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3R ACTION PLAN ADOPTED AT THE G8 SEA ISLAND SUMMIT

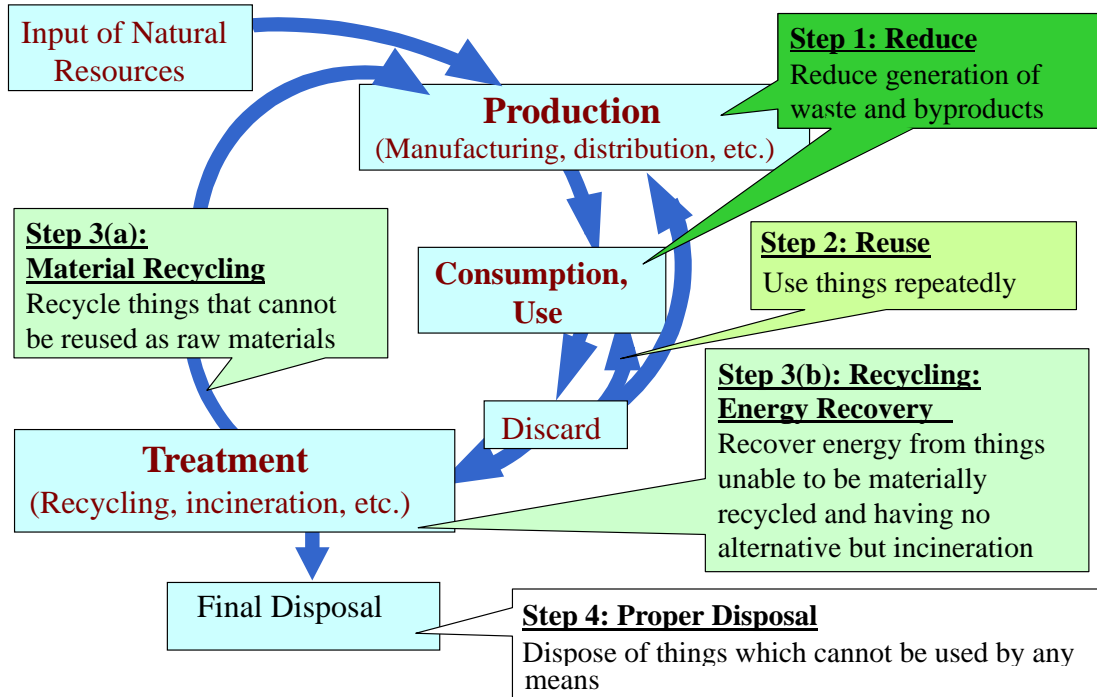
Reduce, Reuse, and Recycle Initiative

We will launch the Reduce, Reuse, and Recycle ("3R") Initiative at a Ministerial Conference in spring 2005 hosted by the Government of Japan. In cooperation with relevant international organizations such as the OECD, we will seek through this initiative to:

- Reduce waste, Reuse and Recycle resources and products to the extent economically feasible;
- Reduce barriers to the international flow of goods and materials for recycling and remanufacturing, recycled and remanufactured products, and cleaner, more efficient technologies, consistent with existing environmental and trade obligations and frameworks;
- Encourage cooperation among various stakeholders (central governments, local governments, the private sector, NGOs and communities), including voluntary and market-based activities;
- Promote science and technology suitable for 3Rs; and
- Cooperate with developing countries in such areas as capacity building, raising public awareness, human resource development and implementation of recycling projects.

Source: *G8 Action Plan on Science and Technology for Sustainable Development: "3R" Action Plan and the Progress of Implementation (Excerpt) June 10, 2004*

CONCEPT OF THE 3Rs IN A SOUND MATERIAL- CYCLE SOCIETY



ISSUE I: NATIONAL POLICIES TO IMPLEMENT THE 3Rs

CURRENT SITUATION

Resource Utilization and Solid Waste Generation

Economic activities are founded on direct or indirect utilization of natural resources. Expansion of economic activities increases impacts on the environment in terms of exploitation, processing, consumption and final disposal of resources. For reductions in the environmental pressure posed by the utilization of resources, it is necessary to improve the efficiency of resource utilization. Improvement in the efficiency level through technological developments and structural changes in the economy has been offset by an even higher increase in absolute production levels throughout the world. It is forecast that continued growth in population and expansion of economic activities will stimulate higher consumption of resources in the future. In these circumstances, major improvement in the efficiency of resource utilization is needed to enable decoupling of environmental degradation from population growth and economic development and to bring down environmental pressures regarding resource utilization to sustainable levels.

In spite of higher efficiency levels in the utilization of resources, it appears that the total consumption of resources will continue to increase as a result of economic growth and higher absolute levels of gross production and consumption in OECD countries. The amount of municipal solid waste generated increased by approximately 40% in absolute terms and 22% in per capita terms from 1980 to 1997, and it is forecast that this will increase by a further approximate of 43% from 1997 to 2020. Although the recycling rate is expected to grow from 18% in 1997 to 33% in 2020, the volume of landfilled wastes is expected to grow slightly (see Annex 1). The amount of hazardous wastes generated increased in most OECD countries between 1985 and 1997, and it is forecast that over the 20 years following that period it will continue to grow at around the same rate as economic growth. Concerning resource utilization, there is still no sign of GDP growth being decoupled from environmental degradation in OECD countries.

Activities for 3R Promotion

In OECD countries, efforts for the promotion of the 3Rs have been strengthened since the late 1980s as a result of the increased recognition of waste minimization, in addition to the collection and treatment of waste, as an important policy issue. One example typical of this trend was the introduction of Extended Producer Responsibility (EPR). EPR refers to the thinking that producers bear a certain responsibility for the proper recycling or disposal of the products they manufacture even after those products are used and are discarded. Concrete examples of implementation include the take-back and recycling of used products and the introduction of economic instruments such as deposit systems. Through the introduction of EPR, business entities have been induced to take a life cycle assessment (LCA) based approach to their products in order to minimize environmental impacts through the entire life stage of a product, not only in production and use but also in recycling and disposal.

Activities contributing to the promotion of the 3Rs can be classified into the following four

policy approaches (see Annex 2).

i) Systems for integrating environmental considerations into socio-economic activities

a) Framework instruments

These instruments seek to achieve policy goals, without any direct prohibitions, restrictions or obligations of specific actions, by setting compulsory targets for achievements or by making it compulsory to follow certain procedures and formalities. Japan's Fundamental Law for Establishing a Sound Material-cycle Society (Cabinet Decision in March 2003) falls under this classification (see Annex 3). This Plan, which stipulates quantitative targets covering the three stages of material flow (see Annex 4), namely, input, cyclical use and output (final disposal), has been set forth for the ten-year period starting from 2000 and constitutes a ten-year framework of programs to accelerate the shift towards sustainable consumption and production as recommended in the JPoI (see Annex 5).

b) Direct regulatory instruments

These instruments seek to achieve policy goals and minimum compulsory observation by the entire society by using specific regulatory methods based on laws. Examples include prohibition of the sale of batteries containing mercury, prohibition of the use of hazardous chemicals in electric and electronic equipment, mandatory take-back and recycling by business entities and restrictions on waste treatment.

c) Economic instruments

These instruments seek to achieve policy goals by inducing economically rational actions by stakeholders through providing economic incentives based on market mechanisms. Examples of this include taxation of wastes to be landfilled, collection of waste treatment fees (at a metered rate) from households, and the use of deposit systems.

d) Voluntary instruments

These refer to the voluntary actions taken by business operators in setting specific nonbinding targets on their own activities and implementing measures with a view to achieving them. Examples include the formulation by industrial associations of voluntary action plans for reduction of solid waste volume, the voluntary agreements between industrial associations and government agencies, and prioritized procurement of environmentally-friendly products (green purchasing) by business entities.

e) Informational instruments

These instruments entail promoting environmentally-considerate actions by stakeholders such as consumers and investors through the disclosure and provision of information concerning environmental impacts of business activities, products and services so that stakeholders can assess and select operators which actively implement environmental conservation activities and products which have a low environmental load during each stage of operations, including during the extraction of resources, production, distribution,

consumption and disposal. Examples are eco-labels and the preparation and disclosure of databases of environmentally-sound products.

