Toward a Sustainable Asia
Based on the 3Rs

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Working Group on Enhancing International Recycling,
Waste Prevention and Recycling Sub-committee
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4.4 Policies for Building Appropriate Cross-border Recycling Systems in the Asian Region

(Reference Material) 3R Initiative
Foreword

Japan has been making active efforts to construct a recycling-oriented society by establishing appropriate laws. They include the Law for Promotion of Utilization of Recycled Resources in 1991 (revised and renamed to Law for Promotion of Effective Utilization of Resources in 2000), Basic Law for Promoting the Creation of a Recycling-Oriented Society in 2000 and other recycling related laws and regulations. As a result of the continuous efforts so far made in relation to recycling and waste disposal, our legislative system has become one of the most developed among nations. Waste disposal capabilities of the domestic recycle businesses have been improved greatly and problem-solving expertise and a large amount of know-how has been accumulated.

Preventing environmental pollution by effective utilization of resources and appropriate waste treatment is a task, not only in Japan but worldwide through promotion of the 3Rs. (Reduction of waste generation, Reuse of parts, and Recycling of used products as raw materials). Based on such awareness, Japan proposed “3R Initiative” at the Sea Islands Summit of the Eight held in June 2004. For a nation such as Japan that is in the midst of creating a world-level recycling-oriented economic society, it is significant to take the initiative in promoting 3R-related activities from the point of view of the contribution to the international community and national interests of the country, where natural resources are limited. The prime purpose of this document is to propose the creation of a “Sustainable Asia based on the 3Rs” in concert with the Asian nations under rapid economic growth, having close economic relation with Japan.

The important point to note is that the promotion of the 3Rs and the appropriate waste treatment are two sides of the same coin. The harmonious coexistence of these activities is an important task not only for Japan but also for other nations. In particular, among those developing countries, there is a risk that recycling activities without appropriate waste treatment/disposal methods and know-how may cause of environment pollution. Thus, the emphasis throughout this document is on the harmonious coexistence of effective resource utilization and environmental pollution prevention.

The Working Group on Enhancing International Recycling, Waste Prevention and Recycling Sub-committee, Industrial Structure Council/METI, since its establishment in May 2004, has intensive discussions on international resource recycling issues. This paper presents a compilation of the results obtained through the discussions over 5 months.

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1. The Status Quo of Cross-border Recycling

1.1 The Status Quo of Trans-boundary movement of Recyclable Materials

1.1.1 Export & import trend of recyclable material

The consumption of natural resources in the Asian nations under rapid economic growth has increased rapidly in the recent years. In China, for example, the apparent crude steel consumption amount in 1993 was about 126 million tons, but the amount in 2002 almost doubled to about 224 million tons. Also the consumption of aluminum and copper, as well as petrochemicals such as ethylene and propylene, has shown a sharp increase.

In response to brisk demand for resources, the import amounts of recyclable materials including ferrous metal scrap and recycled paper in Asian nations are growing rapidly. In China, for example, the import of scrap iron in 2003 jumped to the amount of 9.29 million tons from 3.34 million tons in 1999, and that of recycle paper in 2003 reached to 9.38 million tons from 2.52 million tons in 1999. The amount of recyclable material such as used plastic, scrap iron, copper and aluminum, and used paper exported from Japan also shows a sharp upturn trend. It, therefore, can be seen that the export to China is especially significant.

There is an international treaty that controls trans-boundary movements of recyclable materials, namely, the “Basel Convention (Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal).” The convention restricts the movement of “hazardous wastes,” which require certain treatment for disposing. Considering the amount of import and export of the restricted hazardous wastes, it is limited as compared with the ones of other recyclable materials such as waste plastic, and scrap iron and copper. Japan exports about 800 to 6,500 tons, in a year, of the items including used Ni-Cd batteries and scrap lead to those countries most of which are OECD member nations such as Korea and Belgium. On the other hand, some 800 to 8,700 tons of materials restricted by the Basel Convention, such as silver and copper-laden sludge scrap, lead, used electronic parts and others are yearly imported into Japan from ASEAN countries and OECD member nations.

1.1.2 Improper trans-boundary waste movements

Waste, in general, in the absence of an appropriate waste management system, tends to find itself through inexpensive channels of distribution or treatment following the present system of economy. However, problems relating to waste disposal should not be recognized only from the viewpoint of the cost for treatment, but close attention to the environment and the

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1 Also refer to the related sections in the following reference materials
3 Definitions of “Resource” in Various Laws and Regulations
7 Items Listed in the Basel Convention Imported into Japan
10 Resource Production and Demand Movements by Nation
11 Situations of Recyclable Import by Nation
12 Movements of Japan’s Recyclable Resource Export Amount
14 Items Listed in the Basel Convention Exported from Japan

2 The word “recyclable resource” in this document means “circulatory usable resource” and differs from the Japanese legal term of “recyclable resource” (Example: Section 3, Article 2 of the Basic Law for Promoting the Creation of a Recycling-oriented Society - “In this law, “recyclable resource” means a usable waste”.

3 Also refer to the related sections in the following reference materials
15 Report on Improper Waste Disposal Cases of China
16 Report on Illegal Export Cases of Japanese Enterprises
concerned nations should be paid, because the improper trans-boundary waste movement may affect to the environment and the relationship among those countries. In particular, channels of waste movements tend to be created from a developed nation to a developing nation, according to the present system of the economy that may meet strong opposition from developing nations concerned about environmental pollution.

In fact, many cases of improper trans-boundary waste movement were reported in the past. As for a case that Japan was partly concerned, there was the case of illegal medical waste exports to the Philippines that was revealed in 1999. The international society has worked hard toward the prevention of such improper cross-border hazardous waste movements from developed nations to developing nations. Consequently, Basel Convention was adopted in 1989 and took effect in 1992.

In May 2004, China took a measure of import ban against waste plastics from Japan in response to the fact that banned foreign matter stipulated in the Chinese law was found mixed in the shipped waste plastics from certain companies of waste disposal services in Japan. As this case clearly shows, improper waste exports may interrupts the existing sound channel of recyclable materials and affect the entire current Japanese recycling system.

