

Issues Paper
Senior Officials Meeting on the 3R Initiative
6th-8th March 2006, Tokyo, Japan

22nd February, 2006

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List of Acronyms

3R s	Reduce, Reuse and Recycle
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CEPA	Canadian Environmental Protection Act
CIDA	Canadian International Development Agency
CP	Cleaner Production
DANCED	Danish Cooperation for Environment and Development
ELV	End-of-Life Vehicle
EPR	Extended Producer Responsibility
EU	European Union
E-Waste	Electronic and Electrical Wastes
GIS	Geographical Information System
GTZ	Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
NAFTA	North American Free Trade Agreement
NGOs	Non-governmental Organization
NPOs	Non-Profit Organization
OECD	Organization for Economic Co-operation and Development
RFID	Radio Frequency Identification
SMEs	Small and Medium size Enterprises
TEMM	Tripartite Environment Ministers Meeting among China, Japan and Korea
UK	United Kingdom
UNCRD	United Nations Centre for Regional Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USA	United States of America
US-AEP	The United States – Asia Environmental Partnership
WEEE	Waste electrical and electronic equipment
WTO	World Trade Organization

Introduction

Shift from a Mass Production, Consumption and Disposal Society to a Sound Material-cycle Society

Socioeconomic activities based on mass production, mass consumption and mass disposal expanded in the 20th century, contributing to greater material prosperity. However, this also led to increases in the volume of generated wastes and growing concern over the depletion of natural resources. Global environmental issues such as global warming became prominent as well.

In response to this situation, in June 1992 the United Nations Conference on Environment and Development (the *Earth Summit*) was held in Rio de Janeiro, Brazil. The Rio Declaration on Environment and Development adopted at the Earth Summit proclaims as one of its principles that states should reduce and eliminate unsustainable patterns of production and consumption to achieve sustainable development. Agenda 21 is a specific plan of action, adopted for the implementation of sustainable development. “To control the generation of wastes”, according the Agenda, priorities are “ (a) Encouraging recycling in industrial processes and at the consumed level; (b) Reducing wasteful packaging of products; and (c) Encouraging the introduction of more environmentally sound products”. Important challenges include “(a) Minimising waste; (b) Maximising environmentally sound waste reuse and recycling; (c) Promoting environmentally sound waste disposal and treatment; and (d) Extending waste service coverage ”.

In September 2002, ten years after the Earth Summit, the Plan of Implementation, adopted at the World Summit on Sustainable Development in Johannesburg, South Africa, encouraged all countries to develop a ten-year framework of programmes to accelerate the shift towards sustainable consumption and production.

In order to bring about the sustainable development agreed upon internationally, it is necessary to establish a sound material-cycle society. This is one in which the consumption of natural resources is reduced and environmental impacts are minimised. The key to achieving this lies in the promotion of the 3Rs (i.e. the Reduction of waste generation, Reuse and Recycling of resources and products) in addition to ensuring the environmentally-sound management of wastes.

Background to the Launch of the 3R Initiative

The “3Rs” refers to the reduction of waste, and increased reuse and recycling of resources and products to establish a sound material-cycle society (Figure 1). The 3Rs are closely in line with the spirit of “Mottainai”, a Japanese phrase conveying a sense of regret for something becoming waste without reaching its full utility. Ensuring the environmentally-sound management of waste is a prerequisite for the promotion of the 3Rs.

At the G8 Summit held at Sea Island, Georgia, USA, in June 2004, Japanese Prime Minister Koizumi proposed the 3R Initiative. The Summit adopted the “Science and Technology for Sustainable Development: '3R' Action Plan and Progress on Implementation” as a part of G8 Action Plan (Table 1).

It was decided to officially launch the 3R Initiative at a ministerial meeting to be hosted by the Government of Japan in the spring of 2005, with the purpose of the Initiative being to disseminate 3R activities on a global basis. The 3R Action Plan set forth the following five points to be pursued through the 3R Initiative:

- To promote the 3Rs to the extent economically feasible;
- To reduce barriers to the international flow of goods and materials in relation to recycling and remanufacturing;
- To encourage cooperation among the various stakeholders;
- To promote science and technology for the 3Rs; and
- To promote cooperation between the developed and developing countries in this field.

Ministerial Conference on the 3R Initiative

The Ministerial Conference on the 3R Initiative was held in Tokyo in April 2005, in order to formally launch the 3R Initiative agreed upon at the G8 Sea Island Summit.

The conference discussed the five points to be pursued through the 3R Initiative and recognised the need to further bolster and promote related policies and measures through concerted efforts by the participating countries and organisations. The conference welcomed a proposal by Japan to organise a meeting at the senior official level in Tokyo as a follow-up to the Ministerial Conference, to be held no later than the spring of 2006.

The outcome of the conference was fed into the G8 Summit meeting at Gleneagles in the UK in July 2005. The “Gleneagles Plan of Action - Climate Change, Clean Energy and Sustainable Development” evaluated the 3R Initiative as “an important step towards encouraging more efficient use of resources and materials, which increases economic competitiveness whilst decreasing environmental impacts.”

Aims of the Senior Officials Meeting on the 3R Initiative

The Senior Officials Meeting convenes to discuss issues related to the pursuit of the international implementation of the 3Rs. The exchange will include sharing knowledge of advanced activities from participating countries, communicating future directions of activities between participating countries and organisations, and considering the transboundary movement of 3R-related goods, materials and products.

Composition of this Issues Paper

The five points set forth in the 3R Action Plan include two major challenges of implementation of the 3Rs within each country and the international promotion of the 3Rs such as reduction of barriers to the international flow of 3R-related goods, materials and products. Priority areas for addressing these two challenges are cooperation among the stakeholders, promotion of related science and technology, and international cooperation between the developed and developing countries. Based on this understanding, this Issues Paper is structured as illustrated in Figure 2.

