Asia-Pacific
Economic Cooperation

CAPACITY BUILDING for A RECYCLING-BASED ECONOMY in APEC

APEC
Human Resources Development Working Group
Capacity Building Network

November 2005

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Preface

Asia Pacific Economic Cooperation (APEC) is a framework which promotes economic and technical cooperation for sustained development of the Asia Pacific Region, with 21 member economies. This project entitled "Capacity Building for a Recycling-based Economy (RBE) in APEC" is one of the important activities of the APEC human resource development field in recent years to achieve the objective of sustainable development.

In order for us to enjoy continued well-being for human life, we cannot afford to waste scarce natural resources or energy. Neither can we get away with polluting the environment, nor monopolizing wealth at the expense of others. It is indispensable, and inevitable, to establish a recycle-based society in this region as expeditiously as possible, to achieve sustainable development, maintaining a sound global environment.

Within APEC economies, some areas and some industries are ahead of others in reduction, reuse or recycling of resources. However, in most APEC members, such efforts are still at their starting points. In some cases, the efforts encounter the situation where no one economy can solve the problems alone. Therefore, it is of great importance for APEC as a whole to share experiences and best practices amongst its members, and identify common issues and address them jointly to develop capacity in APEC economies.

APEC is the most appropriate forum to tackle these environmental challenges that all economies are now facing in this region, taking into account the differences of situation amongst member economies as well as the cooperative features of the APEC capacity building exercise.

It should also be noted that this Recycling-Based Economy (RBE) project was carried out jointly through APEC-ABAC [1] collaboration for the first time, in which ABAC's recommendation was implemented as a project under the initiative of APEC's human resources development. Throughout the project implementation, ABAC representatives were involved. Since the nature of the project requires all sectors in the society, including government, business and general public, to be involved in order to achieve RBE, the business representation such as ABAC's in the project was extremely important.

In the course of the project implementation, we received an overwhelming cooperation both by the host economies for the various events and the participating experts who joined the project at various stages. The purpose of the project was to trigger a movement called "a Recycling-based Economy" with its acronym "RBE", the project achieved its purpose, firmly establishing a strong network of experts in this field, who willingly shared their expertise with others. The names of experts and host organizations contributed to this project are listed at the end of this report.

[1] APEC Business Advisory Council is composed of members of 21 economies appointed by their leaders. These representatives make recommendations from the business point-of-view, to APEC leaders' meeting.

In preparing this report, the experts made sincere efforts to collect the available information describing the current situation. The information presented does not necessarily represent the official views of the individual economies in APEC.

As the Project Overseer, I would like to extend my sincere gratitude for the cooperation extended by the experts and their organizations to make this a successful project. I would also like to acknowledge continued support of the officers and staff at the APEC Secretariat. Last, but not least, I would like to express my thanks to the staff of IIST, who have worked very hard to bring this project to this final stage.

November 2005

OJIMI Takato
Project Overseer
Vice President and Managing Director
Institute for International Studies and Training
(IIST)

I. Project Description

1. Background

The growth of the economy in the APEC region brings positive effects on the lives of people with greater prosperity and material wealth. On the other hand, it can potentially damage our environment if we continue the way we have been conducting our business. As we increase consumption of goods and services, through faster turnover of new products, we will produce wastes in greater quantities than we have imagined in the past. Already, in many of the big cities around the APEC region, waste disposal has become a major issue. Therefore, in order to make our economy more sustainable, it is essential to seriously implement the 3Rs of environmental protection, namely Reduce, Reuse and Recycle, as part of integrated sustainable waste management and resource utilization.

In some of the APEC economies, and in selected industry sectors, efforts of 3Rs are already underway. Companies have started to design and develop recyclable products from the conceptual stage to take the entire product life cycle into consideration or, more aptly put, lifecycle design. New business opportunities have been created, while addressing these issues.

On the other hand, most APEC economies are still in their infancy stage as far as implementing 3Rs is concerned. This is due to the fact that it requires not only individual company efforts but also social infrastructure, support industries, relevant technologies, education and awareness, and strong commitment of all stakeholders as well as an appropriate regulatory/policy framework. In other words, an entire social system has to be created to support 3Rs.

The issues have become much more complex, as APEC economies are moving towards more liberalized regimes. Trans-boundary movement of products and services has become increasingly prevalent, reflecting growth in trade and investment. In order to fully promote 3Rs, therefore, it is ideal if we establish a compatible recycling system, whereby goods produced in one economy can be used, and recycled, in any one of the economies within the APEC region.

The importance of developing a recycling-based economy (RBE) was identified by the ABAC during its deliberations in 2003 and included in its recommendation of that year to APEC Leaders.

2. Objectives

Taking the ABAC recommendation into account, APEC Human Resources Development Capacity Building Network has proposed this project, which is the first step towards establishing an RBE in APEC. The aim of this project is to achieve the following objectives to start the daunting task of establishing an APEC-wide system for sustainable development:

- To identify issues and challenges of implementing 3Rs (Reuse, Reduce & Recycling) in the member economies,
- To share best practices of recycling systems used in selected industries
- To design, develop and conduct capacity building programs on a pilot scale basis in three member economies for specific industry sectors,
- To disseminate the programs, materials, and best practices to all APEC economies,
- To establish a network of experts to continue to share information and build a workable RBE system in APEC.

3. Activities

The project was composed of four major components[2]

(1) Kick-off Expert Workshop

A project kick-off workshop among experts to plan and design pilot programs was held in August/September 2004 in Japan. Sixteen experts in the recycling field from ten economies (China, Indonesia, Korea, Japan, Malaysia, Mexico, New Zealand, Philippines, Chinese Taipei and Thailand) were represented at the kick-off meeting. The current status of the recycling of waste in each of these economies, and some best practices, were shared amongst the experts. The experts decided on tentative programs on capacity building activities for the following twelve months.

(2) Pilot Programs

Pilot programs were conducted in three locations to gather issues and best practices in the APEC region. Each program had its specific themes or approaches to accommodate the divergence of the region[3].

a) A roundtable discussion in Mexico City, Mexico, in February 25 & 26, 2005.

Ten overseas and 13 Mexican experts gathered from 6 economies (Canada, Chile, Mexico, USA, Japan and Peru-contributed in absentia), who took part in the roundtable discussion.

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[2] See Fig. 1 flowchart - page 4

[3] For details, see Reference: Meeting Summaries.

The experts represented educational institutions, non-government organizations (NGOs), and central and municipal governments. The theme of the discussion was "Creation of Markets for Recycling of Products without Actual Demand." In addition to sharing the status and best practices of RBE in the economies represented at the roundtable, issues and approaches for creating a market were discussed.

b) A conference in Yinchuan City, China, June 3 to 5, 2005.

A conference was organized in Yinchuan City, China, entitled, "A Recycling-based Economy (RBE) and China's Western Development". Over 20 experts and officials from China and other APEC economies took part in a one-and a half day conference. The experts represented Canada, China, Japan, Korea, Malaysia, New Zealand, and Thailand. It was co-hosted by the Yinchuan Municipal People's Government and China Enterprises Confederation. It attracted over 400 participants and had great media coverage. As Yinchuan has started its major economic development, it was a critical time for the people of Yinchuan to learn the best practices from APEC economies regarding RBE.

c) A symposium in Pattaya, Thailand, June 24 & 25, 2005

A two-day event including recycling site visits was organized in Pattaya, Thailand. The symposium entitled, "APEC Capacity Building on RBE: Guidelines for Thailand" featured three major industry sectors of Thailand, namely, electric and electronic (E&E), automotive and textile. Industry specific best practices and new technologies for RBE were shared among the industry representatives, educators and government officials. Fifteen experts came from Japan, Korea, Chinese Taipei and Thailand. The sector specific concurrent discussions identified specific issues and possible approaches for each of the industry sectors. Events were covered by local television in their documentary programs on RBE.

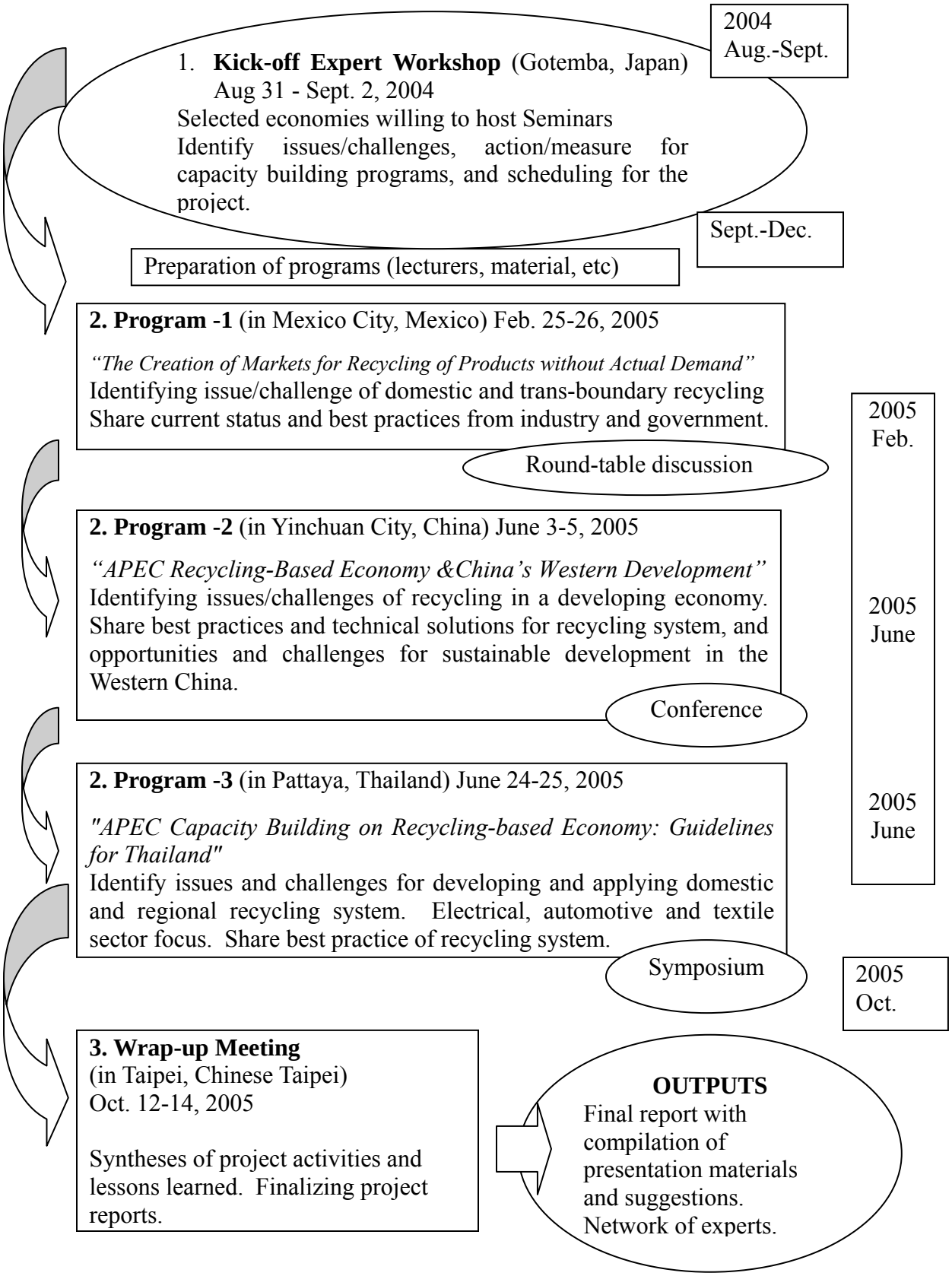
(3) Wrap-up Meeting

Following the three pilot programs, the final wrap-up meeting was organized in Chinese Taipei on October 12 through 14, 2005. A roundtable discussion with local and APEC experts took place to identify alternative actions for a vision of RBE in APEC. The final meeting concluded with the project report identifying future courses of possible actions. The session was attended by experts from Canada, Japan, Mexico, New Zealand, Chinese Taipei and Thailand.

(4) Dissemination of the Results

The compilation of presentation papers and results of discussion in this report has been prepared and handed in to the APEC process, including ABAC, for dissemination.

Figure 1. Flow of APEC RBE Project



II. A Recycling Based Economy - The Vision

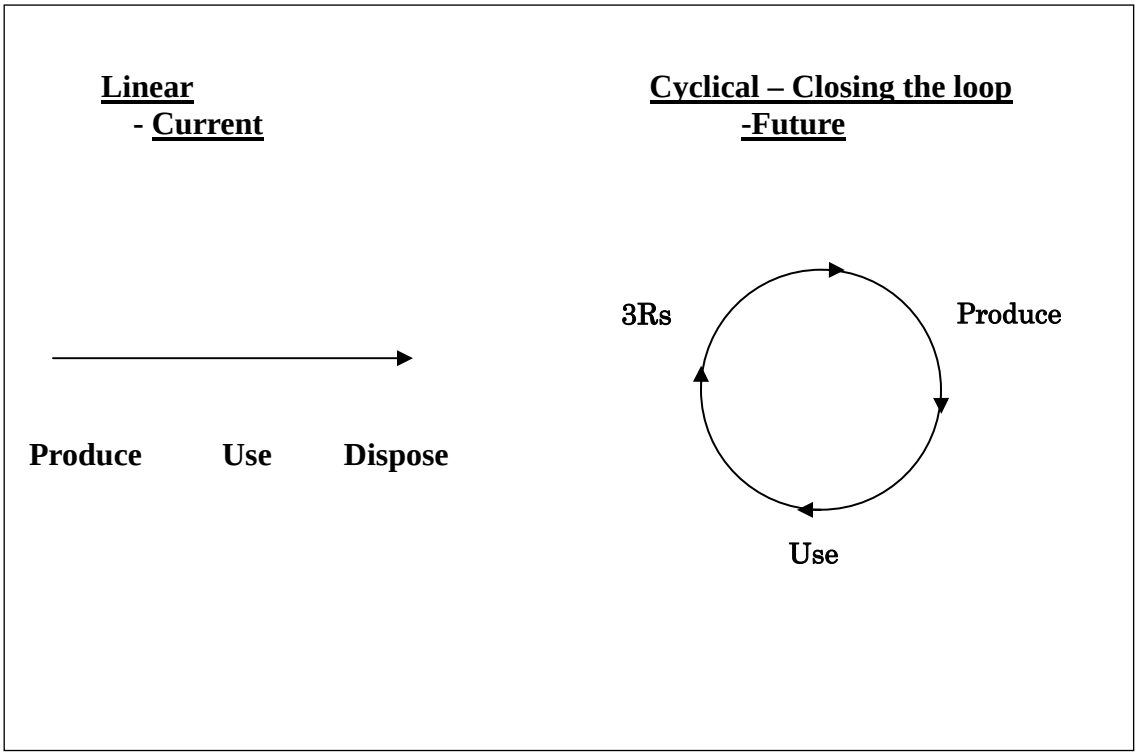
An RBE is one where resources are used sustainably, where energy is used efficiently, and where waste from one process becomes the inputs into another process. It is about meeting the needs of today, without adversely impacting on the needs of tomorrow. It includes the protection of the environment and ensuring the safety of working conditions.

To achieve an RBE, attitudes and processes need to shift from linear to cyclical as schematically demonstrated in Figure 2.

In a business sense, the key messages of an RBE tie in with what are generally considered to be 'sound' business practices, such as maximising the use of resources through increased efficiency, and minimising waste.

The elements of an RBE will include measures for waste recovery and cleaner technologies, promoting eco-efficiency in the manufacturing sectors, and reduction in use of raw materials, energy and pollution. There is an important need for proper waste management rules and legislation, incentives, infrastructure, awareness, motivation, education, and disclosure of information. .

Figure 2: Linear versus cyclical approaches to resource use



III. Current Status in the APEC Region

The term "Recycling Based Economy" (RBE) means different things to different people and is also interpreted differently within alternative APEC economies.

Each economy has identified its own priorities based on its' own circumstances. For example, where water is short, water efficiency may take a higher priority or, if energy is a critical concern, energy efficiency takes a higher priority. Each economy's political structure and policies also influence the type of recycling-based programmes being undertaken, as does the level of infrastructure existing within the economy.

Definitions for words such as "waste" and "recycling rate" and how statistics are presented vary between the economies, so making simple comparisons can be misleading.

1. Economy Specific Status

The following information is summarized from the presentations of the experts. The full texts of presentations are available on the APEC website[4].

Canada
Canada has various regulations, bylaws and policies set at the provincial level. These typically include: waste reduction targets, landfill and/or collection bans, mandatory source separation and extended producer responsibility. Canada has over 54 extended producer responsibility programmes, mostly at the provincial level, and has small voluntary programmes for some computer components. In 2002 the recycling rate was 21% measured as a percentage diversion from disposal including composting.

Chile
An Integral Solid Waste Management policy was approved in 2005 with an objective of reducing the health and environmental hazards associated with waste. It sets the highest priority on the avoidance or prevention of waste in the first place, followed by minimising the waste that is generated. Current recycling rates are approximately 9% for the metropolitan region. In 2004 24% of the total production of steel was recycled.

China
China introduced a law focusing on energy savings in 1998, and then, in 2003, introduced a law to promote cleaner production. The Government has introduced preferential taxation policies to support such initiatives within industry and has a very strong focus on efficient energy utilisation.

Indonesia
Government policy previously focused on the "end-of-the-pipe" but in recent years, there has been a shift towards cleaner production. A national policy on cleaner production was

[4] http://www.apec.org/apec/publications/all_publications/human_resources_development.html

introduced in 2003 and, in 2004, a Cleaner Production Centre was established.

Japan

In 1999, the Japan Business Machine Industry Association established a joint reverse logistic system for copy machines. In 2001 Japan introduced a law promoting the creation of a recycling orientated society. There are also various recycling laws covering specific products/materials such as containers/packaging, home appliances, construction material and end of life vehicles. Current recycling requirements for home appliances range from 50% for washing machines and refrigerators, 55% for TVs and 60% for air conditioners. A collection scheme for personal computers was introduced in 2003.

Korea

Korea currently recycles 43% of the municipal waste generated. Korea has introduced a Comprehensive Waste Management Plan, which sets the framework for waste minimisation, reuse and recycling. It includes a wide range of initiatives including polluter-pays levies and collection fees, packaging regulations, a beverage container deposit system, extended producer responsibility and support mechanisms for recycling industries.

Malaysia

Malaysia has no specific law on the "3R's" but it introduced a national recycling programme in 2000. A target of reducing waste generation by 22% by the year 2020 has been set. Current recycling is estimated to be 3 – 5%.

Mexico

Mexico introduced hazardous waste regulations in 1988 and waste legislation in 2003. It also has various local and state regulations. Current recycling rates range from 12% for plastic, 50% for glass, 82% for paper/card and 95% for aluminium cans (measured as a percentage of production). Mexico has small voluntary programmes for some components of computers. In 2004, the Soft Drink Association set up a voluntary program to collect PET bottles.

New Zealand

There is no specific waste legislation in New Zealand, with current legislation being 'end-of-pipe' focused. A Government strategy on waste was adopted in 2002 which included targets such as diverting 60% of garden waste from landfill by 2005 and 95% by 2010. However these targets are voluntary. Current recycling rates include 19% for plastic packaging, 36% for steel packaging, 48% for glass packaging, 62% for aluminium cans and 69% for paper packaging (as a percentage of consumption).

Peru

A general law on solid waste was introduced in 2000 and specific rules covering recycling, pollution prevention and waste minimisation were introduced in 2004. The current recycling rate is estimated at approximately 5%, and consists mainly of domestic waste.

Philippines

An Ecological Solid Waste Management Act was introduced in 2000 and along with the Toxic Substances & Hazardous and Nuclear Control Act this provides the legislative framework for managing wastes in the Philippines. The Government has introduced a green procurement programme and promotes a materials/waste exchange. The current recycling rate for Metro Manila is 12% measured as a percentage of waste generated.

Chinese Taipei

The trend in government policy has changed over recent years in Chinese Taipei from focusing on the prevention of public hazard (of waste) towards the sustainable utilisation of resources and waste. Waste types are classified through legislation. In 2004, 20.4 % of municipal waste was recycled.

Thailand

Thailand is in the process of developing an appropriate legislative framework but has in place policies which promote cleaner technology, eco-efficiency and material/waste exchange, and to control packaging. A national recycling target has been established for 50% by 2008, with current recycling rates ranging from 23% for plastic, 32% for paper and 51% for glass. A draft strategic plan and draft directives have been prepared for the control of e-waste.

United States

USA has an extensive legislative framework for controlling waste, with variations from state to state. In 2001, 30% of municipal solid waste generated was recycled. Individual product recycling rates range from 21% for glass containers, 36% for plastic drink containers, 45% for paper, and 58% for steel cans. Many states/municipalities are in the process of addressing electronic waste.

2. Trans-boundary Status

The international trade in recyclables is increasing, in particular toward some of the APEC economies. The increased activities in the recycling sector have developed in response to increased demands for resources which is a result of growing economies, and the relatively low labor rates. Basically, it must be expected that some economies cannot recycle all of their own wastes, and hence there must be attention given to trans-boundary shipment of these materials for recycling.

International trade fills a part of demand of resources in growing APEC regions. For example, in 2004 China imported 4 million tons of waste plastics, 12 million tons of used paper and 12 million ton of steel scraps. This represents a growth rate in the imported amount since 2003 of 35%, 31% and 10% respectively.

Most APEC economies have ratified the Basel Convention which control trans-boundary movement of hazardous waste. As an alternative, or in addition, some economies have their own regulations such as pre-shipment inspection, registration of exporting companies, and inspection of foreign recycling facilities.