1.1.3 Globalization of industry – tasks

As the globalization of the economy moves forward, globalization of industry has been accelerated, and under such circumstances, Japan and the Asian nations, which have close economical relationship and are in geographically close, have been making up a new network that can be called “Globalization of Production Network in East Asia.” Within the frame of this new network, China is expected to become a “final assembly nation” and other nations in the East Asian region are expected to work as “suppliers of components.”

Effective utilization of recyclable flint glass (CRT glass cullet) used in CRTs has become an important task. For example, CRT-base TV sets, which Japan no longer manufactures (reduction of production at domestic CRT glass manufacturers are also expected), 3.5 million sets of CRT-base TV sets are being collected in a year according to the rules of Home Appliance Recycling Law of Japan. CRT glass cullet can be resources of high quality, and the reuse of molten glass cullet, instead of manufacturing CRT glass from virgin raw material, can greatly save resource consumption. As for CRT glass cullet, those of which fluorescent coating removed, is currently not classified as a hazardous waste under the domestic law based on the Basel Convention (Law for Import/Export Control of Hazardous Wastes) since May 2004. Concerned economic groups are now developing the means to utilize the glass cullet in overseas factories under the guidelines of its own. This case suggests that the idea

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4 In 1983, there was a case that hazardous wastes stored in an agricultural chemicals plant in Seveso in Italy were found in France and this incident became a diplomatic issue between the Koko Port of Nigeria in 1988.

5 In 1999, it was revealed that an industrial waste disposal company located in Tochigi Prefecture exported medical wastes to the Philippines falsifying the cargo inspection report, which said, “Used Paper for Recycling: 80% and Plastics: 20%.” However, they were in reality injectors, oxygen cylinders, used diapers, bandage and other medical wastes. Some 2,160 tons of wastes unloaded were recovered by the Japanese Government in December 1999 upon request by the Philippines Government for violation of the Basel Convention.

6 Also refer to the related section in the following reference materials.

18 CRT Glass Cullet Recycling Status and Problems

of recycling resources, in other words, reusing resources collected from the consumption stage in the manufacturing stage, cannot be figured as a thing within a small closed domestic environment.

1.1.4 Difficulties in grasping the reality

Although cross-border recyclable resource movements exert a great influence upon the structure of the recycling system in Japan, statistics on such movements is limited and covering merely a few recyclable items. In Japan, 3-digit tariff codes are combined with HS numbers\(^8\) allotted to articles classified according to the “International Treaty on Unified Article Description and Classification,” and the combined codes are used as statistical item numbers. However, just a few recyclable resources such as scrap iron and used paper have HS numbers, which makes it possible to collect the statistical data only of these items. Besides, in some cases, the tasks for classification at customs offices allocate several HS numbers to a recyclable material and this causes disparities in records between importing and exporting parties. Therefore, keeping track records in the entire process of the recyclable resources movement is difficult at present.

1.1.5 Application and trend in Basel Convention\(^9\)

As it has been discussed in the above, Basel Convention has concluded as an international treaty to control trans-boundary movements of hazardous wastes and this convention includes a specific clause of authorization for a hazardous waste movement, when a party intends to export hazardous wastes, the party shall give a prior notice to the other party and shall receive a consent regarding the acceptance of such wastes. Some nations of the member of Basel Convention have so far arranged laws and regulations of their own by following the spirit of the convention. Moreover, there are some differences of interpretation on articles of Basel Convention among those nations. For this reason, in the light of Basel Convention, some nations may determine some items acceptable, even if other nations consider the same items unacceptable, and those nations finally reject to accept concerned wastes.

In addition, in the case of hazardous waste movements from any Asian nation to Japan, there is a criticism that obtaining an approval from the local Basel Authority is time-consuming. With regard to the procedure, in some cases, even the preparation of the documents can be some efforts for companies that would intend to obtain the approval by the local Basel Authority.

Draft of revised Basel Convention has been currently adopted, once it takes effect, hazardous waste movements into developing nations will totally be prohibited. This should affect to the recycling system in Japan. It would, accordingly, be necessary to pay close attention to this series of event.

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\(^8\) HS is an abbreviation of “Harmonized Commodity Description and Coding System.”

\(^9\) Also refer to the related section of the following reference materials.

8. Wastes Import/Export Procedure

1.2 Policies in Asian countries for constructing a sustainable society based on the 3RS

1.2.1 General remarks

In recent years in Asian nations, waste related problems are becoming increasingly serious with the rapid economic growth. The amount of industrial waste from factories has been increasing rapidly as well as the industrial activities. In China, for example, the amount of industrial waste jumped to 950 million tons in 2002 from about 660 million tons in 1996, while the amount of solid waste in Malaysia doubled to about 6.3 million tons in 2000 from 3 million tons according to the record in 1996. Moreover, due to the improvement of the living standards in those countries and economic growth, the waste amount of durable consumption goods including household electric appliances has been on the rise. For example, in China, 182 million household electrical appliances are manufactured and 28 million sets are yearly disposed.

Against this backdrop, proper waste disposal and waste recycling issues are attracting keen interest among the Asian nations. Laws and regulations in relation to waste disposal are well established in most of the nations in the Asian region. In addition, local laws and regulations, which control trans-boundary movements of hazardous wastes, have been established in connection with the ratification of the Basel Convention. In this trend, the Republic of Korea and Taiwan have adopted necessary legislation and the situation has progressed. However, the adequate recycling system under a legal framework has not been developed in other Asian nations except China and Thailand, which have already started discussion on this issue.

In several Asian nations where labor costs are less expensive, manual disassembling and sorting can partly be operated. In this sense, the quality of recycling may be more advanced in comparison with Japan, however, some environment pollution due to the absence of adequate environmental protection measures have been reported at the same time. Regarding the lead storage battery recycling program in a nation in the Southeast Asian region, 98% of lead in a battery can be collected in a well-equipped factory while only 40% can be collected in a small-scale home refinery. Small-size recycling plants without highly developed system are often seen in the Asian region and those factories are likely to cause environmental pollution. In such countries, environmental protection measures should come first rather than promoting effective utilization measures of recyclable resources.

In spite of a recycling system is smoothly adopted in a nation, it cannot be ensured that if the system is recommended to other nations. The system would, however, entail difficulties, because each nation has its unique historical and social background. In several nations, there may be the cases of which many second-hand products collected from big cities are reused in rural districts, or circulating channels are well established by a great number of import dealers of small size due to lack of powerful manufacturing enterprises. There are other cases of that the recycling industry is not well developed and fundamental facilities necessary for recycling wastes while ensuring adequate waste disposal. Therefore, it is important to tailor a legislative recycling system according to their specific needs.