f) Procedural instruments

These instruments provide opportunities for making environmentally-considerate judgments in the important stages of each entity's decision-making processes and incorporate criteria for making judgments when undertaking environmental consideration. Typical examples are environmental management systems such as the EU's Eco-Management and Audit Scheme (EMAS) and the ISO 14000 Series.

ii) Support for 3R-related activities

Examples of environmental investment include subsidies, low-interest loans and preferential tax measures aimed at promoting construction of facilities and technical development related to the 3Rs as well as grants in aid to environmental conservation activities. Another example is the provision of support, such as in the establishing of priority areas which promote a concentration of 3R-related industries and the provision of guidance on marketing. Japan is promoting Eco-Town Projects, aimed at promoting the development of environmentally-friendly towns. Securing conditions for fair competition among 3R-related industries also contributes to 3R-related activities.

iii) Environmental Education

Environmental education aims at increasing the recognition of the importance of issues and deepening common understandings among various stakeholders while nurturing their problem-solving capabilities and developing the basis for voluntary approaches by various entities. In addition to implementation of environmental education in various places such as schools, local communities and offices and awareness-raising campaigns carried out by local public entities and NGOs, efforts for strengthening the base of the activities such as the development of teaching materials, training of teachers and provision of relevant information, are being promoted.

iv) Science and Technology

Science and technology form the intellectual basis for promotion of the 3Rs. They incorporate quantitative analyses concerning the prospects for and policy effects of the formation of a sound material-cycle society, monitoring to obtain data related to resource utilization and material flows, and development of 3R-related technologies.

It is important to include a systematic preparedness into measures to treat wastes generated during a large-scale disaster. Local governments must make coordinated efforts with neighboring local governments in implementing disaster measures before a disaster, such as stipulation of waste treatment plans for a disaster. In addition, central governments must support development of a cross-jurisdictional cooperation system. Also it is important to make an international cooperation among countries.

ISSUES IN PROMOTION OF THE 3Rs

To promote the 3Rs, it is necessary to advance a broad range of activities in order to cover both the entirety of the operations necessary to create a product and its life stages with a viewpoint of “from cradle to cradle”. Thus, it is desirable to formulate comprehensive visions and/or plans for 3R promotion through the participation of various stakeholders and to develop approaches based on those view and/or plans. Care should always be taken with regard to the fact that the promotion of the 3Rs aims at the development of sustainable consumption and production patterns.

Visions and/or plans for the promotion of the 3Rs need to incorporate the following items and viewpoints:

i) Systems for reviewing efforts

In order to review the implementation status of a given effort and rethink that effort as necessary, the establishment of a PDCA cycle, referring to formulation (Plan), execution (Do), inspection and assessment (Check) and review (Action), is indispensable when setting forth a plan or strategy. Setting more concrete targets in specific categories can contribute to concrete outcomes. It is important to set both targets in individual categories and targets which assist in understanding overall trends regarding the connection between economic activities and the material flow towards recycling or disposal.

ii) Identification of the roles of stakeholders

It is necessary for various stakeholders to promote their 3R activities on the basis of an awareness of the distinct roles of various stakeholders. While local governments have been undertaking the disposal of household waste, manufacturers have come to be required to fulfill part of the responsibility for treatment and recycling of certain waste items in keeping with the concept of EPR. The application of EPR differs by country, and the sharing of responsibilities among stakeholders when EPR is applied also varies according to factors such as the characteristics of the waste, socio-economic conditions and historical background. In the future it will be important to examine further the range of waste to which EPR should be applied, the range of relevant stakeholders, and the sharing of responsibilities among these stakeholders. With respect to wastes accompanying industrial activities, it is essential to have activities which are rooted in the responsibilities of the entities generating the wastes.

iii) Expansion of market for products with low environmental impact

In the product manufacturing stage, efforts by manufacturers, such as designing products that facilitate recycling, manufacturing products using recyclable resources, and reducing the volume of hazardous chemical substances in products, are important. In the consumption stage, it is important for government agencies, business entities and consumers to make a shift of their demand to more environmentally-friendly products by actively embracing green purchasing. Information-sharing mechanisms on eco-conscious products among stakeholders, such as through eco-labeling, is important. Also, the securing of the conditions necessary for fair competition contributes to development of 3R-related businesses.

iv) Awareness raising

Various stakeholders are required to understand the importance of mutual cooperation in order to promote 3R activities. Thus, public agencies and industry, in particular, need to take initiative in developing partnerships among relevant entities. Also, it is important to promote environmental education that enables people to realize the necessity of 3R activities.

v) 3R research and development

It will be necessary to shift from conventional science and technology based on the premise of mass production, mass consumption and mass disposal to science and technology which facilitate the establishment of sustainable consumption and production patterns. Therefore, it is necessary to promote research and development aimed at mitigating environmental impacts in all processes, from extraction of resources to production, distribution, consumption, recycling and disposal.

vi) Infrastructure for 3R-related activities

The development of systems to collect used products and facilities for processing and utilizing recyclable resources in local areas is critical for the promotion of reuse and recycling. It is preferable to establish facilities close to the source of waste generation. Needless to say, it is very important to minimize impacts on nearby residents and the surrounding environment.

ISSUE II: REDUCTION OF BARRIERS TO THE INTERNATIONAL FLOW

CURRENT SITUATION

Expansion of World Trade

As global economic growth and free trade advance, the exported volume of goods and services throughout the world increased by more than 17 times, and foreign direct investment by 45 times, in nominal US dollar terms between 1970 and 1998. Moreover, due to expansion in the global trade volume, the ratio of commodity exports out of total global production has almost doubled from 8% to 15% over the past 20 years. It is forecast that as regional trade liberalization and the number of bilateral free trade agreements and economic partnership agreements increase in the future, the volume of transboundary trade will increase (see Annex 6).

Increase in Transboundary Movement of Recyclable Resources

When a country experiencing significant economic growth exists within a region, the need to acquire recyclable resources increases, resulting in the sharp increase of transboundary movement of recyclable resources. For example, in the Asian region the economic growth of countries such as China has been accompanied by an increased demand for resources, and as such the demand for recyclable resources, which are moderate in cost compared to virgin raw materials, has increased (see Annex 7). In addition, efforts have been made in Japan to build up systems for collecting recyclable resources and to promote the collection and recycling of those resources, yet due to increases in recycling costs triggered by hikes in labor costs and other factors, there has been a sharp increase in exports of materials such as waste plastic, used paper and iron scrap to Asian countries since the latter half of the 1990s. Second-hand products have also been exported to those countries.

Furthermore, electronic appliances such as mobile phones and personal computers have rapidly become popular in developing countries. Most of them cause difficulties in disposal due to the fact that they contain hazardous substances. It is expected that transboundary movement of these appliances, destined for recycling and proper treatment, will increase in the future.

Approaches Based on the Basel Convention

The Basel Convention, adopted in 1989 and entering into force in 1992, has created a global management system for hazardous wastes, identifying the roles of parties concerned in order to ensure sound transboundary movement. Based on several basic principles, including environmentally sound management of transboundary movements of hazardous wastes and the pursuit of domestic disposal whenever possible, the Convention has introduced a prior informed consent system and other such systems to address the import or export of hazardous wastes, while promoting capacity building and other kinds of international cooperation through its regional centers. In order to develop the approach by upstream entities further, the Convention has stipulated “hazardous wastes

minimization”, “lifecycle approach to chemicals and hazardous waste management”, “integrated waste management” and “regional approach” as priority areas.

Negative Aspects concerning Transboundary Movement of Recyclable Resources

As the volume of transboundary movements of recyclable resources increases, violations of the Basel Convention and cases of environmental pollution caused by the transboundary movements of waste not necessarily controlled by the Convention have become conspicuous. For example, hazardous wastes may be exported disguised as harmless materials or they may be mixed in with exports of ordinary goods. Second-hand items exported from developed countries to developing countries, such as used automobiles, electronic products or home electric appliances, may be burned in the open air after recovering valuable metals and other components of value, resulting in environmental pollution; pollution from the inappropriate disposal of residues after the recovery of valuable metals and other resources has also been a growing concern.

REDUCTION OF BARRIERS TO THE INTERNATIONAL FLOW

In order to promote the establishment of a sound material-cycle society internationally, 3R-related efforts should be made at the international level as well as at the domestic level. In this context, it is necessary to reduce barriers to the international flow of goods and materials for recycling and remanufacturing, recycled and remanufactured products, and cleaner, more efficient technologies, consistent with existing environmental and trade obligations and frameworks.