3. Common Approaches/Trends for Implementing RBE

APEC economies are adopting a combination of approaches to implement RBE, including:

1) Education and awareness programs

2) Energy efficiency and conservation

3) Cleaner production - a strategy for businesses to make the most efficient use of resources including raw materials, water, energy, time, and money whilst preventing pollution and minimising their impact on the environment.

4) Eco-design /design for the environment - to design a product taking into account its whole lifecycle from manufacture, use to "end-of-use" to decrease the adverse effects on the environment, increase resource efficiency, and allow for re-use and recycling.

5) Reduce, reuse and recycling initiatives

6) Extended producer responsibility (EPR) for difficult wastes (e.g., TVs, refrigerators, tires) also known as Product Stewardship, requires manufacturers to positively manage environmental impacts throughout the lifecycle of their products.

7) Container deposit or refund legislation, litter and waste levies, polluter pays or user pays for some types of wastes.

Within APEC economies there has been a general trend from "end-of-pipe" controls on waste such as treatment and disposal standards, towards reducing or avoiding waste generation in the first place, and then reusing and recycling the waste.

While there are many examples of often small-scale voluntary approaches to reducing and managing waste within APEC economies, there is a clear move towards taking a regulatory approach through the introduction of appropriate legislation or regulations. There is also recognition that no single approach will address all of the waste issues, and that a combination of approaches is required.

Initially, many economies focused on addressing municipal or domestic waste through the introduction of recycling schemes; however, there is now a much wider focus including all waste streams.

There is a move towards introducing EPR schemes for selected difficult wastes.

4. Case Studies

1) A targeted waste approach - Electronic Waste

The amount of electronic waste being generated in APEC economies is growing rapidly. Many APEC economies are only just starting to address this type of waste.

Japan has established a shared responsibility model for refrigerators, washing machines, televisions, and air conditioners, where the manufacturers set up the collection points and recycling plants, retailers undertake the collection and transport, and the consumers pay for the recycling collection and transport costs.

Korea has introduced a mandatory "take back" requirement for refrigerators, washing machines, televisions, air conditioners and personal computers where the producers are required to fund recycling costs and satisfy minimum recycling rate.

Chinese Taipei has built a recycling system for electric and electronic waste since 1997. The recycling rate was 36.4% in 2004. Manufacturers and importers are required to pay a fee which is used to subsidize the final collection and recycling operation.

Thailand has prepared draft directives including definitions and standards for recycling of electronic waste and has prepared a draft strategic plan for managing these wastes. This includes provisions for responsibilities of producer/importer/consumers, the polluter pays principle, the establishment of a recycling fund, consumer education, and R & D into eco-product development.

There are many examples of voluntary initiatives being developed within APEC economies for the purposes of collection and recycling of electronic waste. However, there is no consistency of approach or standards.

2) A targeted waste approach – End-of-Life Vehicles

Dealing with end-of-life vehicles (ELV) is a common issue faced by APEC economies. In many economies, there are existing scrap metal recycling initiatives, but the main issue is separating and dealing with the non-metal and hazardous components in the vehicles.

Japan has recently introduced an ELV law which recognises the existing scrap metal recycling industry and compliments this by targeting the "most difficult to treat" components. Under the ELV law, vehicle manufacturers and importers are required to collect and properly treat fluorocarbon gas from the vehicles' air conditioning unit, airbags and automobile shredder residue.

A recycling fee is charged at the time of purchasing the vehicle and is collected by the Japan Automobile Recycling Promotion Center which manages the overall coordination of the recycling system. The Center uses this fund to refund the cost of treating the three components collected from ELV. A compulsory reporting system linked to the chassis

number and registration number has been established to collect information and monitor compliance. The current recycling rate is 80% and the vehicle manufacturers are aiming to increase this rate to 95% by the year 2015.

Korea has set standards for the dismantling process and facilities under its Automobile Management Act. It has also required recyclability to be considered in the design of new vehicles and set a target of over 85% reusability and recyclability by July 2007.

Chinese Taipei has built a recycling system for ELV and constructed three waste automobile processing plants since 1999. Its objectives are to integrate waste auto processing to recycle used cars, to consolidate the management of contaminants, to generate economic values from recycling, and to reduce pollution from arc furnaces in steel mills. The recycling rate of vehicles was 31.4% in 2004.

3) An individual company approach - Fuji Xerox

Fuji Xerox introduced a company-wide environmental policy in 1991 and a product recycling policy in 1995.

Its 2001 Environmental Strategy strengthened the company's goals to transform Fuji Xerox into a fully recycle-oriented company, to offer outstanding environmentally-conscious products and environmental solutions to its customers, and to strengthen the infrastructure for environmental management. Targets include doubling eco-efficiency by 2010 and reducing the use of hazardous chemicals by the adoption of a phase-out plan for specific chemicals.

A "closed-loop system" has been introduced to utilise resources which focuses on dismantling of recycled products and reuse of the recovered parts and materials. The first step is one of "inverse manufacturing" or the design of the machines. The design of new machines has been changed to increase the use of recycled parts and materials and also to make the eventual dismantling and recycling of the machines at the end of their life easier with the aim of zero-waste to landfill.

In 2004, Fuji Xerox established the Eco-Manufacturing Company in Thailand as an integrated recycling system establishing an international resource recycling network.

IV. Issues in the APEC Region

In view of the current status, the following series of issues have been identified which need to be addressed to improve RBE opportunities.

1. More Precise Definition of Recyclables

This issue exists because there is no standard definition of recyclable materials. Currently, there is mis-labeling or poor labeling of materials (e.g. to distinguish between secondhand computers, as opposed to e-wastes). There are also waste products being exported as recyclables, mixed with non-recoverable waste. Potentially there should be specific designations to differentiate between secondhand goods and those generated from virgin goods. Currently, there are no stipulations on how the information is being reported.

To improve the quality of recyclables and facilitate trans-boundary trade, monitoring and evaluation systems are needed. There are designations of harmonized system codes which assign separate statistical codes to numerous categories of material, but there is no uniformity between economies as to the codes being used, and not all economies have adopted them. This warrants change.

2. Environmental Legislation Dealing with Trans-boundary Movement of Recyclables

Most APEC economies and regions ratified the Basel Convention. However, waste management practices are not compliant with hazardous laws and regulations. The Basel Convention does not deal effectively with recyclable parts and materials crossing borders; there are no established trade rules to make the transaction of recyclables parts and materials smoother. Under existing rules, definitions and treatments differ from economy to economy. As a result, there is need for strengthening of enforcement of illegal shipment of hazardous wastes, which could be accomplished through international cooperation.

There is a need to establish 'baselines' to address the problem in developing economies and to strengthen legislation to monitor waste flows including trans-boundary movement of wastes and secondhand products.

There is no consensus on international trade of secondhand goods

3. Improved Environmental Legislation within Individual Economies

There are important issues related to environmental legislation (and lack thereof) within individual economies. There is a need to have a general level of environmental legislation in order to support recycling and other waste reduction initiatives (e.g. "bottom line" standards for waste disposal, and supporting legislation which could vary

from economy to economy depending on individual circumstances).

The value and effectiveness of recycling efforts are strongly influenced by source separation. Hence, legislation on mandatory source separation by residents and businesses would go a long way to improving the sustainability of recycling systems. If consumer and waste generator do not segregate wastes, the costs of collection and transport, and the difficulties of recycling increase. It also decreases the value of the recycled materials.

Much of e-waste is currently disposed together with municipal solid wastes without pre-treatment. This needs to be controlled.

Tax and financial incentives, effectively implemented, could be designed to greatly assist the sustainability of recycling systems.

4. Eco-Design

There would be benefit if there were 'eco-design' approaches such as designing for easy disassembly of products, to facilitate recycling. The current situation is that for many constituents, there is no design for recycling and hence recycling of the more valuable components creates hazardous wastes.

Eco-design to enhance use of recycled plastics into new products would have significant benefit. This might include use of identifying marks for different resource articles at recycling points (e.g. to make the separation of plastics into specific types, more easily accomplished).

5. Increasing Awareness and Understanding of Magnitude of Recyclables

Currently, there is little understanding as to how much recycling is occurring in different economies. Basic statistics on recycling should be collected in official statistics systems but there needs to be consistent definition of different categories of recyclables.

There is limited awareness of the consumer, to buy 'green' or environmentally sound products. Education of the consumer would have significant influence on manufacturers to improve their product lines to enhance their images, and improve their sales.

There is a need to have clear audit specifications to make it desirable for firms to participate in recycling. For example, this could take the form of a 'green logo' that would allow a product generated in an effective recycling manner (e.g. requiring a minimum percentage of recycled materials to be used in the production), which would both heighten consumer awareness, and encourage the participation of firms.

There is a need to gather basic information and to share information on how to accomplish recycling in an environmentally sustainable manner and in an acceptable working environment for the recyclers.

There is a need for regional cooperation where the collected products, recyclable parts and accessories, materials, are smoothly traded. An infrastructure, such as a waste exchange is needed to ensure that knowledge of 'needs' and 'available' resources are linked, as part of an efficient system.

6. Assistance for Sustainability through Knowledge

Frequently, there is poor financial support from government, to support waste management activities towards RBE. The government could assist in the sustainability of RBE through implementation of government green procurement/purchasing. Further, there could be encouragement of the development of RBEs from multiple directions (NGOs, consumer pressure, etc.). The availability of real time information via websites could assist the matching of sources of wastes to the needs of factories. Such a web-based centre, to serve as a neutral body in coordinating the needs of factories or companies, could ensure connection between the locations of potential recyclables or discarded materials for recycling, and those in need of materials as inputs.

7. Price Fluctuations

There is an enormous need in RBEs for relatively stable prices for recyclables. Governments could assist in this respect by getting the correct combination of taxes, fees and other incentives.

8. Finding an Effective Reuse for Difficult Wastes

The development of effective reuse opportunities for difficult wastes is very important. As an example, a major challenge for automobile tires is the creation and management of genuine solutions for collecting, storing and end use of tires. Similar problematic circumstances also exist for the other difficult wastes.

9. Health Protection of Recyclers

The potential pollution effects of recycling are now generally acknowledged throughout APEC economies, but there needs to be continued attention to health controls for the workers within the recycling industry. Government action to encourage source separation would assist in this issue.

10. Sharing of "Best Practice" Information

There is an issue of technology transfer, and need for data sharing, on collection and source separation for recycling activities. Sharing the industry's best practices on recycling systems would facilitate development of stronger RBE.

11. Extended Producer Responsibility

Extended Producer Responsibility (EPR) for products such as automobile tires, computers, and batteries, needs to be expanded as a possible strategy to improve the viability of RBE.

A standard approach to EPR or take-back system could be developed. Further, disclosure of product lifecycle information would be valuable to improve RBE.

V. Lessons Learnt and Implications

This section identifies those 'lessons learnt' about RBE in the APEC region from the kick-off workshop, the three pilot programs and the wrap-up meeting, as well as the implications of these lessons.

Lesson 1: Need to recognize diversity

• APEC comprises a diverse range of economies whose RBE status is similarly diverse, which rules out generic treatment of RBE.
• While there is no standard definition of RBE or established RBE theory, the essence of the issue is that the emphasis needs to shift from resource consumption (a linear process) to 3Rs (a cyclical process).
• Diverse RBE situations mean diverse solutions. Possible alternative approaches include increased efficiency, economizing, waste reduction, improvement of manufacturing processes and eco-design. (Naturally, these approaches can also be usefully combined to address RBE issues.)
• The appropriate approach—for example, industry-specific or cross-cutting, economy specific or APEC-wide, compulsory or voluntary measures—will be determined by many elements, such as resource type, technology level, volume of recyclable resource (if volume is less than optimal, a common processing among more than one economy creates scale merit), and the level of market development.

Implication 1: The first step must be information exchange and analysis of the actual situation in order to gain an accurate picture of how things stand.

Lesson 2: Sharing best practices and the importance of capacity-building

• Because establishing RBE depends heavily on social systems and technological and human elements, human resource development and capacity-building are of primary importance.
• To ensure a sufficient capacity-building effect and establish RBE societies in each of the APEC economies as well as APEC-wide, a massive input of time and energy will continue to be necessary.
• At the same time, this project achieved some highly significant results: clarification of issues unique to individual economies and common to the region; the sharing of experiences and best practices; discussion of appropriate responses; and identification of effective remedies.

Implication 2: RBE will not be achieved in a day, but capacity-building activities and the sharing of best practices through APEC-based cooperation have proven to be highly effective approaches.

Lesson 3: Legal and institutional frameworks and the market

• In many cases, those economies where recycling is comparatively advanced also have more robust legal and institutional frameworks.
• Having a legal and institutional framework without appropriate enforcement is ineffective.
• Different historical and social backgrounds mean that legal systems cannot simply be transferred intact. Rather, systems have to be specifically designed to suit the characteristics of the particular economy.
• While developing laws and designing systems are principally the role of government, the market and its functions also play a critical role in supplementing legal and institutional framework.
• For those markets where high price volatility is anticipated, government intervention (such as regulations or incentives) would be desirable.

Implication 3: For resources, business types and products where there is no market, an effective approach in addition to laws can be to create and maintain a market, and this is an area where government may be able to play a role.

Lesson 4: Responsibilities of each stakeholder

• All stakeholders have important roles to play in implementing RBE.
• Beyond legal frameworks, government (central and local) should also play a major role in areas such as development of definitions, creation of statistics, monitoring, guiding, assisting, and engaging in green procurement and technology development. These might include taxes and financial incentives for promoting 3Rs.
• Consumers can contribute to establishing RBE by supplying recyclable resources by way of properly sorting wastes or by buying products using recycled resources.
• Producers are key players, particularly for implementing eco-design, including design for easily recyclable products and the use of recycled materials. (There are cases of companies that have made a major contribution to RBE formation by going beyond company-, local- and economy-level to develop 'closed-loop' recycling systems.)
• Producers are also increasingly expected to act on the basis of EPR addressing the full product life-cycle.
• These activities need to be backed by awareness-building and education targeting both consumers and producers. Government, industrial groups, NGOs and other such groups should play a major role in boosting public awareness and increased stakeholder participation.

Implication 4: All stakeholders contribute to RBE formation in various ways. In addition to shouldering their respective areas of responsibility, they will have absolutely critical roles to play in collaboration, information exchange and capacity-building activities.

Lesson 5: Technology development and transfer and international cooperation

• Formation of an RBE society depends heavily on the development of recycling technology, and widespread dissemination of RBE throughout the APEC region will require the development, transfer, introduction and embedding of various types of recycling technology.
• Unlike competition over manufacturing technology, which bears upon economies' international competitiveness, the development of new recycling technology, joint R&D, technology transfer to developing economies and direct investment in recycling industries, etc., represent a win-win situation for both technology developers and users.
• In transferring technology that promotes recycling, international cooperation such as under APEC should be further pursued. Technology cooperation can also be effectively combined with cooperation related to systems, information, policies and network formation.

Implication 5: Pursuing formation of an RBE society through technology development and dissemination is an extremely 'APEC-like' activity, given APEC's positioning of international and technical cooperation at the heart of its philosophy.

Lesson 6: Dealing with trans-boundary issues

• As economic activities, and particularly trade and investment, are increasingly conducted on a trans-boundary basis, the potential for the trans-boundary movement of waste obviously also increases.
• Where the trans-boundary movement of recycled resources is conditioned on factors such as economic disparities, it can potentially expand inappropriate recycling by ill intended parties. On the other hand, it can also obstruct the trans-boundary movement of recycled resources by highly law-abiding companies. A balance therefore needs to be found internationally between appropriate regulations and liberalization.
• Harmonizing standards and import regulations, and establishing an APEC-wide waste tracking system should be promoted.
• Transferring of technology and sharing information will play a vital role in promoting the smooth movement and recycling of resources in the APEC region.
• Many economies have ratified the Basel Convention, but compliance and application problems, as well as the inadequacy of existing laws, have been noted.
• No consensus has emerged on international trade of second-hand goods.

Implication 6: Rather than creating closed-loop RBE within individual economies, RBE needs to be addressed on a more wide-ranging basis. APEC is an appropriate forum for handling trans-boundary issues. Inadequacies of existing laws and their operation need to be addressed.

Lesson 7: Carrying the torch of the RBE project

• This project successfully fulfilled the objectives of identifying issues and challenges in implementing 3Rs and sharing best practices. The project output will provide valuable information and guidance for all APEC member economies[5].
• Discussion on RBE establishment in the APEC region has only just begun, and it will be crucial to carry on the torch lit by HRD.
• To ensure the sustained development of RBE for APEC region, this issue must not be sidelined but rather tackled on an ongoing basis through solid and steady capacity-building.
• More specifically, RBE activities need to be continued and promoted with a vision of sustaining and developing the results achieved in individual APEC economies and coordinating RBE activities with other fields in APEC (environment, energy, etc.).
• There would be significant value in establishing and maintaining a network, (e.g., website, e-mail list, annual conference, etc.) that would share 3Rs success stories and assist in matching availability and needs of recyclable materials.

Implication 7: Implementing the RBE project and putting together the project report has opened the door to a new world. Rather than a conclusion, this is a beginning.

5. http://www.apec.org/apec/member_economies.html

REFERENCES

List of APEC Experts

Meeting Summaries & Programs

List of APEC Experts and Organizers

Economy		Name	Designation	Organization
Canada	Ms.	Maria Kelleher	President	Kelleher Environmental
	Dr.	Edward A. McBean	Vice President and Professor	Conestoga-Rovers & Associates University of Guelph
Chile	Mr.	Gonzalo Velásquez	Chief	Waste Management Dept. Comisión Nacional del Medio Ambient
China	Dr.	Cai Rang	Vice Chairman & President Professor	Advanced Technology & Materials Co.,Ltd MBA Association, WRSA
	Mr.	Chen Fang	Researcher	Policy Resarch Office, Yinchuan Municipal Committee of Communist Party of China
	Dr.	Liu Wenqiang	Official in charge of Recycling-based Economy	Department of Environment and Resources Conservation, National Development and Reform Commission of P.R. China
	Mr.	Hu Zhenhua	Staff	China Enterprise Confederation China Enterpriser Association
	Mr.	Jing Wenxue	Secretary General	China-Japan Management Promotion Center
Indonesia	Mr.	Adi Mulyanto	Researcher	Institute for Environmental Technology, Agency for the Assessment and Application of Technology.
Japan	Mr.	Higuchi Hiroaki	Deputy Secretary-General	PC 3R Promotion Center
	Mr.	Iuchi Setsuo	Director	Recycling Promotion Division, Ministry of Economy, Trade and Industry (METI)
	Mr.	Iwai Atsushi	Executive Managing Director	Japan Business Machine and Information System Industries Association
	Mr.	Kobayashi Tetsuro	Senior Managing Director	Japan Overseas Development Corporation
	Mr.	Kojima Michikazu	Research Fellow	Inter-disciplinary Studies Center, Institute of Developing Economies
	Mr.	Nakatani Yoshio	Senior Managing Director	Japan Automobile Recycling Promotion Center
	Mr.	Tanabe Yasuo	Vice President	Research Institute of Economy, Trade and Industry, IAA
	Dr.	Togawa Ken'ichi	Professor	Faculty of Law, Kumamoto Univ.
	Mr.	Watanabe Tomio	General Manager	Asset Recovery Management, Fuji Xerox Co., Ltd.
	Mr.	Yamasaki Yoshikazu	Head of Osaka Office and Manager of Technical Dept.	Japan Chemical Fibers Association
	Mr.	Yonemura Noriyuki	Counselor	Fuji Xerox Co., Ltd.

List of APEC Experts and Organizers

Economy		Name	Designation	Organization
Japan	Ms.	Yoshida Aya	Ph.D Candidate	Department of Urban Engineering, University of Tokyo
Korea	Mr.	Won Yongkook	Assistant Manager	Korea Environment & Resources Corporation
	Mr.	Tae-Wook Yoo	Senior Research Engineer	Eco-Technology Research Team, Advanced Technology Center, Corporative Research & Development Division, Hyundai KIA motors, Korea
Malaysia	Dr.	Johnny Chai	Vice President	JCI Group
	Ms.	Vene Amylinda Mohd Pilus	Assistant Director	Ministry of Housing and Local Government
Mexico	Mr.	Arturo Davila Villarreal	Chief Executive Officer	SUSTENTA, Compromiso Empresarial para el Manejo Integral de los Residuos Sólidos, A.C.
	Ms.	Adriana Oropeza Lliteras	Chief of Staff	Ministry of the Environment and Natural Resources
New Zealand	Mr.	Allan Robert Goddard	Manager, Resource Efficiency	Auckland Regional Council
Peru	Mr.	Marcos Alegre Chang	President	Grupo GEA
Philippines	Ms.	Ruby Ratcrta	Senior Science Research Specialist, Environmental Sector	Department of Science and Technology (DOST), Philippine Council for Industry and Energy Research and Development (PCIERD)
Chinese Taipei	Dr.	Chang Shiuan-Wu	Researcher	Office of Science and Technology Advisors, Environmental Protection Administration, Chinese Taipei
	Mr.	Yu Yung-Chiech	Director	Northern Branch, Bureau of Environmental Inspection, Environmental Protection Administration
Thailand	Mr.	Charuek Hengrasmee	President	Electrical and Electronics Institute
	Dr.	Chira Hongladarom	Secretary General Lead Shepherd	Foundation for International Human Resource Development APEC Human Resources Development Working Group
	Dr.	Paritud Bhandhubanyong	Director	National Metal and Materials Technology Center (MTEC)
	Mr.	Patanasak Hoontrakul	Vice president	Thai Heng Foundry and Machining (1999) Co., Ltd.
	Dr.	Thumrongrut Mungcharoen	Expert	National Metal and Materials Technology Center (MTEC)
	Mr.	Vallop Tiasiri	President	Thailand Automotive Institute
	Mr.	Virat Tandaechanurat	Director	Thailand Textile Institute
USA	Mr.	Joseph Rinkevich	President	JPR LLC

Summary of Kick-off Workshop

August 30-31, 2004
Tokyo and Gotemba, Japan

A workshop was organized in Japan by Institute for International Studies and Training (IIST) to kick-start the project, attended by 24 experts and representatives from 10 APEC economies. The experts shared the current status of recycling in their respective economies and discussed common issues. Based on the discussion, the experts determined the specific implementation plan to achieve the project objectives. At the end of the workshop, action plans with tentative work schedules were drawn up.

