

Environmentally-Sensitive Industrial Development

Policy Lessons Learnt from Ecotowns in Japan¹

ハリ・スリニバス 土居 亜希子
Hari Srinivas² and Akiko Doi³

This article outlines the drivers that are leading the development of ‘ecotowns’ in Japan. Simply put, ecotowns are multi-stakeholder initiatives focusing on private enterprises, but also involving the public sector and the civil society at large. They are developed as specialized areas for industrial development that are environmentally friendly.

The write up introduces the basic features and development framework of the ecotown concept. It is illustrated with a case study of the Kawasaki ecotown. Implications are drawn for local decision-makers to enable environmentally sensitive urban and industrial development through ecotowns.

Key Words : Industrial Development, Ecotowns, Environmental Governance, Education, Technology

Introduction

What are Ecotowns?

Ecotowns are urban planning and environmental management efforts where industries located in the designated ‘ecotown’ area implement such action within their manufacturing processes and in between industries. They are developed in pursuit of synergies derived from combined efforts in waste treatment, energy efficiency, environmental preservation as well as promotion of industrial development. Such synergies operate at the level of a factory (for example, material use efficiency, energy savings etc.), a group of factories (for example, waste exchange, heat exchange, etc.), or the ecotown as a whole (for example, district heating/cooling, waste processing etc.).

Features of Ecotowns

Ecotowns have a number of key features (UNEP-

IETC, 2008a) such as (a) strong legislation shifting the market towards a recycling-based society, (b) national and local governments are spearheading the drive to bring together industry clusters to be sustainable, (c) increasing product research and development – in the public and private sectors, including universities, (d) the large and rapidly expanding eco-business market domestically and internationally, (e) strong focus on environmentally sound technologies (ESTs), and innovative/cutting-edge solutions to solve environmental problems, and (f) focus on energy conservation, material development and integrated waste management are also features of ecotowns.

A total of 18 ecotowns and seven industrial clusters have been set up all over Japan, with more than 800 industries and 50 universities participating in them. For example, in the Chubu region of Japan, two ecotowns were established, and the industrial clusters there have seen 80 industries and 11 universities set up collaborative initiatives and manufacturing activities.

1 The article is based on a project on ecotowns in Japan implemented by the authors and others at the United Nations Environment Programme (UNEP)

2 Professor of Global Environment Policy, School of Policy Studies

3 Deputy Director, International Cooperation Department, Global Environment Center, Osaka, Japan

Why Ecotowns?

Ecotowns were developed to address a number of problems and challenges faced by Japan, particularly during the 1980s and 90s. Some of these include:

- The 70s and 80s saw rapid industrial and economic growth, resulting in massive industrial pollution and waste generation. This created a need to develop systems that could handle pollution and waste, and were, at the same time, environmentally friendly.
- The 1990s saw a decline in industrial output. With Japanese industries moving to developing countries to save costs, there was a subsequent decline in domestic industrial output, necessitating the development of new industries and technologies. This also raised a need to develop business and industrial opportunities, including job creation and advanced entrepreneurship.
- As a member of OECD, Japan's growing global leadership and influence, particularly in the environmental field, prompted a need to develop model industries that were environmentally friendly. The Kyoto Protocol, which was negotiated in Japan in 1997, also spurred this trend.

Ecotowns were seen as a means of addressing these concerns – as laboratories where environmentally friendly activities could be set up not only within a factory, but also between factories. Ecotowns provided opportunities for industries and local governments to collaborate in providing common facilities such as energy generation plants, incinerators and waste recycling centers, etc. (GEC, 2008a). The partnership with local universities to develop cutting edge and appropriate technologies, and with citizens groups to raise awareness and influence consumption choices, were added attractions enabled by ecotowns.

In order to achieve an ecotown's 'eco' objectives, businesses wanting to set up their factories in an ecotown are carefully selected and approved by the local government based on a number of criteria. The businesses should use local resources, including environmentally friendly technology, human capacity, distribution systems, recycled materials, etc. It should develop new and original business model for effective and stable recycling business. It should aim to be profitable (albeit, in some cases, with support from national and local government and other associations). It should also increase job opportunities for local citizens, and help reactivate the local economy.

