to limit crops that absorbing cadmium from soil are also being conducted.

In April 2010, the content standard for cadmium in rice based on the Food Sanitation Act was revised from less than 1.0ppm to below 0.4ppm. As a result, from June onward, designation requirements for areas of soil on agricultural land requiring countermeasure was changed from "areas with 1mg or more" per 1kg of rice to "areas with more than 0.4mg" per 1kg of rice by promulgating and enacting the government ordinance on the Partial Amendment to the Enforcement Ordinance of the Agricultural Land Soil Pollution Prevention Act.

3. Building a Sound Material-Cycle Society

(1) Let's Start Practicing the 3Rs

A. Introduction

In Part 1, we gave an overview of the waste and recycling situation in Asia and the rest of the world and reviewed the directions of overseas expansion by venous industries, from the perspective of how Japan can contribute to solution of the world's problems with waste. In this section, we will take a look at the state of Japan's progress toward building a sound material-cycle society.

B. In Order to reduce Waste Generation. Start from What We Can Do

The Basic Act on Establishing a Sound Material-Cycle Society prioritizes various measures for waste and recycling. That is, the priorities are assign to generation control, second to reuse, third to recycle, fourth to heat recovery, and then finally to proper treatment. An inspection report for the progress of the FY 2010 Basic Plan for Establishing a Sound Material-Cycle Society pointed out that efforts for the first-priority, generation control are insufficient. Here we will look at generation control.

Figure 3-1 shows changes in Japan's generation of municipal solid waste by type. In recent years, kitchen waste and paper waste made up approximately 70% of the total. For that reason, we will focus particularly on generation control of kitchen and paper waste.

1) Generation control of kitchen waste (particularly untouched food and leftovers)

The photograph (from Kyoto City survey results) shows untouched food (food that was disposed of without being eaten at all) that was disposed of as municipal solid

Figure 3-1 Volume of Municipal Solid Waste by Type (Breakdown)

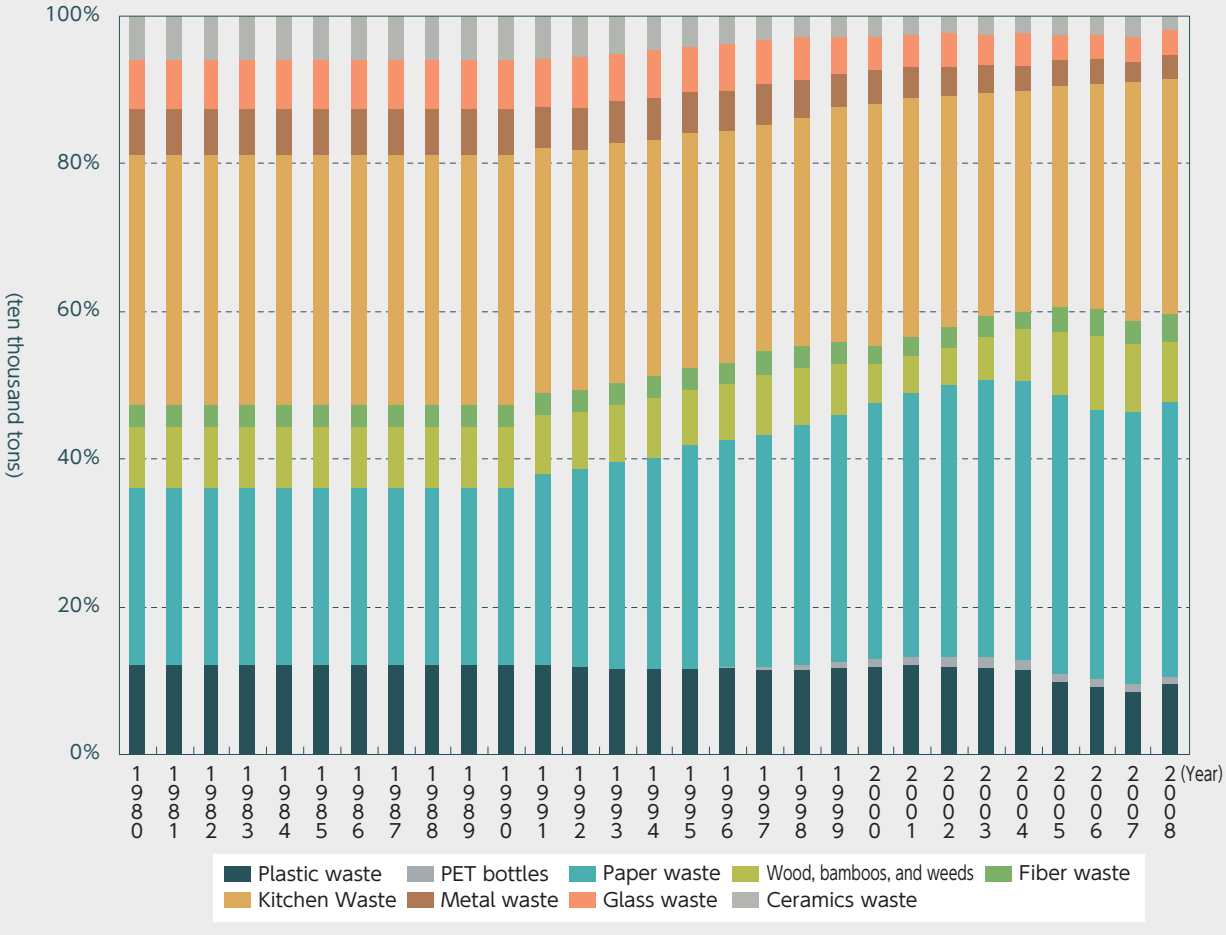
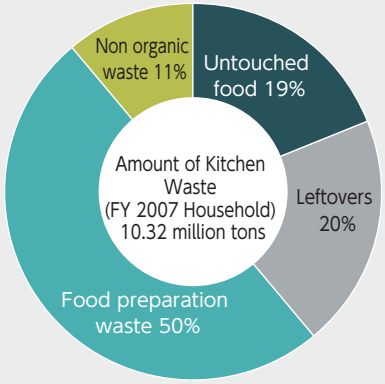


Photo 3-1 Untouched Food Disposed of as Municipal Solid Waste (Based on the Result of the Kyoto City's Survey)

Figure 3-2 Breakdown of Kitchen Waste: Ratio of Untouched food, Leftovers, and Others)



waste. According to an estimation by the Ministry of the Environment based on data from FY 2007, of all the household kitchen waste for the entire country, this kind of untouched food makes up 1.99 million tons (19% of kitchen waste) and leftovers make up 2.09 million tons (20% of kitchen waste).