Prior to the workshop, the experts visited Ministry of Economy, Trade and Industry (METI) to learn about the Japanese Government policies and approaches to industrial recycling. Also, they visited a recycling plant of copy machines to have a first hand experience of the industrial recycling process.

Following are points discussed at the workshop:

Issues of implementing RBE in APEC:

- Enhancing coordination of different levels of government (central, local, municipal governments)
- Difference of capacity by the size (large vs. SMEs) and level of technology among industries
- Inadequate monitoring and evaluation system (common database)
- Standardization (e.g. terminology, recycled materials/labeling)
- Developing/enhancing legal framework and policies
- Barriers to recycling
- - Economic feasibility/price fluctuation /market/volume
- - Technology
- International scheme (e.g. Basel Convention, WTO)
- Enterprise roles on 3-Rs (CSR on sustainability), design for environment
- Developing and strengthening recycling industry
- Effective information, education, and communication program

Project Outputs and Outcomes:

- Raise awareness
- Develop national strategy
- Develop Legal framework
- Tools: incentives
- Trade issues (including Basel Convention)
- Harmonization (standard, definition, statistics, etc.)
- Capacity Building Program
- Industry specific approach (home appliance, plastics, tyres)

APEC project criteria and characteristics

- Common to most economies

- Transferable to other economies in APEC
- Can be developed, attainable
- Contribute to trade & investment
- Related to capacity building

Three pilot programs were decided to be carried out during the project period. Tentatively, Mexico, China and Thailand volunteered to hold such pilot programs.

Capacity Building for a Recycling-based Economy in APEC
Project Kick-off Experts' Workshop

Tokyo & Gotemba, Japan
August 30-31, 2004

PROGRAM

Date Place	Time	Activities
August 30 (Mon) **Tokyo**	09:00 - 09:20 09:20 - 10:15 10:15 - 10:30 10:30 - 12:00 12:00 - 12:10	Move from Capitol Tokyu to IIST by bus Orientation at IIST Move from IIST to METI by bus Briefing at METI on Japan's Recycling Policies Move from METI to Restaurant Castle on foot
	12:15 - 13:10	Lunch at Restaurant Castle
	13:15 - 14:30 14:30 - 16:30 16:30 - 18:00	Move to Fuji Xerox at Ebina by bus Site visit: Recycling Operation at FX Move to Knowledge Space, Gotemba by bus
	18:30 - 20:00	Welcome dinner
Knowledge Space Gotemba	20:00 - 21:00	Workshop 1: Introduction to the APEC Recycling Project Overview of APEC Project (Mr. Ojimi) Remarks from ABAC Representative (Mr. Yonemura) Workshop Program (Ms. Inaba)
August 31 (Tue)	08:30 - 08:50 08:50 - 09:10 09:10 - 09:30 09:30 - 09:50	Workshop 2-1 : Current Status of RBE in APEC Presentation 1 China Presentation 2 Indonesia Presentation 3 Korea Presentation 4 Malaysia
	09:50 - 10:10	Coffee Break
	10:10 - 10:30 10:30 - 10:50 10:50 - 11:10 11:10 - 11:30 11:30 - 11:50	Workshop 2-2 : Current Status of RBE in APEC Presentation 5 Mexico Presentation 6 New Zealand Presentation 7 Philippines Presentation 8 Chinese Taipei Presentation 9 Thailand
	12:00 - 13:00	Lunch
	13:15 - 13:30 13:30 - 13:45 13:45 - 14:00 14:00 - 14:15 14:15 - 14:30	Workshop 3 : Current Status of RBE in Japan Presentation 10 Mr. Iwai Presentation 11 Mr. Kobayashi Presentation 12 Mr. Togawa Presentation 13 Mr. Kojima Presentation 14 Survey Results (Mr. Toda)
	14:30 - 15:00	Coffee Break
Knowledge Space Gotemba	15:00 - 16:30 16:30 - 17:30 17:30 - 18:00	Workshop 4: Discussion on Common Issues Designing Capacity Building Programs Summary of Discussion and Future Actions
	18:30 - 20:00	Farewell Dinner

List of APEC Experts & Representatives

Economy	Name	Designation	Organization
China	Dr.Liu Wenqiang	Official in charge of Recycling - based Economy	Department of Environment and Resources Conservation, National Development and Reform Commission of P.R. China
	Mr.Jing Wenxue	Secretary General	China-Japan Management Promotion Center
Indonesia	Mr.Adi Mulyanto	Senior Advisor	Institute of Environmental Technology Researcher on Environmental Technology for Small/Medium Scale Industries and Recycle of Industrial Components
Japan	Mr.Kojima Michikazu	Research Fellow	Environment and Natural Resource Studies Group, Inter-disciplinary Studies Center, Institute of Developing Economies, JETRO
	Dr.Togawa Ken'ichi	Associate Professor	Research Center for Coal Mining Materials, Kyushu University
	Mr.Iwai Atsushi	Executive Managing Director	Japan Business Machine and Information System Industries Association
	Mr.Kobayashi Tetsuro	Executive Managing Director	Association for Electoric Home Appliances
	Mr.Yonemura Noriyuki	Counselor	Fuji Xerox Co., Ltd.
Korea	Mr.Won Yongkook	Assistant Manager	Korea Environment & Resources Corporation
Malaysia	Ms.Vene Amylinda MOHD PILUS	Public health engineer	Ministry of Housing and Local Government
Mexico	Mr.Arturo Davila Villarreal	General Director	Ingenieria Y Desarrollo Sustentable S.A. de C.V.
New Zealand	Mr.Allan Robert Goddard	Manager, Resource Efficiency	Auckland Regional Council
Philippines	Ms.Ruby Raterta	Environmental Sector Manager	Department of Science and Technology, Philippine Council for Industry and Energy Research and Development
Chinese Taipei	Mr.Yu Yung-Chiech	Executive Secretary	Recycling Fund Management Board, Environmental Protection Administration
Thailand	Dr.Thumrongrut Mungcharoen	Expert	Cleaner Technology Advancement Program, National Metal and Materials Technology Center
	Mr.Patanasak Hoontrakul	President	Thai Subcontracting Promotion Association
Japan	Dr.Suga Tadatomo	Professor	School of Engineering, The University of Tokyo
	Mr.Miyata Hiroyuki	Section Chief	Office for the Promotion of Asia Pacific Economic Cooperation, Ministry of Economy, Trade and Industry (METI)

Japan	Mr.Nabeshima Manabu	Section Chief	Recycling Promotion Division, METI
	Dr.Terazono Atsushi	Senior Researcher	National Institute for Environmental Studies
	Mr.Toda Kazuhiko	Manager, External Relations	Fuji Xerox Co., Ltd.
	Mr.Ojimi Takato	Vice President	Institute for Intenational Studies and Training (IIST)
	Mr.Hosoya Yuji	Director, General Affairs Dept.	Institute for Intenational Studies and Training (IIST)
	Ms.Inaba Etsu	Director, HRD Dept.	Institute for Intenational Studies and Training (IIST)
	Ms.Kawanishi Aki	Staff, HRD Dept.	Institute for Intenational Studies and Training (IIST)

Summary of Roundtable Discussion

"Creation of Markets for Recycling of Products without Actual Demand"

February 25-26 2005
Maria Isabel Sheraton Hotel
Mexico City, Mexico

Organized by: Asian Pacific Economic Cooperation (APEC)
Institute for International Studies and Training (IIST)
SUSTENTA, Compromiso Empresarial para el Manejo Integral de los Residuos Sólidos, A.C.

1. Purpose of the Expert's Roundtable

The main goal of the roundtable was to develop personal relationships among policy makers, scientists and educators in the APEC economies in the field of environment and to increase the partnership, cooperation and sharing of technical skills and information. The roundtable was also intended to share what is the situation on recycling in different APEC member economies .

2. Program

2.1 Presentation and group discussion on February 25, 2005

Opening Ceremony

The Expert Roundtable started with the welcome addresses by:

Mr. Takato Ojimi, APEC Project Overseer, and Vice President and Managing Director of IIST, Japan, explaining APEC thrust and the Project.

Mr. Barojas Weber Luis, Industry General Director, Undersecretary of Foment and Environmental Standard, SEMARNAT, in representation of Mr. Elvira Quezada Juan, Environmental and National Resources Undersecretary, welcomed the participants, both local and foreign to take part in the program.

Mr. Dávila Villarreal Arturo, Chief Executive Officer, SUSTENTA, Compromiso Empresarial para el Manejo Integral de Residuos Sólidos, A.C., serving as a master of ceremony, welcomed all the participants

Presentations

1) Mr. Velasquez Gonzalo, Chief of Waste Management Area of the National Environmental Agency, Chile.
"Current Situation of Solid Waste Recycling in Chile"

Mr. Velasquez Gonzalo explained the current situation of city waste in Chile, the Metropolitan Region of Santiago constituting 52% of all domestic solid waste. Other characteristics include:

- Inadequate data on PC, cartridges or toner waste.
- Replacement tires in Metropolitan Region estimates of 120.000 per annum
- Metal Scraps: No official statistics of quantity. Steel production in 2003 was 1,400.00 tons.
- Dry Batteries: No national legislation that regulates composition, even though some of these batteries contain hazardous elements.

Current Situation of Waste Recycling

- Just 9% of the waste is recycled
- Items recycled are glass, plastic, aluminum cans, paper cardboard.
- PC, cell phones, dry batteries, tires, metal scrap
- Currently a small fraction of tires are used as alternative fuel in cement ovens. However, most tires remain without proper environmental management.
- Metal Scrap: Recycled scrap is used in approximately only 24% of Chile's production, a low figure compared to other economies.
- Dry batteries management: The Ministry of Health recommends they be separated from the rest of domiciliary waste.

Possible Solution for Chile

- General Objective: Guarantee a hazardless waste management for public health and the environment, assuming efficient and sustainable development

Main Ideas of the Policy:

- ✓ Guarantee better efficiency and effectiveness in waste management
- ✓ Improve municipal management
- ✓ Integrated regional vision in waste management
- ✓ Improve the role of recycling markets
- ✓ Promote an integral vision (hierarchical strategy)
- ✓ (Avoid waste generation, minimize waste generation / reuse & recycle, treatment, final disposal.)

Some Short and Middle Term Activities

- Incorporation of Producer Responsibility in a Legal Instrument.
- Dictate a waste tariff regulation, that optimizes this item
- Analyze the experience of recycling and waste recovery programs in other countries
- Study economical waste management instruments applied abroad, to evaluate their potential use in Chile.

- Promote the implementation of Clean Production /Agreements, that incorporate Producer Responsibility.
- Define reduction, reuse, recycling and waste valuation aims.

2) Mr. Edward McBean, Conestoga-Rovers & Associates, Canada

"Trends and Constraints for Waste Recycling; A Comparison of Developed and Developing Economies"

Dr. McBean contrasted the situations in developing and developed economies, citing issues unique to each of them.

Developed Economies

Characteristics

- Households (generally) have the willingness to participate
- Households have space to separate/store recyclables
  - ✓ Source separation generally feasible
  - ✓ Modest success in recycling levels
  - ✓ But costs are substantial

Strategies been used

- ✓ Source separation
- ✓ Drop-off depots for difficult components
- ✓ Regulation restricting pickup to encourage use of drop-off depots
- ✓ Blue-Box Program to make recycling easy. Involves pick up from households
- ✓ Expand the recovery of designated items
- ✓ Improve efficiency
- Nowhere near covering costs
- Plastics are very inefficient (bulky)
- Keep it simple so that people participate

Approaches

- ✓ It is critical to invest in market development to increase sustainability of RBE
- ✓ Labour is expensive
- ✓ Markets are being forced to participate by government regulations and societal pressures

Troublesome Recyclables

- ✓ Automobile tires
- ✓ Electronic waste (E-Waste)
- ✓ Construction & Demolition (C&D)
- ✓ Used Oil
- ✓ Batteries
- ✓ Fluorescent tubes

- Strategies Being Used
  - ✓ Drop off points e.g. acid/bases, flammables, oil, etc
  - ✓ Keep them put of the waste stream
- Oil Recycling
  - ✓ At petrol stations- regulated, and concept was for payments for drop.off, to encourage recycling

Automobile Tire Recycling

- 20 million tires discarded each year in Canada
  - ✓ Improved tire performance
  - ✓ Tire retreading
  - ✓ Recycle by shearing/griding but this is expensive
  - ✓ Supplemental fuel in cement kilns or boilers
  - ✓ Successful uses include as crumb rubber but rubber loses its elasticity / static rubber parts, flooring, mats, mud flaps.

Developing Economies

Some of the current issues

- ✓ Waste very high in organics
- ✓ Waste pickers at many landfills
- ✓ Can vehicles traverse the street & frequency of pickup due to size of vehicle
- ✓ No source separation generally, in these economies
- ✓ Exacerbated because landfills of variable quality
- ✓ Dollars given to landfills for purposes of daily operation are very modest

Examples of Problems

- ✓ Frequently, minimal space for storage of recyclables in homes and hence detracts from willingness of homeowners to participate
- ✓ Lack of markets for the recyclables
- ✓ Exacerbated because landfills are frequently “dumps”
- ✓ Minimal budgets given for disposal of waste.

An Example of Success

- Tucuman, Argentina/Restricted access to refuse/ Recycling is very organized

Conclusion:

- ✓ Avoidance of landfilling has substantial value, to protect the environment
- ✓ Landfill gas recovery may provide a revenue source through Kyoto
- ✓ Restrict access of waste pickers to the refuse where feasible for health protection
- ✓ Use pilot-scale demonstration projects where feasible
- ✓ Have drop-off locations
- ✓ Public education is a continuing need

- ✓ Extended producer responsibility has potential
- ✓ Costs are major problems

3) Mr. Joseph Rinkevich, President of JPR LLC from USA
"From Waste Management to Value Recovery"

Mr. Rinkevich shared development in USA with the experts, as follows:

CONTEXT

- What type of "waste" do Americans produce ?

Paper 36%	Yard Trimming 12%
Food Scraps 11%	Plastics 11%
Metals 8%	Rubber, Leather and Textiles 7%
Glass 6%	Wood 6%
Other 3%	

- How much do Americans recycle ?
  - ✓ Recycling (30.1%) 69,870.00
  - ✓ Combustion (14.5%) 33,370.00
  - ✓ Landfill (55.3%) 128,250.00
  - ✓ Based on 231.5 Million Total Tons MSW Generated (US 2000)
- What materials do American recycle ?
  - ・Auto Batteries 94%、 ・Steel Cans 58%
  - ・Drink Cans 49% ・Paper and Paperboard 45%
  - ・Plastic Drink Containers 36% ・Glass Containers 21%
  - ・Tires 39% Based on 2001 total MSW production of 229 million tons (before recycling)

TRENDS

- This year Americans will replace
  - ✓ 6 million televisions
  - ✓ 17.5 million automobiles
  - ✓ 50 million computers
  - ✓ 130 million mobile phones
- Growing public intolerance of waste
- 39 eWaste bills are pending in 11 US States as of June 2004. (Regulation)

CHALLENGES/OPPORTUNITIES

- "Reduce waste"
  - ✓ Reduce, Reuse &/ Recycle
  - ✓ Eco-efficiency
  - ✓ Zero-waste programs

- ✓ Minimize cost of waste management

- Waste Legacy
  - ✓ Regulations focus on “end-of-pipe” solutions
  - ✓ Infrastructure momentum toward waste management
  - ✓ Education/language focuses on minimizing/reducing
- Value of Commerce
  - ✓ Increased Product Knowledge
  - ✓ Improved Profitability
  - ✓ Greater Supplier/Customer Connectivity
  - ✓ Optimized Innovation Process
  - ✓ Expanded Definition of Quality
- Value of Economies
  - ✓ Increased Economic Activity
  - ✓ Enhanced Market Efficiencies
  - ✓ Reduced Cost of Regulation/Infrastructure
  - ✓ Improved Health and Productivity

SOLUTIONS

- Rethink “waste”
  - ✓ From “cradle-to-grave” to “cradle- to-cradle”
  - ✓ Design products for value throughout their life cycle—especially at end-of use-
  - ✓ Government and corporate policy can encourage and reward innovation toward life cycle thinking
- Environmental Design Goals
  - ✓ 100% Safe Inputs, Cycled/Renewable Inputs, Recycle-able Outputs, Recycled Outputs.
  - ✓ Environmental Design Criteria
  - ✓ Human Health Criteria
  - ✓ Environmental Health Criteria
  - ✓ Life Cycle Design Needed

CASES

- NIKE Footwear Sustainability
  - ✓ Exploring Materials and Processes with Preferred Attributes
  - ✓ Implementing Industrial Ecology Principles in Manufacturing
  - ✓ Reporting Progress to the Marketplace
- Municipal Initiatives
  - ✓ San Francisco “Fantastic Three
  - ✓ New York City “New York City Recycles”

4) Mr. Hiroaki Higuchi, Deputy Secretary General, PC 3R Promotion Center "PC and Home Appliance Recycling in Japan by

Mr. Higuchi explained the development on recycling in Japan, focusing on PC and electric appliances.

RECYCLING ORIENTED SOCIETY

- ✓ Shortage of Waste Disposal Facilities
- ✓ Resource Constraints
- ✓ Environmental Awareness of Citizen
- ✓ Enviromentalization of Industry
- ✓ Promoting Material Circulation
- ✓ Promoting 3R (Reduce, Reuse, Recycle)

LEGISLATION SYSTEM (JAPAN)

- ✓ The basic Environmental Law
- ✓ The basic Law Establish the Recycling-Based Society (framework law)
- ✓ Waste Management and Public Cleansing Law
- ✓ Law for Promotion of Effective Utilization of Resources
- ✓ Electric Household Appliance Recycling Law.

HOME APPLIANCES RECYCLING LAW

- Regulated Home Appliances
  - ✓ Air conditioners
  - ✓ Refrigerators
  - ✓ Washing Machines
- Recycling: Manufacturers and importers
- Required Recycling Rates (making the materials valuable)
  - ✓ Air Conditioners (60%)
  - ✓ Television sets (55%)
  - ✓ Refrigerators (50%)
  - ✓ Washing Machines (50%)
- Recycling Fee: Charged when Appliances are disposed

LAW FOR PROMOTION OF EFFECTIVE UTILIZATION OF RESOURCES (Recycling Law)

- ✓ Industries and Products to be taken, and measures to apply the 3Rs (Reduction, Reuse and Recycling)
- ✓ Designated Resources-Saving Industries
- ✓ Designated Resources-Reusing Industries

- ✓ Specified Resources- Saved Products
- ✓ (Personal Computers)
- ✓ Specified Reuse-Promoting Products
- ✓ (Personal Computers)
- ✓ Specified Labeled Products
- ✓ Specified Resources-Recycled Products
- ✓ (Personal Computers)
- ✓ Specified Byproducts

ISSUES

- ✓ Technology Change
- ✓ Smaller size
- ✓ CRT-LCD Display
- ✓ Business/Household PC
- ✓ Increase of Volume

5) Mr. Noriyuki Yonemura, Counselor Fuji Xerox Co., Ltd.

"Manufacturers-Led Resource Recycling Network in Asia-Pacific Region"

LEGISLATION AND POLICIES OF JAPAN

- ✓ Legislative System for Promoting the Creation of a Recycled- Oriented Society
- ✓ Basic Law for Promoting the Creation of a Recycling-Oriented Society (basic framework law) 2001.

- Establishment of a general scheme
  - ✓ Waste Management Law
  - ✓ Law for Promotion of Effective Utilization of Resources
- Regulation in accordance with the characteristics of specific products
  - ✓ Containers and Packaging Recycling Law
  - ✓ Home Appliance Recycling Law
  - ✓ Food Recycling Law
  - ✓ Construction Material Recycling Law
  - ✓ End-of- Vehicle-life Recycling Law

RECYCLING ACTIVITIES TAKEN BY THE INDUSTRY

- Disposal/Collection System
  - ✓ The recovery and recycling system of home appliances, established by two home electronic maker groups

- ✓ The recovery system of home PC´s, using parcel post which the Japan Electronic and Information Technology Industries Association (JEITA) established in concert with JAPAN POST.
- ✓ The recovery copying machine exchange center, establishment promoted by Japan Business Machine and Information System Industries Association (JBMIA)

CASE STUDY OF FUJI XEROX

- Environmental Policy
  - ✓ Fuji Xerox Group "Shared Values" Environmental (1998)
  - ✓ Fuji Xerox Ecology & Safety (E&S) Vision (1999)
  - ✓ Fuji Xerox Ecology & Safety Basic Policy
- Basic Environmental Strategy (2001)

A. Transform Fuji Xerox and its affiliates into a fully recycle-oriented company
B. Offer outstanding environment-conscious products and environmental solutions to our customers.
C. Strengthen the infrastructure of environmental management.