Proponents and Partners

Ecotown projects are driven by Japan's Ministry of Economy, Trade and Industry (METI) and the Ministry of Environment (MoE). Local and prefectural governments have played a key role in developing and implementing ecotowns, with active participation from industries and universities. Financing of ecotown development is primarily done by METI, with support from the prefectural and local governments.

Other stakeholders such as local universities, chambers of commerce, citizen's groups and NGOs, consumer and trade associations etc. are also actively involved in both the production and consumption ends of a company and its product's lifecycle.

Impacts of Eco towns

Ecotowns have helped cities with declining industrial and economic growth to look at an advanced and cutting edge approach to revitalize their local economies, while becoming environmentally friendly at the same time.

Impacts of ecotowns initiative can be seen in a number of fronts:

- Accelerated local economic development and industrial inflow
- Job creation for local citizens as a result of new industries
- Opportunities for industry clusters seeking to set up 'life-cycle' chains for raw materials and wastes
- Business opportunities and support for environment-related industries and business
- Emphasis on the need for research and development on sound material flows and zero emissions.

Development Framework of an Ecotown

Ecotowns have been promoted in Japan with two key purposes – (1) to develop and promote the local economy and society through encouragement of environmental industry using existing industrial congeries, and (2) to establish the recycling economic system through reduction of waste and increasing recycling based on the identity and originality of local industry and society.

Ecotowns largely depend on a number of stakeholders committing to provide different inputs and resources in the development of an Ecotown. These range from the national government, METI and

MoE, who design the law and legislative system, to the local governments, who create the Ecotown Plan, and industries, who judge the relative economic feasibility of setting up operations in an Ecotown.

If the basic concepts and concrete projects written into the plan are judged by METI and MoE as meeting designated standards of originality and innovativeness, and judged to have the potential to serve as a model for other local governments, the two ministries jointly approve the plan. They then provide financial support for the projects by local governments and private sources, to improve physical recycling facilities, and to implement institutional and organizational projects that can contribute to the realization of a ‘sound material-cycle society’⁴.

Establishing an Ecotown

The establishment of ecotowns are initiated by a local government developing a basic plan for development that contains an Ecotown Plan. METI and MoE review the plan using a number of criteria to access the local government’s plan, including:

- originality and innovativeness of the technology and manufacturing process that is environ-

mentally friendly and sustainable – and could be a model for other industries.

- Participate and secure implementation of the ecotown plan based on agreement among stakeholders
- contribute to reducing, reusing and recycling of resources
- have a reliable financial and development plan, including health and safety management of the facility

Some facilities and schemes may be provided a subsidy for construction cost, particularly those related to waste recycling facilities, planning, information dissemination etc.

While the national government is responsible for the approval of ecotown plans, and providing subsidies for the facilities, the local government develops the local plan, gathers the industries (including SMEs), reaches agreements between various stakeholders, and also provides subsidies for the facilities. The industries themselves participate in the planning process of the local government as a stakeholder, developing recycling and other environmentally friendly technologies, and setting up and managing facilities.

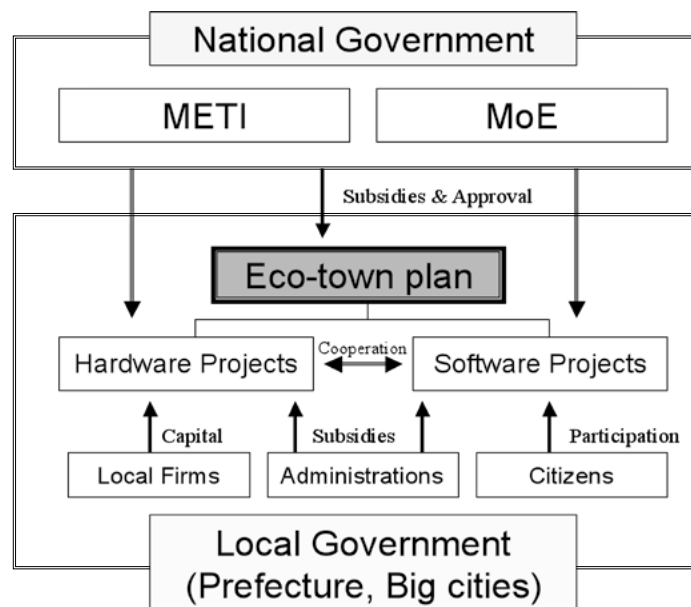


Fig 1. Framework of Ecotowns in Japan
(Source: GEC, 2008c)

⁴ The setting up of a “Sound Material Society” is Japan’s policy response to reduce GHG emissions, prevent pollution, minimize waste generation, as well as address some of the challenges of global environmental change at the local level.

