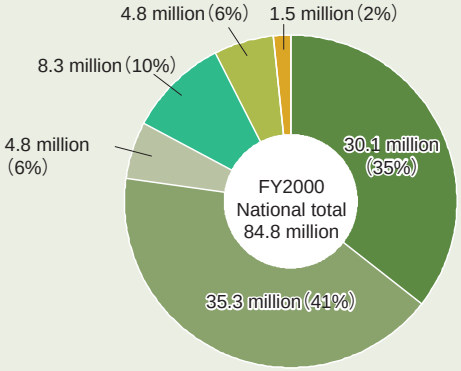
Figure 2-26 Construction waste generation by year and type



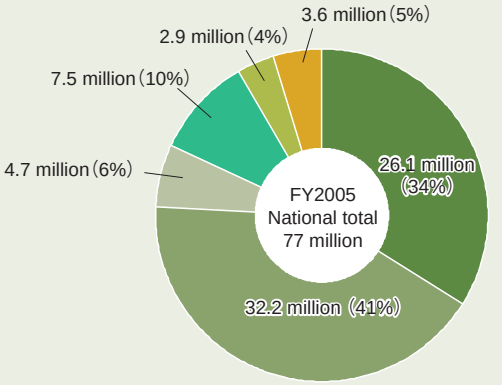
Source: Ministry of Construction



Source: Ministry of Land, Infrastructure and Transport



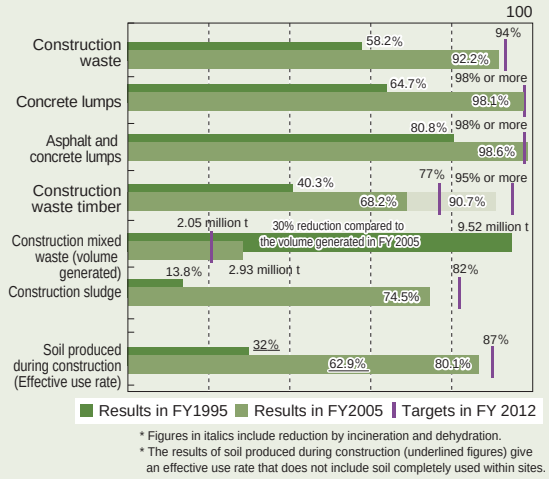
Source: Ministry of Land, Infrastructure and Transport



Source: Ministry of Land, Infrastructure and Transport

Note: Due to rounding off, the breakdowns may not equal the total.

Figure 2-27 Construction waste: recycling status by type



* Figures in italics include reduction by incineration and dehydration.
* The results of soil produced during construction (underlined figures) give an effective use rate that does not include soil completely used within sites.

Source: Ministry of Land, Infrastructure and Transport

Table 2-2 Generation and treatment status of food waste (fiscal year 2006)

(Unit: ten thousand tons)

	Waste generation	Disposal				
		Disposal by incineration or landfill	Recycled			
			Composting	Livestock feed	Others	Total
Municipal waste:	1,587	1,324	–	–	–	263
Domestic	1,045	994	–	–	–	52
Business	542	331	79	47	84	211
Industrial waste	301	42	103	116	39	259
Total	1,888	1,366	–	–	–	522

Note 1: Above figures are rounded off; therefore, the total may not equal the breakdowns.
Note 2: The volume of food waste generated was provisionally calculated by the Ministry of the Environment, based on the generation and treatment status of municipal waste (results of fiscal year 2006), and the generation and treatment status of industrial waste (results of fiscal year 2006).
Note 3: The volume of recycled domestic waste was also provisionally calculated by the Ministry of the Environment in the same manner as Note 2.
Note 4: The volume of recycled business waste and industrial waste (including details) was provisionally calculated, based on the results of the Fiscal Year 2007 Status Survey on Recycling of Circulating Food Resources reported by the Ministry of Agriculture, Forestry and Fisheries.
Source: Ministry of Agriculture, Forestry and Fisheries, Ministry of the Environment.

they are reclaimed in the form of 1.03 million tons of compost (34%), 1.16 million tons of animal feeding stuff (39%), and 390,000 tons of extracted oils and fats (13 %), making a total of 2.59 million tons (a recycling rate of 86%).

The food wastes (business type municipal wastes) derived from food distribution industries and restaurants are reclaimed as 790,000 tons of compost (15%), 470,000 tons of animal feeding stuff (9%), and 840,000 million tons of extracted oils and fats (15%), making a total of 2.11 million tons (a recycling rate of 39%).

On the other hand, food wastes derived from domestic households (household municipal wastes) are generated in small amounts and from numerous places, and the composition is too complicated, therefore, only 520,000 tons (5%) are now reclaimed.

As a result of the foregoing, in total, 5.22 million tons (28%) of the food wastes are reclaimed by composting or animal feeding and the remaining 13.66 million tons (72%) are incinerated and disposed by landfill.

Additionally, rubbish type biomass including food wastes have more possibility to be reclaimed for compost or animal feeds and to be converted to energy or electric power, it is required to further promote their reuse in the establishment of a Sound Material-Cycle Society and the creation of a society that does not contribute to global warming.

H. Automobiles

(a) Automobiles

From the used automobiles sold by collecting companies (mostly car dealers) to the scrapping companies, useful parts and frameworks, such as engines and auto bodies are collected. From the remaining scrap wastes sold on to the shredding companies, iron materials and other useful metals are collected, and the remainder (shredder dusts) are disposed as wastes (Figure 2-28). Concerning the percentage by weight of an automobile, about 20 to 30% are collected (reuse of parts) as useful parts by scrapping companies and about 50 to 55% are recycled (material recycling) as material.

The “Law on the Recycling of Used Automobiles” (abbreviation: “Automobile Recycling Law”) has been enforced and in full operation since January 2005, in the period from enforcement until March 2009, recycling fees for about 92.77 million automobiles have been deposited and in Year 2008 alone. 3.58 million used automobiles were disposed of in accordance with the Automobile Recycling Law .

Since October 2005, new support businesses were started, using the deposit money for specified recycling materials, for the municipalities on the isolated islands where there are problems in the delivery of used automobiles. In 89 municipalities deposit money disbursement was applied to 23,000 used automobiles, in Year 2008.

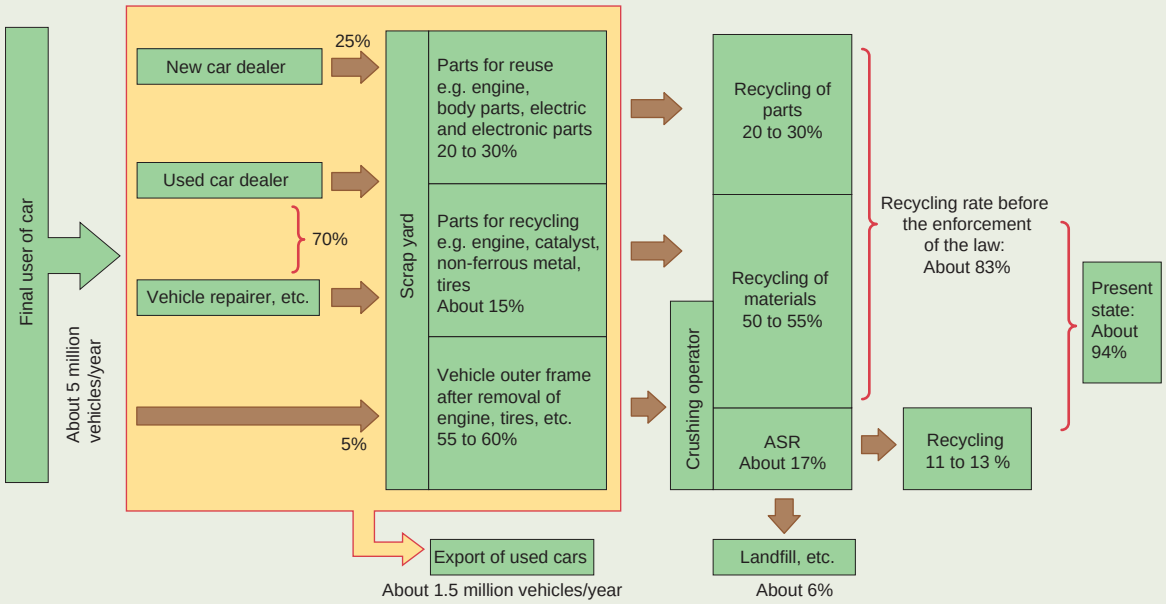
(b) Tires

According to the Recycling Business Division of the Japan Automobile Tire Manufacturing Association, out of 1,022,000 tons of waste tires generated in Year 2005, (Year 2004 1,043,000 tons) 373,000 tons (Year 2004 468,000 tons) were used in the original form or fabricated form for export, and used as the base for retreads or rubber powder, 524,000 tons (Year 2004 448,000 tons) were used for smelting/cement burning or electric power generation,

Concerning used waste tires, as it is not easy to distinguish a good tire from a waste one, there are cases where waste tires were falsely described as good ones and improperly stored in a field have caught fire and caused problems. The Ministry of Environment have already sent notices to the prefectural and city governments, instructing them to handle

Figure 2-28 Used vehicle disposal flow (fiscal year 2007)

Due to the enforcement of the Law for the Recycling of End-of-Life Vehicles, recycling rate of vehicles increased to about 94%.



Source: Created based on materials distributed at the 13th Joint Meeting of the Expert Committee on Vehicle Recycling in the Waste and Recycling Committee of the Central Environment Council, and the Vehicle Recycling WG in the Waste and Recycling Subcommittee under the Environment Division of the Industrial Structure Council, held in May 2008

such cases strictly, as well as to take administrative actions and discipline, if there is a fear of disturbing the maintenance of the environment.

I. Personal computers and peripheral devices

The manufacturers of business model personal computers (starting from April 2001) and home personal computers (starting from October 2003) are obliged to recycle such computers by The Law for Promotion of Effective Utilization of Resources. The target rates set for the promotion of recycling are 50% or over for the desk top computers (machine itself), 20% or over for notebook (laptop) personal computers, 55% or over for cathode-ray tube displays and 55% or over for liquid crystal displays (Figure 2-29, 2-30).

The recycling rate of manufacturers in Year 2007 were, 75.1% for desk top computers (machine itself), 53.7% for notebook (laptop) personal computers, 78.1% for cathode-ray tube displays and 70.7% for liquid crystal displays, all categories exceeded the legal targets.

Personal computers are collected in other ways than shown above, such as direct collection by the wastes disposer from the user or through the leasing/rental company, sales shop or sales company, or by the collection/disposal of municipal entities.

J. Small-size secondary battery (nickel-cadmium battery, nickel-hydride battery, lithium battery, sealed lead acid battery)

For small-size secondary batteries, scarce resources such as〔Ni〕nickel,〔Cd〕cadmium,〔Co〕cobalt and〔Pb〕lead are used, recycling of small-sized secondary batteries has more effect than primary batteries, because the recycling of the latter is limited to only the metal casing.

The manufacturers of small-sized secondary batteries are obliged to recycle such batteries by The Law for Promotion of Effective Utilization of Resources. The target rates set for the promotion of recycling: are 60% or over for nickel-cadmium batteries, 55% or over for nickel-hydride batteries, 30% or over for lithium batteries and 50% or over for sealed lead acid batteries.

The recycling situation of small-sized secondary batteries (including the ones used for cellular phones and PHS – Personal Handy-phone System) in Year 2007 was, 927 tons recycled with a 73.5% recycling rate for nickel-cadmium batteries, 166 tons recycled with a 76.6% recycling rate for nickel-hydride batteries, 278 tons recycled with a 64.1% recycling rate for lithium batteries and 2,223 tons recycled with a 50.0% recycling rate for sealed lead acid batteries, all categories achieved the legal targets.

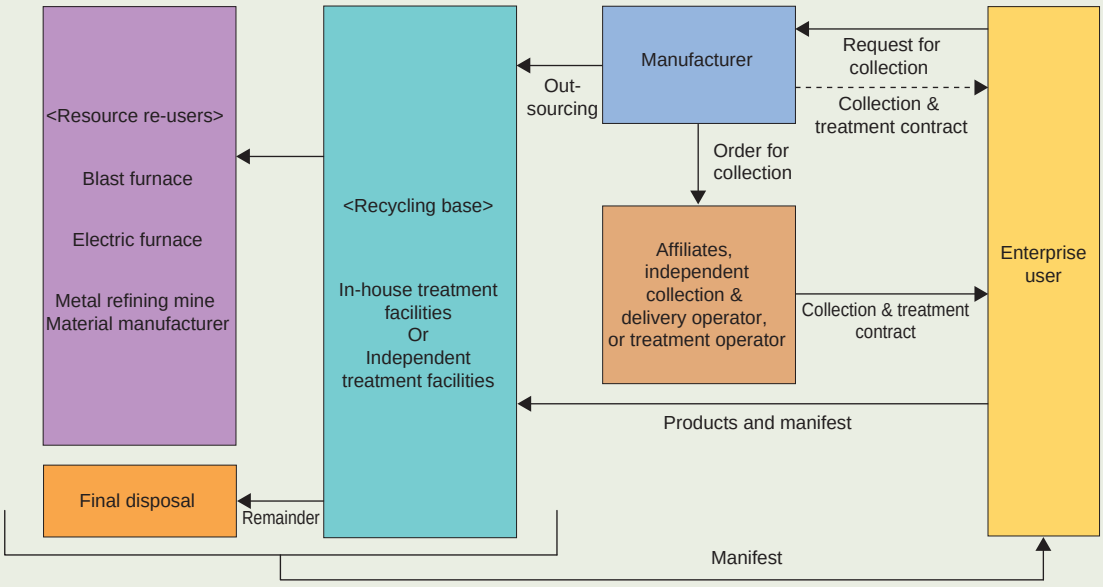
K. Sewage sludge

With the spread of sewage coverage, polluted sludge (sewage sludge) generated from sewage works increases year by year. (Figure 2-31). In Year 2006, about 78.66 million tons of sewage sludge was generated (a decrease of about 950,000 tons from the previous year achieved by converting into concentrated sludge), and this accounted for almost 20% of the generated total industrial wastes, the amount of sewage sludge brought into final disposal sites was 440,000 tons (a decrease of 44,000 tons from the previous year), approaches for decreasing weight have been promoted by various means such as intermediate processing including dehydration and incineration and reclamation. The effective usage rate of sewage sludge in Year 2006 was 74% when converted into specific dry weight.

The reclamation of sewage sludge has expanded in a variety of ways. Focusing on the nature of sewage sludge with its wealth of organic substances, it has been used for green farming since ancient times. Before, it was used in a dehydrated cake style, however, in the mainstream today it is used as a fertilizer in the form of compost. Nowadays, sewage sludge is also used as building material, with an increase of incineration and melting treatment of sewage sludge.

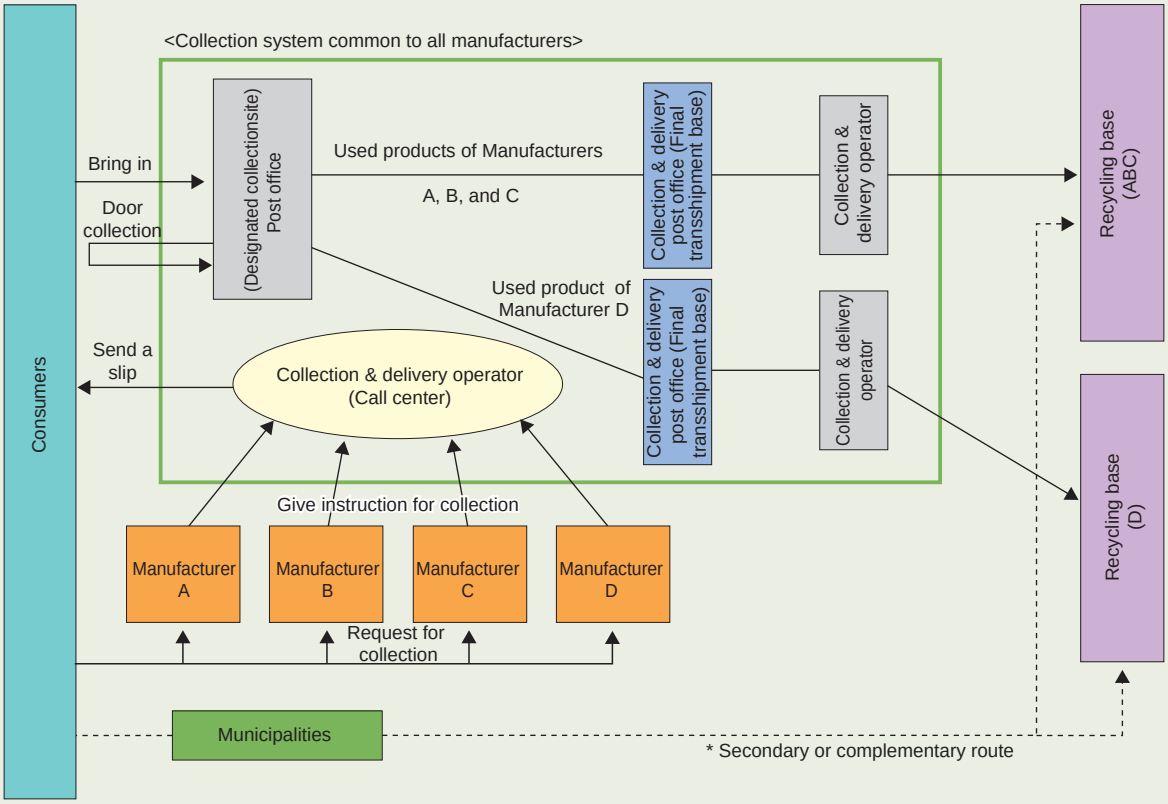
1,660,000 tons of sewage sludge, converted by specific

Figure 2-29 Collection and recycling system for office computers (example)



Source: Ministry of the Environment, Ministry of Economy, Trade and Industry

Figure 2-30 Basic collection scheme of home-use personal computer

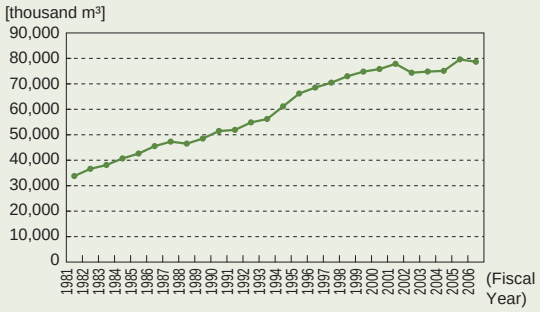


Source: Ministry of the Environment

dry weight, was reclaimed as cement material (800,000 tons), building material (510,000 tons) such as bricks or blocks, and green farming (330,000 tons) such as fertilizer.

Additionally, as an approach to the energy use of sewage sludge, gas power generation by digesters, using gases such as methane which is generated in an anaerobic digestion process, was carried out at twenty-eight facilities around Japan in fiscal 2006, and the use of waste sludge as a fuel and the waste heat derived from the incineration of sewage sludge is also carried out.

Figure 2-31 Changes to sewage sludge by year



Source: Ministry of Land, Infrastructure and Transport

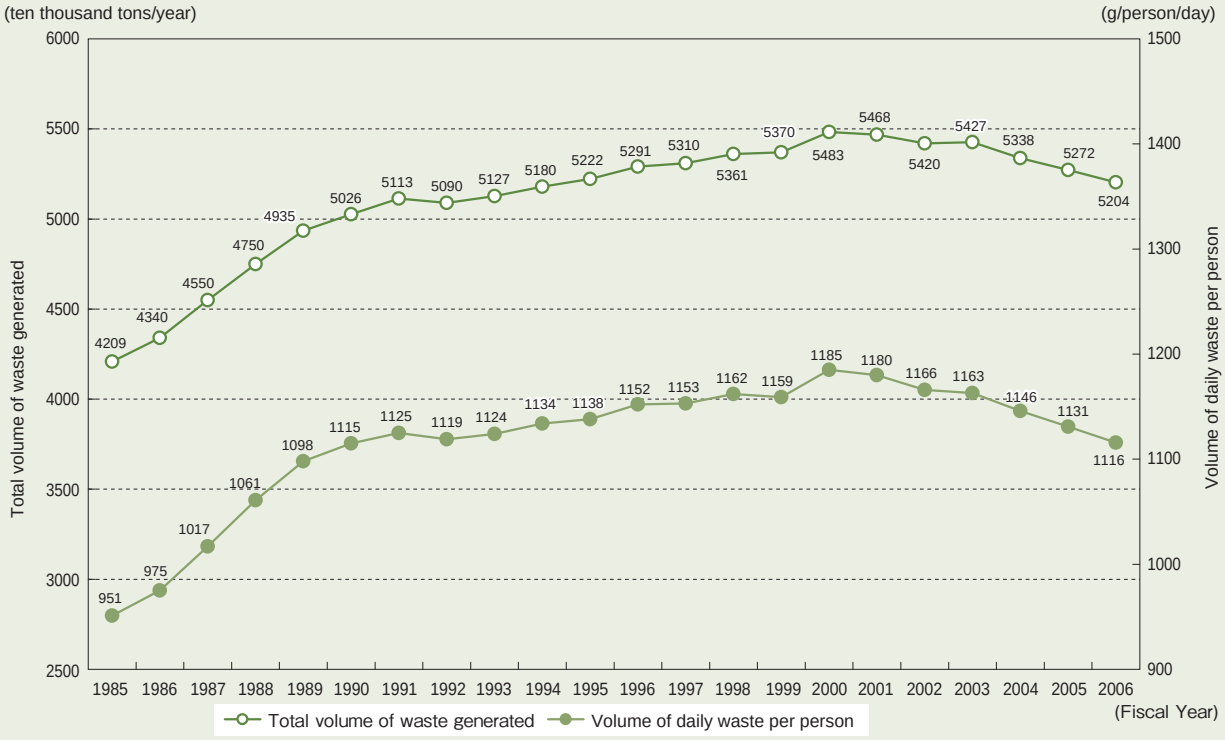
2 Municipal wastes

(1) Municipal wastes (garbage)

A. Changes of the generated amount of garbage

The total amount of garbage generated and the daily amount of garbage generated per person dropped slightly after 1979, the year of the second oil crisis, but from around 1985 there has been a sharp increase which leveled off in 1990; from 2001 until the present there has been a decreasing trend. (Figure 2-32)

Figure 2-32 Changes to total waste generation and daily waste per person

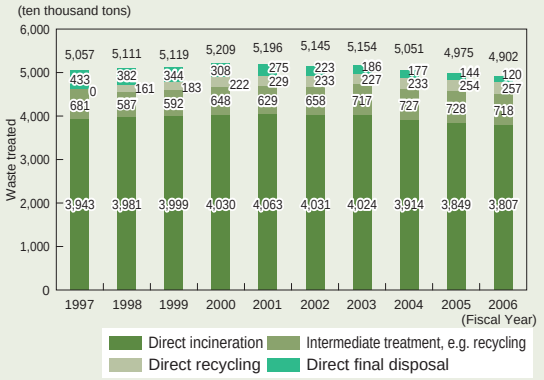


Note: Total volume of waste generated = Designed collection volume + Volume of waste directly brought in + Volume of group collection of recyclable waste
Source: Ministry of the Environment

B. Changes of the garbage processing methods

When considering the changes of garbage processing methods, the ratio of direct recycling and recycling after intermediate processing is steadily increasing, the ratio in fiscal 2006 was 19.9%. The amount of garbage directly sent for final disposal has been steadily decreasing, with a ratio 2.5% in fiscal 2006. (Figure 2-33).

