

Fundamental Plan  
for Establishing a Sound Material-Cycle  
Society

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## Introduction

Today, environmental protection is a vitally important issue that is fundamental to human survival. Furthermore, there is an extremely high degree of international interdependence, even in various areas of everyday living, due to the globalization of economic activities. It is becoming increasingly apparent that we face resource constraints on a global scale. The value of circulative resources (CRs), which rises exponentially with each passing decade, heightens the need to communicate internationally and cooperate with the international community in order to establish a Sound Material-Cycle (SMC) society. Facing up to the reality of a global environmental crisis, Japan is expected to give shape to a dynamic SMC society by taking advantage of its technology and other strengths, and to contribute to solutions through positive participation in such opportunities as the 2008 G8 Toyako Hokkaido Summit. A key to establishing an SMC society is to create material-cycle blocks as part of regional revitalization by encouraging entities to work together, taking advantage of their environmental capabilities in the 3Rs field, and making full use of the respective characteristics and vitality of individual regions.

The Fundamental Plan for Establishment of an SMC Society (hereinafter referred to as “Fundamental Plan”) was established based on the provisions of Article 15 of the Fundamental Law for Establishment of an SMC Society (hereinafter referred to as Fundamental Law) to implement in a comprehensive and systematic manner measures relating to establishment of an SMC society. The First Fundamental Plan was established in 2003 as a 10-year program aimed at accelerating a shift away from unsustainable patterns of production and consumption, based on the Plan of Implementation of the World Summit on Sustainable Development in September 2002. Some progress has been made under the First Fundamental Plan. Its successor, the Second Fundamental Plan is also based on the aforementioned Plan of Implementation.

The Fundamental Plan is positioned as a basic blueprint for building both a “sustainable society” and a “Society in Harmony with Nature”, which will ensure that we can continue to fully enjoy the benefits of a Low-carbon Society and the blessings of nature in the years ahead. It also addresses the global warming issue, through a commitment to the principles set out in the Fundamental Environment Plan and establishing an “SMC Society” which minimizes burdens on the environment. It is important to adopt positive and constructive approaches toward the construction of a sustainable society and to implement integrated actions aimed at realizing both a Low-carbon Society and a Society in Harmony with Nature when promoting establishment of an SMC society. Premised on environmental protection, these measures include promotion of the 3R principles, appropriate handling of the 3R principles, and conservation of the living environment.

Some five years after its establishment, the Fundamental Plan was reviewed in line with changes in socioeconomic circumstances such as the results of initial efforts, progress toward goal attainment, reduction of resource use on a global scale, and the need to respond to global warming and other environmental issues.

Going forward, comprehensive measures based on the Fundamental Plan will be

implemented to promote the establishment of an SMC society on an international scale, with a focus on construction of regional SMC blocks in Japan and Asia.

## Chapter 1 Present Situation and Problems

### Section 1 Present Situation

#### 1. Need for Establishment of an SMC Society

Conventional economic and social activities based on mass production and mass consumption lead to the creation of mass disposal societies, which may hamper environmental protection and the development of SMCs.

For this reason, Japan is experiencing a serious ongoing situation in various respects: an enormous amount of waste, about 470 million tons, is generated annually and, at the same time, disposal of waste etc<sup>1</sup> is becoming more difficult due to the diverse nature of this waste, an increase in environmental loads resulting from the inappropriate management of waste has emerged as a problem, and there is a shortage of landfill capacity at final disposal sites. As for industrial waste, the remaining capacity is 7.7 years for the entire country and 3.4 years in metropolitan areas.

In addition, these activity patterns are closely related to concerns about the depletion of natural resources, which are mainly fossil resources, global warming problems caused by greenhouse gas emissions, destruction of the natural environment through large-scale resource extraction, disturbance of natural material cycles, and the like. Coupled with the global warming crisis and the ecosystem crisis, these activity patterns create a vicious cycle, during which they impact on each other and at multiple levels, thereby worsening environmental problems on a global scale. The waste problem is becoming more serious, especially in developing countries such as Asian nations that are experiencing booming economic growth. It is estimated that the amount of waste worldwide will double between 2000 and 2050. In addition, due to surging prices for resources and an increase in demand for resources on a global scale, there is growing concern about the stable supply of resources, which is increasing resource restraints not only in Japan, which is poor in natural resources, but also internationally.

If mankind continues such economic and social activities, we will face constraints such as resource restraints and acceptable environmental limits on waste, which may interfere with sustainable social and economic development.

#### 2. First Fundamental Plan and Measures Based on the Plan

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<sup>1</sup> These include used articles other than waste, by-products and the like, in addition to those defined as waste in the Waste Management Law. Of these, useful waste is regarded as “circulative resources” in Article 2 of Fundamental Law for Establishment of an SMC Society.

The Fundamental Law set priorities for measures in order to ensure an appropriate material cycle: (1) restraining generation, (2) reuse, (3) regeneration, (4) heat recovery, and (5) correct disposal of waste.<sup>2</sup> Established in 2003 based on the Fundamental Law, the First Fundamental Plan sought to attain these goals by setting up two types of indicators: material flow indicators, which were designed to ascertain the total flow of goods in the economy and society in order to ensure an appropriate Material Cycle; and effort indices, which were designed to monitor the progress of measures and efforts undertaken by entities toward the establishment of an SMC society.

An SMC society is a society in which the amount of resources to be extracted is minimized at all stages of social and economic activities, from resource extraction through production, distribution, consumption and disposal, through a range of measures such as reduction of waste generation and use of CRs, thereby minimizing environmental loads.

In order to give added impetus to efforts toward the establishment of an SMC society, legislation based on the Waste Management and Public Cleansing Law (hereinafter referred to as “Waste Management Law”) and various recycling laws have adopted, in accordance with basic principles set out in the Fundamental Law, two concepts: “discharger’s responsibility” and “extended producer responsibility (EPR)”. The former is based on the idea that dischargers, including businesses and the general public, have primary responsibility for the disposal of waste in ways that reduce burdens on the environment; but, the latter is based on the idea that the makers of products bear a certain responsibility at all stages, including when a product reaches the end of its lifetime. Legislation is gradually being reinforced through a series of revisions to the Waste Management Law, establishment of various recycling laws that led to the enforcement in 2005 of the Law Concerning Recycling Measures for End-of-life Vehicles, and evaluation and review of various recycling laws that began in 2006.

In addition to the development of the legal infrastructure, the development of other facilities vital to the establishment of an SMC Society is underway. These facilities include municipal solid waste disposal facilities, industrial waste disposal facilities, wastewater treatment plants, including sewerage systems, septic tanks and final disposal sites for municipal solid waste and industrial waste. Assistance is provided for the development of facilities which are set out in regional plans formulated by local governments to comprehensively promote 3R activities (Restraining generation (Reduce), Reuse (Re-use) and Regeneration (Recycle)). Highly efficient waste power generation and heat utilization facilities, measures that will contribute to the prevention of global warming, are steadily being developed.

In addition, the following efforts are being made as follows; quickly and accurately

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<sup>2</sup> However, a discharger is permitted to select a more appropriate method, regardless of the order of priorities, provided that method can reduce environmental burdens more effectively.

understanding information about waste and the like; preparing statistical information for analysis and publication; and conducting research and promoting science and technology that contribute to the establishment of an SMC society, ranging from materials development and production processes to cyclical use and disposal.

At the G8 Sea Island Summit in 2004, it was agreed to launch the “3R Initiative,” which is aimed at building an SMC society through the 3Rs of waste, etc. Efforts to implement the 3R Initiative based on the agreement are called for.

### 3. Progress of First Fundamental Plan

Under the First Fundamental Plan, efforts have been made to achieve the following goals concerning material flow indicators in order to ensure appropriate material cycles:

(Table 1 Goals Concerning Material Flow Indicators)

Target Year: 2010

Indicator	Resource Productivity	Cyclical Use Rate	Final Disposal Amount
Objective	Approx. 370,000 yen/ton (*)	Approx. 14%	Approx. 28 million ton

\* Due to revision of the method for calculating real GDP, which led to the switch from fixed-weight to chain-type GDP, data are based on real GDP calculated by the new method. Accordingly, we reset the numerical target for resource productivity for FY 2010 in view of the fact that the First Fundamental Plan set out to achieve “about a 40% improvement on FY 2000”.

- **Resource Productivity (= GDP/Natural resources input)**

Natural resources input indicates the amount of home-extracted and imported natural resources and imported products. It is an indicator that shows how effectively goods are used by industry and in people’s everyday lives (how much wealth we have created with fewer resources) by calculating real gross domestic product (real GDP) from natural resources per unit input.

- **Cyclical Use Rate (= Amount of cyclical use/(Amount of cyclical use + natural resources input))**

This indicator shows what quantity of resources consumed by society (natural resources input) are cyclically used resources (reused and recycled resources).

- **Final Disposal Amount**

"Final Disposal Amount" is the amount of waste disposed of at final disposal sites. It is the index that is directly connected to the urgent problem that the remaining capacity of final disposal sites is rapidly diminishing.

Resource productivity for FY 2005 was about 330,000 yen per ton (about 264,000 yen per ton in FY 2000), 25% up on FY 2000. The cyclical use rate was about 12.2% in FY 2005 (about 10.0% in FY 2000), 2.2% up on FY 2000. The final disposal amount for FY 2005 was about 32,000,000 tons (about 57,000,000 tons in FY 2000), about

44% down on FY 2000.

(Table 2) Changes in resource productivity, cyclical use rate, and final disposal amount

		FY1990	FY 2000	FY 2003	FY 2004	FY2005	Comparison with FY 1990	Comparison with FY 2000
Resource productivity	Ten thousand yen per ton	20.7	26.4	29.5	31.1	33.0	+59.4%	+25%
Cyclical use rate	%	7.4	10.0	11.3	11.9	12.2	+ 4.8 points	+ 2.2 points
Final disposal amount	Municipal solid waste (million tons)	20	12	10	9	8	▲60%	▲33.3%
	Industrial waste (million tons)	89	45	30	26	24	▲73.0%	▲46.7%
	Total (million tons)	109	57	40	35	32	▲70.6%	▲43.9%

In FY 2005, greenhouse gas emissions attributed to the disposal of waste (incineration, landfill, wastewater treatment etc.) increased substantially by about 30% on the base year (1990) of the Kyoto Protocol.

Measures to establish an SMC society are expanding among related entities such as the general public, NGOs, NPOs, business organizations, local governments and central government. Examples of this include sorted collection of waste, increased environmental consciousness at the product design stage and the product use stage.

Regarding the recycling of CRs, we have generally achieved the goals stipulated in the relevant laws and regulations. These goals include the material recycling ratio of PCs and sealed batteries as specified recycling products, recycling rate of recovered specified kinds of home appliances (four items), execution rate of recycling and the like of circulative food resources etc., such as waste residue from business sites, recycling ratio of specified construction material waste from construction sites and the like, and recycling ratio of end-of-life vehicles. The recycled amount of the four items which are subject to recycling under the Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (hereinafter referred to as the “Containers and Packaging Recycling Law”), has been increasing.

In the meantime, there has been increasing awareness and strengthened actions among the general public toward the establishment of an SMC society. These include concern over waste and the use of refill products. Some positive results have been achieved. For example, the amount of household waste generated per person per day (excluding those collected as resources) decreased by about 10% over the last five years (from FY 2000 to FY 2005).

The daily amount of municipal solid waste from business sites also decreased by about 10%, and the final disposal amount of industrial waste decreased by about 73% over the past 15 years (from FY 1990 to FY 2005).

In addition, environmental business management, such as release of environmental

reports and implementation of environmental accounting, has increasingly been adopted. According to estimates, the market for SMC businesses was equivalent to approximately 28 trillion yen in FY 2005, and the number of people employed in such businesses was about 700,000, showing an upward trend.

Internationally, we are making efforts through the G8 process and in cooperation with international organizations such as UNEP and OECD, engaging in bilateral policy dialogue with China and South Korea, and working to promote 3R initiatives. We also operate systems and enforce measures in a more stringent manner, based on the Basel Convention, to prevent generation of hazardous waste at the borders .

## Section 2 Problems

### 1. Evaluation of Past Efforts

Our past efforts pursuant to the First Fundamental Plan have achieved some positive results, as described above. This means that the establishment of an SMC society has been promoted through the efforts of related entities.

Overall resource productivity has increased. However, changes in natural resources input by resource types show that input of earth and rock resources has decreased significantly, while that of oil fuel resources and metallic resources has increased in recent years due to increased demand for new applications such as high-tech products. The exploitation of these resources has not been sufficiently restrained.

As a consequence, the amount of industrial waste being generated has been increasing in recent years. Therefore, we cannot say that sufficient efforts have been made toward restraining generation.

There is insufficient information to enable evaluation of the reuse of CRs, due to delays in the development of statistics that would shed light on the effects of policies.

Although some positive results have been achieved in recycling of CRs, we need to encourage the promotion of such efforts. This is due to some CRs being left out of recycling because sorted collection is not implemented for container and packaging waste, and because there is a need to improve the quality of products recycled from CRs in order to enhance the resource substitution effect.

In FY 2004, the remaining capacity of final disposal sites for industrial waste was 7.7 years for the entire country and only 3.4 years in metropolitan areas. Some improvements have been made due to a steady decrease in final disposal amounts. However, we are still in a very difficult situation.

Given a substantial increase in greenhouse gas emissions from waste disposal, it is important to integrate initiatives aimed at the establishment of an SMC society with

those aimed at the realization of a Low-carbon Society.

Some progress has been made in the international arena. However, demand for resources has been increasing against a backdrop of population and economic growth in developing countries. This makes it increasingly important for Japan to actively implement initiatives and to promote the establishment of an SMC society on a global scale.

## 2. Future Issues

Given such circumstances, it is necessary for us to address, both at home and abroad, the pressing issue of establishment of an SMC society with the aim of limiting and controlling the consumption of natural resources and reducing environmental loads by concentrating efforts on the establishment of a sustainable society and integrating measures aimed at the creation of a Low-carbon Society with those aimed at creating a Society in Harmony with Nature.

For the establishment of an SMC society, it is important to identify and harness the energies of individual regions, and to create a virtuous circle for the environment and the economy through new lifestyles and business approaches. It is also important to ensure the security of 3Rs, while further improving our 3R technology and systems, which are already at world-leading levels, and to enhance domestic infrastructures such as information and human resources. We need to contribute to global efforts by making the most of our advanced environmental capabilities.

For this purpose, we need to specifically address the following issues:

### (1) Establishment of SMC “blocks” through revitalization of local communities

We have been taking appropriate steps in accordance with the First Fundamental Plan, which set numerical targets for the flow of goods in the overall economy and society of Japan. However, the scale of the cycles for different CRs must necessarily differ depending on the individual characteristics of these CRs. This makes it necessary to establish SMC blocks taking into account the appropriate size of blocks for each community and by taking the fullest advantage of regional characteristics, and to link such efforts to the revitalization of local communities through the formation of material-cycle communities. This is the issue that we must address if an effective SMC society is to be established.

In addition, proactive efforts toward establishment of an SMC society undertaken at local levels and in consideration of local conditions will lead to, for example, the development of human resources who will play central roles in such a society and in the construction of local networks. With active participation by various people in local communities, local networks will be strengthened and this will lead to “revitalization of local communities”. It will also lead to increased employment opportunities offered by community businesses<sup>3</sup>, including local industry focused on

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<sup>3</sup> A business that is essential to a local community will be operated as a profit-making business by taking

local production for local consumption and healthy venous industry that operates in harmony with its community, thereby driving “revitalization of local communities” based on the principle of independence and coexistence. How to link these efforts to the establishment of SMC blocks, while taking local conditions into account, is an issue that must be addressed.

(2) Sustainable lifestyle that can be passed on to generations over the next 100 years

It is often the case that members of the general public do little to make a difference, even though they are very aware of waste problems. Therefore, it is important to develop the necessary infrastructures, such as rules and mechanisms, so that we can encourage people to take practical action. For that purpose, it is important to present an easy-to-understand vision of an SMC society in order to help people appreciate why they need to build such a society, and to provide a clear and coherent explanation about the part they need to play by drawing on “Mottainai”, which is one of our traditional values. These are issues that we must address in order to switch to a “sustainable lifestyle that can be passed on to generations over the next 100 years”.