International distribution of goods and materials for recycling and remanufacturing and recycled and remanufactured products could contribute to efficient use of resources and to prevention of environmental pollution associated with de novo extraction and transportation of primary resources and production of materials and products. In addition, the international distribution of cleaner, more efficient technologies will be useful in minimizing waste generation and in reducing environmental impacts.

The benefit of international distribution of 3R-related goods and materials, products and cleaner, more efficient technologies is large not only from environmental aspects but also from economic aspects. Promotion of international recycling will contribute to importing countries in acquiring goods and materials at low cost. This is an advantage especially for developing countries which are exerting efforts towards the launching and fostering of domestic recycling businesses. At the same time, remanufacturing businesses in developed countries have been expanding their activities internationally. Remanufacturing businesses, which remanufacture goods equivalent to new ones from used products, provide their remanufactured products at reasonable prices to second-hand market. In addition, a number of multinational companies utilize this network to take back their own products, remanufacture them and reuse them. Those activities contribute greatly to job creation, efficient use of natural resources and conservation of the environment.

However, there are some barriers to trade in the international distribution of 3R-related goods and materials, products and cleaner, more efficient technologies. In fact, some countries are subject to differentiated treatment in tariffs during the importation of those

goods and materials, products and cleaner technologies. Recognizing that there are various reasons behind this, there is an understanding internationally that it is necessary to reduce such differentiated treatment as much as possible and to eliminate it, if appropriate, and multilateral and bilateral frameworks have taken up various efforts in this area.

With respect to the reduction of barriers to environmental goods and services, in 2001, the WTO Doha Ministerial Conference agreed to conduct negotiations on the reduction or elimination, as appropriate, of tariff and non-tariff barriers. Currently the WTO Committee on Trade and Environment is working on developing a list of environmental goods. By reducing tariff and non-tariff barriers to environmental goods and services, importing countries will be able to obtain higher-quality environmental goods and services at lower prices, and the willingness of governments and corporations for environmental investment will be enhanced. Meanwhile, in exporting countries, the development and introduction of clean technologies, the development of environmentally-compliant products, and the development of waste management systems suitable for developing countries will be promoted. Since dissemination of environmental goods and services will contribute to the promotion of the 3Rs, it is expected that promotion of these actions undertaken through the WTO will result in the realization of the early reduction of barriers to the international flow. Moreover, bilateral efforts contributing to the promotion of the 3Rs have also been launched under the framework of free trade agreements, which aim at promotion of bilateral trade liberalization, and further acceleration of this approach is desirable.

With respect to the international distribution of waste, emphasis should be placed on the fundamental idea of minimization in the country in which the waste is generated. To this end, maximum efforts should be made for the reduction of waste generated and the promotion of reuse and recycling in each country. Thus preparation of a system for separate collection and recycling is necessary. This is particularly important in the case of hazardous wastes. Sound management of wastes that result even after minimization of waste generation is required within the country of origin; however, in cases in which sound reuse or recycling is practiced outside the country, the international flow of those wastes can be permitted, from the viewpoint of effective use of resources, or, alternately, the avoidance of environmental pollution that would be caused by the extraction and transportation of additional primary resources or by the manufacturing of materials, the international flow of those wastes should be permitted. Needless to say, prevention of environmental pollution must be a prerequisite to international reuse and recycling, and it is necessary for both exporting and importing countries to strive jointly to prevent the creation of environmental pollution from transboundary movements of wastes. Except for special cases, including exports of wastes from countries that do not have sufficient environmentally-sound technologies or facilities for recycling to countries that have them, recycling should be based mainly on utilization of domestically-generated recyclable resources. Although the countries where there is substantial economic growth may transitionally rely on imported recyclable resources from other countries, they should make a shift to the recycling of domestically-generated recyclable resources in the medium- to long-term.

In consideration of the above points, it will be necessary to overcome the following issues in order to secure an international flow of recyclable resources based on proper environmental management in the future. In this regard, application of a region-wide approach will yield effective results.

i) Securing of proper utilization and disposal of imported recyclable resources

Environmental pollution may be caused by improper treatment of recyclable resources. In some countries, proper treatment cannot always be guaranteed due to the lack of enforcement capability, and those countries may restrict imports of recyclable resources as a result. It is necessary to enhance legislation enforcement capabilities to ensure environmentally sound management (ESM) of recyclable resources and to foster business entities of good quality.

ii) Data collection concerning the transboundary movement, utilization and treatment of recyclable resources

In order for the competent authorities on transboundary movements in a certain country to conduct examinations of items to be imported or exported, it is often necessary to know of the existence of, and the state of recycling activities which take place in, recycling facilities abroad as well as data concerning the types and quantities of transboundary recyclable resources. However, such data are not always ready for use. In the future it will be necessary to organize this fundamental data.

iii) Strengthening of management systems concerning transboundary movement of recyclable resources

It is difficult for customs offices to monitor the contents of all freight strictly. Accordingly, there is the possibility of extremely poor-quality recyclable resources or waste materials being imported or exported illegally under the guise of ordinary freight. Therefore, it is necessary for customs offices and authorities responsible for controlling the transboundary movement of recyclable resources in both exporting and importing countries to work in cooperation and further strengthen their capabilities to detect illegal practices as they take place.

iv) Sufficient information exchange and information sharing concerning each country's transboundary movement control systems

Although the Basel Convention stipulates a list of hazardous wastes, in the course of practical operation of domestic laws for implementation of the Convention, there are multiple interpretations of these hazardous waste items as indicated under the Convention. In addition, each country has its own independent set of regulations governing transboundary movements. Insofar as insufficient sharing of information among relevant countries results in confusion among business entities, it is important to promote further information exchange and sharing among the competent authorities of each country.

v) Awareness raising among operators involved in the transboundary movement of recyclable resources

Among operators related to the transboundary movement of recyclable resources, there are some who conduct import and export operations despite lacking sufficient knowledge regarding recyclable resources or sufficient know-how regarding means of dealing with them. There are other cases in which waste treatment operators of exporting countries utilize subcontractors who, in order to bring costs down, fail to abide by laws. In order to prevent illegal imports and exports, raising awareness among operators is crucial.

ISSUE III: COOPERATION BETWEEN DEVELOPED AND DEVELOPING COUNTRIES

CURRENT SITUATION

As a result of progress in the global economy, developing countries are also rapidly transforming into consumer societies centered around major cities. As income levels increase, an expansion in volume and a diversification of the type of wastes generated in daily life, such as the increased ratio of waste containers and packaging in the total amount of waste, has been taking place in these cities, just as it has in developed countries. There are countries where reuse and recycling are currently carried out by the informal sector. Meanwhile, issues are arising such as ensuring sound means for the collection, transportation and disposal of wastes. Waste minimization has already become a real issue in a number of major Asian cities, and early development of collection systems for recyclable resources using joint efforts by the public and private sectors is required. Establishment of a sound material-cycle society is important in the medium and long term for ensuring sustainable development. Also, efforts towards establishment of a sound material-cycle society are useful in improving other areas of sustainable development, including poverty reduction, access to safe water and sanitation. However, policy priorities in developing countries still tend to lean towards those development projects that will produce poverty reduction or sustainable growth in the short term.

The JPoI calls for financial and technical support to be provided to developing countries in order to accelerate their shift towards more sustainable production and consumption patterns. To achieve this goal, international organizations and institutions have been promoting various projects in developing countries, including efforts to promote the 3Rs. For example, under the UNIDO/UNEP Program for National Cleaner Production Centres being implemented by UNEP and UNIDO, the establishment of cleaner production centers and preparation of databases in developing countries is now underway. In addition, UNEP has been promoting the Life Cycle Initiative (aimed at the development and diffusion of tools for assessing opportunities, risks and tradeoffs associated with products and services) and the Sustainable Consumption and Production Programme (facilitating information provision, training implementation and network building). Furthermore, as activities relevant to the Basel Convention, some partnership projects, including the development of an environmentally friendly management mechanism for used lead-cell batteries and the Mobile Phone Partnership Initiative, are being carried out.