This is clearly generation of waste that can be reduced, and can be considered as generation of environmental load. In addition, since the factors behind the instability of food supply and demand throughout the world, such as a global population increase and further global warming, are becoming obvious, it is also necessary to work to reduce leftovers in order to secure food stability. Promoting local production for local consumption of food will also lead to creation of a sound material-cycle society. In addition, amid a situation in which more than 900 million people, mainly in developing countries, have nutrition deficiencies, these kinds of large amounts of untouched food and leftovers are against the spirit of "*mottainai*" of trying not to waste anything, which is a mentality that Japan can boast to the world.

According to estimates by the Ministry of the Environment, reducing that untouched food and leftovers by 75% would result in control of generation of approximately 5.93 million tons of waste per year (approximately 1.0% of Japan's total generation of waste) and a reduction of approximately 4.19 million tons of CO_2 per year in terms of greenhouse gases emissions (equivalent to the amount for approximately 830 thousand general households), when the process is considered all the way back to the production stage.

Specifically, there are many ways of generation reduction, such as sales methods that account for changes in consumers' lifestyles (selling by weight, selling per piece, etc.), consumption based on correct understanding of the meaning of expiration date labels, inventory management aimed at avoiding food waste, and cooking methods that avoid food waste. All these are efforts that individual parties can make with a little ingenuity.

2) Generation control of paper waste (in particular, controlling generation of paper used by office equipment)

According to Ministry of the Environment estimates based on data from FY 2007, of paper waste disposed as business waste from offices, 1.41 million tons is paper for office equipment. That amount is 26% of all business paper waste. It is estimated that by reducing that office equipment paper waste by 10% we can reduce waste generation by approximately 300 thousand tons of waste per year (approximately 0.05% of Japan's total waste generation) and a reduction of 176 thousand tons of CO_2 emissions of greenhouse gases per year (equivalent to the amount for approximately 35 thousand general households), when the process is considered all the way back to the manufacturing stage.

3) Promoting 3R actions

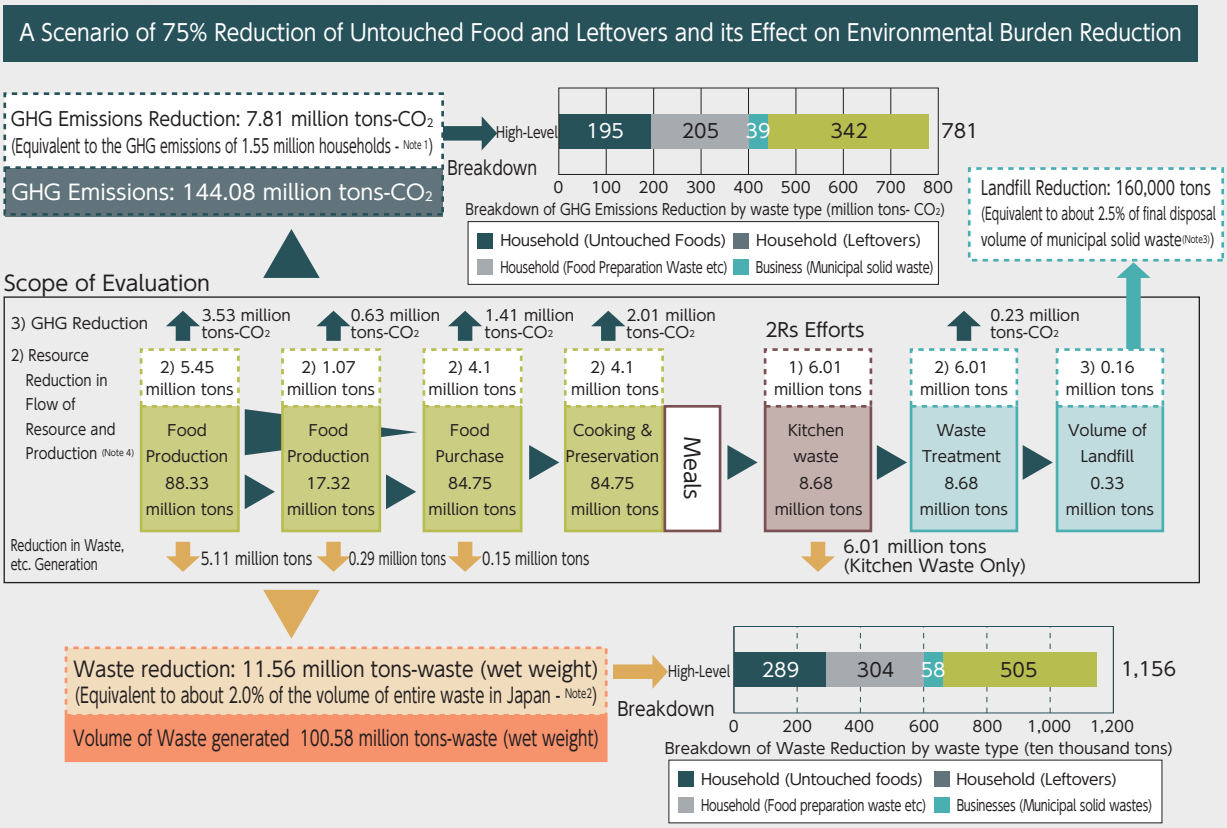
It is important to make efforts for 3R actions such as controlling waste generation through the collaboration and cooperation of individual citizens, NPOs, NGOs, universities, businesses, local governments, and the national government all carrying out their expected roles.

For example, some communities are providing opportunities for relevant parties to take 3R actions together and to after economic incentives (benefits) for 3R activities. Some communities are utilizing 3R eco-point systems as mechanisms to enjoy 3R actions.

