

Sustainable Cities in Japan

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Sustainable Cities in Japan

KYOTO/FUKUOKA/KITAKYUSHU/IIDA/MURORAN/
TAHARA/OMIHACHIMAN

INTRODUCTION

Welcome to the exhibition of Japan at World Urban Forum III. It is our pleasure that practical efforts made in Japan to realize sustainable cities are introduced to people around the world.

The government of Japan is currently formulating the National Land Sustainability Plan. Discussions are being held to reflect the concept of sustainability not only in city development but also in preservation of the entire national territory, including rural areas, forests, and oceans.

We are proud to present progressive activities implemented in cities of Japan.

Sustainable development is a global-scale challenge. To address this challenge, cities around the world must collaboratively take action. Kyoto City, which hosted the Third Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in 1997, has taken positive measures to prevent global warming. Fukuoka City has been active in promoting the worldwide use of its waste treatment technologies.

It is well known that Japan has achieved spectacular economic growth. In the course of that process, however, Japan also experienced serious pollution problems. Kitakyushu City was among the cities that suffered such problems at that time. Kitakyushu City overcame these pollution problems through concerted efforts with enterprises and citizens.

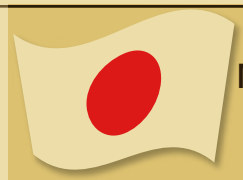
For city development, it is important to establish partnerships among local governments, residents, enterprises, educational/research institutes and NPOs. Muroran City works on the promotion of the environmentally-friendly industry through academia-industry-government collaboration. In Iida City, citizens have taken initiatives in building autonomous communities.

The common goal of sustainable development is to pass on a better world to our future generation in an appropriate manner. To this end, we believe that it is important to impart this concept to younger people who will take the lead in the next generation. Tahara City is committed to promoting education regarding environmentally-friendly energies.

Japan has a history and tradition to be proud of. We believe that valuing historic townscapes and traditional cultures are essential to create a sustainable city. In Omiachiman City, citizens are working together to preserve historic townscapes.

We are proud to introduce partnerships between Japan and UN-HABITAT. Japan has supported the activities of UN-HABITAT since its inception. The UN-HABITAT Regional Office for Asia and the Pacific is located in Fukuoka City, exemplifying the partnerships that the prefecture and the city of Fukuoka as well as citizens have established with UN-HABITAT.

National and Regional Planning Bureau
Ministry of Land, Infrastructure and Transport
Government of JAPAN



National and Regional Planning Bureau
Ministry of Land, Infrastructure and Transport
Government of JAPAN

National Land Sustainability Plan

National Land Sustainability Plan

From quantitative development to sustainability

1. Shift from emphasis on development

Japan has formulated national and regional plans, which are long-term, comprehensive and spatial plans to show the ideal state of territory that is comprised of land, water, nature, social infrastructures, industry accumulation, culture, human resources and others.

In the past, Japan's national and regional planning was centered around the Comprehensive National Development Plan, based on the Comprehensive National Land Development Act (1950).

Starting from its first formulation in 1962, the Comprehensive National Development Plan has been formulated five times. The Plan has proposed the basic policies to address various problems confronting Japan in each era. These problems include overpopulation in metropolitan areas and depopulation in rural areas. The Plan has produced positive results such as regional dispersion of production facilities, and reduction of income disparities between regions.

However, facing declining population of our country, the Comprehensive National Development Plan, which was a development-oriented plan aimed at quantitative expansion,

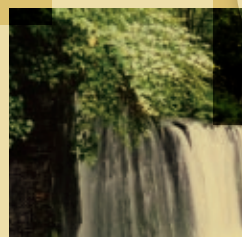
no longer meets the needs of the times. In addition, pressing issues are emerging, such as expansion of areas where maintaining the local community is becoming difficult, rapid devastation of farmlands and forests and unutilized existing stock. From an international perspective, the East Asian economic bloc is growing rapidly so that close collaboration with East Asian countries is crucial.

Therefore, the Government of Japan drastically reviewed the past national and regional planning systems. Consequently, the Ministry decided to revise the Comprehensive National Land Development Act to the National Land Sustainability Planning Act, and to replace the Comprehensive National Development Plan with the National Land Sustainability Plan, which projects the vision of our mature society.

The National Land Sustainability Plan is comprised of the National Plan and the Wide-area Regional Plan. Currently, discussions are under way with the view of establishing the former by mid-2007, and the latter by mid-2008.

Comprehensive National Development Plan

Development-oriented plan aimed at quantitative expansion



Qualitative improvements of national land including landscape and environmental aspects

Utilization and conservation of limited resources

National Land Sustainability Plan

Formation of national land that enables local communities to develop autonomously

Plan suitable for a mature society

Effective use of existing stock

Safety, security and stability in people's lives

Ocean utilization and international cooperation



photo by the MAINICHI NEWSPAPERS



2. Building a vision through collaboration between national and local governments

Another characteristic of the reform is decentralization. The Comprehensive National Development Plan comprises only the National Plan whereas the new National Land Sustainability Plan has a dual structure consisting of the National Plan and the Wide-area Regional Plan.

The National Plan clarifies the future vision for national land and people's lives, and makes explicit the responsibility

of the central government.

The newly introduced Wide-area Regional Plan is formulated through mutual collaboration and cooperation of central and prefectural governments by organizing opportunities to hold discussions on an equal footing.

This enables local governments to develop each region, respecting their autonomy and independence.

National Land Sustainability Plan

National Plan

The central government clarifies what national land and people's lives should be.

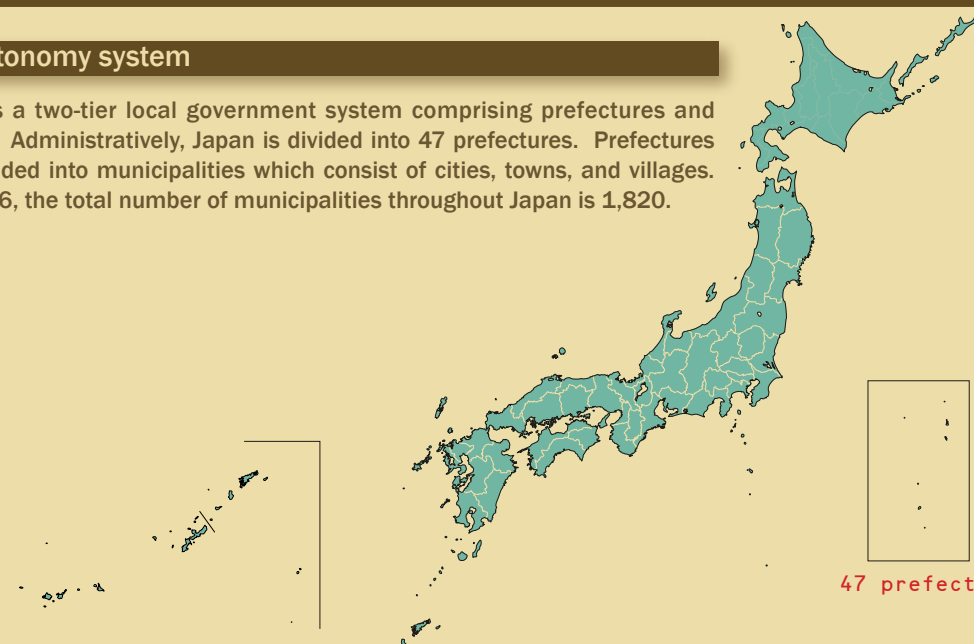


Wide-area Regional Plan

Each block consisting of several prefectures formulates plans through cooperation between the central and local governments.

Japan's autonomy system

Japan has a two-tier local government system comprising prefectures and municipalities. Administratively, Japan is divided into 47 prefectures. Prefectures are further divided into municipalities which consist of cities, towns, and villages. As of April 2006, the total number of municipalities throughout Japan is 1,820.



47 prefectures in Japan

JAPAN

Japan is an island country forming an arc in the Pacific Ocean to the east of the Asian continent. The land comprises four large islands named (in decreasing order of size) Honshu, Hokkaido, Kyushu and Shikoku, together with many smaller islands. The Pacific Ocean lies to the east while the Sea of Japan and the East China Sea separate Japan from the Asian continent.

In terms of latitude, Japan coincides approximately with the Mediterranean Sea and with the city of Los Angeles in North America. Paris and London have

latitudes somewhat to the north of the northern tip of Hokkaido.

Japan's total land area is about 378,000 square kilometers. It is thus approximately the same size as Germany, Finland, Vietnam or Malaysia. It is only 1/25 the size of the United States and is smaller than the state of California.

EX. 1

Sustainable Cities in Japan



Population: 1,470,593
Area: 827.9 km²

KYOTO CITY

Biodiesel Project

Kyoto City's initiatives to prevent global warming and to create a recycling-oriented society

Approaches to biodiesel fuel production project

In order to prevent global warming and to create a recycling society, Kyoto City is recovering waste edible oil discharged from households and refining it to produce environmentally friendly biodiesel fuel from the viewpoints of waste edible oil recycling, purification of automobile exhaust gas, reduction of carbon dioxide emissions, live education about environmental problems and vitalization of local communities. This biodiesel fuel is currently used by all waste collecting vehicles and some municipal buses. These approaches contribute to a reduction in carbon dioxide emissions by about 4000 tons per year.

Current situation of waste edible oil recovery

The raw materials for biodiesel fuel produced in this facility are waste edible oil (used tempura oil) discharged from general households as well as restaurants and cafeterias in Kyoto City. Waste edible oil is recovered monthly from households by placing polyethylen tanks in recovery points with the cooperation of the Regional Waste Reduction Promotion Committees basically established in each district or health

councils, regional women's associations or volunteers in every region in partnership with citizens. We will enhance linkages among citizens, companies, and the municipality to aim for an increase in recovery points.

<Approaches to recovery from households through collecting points>

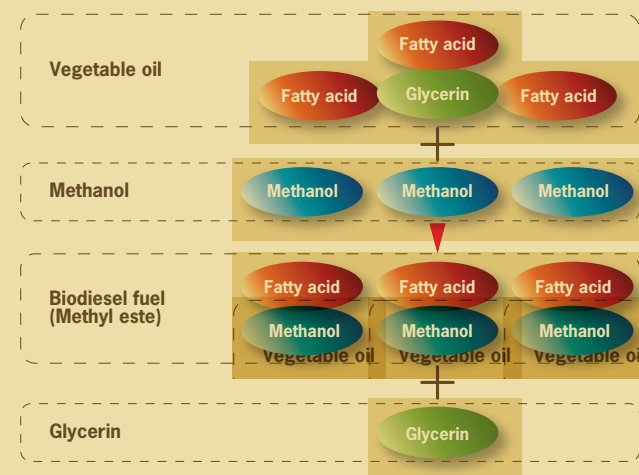
- As of the end of March 2006: 956 points
- 2015: More than 2000 points (target value)

(Quoted from Kyoto City Recycling Society Promotion Basic Plan-City Waste Strategy 21)



What is biodiesel fuel?