ISSUES FACED BY DEVELOPING COUNTRIES

The creation and appropriate implementation of systems for promoting establishment of sound material-cycle societies constitute the basis for realizing sustainable production and consumption patterns. Developing countries need to enhance efforts to develop systems for implementing the sorting and collecting of domestically-generated waste, implementing reuse and recycling and undertaking appropriate treatment of residues. They should also enhance systems that will enable them to undertake sound management of recyclable resources imported from other countries.

A key to promoting measures toward sound material-cycle societies in developing countries is the cooperation among various stakeholders, including governments, private

sector entities, NGOs, local communities and academics. In this regard, developing countries should systematically promote implementation of various measures suitable for their national conditions in cooperation with international community, clarifying their positions regarding waste management and the 3Rs in their national policy agenda through the formulation of national plans and strategies.

When addressing waste management and the 3Rs, great attention should be given to the following:

i) 3R-related policies and institutions

While some developing countries are promoting systems for addressing the 3Rs, in almost all developing countries, legal systems regarding the 3Rs have yet to be established. Insufficient institutional capability to support 3R measures is a common issue for all developing countries to address. It should be borne in mind that the establishment of waste management systems that cover the sorted collection, transportation and intermediate treatment of wastes in keeping with local conditions, as well as the efficiency of such systems, are prerequisites for the promotion of 3R measures. From this perspective, it is necessary to train persons in local governments and strengthen their capacity, insofar as local governments play the decisive role in the administration of waste management. If reuse and recycling is being carried out by the poor as part of the informal sector, utilization of that sector needs to be studied as appropriate, keeping in mind the impacts on the lives of the poor.

ii) 3R technology, systems and facilities

The recycling or proper treatment of kitchen waste, wastepaper, and waste plastics is an issue common to developing countries, yet the necessary technological human resources or systems are not sufficiently established. Specific issues include: development and dissemination of technology for utilizing residues as organic resources after kitchen waste is used as biomass energy, establishment of wastepaper collection systems and enhancement of wastepaper recycling technology, and the development and dissemination of energy utilization technologies of waste plastics that are not suitable for material recycling. Caution should be given to the needs of developing countries that reflect their national conditions in the introduction and dissemination of waste management and recycling technologies. More sophisticated recycling and treatment technology for used electrical and electronic equipment, clean technologies for reducing waste generation and the promotion of the use of environmentally sound products are future issues to be addressed.

iii) Awareness of the 3Rs

Production and consumption are the prime concerns of people in developing countries and awareness of citizens, corporations and governments is still low towards waste issues. Some multinational corporations and export manufacturers with ISO 14001 certification recognize the need to reduce waste and implement sound treatment as part of environmental management. However, some manufacturers, particularly those operating exclusively in domestic markets, may not be sufficiently aware of the necessity of environmental management. In order to establish waste sorting and collection systems, cooperation among all relevant parties is essential, and it is necessary to enhance common

awareness of the issues as well as enhance recognition of the importance of actions through the implementation of environmental education and the dissemination of information regarding successful inter-stakeholder (e.g. local governments) partnerships.

iv) Sound material-cycle business

Recycling and reuse by the informal sector are functioning in some developing countries. However, because of the small scale of recycling markets, there is much collected waste that ends up undergoing disposal but not recycling or reuse. Some cyclical resources such as copper and mercury contained in used products are not recycled and are instead disposed as waste due to a lack of refining plants in the countries that generate them. Even though the developing countries have a cost advantage in the resource recycling business, some of them do not have sufficient capability from technological or legal standpoints to address the issue. In some cases, business entities do not have sufficient awareness with regard to compliance with environmental regulations, leading to damage to human health or environmental pollution during the collecting and reprocessing of recyclable resources. Establishment of environmentally-sound management systems by the entities in charge of recycling businesses is necessary.

ISSUE IV: COOPERATION AMONG STAKEHOLDERS

CURRENT SITUATION

It is essential that stakeholders, including the central government, local governments, private sector entities, NGOs, and local communities establish cooperative relations and promote the 3Rs throughout all of society. The fundamental roles of each stakeholder are as follows.

As for the central government, in addition to undertaking fundamental preparations, such as preparing the legal framework and other institutional systems, inducing the private sector through subsidies and tax incentives to construct recycling facilities, providing support for research and development, and providing citizens and NGOs with support and relevant information to foster voluntary activities, it also sets the pace by implementing its own measures, thus enhancing partnership among various stakeholders and promoting 3R-related measures at the national level. Local governments have a role to play as local coordinators, ensuring enforcement of laws and regulations related to the 3Rs and promoting actions suitable for local conditions, including the stipulation of specific action plans, promotion of green procurement, awareness raising, information disclosure, ensuring participation by local communities in decision-making processes regarding relevant policies, and development of hubs for recycling businesses. The central government and local governments also have the role of leading markets in desirable directions through economic measures such as the introduction of charges for garbage collection and the collection of landfill taxes.

The private sector has the role of promoting the 3Rs by implementing environmentally-sound operations to develop and supply environmentally sound products and services, developing technologies and providing them to the market, taking back a certain amount of waste, reusing used materials in new products or reusing materials as raw materials or fuels in keeping with EPR, and ensuring sound waste management. Also, in keeping with the concept of corporate social responsibility (CSR), private sector entities can be expected to take on the tasks of developing and promoting environmental management systems as well as disclosing information on the 3Rs, to promote environmental management systems, and to provide information on raw materials and recycling methods so that consumers are able to choose products with lower environmental impact.

Local communities should play a role by actively participating and cooperating in 3R activities by reviewing their lifestyles, purchasing environmentally-sound products and implementing thorough sorting of wastes, being aware of their own responsibilities as waste generators. Communities also should take an active part in the decision-making processes concerning 3R promotion conducted by central and local governments. Meanwhile, NGOs are responsible for promoting environmental conservation activities on a local basis and improving awareness concerning both the significance of the 3Rs and concrete actions, as well as for monitoring the progress of governments and the private sector and recommending policy options.

The roles of various parties concerned with waste differ according to various elements, such as characteristics of the waste, socioeconomic conditions and historical background.

For example, due to regulations based on the EPR, some parts of the responsibility of waste management of used containers and packaging, used electric and electronic appliances and end-of-life vehicles have been transferred in some countries from local governments to business entities. In addition, there are new stakeholders appearing, such as business entities which provide the second-hand market with, for example, products repaired and refurbished by replacing parts in items such as used cars and computers with more highly-sophisticated components.

ISSUES IN PROMOTING COOPERATION AMONG STAKEHOLDERS

Building of Partnerships among Diverse Stakeholders

A number of stakeholders are involved in the various stages of resource recycling, ranging from extraction of resources to manufacturing and use of products, recycling and disposal of used goods. Cooperation among various stakeholders is necessary to reduce the volume and the hazardousness of wastes in each stage of the product's life. For example, in the manufacturing stage, environmental consideration by manufacturers includes selecting raw materials which have low environmental impact, manufacturing of long-life products, and designing products in ways that facilitate their reuse or their recycling. In the consumption stage, consumers purchase and use those products and services that are environmentally-friendly. Furthermore, during the reuse and recycling stages, it is important to distribute roles among stakeholders appropriately so that illegal treatment methods, such as illegal dumping, can be reduced. Thus, improvement of awareness and development of partnership among stakeholders is a key issue for the promotion of the 3Rs.

Building public-private partnership is particularly important. Local public entities can be expected to take on the role of local coordinators under the leadership of local governors in order to promote 3R activities that are rooted in local communities. For the promotion of the 3Rs concerning products distributed in the international markets, the development of partnerships between exporting and importing countries is necessary.

Refurbishers and repairers play important roles in terms of reuse and recycling, and further development of their activities is expected. At the same time, how to apply the concept of EPR to these new stakeholders is an issue which needs further consideration.

In promoting cooperation among different stakeholders, it is important to identify appropriate cost burdens after considering the environmental benefits and economic costs of operating recycling systems. The introduction of LCA and other assessment methods is desirable.

Promotion of Linkage among Different Sectors

Linkage among different sectors would enable expanded provision of opportunities to reduce waste through having waste products from one company used as raw materials for another. Win-win relations can be realized by establishing linkages between different sectors, with waste dischargers reducing treatment costs while users of recyclable resources reduce both procurement costs for raw materials and environmental impacts. Projects utilizing household waste or post-incineration ash as raw materials for cement as

well as projects converting construction waste into raw materials for buildings are already being implemented. Furthermore, as part of the Eco-Town Project in Japan, efforts are underway to develop hubs to enable recycling of various wastes in terms of quantity and quality and to reuse stably and effectively waste products and exhaust heat generated from certain business categories as raw materials and energy sources in other key industries. It is also beneficial to proactively promote linkage among different sectors in terms of creating new industries and enhanced employment opportunities.

