



GEC

Eco-town Initiatives by Private Sectors and Local Governments in Japan

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Eco-town Program in Japan

- In Japan, the Eco-town Program is promoted by the Ministry of Economy, Trade and Industry (METI) and the Ministry of Environment (MOE) and operated by local governments, aiming at creating resource-recycling socio-economic systems by promoting waste reduction and recycling, and stimulating local industry and economy by promoting recycling businesses.
- UNEP/IETC focused on the concept of the eco-town program in Japan, and has been implementing pilot projects to promote the concept in Bandung, Indonesia and Penang, Malaysia since 2004.

Profile of GEC

- Global Environment Centre (GEC) is a supporting organization of the UNEP/International Environmental Technology Centre (UNEP/IETC) in Osaka, Japan.
- GEC has been supporting “UNEP/IETC’s Eco-Town Project” since 2004. With the aim of facilitating the improvement of waste management and the transition to a recycling oriented society in developing countries, GEC has been disseminating information on the concepts, policies, and approaches of Eco-towns in Japan, carrying out surveys on the state of waste management and recycling industries developing countries, organizing seminars on Eco-towns, and preparing reports and publications.

Eco-Town Recycling Technology Database Project

- In order to promote and facilitate the development of Eco-towns in developing countries, GEC started a new activity to create an “Database of Eco-town Recycling Technologies in Japan” in 2009.
- The objective of the database is to disseminate information that will be good references for developing countries in actually creating policies, plans, and approaches for Eco-town development. The following information will be included in the database.
 - What types of recycling technologies are available? What should be taken into account when applying such technologies?
 - What kind of initiatives and approaches are available for promoting eco-towns?

Needs Survey on Recycling Technologies for Eco-Town Development

- Before starting the development of the technology database, surveys were carried out to identify the needs for recycling technologies which will support to create recycling oriented societies. The surveys were carried out based on a list of recycling technologies used in Eco-towns in Japan.
- The surveys were carried out in 2009 in Bandung, Indonesia and Penang, Malaysia, which are the pilot cities for UNEP/IETC's Eco-town project. The surveys were carried out by the Institute of Ecology (IOE) of Padjadjaran University in Bandung and the Socio Economic Research Institute (SERI) in Penang.

Results of Needs Survey on Recycling Technologies (1)

Waste classification	Type of waste	Recycling technology
Waste plastic	Waste plastic	Shredding / sorting/ manufacturing recycled products
	Waste plastic	Shredding / granulation / dechlorination / decomposition / distillation / recycled oil recovery
	Waste PET bottles	Sorting by label / sorting by bottle color / shredding / washing
	Waste plastic, waste PET bottles	Pelletization
	Used textiles, used clothes, waste polypropylene	Cutting up / thermal compression
Waste wood	Waste plastic + waste timber	Crushing / melting / stirring / mixing / molding
	Waste wood	Sorting / crushing / carbonizing / board manufacturing
	Waste wood	Fiberizing/ manufacturing mats with needle machines
	Food waste	Bio-gasification
	Sludge + food residue + rice hulls	Mixing / processing

Results of Needs Survey on Recycling Technologies (2)

Waste classification	Type of waste	Recycling technology
Waste paper	Hard-to-recycle waste paper	Pulping / removal of foreign materials / bleaching / processing
	Paper containers and wrapping	Shredding / manufacturing litter bed for livestock
	Waste Newspaper	Turning into cellulose fiber
Other	Waste tires, waste rubber	Kneading / processing / molding
	Glass bottles (one-way bottles)	Cleaning / inspection / crushing into cullet
	Used fluorescent tubes	Crushing / sorting
	Household electric appliances, office automation equipment	Dismantling / crushing / sorting out materials
	Sludge and dust that contains valuable metals	Drying / melting / reducing
	Incineration ash + combustion residue + sludge	Pre-processing / blending / burning

Survey on Japan's Eco-Town Recycling Technologies

- Based on the results of the needs survey on recycling technologies, GEC carried out surveys to collect the following information regarding recycling technologies adopted in eco-towns in Japan in 2010.