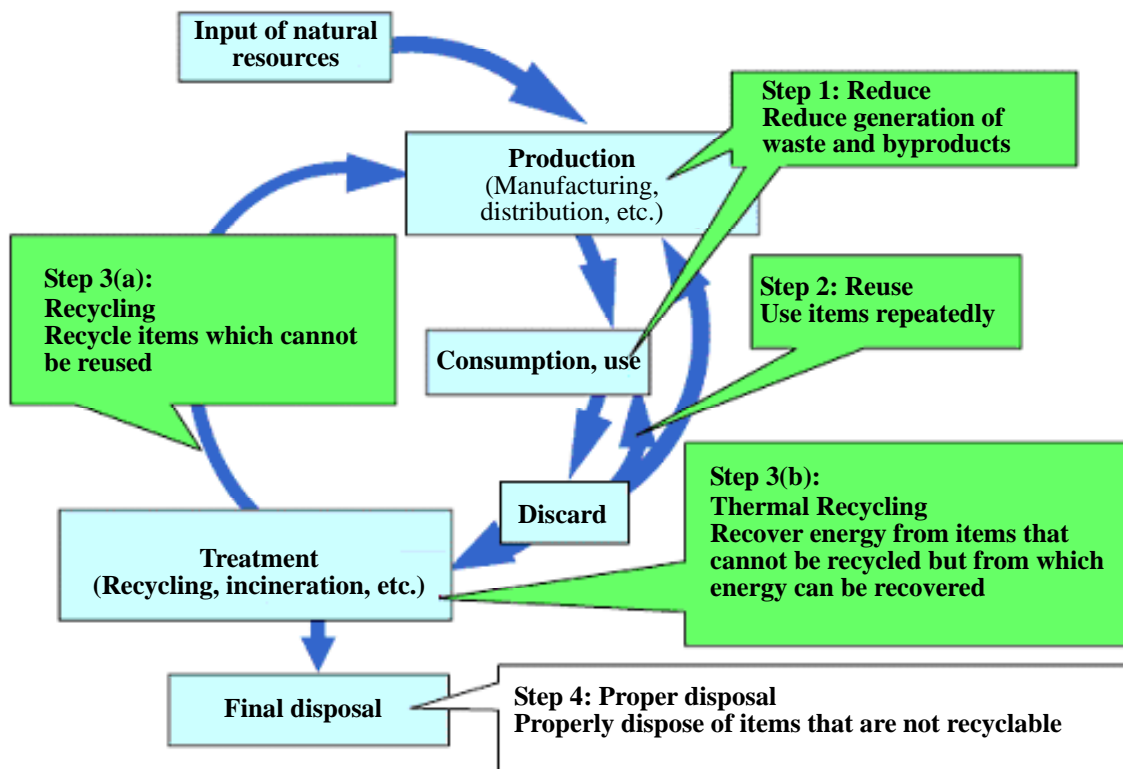


Figure 1 Concept of the 3Rs in a Sound Material-Cycle Society

Table 1 3R Action Plan Adopted at the G8 Sea Island Summit: Science and Technology for Sustainable Development: “3R” Action Plan and Progress on its Implementation

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 organisations 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 the 3Rs; and
- Cooperate with developing countries in such areas as capacity building, raising public awareness, human resources development and the implementation of recycling projects.

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

**Table 2 Gleneagles Plan of Action
Climate Change, Clean Energy and Sustainable Development**

At Evian, we agreed that energy efficiency is a key area for G8 action. And following agreement at the Sea Island Summit in 2004, the 3Rs (Reduce, Reuse, Recycle) initiative was launched in Tokyo this April - an important step towards encouraging the more efficient use of resources and materials, which increases economic competitiveness whilst decreasing environmental impacts.

Source: Gleneagles Plan of Action
Climate Change, Clean Energy and Sustainable Development (July, 2005)

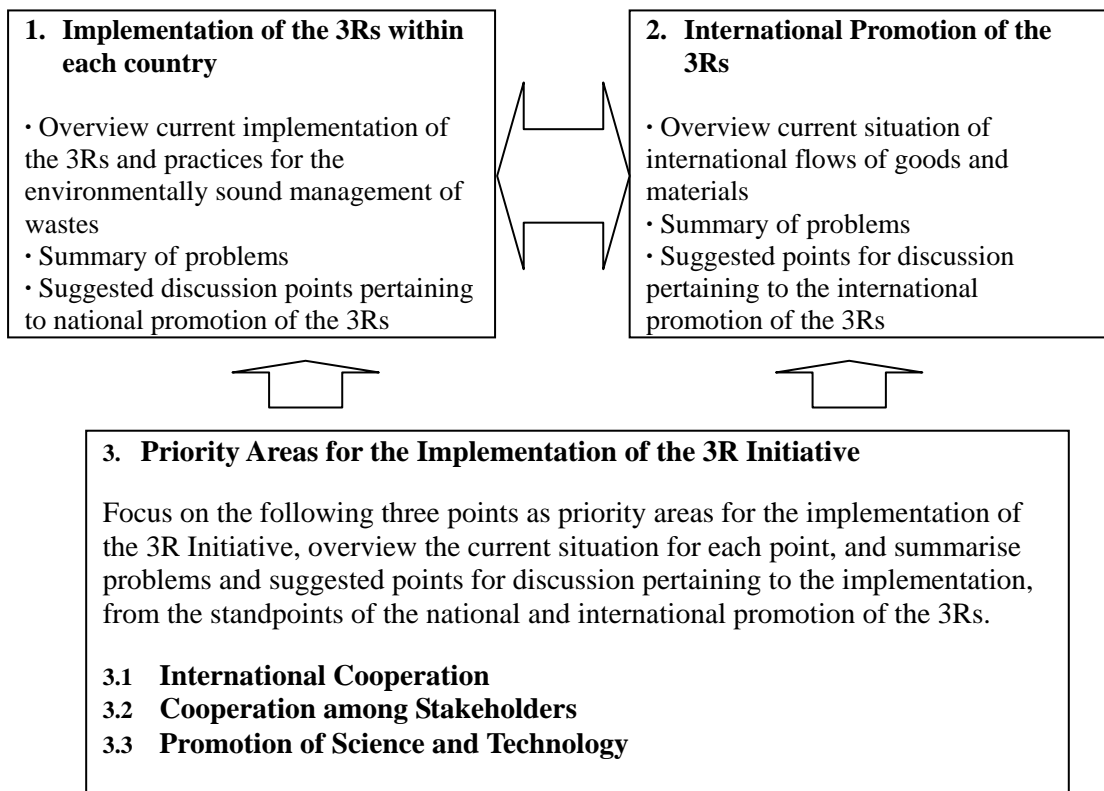


Figure 2 Composition of this Issues Paper

Terms used in this Issues Paper

It is necessary to pay attention to terms and definitions concerning wastes, recyclable resources and hazardous waste, as they vary from country to country. The G8 Action Plan refers to targets for the reduction of barriers to international trade flows in (i) goods and materials for recycling and remanufacturing, and (ii) recycled and remanufactured products, along with cleaner and more efficient technologies. In this Issues Paper, “recyclable resources” refers to (i), while (ii) includes “secondhand goods (products that can be reutilised (reused) in their original form)” and “remanufactured products (goods that have had their performance restored and have had value added from their pre-disposal status after dismantling, washing, testing, parts exchange and/or other processes).” Sometimes, it is important to note the distinction between secondhand goods and remanufactured products. In this Issues Paper, “3R-related goods, materials and products” are used as a generic term for (i) and (ii). In the actual application of laws and conventions, definitions according to the relevant national laws and/or international conventions shall take precedent.

1. Implementation of the 3Rs within each country

1.1 Current Situation

This section summarises the current situation of 3Rs activities in the participating countries, international discussions on sustainable consumption and production, and current situation for the environmentally-sound management of wastes.

1.1.1 Current Situation of 3R Activities in Participating Countries

National legislation on the 3Rs

The status of 3R-related legislation varies, with some countries having established waste management laws incorporating the 3Rs, others with such laws in preparation, and still others having no waste management laws at all (Table 4). Some governments also have standards to promote the sorted collection of waste, standards for the classification of recyclable wastes, recycling targets, and/or other regulations related to the 3Rs (see Table 3).