Information Sharing for Promoting Linkage among Stakeholders

Information sharing among stakeholders regarding products is critically important for promotion of the 3Rs with linkage among shareholders. For example, products designed to facilitate recycling should have such information conveyed accurately from manufacturers to consumers and to recycling businesses and waste treatment entities. With respect to globally-distributed products with environment-polluting potential, such as mobile phones or computers, information on those products should be shared between exporting and importing countries to ensure environmentally-sound recycling and disposal, paying due attention to protection of intellectual property rights.

ISSUE V: PROMOTION OF SCIENCE AND TECHNOLOGY SUITABLE FOR THE 3Rs

CURRENT SITUATION

Scientific and technological developments have brought about the modern material society. As represented by home electrical appliances and automobiles, science and technology have provided major impacts on all aspects of life, improving convenience and amenity as well as providing materialistic satisfaction. At the beginning of the 20th century, mass production through conveyor belt assembly lines in the automobile industry improved production efficiency, supplying large quantities of products at low prices. Subsequently, this technique of production was introduced to other industries, thereby enabling ordinary people to acquire products that had hitherto been reserved for a few persons of wealth. Mass production and mass consumption inevitably generated mass waste, and the introduction of newer models spurred by rapid technical developments has encouraged repurchasing of products and contributed to the mass disposal of usable products.

In the 21st century, the promotion of research and technical development aimed at reducing environmental impacts in all processes from the extraction of resources through production, distribution, consumption and disposal is now called for. Progress has been made in developing and applying LCA techniques in order to assess environmental impacts across all stages of a product's life. New technologies and systems that will contribute to the promotion of the 3Rs have been proposed through the development and application of state-of-the-art sciences such as nano-technology and biotechnology. Revision of manufacturing processes by utilizing these technologies and systems leads not only to reductions in the cost of treatment of industrial wastes but also improvements in the extraction rate and reductions of raw material usage, enabling improvements in profit-earning ratios for businesses.

SCIENCE AND TECHNOLOGY SUITABLE FOR THE 3Rs

Rather than undertaking remedial measures after environmental pollution occurs, science and technology suitable for the 3Rs, having outstanding effectiveness in improving the environment from the perspective of LCA, need to enable society as a whole to take a systematic approach and thereby make possible the prevention of problems before they occur. Science and technology suitable for the 3Rs not only contribute to environmental conservation, but also create new economic added value to bring out latent demand in the society and promote increased sophistication of the overall industrial structure.

Promotion of science and technology suitable for the 3Rs requires accumulation of knowledge covering a wide and diverse field, from natural sciences through the humanities and social science. In particular, efforts should be made to promote research and technological development regarding the following fields and issues.

i) Research on local cyclical systems

Identification of material flows at the local level and the specific technologies necessary for circulating materials at the local level is necessary to bring about such material cycles

in local areas. Based on that, further efforts should be made to demonstrate what social and technical systems are needed for the introduction and establishment of such technologies. In particular, research should be carried out from the standpoint of the social sciences, since material circulation sometimes requires the reform of social systems far beyond the reform of mere industrial technology and industry as well as changes in social institutions to support technology and shifts in the values, work ethic and lifestyles of people who will be using such technologies.

ii) Research concerning the cyclical material flow

Research is required for the development of methods to assess whether and how well the actual material flow is being transformed into a cyclical flow as a result of 3R activities. More concretely, analyses of material flows at a local level and analyses of individual goods and waste products, as well as development of indicators for assessing progress of 3R implementation, should be carried out.

iii) Development of 3R clean technologies

Development of technologies to reduce the generation of waste and to enable reuse and recycling of used products is necessary. Concrete examples of this would include technologies for manufacturing processes which minimize waste, utilization of used parts, recycling of synthetic materials which are difficult to recycle, chemical recycling of plastics and the recycling of things unusable otherwise, such as sludge and post-incineration ash. When developing such technologies, it will be necessary to incorporate mechanisms of nature, including bio-mimicry, and promote interaction among different fields of specialization, such as engineering, biology and architecture. In developing these technologies, it is important to keep in mind always the need for proper treatment of waste.

iv) Technological development for 3R designing

It is necessary to develop product manufacturing techniques which comply with the 3Rs. Examples include techniques for reducing the amount of raw materials required, which are useful in lessening the volume of generated wastes, manufacturing materials which can easily be recycled, designing products that can be upgraded their functions (which enables reuse of the products), and processing and assembling products that facilitate disassembly, separation and screening for easy recycling. Technological development in this field also includes the creation of technologies for inspecting the functions of recycled parts and products, technologies for managing information regarding the use histories of individual parts of products, and maintenance technologies enabling products and parts to be used over the long term.

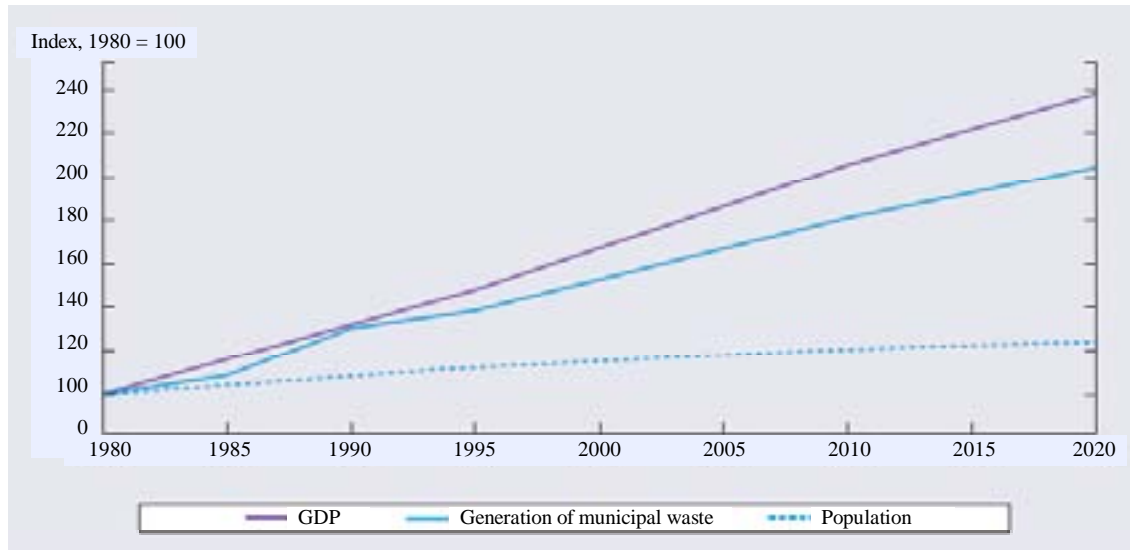
In order to promote 3R measures at the global level, it is necessary for technological development and research to be advanced cooperatively, incorporating mutual information sharing. For example, methods for analyzing material flow have already begun to be addressed through international joint research, with the OECD serving in a central role.

In order to improve mutual understanding and ensure cooperation among stakeholders hoping to promote the 3Rs, information sharing regarding 3R activities and communication among governments, the private sector and local communities are crucial.

As one of the fundamental aspects, it is important to provide, in ways that are accessible, easy to understand, and shared in common among stakeholders, information that can assist stakeholders in reaching decisions with regard to science and technology (e.g., the current status of the research or technology, the results of the science or technology, its effectiveness in improving the environment, cost efficiency when reflecting it in government policies, or feasibility with regard to societal systems). Furthermore, local universities and research institutes conducting research and development in collaboration with local industries, local governments and communities is effective for introducing technologies to promote the 3Rs in a manner that is rooted in communities.