Figure 2-33 Changes to the garbage processing methods



Source: Ministry of the Environment

C. Changes of the operating expenses for garbage processing

The total amount of operating expenses for garbage processing in fiscal 2006 was 1,862.7 billion yen, this averages out to about 14,600 yen per person, a decrease of 300 yen on the previous year (Figure 2-34).

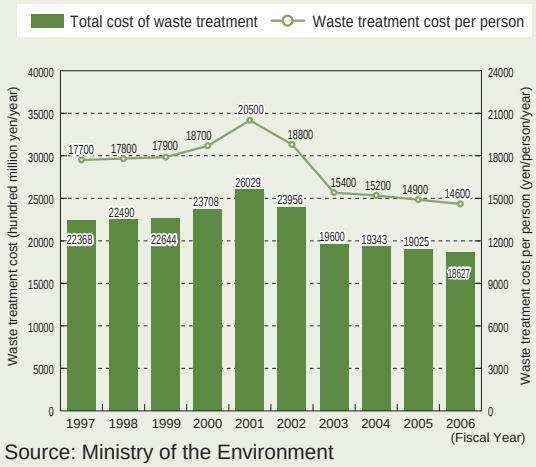
(2) Municipal waste (night soil)

A. Changes to the disposal of night soil

Concerning changes in the night soil disposal population, while the number of Johkasoh (a compact high-performance on-site waste water treatment tank facility with bio-function) users remains at the same level, due mainly to the increase of public sewage system users (83.74 million in fiscal 2006), the total population of flush toilet system users which includes the latter is increasing year by year (114.58 million in fiscal 2006) (Figure 2-35).

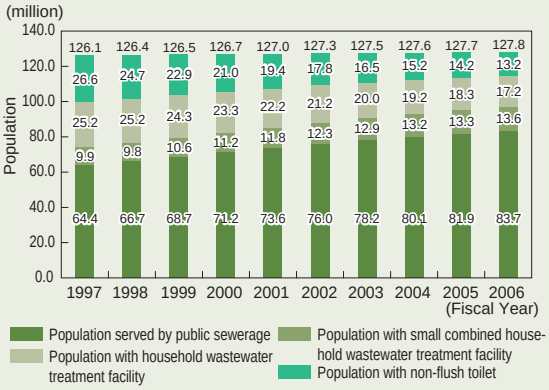
The number of individual waste water treatment facilities was 8,420,000 (8,620,000 in fiscal 2006) at the end of fiscal 2007 a decrease of 200,000 on the previous year. Johkasoh (treating both kitchen and toilet waste) and night soil a decrease from purification tanks (only treating toilet waste) accounted for 2,780,000 (2,660,000 in fiscal 2006) and 5,640,000 (5,970,000 in fiscal 2006) respectively, which resulted in the ratio of Johkasoh increasing to 33% (31% in fiscal 2006) of all individual waste water treatment facilities in 2007. These figures would seem to be influenced by a number of factors: the diffusion of Johkasoh by increased subsidy rates for municipal governments; the prohibition of new construction of night soil purification tanks set in the revision of the Johkaso Law in Year 2000; an increasing number of abolished the night soil purification tanks impacted by the shift to the Johkaso; and the progress of sewage systems.

Figure 2-34 Changes to waste treatment costs



Source: Ministry of the Environment

Figure 2-35 Changes to numbers using the different methods of night soil treatment



Note: Figures in the graph refer to population composition (million).
Source: Ministry of the Environment

B. Changes to the processing situation of night soil and septic tank sludge

In fiscal 2006, from the total of 26.11 million kiloliters night soil and individual wastewater treatment facility sludge, 97.2 % or 25.39 million kiloliters were processed at human-waste treatment plants or by discharge into sewage systems.

390,000 kiloliters were discharged into the sea, about 1.5% of the total planned disposition in Year 2006, and this figure has slightly decreased year by year. Disposal by discharge into the sea was prohibited in February 2007.

3. Industrial wastes

(1) Status of the generation and disposal of industrial wastes

A. Changes to the exhaust amount of industrial wastes

The figures for industrial wastes generated since fiscal 1990, have stayed more or less constant at around 400 million tons, with no major yearly differences (Figure 2-36).

B. Changes to the number of intermediate processing facilities of industrial wastes

Intermediate processing facilities carry out incineration, breakup or dehydrate industrial wastes, there number decreased slightly on the previous year by 1.2% to a total of 18,935 licensed facilities for all of Japan. 21.3% are dehydrating facilities for polluted sludge, 45.1% are breaking-up facilities for wood-wastes or debris and 7.9% are other incineration facilities. (Figure 2-37).

C. Changes to the number of permits given to new facilities for disposal of industrial wastes (incineration facilities and final disposal sites)

The number of permits given to new facilities for disposal of industrial wastes, both for incineration facilities and final disposal sites have sharply decreased, when compared with the years before revision of the Wastes Management Law in Year 2000. (Figure 2-38, 2-39).

(2) Wide-area movement of wastes in the greater metropolises

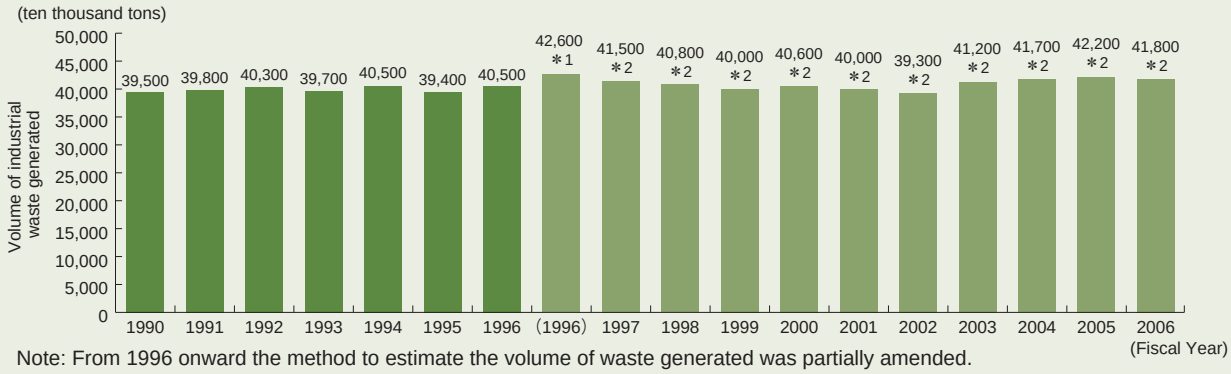
In such megalopolis as the Tokyo metropolitan district, it is becoming difficult to secure intermediate processing facilities such as incineration furnaces and final disposal sites, this is caused by the upgrading of land-use and environmental problems. Therefore, as it is not easy to process wastes in the local area, most of the municipal wastes and industrial wastes are transported across prefectural and city governmental borders to other areas for disposal.

In fiscal 2006, out of all municipal wastes generated from one Metropolis and six prefectures in the Tokyo metropolitan district, 1,780,000 tons were sent for final disposal, of these 230,000 tons were transported to an area other than where they originated, 190,000 tons - about 80% of the latter - were sent for final disposal to other areas outside the Tokyo metropolitan district. The final disposal amount of municipal wastes transported from the nationwide municipalities to prefectures outside their boundaries was 350,000 tons, the Tokyo metropolitan district accounts for a little over 60% of these.

In fiscal 2006, the amount of industrial wastes transported for the purpose of intermediate processing or final disposal from the Tokyo Metropolitan district to an area other than where they originated was 14,960,000 tons, 7,700,000 tons of these – which accounts for a little over 50% - were transported from the Tokyo metropolis, and of these 2,490,000 tons flowed-out from the Tokyo metropolitan district to other areas. (Figure 2-40).

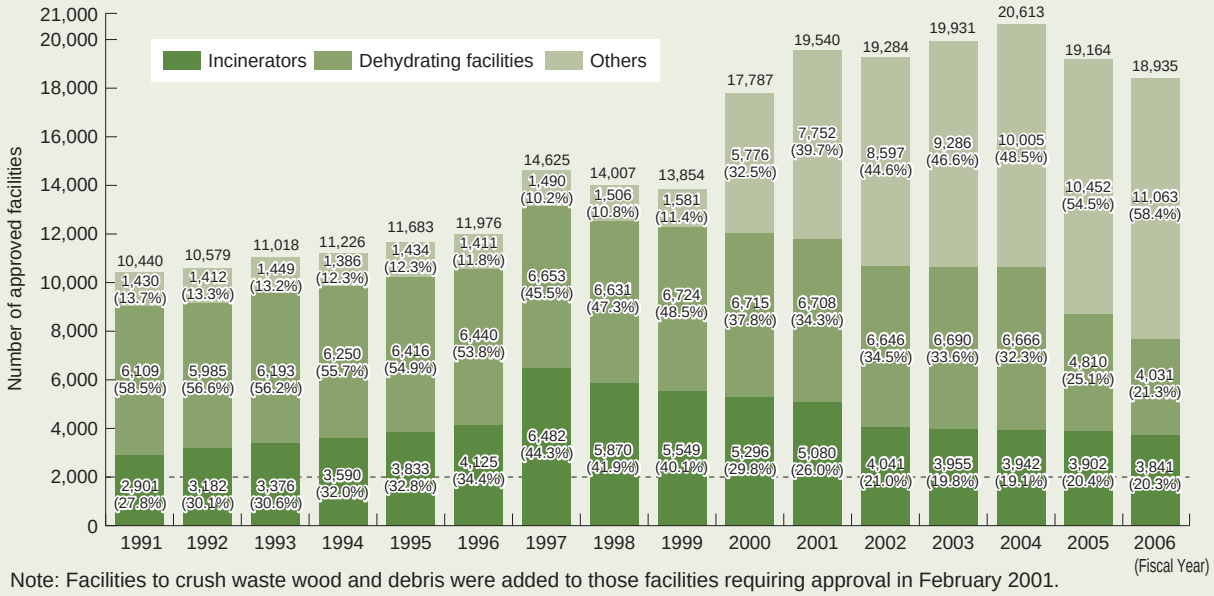
It is worthy of note that as the amounts transported from the Tokyo metropolis to Saitama, Chiba and Kanagawa prefectures for intermediate processing are noticeably large, and the amounts transported for final disposal from Saitama and Kanagawa prefectures to other prefectures are also distinctly large, it is presumed that industrial wastes transported from Tokyo metropolis to outside are, after being sent

Figure 2-36 Changes to the exhaust amount of industrial wastes



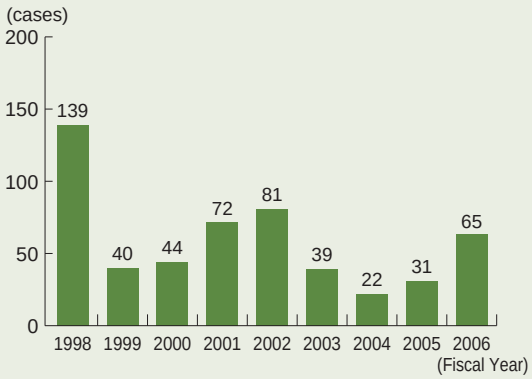
Note: From 1996 onward the method to estimate the volume of waste generated was partially amended.
*1: In accordance with the Basic Guidelines of Japan for the Promotion of Measures against Dioxins (decided by the Ministerial Conference on Dioxin Policy), in September 1999 the Government established waste reduction targets with an aim of attainment in fiscal year 2010; the volume of waste generated in fiscal year 1996 is given in relation to this target.
*2: The volume generated from 1997 onward is calculated based on the same precondition applied in *1.
*3: 19 types of industrial waste as stipulated by the Waste Disposal and Public Cleansing Law are covered by this graph.
Source: Ministry of the Environment

Figure 2-37 Changes to the number of intermediate processing facilities of industrial wastes



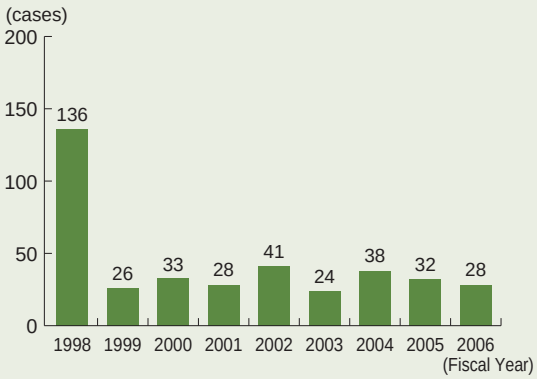
Note: Facilities to crush waste wood and debris were added to those facilities requiring approval in February 2001.
Source: Ministry of the Environment

Figure 2-38 Changes to the number of newly approved incinerators (industrial waste)



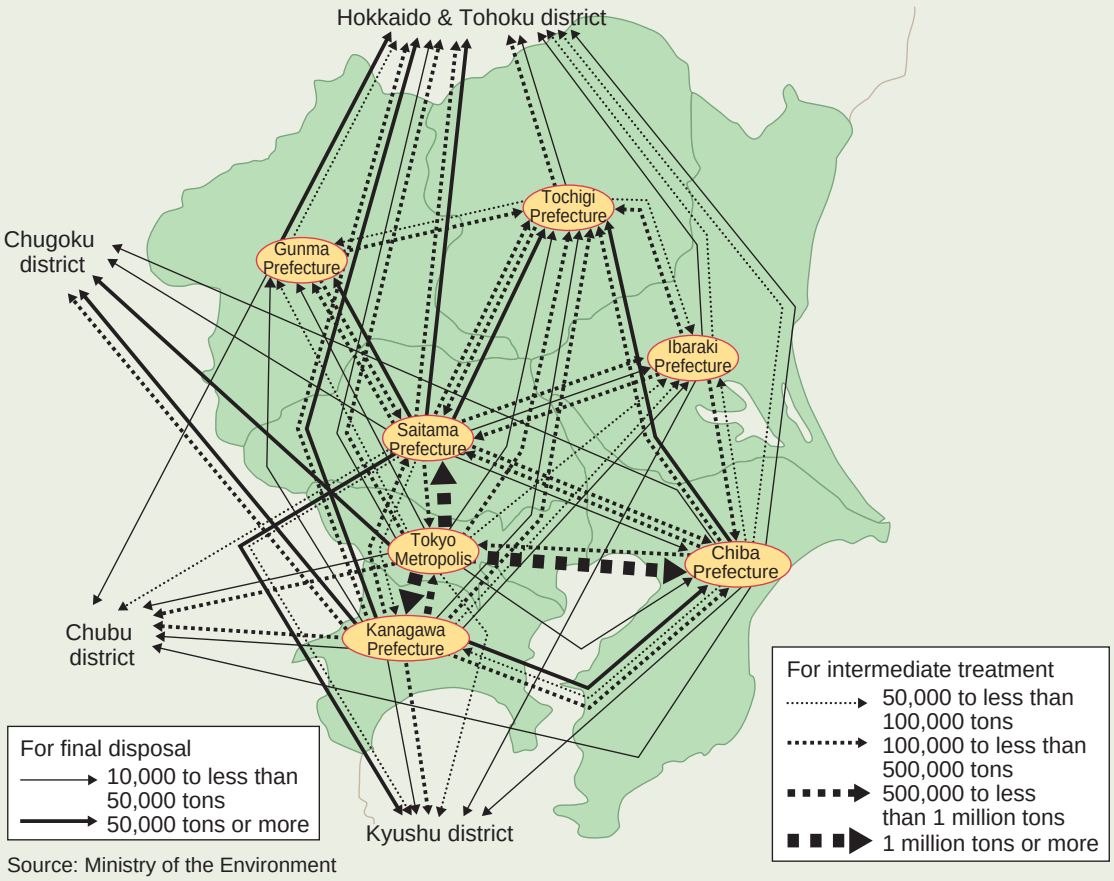
Note: The number of new facilities was surveyed by the Ministry of the Environment, but this could change in the future.
Source: Ministry of the Environment

Figure 2-39 Changes to the number of newly approved final disposal sites (industrial waste)



Note: The number of new facilities was surveyed by the Ministry of the Environment, but this could change in the future.
Source: Ministry of the Environment

Figure 2-40 Status of wide-area movement of industrial waste generated in the Tokyo Metropolitan district (fiscal year 2006)



Source: Ministry of the Environment

for intermediate processing in the neighboring prefectures, transported again to other prefectures for final disposal.

There is a deep concern about such movement of waste across wide areas; if waste is illegally dumped in the area accepting waste and causes environmental pollution, this may trigger many regional conflicts resulting in increased restrictions on the acceptance of waste. This is coupled with feelings of unease and unfairness about accepting waste transported from other generation areas.

In the areas around Tokyo, as is shown in the state of residual years of the sites, securing of final disposal sites, especially final disposal sites for industrial wastes is becoming more difficult, and this shortage is supposed to be the main cause of the wide-area movement of wastes to neighboring prefectures.

4 Wastes-related Information

(1) State of Final Disposal Sites

A. Municipal wastes

(a) State of Final Disposal

Final disposal volume in 2006 (total of direct final disposal volume and final disposal volume after intermediate treatment) is 6.81 million tons, and final disposal volume per person daily is 146 g. This indicates that the final disposal volume continues to decrease (Figure 2-41).

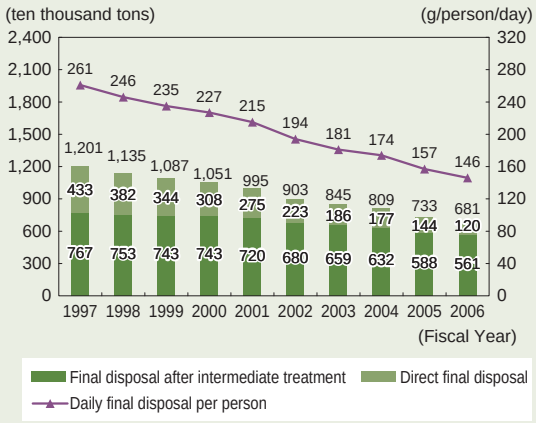
(b) Residual Number of Years and Residual Volume of Final Disposal Sites

As of the end of 2006, the number of final disposal sites is 1,853, and residual volume is 130.36 million m3. The national average residual number of years is 15.6. Because the final disposal volume in 2006 is smaller than that of the previous year, the residual number of years is increasing although the residual volume is decreasing (Figure 2-42).

(c) Municipalities Where There Is No Final Disposal Site

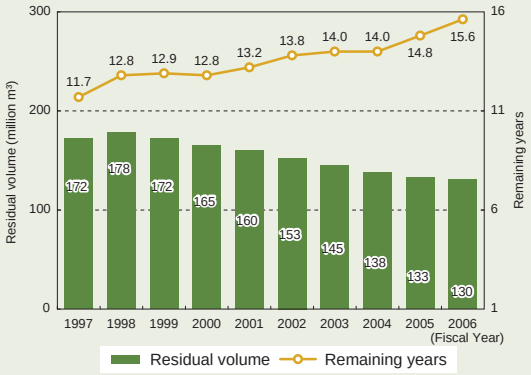
As of the end of 2006, among Japan's 1,827 municipalities, 343 of them need to dispose of wastes but have no final disposal sites and entrust private final disposal sites with landfill (however, when they landfill wastes in the public disposal sites of municipalities targeted for the Osaka Bay Phoenix Plan, use other municipalities, public corporations, etc. although they have no final disposal sites, they are included in the number as having final disposal sites) , and Figure 2-43 shows the distribution of the municipalities.

Figure 2-41 Changes to final disposal and daily final disposal per person



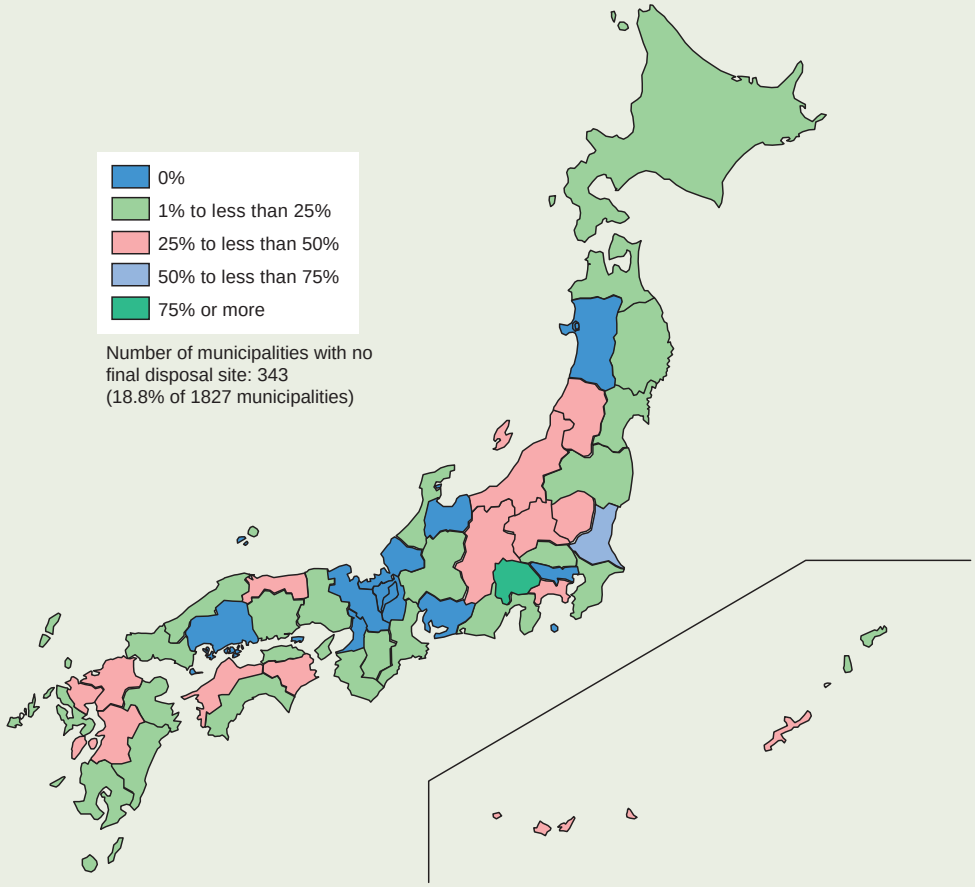
Source: Ministry of the Environment

Figure 2-42 Changes to residual volume and remaining years of final disposal sites (municipal waste)



Source: Ministry of the Environment

Figure 2-43 Municipalities with no final disposal site (as of the end of fiscal year 2006)



Note: "Municipalities with no final disposal site" refers to municipalities that as relevant municipalities do not have any final disposal site and outsource landfill disposal to private final disposal sites. However, even if they do not have any final disposal site, if they are located in the area covered by the Osaka Bay Phoenix Plan, or if they dispose of waste in public landfills in other municipalities or public corporations, such municipalities are included in municipalities with final disposal sites.

