Kitakyushu's Challenge to Promote Green Growth

Kazuhide Umemoto
Deputy Mayor, City of Kitakyushu

City located near to other Asian nations, rich in nature, and developed as a manufacturing area

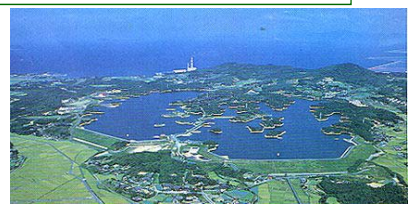
Population: 977,000 (2010)

Area: 487.88 Km^2

GDP: 3,430 billion yen (2010)

Rich nature and branded food materials

Karst Plateau Hiraodai



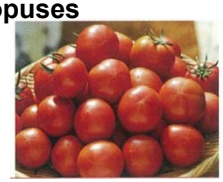
Wakamatsuhoku Beach

Ouma Bamboo Shoots

Kanmon Straits Octopuses

Kokura Beef

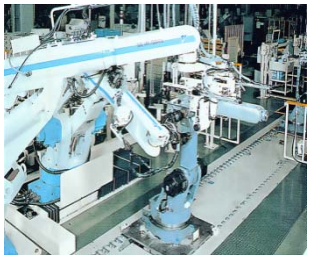
Buzen-Sea Oysters



Wakamatsu Special Tomatoes

Major companies in Kitakyushu area

Nippon Steel Corporation



Yasukawa Electric Corporation

TOTO Ltd.

Mitsubishi Chemical Corporation

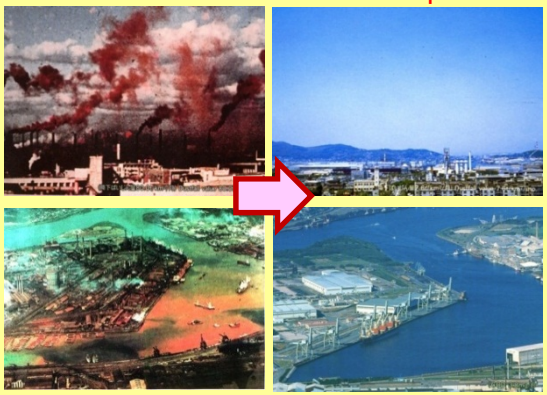
Toyota Motor Corporation · Nissan Motor Co., Ltd.

Mitsubishi Materials Corporation

Kitakyushu City as a leading runner of an environment-friendly city

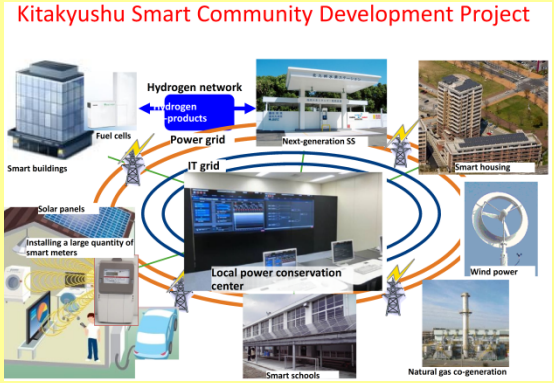
Kitakyushu aiming to become the World Capital of Sustainable Development

Experience of overcoming pollution and International Environmental Cooperation

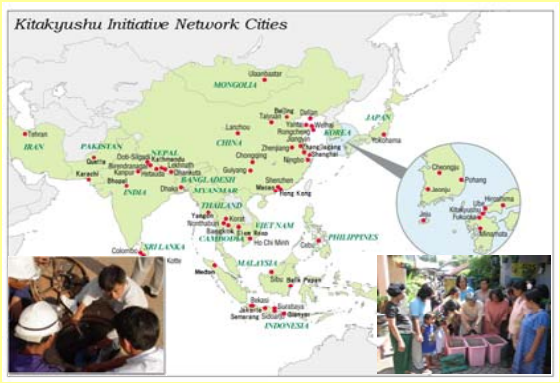


Prominent environmental technologies and Social System

Kitakyushu Smart Community Development Project



Urban environment diplomacy with Asian cities



Eco-Model City
（July,2008）

Environmental Future City
(December,2011)

OECD Green City Program Model City

Together with Paris, Chicago, and Stockholm!