The success of an ecotown has largely depended on the setting up of an appropriate system for material inputs, facilities and product outputs in order to succeed in reuse/recycling businesses and by-product exchange. Success has also depended on legal systems and regulations, availability of raw materials and recyclable ‘waste’, subsidy systems for technology development and capital investment, and proper treatment of eventual waste and sales outlet for eco-friendly products.

Support systems have been established mainly by the national government in Japan. This primarily consists of formulation of laws for promotion of effective utilization of resources, based on the *Basic Law for Establishing the Sound Material-Cycle Society* enacted in 2000. The government enacted the *Law on Promoting Green Purchasing* to institutionalize the purchasing standards of the business entities, and has promoted the concept of CSR among consumers and enterprises. The government has also promoted to strengthen and ease regulations for proper treatment

of waste.

Legislative foundation of Ecotowns

Based on the Basic Law for Establishing the a Sound Material-Cycle Society, a number of other laws have also been enacted, including the Law for Promotion of Effective Utilization of Resources (2000), and the Container and Packaging Recycling Law, Electric Household Appliance Recycling Law, Construction Material Recycling Act, Food Recycling Law and Automobile Recycling Law (GEC, 2008a).

These laws have made it possible to ensure that manufacturing processes using wastes as production materials, sales in reuse/recycling businesses, and by-product exchange can be initiated. This has in fact resulted in an expansion of the market for reuse/recycling businesses, and by-product exchange, along with an increase in laws covering wasteemissions and pollution issues.

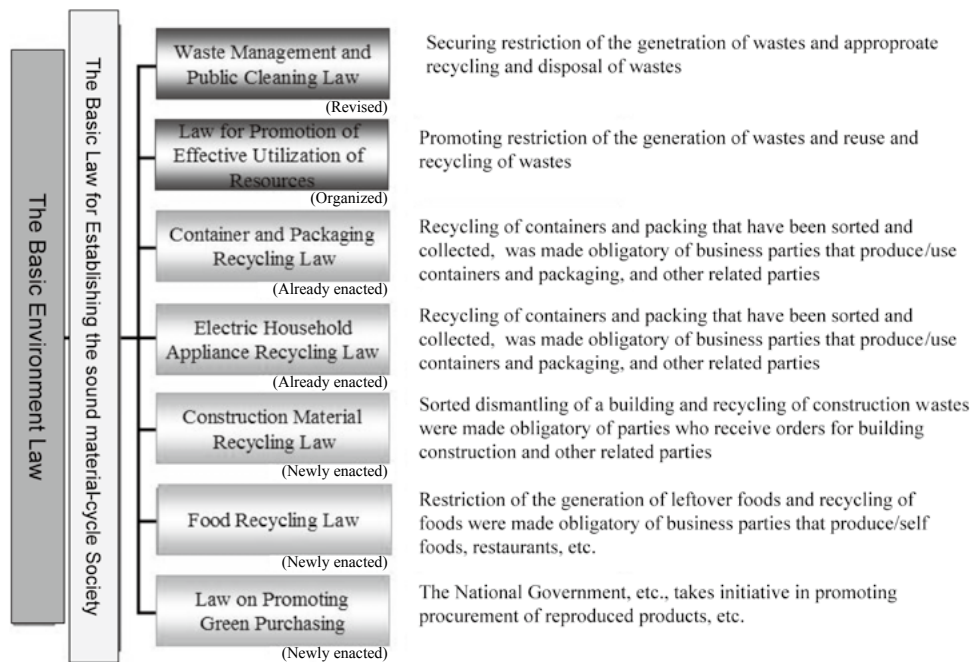


Fig 2: Law system concerning 3R in Japan
(Source: GEC, 2008c)

Each Ecotown plan contains industrial, social and regional components, according to the characteristics of each city or town. Some examples include –

1. Promotion of establishment of a sound material-cycle society by attraction of enterprises – Kita-Kyushu Ecotown
2. Promotion of establishment of a sound material-cycle society by regional industrial infrastructure – Kawasaki Ecotown
3. Waste management and town planning – Naoshima Ecotown
4. Promotion of the establishment of a sound material-cycle society by citizens' involvement – Minamata Ecotown

Case Study: Kawasaki Ecotown

Kawasaki City is home to one of Japan's oldest and largest industrial parks. Established in 1902, Kawasaki Coastal Industrial Area houses over 50 heavy industrial enterprises in a 250-acre area. Its largest tenants consist of oil refineries, steel manufacturers, power generators, and chemical manufacturers. Kawasaki city is located adjacent to Metropolitan Tokyo and has a population of 1.2 million.