Current situation of the introduction of EPR in participating countries

Also, the concept of Extended Producer Responsibility (EPR) plays a significant role in promoting 3Rs activities. The institutional development of 3R-related legislation based on the concept of EPR is crucial in implementation of the 3Rs in accordance with the national situation in each country. (see Table 4)

Table 3 National and regional recycling targets

Country	Recycling targets	Target year
Italy	163 kg per capita per year by 2007	Attained in 2002
Japan	Reduce municipal waste generation by 5%; Keep the rate of increase in industrial waste below 12%	2010
	Improve recycling rates for municipal waste from 11% to 24%, and industrial waste from 41% to 47%	2010
	Reduce the amount of landfill treatment by 50% (for both municipal and industrial wastes)	2010
Singapore	Improve the waste recycling rate from 44% to 60%	2012
South Africa	Reduce municipal waste by 30%; Keep the rate of increase in industrial waste to below 10%	2010
	Improve the recycling rate from 10% to 50% (for both municipal and industrial wastes)	2010
	Reduce the amount of landfill treatment by 60% for municipal waste, and 30% for industrial waste	2010
Thailand	Reduce total waste generation by 30%	2009
UK	Improve the rate of recycling/composting of general waste from 25% to 30%, and then to 33%	2010, 2015
	Reduce the amount of landfill treatment by 15%	2005
USA	Reduce municipal waste by 35%	2008
EU	Recycle 60% of packaging waste	2008
	Reuse or recycle 80% of end-of-life vehicles (Recovery rate 85%)	2006
	Reuse or recycle 85% of end-of-life vehicles (Recovery rate 95%)	2006
	Recycle 80% of waste electrical and electronic equipment	2008

Source: 3R Portfolio

Table 4 Examples of national legislation on the 3Rs

	Examples of waste treatment related legislation	Examples of 3Rs-related legislation					Examples of regulations on transboundary movement of recyclable resources	
		Basic Law	Packaging	WEEE	End-of-life vehicle	Others	Waste and recyclable resources	Secondhand goods
Brazil		Introduction of National Solid Waste Policy Bill is underway.						
Canada	(each municipality)	Canada Environmental Protection Act (1999)	(does not exist at federal level)	(does not exist at federal level)	(does not exist at federal level)	(does not exist at federal level)	CEPA1999 Regulation	
China	Sold Waste Law (1995)	Interim Provisions Concerning Certain Questions on the Multipurpose Utilization of Resources (1985), Law on the Promotion of Clean Production(2003) Basic Law on the Promotion of the Development of Circular Economy (to be introduced in 2007)	Provisional Rule for Management of Recycling Packaging Resource (1998)	Under consideration	Under consideration	Administrative Regulation on Scrap Tire Recycle and Utilization(drafting process has started). "China RoHS" (to be introduced in 2006)	Interim Provisions for the Administration of Environmental Protection regarding the Import of Waste Materials(1996)	
France		Waste Disposal and Materials Recovery Law (1975)	Packaging Waste Decree (1993)	WEEE Decree(2005)	ELV Decree (2003)	Battery Decree(1998)	Transfrontier Shipment Regulation (based on Council Regulation No. 259/93 of EU) (1993)	
Germany	Landfill Ordinance (2002), Ordinance on Mine Backfilling(2002) Ordinance on the Prohibition of PCBs and PCTs (2000) etc.	Closed Substance Cycle and Waste Management Act (1996)	Packaging Ordinance (1991)	Act on the Disposal of Information, Office and Communication Technology Equipment (2005)	End-of-Life Vehicle Act (2002)	Battery Ordinance (1998), Ordinance on Bio-Wastes (1998), etc.	Waste Shipment Act (based on Council Regulation No. 259/93 of EU) (1994)	
India	HW Rules (1989, 2003)							
Indonesia	Government Regulation concerning Hazardous and Toxic Waste Management (1994)						Government Regulation concerning Hazardous and Toxic Waste Management (1994) Decree of Head of Environment Impact Management Agency (1995)	Decision of Minister of Indonesia and Trade (regulation of Import of Used Car and Bus)
Italy		The Ronchi Decree	The Ronchi Decree	WEEE Directive (2005)	ELV Directive (2003)		Based on Council Regulation No. 259/93 of EU	
Japan	Waste Disposal and Public Cleansing Law (1970)	Basic Law for Establishing the Recycling-Based Society (2000), Law for the Promotion of Effective Utilities of Resources (1991)	Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (1995)	Law for Recycling of Specified Kinds of Home Appliances (1998)	End-of-life Vehicle Recycling Law (2002)	Construction Waste Recycling Law (2000) Food Recycling Law (2000)	Law for the Control of Export Import and Others of Specified Hazardous Wastes and Other Wasted (1992) Waste Disposal and Public Cleansing Law (1970)	

	Examples of waste treatment related legislation	Examples of 3Rs-related legislation					Examples of regulations on transboundary movement of recyclable resources	
		Basic law	Packaging	WEEE	End-of-life vehicle	Others	Waste and recyclable resources	Secondhand goods
Malaysia	Environmental Quality (Scheduled Wastes) Regulations (1989)						Customs (Prohibition of Export) Order (1998) Customs (Prohibition of Import) Order (1998)	
Mexico		General Law for the Prevention and Integral Management of wastes (2004)						
Philippines	Ecological Solid Waste Management Act (2001) Toxic Substances and Hazardous and Nuclear Waste Control Act (1990)						Toxic Substances and Hazardous and Nuclear Waste Control Act (1990) Republic Act 4653 (1996)	
Republic of Korea	Waste Management Law (1986)	Act on the Promotion of Saving and Recycling of Resources (1992)	Ordinance on the Standards of Packaging Methods and Material (1993)	Regulation on Home appliances recycling (1993)	Under consideration	Regulation on Food Recycling (2003) Act on the Promotion of Construction Waste Recycling(2003) Act on the Promotion of Green Product Purchase(2004)	Act Relating to the Transboundary Movement of Waste and its Disposal (1995)	
Russia	Health Regulations governing the Definition of Safety Cassettes of Toxic Industrial and Consumer Waste etc.	Federal Law No 89-FZ on Industrial and Consumer Waste (1998)						
Singapore	Environmental (Public Health) Act (1969)						Hazardous Waste (Control of Export, Import and Transit) Act(1998)	
South Africa	National Environmental Management Act (1998)							
Thailand	Factory Act(1992)						Hazardous Substance Act (1992)	Regulation to Import Used Electrical Appliances and Electronics Equipments (2003)
UK		Environmental Law (1995) Waste and Emissions Trading Act (2003)	Packaging Waste Regulations (1997, 2003)	WEEE Regulations to be introduced	ELV Regulations (2003)	Battery Regulations to be introduced	The Transfrontier Shipment of Waste Regulations (based on Council Regulation No. 259/93 of EU)	
USA	(each state level)	Resource Conservation and Recovery Act (1976, 1984)	(does not exist at federal level)	(does not exist at federal level)	(does not exist at federal level)	(does not exist at federal level)		
Vietnam	Environmental Protection Law (1994) Regulation on Hazardous Waste Management (1999)						Decision of Ministry of Science, Technology and Environment (2001)	Decision of Ministry of Science, Technology and Environment (2001)
EU	Council Directive 75/442/EEC on Waste (1975) Landfill Directive1999/31/EC(1999) Waste Incineration Directive 2000/76/EC(2000)	Council Directive 75/442/EEC on Waste (1975)	Directive 94/62/EC on Packaging and Packaging Waste (1994)	WEEE Directive 2002/96/EC (2002)	ELV Directive 2000/53/EC(2000)	Battery Directive91/157/EEC (1991)	Council Regulation (EEC) No 259/93 (1993)	

Activities for the promotion of the 3Rs

Typical activities for the promotion of the 3Rs include: green purchasing, eco-labels, environmental evaluation of urban systems, industrial ecology-based policies, public awareness programs, national plans for waste reduction/avoidance, environmental education, provision of 3R information through the Internet and other media, provision of seminars and workshops, and the inclusion of local communities into 3R activities. In some cases, the central government provides financial assistance to local governments and municipalities to support local promotion of 3R activities.