Used tempura oil recovered from households, restaurants, and cafeterias is refined to produce fuel applicable to diesel vehicles by reducing viscosity and the flash point through reaction with methanol.



Quality standard of biodiesel fuel

Kyoto City developed the preliminary standard (Kyoto Standard) in order to secure high quality biodiesel fuel applicable to newly commercialized vehicles based on findings obtained from actual vehicle travel tests, as well as basic information on typical standards for biodiesel fuel established in Europe and the United States. In particular, we defined the values for the pouring and clogging points affected by low temperature in winter, using the lowest temperature in Kyoto.

Standards for biodiesel fuel

Item	Unit	Value for reference		
		Preliminary standard of Kyoto March 2002	EU Standard EN14214 July 2003	United States of America ASTM D6751 January 2002
Density (15°C)	g/ml	0.86-0.90	0.86-0.90	0.88
Dynamic viscosity (40°C)	mm/s	3.5-5.0	3.5-5.0	1.9-6.0
Pour point	°C	-7.5 or less	-	-
Clogging point	°C	-5 or less	-15 to +5 *	-
10% residual carbon	%	0.30 or less	0.30 or less	0.50 or less **
Cetane number		51 or more	51 or more	47 or more
Sulfur content	ppm	10 or less	10 or less	500 or less
Flashing point	°C	100 or more	120 or more	130 or more
Moisture	ppm	500 or less	500 or less	500 or less
Monoglyceride	%	0.8 or less	0.8 or less	-
Diglyceride	%	0.2 or less	0.2 or less	-
Triglyceride	%	0.2 or less	0.2 or less	-
Free glycerin	%	0.02 or less	0.02 or less	0.02 or less
Total glycerin	%	0.25 or less	0.25 or less	0.24 or less
Methanol	%	0.2 or less	0.2 or less	-
Alkali metals (Na+K)	mg/kg	5 or less	5 or less	-
Acid value		0.5 or less	0.5 or less	0.8 or less
Iodine number		120 or less	120 or less	-

* depending on weather

** 100% fuel

Biodiesel Project

EX. 1

Sustainable Cities in Japan

History of approaches to biodiesel fuel production project

- July 1996: Discussion about legal compliance started with relevant agencies.
- October: Long-term travel test conducted for six months using four vehicles for separately collecting waste bottles and cans.
- January 1997: Influence on vehicles investigated. Exhaust gas investigated in detail (until March 1997). Since no problems regarding safety and the environment were found, activities were enhanced toward full-scale implementation.
- March: Exhaust gas measurement of 6-mode performed by the Japan Automobile Transport Technology Association. It was recognized that all contents of CO, HC, NOx, etc., satisfy the restricted values.
- June: One-month travel test conducted using 21 waste collecting vehicles of all Town Landscaping Offices.
- August: Model tests for collecting household waste edible oil started. Collecting area expanded step by step.
- September: Discussed the light oil inward tax with Kyoto Prefecture. It was verified that the fuel contains no hydrocarbon. It was decided that use of 100% biodiesel fuel is free of duty.
- October: Final discussion about automobile inspection certificates with Ministry of Transportation. "Automobile Inspection Implementation Instructions" in the road transportation vehicle law was partly amended to allow description of "Waste edible oil commonly used" in the remarks column of the automobile inspection certificate.
- November: Oil stations installed at the sites of the West, East, and South Clean Center. The fuel fully introduced to all waste collecting vehicles (about 220 cars) (annual consumption 1.3 million liters).
- December: Kyoto Conference on the Prevention of Global Warming (COP3) held in Kyoto City.
- January 1999: The fuel was approved as a twenty-first century type of new energy and received the 1998 New Energy Grand Prix "Resource and Energy Minister Award" (from New Energy Foundation).
- April: Experimental application to municipal buses started.
- April 2000: Application of biodiesel fuel (containing 20%) to about 80 municipal buses started.
- April 2001: An oil station installed at the site of the North-East Clean Center.
- July 2001: Biodiesel Fuel Production Project Technical Study Committee established.
- March 2002: Preliminary quality standard for biodiesel fuel in Kyoto City developed.
- June 2002: Assistance for biodiesel fuel requested to the government.
- May 2004: Kyoto Municipal Waste Edible Oil Fuel Production Facility completed.



Kyoto City

Recycling of waste edible oil to biodiesel fuel contributes to:

[Global warming prevention thanks to reduction of fossil fuel consumption]

Application of biodiesel fuel originating from organisms eliminates carbon dioxide emissions caused by fossil fuel combustion and significantly contributes to the prevention of global warming by using the fuel as an alternative to light oil, a type of fossil fuel.

[Environment friendly low public hazard fuel]

Biodiesel fuel is a low public hazard and one that greatly reduces black smoke contained in automobile exhaust gas and produces very little sulfur oxides that may generate acid rain.

[Promotion of recycling society creation]

Approaches to expand the cycle of waste edible oil recovery and to reutilize it as fuel in partnership with citizens, companies, and the municipality promote human exchange and vitalize local activities essential for creating a recycling society.

Utilization of biodiesel fuel

November 1997 –

Biodiesel fuel began to be used for about 220 garbage collection trucks that run on 100% biodiesel fuel



April 2000 – Biodiesel fuel began to be used for about 95 city buses belonging to Yoko-ji Branch Office that run on 20% biodiesel blended with 80% light oil.

May 2006 –

Kyoto City started to operate two city buses that run on 100% biodiesel fuel. Annual amount of biodiesel fuel used in Kyoto City: 1,500,000 liters

Production of biodiesel fuel

[Outline of facility]

One of Japan's largest facilities established by municipalities

- Production capability: 5,000 liters/day (1,500,000 liters/year)
- The facility began full-scale operations in June 2004.
- Total construction cost: approx. 750 million yen



[Features of the facility]

This facility has high level functions satisfying the preliminary standard of biodiesel fuel quality developed by Kyoto City as well as the following features about production scale and safety measures.

1. It has a high-level function capable of removing the maximum amount of impurities in the production method of the three-tank construction and eight processes.
 - (1) Two-stage reaction using an alkali catalyst contributes to higher efficiency. Moreover, the cleaning and the depressurized evaporation process using warm water are used to refine raw materials to produce high-quality biodiesel fuel.

(2) After production of biodiesel oil, the remaining methanol that has been used as raw material is recovered for reuse.

2. Equipment for mixing biodiesel oil with light oil to use it as fuel for municipal buses .

3. Almost all refinery processes are automated .

4. Electrical devices for fire prevention, gas detectors, and oxygen densitometers are installed in the production building in order to sufficiently take safety into consideration.

[Biodiesel project technical review committee](since FY2001)

- Establishment of provisional standards for biodiesel fuel quality (Kyoto Standards)
- Examinations are made as to appropriate technical measures to be taken in various processes from material procurement through fuel production to its use for vehicles, and instructions are issued according to the necessity.
- FY2004
Received the Environment Minister's Award for Anti-Global Warming Activities

[Requests to the national government]

Development of systems to establish the regional resource recycling system through the Biodiesel Project

- 1) Establishment of quality standards to stabilize the quality of biodiesel fuel and to promote the development of biodiesel-compatible vehicles
- 2) Establishment of systems to support the recycling of used cooking oil into fuel

- Financial support for the collection of used cooking oil in local communities and for the development of its recycling facilities
- Tax breaks and other advantage in relation to the use of biodiesel fuel

[Measures by relevant Ministries and Agencies]

Japan's Biomass Strategy decided by the Cabinet Meeting, Government of Japan (December 2002)

- Examinations aimed at fuel quality standardization (Ministry of Economy, Trade and Industry) (since FY2003)
- Examinations towards the development of biodiesel-compatible vehicles (Ministry of Land, Infrastructure and Transport) (since FY2004)
- Launching the Biomass Frontier Promotion Project and other programs (Ministry of Agriculture, Forestry and Fisheries) (since FY2003)
- Examinations on the safety of fuel supply equipment (Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications) (since FY2004)

[Financial support]

- FY2002: Subsidies for regional structural reform projects to prevent global warming (10,890 thousand yen) (Ministry of Environment)
- FY2003: Subsidies for projects to reduce CO₂ emissions (259,392 thousand yen) (Ministry of the Environment)
: Subsidy for the implementation of the Biomass Frontier Promotion Project (5,964 thousand yen) (Ministry of Agriculture, Forestry and Fisheries)
- FY2004: Subsidy for the implementation of the Biomass Frontier Promotion Project (5,978 thousand yen) (Ministry of Agriculture, Forestry and Fisheries)

[Efforts to promote the use of biodiesel throughout Japan]

- Formation of the Study Group on the Effective Use of Biodiesel Fuel (March 2004)
- The 1st Forum to Promote the Use of Biodiesel Fuel by Municipalities (Kyoto International Community House, October 2004)
- The 2nd Forum to Promote the Use of Biodiesel Fuel by Municipalities (Kyoto International Conference Hall, February 2006)

Biodiesel project's five effects and benefits

1. Recycling of used cooking oil

2. Reduction of CO₂ emissions Approx. 4,000 tons/year

3. Purification of exhaust gas Reduction of SO_x to 1/100 or lower

4. Hands-on environmental education

5. Revitalization of local communities

KYOTO CITY

Kyoto, originated from the ancient capital, Heiankyo founded in 794, is one of leading Japanese metropolises, in harmony between lives of 1,470,000 Kyoto peoples and natures as well as cultures fostered through its eternal history. Also, it is a rare city with natures subject to four seasons of spring, summer, autumn and winter, where people can closely feel traditional cultures and arts created and enjoy those in dept.

Meanwhile, Kyoto is used to continuously develop new cultures and industries through its active character and spirit of reform, although it follows the excellent traditions and cultures created by the ancestors.



EX. 2
Sustainable Cities in JapanPopulation: 1,401,212
Area: 340.6km²

FUKUOKA CITY

Fukuoka Method

Fukuoka Method provides an affordable solution to upgrade open-dumping sites

Why talk about municipal solid waste landfill?

It is a well-established fact that the world is urbanizing rapidly. Much of this growth is taking place in developing countries. As per the UN estimates, Less Developed regions accounted for 78% of the world's increase in urban population between 1950 and 2000. This trend will continue but with a greater vigor. By 2030 almost 80% of the world's urban population of 5 billion would be living in developing countries.

The rapid urbanization in developing countries is hastening the growth of existing cities as well as the emergence of new ones. The speed is so great that many cities are finding it difficult to manage the growth. As a result basic urban services are lagging behind. Facility like municipal waste landfill seldom receives the priority it deserves, partly because located away from the main cities, landfills seldom draw public interest. Unfortunately, problems do not go away simply because we do not see them. Environmental consequences of open dumping are well documented and well-known. With the expected increase in the urban population and the number of cities, the problem will magnify.

Municipalities often cite lack of money and lack of know-how as the two main reasons for their inability to adopt an environmentally responsible landfill method. The Fukuoka Method, developed in the city of Fukuoka in Japan, might provide an answer to this problem.

What's the Fukuoka Method?