(3) Business Approach to Realize a Virtuous Circle for the Environment and the Economy

The market for SMC businesses is expanding overall. SMC businesses that are achieving particularly high growth rates include home appliances, used vehicle recycling and iron scrap processing. To sustain the growth of these businesses, which have been helped by strong demand for scarce resources in recent years, we need to establish a new business approach that will realize a virtuous circle for the environment and the economy.

We need to address the issue of reuse in particular by strengthening assistance based on a detailed understanding of current status of reuse.

It is important to create a relationship between the environment and the economy (virtuous circle for the environment and the economy) so that economic revitalization will lead to an improved environment, which will further advance the economy and, in turn, the environment will benefit. To that end, we must develop a mechanism and change the consciousness of consumers so that genuine efforts to reduce environmental loads, such as those mentioned above, technical innovation to promote advanced 3R, use of recycled products during product design and manufacturing, and construction of a new business model, will be duly recognized and rewarded.

(4) Further Promotion of 3R Focused on Reducing Waste Generation and Ensuring Appropriate Waste Management

With waste generation continuing at high levels, various issues have come to light in recent years. These problems include inappropriate cyclical use and

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advantage of the strengths of that local community.

disposal of waste, a shortage of landfill capacity at final disposal sites, disposal of hazardous waste such as asbestos, and illegal dumping. A series of revisions have been made to the Waste Management Law and other measures have been taken to respond to these problems. However, these efforts have not been sufficient to reduce waste generation. It is, therefore, necessary to ensure appropriate disposal of waste, which is a prerequisite for establishment of an SMC society, and to preserve the living environment.

For this reason, we need to enhance and strengthen necessary measures and systems, including the Waste Management Law and other recycling related laws, in order to promote the cyclical use of CRs and to advance efforts to ensure appropriate waste disposal, both at home and abroad, while giving top priority to reducing generation of waste and the like toward accomplishment of the policy objectives stipulated in the Fundamental Law. In doing so, it is necessary to advance the effective use of alternative resources that will contribute to reducing new resource input through quantitative expansion) and to promote high-quality recycling, and to measure the effect of such efforts.

In addition, it is vital to promote 3Rs efficiently by utilizing IT, ensure that hazardous waste is appropriately disposed of, and step up efforts to eradicate illegal dumping.

(5) Enhancement of 3R Technology and Systems

3R technologies and systems comprise the vital backbone of an SMC society. They also represent one of the most important areas where Japan can demonstrate its international leadership in science and technology. We need to develop technologies and systems that will reduce the input of non-renewable resources and energy, effectively utilize biomass materials that can be regenerated in nature as resources and energy, and reduce environmental loads caused by release into the environment of harmful substances and greenhouse gases.

(6) Accurate Interpretation and Provision of Information and Human Resources Development

The Fundamental Plan uses weight-based material flow indicators. These will enable quantitative measurement of progress toward the establishment of an SMC society, identification of trends through factor analysis, and determination of their meanings. However, it has been found that these indicators need to be improved because a reduction in the input of nonmetallic mineral resources will contribute significantly to a reduction in the input of natural resources, and because these indicators do not always accurately reflect the value of premium-grade materials. Statistics are vital for setting indicators. However, it is difficult to obtain statistics outside Japan. Therefore, we need to look at more effective ways of collecting and disclosing such data in the future. In addition, it is important to make these data available in form that is easy to understand and to bring as much transparency as possible to the effects of individual initiatives as a way of encouraging entities to make further efforts.

It is also important to qualitatively and quantitatively enhance human resources who play central roles in promoting an SMC society, thereby laying the foundation for comprehensive action.

#### (7) Establishment of International SMC Society

It is vital for environmental issues accompanying resource constraint and waste disposal to be addressed both in Japan and overseas. It has been pointed out that an increase in waste generation in East Asian countries and a rapid increase in the trade volume of CRs for recycling may cause environmental pollution through inappropriate disposal. It is, therefore, necessary to build an international SMC society that aims at the establishment of healthy material cycles, in line with the projected economic growth of developing countries.

### Chapter 2 Medium- to Long-term Vision for Establishment of a Sound Material-Cycle Society

In order to establish an SMC society, it is absolutely imperative that businesses, the public, nonprofit organizations (NPOs), nongovernmental organizations (NGOs), business organizations and others initially focus on the realization of a sustainable society and share a specific medium- to long-term vision of a sound material society, and then work in unison while fulfilling their respective roles, aiming high, and taking concrete steps to establish an SMC society.

If the activities of these various entities are conducted effectively, by around the year 2025 an SMC society along the lines of the following vision will have been established and the public, both now and in the future will be able to enjoy healthy and cultured lifestyles.

#### Section 1 Material Cycle in Nature and Material Cycle in Economic Society

We live in, and greatly benefit from, a so-called mass-production, mass-consumption and mass-disposal society in which we extract resources from nature in large quantities, produce and consume various goods in large quantities, and then discard disused items into the natural environment in large quantities. This means that we may waste effective resources and interfere with SMCs. An increase in demand for resources as a result of expanding populations and economic growth in developing countries is raising concerns over resource constraints incurred through depletion of natural resources and price surges, environmental destruction through stripping of natural resources, and issues of environmental pollution as a result of inappropriate disposal of hazardous waste and the like.

In addition, large quantities of greenhouse gases such as carbon dioxide are released by mankind and are causing global warming. Global warming is already negatively affecting water resources and vulnerable ecosystems. It is predicted that more serious negative impacts will be experienced in all parts of the world as temperatures continue to rise.

Meanwhile, the loss of biodiversity, which serves as the foundation of survival of not

only mankind but all other organisms, is increasing as a result of human activities that alter habitats and growing environments for organisms, for example, through land development and environmental pollution.

To respond to and eradicate the three above-mentioned threats to the Earth, a sound environment that offers a multitude of benefits will be preserved both on a global scale and in immediate environments, and a society that allows everyone, everywhere to experience comfort and contentment through their lifestyles and pass on such ways of living to future generations (in other words, a sustainable society) will be constructed. To create a sustainable society, initiatives to establish an SMC society and a Low-carbon Society will be integrated and advanced.

Realization of an SMC society will lead to the recovery of cycles in the natural world. The natural environment is dependent on maintaining a delicate balance in the ecosystem where substances circulate through the air, water, soil, and organisms. If we continue with our current mass-production, mass-consumption and mass-disposal society, the natural world will suffer from massive environmental loads and the present form of society will become unsustainable.

The following will be fundamental principles of the SMC society that we are currently aiming to create: reducing the amount of resources that are removed from nature as far as possible, and reducing the amount of materials that are finally discarded in the natural environment as far as possible by utilizing formerly used items as recycled resources. This will make it possible to establish a so-called Stock Type Society in which a large stock of superior goods will be built up and wealth will be created through the comprehensive utilization of all inputs.

The following scenarios need to be considered and developed in order to establish an SMC society: the “Technology Development Promotion Type” scenario, which focuses on investment aimed at economic growth and productivity improvement as in the present economy and society and which uses technology development as a major driver; the “Lifestyle Innovation Type” scenario in which people’s lifestyles will become more environment-conscious; and the “Environmental Industry Development Type” scenario, which is aimed at implementing economic structural reforms that will lead to the advancement of a dematerialized economy through innovation in business approaches, accompanied by a shift of focus from IT and technical innovation in the environmental field and from provision of goods to provision of functions. These scenarios will lead to the establishment of a virtuous circle for the environment and the economy. They are not necessarily mutually exclusive. It is, therefore, important to combine the advantages of all three scenarios.

A sustainable society will be developed by respecting the cycles in the natural world and establishing a more healthy material cycle, including handling of carbon, in human society so that our material cycle harmonizes with the larger scale cycles of nature and

Planet Earth. If both Japan and all other countries cooperate in making such efforts, Asia and the rest of the world will enjoy development and prosperity.

## Section 2 Realization of Sound Material-Cycle Society Based on the Characteristics of Individual Regions

Material cycles in the economy and in society do not have to be uniform. It is important to establish cycles on a scale that is optimal for the characteristics of each region and each CR. For example, CRs such as biomass materials that are generated in a particular area or that are perishable will be circulated within an area, while those that require advanced treatment technology will be treated in wider areas. “SMC blocks” is based on the idea that resources that can be circulated within a given area will be circulated within that area as far as possible while, for practical reasons, other resources will need to be circulated in wider areas. The establishment of layers of such blocks based on the primary premise of appropriate management of waste and prevention of illegal dumping, while seeking cooperation among areas, will help advance the formation of a community which is sustainable and can be integrated with a Low-carbon Society and Society in Harmony with Nature.

For example, at community levels, unwanted articles will be offered to neighbors or sold at flea markets for reuse. Faulty goods will be repaired so that they can be used for as long as possible. Municipal resource recovery facilities such as recycle plazas that allow goods to be reused and recycled and assist in the education of local residents will function as bases for recycling activities involving the general public, NGOs, NPOs and the like, thereby facilitating community businesses. The use of bicycles as a means of transportation will contribute to the establishment of local communities that impose lower environmental loads.

In rural areas, thinned timber, livestock manure, seashells, separately collected raw garbage and the like will become CRs. Such biomass CRs will be used for fertilizer and animal feed, which will help establish a cycle in which agricultural, livestock and fishery products and the like will be produced and consumed in the same area. The establishment of sustainable agriculture, forestry and fisheries will contribute to the preservation of “satochi” and “satoyama” as a habitat for organisms.

In small and medium cities where cities and farming villages are located close to each other, efforts to transport a certain amount of biomass materials as CRs to be used as fertilizer, animal feed and the like, or as energy, depending on the characteristics of the region, will be promoted in order to establish a material cycle between cities and farming villages. With regard to industrial waste, if there is no resource recovery facility in neighboring areas, the wastes will be distributed across relatively wider areas through physical distribution networks and regenerated as CRs.

In big cities, due to the high density of waste generation, a massive amount of waste

is constantly being generated and collected. Wastes will be collected as resources and duly sorted according to their potential uses. Resource recovery, reduction of unusable waste at incineration facilities, and heat recovery at incineration facilities will be conducted efficiently on a large scale. For example, in order for biomass materials and plastics, etc. to be used as CRs, waste residue from the original material cycle will be used for recycling and/or heat recovery. CRs will be used comprehensively at multiple stages, on a large scale, and in an efficient manner.

On a district/national scale, the resource input required for production activities will be comprehensively limited and controlled within the industry cluster which is at the center of the resource cycle. Meanwhile, recycling and recycling-related businesses will be clustered and CRs will be collected in wider areas, for example, through land transportation and marine transportation, and the efficient use of CRs will be advanced through the merit of scale and mutual cooperation within the cluster. In addition, technology, infrastructure, know-how etc. of arterial industry will be used to support efforts to achieve zero emissions. Original technologies will be used for CRs. For example, rare metals, which are small in amount but have high added value, will be collected, and hazardous waste will be rendered harmless.

In the SMC blocks on an international scale, measures to use CRs based on the characteristics of individual countries will be promoted. In Japan, we will use CRs that cannot be recycled in other countries and that require advanced recycling technology. The first step toward establishment of international SMC blocks is to create an SMC society in each country, enhance efforts to prevent illegal import and export of waste, and ensure traceability of the movement of waste across borders. The next step is to facilitate the movement of CRs across borders based on the existing system for international division of labor.

### Section 3 Development of Social and Economic Systems with Reduced Resources Consumption and High Energy Efficiency

We will strive to realize virtuous circles for the environment and the economy both domestically and internationally. The key to the establishment of such relationships is technology development. We will contribute to a better world by taking advantage of our technology, which is our strength, and by alleviating tight demand and supply of energy and resources.

The use of non-renewable resources such as fossil fuels and minerals will be minimized, and the use of biomass materials, which include CRs and renewable organic resources derived from living organisms, will be promoted. As part of such a process, the use of untapped energies, including renewable energy specific to individual regions, will be advanced, and this will facilitate the establishment of energy-independent communities. In addition, and as part of such progress, technology development and infrastructure development related to the promotion of natural energy will be facilitated.

Furthermore, of wastes derived from fossil resources, those that can contribute to measures to prevent global warming and those that can play a role in the effective utilization of untapped energies will be used as raw materials in the form of CRs. Then, the remainder will be used for energy recovery through, for example, waste power generation and heat utilization.

Enhanced circulation and improved efficiency of resource and energy utilization will be achieved throughout all stages of social and economic activities from resource extraction through production, distribution, consumption, and disposal. The establishment of social and economic systems geared toward reduced resource consumption and high energy efficiency will be advanced through a range of measures such as restraining the generation of waste and utilization of CRs.

In “the formation of cities and communities”, various municipal functions will be consolidated. Reduction of resource consumption and improvement of energy efficiency will be achieved through the realization of function-intensive city structures, centered on public transportation. Appropriate preservation and sustainable use of the natural environment in the immediate environs such as “satochi” and “satoyama” will facilitate the formation of cycle type, natural symbiosis type and low-carbon type communities.

In the area of “transportation”, the use of public transportation will be facilitated and there will be greater utilization of bicycles at the community level. To support such movement of people, efforts to develop public transportation, increase the convenience of bicycles through the development of bicycle-friendly traffic environments, and promote the wider use of eco-drive and car sharing (joint car use) will be advanced. Congestion will be eased through traffic signal controls and provision of traffic information utilizing IT. As for cars, those offering high environmental and energy efficiency, such as electric cars and hydrogen fuel-cell cars, will become widely used. Conventional cars with internal combustion engines will undergo significant improvement in energy efficiency. With the move toward a modal shift through the utilization of rail and ships, a broad and efficient venous distribution network for CRs will spread. Development of ports as bases for comprehensive network distribution (hereinafter referred to as “recycle ports”) will be facilitated to support the movement of cargo as described above.

#### Section 4 Establishment of Lifestyle Based on the Philosophy of “Mottainai” and Acceleration of Efforts through Partnerships among Concerned Entities

##### 1. Spread of Material Cycle Efforts Based on the Philosophy of “Mottainai”

A general awareness will develop among the public that our conventional lifestyle based on mass-production, mass-consumption and mass-disposal has led to the escalation of environmental problems on a global scale. The majority will be increasingly aware of the need to shift to a new lifestyle that brings material comfort into balance with environmental preservation. People will increasingly put the

philosophy of “Mottainai” into practice in every aspect of life, for example, when selecting and consuming goods and services, so that they will be able to take the fullest advantage of what these goods and services have to offer. They will also be increasingly aware of their responsibilities as dischargers.

With regard to lifestyle, one that allows us to commune with the natural environment specific to our local area, use and utilize locally sourced biomass and other renewable energy resources, live comfortably and harmoniously with nature and experience natural rhythms by, for example, eating foods in their natural season, will take root. And the “one-way” lifestyle that was formed during the latter half of the 20th century will be replaced by one that is based on the “material cycle”.

In terms of involvement with nature, there will be increased understanding that our right to live in the natural environment entails firsthand experience of that environment, obtained by playing in, getting close to, and “gratifying our senses” in natural surroundings, both in the community and in cooperation with the community. We will manage forests, an accessible example of “nature”, according to plans that include growing trees over a time span of 100 years. Also, we will use felled timber for housing and furniture, then as recycled wood particle board and the like, and will finally utilize it as fuel for heating or for other purposes. In addition, “satoyama”, community-based forests, will be utilized as sites for mushroom-picking and edible wild plant gathering, for observing nature, and for environmental education. Biomass resources such as thinned timber and Japanese silver grass, which are produced as a natural consequence of maintaining satoyama, will be utilized effectively.

With respect to “clothes”, people will take care of them and use them for longer periods. They will dress more specifically by coordinating clothes with the season and the occasion. For example, the value of the kimono, handed down over generations, will be seen in a new light and old clothes will be sold at flea markets. People will be encouraged to remake unwanted garments into new clothes, imparting to them a fresh value.