Source: Ministry of the Environment

(d) Future actions and initiatives

Because waste treatment facilities, such as final disposal sites, are public-nuisance facilities, it is difficult to find new locations to build them, and the municipalities all have difficulty in finding locations for final disposal sites in particular. Against this background, each municipality has been making efforts to find locations for final disposal sites across a broader area. However, they should not act based on the idea that they aim to secure locations in other areas because it is simply difficult to do so in their own areas,

they need to develop final disposal sites in broader areas as a final measure after having decreased the number of facilities to be managed, and taken certain and high-level environment-conserving measures as well as reducing the amount of wastes and thoroughly promoting appropriate recycling and reuse of wastes.

Municipalities need to develop waste treatment facilities needed for the establishment of such a sound material-cycle society after having established specific goals related to the 3Rs of wastes and having formulated a definite plan of comprehensive measures for achieving the goals.

B. Industrial Waste

The residual volume of final disposal sites for industrial wastes at the end of fiscal 2006 is 16,286 m^3, a decrease of 2,339 m^3. In addition, the national average residual number of years is 7.5, which indicates the situation has gradually improved. However, the residual number of years in the Greater Tokyo Metropolitan area is 4.4, and, in greater metropolitan areas in particular, their residual number of years has been decreasing (Figure 2-44).

Basically, final disposal sites of industrial wastes should be developed by private business operators. However, based on the development situation, the final disposal volume regarded as necessary needs to be secured with the development of facilities by the public sector.

(2) Efforts at Thermal Recycling in Waste Incinerators

A. Use of Residual Heat from Waste Incineration

About 70% of all facilities around the country make effective use of residual heat from waste incinerators for hot water, steam, electric power generation, etc (Figure 2-45). More specifically, the residual heat is used for various purposes, such as waste power generation described later, heating and hot water supply in waste incinerators. The heat is also used in places other than waste incinerators for heated pools, supply of hot water and heat to social welfare organizations, such as welfare facilities for the elderly, regional heating, etc.

Saving of natural resources and energy used in waste disposal facilities and contribution to regional communities account for the majority of reasons for using residual heat.

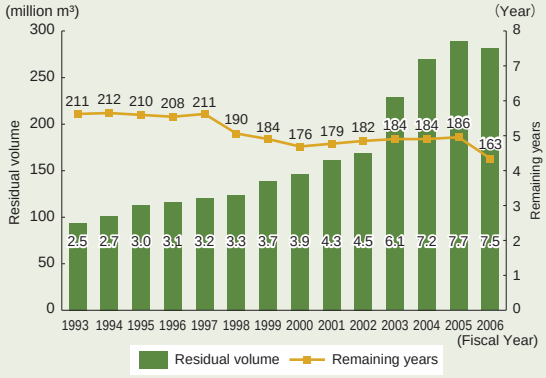
In addition to the promotion of such use of residual heat in waste incinerators, a system for further promoting the supply of heat, etc. to places other than waste incinerators needs to be created. In order to develop such a system, technical problems, such as dealing with changes in the volume and quality of wastes, cost comparison with heat supplied by gas and petroleum, coordination with relevant laws and regulations, such as the Electricity Enterprises Law, and so forth need to be fully examined.

B. Waste Power Generation

In waste power generation, the thermal energy of high-temperature exhaust gas generated when wastes are incinerated is collected by a boiler, which generates steam to rotate a turbine for electric power generation. Waste power generation is one of the effective ways of using residual heat from waste incinerators.

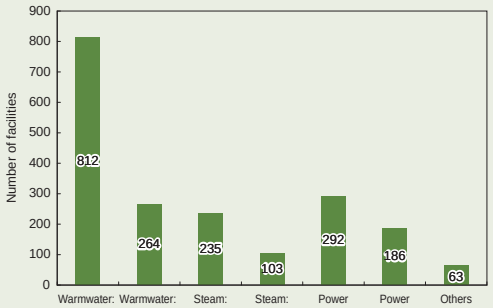
At the end of fiscal 2006, among waste incinerators in operation or under construction, 293 incinerators are generating electrical power or scheduled to do so (Table 2-3). In addition, larger-scale waste incinerators tend to conduct waste power generation. Therefore, while such incinerators account for 22.5% of all incinerators, their waste treatment capability accounts for about 56.0% of that of all waste incinerators. The total amount of generated electricity of the waste incinerators conducting waste power generation is about 7.2 billion kWh. When annual electric power consumption per household is calculated as 3,600 kWh, the total amount equals to the annual electric power consumption of about two million households. In addition, 186 waste incinerators use electric power generated with waste power generation in places other than their facilities.

Figure 2-44 Changes to residual volume and remaining years of final disposal sites (industrial waste)



Source: Ministry of the Environment

Figure 2-45 Waste heat utilization of incinerators (fiscal year 2006)



State of waste heat utilization		Utilized							Not utilized
		Utilization of warmwater		Utilization of steam		Power generation		Others	
		Warm-water: inside facilities	Warm-water: outside facilities	Steam: inside facilities	Steam: outside facilities	Power genera-tion: inside facilities	Power genera-tion: outside facilities		
Number of facilities	877 (904)	812 (840)	264 (273)	235 (230)	103 (102)	292 (285)	186 (179)	63 (62)	424 (414)

Figures in the brackets are data for fiscal year 2005.

Note 1: Apart from private facilities, the facilities shown in the graph are established by municipalities or affairs associations, and include facilities for which construction work started in the relevant year and facilities out of service, but exclude closed facilities.

Source: Ministry of the Environment

Table 2-3 Number of waste power generation facilities and generating capacity (fiscal year 2006)

Number of power generation facilities	293 (286)
Power generating capacity (thousand kW)	1,590 (1,512)
Power generation efficiency (%)	10.93 (10.70)
Total power generation (GWh)	7,190 (7,090)

Data in the brackets are for fiscal year 2005.

Note 1: The facilities shown above are established by municipalities or affairs associations, and include facilities for which construction work had already started and facilities out of service, but exclude closed facilities.
Note 2: Power generation efficiency was calculated using the following formula.
Power generation efficiency [%] =

$$\frac{860\ [\text{kcal/kWh}] \times \text{Total power generation [kWh/year]}}{1{,}000[\text{kg/t}] \times \text{Volume of waste incinerated [t/year]} \times \text{Volume of waste heat generation [kcal/kg]}} \times 100$$

Note 3: Figures in the brackets are figures for the previous fiscal year.
Source: Ministry of the Environment

Power generation efficiency with waste power generation is about 11%, but it varies from a few percent to about 20%, depending on the incinerator. Recently, more efficient power generating facilities have been introduced. However, under the present circumstances, about three quarters of the heat amount generated by incineration is lost even with power generation and other uses of residual heat combined. On the other hand, attempts to effectively use low-temperature hot water after electrical power generation with a heat-storing heat pump for regional air-conditioning systems are found. In order to increase such facilities it is effective to develop units which combine both heat supply and heat use.

C. RDF (Refuse Derived Fuel)

RDF (Refuse Derived Fuel) has the following characteristics: it putrefies less than normal wastes, it can be stored for a relatively long period of time, it can be delivered easily because its volume and weight can be reduced, and stable incineration is possible because its form and calorific value are almost constant.

In a sound material-cycle society it is required to use RDF, based on the priority order of waste treatment and regional characteristics.

(3) Present State of Illegal Dumping, etc.

A. Cases of Illegal Dumping of Industrial Waste Found in Fiscal 2007

(a) Number of Illegally Dumping Activities and Amount of Illegally Dumped Wastes

The number of cases of illegally dumping industrial wastes reported in fiscal 2007 is 382 (554 in the previous year) and the amount of illegally dumped wastes is 102 thousand tons (131 thousand tons in the previous year). The number and the amount decreased from the previous year (Figure 2-46).

In addition, the number of newly confirmed illegally dumping activities in fiscal 2007 where 5,000 or more-ton wastes were dumped is two. The numbers (1), (2), (3), and (4) in parentheses below respectively show the amount of dumped wastes, types of dumped industrial wastes, place where wastes were dumped, and the perpetrator.

- Narita City, Chiba Prefecture ((1) 10,834 tons, (2) debris, (3) land for agricultural use (4) unknown)
- Tsuruoka City, Yamagata Prefecture ((1) 27,692 tons, (2) debris, (3) wasteland (4) Business operator with permission)

(b) Types of Illegally Dumped Industrial Waste

According to the types of illegally dumped industrial waste reported in fiscal 2007, construction waste, such as debris and waste wood, accounts for 75.9% of all illegally dumped activities (290 cases) and 79.0% of all dumped wastes (80 thousand tons), and the ratio of construction-related waste to all wastes continues to be high (Figure 2-47).

(c) Business Operators That Dumped Waste Illegally

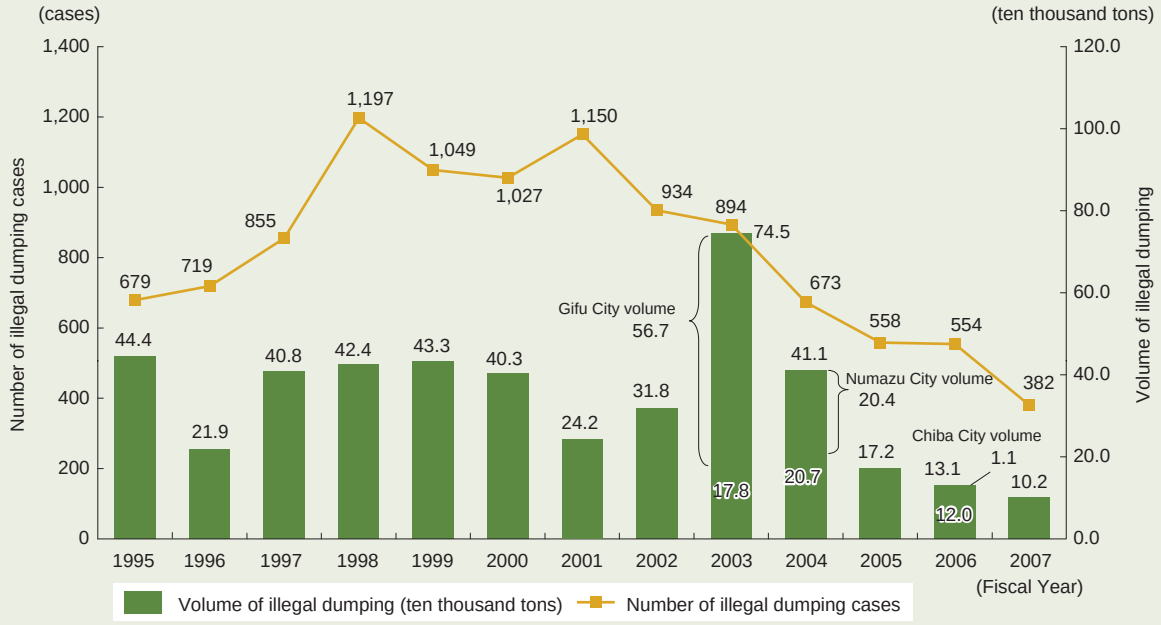
Among business operators that carried out illegally dumping activities newly reported in fiscal 2007, waste-discharging enterprises account for about 50.5% (193 cases) of all the cases, which is the highest number. About 26.2% (100 cases) were dumped by unknown business operators, about 14.9% (57 cases) by unlicensed ones, and about 5.5% (21 activities) by licensed ones. Concerning the amount of illegally dumped wastes, licensed business operators account for 30.6% (31,114 tons), which is the highest number. The following figures are 23.7% (20,186 tons) by waste-discharging enterprises, 22.4% (22,804 tons) by unlicensed operators, 19.8% (20,186 tons) by unknown ones, and 3.4% (3,502 tons) by multiple-business operators (Figure 2-48).

(d) State of Hindering Waste Removal

Among illegally dumping cases newly reported in 2007 (382 cases, 101,718 tons), 73.6% (281 cases) of them and 63.1% (64,183 tons) of the dumped wastes were dealt with in order to remove problems caused by them for the conservation of the environment (Figure 2-49).

Note: The Ministry of the Environment conducts research concerning (3) every year in cooperation with the 47 prefectures and ordinance-designated cities of Japan (hereafter referred to as “47 prefectures, etc.”). Among the illegally dumping cases newly reported by the 47 prefectures,

Figure 2-46 Changes to the number of illegal dumping cases of industrial waste and volume dumped



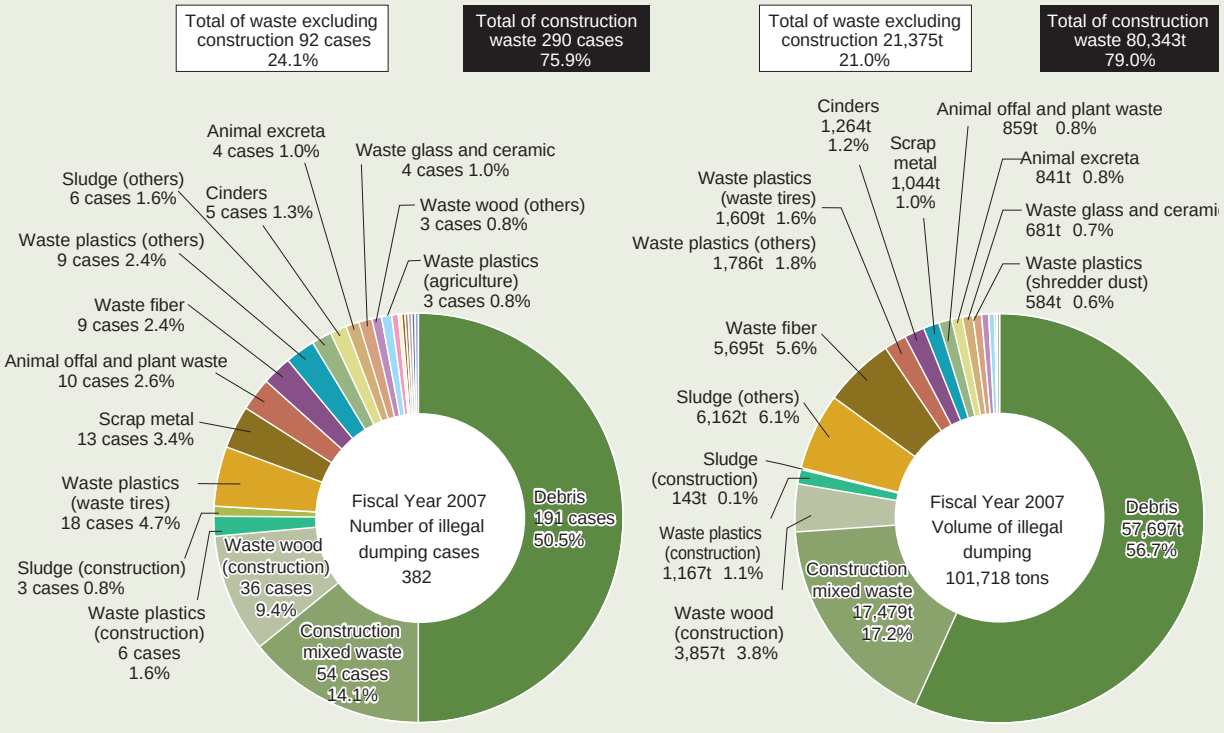
Note 1: Regarding the number of cases and volume of illegal dumping shown above, from among illegal dumping of industrial waste identified by prefectures and ordinance-designated cities, cases where the volume of dumping per case was 10 tons or more were totalized (however, cases including specially controlled industrial waste were all counted individually).

Note 2: As shown in the above graph, the cases of Gifu City and Numazu City were only discovered in 2003 and 2004 respectively; however, illegal dumping had already been carried out for several years previously and as a result, these cases were reported as a large-scale case in the relevant fiscal years. Concerning the Chiba City case in fiscal year 2006, the case was actually revealed in 1998, but the report was not made to the Ministry of the Environment at the that time, and it was made in fiscal year 2006.

Note 3: Sulfate pitch cases and ferrosilt cases were excluded from the survey. Ferrosilt was used as refill materials, and its sales and use started in August 2001. Approx. 720,000 tons were sold and used, but later this was identified as illegal dumping cases. The illegal dumping was confirmed at 45 sites in four prefectures, and removal of ferrosilt had been completed at 39 sites (as of the end of November 2008).

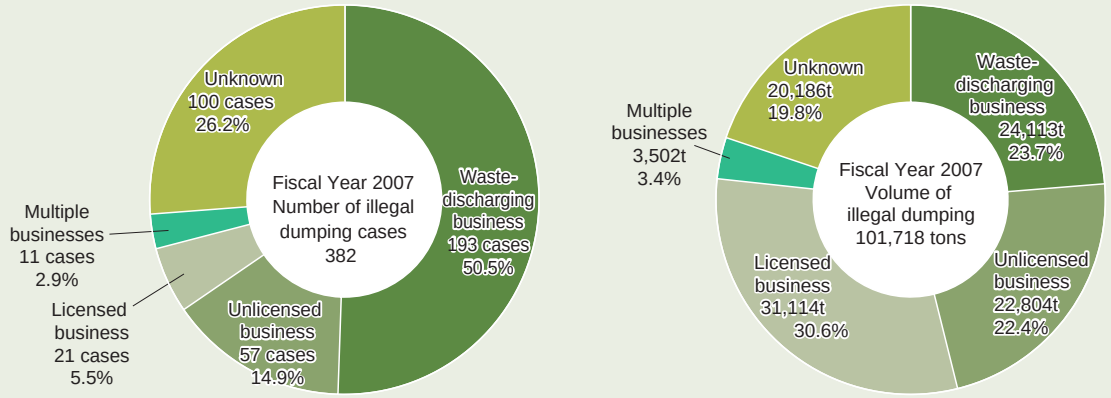
Source: Ministry of the Environment

Figure 2-47 Types of illegally dumped industrial waste (fiscal year 2007)



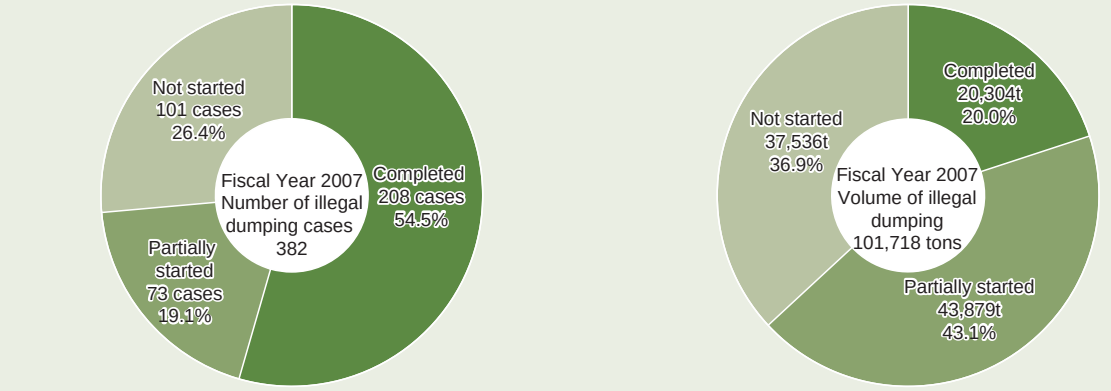
Source: Ministry of the Environment

Figure 2-48 Perpetrators of illegally dumped industrial waste (fiscal year 2007)



Source: Ministry of the Environment

Figure 2-49 Status of clear-up removal and other measures taken concerning illegally dumped industrial waste (fiscal year 2007)



Source: Ministry of the Environment

etc. each year, the research covers cases where the dumped amount of each case is 10 tons or more; sulfate pitch- and ferrosilt-related cases are excluded. (However, the research covers all cases related to specially controlled industrial waste.)

B. Unsolved Cases of Illegally Dumped Industrial Waste as of the End of Fiscal 2007

As of March 31, 2008, the number of unsolved cases of illegally dumped but inappropriately treated industrial waste found by the 47 prefectures, etc. all over the country was 2,753, and the residual amount of the waste was 16.337 million tons (Figure 2-50).

C. Others

(a) Number of Arrested Business Operators

The number of business operators arrested for illegal dumping of industrial waste according to the Waste Disposal and Public Cleaning Law reached a peak in 2003 but numbers remain high since then. In 2008, the number of operators arrested for illegal dumping of industrial waste by the police according to the Waste Disposal and Public Cleaning Law was 669 involving 501 cases (Figure 2-51).

(b) Intensification of Elimination of Illegal Dumping Campaign

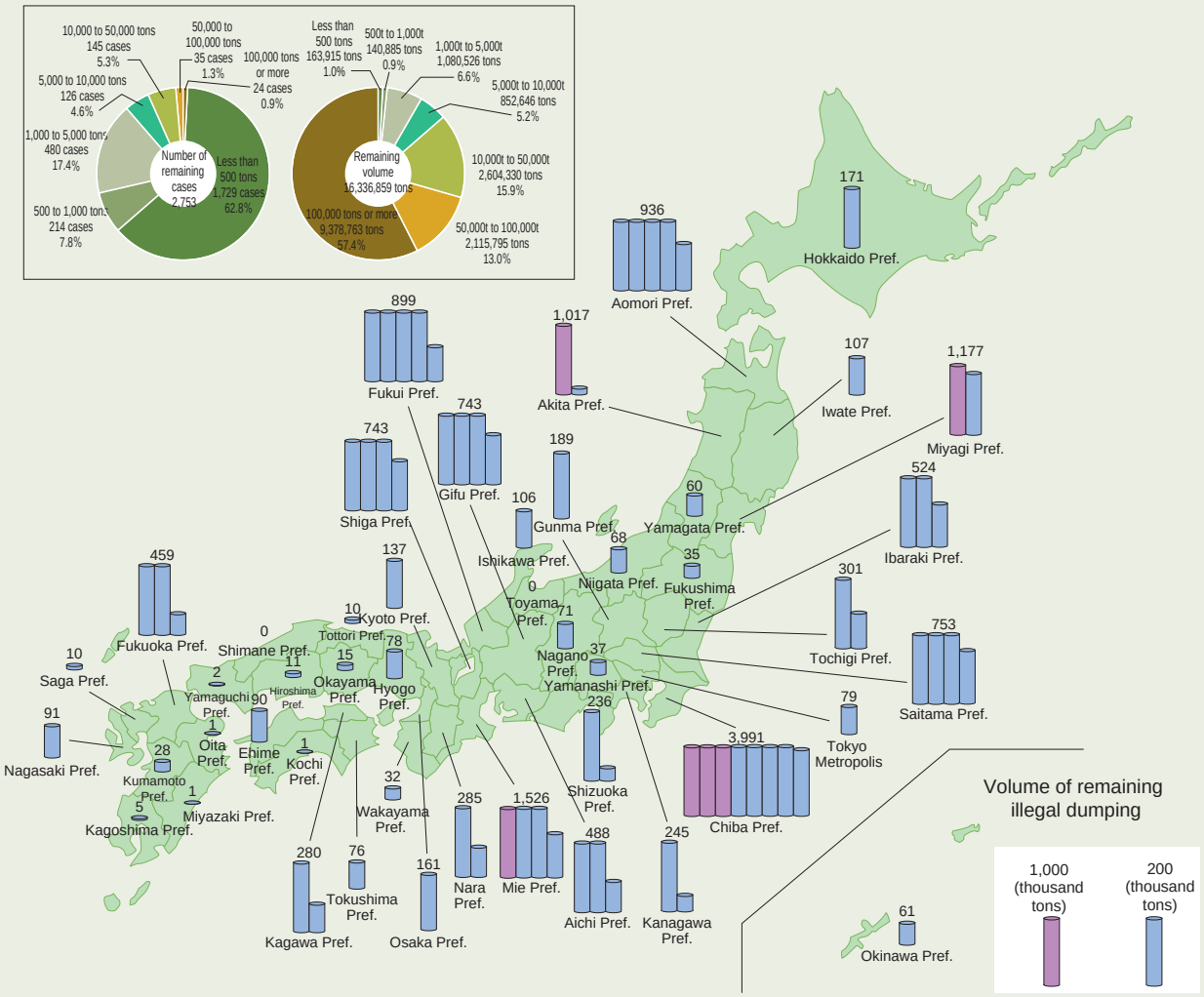
A wide-ranging campaign against illegal dumping has been carried out, based on tighter regulations according to the Waste Disposal and Public Cleaning Law and the "Illegal Dumping Elimination Action Plan." In order to prevent illegal dumping and reinforce measures against the increase of illegal dumping, a "Nationwide Waste Illegal Dumping Monitoring Week" has been established from May 30 to June 5 each year since 2007, and, in this movement, the national government and the 47 prefectures, etc. have cooperated with one another to simultaneously take measures for eliminating illegal dumping, etc. through educational and awareness activities.