Supporting organisations

Some countries have instituted organisations for the implementation of the 3Rs. Specific public-private organisations include: joint public-private organisations for cleaner production (CP), establishment of CP centers, strategic CP committees, establishment of CP partnership funds, environmental partnerships (offering incentive for manufacturing plants), and national waste summit meetings. Related initiatives by private organisations (e.g. NGOs) include the establishment of the Singaporean Waste Management and Recycling Association.

1.1.2 International discussions on the 3Rs

The promotion of sustainable consumption and production patterns has much in common with 3R activities in many countries. The Johannesburg Plan of Implementation suggests activities to promote sustainable consumption and production patterns, and encourages all countries to develop a ten-year framework of programmes to accelerate the shift towards sustainable consumption and production.

To promote this ten-year framework, two sessions of the International Experts Meeting have been held. At the Second International Experts Meeting (Costa Rica, September 2005), the following challenges were mentioned in the promotion of sustainable consumption and production:

- Securing the financial resources needed for waste management;
- Enhanced delegation of responsibilities from national to local authorities;
- Improved awareness of waste issues, establishment of a legislative framework, and financial incentives, based on political will, leadership and ownership as the three key conditions for successful waste management; and
- Environmentally-sound treatment of end-of-life vehicles.

Implementation of the 3Rs at a regional level has been discussed in the several occasions recently. Under the framework of the Tripartite Environment Ministers Meeting among China, Japan and Korea (TEMM), in September 2005, the State Environmental Protection Administration of China (SEPA) organized the “Symposium on Circular Society/ Economy” in Beijing, China. Also, at the 7th Tripartite Environment Ministers Meeting (TEMM) held in Seoul, Korea, it was agreed to organise seminar series and workshops on Circular Society/ Economy and the 3Rs in turn among the three countries. Based on this agreement, “China-Korea-Japan Tripartite Seminar on Circular Society/ Circular Economy/ the 3Rs” will be held in February 2006.

Also, in October 2005, the International Conference on “Circular economy and 3R strategy-It’s good for the economy, it’s good for the environment” was co-organized to discuss importance of Circular Economy and the 3Rs by OECD and Ministry for Environment & Territory of Italy.

1.1.3 Current Situation of the Environmentally-sound Management of Waste

Environmentally-sound management of waste is a prerequisite for the implementation of the 3Rs, and related policies must be prioritised, since some developing countries do not have appropriate systems for such management.

In particular, countries share the issues related to organic (i.e. food and plant-based) waste, medical waste, electronic electrical waste (E-waste), and end-of-life vehicles (see Table 5).

Table 5 Examples of common waste problems shared among countries

Organic waste

Although some developed countries have introduced policy measures to promote composting and methane fermentation as the main recycling methods for organic waste, the majority of countries continue to landfill such waste, sometimes after volume reduction and stabilisation via incineration, or directly landfilled without incineration.

Medical waste

While incineration, autoclaving and/or other heat treatments are applied to medical waste in developed countries, most developing countries reclaim it together with other wastes without treatment. This entails a significant risk of infection on the part of the operators during recovery, transportation, loading/unloading, and reclamation processes. There are also concerns over the health of waste pickers, who earn their living from waste yards and landfill sites, as well as broader health impacts via the spread of infectious diseases.

Electronic and electrical wastes (E-waste)

At present, there are cases where E-waste is transferred across national borders to be used as secondhand goods for recycling. This occurs as a consequence of waste transfers following market principles. However, informal recycling practices (i.e. open burning, acid extraction) as well as hazardous substances contained in E-waste sometimes cause environmental problems in the recipient country. In countries with restrictions on the importation of secondhand goods, applicable products are sometimes imported under the classification of “recyclable resources (goods and materials for recycling and remanufacturing).” Unless the retrieval of valuable resources and the management of residues are performed appropriately in such importing countries, this may result in health hazards to the operators, as well as environmental pollution.

End-of-life vehicles

End-of-life vehicles contain lead, mercury and other hazardous substances in their parts, waste oil, other fluids and catalysts. Therefore, inappropriate dismantling of end-of-life vehicles entails the risk of causing environmental pollution.

1.2 Requirements

1.2.1 Establishing legislation and targets for the promotion of the 3Rs

To promote the 3Rs it is necessary to consolidate various relevant legislations. Many developed countries have become aware of the significance of extended producer responsibility (EPR) and have enacted applicable laws and regulations. It is important to transfer this concept to developing countries in accordance with socio-economic situation of each country. The setting of recycling or similar targets is also an effective means.

1.2.2 Overcoming barriers to the promotion of the 3Rs

Major barriers to the promotion of the 3Rs include:

- Difficulties in financing due to the low priority given to 3R policies;
- General indifference to the 3Rs in society;
- Lack of information and technology;
- Lack of human resources and the required organisations in central and local governments; and
- Economic problems such as the high cost of recycled products.

These difficulties are common to many countries. It is therefore necessary to share information among the relevant countries on cases where these difficulties have been overcome and the reasons for their success. It is also necessary to examine solutions through international cooperation.

1.2.3 Environmentally-sound management of wastes and its integration with the 3Rs

The environmentally-sound management of wastes is a prerequisite for the promotion of the 3Rs. However, it is possible to integrate the 3Rs and the environmentally-sound management of wastes. For example, when it is integrated with 3Rs activities, environmentally-sound management of organic waste and E-waste can be implemented efficiently. Among the countries facing common difficulties in achieving the environmentally-sound management of wastes, it is effective to share good practices, past experiences and the reasons for their success and failure. It is also necessary to examine solutions through international cooperation.

1.3 Suggested Points for Discussion

- Can the essence of good practices be identified so that the key factors leading to success are singled out?
- Can good practices be transferred to other countries? What could be possible obstacles, and how can we overcome them?
- What legislation has been adopted for the promotion of the 3Rs? How far is the Extended Producer Responsibility applied in each country?
- What difficulties do countries share in the pursuit of the environmentally-sound management of wastes? What is required to overcome these difficulties? How should the 3Rs be fed back to the environmentally-sound management of wastes?

2. International Promotion of the 3Rs: International Flow of 3R-related Goods, Materials and Products

2.1 Current Situation

At the Ministerial Conference on the 3R Initiative, discussions were held on the reduction of barriers to the international flow of (i) goods and materials for recycling and remanufacturing, and (ii) recycled and remanufactured products. As context for giving attention to international 3R-related flows, note that increasing international trade enabled by globalisation of production and consumption causes rapidly growing volumes of international flows of goods, materials and products. At the same time, in developing countries, there is growing concern over difficulties to treat increasing wastes such as E-waste.