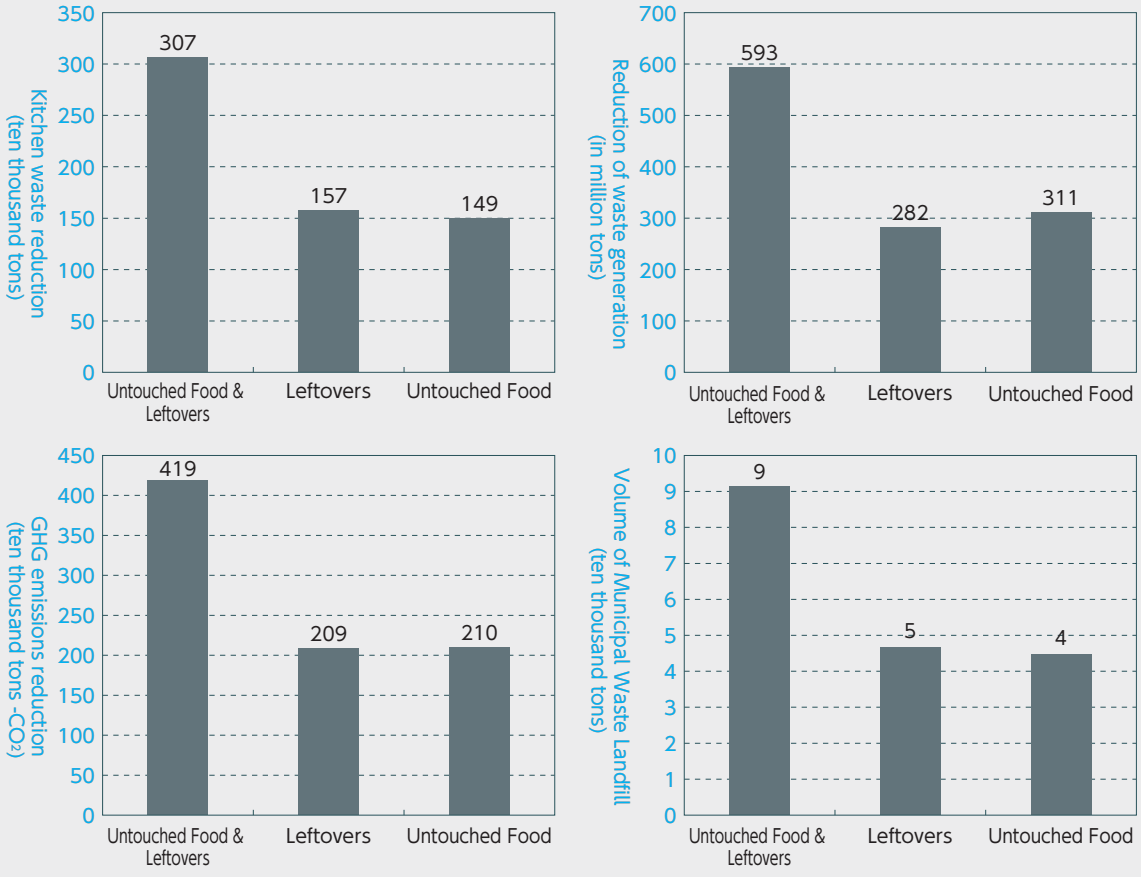
Campaigns are also being conducted to promote the use of drink containers such as reusable water bottles and coffee cups ("My Bottle" and "My Cup") at offices, schools, and various other places.

Above are just a few examples of such efforts. The small daily efforts of each individual, such as trying to minimize waste and making ever action with the *mottainai* mindset, will have a significant effect on creating a sound material-cycle society. Japan will further promote the creation of opportunities for 3R actions and make efforts to build a sound material-cycle society.

Figure 3-3 Analysis of the Kitchen Waste Reduction and its Effect on Environmental Burden Reduction (Whole Life Cycle Analysis of a High Level Case)



Note 1: Estimated based on FY 2008 CO_2 Emissions per household (including use of automobile etc) of 5,040 kg CO_2 per household
Note 2: Estimated based on FY 2007 Total Volume of Waste (generation only within Japan): 590.90 million tons
Note 3: Estimated based on FY 2007 Final Disposal Volume: 6.35 million tons
Note 4: Reduction of production and reduction of resource use due to the waste reduction (Reduction in each phase)



Column

The Effects of Efforts to reduce Generation of Paper for Office Equipment

In offices, a lot of paper is consumed for a wide variety of purposes, such as documents sent externally, documents used for internal meetings, and documents printed by employees for proofreading. A variety of efforts are possible for controlling the generation of paper waste.

The Ministry of the Environment conducted a two-week verification campaign with the cooperation of a business in the Tokyo metropolitan area, to see the effect of the efforts to control generation of paper waste. Specifically, the company made a decision at a management meeting, and their approximately 260 employees made efforts in the office accordingly, such as double-sided and n-up printing and paperless meetings, and determined the amount of reduction accomplished by such efforts. During the first week the employees made thorough efforts to control waste generation. During the second week, the management made a graphical presentation of the change in the number of pages printed (the number on the printer/copy machine counter) in order to visualize the changes for their employees, and the employees continued their efforts to control waste generation.

As a result, they achieved a 7% reduction according to conversion by the printer/copy machine counter.

In addition, compared to before the campaign, all

Table 1 An Example of Office Paper Reduction Efforts

実施場所	2Rs Efforts
Within Offices	○Paperless/Computerization ・Computerize office documents (e.g.. detailed statements) ・Automate intra-office documents (Use bulletin board systems and electronic payment systems) ・Hold Paperless Meetings (e.g. Use a projector) ・Apply printing restrictions to electronic files (e.g.. disable printing) ○Reduce paper consumption ・Use double-sided and n-up printing ・Reduce bookcases and implement free-seating scheme ○Avoid excess printing ・Ensure the number of printed documents required (e.g. determine the number of meeting attendees) ○Eliminate printing mistakes ・Preview documents before printing
Outside Offices	○Paperless/Computerization ・Use email (including file attachment) ・Use electronic commerce systems (e.g. EDI and CALS) ・Provide information on website ○Avoid excess printing ・Ensure the number of printed documents required (e.g.. determine the number of meeting attendees) ・Reduce wasteful document printing for customers (e.g.. improve inventory management of catalogues)

Figure 1 Office Paper Reduction (Changes in the Number of Pages Printed from a Multifunctional Printer per Day per Active User)