By the 1970's the city and the industrial park were considered one of Japan's most contaminated areas. Residents suffering from asthma and other respiratory diseases filed a lawsuit against the central government and industrial park tenants in 1982. Serious environmental problems, along with the restructuring and nationalization of certain industries, resulted in the closing of several plants and stagnation of the local economy.

To resolve the situation, Kawasaki decided to redevelop the city by promoting its *Project for Making Kawasaki City Environmentally Harmonious*. This project is based on the concept of converting the city into a place where all actions, from people's everyday activities to industrial operations, are conducted in harmony with the environment and an ecotown project is one of its main components. The city government and local businesses have taken numerous steps to develop the area into an environmentally friendly production zone. Steps include establishment of recycling and material reuse programs between facilities, restrictions on emissions, and higher pollution abatement standards, as well as provision and promotion of logistical support and coordination

of material exchange, research and development and public education.

The strength of Kawasaki City is that it has a well-established transportation infrastructure that includes ports, railroads, canals, and energy facilities, which are indispensable to resource-related companies. In addition, this area has a high concentration of Japan's leading large industrial firms, and also a large number of small and medium enterprises in the field of resource recycling, and various environment-related facilities. Through the close integration of existing infrastructure and industrial elements, Kawasaki created an opportunity for an operationally competitive resource-recycling system.

The Kawasaki Ecotown Project⁵ was set up to achieve a number of objectives. One of the first was to promote industrial firms' efforts to make their operations and systems environmentally friendly and ecologically sound. This was done through the establishment of a model zero-emission plant, and achieving of zero emissions of effluent water and zero production of waste from the manufacturing facilities. An environmentally sound transportation system was also set up. In order to encourage industries to locate in the ecotown, a model plant was constructed and set up by the local city government.

The project also aimed to promote a programme for creating a zero emission, environmentally friendly, and ecologically sound community. This was done through the establishment of environmental targets, development of a 'zero-emissions' industrial park, creation of green-belt networks and renovation of manufacturing facilities into community amenities, introducing environmentally friendly vehicles, and implementing recycling as a community activity by promoting joint activities for collecting and recycling of paper, glass bottles, cans, and PET bottles, and use of recycled goods.

A key feature of the project was the implementation of research and development programmes to promote sustainable development. This was done through the development of energy co-generation systems for utilization of waste heat from plants and factories, undertaking of studies to develop and commercialize recycling systems, and promoting joint research and development of environmentally related technologies.

The success of the project was further strengthened by the establishment of an information system.

5 Information from policy documents and reports of the Kawasaki City Government

This created a widely accessible database for information on environmentally related technologies. The project's achievement in terms of environmental protection could also be assessed as a result of the information system. In-house information concerning the environmental aspects of the Kawasaki Ecotown was collated by the system and disseminated to communities outside the Ecotown.

The ecotown was not just an industrial complex. It also contained an Ecotown center, which was designed as a place for environmentally related human interactions and training, as well as for the gathering and dissemination of environmentally related information. Citizens wanting to learn about the environmental activities of the factories in the Ecotown could visit the Center, and also carry out seminars or workshops.

Some of the processes and technologies currently in place include ecologically sound cement production, which uses fly ash and bottom ash from incin-

erator plants as inputs. Waste oil is used for energy to heat the kilns for production. Electronic appliance recycling provides input for steel manufacturing. A new type of blast furnace utilizing municipal plastic waste as a reducing agent in place of coal was developed by NKK, one of Japan's leading steel makers. This system received funding from METI as a part of the Ecotown project and is in operation with the capacity of recycling 40,000 tons of waste plastic every year.

The Kawasaki Ecotown is a joint effort between government and local business. While still in the early stages of development, it represents a promising example of the industrial area redevelopment model, focusing on environmental technologies and by-product utilization efforts. The City benefits from the reduced burden of municipal waste treatment by having an advanced recycling facility on site, and private business achieve cost savings by utilizing recycled materials, which in turn will result in revitalization of the local economy.