- Targets
  - ✓ CO2 Emissions /Global warming
  - ✓ New resources input /Resource depletion
  - ✓ Hazardous chemical substances / Chemical Pollution

RECYCLING POLICY

- **History**
  - ✓ 1991 company-wide Enviromental basic policy
  - ✓ 1995 Product recycling policy
  - ✓ 2000 First "Zero Waste" System in Japan
  - ✓ 2004 Integrated recycling system in Asia-Pacific
    - Integrated Recycled System
    - Corporate Policy: Promote reuse of resources for infinite "Zero Landfill"

1.- Inverse Manufacturing
Lifecycle Product Planning
Design for Parts Reuse/Recycling

2.- Closed-Loop System
Reuse

3.- Zero Emissions
Recycle

PRODUCT RECYCLING FOR ASIA PACIFIC

- Fuji Xerox Eco-Manufacturing Company

(FX-EX Distinctive characteristics)

1. Is rooted in cooperation and trust of nine Asia-Pacific economies and regions (Korea, Indonesia, Malaysia, the Philippines, Singapore, Hong Kong, Thailand and Australia, New Zealand (waiting for final approval)
2. Enables collection and disassembly, and detoxification of hazardous materials without any intermediaries.
3. Aims for zero-landfill / recycle rate of 99.6%
4. Drives the fair and equal allocation of cost for local sales companies
5. Boosts productivity enable by a pool of used products
6. Helps reduce waste cut waste from around 25 to 0% (Thailand)
7. Creates a new industry

REVIEW OF BASEL CONVENTION

- ✓ The Basel Convention has no room to deal recyclable parts and material across boarders, although these can be used one more time.
- ✓ Accordingly, the are no established trade rules to make the transaction of recyclable parts and materials smoother.
- ✓ Ever under the existing rules, definitions and treatment differ form country to country (Export-side, Import-side)

CONCLUSION

- Creating a recycling-oriented society in the 21st century
- Formulating a new framework to advance recycling smoothly on a global basis

6) Ms. Maria Kelleher, President of Kelleher Environmental "Current Recycling Situation in Canada"

QUICK BACKGROUND TO CURRENT CANADIAN SITUATION

- Waste Management in Canada
  - ✓ Waste Management is a provincial responsibility across Canada
  - ✓ Each province does things differently
  - ✓ EPR (Extended Producer Responsibility) is the cornerstone of all new policies
  - ✓ Very little harmonization of approaches between the provinces

MARKETS AND MARKET DEVELOPMENT

- ✓ Some materials always have markets (paper, metals)
- ✓ Price varies substantially depending on demand
- ✓ These materials are commodities; operate in global markets
- ✓ Prices change for unpredictable reasons
- ✓ Sustained demand is key for recycling programs

- ✓ Green procurement from government assists substantially
- ✓ Government and companies can create demand through enforced procurement practices and policies
- ✓ Glass markets a problem in Ontario
- ✓ Stewardship Ontario has mandate to invest in market development and research.
- ✓ Investing in glass utilization projects.

- **Markets for Plastics**
  - ✓ Plastics are a challenge
  - ✓ PET and HDPE have stable markets and high values
  - ✓ Other plastics more challenging
  - ✓ Numerous technical options explored
  - ✓ New products developed with mixed success
  - ✓ Mixed success in finding new uses and substitutes.

NEW PROGRAMS AND MATERIALS

ONTARIO

- Dispose of 9.6 million tonnes of waste per year
  3.4 million tonnes residential
  6.2 million tonnes IC&I and C&D
  3 million tonnes exported by Canada to US for disposal
  400 truck per day cross border
  US border slowdowns because of Homeland Security
  Michigan does not want Toronto waste
  Blue Box Waste
- Packaging and printed papers:
  - ✓ Consumed in the household, and
  - ✓ Managed by municipal waste
  - ✓ Management system
- Packaging materials include, glass, metal, paper, plastic and textiles

BLUE BOX RECYCLING WORKS BECAUSE…

- We started in the midst of a landfill crisis
  - ✓ People want to contribute to the solution
  - ✓ It empowered people when other messages were hopeless
- People want to do the right thing for the environment
- Social Technology- uses social marketing techniques to change behavior
- Peer pressure
  - ✓ More Ontario residents recycle than vote
- Guilt in midst of consumer society

- We captured the kids
- However, it can only get 25% to 30% diversion and will not likely proceed much beyond that magnitude

TORONTO

- Yellow Bag Commercial Program
- Multi-Family Residential Organics
- Toronto Green Bin Program

Result:

- ✓ Participation in the Green bin Program 90%
- ✓ Contamination generally low 10%

WHAT WE HAVE LEARNED

- Education must be sustained over long term
  - ✓ People stop recycling unless messages constantly reinforced
- Keep it simple to keep people involved
  - ✓ People understand that newspapers are recyclable
  - ✓ Still confused about plastics.
- Collection largest part of waste management system costs; use one truck to collect two (or more) different streams
- Source separation key to clean outputs
  - ✓ Two-stream wet-dry collection now pursed
  - ✓ Guelph moved to "Two Stream Plus"
  - ✓ Mixed waste processing still struggling
- Recyclables are commodities- compete in global markets
  - ✓ No control over prices
  - ✓ Need to learn risk management
- Markets, markets, markets
  - ✓ Government role in establishing markets through procurement policies

CONCLUSIONS FROM 15 YEARS OF RECYCLING IN ONTARIO

- A waste disposal crisis helps
- Markets and market development critical to sustainability
- Remove waste management from political decisions
- Strong policies to force high diversion rates
- Shared responsibility best model
- The public will help, but reasons for high diversion need to be clearly articulated
- Measurement, data collection and analysis to support decision making.

7) Ms. Adriana Oropeza Llinteras, Chief of Staff, Office of the Undersecretary for Environmental Regulation and Promotion, "Economics of Recycling: Waste Tires"

INADEQUATE DISPOSAL:

- **Structural determinants**
  - ✓ Institutional failures
  - ✓ Private - Public
  - ✓ Private - Private
  - ✓ Public - Public
- **Private costs**
  - ✓ Low disposal costs in open-air waste sites
  - ✓ General unwillingness to pay for adequate management
  - ✓ Low cost of taking advantage of tires' heat content in uncontrolled facilities (brick ovens)
- **Social costs**
  - ✓ High public health costs due to fires/uncontrolled incineration processes, etc.
  - ✓ Emissions: policyclic aromatic hydrocarbons, nitrogen dioxide, sulphur dioxide, benzene, carbon monoxide
- **Private benefits**
  - ✓ Profitable secondary market
  - ✓ Extraordinary benefits from tax evasion
- **Social benefits**
  - ✓ Low fiscal revenue
  - ✓ Disloyal competition to formal markets
  - ✓ Limited employment of raw material under controlled conditions

SIMULTANEOUS MARKETS

Domestic tire consumption

Used tires

Energy recycling

- **Principles**

a) Valorization: "To recover any remaining value or heat content from waste by means of its reintroduction in productive processes."

b) Shared responsibility: Systematic actions in which the following are involved:

- ✓ Producers
- ✓ Importers
- ✓ Exporters
- ✓ Retailers
- ✓ Consumers

- ✓ Government authorities at different levels
- ✓ Service providers

- **Waste Management**
  - ✓ Economic and financial aspect
  - ✓ Legal aspects
  - ✓ Institutional aspects
  - ✓ Technical aspects
  - ✓ Social aspects

- **Economic and financial aspects**
  - ✓ Size and structure of the economy
  - ✓ Distance from centers of production
  - ✓ Rate of Return on Investment
  - ✓ Recovery of investment in 20-25 years
  - ✓ Transaction costs
  - ✓ Fees and sanctions

- **Institutional Aspects**
  - ✓ Long-range public policy
  - ✓ Well-defined property rights
  - ✓ Well-defined, prompt regulatory requirements
  - ✓ Coordination among different government agencies and levels

- **Legal certainty**
  - ✓ Consistent legal frameworks
  - ✓ Well-distributed faculties and areas of competence

- **Legal enforcement**
  - ✓ Perception and evolution of environmental risk
  - ✓ Evaluation and prioritization of environmental agenda

- **Waste Tire Management: Creating new technologies for tires disposal**

Closing Ceremonies

- **Mr. Takato Ojimi**, APEC Project Overseer, and Vice President and Managing Director of IIST, Japan

- **Mr. Dávila Villarreal Arturo**, Chief Executive Officer, SUSTENTA, Compromiso Empresarial para el Manejo Integral de Residuos Sólidos, A.C.

2.2 Recycling Plant and Sanitary Landfill Visit on February 26, 2005

Main Purpose: To show the participants the current status of waste management in Mexico City.

3. Lessons learned from the Roundtable

The objective of the roundtable discussion was to share experiences among the APEC economies on recycling, particularly with developing economies in order to make some recommendations and share information. The specific focus at the roundtable discussion was to provide some essential information to start building infrastructure for the creation of needed markets for recyclables.

The Expert´s Roundtable "Creation of Markets for Recycling Products without Actual Demand" was conducted in an extremely open and high-level discussion, and strong enthusiasm. This roundtable developed in close co-operation among the APEC members. It involved participants from five APEC economies, provided a forum where experiences in recycling were exchanged and new proposal ideas developed. An open dialogue and equal respect for the views of all participants was employed with emphasis toward the major problems faced by developing and emerging economies, as well as potential solutions.

Developing and emerging market economies must work really hard to get a strong institutional framework to make the rules of the game clear. A good legal and regulatory framework helps to bridge the gap between the interests of those that run a company and the environment, and builds on the enforcement of existing law and regulations.
It is important that the government and private enterprises make investments in the development of infrastructure for the control of wastes. All the participants agreed that one of the challenges is to create a strong educational program in this field.

We must promote reduce, reuse and recycling in all the social sectors. Taking in account the experiences of other economies such as Canada less developed economies in APEC will benefit the region. It is also advisable to make voluntary agreements between the industry and the government in order to start a pilot projects to control the types of wastes.

The principle of Extended Producer Responsibility (EPR) could be analyzed for the control of some of the wastes that we have mention such as tires, computers, and batteries. Decisions have to be made from a long-term view, considering the needs of more than just the current generation.

In general, all the participants want to answer many questions, some of the information that was provided from the experts create polemic in to audience, but WHY, WHAT, HOW, WHO, WITH WHAT, WHERE AND WHEN were the top questions. The following are some of the main topics that were identified.

INDUSTRY FOCUS ?

As everyone may be aware, e-waste is one of the major challenges. What to do with the computers, cell phones, etc. and some of the non traditional wastes like dry batteries (whether a household needs to reinforce the legislation, how the community must do with the disposal)
Tires, used cars, construction and demolition wastes face the common challenges about the space, how to treat them right.

ISSUES

Secondary market in the third country was one of the most pointed issue questions like What would happen to the end of life in the third country market?, and what are the opportunities to create a reverse manufacture?. And what to do with the Hazardous waste.

INTERNATIONAL COOPERATION

There are plenty ways to create an efficient international cooperation. The experts mention that we must developed tools to gathering basic information, as well as best and worst practice, Sharing developing of innovation, Coordination regard regulations, Approach to coordination among the government agencies, Produce conferences in order to learn about Industry specific best practice sharing, Training, Discussion on cross-border issues.

And of course the alternative of a Pilot project can show the results of what could happen if we follow the lessons.

The only way to achieved this is by getting involved and committed. The technology provided us the key we just have to make it work.

APPROACHES

They are many ways to make things happen; in the meeting they underlined these below:

- Decision whether market mechanism functions (i.e. potential cost of damage).
- Research component: Electric component, less metal, less value, what can be incorporated.
- Reverse logistic system for products without enough volume.
- Information to encourage recycling industry minimizes the volume, base line data re units in the market, incentive for business.
- Information on industry / product (e-waste), life expectancy as an example.
- Technical training.

WHY NO MARKET/SYSTEM?

The experts mention some of the many barriers integrating an efficient recycling system like:

1. New product/technology
2. Value of material/product
3. No design for recycling
4. No system of recycling

5. Lack of trading mechanism/technology
6. Lack of knowledge by the government policy makers/industry (risk & benefit awareness).
7. Regulatory barriers (taxes)
8. Small business
9. Price fluctuation (lack of risk management)
10. Cost of not recycling not establish
11. Quality & quantity of products
12. Resistance to change
13. Change of policy (mobility of policy makers)
14. Managing waste vs. recycling
15. Established industry vs. new emerging approaches.

ROLES OF DIFFERENT PLAYERS

There are many in-puts and out-puts that are directly interconnected, so every player must be aware of their roles and play right. If everyone works their matters the problems can be solve in a very effective ways.

Government

- Legal framework/Regulation
- Tax
- Incentives
- Inter-sectorial network
- Material movement

Retailers/Logistic Industry

- Relation with producers
- Cost Sharing?

Producers/Importers

- Voluntary agreement
- EPR
- Design to recycle
- Material Movement
- Cost sharing?

Academic

- Eco-design
- Research on cost/benefit

NGO/Consumers

- Awareness racing
- Policy advocacy

CONCLUSION

It's true that we must work hard to design a great recycling industry, because as has been managed today it's not profitable (unless you are creative).
We should keep it simple, it's easier to been follow as a community.
If no market, create one by multiple directions (government, NGO, consumer pressure, international pressure, etc.

5. Acknowledgement

The roundtable would not have been possible without the hard work and generosity of APEC/IIST which has provided essential financial support to all of the roundtable participants. It is, however, the members of the roundtables who deserve the greatest credit, on whose presentations, papers and interventions this report is based. We are looking forward to make a better recycling world.

Roundtable Discussion
on
"The Creation of Markets for Recycling of Products without Actual Demand"

Mexico City, Mexico
February 25-26, 2005

PROGRAM

February 25

9:00 – 9:30	**Opening: Mr. Davila Villarreal Auturo,** Chief Executive Officer, SUSTENTA, Compromiso Empresarial para el Manejo Integral de Residuos Sólidos, A.C. **Opening Speech: Mr. Takato Ojimi,** Managing Director, Institute for International Studies and Training & APEC Project Overseer **Welcome Speech: Mr. Barojas Weber Luis,** Undersecretary of Foment and Environmental Standard, SEMARNAT, in representation of Mr. Elvira Quezada, the Environment and Natural Resources Undersecretary
9:30 – 9:45	**Participants Introduction**
9:45 – 10:15	**Presentation 1: Ing. Gonzalo Velasquez from Chile**
10:15 – 10:45	**Presentation 2: Lic. Adriana Oropeza from Mexico**
10:45 – 11:15	**Presentation 3: Dr. Edward McBean from Canada**
11:15 – 11:45	**Discussion Panel**
11:45 – 12:00	**Coffee Break**
12:00 – 12:30	**Presentation 4: Joseph Rinkevich from the United States of America**
12:30 – 13:00	**Presentation 5: Higuchi Hiroaki from Japan**
13:00 – 13:30	**Presentation 6: Noriyuki Yonemura from Japan**
13:30 – 14:00	**Presentation 7: Maria Kelleher from Canada**
14:00 – 15:30	**Lunch**
15:30 – 17:30	**Round Table with All Lecturer and Participants**
17:30 – 18:00	**Conclusions and Future Steps**
20:00 – 22:00	**Dinner hosted by IIST**

February 26

8:30 – 12:00	**Field Trip to Mexico City Recycling Plant and Landfill Site**
12:00 – 14:00	**Lunch hosted by Mr. Arturo**

List of Experts

1. Cristina Cortinas De Nava,	**Environmental Consultant / Private (Mexico)**
2. Jessica Dávila Castellanos	**Logistic Coordinator, Sustenta (Mexico)**
3. Sandra Herrera	**Coordinator of the México Clean Program Organizatión / Environment And Natural Resources Ministry (Mexico)**
4. Etsu Inaba	**Director, H.R.D. Department, Institute for International Studies and Training (Japan)**
5. Maria Kelleher	**President / Kelleher Environmental (Canada)**
6. Isabel Kreiner	**Environmental Researcher, Superior Studies Technological Institute of Monterrey Campus State of Mexico (Itesm) (Mexico)**
7. Adriana Oropeza Lliteras	**Head of Adviser Team, Undersecretary of Foment and Environmental Standard (Mexico)**
8. Pilar Tello Espinoza	**Head of Waste División, Inter-American Sanitary and Environmental Sciences Association (Aidis) (Mexico)**
9. Sylvie Turpin Marion	**Environmental Researcher Metropolitan Autonomous University (Uam) (Mexico)**
10. Luis Barojas Weber	**Industry General Director Undersecretary of Foment and Environmental Standard, Semarnat (Mexico)**
11. Carlos Berzunza	**International Stándard Director General Direction of Standard, Economy Ministry (Mexico)**
12. Guillermo Calderón Aguilera	**General Director of Environmental Regulation and Supervision /Environmental Secretary of Federal District Government (Mexico)**

List of Experts (continued)

13. Arturo Dávila Villarreal	**Chief Executive Officer, Sustenta, Compromiso Empresarial Para El Manejo Integral De Residuos Sólidos A.C. (Mexico)**
14. Hiroaki Higuchi	**Deputy Secretary General / PC 3R Promotion Center (Japan)**
15. Edward McBean	**Vice-president / Conestoga Rovers & Associates (Canada)**
16. Joseph Rinkevich	**President / JPR LLC (U.S.A.)**
17. Giovan Reyes Sanchez	**Representive, Ecology Comisión of The National Confederation of Industry Associations (Mexico)**
18. Guillermo Román Moguel	**Technical Sub-director / Interdisciplinary Center for Research and Studies on Environmental and Development, National Politechnical Institute (Ciiemad-Ipn) (Mexico)**
19. Gustavo Rosiles Castro	**Solid Waste Director / Ministry of Social Development (Sedesol) (Mexico)**
20. Takato Ojimi	**Vice President and Managing Director, Institute for International Studies and Training (Japan) APEC Project Overseer**
21. Conrado Sarmiento	**Technical Underdirector, General Direction of Urban Services, Federal District Government (Mexico)**
22. Kazuhiko Toda	**Manager, External Relations, Fuji Xerox Co. Ltd. (Japan)**
23. Gonzalo Velasquez	**Solid Waste Department, Environmental National Commission (Chile)**
24. Noriyuki Yonemura	**Counselor, Fuji Xerox Co. Ltd. & ABAC Representative (Japan)**

Summary of Yinchuan Conference

"A Recycling-based Economy and China's Western Development"

June 3-5, 2005
Ning Xia Apollo Hotel
Yinchuan, China

Organized by: Asia-Pacific Economic Cooperation (APEC)
Institute for International Studies and Training (IIST)
Yinchuan Municipal People's Government
China Enterprise Confederation (CEC)
Supported by: Economic Commission of Ningxia Hui Autonomous Region
Beijing Rushuihui Management Consulting Co., Ltd.

Executive Summary

Institute for International Studies and Training (IIST), Yinchuan Municipal People's Government and China Enterprises Confederation (CEC) jointly conducted the APEC Conference entitled, "A Recycling-based Economy (RBE) and China's Western Development". The Yinchuan conference gathered nearly 400 participants, including government officials, APEC experts, embassy staff and business representatives from more than 10 economies. The main objective of the conference in Yinchuan was to discuss the question of how to promote RBE in western China, the current situation and future prospects, and methods to establish RBE systems in the APEC region.

The symposium was conducted over one and a half days. On the first day, there were two keynote speakers in the morning and five experts made presentations at the panel session in the afternoon. On the next day there were two keynote speakers, while five other experts made presentations on China's western development. The theme for the first day was *Current status and future prospects for a recycling-based economy in APEC,* and for the second day it was *Sustainable Economic Development in Western China.*

In the welcome remarks by **Mr. Takato OJIMI**, Managing Director of IIST and APEC project overseer, he explained the background and objectives of the project. He also expressed appreciation of the co-organizers whose support made it possible to organize the event in Yinchuan. **Mr. Wang Zhengwei**, Vice Chairman and Standing Member of CPC committee of Ningsia Hui Autonomous Region, also welcomed the participants, and stressed the importance of this conference for the Region.

In their opening remarks, **Mr. Mao Rubai**, chairman of the Environmental Protection and Resources Conservation Committee of National People's Congress (NPC) of P.R.China, and **Mr. Zhang Lijun**, Vice Minister, State Environmental Protection Administration (SEPA) of P.R. China, emphasized the importance of promoting RBE in Western China through the establishment of "Circular Economy Law" and the enhancement of existing environmental regulations.

Dr. Chira Hongladarom, Lead Shepherd of APEC Human Resources Development Working Group (HRD-WG), emphasized the thrust of APEC that provides assistance for human resource development in the region and this project to support China regarding its RBE programs. **Mr. Yasuo Tanabe,** Vice President, Research Institute of Economy, Trade and Industry (Japan), advised on competitive economic integration in Asia in both artery and vein industries. He emphasized cross-border environmental issues, for example acid rain and yellow sand stemming from China, which would also affect neighboring countries on the Korean peninsula and Japan.

At the panel session, **Mr. Allen Goddard**, Manager of Resource Efficiency, Auckland Regional Council (New Zealand), and **Dr. Thumrongrut Mungcharoen,** Assistant Professor, Kasetsart University (Thailand) outlined current 3R activities in their economies. **Mr. Michikazu Kojima**, Research Fellow of the JETRO Institute of Developing Economies (Japan), stressed that information on the recycling industry was limited in most developing economies. He also emphasized that the reduction of transportation costs and creating waste-related data would be very useful for the promotion of recycling. Pollution control is the main premise for promoting recycling and trans-boundary movement of recyclable resources. Two presentations by the Chinese business representatives, Mr. Cai Rang and Mr. Zhu Zhenlin, shed the light on the relevant approaches and issues in the context of China.