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10 Also refer to the report prepared by Kojima, a committee member.
1.2.2 China

China’s resource consumption amount is increasing with its rapid economic growth, and a pressing need for China is effective resource utilization. The China’s recent economic development also improved the standard of living and durable consumption goods such as household electric appliances, which are now widely available in the country. Waste disposal is expected to become another pressing issue. In response to the needs, positive actions are being taken on the government level to create a sustainable society. In 1995, China promulgated “Solid Waste Environment Pollution Prevention Act” to regulate solid waste management, legislative system, waste collection, storage, transport and disposal. Furthermore, “The People’s Republic of China – Cleaner Production Act” came into operation starting from January 2003 to work toward the goal of cleaner production and to improve resource utilization efficiency.

In addition, manual disassembling and separating are operated in China due to low labor costs, for instance, separating the coat from copper wire in recycling waste electric cables, which is not operated much in Japan. However, there is a report warning that recycling of waste articles requiring more complex treatment, such as scrap substrate, may cause environmental pollution due to the lack of adequate environment conservation techniques. To cope with that, the government plans to strengthen infrastructures indispensable for proper waste treatment and recycling by building industrial parks. The recycle industry of Japan, in harmony with such movements in China, is now pushing ahead with waste disposal activities in China by taking advantage of technical skills for environment conservation gained through experiences.

1.2.3 ASEAN countries

Landfill has long been the major waste disposal method adopted in many ASEAN nations. Either of waste reduction by incineration or preliminary treatment, could have been adopted by concerning public health, was not common in the past. However, several actions are now starting towards the creation of a sustainable society. In Malaysia where currently over 90% of waste is disposed by landfill, the government set up a recycling program to improve its recycling rate (including heat recovery) up to 22% from the current rate of 5% or less by 2020.

Some nations in the ASEAN region, second-hand shops, private waste collectors and various small businesses support waste management, in other words, each nation operates waste management in a manner based on their own social background and economic system.

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11 Also refer to the related section of the following reference materials.

20-1 Status Quo of Recycling in China
20-2 Status Quo of Recycling in Singapore
6 The Present Condition of the Thai & Malaysian Waste Dealers
20-6 Status Quo of Recycling in Malaysia
20-7 Status Quo of Recycling in Thailand
20-8 Status Quo of Recycling in Indonesia
20-9 Status Quo of Recycling in the Philippines
20-10 Status Quo of Recycling in Vietnam
1.2.4 Other countries and regions

The Republic of Korea has been pushing ahead with its unique waste disposal and recycling measures including the gross waste amount control measure (charges according to amount of waste), the use of disposable goods (the use of disposable containers at restaurants and giveaway plastic bags at stores/shops of a certain scale or larger), reduction and recycling of left-over food, and other programs. Korea promulgated “Resource Economization and Recycle Promotion Act” in 1992 and it was later drastically revised and enforced in 2002.

Taiwan has adopted legislations relating to waste disposal and collection. In 2002, the nation has laid down “Resource Collection and Reuse Act” which regulates reusing and recycling of resources comprehensively.

1.3 Policies in Japan for Constructing a Sustainable Society based on the 3Rs

1.3.1 Trends in Japan for constructing a sustainable society based on the 3Rs

Japan has been making active efforts to construct a recycling-oriented society based on the 3Rs - reduction, reuse, and recycling - and established laws accordingly. They include the Law for Promotion of Utilization of Recycled Resources in 1991, Basic Law for Promoting the Creation of a Recycling-Oriented Society in 2000 and several other recycling related laws and regulations.

In connection to the development of world’s leading legislative system waste disposal capabilities of the domestic recycling businesses have been improved greatly. Nowadays, not only waste disposal businesses that have engaged in the recycling industry conventionally but also businesses from the cement, non-ferrous metal, iron and steel, and chemical industries are among those actively participating in the recycling industry. As a consequence, high-level recycling activities are underway by utilizing conventionally accumulated waste disposal technologies and other innovative technologies that the raw material and manufacturing industries have developed. Some non-ferrous companies started a new business to produce metal of the same quality as raw ore. Also, by capitalizing their unique technologies in separating useful metal from ore, and some other companies, by utilizing their exhaust gas and liquid waste processing technologies, they are contributing to hazardous material elimination and adequate waste disposal operation enabling hard-to-dispose wastes disposal.

With the globalization of the economy, cross-border recycling is becoming increasingly important for Japan in the process of establishing its recycling system. However, shifting the waste disposal and recycling activities, so far handled domestically to overseas countries, may trigger environmental pollution due to possible improper cross-boarder waste movements. There is also a danger that recycling resource acceptance may be stopped due to a drastic change of policies in other countries. Therefore, it is dangerous to let wastes flow freely according to the present economic trends.

13 Also refer to the related section of the following reference materials.

20-3 Status Quo of Recycling in South Korea
20-4 Status Quo of Recycling in Taiwan
1.3.2 Emerging trends in the Japanese business sector

(a) Eco-friendly activities in the overseas branches\textsuperscript{14}

In response to the recent environmental sensitivity in Japan, the number of companies working to enhance their brand images through environmental conservation activities has increased, and many companies are actively promoting “zero-emission” and “waste and recycling governance”\textsuperscript{15}. For a company to remain competitive in today’s society, it is critical that it remains sensitive to environmental pollution issues. Under such circumstances, companies are required to differentiate programs from other competitors and demonstrate the advantages of such programs.

In light of such current movements, Japanese companies have overseas branches start environment conscious programs. Some of them have already started programs to improve recycling rate.

It is critical for companies operating overseas branches to meet local environmental requirements and to avoid an infringement of local laws that damages their brand images. However, it is often difficult for overseas branches to obtain up-to-date information relating to each nation’s waste disposal and recycling related laws and regulations. Even though they are aware of the local laws and regulations, the local waste disposal or recycling industry may not be well developed or well-equipped waste and recycling facilities may not be available locally, and companies face difficulties in disposing and recycling wastes. In a survey of Japanese-controlled firms in the Asian region (Japanese leading companies’ overseas branches) by Kyushu Prefectural Economy, Trade and Industry Bureau, 42.4% of the respondents said that “recycle-related technologies are less developed and related information is limited” and 39.5% said that “information on waste treatment businesses is limited.”