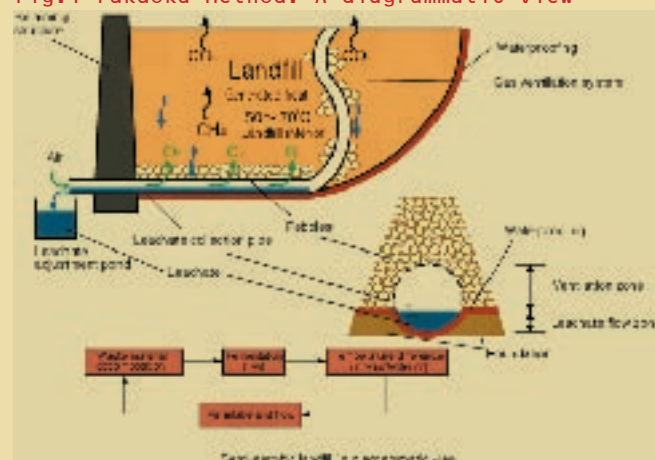
The Fukuoka Method landfill is a semi-aerobic landfill researched and developed in Fukuoka City some 40 years ago. Today some 70% of the cities in Japan have adopted this method. It is simple to construct and operate, allowing municipalities to add more "technology" as they acquire a

better understanding of waste degradation process.

The Fukuoka Method landfill is simple to construct: perforated pipes (leachate collection pipes) embedded in pebbles and graded boulders are laid at the bottom of the landfill in order to drain out leachate as quickly as possible, preventing it from stagnating in the waste material. In addition, series of vertical gas venting pipes connected to the horizontal pipes form a network that allows fresh air to circulate through the waste by convection.

Heat generated by microbial activity in the landfilled waste layers causes the temperature inside the landfill to rise. Air convection generated by the temperature difference between the inside and the outside of the landfill makes it possible for air (oxygen) to enter the waste layers through the leachate collection pipes. This phenomenon promotes aerobic condition in waste layers and causes a rapid microbial decomposition of waste and purifies the leachate.

Fig.1 Fukuoka Method: A diagrammatic view



1. Fukuoka Method landfill generates less polluted leachate

Advantages of the Fukuoka Method

Fig.2 shows the change of BOD concentration in leachate, which was, generated from the on-site scale experiments. From this graph, the quality of leachate improves significantly and more rapidly in semi-aerobic landfill (Fukuoka Method) than anaerobic landfill.

This offers considerable advantage in doing secondary treatments of leachate.

Fig.2 Landfill type and change in Leachate BOD over time



2. Fukuoka Method landfill generates less harmful gases, such as Methane, Hydrogen Sulfide.

In the Fukuoka Method landfill, the generation of methane gas is reduced, thus contributing to the prevention of global warming.

Under anaerobic conditions, decomposition of reclaimed waste will take quite a long time, so that the generation of methane gas will continue even after the completion of landfill work.

Table.1 Landfill Types and the generation ratio of gases by volume.

Landfill type	CO ₂	CH ₄
An aerobic Landfill	50	50
Fukuoka Method	80	20

3. Fukuoka Method promotes decomposition / stabilization of waste

In the Fukuoka Method landfill, stabilization of landfills is enhanced by making it possible to use the completed landfill sites for other purposes in a shorter period.

The effective utilization of completed landfill sites has been practiced in Fukuoka City.

Fig.3 After use of the completed Landfill in Fukuoka



4. Fukuoka Method allows a high degree of freedom in the selection of materials

The technology is cost-effective and simple to construct and operate, and allows a high degree of freedom in the selection of materials for pipes and accessories.

Fig.4 Wasted tires are used as Leachate collection pipes



EX. 2

Sustainable Cities in Japan

Fukuoka City

EX. 2

Sustainable Cities in Japan

Case Study 1: Malaysia

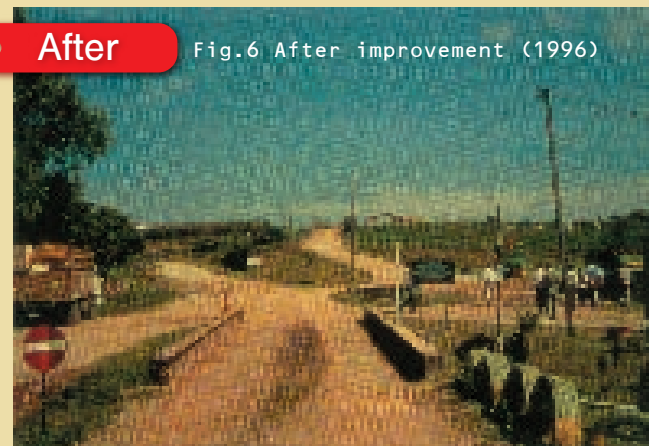
Before

Fig.5 Before improvement (1988)



After

Fig.6 After improvement (1996)



Transfer of the Fukuoka Method was successfully implemented in Seberang Perai Municipal Council in Malaysia. One of the important points is that the locally available resources were used as much as possible for the improvement work. Flexible ideas brought surprisingly good results.

Fig.7 photo shows the installation of main and several branch leachate collection pipes. The main pipe is made of concrete and the branch pipes are made of bamboo.

Bamboo was utilized for the pipes because it was easy to obtain and not expensive in Malaysia.

Fig.7 Bamboo leachate collection pipes



Researchers tested the activated carbon absorption treatment of leachate by using the wasted activated carbon. (See Fig.8)

Fig.8 Activated carbon absorption treatment



Fig.9 shows the comparison of leachate color. From the right, sample leachate, aerated leachate and activated carbon absorption treated water. Their trial was successful.

Fig.9 Treated Leachate color



Case Study 2: Samoa

Fig.10 Before improvement (2002)



Before

After

Fig.11 After improvement (2003)



An open dump site was upgraded to a sanitary landfill using Fukuoka Method in Samoa in 2003. Fig.11 shows the same landfill in 2003. School kids are studying solid waste management at the site.

Case Study 3:
Weifang in Shandong Province, China

UN-HABITAT promotes technical cooperation, including technology transfer, across the globe on the principle of informed choice. The UN-HABITAT Regional Office for Asia and the Pacific (ROAP) and Fukuoka City of Japan have been collaborating in introducing a particular type of landfill design and operation, commonly known as the Fukuoka Method since 1998. Collaborative partnership between UN-HABITAT Fukuoka Office, Fukuoka City and Fukuoka University has made significant contribution in realizing Fukuoka Method Landfill in Weifang, China.

Fig.12 Fukuoka Method Landfill in Weifang, China



Case Study 4: Workshop in Kathmandu, Nepal

His Majesty's Government of Nepal, Ministries of Physical Planning & Works, Municipal Association of Nepal, and UN-HABITAT Fukuoka Office co-organized a workshop on the Fukuoka Method landfill design and operation in Kathmandu, Nepal from 5 to 7 December 2005. At the

request of UN-HABITAT Fukuoka Office, Fukuoka City and Fukuoka University provided technical expertise on the subject.

Fig.13 Practical on-site training in Nepal (2005)



FUKUOKA CITY

The Asian-Pacific region is drawing global attention for its remarkable economic growth.

This rapid economic expansion has, however, also aggravated urban problems associated with a massive influx of new residents.

Fukuoka City has been promoting friendship and mutual cooperation in Asian-Pacific region toward solution of urban problems and network-building for further development of Asian cities.

Fukuoka has announced its bid for hosting the 2016 Olympics Games. Taking advantage of the past exchange activities with other Asian cities, Fukuoka aims to host the Olympics, providing dreams, hopes and inspiration to the children around the globe and bridging Asia with the rest of the world.



EX.3
Sustainable Cities in JapanPopulation: 988,782
Area: 488km²

KITAKYUSHU CITY

Conquering Pollution

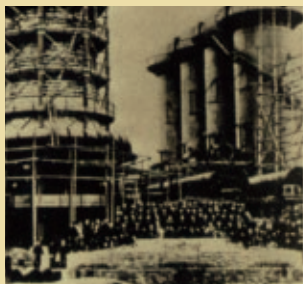
Lessons learned from overcoming pollution problems

The light and dark side of Japan's modernization

[Industrial Prosperity]

Since the opening of the government-operated Yawata Steel Works in 1901, the Kitakyushu region developed as an area of heavy and chemical industries. With the use of iron ore from China and abundantly available coal from the Chikuhō coal mines, the heavy and chemical industries developed rapidly backed by the Japanese government policies of the 1950s. The City of Kitakyushu became one of the four leading industrial zones of Japan.

Fig.1 Construction of the Yawata Steel Works



[Generation of pollution]

In the 1960s, Japan underwent a period of rapid economic growth, with heavy and chemical industries, namely steel, machinery and chemicals, as the major driving force.

Economic development and industrial prosperity brought about pollution problems of a magnitude never before experienced. In Japan, where industrial and residential zones were located close together because of space limitations, serious pollution damage resulted. Kitakyushu was no exception.

Air pollution

In the Shiroyama district of the Dokai Bay area where numerous large industrial plants were clustered together, the largest smoke dust fall in Japan was recorded in 1965, a staggering annual average of 80 tons per month per square kilometer (with an all-time high reaching 108 tons per month). In 1969, Japan's first smog alert was issued here in Kitakyushu. The area suffered such phenomenal air pollution that the Shiroyama district came to be known as a scrap heap for pollution. Severe air pollution led to a large number of asthma sufferers.

Water pollution

In addition to being a semi-closed water system, Dokai Bay was subject to the discharge of untreated wastewater from factories as well as domestic effluent. Pollution thus became extremely serious, and a survey in 1966 found the dissolved oxygen level of Dokai Bay to be 0mg/l and the chemical oxygen demand (COD) to be 36mg/l. Dokai Bay was referred to as the "Sea of Death", where even e-Coli could not survive.



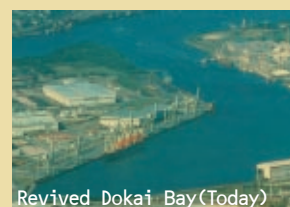
Fig.2 Dissolved boat screw

[Conquering pollution]

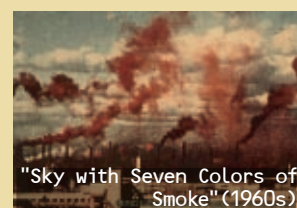
The citizens, the local government, and the industrial sector have all joined forces to combat this damage to our environment. In the past, not even bacteria could live in the Dokai Bay area, known then as the "Sea of Death". Now, over 100 species of fish have returned to the bay. While once the sky rained down the highest level of polluted precipitation in Japan, earning it the moniker of "The Seven-Colored Smoke," the skies have improved to the point where Japan officially selected us as a "starry sky city." Finally, Kitakyushu has reclaimed its beautiful seas and skies.