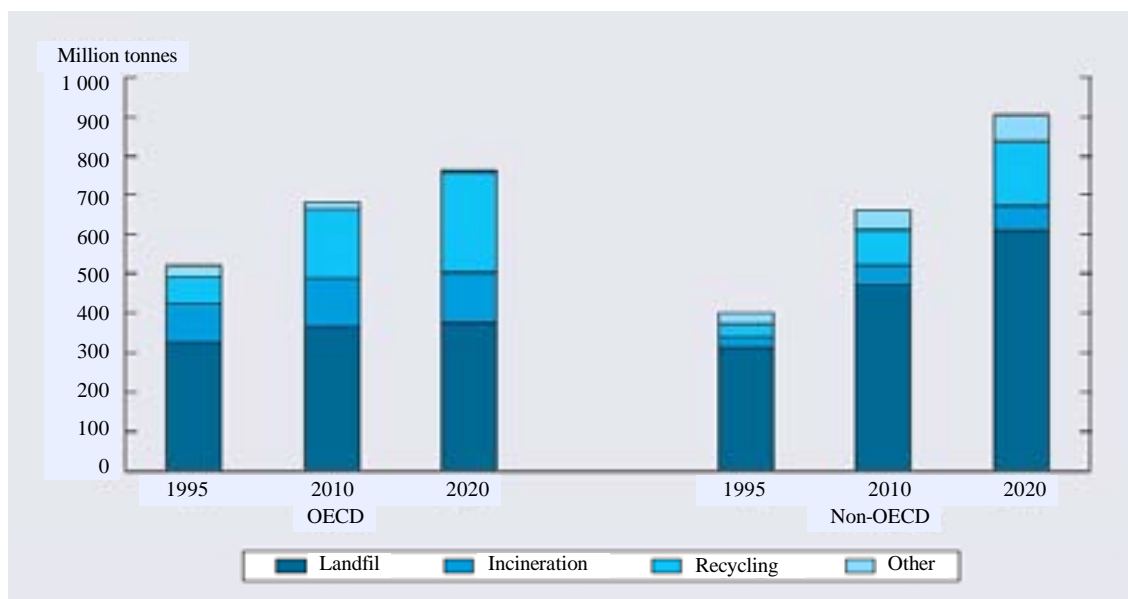
ANNEX 1: OUTLOOK OF MUNICIPAL SOLID WASTE GENERATION IN OECD COUNTRIES

Municipal Waste Generation, GDP and Population in OECD Countries, 1980-2020



Source: OECD (2001) *OECD Environmental Outlook*.

Municipal Waste Management, 1995-2020



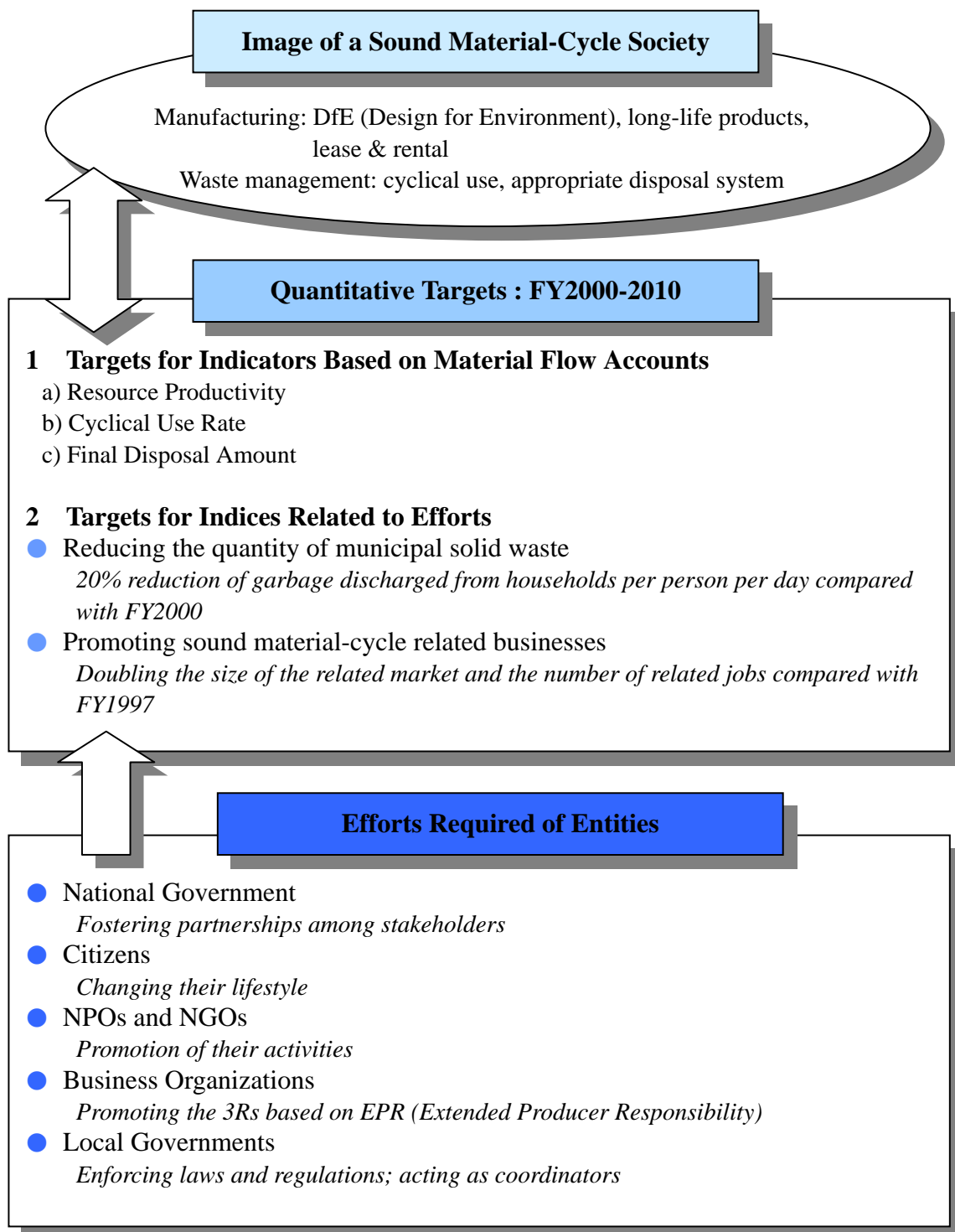
Source: OECD (2001) *OECD Environmental Outlook*.

ANNEX 2: PRACTICES USEFUL IN PROMOTING THE 3Rs

Types of Practices		Content	Examples Being Undertaken
Systems for integrating environmental consideration into socioeconomic activities	Framework instruments	Declaring hierarchic waste policy as basic policy	<ul style="list-style-type: none"> • EU (Waste Framework Directive) • Japan (Fundamental Law for Establishing a Sound Material-Cycle Society)
	Direct regulatory instruments	Establishing reduction targets for landfilled waste	<ul style="list-style-type: none"> • EU (Directive on Landfill of Waste) • Japan (Fundamental Plan for Establishing a Sound Material-Cycle Society)
Systems for integrating environmental consideration into socioeconomic activities	Economic instruments	Establishing targets for recycling rates and/or utilization rates for recyclable items, set for each item type	<ul style="list-style-type: none"> • EU (container and packaging waste, end-of-life vehicles, waste electric and electronic equipment) • Japan (construction wastes, food wastes, waste containers and packages, end-of-life vehicles, waste home appliances [television sets, air conditioners, refrigerators, washing machines], personal computers, compact rechargeable batteries)
		Mandatory collection and recycling of waste	<ul style="list-style-type: none"> • Japan (waste containers and packages, end-of-life vehicles, waste home appliances [television sets, air conditioners, refrigerators, washing machines])
Systems for integrating environmental consideration into socioeconomic activities	Voluntary measures	Mandatory use of used parts and materials; mandatory application of designs reflecting the 3Rs	<ul style="list-style-type: none"> • Japan (mandatory use of used parts and materials, mandatory application of designs reflecting the 3Rs for specified industries and products)
		Ban on sales of products containing hazardous substances	<ul style="list-style-type: none"> • EU and USA (ban on sales of batteries containing mercury)
Systems for integrating environmental consideration into socioeconomic activities	Voluntary measures	Collection of waste collection/treatment charges	<ul style="list-style-type: none"> • Japan and USA (introduction of waste treatment charges at a metered rate by local governments)
		Taxation on landfilling of solid waste	<ul style="list-style-type: none"> • Japan (local governments), United Kingdom, France, Italy
Systems for integrating environmental consideration into socioeconomic activities	Voluntary measures	Deposit system	<ul style="list-style-type: none"> • USA (deposit systems for beverage containers by local governments)
		Establishing targets and target levels for 3R-related activities and conducting follow-ups regarding agreements between an industry association and the Ministry of the Environment or between a company and a relevant local government environment bureau	<ul style="list-style-type: none"> • Germany (agreement on reduction of landfilled construction wastes by half, agreed between the Federal Ministry for Environment, Nature Protection, and Reactor Security and an association comprised of construction industry, demolition industry, and construction materials manufacturer members) • France (agreement reached between the automobile industry and the Ministry of the Environment for reducing to the greatest extent possible wastes generated by collection and treatment of end-of-life vehicles)
Systems for integrating environmental consideration into socioeconomic activities	Green purchasing	Establishing targets on waste reduction through preparation of industry association voluntary action plans and public announcement of the results	<ul style="list-style-type: none"> • Japan (industry associations stipulate voluntary action plans including targets on waste reduction and recycling rates, and publish reports on the progress)
		Green purchasing	<ul style="list-style-type: none"> • Japan (initiative by Green Purchasing Network comprised of companies, administrative bodies, and consumers)