(Eco-town recycling companies: 12)

- Technology process
- Background (Why did the company start the recycling business?)
- Factors in success, difficulties faced, issues and challenges

(Local governments: 10)

- Eco-town plans
- Background (Why did the local government start the eco-town program?)
- Difficulties faced, unique approaches and initiatives, issues and challenges



Case Studies of Private Sector Initiatives in Japan

Case Study of Private Sector Initiative (1)

Recycling of plastic containers & packaging from households and plastic wastes from industries

Name of recycler: PRTEC
Location: TOYAMA City Ecotown



Receiving waste: Plastic containers & packaging from households
Plastic wastes from industries

Products: Polypropylene (PP)/ Polyethylene (PE) flakes
Polypropylene (PP)/ Polyethylene (PE) recycled pellets
Polystyrene (PS) recycled pellets

(waste recycling ratio: 50%)

By-products from recycling process

⇒ Refuse Derived Fuel (RDF)

(waste recycling ratio: 50%)



Main process for PP/PE recovery

Removal of
dusts & solids
using a rotary
drum screen



Manual separation
(wood, paper, aluminum, fiber,
dirty plastics, etc are removed)



Optical Separation
using near-infrared
spectroscopy
(PP/PE separated)



Crushing/
shredding



PP/PE pellets



Pelletizer
(PP/PE fluff
is pelletized)



PP/PE flakes



Air
separation



Gravity separation
(PET,PS,PVC are
removed from PP/PE)



Why did recycling start?

- **City council members** were exploring and inviting new industries in the city.
- The **city government** actively developed the Eco-town plan and invited recyclers.
- By the enforcement of the “Containers and Packaging Recycling Law” (national law), it was expected that **sufficient volume of recyclable waste plastics would be collected** and the plastic recycling business would be **economically viable**.
- Hokuriku Electric Power Company, a **leading company in the area**, is highly interested in the environment protection, and financed part of **capital investment** to establish the recycling company.
- An existing plastic processing company located in the same area participated in establishing the recycling company, and was **ready to recycle the PP/PE material recovered**.



Recovered PP/PE material

Recycled plastic products

Issues and Challenges

- ❑ In the beginning of the operation, the installed recycling facility did **not fit for waste plastics from households.**
- Additional separation process and washing units were required.
- ❑ A lot of **dirty plastic wastes and non-plastic wastes** were mixed in recyclable plastic wastes, accordingly the waste recycling ratio was rather low.
- The recycler carried out **awareness raising** activities on the **importance of waste separation for citizens**, such as tour for the recycling plant, distribution of recycled bags.
- Sales of RDF to private industries increased because of their initiative to **reduce CO2 emission.**



Case Study of Private Sector Initiative (2) Recycle of Waste Plastic Containers & Packaging from Households

Recycler: Cooperative Association of Waste Collection Companies
in Gifu Prefecture

(Number of member companies: 37)

Location: Gifu Prefecture Eco-town

Receiving wastes:

Separately collected waste plastic containers & packaging

Products: Polypropylene (PP)/ Polyethylene (PE) Flakes

(waste recycling ratio: 50%)

By-products from recycling process

⇒ Refuse Plastic Fuel (RPF)

Fuel for cement production

(waste recycling ratio: 40%)



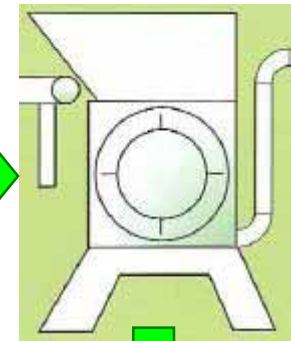
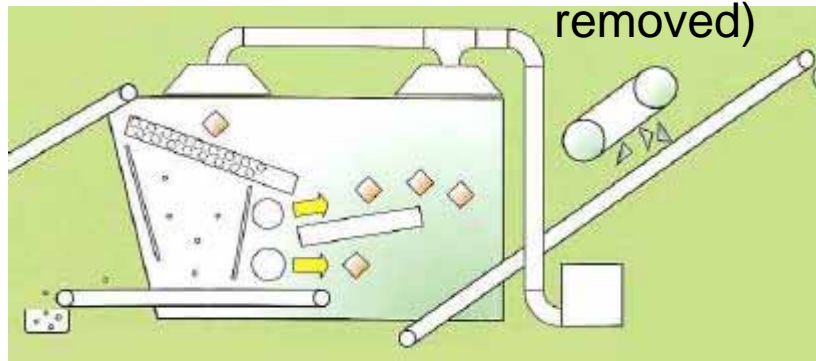
Main process for PP/PE recovery