For foods, products labeled with the name of the producer so that their “face” can be seen will be preferred and consumed. There will be rising interest in food safety guarantees. Dietary education will foster people’s sense of gratitude for food. Buying food with the shortest expiration date or the shortest recommended use-by date at supermarkets and convenience stores will become established custom. It will become common practice for people to order food for a wedding reception on the day of the wedding. As a result, unsold and leftover food will be reduced. In addition, the concept of the environment-friendliness of food will spread widely so that locally produced seasonal food will be consumed locally and chopsticks will be made from thinned timber. Meanwhile, in locations where urban areas are adjacent to cultivated land, the establishment of SMC at a local level will be facilitated through the joint efforts of business organizations such as supermarkets, restaurants and farms to facilitate local

cooperation, for example, through localized production and consumption of products and the use of fertilizer and animal feed made from kitchen waste.

Turning to “housing”, high-quality houses that can be used for longer periods will be designed for and valued by members of different generations. Solar water heaters will be installed and building materials with high insulation efficiency and other desirable properties will be used in construction as part of energy-saving efforts. People will develop greater respect for traditional practices and tools such as “sudare (chick blind)” and “uchimizu (water sprinkling)”, and will have lifestyles that are beneficial to both humans and the environment. In addition, people will renovate old houses, empty homes and offices and re-use them with care and respect.

As for “health”, LOHAS (Lifestyles of Health and Sustainability – which focuses on the sustainability of human health and the environment) will become widespread and people will increasingly focus on non-materialism (spiritual richness). Mental and physical health and environmental preservation will be integrated. In addition, health-related safety and security will be enhanced through more effective control of health risks associated with chemical substances.

For “employment”, SMC businesses will occupy an important position in respect of employment, and community-based activities will be established as community businesses and grow in a sustainable manner. Meanwhile, work-life balance will be promoted and a virtuous circle for “enhancement of work” and “enhancement of life beyond work” will be introduced. People will actively participate in voluntary environmental activities both at home and in the local community.

In terms of “leisure”, people will have more opportunities to access art and culture, including concerts, theaters and art museums, and more people will participate in leisure activities such as sports and camping. They will enjoy eating foods more slowly, develop an interest in ecotourism, and engage in various community activities on a regular basis, thereby enriching their lives. While people will enjoy these activities and pastimes, consideration for the environment will be incorporated into every aspect: reusable cups will be used in place of disposable containers at soccer and baseball stadiums and concert halls and the like, and efforts to use and utilize raw wastes from hotels and restaurants as compost and/or biogas will be promoted.

As for objects, people will set a high value on using furniture and tools for many years, by polishing, repairing and mending them, using their own hands. And as a result of the benefits that people will gain by making goods, using their own energy and ingenuity, they will experience a great sense of satisfaction from their handiwork, which will also be highly appreciated by others. There will be a larger proportion of long-life products, which will be designed to save energy and function for longer. Moreover, the need for services such as lease and rental services for people who do not wish to purchase or possess products, and repair and maintenance services that

will allow these products to be used for a long period of time, will increase. In regard to appliances that use energy, appropriate use of energy-saving technology will become more widespread. People will choose more efficient appliances when replacing old items, while bearing in mind the philosophy of “Mottainai”.

With respect to household articles that need to be replaced after a certain time or goods for children that are used only for a short term, people will begin to realize that they only need to purchase the functions of these goods, rather than needing to possess them. They will actively use so-called recycling shops, flea markets and the like, and use articles and provision of functions (“servicizing”) creatively and wisely. Moreover, people will bring their own shopping bags or wrapping cloths when going shopping and will refuse unnecessary containers or packaging. Then, it will become common for people to purchase environmentally conscious products and services (green products and services), including recycled goods and refill products that impose smaller environmental loads (green purchasing).

## 2. Acceleration through Partnerships among Concerned Entities

With these changes in the awareness and behavior of the general public, joint efforts toward the establishment of an SMC society will advance through partnerships between residents, NGOs, NPOs, business organizations and governments in each community, thereby accelerating changes in awareness and behavior and revitalizing the community. (For measures and initiatives taken by each entity, see Chapter 4: Cooperation between Entities and Their Expected Roles.)

Specifically, the public and other entities will be encouraged to fully participate and become involved in the process of formulating and deciding on measures under the leadership of the government. In response to these measures, people will participate in various environment-related activities organized by NGOs/NPOs and local governments, resource collection, cleaning activities and flea markets. Business organizations will also participate actively in environmental preservation activities in the community, communicate their 3R efforts in their factories and offices, and provide environmental information and opportunities for environmental education to local residents living in their vicinity. Through coordination between NGOs, NPOs and local public authorities, a framework for using community currencies will be established. Environmental preservation activities will be facilitated, including the active use of community currency.

Meanwhile, business organizations will estimate the environmental loads imposed by their products and services and provide information to the general public in their role as consumers. Consumers will then select products and services based on that information. Similarly, consumers’ demands for environment-conscious products and services will be easily conveyed to business organizations through NGOs, NPOs and the like. Enhanced environment-consciousness will be ensured in the production phase. In the emission phase, the public will ensure that waste is separated as a

result of measures taken by local civic authorities to educate them on environmental issues. This will make it easier for business organizations to recycle waste and produce advanced recyclable products. The public will also become more cooperative in helping business organizations to collect waste.

Information on actual conditions, issues and measures, which form the basis of partnerships between concerned entities, will be easily accessible by anyone. Entities will be encouraged to implement the necessary measures and public administrations will be encouraged to collaborate in these activities. These measures will include provision of technical information in a form that is simple and easy to understand, proactive and swift provision of information utilizing IT, and linking and networking of related information. Information will be transmitted to the rest of the world, and community-based detailed information will be provided to the general public.

## Section 5 Establishment of a Broad Understanding of 3R Principles in Manufacturing and Other Economic Activities

The expansion of systems based on discharger's responsibility and EPR, the establishment of a system for prevention of and crackdown on illegal dumping and for remediation, the promotion of voluntary efforts and the streamlining of various procedures will be promoted. As for products, there will be a broader understanding of the 3R principles throughout product lifecycles from production through distribution and use to disposal. The 3R principles will also increasingly take root in other economic activities.

With regard to "products", specifically, active efforts will be made to minimize the amount of natural resources input throughout product lifecycles. For example, Design for Environment (DfE) will be incorporated into products from an entire lifecycle standpoint: "Resource-saving manufacturing" will be introduced so that the input of natural resources will be reduced throughout the production process from raw materials to components, products will be designed to facilitate their repair, maintenance and upgrade and, by taking into account the issues that arise after they become unusable, they will be designed so that their correct reuse, recycling or disposal can be easily performed, if and when they become waste. Thus, manufacturers will develop and sell more refill products and long-life products, as well as products that use fewer resources, have more value added, and attach importance to functionality and design. In factories, the production process will be integrated with cyclical use and disposal processes, while organic cooperation among industries and cooperation between industry and local communities will be promoted in order to minimize the input of raw materials and to advance reduction of waste generation. Also, manufacturers will minimize use of hazardous chemical substances in each of the stages, including material choice, processing, and assembly.

At the distribution and end-use stages, there will be a shift from frequent model changes, mass production and mass marketing of products to more responsible

production which accepts responsibility for the disposal of products after they become unusable. Enhanced services will be required to permit longer use of products, including repair, maintenance and upgrade services. Efforts will also be made in the areas of provision of product information concerning the environment and pricing. In addition, in the business activities of offices, in an effort to consider the environment, actions to reduce waste, energy use and the like will be further promoted. Practices utilized will include: photocopying on both sides of paper; use of green products and services; appropriate use of lighting apparatus and air conditioners; and the spread of telecommuting due to advances in information technologies.

At the disposal stage, products will be collected when their useful lives are at an end. Measures to collect useful resources, such as rare metals used by industries, and measures to regenerate products will be further promoted. Waste disposal and recycling businesses will play extremely important roles. Cooperation among industries and companies, including manufacturers, will help advance responsible cyclical use and disposal of waste.

For services, ways of providing products other than selling them will be more common: lease and rental systems based on the concept of providing functions, and so-called 'recycling shops' that supply high-quality goods, and offer repair and maintenance services that will encourage customers to use superior products with care for a long time. In addition, servicizing, which will contribute to reducing environmental loads, will be used more actively to replace the provision of goods.

In the area of finance that supports business activities, more loans and the like will be provided to environment-conscious companies and environmental projects and activities. Business organizations that are making 3R efforts will also enjoy an advantage in financing. The provision of such funds will facilitate 3R initiatives at every stage, thereby advancing 3R measures in the area of financing and in the provision of goods and services.

There will be a shift in the way business organizations view economic activities: obtaining customer confidence through 3R efforts, as described above, is a desirable way of conducting economic activities for both consumers and business organizations over the long run. Those businesses that provide products and services will be increasingly willing to engage in efforts to preserve the environment. Specifically, they will provide green products and services by utilizing new technologies and systems and proposing new business models.

As a result, the domestic market for SMC businesses will expand and the green products and services of Japan will become highly regarded internationally, thereby driving an environment-friendly business market in Asia and the rest of the world. In addition, many researchers will come to Japan to gain knowledge and experience. Researchers from Asia will come to Japan to study at universities, companies and other institutions. In many cases, they will strive to establish SMC societies when they return to their own countries.

## Section 6 Enhancing Systems for the Correct Cyclical Use and Disposal of Waste

Based on the passing and enforcement of laws, regulations and the like for the disposal and recycling of waste, comprehensive recycling facilities will be constructed or improved at key locations that are appropriately and systematically deployed countrywide to form the foundation of an SMC society. These facilities will be able to recycle and/or dispose of waste including containers, packaging and home appliances more efficiently, using advanced technologies. Meanwhile, biomass, including raw garbage, will be recycled at small-scale recycling facilities or biomass utilization plants in local areas. Furthermore, recycle ports and the like will be constructed to handle the flow of CRs over wider areas if the materials and related industries adopt and implement advanced technologies. These infrastructures will be resource-producing centers in our society and will generate and provide new resources. Businesses will contribute to minimization of new extraction of resources from nature by actively using these new resources.

Moreover, waste disposal facilities will be enhanced and integrated, and will have longer lives. These facilities will decompose and detoxify hazardous waste such as PCBs and asbestos which require advanced treatment technologies, and will collect harmful substances that are difficult to substitute in order to promote their reuse and recycling within closed systems. They will also extract useful substances from waste residue by taking advantage of advanced technologies. Furthermore, based on the prioritization of the measures to be taken in an SMC society as stipulated in Fundamental Law for Establishment of an SMC Society, they will implement high-efficiency heat recovery to collect energy sources during incineration of waste that cannot be reused or recycled. Highly efficient energy recovery systems, which generate methane and electricity from waste, will proliferate, especially where there is a need to process municipal solid wastes.

Waste will be transported while taking the environment fully into consideration. Railroad and vessel transportation will be used in addition to or combined with transportation by truck. For example, through the construction of recycle ports as bases for marine transportation of cyclic resources and the increased convenience this will bring, a venous distribution network will be constructed centered on harbors.

As for final disposal sites, measures will be taken according to the actual conditions that exist in each area. For example, large disposal sites will be constructed or improved, or waste buried in existing disposal sites will be recycled and/or reduced in quantity, in order to increase reclamation capacity and prolong the lives of final disposal sites, on the premise that such waste will be handled properly.

In addition, these facilities will be open to the public and actively utilized as places for environmental education and related purposes.

To establish an SMC society and to eradicate illegal dumping, measures to prevent

such dumping and control systems will be established through utilization of information technologies and the like and in cooperation with community and related agencies. In regard to past illegal dumping, “negative inheritance” will be rectified through remediation.

The 3R principles, waste-processing technologies, measures and systems that facilitated their development and introduction, and the efforts of concerned entities that actually implement them can be described as a “Japanese model for an SMC society”. This can serve as a useful reference for other countries. In particular, by showing the way to other Asian countries, Japan is making a contribution to the establishment of SMC societies on an international scale. Japan systematically transfers experience, technologies and systems that are appropriate for these countries (e.g. safe and hygienic human waste treatment systems) and that can be applied to their respective societal conditions. In addition, Japan collaborates with other countries, especially East Asian countries, as a partner in the drive to establish SMC societies throughout the region. This will help establish SMC societies on an international scale.

### Chapter 3 Indicators and Quantitative Targets for Establishment of an SMC Society

The First Fundamental Plan adopted material flow indicators and effort indices, for which respective quantitative targets were set. Progress has been monitored every fiscal year. This plan sets the material flow indicators and effort indices based on the results of that monitoring.

This plan will adopt three material flow indicators, as in the First Fundamental Plan, along with supplementary indicators. In addition, other indicators will be introduced to monitor changes without setting quantitative targets, in order to identify issues that call for action.

Regarding effort indices, indices will be introduced to monitor near-term changes in addition to indices for which quantitative targets will be set.

The State, general public, NPOs, NGOs, business organizations, local governments and the like will attain the quantitative targets by making the efforts described in the next chapter and below, including strict enforcement of relevant laws. Upon attainment of the quantitative targets, concerned entities will continue to maintain and improve the level of their efforts.

#### Section 1 Material Flow Indicators

##### 1. Indicators for which Quantitative Targets are Set

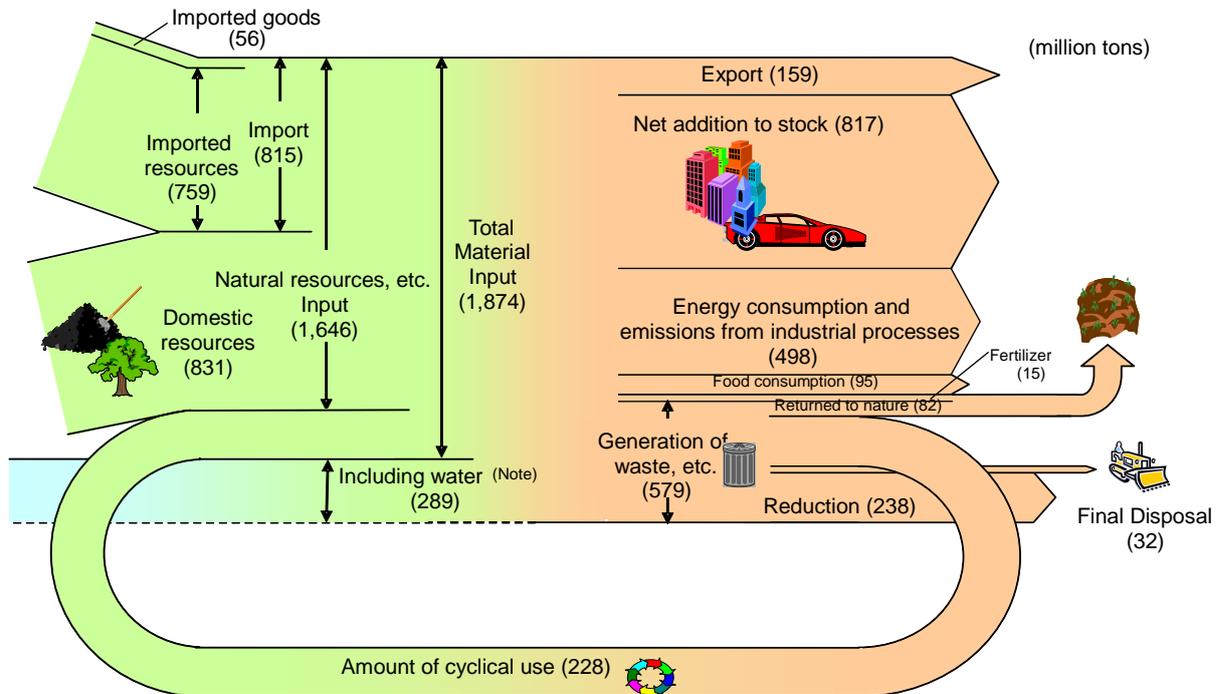
This plan continues the use of three indicators which represent the three aspects of the material flows in our society, and we have set a quantitative target for each of the three indicators. We have set FY 2015 as a target, together with a longer perspective that projects the vision we have of society around FY 2025.