(4) Specially Controlled Waste

A. Overview

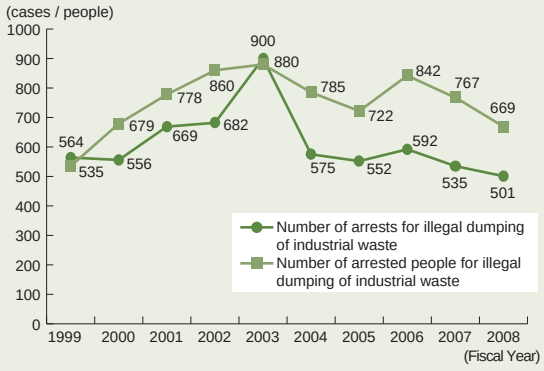
"Specially controlled waste" refer to those wastes specified by a Cabinet Order as wastes which are explosive, tox-

Figure 2-50 Remaining volume of illegally dumped industrial waste by prefecture (by prefecture and ordinance-designated city, as of the end of fiscal year 2007)



Note: The above data concerns cases of improper disposal of industrial waste, e.g. illegal dumping, identified by all prefectures and cities with a public health center as of 2005; from among these cases, the above data was created by counting those cases for which it was possible to ascertain the remaining volume of waste.
Source: Ministry of the Environment

Figure 2-51 Changes to the number of arrests for illegal dumping of industrial waste



Source: Created by the Ministry of the Environment, based on materials published by the Metropolitan Police Department

ic, infections or of a nature otherwise harmful to human health and the living environment (specially controlled municipal waste or specially controlled industrial waste). These wastes are appropriately treated according to a special treatment criteria based on the types of specially controlled waste. A licensed business operator is entrusted with the treatment of the specially controlled waste.

B. Wastes Included in Specially Controlled Waste

To date wastes shown in Table 2-4 have been designated as specially controlled waste.

(5) Measures for Treating Asbestos

A. Industrial Waste

The revised Air Pollution Control Law (Act No. 5 of 2006) that amended the Air Pollution Control Law, etc. was completely enforced in April 2007 in order to prevent dam-

Table 2-4 Specially controlled wastes

Classification	Major groups		Description
Specially controlled municipal waste	Parts containing PCBs		Parts containing PCBs, and included in waste air conditioner, waste TV or waste microwave
	Soot and dust		Generated at incinerators in waste treatment facilities
	Soot, dust, cinders, sludge		Generated from municipal waste incinerators, which are facilities specified by the Law Concerning Special Measures against Dioxins, and including dioxins
	Infectious municipal waste		Generated from hospitals or similar, and that may contain infectious pathogens or have such pathogens attached
Specially controlled industrial waste	Waste oil		Volatile oils, kerosene, light oils
	Waste acid		Extremely corrosive waste acid with pH2.0 or lower
	Waste alkali		Extremely corrosive waste alkali with pH12.5 or higher
	Infectious industrial waste		Generated from hospitals or similar, and that may contain infectious pathogens or have such pathogens attached
	Specified hazardous industrial waste	Waste PCB, etc.	Waste PCBs and waste oils including PCBs
		PCB-contaminated material	Sludge subject to PCB-permeation, waste paper subject to PCB-application or impregnated with PCB, waste wood or waste fiber subject to PCB-permeation, waste plastics or scrap metal subject to adherence of PCBs, or have enclosed PCBs, waste ceramic or debris subject to adherence of PCBs
		Treated PCB material	Treated in order to dispose of waste PCBs or PCB-contaminated materials, and including PCBs
		Designated sewage sludge	As stipulated by Article 13-4 of the Enforcement Ordinance of the Sewerage Law
		Slag	Slag including heavy metals
		Waste asbestos	Generated by construction asbestos removal businesses, or from sites with designated particulate emitting facilities installed, and with a risk of dispersion
		Soot, dust, cinders	Waste including heavy metals or dioxins
		Waste oil	Waste oils including organochlorine compounds
		Sludge, waste acid, waste alkali	Waste including heavy metals, PCBs, organochlorine compounds, agricultural chemicals, dioxins

Source: Ministry of the Environment

age caused by asbestos to the health, etc. of people. In order for the national government to promote safe and rapid treatment of waste containing asbestos, started under this law is a system (called "Toxicity Eliminating or Decomposing Treatment Certification System) when the Minister of the Environment certifies an operator to be able to eliminate or decompose toxicity with advanced techniques, such as fusion, no license for a specific type of business and facility installation is required of a business operator by the governor, etc. of the prefecture.

B. Municipal waste

The Ministry of the Environment is requesting municipalities to deliver the wastes of household appliances containing asbestos, such as irons, toasters, and dryers, distinguish them from other wastes, collect them without damaging them, not to smash them if possible after collection, and to finally dispose of them by sprinkling with water or immediately covering them with soil, or to distinguish them from other wastes when stored.

On the other hand, as a permanent measure, the ministry laid down technical guidelines based on advice by professionals about how to treat the waste of household appliances containing asbestos, showed the guideline to municipalities, and requested them to treat the wastes appropriately.

(6) Development of a System for Treating Polychlorinated Biphenyl (PCB) Waste

A. Development of a Nationwide System for Treating PCB Waste

The Japan Environment Safety Corporation developed a system for treating high-pressure transformers, capacitors, etc. containing PCB, based on this system, five broader-area treatment facilities have been established in Japan (Kitakyushu City, Toyota City, Tokyo Metropolis, Osaka City, and Muroran City in Hokkaido). Treatment operations started in Kitakyushu in December 2004, in Toyota in September 2005, in Tokyo in November 2005, in Osaka in October 2006, and in Hokkaido in May 2008.

The national government, in cooperation with 47 prefectures, has been making efforts to establish a fund (PCB Waste Treatment Fund) to facilitate treatment by small and medium size companies that cannot bear the burden of such expenses.

B. Measures for Treating Waste Electric Equipment, etc. Containing Very Small Amounts of PCB

Concerning PCB waste, it has been found that transformers, etc. in which no PCB is used actually contain a large quantity of insulating oil contaminated with very small amounts of PCB (hereafter referred to as "waste electric equipment, etc. containing very small amounts of PCB). However, there is no prospect that most of the PCB waste will be treated appropriately. This waste electric equipment,

Table 2-5 PCB waste storage status (as of March 31, 2005)

Type of waste	Number of business establishments that store PCB waste	Storage quantity
High voltage transformer	3,684	20,731 units
High voltage capacitor	48,691	259,500 units
Low voltage transformer	548	36,114 units
Low voltage capacitor	3,748	1,955,864 units
Pole-mounted transformer	200	2,252,756 units
Ballast	13,846	5,740,284
PCB	230	56 t
Oil including PCB	1,447	179,510 t
Carbonless paper	401	655 t
Rag	1,101	339 t
Sludge	215	34,080 t
Other machinery and equipment	2,575	121,852 units

Remarks: Regarding items that cannot be measured as a number of units or weight, e.g. stored in a drum or any other bulk containers, only the number of business establishments were counted. Regarding PCB, oil including PCB, paper, rag and sludge, from among those items that were recorded by weight or volume, the items recorded by volume were totalized after converting into weight assuming 1 liter = 1kg.

Table 2-6 Use status of products containing PCBs in business establishments that store PCB waste

Type of waste	Number of business establishments that store PCB waste	Storage quantity
High voltage transformer	1,347	5,173 units
High voltage capacitor	8,154	26,860 units
Low voltage transformer	94	810 units
Low voltage capacitor	279	36,292 units
Pole-mounted transformer	7	1,564,229 units
Ballast	1,662	419,633
PCB	24	89kg
Oil including PCB	14	18kg
Other machinery and equipment	1,026	5,492 units

Remarks: Regarding PCB and oil including PCB, from among those items that were recorded by weight or volume, the items recorded by volume were totalized after converting into weight assuming 1 liter = 1kg.

etc. containing very small amounts of PCB that is not expected to be treated may damage the environment because of loss, etc. Therefore, it is necessary to develop a comprehensive system for treating such equipment. In order for the private sector to develop a system, it is first necessary to examine the feasibility of treating such equipment by using existing industrial waste treatment facilities. The national government has been conducting an experiment for incineration verification in three facilities in 2005, five facilities in 2006, four facilities in 2007, and four facilities in 2008. The "Expert Committee on Treatment of Waste Electric Equipment Containing Very Small Amounts of PCB" that was set up in February 2007 in the Waste and Recycling Committee of the Central Environment Council has been discussing the results of verification tests and how to promote the treatment of PCB waste in the future. (Tables 2-5 and 2-6)

(7) Dioxins Emission Control

A. What Are Dioxins?

Dioxins are substances generated naturally in the process of substance incineration (by-product).

Polychlorinated dibenzo-para-dioxin (PCDD) has 75 types of isomers, polychlorinated dibenzofuran (PCDF) has 135 types of isomers, and coplaner polychlorinated biphenyl (coplanar PCB) has a dozen types of isomers. Among these types of isomers, 29 types are regarded as being toxic.

B. Position of Waste Incinerators in the Dioxin Problem

The main generation source of dioxins is garbage incineration. In addition to this, there are various generation sources, such as electric furnaces for steelmaking, cigarette smoke, and automobile emissions. It is said that dioxins are also generated in the natural world by forest fires, volcanic activities, etc. In addition, a research report says that dioxins contained in once used PCB and some types of agrochemicals as impurities may be accumulated in the environment, such as in mud found at the bottom of rivers or the sea.

The movement of dioxins after they have entered the environment is not known clearly. However, it is known, for example, that dioxins that have stuck to particles in the air fall to the ground and contaminate the soil and water. It is also known that dioxins including ones that have already been accumulated in the environment over a long time, including bottom mud, are taken up by plankton, fish and shellfish and on through the food chain into other animals.

C Details of the Dioxin Problem

In November 1983, newspapers drew attention to the dioxin problem when they reported that dioxins had been detected from ashes in a municipal solid waste incinerator.

The dioxin problem in waste treatment was discussed earlier, and measures were taken according to "Guidelines for Prevention, etc. of Dioxins Generation Related to Waste Treatment" (new guideline) created by the former Ministry of Health and Welfare in January 1997.

In the new guidelines, an emission concentration of 80 ng-TEQ/m3 was set as a criterion for judging the necessity of urgent measures. The new guidelines were positioned as a new structural standard and maintenance management standard, etc. through the revision in August 1997 of the Enforcement Ordinance of the Waste Management and Public Cleansing Law and the Implementation Ordinance of the same law, and was enforced in December of the same year. The Ministry of the Environment also decided to impose legal regulations on dioxins as designated substances of the Air Pollution Control Law and established emission control standards for emissions from incinerators and electric furnaces for steelmaking in December 1997, thereby regulating emissions of dioxins. Due to these regulations, dioxin concentration in emissions was required to be measured in December 1997, and the concentration standard to be met was applied

in December 1998. In December 2002, it was decided that a stricter concentration standard would be applied.

In addition, the national government held its first Ministerial Conference on Countermeasures against Dioxin in February 24, 1999. In the Ministerial Conference on Countermeasures against Dioxin held in March 30, 1999, "Basic Guidelines of Japan for the Promotion of Measures against Dioxins" were laid down, which urged the national government as a whole to vigorously pursue various countermeasures, such as considerably decreasing the emission amount of dioxins. According to the guidelines in particular, it was decided that the total emission amount of dioxins would be reduced by "about 90%" by the end of March 2003, compared to the amount in 1997.

In 1999, the "Law concerning Special Measures against Dioxins" was enacted. In 2000, based on the same law, a target reduction amount was set by the "Plan for Reducing the Amount of Dioxins Emitted Through Business Activities in Japan", and the plan required an emission inventory of dioxins to be drawn up every year. It was confirmed that the estimated emission amount of dioxins in 2003 was about 95% smaller than that in 1997, and the plan was evaluated because the target emission amount was achieved. According to the report by the Central Environment Council (in November 2004) it was stated that the risk of dioxins needs to be continuously controlled, the plan was changed in June 2005 in order to take further measures for reducing dioxins, and a new reduction target for 2010 was set. The total estimated emission amount in 2007 fell below this target, and it is considered that dioxins have been steadily reduced (Table 2-7).

In addition, the total amount of dioxins emitted from waste incinerators in 2006 was about 98% less than that in 1997. This is probably because many of the incinerators that could not meet the emission standard and other structural and maintenance management standards, were either suspended or closed their operations due to the support measures, etc. related to tighter regulations and the development of standard-meeting incinerators, and because new incinerators that met the standards were developed. The achievement rate in 2007 of the environmental quality standards set according to the Law concerning Special Measures against Dioxins was 100.0 % for the atmosphere, and the environmental quality standards were met for all measurement points.

Table 2-8 Status of export and import based on the Basel Law (2007)

	Weight (tons)	Partner countries	Items	Purpose of export and import
Export	48,788	South Korea, Belgium, USA	Lead ash, lead scrap (lead-acid battery), solder waste, nickel sludge, etc.	Collection of metals
Import	6,123	Philippines, Singapore, Indonesia, Thailand, Malaysia, China, etc.	Copper sludge, silver sludge, zinc sludge, used fluorescent lamp, waste substrate, electronic component scrap, nickel-cadmium battery scrap, etc.	Collection of metals, etc.

Source: Ministry of the Environment

Table 2-7 Reduction targets concerning estimated emissions of dioxins by business sectors in Japan

(WHO-TEF (1998) used)

Business sectors	Reduction targets in FY 2010 (g-TEQ/year)	(Reference) Estimated emissions		
		FY 1997 (g-TEQ/year)	FY 2003 (g-TEQ/year)	FY 2007 (g-TEQ/year)
1. Waste treatment sector	164～189	7,205～7,658	219～244	182～200
(1) Municipal waste incinerator	51	5,000 [Water] 0.044	71 [Water] 0.004	52 [Water] 0.002
(2) Industrial waste incinerator	50	1,505 [Water] 5.3	75 [Water] 0.60	60 [Water] 1.6
(3) Small scale waste incinerator, etc.	63～88	700～1,153	73～98	70～88
2. Industrial sector	146	470 [Water] 6.3	149 [Water] 0.93	100 [Water] 0.8
(1) Electric furnace for steel-making	80.3	229	80.3	50.2
(2) Sintering facility for steel making	35.7	135	35.7	20.5
(3) Zinc-collection facility (Calciner, sintering furnace, blast furnace, smelting furnace, drying furnace)	5.5	47.4	5.5	1.8
(4) Aluminum alloy manufacturing facility (Calciner, smelting furnace, drying furnace)	14.3	31.0	17.4	15.6
(5) Copper-collection facility	0.048	0.053	–	–
(6) Pulp manufacturing facility (bleaching process)	0.46	0.74	0.46	0.58
(7) Other facilities	9.9	26.5	9.9	11.1
3. Others	4.4～7.7	4.8～7.4 [Water]1.2	4.4～7.3 [Water] 0.56	4.2～7.3 [Water] 0.29
Total	315～343	7,680～8,135	372～400	286～307

Note 1: The reduction targets represent annual dioxin emissions after measures to reduce dioxins in exhaust gas and effluent have been taken.
Note 2: WHO-TEF (1998) used: TEFs proposed by the WHO in 1997 and published in a specialist journal in 1998 were used.
Note 3: "3. Others" refers to crematoriums, cigarette smoke, vehicle exhaust, terminal sewage treatment facilities, and final landfill sites for waste.
Note 4: "Water" shown in the table refers to the discharge into water (included figure).
Note 5: The symbol "–" indicates there was no operation in the relevant year.
Source: Created by the Ministry of Environment, based on the Government Plan to Reduce Dioxin Levels Resulting from Business Activities in Japan (enacted in September 2000 and amended in June 2005) and Dioxins Emissions Inventory (December 2008)

(8) Transboundary Movement of Hazardous Wastes

According to the "Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal" (hereafter referred to as the "Basel Convention") adopted to address the problems of environmental pollution, etc. resulting from the transboundary movement of hazardous wastes, Japan enacted the "Law for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes" (Act No. 108 of 1992) (hereafter referred to as the "Basel Law"), and it has imposed the necessary regulations on export and import of wastes by revising the Waste Management and Public Cleaning Law. As of January 2009, 171 nations and the EC were parties to the Basel Convention, and the convention is improved or revised at a conference of these countries held about every two years. Table 2-8 shows the regulations on export and import based on the Basel Law.

In recent years, against the backdrop of the globalization of economic activities and increase in demand for resources due to rapid economic growth in Asian countries, an international movement of recyclable resources aiming at recycling has been activated. Under such circumstances, because there is a fear of inappropriate export and import of wastes, etc., the Ministry of the Environment has been cooperating with the relevant domestic authorities and the government agencies of each country to take measures for preventing them. (For information on cooperation with the government agencies of each country, refer to (2) in Section 5, Chapter 3.

Section 3. State of Implementation of Legal Systems for Establishment of a Sound Material-Cycle Society

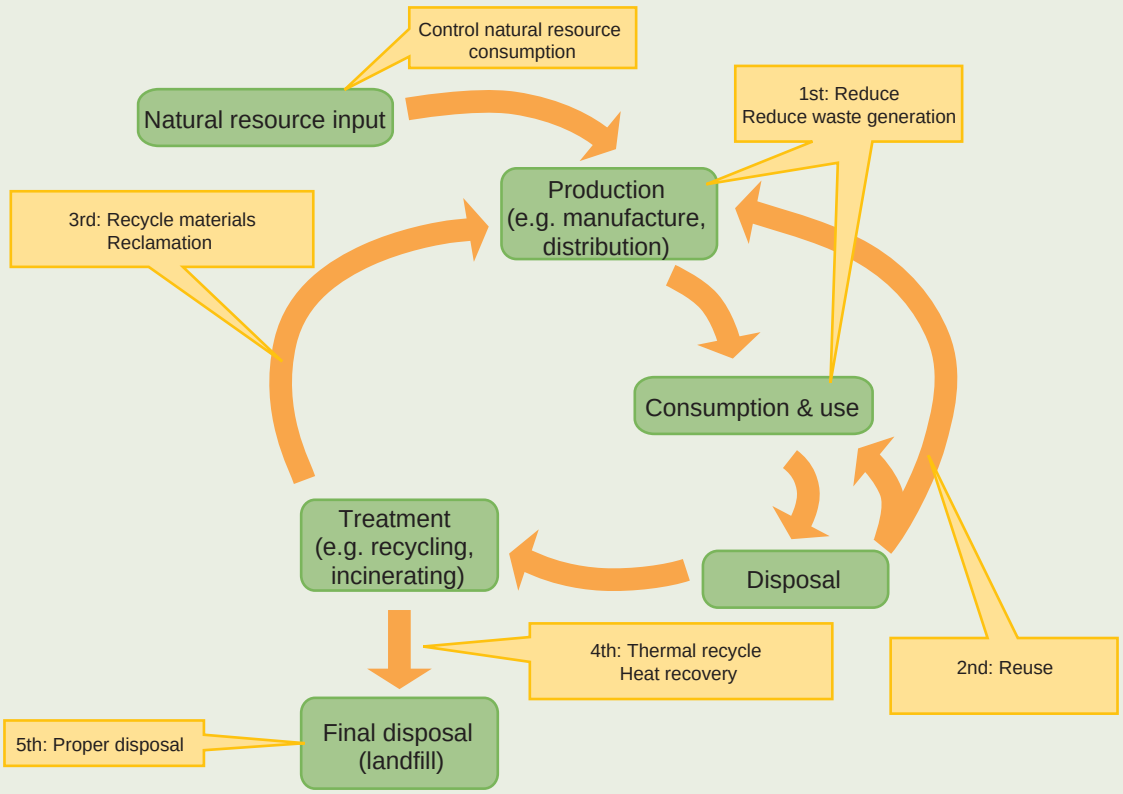
(1) Fundamental Law for Establishing a Sound Material-Cycle Society

The "Fundamental Law for Establishing a Sound Material-Cycle Society" was promulgated in July 2000 and enforced in January 2001, with the aim of securing a material cycle in society by revising the present state of our mass-production, mass-consumption, and mass-disposal society and the lifestyles of people, to thereby establish "a sound material-cycle society" where consumption of natural resources is curbed and the environmental load is decreased.

This law provides the following: (1) objects subject to this law should be understood as "wastes, etc." in an integrated manner regardless of whether they are valuable or of no value and products should be prevented from becoming wastes, etc., (2) the usefulness of generated wastes, etc. should be paid attention to and wastes, etc. should be re-recognized as "recyclable resources" for them to thereby be subject to cyclical use (reuse, recycling, and heat recovery) , (3) wastes that are not capable of cyclical use should be appropriately disposed. With these processes, this law aims to realize "a sound material-cycle society", that is "a society where the consumption of natural resources can be reduced and as much of the environmental load as possible can be decreased." (Figure 3-1)

The Sound Material-Cycle Society Fundamental Law pro-

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



Source: Ministry of the Environment

motes two concepts as the base of its policies: the responsibility of waste generator and extended producer responsibility .

A. Responsibility of Waste Generator

A waste generator must bear the primary responsibility for the reduction of environmental load caused by its disposal of wastes. "Responsibility of waste generator" is an idea that a business operator that generates wastes should bear the responsibility for proper treatment of the wastes, and it is one of the basic principles of measures for recycling wastes. More specifically, proper treatment of wastes means that a business operator must sort its generated wastes and treat them by itself.

Because the perpetrator of environmental load caused by the disposal of wastes is the generator of the wastes, it is rational to think that the generator is responsible for the reduction of environmental load caused by its disposal of wastes. The root of this idea lies in the so-called Polluter-Pays Principle.

This idea of "responsibility of waste generator" must be continuously and thoroughly promoted. In addition, ordinary citizens cannot be free from their responsibility as a generator of wastes and need to play their roles positively.