Air separation
(dusts are removed)

Magnetic separation
(metals are removed)

Manual separation
(wood, paper, aluminum, fiber,
dirty plastics, etc are removed)

Crushing & shredding
(15mm pieces)

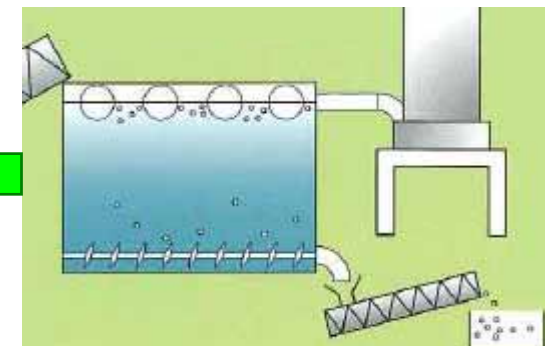
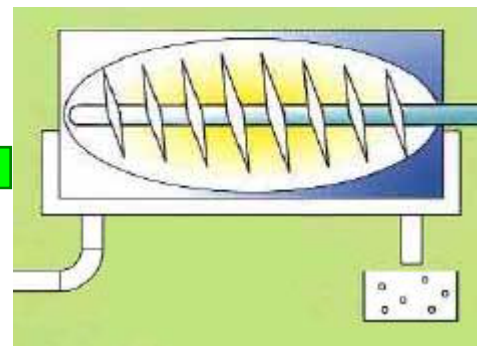
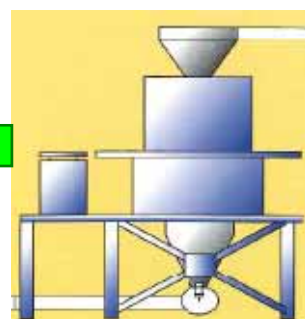


Recovered
PP/PE
material

Semi-thermal
volume
reduction

Centrifugal separation
(settleable plastics (mainly
PET,PS,PVC) are removed)

Gravity separation
(settleable plastics (mainly
PET,PS,PVC) are removed)

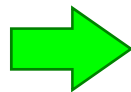


Why did recycling start?

- The Cooperative Association needed to **explore new business**, because it was expected that waste generation volume would decrease due to the progress of separate collection and recycling of wastes.
- The association expected that the operation of recycling business could **increase its competitiveness** in bidding for waste collection services.
- The **Chairman** of the association was **highly interested in the environmental management** and had a **strong leadership**.
- By the enforcement of the “Containers and Packaging Recycling Law” (national law), a mechanism was formulated that **a certain amount of waste plastic recycling cost is paid to recyclers** by a designated governmental affiliated organization. (Recyclers need to participate in the bidding.)
- The association could find a company which can purchase and recycles recovered PP/PE through **business matching arrangement**.



Recovered PP/PE



Recycled Plastic
Cargo Pallets



Recycled Plastic
Parking Stops

Issues and Challenges

- In the beginning of the operation, a lot of **dirty plastic wastes, non-plastic wastes and dangerous objects were mixed** in recyclable plastic wastes.
- Member companies carried out **awareness raising activities for citizens** on waste separation.
- Whenever dangerous objects were found, the association notified the local government of it.
- The association had consultations with local governments about the **criteria of waste separation**.
- The government affiliated organization **discloses the “mixture rate”** of dirty plastic wastes, non-plastic wastes and dangerous objects by local government through the Internet to the public.
- ◆ **The key is how to deepen citizens’ understanding of waste separation.**





Summary of Survey Results on Recycling Companies

Why did the Company Start the Recycling Business? (Multiple answers given)

- Invited to participate in the Eco-town program by the local government: 8 companies
- Enforcement recycling laws (home appliances, containers and packaging, etc.): 7 companies
- Exploring or expanding new business areas: 7 companies
- The company president or parent company had a strong interest in the environment protection: 6 companies
- The company was originally engaged in waste collecting service: 5 companies (municipal waste, waste paper, wood waste, etc.)
- Incorporating new societal demands into the company's business: 3 companies
(Securing rare metals, disposing of confidential documents, etc.)