(b) Japanese waste management and recycling industry operating in Asia\textsuperscript{16}

To meet the demand from Japan-based companies for adequate waste treatment and recycle, several Japanese firms in the field of waste disposal and recycling are starting businesses overseas. In connection to the development of environmental laws, number of foreign-invested companies and governmental support in China, a Japanese non-ferrous metal company established a joint venture in Jiangsu Province of China where

\textsuperscript{14} Also refer to the related section of the following reference materials.

5 Recyclable Resources which are difficult to dispose and recycle for the Japanese Companies Operating in the Asian Region

21 Waste Disposal and Recycling Challenges of the Japanese Companies intending to start Businesses in the Asian Region

\textsuperscript{15} “Waste Disposal, Recycling Governance” represents a concept that businesses producing wastes must rigidly manage and dispose of their own wastes by building up an adequate internal waste disposal and recycling system or by building up an adequate waste disposal and recycling system applicable to their vendors and source manufacturers. For further details about this concept, refer to the “Guidelines for Waste Treatment and Recycling (by Commodity/Business)” prepared by the Working Group on Enhancing International Recycling, Waste Prevention and Recycling Sub-committee, Industrial Structure Council (September 2004).

\textsuperscript{16} Also refer to the report prepared by Watanabe and . Nakajima, committee members, and refer to the related sections of the following reference materials.

25 Problems for the Japanese Waste Disposal Companies intending to start Businesses in the Asian Region
there have been keen demands from Japanese companies for adequate recycling and waste disposal. The company now plans to initiate a precious metal recovery business starting from fall of 2004. In addition, some Japanese electronic component recycling companies has announced that they will start a business of disassembling and recycling domestically pre-processed component in China.

(c) **International reuse/recycle network**\textsuperscript{17}

There is also an effort to extend domestic reuse and recycle activities over the Asian region. Several photo-copy machine manufacturers that have been doing high-level reuse and recycling activities to recover parts from copy machines collected and/or to recover plastic components upon disassembling machines are going to establish overseas branches. Also, some of them intend to start recovery, reuse and recycling businesses on the same scale as in Asia.

(d) **Promoting eco-friendly activities in the stages of design and manufacturing of products**\textsuperscript{18}

Some international companies are trying to design and manufacture products that yield less waste after end-of-life under a unified management system to decrease adverse effect on environment. One example is that an electric machinery manufacture has introduced new soldering techniques eliminating the use of lead to their factories world-wide and, at the same time, is now constructing databases on the contents of chemicals and the accurate locations where it is used. The company, through such positive actions, has been challenging to minimize the use of hazardous substances from the design and manufacturing stages and to avoid environment pollution risks by used products.

2. **The Basic Direction and Perspective**

2.1 **Fundamental Issues on Cross-border Recycling**

In order to realize the sustainable development globally, it is important to disseminate the measures taken in Japan to create a sustainable society on a world scale through international cooperation and by creating a global partnership. Another important point is to create a global partnership between the major industrialized nations including the G8. Moreover, Japan, having a close economic relation with the rapid growth in the Asian region, should take strong initiative in the region in economizing on the use of recyclable resources and in developing a sustainable society.

In the Asian region, in order to reduce resource consumption while maintaining economic growth structural shift towards a sustainable society, as well as improving resource recycling efficiency by adopting innovative techniques and introducing new technologies are important objectives. However, possible environment pollution under the slogan of the 3Rs-based sustainable society construction activities should be avoided by any means. As the ultimate goal for parties concerned is to prevent environmental pollution throughout Asia, finding solutions to the current serious waste disposal problem and taking proper measures to prevent

\textsuperscript{17} Also refer to the report prepared by Mr. Sakai, a committee member, and refer to the related section of the following reference materials.

**22 Cross-border Resource Recycling Activities by Japanese Companies**

\textsuperscript{18} Also refer to the report prepared by Otsuru, a committee member
environment pollution due to inadequate waste disposal and recycling are of extreme importance.

In conclusion, addressing two large problems at the same time, namely 1) how to eradicate improper waste disposal in waste management and recycling (pollution issue) and 2) how to enhance effective utilization of resources (resource utilization issue), will become very important in tackling international resource recycling issues. The two issues should be dealt with the conviction that protecting the environment is the basic principle in enhancing resource utilization.

(i) How to eradicate improper waste disposal in waste management and recycling (pollution issue)

(ii) How to enhance effective utilization of resources (resource utilization)

2.2 The Basic Direction and Perspective

There are many types of wastes and they can be grouped according to physical properties, but the definition of waste differs from nation to nation depending on each nation’s technology level and cultural backgrounds. For this reason, transferring one recycling system functioning well in a nation to another nation may sometimes end in failure. When constructing a highly sustainable society, tailoring a system to each nation’s specific needs, taking into consideration their industrial structure and/or distribution channels of each nation, is necessary.

Also, pushing forward recyclable resource effective utilization measures hastily will sometimes cause environmental pollution, for many Asian nations do not have adequate waste treatment and disposal technologies at this stage. To start the steps toward the creation of a sustainable society in Asia it is essential to set long-term, mid-term and long-term tasks and implement then while closely monitoring each nation’s progress.

Especially in the case of an organizing program of resource recycling network within the Asian region, taking the necessary steps one by one with a good grasp of each nation’s development stage is quite important. In view of the realities in the Asian nations, very basic and steady measures toward building a sustainable society should be introduced.

Our suggestions, based upon the points so far discussed, are as follows:

(a) Action based on the efforts in each nation

In order to start a highly advanced resource recycling network within the Asian region, it is a precondition that an adequate waste disposal system as well as traceability, and is already in place in each country. However, the development level of each nation varies greatly at this stage. It is, therefore, important to adopt necessary measures one by one steadily for the organization of a highly advanced resource recycling network.

To begin the first steps toward such a sustainable society, concentrating each nation’s efforts into infrastructural projects, in partnership with other related nations, is essential.
(b) Creation of reliable international waste distribution system and proper waste management and recycling system (pursuit of economic growth while ensuring environmental conservation)

Environmental pollution in the name of effective resource utilization should be avoided by all means, and it is necessary to maintain the principle that environmental pollution prevention is an absolute precondition to effective utilization of recyclable resource based on the 3Rs.