B. Extended Producer Responsibility

Extended Producer Responsibility (EPR) is an idea that a producer bears a certain responsibility (physical or financial responsibility) for the reuse, recycling, and disposal of the products it produced even after the products were used and then disposed of. This idea gives producers incentives to develop and produce products that are difficult to be disposed of and easy to be reused or recycled. Now we have problems that there are an excessively large amount of wastes and that it is difficult to reuse or recycle them. Therefore, the extended producer responsibility is one of the important ideas for solving such problems. (Table 3-1)

C. Fundamental Plan for Establishing a Sound Material-Cycle Society (Sound Material-Cycle Society Fundamental Plan)

The Fundamental Law for Establishing a Sound Material-Cycle Society provides that the Fundamental Plan for Establishing a Sound Material-Cycle Society should be formulated as a fundamental plan related to the establishment of a sound material-cycle society.

The Fundamental Plan for Establishing a Sound Material-Cycle Society is a central device for comprehensively and systematically implementing policies related to the establishment of a sound material-cycle society, and it provides the image of what a sound material-cycle society should be like, sets numerical targets for the establishment of a sound material-cycle society, and shows the direction of actions taken by the national government and other actors.

The second Sound Material-Cycle Society Fundamental Plan decided upon by the Cabinet in March 2008, provides that all actors, including ordinary citizens, business operators, NPOs, NGOs, universities, local public bodies, and the national government should cooperate with one another to take actions for the establishment of a sound material-cycle society. Above all, the plan states that the national government should take the following comprehensive actions: (1) the integrated creation of both a low-carbon society and a society in harmony with nature, (2) the promotion of creation of "regional resource recycling zones," (3) the promotion of a people's movement for the 3Rs, (4) the thorough promotion of businesses for a sound material-cycle society, such as green purchasing, (5) improvement of the mechanism of the 3Rs focused on waste generation reduction, (6) improve increasingly sophisticated techniques and systems for the 3Rs, (7) understand information and develop of human resources, and (8) establish an international sound material-cycle society.

In order to steadily implement the Sound Material-Cycle

Table 3-1 Extended producer responsibility described in Extended Producer Responsibility: A Guidance Manual for Governments by OECD

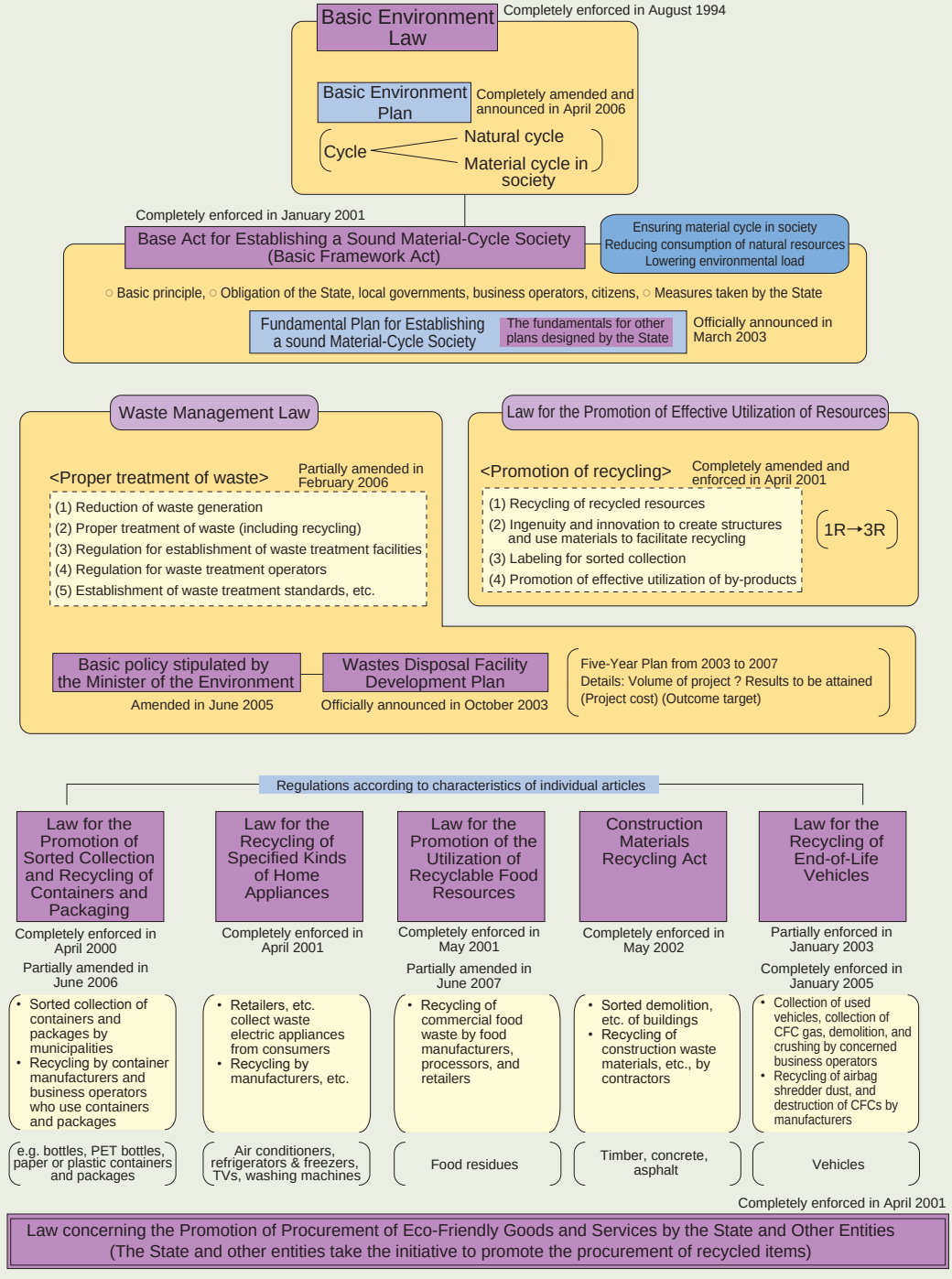
(1) Definitions	An environmental policy approach in which a producer's responsibility, physical and/or financial, for a product is extended to the post-consumer stage of a product's life cycle. More specifically, (1) Producers accept responsibility when they design their products to minimize environmental impacts over the product's life cycle (2) Producers accept physical and/or economic responsibility for those environmental impacts that cannot be eliminated by design.
(2) Primary function	To transfer the financial and/or physical responsibility, in whole or part, of waste treatment from local government authorities and the general taxpayer to the producer
(3) Four principal goals purposes	(1) Source reduction (natural resource conservation, materials conservation) (2) Waste prevention (3) Design of more environmentally compatible products (4) Closure of material-use loops to promote sustainable development
(4) Effectiveness	To pressure parties concerned in the upstream side design and selection of materials for a product; and to enable sending of appropriate signals to producers so that they will include external environmental costs incurred by their products
(5) Shared responsibilities	In the product chain, from manufacturing to disposal, shared responsibilities among all actors are an inherent part of extended producer responsibility
(6) Examples of specific policy approaches	(1) Product take-back (2) Deposit/refund (3) Surcharge/tax (4) Advance disposal fees (5) Minimum recycled content requirements (6) Leasing

Source: Created by the Ministry of the Environment, based on Extended Producer Responsibility: A Guidance Manual for Governments (2001) by OECD

Society Fundamental Plan, the Central Environment Council is required to check how the policies based on the Sound Material-Cycle Society Fundamental Plan have been implemented every year and as necessary report the direction of future policies to the national government. In fiscal 2008, for the first time, the council checked how the second Sound Material-Cycle Society Fundamental Plan had been implemented.

Specifically, the council had seven intensive deliberations, based on the actions taken by the industrial world, business operators, and local public bodies and four public hearings with relevant government ministries and agencies, and compiled the results of the audit in February 2009. The report of these results highlighted, as future issues to tackle, further promotion of actions for achievement of the set numerical targets, quicker reporting of statistics, cooperation among policies for a low-carbon society and a society in harmony with nature, development of the system and reinforcement of cooperation for strategic use of useful resources, such as rare metals, further promotion of reduction and reuse of resources, promotion of actions by local public bodies based on regional resource recycling zones seen also from the viewpoint of local revitalization, exercise of leadership for the establishment of a sound material-cycle society in Asia (Figure 3-2).

Figure 3-2 A system of policy measures to promote establishing a sound material-cycle society



Source: Ministry of the Environment

Column

The lifestyle in a sound material-cycle society is the exercise of the 3Rs! "Re-style"

The ministry of the Environment runs a Website for the Web magazine "Re-Style" (http://www.re-style.jp/) to provide easy-to-understand information and what can be done in daily life to reduce wastes and make effective use of resources as well as develop eco-friendly lifestyles

In "Re-Style,"

- "Features" that provide topical information related to the 3Rs and
- Rich contents, such as "Re-stylist Talk" that introduces interviews with celebrities and artists about their eco-friendly efforts in their daily lives and lifestyle, are provided.

In addition, it has a more user friendly search function, "Re-style Search," which allows the search of select regions or categories, such as "Buy, sell, and give," "Repair," and "Live and enjoy." It provides necessary information on Websites, companies, etc. related to the 3Rs.

Furthermore, a Website for mobile terminals has been available since fiscal 2008, enabling easy access to the site from outdoors or in a person's spare time.

(2) Waste Management and Public Cleansing Law (Waste Management Law)

A. Comprehensive Actions in Waste Management

In March 2001, the Minister of the Environment decided and officially announced the "Basic Guidelines for the Comprehensive and Systematic Promotion of Waste Reduction Measures and Other Appropriate Treatments" (Basic Guidelines). The guidelines basically provide the following: (1) the generation of wastes should be controlled as much as possible, (2) then actual wastes should be used as cyclically as possible in the order of reuse, recycling, and heat recovery in consideration of prevention of improper waste treatment and reduction of the environmental load, and (3) wastes unable to be subject to proper and cyclical use, even after such generation control and proper and cyclical use have been thoroughly carried out should be treated properly. With these processes, it is required for the final disposal volume of municipal waste and that of industrial waste to be reduced by about 50% by fiscal 2010, compared with fiscal 1997, and, also in fiscal 2006, efforts to achieve the target were steadily made.

In addition, when the Waste Management Law was revised in June 2003, provisions concerning the formulation of the Wastes Disposal Facility Development Plan were added to the law, resulting in the repeal of the Law for Special Measures for the Improvement and Construction of Waste Treatment Facilities. The Waste Disposal Facility Development Plan, whose target was changed from "amount of projects" to "results to achieve" based on the discussions about the revision of the ideal state of social capital development by the national government, was decided on by the Cabinet in October 2003. Because this plan was supposed to reach its final year in fiscal 2008, the new Wastes Disposal Facility Development Plan into which a perspective on cooperation with measures against global warming was incorporated was decided on by the Cabinet in March 2008.

"Subsidy System for Promoting the Establishment of a Sound Material-Cycle Society," under which targets for promoting the 3Rs of wastes were set to promote the development of waste treatment and recycling facilities cross-jurisdictionally and comprehensively, was established in fiscal 2005. Under this system, municipal waste treatment facilities, such as heat recovery facilities, high-efficiency raw material and fuel recycling facilities, sludge recycling centers, final disposal sites, recycling centers, have been developed to promote the generation control, cyclical use, and proper treatment of wastes. In fiscal 2008, 51 regional plans for effectively using this subsidy were formulated.

Furthermore, social capital development programs that utilize private finance initiatives (PFI) to develop municipal waste treatment facilities (PFI programs) were subsidized.

When the Waste Management and Public Cleansing Law was revised in June 2000, requirements for business operators to be designated as waste treatment center operators were relaxed in order to promote the further use of the Solid Waste Treatment Center System. In addition, in order to support the development of first-class waste treatment facilities that include the private sector, such excellent facilities are qualified as specified facilities, based on the "Law to Promote the Development of Specified Facilities for the Disposal of Industrial Waste." In fiscal 2008, one corporation was designated as a waste treatment center, and, at the end of the same fiscal year, 18 corporations were designated. In addition, the subsidy system created in fiscal 2000 for model development projects by industrial waste treatment facilities has promoted the further development of industrial waste treatment facilities operated by the public sector. In fiscal 2008, five projects for developing controlled landfill sites for domestic wastes and industrial waste, etc. were subsidized.

Among the greater metropolitan areas where final disposal sites are especially difficult to secure, in the Kinki area, the Osaka Bay Regional Offshore Environmental Improvement Center promoted the smooth development of regional waster disposal facilities and landfill facilities.

In addition, soft measures seen in the sorting and collecting garbage, etc. by municipalities, which would lead to more reduction and recycling of wastes, were assisted. The Waste Management and Public Cleansing Law revised in 1992 was enforced in December 1993, and, since then, necessary regulations, such as for the export of wastes to be checked by the

Minister of the Environment and import of wastes to be approved by the same minister, have been imposed on the export and import of wastes under the principle of domestic treatment. In 2007, 36 exports were checked and 6 imports approved by the minister, according to the Waste Management and Public Cleansing Law. (For information on the transboundary movement of hazardous wastes, refer to (8) in 4, Section 2, Chapter 3.)

In addition, in order to improve conditions for waste-discharging enterprises to select excellent waste-treating enterprises, a project for developing a larger number of excellent industrial waste-treating enterprises has been carried out. Created as part of this project was the "Excellence Evaluation System," in which the 47 prefectures, at the time of license renewal, check that waste-treating enterprises meet certain standards and as of the end of March 2009, 2,081 projects and 274 enterprises has been certified. On the other hand, some local public bodies operate a system in which waste-treating enterprises can be checked if they meet the necessary evaluation standards, regardless of the time of license renewal. Also in this system, 618 projects and 157 enterprises are certified to meet the standards, showing a steady increase in numbers.

In addition, the introduction of the electronic manifest system has a lot of advantages, such as higher-efficiency administrative work, compliance improvement, and forgery prevention, which rapidly increased the adoption rate of the system to about 14% at the end of fiscal 2008. However, the number is still smaller than expected. Therefore, in order to achieve the target that the adoption rate of the electronic manifest system should be increased to 50%, which is set in "IT New Reform Strategy" (January 19, 2006) compiled by the IT Strategy Headquarters, systematic and comprehensive efforts are being made to spread and promote the system.

B. Promotion of Waste Reduction, etc. Based on the Waste Management and Public Cleansing Law

According to the Waste Management and Public Cleansing Law revised in 1997, a so-called "Recycling Certification System" was created. In this system, an enterprise does not need a license for a specific type of business and facility installation when the means of recycling specific wastes by a waste-treating enterprise has been certified by the Ministry of the Environment to meet certain standards, such as no expected problem with the conservation of the living environment. At the end of fiscal 2008, 66 cases were certified in municipal waste treatment and 48 cases in industrial waste treatment.

In addition, according to the Waste Management and Public Cleansing Law revised in 2003, a so-called "Wider-area Treatment Certification System" was created. In this system, when a waste-treating enterprise is certified by the Minister of the Environment as suitable for proper waste treatment including waste reduction because of its wider-area operation, no license for a specific type of business is required of the enterprise. In October 2008, waste printing machines and waste devices for cellular phones were included in municipal waste subject to the Wider-area Treatment Certification System. In order to promote the collection and recycling of wastes by manufacturers, etc. themselves, by the end of fiscal 2008, 69 cases were certified in municipal waste treatment and 169 cases in industrial waste treatment.

According to the report "Ideal State of Municipal waste Treatment by Municipalities for the Establishment of a Sound Material-Cycle Society" submitted by the Central Environment Council in February 2005, the Ministry of the Environment decided that the whole national government would build appropriate recycling and treatment systems focused on the 3Rs, this was based on the fact that the objective of the waste-recycling administration has been shifting from conventional matters, such as conservation of the living environment, improvement of public health, and solutions to pollution problems, to the establishment of a sound material-cycle society. Accordingly, the ministry revised its basic policy formulated according to the provision of Paragraph (1), Article 5-2 of the Waste Management and Public Cleansing Law in May 2005.

The basic policy laid out tasks for municipalities to achieve for the optimization of municipal waste treatment systems for the establishment of a sound material-cycle society, the following three points are now clearly described (Figure 3-3).

1) To analyze and provide costing information needed for projects related to municipal waste treatment, examine the analysis results from various angles, and utilize PFI as necessary, so that the projects becomes socioeconomically efficient

2) To further charge a fee for municipal waste treatment in order to promote the generation control and recycling of municipal waste with economic incentives used to share costs fairly according to the amount of generated waste, and to raise the awareness of citizens

3) To clearly explain to citizens and business operators the necessity and environmental load and economy-related advantages when the current municipal waste treatment system categories for sorted collection of wastes, waste treatment methods, etc. are changed or when a new system is introduced

According to the statements shown above, in June 2007, the Ministry of the Environment created "Municipal waste Accounting Standards" that gave a standard method of analyzing costs for a municipal waste treatment project, "Guidance for Charging a Fee for Municipal waste Treatment" that showed how to carry out procedures for charging a fee, and "Guidelines for a Municipal waste Treatment System for the Establishment of a Sound Material-Cycle Society in Municipalities"

Figure 3-3 Changes to implementation rate of charging waste treatment fees by municipalities

Note: Implementation rate of charging waste treatment fees by municipalities is the rate of local governments that have implemented charging fees for domestic waste treatment (excluding waste directly brought in and bulky waste); in recent years the rate is steadily increasing apart from fiscal year 2004, in which the rate appears to decrease due to the merger of municipalities.

that showed the standard categories for sorted collection of municipal waste and ideas on how to recycle and treat them. At the same time, the ministry gave briefings on these guidelines to local public bodies and technically assisted their reform for realization of the 3Rs.

C. Examination and Evaluation of How the Waste Management and Public Cleansing Law Has Been Enforced

Ten years have passed since the Waste Management and Public Cleansing Law revised in 1997 was enforced, and the national government has examined how the law had been enforced according to the supplementary provisions of the revised law. After that, according to the supplementary provisions of the successively revised law, it is necessary to examine the enforcement state of the law stage by stage. Therefore, in July 2008, the "Expert Committee on Waste Treatment System" was set up in the Central Environment Council, and it examined and evaluated how the rules for the generation control, proper treatment, etc. of wastes based on the Waste Management and Public Cleansing Law were observed.

(3) Johkasoh Law (Household Wastewater Treatment Facility Law)

The Johkasoh Law enforced in October 1985 aims to properly treat raw sewage and miscellaneous wastewater with household wastewater treatment facilities, to thereby contribute to the conservation of the living environment and the improvement of public health from the viewpoint of conservation of the water quality of the public water area. The law also understands the series of processes of manufacturing, installing, and managing household wastewater treatment facilities in an integrated manner and imposes tighter regulations on them. At the same time, it requires people engaged in the operations of installation and management of the facilities to have certain qualifications.

The law provides that an examination should be carried out to check if each household maintains and manages its household wastewater treatment facility properly. The ratio of households that undertook an examination of water quality conducted at the end of fiscal 2007 according to Article 7 of the law was 87.9%, a 1.2% increase from fiscal 2006. In addition, the ratio of households that undertook a regular examination of their household wastewater treatment facilities carried out according to Article 11 of the law was 25.7% (47.0% for combined household wastewater treatment facilities), 1.9% increase (1.6%increase for combined household wastewater treatment facilities) from fiscal 2006.

(4) Law for the Promotion of Effective Utilization of Resources (Resources Effective Utilization Law)

The Resources Effective Utilization Law enforced in April 2001 specifies the following business categories: 1) business that should control the generation of or recycle by-products (specified businesses in which resources are saved: steel business, paper and pulp manufacturing business, etc.), 2) business that should use recycled resources and recycled parts (specified reuse business: paper manufacturing business, glass container manufacturing business, etc.), 3) products for which raw materials, etc. should be made rational use of (specified products for which resources are saved: automobiles, electric home appliances, etc.), 4) products for the use of recycled resources or recycled parts should be promoted (designated reuse-promoting products: automobiles, electric home appliances, etc.), 5) products that should have labels for promoting sorted collection (products with designated labels: plastic containers and packages, paper-made containers and packages, etc.), 6) products that should be collected and recycled by their manufacturers (designated recycled products: personal computers, small rechargeable batteries), 7) by-products the use of which is promoted as recycled resources (designated by-products: coal ash generated by the electricity industry), and the law imposes certain obligations on business operators engaged in each business mentioned above and promotes their voluntary efforts to make effective use of resources.

In addition, in January 2008, the basic policy working group of the Waste Treatment and Recycling Subcommittee under the Environment Division of the Industrial structure Council offered opinions concerning the vision of a new 3Rs policy for the establishment of a sound material-cycle society in the future. According to this vision, the Ministry of the Environment is taking measures for reducing the amount of various types of resources to be used.

First of all, in order to reduce the amount of resources to be used in a whole product supply chain, the ministry has selected 20 model projects and tries to create outstanding cases of resource-saving manufacturing through material flow cost accounting, environment-conscious design, etc.

In addition, the ministry is discussing a method or system for evaluating the activities carried out by manufacturers in their 3Rs-related product design and manufacturing in order to expand the market for 3Rs-conscious products so that consumers can accurately and easily understand and evaluate the manufacturers' efforts.

(5) Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging (Containers and Packaging Recycling Law)

A. Enforcement Status

Among the items sorted and collected in fiscal 2007, particularly the amount of plastic bottles, plastic containers, and paper-made containers and packages for beverages increased. On the other hand, the amount of steel containers decreased from the previous year (Table 3-2).

The amount of collected and sorted plastic containers and packages excluding plastic bottles that were added to target items in April 2000 has increased steadily, and the ratio of collected and sorted plastic containers and packages and that of paper-made containers and packages to plastic and paper-made containers and packages that were collected without being sorted are 71.8% and 38.3%, respectively. However, the ratios are still low, compared with those of other items, and it is essential to increase the number of municipalities that conduct sorted collection (Figures 3-4 and 3-5 and Table 3-3).