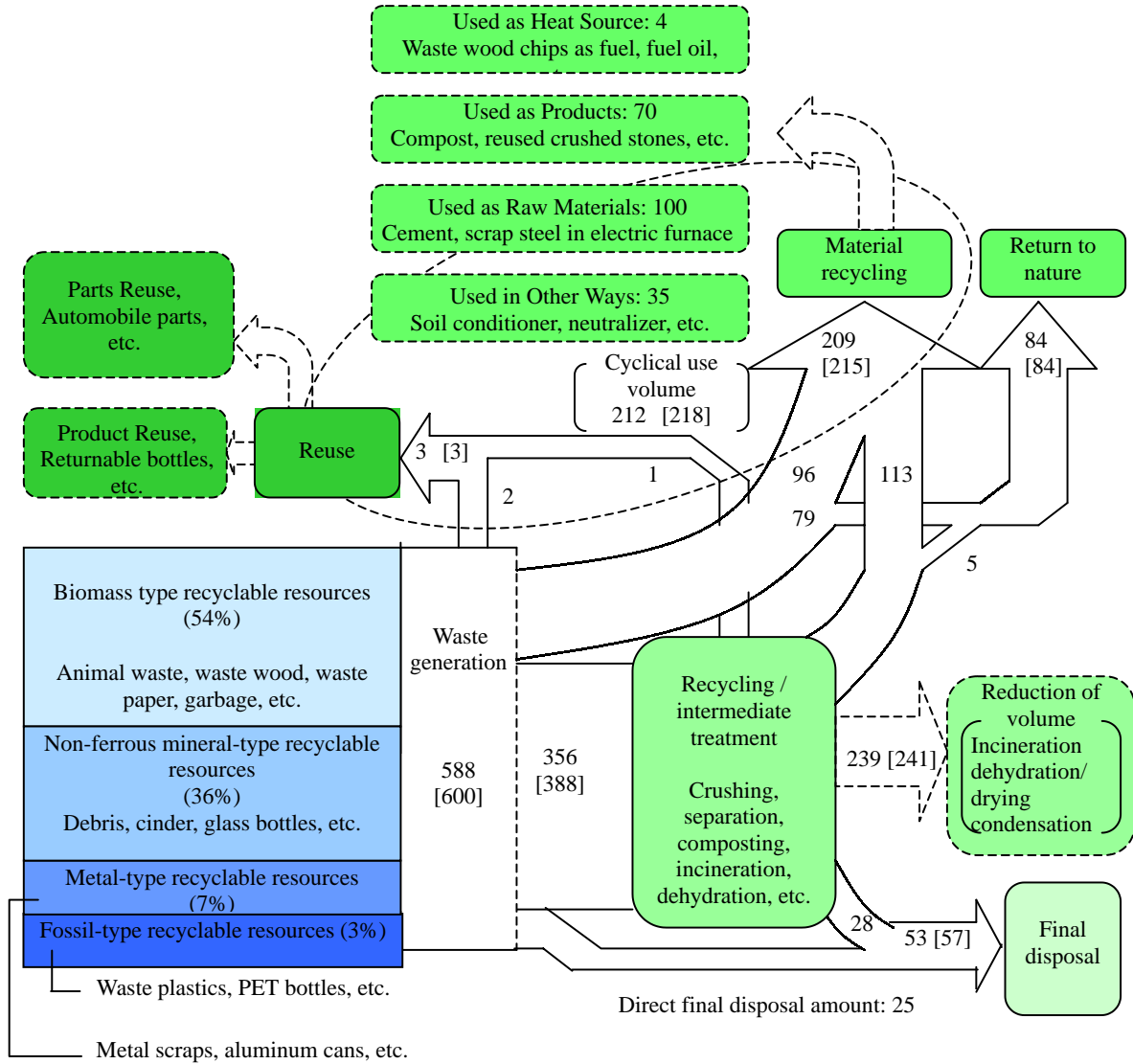
Types of Practices		Examples of Practices	
		Content	Examples Being Undertaken
Systems for integrating environmental considerations into socioeconomic activities	Informational instruments	Eco-labeling	<ul style="list-style-type: none"> • EU, Germany, USA, Canada, Japan, and other countries • Promotion of eco-labeling by Global Ecolabeling Network (GEN), comprised of organizations promoting eco-labeling
	Procedural instruments	<p>Eco-labeling indicating types of materials for recycling</p> <p>Development of guidelines and product databases for green purchasing</p> <p>Promotion of introduction of environmental management systems to the public and private sectors</p>	<ul style="list-style-type: none"> • Japan (compulsory indication of materials used in aluminum/steel cans, PET bottles, nicad batteries, and plastic/paper containers and packages) • Japan (uploading of guidelines and product database on the homepage of Green Purchasing Network) • EU (eco-management and audit scheme (EMAS)) • ISO 14000 series
Support measures		<p>Subsidies, low interest loans, preferential tax treatment for establishment of 3R-related facilities</p>	<ul style="list-style-type: none"> • USA (provision of low-interest loans and technical support to the recycling industry in the Recycling Market Development Zone established in the State of California) • Japan (low-interest loans by public financial institutions, accelerated depreciation of certain portion of acquiring costs of recycling facilities [national tax], reduction of property tax on waste recycling facilities [local tax]) • Japan (Eco-Town Project)
Environmental education		Development and implementation of environmental education programs on the 3Rs	<ul style="list-style-type: none"> • USA and Germany (waste management and recycling included in the environmental education programs, systematic development of teaching materials and human resources)
		Conducting of awareness-raising campaigns	<ul style="list-style-type: none"> • United Kingdom and France (conducting awareness-raising campaigns by governments and public organizations)
Science and technology		Development and implementation of 3R-related technology development programs	
		3R-related research (identification of material flows, development of indicators, research on social systems, etc.)	<ul style="list-style-type: none"> • Japan (the Office of Cabinet and related government agencies have been jointly promoting 3R-related research and development programs via cooperation between public and private sectors, conducting national-level prioritization through a top-down approach.)

ANNEX 3: FUNDAMENTAL PLAN FOR ESTABLISHING A SOUND MATERIAL-CYCLE SOCIETY (OUTLINE)



**ANNEX 4: MATERIAL FLOW IN JAPAN
(FROM APRIL 1, 2001 TO MARCH 31, 2002)**

Units: million tons
Values in brackets are those for FY2000



Source: Based on *White Paper on Sound Material-Cycle Society* by the Ministry of the Environment, Japan (2004)