Factors in Success

◆ Selling of Recycled Products

- Was introduced to companies that purchase recycled products (PE/PP/PET, recycled oil, etc.)
- There were groups that cooperate on selling recycled products.
- Could find companies/local governments that actively purchase recycled products from a CSR standpoint (products made from recycled waste paper, etc.)
- The parent company provided cooperation or support for collecting waste materials or selling recycled products (recycled fluorescent tubes).
- The parent company or affiliated companies agreed to purchase recycled products or residue (metals recovered, slag, methane gas, etc.).

Factors in Success

◆ Technological Aspects

- Applied the company's existing technology or know-how (steel-making, smelting, home electronics, paper-making, etc.)
- Had already developed or established recycling technology (oil production from waste plastic, waste paper recycling, etc.)
- Was introduced to a company that has recycling technology (sorting and crushing waste plastic into flakes, wood waste recycling, etc.)
- Could find an association/organization that cooperate in technology development (waste paper recycling, etc.)

Common Problems

- ◆ Foreign material mixed in recyclable waste material
 - In the case of waste plastic, plastic bottles,
 - Cans, bottles, glass, trash, leftover drink liquid, dirt and sand, batteries, knives



Common Problems

- ◆ Foreign material mixed in recyclable waste material
 - In the case of food waste,
 - Plastic bags, plastic containers, chopsticks, forks, spoons, plastic, paper, cardboard
 - In the case of waste paper,
 - Clips, strings for binding paper, plastic, calculators
 - In the case of wood waste,
 - Nails, clamps, nuts and bolts, chains

Common Problems

Dirty plastic wastes



Clean plastic wastes



Common Suggestions by Recycling Companies

□ Points for success in the recycling business

- How to secure a constant amount of waste materials?
- How to obtain waste materials properly separated?
- How to secure companies/organization/markets/channels which continuously purchase recycled products?



Case Studies of Local Government Initiatives in Japan

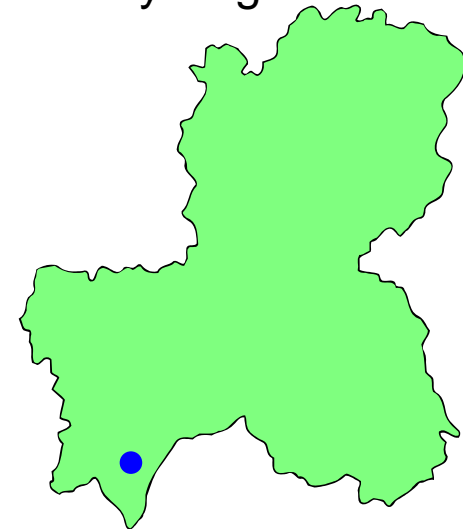
Case Study of Local Government Initiative

(1) Gifu Prefecture Eco-Town

- Start of Eco-town program: 1997
- Preparation of Eco-town plan:
Waste Management Department
& Industrial Promotion Department
of Gifu Prefectural Government
- Number of Recycling Facilities: 2
Recycling facilities are located in a specific area.
- Types of wastes recycled in Eco-Town Facilities:
 - Waste plastic containers & packaging
 - Recycled pellets



Location of
Gifu Prefecture Eco-town
Recycling Facilities



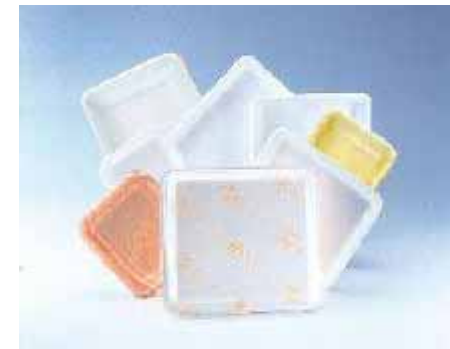
Why Eco-Town program started?