B. Enforcement of the Containers and Packaging Recycling Law)

In April 2008, the revised Containers and Packing Recy-

Table 3-2 Sorted collection plan and recycling plan

(1) Number of municipalities with sorted collection

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Glass containers: colorless	1,779 97.4%	1,780 97.4%	1,781 97.5%	1,784 97.6%	1,788 97.9%
Glass containers: brown	1,782 97.5%	1,783 97.6%	1,783 97.6%	1,786 97.8%	1,790 98.0%
Glass containers: other colors	1,782 97.5%	1,784 97.6%	1,786 97.8%	1,790 98.0%	1,794 98.2%
Paper containers and packages	896 49.0%	915 50.1%	942 51.6%	965 52.8%	974 53.3%
PET bottles	1,791 98.0%	1,792 98.1%	1,802 98.6%	1,804 98.7%	1,806 98.9%
Plastic containers and packages	1,429 78.2%	1,465 80.2%	1,489 81.5%	1,504 82.3%	1,517 83.0%
Steel cans	1,819 99.6%	1,819" 99.6%	1,819 99.6%	1,819 99.6%	1,821 99.7%
Aluminum cans	1,820 99.6%	1,820 99.6%	1,820 99.6%	1,820 99.6%	1,822 99.7%
Cardboard boxes	1,744 95.5%	1,749 95.7%	1,753 95.9%	1,756 96.1%	1,759 96.3%
Drink cartons	1,568 85.8%	1,575 86.2%	1,585 86.8%	1,587 86.9%	1,591 87.1%

[Upper row: number of municipalities, lower row: percentage of all municipalities]
Total number of municipalities: 1,827 (as of April 1, 2007)

(2) Estimated sorted collection (Unit: thousand tons)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Glass containers: colorless	359	359	358	357	356
Glass containers: brown	309	309	308	308	307
Glass containers: other colors	183	184	184	184	184
Paper containers and packages	146	153	161	168	171
PET bottles	303	312	324	332	340
Plastic containers and packages	804	858	945	978	1,004
Steel cans	314	312	311	309	307
Aluminum cans	149	150	151	152	152
Cardboard boxes	752	763	770	776	781
Drink cartons	25	26	27	28	28

(3) Estimated recycling (Unit: thousand tons)

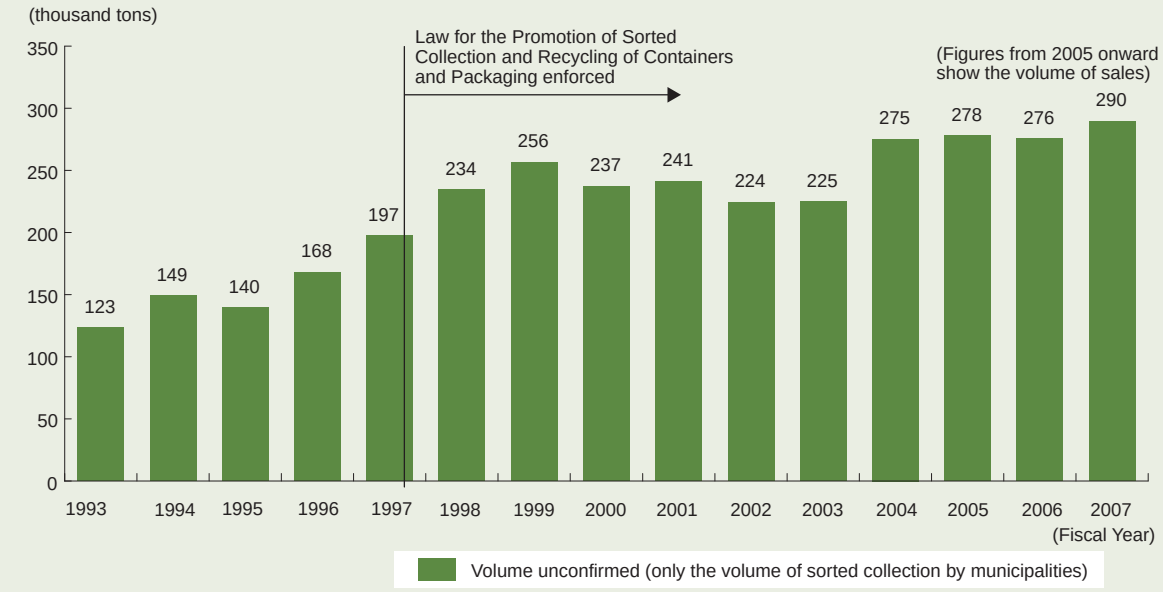
	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Glass containers: colorless	180	180	180	180	180
Glass containers: brown	160	170	170	170	170
Glass containers: other colors	130	130	130	130	130
Paper containers and packages	356	356	356	356	356
PET bottles	370	384	384	385	386
Plastic containers and packages	1271	1291	1291	1293	1,293

Source: Ministry of the Environment

cling Law was enforced completely, and a system was implemented in which business operators provided money to municipalities that contributed to rational recycling of containers and packages. With this system, the quality of sorted collection was improved and, therefore, the efficiency of the whole social system was improved.

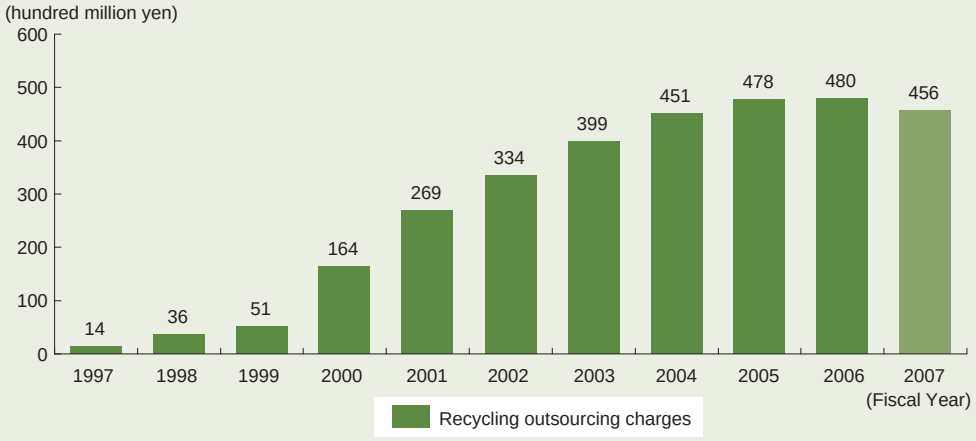
In addition, in July 2008, the Ministry of the Environment set up the "Study Committee for the Further Transparency in the Container and Package Recycling Flow" in order to discuss issues and measures for the improvement of transparency in the flow of recycling containers and packages including plastic ones and to draw a certain conclusion. Furthermore, the ministry conducted the following in order to promote the 3Rs of waste containers and packages: (1) educational and awareness activities toward consumers were conducted by promoters for controlling the generation of waste containers and packages

Figure 3-4 Changes to the unconfirmed volume of PET bottles (*difference between production/volume of sales and volume of sorted collection)



Source: Ministry of the Environment

Figure 3-5 Changes to recycling outsourcing charges paid by specified businesses to designated corporations



Source: Created by the Ministry of the Environment, based on materials published by

Table 3-3 Collection by designated corporations of waste conforming to sorted collection criteria

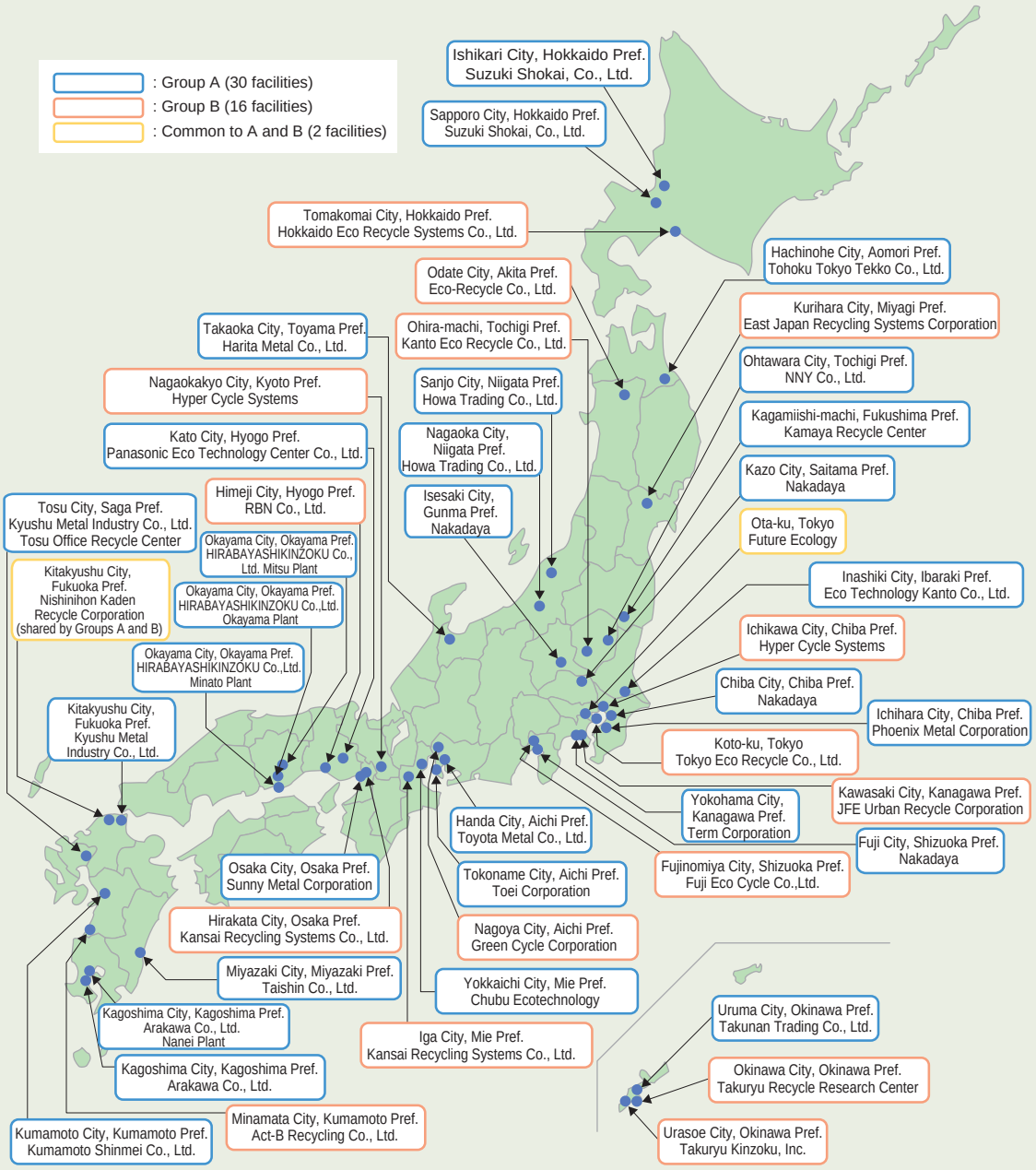
FY 2007	Plastic containers and packages	Paper containers and packages	PET bottles	Glass bottles		
				Colorless	Brown	Other colors
Number of municipalities conducting sorted collection	1,304	696	1,765	1,736	1,741	1,731
Number of municipalities transferring waste to designated corporations	988	154	1,082	913	969	1,195

Source: Created by the Ministry of the Environment, based on materials published by the Japan Container and Package Recycling Association

(nickname: 3Rs promoting meister) who were commissioned according to the Containers and Packaging Recycling Law, (2) Minister of the Environment Awards were granted to outstanding products or activities useful for the 3Rs of waste containers and packages and to "My bag" (grocery bag) that consumers made by themselves, (3) model projects were carried out for promoting the introduction of supermarkets charging a fee for plastic grocery bags, and (4) "Container and Package 3Rs Promotion National Convention – Efforts for the Reduction of Plastic Grocery Bags across the Country –" was held in Tokyo in January 2009 and the convention transmitted information on various activities with regional characteristics for reduction used throughout the country.

Figure 3-6 Development status of major home appliance recycling plants

(As of March 2008)



■ Classification of Groups A and B
Designated sites are divided into two groups: Group A and Group B.
Group A: Led by Panasonic Corporation and Toshiba Corporation, and located in 190 sites nationwide.
Group B: Led by Hitachi, Ltd., Sharp Corporation, Mitsubishi Electric Corporation, Sanyo Electric Co., Ltd., and Sony Corporation, and located in 190 sites nationwide.

Source: Ministry of the Environment

(6) Law for the Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law)

A. Enforcement Status

The Home Appliance Recycling Law was enforced completely in April 2001. Currently, there are 380 designated collection sites where manufacturers of four types of waste home appliances (household air-conditioners, CRT-based televisions, refrigerators and freezers, and washing machines) subject to the law collect them, and recycling plants for the four types of collected waste home appliances are operating in 48 locations across the country (Figure 3-6). In these recycling plants, iron, aluminum, copper, glass, and rare metals used for printed-circuit boards are collected as well as fluorocarbons used as a refrigerant in household air-conditioners, refrigerators, and freezers, and fluorocarbons contained in heat insulating materials used for refrigerators and freezers.

The number of these four types of home appliances collected in designated collection sites and their recycling ratio in recycling plants are shown in 1-(3)-D., Section 2, Chapter 3, and each ratio of recycling by manufacturers of the four types of home appliances exceeds the legal standard.

B. Revision of the Home Appliance Recycling System

In April 2006, five years have passed since the enforcement of the Home Appliance Recycling Law, and it was time to revise the Home Appliance Recycling System according to a provision of the law. In June of the same year, the system was examined and evaluated in the joint conference of the Central Environment Council and the Industrial Structure Council. As a result in February 2008, "Report on the Evaluation and Examination of the Implementation Status of the Home Appliance Recycling System" was compiled.

The Ministry of the Environment has concretized the measures shown by the report as follows:

- In order to prescribe the addition of home appliances subject to the law (liquid crystal and plasma televisions and laundry driers) and the raising of the recycling ratio of the existing home appliances subject to the law, the enforcement ordinance of the Home Appliance Recycling Law was revised in December of the same year (enforced in April 1, 2009).
- For the establishment of a cooperative framework among concerned parties including financial support concerning measures against illegal dumping, and the improvement of the collection and transportation of waste home appliances in isolated islands, with financial cooperation from the manufacturers of home appliances cooperative projects have started for the prevention of illegal dumping and to provide measures for isolated islands.
- In November 1, 2008, the recycling charges of air-conditioners, CRT-based televisions (15-inch or smaller types), and refrigerators and freezers (170-liter or less types) were lowered for waste home appliances to be collected appropriately and for burdens borne by consumers to be eased before TV analog broadcasting is stopped in 2011.
- Concerning designated collection sites that are currently divided into two groups, in order to reduce the burdens and inequalities among retailers, etc. concerning the collection and transportation of waste home appliances, locations that are distant from both groups were commoditized in advance to create a smooth environment for transactions.
- Because distribution by retailers for reuse of specified home appliances is expected to improve convenience for consumers who dispose of waste home appliances, "Guidelines on the creation of standards for sorting for reuse and recycling" were laid down to promote appropriate reuse and recycling for retailers.

(7) Construction Materials Recycling Act (Construction Recycling Act)

A. Enforcement Status

The Construction Recycling Act was enforced in May 2002, targeting concrete mass, asphalt and concrete mass, and waste lumber disposed of at construction sites. In fiscal 2005, the recycling rate of concrete mass and that of asphalt and concrete mass was 98.1% and 98.6%, respectively, which are high values. The recycling rate of lumber disposed at construction sites is 68.2% and the rate with reduction included is 90.7%, showing steady recycling.

B. Revision of the Construction Recycling System

In order to address issues related to construction recycling, "Plan 2008 for Promoting the Construction Waste Recycling" was formulated in April 2008, and measures based on this plan are being taken. In addition, in order to understand the actual state of construction by-products after the formulation of "Plan 2008 for Promoting the Construction Waste Recycling", research on the actual state of construction by-products for fiscal 2008 was carried out. Because five years passed since the complete enforcement of the Construction Recycling Act in May 2002, an interim report was compiled after six deliberations by the joint conference of the Social Capital Development Council and the Central Environment Council. After that, in the seventh joint conference held in December 2008, a report mainly focused on the visualization of construction recycling was compiled. According to these reports, the Ministry of the Environment decided to conduct necessary system revisions including the revision of its ministerial ordinances.

(8) Law for the Promotion of the Utilization of Recyclable Food Resources (Food Recycling Law)

The rate of recycling, etc. of recyclable food resources in fiscal 2007 was 54% for the whole food industry. Concerning the recycling rate of each business category, 81% for the food manufacturing industry, 62% for the food wholesaling industry, 35% for the food retailing industry, and 22% for the food service industry, showing differences among the industries.

According to the law that revised part of the Law for the Promotion of the Utilization of Recyclable Food Resources, which was enforced in December 2007, the Ministry of the Environment is making efforts including approval of the recycling business plan implemented by the parties concerned in cooperation with one another to achieve the target implementation rate (shown in the basic policy based on the provision of Paragraph (1), Article 3 of the same law) of the recycling, etc. of recyclable food resources by food-related business operators.

(9) Law for the Recycling of End-of-Life Vehicles (Vehicle recycling Law)

A. Enforcement Status

Since the Vehicle Recycling Law was enforced completely in January 2005, among the business operators affected by the law, the following have been registered and approved by the 47 prefectures, etc,: about 79,000 vehicle collecting companies, about 18,000 fluorocarbons collecting companies, about 6,600 vehicle dismantling companies, and about 1,300 vehicle crushing companies.

The national government, in cooperation with the relevant administrative agencies of the 47 prefectures, etc, aimed to ensure fair application of the law and took measures against improper treatment of vehicles, targeting the last users of vehicles, relevant business operators, and exporters.

In addition, in order to enforce the law efficiently, the government using various types of media conducted public relation activities and held briefings for relevant business operators, vehicle owners, etc.

Costs needed for recycling of fluorocarbons, air bags, and

shredder dusts (fluorocarbons are destroyed) are set and announced officially by automobile manufacturers, etc. As an organization that handles costs needed for managing recycling charges (charge management cost) and costs needed for managing the information on end-of-life vehicles (information management costs), the Japan Automobile Recycling Promotion Center is approved by the Minister of Economy, Trade and Industry and the Minister of the Environment, and the costs are announced officially.

The number of reports by vehicle collectors on used vehicles (electronic manifest report) was about 3.58 million in fiscal 2008. In addition, the total number of vehicles charged a fee for recycling in the period from January 2005 to March 2009 was 9,227, and the total amount of charged fees was 912.1 billion yen.

In addition, for municipalities on isolated islands that have difficulty collecting used vehicles, a support program with specified recycling deposits was started. In fiscal 2008, deposits for 23,000 vehicles were given to 89 municipalities.

B. Evaluation and Examination of the Vehicle Recycling System

Article 13 of the supplementary provision of the Vehicle Recycling Law states that, within five years after the enforcement of the law (February 1, 2005), how the law has been implemented should be examined and that necessary measures should be taken according to the results of the examination. Therefore, the vehicle recycling system has been evaluated and examined in the joint conference of the Central Environment Council and the Industrial Structure Council since July 2008.

(10) Law for the Promotion of Use of Agriculture, Forestry and Fisheries Resources as Raw Materials of Biofuel (Agriculture, Forestry and Fisheries Resources Biofuel Law)

In October 2008, "Agriculture, Forestry and Fisheries Biofuel Law" was newly enforced to promote the use of biomass originating from agriculture, forestry, and fisheries as biofuel, and to expand the production of domestic biofuel.

This law states the following: (1) the national government approves plans related to the "Production and Manufacturing Cooperation Project" in which farmers, foresters, fishers, and biofuel manufacturers, in cooperation with one another, are engaged in the process from production of raw materials to the manufacturing of biofuel (ethanol, wood pellet, etc.) and a "Research and Development Project" in which research and development is carried out to improve biofuel manufacturing techniques and (2) according to the approval by the government, support measures are taken, such as reduction of fixed property taxes on newly built biofuel manufacturing facilities and prolongation of the redemption period of improvement funds for farmers, foresters, and fishermen.

In December 2008, the first plan related to "Production and Manufacturing Cooperation Project" was approved.

(11) Law concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)

A. Promotion of Actions by the National Government and Local Public Bodies According to the Law

According to the "Basic Principles for Promoting Green Purchasing" (Basic Principles), organizations of the national government and others officially announced their procurement plans for fiscal 2008 and procured eco-friendly goods and services, based on the plans.

Designated procurement items and criteria for judgment of what should be procured specified in the Basic Principles are subject to revision as necessary according to the development and popularization status of the items and the improvement of scientific knowledge. Also in fiscal 2009, the Basic Principles were revised in February, and the number of designated procurement items became 246 in 19 fields.

B. Promotion of Green Purchasing by Various Types of Participants

The activities of the Green Purchasing Network, which started as an organization composed of companies, the administration, consumer groups, etc. that took the initiative in working on green purchasing in cooperation with one another, were actively assisted, and, through their green purchasing seminars and educational and awareness activities, the idea was introduced that they preferentially purchased products with less environmental load, such as products with less generation of waste and recyclable products. In addition, briefings were given to help people to know and understand the "Guidelines for Labeling concerning the Environment;" the guidelines describe how information on eco-friendly goods and services should be provided to promote green purchasing.

(12) Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (PCB Special Measures Law)

The Kanemi rice oil disease incident that occurred in 1968 revealed the toxicity of PCB to humans. Accordingly, in October 1973, the "Law concerning the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. " was enacted, and the manufacture, import, and use of PCB were banned. However, no treatment system for waste home appliances, etc., was built because the cooperation of local public bodies and people around possible construction sites for treatment facilities was not forthcoming, and for other reasons. Therefore, PCB waste was securely stored over a long period of time. In addition, the "Stockholm Convention on Persistent Organic Pollutants" (POPs Convention) adopted in May 2001 requires that the use of PCB be wholly abolished by 2025 and PCB waste be controlled appropriately till 2028. Under such circumstances, in order to prevent environmental pollution by PCB to protect public health in the future and conserve the living environment, the PCB Special Measures Law was enacted in June 2001. According to this law, the national government should take measures for building a PCB waste treating system, such as establishment of the PCB Waste Treatment Fund and

the development of base treatment facilities by the Japan Environmental Safety Corporation (JESCO). With these measures, the treatment of PCB waste is supposed to be completed by 2016. In April 2003, the "Basic Plan for PCB Waste Treatment" specified in the PCB Special Measures Law was formulated in order to comprehensively and systematically promote the certain and proper treatment of PCB waste. Because new projects were developed, the basic plan was revised in October 2007.

(13) Law on Special Measures concerning Removal of Environmental Problems Caused by Specified Industrial Wastes (Law on Special Measures against Specified Industrial Wastes)

In Japan, industrial wastes generated because of improper treatment, such as illegal dumping, have caused problems with the conservation of the living environment. In addition, the industrial wastes left as they are for a long time, have created public distrust in industrial waste treatment, which prevents a sound material-cycle society from being established. In view of such circumstances, it is essential to solve problems originating from industrial wastes and systematically and steadily prevent them from being generated. To tackle these issues, the "Law on Special Measures concerning Removal of Environmental Problems Caused by Specified Industrial Wastes" (Act No. 98 of June 2003: hereafter referred to as "Law on Measures against Specified Industrial Wastes) was enacted in June 2003, and enforced as a temporary law until 2012 before the enforcement of the revised Waste Management and Public Cleansing Law (in June 17, 1998). The reason why this special measures law was enforced was for the national government to provide financial assistance to the 47 prefectures, etc. if they by themselves remove problems concerning the conservation of the living environment originating from improperly treated industrial wastes (specified industrial wastes) against the treatment standards specified in the revised Waste Management and Public Cleaning Law or they prevent such problems from occurring (removal, etc. of problems).

The Law on Measures against Specified Industrial Wastes provides the following: (1) the Minister of the Environment should lay down "Basic Guidelines for Promoting the Removal, etc. of Problems Originating form Specified Industrial Wastes Systematically and Steadily by 2012" (Basic Guidelines), (2) 47 prefectures, etc. can formulate a plan for implementing the removal, etc. of problems originating from specified industrial wastes existing in their jurisdictions (Implementation Plan), (3) when the Industrial Waste Proper Treatment Center contributes funds for the 47 prefectures, etc. that implement the removal, etc. of problems originating from specified industrial wastes, the national government can provide financial assistance to the funds needed for the removal, etc. from within its budget, and (4) the costs incurred by the 47 prefectures, etc. to implement the removal, etc. of problems originating from specified industrial wastes are supplemented with their local bonds.