Box 1: The Kawasaki 7-point Guiding Principles for Building Ecotowns in Asia⁶

1. Developing local authorities initiatives in providing directions for sustainability by setting up necessary regulations, economic incentives and capacity building
2. Formulating national government frameworks to guide a variety of sectors by setting up laws, plans, economic instruments, international conventions (such as Kyoto Protocol etc.)
3. Ensuring industries' continued willingness and determination to pursue sustainable production and consumption in their own business strategies
4. Facilitating active participation from civil communities such as consumers, NGOs and mass media
5. Activating strong will to change the 'cost' of environment management into valuable opportunities and profits in the long run.
6. Collaborating with academic communities and financing institutions such as banks, international aid agencies
7. Incorporating local traditional cultures and values in building and implementing strategies for an eco-town.

⁶ Presented by Mr. Saburo Kato, special Advisor to the Mayor of Kawasaki during the 5th Eco Business Forum, 16-18 February 2009, Kawasaki, Japan

Policy Implications of Ecotowns

Many industries have been set up and a number of environmentally friendly production processes developed based on the current Ecotowns Plans. The usual concern for businesses establishing themselves in an ecotown is if they will manage to generate a profit from their initiative. While many businesses receive considerable support from the national government, (up to half of the initial capital costs), most undertake their business without any special support. They see the opportunity in belonging to the ecotown community, the exchange of information and knowledge, special training and education, as well as using their presence in an ecotown itself as a product-sales feature.

For businesses with factories in an ecotown, a number of advantages are facilitated, including satisfying environmental laws concerning the 3Rs (Reduce, Reuse, and Recycle), responding to sound waste management and recycling of waste, refuse incineration ash, hard-to-treat refuse, etc. They also benefit from the extensive utilization of common and shared facilities of ecotowns, existing commercial distribution networks, recycling industrial complexes, and active citizens' involvement.

For urban developers, the development and implementation of Ecotown projects provide incentives on a number of issues that go beyond their professional boundaries. This, therefore, calls for comprehensive multidisciplinary partnerships that will enable the achievement of the goals and objectives of an ecotown. A broad range of stakeholders will need to provide inputs and facilitate such partnerships, to plan and develop an ecotown (Srinivas, 2006), including –

ties in ecotowns provide opportunities for companies to meet and exchange information, as well as with consumer groups and NGOs.

3. **Application and implementation of environmentally sound technologies:** Ecotowns can implement cutting edge and innovative technology demonstrations that are environmentally friendly, and also provide opportunities for capacity building and training on related issues.
4. **Information access:** Providing reliable and credible information on an ecotown's industries and its products/services is a critical aspect to ensure its success. This is delivered through focused workshops and training sessions to raise awareness, decision support tools and strategies, and technology and material marketplaces.

Based on lessons learnt from Ecotowns in Japan, a generic model can be developed, outlining some of the policies to be taken up by cities wanting to create ecotowns. This model will specify the roles and responsibilities of key local stakeholders, including the local government, banks, universities, citizens, local NGOs, and the industries themselves.

1. **Policy and Strategy Development:** Ecotowns clearly need critically focused environmental laws and regulations to succeed. Clear standards and codes, targets, and development goals need to be set up. Besides integrating ecotowns into larger development plans of the city, it should also have financial and other incentives to ensure that industries will locate themselves in an ecotown.
2. **Market Creation and Networking:** Ecotowns can literally become 'brand names' that industries can use to sell their products and services as environmentally friendly. Common facili-