The panel discussion covered the following topics: *What businesses can do for promoting RBE*, and *How to promote public awareness for implementing RBE*. Through the discussion, the role of business was acknowledged, i.e. that companies can improve their efficiency by reducing resource use and installing or developing new technologies. Meanwhile, this also helps them to become more competitive globally and creates new business opportunities. Disclosing information on the external environmental costs of products or environmental pollution caused by landfills would also help raise public awareness.

On the second day **Mr. Setsuo Iuchi**, a Director from the Ministry of Economy, Trade and Industry (Japan), described Japanese policies and legal systems for promoting a sustainable society based on the concept of 3Rs. He also stressed the importance of promoting environmentally sound cross-border recycling in the Asian region. **Dr. Edward A. McBean**, Vice president, Conestoga-Rovers & Associates (Canada), advised developing economies on the need to utilize landfill gas and to integrate waste management with global environmental strategy, such as the Kyoto Protocol.

Dr. Peng Longyun, Senior economist of the Asian Development Bank, advised that more local and central government efforts were required to attract foreign investment for China's western development. **Mr. Bao Jian**, Assistant to the Mayor of the People's Government of Yinchuan City, and **Ms. Dong Ling**, Director of Yinchuan Ningdong Energy and Heavy Chemical Industry Base, expressed the idea of implementing the RBE concept within a specific local government's policy, through industrial structural reform and development of eco-industrial areas.

Mr. Noriyuki Yonemura summarized the outcome of this seminar by identifying the consensus, i.e. that specific practices should be carried out at different levels: national, local, enterprise or citizen. He further shared most recent development of RBE in the areas of business and community in Japan and other APEC economies.

The seminar provided many valuable insights and observations on how to implement RBE in

China, as well as in the APEC region. The need for good practices in waste management and recycling was recognized. Coordinated efforts among various stakeholders including government, industry and citizens are necessary to optimize the earth's limited natural resources and to achieve economic development at the same time.

Full Summary

1. Opening Session

A. Welcome Remarks

Mr. Takato Ojimi (Japan)
Vice President and Managing Director, Institute for International Studies and Training (IIST) and APEC Project Overseer

Mr. Ojimi introduced one of the co-organizers of the seminar －Institute for International Studies Training (IIST), and explained that IIST has been representing Japan in the APEC's human resource development activities since the beginning of APEC. A great number of projects were carried out with IIST's initiatives in the field of management development. This project on Capacity Building on a Recycling-based Economy in APEC was one of such efforts to share information and knowledge between the APEC member economies.

Mr. Wang Zhengwei (China)

Vice Chairman and Standing Member of the CPC Committee of Ningxia Hui Autonomous Region

Mr. Wang said Western China was important in terms of protecting the ecological environment of China. The Chinese government has been introducing RBE into its national strategy for sustainable development since 1989. During the last five years, the Chinese government invested nearly 110 billion CNY for environment conservation and it also played an important role in Western China's economic development. However, there were still many highly polluting industries in Western China, which gave rise to 1.2-1.3 times more pollutants than in Eastern China.

Mr. Wang said that this seminar would provide a great opportunity for Yinchuan to study good practices regarding RBE in developed economies.

B. Opening Speeches

Mr. Mao Rubai (China)
Chairman of the Environmental Protection and Resources Conservation Committee of the National People's Congress (NPC) of P.R.China

Mr. Mao said it was necessary to provide the legal basis for promoting RBE in China. Overall China's RBE-related legislation was in the beginning stage. China was in the process of establishing a basic law to standardize recycling-based activities, mapping out codes to explain

the Clean Production Promotion Law in China, as well as proposing regulations to include household electrical appliances, containers and package recycling. Currently, NPC was stepping up the schedule for legislation on RBE and bringing it into the China's long-term economic development strategies, he said. It would also be important to promote RBE by changing the industrial structure. Mr. Mao said it was necessary to create representative eco-industrial parks to promote RBE model projects of industries with a high environmental impact such as the steel, non-ferrous metal, electricity and coal.

Mr. Mao said that not only the urban-type RBE development model (industries, eco-industrial parks and cities), but also the agricultural-type RBE development model (farmers, local communities and agricultures) would be desirable. China should effectively inter-relate RBE and western development, and environmental protection policies.

Mr. Zhang Lijun (China)
Vice Minister, State Environmental Protection Administration (SEPA) of P.R. China

Mr. Zhang said strict management and enforcement of environmental regulation was primary for promoting RBE in western China. SEPA conducts environmental assessment of factory construction, for example, to promote structural change according to the law. It was necessary to prevent projects that involve high energy, water, or material consumption, or high environmental pollution and to realize high-technology-oriented, profitable, resource-saving and environmentally sound projects to realize RBE. China had achieved certain result by launching CDM projects with Canada and Italy. Further international cooperation would be needed by launching CDM projects in the area of environmental protection.

C. Keynote Speeches

Dr Chira Hongladarom (Thailand)
Lead Shepherd of Human Resources Development Working Group (Thailand)

“Toward Establishing a Recycling-Based Economy in APEC”
Dr. Hongladarom remarked that Asia-Pacific Economic Cooperation (APEC) was happy to provide capacity-building of human resources to develop a recycling-based economy (RBE) in China. In the long term, such efforts would contribute to both the Asian-Pacific area and the entire world.

He further elaborated the role of the APEC project on RBE which aimed to link human resources and technology regarding recycling. First of all, APEC might be able compile guidance manual, covering best practices of RBE, so that it could let more people know and understand how to build RBE. In addition, APEC also could provide high-quality training and opportunities to upgrade education for those engaged in RBE in APEC economies and to generate greater public awareness.

An advanced management system would also be needed for Western China to realize RBE and to speed up the construction of a society based on saving resources and on environmental protection. APEC could help provide strong human resources for the government, enterprises and other organizations in this area. Dr. Hongladarom concluded that he hoped to see each member economies of APEC undergo fast, but sustainable, development.

Mr. Yasuo Tanabe (Japan)
Vice President, Research Institute of Economy, Trade and Industry (Japan)

"Asian Response to Resource and Environmental Limitations"
Mr. Tanabe presented his views on current limits to resources and the environment and referred to the challenges. He started by introducing the experiences of Japan: how Japan had responded to limits to resources and the environment over the last 30-40 years as a front-runner of economic development in Asia. Then he posed a question to the audience: How should Asia, in particular China, tackle the current challenge? How can sustainable economic growth be achieved in Asia?

Japan's Experience

Japan experienced high economic growth from the 1950s through the early '70s. At the same time, Japan faced serious pollution problems in the '60s and '70s, and was also hit by the two oil shocks in the '70s. Accordingly, Japan had to convert its economy from its highly environment- and energy-intensive economic growth path.

Japan overcame such problems as air and water pollution through the efforts of industry, thanks to regulations and guidance. Also, in response to the rise in oil prices, Japan had achieved a highly energy-efficient economy as a result of efforts by industry and the general public. One could say that the Japanese economic model had thus shifted and evolved from one assuming limitless resources to one considering environmental capacity.

Although economic growth had slowed since the bursting of the "bubble economy" in the '90s, Japan had been making efforts to create an economy and society that had the ability to respond to limits to resources and the environment. Examples included actions and programs taken in response to the agreement and ratification of the Kyoto Protocol, and recycling laws including the "Basic Law on Building a Recycling-oriented Society." Behind this success was the fact that the people in Japan have properly understood the signs of limits to resources and the environment and in response to these signs all parties ― government, industry and the public ― had, with shared responsibility, taken appropriate actions in their own roles to reform the social and economic system.

China's economic growth and environmental problems in Asia
Following Japan's economic development, Asian economies, including NIEs, ASEAN and China, had developed according to the "Flying Geese" model since the 1970s. However, in

recent years, the Asian economic integration model was facing limits to resources and the environment, just as Japan experienced 30 years ago. The greatest trigger issue was the resource-intensive utilization caused by Chinese economic growth.

Mr. Tanabe said that the recent rise in oil prices was a typical example. The average WTI price rose from US$27 per barrel in 2003 to US$41 in 2004. The situation could be explained by the supply and demand curve familiar to economists, which meant the impact of Chinese demand had a major effect on the international market. The high prices of these resources affected not only China, but also all economies in Asia, and indeed around the world, which would be bound to face limits to resources.

Environmental problems were also becoming serious; especially, China's environmental problems might be affecting neighboring economies. For example, acid rain originating from China, was pouring onto the Korean peninsula and Japan. Yellow sand stemming from desertification on the continent was also drifting over the Korean peninsula, Japan and even the Pacific. Thus, environmental problems affect not just one economy but the region as a whole.

Asian Response to the Challenge

Mr. Tanabe explained the theory of the environmental Kuznet's Curve, which explains that environmental impact increases in line with economic growth in the initial stage, while at a later stage of development it will decline. He said that Asia should challenge this theory because of the latecomer's advantage and the learning effect.

Mr. Tanabe also explained that there were two sides to economic activities: the "artery economy", the stream of production, distribution and consumption, and the "vein economy", the end-of-life, or post consumption stream. Japan had enforced various recycling laws to integrate both the artery and vein streams and to effectively promote recycling.

If one looked at the energy intensity of the US, Japan and China, the resource productivity of the US was twice that of Japan, and the energy intensity of China was 10 times that of Japan. Meanwhile, per-capita energy consumption in the US was twice as high as Japan, while that of China is one-fifth as high as Japan.

	Japan :	US :	China
Energy Consumption/GDP	1	2	10
Energy Consumption/Capita	1	2	0.2
Energy Consumption	1	4	2

One could imagine a horrible scenario if China consumed 10 times more energy in the future as it does today. China should avoid the path taken by the U.S. in terms of its massive environmental impact.

Japan might offer a better model in sustainable development. Mr. Tanabe declared his hope that

China would pursue a higher resource-efficient model than that of Japan and take advantage of its latecomer position to attempt to leapfrog in certain cases.

Conclusions

Mr. Tanabe emphasized that we should develop a more efficient vein economy comparable in competitiveness to the artery economy of the APEC region. He also mentioned that Japan would be willing to assist with Asian economic integration, through trade and investment, with the spillover of its technology and skills.

Mr. Tanabe said that the most important thing was human resource development, both in institution-building and in reform of the social and economic system. He hoped that this seminar would serve this purpose as well.

Q&A
There was a question on what kind of international assistance Japan can offer to China, while Japan also benefits from China's western development, just as China's environmental pollution affects Japan.

Mr. Tanabe answered that in terms of Economy-to-Economy cooperation, it is important that Japan's contribution also benefit Japanese taxpayers, while in the case of business-to-business, it has to be conducted in a sustainable way.

2. Presentation 1:
"Current Status and Future Prospect for a Recycling-based Economy in APEC"

Mr. Allan Goddard (New Zealand)
Manager, Resource Efficiency, Auckland Regional Council, New Zealand
Chairman, Waste Management Institute of New Zealand

"Recycling in New Zealand"
Mr. Goddard explained the current situation of waste management and recycling in New Zealand by introducing a number of case studies for promoting recycling.

Current situation of waste management and recycling
Mr. Goddard started off with the context of New Zealand, which has a land area of approximately 268,000 square kilometers, with a population of approximately 4 million people, 39 million sheep and nearly 10 million cattle. New Zealand disposed of over 3.4 million tons of solid waste each year, which included both domestic and industrial waste. Landfills are the main disposal facilities in New Zealand because of the relatively low cost of disposal, ranging from $10 – $100 per ton.

He indicated that waste volumes had been steadily increasing, being closely linked to

economic and population growth. Since the 1990s recycling volumes had been increasing. The dip in the volumes in the early 1990s was due to a downturn in the economy.

New Zealand's waste was typically made up of a large organic component. The next two major fractions were construction and demolition wastes and paper waste. Typical public recycling systems were curbside collections that included paper, HDPE and PET plastic containers, steel and aluminum cans, and glass bottles in urban areas and drop-off facilities in more rural areas. The materials were either partly sorted on the collection truck or transported to a sorting facility where the material was bailed for market.

Legislation and barriers for recycling

New Zealand had no specific waste legislation except its main environmental legislation, the Resource Management Act, which focused on discharges into the environment. Responsibility for domestic waste collection and recycling lie with the local councils, of which there were 74 in New Zealand. In contrast, businesses must provide for their own waste disposal and recycling.

New Zealand took a voluntary approach to reducing and recycling waste. In 2002 the Government released a voluntary strategy, which included targets for reducing waste. For example:

- 60% of garden waste diverted from landfill and beneficially reused by 2005 and 95% by 2010
- 50% of construction and demolition waste diverted from landfill by 2008
- to pilot 8 extended producer responsibility programs targeting difficult "special" wastes by 2005

However, these targets are totally voluntary, so it was difficult to collect the data for evaluating their achievement.

Mr. Goddard said that there are potential barriers which made recycling difficult in New Zealand. He listed these barriers to recycling in New Zealand as follows:

- Low cost of landfill disposal
- Geographical spread of population leading to high transport costs
- Relatively small volumes, economies of scale
- Limited local markets (rely on export trade)
- Foreign exchange fluctuations and commodity market volatility
- High capital cost and difficulty in getting finance for establishment of new businesses
- Voluntary approach (lack of legislation)
- Skill shortage
- Duplication of effort

Mr. Goddard described four case studies in New Zealand.

Case Study 1- Voluntary Government/Industry Agreements -Packaging Accord

Packaging Accord was known as the best example of voluntary agreement between

government and industry for reducing waste and recycling. Since New Zealand relied on a voluntary approach instead of a regulatory approach, it was important to get commitment from the industries. The Government had negotiated specific voluntary agreements with selected industries and it was agreed for 5 years from 2004. Packaging waste represented approximately 12% of waste going to landfill in New Zealand; Packaging Accord aimed to reduce land-filling and increase recycling rates. As over 50% of all packaging in NZ was imported, there was a need to "capture" this component, which was done by reaching agreement with each sector, such as the brand owners and retailers of the products.

Table 1 Mass balance of packaging materials

MATERIALS	PRODUCTION (Tons)	CONSUMPTION (Tons)	COLLECTION (Tons)	COLLECTION CONSUMPTION
ALUMINIUM	9,525	6,590	4,060	62%
GLASS	104,020	168,165	80,510	48%
PAPER	388,820	279,840	192,160	69%
PLASTICS	144,215	125,955	23,815	19%
STEEL	42,265	34,425	12,505	36%
TOTAL	**688,845**	**614,975**	**313,050**	**51%**

Source: www.packaging.org.nz

This table shows how much packaging was produced within New Zealand, and after allowing for imports and exports how much was consumed within New Zealand. It then showed how much was collected for recycling. At present overall recycling of packaging represented approximately 51% of which was consumed within New Zealand. However, individual rates for the different materials varied; with the rate for plastic being the lowest at 19% and that for paper the highest at 69%. National recycling targets for 2008 (as a % of consumption by weight) were set as Aluminum 65%, Glass 55%, Paper 70%, Steel 43%, and Plastics 23%. Each industry was involved in developing these targets to ensure commitment to them and ensure that they could realistically be achieved within the time frame set.

The Government had made other Voluntary Agreements on "difficult" wastes including used tires, oil, plastic silage film, and empty plastic agricultural chemical containers. Some larger companies had established their own recycling schemes, for example, Vodafone for mobile phones/batteries.

Case Study 2 – BusinessCare Trust and ZeroWaste Academy

The "skills shortage" gap was being filled by two NPOs. The ZeroWaste Academy had been set up to facilitate "hands-on" training for recycling operators and was also working with a university to establish appropriate university-level training. The Business Care Trust was established to work directly with businesses and had developed extensive training materials and resources, which were available through workshops, newsletters and a website.

Case Study 3 - Recovered Materials Enterprise Trust

One of the potential barriers for the establishment of new recycling businesses was the difficulty in getting technical advice and start-up funding. The Recovered Materials Enterprise Trust was established to help overcome these barriers: it advised and provided loans to businesses for the start-up. The Trust itself was established with grants from local government and government agencies, and it had made efforts to attract loan capital from investors. It had recently joined forces with a larger ethical investment trust and was currently self-funding, utilizing the interest earned from loans.

Case Study 4 – Lifeafterwaste

Lifeafterwaste was an initiative of the Waste Management Institute of New Zealand, which aimed to change the society from mass consumption-production-disposal to a more sustainable one for production, consumption and recycling. When different organizations were involved in similar campaigns, it caused the duplication of their efforts and might also create confusion. This initiative aimed to link all education campaigns for recycling, so that the people could get the same message and material, which provided significantly more exposure for the same overall spending.

Conclusion

In conclusion, Mr. Goddard summarized his presentation as follows:

(1) NZ did not have specific waste legislation and relies on voluntary approaches
(2) The lack of regulatory "drivers" to reduce waste encourages innovation but had led to mixed responses
(3) To support recycling NZ relies on international trade
(4) Industry associations and not-for-profit organizations play an important role

Dr. Thumrongrut Mungcharoen (Thailand)
Assistant Professor, Kasetsart University

"Current Status and Future Prospects for Recycling-based Economies in APEC: Case Study of Thailand"

Dr. Mungcharoen shared Thailand's experience in implementing waste management and recycling policies.

Current recycling status in Thailand

Thailand's Municipal Solid Waste (MSW) did not change so much during 2000 to 2003; total amount of MSW, recyclable waste potential, compostable waste potential and the amount of utilization was 14.4 million tons, 6.8 million tons, 8.5 million tons and 2.8 million tons, respectively. The major components of garbage in Thailand were recyclable waste (42%) and organic waste (46%).

In Thailand, the landfill situation was crucial, as in many other economies: there had been strong opposition from local residents on creating new landfill sites. In the year 2000, the

Energy Research Institute proposed a "comprehensive recycling strategy", which set a national recycling target of 50% by the year 2008. The Thailand Environment Institute, an NGO, established a "Material Exchange Center (MEC)". MEC is a web-based center to facilitate waste exchange among industries in Thailand and also plays an important role in enhancing awareness among industries. In Bangkok, in 2000, the first community recycling center was established. Because Bangkok generated 40% of national waste, the facility could treat 1800 ton/ year to help reduce waste. According to the 9th national plan (2002-2006), the Thai government supports the segregation, take-back and recovery of at least 30% of waste, and promotes cleaner technology and production.

Best practice for promoting recycling

Some municipalities in Northern Thailand had set their targets for waste reduction. Dr. Mungcharoen also explained the best example of solid waste management in Pitsanulok Municipality. "Wongpanit Group", a waste collection and recycling company, purchased recyclable waste, such as waste plastic bottles, at good prices. It motivated the local community to separate wastes, so the community could reduce the amount of landfill by almost 50%.

E-waste recycling in Thailand

In Thailand, the organizations responsible for e-waste and recycling related projects include: Department of Foreign Trade, Thailand Environment Institute, National Metal and Materials Technology Center, and National Energy Policy Office. The Government of Thailand organized several activities for e-waste management. During 2000-2004, it conducted a study of current regulations for e-waste, established an action plan and measures for e-waste, and conducted technical cooperation for e-waste management.

The estimated amount of E-waste generation and potential amount of recycling were shown in Table 1. There was a study on estimating the quantities of e-waste during 1994-2010 which was done by the Pollution Control Department and JETRO in 2004.

Table 1. Estimated Amount of WEEE in 2003

Type	WEEE (MT)	Recyclables * (MT)	Non-recyclables ** (MT)
TV set	8,201	2,542	5,659
Refrigerator	17,763	16,342	1,421
Washing Machine	11,370	8,073	3,297
Air Conditioner	17,407	17,407	-
Personal Computer	2,105	2,105	-
Total	57,934 (100%)	47,577 (82.1%)	10,377 (17.9%)

* Can be sold, ** Can not be sold

The Pollution Control Department conducted a survey of e-waste recycling in June 2004. It dismantled 10 units for each category of e-waste and weighted the recyclables and non-recyclables (see Table 3).

Table 2. Average Lifetime of WEEE in Thailand

Product type	Average Lifetime (yr)	Product type	Average Lifetime (yr)
TV set	18	CRT monitor	9
Refrigerator	14	Mobile phone	2
Washing Machine	12	Mobile phone batteries	1
Air Conditioner	9	Fluorescent lamps	1
Personal Computer	7	Dry cell batteries	2 months

Source: Survey of the WEEE in Thailand, June 2004

Table 3. Recycle

Type	Average weight (kg/unit)	Recyclables (%)	Non-recyclables (%)
TV set	17.45	31	69
Refrigerator	40.37	92	8
Washing Machine	45.48	71	29
PC	6.79	100	0
CRT Screen	13.61	100	0

Source: Survey of the WEEE in Thailand, June 2004

The Pollution Control Department compiled the "Draft Regulation on Thai WEEE," which was now under the consideration of Thai Cabinet.

Industry practices

Dr. Mungcharoen also said that there was high potential for industrial waste utilization. He introduced several companies' practices. Toyota (Thailand) collect waste, such as thinner, steel scraps, wood and paper, as well as plastic recycling. Michelin Siam Group had a used-tire recycling project and Siam Cement Group practices "Green Procurement" according to their Life Cycle Thinking concept. Siam Cement Group also had good waste management: in 2003, non-hazardous waste recycling were 297,319t (on-site) and 213,098 t (off-site) and hazardous waste recycling were 132,442t (on-site) and 3,143 t (off-site). Philips and Toshiba (Thailand) introduced a take-back policy for fluorescent light bulbs.