This principle is not only for recycling-oriented society construction but also trans-boundary recyclable resources movements. It should strictly be followed in order not to cause environmental pollution within the nation accepting recyclable wastes. In order to assure this, recyclable resource movements and recycling have to be carried out based upon a positive and reliable schemes or systems.

(c) Consistency between the legislation of each nation’s and the importance of information exchange

Legislative system relating to the activities based upon the 3Rs will sometimes exert influence upon manufacturing and distribution systems. In particular, the measures to be taken in the upstream stages including designing and manufacturing stages can exert influence upon international trading trends. Therefore, international harmonization of each nation’s waste disposal and recycling laws is of utmost importance for the related parties. Variation in legislative system from nation to nation will cause great inconvenience to industries and businesses and may further invite inefficiency in manufacturing and distribution stages.

Furthermore, strengthening the bond of trust between the nations concerned and constructing schemes necessary to ensure compatibility between recyclable resource effective utilization and environment pollution protection is also very important. To that end, each nation is requested to learn from experiences and to accumulate knowledge in relation to proper cross-boarder recyclable resource movements, and is required to exchange information closely toward international harmonious legislative systems.

In addition to the above mentioned fundamental requirements are to be satisfied at the nation level important measures to be taken by other parties concerned. This will be detailed in the following section.

(d) Enhancing the activities of the businesses sector

Japanese companies operating overseas are capable of contributing to constructing sustainable societies throughout Asia, through providing the nations with the waste related expertise, technologies and know-how of their own. In return, those Japanese companies will be able to improve their brand images in the Asian nations with increasing variety of consumer needs, if they contribute to the construction of sustainable societies.
In the process of developing recycling related legislative system in Japan, Japanese companies played a key role before the various laws and regulations have taken root deep in Japan. When they are able to share such schemes with the Asian nations on-a-private-level, or at the government-level, it will work quite well in the smooth operation of legislative systems in the Asian nations toward the establishment of sustainable societies. In order to do so, it is essential for those companies to establish good partnerships with Asian nations. In this relation, it is important that government-level actions such as positive evaluation and promotion of those scheme.

(e) Establishing an action plan with a multi-layered perspective

Waste disposal and/or recycling issues involve many different parties such as administrative agencies and departments (central governments, local governments), businesses (international enterprises), markets (cross-border recyclable resource circulating markets) and/or consumers, and in order for a recycling-oriented economic society to take root in the Asian region, every measure and action relating to waste disposal and recycling issues must be considered from viewpoint of each stakeholder with attention to detail.

(f) Improving the efficiency of the international waste distribution system

When working toward the construction of a recyclable resource circulation network, the economy and the efficiency of distribution channels should be taken into consideration for the purpose of the enhancement of recyclable resources effective utilization. Accordingly, infrastructural programs such as recycle ports constructing is essential.

2.3 Sustainable Asia Based on the 3Rs

The Asian region is under a rapid economic growth with increasing level of integration economically. To build up sound and stable recycling-oriented economic societies in the region from the viewpoints discussed earlier is a real challenge to the Asian society’s own interest, to the sustainable development of the world and further to Japan’s own interest. Japan and the Asian nations, in mutual collaboration, have to work toward the goal of reducing resource consumption amount by promoting recyclable material effective utilization measures and preventing the dispersion of environment pollution at the same time.

To realize the goal, each nation first make a considerable effort into the construction of a sustainable society. However, in addition to this, it will also become quite important to work toward the construction of an adequate recyclable resource circulation system in the region facilitating circulation of recyclable resources that cannot be utilized efficiently in a nation having less developed waste disposal and recycling technologies and facilities.

When working toward the construction of an adequate recyclable resources circulation system in the Asian region, the utilization of the resource circulation network should be well operated and highly controlled by the businesses consisting a global production system. In other words (a) high-level recyclable resources circulation network operated by manufacturing businesses is essential. At the same time, for an international market trading recyclable resources, where a variety of businesses are participating in trading, to work in an orderly manner, taking firm measures for the prevention of environment pollution, in other words (b) pollutant controlling measures in the trade of international recyclable resource, is important.
Each Asian nation, while making steady progress toward the establishment of a recycling-oriented society based upon the philosophy above, must make further efforts in realizing “Sustainable Asia based on the 3Rs.” This will be realized only when a structural change in each nation toward the construction of a recycling-oriented economic society has been completed, compatibility between each nation’s legislation system has been ensured and an adequate traceability system in relation to recyclable resources has well constructed. The utilization of recyclable resources will be improved dramatically through the cross-border recyclable resources circulation network.

A Sustainable Asia Based on the 3Rs

[Through international cooperation, this concept seeks to enhance resource utilization in the region, as well as to prevent the spread of environmental damage.]

1. Structural Change to Create a sustainable Society in each country
2. Building an appropriate cross-border recycling system in the Asian region
   a. network of highly controlled cross-border recycling systems set up by international manufactures
   b. control of potential contamination in international transaction of recyclable materials
3. **Agenda for Building a Sustainable Asia Based on the 3Rs**  
- the concept in detail and the roles of the entities concerned -

3.1 **Structural Change towards Sustainable Societies based on the 3Rs in Each Country**

3.1.1 In the asian countries: developing the base to promote structural change towards a sustainable society based on the 3Rs

In the Asian nations, where waste disposal issues have become serious with the rapid economic growth, major efforts to establish a recycling-oriented economic society are underway. Under such circumstances, Japan should offer those nations cooperation by making the most of the knowledge and expertise gain from the practical experiences in the past.

(a) **Creation of legislative systems**

In several nations in the Asian region, waste reuse or recycling is done better than the same operation in Japan through manual disassembling and separating due to lower labor costs. At the same time, it has been reported that recycling without adequate environment conservation technologies like waste residual processing has caused environmental pollution. To build up a highly advanced recycling-oriented society in the Asian nations while ensuring the compatibility between proper waste disposal and resource effective utilization, the creation of a systematical framework in teamwork with the governments, business entities and consumers concerned is absolutely essential.

To facilitate the creation of such a framework, the provision of data or information, in particular, introducing the cases experienced in Japan (partnership building between parties concerned and troubles and countermeasures arose and taken before and after the framework creation) will be useful to each nation in the Asian region that are in the midst of creating a framework of its own. Additionally, introducing various systems devised and implemented in Japan (like the home appliance recycling coupon program, PC recycling marking system) in conjunction with the systematical framework creation programs will be useful.