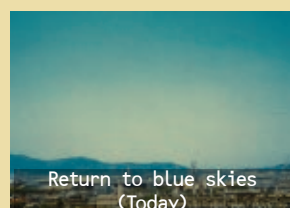
Polluted Dokai Bay (1960s)



Revived Dokai Bay (Today)



"Sky with Seven Colors of Smoke" (1960s)



Return to blue skies (Today)

Conquering Pollution

EX.3
Sustainable Cities in Japan

Lessons learned from overcoming pollution problems

[Driving forces in overcoming pollution: Urban renewal through partnership]

In order to overcome its grave pollution problems, the City of Kitakyushu was the first among local authorities to implement pollution countermeasures.

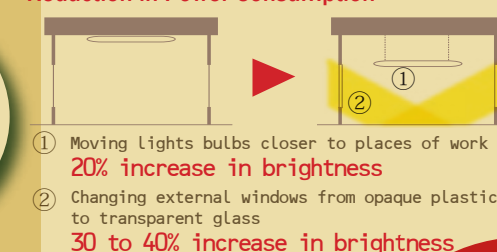
The local community partnership that was built up through the process of overcoming pollution is still very much alive in today's town planning and local environmental improvement activities.

Furthermore, the partnership is highly appreciated internationally as a model of environmental improvement.

Initiatives by
ResidentsCommunity-led
Environmental ImprovementInitiatives by
Private EnterprisesInitiatives by
Local Government

Private enterprises actively undertook measures to counter pollution, including improving production processes, installing pollutant removal and treatment facilities, and marking greater greenery provision in plants. While implementing these actions, they acquired not only end-of-pipe technologies such as effluent and emission treatment but also introduced technology to promote pollution control through the improvement of manufacturing facilities and processes and the efficient use of resources and energy (low pollution production technology = cleaner production). Not only did cleaner production improve the environment but it also resulted in the economic benefit of raised productivity.

Reduction in Power Consumption



Introduction of Cleaner Production

- *Evaluation and improvement for the use of raw materials.
- *Improvement of manufacturing processes, and through maintenance.
- *Capacity building.

Efficient use of
Resources and
energy Raised Productivity
+
Improvement of the
Environment

Fig.3 The first to speak up about pollution problems were mothers who formed a citizens' movement because they were concerned about their children's health. Under the slogan "We want our blue skies back", the mothers took their own initiatives to monitor air pollution and used the results to lobby private companies and the government to implement improvement measures.



[Resulting environmental activism]

While working to overcome serious pollution problems, Kitakyushu accumulated a wealth of environmental know-how. In addition to encouraging environmentally friendly development locally, the city has also actively worked to share its knowledge overseas.



Fig.4 Receiving trainees from overseas



Fig.5 UNCED Local Government Honours (1992)



Fig.6 ESCAP ministerial conference on environment and development in Asia and the Pacific in Kitakyushu (2000)



Fig.7 Johannesburg summit (2002)

KITAKYUSHU CITY

Kitakyushu City was born in February 1963 through the merger of five cities, all having long histories. Such a merger of five municipalities on an equal basis was unprecedented in the history of the world. Today, Kitakyushu City has the population of 1 million and the City area of 485 square kilometers.

Located at the northernmost tip of Kyushu Island in the west end of the Japanese Archipelago, Kitakyushu lies halfway between Tokyo and Shanghai. The close proximity to various Asian metropolises benefits Kitakyushu significantly.

Kitakyushu has long been home to various modern industries. While contributing to Japan's modernization as an industrial city, the City has accumulated advanced industrial technologies and expertise.

Today, Kitakyushu is advancing diverse activities under the key word 'internationalization' on the basis of the fundamental plan of the 'Kitakyushu Renaissance', whose basic concept is 'Toward Becoming an International and Technological City with Waterfront, Green Environment and Kind-heartedness'.

Despite being a large city with one million residents, Kitakyushu has its natural environment.

The City seeks to maintain harmony with natural environment; to this end, the City is committed to promoting the harmonization with environment including the development of environmental industry, while at the same time constructing extensive infrastructures.

EX. 4
Sustainable Cities in JapanPopulation: 107,593
Area: 658.76km²

IIDA CITY

Making Partnerships

Sustainable community development through partnerships between the city and residents

Grassroots community development initiatives Tatsuoka Free School, which received the "Mutosu" Iida Award 2005



"Mutosu" urban development plan

Residents of Iida City are committed to community development with the slogan "Mutosu" (self-rule, independence autonomy), "Mutosu" originated from a Japanese team: "ntosu", which is listed at the very end of the most famous Japanese dictionary (Kojien). Since 1982, the city has been using "Mutosu" as a slogan to inspire residents to make Iida an ideal city. Although the original meaning of the team is "I will" or "we will", the resolution is to create though residents' voluntary activities, a lively community where residents are happy and proud to live in.

The city has also created annual "Mutosu" Iida awards, to commend organizations that contribute significantly to community development. Last year, the "Mutosu" Iida award was presented to Tatsuoka Free School, which was established by a group of residents desiring to contribute to communities with their expertise. The school holds an outdoor program for elementary and junior high school children to cultivate rice and vegetables on paddies and fields, holiday classes to assist children with their studies and other events.

There are many more groups in the city. Some are committed to training people for community development, others make local products by using local materials, and others are engaged in various other activities. By commending and supporting such organizations, Iida City promotes collaboration with its residents and the government policies of the Japanese government that deal with industrial zones.

Buildings and a row of apple trees in the redeveloped district



Junior high school students taking care of apple trees



Downtown area redevelopment project

By attracting more people to live in and visit downtown areas, the City intends to revitalize entire city areas. The City's urban redevelopment originated in 1949, when most part of the city was destroyed by a large fire. Before the fire, Iida was a beautiful castle town, dubbed "little Kyoto" (Japan's ancient capital). In the course of reconstructing Iida as a model city of improved disaster preparedness, junior high school students planted 47 apple trees on both sides of the City's main street, wishing its successful completion. Today, the street lined with apple trees has become a symbol of the city.

To increase the urban population, the city is currently committed to an urban integrated redevelopment project, featuring construction of housing and other facilities. As an organization responsible for the project, a company (Iida Urban Development Company) was established with the funds of residents, enterprises, financial organizations and the city government. In addition to implementing the redevelopment project, the company is committed to various services, including the management of tenants, operation of shops and restaurants, organization of events, support of cultural activities, and provision of welfare services.

To promote tourism, private businesses, tourist bureaus

and the city government work together to enhance attractive features of Iida City, particularly the streets lined with apple trees.

Community-based environmental campaigns

In 1996, the city adopted a vision of developing Iida into an environmentally-conscious and cultural city. Ever since, the city has been committed to various environmental campaigns.

The city's Master Plan for Environmental Preservation stipulates a numerical target of reducing greenhouse gas emissions by 10%. To achieve this goal, the city has adopted the "Regional Plan for Promoting Use of Renewable Energy Sources and Energy Conservation". As one such measure (ahead of other Japanese municipalities), the city began promoting installation of solar panels on roofs of private homes. To date, a total of 775 homes have solar panels installed.

Solar panels installed on the roof of a childcare center



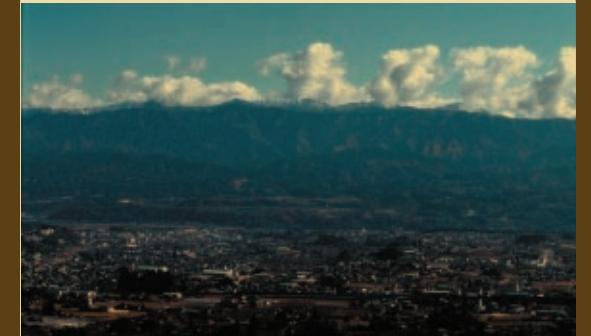
In addition, the city is committed to an eco-friendly utility service through the partnerships between residents, enterprises, and the municipal government. An energy supply company, originally established by an NPO, and funded by investment from around the country, is engaged in community-based photovoltaic power generation and the management of a shopping mall (ESCO), which is operated by solar power. The company is also engaged in promoting effective use of "green electricity" environmental education for young children and a co-generation project using wood pellets. In this way, the environmental campaign of Iida City features fusion of the local economy with locally produced energy.

Another unique initiative is the appointment of about 110 environmental monitors among the residents who are over ten years old (fifth grade of elementary school). The monitors are asked to report whenever they recognize plant and species as indices of a clean environment. The city analyzes their reports to reflect them in its environmental policies.

Involving many residents in this way, the city promotes residents' awareness of the importance of environmental

preservation for future generations.

IIDA CITY



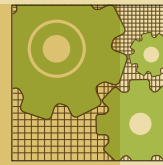
Iida City is located in the southern west area of Nagano Prefecture, which stretches north to south in central Japan. The city, embraced by the South and Central Japan Alps, was constructed on the riverbank along the Tenryu river and flourished as a castle town. Today, it has a population of 108,000 as of the end of March 2006. The city area is 658.76km².

In addition to abundant natural blessings, and a particularly mild climate and scenic beauty that feature seasonal change, residents of Iida are proud of its long history and traditional culture. The city streets are lined with apple trees, and Iida is well known for Iida Puppet Show Festival and Toyama Shimotsuki Festival (harvest festival), the latter being designated by the national government as an important "Intangible Folk-Cultural Property"

Since 1937, when Iida became a "city" under the modern municipal system, Iida has continued to develop as a pivotal city in southern Nagano prefecture. Today the city is promoting various types of tours, including "eco-tours" and "green tours". These "tours" offer participants opportunities to experience agricultural activities and "educational tours" that enable tourists to access regional resources. By seeking optimal regional management the municipal government and its residents are committed to sustainable community development so as to create an "autonomous cultural and economic city". Furthermore, by re-evaluating various assets that the city has inherited and using them effectively, the city aims to promote a sustainable regional society, under the slogan "Mutosu" (self-rule, independence autonomy), residents participating in community development projects at creating a friendly community, where all residents are linked through heart-to-heart communication.

EX.5

Sustainable Cities in Japan



Population: 98,686
Area: 80.65km²

MURORAN CITY

Creating An Eco-Industrial Hub City

Our goal is to become
a sustainable eco-industrial city
through academia-industry-government
collaboration

History and current status of local industries in Muroran City

The City has developed as a center of heavy industries in Hokkaido. Its key industries being iron and steel, cement, oil refining and other materials production industries, as well shipbuilding, plant and machining industries that use iron and steel as materials. In the vicinity of the key manufacturers, there are small and medium-sized companies that supply materials or provide machining, maintenance and other services. To win customers from among the employees of these companies, many shops and eating and drinking establishments were set up and thrived.

During the decade beginning from 1965, when Japan experienced rapid economic growth, the City's population and industrial growth peaked. Since 1975, the prolonged structural and high-yen recession has forced local companies to downsize or rationalize their operations, dampening production activities.