For the 12 projects for the removal, etc. of specified industrial wastes in Teshima Island in Kagawa Prefecture, the border between Aomori Prefecture and Iwate Prefecture, Sutamacho in Yamanashi Prefecture (present Hokuto City), Noshiro City in Akita Prefecture, Kuwana City in Mie Prefecture, Sanwamura in Niigata Prefecture (present Jouetsu City), Tsuruga city in Fukui Prefecture, Murata Town in Miyagi Prefecture, Yokohama City in Kanagawa Prefecture, Gifu City in Gifu Prefecture, Niigata City in Niigata Prefecture (former Maki Town), and Miyawaka City in Fukuoka Prefecture, some of the 47 prefectures, etc. formulated implementation plans, and the Minister of the Environment approved them. Among these prefectures, etc., Tsuruga City in Fukui Prefecture has the largest illegal dumping amount of about 1.1 million m^3, and the national government provides financial assistance, etc. to these prefectures, etc. that carry out projects of removing, etc. of the problems through the Industrial Waste Proper Treatment Center.

Section 4. Infrastructure Development for Establishing a Sound Material-Cycle Society

(1) Financial measures

In the Basic Law for Establishing a Sound Material-Cycle Society, the Government calls for the adoption of financial measures necessary for implementing the tasks to establish a Sound Material-Cycle Society. Of the national budget for the Cabinet Office and each ministry, expenditure for promoting the establishment of a Sound Material-Cycle Society is approx. 812,032,850,000 yen, as planned in the FY 2008 original budget (of which, approx. 477,786,000,000 yen are to be used as subsidies for sewage work expenses).

(2) Promotion of the Sound Material-Cycle Society business

A. Market size of the Sound Material-Cycle Society business

The size of the market and workforce in the field of waste and recycling (Sound Material-Cycle Society business) was estimated to be approx. 30 trillion yen and 630,000 personnel in 2006, according to research conducted by the Ministry of the Environment among environmental businesses; growth is expected accompanying the formation of a Sound Material-Cycle Society. The rough breakdown of market size and workforce for 2006 is, approx. 26 trillion yen and 490,000 personnel in the field of "repair" industries, such as business concerning recycled-materials including plastic/iron/waste paper, machine/furniture repair and housing improvement/repair, followed by approx. 3 trillion yen and 140,000 personnel for the provision of services such as waste disposal, resource recovery and recycling. In the Second Fundamental Plan for Establishing a Sound Material-Cycle Society, the target market size of the circulation business sector was set at about double its size in 2000 (Table 4-1).

B. Efforts toward the promotion of Sound-Material-Cycle Society business

Along with encouraging business operators to achieve the target utilization rate of recycled resources, and to improve

Table 4-1 Sound material-recycle society business: market scale in Japan

		Supply of machinery, equipment and plants	Supply of services	Supply of materials, final consumer goods	
Business examples		• Intermediate treatment plants • Melting equipment • RDF manufacturing/using facilities • Oil manufacturing facilities from plastics • Composting equipment from kitchen waste • Plant construction • Construction of final disposal sites	• Waste treatment • Resource recovery • Recycling	• Reclaimed oil from plastics • PET-recycled fiber • Products made of timber from forest-thinning • Recycled products (e.g. scrap metals) • Products made from reclaimed items (e.g. recycled paper) • Refillable products • Repairs of machinery, furniture • Housing improvement, repairs	Total
Market and employment scale		• Manufacture of equipment and materials for preventing pollution (waste-related) • Construction and installation of machinery and equipment (waste-related)	• Supply of services (waste-related)	• Recycled materials • Repairs	
	2000	806.5 billion yen	27,536 billion yen	169,800 billion yen	205,401 billion yen
	2006	5,339 billion yen	31,874 billion yen	259,523 billion yen	296,736 billion yen
	2000	1,872 people	195,292 people	331,513 people	528,677 people
	2006	7,049 people	139,667 people	485,816 people	632,533 people

Source: Materials published by the Central Environment Council

their recycling abilities in response to the state of individual items such as developing new purposes for recycled resources. Usage of recycled products and market development have been promoted, through the active utilization of recycled products by all bodies including the State, local governments, business operators and citizens, also taking into account that recycled resources and recycled products tend to be relatively expensive compared to products made from virgin materials. As for the procurement results of the State and other entities concerning designated procurement items (types of environmental goods of which procurement should be promoted intensively by entities such as the State) for 2006, procurement of goods that satisfy the evaluation criteria had accounted for a high proportion of the total amount for most items, and exceeded 95%, including the items newly designated in FY 2006.

Also, a variety of projects to promote the improvement of industrial waste treatment services, which will be the foundation for establishing a Sound Material-Cycle Society, have been implemented.

In addition, projects have been carried out in order to foster so-called “local community business”

(3) Utilization of economic instruments

As for waste problems generated by the day-to-day activities of large numbers of people, there are certain limits to the results that can be achieved through the existing regulatory measures, which are centered on the regulation of large-scale sources and certain activities. Therefore, to cope with the problem, it is necessary to combine various policy instruments such as regulatory, economic and voluntary approaches, and implement their appropriate utilization.

Responding to the establishment of a discretionary tax system for specific purposes by the Omnibus Decentralization Act enforced in April 2000, from the viewpoint of respecting tax autonomy, many of the local governments are making moves toward the introduction of waste taxes.

According to a Ministry of the Environment survey, as of January 2009, ordinances concerning local discretionary taxes for specific purposes related to industrial wastes are enacted in 27 prefectures out of 47 (Mie, Tottori, Okayama, Hiroshima, Aomori, Iwate, Akita, Shiga, Nara, Yamaguchi, Niigata, Miyagi, Kyoto, Shimane, Fukuoka, Saga, Nagasaki, Oita, Kagoshima, Miyazaki, Kumamoto, Fukushima, Aichi, Okinawa, Hokkaido, Yamagata, Ehime) and in one ordinance-designated city out of 60 (Kitakyushu) .

(4) Promotion of education and learning, enhancement of public relations activities, support for civil activities, and human resources development

In addition, “Community Support Projects toward the Realization of a Sound Material-Cycle Society” were implemented by first collecting ideas from the public for efforts toward the realization of a Sound Material-Cycle Society centering on the 3Rs. Such projects would be carried out through the cooperation of each body including civil groups such as NGOs and NPOs, business operators and local governments,; the projects should be pioneering, ingenious, and at the same time, generally applicable to other areas.

The Ministry of Economy, Trade and Industry implemented projects such as the lending of “Let’s Go, 3Rs”, a DVD for heightening awareness aimed at people of all ages, in order to promote the ordinary citizen’s active and voluntary participation in 3Rs activity in an easy-to-understand manner. Also, along with installing or lending learning materials for 3Rs education such as container and package recycling materials to local learning bases, local energy-saving reuse promotion projects were implemented with the cooperation of local business operators and consumers.

Also, projects such as the holding of the Japan Environmen-

Column

Community Support Projects toward a Sound Material-Cycle Society

The Fundamental Plan for Establishing a Sound Material-Cycle Society requires that the State should support regional model efforts carried out by various bodies such as NPOs and NGOs.

In response to this, the Ministry of the Environment is promoting the development of regional efforts, through publicly seeking approaches toward the establishment of a Sound Material-Cycle Society to be cooperatively carried out by NPOs, NGOs or business operators and the local governments; such should also serve as models for other regions, and be implemented as community support projects toward the realization of a Sound Material-Cycle Society.

In FY 2008, from around Japan, 30 projects were submitted, of which 8 were adopted. The outlines of the adopted projects are as follows:

- The World of Earth-Friendly "3Rs" – Its practice and educational campaign – Don't Tear It Down! Use Your Brain and It Can Be Used! Project (Kazemachi Study Group)

An old family residence in Kesennuma City, which was built during the early Showa years and has distinctive local characteristics, was restored after research had been carried out. This family residence became a base for regional activities, and educational campaigns for the 3Rs have been implemented, through activities such as creating exhibits out of goods collected from demolished sites, and holding photo sessions of "the 3Rs" with high-school students from the city. Also, candles set in candle holders made from waste bottles were lighted along the shore of Kesennuma Bay, contributing to the townscape and scenery.

- Model Project for Establishing a Unified Reuse System for 720/900 ml Glass Bottles in Yokohama City (Ecological Life and Culture Organization)

A reuse system for 720/900 ml glass bottles (filling, distribution, sales, collection, cleansing and reuse) was introduced in Yokohama City, a city of the Tokyo Metropolitan District, where a collection/resources recycling system was established in a specific area, and efforts were made toward waste reduction, energy saving and the establishment of a Sound Material-Cycle Society. Also, along with researching changes in collection efficiency, efforts were made toward the popularization of reusable containers in other areas, by analyzing/evaluating the results of a consumer questionnaire survey and interview survey of relevant people.

- "Nagoya Reuse Station" Demonstration Project (Takeuchi Laboratory, Graduate School of Environmental Studies, Nagoya University)

"Nagoya Reuse Stations" were added to existing recycling bases in Nagoya City, where reusable daily commodities were collected, and were given back to the local residents. Also, reuse and waste reduction within the city was promoted through such means as the implementation of questionnaire surveys of the users of the "Reuse Stations" and PR activities via the website.

- Project for Establishing a Business Model by Creating a Loop of Recyclable Food Resources (Okaeri-yasai Project)

Compost is made from the recyclable food resources generated by supermarkets, elementary schools and others in Nagoya City, and vegetables are grown using the compost. The vegetables grown are certified as "Okaeri-yasai", and efforts are made to establish a loop of recyclable food resources in the metropolitan areas and to construct a business model, by implementing sales/promotion activities, and returning the vegetables to Nagoya city's market and food services at schools. Also, the model project sites by accepting visitors were used for environmental study programs for local residents .

- Project to Create Incentives for Managing Countryside Hills through Promoting the Use of Firewood, and to Establish a Network for Reusing the Ashes/Soot (Noto Hanto Oraccha no Satoyama Satoumi)

By implementing maintenance of otherwise neglected countryside hills, and promoting their management, thinned wood generated from managing them were used as household firewood for wood stoves,. On top of utilizing the ashes and soot discharged after the use of firewood in marine product processing, agriculture and other uses, efforts were also made to promote the utilization of unused resources, through creating systems for recycling/reusing the resources from countryside hills within the region.

- Demonstration Project for Developing an Action System toward the Reduction of "Domestic Garbage" Utilizing IT Technologies and Collection Vehicles with Measuring Instruments with the Collaboration of Citizens, Businesses and NPOs (Learning and Ecological Activities Foundation for Children)

Domestic garbage (raw garbage and other garbage such as plastics) discharged by the residents of the model area was collected by collection vehicles equipped with measuring instruments, the amount was measured, and information concerning the discharged garbage was provided to each household through means such as the Internet. Also, questionnaire surveys concerning changes in awareness and action regarding domestic garbage were made among the residents involved in the project, and efforts were made to create a model example for reducing garbage discharge by raising the awareness of each individual concerning waste reduction, through the establishment of a system where each body, namely the residents who discharge garbage and the garbage collectors who collect them, can participate and cooperate in creating a system for reducing domestic garbage.

- Revitalization Project of the Local Community

through Local Production for Local Consumption of Resources (Okayama Prefecture Environmental Counselors Association)

In Tsu City of Okayama Prefecture, where the final disposal site for municipal wastes is nearing its full capacity and therefore waste reduction is required, the schools, NPOs and the local community worked in cooperation to accumulate garbage and weeds (reeds), produced pellets from of them, and utilized them as fuel for heating schools and offices, and for horticulture (greenhouses). In addition, establishment of a community project for promoting organic agriculture to maintain regional vitality, and for promoting local production for local consumption of energy by the utilization of biomass stored in the region was promoted, through means such as mixing the incineration ashes with raw garbage compost produced with the participation of the residents, converting them into good quality fertilizers, and utilizing them on farms.

○ Project for Effective Utilization of Recyclable Resources such as Local Production for Local Consumption Pruning Waste (Miyama City Silver Human Resources Center)

Contribution were also made to recycling agriculture as promoted by local governments, by pulverizing and grinding the pruning wastes generated in the process of silver project activities, putting them to various uses as base material, giving them back to the local community, and by utilizing them as soil conditioner. Also, the pruning wastes were used as base material for producing cardboard compost, and by using the leftovers from school meals for creating compost, interaction between the elderly people from the Human Resources Center and the school children was promoted, contributing to enhancing the circular relationship among environmental awareness raising, revitalization of the town, urban development and harmony among people.

tal Learning Fair and lectures for teachers in charge of environmental education, implementation of research regarding the future direction of new environmental education, and the designation of model schools for Global Learning and Observations to Benefit the Environment program (GLOBE) has been carried out, with the aim to promote environmental education in schools.

On top of this, the holding of basic courses for training environmental education leaders, program development for promoting environmental education and the development of information provision framework has been promoted under the coalition/cooperation of the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of the Environment, and the "Environmental Education/Environmental Learning Database" has been publicized on the website.

Where environmental conservation efforts by local governments and businesses such as the formulation of environmental conservation plans and environmental measuring are concerned, the Ministry of Education, Culture, Sports, Science and Technology has been giving the title of "professional engineer (environmental category)" to competent engineers who have passed the professional engineer examinations and had been registered based on the Professional Engineer Act (Act No. 25 of 1983), and has been promoting the utilization of the title.

The number of registered professional engineers (environmental category) is 970, as of the end of December, 2008.

Where environmental conservation efforts such as the formulation of environmental conservation plans and environmental measuring by local governments and businesses are concerned, the Ministry of Education, Culture, Sports, Science and Technology has been certifying competent engineers as "professional engineers (environmental category)", and has been promoting the utilization of the title.

(5) Implementation of research and promotion of science and technology

Research on 3Rs technology was selected as one of the research subjects to be handled specifically during the following five years in the environmental field, in the "Field-Specific Promotional Strategy" decided by the Council for Science and Technology Policy in March 2006, based on the 3rd Term of the Science and Technology Basic Plan decided by the Cabinet in March 2006. Also, the Central Environment Council discussed "the desirable state of the strategy for intensively promoting environmental studies and environmental technology development", summarized the Central Environment Council report clarifying the "emphasized fields" such as the field of "the establishment of a Sound Material-Cycle Society", formulated the "Enforcement Policy of the Promotion Strategy for Environmental Research and Environmental Technology Development" in March 2007, and has been following up such efforts every year. In addition, alternative materials and recovery technology of rare metals had been selected as countermeasure technology for rare resources, in the "Strategy for Innovative Technology" decided by the Council for Science and Technology Policy in May 2008.

Where grant-in-aid scientific research such as those for waste treatment are concerned, tasks were widely sought utilizing the competitive research fund, and 74 research projects and 6 technology development projects were implemented in FY 2008.

As for research projects, research/technology development in Asia and eventually in the international society concerning the 3Rs have been promoted, and in order to contribute to the establishment of an international 3Rs, great emphasis was placed on researches for solving the various problems surrounding the waste issue that would also contribute to the establishment of a Sound Material-Cycle Society, namely "Research for Promoting the 3Rs" "Research for Promoting the Utilization of Waste Biomass" "Combined Social-Scientific Research Toward the Establishment of a Sound Material-Cycle

Society" "Research Concerning Waste Management Technology for Safety and Security, Such as the Solution of the Asbestos Issue " and "Research Concerning the Solution of Driftwood and Driftwaste Issues", along with establishing a "Special Category for 3Rs Initiatives".

As for technology development projects, great emphasis was placed on themes such as "Development of Waste Biomass Utilization Technology" and "Development of Technology concerning the Detoxification of Asbestos Waste", with the aim to develop technologies that will influence the next generation, such as waste treatment technology.

Also, where research and development expenses for pollution prevention from among other research and development expenses for global environmental conservation are concerned, "Research to Contribute to the Establishment of a Sound Material-Cycle Society" continued to be among the items requiring special enhancement on the previous fiscal year, and research and development for five issues such as the development of waste treatment/reuse technologies was implemented.

Development of a new scientific technology for converting resource molecules that can be effectively utilized into a usable substance/material, and an innovative environment restoration technology for dissolving air pollution molecules such as nitrogen oxides (NOx) and sulfur oxides (SOx) or dioxins and converting them into environment-friendly molecules are promoted, in order to realize the conservation of the global environment and the sustainable development of human society at the same time.

Also, efforts were made by the Ministry of Agriculture, Forestry and Fisheries to establish a biomass utilization model for implementing comprehensive utilization of biomass as fuel and material according to their regional characteristics, along with developing the technology for producing low-cost high-efficiency bio fuel and the technology for utilizing biomass as materials, in order to promote the utilization of organic resources such as wood waste, livestock manure or waste edible oil as biomass.

The Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Economy, Trade and Industry have been collaborating to promote the "Element Strategy/ Rare Metal Substitute Materials Development Project". The Ministry of Education, Culture, Sports, Science and Technology is promoting research development for creating new materials, by substituting rare elements with more common elements, from the viewpoint of studying the roles of elements that determine the characteristics/functions of substances/materials and utilizing them, in the "Element Strategy Project". On the other hand, the Ministry of Economy, Trade and Industry through the "Rare Metal Substitute Materials Development Project" has launched technology development toward substituting/reducing usage of indium for transparent electrodes used in liquid crystal panels, dysprosium for rare-earth magnets, and tungsten for carbide tools.

Also, the Ministry of Education, Culture, Sports, Science and Technology is promoting the development of photocatalysts that obtain hydrogen by dissolving water using sunlight, and of solid acid catalysts that dissolve non-edible parts of plants such as cellulose, converting them into sugar.

In addition, the Ministry of Economy, Trade and Industry has formulated a research and development project where multiple technology developments and related policies toward their realization are bundled together as technology development strategies, and has been implementing research and development of technology for practical application to contribute to the promotion of the 3Rs in the field of the environment - 3Rs within the project, and in FY 2008, has conducted technology development for making high strength building materials, for recycling rare metals, and for resource conservation.

The National Institute for Environmental Studies worked on the steady implementation of the "Priority Program for Sustainable Material Cycles", which is one of the priority programs mentioned in the Second Medium-Term Plan (program period: FY 2006 to 2010).

(6) Facilities

Support was provided for advanced projects to improve recycling-related facilities, within the "Eco-Town Plan" (Figure 4-1) implemented under the coalition of the Ministry of the Environment and the Ministry of Economy, Trade and Industry, with the aim of establishing a socio-economic system with environmentally sound resource cycles in the local area.

As for livestock manure generated by the livestock industry, implementation of appropriate treatment and effective utilization were promoted, based on the Act on the Appropriate Treatment and Promotion of Utilization of Livestock Manure (Act No. 112 of 1999).

Under such circumstances, wide-ranging efforts were made for such projects such as the improvement of composting facilities, along with creating plans for distributing and utilizing compost/rice straw, in order to promote distribution/utilization through strengthening the cooperation between livestock farmers and crop farmers in the cyclical use of livestock manure and rice straw.

In addition, support for improving facilities to reduce sewage sludge and promotion of new technology development had been implemented.

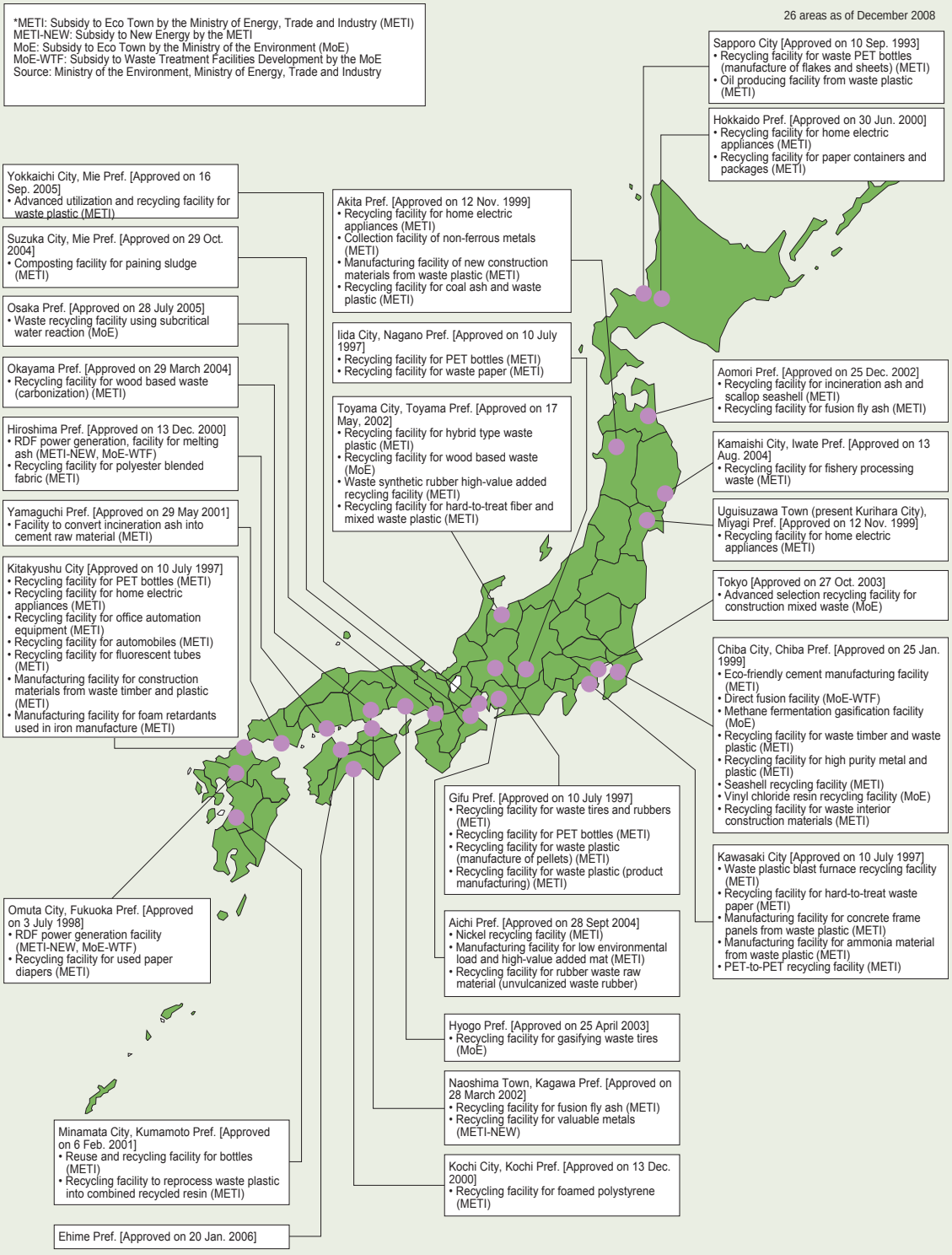
In the Kinki region, the Osaka Phoenix Project was promoted, based on the Law for Bay Area Marine and Environment Consolidation Centers (Act No. 76 of 1981), and disposal sites in Amagasaki, Izumi-Otsu and Kobe are accepting wastes discharged from 6 prefectures and 175 municipalities of the Kinki region.