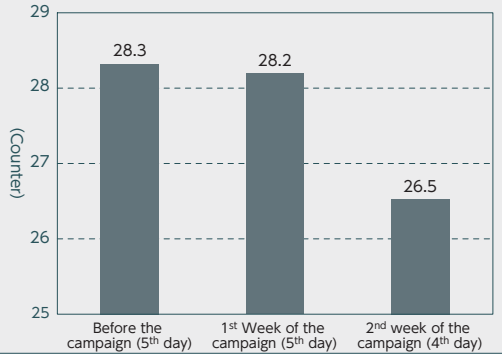
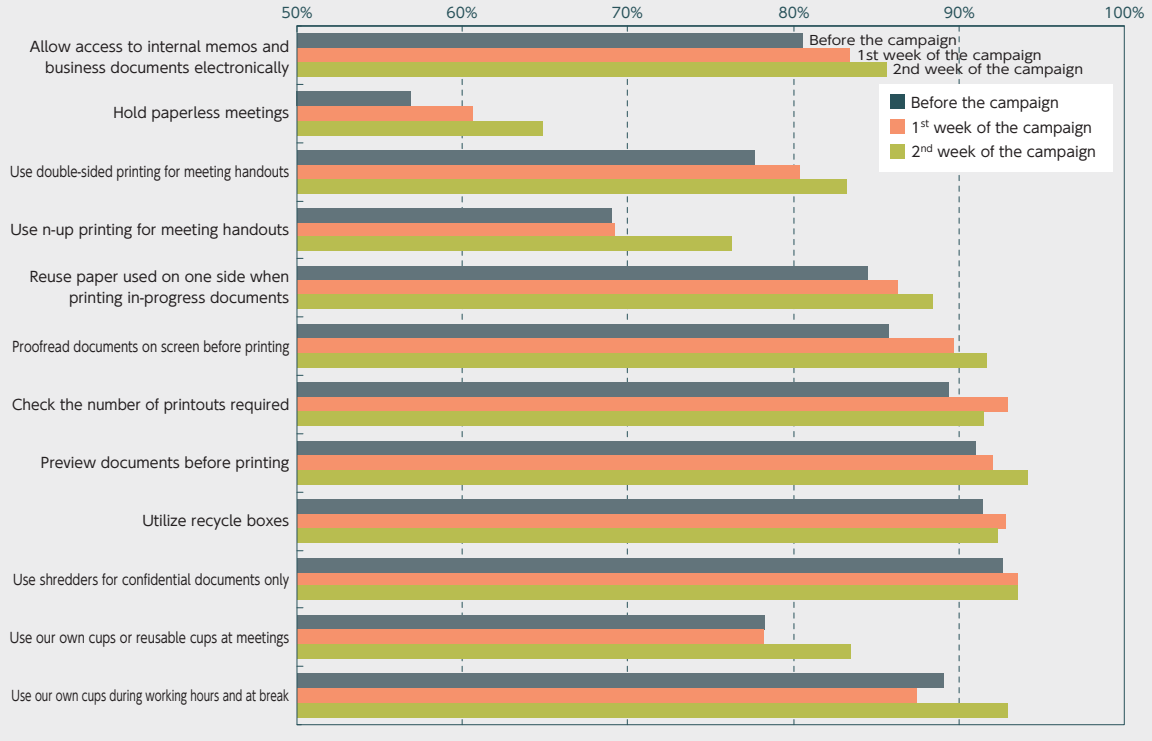


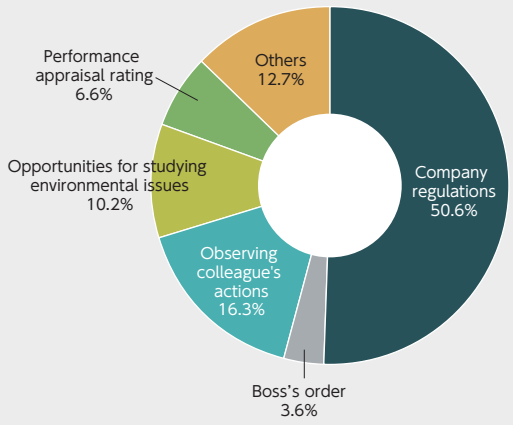
Figure 2 Paper Waste Reduction Efforts and Changes in Implementation Rate (Changes in Ease of Practice)



of the actions to control waste generation were conducted at a higher ratio at the end of the campaign. Actions that particularly increased were holding paperless meetings (14.0%), n-up printing (10.5%), and double-sided printing (7.1%).

After the campaign, a questionnaire was also distributed concerning effective methods for motivating people to make efforts to control waste generation in that office. The answer the most people gave was to make such actions the company regulations, followed by their colleagues actions. It is believed that factors such as making office rules and creating a positive atmosphere at the office are effective for encouraging actions to control waste generation.

Figure 3 Determinants for Environmental Behaviors



(2) The Material Flow of our Country

The first step to establishing a Sound Material-Cycle Society is to know the amount of resources we are collecting, consuming and dumping.

In the material flow overview for Japan (in FY 2008) (Figure 3-5), the total material input was 1.74 billion tons. 660 million tons were accumulated as buildings and society's infrastructure. 180 million tons were exported as products, 490 million tons were used in the energy consumption, and 580 million tons of wastes were generated. Out of these items, the amount cyclical recycled was 250 million tons, equivalent to 14.1 % of the total material input.

In the Second Fundamental Plan for Establishing a Sound Material-Cycle Society (cabinet decision in March 2008, hereafter called the "Fundamental Plan for a Sound Material-Cycle Society", specific goals have been set for indexes concerning "entrance," "exit" and "circulation" of the material flow, that is, three different aspects of the material flow (or substance flow), in order to facilitate the well-balanced development of measures such as reduction, reuse, recycling and disposal, and to promote the formation of a well-balanced and advanced sound material-cycle society.

The target year of each index is FY 2015.

Indexes	Resource productivity	Cyclical use rate	The amount of final disposal
Goals	about 420 thousand yen per ton	about 14-15%	about 23 million tons

Recent achievements of each index are as below:

1) Resource productivity (= GDP / Input of natural resources etc) (Figure 3-6)

FY 2008: About 361,000 yen per ton (about 38% increase from FY 2000 of 260,000 yen per ton).

2) Cyclical use rate (= amount of recycling utilization / (amount of circulative utilization + Input of natural resources etc)) (Figure 3-7)

FY 2008: About 14.1% (about 4.1 point increase from FY 2000 of about 10 %).

3) Final disposal volume of waste (= Volume of waste landfill) (Figure 3-8).

FY 2008: About 22 million tons (about 60% decrease from FY 2000 of about 56 million tons).

(3) Amount of waste generated

A. Status of municipal solid wastes (garbage)

The total volume of waste *1 in FY 2009 was 46.25 million tons (3.9% decrease from the previous year), or 994 grams daily per person (3.8% decrease from the previous year) (Figure 3-9).

*1: "Total volume of waste" = "designed collection volume + volume of waste directly brought in + group-based recyclable resource collection".

Looking at the shifts of human waste treatment populations, it can be seen that the number of combined household wastewater treatment facilities is increasing, conversion of household wastewater treatment facilities leads to removal and connection to public sewage systems, and the overall population for water-purifier tanks remains at an almost steady level. In contrast, due to an increase in the population for public sewage systems (87.82 million people as of FY 2009), the population comboned for flush toilet users (116.62 million people as of FY 2009) is increasing each year.