The volume of the transboundary movement of hazardous wastes throughout the world soared from approximately 3 million tons in 1993 to 16 million tons in 2001. (Source: Website of the Secretariat of the Basel Convention: See Figure 4) In particular, it is observed that imports and exports of recyclable resources (goods and materials for recycling and remanufacturing) are increasing in Asia (See Table 6 and 7).

With regards to reduction of barriers to the international flow of 3R-related goods, materials and products, along with cleaner and more efficient technologies, some take the standpoint of active promotion, based on the perspective of free trade. Others take a more negative stance, emphasising the importance of environmental protection.

At the Ministerial Conference on the 3R Initiative, developed countries by and large expressed interest in the reduction of barriers to international flows of 3R-related goods, materials and products, along transfer of cleaner and more efficient technologies. Some developed countries presented their view that the active use of remanufactured products and the reduction of barriers to their trade would contribute to the 3Rs at a global level. For example, some pointed out remanufactured products (goods that have had their performance restored and have had value added from their pre-disposal status after dismantling, washing, testing, parts exchange and/or other processes) should be separated from secondhand goods for favored treatment in tariffs and non-tariff barriers. It was also pointed out that development of a list of environmental goods and services under the WTO Doha Mandate would be an important task from the viewpoint of promoting free trade. At the Ministerial Conference on the 3R Initiative, the existence of high tariff rates and non-tariff barriers for 3R-related goods, materials and products was emphasized. On the other hand, many developing countries were apprehensive that the reduction of barriers to such international flows could lead to importation of wastes into their countries, leading to becoming a dumping group for waste. They also expressed concern over the quality and usable lifespan of recycled and remanufactured products. At the same time, some emphasized on compliance with the Basel Convention and ratification of the Basel Ban Amendment.



Source: Reprint from website of Secretariat of the Basel Convention

Figure 4 Transboundary movements of hazardous waste among Parties to the Basel Convention

Table 6 Exports and Trade balance (exports - imports) of recyclable resources in major Asian countries and regions in 2003 (triangles denote negative numbers)

(one thousand tons)

	Japan		Korea		China		Taiwan		Philippine		Thai		Malaysia		Indonesia		India	
	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance	Total export	Trade balance
Plastic	681	678	82	76	30	2996	137	74	25	17	59	58	60	33	19	15	3	50
Paper	1970	1853	158	1168	1	9381	15	1106	7	367	3	1095	1	228	17	1997	1	1437
Iron	5719	5515	307	5906	3	9290	118	3058	494	475	117	1162	294	4824	37	927	30	2337
Copper	307	186	94	59	7	3157	75	5	20	11	54	50	471	253	22	19	5	82
Aluminum	69	44	1	174	11	647	59	56	20	18	17	5	31	n.r.	13	8	1	101
Lead	12	10	0	0.4	0.1	0.1	0	0	0.5	0.5	0.6	0.6	0.3	0.3	0	0.7	0.3	37.0

Source: Kojima (2005), based on trade statistics from each country

Note: n.r. = not reported Although there was a record of imports of large amount of aluminum scrap from Philippines into Malaysia, it doesn't match with the data from Philippine side.

Table 7 Import of recyclable resources in major Asian countries and regions in 1990 and 2003

(one thousand tons)

	Japan		Korea		China		Taiwan		Philippine		Thai		Malaysia		Indonesia		India	
	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003
Plastic	3	2	15	6	24	3024	0	63	23	8	0.8	0.8	17	27	28	4	13	53
Paper	634	117	1486	1326	423	9382	1807	1121	252	374	214	1098	10	229	462	2014	385	1438
Iron	1047	204	3876	6213	183	9293	2563	3176	64	19	1101	1279	734	5136	946	964	3152	2367
Copper	117	121	287	153	21	3162	15	80	0	31	2	4	2	218	1	3	80	87
Aluminum	340	113	39	175	5	653	70	115	0.6	2	2	22	4	n.r.	0.1	5	7	101
Lead	1.1	0.0	47.0	0.4	5.0	0.0	34.0	0.0	15.0	0.0	7.0	0.0	4.0	0.0	35.0	0.7	7.0	37.0

Source: Kojima (2005), based on data from trade statistics of each country

Note 1: n.r. = not reported See comment above

Note 2: The data of 1990 of India is from April 1990 to March 1991

There are large companies utilising recycled parts and byproducts from manufacturing processes in their business, which represent an example of international flow of 3R-related goods, materials and products. Companies sometimes give up their efforts to implement such measures in their supply chain covering two or more countries due to differences in the regulatory definitions or other related issues in the relevant countries.

2.2 Requirements

Major requirements enabling international flows of 3R-related goods, materials and products can be summarised into the following two issues; “reduction of barriers to international flows while ensuring environmental protection” and “clarification of categories”.

2.2.1 Reducing barriers to international flows and ensuring environmental conservation

It is necessary to take into account both opportunities and risks and examine how to harmonise the reduction of barriers to such international flows while ensuring environmental protection. Specific challenges include:

a. Ensuring the domestic management of wastes and enhancing the capacity for environmentally sound management

The Ministerial Conference on the 3R Initiative emphasised that, in principle, the control of waste generation should be implemented within the generating country. Therefore, it is necessary to ensure the domestic management of wastes, and to develop the appropriate capacities for sound management. It is also important to develop the recycling industry and to introduce economic incentives. Furthermore, if appropriate management of residuals from the 3Rs is difficult within a country, regional and inter-regional cooperation should be examined.

b. Relationship to extended producer responsibility (EPR)

Extended producer responsibility (EPR) is effective as a policy tool to promote the 3Rs within a country. However, the international flow of goods and products should be examined from a different viewpoint, since the producers and the consumers are located in different countries. Furthermore, if exported products and secondhand goods are illegally dumped as wastes at the end of their use in other countries, even if the producer bears no legal responsibility, the firm’s reputation will suffer, representing a risk to competitiveness.

c. Ensuring traceability and establishing certification systems

Under the free trade mechanism, there are increasing voluntary regulation/standards in the management of logistics. Specific methods include the use of manifestos, the attachment of product/material data sheets, and the certification of excellent companies with effective management systems. There should be an examination of how to make use of such activities in the control of transboundary movements of 3R-related goods, materials and products.

2.2.2 Clarifying the categories

Definitions of 3R-related goods, materials and products vary from country to country. As an example of a problem that can arise from these differences, note there are cases when articles categorised as valueless resources in some countries may be classified as valuable resources in others. There may be differences between interpretations of the Basel Convention and other international rules, as well as the scope of national restrictions with regards to hazardous wastes. Also, the classification of wastes, secondhand goods and recyclable wastes is sometimes difficult. For example, the term E-waste may denote secondhand home appliances, those to be recovered as material resources, or to be reused through parts retrieval. In reality, complex elements intertwine in the above classification. For example, since the Basel Convention does not apply to secondhand goods, recyclable wastes containing hazardous substances are sometimes exported under the pretense that they are secondhand goods, despite their actual intended use as materials for resources recovery. It is therefore necessary to identify the categories for the classification of 3R-related goods, materials and products. Where such a classification is difficult, it is necessary to develop and disseminate mechanisms for identification and tracking purposes, including guidelines, coding systems and traceability systems.