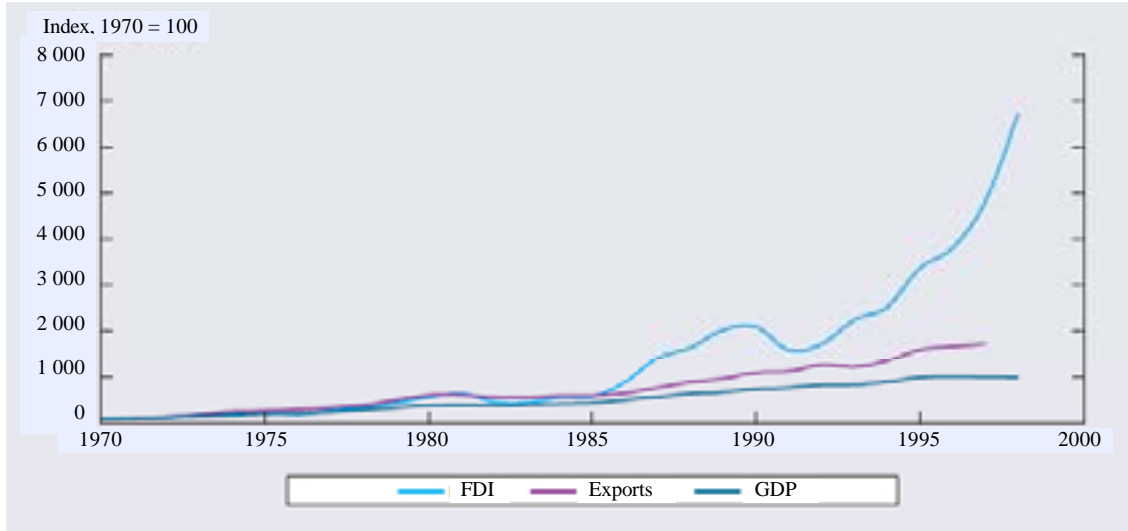
ANNEX 5: WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT PLAN OF IMPLEMENTATION (EXCERPT)

III. Changing unsustainable patterns of consumption and production

15. Encourage and promote the development of a 10-year framework of programmes in support of regional and national initiatives to accelerate the shift towards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, delinking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation, pollution and waste. All countries should take action, with developed countries taking the lead, taking into account the development needs and capabilities of developing countries, through mobilization, from all sources, of financial and technical assistance and capacity-building for developing countries. This would require actions at all levels to:
 - (a) Identify specific activities, tools, policies, measures and monitoring and assessment mechanisms, including, where appropriate, life-cycle analysis and national indicators for measuring progress, bearing in mind that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries;
 - (b) Adopt and implement policies and measures aimed at promoting sustainable patterns of production and consumption, applying, inter alia, the polluter-pays principle described in principle 16 of the Rio Declaration on Environment and Development;
 - (c) Develop production and consumption policies to improve the products and services provided, while reducing environmental and health impacts, using, where appropriate, science-based approaches, such as life-cycle analysis;
 - (d) Develop awareness-raising programmes on the importance of sustainable production and consumption patterns, particularly among youth and the relevant segments in all countries, especially in developed countries, through, inter alia, education, public and consumer information, advertising and other media, taking into account local, national and regional cultural values;
 - (e) Develop and adopt, where appropriate, on a voluntary basis, effective, transparent, verifiable, non-misleading and non-discriminatory consumer information tools to provide information relating to sustainable consumption and production, including human health and safety aspects. These tools should not be used as disguised trade barriers;
 - (f) Increase eco-efficiency, with financial support from all sources, where mutually agreed, for capacity-building, technology transfer and exchange of technology with developing countries and countries with economies in transition, in cooperation with relevant international organizations.

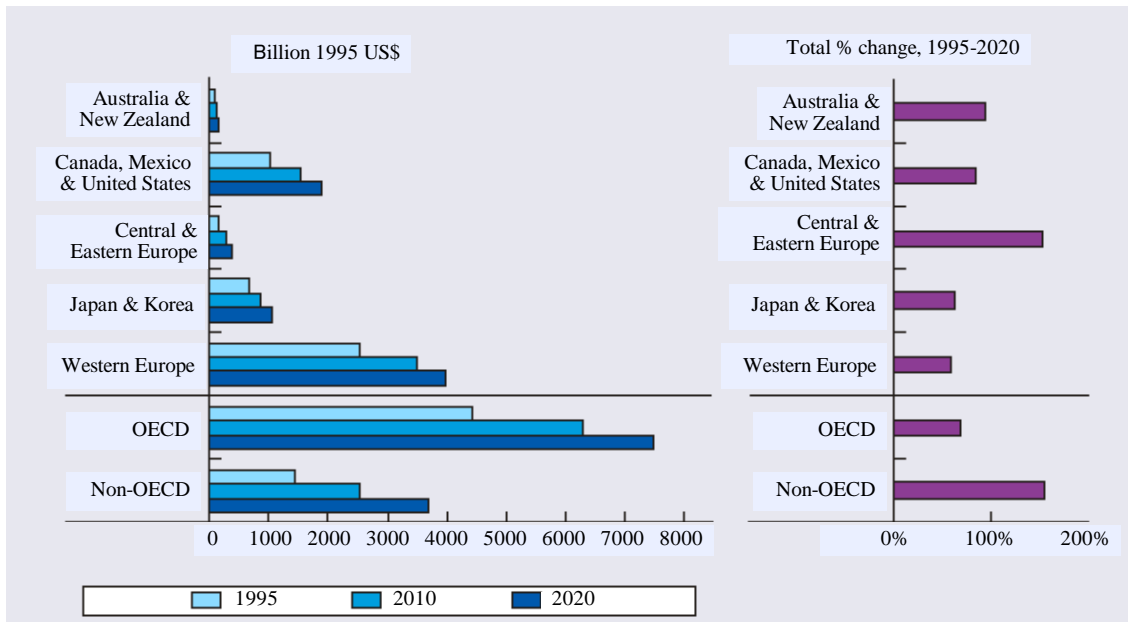
ANNEX 6: OUTLOOK FOR WORLD TRADE

World Exports, Foreign Direct Investment and GDP in Current US\$, 1970-1998



Source: OECD (2001) *OECD Environmental Outlook*.

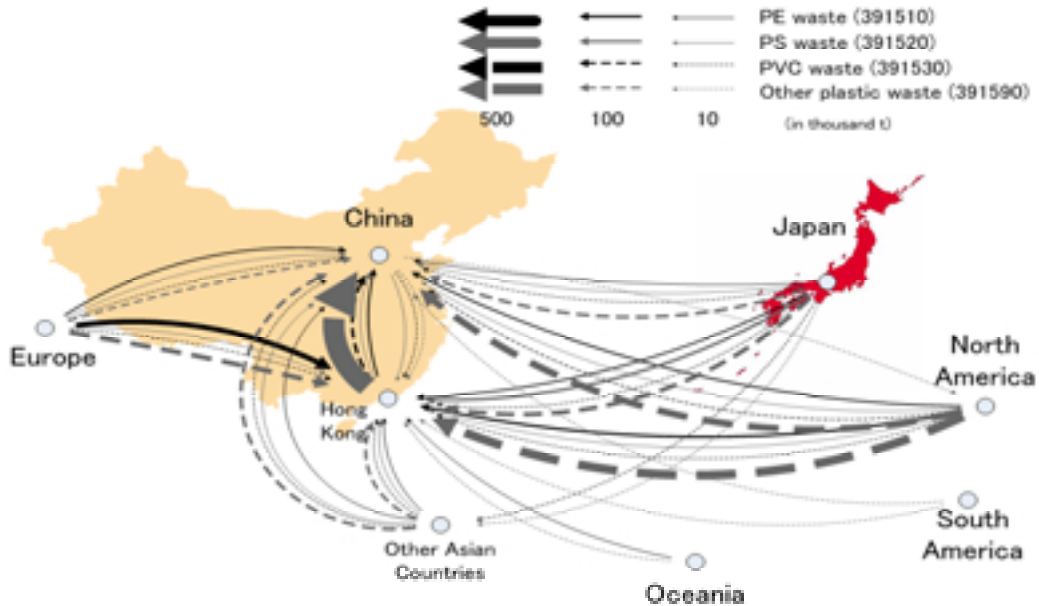
World Exports, 1995-2020



Source: OECD (2001) *OECD Environmental Outlook*.

ANNEX 7: TRANSBOUNDARY MOVEMENT OF RECYCLABLE RESOURCES IN ASIA

Transboundary Movement of Waste Plastics in Asia, 2001



Source: Atsushi Terazono, Aya Yoshida, Jianxin Yang, Yuichi Moriguchi and Shin-ichi Sakai (2004) "Material cycles in Asia: Especially the recycling loop between Japan and China," *Journal of Material Cycles and Waste Management*, 6:82-96

Transboundary Movement of Waste Electric and Electronic Appliances in Asia



Source: Division of Environmental Conventions of UNEP, The Basel Convention, GRID-Arendal and DEWA-Europe (2004) *Vital Waste Graphics*.