B. Status of industrial waste treatment

The total volume of industrial wastes generated across the country in FY 2008 was 403.66 million tons. About 216.51 million tons (54% of the total volume) were reclaimed, about 170.45 million tons (42% of the total volume) were reduced by intermediate processing, and 16.70 million tons (4% of the total volume) were subject to final disposal. The volume of reclamation refers to the total volume of the directly reclaimed volume plus the volume reclaimed from the treatment residue produced by intermediate treatment. The volume of final disposal

Figure 3-4 My Bottle, My Cup Campaign

What is "My Bottle, My Cup Campaign"?

The efforts to encourage people to use their own bottles, tumblers, jugs and tea cups (e.g. "My Bottle" and "My Cup") in workplaces, universities, schools and away from home, and to promote the reduction of environmental load.

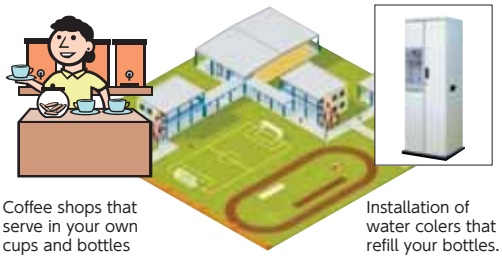
My Bottle, My Cup Campaign logo mark

Specific examples of the campaign

Demonstration experiments at universities

To provide infrastructure, distribute bottles, and conduct monitoring and study to verify the progress of the effort and its effect on the reduction of environmental load

Attended by 1) Ferris University,
2) Yokohama City University
3) Osaka University



Coffee shops that serve in your own cups and bottles

Installation of water colers that refill your bottles.

Awareness campaign at events (2010)

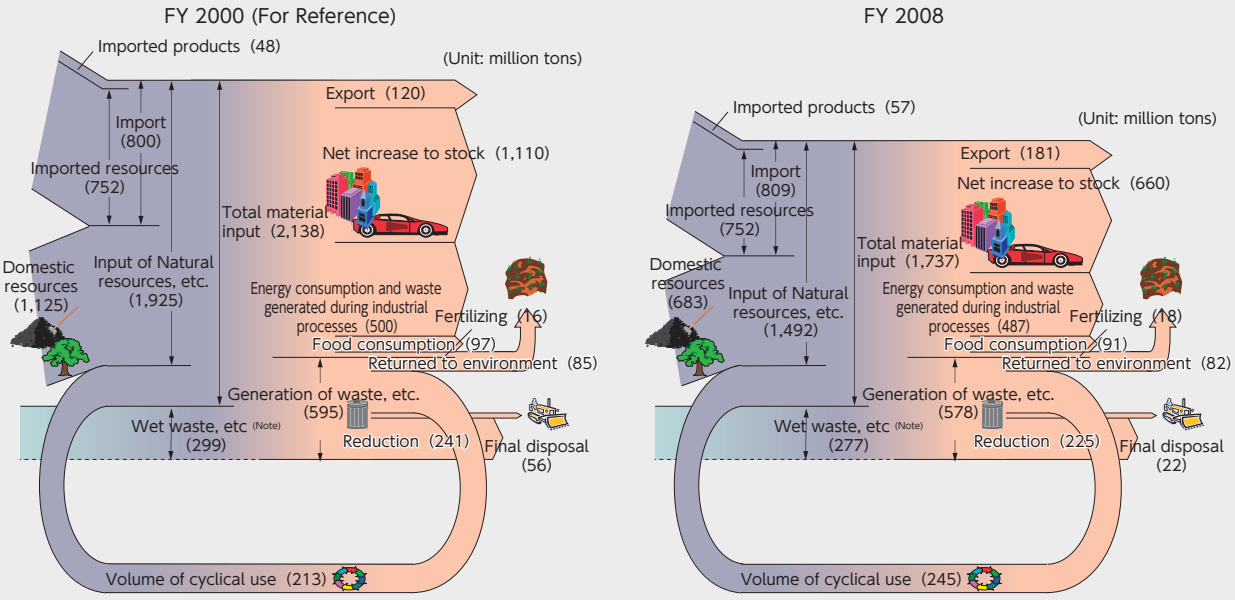
○Opened an exhibition booth at Eco Life Fair provided by the Ministry of the Environment on 5-6 Jun. Provided tea service and promotion display.
○Declared October as a special month to promote 3Rs activities. Requested local government and communities for cooperation. Provided support.

Provided information on Website

http://www.re-style.jp/bknbr/mybottle

○Provided the information telling which shops serve in your own bottles.
○Introduced examples of the companies making advanced efforts in their workplaces.
○Introduced examples of the awareness promotion activities of local governments.

Figure 3-5 Material Flow in Japan (FY 2008)



Note: Wet waste, etc means water content included in waste (e.g. sludge, animal waste, human waste, waste acid and waste alkali) and input of earth and sand as a result of economic activities (e.g. sludge generated by mining, construction and waterworks and slag from mining).
Source: Sound Material-Cycle Society Planning Committee, Ministry of the Environment

refers to the total volume of the wastes directly sent for final disposal and the volume of treatment residue sent for final disposal after intermediate treatment (Figure3-11).

C. Measures for Reducing Greenhouse Gases in the Field of Waste

The emission of greenhouse gases derived from waste was approximately 34.31 tons (carbon dioxide equivalent) in FY 2008, and has been steadily declining in recent years, due to efforts based on the "Kyoto Protocol Target Achievement Plan."

(4) Number of Incidents and Amount of Illegal Dumping

In FY 2009, there were 279 new cases of illegal dumping (57 thousand tons), and 187 cases of inappropriate treatment of industrial waste (379 thousand tons).

(5) Japan's approach to a sound material-cycle society

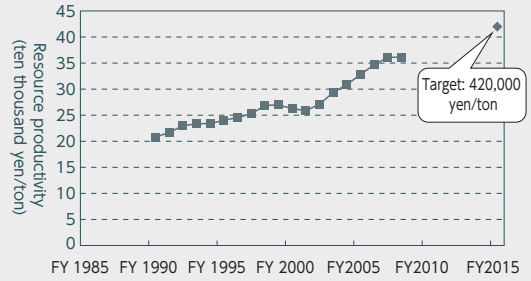
In order to ensure the steady implementation of the Sound Material-Cycle Society Fundamental Plan, the Central Environmental Council is required to review the progress of measures based on the Fundamental Plan for a Sound Material-Cycle Society every year and report on the direction of future policies to the government as necessary. In FY 2010 the Council conducted the third evaluation of the progresses of the measures based on the Fundamental Plan for a Sound Material-Cycle Society.