Table 2: Matrix of stakeholders and roles in establishing ecotowns⁷

Stakeholders \ Roles	Governance			Education	Technology
	Laws & Legislations	Policy & Strategy	Finance	Awareness & Capacity Building	Technology Development & transfer
National Government	<ul style="list-style-type: none"> ✓ Clearing up Policy Guidance <ul style="list-style-type: none"> • Fundamental Law for Establishing a Sound Material-Cycle Society • Development of the laws related to 3R • Kyoto Protocol • Law to promote global warming countermeasures 	<ul style="list-style-type: none"> ✓ Defining future scenarios <ul style="list-style-type: none"> • Sound Material-Cycle Society • Eco-Town Projects ✓ Designation of the important R&D and industrial promotion field (Environment/ Nano-technology /IT/ Biotechnology) 	<ul style="list-style-type: none"> ✓ Setting out budgets <ul style="list-style-type: none"> • Eco-Town Hardware Subsidies • Eco-Town Software Subsidies • Subsidies for research projects related to the environment 	<ul style="list-style-type: none"> ✓ Rising awareness <ul style="list-style-type: none"> • Environmental Learning Programs • PR Activities (Internet, Brochures etc.) • Symposiums ✓ Building capacity <ul style="list-style-type: none"> • Secretariat Office of Committees ✓ PDCA cycle 	<ul style="list-style-type: none"> ✓ Holding International Conferences <ul style="list-style-type: none"> • 3R Initiative (example) ✓ Establishing of demonstration projects ✓ Green Purchase
Local Government	<ul style="list-style-type: none"> ✓ Clearing up Policy Guidance <ul style="list-style-type: none"> • Ordinances related to the environment • Creation of the Plan to Achieve the laws related to 3R • Basic Plan to Combat Global Warming 	<ul style="list-style-type: none"> ✓ Urban planning to solve local issues <ul style="list-style-type: none"> • Designing Eco-Town plans ✓ Policy mix • 	<ul style="list-style-type: none"> ✓ Setting out budgets <ul style="list-style-type: none"> • Eco-Town Hardware Subsidies • Eco-Town Software Subsidies • Industrial Waste Tax ✓ Developing premises for facilities <ul style="list-style-type: none"> • Infrastructure Development Costs 	<ul style="list-style-type: none"> ✓ Establishment of Eco-Town Centers ✓ Coordinating Eco-Tours ✓ Rising awareness <ul style="list-style-type: none"> • Environmental Learning Programs • PR Activities (Internet, Brochures etc.) • Symposiums ✓ Building capacity <ul style="list-style-type: none"> • Secretariat Office of Committees ✓ PDCA cycle 	<ul style="list-style-type: none"> ✓ Integrated Waste Management ✓ Establishing demonstration projects ✓ Green Purchase
Industries	<ul style="list-style-type: none"> ✓ Abiding the laws and legislations <ul style="list-style-type: none"> • Compliance ✓ Express one's opinions <ul style="list-style-type: none"> • Public Comments for the national/local environmental policy 	<ul style="list-style-type: none"> ✓ Strategy for survive <ul style="list-style-type: none"> • Plans to Commercialize 3R-Related Projects • Environmental Management • Plans to reduce GHGs and manage hazardous wastes 	<ul style="list-style-type: none"> ✓ lining up <ul style="list-style-type: none"> • Investment in Facilities • Financial Assistance ✓ Paying taxes 	<ul style="list-style-type: none"> ✓ Rising awareness <ul style="list-style-type: none"> • Opening Facilities for the Public • Sustainability Reporting ✓ Building capacity <ul style="list-style-type: none"> • Fostering of Experts • Participation in Study Groups • Establishing groups for Cooperation among communities 	<ul style="list-style-type: none"> ✓ R&D <ul style="list-style-type: none"> • 3R technologies and social systems • Waste exchanges • Distribution system ✓ Establishing demonstration projects ✓ Green Purchase
Banks	<ul style="list-style-type: none"> ✓ Abiding the laws and legislations <ul style="list-style-type: none"> • Compliance 		<ul style="list-style-type: none"> ✓ Investing in projects in Eco-Towns <ul style="list-style-type: none"> • Investment ✓ Paying taxes 	<ul style="list-style-type: none"> ✓ Setting out Socially Responsible Investments 	
Universities	<ul style="list-style-type: none"> ✓ Advising on policymaking of national/local government <ul style="list-style-type: none"> • Participation in Committees 	<ul style="list-style-type: none"> ✓ Strategy for survive <ul style="list-style-type: none"> • emphasis on practical R&D projects • business-academia collaboration 	<ul style="list-style-type: none"> ✓ Investing in R&D projects <ul style="list-style-type: none"> • R&D Project Costs ✓ Paying taxes 	<ul style="list-style-type: none"> ✓ Rising awareness <ul style="list-style-type: none"> • Reporting Research Results ✓ Building capacity <ul style="list-style-type: none"> • Fostering of Experts 	<ul style="list-style-type: none"> ✓ R&D <ul style="list-style-type: none"> • 3R technologies and social systems • Evaluation Methods • Assessment tools ✓ Coordinating among Stakeholders
Citizens/NGOs	<ul style="list-style-type: none"> ✓ Express opinions <ul style="list-style-type: none"> • Public Comments for national/local environmental policies 	<ul style="list-style-type: none"> ✓ Appealing to national/local government and industries as grass-roots opinions 	<ul style="list-style-type: none"> ✓ Paying taxes 	<ul style="list-style-type: none"> ✓ Participating programs <ul style="list-style-type: none"> • Environmental Learning Programs • Symposiums • Eco-Tours ✓ Building capacity <ul style="list-style-type: none"> • Establishing NGOs • Participation in Study Groups 	<ul style="list-style-type: none"> ✓ Separating trash properly according to types ✓ Green Consumers Activities