- Gifu Prefecture Government faced a **serious shortage of waste landfill sites** and the difficulty in constructing new waste landfill sites. Therefore, **reduction of waste disposal** was critical for them.
 - In 1997, construction of a waste landfill site was rejected in a referendum.
- The prefecture government needed to **present its waste management policy to citizens**, including not only construction of waste landfill sites but also **development of recycle-oriented system** in the prefecture.
- The governor of the prefecture had a strong leadership in reduction of waste disposal.
- There was a good collaborative relationship between the waste management department and the industry promotion department in the prefecture government.

Unique Initiatives for Eco-Town Development

- “**Comprehensive recycling**” was adopted as a **principle of the waste management policy** of the prefecture, and it was reflected on the master plan of the prefecture.
- To promote the use of recycled products, the prefecture government set up an “**authorization system of recycled good and products**”. (Currently 274 items are authorized by the prefecture government.)
- The prefecture government stipulated “**the priority use of authorized recycled goods and products**” in its general specifications for contracts and procurement.
 - People tend to choose non-recycled goods/products, even the price and the quality of recycled goods/products are equivalent to non-recycled ones. (In particular, people without sufficient **knowledge and understanding of the environment issues.**)

Examples of Authorized Recycled Goods by Gifu Prefecture Government



Case Study of Local Government Initiative

(2) Toyama City Eco-Town

- Start of Eco-town program: 2002
Phase 1: 2002- Phase 2: 2005-
- Preparation of Eco-town plan:
Waste Management Department
of Toyama City Government
- Number of Recycling Facilities: 8
Recycling facilities are located in a designated
Eco Town Industrial park.
- Types of wastes recycled in Eco-Town Facilities:
 - Waste plastic containers & packaging
 - Plastic wastes from industries
 - Wood wastes
 - Food wastes & waste cooking oil from hotels,
supermarkets, food industries
 - Used automobiles
 - Waste fibers, Mixed plastic waste, scrap tires



Location of
Toyama City Eco-Town
Industrial Park



Why Eco-Town program started?

- Toyama City Government faced a **serious shortage of waste landfill sites** and the difficulty in constructing new waste landfill sites. Therefore, **reduction of waste disposal** was critical for them.
- The policy on **recycle-oriented, participatory and action-oriented approaches** had been stated in the environmental master plan of Toyama City.
- In the past, Toyama Prefecture has experienced **river pollution** by cadmium discharged from lead mining. The cadmium pollution had caused **serious disease** among a number of residents in the downstream area. Therefore, **environmental awareness among the residents** was fairly high.
- Waste separate collection was well recognized and implemented among the citizens under the **strong initiative of the city government.**

Unique Initiatives for Eco-Town Development

- The city government carried out a detailed **preliminary survey on the generation volume of recyclable wastes**, and provided the enough data/information when they called for recycling business proposals.
- **Experts of local universities** were invited to a committee as members to select the most appropriate recycling business proposals. The committee examined the business proposals to achieve successful recycling within the region.
- Subsidies were provided for the construction of recycling facilities in **collaboration with industry promotion department** aiming at promoting new industries.
- The city government **designated recycled products as priority items** to be used for the **government procurement** and the **public projects**.
- The city government **designated recycling companies in the Eco-town as priority facilities for the treatment** of domestic wastes generated in the city.

Issues and Challenges

- ❑ Local residents opposed the construction of Eco-town industrial park.
- The city government, recyclers and the local residents made an “**environmental conservation agreement**” that recyclers should carry out their business activities with environmentally conscious practices.
- The city government and recyclers are organizing tours to the Eco-town industrial park and issuing Eco-town newspaper, **for better understanding of the value of recycling business by residents and citizens.**

(In 2009, Eco-town received 9,200 visitors.)