As for the state of enforcement of the Waste Management and Public Cleansing Law, the Central Environment Council gave its opinion on the "direction for reconsideration of the waste treatment system" in January 2010.

Reviews were conducted based on that opinion, and the "Bill for Making Partial Amendment to the Waste Management and Public Cleansing Law" was decided upon by the Cabinet on March 5, 2010, and submitted to the Diet on the same day. The bill was unanimously approved and enacted by both the Lower House and the Upper House, and promulgated on May 19, 2010. Also, the "cabinet ordinance partially amending the Enforcement Ordinance of the Waste Management and Public Cleansing Law" was decided upon by the Cabinet on December 17, 2010, and promulgated on December 22, 2010. These amendments excluding some of the parts were enacted on April 1, 2011. As for container and package recycling, a joint meeting of the Central Environment Council and the Industrial Structure Council was held and the councils summarized the guidelines of plastic container recycling methods. The summary stated that the prioritization of material recycling methods would be continued for the moment, and identified measures for improving the quality of material recycling methods, such as improving the bid system. In addition, in order to promote the 3Rs for container and packaging waste, the Ministry of the Environment is conducting dissemination and awareness raising activities for consumers through the waste containers and packaging reduction promoters (nicknamed "the 3R Promotion Meister") commissioned based on the Containers and Packaging Recycling Law. The Ministry of the Environment has also been conducting the "My Bottle, My Cup Campaign" since June 2010 for reducing the amount of disposable drink containers, conducting awareness raising activities at events with the cooperation of local governments, groups and corporations, and conducting demonstration experiments at universities.

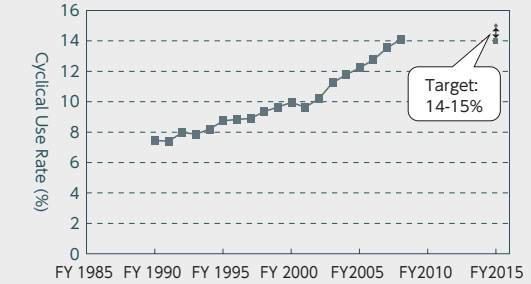
As for automobile recycling, the Ministry of the Environment released the "Report on the Progress of the Automobile Recycling System" in January 2010, and proposed that they should clarify the handling procedure of used vehicles and end-of-life vehicles. Based on the Report, the joint council working groups of the Central Environment Council and the Industrial Structure Council started discussions in July 2010 to develop guidelines to serve as criteria for determining end-of-life vehicles and used vehicles, and released a "Report on

Figure 3-6 Changes in Resource Productivity



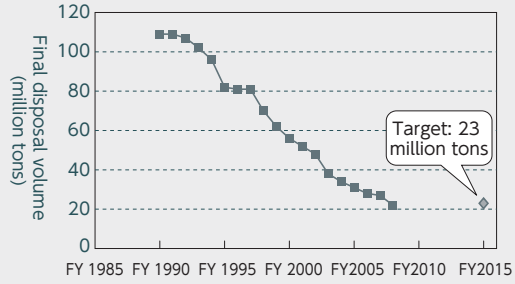
Source: Ministry of the Environment

Figure 3-7 Changes in the Cyclical Use Rate



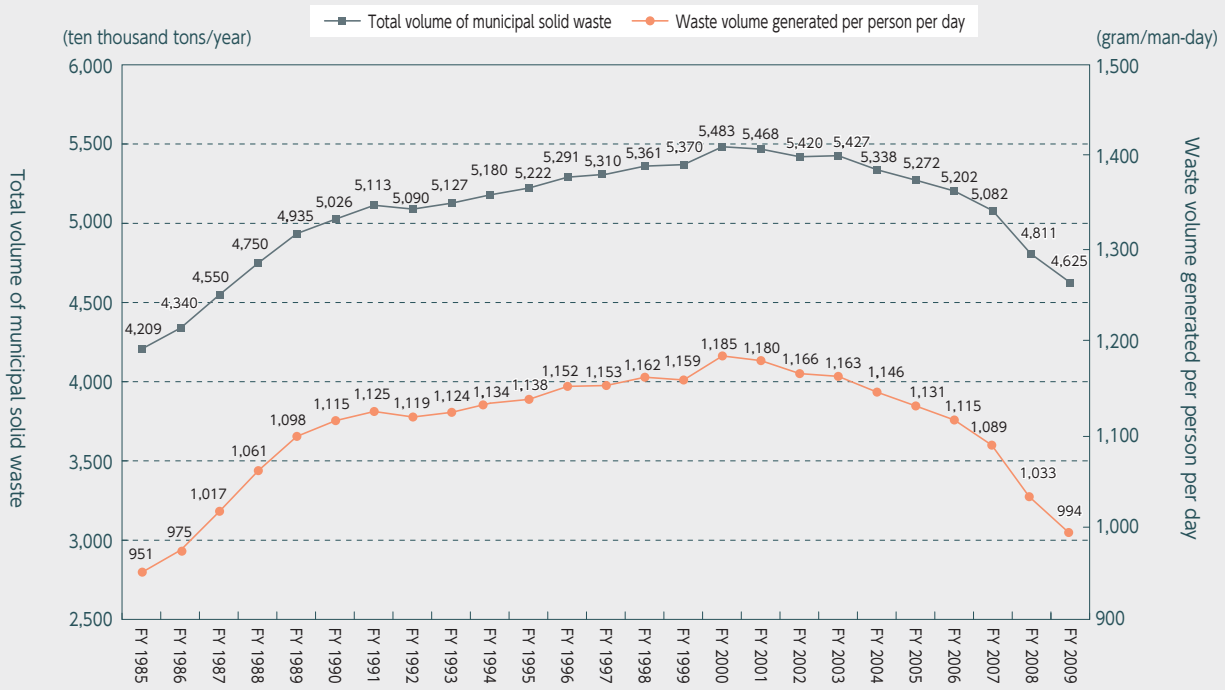
Source: Ministry of the Environment

Figure 3-8 Changes in the Final Disposal Volume of Waste



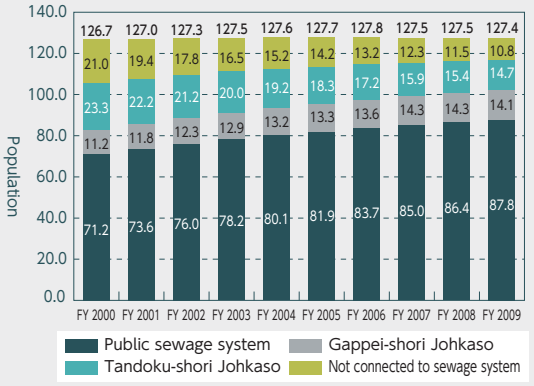
Source: Ministry of the Environment

Figure 3-9 Changes in the Total Volume of Municipal Solid Waste and Waste Volume generated per Person and per Day



Note: "Total volume of municipal solid waste" = "designed collection volume + volume of waste directly brought in + group-based recyclable resource collection"
Source: Ministry of the Environment

Figure 3-10 Changes in the Population by Night Soil Treatment Facilities



Note: All figures in the graph are populations (in millions).
Source: Ministry of the Environment

Determining End-of-Life Vehicles" in February 2011.