Kitakyushu Asian Center for Low Carbon Society

as a base for exporting urban environmental infrastructure

Establish green city development that accommodates the diverse needs of Asian cities and firms

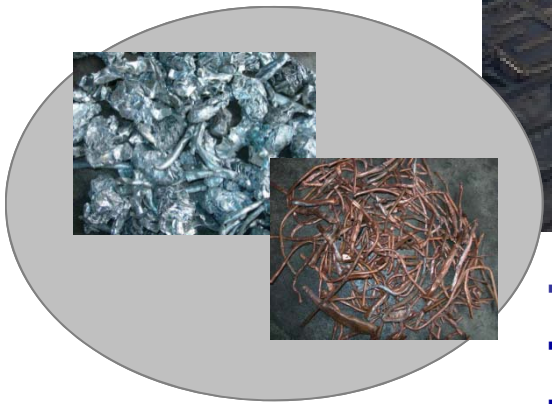
Taking on the Challenge of a Resource Recycling Society
Kitakyushu Eco-Town Project

Automobile recycling

Japan's Largest Eco-Town

Approved 1997, Started operations 1998
No. business facilities: 29
No. research facilities: 16

R&D on recycling technologies for solar power systems



Collection/treatment of rare metals

- Investment ~66 billion yen
- Employees ~1,300
- Visitors ~1,000,000 (1998-March 2012)

Fluorescent lighting recycling

Kitakyushu Smart Community Development Project

Creating a new lifestyle with locally produced and locally consumed energy
Selected as one of four bases in Japan in April 2010

Smart buildings

Fuel cells

Hydrogen network

Hydrogen by-products

Next-generation SS

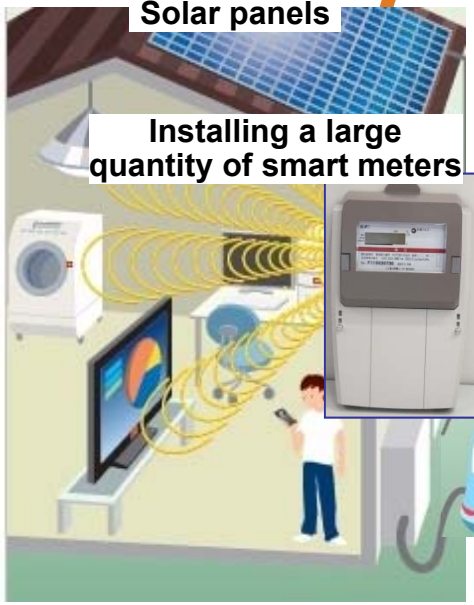
Smart housing

Power grid

IT grid

Local power conservation center

Wind power



Solar panels

Installing a large quantity of smart meters

Smart schools

Natural gas co-generation

Water Plaza Kitakyushu Project

Opening ceremony (2010.12.14)

Low-Carbon Technologies in Kitakyushu

Mitsubishi Materials
15 types of waste treatment and recycling, such as metal waste and sludge

Nippon Coke & Engineering
CDQ (Coke Dry Quenching Process)
Supply power and steam to neighboring factories
Power generation capacity: 27,900kW

Mitsubishi Chemical
Processable organic photovoltaics
Next-generation flexible and lightweight photovoltaic modules

Yaskawa Electric
Energy saving, inverters

Eco-Techno
Western Japan's largest eco-technology expo that displays the latest eco-technologies, products and information

Kitakyushu Eco-Premium

Creating a low-carbon economy through eco-products and services (Select eco-premium goods)

Thick boards manufactured in electric arc furnaces using steel scrap

75% reduction in CO_2 emissions

Eco-friendly sanitary ceramic products (with tank)

Reduces amount of water flushed to 3.8 liters

Next-generation lighting CCFL

Long-lasting (similar to LED). Energy savings of 20-40% compared with fluorescent lights.

Outline started in 2004

Technologies and products (eco-products), as well as services (eco-services) within the city that reduce impacts on the environment are selected as “Eco-Premiums,” which then promote the environmental activities of local industries through their expansion and penetration into various markets.

Focal points: Resource conservation, energy saving, long-lasting, simple maintenance, leasing, reusing, etc.

Kitakyushu Asian Center for Low Carbon Society

Utilization of the environmental technologies developed through the solution of pollution problems and manufacturing processes, and the inter-city network established by international cooperation in the past

Kitakyushu Asian Center for Low Carbon Society opened in June 2010.

Accumulating environmental technologies in Kitakyushu City and throughout Japan, for building low carbon societies in Asia through environmental business skills