The roles, as outlined in Table 2, cover the domains of governance (laws and legislation, policy and strategy, finance etc.), education (awareness building and capacity development), and technology (technology development and transfer).

Putting the above matrix in place will require synergies and partnerships among the stakeholders to enable a number of outcomes, including access to market information, development of infrastructure and market conditions, availability of targeted and low-interest credit, income generation and job creation through setting up of new enterprises, technology upgradation and management, skill and capacity development of producers and workers, broader range of products and services that are also environmentally sound, etc.

From a macro perspective, it is imperative that baseline data and a broad understanding be established before detailed policies and plans be put in place for an ecotown. Such baseline data needs to cover issues (GEC, 2008b) outlined below:

- Assessment of total and sector-specific waste water, materials and energy volumes/flow patterns from all industry sources at the metropolitan.
- Identification of actual and potential commercial waste volumes by industry sector and waste sent to incinerators/landfills without recycling.
- Identification of critical mass of industries in selective industry sectors to ensure success of an ecotown.
- Economic, environmental and physical risk assessment of waste and energy by-product utilization.
- Spatial concentrations and transportation of flows of input resources and wastes.
- Environmental sensitivities of regional locations for waste materials, water and energy processing and reprocessing.
- Implications of the regional growth management strategy and planning schemes on sustainable industry development - especially future industry location.

⁷ This matrix was developed in interactions between the Kawasaki city government, Global Environment Center and UNEP-IETC

- Regulative frameworks of environmental storage and handling of waste material, particularly hazardous or toxic wastes.
- Assessment of local government's and industry's consistency in the application of environmental policies, standards and performance criteria affecting waste management and reprocessing industries.
- Assessment of societal attitudes towards supporting waste management industries in inner urban areas and contaminated sites, as well as attitudes towards integrated industrial development planning involving mixed industry development.

The above information will help understand the detailed macro context for an Ecotown, including waste flows, markets, production, and material transport costs and requirements, which will be critical for developing a successful Ecotown.

The main supply-side approaches to facilitate broader investment in Ecotowns and eco-industrial parks (ADB, 2001) include:

- (a) Provide technical assistance and technical know-how transfer** to manufacturers to upgrade their product designs or improve quality; provide assistance in improving business strategies. This can include training, more efficient product designs, special incentives for change in design and production lines as well as financing for undertaking such steps.
- (b) Support development of minimum efficiency standards and regulatory mechanisms.** Minimum efficiency standards help remove the least efficient products from the market, and "push" manufacturers to retool to provide more efficient products. This can include allocation of funding, design, efficiency or performance standards.
- (c) Facilitate voluntary agreements with manufacturers, dealers, and distributors.** This can be done through a neutral third party acting as an "honest broker" to facilitate change in the marketplace, including building awareness and incentives for alternative environmentally friendly and efficient technologies.
- (d) Pilot new distribution mechanisms through retailers, dealers, or electric utilities.** Convenient supply systems that enables easy

access for the products for consumers, and financial incentives help in quicker uptake of environmentally sound technologies. Roles for private companies, local governments and other stakeholders need to be identified for the purpose.