Actions toward new growth industry

Although the City suffered shrinking industrial output and population, it remains in the top ranks in Hokkaido in terms of the shipment value of manufactured products (ranked first according to the 2004 preliminary estimates of shipment values of manufactured products), maintaining the highest level of industrial accumulation (employers, existing facilities and technologies, etc.) in Northern Japan. By creating new businesses that effectively utilize existing industrial accumulation, we will be able to curb further outflow of population and contraction of the local economy, and lay the foundation for future industrial and regional development. Among other things, the environmental industry is particularly promising. In this industrial field, we can make the most of the advanced technological abilities and high temperature heat treating furnaces, such as coke ovens and cement kilns available in Muroran City. In addition, society is expected to attach greater importance on the reduction

of environmental load, such as waste and carbon dioxide. Under these circumstances, we established in 2001 a council to promote the environmental industry in the Muroran area, as a partnership between industry, government and academia. Based on a shared understanding of the need and expectations of the environmental industry, the council developed an action plan aimed at creating the environmental industry in the Muroran area (in fiscal 2002), which is now under way.

Objectives of creating an eco-industrial hub

Muroran City aims to become an eco-industrial hub in Northern Japan by concentrating environmental businesses in the Industrial City as a means of regaining vitality. To realize this goal, we make use of the accumulation of advanced technologies in Muroran City. A city of manufacturing; ports and other logistics functions; research and development establishments, including the Muroran Institute of Technology; and networks of academia, industry and government. By creating an eco-industrial hub, we are attaining the following objectives:

- Industrial development in this area (Reorganizing local industries and capturing new added value by using environmental concerns as leverage)
- Regional development of this area (Curbing the population drain and revitalizing the community by job creation and other measures)
- Contribution to the environment in this area (Reducing local environmental load, and creating a recycling-oriented community)
- Contribution to the environment outside this area (Contributing to resolving or mitigating waste problems in other regions and global environmental problems)

Specific projects that contribute to creation of eco-industrial hub

Creating An Eco-Industrial Hub City

EX.5

Sustainable Cities in Japan

Projects that play key roles in the creation of an eco-industrial hub are categorized into three types according to the purpose, means and other elements, so that we are able to take a strategic and conscious approach toward accomplishing each purpose:

1.Core Project

Purpose: Creation of the core of an eco-industrial hub

Means : Utilizing accumulation of key industries and logistics functions available in the City

Strategy: Regarding recycling, hazardous substances treatment and new energy businesses as the core projects, we focus our efforts not only on the promotion of existing recycling businesses, but also on the startup of core environmental businesses that have a strong impact, such as PCB waste treatment, for which officials permits have already been obtained, and recycling of agricultural plastics. Once Muroran City gains recognition for these businesses, we will move on to other projects.

2.Dissemination projects

Purpose: Operation of environmental businesses that sprang

in Muroran in other areas

Means : Utilizing technologies and technological development functions accumulated around the key industries

Strategy: With the aims of revitalizing peripheral companies and creating new businesses, we promote strategic operation of environmental businesses outside this area, in which recycling demand is low. By utilizing technologies developed in Muroran, companies are launching new businesses or commercializing products through academia-industry-government collaboration, and will propose prototypes through model projects or demonstration tests.

3.Foundation projects

Purpose: Realization of sustainable "eco-industrial city"

Means : Fostering community culture that supports the environmental industry

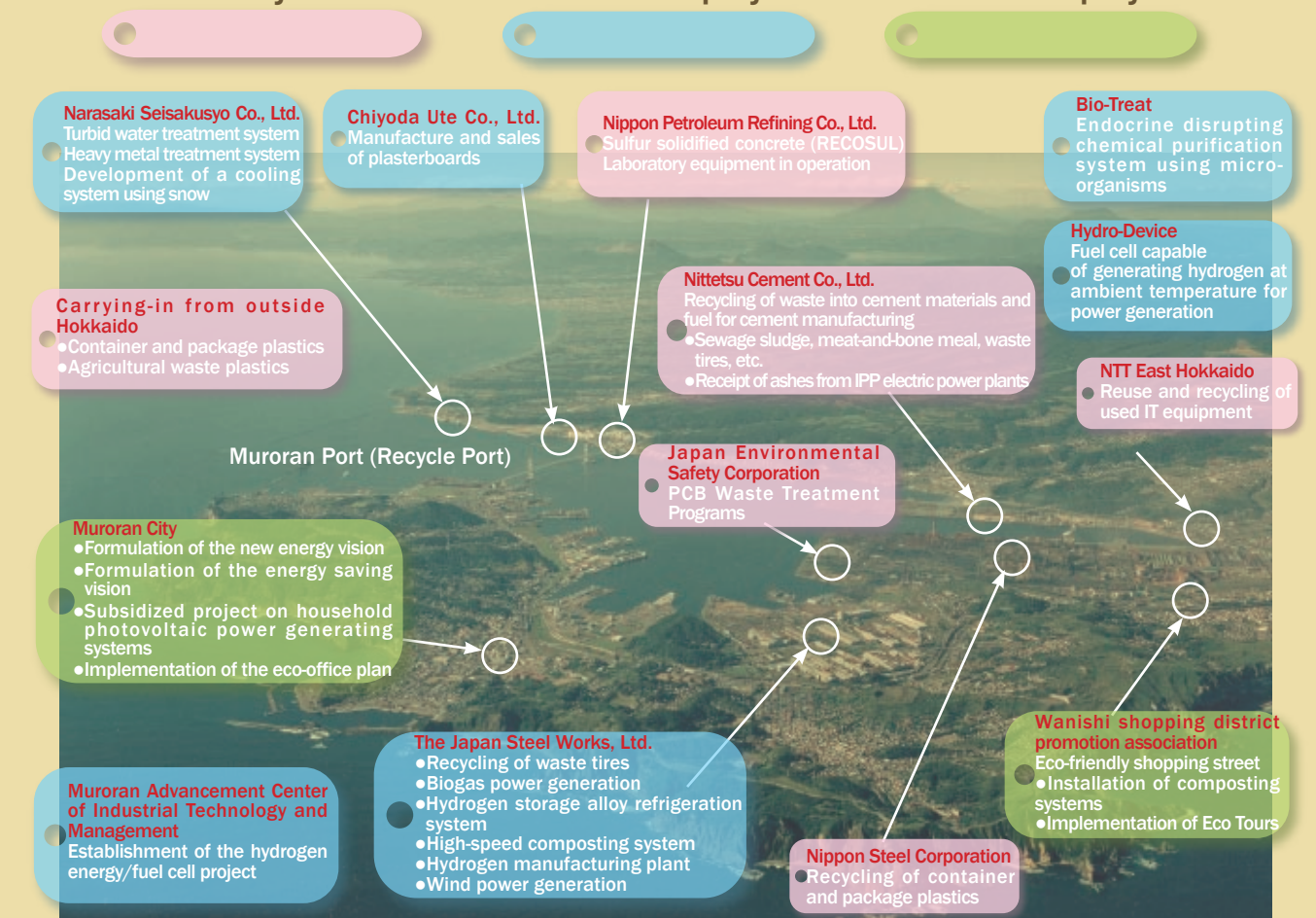
Strategy: Community-based actions are taken to pursue environmental-friendly jobs, lifestyles and urban development, while promoting the revitalization of other industries and the startup of new businesses.

Implementation of major projects for creating eco-industrial hub

1.Core Project

2.Dissemination projects

3.Foundation projects



Muroran City

Progress of implementation

1.Core projects

Nippon Steel Corporation Muroran Works started a waste plastic recycling business in 2002. In the coke-oven chemical materials recycling process, container and package plastics are charged into a coke oven carbonization chamber, carbonized at high temperature of 1200°C in the absence of oxygen and thermally decomposed into coke, hydrocarbon oil and coke-oven gas. Coke is used as a reducing agent in blast furnaces, hydrocarbon oil as a material for plastics, and coke-oven gas as a fuel for power plants. The annual amount of plastic waste transported to this facility from in and outside Hokkaido for recycling increased from 20,600 tons in 2003 to 22,300 tons in 2004, to 23,300 tons in 2005. Under the national PCB Waste Treatment Programs, Japan Environmental Safety Corporation is constructing a regional PCB waste treatment facility that will cover Hokkaido and 15 other prefectures in the Tohoku and other regions. The facility, which is scheduled for commencement of operation in October 2007, is expected to treat approximately 4,000 tons of PCB waste.



the recycling facility attached

Nippon Oil Corporation developed a method of recycling by-products from the petroleum refinery process and fishery and other waste into reformulated sulfur solids (to be marketed under the name of “RECOSUL”). The new material is manufactured by mixing reformulated sulfur, which is produced by adding an additive to sulfur recovered from hydro-desulfurization unit, with coal ash and scallop and other shells. Sulfur-solidified concrete is superior to conventional concrete in its strength, impermeability and acid resistance.

The company constructed experimental sulfur concrete manufacturing equipment on a business scale, and launched field tests to demonstrate early attachment of algae on the artificial substrates. Upon completion of the demonstration test, the recycling business is scheduled to start in fiscal 2006.



the sulfur-solidified concrete manufacturing system attached

Regarding the new energy business as one of its core businesses, the Japan Steel Works, Ltd. Muroran Plant will start the distribution of power generating facilities, with the view of realizing a domestically-produced wind power plant. The company



blades manufactured

has already set up a subsidiary that manufactures rotor blades for wind turbines. The blade manufacturer has commenced production and, this year it will start the full-scale production of large blades, including a 40-meter blade, one of the largest wind blades in the world.

2.Dissemination projects

Two venture firms sprang from the Muroran Institute of Technology, a local university. Bio-Treat Ltd. is developing a wastewater purification system using a novel species of microbe that degrades endocrine disrupter chemical (Nonylphenol), aiming to commercialize the system. Hidro-Device is working to bring to market its portable fuel cell, which is capable of generating hydrogen at ambient temperatures using finely pulverized aluminum. The Muroran Institute of Technology also established an environmental science and disaster control research center. Amid growing awareness among local citizens, corporations and government, the center promotes research and development of environment-related technologies that contribute to regional industrial development and environmental preservation.

3.Foundation projects

In the Wanishi shopping district, one of the local shopping streets, the Wanishi shopping district promotion association has carried out environmentally conscious activities: installation of kitchen waste composting systems; implementation of an initiative to reduce the use of supermarket plastic bags; establishment of Eco Shops; and organization of Eco Tours of local corporations' environmental industrial facilities in collaboration with local NPOs. This fiscal year, Muroran City will start separate collection of waste plastics as recyclable resources.

In addition to the above projects, some companies set up business operations or launched a new business in Muroran City. Chiyoda Ute Co., Ltd., a manufacturer and supplier of plasterboards, constructed a new plant on the site adjacent to Nippon Petroleum Refining Co., Ltd., aiming to produce plasterboards using gypsum recovered from the flue gas desulfurization process in the refinery's power generation business. NTT East Hokkaido started computer recycling services, including erasing of hard drive data, to promote the reuse and recycling of used personal computers, servers and other IT equipment.

Future actions: Dissemination of eco-brand image

To create an eco-industrial hub, government, citizens, corporations and all other stakeholders in the community need to participate and collaborate in the promotion of environmentally-friendly urban development and lifestyle, instead of relying solely on the utilization of key industries. In all industries, let alone manufacturing, companies must pursue environmentally conscious business management.