(Table 3 Target Concerning Material Flow Indicator)

Target Year: 2015

Indicator	Resource productivity	Cyclic use rate	Final disposal amount
Target	420,000 yen/ton	14~15%	23,000,000 tons

Reference] Figure 1. Illustration of material flow in Japan in FY 2005  
(prepared by the Ministry of the Environment)

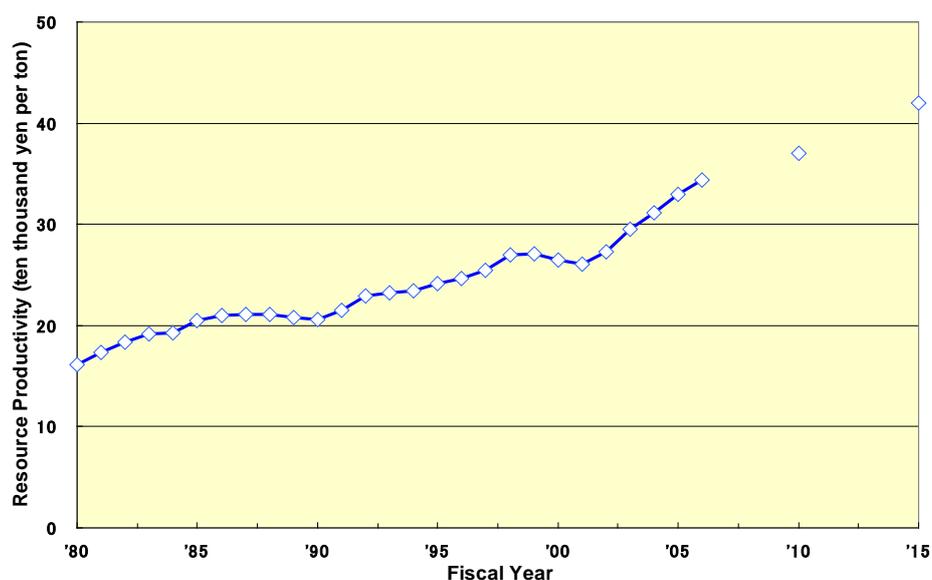


(Note) Including water: Input of water included in waste and the like ( sludge, animal manure, human waste, waste acid, waste alkali) and sediment and the like associated with economic activities (sludge from mining, building and water works and tailing from mining).

(1) "Inlet": Resource Productivity ( =  $\frac{\text{GDP}}{\text{Natural resources and the like input}}$  )

We have set a target for Resource Productivity of about 420 thousand yen per ton by FY 2015 (almost double the approx. 210 thousand yen per ton in FY 1990, and about a 60% improvement on 260 thousand yen per ton in FY 2000).

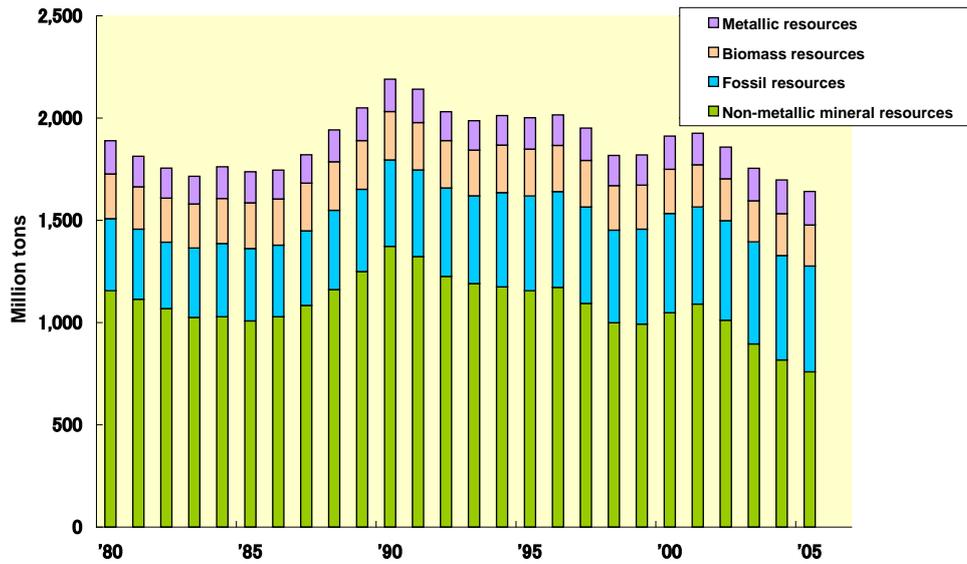
[Reference] Figure 2. Resource productivity in each fiscal year from 1980 to 2000  
(estimated by the Ministry of the Environment)



\* “Resource Productivity” is the index to comprehensively represent how effectively materials are used by industries and in people’s lives. Natural resources are limited in quantity, cause environmental loads when extracted, and finally become waste. Therefore, it is desirable that the GDP is effectively generated with a lower input of natural resources. That is, an improvement of resource productivity is desired. “Natural resources input” indicates the amount of home-extracted and imported natural resources and imported products, and is also referred to as Direct Material Input (DMI).

As for natural resources input, a breakdown of natural resources input etc. (measurement of fossil resources, metal resources, nonmetallic mineral resources and biomass resources from home and abroad) will be measured supplementarily because an increase or decrease of nonmetallic mineral resources (earth and rock resources) has a large impact on the natural resources input a whole, because it is necessary to pay specific attention to fossil resources from the standpoint of global warming preventive measures, and because it is desirable to use collected biomass materials by taking due account of the environment to enable their sustainable use.

[Reference] Figure 3. Natural resources input by resource types  
(estimated by the Ministry of the Environment)

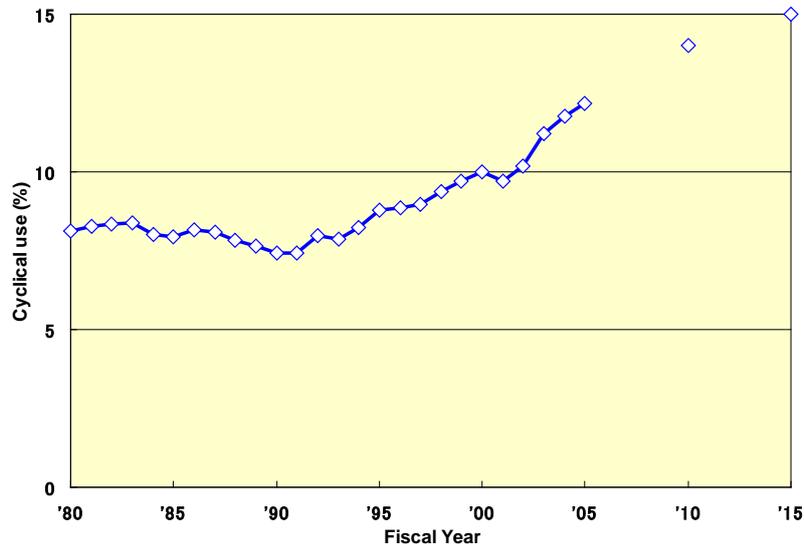


(2) “Cycle”:

$$\text{Cyclical Use Rate} \left( = \frac{\text{Amount of cyclical use}}{\text{Amount of cyclical use} + \text{natural resources input}} \right)$$

We have set a target for Cyclical Use Rate of about 14% to 15% by FY 2015 (almost 80% improvement on about 8% in FY 1990, and 40% to 50% improvement on about 10% in FY 2000).

[Reference] Figure 4. Cyclical use rate in each fiscal year from 1980 to 2000  
(estimated by the Ministry of the Environment)

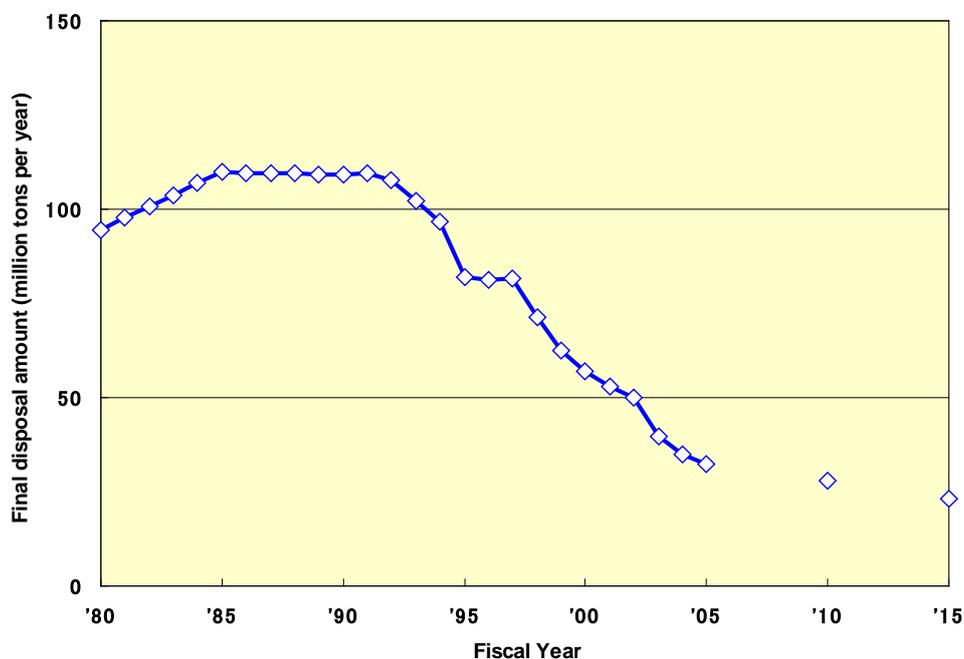


\* “Cyclical use Rate” is the index to represent the percentage of the amount of cyclical use in the total amount of things input into an economic society. It is desirable, in principle, that this rate is increased, which means correct cyclical use is promoted to reduce the final disposal amount. The “total amount of things input into an economic society” is the sum of the natural resources input and the amount of cyclical use.

(3) “Outlet”: Final Disposal Amount (= Final disposal amount of waste)

We have set a target for Final Disposal Amount of about 23 million tons (almost 80 percent reduction on about 110 million tons in fiscal year 1990, and almost 60 percent reduction on about 56 million tons in fiscal year 2000).

[Reference] Figure 5. Final disposal amount in each year (surveyed by the Ministry of the Environment)



\* “Final Disposal Amount” is the index that is directly connected to the urgent problem that the remaining capacity of final disposal sites is rapidly shrinking. This index is the sum of the final disposal amount of municipal solid waste and that of industrial waste, and it is desirable to decrease this amount.

2. Supplementary indicators for which quantitative targets are set

(1) Resource productivity excluding earth and rock resources input

In terms of resource productivity, resource productivity per natural resource input, excluding earth and rock resources input, will be set as a quantitative target to complement existing resource productivity, because rises and falls in nonmetallic mineral resources (earth and rocks) impact on natural resources input overall. Resource productivity per natural resource input, excluding earth and rock resources input, will be about 770,000 yen per ton in fiscal year 2015 (about 30% increase on about 590,000 yen per ton in fiscal year 2000).

(2) Coordination with efforts toward Low-carbon Society

To gauge the progress of integrated development of the efforts toward a Low-carbon Society and the efforts toward an SMC society, we set a target for CO<sup>2</sup> emission reduction of 7.8 million tons, to be achieved in fiscal year 2010 in the area of waste, in accordance with the revised Kyoto Protocol Target Achievement Plan. In addition, greenhouse gas emissions from waste and greenhouse gas emissions from fossil fuels, which can be replaced by recycling of waste into raw fuel, waste power generation and

the like, will be measured to gain an accurate understanding of the situation.

Greenhouse gas emissions from the area of waste will be about 43 million tons or less in FY 2010 (average emissions for five years from FY 2008 to FY 2012), based on measures stipulated in the revised Kyoto Protocol Target Achievement Plan.

### 3. Indicators to monitor changes

#### (1) Resource productivity of fossil resources

As for resource productivity of fossil resources, only resource productivity per fossil resource input will be measured, because fossil resources are non-renewable, and thus must be used particularly efficiently, and because it is necessary to consider fossil resources from the standpoint of global warming preventive measures.

#### (2) Biomass resources input rate

Regarding biomass resources, the ratio of biomass resources input to natural resources input (biomass resources input rate) will be measured because it is desirable to use biomass materials that have been collected taking due account of the environment in order to enable their sustainable use.

#### (3) TMR including hidden flows

The total amount of concerned material (Total Material Requirement, hereinafter referred to as "TMR") includes a wide range of elements such as "hidden flows" of materials that may be extracted or mined along with resources targeted for extraction, or materials that may be emitted as waste. TMR is a rough quantitative indication of the sustainability of resource use or environmental loads on a global scale. Reduction of new resource extraction from the natural environment and promotion of cyclical use of metallic resources will lead to a reduction in environmental loads abroad, which is associated with the use of resources in Japan. TMR can also be used to evaluate progress in the recycling of rare resources and the like, as it is difficult to evaluate such progress from weight only. As for imported metallic resources that are subject to 3R measures, it is estimated that about 2.1 billion tons of TMR are generated (21 times metallic resources imports which are about 100 million tons – in terms of the amount of pure metal) in relation to metallic resources imported into Japan. Therefore, TMR for metallic resources imported into Japan will be measured.

To measure TMR, it is necessary to obtain accurate information on the grade and type of mineral ore at each mine where metallic resources are extracted. However, Japan relies on imports to meet most of its demand for metallic resources, which makes it difficult to obtain accurate information on the grade and type of mineral ore at each mine outside Japan. It is therefore necessary to be aware that we have to rely on estimated data to a significant degree. It is also necessary to consider, to a certain extent, that TMR itself is not a direct indicator of destructive impact on the environment.

Securing a stable supply of metallic resources from abroad is an important issue for Japan. However, overseas mines have been confronted by a drop in the quality of mineral ores and the need to dig deeper for mineral deposits, which may affect TMR. It

is therefore necessary to continue accumulating international knowledge.

#### (4) Indicators based on international resource cycles

Regarding the international movement of recyclable resources, the volume of CR imports and exports will be measured in order to review their domestic and international cycles.

In addition, total material consumption (the total amount of materials directly consumed in domestic economic activities – Domestic Material Consumption), which is total material input minus exports, will be measured.

Similarly, there is the total amount of concerned material in respect of domestic consumption (Total Material Consumption) for TMR.

#### (5) Resource productivity by industry area

In regard to changes in resource productivity, we will analyze changing factors more precisely, not only by using our indicators for the whole country but also by estimating individual resource productivity for mass resource consumption type goods and services.

### 4. Issues to be examined

We will examine the following matters:

- Material flow in each region

The compilation of statistics concerning the movement of materials between prefectures and municipalities has not been satisfactory, which makes it difficult to estimate the material flow at this point. However, quantitative measurement and announcement of the material flow and the like in each region, for which efforts should be made, are an important way to encourage the formation of a material-cycle community based on the concept of SMC blocks. When comparing regions, it is necessary to take into account differences in industry structures.

- Material flow indicators that allow international comparisons

To enable comparisons with other countries, including advanced countries and Asian countries, it is necessary to develop a common computation method and to construct a database. We will actively contribute to the accumulation of international knowledge. In addition, we will promote assistance through the development of statistics, especially those concerning resource productivity, recycling ratios, and final disposal amounts in Asian countries.

- Primary Resource Equivalence Conversion Weight

The present material flow indicators examine the possibility of measuring the primary resource equivalence conversion weight, which adds the weight of raw materials to the weight of products, based on the concept that the amount of highly processed imported materials and products could be underestimated. To deal with

such cases, we will also advance development of other conversion methods so that consensus among concerned parties can be obtained both at home and abroad.

- Environmental Efficiency and Resource Productivity

Resource productivity indicates how much GDP is produced per natural resource input. There is also the concept of “environmental efficiency”, which indicates efficiency between environmental loads and the added value of goods and services. When calculating environmental efficiency, the value of a company or product is used instead of GDP, and environmental loads are used instead of natural resources input.

Regarding environmental loads associated with the extraction of resources and the use of resources and products, there is a possibility that we will collect and analyze information required for quantitative understanding and evaluation, develop inventory concerning the computation of such environmental loads, and promote joint research between domestic research institutions and overseas research institutions and international organizations.

- Establishment of a standardized conversion factor that can be used internationally

We will contribute to discussions at OECD and UNEP forums about a conversion factor for which insufficient statistics have been compiled and for which no international consensus has been obtained. We will ensure that the outcomes of these discussions are fully utilized.