As a waste treatment countermeasure at ports, subsidies were provided for sea wall construction for landfill sites of 21 ports, during FY 2008. Also, a project to effectively utilize surplus soil generated from construction works in the national capital region cross-jurisdictionally as resources for constructing ports (the so-called "Super Phoenix") was commenced in FY 1994 in order to promote resource recycling, and in FY 2008, surplus soil generated from construction works were accepted at Hiroshima Port and other areas.

(7) Prevention and removal of obstacles to living environment conservation

In order to prevent improper treatment of industrial wastes such as illegal dumping, and to remove obstacles, efforts were made to intensify surveillance by strengthening the coopera-

Figure 4-1 Map of approved Eco Town Project areas



tion among prefectures for purposes such as information exchange, along with strengthening the systems for on-site inspection by establishing Regional Environment Offices in 7 blocks throughout Japan in October 2005. In addition, to prevent improper treatment of sulfate pitch and the like, efforts were made to promote cooperation with related organizations for such purposes as sharing relative information, and prevention measures were promoted.

Also, subsidies were provided to prefectures based on laws such as the Waste Management and Public Cleansing Law, along with providing subsidies from the State to the Promotion Center for the Proper Treatment of Industrial Waste fund, accompanying voluntary contributions from industry.

In addition, information concerning illegal dumping was collected directly from citizens through the Illegal Dumping Hotline set up by the Ministry of the Environment, and teams of experts with experience of on-site investigations and the relevant laws were dispatched, as part of the effort to support prefectural measures for countering illegal dumping.

(8) Other governmental efforts

A. Promotion of urban redevelopment project

The Council for Promoting Zero-waste Cities in Tokyo Metropolis and the Council for Promoting Zero-waste Cities in the Keihanshin Metropolitan Areas have formulated a medium to long-term plan concerning the achievement of waste reduction targets, development of waste treatment/recycling facilities and the establishment of a reverse physical distribution system, and have been following up on the efforts every year, through means such as checking of the progress and consideration of new tasks, in order to realize the "Reconstruction to Create Zero-Waste Cities in the Metropolitan Areas" promoted as an urban redevelopment project. The Council for Promoting Zero-waste Cities in the Chubu Areas has been working for waste reduction, based on the medium to long-term plan formulated in FY 2006. In FY 2008, The Council for Promoting Zero-waste Cities in Tokyo Metropolis had been working with the aim to reduce the final disposal volume of waste to zero, based on the second medium to long term plan formulated during the previous fiscal year.

B Promotion of the zero emission plan

Support was provided for advanced projects to develop recycling-related facilities toward realizing the establishment of a resource-recycling socio-economy in the local area, and Eco Town Plans of 26 regions throughout Japan were approved by the end of March 2009.

C. Establishment of a reverse physical distribution system to realize a Sound Material-Cycle Society

When considering transportation of wastes, recycled resources and products, it is anticipated that its quantity will increase, along with transport distances, due to the increase in items now subject to recycling and improvements in the recycling rate. Also, owing to the concentrated building of waste/recycling facilities and the formation of bases in the metropolitan areas, it will be necessary to create a distribution system to adequately respond to waste treatment such as additional recycling, implemented by cooperation among bases.

It was also mentioned in the "New Comprehensive Distribution Policy (2005 to 2009)" decided by the Cabinet in November 2005, that it is necessary to promote the construction of an effective reverse physical distribution system ensuring proper treatment and transportation, so as to work toward the establishment of a Sound Material-Cycle Society. Thus, support was provided for the reverse physical distribution project proposed during the Green Logistics Partnership Conference.

In order to realize a Sound Material-Cycle Society, ports that serve as bases for the reverse physical distribution system responding to the location of recycling facilities covering wide areas are specified as "integrated reverse physical distribution recycling hub ports (recycling ports) " (21 ports throughout Japan), and comprehensive support measures are implemented such as the promotion of private-public cooperation and the improvement of port facilities. In FY 2008, demonstration experiments for transporting recycled resources by ship via recycling ports had been carried out, and verification of the appropriate techniques to pack/handle the cargo and of the information management technology was conducted.

Also, construction of recycled resource treatment facilities such as buildings and facilities for interim storage by joint public-private ventures and other bodies was supported.

D. Appropriate handling of wastes from agricultural production materials such as used agricultural plastics

In order to promote the appropriate treatment of wastes from agricultural production materials such as used agricultural plastics, cooperation among related groups was established, the treatment/reduction plan was formulated, verification of the introduction technologies of biodegradable plastic films was implemented at the level of prefectures and municipalities, and popularization/awareness activities were set up in order to increase demands for recycled products, at a nationwide level.

E. Promoting the recycling of used FRP vessels (boats)

As for FRP (fiber reinforced plastic) vessels, supportive and cooperative actions were made through means such as the popularization and awareness concerning the "Recycling System for FRP Vessels" and project evaluation, in order to support the Japan Boating Industry Association in its efforts for the phased construction and operation of the "Recycling System for FRP Vessels" starting from November 2005, utilizing the wide-area recognition system based on the Waste Management and Public Cleansing Law, in light of the recycling technology established by the Ministry of Land, Infrastructure and Transport. In FY 2008, actual operation of the abovementioned system has been launched throughout Japan, and approx. 750 FRP vessels have been recycled.

F. Promotion of the proper treatment and recycling of used aerosol products

As for the used aerosol products disposed as garbage after consumer use, they have been causing fire accidents in collection vehicles during garbage collection at municipalities, explosion accidents during processing work at crushing facilities, and have been the source of recycling problems. In order to promote the proper treatment and recycling of these aerosol products, the municipalities and the product industry has worked in cooperation to popularize the necessity of disposing them as garbage after removing the filler with an appropriate tool, while the product industry worked to switch products to those equipped with devices that enable easy removal of the filler.

G. Promotion of standardization

Japanese Industrial Standards Committee (JISC), the standardization institute of our State, is working on the adjustment of environmental JIS, based on the "Environmental JIS Development Action Program" formulated in April 2002. In FY 2008, research/consideration of the environmental JIS utilization status in green purchasing by the local governments/businesses/consumers was implemented identifying the position of the environmental JIS among other environment-related laws, and tasks toward the further promotion of the environmental JIS utilization were extracted.

H. Formulation of the Waste Recycling Governance Guidelines

The "Waste Recycling Governance Guidelines for Waste Generating Companies" were formulated in September 2004 by the Industrial Structure Council, in order to have the waste-discharging enterprises implement thorough waste management, and to promote voluntary efforts for conducting waste and recycling management from the managerial viewpoint. In FY 2005, efforts were made to promote the proper treatment of waste and recycling by businesses, through means such as the holding of briefing sessions for various trade associations, human resources development assistance within medium and small-sized businesses and seminars, toward the popularization of the Waste Recycling Governance Guidelines. In addition, research with the aim to review the Waste Recycling Governance Guidelines was implemented in FY 2008, due to the fact that the social responsibility required of businesses concerning social/economic/environmental aspects have been changing.

I. Revision of the Guideline for Waste Treatment and Recycling by item/industry

The Guideline for Waste Treatment and Recycling by item/industry was formulated in 1990 for each item/industry, with the aim to promote voluntary efforts by business operators concerning the 3Rs (Reduce, Reuse and Recycle). In the revision made in FY 2006, efforts concerning useful metals (including rare metals) for three items and four industries were included, along with new target values toward the reduction of paper (paper containers and packages, cardboard containers and packages, beverage containers and packages), glass bottles, steel cans, aluminum cans, plastics (plastic bottles, plastic containers and packages), accompanying the revision of the Containers and Packaging Recycling Law.

J. Acceleration of biomass utilization

Fostering of national understanding through means such as information provision and holding of various briefing sessions, support in the formulation of the biomass town concept, and support in improving the biomass utilization facilities utilizing new technologies were implemented, based on the new "Biomass Nippon Strategy" decided by the Council in March 2006. Particularly where the promotion of biofuel utilization is concerned, approaches were made toward the efficient enforcement of the Act on Promotion of Utilization of Organic Resources Originated from Agriculture, Forestry or Fisheries as Materials for Biomass Fuels newly put into effect in October 2008, and support was provided for cooperative efforts by agriculture/forestry/fishery workers and biofuel manufacturers. Also, a project aiming at the establishment of an effective technology for producing biofuels using soft cellulose materials such as rice straw, which can also serve as a food supply, has been launched.

As for the acceleration of biomass towns, support has been provided for the concept formulation and its realization, and 197 municipalities have issued their biomass town concept as of the end of March, 2009.

Apart from this, cyclical use of resources through the recycling of shells which are seafood processing by-products has been promoted.

Also, in the Agricultural Community Effluent Treatment Program, volume reduction of excess sludge has been promoted according to the actual situation of the region, along with promoting recycling through means such as compost creation and the utilization of construction materials, concerning the sludge generated in the treatment process.

K. Collection of rare metals from used small household appliances and the Advanced Disposal Promotion Project

The Ministry of Economy, Trade and Industry and the Ministry of the Environment have set up a "Study Group for Collecting Rare Metals from Used Small Household Appliances and Implementing Proper Treatment" in December 2008, have grasped the status of rare metal contents regarding the collected used small household appliances, implemented toxicity assessment concerning the recycling of used small household appliances, and considered the matter of proper treatment, along with considering the efficient and effective recovery method in cooperation with the local governments who have more experience in collecting used small household appliances, with the aim to construct a proper and effective recycling system for rare metals.

Section 5. Creation of an International Sound Material-Cycle Society

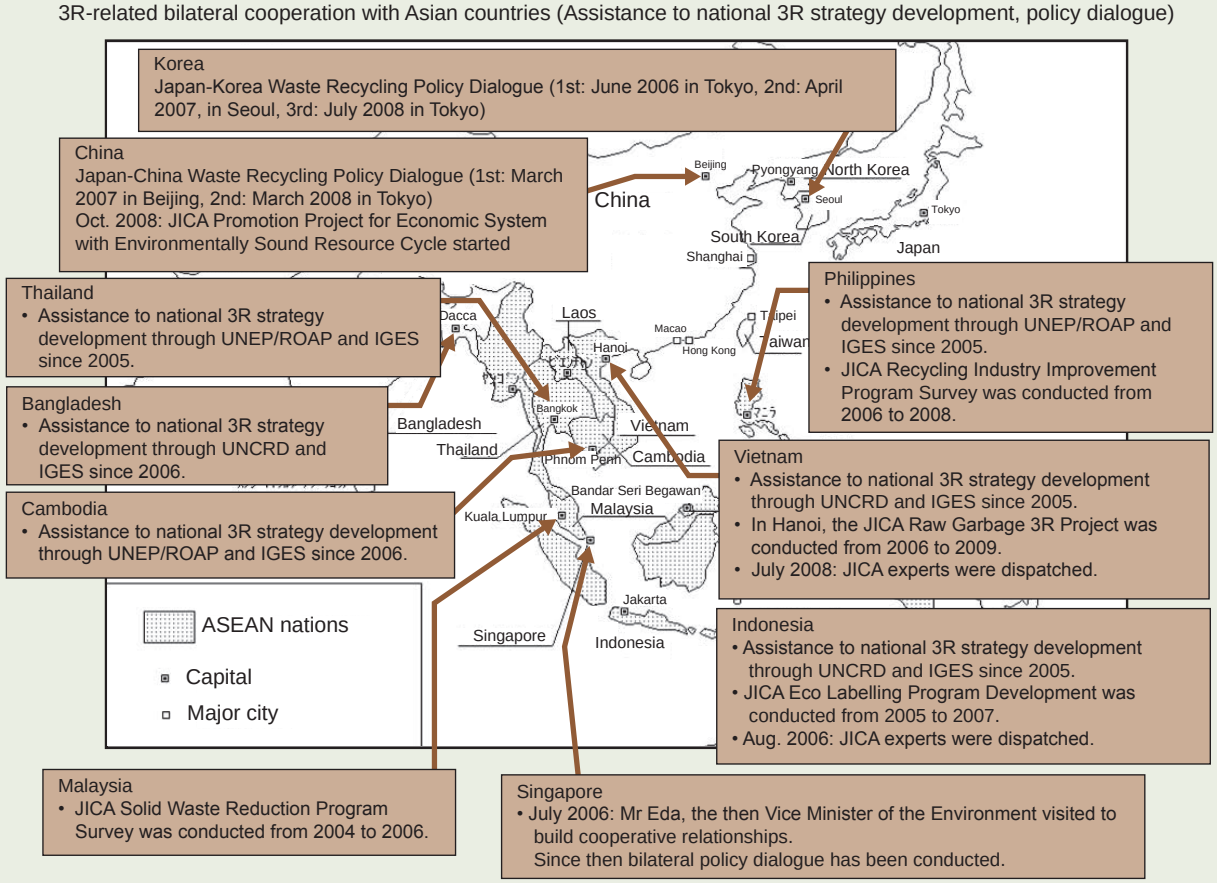
A. Promotion of the 3R Initiative in G8 countries

G8 Environment Ministers Meeting had been held in Kobe in May 2008, and the 3Rs were adopted as the major agenda. Through discussions among the ministers of the participating countries, it was confirmed that the international efforts concerning the 3Rs are progressing since the "3Rs Initiative" had been proposed in the G8 summit in 2004, and the "Kobe 3Rs Action Plan", where concrete actions to be taken by each of the G8 countries toward the further promotion of the 3Rs were listed and agreed. This plan was also supported by the leaders of G8 countries in the Lake Toya G8 summit, which was held alongside Lake Toya in Hokkaido, in July 2008.

Hence, based on this action plan, each of the G8 countries agreed to participate in efforts for reducing disposable goods such as plastic grocery bags, setting targets considering resource productivity, accepting hazardous wastes from developing countries, and supporting the capacity building of developing countries. Particularly, where the reduction of plastic grocery bags are concerned, Japan, China and Korea collaborated in encouraging the countries of Asia and the whole world to participate in the same effort, since all of these three countries were to take measures to address the issue.

Also, "Japan's New Action Plan towards a Global Zero Waste Society" was presented during the G8 Environment Ministers Meeting, where international efforts to be promoted toward the establishment of a Sound Material-Cycle Society in

Figure 5-1 3R-related bilateral cooperation with Asian countries



Source: Ministry of the Environment

Asia and other regions were listed.

B. Efforts in Asia

(a) Supporting the formulation of 3Rs plan/strategy by each country

In countries such as Vietnam and Indonesia, and according to the conditions in each country, Japan has been supporting the formulation of plans and strategies for promoting the 3Rs nationally, working in cooperation with the United Nations Centre for Regional Development (UNCRD), United Nations Environment Programme (UNEP) , Regional Office for Asia and the Pacific and the Institute for Global Environmental Strategies (IGES) . In FY 2008, in countries such as Vietnam, Indonesia and Thailand, support was given to wide-ranging related parties and the aid agencies of each country to consider a strategy plan.

(b) Policy dialogues

In order to promote the 3Rs, Japan has been promoting proactive policy dialogues, with the departments in charge of waste treatment and the 3Rs of the countries where efforts are being made toward the reinforcement of the domestic system and the systematic implementation of 3Rs policies.

In July 2008, a “Japan-Korea Waste Recycling Policy Dialogue” between department head representatives was implemented with Korea’s Ministry of the Environment. Opinions were exchanged concerning the contents of Japan’s Fundamental Plan for Establishing a Sound Material-Cycle Society and Korea’s Master Plan for Resource Recycling formulated in the same year, the status of both countries regarding the reduction of plastic grocery bags and approaches in collecting energy from wastes was assessed, and it was confirmed that both countries will cooperate toward the establishment of a Sound Material-Cycle Society in Asia. (Figure 5-1)

In addition, in East Asia, a working party on “solid waste/hazardous waste” has been established under the “Regional Forum on Environment and Health in Southeast and East Asian Countries” established in 2007 with the aim to improve coping abilities regarding regional environment and health issues, with the participation of 14 countries (10 countries from Southeast Asia, Japan, China, Korea and Mongolia.) Japan is the chair of this Working Party, and in December 2008, the Second Working Party was held in Cambodia, where issues and good practices concerning municipal wastes were shared, and considerations were made of the reports summarizing the status of medical waste management in each country

Also, in December 2006, consensus was reached concerning the implementation of the Japan-China Recycle-Oriented City Cooperation Project, between the Governments of Japan and China.The aim of this cooperation project is to transfer the know-how that was accumulated in Japan through the process of developing Eco-Towns and the construction of recycling facilities for maximizing the utilization effectiveness of recycled

resources.

In concrete terms, utilizing the framework of inter-regional communication, obtaining cooperation from Japan's local governments and businesses, feasibility studies (FS), researches (infrastructure development promotion project) and human resources development have been implemented. So far, agreements have been concluded between the cities of Kitakyushu and Tianjin/Qingdao, and between Hyogo Prefecture and Guangdong Province.

Japan has proposed the inauguration of the "Regional 3R Forum in Asia", in the Meeting of the Environment Ministers during the East Asia Summit held in Hanoi, Vietnam in October 2008, and has obtained approval from the other participating countries. The aim of the Asian Forum for the Promotion of 3Rs is to become a platform for inter-regional cooperation for promoting the 3Rs, through means such as the creation/implementation of pilot projects and the promotion of research cooperation, with the participation of wide-ranged related parties such as international organizations, aid agencies, research institutes and private sectors, planned to be inaugurated in 2009.

(c) Creation of information bases/research networks regarding the 3Rs

In order for each of the Asian countries to proceed with the popularization of technologies and the creation of new systems regarding the 3Rs, and waste treatment adapted to suit domestic conditions, it is extremely important to promote the efficient accumulation/provision of knowledge and technologies regarding the 3Rs. Therefore, the Ministry of the Environment has been supporting the creation of contents for the information base "3R Knowledge Hub" established and managed under the initiatives of organizations such as the Asian Development Bank, UNEP and Regional Office for Asia and the Pacific. Also, support is provided for the activities toward the establishment of "Society of Solid Waste Management Experts

Table 5-1 Waste generation: sectors and countries

(Unit: thousand tons)

Country	Year	Agriculture and forestry	Mining and quarrying	Manufacturing	Energy manufacturing	Waterworks	Construction	Others	Municipal waste	Total
Canada	2004	–	–	–	–	–	–	–	13,380	–
Mexico	2006	–	–	–	–	–	–	–	36,090	–
USA	2005	–	–	–	–	–	–	–	222,860	–
Japan	2001	90,430	13,770	122,880	6,970	8,310	76,150	3,860	54,930	455,180
South Korea	2004	–	–	38,330	–	–	54,200	–	18,250	110,780
Australia	2002	–	–	9,470	–	–	13,740	–	8,900	32,380
New Zealand	1999	150	–	800	–	–	800	–	1,540	3,290
Austria	2004	–	–	–	–	1,910	28,600	18,900	4,590	54,000
Belgium	2002	1,150	120	13,650	850	200	10,490	6,300	4,750	36,360
Czech	2005	460	650	6,040	2,310	650	9,110	2,770	2,950	24,940
Denmark	2005	–	–	1,850	1,080	820	5,270	1,850	3,340	14,210
Finland	2004	860	23,820	15,710	1,570	510	20,840	100	2,370	65,790
France	2004	–	–	90,000	–	960	–	–	33,780	128,610
Germany	2004	–	50,450	53,010	–	–	187,480	–	48,430	339,370
Greece	2003	–	–	–	–	–	5,000	–	4,710	–
Hungary	2004	–	13,080	5,200	3,330	–	1,740	2,050	4,590	29,990
Iceland	2004	50	0	50	0	0	20	230	150	490
Ireland	2004	60,170	4,050	5,300	290	60	2,680	–	3,000	57,160
Italy	2004	440	900	37,780	2,800	13,550	46,460	5,530	31,150	138,620
Luxemburg	2004	–	50	730	0	130	6,980	90	310	8,300
Holland	2004	2,390	90	16,900	1,430	170	24,000	6,150	10,160	61,290
Norway	2005	160	190	3,800	40	–	1,500	2,260	1,840	9,790
Poland	2005	–	39,620	58,440	19,840	3,280	240	2,740	9,350	133,960
Portugal	2002	–	3,630	8,980	320	50	–	110	4,620	17,710
Slovakia	2004	4,490	–	8,680	–	260	1,690	–	1,400	16,590
Spain	2004	–	21,780	28,510	5,940	–	–	9,510	27,590	–
Sweden	2004	–	58,640	29,470	1,250	920	11,270	–	4,170	105,710
Switzerland	2004	–	–	1,130	–	210	11,900	–	4,910	18,140
Turkey	2004	–	–	17,500	13,890	3,240	–	–	29,740	64,350
UK	2002	540	96,390	45,000	6,180	1,390	109,000	30,320	36,120	323,430

Source: OECD

in Asia and Pacific Islands (SWAPI)" carried out mainly by the Japan Society of Material Cycles and Waste Management, expecting it to develop as a network of researchers and experts on waste/3Rs in Asia. In addition, studies have been implemented in order to promote the policy research regarding resource recycling in East Asia in cooperation with the relevant bodies of each country, such as research institutes and universities.

(d) Technology cooperation regarding the 3Rs/waste management and supports for infrastructure development

As ODA assistance to developing countries, JICA has been implementing technology cooperation focusing on improving the coping ability of the central governments, local governments and private sectors, and on reinforcing partnerships. At the central government level, supports have been provided for purposes such as to develop the legal systems in order to promote waste management and the 3Rs at the national level, and to support the formulation and implementation of basic policies and plans in order to enforce the regulations. Also, at the local government level, activities such as the creation of systems for promoting reduction of the generation of waste and for carrying out sorted collection in cooperation with residents, and awareness raising of residents have been implemented. In addition, promotion of the recycling industry such as green purchasing and eco-label schemes, and consideration/planning of measures for promoting corporate efforts have been supported, in order to promote reduction of the generation of waste and recycling of resources in the private sector. Also, there are various training programs regarding waste management and the 3Rs taking place in Japan, inviting technical staffs and government officials from the developing countries. In FY 2008, a new technology cooperation project for developing a recycling-oriented economic system has been launched in China, and in Hanoi, Vietnam, projects for the sorted collection and composting of urban wastes are continuously implemented. In addition to these, support has been provided for waste management equipment and for developing waste treatment facilities, through grant assistance and loan assistance.

C. Environmentally sound management of hazardous wastes

In order to implement proper regulation on the transboundary movements of hazardous wastes, the Ministry of the Environment has been heading up the "Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes", and information has been actively exchanged among the participating countries, regarding matters such as the relative regulations and improper cases of each country. In addition, financial/technical support has been provided for projects promoted by each country under the Basel Convention, in order to implement environmentally sound management of the e-wastes generated in the Asia-Pacific region.

D. Other efforts

Projects concerning material flow and resource productivity implemented by OECD are regarded as significant, and discussions are held in a proactive manner. Support is also provided for the "International Panel for Sustainable Resource Management" established by the United Nations Environment Programme (UNEP) in 2007 aiming at the implementation of scientific assessment on the influence of natural resource utilization on the environment, from the viewpoint of promoting the 3Rs Initiative.

The latest data since 1998 on the amount of wastes generated by each country collected by OECD are shown in Table 5-1. (Data on the amount of wastes generated by each of the OECD member countries)