With the aim of building an appropriate and effective system for recycling rare metals, in 2009 the government held the "Study Group for Collecting Rare Metals from Used Small Household Appliances while also reviewing Proper Treatment" again, and conducted model projects in seven areas throughout Japan, and reviewed the efficient and effective collection methods. The government also studied the rare metals contained in the collected end-of-life small household appliances, conducted assessment of the hazards and appropriate treatment of recycling such appliances, and reviewed assessment of the options of the recycling system. In order to review recycling systems of small electric and electronic devices and the recycling of useful metals from end-of-life products, the Waste and Recycling Sub-committee of the Central Environment Council's Committee started discussions in March 2011.

(6) International efforts

In May 2008, the G8 Environment Ministers Meeting was held in Kobe, featuring the 3Rs as one of the main themes. The ministers confirmed that the actions for 3Rs have spread among G8 states and other countries since the "3Rs Initiative" was proposed at the G8 Summit in 2004, and agreed upon the "Kobe 3R Action Plan", that included actions and objectives to encourage further 3R development among G8 states. The Action Plan also received support from G8 Summit leaders at the G8 Hokkaido Toyako Summit in July 2008, held in the Lake Toya area in Hokkaido.

As for the efforts in Asia, Japan is working in co-operation with the United Nations Centre for Regional Development (UNCRD), the United Nations Environment Program (UNEP), and the Institute for Global Environmental Strategies (IGES) and supporting countries such as Vietnam and Indonesia for their formulation of plans and strategies for to promote the 3Rs in accordance with the situation of each country. In FY 2009, Japan assisted Vietnam to formulate their national strategies, and in FY 2010, Bangladesh.

In November 2009 a "Meeting of the Regional 3R Forum in Asia" was help with the joint sponsorship of the Ministry of the Environment and the United Nations Centre for Regional Development (UNCRD). The meeting had the participation of government representatives, international organizations, and experts on the 3Rs from fifteen countries in Asia. At the meeting, the participants agreed on a "TOKYO 3R STATEMENT: Towards the

Establishment of the Regional 3R (Reduce, Reuse and Recycle) Forum in Asia," and established the "Regional 3R Forum in Asia". The participants decided to facilitate high-level policy dialogues on the 3R issues, facilitate improved dialogue and cooperation with countries for implementing 3R projects, provide a strategic and knowledge platform for sharing information, and provide a platform to develop networks of stakeholders under the Regional 3R Forum in Asia.

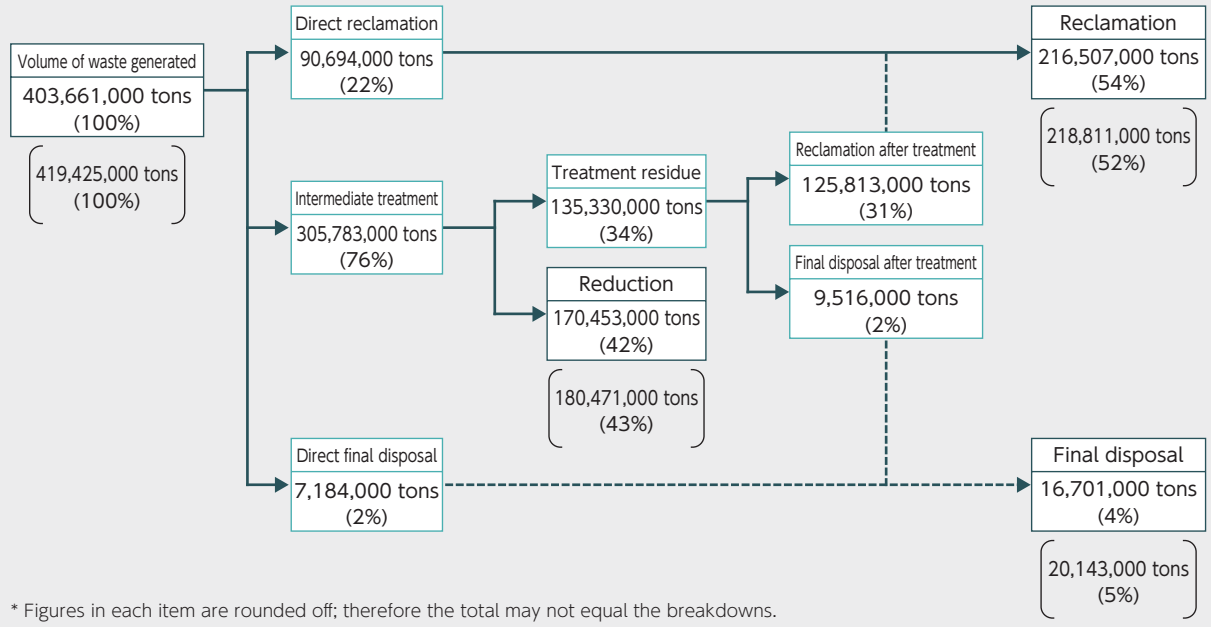
The second meeting was held in October 2010 in Kuala Lumpur, Malaysia. It was co- hosted by the Ministry of the Environment, the Ministry of Housing and Local Government, Malaysia, and the United Nations Centre for Regional Development (UNCRD) and its theme was "3Rs for Green Economy and Sound Material-Cycle Society." At the meeting. a Chair's Summary was compiled, and Singapore expressed their decision to host the third Forum in Singapore in 2011, which the participants welcomed.