- 3R indicators based on the amount of reuse, material flows by individual items, and a common calculation method

We do not have sufficient detailed data at this point in time, so we will continue to examine them.

## Section 2 Effort Indices

To measure the progress of efforts for establishment of an SMC society, we set targets concerning the following effort indices.

The “index for which a target is set” and the “index to monitor changes” have been set as part of these effort indices to enhance and strengthen the “effort indices” system.

We have set FY 2015 as the target year.

### 1. Indices for Which a Target is Set

#### (1) Reducing the Quantity of Waste

##### (i) Reducing the quantity of municipal solid waste

Municipal solid waste generation is classified differently from waste from households and waste from business activities. Therefore, we set the following three effort indices concerning the reduction of municipal solid waste.

- (a) As effort indices concerning both the public and business organizations, we set a target of reducing the “amount of garbage discharged per person per day (municipal solid waste generation consisting of the designed amount of waste collected by a municipality (local government) , the amount of waste directly transported by a business and the amount of recyclables collected by civic groups was converted into an amount per person per day)” by about 10% compared to the amount in FY 2000.

[Reference: “Waste Disposal in Japan (FY 2005 Edition)” Ministry of the Environment]  
• “The amount of garbage discharged per person per day”: about 1,185 grams on average (in FY 2000)  
• “The total amount of solid waste generation”: about 54,830,000 tons (FY 2000 Edition)

- (b) To evaluate the publics’ efforts to reduce waste and to participate in sorted collection, we defined the amount excluding the amount of recyclables collected by civic groups, recyclable waste and the like as the “amount of garbage discharged from households per person per day”. We set a target of reducing the amount of garbage discharged from households per person per day by about 20% compared to the amount in FY 2000.

[Reference: Estimated from “Discharge and Disposal Situation of Municipal Solid Waste (FY 2005 Edition)” Ministry of the Environment]  
• “The amount of waste generated from households per person per day”: about 660 grams (in FY 2000)\*  
\* The amount of waste generated per person excluding the amount of waste from businesses, the amount of recyclables collected by civic groups, and the amount of recyclable waste.  
• The amount of waste generated from households: about 36,840,000 tons: (in FY 2000)

- (c) As for waste generated from businesses, we set a target of reducing the “total amount” of garbage discharged from businesses by about 20% compared to the amount in FY 2000, instead of targeting to reduce the amount discharged per business, because the number of businesses changes significantly and because there are a big differences in the amount of waste generated depending on the size of the business.

[Reference: “Discharge and Disposal Situation of Municipal Solid Waste (FY 2005 Edition)” Ministry of the Environment]  
• Amount of waste generated by businesses: about 17,990,000 tons (in FY 2000)

(ii) Reducing the amount of industrial waste

We set a target of reducing the final disposal amount of industrial waste by about 60% compared to the amount in FY 2000 (by about 80% compared to the amount in FY 1990).

[Reference: “Report on Generation and Disposal of Industrial Waste (Results in FY 2005)” Ministry of the Environment]  
• “Final disposal amount of industrial waste in FY 1990”: about 89 million tons  
• “Final disposal amount of industrial waste in FY 2000”: about 45 million tons  
• “Final disposal amount of industrial waste in FY 2005”: about 24 million tons

(2) Changes in Thoughts and Actions to Establishing an SMC Society

We set a target, as a result of a questionnaire, that about 90 percent of respondents should aim to reduce the amount of waste, implement cyclical use,

and practice green purchasing, and that 50 percent should take concrete actions in relation to these matters, based on the results of a questionnaire survey on attitudes and actions toward establishing an SMC society.

In addition, we will set questionnaire items that take into account changing lifestyles, including increasing use of the Internet and “own shopping bags”, and we will conduct a more flexible and efficient survey by utilizing the Internet and other media.

<p>[Reference: “Survey on Attitudes toward Establishment of an SMC Society” (in FY 2007, N (population parameter) = 1,232)]</p> <ul style="list-style-type: none"> <li>■ Attitude toward 3R in general <ul style="list-style-type: none"> <li>○ Interest in waste problem <ul style="list-style-type: none"> <li>• “I am (very/somewhat) interested in waste issues”: 86%</li> </ul> </li> <li>○ Recognition of 3Rs <ul style="list-style-type: none"> <li>• “I know the term 3R (and its priorities/meaning)”: 22%</li> </ul> </li> <li>○ Attitude toward waste reduction and cyclical use of waste <ul style="list-style-type: none"> <li>• “I (always/sometimes) try to reduce garbage and recycle things”: 79%</li> <li>• “Although I think the waste problem is serious, I buy a lot of things and dump a lot of things”: 7%</li> </ul> </li> <li>○ Attitude toward green purchasing <ul style="list-style-type: none"> <li>• “I (always/as much as possible/occasionally) try to buy environmentally friendly products”: 86%</li> <li>• “I do not try to buy environmentally friendly products at all”: 11%</li> </ul> </li> </ul> </li> <li>■ Major, specific 3R action example <ul style="list-style-type: none"> <li>○ Reduce <ul style="list-style-type: none"> <li>• “I try to take my own shopping bag when I go shopping and refuse free plastic shopping bags or excessive packaging”: 45%</li> <li>• “I try to choose stores that use simple packaging or that do not use disposable tableware (e.g. chopsticks)”: 12%</li> <li>• “I try to take my own chopsticks when I eat out so that I can refuse disposable chopsticks, or refuse disposable tableware”: 7%</li> </ul> </li> <li>○ Reuse <ul style="list-style-type: none"> <li>• “I try to sell and buy things through Internet auctions”: 24%</li> <li>• “I try to sell and buy at secondhand shops, charity bazaars or flea markets”: 23%</li> <li>• “I buy products that use returnable containers, such as bottled milk”: 18%</li> </ul> </li> <li>○ Recycle <ul style="list-style-type: none"> <li>• “I take trays, cellular phones and the like to shops for collection”: 46%</li> <li>• “I actively buy recycled products made from regenerable materials”: 20%</li> </ul> </li> </ul> </li> </ul>
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### (3) Promoting SMC Businesses

#### (i) Promoting green purchasing

We set a target that about 50 percent of all the local governments and listed companies (companies listed in the first and second sections of the Tokyo, Osaka and Nagoya Stock Exchanges), and about 30 percent of the unlisted companies surveyed (unlisted companies and business offices with 500 employees or more), will implement organization-wide green purchasing.

We will analyze the results of questionnaire surveys to gain a clear understanding of the extent to which green purchasing has penetrated, and to promote green purchasing efforts.

#### (ii) Promoting environmental business management

We are striving to promote and increase the number of ISO14001 environmental management system certifications that are issued. In addition, we set a target that the number of certificates issued under the Eco Action 21, which enables SMEs to design and operate environmental management programs, will reach 6,000.

We are gaining an understanding of the extent to which environmental reports and environmental accounting have penetrated, as a result of questionnaire surveys, and we are making efforts to improve the current level of dissemination.

[Reference: Number of ISO 14001 certificates issued: 20,000, Number of Eco-Action 21 certificates issued: 2,000 in FY 2007, Ministry of the Environment]  
[Reference: "Survey on Environmentally Friendly Business Behavior in FY 2006" (FY 2007), the Ministry of the Environment]

- "Publication rate of environmental reports in FY 2006"  
Listed companies: about 52%, unlisted companies: about 28%.
- "Implementation rate of environmental accounting in FY 2006"  
Listed companies: about 40%, unlisted companies: about 22%.

(iii) Expanding SMC business market

We set a target that the market size of SMC businesses should double compared to that of the year 2000.

In addition, we measure the number of staff employed by SMC businesses.

[Reference: Survey on the Greening of Industrial Activity for the Integration of Environment and Economy, FY 2006 (Ministry of the Environment Survey)]

- "Market size of SMC businesses in the year 2000": about 21 trillion yen
- "Market size of SMC businesses in the year 2005": about 28 trillion yen
- "Number of staff employed by SMC businesses in the year 2005": about 700 thousand.

(4) Steady implementation of individual recycling laws, plans and the like

For individual items and business types, the targets that are set based on their respective recycling laws, programs, and the like should be achieved.

2. Indices to monitor changes

We are ascertaining in quantitative terms changes in the efforts being made by entities and set "indices to monitor changes", which will also serve as a reference for information provision and future measures.

(1) Size of rental and lease business market and the shipping rate for refill products

We are gaining an understanding of the size of the market for rental and lease businesses and the shipping rate for refill products as the publics' and business organizations' effort indices of Reduce and Reuse.

(2) Rate of refusal of free plastic shopping bags (rate of "taking own shopping bags") and the volume of sales of disposable products (imported chopsticks)

We are gaining an understanding of the rate of refusal of free plastic shopping bags (rate of "taking own shopping bags") and the volume of sales of disposable products (imported chopsticks) as the publics' effort indices of Reduce.

(3) Size of the market for secondhand goods and the rate of use of returnable bottles

We are gaining an understanding of the size of the market for secondhand goods and the rate of use of returnable bottles as the publics' and business organizations' effort indices of Reuse.

- (4) Number of stadiums introducing “reusable cups” and the like  
 We are gaining an understanding of the number of stadiums that have introduced “reusable cups” that can be washed and re-used a number of times, as business organizations’ effort indices of Reuse.
- (5) Number of fundamental plans for SMCs and the like at regional levels  
 We are gaining an understanding of the number of fundamental plans for SMCs formulated by local governments (including Basic Environmental Plans with material cycle-related descriptions), as local governments’ effort indices of 3R in general.
- (6) Percentage of local governments that are implementing paid garbage collection and top municipalities in terms of waste reduction efforts  
 We are gaining an understanding of the percentage of local governments that are implementing paid garbage collection, and top municipalities in terms of waste reduction efforts, as local governments’ effort indices of Reduce.
- (7) Number of resource recovery facilities (recycle plazas and the like)  
 We are gaining an understanding of resource recovery facilities such as recycle plazas as local governments’ effort indices of Reuse and Recycle.
- (8) Rate of recycling of municipal solid waste, total amount of recyclables collected by civic groups, top municipalities in terms of recycling efforts, percentage of local governments that are implementing sorted collection, and amount of sorted collection by municipalities by item, and the like  
 We are gaining an understanding of the rate of recycling of municipal solid waste, the total amount of recyclables collected by civic groups, top municipalities in terms of recycling efforts, the number of local governments by sorted collection type I to III<sup>4</sup>, and the like, as local government’s effort indices of Recycle.
- (9) Number of environmental learning and exchange meetings held by local governments and the like, and number of applications submitted to the “Assistance Program for Local communities for Establishing an SMC Society”  
 We are gaining an understanding of the number of environmental learning and exchange meetings held by local governments and the like, and the number of applications to the “Assistance Program for Regions Establishing an SMC Society” that have been achieved through cooperation and collaborative efforts of entities, as entities’ effort indices of 3Rs. In addition, we work on improving the indices used to indicate cooperation and collaborative efforts of entities, actively collect and gain an

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<sup>4</sup> Municipalities categorized as Type I: Municipalities that have recovered resources such as paper, metal, glass and plastic bottles.  
 Municipalities categorized as Type II: Municipalities that have recovered resources such as paper, metal, glass, plastic bottles and waste plastics.  
 Municipalities categorized as Type III: Municipalities that have recovered resources such as paper, metal, glass, plastic bottles and waste plastics, and at high-speed composting facilities.

understanding of good examples, and provide assistance including information transmission, from the standpoint that it is important for entities to cooperate and make collaborative efforts toward the establishment of an SMC society and that it is desirable to promote such efforts.

We will make necessary changes to and improve effort indices in a flexible manner based on the results of annual inspection and analysis, because it is necessary to ensure that the efforts of concerned entities will lead to steady progress.

Meanwhile, these effort indices are expected to provide a reference for the establishment of targets at regional levels, for example, when establishing more advanced effort indices specific to regions.

[Reference] Table 4 Effort Indices Concerning the Establishment of an SMC Society

Entity	Characteristics of indices	Reduce	Reuse	Recycle
Citizen	Target	<b>Overall 3R efforts</b> <ul style="list-style-type: none"> <li>Reduction of municipal solid waste                             <ul style="list-style-type: none"> <li>Amount of waste generated per person per day: About a 10% reduction compared to the amount in FY 2000</li> <li>Amount of waste generated from households per day: About a 20% reduction compared to the amount in FY 2000</li> </ul> </li> <li>Changes in "Thoughts and Actions for Establishing a Sound Material-Cycle Society" (Attitude Survey)                             <ul style="list-style-type: none"> <li>People who have the intention of reducing the amount of waste, and adopting cyclical use and green purchasing: About 90%</li> <li>People who take concrete actions regarding these matters: About 50%</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>e.g. "I try to sell and buy at secondhand shops, charity bazaars or flea markets", "I buy products that use returnable containers, such as bottled milk"</li> </ul>	<ul style="list-style-type: none"> <li>e.g. "I wash used bottles to make recycling easier", "I separate garbage and dispose of it at the designated points"</li> </ul>
	Changes to be monitored	<ul style="list-style-type: none"> <li>Size of market for rental and lease businesses</li> <li>Shipping rate of refill products (detergent)</li> <li>Rate of refusing free plastic shopping bags (Rate of taking own shopping bags)</li> <li>Sales volumes of disposable products (imported chopsticks)</li> </ul>	<ul style="list-style-type: none"> <li>Size of market for secondhand goods</li> <li>Rate of use of returnable bottles</li> </ul>	
Business organization	Target	<b>Overall 3R efforts</b> <ul style="list-style-type: none"> <li>Reduction of municipal solid waste                             <ul style="list-style-type: none"> <li>Amount of waste generated per person per day: About a 10% reduction compared to the amount in FY 2000</li> <li>Amount of waste generated by businesses: About a 20% reduction compared to the amount in FY 2000</li> </ul> </li> <li>Reduction of industrial waste                             <ul style="list-style-type: none"> <li>Final disposal amount: About a 60% reduction compared to the amount in FY 2000</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Promotion of green purchasing                             <ul style="list-style-type: none"> <li>Over 50 percent of all listed companies</li> <li>Over 30 percent of unlisted companies</li> </ul> </li> <li>Promotion of environmental business management                             <ul style="list-style-type: none"> <li>Number of ISO 14001 certificates: Diffusion and expansion (About 20,000 certificates have been issued to date)</li> <li>Number of Eco Action 21 certificates: 6,000 certificates have been issued)</li> </ul> </li> <li>Promotion of <b>SMC businesses</b> <ul style="list-style-type: none"> <li>Size of market: Has doubled compared to the year 2000</li> </ul> </li> </ul>
	Changes to be monitored	<b>Overall 3R efforts</b> <ul style="list-style-type: none"> <li>Promotion of environmental business management                             <ul style="list-style-type: none"> <li>Environmental report</li> <li>Environmental accounting</li> </ul> </li> <li>Size of market for rental and lease businesses</li> <li>Shipping rate of refill products (detergent)</li> </ul>	<ul style="list-style-type: none"> <li>Size of market for secondhand goods</li> <li>Rate of use of returnable bottles</li> <li>Number of stadiums that have introduced "reusable cups" and the like</li> </ul>	<ul style="list-style-type: none"> <li>Promotion of <b>SMC businesses</b> <ul style="list-style-type: none"> <li>Size of employment</li> </ul> </li> </ul>
Local government	Target	<b>Overall 3R efforts</b> <ul style="list-style-type: none"> <li>Promotion of green purchasing                             <ul style="list-style-type: none"> <li>All local governments should implement green purchasing</li> </ul> </li> </ul>		
	Changes to be monitored	<b>Overall 3R efforts</b> <ul style="list-style-type: none"> <li>Number of fundamental plans for SMC and the like at the regional level</li> <li>Percentage of local governments that are implementing paid garbage collection</li> <li>Top ten municipalities in terms of "Reduce" efforts (in terms of the amount of waste generated per person per day)</li> </ul>	<ul style="list-style-type: none"> <li>The number of resource recovery facilities (e.g. recycle plaza) (*)</li> </ul>	<ul style="list-style-type: none"> <li>Rate of recycling of municipal solid waste</li> <li>Amount of waste collectively collected (Breakdown of municipal solid waste recycling rate)</li> <li>Top ten municipalities in terms of "Recycle" efforts (in terms of recycling rate)</li> <li>Promotion of recycling based on individual recycling laws and the like                             <ul style="list-style-type: none"> <li>Containers and Packaging Recycling Law</li> <li>Percentage of local governments that are implementing sorted collection of containers and packaging</li> <li>Amount of sorted collection by local governments by item and the like</li> </ul> </li> </ul>
Cooperation and collaborative efforts	Target			
	Changes to be monitored	<b>Overall 3R efforts (*)</b> <ul style="list-style-type: none"> <li>Number of environmental learning and exchange meetings held by local governments and the like</li> <li>Number of applications to the "Assistance Program for Regions Establishing a Sound Material-Cycle Society", Examination and implementation of effective follow-up</li> </ul>		

State Promoting measures to establish an SMC society in a comprehensive and systematic manner based on the Fundamental Plan

Note

- Overall efforts concerning 3R
- Effort indices set out in the existing Fundamental Plan
- Of actions set out in the Changes in "Thoughts and Actions for Establishing an SMC Society" (Attitude Survey), those set out in the "Action" section
- Indices that have been recognized in the existing measures other than Fundamental Plan
- Effort indices that are expected to be introduced in the new Fundamental Plan

\* Data that will be obtained through a questionnaire and the like in the future

## Chapter 4 Cooperation between Entities and Their Expected Roles

In a framework of cooperation between all concerned entities, various measures will be promoted comprehensively and systematically through their active participation and appropriate division of labor. Particularly in the case of measures at state and local government levels, entities will participate in the entire process from the formulation phase to the implementation phase while working closely together. In addition, advanced cooperation and efforts will be evaluated and the capacity to transmit such information will be improved.