When these goals are accomplished, an eco-brand image of Muroran City will be created. To this end, we will

take the following actions:

1. Promotion of collaboration between the industrial and civilian sectors utilizing the accumulation of industrial assets that can be diverted for consumer use, such as corporate technologies and exhaust heat from factories;
2. Development of a wide-area resources and energy recycling system, in which recyclable resources that are difficult to treat properly are transported from the Tokyo metropolitan area or other regions to undergo advanced pre-treatment at the Recycle Port (a recyclable resources logistics base port designated by the Ministry of Land, Infrastructure and Transport) for recycling;
3. Promotion of creation of environmental businesses that spring from small and medium-sized companies and universities, by encouraging joint research or other forms of collaboration between industry and academia, such as between the Muroran Institute of Technology and corporations and by promoting research on subjects that lead to environmental businesses; and
4. Creation of a “participatory eco-community,” in which environmentally conscious projects that involve citizens, such as Eco Shopping District and Eco Tour, have become firmly established.

Conclusion

Our actions described above led to the selection of Muroran City as a model city for creation of environmental-friendly city designated by the Urban Renaissance Headquarters of the Japanese Cabinet Secretariat (in June 2003). Since local corporations, universities, citizens and government participate in the development and implementation of these projects and actions in their respective capacities, our Urban Renaissance initiative has gained momentum, making steady progress. Muroran City is drawing much attention of those involved in administration at the national and local level and, it seems, is gaining recognition as an environmentally conscious city.

In April of this year, Muroran City was selected again by the Urban Renaissance Headquarters as a model area for global warming and heat island countermeasures, for its plan to implement anti-global warming projects using new energy sources. As one of those projects, the City applied to the Ministry of Environment to join the Renewable Energy

for CO₂ Reduction Model Area program, and successfully obtained approval this fiscal year. Under the program, local corporations are working to install wind and photovoltaic power facilities to supply electricity to public facilities.

We continue to vigorously promote environment-related businesses so that information on new businesses and technologies will be disseminated within Japan and abroad from the entire area of Muroran as an eco-industrial hub city, contributing to environmental protection.

MURORAN CITY

Muroran is located in the southwestern part of Hokkaido, Japan, at approximately 42 degrees North latitude, 140 degrees East longitude. Covering a total area of 80.64 square kilometers, the city stretches 12 kilometers from east to west and 15.2 kilometers from north to south on a horseshoe-shaped peninsula jutting westward into the sea. Along the inner side of the horseshoe shape, there are industrial areas, mainly of key industries, surrounded by abundant nature. The 1,380-meter-long Hakucho Bridge crosses over the mouth of the bay, making a loop for this “circle city” of approximately 100,000 residents.

The history of Muroran dates back to the Keicho era (1596-1615), when the Matsumae clan set up a trading post in Etomo at the edge of the peninsula. With the visit of the British ship “Providence” to Etomo in 1796, the port became internationally known as a good natural port. With the opening of the Port of Muroran in 1872, a railroad connecting Hakodate, Muroran and Sapporo and a regular sea-line, Muroran prospered as a land and marine transportation hub for Hokkaido. The steel plant and iron works constructed at the end of the Meiji period (1868-1912) led to the development of Muroran as an industrial port city. In the postwar period, oil refineries started operations here, adding the heavy chemical industry to the city's list of key industries.



EX. 6
Sustainable Cities in JapanPopulation: 66,354
Area: 188.58km²

TAHARA CITY

Sustainable Urban Development and Education

Involving all generations in promoting sustainable development

Tahara City's "Eco-garden city concept"

In 2003, Tahara City started its initiative of "Tahara Eco-Garden City Concept" to achieve a sustainable urban development and to create an affluent and environment-friendly city. To that end, efforts are being made in a wide range of areas.

With four key themes, (1) involve all generations in promoting the community development, (2) revitalize industries and achieve an affluent life, (3) best utilize local resources, and (4) reduce environmental burden to create a sound global environment. The city has worked on seven major projects. Those are (1) ecology project using colza flower, (2) waste recycling project, (3) "eco-energy" introduction project, (4) energy-saving promotion project, (5) "compact city" project, (6) "green network" project, and (7) "eco-industry" project.

In implementing the projects, the city government is proactively collaborating with not only corporations and citizens, but also elementary and secondary schools to promote "Eco Garden City Concept."

Introduced here are educational programs conducted in schools to promote the development of sustainable environmental-friendly city.

Environmental education in elementary schools

There are 20 elementary schools, seven junior high schools and three high schools in Tahara City. Concerns about the contamination of Shio River that runs through the city raised public awareness towards environmental conservation. Educational institutes are now proactively organizing in-class programs and after-school activities regarding environmental issues.

In 2004, using the city's subsidy to promote ecology education programs, Tahara Chubu Elementary School held a class on a new energy generation method. The weather condition in Tahara City is quite suitable for solar power

generation because the amount of solar radiation in the region is the largest in Japan. In fact, approximately 2.7% of house owners in the city have installed a solar power generator, which is the highest rate in Japan.

Case Study 1: Workshop on the new energy generation method (solar energy generation)

Solar energy generators were purchased to show students how to generate energy from sunlight (natural energy). The purpose of the program was to help students deepen understanding of current environmental concerns represented by global warming and raise their awareness towards creating an energy-saving and recycle-oriented society.

After explanation was provided by the teacher regarding the basic concept of solar power generation, students divided into small groups, took out new solar power generator kits from the box and assembled the generators while looking at the instruction book.

Students Learning how the system works through assembling the kits



Comparing the amounts of solar radiation between shady and sunny places



How does the amount of sunlight differs depending on the panel angle?



Through the experience of assembling the generator kits on their own, the students took more interest in solar power generation. They eagerly examined how the solar panel angle and weather conditions affected the power generation efficiency.

Case Study 2: Wind Power Generator donated by the PTA

Compact hybrid wind-power generator donated by the PTA



In 2004, the PTA of Kinugasa Elementary School donated a compact wind turbine generator to the school. The generator adopts a "hybrid" method: a combination of solar power and wind power generation. The electricity produced by the generator is used for lighting. Using the City's subsidy to promote ecological education programs, a panel board was added in 2005 as a tool for environmental education. On the panel, how to generate electricity from natural energy is described and the amounts of power generated by wind and solar energy respectively and the wind velocity are indicated.

Environmental education in junior high schools

Tahara Junior High School has held a learning session on Tahara City's "Eco Garden City Concept" on an annual basis as a part of its general learning program, inviting a lecturer from the city office.

Case Study 3: Eco-project using colza flowers

The aim of this project is to promote the recycling of resources. Colza flowers are grown in unused farmlands to improve the soil quality, and the colza oil is used for cooking. Moreover, used cooking oil is refined into a bio diesel fuel (BDF) and used as an alternative to light oil fuel.

After receiving a lecture about the project in class, students went out to the farm to sow colzas with NPO members engaged in the eco-project. Colzas, whose diameter is 2 mm, are so tiny that it is difficult to know where the seeds are sown and where not. Therefore, students tried to work together to the same rhythm to make sure the seeds are sown evenly on the entire field.

Sowing colzas; a rare experience for students



Case Study 4: Energy Saving Project

This project is designed to promote an ecology-conscious lifestyle by encouraging the use of energy-saving lighting equipments, for example, so as to reduce the amount of energy consumed and thus help alleviate global warming. Described here is one of these programs. Students and the city office staff visited a sales branch of an electric power company to learn what induction heating (IH) is.

Students listened to the manager's lecture in a serious and earnest manner. After that, they had a joyful time making pancakes on the IH cookers. How did the pancakes taste.

EX. 6

Sustainable Cities in Japan

The branch manager of an electric power company giving a lecture



Making pancakes on the IH cooker, an energy saving equipment



Visiting the city office hall to see the solar power generator on the roof



The city government is taking the leadership in introducing solar power generators. While awarding subsidies to citizens to install solar power generators in their houses, the city government is also encouraging public facilities to introduce the solar power generation system. The city office hall has installed a solar power generator with the capacity of 20kW, which is producing nearly 4% of the total energy consumed in the office building annually.

Environmental education in high school

Having been designated by the Japan Productivity Center for Socio-Economic Development as a site for energy education for three consecutive years since 2002, Aichi Prefectural Atsumi Agricultural High School has conducted workshops and learning sessions in classes and after school activities to teach students about various energy sources.

Case Study 5: Workshop on energy environment

The High School is offering a class of agricultural machinery, in which students study the mechanism of machinery and engines.

A program was held to deepen students' understanding of energy environmental issues through the learning of what is the fuel cell and how it works. According to a survey conducted prior to the program, while 81% of the students knew about the hybrid vehicle, only 35% were informed of the fuel cell. It is likely that the recognition rate was low because the fuel cell has not been commercialized yet.

Learning about "clean" energy using the fuel cell



A fuel cell car kit was used in the workshop because it was the most effective way to help students understand the mechanism and theory of the fuel cell.

Experiment of running a fuel cell car



CITY

Students were looking at the vehicle excitedly. Can it really run on the fuel cell? To understand the mechanism of the fuel cell car, knowledge of not only mechanical engineering but chemistry also is necessary.

The fact that approximately 80% of the students took interests in the fuel cell through the actual experience of running the fuel cell car was quite a meaningful result for the program organizer.

Although not many students understood why efforts were being made to develop such a fuel cell vehicle and how energy and environmental issues were interrelated with each other in our life, approximately 70% said that they felt the fuel cell would be necessary in the future as an important energy source.

Case Study 6: Other initiatives using the fuel cell car

Participation in an eco-car race



Members of Industrial Club of Atsumi Agricultural High School decided to participate in an eco-car race as part of the school's energy education program. Based on what they learned in the workshop, the club members installed a fuel cell in one of their eco-cars and made an entry in an eco-car race.

The participation in the race further motivated the students to learn about the fuel cell and provided them with an invaluable experience in activities outside school.

Case Study 7: Wind and solar power generators

In 1997, with the assistance of the Prefectural government, the High School installed a wind turbine and a solar power generator in its premises and built a greenhouse that is run by wind and solar energy. The electricity generated by the wind turbine is used to open and close the house's curtains while solar power is mainly used as an energy source for the control panel.

Since the greenhouse serves as a good example of clean energy utilization, the High School often has visitors from other elementary and junior high schools and non-educational organizations to see the facility. In 2004, an explanatory panel was installed using the city's subsidy for ecology educational programs to help students and visitors easily understand how the clean energy is used for agriculture.