Future prospects

Dr. Mungcharoen explained the current problems:

- Wastes in Thailand were currently increasing by up to 10% each year
- Very difficult to separate "useful waste" from "municipal waste"
- Lack of specific regulations or measures for the management of waste
- Lack of high-technology recycling factories
- Poor financial support for waste management as reflected in the budget allocation each year
- Lack of expertise, technologies and facilities

Dr. Mungcharoen ended his presentation by explaining the future orientation of waste management in Thailand. There is a Solid Waste Management Strategy for 2006: the target for

total amount waste reduction is 5% and the targeted national recycling rate is an increase from the current 11% to 30%. The reducing and recycling waste strategies are as follows:

- Getting the incentives right - the taxes, fees or other incentives that can be implemented in Thailand
- Taking awareness to the next level
- Separating the waste
- Harnessing the market for waste

Dr. Cai Rang (China)
President of Advanced Technology & Materials Co., Ltd.

Dr. Cai explained the concept of RBE and its importance from the perspectives of science and technology.

Dr. Cai said RBE had become an emerging concept in the sustainable development of China. RBE put emphasis on the most efficient use of resources and environmental protection. Compared to the conventional model, RBE (Reduce-Reuse-Recycling) could make better use of resources and energy, minimize waste discharge, and therefore achieve harmony between society, the economy and the environment. Dr. Cai gave some examples of technologies which would improve production efficiency in traditional industries such as new type of coal-fired plants and modern steel production plants.

In recent years, China has made remarkable efforts in developing RBE across the country since it has faced serious resource and energy shortages. Dr. Cai said the photovoltaic power industry had a bright future in China because of the recent cost reductions and technical progress in solar batteries. In 2003-2004, material studies had been initiated because hazardous substances in electronic products which also might affect China's exports.

Dr. Cai said Karl Marx, a famous communist, mentioned the relationship between human and natural resources: it had to be circular and not linear. In that sense, it was necessary to develop good circulation of resources and energy by investing environmental technologies from a scientific viewpoint.

Before ending his presentation, Dr. Cai emphasized the importance of government policies and public participation for building a social system based on RBE.

Mr. Michikazu Kojima (Japan)
Research Fellow, JETRO Institute of Developing Economies

"Current Status and Policy Options of a Recycling-based Economy in APEC"
Mr. Kojima described the current status of a Recycling-based Economy (RBE) in APEC and future policy options. He posed the following questions: What are the main obstacles in implementing recycling? What are the possible reasons? What kind of policies will be effective

for promoting RBE in APEC economies?

In China, the term of sound-material cycle society “Xun Huan Jing Ji”(meaning, a society with a sound material-cycle) has a broader sense. It emphasizes on energy conservation and water resource conservation, rather than the recycling of waste. However, recycling of waste also could save energy, water and other natural resources.

In developed economies including Japan, industrial sectors had invested in saving energy and water since the 1960s due to the stricter enforcement of water pollution control. Regulations forced industries to make investment for water pollution control. Some industries found that treated water can be re-used in their own factory.

In addition, energy conservation had been pushed by the high energy prices. Two oil shocks, in the early 1970s and around 1980, forced industries to invest in energy-saving. In the late 1990s, Japan started efforts to promote recycling.

Some waste products, such as used paper and metal scraps, were collected and recycled in all of Asia. However, dry batteries, fluorescent lamps and others items were collected in some economies, but not in others. There were various possible reasons why certain waste items were not effectively recycled. For example, the high cost due to the inefficiency of recyclers and high transportation costs, inadequate volume collected in a specific area, and the lack of regulations promoting recycling may be obstacles in recycling.

Some Chinese people say that the lack of technologies and business enterprises was an obstacle to promoting recycling. However, in fact, it might be due to inefficient transportation. For example, if there was no waste-separation program or if there was no compactor, it would increase the cost of the collector and the transporter.

Mr. Kojima said that he was impressed to see quite good compactors and cutting machines at a recyclable waste market in Yinchuan. However, he expressed his concerns, as to whether or not other waste items, such as batteries and lamps were also collected.

Mr. Kojima believed that it was very important to identify the obstacles in the process of recycling, before recycling policy could be formulated. It might also be difficult to find appropriate recyclers in a specific area when a sufficient amount of recyclable waste was not collected, or because the demand of recycled materials was not sufficient to run a recycling facility. In such cases, trans-boundary movement of recyclable waste would be essential to build recycling networks on international and inter-provincial levels. A personal-computer recycling company in the Philippines exported CRT glass and printed circuit board to Korea for further recycling. A Japanese joint-venture company in China exported Ni-Cd batteries to Japan for metal recovery.

At the same time, Mr. Kojima pointed out the problems caused by trans-boundary recycling.

Improper recycling in developing economies has caused some serious pollution: e-waste recycling in Guiyu in the southern part of China, and waste car battery recycling in India and Vietnam.

Other problems included the export of non-recyclable waste under the name of recycling or second-hand products. There are international regulations on trans-boundary movement of hazardous waste; however, in practice more international cooperation would be needed.

Conclusions

- Information on the recycling industry is limited in most of developing economies. Basic statistics on recycling should be collected as part of the in official statistics system or through surveys.
- Pollution control of recycling industries was a precondition for promoting recycling and trans-boundary movement of recyclable resources.
- Enforcement to control illegal shipment of hazardous waste should be strengthened through international and inter-provincial cooperation.

Mr. Zhu Zhenlin (China)
CEO of Ningxia Darong Group

"Let us promote the RBE concept through the development of companies and by improving companies' competitiveness"

Mr. Zhu introduced his company, Ningxia Darong Group, which was founded in 1984. With 20 years of hard work, the company became the leading cyanamide series manufacturer in the world. The company has achieved "multi-lateralization" through its technological innovations and the advantage of natural resources in Ningxia. It started producing calcium carbide in the early 1990s, and had become an integrated calcium carbide, calcium cyanamide, dicyandiamide and hydrogen cyanamide producer.

Mr. Zhu said his company recognized RBE as an important concept in its early stages. The company introduced the concept of RBE and Cleaner Production to treatment and circulation of waste water, waste residue and discharged air in the early '90s. He said the efficient utilization of resources would make the company both economically and environmentally profitable.

Utilization of Water Resources

Mr. Zhu referred to the circulation of water resources as an example of economically and environmentally profitable approach. In 1994, his company invested nearly 2.6 million CNY to introduce a water circulation system, even though waste prices were considerably low at the time. Calcium carbide furnaces used plenty of cooling water, so the company could save 8 million cubic meters of water and 1.60 million CNY every year.

Utilization of Solid Waste

During the production process of dicyandiamide, 5000 tons of waste residues were discharged. During 1990 to 1999, the company produced 30,000 tons of cyanamide products, while it also produced 200,000 tons of residues. This created large problems for the company because it costed 1 million CNY for transportation and land-filling. In 1998, waste residues amounted almost to "a mountain". Because the particles were like sand, they were blown about by the wind and also created environment problems. In 1993, the company started a R&D project on cyanamide residue recycling and invented a method to use residues for cement production. In 1998, the company invested 78 million CNY to build a cement production line with a 18,000-ton/year production capacity. This method obtained a national patent in September 2004. It brought great economic benefit to the company.

Utilization of Waste Heat by Introducing Cleaner Production
Mr. Zhu said the company also invested in a new project in 2004 for the environmental improvement of an existing calcium carbide furnace, to reduce air emissions and recover waste heat to generate steam needed for the expansion.

Based on his several years of experience, Mr. Zhu proposed the following measures to be taken for the further promotion and development of RBE for companies in China.

(1) Because RBE is a new concept, there is the possibility that companies will encounter contradictions of current regulations or policies. The government should take necessary actions to reduce such problems or obstacles for the promotion of RBE.
(2) Because RBE is a systematic approach, the industry's structures have significant effects on companies' development. So, when the government or organization of eco-industrial parks make plans on industrial structure, they should work together closely and cooperate with each other to prevent conflicts.
(3) In order to promote RBE, the government should establish related legislation and provide taxes, prices, and financial incentives to companies for R&D investment on resource utilization and so on.

3. Panel Discussion

Ms. Inaba, Director, Human Resource Department of Institute for International Studies and Training (IIST), chaired the panel session. She posed such questions as "What can businesses do and how can businesses shift towards RBE?"
She said one incentive could be the economic reason, for example, entering the recycling industry in order to reduce the cost by, for example, reusing used parts. If the dumping cost gets higher, then businesses would be willing to pay money for recycling instead. Responsible companies do not want to dump their waste, but instead would try to use the waste for recycling. Also, there are EPR rules, which have been recognized as global standards.

Dr. Mungcharoen said that multi-national companies try to improve their eco-efficiency and could at the same time get environmental benefits by doing so. For example, reducing waste

water could also prevent water pollution. More and more companies were now eager to reduce energy consumption, tighten their pollution control and introduce environmentally focused designs for their products.

Mr. Goddard said that consumers would be able to influence businesses to take actions. For example, introducing eco-labeling could make a profit as well as raising the awareness of consumers.

Mr. Cai said there were several reasons why some companies devote themselves to RBE. One was because the companies could improve their competitiveness by improving resource efficiency and cutting costs. A second was international pressure and a third was new business chances and new technology development.

Ms. Inaba asked the Chinese audiences how much they cared about the practices of RBE, for example, whether they were willing to pay more for eco-friendly products or not. (Small minority of the audience raised their hands.) Ms. Inaba posed a question to the panelists: How can we raise public awareness for promoting RBE?

Dr. Mungcharoen said that it was important to give information to the public, especially on costs, which included the hidden costs.

There was a question from the audience: "how did the developed economies raise the public awareness of RBE in the initial stages?"

Mr. Kojima said the biggest impact might be pollution because it directly affected human health. In addition, the shortage of landfill sites raised the public awareness of the necessity to reduce the amount of waste, because Japan could not find any landfill sites without destroying nature. After a lot of discussion, Japan established various recycling laws and Japanese citizens started recycling because they were also concerned about pollution from landfill sites.

Mr. Cai said that it was also very effective when an economy's leader showed or spoke about RBE's importance directly to the public. He said that the prime minister of Germany once wore disposable clothing to show the importance of recycling, and that this was quite effective.

Mr. Zhu shared his experience in his own company where employees awareness had to be raised. He stressed the importance of leaders' role. He emphasized that leader should show his commitment and lead "by example" in his every day behavior.

4. Keynote Speeches 2: "APEC Collaboration for a Recycling-based Economy"

Mr. Setsuo Iuchi (Japan)
Director of Recycling Promotion Division, Ministry of Economy, Trade and Industry

"Towards Building a Sustainable Global Society based on the 3Rs"

Mr. Iuchi introduced policies and legal systems to promote a sustainable society based on the 3Rs. He also mentioned the current situation and future orientation, and how Asian-Pacific economies can cooperate in promoting 3Rs in the region, including promotion of environmentally sound cross-border recycling.

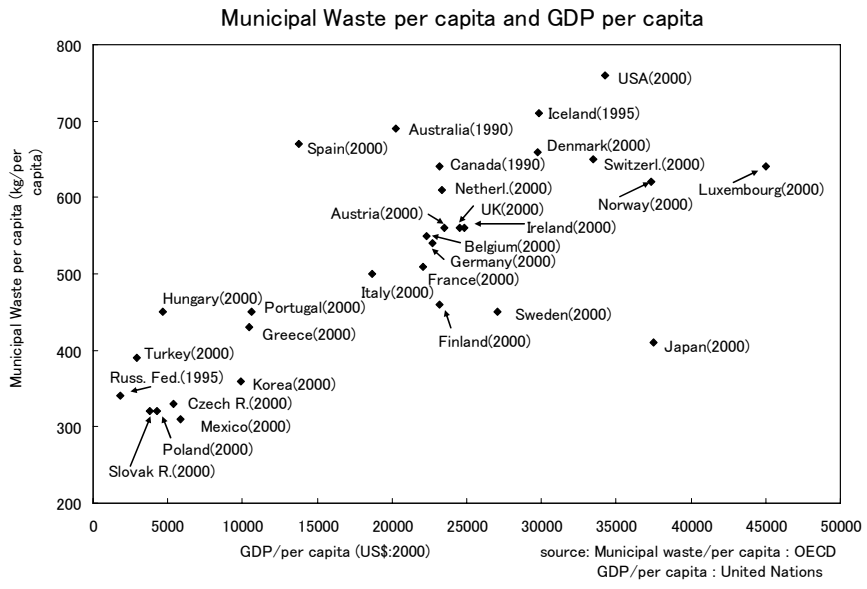
Current situation

Mr. Iuchi explained the macro material flow of Japan: Japan consumes about 2.1 billion tons of resources annually including energy, recycles about 10% of the total consumption, and finally landfills about 53 million tons. Japanese macro goals toward a sustainable society included three targets:

1. Improve the efficiency of resource use, measured by GDP divided by the amount of virgin resources used. Its goal was to improve this rate by 40% in 2010 compared with 2000.
2. Improve recycling rates from 10% in 2000 to 14% in 2010.
3. Reduce final landfill amount by half from 2000 to 2010.

Mr. Iuchi showed the trend in municipal solid waste treatment in Japan: direct final disposal had been decreasing year by year to 4.3% in 2002. Nearly 80% was reduced in weight by incineration. Also, the recycling rate of municipal solid waste had been improving steadily, to 15.9% in 2002. When measured on the per capita waste emission before recycling and treatment among OECD economies, Japan showed a fairly good record compared with other developed economies including Germany and Sweden.

The following graph shows more interesting comparison of OECD economies. The horizontal axis shows the per capita GDP; the vertical axis shows the per capita waste emission per year. It indicates that basically waste emission increases as GDP increases: Germany is on the trend line, the USA is at the top and Sweden is a little below the trend line. In contrast, Japan is far below the trend line. Mr. Iuchi said that he hopes Asian economies can learn something from the Japanese system and Japan's experience.



The total amount of industrial waste had been stable over the last 10 to 12 years, while the recycling rate had been increasing gradually, to about 45%, and the final landfill, now only 10% of the total emissions.

Legal Framework for

Establishing a Sound Material-Cycle Society

Mr. Iuchi explained the legal framework of Japan. The Basic Law for Establishing a Sound Material-Cycle Society was the fundamental law of the whole framework. The government made a Basic Plan and annually reviewed the progress by calculating the resource productivity, the cyclical use rate, the reduction of final landfill, and other specific endeavors, including the implementation of each recycling law.

Under the Basic Law, there were two broad laws: the Waste Management and Public Cleansing Law and the Law for Promotion of Effective Utilization of Resources. Under those, there were individual recycling laws for containers and packaging, home appliances, end-of-life vehicles, construction materials, and food waste. To expand markets for eco-friendly products, such as recycled goods, Japan had enacted the Green Purchasing Law, which required central and local governments to purchase such products.

Mr. Iuchi also explained the performance of individual recycling laws. The collection amounts were growing steadily and this had reached 10 to 11 million units per year for home appliances. For promoting eco-friendly products, Japan had more than 200 new JIS industrial standards, and promoted R&D of eco-design. There were exhibitions for eco-products every year. Last year, one was held in Malaysia; in 2005 it was planned to be held in Thailand. Mr. Iuchi hoped one would be held in China in the near future.

Cooperation in Asian Pacific Region

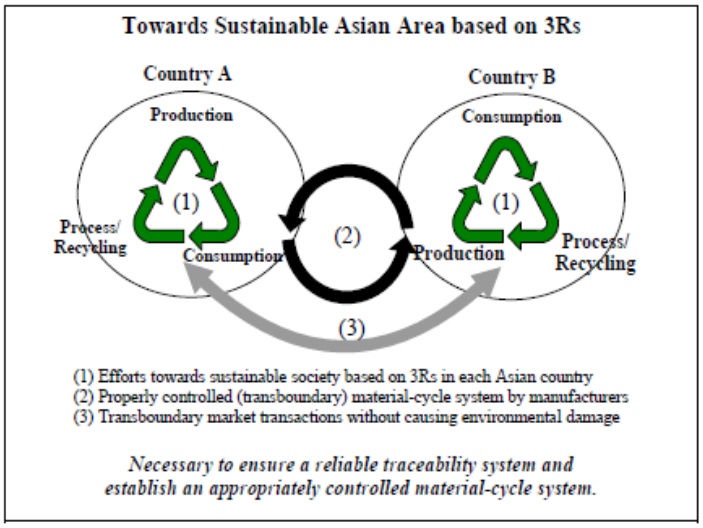


Figure 1

Because of the globalization of the economy, international trade of products and parts had been increasing. At the same time, cross-border trade of recyclable goods and materials also increased. In some Asian economies, waste management and resource utilization had become major concerns. In Japan, major industries such as the steel, non-ferrous metal refining, cement, and chemical industries had already entered the recycling industry because they accumulated advanced technologies and major advanced facilities. Mr. Iuchi said that Japan would be able to contribute to other Asian economies in constructing 3R-based societies in terms of technical cooperation, capacity building, and policy dialogues to exchange views for better policies and legal frameworks.

The concept of establishing a sustainable Asian region based on the 3Rs is shown in Figure 1. The goal was to maximize resource utilization in the region, while restricting the spillover of

environmental pollution to other economies, so that resource use will not become a limiting factor for steady economic growth. Mr. Iuchi emphasized that it was most important to construct a 3R-oriented society in each economy and to realize the traceability of goods and materials so that exported goods and materials are properly recycled.

Dr. Edward A. McBean (Canada)
Vice President, Conestoga-Rovers & Associates

"Waste Recycling: Experience and Trends in Developed and Developing Economies"
Dr. McBean explained the current waste management situation in both developed and developing economies.

Examples of experience in developed economies
Dr. McBean first gave a brief explanation of waste composition in Argentina, Brazil and Canada. In developed economies, there were more plastics, papers and metals, and less organic waste compare to developing counties.

Dr. McBean summarized key features for success in waste management in developed economies as follows:
- Households (generally) were willing to participate
- Households had space to separate/store recyclables
- Source separation was generally feasible
- Modest success in recycling levels e.g. 30% of residential waste, while objective was 60 %

In developed economies, there were several strategies being used for promoting the 3Rs, i.e. waste reduction, reuse and recycling. For example, the "Blue-Box" Program was initiated in 1987 and had expanded the recovery of designated items even though it costed 10 times more than landfill. The approaches and characteristics in developed economies were (1) investment in market development, (2) high labor costs, (3) markets being forced to participate by government regulations and societal pressures. Troublesome waste in developed economies includes automobile tires, electronic waste (e-waste), construction and demolition waste, used oil, batteries and fluorescent tubes.

Examples of experience in developing economies
Dr. McBean explained the relevant features in developing economies: (1) Organic waste accounted for a very high percentage, (2) there were waste pickers at many of the landfills to collect recyclables, (3) vehicles traversed the streets and pick up waste frequently, (4) no waste/source separation at household level, (5) problem of leachate containment at landfill sites.

Dr. McBean also summarized the current problems in developing economies as follows:
- Frequently, minimal space for storage in homes
- Lack of markets (for recycling)
- Exacerbated because landfills were frequently 'dumps'

- Minimal budgets allocated for disposal of waste
- Bankruptcies due to corruption

Dr. McBean believed that incineration did not work in developing economies because costs were extremely high and environmentally harmful emissions were a continuing issue. He outlined successful examples in Indonesia and India. In Indonesia, a landfill was set up near a city center, which made collection and transportation more efficient. Dr. McBean said developing economies should make full use of composting potential. In India, localized (neighborhood) recycling was commonly used in the form of localized (wagon) collection of organics for composting. The residents who contributed to this system get compost in return.

Conclusion

For better waste management and recycling in developing economies, Dr. McBean noted that the following actions should be taken:

- Landfill gas should be recovered because it had substantial value for energy use and environment protection (e.g. collecting gas through Kyoto Protocol)
- Access by waste pickers should be restricted where feasible (from a human health perspective), but at the same time, opportunities to work in waste management or the recycling industry should be provided by utilizing this low-cost labor.
- Elaborate pilot-scale demonstration projects/programs where feasible (e.g. waste separation, drop-off locations, etc.)
- Invest to develop the market by virtue of more recyclables being available (essential for sustainable system)

Dr. McBean also emphasized that public education was a continuing need for the developing world.

5. Presentation 2: "Sustainable Economic Development in Western China"

Dr. Peng Longyun (China)
Senior economist, Asian Development Bank, ADB

"Let us Use Foreign Investment to Improve Western China's Development"

Dr. Peng made a brief introduction of ADB. ADB was established in 1966 as a multilateral development finance institution dedicated to reducing poverty in Asia and the Pacific. Its headquarters are in Manila, the Philippines.

Dr. Peng introduced ADB's activities for western China's development. Some 80% of ADB's loan programs were for the development of midwestern China. In addition, ADB had also provided technical assistance for the following:

- Strategic studies for western China development
- Public acceptance of FDI (foreign direct investment) in western China
- Strategic studies for attracting FDI to western China

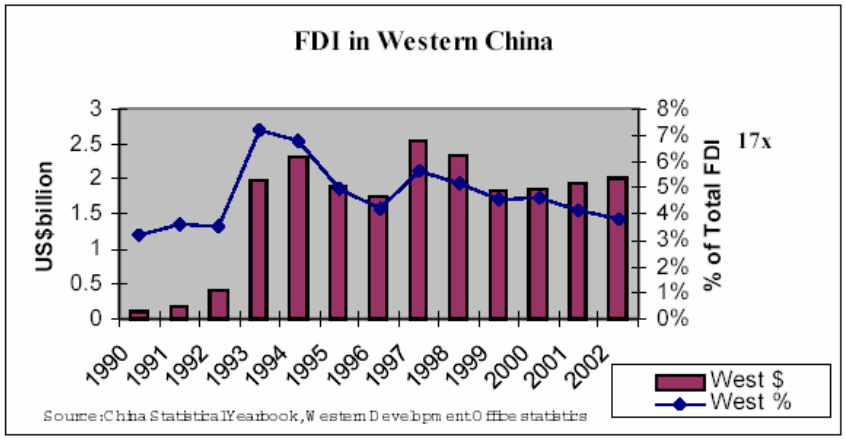
- Strategic studies the development of three midwestern China provinces

Dr. Peng explained the results of the strategic studies for attracting FDI to western China. In this study, ADB did a survey on identifying the reasons that FDI providers do not want to come to western China.