As such a system in a nation may sometimes exert influence upon the whole international trading flow, each Asian nation is in the process of setting up laws and regulations relating to waste disposal, but the influence over the current international trading system should be minimized. Burdensome and repetitive procedures at business entities will be obviated as much as possible through close information exchange between the governments and the private sectors concerned.

(b) **Fostering waste management and recycling industry**

The compatibility between proper waste disposal and recyclable resource effective utilization is essential for each Asian nation, and to foster the waste disposal and recycling industries to the extent that they are capable of realizing such compatibility is a pressing need at this moment. Without a systematical framework, waste disposal and recycling businesses utilizing highly advanced technologies may sometimes fail to succeed due to low profit margin, and the creation of a systematical framework
discussed in the previous section and other waste related measures have to be proceeded concurrently in an integrated manner.

Moreover, pouring energies into only the construction of waste processing plants and or recycling plants during the waste disposal and recycling industry fostering stage is not enough, and human resources development programs and other software-based operation system construction plans, including the assurance of proper distribution channels, must be in place. Additionally, tailoring an industry foster plan according to each nation’s social backgrounds, such as “open door” policy to the existing industries, is also essential.

When considering the issue here from different points of view, it is also a important that companies of developed countries including Japanese companies operating in the region take the initiative in implementing an adequate waste disposal and recycling practices in the region. It may work as a trigger and speed up the growth of the local waste disposal and recycling industry with advanced technologies may be accelerated. If this should realize, the 3Rs-based waste reduction measures can push forward their counterpart companies like manufacturers and source companies.

Also, when considering the realities that the recycling industries in the Asian region are less developed, there is a possibility for Japanese factories and plants to have recycling expertise initiative on recycling businesses overseas and take charge of waste disposal and recycling operations upon request from foreign companies operating in the region.

3.1.2 In Japan: Pursuit of advanced sustainable society based on the 3rs through maximization of effective utilization of recyclable materials and contribution to the asian countries

Japan has been a pioneer in the construction of sustainable society among the Asian nations. Its legislation system has now become one of the world’s most advanced systems. For a nation like Japan, it is obligatory to make further efforts toward the construction of much higher level of recycling-oriented economic society instead of accepting the status quo. Japan should take a leadership position in this field.

(a) Pursuit of sustainable society based on the 3rs and strategies of recyclable materials

Today’s awareness among the Japanese public about waste disposal practices like trash separating has been resulted from the continuous efforts made by general consumers, business establishments, local governments and the Japanese government. However, once the tasks relating to waste disposal are commissioned to foreign countries, it is possible that such good practices will be hindered. The Japanese Government’s current policy of pursuit of much higher level recycling-oriented society construction should be maintained.

Moreover, for a nation like Japan that is heavily dependent on imported resources, it is quite meaningful to carry out recycling operations domestically. One example is recovering useful metals like rare metals from waste substrates. Recycling opens the way for precious resource self-supply for further facilitates stable resource supply in Japan. Recycling industries such as non-ferrous metal industry is well developed by
taking into consideration of resource exhaustion. The recycling operations at higher ranks as one of the important resource strategies that should be evaluated highly.

Of course, articles that are destined for a particular terminal treatment plant, or articles that are regarded highly valuable and on a list of the systematical recycling items, and wastes of highly contaminant should be treated and recycled domestically here in Japan without relying on waste disposal operations overseas.

(b) Export of wastes

It should be avoided that we discuss the issue of wastes exports only from economical viewpoint, as improper waste disposal overseas is likely to occur. However, cross-border exports of recyclable resources that are highly useful for other nations in view of the industrial structure and can be used effectively in a manufacturing operation (such as CRT’s glass cullet) should be admitted, on condition that a reliable pollution preventing measure is in place locally.

As for exports of recyclable resources, it is required that the producers planning exports (including local governments) verify that imported wastes will be undergone proper treatment operations of the same level as Japan prior to shipments, even if such recyclable resources are officially admitted for exports for sale. Furthermore, the producers must make sure that residuals left behind after recovering useful components from wastes for recycling will surely be disposed of in a reliable manner not to cause environmental pollution.

In relation to wastes exports, it is also important to learn about future trends if recyclable resources are constantly in demand or not in the Asian region in consideration of Asia’s future raw materials supply capacity improvement tendencies and growth rates for raw materials demand.

(c) Import of wastes

Not many nations in the Asian region have highly-advanced waste disposal technologies, and they are facing difficulties in disposing of waste substrates and other hard-to-dispose-of wastes. Such hard-to-dispose-of wastes often contain rare materials, and when they undergo waste disposal operations in Japan, where advanced technologies necessary for adequate waste disposal are available, they may be rendered harmless through the technologies and can be utilized effectively.

For the advantages in the above, it is worthwhile continuing positive discussion of importing such wastes acceptable and disposable in Japan, from the viewpoint of effective resource utilization promotion in the Asian region as well as the viewpoint of Asia’s pollution prevention.

(d) Consideration of domestic recycling system from an international perspective

In Japan, recycling related systems were conventionally established on the domestic-waste domestic-recycling principle and international resource recycling systems were not given much attention. However, considering the recent rapid globalization of economy, we can no longer afford to look at any waste disposal and recycling
legislation system in isolation from international recyclable resources circulation issues. In the future, we should construct any domestic recycling system by giving due consideration to overseas legislation systems and international recyclable resources circulation systems.

3.2 Towards Building an Appropriate Cross-border Recycling System in the Asian Region

3.2.1 Conditions for an appropriate recycling system: securing a reliable traceability system

Considering the issue of movement of recyclable resources, which may cause environmental pollution to overseas countries, it is absolutely necessary to ensure that the materials are being reliably processed and become totally contaminant-free prior to shipments. For the purpose of proof, advance researches, which are to determine if such recyclable resources are treated adequately or not, are required as well as an adequate distribution and recycling system with a reliable traceability.

To be more specific, the following items should be checked before constructing an adequate traceability system:

(i) a system securing effective utilization of recyclable materials and proper waste residual treatment at all stages in the process of waste circulation (throughout the circulation phase) has been established by concerned parties,

(ii) anti-pollution measures are taken at every stage in the system, and

(iii) a mechanism capable of monitor that the above system is functioning in order and capable of showing the actual recyclable resource flow according to the preconditions included in the system.