A windmill installed in Atsumi Agricultural High School (1997)

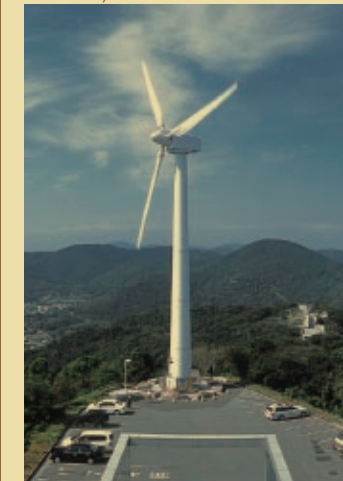


A solar power generator built in Atsumi Agricultural High School (1997)

TAHARA CITY

Tahara City is located on the Atsumi Peninsula, the southeast part of Aichi Prefecture. The city was opened 500 years ago as a castle town and is known in connection with WATANABE Kazan, an artist and liberal politician in the late Edo Period. Integrated with Atsumi City in 2005, the city now covers the whole peninsula and has a population of 66 thousand. The city has started its initiatives to become an affluent and vigorous city where harmony between urban development and agriculture is achieved.

Having one of the nation's best farm areas, the city boasts the largest yield of agricultural products in Japan. The city is also ranked 13th place for output of industrial products. In its 1,100-hectare industrial district along the



coast, Toyota's Tahara Factory and many other transportation machinery manufacturers are in operation.

In 2003, Tahara City launched its "Eco-Garden City Concept" to address the global warming. Citizens and the municipal government are working together to achieve a sustainable urban development to create an affluent and environmental-friendly society.

EX. 7

Sustainable Cities in Japan



Population: 68,946
Area: 76.97 km²

OMIHACHIMAN CITY

Passing Traditions to The Next Generation Through Preservation of Landscapes

Landscape plays a key role in urban development

Restoration of the Hachiman Canal

[Residents Campaign to Restore the Hachiman Canal]

The city of Omiachiman has a well-organized grid-pattern layout consisting of 12 north-south streets and four east-west avenues, which were constructed when the Hachiman-yama Castle was built in 1585 by HASHIBA (TOYOTOMI) Hidetsugu, nephew of HASHIBA (TOYOTOMI) Hideyoshi (a great soldier). The Hachiman Canal was also constructed at that time as a means for water transportation as well as a moat to protect the castle. Linking to Lake Biwa, the canal served as an artery for transportation and played an important role in sustaining economic activities of merchants in the Hachiman region because all vessels traveling on Lake Biwa were obliged to visit the port of Hachiman.

Despite the prosperity of that time, the canal became obsolete along with the progress of motorization, by which land vehicles began to be used as a main means of transportation, replacing boats and ships. Furthermore, the canal water was heavily contaminated with sludge and algae generated by domestic waste-water. It was nearly 30 years ago that a plan was presented to fill in the canal and create parking lots and a park on the site. However, residents who wanted to preserve the tradition and culture of the area along with the landscape protested against the plan. The protest evolved into a city-wide movement aiming for not only revitalization of the Hachiman Canal but also preservation of old buildings and streets of Hachiman merchants, leading to the formation of an urban development plan by Omiachiman City. Responding to the movement, the City started construction work to renovate the canal and

designated the area as a historic district to preserve old buildings. In 1991, the area was designated by the national government as an Important Preservation District for Groups of Historic Buildings.

Currently, subsidies are provided for renovation of buildings designated as "historic buildings" to facilitate programs to preserve landscape of the area. As a result of lessened financial burden on residents of the area and enhanced citizen awareness towards the preservation of landscape, culturally valuable buildings in the area are now preserved and maintained.

Maintenance of Hachiman Canal is also underway by citizen volunteers led through "Association of Hachiman Canal Preservation". These people are conducting programs such as cleaning and planting of flowers and trees along the canal.



Before



After

Preservation of Landscapes EX. 7

Sustainable Cities in Japan



Important cultural landscape ; waterfront views of omiachiman

The area extending from the western shore of Lake Biwa to the northeast of Omiachiman City presents beautiful sceneries of reed fields, intricate canal networks, paddy fields, villages and then small mountains. These beautiful landscapes with water represent the most traditional aspects of Japan.

During the Edo and Meiji periods, Omiachiman was well known for its reed products, and many commodities made from marsh plants such as rush mats (Omi-omote tatami) and quality linen garments (Omi-jofu) were traded by Hachiman merchants from Hachiman at a central wholesale market in Nihonbashi, Edo (Tokyo). Blinds, screens, partitions and other quality furniture items made of reed are still manufactured in Omiachiman. Despite the decline in the number of manufacturers of those products, the vast reed fields are properly maintained by using traditional agricultural methods such as burning of reed fields.

However, Lake Sainoko and reed fields in the area underwent drastic changes, and it was necessary to take an immediate action to protect the landscape of the area. To pass down the traditional Japanese landscape to future generations, the Omiachiman city government established an ordinance to preserve the environment of the area. To develop a waterfront landscape preservation plan based on the ordinance, the municipal government worked with residents of the area whose life was deeply related to the lake and marshes as well as experts and specialists to decide what should be done for the preservation. This was the first initiative conducted in Japan to preserve local scenery. Proactive initiatives have been conducted to promote the program. For example, public hearing was held to collect opinions from citizens, and requirements for landscape protection were identified based on the ideas and opinions collected.

Furthermore, Omiachiman City became an administration body responsible for the waterfront landscape preservation plan. As a result of these efforts, the waterfront area of Omiachiman was designated as the first Important



Cultural Landscape in Japan.

What are the criteria when people choose a place to live for life? When unique characteristics of Japanese local cities and towns are being lost, what does Omiachiman

City have to offer to differentiate itself from other places? The city government concluded that the crucial factor is beautiful landscape. In urban development of the 21st century, landscape does play a key role. Therefore, the city government has established the water landscape preservation plan to protect, enhance and newly create beautiful landscapes.



OMIHACHIMAN CITY

Located nearly in the center of the main island of Japan, Shiga Prefecture has been a hub for transportation between three economic regions of Kinki, Chubu and Hokuriku. Taking the geographical advantages, many cultural traditions and industries have developed in the prefecture over a long period of time. Omiachiman City is located in the center of the prefecture. In the eastern part of the city, Koto Plain is spreading from the foot of Suzuka Range that serves as a border between Shiga and Mie Prefectures. The northeastern part of the city is an urban area developed on the fan-shaped land in front of Lake Biwa. An area extending from the western shore of Lake Biwa presents beautiful sceneries of reed fields, complicated canal networks, paddy fields, villages and small mountains. These beautiful landscapes with water, represent the most traditional aspect of Japan. In the urban area under the Hachiman-yama Castle built by TOYOTOMI Hidetsugu in 1585, rows of old merchant buildings are still preserved.

The land area of the city, 12.6 km in width from east to west and 15.4 km from north to south, is 76.97 km². The population is nearly 70 thousand, the city is playing a key role in the mid part of the prefecture.



Photo by Shigeru Jufuku

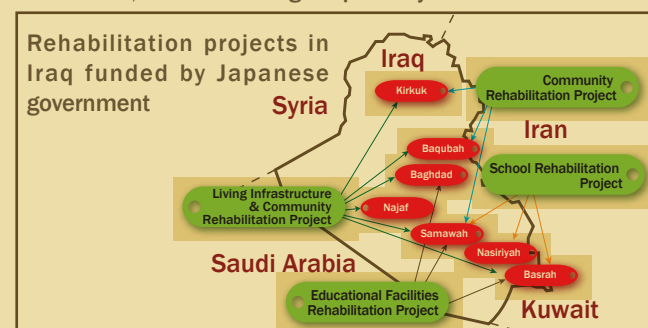


Partnerships between Japan and UN-HABITAT

With the support from the Japanese government, the UN-HABITAT Fukuoka Office is committed to construction of housing, community infrastructure, and school facilities. The major projects currently under way include post-conflict rehabilitation projects in Iraq, post-Indian Ocean Tsunami/Sumatra Earthquake reconstruction projects in Sri Lanka, post-conflict community reconstruction projects in Afghanistan, poverty alleviation projects in Cambodia, and projects to support returnees in Somalia.

Case Study 1: IRAQ

In all post-conflict rehabilitation projects in Iraq, the UN-HABITAT contracts local construction firms, employs local workers, and purchases nearly 100% of construction and other materials locally. The number of local people employed for such projects up until now totals approximately 420,000. In this way, UN-HABITAT projects are significantly contributing to revitalizing Iraqi economy, improving technological levels of Iraqi workers and enhancing competitiveness of local businesses, thus stabilizing Iraq society.



1. Community rehabilitation project

Details of the project

Building approximately 2,000 houses primarily for poor families and widows who lost their husbands in the war.

Target cities
Samawah, Baghdad and Kirkuk

In Samawah, where public order is maintained much more than in other cities, the project is progressing as scheduled. In Baghdad, however, we have to carry out the project by paying meticulous attention to a public order situation, political trends and the safest time zone of the day. Yet, we often have to



suspend the project in order to ensure security of both workers and beneficiaries. Despite such obstacles, residents are extremely eager to have their houses rebuilt. Of the various projects in Iraq, rebuilding houses is one of the most demanded by local residents.

2. School rehabilitation project

Details of the project

Rebuilding approximately 200 school buildings (kindergartens, primary schools and junior and secondary high schools) that had extensive damage caused by the war and economic sanction

Target cities

Samawah, Basrah and Nasiriyah

It is believed that Iraqi people's educational level rapidly declined during the former regime, with their literacy rate dropping to 50 – 90% of the previous level. As a result of this project, enrollment ratio of Iraqi children, particularly girls, are increasing. In addition to providing proper and safe educational environment, the project aims to broaden children's perspectives by giving them many options, and to inspire them to ponder about peace from various angles.



Samawah: School for developing women teachers (Left: before the project; right: after the project completion)

We hope that the School Rehabilitation Project will ultimately help Iraqi people to advance long-term peace-building processes by making schools the places to think about the broad framework of peace. As of November 2005, 180 schools and kindergartens were already rebuilt. The numbers of children desiring to enroll rebuilt schools are rapidly increasing; children at such schools look very happy.

3. Educational facilities rehabilitation project

Details of the project

Rebuilding facilities of universities, technological colleges for developing teachers and other advanced educational facilities, along with buildings of kindergartens

Samawah: Collective housing (without water service) before the project



and primary/junior high schools in Baghdad.

Target cities

Samawah, Baghdad and Basrah

To help Iraqi people to achieve national reconstruction at the earliest possible stage, this project has been designed to swiftly foster young Iraqi engineers and educators, who are expected to play leading roles in the national reconstruction. Out of the various education facilities whose operation is difficult due to damages inflicted by the war and plunder and the aging of facilities caused through the economic sanction, the project places priority on the reconstruction of engineering and education colleges as well as vocational schools for practical training. In this project which was initiated in August 2004, rehabilitation has been completed for four vocational schools and five engineering colleges. In addition, nine colleges are currently under reconstruction. In Baghdad, construction work has been completed for eleven primary schools.