In the survey, there was a question on plans for the next five years. Nearly 65% answered "expand in western China as normal", 22% answered "expand quickly", and 12% answered "wait and see" or "stay at the same level". Less than 1% answered "withdrawal" from western China.

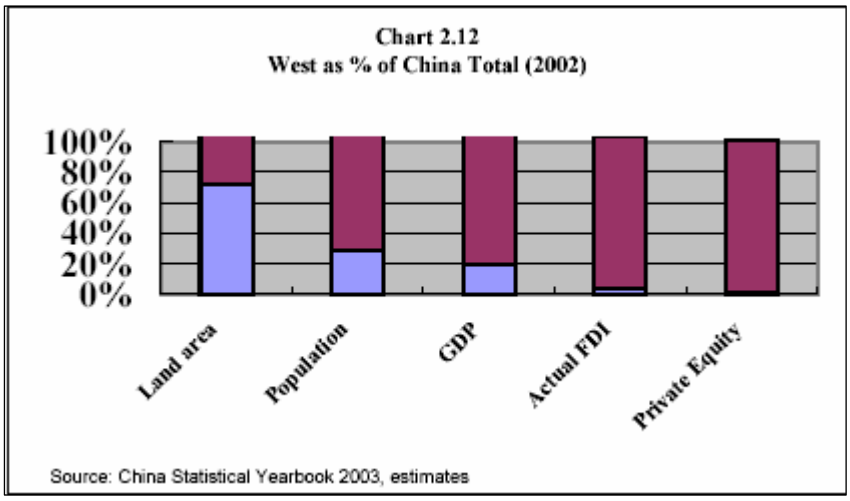
In general, nearly 60% answered that the investments were towards midwestern China. The reasons for positive answers are as follows: "preferential policies (e.g. preferential tax measures)" (13%), "rich natural resources" (13%), "potential market" (58%), "good industrial base" (8%) and "good technological ability" (8%). In contrast, the negative reasons were "less economically developed" (14%), "constraints on infrastructure" (22%), "immature market" (14%), "poorly developed consumption market" (22%), and "constraints on human resources"(13%).

Figure 1 FDI in Western China



As shown in Figure 1, FDI in western China was decreasing. The ratios of land area, population, GDP, actual FDI and private equity in the west are lower than in China as a whole (Figure 2). Dr. Peng mentioned the main reasons that FDI did not come to the west, such as high cost, many restrictions, and not enough services. The costs include land, public facilities (e.g., electricity, gas, and water), resources, transportation and labor. The land cost was higher than in eastern areas because of uncertain elements, but the electricity cost in the west is lower than most people think.

Figure 2 The Share of Western China



Some restrictions can be found in the west. For example, in western China, there were fewer arrangements or local public support for industries, the accession to the WTO was also at the very last, and the authorization procedures were not clear enough. Public (government) service was not good enough for attracting FDI. There are limited human resources, or fewer foreign financial institutions, less health-care, etc.

"How can western China pull in FDI?"
Dr. Peng ended his talk by identifying his recommendation to local governments and the central government. He said local governments should reduce the cost of land, public facilities (e.g., electricity, gas, water), and the necessary expenses for investment. Also, various improvements in the situation of exclusive possession of government-owned companies were required, for example, introducing PFI in the long term. Relaxation of regulations (e.g., permission for building an international school) and enhancement of the administrative capabilities of local governments would be also important. The central government should take the necessary measures to attract FDI for eastern China and opening the transportation market to reduce the transportation cost.

Mr. Bao Jian (China)
Assistant of Mayor, the People's Government of Yinchuan City Ningxia Hui Autonomous Region

Mr. Bao introduced the natural and historical characteristics of Yinchuan City.
Mr. Bao said Yinchuan could achieve its development by developing the coal chemical industry, oil and natural gas chemical industry, and high-energy, new materials industry because Yinchuan has good coal resources.

Mr. Bao also explained Yinchuan City's development plan and developing projects in four major industrial areas: (1) the heavy chemical industry, (2) the green industry and bio-pharmaceutical industry, (3) the machinery electronics industry, and (4) the eco-tourism industry.

Lastly, he asked the attendees for their cooperation in the development of Yinchuan and for further investment in such fields.

Dr. Johnny S. C. Chai (Malaysia)
Professor, Inter American University

Dr. Chai believed China's Western Development was the most important strategy in the 21st century for China's long-term development. Western China includes 10 provinces/cities/autonomous regions: Shanxi, Gansu, Qinghai, Ningxia, Xinjiang, Sichuan, Chongqing, Yunnan, Guizhou and Xizang, which all had good natural resources, landscapes and land areas. Currently, western China's economy was lagging behind the national average, but this also meant there was potential for development in the future.

As an overseas Chinese from Malaysia, Dr. Chai expressed his hopes that the potential development in western China could be achieved by enhancing cooperation among middle, west and south Asian economies.

Dr. Chai considered the following to be important aspects for China's Western Development (**WITH-CEO**):

(1) **O**PENNESS: Open the market and attract more FDI
(2) **E**COLOGY: Build an ecological economy
(3) **C**ITYLIFE: Construct good economic markets in cities
(4) **T**OURISM: Promote eco-tourism
(5) **W**ATER: Utilize water resources
(6) **I**NFRASTRACTURE: Maintain the energy and transportation base
(7) **H**UMAN RESOURCES: Invest in human development

Ms. Dong Ling (China)
Director, Yinchuan Ningdong Energy and Heavy Chemical Industry Base

Ms. Dong explained the Ningxia government's ecological industrial park project, the "Ningdong Energy & Heavy Chemical Industry Base (NDB)". It had been planned for the construction of a new type of energy and heavy industry chemical industry base. In the Ningdong Coal field, there is a proved deposit of 27.3 billion tons of coal, which was 86% of the total coal resources around the Ningxia region. Needless to say, the NDB had beneficial conditions for transportation of coal resources.

Ms. Dong introduced the details of the NDB. The NDB was located in Lingwu, Yinchuan City, and consists of three bases: electronic power generation base, a chemical industry base and a coal base. The electronic base has two thermal power plants with a capacity of 10,000 MW/year. It was not only for Ningxia but also for utilization in the West-East Power Transmission Project, which brought electric power from west to northeastern China. The chemical industry base included coal indirect liquefication (8 million tons/year), coal-based DME (1.2 million tons/year), coal-based methanol alkene polymers (4 million tons/year) and other projects. The coal base is planned to reach an output of 80 million tons by 2010 and 130 million tons by 2020.

Ms. Dong emphasized that the industrial structural adjustments had greater importance for realization of RBE. That was also why the NDB project had been so strongly supported by the State.

Mr. Lee Swee Chye (Malaysia)
Managing Director, EONGTA (M) SDN BHD

Mr. Lee Swee Chye explained the concept of RBE and introduced the practices of RBE in

Malaysia. He said that in Malaysia, some supermarkets have already stopped providing free plastic bags to customers. Instead, the supermarkets allowed customers to push shopping carts to the carpark so that they could unload their purchased products from the cart to their car. This type of concept could reduce the demand for plastic bags. The supermarket, named "makro", was opening 60 stores in five Asian economies.

Mr. Lee listed and explained the characteristics of RBE as follows:

- New systematic view: RBE consists of natural resources, science and technology and mankind, so mankind should be seen as part of the whole system.
- New economic view: shift from a traditional industrialized economy to a sustainable economy
- New cultural values: change our values of the traditional economy, such as exploitation of natural resources or landfill, towards a harmonious coexistence of nature and humans
- New concept of production: towards a sustainable production based on 3Rs
- New concept of consumption: towards a sustainable consumption based on agriculture or composting
-

6. Closing Ceremony

Mr. Noriyuki Yonemura (Japan)
Member of APEC Business Advisory Council (ABAC)
Councilor of Fuji Xerox Co., Ltd.

"Towards a Recycle-Based Economy"

Mr. Yonemura first gave a brief introduction of ABAC and its role. He explained the details of Fuji Xerox's activities on recycling and the Eco-town project in Kitakyushu, Japan.

Introduction of ABAC (APEC Business Advisory Council)

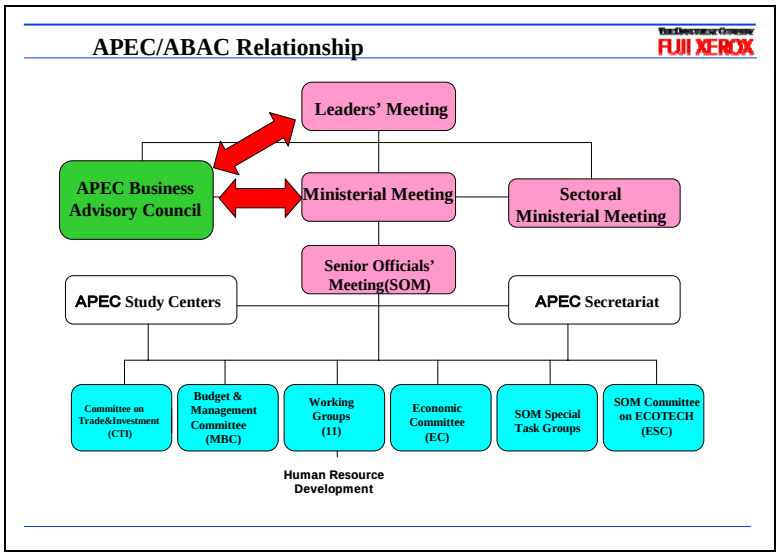


Figure 1

ABAC was established in November 1995 and there are 21 members participating in this. The ABAC and APAC relationship is as shown in Figure 1.

The role of ABAC is to provide advice on specific business sector priorities and business-related issues or to provide a business perspective on specific areas of cooperation. According to the ABAC Recommendations in

2004, the members should "work together to address critical capacity-building needs at the institutional, organizational and human level".

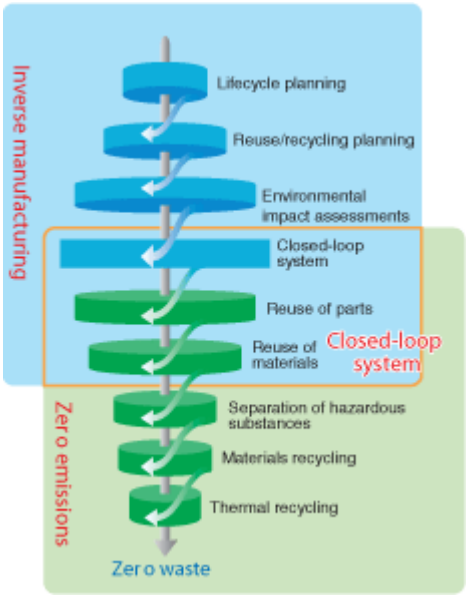
ABAC also proposed recommendations on the Recycle-Based Economy (2003):

- Identify issues and challenges associated with the implementation of recycling programs within APEC member economies;
- Share the industry's best practices in implementing recycling systems;
- Identify capacity-building needs to advance a recycling-based economy;
- Design, develop, and conduct capacity-building programs on a pilot basis within selected member economies;
- Establish a network of experts, including those from the private and business sectors, to share information on recycling.

Effective usage of resources would contribute to preserving the global environment. The contribution of additional investment and technology transfer would promote waste material treatment and recycling in the recipient economy and create new business opportunities. This seminar was also part of activities to promote these contributions.

Fuji Xerox's activities and challenges for Sustainable Growth

Mr. Yonemura introduced the status of the electronics industry of Japan. In recent years, Japan's overseas production ratio for the main domestic electronic appliances had been increasing steadily. Because of this, the trade pattern of Asia had also changed dramatically. Japan had to import more electronics from overseas, so new rules were required for used-product recycling. This was also the reason that APEC started the RBE project in 2003.



Mr. Yonemura gave an overview of his company, Fuji Xerox. Fuji Xerox was established in 1962 as a joint venture of Fuji Photo Film Co., Ltd and Xerox Limited. Its major products are digital color copying machines and printers.

As part of its corporate societal responsibility (CSR) efforts, Fuji Xerox formulated an "Integrated Recycling System", which was based on a closed-loop system designed for effective use of resources, and treats end-of-life products as valuable resources instead of as waste. Two approaches were used for each process in the product lifecycle from upstream to downstream. One was "inverse manufacturing" —the creation of products with low environmental impact by reusing parts in a closed loop. The other was "zero emissions" —the use of the resources contained in parts that cannot be reused whole.

Recently Fuji Xerox had established the Eco-Manufacturing Company in Thailand, as an

integrated recycling system based on an international resource recycling network that comprises nine economies or regions in its Asia-Pacific territory. The main tasks of this company were collection, disassembly and separation of used Xerox office equipment. These activities were expected to help achieve zero-landfill. In Thailand, a higher material recovery ratio could be achieved thorough manual disassembly: the separation category and plastic types were 64 and 14, while for Japan the equivalents are 44 and 6 types. Some parts which contained hazardous substances that could not be treated in Thailand, would be exported to Japan under the strict tracking system.

Kitakyushu Eco-Town Project

Mr. Yonemura introduced the Eco-Town Project, which was initiated recognized by the Japanese Ministry of Economy, Trade and Industry (METI). The objective of the Eco-Town Project was to build a resource-circulating society through reduction of waste and promotion of recycling, and to promote local industry through the enhancement of the environmental industry. METI provides financial support for the construction of leading Recycling Facilities. Eco-towns were now located in 23 districts.

The Eco-Town Plan was made through the joint cooperation of local government, citizens and industries based on local know-how or characteristics. The City of Kitakyushu had established the "Kitakyushu Eco-Town Plan" as a basis for promoting environment/recycling industries, and had embarked on its implementation in the Hibikinada area of Wakamatsu ward. Besides recycling facilities, there was the practical research area, in Kitakyushu Eco-Town. It carried out a number of R&D projects by venture business, universities, etc.

Mr. Yonemura ended his talk by identifying the practices within economy and ecology that should be carried out at different levels: national, local, enterprise or citizen levels. He also said that the Japanese government took strong leadership and proposed the 3R Initiative, which must be pursued globally a sound material-cycle society through the "3Rs" of reduce, reuse and recycle. International collaboration had become more important for creating cooperation bases for the development of strategy, technology, human resources and public awareness, as well as in the area of implementing international rules (e.g. trade).

Conference on
"A Recycling-Based Economy & China's Western Development"

Yinchuan, China
June 3-5, 2005

PROGRAM

June 3 "Toward Establishing a Recycling-Based Economy in APEC"

Registration **8:30-8:45**

Opening Session **9:00-10:00**

（Chairperson: **Liu Xuejun**, Mayor of Yinchuan）

Opening Remarks **Takato Ojimi**
Vice President, Institute for International Studies & Training

Welcome Remarks **Wang Zhengwei**
Standing Member of CPC Committee of Ningxia Hui Autonomous Region,
Vice Chairman of Ningxia Hui Autonomous Region

Opening Speechs **Mao Rubai**
Director, Environmental Protection and Resources Conservation Committee of the National People's Congress of P.R.China

Zhang Lijun
Deputy Minister, State Environmental Protection Administration of P.R.China

Coffee Break **10:00-10:15**

Keynote Speeches 1 **10:15-11:15**

Chira Hongladarom Lead Shepherd, APEC Human Resources Development Working Group
Yasuo Tanabe Vice President, Research Institute of Economy, Trade and Industry, IAA, Japan

Presentation 1 "Current Status and Future Prospect for a Recycling-based Economy in APEC" **11:15-11:45**

Allan Goddard Manager, Resource Efficiency, Auckland Regional Council, New Zealand

Lunch **12:00-13:00**

Presentation 1 "Current Status and Future Prospect for a Recycling-based Economy in APEC" **14:30-16:30**

Thumrongrut Mungcharoen
Director,Cleaner Technology and Eco-Design Research Unit, KU, Thailand

Cai Rang CEO, Advanced Technology & Materials Co.,Ltd., P. R. China

Michikazu Kojima Research Fellow, Development Studies Dept., Institute of Developing Economies, JETRO, Japan

Zhu Zhenlin CEO, Ningxia Darong Group, P.R.China

Coffee Break **16:30-16:45**

Panel Discussion "Overcoming Challenges for a Recycling-based Economy" **16:45-17:45**

Coordinator: **Inaba Etsu,** Institute for International Studies & Training, Japan

Panelists:

Allan Goddard Manager, Resource Efficiency, Auckland Regional Council

Michikazu Kojima Research Fellow, Development Studies Dept., Institute of Developing Economies, JETRO

Thumrongrut Mungcharoen
Director, Cleaner Technology and Eco-Design Research Unit, KU

Cai Rang CEO, Advanced Technology & Materials Co.,Ltd.

Zhu Zhenlin CEO, Ningxia Darong Group

Reception Banquet **18:30-20:00**

Hosted by Yinchuan Municipal Government

June 4 "Toward Establishing a Recycling-Based Economy in APEC"

Keynote Speeches 2 **14:30-15:00**

Setsuo Iuchi Director, Recycling Promotion Division, Ministry of Economy, Trade and Industry, Japan

Presentation 2 APEC Collaboration for a Recycling-based Economy **15:00-15:30**

Edward McBean Vice president, Conestoga-Rovers & Associates, Canada

Presentation 3 Sustainable Economic Development in the Western China: "Challenges and Opportunities" 15:30-17:00

Longyun Peng	Economist, PRC Resident Mission, Asian Development Bank
Bao Jian	Mayor-assistant, Yinchuan Municipal Government, P. R. China
Johnny Chai	Vice President, JCI Group, Malaysia
Dong Ling	Director, Yinchuan Ningdong Energy and Heavy Chemical Industry Base, P. R. China
Lee Swee Chye	Managing Director, EONGTA (M) Sdn. Bhd., Malaysia

Coffee Break 17:00-17:15

Closing Session 17:15-17:55

Chairperson: **Li Wenzhang**, Vice Secretary of CPC Yinchuan Municipal Committee
Director, Yinchuan Economic Development Zone

Concluding Presentation "Recycling-based Economic Development from the Business Perspectives" 17:15-17:45

Noriyuki Yonemura ABAC Japan Representative / Counselor, Fuji Xerox Co., Ltd.

Closing Remarks 17:45-17:55

Liu Xuejun Mayor of Yinchuan Municipal Government

Reception Banquet 18:30-20:00

Hosted by IIST

June 5

World Environment Day Comemorial Event 8:30-12:00

Summary of Pattaya Symposium

"APEC Capacity Building on a Recycling-based Economy: Guidelines for Thailand"

June 24-25, 2005
Siam Bayshore Resort & Spa
Pattaya, Thailand

Organized by: Asia-Pacific Economic Cooperation (APEC),
Institute for International Studies and Training (IIST),
National Metal and Materials Technology Center (MTEC),
National Science and Technology Development Agency (NSTDA),
Ministry of Science and Technology (MOST),
Foundation for International Human Resource Development (FIHRD),

Co-organized by:
Electrical and Electronics Institute (EEI),
Thailand Automotive Institute (TAI)
Thailand Textile Institute (THTI)

1. Purpose of the symposium

The main purpose of this symposium is to raise awareness and build capacity among local participants and public on recycling technologies and a recycling-based economy (RBE) specific to electrical & electronics (EE) industry, automotive industry, and textile industry which are the 3 key industrial sectors of Thailand.

2. Details of the symposium

2.1 Recycling Plants Visit on June 24, 2005

Main purpose: to familiarize the participants with the current recycling status in Thailand

- EE route: CRT glasses recycling and copying machines recycling
- Automotive route: tire recycling and batteries recycling

2.2 Presentation and group discussion on June 25, 2005

Opening Ceremony

The symposium started with the Welcome Addresses by:

- **Dr. Thumrongrut Mungcharoen**, Expert of MTEC/NSTDA, and Director of CT & EcoDesign Research Unit at Kasetsart University, Thailand.
- **Dr. Chira Hongladarom**, Lead Shepherd of APEC HRDWG, and Secretary-General of FIHRD, Thailand.

followed by the Opening Remarks from:

— **Mr. Takato Ojimi**, APEC Project Overseer, and Vice President and Managing Director of IIST, Japan.
— **Dr. Paritud Bhandhubanyong**, Director of MTEC/NSTDA, Thailand.
— **Dr. Sakarindr Bhumiratana**, President of NSTDA, Thailand.