Case Study of Local Government Initiative

(3) Aich Prefecture Eco-Town

- Start of Eco-town program: 2004
 - 1st Phase: 2004-2006
 - 2nd Phase: 2007-2010
- Preparation of Eco-town plan:
Waste Management Department of Aich Prefectural Government
- Number of Recycling Facilities: 17
Recycling facilities are located not in specific/designated areas, but in existing manufacturing factories spreading in the prefecture.
⇒ No need to secure lands for recycling facilities.
- Types of wastes recycled in Eco-Town Facilities:
Wood wastes, wood chips, food residue, food waste, concrete waste, waste ceramic products, waste glass, waste rubber, used lead batteries, automotive shredder residue (ASR), sludge/dusts containing Nickel/Zinc



Location of
Aich Prefecture Eco-Town
Recycling Facilities



Why Eco-Town program started?

- Aich Prefecture Government faced a **serious shortage of waste landfill sites**.
 - In 1999, Nagoya City Government announced “*Waste Emergency Declaration*”
- The national law (Waste Management and Public Cleansing Law) stipulates that **local governments should make an effort for promoting reduction and recycling** of wastes.
- The existing heavy industries declined and open space increased in industrial areas. Accordingly, the prefecture government needed to **stimulate local economy**.
- There was a limit on the growth of existing main industries of Aich Prefecture (automobile, timber, food). Therefore, private sectors were also seeking to **create a new business model**.
- The **governor** of Aich Prefecture took **strong leadership** in developing a recycle-oriented society.
- The waste management department of the **prefecture government** identified the urgent needs and **took initiative** in developing Eco-towns.

Unique Initiatives for Eco-Town Development

- Introduction of **Recycling Business Creation Coordinator** System
 - **Retired experts of private companies** were hired by the prefectural government to organize recycling business creation meetings/seminars (sorted by 7 waste categories) and to provide **tailored business matching support** across various industries and manufactures.
- Introduction of **Industrial Waste Disposal Tax**
 - The prefectural government imposed a new tax on industrial waste disposal of 1,000 JYN/ton in 2005. Its revenue has been accumulated in a special fund, and used for subsidies for new recyclers, salaries for the “recycling business creation coordinators”, and operational costs for eco-town development program.

Unique Initiatives for Eco-Town Development

- **Collaboration with Academia**
 - In collaboration with Toyohashi University of Technology, “Resource recycling information system” was developed and technology research/development supports are provided for industries/manufacturers.
- **Prefecture Environment Award**
 - “Aich Prefecture Environment Award” is offered to companies with excellent technology or business activities related to 3Rs. The award contributes to increasing publicity of selected companies, medium/small enterprises (SME) in particular, by **highlighting their business value.**



Summary of Survey Results on Local Governments

Why did local governments start eco-town programs?

Main reasons (multiple answers given)

◆ Regarding waste management issues

- Shortage of waste landfill sites or incineration capacity (7)
- Generation of a huge amount of organic waste from agriculture, forest, or fishing industry (3)

◆ Regarding issues on promoting local industries

- Decline of major local industries, necessity for stimulating local economy (4)

◆ Regarding who took leadership

- Governor/mayor, leaders of local industries/academia (3)
- Administrative officials of local government (3)

◆ Regarding effects of laws/regulations

- Obligation to formulate a waste reduction plan by national law (2)
- Development of recycling laws by national governments (2)

Original Advantages

◆ Utilization of existing technologies

- Manufacturing/steel-making industries or research institutes are concentrated in the area, accordingly various technologies have been existing in the local private-sector.
- Because near from a metropolitan area, many waste processing plants are located there and various waste processing technologies have been processed by local waste processing companies.

◆ Understanding and cooperation of residents

- Because serious pollution problems had occurred in the past, the environmental awareness of residents has been already high.
- During the process to overcome past pollution problems, a dialogue mechanism between the local government and residents has already been established.
- By the effort of local government, separate waste collection has been already well practiced by residents.
- By the effort of local government, residents have been already widely involved in waste reduction and recycling.