2.3 Suggested Points for Discussion

- Can we identify and analyse concrete cases where either environmental integrity or free trade is jeopardised by the flow of 3R-related goods, materials and products?
- Can we identify measures to enhance the positive effects and mitigate the negative effects accompanied with the international trade of 3R-related goods, materials and products?
- At the international level, how should we efficiently coordinate criteria distinguishing between those goods which will be regulated or not with respect to 3R related international flows?

3. Priority Areas for the Implementation of the 3R Initiative

This section addresses how to make progress towards the priority issues raised in Section 1 on implementation of the 3Rs within each country and Section 2 on International Promotion of the 3Rs. Priority areas to put effort into are 1) international cooperation, 2) cooperation among stakeholders, and 3) the promotion of science and technology. These three areas are discussed in terms of; i) the current situation and trends , ii) concrete measures needed to improve the situation, and iii) suggested points for discussion.

3.1 International Cooperation

3.1.1 Current Situation

The listing in Table 8 of examples of international cooperation activities reveals the following :

International cooperation concerning the development of national 3Rs strategies has begun in some countries such as Vietnam and Indonesia with the support of the UNCRD. Some of the international cooperation projects for promoting the environmentally-sound management of wastes also include “Recycle” in their scope.

Examples of international cooperation integrating environmentally-sound management of wastes and “Recycle

- A project called the “Solid Waste Bank” has been developed in Thailand with the assistance of CIDA to manage and sell recyclable wastes collected by community members working together, returning the profits on sales to the members. Such methods are also considered beneficial from the viewpoint of employment generation.
- Information centres have been established in Philippines with the assistance of Canada and United States to exchange information on generated recyclable wastes and available recyclers.

International cooperation is also underway for introducing Cleaner Production, which contributes to the improvement of “Reduce” in the production phase. Many countries are engaged in the establishment of National Cleaner Production Centres and related programmes with assistance from UNIDO, UNEP and other international aid agencies. As an example of the international cooperation to mitigate environmental impacts of transboundary movements and ensuing improper treatment of hazardous wastes, projects have been initiated under the leadership of the Secretariat of the Basel Convention which focus on specific products such as end-of-use lead-acid batteries and mobile phones.

Table 8 Examples of International Cooperation Activities relating to the 3Rs

Country	National legal framework, Policy, Strategy	Information sharing, Training, Public Awareness	Pilot Project			
			Reduce	Recycling		
				Economic incentives	Informational method	Others
Brazil			National Cleaner Production Center (UNIDO/UNEP)			
China	Studies on “Legal Framework for the Circular Economy in China” and “Policies and Regulations for Promoting Development of Circular Economy in China” (Italy, World Bank)	Establishing an Environmentally Sound Technology Transfer Center (ADB) Green Aid Plan (Japan)	ADB Technical Assistance Cluster: Promotion of Clean Technology (ADB) National Cleaner Production Center (UNIDO/UNEP)			
India		Green Aid Plan (Japan)	National Cleaner Production Center (UNIDO/UNEP)			
Indonesia	3R National Strategy Formulation (UNCRD)	Green Aid Plan (Japan)	ProduksiH Project (GTZ)	Industrial Efficiency and Pollution Control Project (Germany)	Waste-to-Product Partnership Program (US-AEP)	Tsunami Waste Management Programme (UNDP)
Malaysia		Green Aid Plan (Japan)				
Mexico			National Cleaner Production Center (UNIDO/UNEP)			
Philippines		Green Aid Plan (Japan)	Industrial Environmental Management Project (US-AID)		Industrial Waste Exchange Program (Canada, US-AEP)	Private Sector Participation in Managing the Environment (UNDP)
Thailand	Construction and Demolition Waste Management System (GTZ) Packaging Waste Project (GTZ)	Green Aid Plan (Japan)	Promotion of Cleaner Technology in Thai Industries (DANCED)	Solid Waste Bank (CIDA)		Green Manufacturing Technical Assistance Program (Japan) Fluorescent Lamp Partnership Program (Japan)
Viet Nam	3R National Strategy Formulation (UNCRD)	Green Aid Plan (Japan) Viet Nam- Canada Environment Project (CIDA)	National Cleaner Production Center (UNIDO/UNEP)	Making Waste Work for the Economy (CIDA)		Source Separation and composting of Municipal Waste (AusAID)

Source: UNCRD Website

3.1.2 Concrete Measures

In planning and formulating international cooperation projects related to the 3Rs, it is important to consider the needs of recipient countries. For example, trend of international cooperation on the 3Rs and the needs assessment survey conducted by the UNCRD in 2004 covering over ten Asian countries suggest that international cooperation in the following six points would be effective. In developing actual projects, it should be also noted that country-driven and issue-specific approaches are taken into account, as the Ministerial Conference pointed out. Also, to enhance capabilities lacking in developing countries, in addition to capacity building approaches such as technology transfer and training, it is also important to emphasise capacity development, which aims to foster indigenous capacity to deal with 3R-related challenges.

a. International cooperation to implement the 3Rs within each country

Collection and dissemination of information, and awareness raising

For international promotion of the 3Rs, it is highly beneficial to share national experiences and good practices. In many countries the primary interest in waste control policies is for the environmentally-sound management of waste. For this reason the 3Rs are not sufficiently embodied in policies or promoted. To build social understanding and raise public awareness of the 3Rs, it is effective, to provide evidence and basic statistics showing that that “Reduce”, “Reuse” and “Recycle” help waste management. In schools curricula, it is helpful to incorporate the “Mottainai” concept as the core philosophy of the 3Rs as well as introducing specific activities.

International cooperation should be also promoted for the management of transboundary movements of 3R-related goods, materials and products, by the regionally and globally coordinated efforts of information collection and management to track such transfers.

Support for the establishment of national legislation, strategy and policies

As the Ministerial Conference pointed out, a systematic approach by administrative bodies is important for the promotion of the 3Rs in countries. Therefore, international cooperation in the establishment of a clear legal framework, national strategies and policies should be of high priority.

Implementation of pilot projects

Pilot projects will play a beneficial role in raising awareness of 3Rs policies, and in enhancing implementation capacities.

Examples of typical pilot projects

- Introduction of economic incentives;
- Transfer of clean technologies, for instance, using regional centres ;
- centres to exchange recycling-related information and other schemes to promote the distribution and exchange of 3R-related information (e.g. on eco labels)
- Implementation of organic waste composting and other projects with 3R effects, in order to raise public awareness, especially in developing countries;
- Implementing environmentally-sound management of medical waste, heavy metal and/or

- other hazardous wastes;
- Constructing information systems to track transboundary movements of 3R-related goods, materials and products; and
- Training and technology transfer, to ensure environmentally-sound export/import, transfer, storage, and treatment of 3R-related goods, materials and products.

b. Sharing experiences on the promotion of the 3Rs

It is beneficial to share the experiences of countries that have overcome various obstacles in the promotion of the 3Rs and the environmentally-sound management of waste. It is necessary to make full use of their accumulated knowledge, both successes and failures. In the sharing of experience, the breadth and long-term aspects of effects of the 3Rs should be communicated.