Session 1: Automotive Industry

Mr. Yoshio Nakatani (Japan)**,**
Chief Operating Officer of Japan Automobile Recycling Promotion Center

"ELV Recycling System in Japan"
- There is a massive waste in Japan's automotive industry (more than 5 million automobiles) and Japan uses 3R Principle: Reduce, Reuse, and Recycle as solution
- Objectives of Japan's ELV recycling Law aim to evolve Japan into a Recycling-based society and to contribute to the protection of the environment
- Features of Japan models
  - Vehicle manufacturers responsible for recycling ASR (Automobile Shredder Residue), airbag, and fluorocarbon
  - Advance payment of the recycling fee for new vehicles at the time of purchasing and for vehicles in use at the time of periodic inspection
  - Separate marking of the recycling fee
  - ELV treatment information
  - Recycling-Registration linkage
  - Support of local administrations
  - Making full use of JARC in fund management, information management and local administration support
- Target of ELV Recycling Rate
  - Further development of recycling technologies
  - Further use of recyclable materials
- Recommendations
  - Each country should develop its own ELV recycling system that matched the national condition

Mr. Tae-Wook Yoo (Korea)
Senior Research Engineer of Eco-Technology Research Team, Advanced Technology Center, Hyundai KIA motors

"Status of Automobile Recycling in Korea"
- Status of Korea Automobile Industry & ELVs
  - Growth up every year, about 14.5 million automobiles in 2003
  - Ratio of No. of ELV/Dismantle ~ 1,739
- Regulation of ELVs in Korea
  - Automobile management
  - Resource saving & Recycling promotion
- Activities for promoting auto recycling in Korea
  - Development of environment friendly dismantling system
  - Development of analysis standard
  - Development of ASR treatment technology

- Recycling activities of Hyundai & Kia motors
  - Carpet recycling
  - Bumper recycling
  - Pad type instrument panel recycling
  - Seat recycling
  - Weather strip recycling
  - Bumper GMT Back Beam recycling

Mr. Vallop Tiasiri (Thailand)
Director of Thailand Automotive Institute

"Overview of a Recycling-based Economy: System and Technologies in Automotive Sector in Thailand"

- Thailand automobile industry overview
  - Growth up every year: 950,000 automobiles and 2.8 million motorcycles in 2004
- ELV Directive 2000/53/EC
  - By Jan. 1, 2006
    - Reuse and recovery 85% by adv. wt./vehicle and yr
    - Reuse and recycle 80% by adv. wt./vehicle and yr
  - By Jan. 1, 2015
    - Reuse and recovery 95% by adv. wt./vehicle and yr
    - Reuse and recycle 85% by adv. wt./vehicle and yr
- ELV movement in Thailand
  - Green car project
  - Parts recycling
  - Products testing
  - Manufacturer's awareness
- Thailand's future ELV efforts
  - Increase recovery and recycling
  - Integrate in the design and production of new vehicles
  - Use alternative materials for recycling purpose

Session 2: Electrical and Electronics Industry

Mr. Yung-chiech Yu (Chinese Taipei)
Director of Northern Branch, Bureau of Environmental Inspection, Environmental Protection Administration

"Overview of Recycling Technology in Electrical and Electronics Industry in Taiwan and in the World"

- Current status analysis
  - Germany: DSD system and Cyclic economics system
  - France: Eco-Emballages Company, operate WEEE recycling system
  - UK: Producer liability system and Recycling credit system
  - Japan: Consumer, Local public community and Business holder joint liability system
- Recycling system in Taiwan
  - The material stinting period before 1988
  - Producer-duty-recycling period (privately operate with organization from: 1988-1997)

- Semi-official recycling period; the recycle foundation committee period (officially owned operate July 1997-June 1998)
- Period that government established the recycle fund and performed public recycling activity (official owned and operated 1998-to date)
- Legal accordance-Article 15 of Waste Disposal Act

➢ Recycling Strategy
- In the production stage: from raw material application to use and sell the ready-made merchandise. In this stage, we focus on the amount-reduction control of waste by updating process and improving production technologies, as well as reducing the unnecessary resource consumption.
- In the removing/treating stage: from inputting waste into the treating plant to convert the waste into recycling material. In this stage, we emphasize to make recycle task, trying best to recycle the valuable resource waste back and apply it again.
- 5R strategy: reduce, reuse, repair, refuse and recycle.

➢ Future vision
- The trend of waste management policy in Taiwan has changed from preventing public hazard to sustainable utilization to managing direction from terminal to source of waste
- Using the economic market mechanism and combining the waste-source-generation system and resource recycling system, to process the resource works together

Mr. Charuek Hengrasmee (Thailand)
Director of Electrical and Electronics Institute

"Current Status of Recycling in E&E Industry in Thailand"
Past activities
- National Committee on WEEE & ROHS was established
- EEI study project on WEEE & ROHS (Dept. of Foreign Trade: MOC)

➢ Current Measures and On-going Plans
- DIW Project on EE Recycling Plant
- PCD F/L Lamp Recycling Plant Feasibility Study
- OIE and PCD (Draft) Strategic Plan on WEEE Management
- NESDB/EEI Green Productivity Movement Project
- FTI/EEI/TISTR/MTEC: Pilot Project on EE Recycle

➢ Conclusion
- Waste collection
- Separation/Recycling system
- Waste treatment
- Funding&Cost effectiveness of waste management system

Session 3: Textile Industry

Mr. Yoshikazu Yamasaki (Japan)
Head of Osaka Office and Manager of Technical Department, Japan Chemical Fibers Association

"Overview of Recycling Technology in Textile Industry in Japan and the World"
Administration country measures on the textile product recycling promotion in Japan
- Waste management law

- Law for promotion of Effective Utilization of Resource
- Green purchasing law

➢ The development of textile recycling technology in Japan
- Mechanical recycling
  - Wiping cloth, shoddy
  - Synthetic fiber 100% re-melting and molding material
- Chemical recycling
  - De-polymerized to the raw materials
- Thermal Recovery
  - Incineration with heat recovery
  - Cement kiln as raw material and fuel
  - Reuse derived fuel
- Others
  - Blast furnace
  - Heat decomposing to the oil

➢ The development of carpet recycling technology
- Recycling of Cutting chips

Mr. Virat Tandaechanurat (Thailand)
Director of Thailand Textile Institute

"Current Status of Recycling in Textile Industry in Thailand"

➢ Recycling in Textile industry in Thailand
- Process chemicals & Raw materials: Recycle
- Production waste: Mostly Recycle
- Consumer: Reuse
- No recycle of fibers from the used garments

➢ Summary
- Recycle of fiber production waste: Re-polymerization 18%, Reprocess and other application 82%
- Recycle of Chemical: glycol, caprolactam and processing chemical
- Recycle/reuse of water
- Recycle/reuse of yarn/fabric and garment: Recycle in plant
- No recycle of used fiber from garment

Session 4: Presentation on Future Direction of a Recycling-based Economy in APEC

Mr. Michikazu Kojima (Japan)
Research Fellow of Institute of Developing Economies, JETRO

"Towards Appropriate International Recycling and Re-use"

➢ Current situation
- Technology of recycling waste
  - PET
  - PS
  - Computer and CRT
  - Automobile part
- Collection system: Who? And How?

- Current problem
  - International trade of Secondhand goods and Waste
  - Pollution of Recycling factory
  - Lack of Recycling factory
  - Large volume of waste from recycling import waste
- Recommendations
  - The information on recycling industry and secondhand market is limited. Basic statistics on recycling should be collected in official statistic system.
  - Pollution control of recycling industries is a precondition for promoting recycling and trans-boundary movement of recyclable resources. Or developing economies should design trade policy on recyclable resources in order to promote environmentally sound recycling.
  - The enforcement of controlling illegal shipment of hazardous waste should be strengthened through international cooperation.
  - Standard of exporting and importing recyclable waste should be re-examined from the view point of recycling technology in developing economies. To minimize the waste disposal in developing economies, the standard should be taken into account the process of recycling.
  - Procedure to export and import hazardous waste should be established in every economy. It is very difficult to handle all of hazardous waste within an economy. If proper recycling is ensured, the time to get approval of export and import should be shortened.
  - There is no international consensus on international trade of secondhand goods. We should study merit and demerit of international re-use, and how to manage it from the view point of resource conservation and recycling.

Mr. Tomio Watanabe (Japan)
General Manager of Asset Recovery Management, Fuji Xerox

"International Resource Recycling System"
- Fuji Xerox uses 3R system
- Fuji Xerox Eco-Manufacturing in Thailand
  - Landfill waste: 0.4%
  - Material recycle: 10.8%
  - Thermal recycle: 88.8%
- Integrated Recycling System in Asia-pacific region
  - Prevent illegal dumping by the collection by manufacturer
  - Not to incur environmental impact in importing economy
  - Not to generate waste in the importing economy
  - Provide benefits to the importing economy

Dr. Thumrongrut Mungchareogn (Thailand)
Expert of MTEC/NSTDA, and Director of CT & EcoDesign Research Unit at Kasetsart University

"Future Direction of a Recycling-based Economy in APEC"
- Current recycling system in Thailand
  - 14.4 M tones solid wastes in 2003, Recycle-able waste potential 6.8 M tones

- 9th National Economic and Social Development plan
  - Supporting the segregation, take back and recovery of waste at least 30%
  - Promoting the waste recovery and Cleaner Technology (CT)
- Industry practices: examples of Toyota, Michelin Siam, Siam Cement Group, etc.
- Green movement: CT, LCA (3-yr Thai national LCA database project), EcoDesign (TGDN), GSC, government green procurement, etc.

➢ Future direction of RBE in APEC
- Share Good Practices for RBE among APEC
  - Extended producer responsibility and "take-back" recycling program
  - Product information disclosure using life-cycle-concept
  - Government Green Procurement/ Purchasing + Tax & Financial incentives
  - Eco-industrial park, Pay-per-back strategy, Effective collection system
  - Raise awareness + Strengthen legislation + Implement DfE/ LCA/ CP
- Collaboration for a Recycling-based Economy in APEC
  - Raise awareness among government, enterprise/industry associations, recycling industry, NGO/academia/HRD institutions, and individual consumers
  - Develop national and regional strategy and action plan + legal framework
  - Understand alternative tools to encourage recycling
  - Address trade issues + Harmonise standards, définition, statistics, etc.
  - Develop comparable monitoring and evaluation system
  - Build capacity of recycling industry
  - Share industry specific approaches for sustainability of the system
- List of Possible collaboration projects
  - Prepare APEC technical guidelines (good practices for RBE)
  - Set up Training courses/ awareness raising campaign/ seminars/ etc. on RBE
  - Facilitate a global community to share knowledge on RBE
  - Collaborate on "Trans-boundary movement of wastes"

Session 5: Group Discussions on future Direction of a Recycling-based Economy for Thailand for Electrical & Electronics, Textile, and Automotive sectors

Electrical and Electrics group:

➢ Identification of problems
- Short life span of products
- Illegal dumping
- Free riders
- Recycling facilities
- Pollution from recycling processing
- Lack of awareness
- Lack of recycling technical knowledge
- No standard in recycling plants
- No marketing routes of recycled products
- No confidence from customers in terms of quality, safety, and associated environment impacts of recycled products

➢ Vision statement by 2020:
1. Sustainable RBE
2. Sustainable consumption and production
3. Zero landfill

4. Green society
5. Innovation technology
6. Extended life span of products
7. Establishment of eco-industrial park

- Directions to move towards RBE
  1. Raising awareness: communication through media, education in all levels, campaign by NGOs
  2. Legislative measures: government, green procurement laws, systematic waste management (3Rs), standards
  3. Knowledge management of recycling technology
  4. Evaluation and judging the potential for recycling activities
  5. R&D, plus technology transfer from foreign experts

Automotive group:

- Current Situation
  - Recycle has high cost
  - Lack motivation, funding, knowledge, technology, and awareness.
  - Law & regulations: export, in-house
- Counter measures: incentive, tax, SME/ Government Subsidies and Education
  - Education done by MTEC, Ministry of Industry (MOI), and TAI
    - Consumer/ Producer ⟶ Training pilot project ⟶ Expansion
  - Incentive > manufacturers
    - Green loan-SME bank
    - Low interest-SME bank (improve their technologies)
    - Green label – TAI, TRF, TISI, TEI
    - Tax, fee-MOF, BOI
  - Enforcement > PCD, TISI, DLT
    - Survey the capability of the suppliers (especially local suppliers)
    - Plan for time frame for regulations on recycling standard
    - Increase the target step by step

Textile group:

- Improvement of Production Processes to be more effective
  - Source reduction in process
  - Promote recycle technology transfer
  - Right first time process
- Develop recycle social system
  - Raise awareness and 3R principle
  - Involve stakeholders including end-users to maximize recycle
  - Improvement of law and regulations/standard of waste
  - Government help and support in recycle
  - Central facilities for recycle
  - Banks to collect old fabric

Closing ceremony

— **Dr. Thumrongrut Mungchareogn,** Expert of MTEC/NSTDA, and Director of CT & EcoDesign Research Unit at Kasetsart University, Thailand

— **Mr. Takato Ojimi,** APEC Project Overseer, and Vice President and Managing Director of IIST, Japan.
— **Dr. Chira Hongladarom,** Lead Shepherd of APEC HRDWG, and Secretary-General of FIHRD, Thailand.

3. Lessons learned from the symposium

(What was useful for you and the rest of the Thai experts?)

The symposium provided a good opportunity to learn recycling technologies and the recycling-based economy (RBE) from APEC experts. The participants and experts also had a chance to exchange opinions and experience on various important topics such as the current situation and problems, then the vision set by the year 2020, and finally the directions to move towards RBE for the three key sectors in Thailand namely electrical and electronics, automotive, and textile sectors.

(What were not adequately covered and would like you to further pursue?)

This APEC RBE symposium in Thailand has run successfully according to the planned objectives despite time constraint for the preparation of the event. Not only the participants in the symposium, but also the general public of Thai people have had an opportunity to learn recycling technologies and the recycling-based economy (RBE) from the coverage of the reporters from newspapers, television stations and weekly magazines. As mentioned earlier, this symposium is focused only on the three industrial sectors (EE, Automotive and Textile) therefore it would be more benefitial to Thailand if we could promote and disseminate this RBE knowledge to other industrial sectors in the future.

4. Acknowledgement

The symposium would not have been possible without the hard work of all of the organizers especially the staff of MTEC and IIST, and the tireless contribution from the participants and the experts (both local and APEC).

Symposium on
"APEC Capacity Building on a Recycling-based Economy: Guidelines for Thailand"

Pattaya, Thailand
June 24-25, 2005

PROGRAM

June 24, 2005: Site visits to recycle plants:

9.30-18.00 1st route: CRT and copy machine-recycling plants
2nd route: Tire and battery-recycling plants
19.00-20.00 Welcome Dinner at Bali Hai Garden

June 25, 2005: Technical presentations and panel discussions

8.30-9.00 **Registration**
9.00-9.20 **Welcome Address**

- **Dr. Paritud Bhandhubanyong,**
  Director, National Metal and Materials Technology Center (MTEC),
  National Science and Technology Development Agency (NSTDA)
- **Dr. Chira Hongladarom,**
  Lead Shepherd, APEC Human Resource Development Working Group
  Secretary-General, Foundation for International Human Resource Development (FIHRD)

9.20-9.30 **Opening Remarks**

- **Mr. Takato Ojimi,**
  APEC Project Overseer and Vice President
  Managing Director, Institute for International Studies and Training (IIST)
- **Dr. Sakarindr Bhumiratana**,
  President, National Science and Technology Development Agency (NSTDA)

9.30-9.40 **Group Picture**
9.40-10.00 **Coffee Break**

Overview Presentations of a Recycling-based Economy:Systems and Technologies in APEC

10.00-11.00 **Session 1: Automotive Industry**

- **Mr. Yoshio Nakatani,**
  Chief Operating Officer, Japan Automobile Recycling Promotion Center, Japan
- **Mr. Tae-Wook Yoo,**
  Senior Research Engineer, Eco-Technology Research Team, Advanced Technology Center, Corporative Research & Development Division, Hyundai KIA motors, Korea

- **Dr. Vallop Tiasiri,**
  Director, Thailand Automotive Institute, Thailand

Overview Presentations of a Recycling-based Economy: Systems and Technologies in APEC (continued)

11.00-11.40 **Session 2: Electrical and Electronics Industry**

- **Mr. Yung-chiech Yu,**
  Director, Northern Branch, Bureau of Environmental Inspection
  Environmental Protection Administration, Chinese Taipei
- **Mr. Charuek Hengrasmee,**
  Director, Electrical and Electronics Institute, Thailand

11.40-12.20 **Session 3: Textile Industry**

- **Mr. Yoshikazu Yamasaki,**
  Head of Osaka Office and Manager of Technical Department,
  Japan Chemical Fibers Association, Japan
- **Mr. Virat Tandaechanurat,**
  Director, Thailand Textile Institute, Thailand

12.20-13.30 **Lunch**

Presentations & Group Discussions on Future Direction of a Recycling-based Economy in APEC

13.30-14.30 **Session 4: Presentations on Future Direction of a Recycling-based Economy in APEC**

- **Mr. Michikazu Kojima,**
  Research Fellow, Inter-disciplinary Studies Center Institute of Developing Economies, Japan
- **Mr. Tomio Watanabe,**
  General Manager, Asset Recovery Management, Fuji Xerox, Japan
- **Dr. Thumrongrut Mungcharoen,**
  Expert, MTEC, NSTDA, and Director, CT & EcoDesign Research Unit,
  Kasetsart University, Thailand

14.30-15.30 **Session 5: Group Discussions** on Future Direction of a Recycling-based Economy in Thailand for Electrical & Electronics, Textile, and Automotive sectors
By Local Experts and Participants

15.30-15.45 **Coffee Break**

15.45-16.30 **Session 6: Group Presentations & Conclusions**
By Local Experts and Participants

16.30-16.45 **Session 7: Closing Remarks**

Capacity Building for a Recycling –Based Economy in APEC
Wrap-up Meeting

Chinese Taipei
October 12-14, 2005

PROGRAM

October 12 (Wed.)	**1. Visit Recycling Facilities**
14:30~17:10	Visiting Electric & Electronic equipments recycling plant (**E&E RECYCLING, INC**, in Yang-Mei Township, Tao-Yuan Hsien) Visiting the used Motors recycling plant (**Kuan-In Waste Automobile Processing Plant**, in Kuan-yin Township)
18:00~19:30	Welcome Dinner (Hosted by EPA)
October 13 (Thu.)	**2. Workshop with Experts from Chinese Taipei**
09:00~09:50	Meet with the EPA Minister, **Dr. Kow-Lung CHANG** - Welcome Remarks by Minister CHANG - Introduction of EPA & APEC project - Exchange of Views
10:00~12:00	Workshop with experts from Chinese Taipei (chaired by Director General of EPA, **Dr. Gwo-Dong Roam**) - Briefing on the current issues and measures of the resource recycling in Chinese Taipei - Discussion: "How to Reach the Goal of Zero-waste in 2020 by Practicing a Recycling-Based Economy" The sub-topics: (1) Legislative and Administrative Aspect (2) Industry and Commercial Aspect (3) Research and Development Aspect (4) Non-Government Organization Aspect
12:00~13:30	Welcome Lunch (hosted by EPA)
October 13 (Thu.)	**3. Wrap-Up Meeting**
14:00~18:00	Session (1) Briefing of Past Activities
18:00~19:00	Working Dinner
19:30~22:00	Session (2) Discussion of Report & Drafting Session
October 14 (Fri.)	
09:00~12:00	Session (3) Finalization of Report
12:00~13:00	Lunch
19:00~21:00	Dinner (hosted by IIST)

List of Experts from Chinese Taipei

Ms. Soon-Ching Ho	Director General	Department of Waste Management, EPA
Ms. Chuen-Lan Yen	Deputy Executive Secretary	Recycling Fund Management Board, EPA
Dr. Min-Shing Tsai	Professor	Department of Resource Engineering National Cheng Kung University
Dr. Tien-Chin Chang	Associate Professor	Graduate Institute of Environmental Planning and Management National Taipei University of Technology
Dr. Yuh-Ming Lee	Professor	Institute of Natural Resource Management National Taipei University
Mr. Fong-Sheng Tu	President	EME Recycling Co., LTD (Electronics Treat Plant)
Dr. Jack C. T. Hsu	Vice President	Chung Tai Resource Technology Corp. (Fluorescent Lamp Treat Plant)
Mr. Kensun Cheng	General Manager	Sun-Chi-Yuan Environmental Protection Technology Co., LTD (Automobile and Motorcycle Treat Plant)
Mr. Winston Liu	President	Super Dragon Technology Co., LTD (IT Objects Treat Plant)
Ms. Mei-Chuan Yen	President	Homemaker's Union and Foundation (NGO)

List of APEC Experts & Representatives

Dr. Edward A McBean (Canada)	Vice President	Conestoga-Rovers & Associates
Mr. Kojima Michikazu (Japan)	Research Fellow	Inter-disciplinary Studies Center, Institute of Developing Economies
Mr. Yonemura Noriyuki (Japan)	Counselor	Fuji Xerox Co., Ltd.
Mr. Arturo Davila Villarreal (Mexico)	General Director	Ingenieria Y Desarrollo Sustentable S.A.. de C.V.
Mr. Allan Robert Goddard (New Zealand)	Manager, Resource Efficiency	Auckland Regional Council
Mr. Yu Yung-Chiech (Chinese Taipei)	Director	Northern Branch, Bureau of Environmental Inspection, Environmental Protection Administration
Dr.Thumrongrut Mungcharoen (Thailand)	Director	Cleaner Technology and Eco-Design Research Unit, KU
Dr. Terazono Atsushi (Japan)（Observer)	Senior Researcher	National Institute for Environmental Studies
Mr. Ojimi Takato (Japan)	Managing Director	Institute for International Studies and Training & APEC Project Overseer
Ms. Inaba Etsu (Japan)	Director	Human Resource Development Department, Institute for International Studies and Training
Ms. Kawanishi Aki (Japan)	Staff	Human Resource Development Department, Institute for International Studies and Training