Unique Initiatives by Local Governments (1)

- ◆ Promotion of collaboration among private companies
 - Several local governments are arranging opportunities and meetings for business-matching in order to promote resource-recycling on the initiative of the private sector.
 - A local government is hiring retired experts of private companies as resource-recycling business promotion coordinators
- ◆ Collaboration with local universities
 - Some local governments are arranging and promoting the support of local university to private companies for research and development of recycling technologies
 - Some local governments are entrusting the assessment of feasibility of newly proposed recycling businesses.

Unique Initiatives by Local Governments (2)

- ◆ Support for accessing to the information required to promote recycling business
 - Some local governments are carrying out surveys on the amount of recyclable waste generation and disseminating the information to private companies.
 - Some local governments are widely disseminating information on the amount of waste generation and disposal by waste category.
 - Some local governments are providing subsidies to private companies for research on the availability of waste materials and channels for selling recycled products.
 - Some local government are identifying specific wastes to be recycled primarily and inviting proposals for technologies to recycle the specified wastes from private companies.
 - A prefecture government is classifying waste items into ones to be recycled centrally in one place and ones to be recycled in each region.

Unique Initiatives by Local Governments (3)

◆ Securing funds for eco-town programs

- Several local governments introduced industrial waste disposal tax, and are using it for operational cost of eco-town programs, public awareness raising, subsidies to private companies.

◆ Prioritizing recycled products and recycling companies

- Every local government designates recycled products as priority items to be adopted for the government procurement and public projects.
- Some local governments designate recycling factories as priority facilities to which municipal wastes should be transferred.
- In a local government, recycled fuel from plastic waste was used for a sludge incinerator at a public sewage-treatment plant.
- A prefecture government issued a notice to public works departments of city/municipal governments to promote the use of recycled cement produced in the prefecture.

Unique Initiatives by Local Governments (4)

- ◆ Encouraging incentives of recycling companies
 - Several local governments have established authorization systems of recycled products and goods.
 - Some local governments have set up Environment Awards which are offered to companies with excellent practices/activities regarding the 3Rs.
- ◆ Other forms of support to recycling companies
 - Some local governments are assigning staff in charge of providing support to each recycling company participating in eco-town programs.

Unique Initiatives by Local Governments (5)

- ◆ Call for cooperation of residents in collection of recyclable waste materials
 - Holding symposiums in order to obtain a consensus among residents regarding a resource-recycling society
 - Mayor's appearance on TV to urge residents to promote recycling
 - Site visiting program to recycling factories for elementary school students as part of their social studies classes
 - Training program for resident representatives to create community leaders for promoting separate waste collection and recycling
 - Establishing patrol teams consisting of government staff to provide guidance/instructions on separate collection for residents
 - Displaying slogans/logos to promote separate collection on waste collection vehicles and the uniforms of waste collection staff
 - Setting waste collections days on different days for waste plastics and for cans, bottles and PET bottles in order to facilitate separate waste collection
 - Establishment of a original collection system for small home appliances and electronics including mobile phones

Summary

- Every city/municipality, industry and citizen will face shortage of waste landfill sites in near future. Waste reduction and recycling will soon become inevitable for every city/municipality.
- There are a wide variety of options in planning, financing, technology selection, implementation, initiatives, partnerships, and support systems for resource recycling. By applying options suitable for local situation/condition flexibly, resource recycling will be promoted.
- Strong leadership/initiatives of top leaders in government sectors and private sectors are the important element in success.
- Involvement of wider stakeholders facilitates in finding business partners, financing, securing sufficient waste materials and markets of recycled products, obtaining technical/operational support, etc.
- It is extremely important to obtain citizens' understanding and cooperation in promoting separate waste collection, acceptance of recycling factories, establishing regulations, etc. To this end, it is quite important to actively raise citizens' awareness and disclose various information/data on wastes and recycling to citizens.

GEC is compiling this information into a database, and will organize a eco-town workshop in Penang, Malaysia in December 2011.

We welcome participation and presentations from the ones who are involved in creating a recycling oriented society.

Thank you for your kind attention.