Broad and long-term effects of the 3Rs

- The 3Rs trigger a positive cycle of environmental protection and economic development, thereby contributing to the alleviation of poverty, more efficient production, and other aspects of economic growth required in developing countries; and that
- The 3Rs help the promotion of environmentally-sound management of wastes, with resulting reductions in water/soil pollution and other environmental problems, thereby providing grounds for sustainable development in developing countries.

c. Roles of international organisations in the international cooperation

In the international cooperation between a developed country and a developing country, it is sometimes more effective to proceed in a multilateral or region-wide programme, instead of a bilateral one. In such cases, international organisations can serve as operators or coordinators of the programme. International financial institutions may be able to bolster their assistance in funding projects related to the 3Rs promotion and the environmentally-sound management of waste. Through such roles, international organisation can contribute to promoting cooperation between developed to developing countries on a region-wide and strategic basis.

d. International cooperation through alliance with other policies

In international cooperation for the promotion of the 3Rs in developing countries, it is important to ensure alliances with other major policies and measures such as poverty alleviation, developmental policies and environmental policies. Many major policies have close relationship with the 3Rs, such as the ties between the promotion of the recycling industry and developmental policies; 3R policies and the urban informal sector engaged in recycling activities; 3Rs policies and water/oil pollution, as well as connections with global environmental issues. Many international cooperation projects have been carried out in these other areas. Therefore, it will be mutually beneficial for 3R-related international cooperation to ensure alliance with such existing schemes and programmes of international cooperation as necessary.

e. International cooperation to promote environmentally-sound international trade

Environmental problems pertaining to the transboundary movement of 3R-related goods, materials and products are either caused by a lack of capacity in the recipient country in environmentally-sound waste management or by improper export such as trade in non-recyclables falsely labelled as recyclables. Therefore, international cooperation in this

area shall comprise measures to enhance processing capacity in the recipient countries and efforts to track the flows of 3R-related goods, materials and products followed with establishment of efficient systems to stop improper trade.

f. International cooperation for the environmentally-sound management of wastes

In many developing countries, enhancement of environmentally-sound management of wastes is still a great challenge. For example, the 3Rs activities and environmentally-sound management can be integrated in the case of organic waste and E-waste. International cooperation is required to help the improvement in environmentally-sound management, and the treatment of residuals from the 3Rs.

3.1.3 Suggested Points for Discussion

a. Points for discussion on the promotion of the 3Rs within countries

- How can we accelerate the ongoing progress in international cooperation on the 3Rs?
- How best can countries with expertise in the 3Rs and the environmentally-sound management of waste contribute to international cooperation?
- What do we expect of international organisations in promoting the 3Rs in developing countries?
- How do we integrate our focus on the 3Rs into other areas of international cooperation, such as poverty alleviation and climate change?

b. Points for discussion on international 3R promotion

- How can international cooperation address environmental concerns associated with international flows of 3R-related goods, materials and products?
- What kind of international cooperation can be developed to help developing countries with the treatment of residuals from the 3Rs?
- Is it possible to develop common goals and directions for developed countries and developing countries for region-wide promotion of the 3Rs and environmentally-sound management of wastes?

3.2 Cooperation among Stakeholders

3.2.1 Current Situation

For the current situation of cooperation among the stakeholders to promote the 3Rs, the following points can be summarised from the 3R portfolios:

a. Measures to promote cooperation between related entities

Major stakeholders in the promotion of the 3Rs include the central government, local governments, private sector entities, NGOs/NPOs, and local communities. The roles of stakeholders are summarised in Table 9.

Table 9 Roles of stakeholders

Stakeholder	Role
Central governments	Includes setting broad policy goals and targets for the implementation of the 3Rs, and promotion of 3R-related policy measures. In developing countries, the introduction of 3R-related policy measures is often of lower priority.
Local governments	Includes coordination among stakeholders, with typical activities as follows: <ul style="list-style-type: none">- Support for small and medium-sized enterprises;- Formulation of a sound material-cycle community, based on an integrated recycling industry;- Stimulation of the recycling market through green purchasing; and- Improvement and promotion of informal sectors, through such measures as the integration of waste pickers.
Private sector	Execution of 3R activities on the basis of extended producer responsibility (EPR), development of innovative technologies to promote the 3Rs, increased investment in 3R-related capacity, and providing relevant product information
Local communities	Participation in 3R activities (such as recovery and recycling of wastes), and participation in the decision-making process of government
NGO	Implementation of 3R activities, awareness raising (such as dissemination of recycling technology information by NPOs), and monitoring of actions taken by the private and public sectors

b. The promotion of environmental education and information sharing

To promote cooperation among stakeholders for the 3Rs, important factors include capacity building for each entity through environmental education and enhanced collaboration through information sharing. Examples of environmental education include classes at public primary schools, as well as non-public activities such as awareness raising campaigns through mass media and NGOs. Concrete examples of information sharing activities include the sharing of technology and pollutant information, as well as eco-label systems for products.

c. Networks relating to transboundary movement of 3R-related goods, materials and products

Many multinational companies have already established a global network to recover, remanufacture and reuse their products. Also, the import/export procedures concerning the transboundary movement of hazardous wastes are stipulated by the Basel Convention, in which 162 countries and 1 agency (European Community) participate (as of September 2004).

3.2.2 Concrete Measures

The following measures will be possible to further promote the cooperation among stakeholders with relation to the 3Rs:

a. Enhancing collaboration among stakeholders

Activities in the industrial sector

The industrial sector has undertaken 3R-related activities with an eye to improve environmental business management and resource productivity. The further development of these activities, such as cleaner production measures as well as projects based on the concepts of industrial ecology or zero emissions, such as eco-industrial parks and zero-waste plants, is desirable. In particular, Japan and other countries have introduced advanced initiatives such as “eco-town,” which pursues increased environmental efficiency through collaboration between different industries. Another important drive for the promotion of the 3Rs can be the utilisation of environmental technology and industrial infrastructure owned by the heavy and chemical industry sector, which has overcome the past pollution problems.

Partnership in local communities

Local governments are able to promote environmentally-sound management and sorted collection of waste through developing partnership with local communities. In developing countries, the status and perspective on the 3Rs varies greatly between urban and rural areas. Urban municipalities are equipped with necessary systems and human resources, yet face increasing amount and types of waste due to rapid urbanisation and economic growth. On the other hand, rural areas are short of such systems and human resources.

b. Improving informal sectors

In developing countries, informal sectors may play a significant role in the recycling process. They also provide job opportunities and income sources to the poor. In developing countries, measures such as organising such sectors into corporations and shifting their employment to public recycling centres can be taken to improve conditions while ensuring employment as well as continuation of recycling activities.

c. Promoting information sharing and environmental education

To lead cooperation among stakeholders to a success, it is necessary to establish mechanisms for human resource development and information sharing. In developed countries, diverse information is available through the Internet and mass media. On the other hand, such an information infrastructure is not yet established in developing countries, except for some

urban areas. Therefore, environmental and health education should play a significant role in the awareness raising of local governments and communities.

d. Cooperation among stakeholders to realise sound transboundary movements of 3R-related goods, materials and products, in terms of environmental conservation

To realise sound transboundary movement of 3R-related goods, materials and products, in terms of environmental conservation, it is necessary to share information between exporting and importing countries. Information categories to be shared include: data on waste management systems of the relevant countries, a list of recycling industries conducting proper treatment, and information on markets for secondhand goods and recyclable resources.