- (e) Provide financial incentives to producers and dealers.** Financial incentives can encourage the sale of environmentally sound products, as well as provide disincentives for non-efficient products. Competitions for product design, and similar programmes help in increasing awareness among producers and dealers.
- (f) Provide quality testing.** Perceived and actual problems with quality can be a strong deterrent to the purchase of an environmentally sound technology. When a new technology is introduced to a market, there is often a perception that "it won't work here." In markets that have products of widely varying quality, quality testing is one way to overcome misperceptions and provide consumers with credible quality information. Actions can include improving test procedures, testing capabilities and efficiency certification for equipment; performance guarantees for products that is backed by independent on site testing; random testing of off the shelf products to check quality commitments made by manufacturers; developing quality specifications; assisting test laboratories to improve their procedures and ensure testing consistency; and product certification programmes.
- (g) Provide financing for manufacturing upgrades.** Such loan financing help manufacturers to convert production facilities to produce more efficient models. Loans can be provided in conjunction with technical assistance and technical know-how transfer to design the products themselves and upgrade production facilities.

Conclusions

The ecotown project initiated in Japan was conceptualized under unique socio-economic and environmental conditions and challenges that resulted from the rapid growth periods of the 60s and 70s. As a result, local economic revitalization and job

creation, new technology development, and reversing environmental degradation were primary concerns that prompted the local and national governments to set up Ecotowns.

As illustrated in the previous sections, the lessons learnt have been quite significant. The successes of Ecotowns established nation-wide are still being evaluated among the projects, especially among the ones established during the initial phases (for example, Kawasaki and Kita Kyushu).

Undoubtedly, the facilitative legal and legislative frameworks, along with infrastructure provision and consultative networking between the government and private sector, provided the necessary boost for the private sector to set up industries in Ecotowns. Collaboration with universities and other research and development institutions also facilitated these processes. Another key factor enabling successful implementation of the projects was the massive subsidies provided both by the national and local governments for individual industries.

Countries in the Asia Pacific region that are attempting to adopt the ecotown concept will have to take these factors into consideration. The situation and conditions for setting up ecotowns in other countries are not the same as in Japan, and hence a thorough analyses of socio-economic and environmental scenarios have to be made to understand the context within which ecotowns will be set up.

For countries in the Asia Pacific region, ecotowns need to be looked at as an economic opportunity for local governments in terms of job creation and income generation, and a business opportunity for private enterprises, in terms of goods and services to prevent, mitigate and solve environmental challenges (UNEP-IETC, 2009b). If properly undertaken, ecotowns can in fact, help the countries to leapfrog some of the environmental problems that OECD countries themselves have faced during their phases of rapid growth, without sacrificing their own economic growth objectives.

Therefore, in facilitating broad consensus for the development of ecotowns, the environmental and ecological benefits need to be highlighted in addition to the socio-economic ones as well. The very character and definition of ecotowns - focusing on the private industries' environmental performance, but involving the local governments, universities and R&D institutions, and the civil society at large - en-

able such multiple benefits to be realized.

Ecotowns have become a model approach that not only help national and local governments to meet many of their developmental (socio-economic and environmental) goals, but also demonstrates their commitment to broader sustainability and to build a good quality of life for its citizens.

REFERENCES

- ADB (2001), "Eco-industrial Park Handbook for Asian Developing Countries: Report to Asian Development Bank" Manila: Asian Development Bank
- Global Environment Center (2008a), "3Rs Technologies and Techniques in Japan" Osaka: Global Environment Center
- Global Environment Center (2008b), "Legal and Other Support Systems for Eco-Towns in Japan" Osaka: Global Environment Center
- Global Environment Center (2008c), "Ecotowns in Japan" Osaka: Global Environment Center
- Srinivas, Hari (2005), "3R Concept and Eco-Towns: Building an economy based on the life-cycle approach" Report for the High Level Meeting on 3Rs and Integrated Waste Management through Eco-Town Development, 6 June 2005, Osaka, Japan
- Srinivas, Hari(2006), "Japan: The Eco-Town Strategy" in Judith Ryser and Waikien Ng (Eds), Making Spaces for the Creative Economy. Madrid: Metropolis Inc.,
- Srinivas, Hari (2008) "Building an Environment for the Built Environments" in Brkovic, Milica, Innovation and Creative Spaces in Sustainable Cities. Belgrade: Holcim Foundation
- UNEP-IETC(2009a), "Development of Eco-towns In the Asia-Pacific Region" Project note. Osaka: UNEP International Environmental Technology Center
- UNEP-IETC (2009b), "Environmentally Sustainable Industrial Development: The Concept of Eco-Towns in the Asia Pacific Region" Presentation made at the Northeast Asia Eco-Forum, 23-26 Sept 2009, Shenyang, China