When implementing these measures, concerned entities are expected to play the following roles. The State, as will be described in Chapter 5, will comprehensively promote efforts toward the establishment of an SMC society, including formulation and review of the Fundamental Plan and consistent enforcement of relevant legislation. The State will also endeavor to build a basis for the efforts of concerned entities to appropriately utilize policy approaches, while conducting businesses and engaging in consumption toward the establishment of an SMC society from the standpoint of consumers.

### Section 1 Citizens

Private citizens are expected to realize that they are, as consumers and community residents, themselves dischargers of waste and the like, and that they are imposing burdens on the environment and therefore should accept responsibility for their own waste problems. They are also expected to be aware of the roles they should play in the establishment of an SMC society, conduct themselves accordingly, and take further steps to modify their lifestyles in order to enable the establishment of an SMC society.

Specifically, environmental loads resulting from everyday activities should be reduced through individual efforts to: refrain from using disposable products through use of “furoshiki” and “My Own Shopping Bags”, select simple packaging, avoid excessive emphasis on “freshness”, purchase recycled products and refill products, use rental and leasing services, choose green products and services that impose smaller environmental loads, such as use of “My Own Chopsticks” and chopsticks made from thinned timber, cooperation for reduction of waste and sorted collection for recycling, use of bicycles and public transportation, use and utilize biomass, and so on.

Also, individual efforts to foster interest in the environment in their own areas, and to participate or cooperate in environmental education, environmental learning, and activities for environmental preservation, can all contribute to the establishment of an SMC in local communities.

### Section 2 NGOs, NPOs, Universities and Similar Bodies

NPOs, NGOs, universities and the like are expected to conduct activities and to make advanced efforts that contribute to establishment of an SMC society so that their social

significance will be enhanced through collection of up-to-date information and transmission of technical knowledge. They are also expected to coordinate the activities of various entities aimed at facilitating the establishment of an SMC society.

Private entities such as NGOs and NPOs, in particular, are expected to conduct the following: activities aimed at preserving the environments of local areas, such as promotion of 3R, and helping local residents to modify their lifestyles; environmental education, environmental learning and awareness-raising activities to promote actions by the general public and businesses to establish an SMC society; and sustainable and expandable activities in the form of community businesses.

Furthermore, research institutions such as universities are expected to facilitate policymaking and specific actions by entities toward the establishment of an SMC society by enhancing technical and academic knowledge and providing objective and reliable information.

### Section 3 Business Organizations

Business organizations are expected to fulfill their corporate social responsibility (CSR), which is vital to their sustainable growth, by conducting business activities in a manner that takes account of environmental issues. This should include compliance with laws and regulations and prevention of the incurrence of unnecessary social costs such as those incurred as a result of illegal dumping. They are also expected to further promote efforts for responsible cyclical use and disposal of waste, build networks with consumers, and disclose relevant information by enhancing transparency, based on discharger's responsibility and EPR.

Specifically, they are expected to: reduce production and distribution of disposable products; refrain from using excessive packaging; promote simple packaging; reduce the number of plastic bags given to shoppers; extend the lives of products; use materials, products and services, such as CRs, which contribute to reducing environmental loads; recover obsolete or discarded products for which responsible disposal is difficult or which have high resource value; practice responsible cyclical use and disposal; and make more efficient use of resources and energy, so that the environmental loads resulting from their business activities can be reduced. As for products, they will be developed with consideration given to environmental loads at various stages, including resource extraction, production, distribution, consumption and disposal, through life-cycle assessment (LCA) and the like, so that environmental loads at every stage can be reduced and that environmentally friendly business partners will be selected. 3R efforts will be advanced throughout the lifecycle of products under enhanced cooperation between upstream, midstream and downstream companies in the supply chain. Also, efforts will be made to diffuse green products and services by cutting costs and developing, manufacturing and distributing attractive products that reflect the taste of consumers in regards to quality, design and the like. Moreover, efforts

will be promoted to: ensure reliability by providing consumers with appropriate information about environmental loads imposed by products and services through environmental labeling and the like; disclose and provide information about environmental loads regarding their business activities and their efforts to reduce them through the preparation and publication of environmental reports and the like; ensure transparency through information provision; and contrive to present an assortment and display of green products and services when selling them. Furthermore, financial institutions and investors are expected to facilitate the provision of loans and the like to environmentally friendly companies and environmental projects and activities.

Among business organizations, waste disposers have an extremely important role to play in establishing an SMC society. They should enlist the cooperation of dischargers of waste and promote correct cyclical use and advanced disposal of waste, so that environmental loads resulting from their business activities will be reduced and the living environment will be conserved. In addition, cooperation between and integration of the venous side and the arterial sides will be advanced through feedback of information on 3R efforts from the venous side, which conducts cyclical use and disposal of waste as represented by recycling of home appliances and the like, to the arterial side, which designs and manufactures products.

#### Section 4 Local Government

Local governments have a central role to play in facilitating efforts to establish an SMC society at the local level. They are, therefore, expected to consistently enforce laws and regulations that are appropriate to the natural and social conditions of each local area and conduct responsible cyclical use and disposal of waste. They are also expected to play important roles in coordinating various entities so that opportunities for cooperation are provided to entities across industry sectors. Prefectural governments in particular are expected to lead and coordinate the efforts of local authorities and concerned entities from a broad-based standpoint. Meanwhile, local authorities are expected to play their roles as lower tiers of government and to cooperate closely with each other.

Specifically, local governments will make efforts in community development, including sorted collection and appropriate management of waste as a matter of course, promotion of 3R through appropriate utilization of economic techniques as necessary, including paid disposal of municipal solid waste, and improvement of public utilities such as waste disposal facilities through comprehensive use and utilization of resources, energy recovery and biomass materials, so that the establishment of an SMC society in local areas will advance and environmental loads will be reduced. Moreover, assuming roles as coordinators and primary energizers of community efforts, local governments will encourage various entities to take actions such as comprehensive implementation of sorted discharge by providing opportunities for environmental education and learning. They will also cooperate with business and private organizations, including NPOs and

NGOs, to assist local residents in modifying their lifestyles, recommend environment-conscious green products and services or products made in the local area, and provide information about them. Local governments will promote these and other measures comprehensively and systematically, according to the characteristics of each area, in order to establish an SMC society. It is important to evaluate and communicate the effects of such efforts in local areas.

Furthermore, as they themselves are business organizations, local governments will take the initiative in green purchasing and contracting, implementation of an environmental management system, and other actions for establishing an SMC society. And, they will formulate and review basic plans to promote the establishment of SMC societies in their local areas, based on the Fundamental Plan.

## Chapter 5 State Initiatives

This chapter describes specific efforts toward the establishment of an SMC society based on the vision for realization of a sustainable society, set forth in Chapter 2.

### Section 1 Basic Direction of Initiatives

Material cycles in nature and material cycles in social and economic systems that constitute part of the material cycle in nature are inextricably linked in establishing an SMC society. It is, therefore, important to ensure an appropriate cycle by considering both cycles. For that purpose, measures will be taken to preserve the natural environment, ensure a healthy water cycle that supports environmental preservation, and promote agriculture, forestry and fisheries that also serve to preserve the natural environment, so that an appropriate cycle of materials such as nitrogen in nature are maintained and enhanced.

With regard to social and economic systems, in view of the importance of establishing an SMC society that can be sustained into the future, we will take appropriate measures to improve cyclical functions, including appropriate reuse of waste and further promotion of recycling, while placing the highest priority on reducing generation of waste, based on technical and economical feasibility.

In addition, the sustainable society that we should be aiming to create will be one that incorporates aspects of building a “Low-carbon Society” and “Society in Harmony with Nature”. For this reason, we will endeavor to realize a sustainable society by making comprehensive efforts such as contributing to measures to prevent global warming through 3R efforts, when establishing an SMC society.

The basic directions of measures that the State will take toward the establishment of an SMC society on the basis of this concept are as follows:

- (1) The State will promote cooperation and collaborative efforts among concerned entities such as local governments, while comprehensively promoting steps the whole nation can take to move toward the establishment of an SMC society, including the

measures set out in the following section.

In doing so, the State will ensure sufficient cooperation among government ministries and agencies while making concerted efforts to effectively and efficiently implement appropriate enforcement of relevant laws and regulations and management of businesses.

- (2) In promoting these efforts, the State will need to examine measures from a broader perspective and by going beyond the existing framework for State measures, and to implement a combination of consistent policy approaches including a regulatory approach, economic approach, voluntary approach and information approach, while giving consideration to important elements of policies concerning technology, value systems, social systems and the like.

The State will coordinate such efforts with other environmental policies such as those concerning the establishment of an SMC society through cooperation between the State and local governments, establishment of an international SMC society in East Asia and other regions, and measures to prevent global warming etc., in particular, and promote efforts that will generate synergistic effects.

- (3) To appropriately evaluate and examine the progress and the current status of the measures being taken, the State will act promptly to further promote the collection, analysis and disclosure of data on materials flow and waste and the like.

In addition, the State will develop information infrastructures to ensure that entities can access, use and exchange such information in a timely and appropriate manner.

## Section 2 Domestic Initiatives

1. Efforts toward a Sustainable Society which Integrates a Sound Material-Cycle Society, Low-carbon Society and Society in Harmony with Nature

- (1) Promotion of Comprehensive Efforts toward an SMC Society and a Low-carbon Society

Efforts to establish an SMC society and Low-carbon Society require changes to the existing social and economic systems and lifestyles. The State will, therefore, promote crosscutting measures to maximize the synergistic effects of the two societies. First, the State will restrain waste generation as much as possible. Second, the State will implement optimal cyclical use of waste by opting for reuse in the first instance, and then recycle, while giving consideration to preventing the inappropriate treatment of waste and reducing other environmental loads. Third, to deal with the remaining waste, the State will contribute to the reduction of greenhouse gas emissions by implementing extensive heat recovery through the introduction of waste power generation and the like. In addition, the State will examine methods for sustainable waste power generation, including measures to promote heat recovery among small and medium-sized waste disposers who do not have waste power generation networks that enable consistent power supply and

heat recovery. Moreover, the State will promote waste power generation and heat recovery at incineration facilities and business facilities that release low- to medium-temperature heat during their industrial processes. The State will also strengthen its perspective on LCA to promote more efficient and effective 3R efforts.

Meanwhile, the State will efficiently utilize biomass CRs as carbon-neutral CRs, in addition to active use and utilization of renewable energies such as sunlight and wind power that take advantage of natural energy sources. Specifically, the State will promote efforts to produce: eco-feeds, fertilizer and the like from food waste, ethanol from paddy straw, waste wood and the like, biogas from high-efficiency methane collection, biodiesel fuel from waste cooking oil and the like, and solid fuel from wood pellets, sludge and the like.

The State will facilitate a modal shift to use of combined road, water and rail transport to reduce environmental loads for transportation of CRs, and will promote the construction of efficient, wide-area venous distribution networks, thereby contributing to the establishment of a Low-carbon Society.

(2) Promotion of Integrated Efforts toward an SMC Society and a Society in Harmony with Nature

To prevent destruction of the natural environment through resource extraction and to secure an appropriate natural material cycle, the State shall promote the development, efficient use and controlled consumption of alternative materials that replace non-renewable natural resources such as fossil fuels and mineral resources. With respect to new extraction of resources from the environment, the State will endeavor to reduce the final disposal amount by using spent resources as CRs and through extensive energy recovery, while promoting the prolonged use of products such as high-quality housing that has a long useful life.

Meanwhile, when utilizing potentially renewable resources, it is necessary to promote sustainable use while giving consideration to conservation of biodiversity. From this perspective, the State will promote the use and utilization of biomass resources and the like based on the Comprehensive Biomass Nippon Strategy (March 2006), and the appropriate development of forests and use of lumber. In addition, the State will promote forms of agriculture that conserve the environment and that use reduced quantities of chemical fertilizer and synthesized chemical pesticides and the like, together with agricultural, forestry and fishery methods that focus on environmental conservation, such as sustainable aquaculture that contributes to the improvement of fishing environments. The State will also promote the use of currently unused natural resources such as rainwater in city areas, paddy straw in rural districts, and plant resources that are by-products of the use and maintenance of satochi, satoyama and the like.

2. Creation of Sound Material-Cycle Society Based on Geographical Blocks

The State will promote the establishment of “local SMC blocks” of an appropriate size to suit the characteristics of CRs by taking advantage of local features and conditions, thereby accomplishing revitalization of local communities. A local SMC block will be formed as a result of entities actively playing their respective roles through mutual cooperation and collaborative efforts (to create links). The State will coordinate the activities of entities at international and national levels, and at district levels, by fully utilizing its regional branches and local offices to help entities support the efforts of local governments, cooperate and undertake collaborative measures. Under the leadership of State and local governments, entities will forge collaborative efforts at the conceptual phase, formulate local plans, and promote the development of infrastructures required for the establishment of SMC societies.

Given that the establishment of local SMC blocks will be based on the characteristics of CRs, and on the premise of appropriate management of waste, the State will examine the scope of appropriate cycles based on the characteristics of local communities for each circulative resource and from various perspectives: environmental perspective, such as measures to prevent global warming and conservation of biodiversity; resource perspectives, such as scarcity and effectiveness; and economic perspectives, such as transport efficiency and disposal costs. For example, biomass CRs that are generated only in certain areas or that are perishable will be disposed of in those areas, and biomass CRs that require advanced disposal technology will be disposed of further afield. The State will also promote the establishment of SMC blocks at the local level, of appropriate sizes, as follows.

In the case of biomass CRs, concerned parties will make concerted efforts, with cycles at community and local levels in mind and based on the new Comprehensive Biomass Nippon Strategy, in order to implement the “biomass town” concept, which is aimed at building a comprehensive system for use and utilization of biomass resources under the leadership of local authorities and with the cooperation of a broad range of concerned parties encompassing many different areas. Meanwhile, cooperation and collaborative efforts of concerned parties, including certification of food recycle groups pursuant to the Food Waste Recycling Law, will lead to the establishment of a system that ensures that products such as food and energy will be produced and consumed in the same area, depending on the characteristics of areas such as whether they contain major cities or local cities. Local community businesses, which conduct material recycling activities for commercial purposes such as composting of kitchen garbage collected and disposed of by private organizations and local governments, eco-feeds produced from food waste, and biofuels produced sustainably from waste food oil, will be fostered. Furthermore, the effective use of livestock manure and biomass materials such as sewage sludge will be promoted.