4. Living infrastructure & community rehabilitation project

Details of the project

Rebuilding waste treatment facilities, sewage plants, orphanage and other facilities for sick and vulnerable people

Target cities

Baghdad, As Samawah and Kirkuk

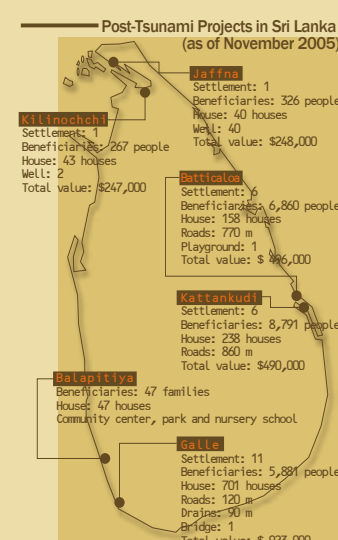


Basrah: Bombed laboratory of a technological college (Left: before the project; right: under rebuilding)

Case Study 2: SRI LANKA

Community infrastructure and housing reconstruction project in the areas devastated by the tsunami

In Sri Lanka, the UN-HABITAT first established community forums in each target districts. Through the community forums, we coordinated the various demands of residents and other stakeholders to prepare action plans for community reconstruction and to select beneficiaries.



In implementing plans, UN-HABITAT exchanged contract agreements with the communities concerned to ensure that community members take the initiative in carrying out projects. Together with local governments, UN-HABITAT provided community members with technological and other advice necessary for carrying out the project.

Details of the project

- Supporting victims, particularly women and children, to help them resume their day-to-day activities
- Reconstructing houses, water supply and sewage facilities, public halls and other community infrastructure to help residents resume their daily activities
- Creating employment opportunities in the areas struck by tsunami so as to revive local economy
- Building community systems to ensure peoples' participation in the projects

Target cities

Galle, Batticaloa, Kattankudi, Kilinochchi and Jaffna

Project Approach

- Establishing community forums and strengthening their capacity
- Promoting peoples' participation in preparation and implementation of reconstruction plans
- Promoting the reconstruction of destroyed facilities rather than construction of new facilities in other locations
- Securing peoples' rights of residence to land, and property
- Securing fair distribution of aid so as to ensure steady progress of peace-building processes

[Story of a girl who lost her house in tsunami]

Kachi, a twelve-year-old girl in Sri Lanka, lived with her mother and younger brothers. After her father died in a terrorist attack, the family had no regular income source. At the end of 2004, the great tsunami hit her village, washing away her house.



Kachi's mother had no way to rebuild the house. When the family were utterly at a loss, the UN-HABITAT decided to rebuild the villagers' houses in its reconstruction project funded by the Japanese government. In Kachi's village, all 4,600 residents, including Kachi, are Islam. Although traditional Islam women seldom participate in public events, Kachi attended the ground-breaking ceremony with her family members. All villagers agreed to support the reconstruction project, promising to cooperate with each other in order to complete the house reconstruction as soon as possible.

In the six districts struck by the tsunami, the UN-HABITAT staff members are working with local residents to reconstruct houses, living infrastructures such as roads and drains, community centers and kindergartens. In addition to help victims restore their daily lives as soon as possible, the staff members also provide daily necessities that were washed away by the tsunami.

(Photo by the UN-HABITAT Fukuoka Office)

Beneficiaries' meeting



Rebuilding a house (Galle City) A rebuilt house (Batticaloa City)

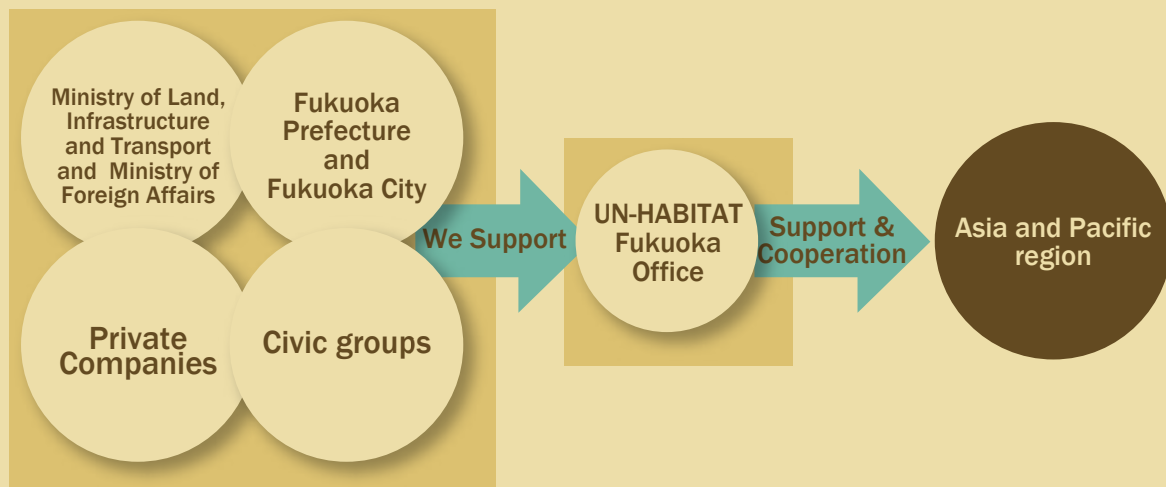


Partnerships of UN-HABITAT Fukuoka Office with Fukuoka Prefecture

In August 1997, as the regional office for Asia and Pacific of the United Nations Human Settlements Programme (UN-HABITAT) was established in Fukuoka. Since then, the Japanese government (the Ministry of Land, Infrastructure and Transport and the Ministry of Foreign Affairs), local

governments (Fukuoka Prefecture and Fukuoka City), private companies and civic groups in the region have cooperated together to actively support activities of the UN-HABITAT Fukuoka Office, contributing to the improvements of the living environments for people in the Asia and Pacific region.

International cooperation through regional partners



Forms of support

Fukuoka Prefecture and Fukuoka City have organized a Cooperating Committee together with the local business community to directly provide the UN-HABITAT Fukuoka Office with various management supports including financial assistance. On World Habitat Day celebrated in October every year, the Committee organizes a symposium and various seminars to promote citizens' understanding of UN-HABITAT activities in cooperation with the Fukuoka Office.

The most salient characteristics of these partnerships is that not only the Japanese government but also local governments, private enterprises, NPOs and citizens cooperate together to support the UN-HABITAT Fukuoka Office.

The World Habitat Day 2001 Global Conference held in Fukuoka: Keynote speech by Anna Kajumulo Tibaijuka, Executive Director, UNHSP (HABITAT)



Photograph) General Assembly: From left to the right: Mr. Hiroto Yamasaki, Mayor of Fukuoka City; Mr. Wataru Aso, Governor of Fukuoka Prefecture; Tatsuo Kawai, Chairman of the Cooperating Committee for the UNHSP (HABITAT) Fukuoka Office; Ms. Mari Christine, Goodwill Ambassador for UN-HABITAT; and Mr. Madhab Mathema, Former Acting Chief of the UN-HABITAT Regional Office for Asia Pacific.

The Cooperating Committee for the UNHSP (HABITAT) Fukuoka Office was formed in 1997 by Fukuoka Prefecture, Fukuoka City, three economic organizations and 35 private companies in the region, in recognition of the activities of the UN-HABITAT, to provide technical assistance to Asian countries.

Also at the citizen's level, private voluntary organizations, such as the Japan Habitat Association and the Citizens Net for Habitat, play a central role in supporting operations of the Fukuoka, Office, through publicity and fund-raising activities.

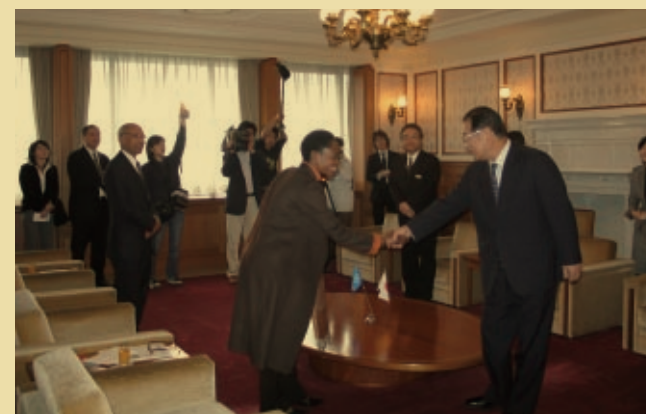
As a result of these efforts, there is an increased recognition of UN-HABITAT activities among citizens in recent years. In the wake of the Great Sumatra Earthquake and Indian Ocean Tsunami and the Pakistan Earthquake, many citizens offered donations through UN-HABITAT to help victims in the disasterstruck areas. It is encouraging to see that citizens' support activities to improve the living environments in Asia and the Pacific are certainly expanding.



UN-HABITAT Goodwill Ambassador, Mari Christine, introducing the UN-HABITAT activities

Towards a sustainable society

We are sure that the UN-HABITAT will play an increasingly greater role in promoting more sustainable development in the 21st century to create a promising and prosperous society for all. Fukuoka Prefecture has accumulated experience in resolving various environmental and urban problems. The Prefecture has also carried out technological development, and promoted new research toward the realization of a comprehensive resource-recycling-oriented society. Through these efforts, Fukuoka Prefecture will continue its unique international contribution to resolve global-scale issues concerning disasters, poverty and the environment in partnerships with the UN-HABITAT.



Anna Tibaijuka, Executive Director, expressed appreciation to local partnerships of Fukuoka, and Wataru Aso, Fukuoka Governor, praised the activities of HABITAT (Photographs proved by the UN-HABITAT)

Fukuoka Prefecture

Located in close proximity of the mainland of China and the Korean Peninsula, Fukuoka has served as a gateway of trade and exchange between Japan and the continent since ancient times. By promoting various interregional exchanges, Fukuoka Prefecture has managed to develop an open society in an area where various cultures coexist.. In Fukuoka, which has easy access to other regions by land, sea and air, many international conferences and events are organized. More than 5,000 international students from 79 other countries and regions worldwide are studying in Fukuoka.

Industries

As a center for the production of one million automobiles, Fukuoka has a cluster of automobile-related companies. Through partnerships involving industries, government and academia, Fukuoka strives to develop new industries, such as environment and recycling, information technology, semiconductor (system LSI), hydrogen energy, biotechnology, nanotechnology, and robotics. Furthermore, blessed with nature's bounty, Fukuoka prefecture is also where high-quality agricultural products are produced. Affixed with the "Fukuoka brand" mark, these products have in recent years been exported to other Asian countries.

Interregional exchange

Fukuoka pref, maintains sister affiliation with Hawaii, the U.S. since 1981, friendship affiliations with Jiangsu province, China since 1992, and Bangkok, Thailand since 2006. The pref, also participates in Governors' Meeting with the southern coastal region of Korea (Pusan metropolitan city, Cholla-namdo, Kyongsang-namdo and Chejudo) every year since 1992.





Sustainable Cities in Japan

KYOTO/FUKUOKA/KITAKYUSHU/IIDA/MURORAN/
TAHARA/OMIHACHIMAN

National and Regional Planning Bureau
Ministry of Land, Infrastructure and Transport
Government of JAPAN

<http://www.mlit.go.jp/english/index.html> E-mail keitok@mlit.go.jp
TEL +81-3-5253-8352 FAX +81-3-5253-1709