In June 2009, the Minister of the Environment and the Minister of Environmental Protection of the People's Republic of China concluded a memorandum to support cooperatire for creating environmentally-friendly cities by developing cyclical economic industries in Kawasaki City and Shenyang City, China. As part of the cooperation projects, the Ministry of the Environment and the Ministry of Environmental Protection of the People's Republic of China held workshops in March 2010 in China's Beijing and Shenyang cities, with the objective of sharing information on policies and technologies for creating a sound material-cycle society.

In addition, in order to appropriately conduct the export and import of the hazardous waste based on the Basel Convention, the Ministry of the Environment has been conducting activities for the "Asian Network for Prevention of Illegal Trans-boundary Movement of Hazardous Wastes" each fiscal year since 2004, and holding workshops and making various efforts have to promote dialogues with the people in charge of the Basel Convention in each of the countries in Asia and relevant international organizations inder to strengthen collaboration among them all. Also, in order to manage e-waste and computer waste in an environmentally appropriatemanner in the Asian-Pacific region, Japan is also providing financial and technological support for the projects implemented by countries under the Basel Convention.

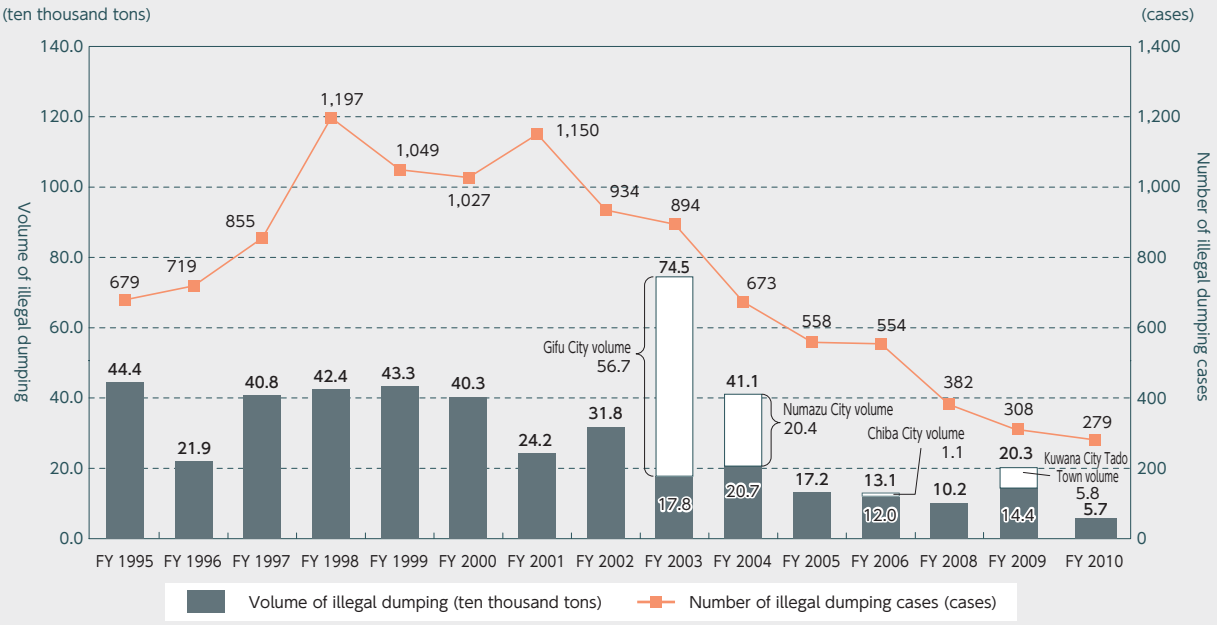
The United Nations Commission on Sustainable Development (CSD), which evaluates the state of implementation of "Agenda 21," adopted at the 1992 Earth Summit. based on their annual plans, is taking up "waste management" as their theme for the two-year period from 2010 through 2011. In order to actively contribute to CSD discussions, the Ministry of the Environment organized a "CSD-19 Intersessional Conference on Building Partnerships for Moving towards Zero Waste" in Tokyo in February 2011, attended by experts on waste management and the 3Rs from around the world. The results of that conference were contributed to the 19th session of the CSD meeting held in May 2011.

Figure 3-11 Industrial Waste Treatment Flow (FY 2008)



* Figures in each item are rounded off; therefore the total may not equal the breakdowns.

Figure 3-12 Changes in 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).
2: The cases of Gifu City and Numazu City were revealed in 2003 and 2004 respectively and it was found that the illegal dumping had already been carried out for several years by then. As a result, these cases were reported as a large-scale case in the above fiscal years.
The case of Chiba City case (colored white) was revealed in FY 1998 but reported to the Ministry of the Environment in FY 2006.
The case of Kuwana City Tado Town (colored white) was revealed in FY 2006 but reported to the Ministry of the Environment in FY 2008.
3: Sulfate pitch cases and ferrosilt cases were excluded from this survey and would be arranged for separate survey reporting.
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 has been completed at 42 sites (as of February 15, 2010).
* Figures were rounded off; therefore the total may not equal to the breakdowns.
Source: Ministry of the Environment

4. Assessing and Managing the Environmental Risk of Chemical Substances

(1) Current State of Chemical Substances Remaining in the Environment

In today's society, a wide variety of chemical substances are used in various industrial activities and daily living, providing convenience to our lives. In addition, there are some chemical substances generated unintentionally as a result of incineration and other activities. There are some chemical substances that would pollute the environment, causing harmful effects to the human health and ecosystems, if they are not properly managed in the various stages of manufacturing, distribution, use, or disposal. The Ministry of the Environment has been conducting eenvironmental survey and monitoring of the state of chemical substances remaining in the general environment and releasing the findings in "Chemicals in the Environment" (http://www.env.go.jp/chemi/kurohon/). The government has been examining the selection of target chemical substances and improving the survey methods in accordance with the environmental measures so that the results of the survey would be utilized effectively in measures to tackle chemicals in the environment since FY 2002. The government conducted the surveys with a new adopted framework that consisted of several surveys with different purposes: the Initial Environmental Survey, the Detailed Environmental Survey for Exposure Study, and Environmental Monitoring from FY 2010. These survey results have been utilized in various substances-related policy measures, including the addition of substances for regulation to the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Act No. 117 of October 16, 1973, hereinafter referred to as "the Chemical Substances Control Law"), review of the designation of certain chemical substances, under the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (Law No. 86 of 1999, hereinafter referred to as "PRTR Law"), and the basic data for the implementation of environmental risk assessment.

(2) Promoting the Environmental Risk Assessment of Chemical Substances

In response to the need in regard to environmental policies and based on the results of the above-mentioned environmental survey and monitoring of chemicals, the government is assessing the harmful effects on human