In addition, export permission of the wastes must be reviewed. Under the present circumstances, it is often considered that the waste can be acceptable by one nation, but not by the other nation, and there is still some differences even in one nation. Bearing this in mind, we have to set up standards to differentiate between recyclable resources and non-recyclable resources and acceptable reproduced materials standards at the same time.

Some wastes handed over to a waste disposal company for treatment is exported without prior consent of the waste producer which commissioned such a task. In order for the Japanese waste producers to circumvent such a case and to prevent pollution in a foreign country, precautionary measures, including frequent verification works to ascertain the final destinations or the end users of wastes produced by the waste producer, should be considered under the philosophy of “waste and recycling governance”.

3.2.2 Acceptable cross-border recycling system

Recyclable resources circulation systems are an international system. In order to put those systems to practical operation, an in-depth study should be made and proper measures for restrictions are urgently expected. Strict observation by the concerned authorities at incoming/outgoing points is especially expected for some cases, which are not stipulated in such systems. Followings are the examples of the cases.
(a) Highly controlled cross-border recycling system setup by manufacturers

Several photo-copy machine manufacturers, which have been doing advanced reuse and recycling activities to recover parts and plastic components from copy machines collected by dealers upon disassembling machines, are going to establish overseas branches. Additionally, those companies have initiated the export of waste plastic components after screening operation by a Japanese recycling plant to Chinese recycling plants, where they are transformed into pellet for sale.

Another example is that certain household appliance manufactures of Japan, having long experience in the high-tech recycling in adherence to the principles of the Home Appliance Recycling Law, are studying the possibilities in exporting high-quality glass cullet recovered from CRTs to overseas CRT glass manufacturing factories for reuse in the manufacturing operation of products of their own.

In this manner, some manufacturers themselves, upon giving due consideration to the life cycle of products, handle the processing of end-of-life products under their own brands to enhance resources effective utilization and recycling through the global circulation channels. In such cases, those systems developed by manufacturers, in view of adequate waste disposal and resource effective utilization in the Asian region, should be authorized as an international system, as far as it is apparent that stringent control programs are provided and those resource recycling systems have an adequate traceability.

(b) Transaction of recyclable materials under appropriate control to prevent environmental damage

Cross-border recyclable contaminants trading markets attract an indefinite number of participants, and therefore it is required that the contaminants do not damage the environment in the accepting nation. So, besides the minimum requirement of conducting the Basel Convention and other necessary formalities, it is compulsory for cross-border recyclable contaminants vendors to take every measure to assure a proper traceability throughout the circulation of contaminants of their own from a broad view.

(c) Cross-border contaminant-free recyclable resources movements

In the case of wastes subjected to pollutant elimination operations in a nation, and if they can be used as a source material, cross-border movements should be accepted as the case with other ordinary resources. As far as it is apparent, such wastes are not harm to any stage of recyclable resources circulation systems in each nation.

Several manufactures, chiefly household appliance manufactures, have started new actions in an attempt to manufacture products producing less contaminant components after they are consumed through a total manufacturing method from product conception through engineering and final assembling. Such positive actions should also be highly valued.
3.2.3 Economical and adequate distribution channels construction

It can be said that recyclable resources movements will require much more transportation costs as compared to material goods flowing to-and-from through the main commodity flow, and for the promotion of waste recycling and efficient utilization. It is essential to lower the incurring distribution costs. To lower the transportation costs, large amount bulk transportation and/or transportation in return for cargoes delivered through the main commodity flow will work well. Moreover, other necessary infrastructure should also be established.

Also, when taking into consideration that recyclable resources include pollutants and contaminants, proper environment protection measures should be taken in constructing distribution channels so that recyclable resources are being properly transported and stored.

4. Direction for Adopting Comprehensive Policy

In order to propel the “Sustainable Asia based on the 3Rs” activities in long terms, it is required that Japan takes the initiative in propelling the following plans in a comprehensive manner in concert with the Asian nations.

Before putting those plans into effect, they have to be separated into two groups both in short terms and mid terms as the first step.

In the short term, the following is essential:

- making strict regulations relating to environment pollution due to waste disposal and recycling activities (waste disposal technologies propagation related rules are included)

In the mid and long term, the following should be pursued simultaneously:

- construction works towards a recycling-oriented economic society in the Asian nations
- construction works towards a recyclable resources circulation network in the Asian region

4.1 Policy Dialogues

Japan has a history in the field of waste disposal, but the Asian nations have just got down to the field, and conveying the experiences of Japan to those nations is useful in constructing sustainable societies in the region. In doing so, Japan, will also be favored with a good opportunity in obtaining information useful to improve our waste disposal system, as each nation has its own social and economical backgrounds. From this viewpoint, setting a forum or a seminar for discussions regarding each nation’s action programs toward a recycling-oriented economic society, waste disposal related issues each nation is now facing and successful cases realized through private and government sectors’ efforts is fruitful. Also, to have individual talks with each Asian nations by taking opportunities of various political meetings (for example, Green Aid Plan¹⁹ - Political Meeting) is meaningful.

¹⁹ Green Aid Plan (GAP) is a programme specifically designed to support developing nations that are struggling to solve industrial pollution and environmental problems through transfer and dissemination of the Japanese technologies based upon the environmental pollution control measures taken in the past in Japan.
It is also a good idea to take up the Asia recyclable resources circulation network related topics on the agenda, in addition to domestic updates in each nation, for further discussions over recyclable resources circulation systems with a reliable traceability. When such issues are fully considered and mutual understanding between the two nations have deepened, discussions on things relating to the formalities and smooth operation of cross-border recyclable resources movements, and studies on the conclusion of a two-nation treaty on cross-border recyclable resources movements will have to be proceeded.

Once the construction of a recyclable resources circulation network with a reliable traceability is realized through such individual political talks with each Asian nation, a regional level treaty may be discussed.

4.2 Sharing Information

(a) Sharing information on legislative systems and waste management and recycling business

It is often said that information on waste disposal and recycle related laws and rules of the Asian nations, as well as information regarding waste disposal and recycling businesses is insufficient. However, for the Asian nations to establish an adequate waste disposal and recycling system of its own, and for companies to push ahead with overseas businesses, information gathering is quite important to avoid violation of other nation’s laws and rules. Therefore, information sharing will become absolutely necessary.