It is also important to establish a network linking national governments in order to control improper imports and exports. Related mechanisms for information sharing and collaborative control shall be required as well. In addition to such administrative efforts, it will be also beneficial to establish international networks among NGOs and citizens' groups, thereby monitoring the environmental soundness of transboundary movements of 3R-related goods, materials and products.

e. Environmentally sound international distribution of 3R-related goods, materials and products

Promoting technology transfer related to the 3Rs and the environmentally-sound management, as well as accelerating investment in treatment facilities in developing countries is expected by utilizing a global network of supply chains established by multinational corporations. In such cases, cooperation shall be required between the multinational companies operating overseas, and the stakeholders in the recipient countries (e.g. local companies and communities).

3.2.3 Suggested Points for Discussion

a. Points for discussion on the 3R promotion in countries

- How can central and local governments, the private sector and NGOs work together to promote the 3Rs?
- In promoting the 3Rs in developing countries, how do we perceive the role of the informal sector, and how can we strengthen its role, if necessary, in promoting the 3Rs?
- How can information sharing and environmental education contribute to the cooperation among stakeholders?

b. Points for discussion on the international 3R promotion

- Regarding the international flow of 3R-related goods, materials and products, how can stakeholders cooperate to prevent illegal trade?
- How can we perceive the role of multinational companies in the international trade of 3R-related goods, materials and products?

3.3 Promotion of Science and Technology

3.3.1 Current Situation

The Ministerial Conference on the 3R Initiative pointed out that the development of technologies that are suitable for the 3Rs is an urgent priority. 3R-related technologies can be categorised into i) recycling-related, ii) eco-design, and iii) new technologies (see Table 10). To address short-term problems, the application and dissemination of existing technologies for recycling and eco-design is effective, while more advanced environmentally-conscious design technologies and totally new technologies are expected to be developed and applied to solve medium-term and long-term issues. The Ministerial Conference on the 3R Initiative also pointed out the importance of certain measures, such as establishment of 3R research networks, clean technology centres, technology exhibition, and databases of good practices and available technologies. Also important are financial incentives for 3R-related research on the development and application of technologies.

Table 10 Details and characteristics of 3R-related technologies

Recycling-related technologies

(Technologies for the minimisation, recycling, recovery and treatment of wastes)

This category includes specific recycling technologies for specific wastes and waste products that combine several elemental technologies and comprehensive system technologies. These are applied to the recycling and remanufacturing of multiple types of wastes and waste products in joint treatment facilities or recycling centres established with public assistance.

Many of these technologies are labour-intensive and relatively low-cost. In particular, the promotion of the 3Rs in developing countries usually requires basic technologies to enable volume reduction and the sorted treatment of wastes, including “shredding, screening, washing, drying, dehydrating” and/or other basic technologies. Prior to the use of such technologies, the sorted collection of recyclable wastes and other general wastes is required.

Eco-design technologies

Eco-design technologies include those that enable reduction in materials, production technology of easily recyclable materials, product design technologies that facilitate reuse of products easily by upgrading performance, and manufacturing technologies for easier disassembly. The latter deals with separation and screening of products to enable reuse and recycle, and relate to industrial processes with minimal waste generation and a low level of hazard, such as cleaner production and clean technologies. In most cases, they are developed by individual manufacturers, and apply to their in-house processes and specific products. To make use of such technologies, the payment of license fees is usually required. Cleaner production and eco-friendly design technologies have been developed and are applied in most developed countries and some developing countries. However, the level of commitment varies according to the company.

New technologies

New technologies include biotechnology, nanotechnology and information technology. Application of these technologies is expected to result in new kinds of proposals for technological systems promoting the 3Rs.

The development of technologies that meet the requirements for the 3Rs will contribute not only to environmental conservation goals, but also to the development of latent demand and competitiveness in societies. Also, one can imagine that there will be value creation, improvements in industrial efficiency, and enhanced innovation.

3.3.2 Concrete Measures

The following measures are important for the promotion of research and development, as well as for its application in relation to 3R-related science and technology:

a. Promoting 3R-related science and technology through collaboration between the industrial, academic and public sectors

For the promotion of science and technology for the 3Rs, cooperation between the industrial sector, public research institutions, universities, governmental agencies and other related entities is essential. From this perspective, it is important to establish mechanisms to integrate related industrial and academic facilities, as well as combining industrial and environmental policies that ensures cooperation between the stakeholders. Such mechanisms will be particularly useful in the development and dissemination of eco-design technologies and new technologies, which tend to be relatively costly. There must also be an examination of how to incorporate small and medium-sized enterprises and to promote collaboration between SMEs through such mechanisms.

Also, it is similarly important for public research institutions and universities to engage in active research and technology development for the 3Rs, and make their technologies available for dissemination. However, it should be noted that license and patents for 3R-related technologies should be protected to appropriately stimulate innovative approaches from researchers and engineers.

b. Applying appropriate technologies in accordance with the national situation

Finding solutions is not only about advanced technologies developed in rich countries. Sharing process and experiences relevant to the particular situation in different countries is also important. The environmentally-sound application of 3R technologies calls for, as a prerequisite, ensuring the sorted collection of general waste and the environmentally-sound management of wastes.

c. Developing and disseminating technologies and systems to ensure environmentally sound flows of 3R-related goods, materials and products

To ensure environmentally-sound resource recycling, it is necessary to develop technologies and systems for the appropriate identification and screening of 3R-related goods, materials and products. Such technologies and systems can be a combination of identification coding, product labelling, systems for the certification of recyclers, materials databases (of hazardous contents and other information), IC tag system (RFID), geographic information systems (GIS), and/or other information technologies. To ensure the satisfactory performance of these technologies and systems, concerted efforts in the international community are required to provide the framework for information sharing and coordination between certification standards. NAFTA's Environmental Cooperation Committee, for example, is examining the application of such systems to the tracking of the transboundary movement of hazardous wastes.

d. Accumulating scientific knowledge beneficial to the sound international flow of resources

At the Ministerial Conference on the 3R Initiative, many developing countries emphasised their lack of capacity in the area of recycling and in their ability to distinguish regulated hazardous wastes. To deal with this, usable technologies/methods to assess toxicity and risk should be developed. These technologies, along with accumulation and sharing of international experience should contribute to better realisation of sound international 3R-related flows. Another approach for international cooperation on the 3Rs in developing countries is utilisation of environmental technology and industrial infrastructure owned by the heavy and chemical industry sector in developed countries, which has overcome past pollution problems.

3.3.3 Suggested Points for Discussion

a. Points for discussion in Working Group I

- Can we identify measures to disseminate 3R-related science and technology?
- Can we identify concrete obstacles that prevent countries from disseminating appropriate technologies in accordance with national situation? What effective solutions can be applied?

b. Points for discussion in Working Group II

- How can we promote technological and systems development to secure environmentally-sound flows of 3R-related goods, materials and products?
- What scientific knowledge is considered necessary to secure the environmentally-sound international flow of 3R-related goods, materials and products? How can we accumulate such scientific knowledge?

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