As regards CRs, including those present in products and non-renewable resources, the State will, with a view to wider-scale areas, progressively implement measures based on individual recycling laws and the Law for the Promotion of Effective Utilization of Resources. The State will also appropriately utilize wide-area certification and recycling certification under the Waste Management Law. The State will further reduce resource input in supply chains and promote the use of materials over wider

areas with cooperation between industries in an attempt to promote recycling at every stage. The State will also endeavor to enhance collection systems, strengthen cooperation with consumers, and improve recycling technology and systems for the specific purpose of enabling appropriate and strategic use of useful resources contained in CRs.

For all CRs, the State will provide assistance to entities that are making efforts toward the establishment of an SMC society and whose endeavors can be used as a model. The State will provide financial assistance for the development of waste treatment facilities by prioritizing programs related to the establishment of local cycle blocks. Furthermore, the State will provide assistance to clusters of recycling industries, including utilization of eco-towns through cooperation between companies, and will endeavor to build venous distribution networks with low environmental loads, including facilitation of marine transportation through the promotion of recycling ports.

The State will endeavor to ensure appropriate use and disposal of CRs and conservation of the living environment as major premises of such assistance (See 5: Enhanced Framework for the Appropriate Use and Disposal of CRs). Given the possibility that in some areas the amount of CRs, the size of facilities, and the demand for recycled products are not in balance, the State will also endeavor to establish cooperation between local areas based on appropriate information.

### 3. Innovation in Individual Lifestyles

It is important for the establishment of an SMC society that every member of the public modifies his or her lifestyle into a form that is environment-conscious and sustainable (See Section 1, Chapter 4). To encourage individuals to alter their lifestyles, the State will promote environmental education, environmental learning and the like in a comprehensive manner, for all age groups from children to elderly people, at various places including schools, community centers, homes, workplaces, and outdoor activity spaces, and in cooperation with the people concerned. In so doing, the State will cooperate with local governments so that its efforts will enable concerned entities to learn from each other, as opposed to one-way information transmission. Furthermore, the State will cooperate with opinion leaders in various fields, including containers and packaging discharge control personnel (commonly called 3R Promotion Meisters) as stipulated in Containers and Packaging Recycling Law, and will conduct a national campaign to demonstrate actions that should be practiced by individual citizens.

Meanwhile, the State will promote the establishment of systems to support entities' efforts to create community-based SMC societies by private citizens, NGOs, NPOs, business organizations and the like. For example, the State will support entities' concerted, advanced efforts to reduce waste generation, including utilization of reusable containers such as returnable bottles, and will communicate the message nationwide by presenting awards, etc. The State will endeavor to acquire and utilize knowledge, techniques and the like possessed by the older generation who will grow

in number in the coming years. The State will also promote the efforts of individuals to recycle household goods and the like through the active participation of local residents, the setting up of flea markets, and use of recycling and repair shops, and by introducing examples of more effective methods and the like. When providing information on such sophisticated approaches, the State will conduct campaigns efficiently or utilize various media, including the Internet and mass media depending on their characteristics, in cooperation with private organizations such as NPOs and NGOs.

#### 4. Promotion of Sound Material-Cycle Businesses

The State will take the lead in actively utilizing green products and services such as appropriate recycled products and renewable energies through green purchasing and contracting. The State will also assist efforts to utilize “servicizing” and the like that contribute to the reduction of environmental loads rather than to the supply of goods, and to reuse-efforts.

To foster the development of markets for SMC businesses without damaging the credibility of such businesses and with a view to improving the quality and resource performance of recycled products and the like, the State will promote efforts to appropriately evaluate and display the quality, safety, environmental performance of recycled products, and to provide easy-to-understand environmental labeling and information related to green products and services.

Furthermore, the State will encourage business organizations to make voluntary efforts to introduce environment management systems, and to prepare and publish environmental reports and environmental accounting records, thereby ensuring that companies consistently implement environmental measures in their business activities, including production of 3R-conscious products.

The State will examine the effects of economic measures designed to encourage business organizations to make voluntary efforts toward the establishment of an SMC society based on market mechanisms.

From the perspective that appropriate management of waste, which is one of the tasks that SMC businesses should undertake, is important, the State will seek to rationalize the process of collection, transport, and disposal of waste, and to fully enforce the laws and regulations for promoting SMC businesses. The State will also foster top-quality businesses through introduction of a company rating system, using an independent commission and implementation of assistance measures, so that an environment in which bad money does not drive out good money will be created. The State will also ensure transparency of and collection of the costs required for responsible cyclical use and disposal of waste. Furthermore, as a means of demonstrating positive business practices in order to promote responsible management of waste and the like through joint efforts by the State and communities, it will proactively open model plants in communities and/or schools as places for environmental education and learning. In addition, the State will support the integration of industries, such as eco towns and the like, and cooperation between

companies.

Moreover, the State will implement financial, technical, and other measures to support investment in equipment that will facilitate proper cyclical use and disposal of waste. In addition, the State will examine ways to promote such efforts to support SMC businesses through the development of methods to evaluate environmental consciousness in financial terms.

## 5. Enhanced Framework for the Appropriate Use and Disposal of CRs

Because we continue to face a shortage of landfill capacity at final disposal sites and there is a growing need to limit the consumption of natural resources due to resource constraints, the State will, in accordance with the order of priorities set out in the Fundamental Law and based on the concepts of discharger's responsibility and EPR, advance efforts to reduce waste generation as its top priority, and will further promote efforts toward conservation of the living environment and responsible cyclical use and disposal of waste.

For that purpose, the State will enhance and reinforce necessary measures, including recycling systems and waste disposal systems, with a view to improving cooperation between entities, appropriate division of labor, appropriate and fair cost burdens, and efficiency of the entire system, with a major focus on further enhancement of upstream measures that will lead to reduction of waste generation, including promotion of design and manufacturing that give consideration to product lifecycles that are appropriate to product features, in an attempt to reduce environmental loads associated with disposal of waste and in an effort to ensure international consistency. Efforts to introduce charges for disposal of municipal solid waste, thereby providing an economic incentive to reduce waste, are becoming more widespread. The State, therefore, will promote introduction of this approach on a national scale by publishing and circulating a guide to charging for disposal of municipal solid waste.

Furthermore, the State will promote phased improvement of sorted collection and responsible disposal of waste by local authorities in pursuit of full implementation of energy recovery, such as recycling of domestic waste and waste power generation, by providing guidelines that illustrate the fundamental policy of accounting standards for municipal solid waste, standard sorted collection of municipal solid waste, and proper cyclical use and disposal of municipal solid waste.

The State will encourage the voluntary efforts of manufacturers to reduce their use of hazardous substances in both manufacturing processes and finished products, and develop a mechanism that will encourage hazardous substances management and provision of information on such substances, in light of their impacts on our daily lives and in consideration of international trends. Moreover, the State will conduct hazard assessment of waste, research the impact of cyclical use and the disposal of waste on the environment, and develop and ensure that sound disposal technologies are disseminated.

In respect of substances such as asbestos and PCBs, which require special treatment due to their harmful effects and the difficulty of disposing of them, the State will endeavor to enhance the framework for appropriate disposal, including that for ensuring their detoxification, by making best use of current scientific knowledge and giving consideration to reducing the social cost.

To establish an SMC society, it is essential to have in place suitable facilities for cyclical use and disposal of waste. For that purpose, the State will promote efforts to develop wide-area waste treatment facilities and final disposal sites by actively disclosing information and promoting dialogue with local residents, while giving due consideration to the environment.

Specifically, with respect to facilities for cyclical use and disposal of waste, the State will promote the construction and improvement of such facilities, with an emphasis on securing adequate recycling capacity and appropriate deployment, using various policy instruments such as support for technological development, economic assistance, and the provision of public services through private initiatives, that is, private finance initiatives (PFI). Particularly in the area of advanced responsible cyclical use and disposal of waste, the State will take measures to encourage and facilitate effective and integrated construction and improvement of such facilities according to the nature of the waste and their physical distribution.

The State will continue to provide forecasts on the remaining capacity of final disposal sites, construct and improve final disposal sites, study potential recovery of the capacity of final disposal sites, promote communal disposal among local governments, and facilitate cross-boundary, wide-area measures according to the individual prefectures embraced by the respective metropolitan areas. Regarding final disposal sites for industrial waste with very little remaining capacity, the principle that the discharger has primary responsibility will continue. However, if necessary to adequately ensure responsible disposal of industrial waste, the State will promote establishment of industrial waste disposal facilities by the public sector, so that safe and appropriate, controlled-type final disposal facilities are guaranteed. In the case of wastes that are generated on land, the State will endeavor to operate a permit system concerning disposal of such wastes in the sea and to reduce the amount of such disposal, pursuant to the Law Relating to the Prevention of Marine Pollution and Maritime Disaster and based on the fact that disposal of waste into the sea was prohibited in April 2007.

With regard to the transportation of waste, including waste for reuse and recycling, taking into account such considerations as reduction of environmental loads, the State will promote the establishment of an efficient venous distribution network that utilizes rail and/or sea transportation for medium to long distances, in appropriate combination with biofuel powered refuse collection vehicles and garbage trucks.

To prevent illegal dumping, the State will aim to computerize the control manifest system, which will allow interested parties to determine whether or not waste has

been properly transported and disposed of, and to increase the rate of use of electronic manifests to 50% by FY 2010. Based on the “Outline of the Action Plan toward Eradication of Illegal Dumping”, which mandated the immediate goal of eradicating cases of large-scale illegal dumping by FY 2009, all entities, including individuals, business organizations, local governments and the State, will work together to steadily implement measures to prevent illegal dumping through promotion and educational activities such as the “nationwide illegal dumping monitoring week”. And, in the event that illegal disposal occurs, the State will endeavor to facilitate appropriate and prompt remediation.

The State will provide assistance to local governments whose areas have been struck by disasters to aid recovery and ensure that wastes and refuse generated as a result of such disasters will be disposed of promptly and appropriately. The State will also implement measures to prevent dispersal of waste in the affected areas, organize educational events as a way to reduce floating waste and waste washed ashore, efficiently and effectively ascertain the status of waste washed ashore based on the situation in each area, and establish collection and disposal methods. Furthermore, the State will progressively implement measures, including assistance to local governments that collect and dispose of large amounts of waste washed ashore, in areas that suffer serious damage. The State will also collect floating waste in enclosed coastal seas.

## 6. Sophistication of 3R Technology and Systems

Formerly, the focus of technologies and systems related to recycling, energy recovery and disposal of waste was on development and commercialization of elemental technology for various processes of recycling and waste disposal, and construction of recycling and disposal systems. Subsequently, inverse manufacturing has been proposed. As 3R-related legal systems and the like, such as recycling laws and regulations, have gained currency, steady progress has been achieved: by-products are passed on between different processes, cooperation between industries has been enhanced through the utilization of CRs as raw materials and energy in the materials industries, and manufacturing of 3R-conscious products has advanced. 3R efforts are beginning to percolate through total product lifecycles and across entire supply chains.

Going forward, the State must accelerate and advance consistent 3R efforts throughout product lifecycles and across entire supply chains, build 3R technologies and systems to support Japan’s aspiration to become a world leader in science and technology, and communicate our environmental capabilities to the rest of the world. These actions should reflect our approaches to the issues of resource constraints, such as those for rare metals, increasing demand for minimized final disposal amounts, and integration of efforts toward a low carbon society and a Society in Harmony with Nature. For that purpose, it is necessary for the State to actively

promote research and development and commercialization of 3R technology and systems, together with development and commercialization of a business model from the perspective of product lifecycles and supply chains.

In the manufacturing phase, the State will promote greater sophistication in the technology and systems to be used in the design and manufacturing of DfE products, according to the functions and characteristics of products and in due consideration of the order of priorities from the perspectives of harmful effects and extreme scarcity of rare metals and the like. Specifically, the State will promote development of systems that will realize 3R and energy recovery throughout product lifecycles and across entire supply chains. For that purpose, the State will enhance various efforts: reduction of waste through prolonged useful life of products and buildings, reduction of by-products generated from manufacturing processes through cooperation among companies, reuse and recycling of products and components, energy recovery, responsible disposal of waste, and selection of materials with a view to reducing environmental loads that might be incurred as a result of harmful substances. The State will not only facilitate more effective solutions concerning photocopiers, home appliances, and cars etc., but will also promote the extended application of such efforts to various other products.

When disposed of or used products are used cyclically or properly disposed of, product reuse, component reuse, materials recycling, recovery and use of energy, and responsible disposal of waste should be implemented hierarchically. For that purpose, the State will first promote greater reuse, and advanced recycling technology and systems at multiple levels. Specifically, the State will coordinate the design and manufacture of DfE products, foster development and reduce the costs of elementary technology such as dismantling, selection, cleaning and separation in the reuse and recycling processes. The State will also promote development and application of quality control technology from the perspective of utilization of waste as reuse products and components, and materials for recycling, together with development of systems comprising these individual technologies. For example, the State will further promote advanced recycling, such as horizontal recycling of plastic components from old products into new products, in the case of home appliances, through efforts to advance such technologies and reduce costs. The State will promote utilization of raw materials and comprehensive use of energy in the materials and other industries. If such measures are not implemented, the State will promote the advancement of highly efficient energy recovery and utilization systems from large-scale systems to distributed systems, so that energy will be recovered and utilized efficiently and fully. Specifically, the State will promote commercialization of large-scale waste power generation that effectively utilizes medium- to low-temperature waste heat, together with development of highly efficient, mid-scale waste power generation technology. The State will also promote development of distributed systems that efficiently utilize system power and integrate natural energy, which will lead to local production and consumption of energy. Furthermore, for disposal of waste remaining after reuse,

recycling and energy recovery, the State will promote advancement of technologies for more efficient intermediate treatment and final disposal, with the aim of minimizing any long-term environmental impacts from such technologies without compromising quality, safety and security. Meanwhile, the State will promote development and application of a final disposal site regeneration system that recycles waste and recovers energy at existing final disposal sites, and properly disposes of remaining waste at final disposal sites with enhanced functions. In addition to the efforts at each level, including reuse, recycling, recovery and utilization of energy, and disposal of waste, the State will further advance technology and systems from the perspective of reducing environmental loads associated with the cyclical use and disposal of waste. Specifically, the State will coordinate the design and manufacture of DfE products, promote the development and application of technologies and systems that enable cyclical use of harmful substances that are difficult to replace, limit emissions into the environment through decomposition and detoxification, and curb greenhouse gas emissions.

The State will strategically advance technologies and systems to use and utilize renewable biomass materials. Specifically, the State will establish a system for using and utilizing biomass materials that can be implemented on an ongoing basis, and will promote its dissemination through the establishment of technology to use and utilize biomass materials and energy, and through the establishment of systems that enable efficient use and utilization of materials, such as local production and consumption.

Moreover, the State will systematically promote development of design technology that incorporates functionality to evaluate the effects of the above 3R technologies and systems, individual technologies and systems, and social systems, and that implement 3R type production and consumption systems.

To realize the advancement of such technologies and systems, the State will implement the following measures:

First, the State will strongly support research and technology development in line with the Promotion Strategies by Field of the Council for Science and Technology Policy, from the perspective of establishing Japan as a nation based on creativity in science and technology, and will reinforce the structure for promoting systematic and well-balanced research in both basic and applied research through industry-government-academia cooperation and cooperation between government ministries. Then, the State will provide various forms of assistance at multiple levels, such as research and technology development assistance, commercialization assistance for model projects, and assistance for the establishment of business models and local models.

In addition, the State will endeavor to create a market for 3R technologies and systems by taking the lead in procuring products and services that utilize superior 3R technologies and systems, conducting public relations activities to disseminate information among consumers, and by utilizing economic incentives such as paid garbage collection. The State will also promote establishment and improvement of

standards for by-products and recyclable resources from used products, standards for environmentally conscious design, and standards for 3R technologies with a view to international standardization. Enhancement and reinforcement of necessary measures and systems, such as a 3R-related legal system, will also lead to the advancement of 3R technologies and systems.

In addition, industries with technology information, academic sector institutions with information such as results of basic research, NPOs with the know-how to provide concepts and function as coordinators, and administrative authorities with accumulated, relevant information will promote the construction of information networks that enable them to share information, and facilitate the creation of new businesses and the implementation of efforts as components of the social system.