Also, as waste disposal and recycling related rules and laws exert influence over the current production practices, marketing and economic activities worldwide, and assurance of consistency between each nation’s legislative systems is important. For this reason, facilitating information exchange between the parties concerned capitalizing on the opportunities of political meetings, deepening understanding of each nation’s rules and policies, and having a good grasp of the development level of waste disposal and recycling industries in each nation is quite essential.

(b) Study on the Status quo of international flow of recyclable materials in the region

Upon building an adequate recyclable resources circulation network construction activities in the Asian region, information and data on actual movements of wastes and recyclable resources in the region should be organized in good order. For this reason, each Asian nation as well as Japan are required to swiftly gather and compile date on wastes and recyclable resources cross-border movements.

Also, if they are able to reach information detailing the past illegal cases involving Asian waste disposal and recycling businesses, it will help strengthen the measures so far taken at each nation to stop illegal waste movements at incoming/outgoing points. In other words, the possibilities of exchanging broad information including illegal cases should be studied for mutual interests among the Asian nations.
4.3 Policies for Building Appropriate Cross-border Recycling Systems in the Asian Region

(a) Technical assistance

Japan has exerted its earnest efforts in constructing a sustainable society by instituting various laws and regulations related to waste disposal, and if Japan conveys the experiences obtained during the process and if Japan transfers its accumulated know-how and expertise to the Asian nations, it will be of help to the region. So, it is desired that Japan will capitalize on the opportunities of political meetings mentioned earlier (Green Aid Plan Political Talk programs are included) and actively exchange information. For Japan, it is also desired to give technical assistance toward the construction of an adequate waste disposal and recycling system in each nation while giving due consideration of each nation’s social and economic backgrounds.

Moreover, parallel to the actions by Japan, Japan should also support to complete waste disposal and recycling industry infrastructures in each nation. To realize this, the provision of software-based assistance such as know-how on system operation enabling the technical-aided capacity building activities by Japan will become essential.

(b) Human resources development and exchange, and environmental education

For a nation that intends to construct a recycling-oriented economic society, human resources development and public education concerning waste disposal and recycling is crucial. There are various educational projects and programs related to waste disposal and recycling, and they include APEC Recycling Project, several intern programs designed by the Japan International Cooperation Agency (JICA), the Association of Overseas Technical Scholarship (ATOS) and other international institutions. And it is highly desired that each nation in the Asian region facilitate professional human resources foster and exchange programs, and promote environmental education programs towards the construction of a sustainable, in conjunction with the programs included in the “UN Decade of Education for Sustainable Development”.

The soon coming “3Rs Initiative Cabinet Minister Meeting,” to be held from April 28 to 30, 2005, will be a good chance to hold several other international symposiums during the period by soliciting participation by experts and professionals in each Asian nation in this field. At the same time, actions to provide those experts and professionals with opinion exchanging opportunities and to make those meetings and symposiums known to the public in each nation will also become necessary.

(c) Financial assistance

In order for an adequate waste disposal and recycling system to take root in the Asian nations and the region, it is effective to encourage the Japanese companies to be involved throughout the life-cycle of products, taking charge of every phase, from manufacturing, collection of used products, reuse to recycling, and other waste related businesses having highly advanced and unique recycling techniques and know-how to start their businesses in the region and step up their activities.
To encourage those businesses to participate in the waste and recycling industries in the region, policy based financial assistance measures or effective utilization of investment financing facilities available from the Japan Bank for International Cooperation will may be considered positively.

4.4 Policies for Building Appropriate Cross-border Recycling Systems in the Asian Region

(a) Construction of an appropriate cross-border recycling network with an appropriate traceability system

In view of creating a recycling network with an adequate traceability, and in order to prevent improper recyclable resources processing at locations accepting resources, three major requirements should be fulfilled. 1) The provision of an adequate and overall processing system, including the final stage residual processing operation, set up by the parties concerned (resources circulation channel), 2) the provision of measures preventing environment pollution at every phase of a circulation system and 3) the provision of measures necessary to check if resources are flowing orderly in accordance with the rules defined in the system in order to ensure traceability during movements of recyclable materials.

Toward that end, functions to be performed by the government and by business entities must be defined, and standards and requirements to be satisfied by manufactures when they are to establish an advanced resources circulation system with a reliable traceability must be provided, and rules to be applied to recyclable wastes trading markets attracting an indefinite number of participants for the assurance of a traceability must clearly be set up.

When handling the above issues, in-depth discussions between the nations concerned on the decisions made domestically or joint studies between them from an earlier stage should be carried out to deepen common understanding among parties concerned including the agencies and authorities and to make up a framework that will be welcomed among the parties.

(b) Distribution channel construction

When constructing a recycling resources circulation network, improving the cost effectiveness and the efficiency of distribution channels is quite important in order to ensure adequate quality of recyclable materials.

To satisfy this requirement and to construct proper distribution channels provided with necessary anti-pollution measures, promoting “recycling ports” construction activities and building recyclable resources storage depots in and around harbors and ports is required.

(c) Coordination with International agencies and institutions

The importance of recycling activities promotion in alliance with international agencies and institutions such as OECD was taken up in the “3Rs Initiative” agreed at the Sea Islands Summit held in June 2004, while the issues on cross-border waste movements
have been discussed repeatedly at the meetings of the member nations of the Basel Convention, several forums hosted by the OECD and other international institutions.

In constructing a resources circulation network in the Asian region, it is important that the parties concerned continue to discuss in coordination with those international institutions. It is recommended that the parties concerned establish an evaluation mechanism assessing adequate resources circulation system with traceability in cooperation with the OECD and the Basel Convention Office.

In addition to the coordination mentioned above, the parties concerned must positively act in concert with the international institutions also with reference to sustainable society construction related legislative organization in Europe and other nations in view of ensuring consistency and transparency among different legislative systems.

(Reference)
The G8 Summit 2004 Document
Science & Technology for a Sustainable Development: 3R Action Plan and Implementation (excerpts)

3R (reduction, reuse and recycling) 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 manufactured products, and cleaner, more efficient technologies, consistent with existing environmental and trade obligations and frameworks;

Encourage cooperation among various stakeholders (central government, 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.