#### 7. Accurate Interpretation and Provision of Information Related to the Establishment of a Sound Material-Cycle Society and Development of Human Resources

The State will promptly inspect, develop and improve statistical information to enable timely compilation of accurate information concerning: the status of materials flow in Japan, the amount of waste generation by type, the status of cyclic use and disposal of waste, future prospects, technology data such as the material, composition and form characteristics of waste items, and environmental impacts of the use and disposal of waste. By so doing, the State will seek to gain an appreciation of flow by area, individual items, and material units in order to obtain more detailed information on the actual conditions pertaining to waste, in addition to statistics for the whole country. In addition, the State will examine ways to obtain information with a focus on not only quantity but also quality, including the value and use of reuse and CRs to be regenerated. Moreover, the State will endeavor to obtain more information on the amount of CRs to be reused and the conditions of use by CRs.

The State will accurately analyze obtained statistics in order to predict the remaining useful lives of final disposal sites and to examine ways to reduce generation of waste. The State will also analyze the flow of CRs and environmental loads in order to study appropriate sizes for SMC blocks and to integrate efforts toward a Low-carbon Society and a Society in Harmony with Nature. In addition, the State will utilize IT to establish an information network that enables concerned parties to efficiently obtain, use and exchange information.

Furthermore, the State will seek to provide easy-to-understand information to help advance concerned entities' efforts. For example, the State will endeavor to provide information on efforts at the emission phase and its effects, especially from the perspective of consumers who actually take action.

To develop human resources who will promote an SMC society, the State will enhance personnel development in terms of quality and quantity by promoting exchanges and information provision between academic, business and government circles such as business organizations, universities, research institutions, State and local governments, NGOs and NPOs. The State will especially promote development of coordinators through development of young researchers at universities and other

institutions, handing on of technologies at universities and industries, and personnel exchanges between NGOs and NPOs. Also, the State will enhance the service training system for staff of the State and local governments and teachers and other instructors concerned with environmental education and environmental learning, in order to improve their quality.

### Section 3 Material Cycle in International Relations

#### 1. International Trends in CRs

Waste generation is expected to increase globally due to economic growth in Asia and other countries. With the advancement of recycling and increased demand for resources, importation of CRs is increasing rapidly. Imports and exports of CRs between Japan and other countries are growing fast, especially those with countries in East Asia, which are enjoying rapidly strengthening trade relations with Japan.

Such material cycles on an international scale are expected to reduce environmental loads and foster efficient utilization of resources if properly implemented. However, if they are not implemented correctly, environmental damage may result.

For example, some CRs, such as harmful substances which are difficult to dispose of in an environmentally acceptable manner in developing countries, can be responsibly disposed of or collected as resources in Japan, due to its advanced technologies. One example is glass cullet for cathode-ray tubes. Because glass cullet is only produced overseas, its return to the production process on the production base will contribute to curbing the consumption of natural resources and the proper use of CRs.

On the other hand, some cases have been reported in which waste generated at home and abroad, especially waste from electrical and electronic equipment (so-called "e-waste"), is creating environmental problems in developing countries, because waste disposers are recycling e-waste, even though they do not have adequate technology to correctly dispose of such waste.

For this reason, in establishing an international SMC society, it is necessary to consider the environmental loads of CRs and give top priority to the development and improvement of laws and regulations aimed at preventing environmental pollution in each country and to improving the capacity to dispose of waste properly, such as law-enforcement capabilities, based on the principle that waste shall be disposed of in a responsible manner within the country that generated it. It is also necessary to enhance efforts to prevent the illegal import and export of waste. On that basis, it is important to facilitate the international movement of CRs if such resources will contribute to the reduction of environmental loads and efficient utilization, depending on their characteristics, as a way to complement cyclical use of CRs within each country. It is necessary to share such basic ideas about international material cycles with other countries, and to advance integrated efforts, first on a regional scale and then globally.

## 2. Japan's Contributions to Establishment of a Sound International Material Cycle Blocks in East Asia

It is necessary to further expand 3R initiatives in consideration of the trends in international material cycles and the issues addressed above, and to step up efforts to ensure the realization of an SMC society, first in East Asia, with which Japan has a close relationship, then in the Asia-Pacific region and ultimately in the world at large. For that purpose, the State will enhance international cooperation to promote 3R in Asia and then worldwide. For example, the State will summarize its efforts in respect of the "Japan's Action Plan to Promote Global Zero-Waste Societies", which is aimed at supporting 3R-related measures and programs in developing countries, strengthening international cooperation, and communicating the concept internationally. The State will promote the following efforts by taking advantage of its advanced systems, technology and experience in respect of 3R and waste management.

### (1) International Expansion of Japan's Systems, Technology and Experience

We will support the establishment of SMC societies outside Japan, from Asia, which is experiencing rapid economic growth, to Africa, which is expected to grow in due course, in ways that are appropriate to the circumstances of individual countries. Specifically, we will share our advanced systems for 3R and waste management, our excellent technology and systems, and our experience of stimulating concerned entities to participate in relevant efforts and cooperation through assistance in formulating a plan to promote 3R efforts in Asian and other countries, cooperation toward the establishment of SMC cities based on the eco-town model, and assistance to establish and deploy safe, hygienic human waste treatment systems. For that purpose, we will ascertain the situation surrounding development and improvement of related systems, actual conditions of waste management and needs for technology and the like of each country, provide our 3R technology and systems to these countries, and host trainees. Furthermore, we will promote international cooperation, not only at the State level, but also between various entities, including the general public, business organizations and local governments.

### (2) Realization of Material-Cycle Societies across East Asia

We plan to formulate an "East Asia SMC Society Vision" by 2012, setting forth how Japan will contribute to the establishment of sustainable material cycles, including basic ideas and targets toward the establishment of SMC societies in East Asia. We will then work toward realization of appropriate and efficient SMCs throughout East Asia, which has a particularly high trade volume. We regard countries in this region as "partners" in this venture and we will share basic understanding of the 3R concept and the like with these partners, and strengthen cooperation through bilateral policy talks and multilateral processes so that we and

our partners will be able to make collaborative efforts toward the realization of the “East Asia SMC Society Vision”.

To prevent pollution caused by the international flow of waste and the like, we will cooperate with other Asian countries and promote efforts to exchange information and to improve law enforcement capabilities in order to prevent the illegal import and export of waste. Regarding materials that are recycled both at home and abroad (e.g. PET bottles and home appliances), we will continue to make ongoing domestic efforts, and will promote implementation of measures to prevent inappropriate waste being exported. We will also examine the possibility of determining criteria for judging used goods at the time of export as stipulated in the Basel Convention to ensure that electric appliances discarded by households and that contain hazardous substances (and are thus inappropriate for reuse), will not be exported under the pretext that they are secondhand goods suitable for reuse. In addition, we will facilitate international flow of waste and the like in ways that are desirable from the perspective of environmental protection by accepting wastes that Asian and other developing countries find difficult to dispose of in an environmentally responsible manner, but for which proper disposal is within Japan’s capabilities. For example, metallic materials will be recovered from waste using advanced technology, and then recycled.

At the same time, we will promote participation by and cooperation between various concerned entities, and work at government level to encourage development of an international venous distribution network that is appropriate, efficient, safe and secure.

(3) Construction of 3R Research and Information Network and Common Rules in Asia

We will develop and improve the 3R information base established at the Asia Institute of Technology (in Bangkok) in cooperation with international organizations and other countries. We will also further develop research network facilities for specialists in waste disposal and 3R efforts in the Asia-Pacific region. We will coordinate such efforts, build the “3R Research and Information Network in Asia” as a knowledge and information base to promote 3R initiatives in countries in the Asia-Pacific region, and support the 3R efforts of other countries by sharing policies and experiences. Furthermore, we will promote dissemination of standards and specifications concerning the quality and the like of environment-conscious products and CRs in consideration of entire product lifecycles.

(4) Japan’s Contribution toward Improvement of International Resource Productivity

With G8 countries set to make proactive efforts to limit the consumption of natural resources and minimize environmental loads toward realization of a “sustainable society”, we will lead member countries in further development of 3R Initiatives by, for example, improving resource productivity.

We aim to improve resource productivity and other material flow indicators so that they will become common indicators that are more accurate. For that purpose, we will actively engage in international joint research with a view to environmental

impact assessment. Specifically, we will support the International Panel for Sustainable Resource Management set up by United Nations Environmental Programme (UNEP) with the aim of providing scientific assessments of the impact of use of natural resources on the environment. We will also support the work of the OECD concerning material flow and resource productivity that could evolve into a common rule for promotion of 3R<sup>5</sup>.

## Chapter 6 Effective Execution of the Plan

### Section 1 Progress Evaluation and Examination at the Central Environment Council

To ensure steady implementation of the Fundamental Plan, the Central Environment Council will seek input from people from all quarters and walks of life. The council will take into account the results of independent studies by relevant ministries, annually examine the progress of measures being taken based on the Fundamental Plan, endeavor to coordinate the work with examination of the Fundamental Environmental Plan, set priority examination points on a yearly basis, hold intensive discussions in the Central Environment Council, and advise the Government, as necessary, about subsequent directions its policies should take. The results of the examination by the Central Environment Council will be reflected in documents, including the annual report (the Annual Reports for Establishing an SMC Society) that is to be reported to the Diet each year.

In addition, the Fundamental Plan shall, in about five years, be reviewed in a manner that flexibly and appropriately responds to changes in both domestic and international societies and economies.

### Section 2 Cooperation among Related Ministries

The Government will promote close cooperation among relevant ministries through Cabinet conferences, ministerial meetings, liaison conferences of relevant ministries and the like, and will manage budgets and information that will contribute to the establishment of an SMC society in an integrated fashion, in order to comprehensively and systematically execute the measures set forth in the Fundamental Plan.

The Government will formulate and promote Governmental plans other than the Fundamental Environment Plan following the basic direction of the Fundamental Plan, for the establishment of an SMC society.

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<sup>5</sup> The OECD adopted the “Council Recommendation on Material Flows and Resource Productivity” in 2004. It has made various efforts, including formulation of international guidelines for the utilization of material flows, and improvement of methods for evaluating the efficiency of resource utilization. Japan has been and is playing a leading role within the OECD.

The Government will promote organic collaboration between fundamental plans and other measures that are particularly closely related to the establishment of an SMC society, including measures to prevent global warming, and measures concerning conservation of biodiversity and promotion of sustainable use of materials.

### Section 3 Cooperation among Concerned Entities

The Government will promote cooperation and collaborative efforts among concerned entities by developing and improving information bases that uniformly manage information on these entities' efforts toward the establishment of an SMC society.

### Section 4 Establishment of the Progress Schedule for Executing the Individual Laws and Measures

Hereafter, the Government will promote efforts to enforce the laws and execute the measures for establishing an SMC society, according to the progress schedule shown in the appendix.

The Government will actively make policy assessments during process management, review details of the measures as necessary, in light of progress in implementation of the measures and in goal attainment, and will reflect the results of assessment in measures to be taken in the next fiscal year.

## Conclusion

### (Modern Society and SMC Society)

It has been seven years since the Fundamental Law for Establishment of an SMC Society was formulated in 2000, which is regarded as the year in which efforts toward establishment of an SMC society began. Progress has been made in various aspects since then. Some efforts have drawn high praise, including those that have led to a significant reduction in the final disposal amount of industrial waste, elimination of negative inheritance, and other advanced examples. This shows we are steadily advancing toward becoming an SMC society.

In the meantime, issues have arisen in the context of an increasing population and expansion of the global economy. These issues include the threat of global warming, the wasteful use of resources, and threats to the ecosystem. To resolve these issues, it is imperative to fundamentally review the way we conduct social and economic activities and the way we live in order to move toward the establishment of a sustainable society. To promote this goal, it is important to have a coherent view on how such a sustainable society will be established, and integrate and advance efforts to establish a low carbon society and a Society in Harmony with Nature.

### (Objectives of Second Fundamental Plan)

Based on such considerations, the Second Fundamental Plan for Establishment of an SMC Society first reviewed the actual status of efforts to date against the targets set forth in the First Fundamental Plan for Establishment of an SMC Society. It also analyzed issues from various angles and set out specific points for examination (Chapter 1).

It then presented a medium- to long-term vision of an SMC society from the perspective of our involvement with an all-encompassing material cycle of nature, people's lifestyles, business methods, social and economic systems, sophistication of 3R technology and systems such as high quality 3R. Of these considerations, one that is considered especially important is realization of an SMC society by taking advantage of local characteristics (Chapter 2).

The basic concept of "SMC blocks" is aimed at working toward the establishment of a more carefully crafted and effective SMC society by creating an optimal size for such blocks at community, area, district, national and international levels, depending on the nature of CRs and on local characteristics. This concept is also expected to drive the "revitalization of local communities" based on the principle of independence and coexistence.

It is extremely important to set appropriate targets in order to provide a clear incentive for entities to make efforts toward the establishment of an SMC society and for ascertaining the results of such efforts. For this reason, "material flow indicators", which measure progress toward the establishment of an SMC society within the macro frame,

and “effort indices”, which ascertain progress in terms of entities’ efforts, were adopted. Material flow indicators and effort indices were roughly divided into two types: those that require quantitative targets and those that require monitoring of changes. Quantitative targets were set accordingly (Chapter 3).

The success of these efforts may depend on whether or not entities can make sustained efforts toward the establishment of an SMC society as they generate synergistic effects through cooperation and collaborative efforts backed by trust. For this reason, the Second Fundamental Plan specified the roles that respective entities were expected to play.

Private citizens are required to be aware of the fact that they are creating environmental loads through consumption, and to take actions as major players in order to establish an SMC society.

NGOs, NPOs and similar bodies, along with academic experts, are expected to play major roles as coordinators of a broad range of initiatives. For example, they are expected to take the lead in advanced activities and research, convey information, and create opportunities to encourage entities to take specific actions.

Business organizations are required to comply with relevant laws and regulations, conduct comprehensive environmental business management without undermining consumer confidence, advance technology development, establish a broad understanding of 3R principles at every level of provision of products and services, actively participate in nature conservation activities at the local level, and play important roles in contributing to communities. Among business organizations, waste disposers play extremely important roles in the establishment of an SMC society, and are therefore required to ensure responsible cyclical use of waste and to advance such efforts.

Local governments are expected to play roles as coordinators among various entities. Specifically, as a lower tier of government which is closer to people’s daily living situations, they are expected to enforce laws and regulations, conduct responsible cyclical use and disposal of waste, and promote cooperation between business organizations across industry sectors (Chapter 4).

The State has roles to play in consumption activities, business operations, and development and improvement of the infrastructures required for entities’ efforts. Based on the above-described vision for an SMC society, the State will take various measures toward the establishment of a sustainable society which is a consolidation of an SMC society, a Low-carbon Society and a Society in Harmony with Nature. These measures will include establishment for SMC blocks, innovation in lifestyles, promotion of cycle-type businesses, enhancement of the framework for responsible use and disposal of CRs, sophistication of 3R technology and systems, accurate understanding of information, and human resources development (Chapter 5).

Furthermore, this plan provides a concrete path toward making contributions to the establishment of international SMC societies with a specific focus on Asia and in consideration of changing international situations following the formulation of the First Fundamental Plan. Specifically, the State will revise the “Japan’s Action Plan to Promote

Global Zero-Waste Societies”, formulate the “East Asia SMC Society Vision”, and develop and improve an information base for 3R efforts. The State will transfer Japan’s most appropriate technologies to other countries according to their respective circumstances.

This Fundamental Plan sets the basic direction toward the establishment of an SMC society and incorporates targets. The State will ascertain and issue annual reports on the progress of a number of specific efforts.

(Responsibilities of today’s society)

All of us must appropriately fulfill our respective responsibilities toward establishment of an SMC society. Such responsibilities and division of labor should not be confined only to the present generation; they will also need to be addressed by future generations.

Whether we like it or not, our actions today will impact in major ways on the choices available to future generations. We can accelerate efforts toward the establishment of an SMC society by harnessing collective wisdom and through cooperation and collaborative efforts backed by trust, so that future generations will not be subjected to major societal pressures and concerns as a result of inherited resource constraints and waste problems.