Waste disposal


Waste water disposal

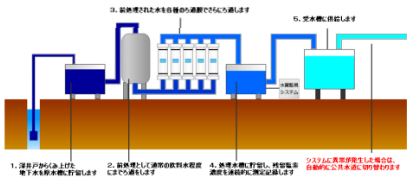

Exporting Green City

Cogeneration & energy conservation


Surabaya Industrial Estate Rungkut


Investigating methods for quantifying CO_2 reduction

Tap-water purification



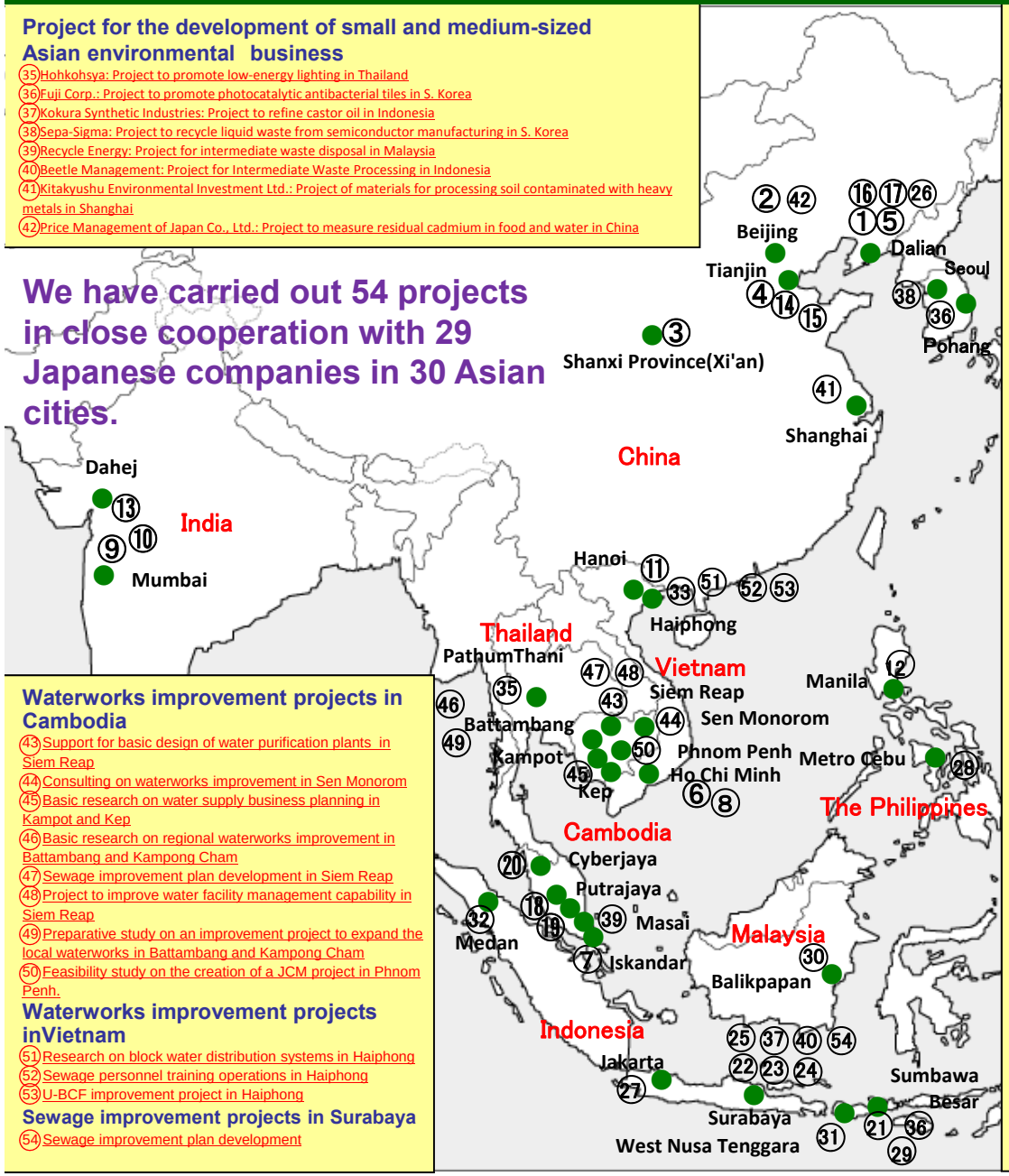
Drinking water supply operations

Diverse Project Development Map

Project for the development of small and medium-sized Asian environmental business

35 Hohkohsya: Project to promote low-energy lighting in Thailand
36 Fuji Corp.: Project to promote photocatalytic antibacterial tiles in S. Korea
37 Kokura Synthetic Industries: Project to refine castor oil in Indonesia
38 Sepa-Sigma: Project to recycle liquid waste from semiconductor manufacturing in S. Korea
39 Recycle Energy: Project for intermediate waste disposal in Malaysia
40 Beetle Management: Project for Intermediate Waste Processing in Indonesia
41 Kitakyushu Environmental Investment Ltd.: Project of materials for processing soil contaminated with heavy metals in Shanghai
42 Price Management of Japan Co., Ltd.: Project to measure residual cadmium in food and water in China

We have carried out 54 projects in close cooperation with 29 Japanese companies in 30 Asian cities.



Waterworks improvement projects in Cambodia

43 Support for basic design of water purification plants in Siem Reap
44 Consulting on waterworks improvement in Sen Monorom
45 Basic research on water supply business planning in Kampot and Kep
46 Basic research on regional waterworks improvement in Battambang and Kampong Cham
47 Sewage improvement plan development in Siem Reap
48 Project to improve water facility management capability in Siem Reap
49 Preparative study on an improvement project to expand the local waterworks in Battambang and Kampong Cham
50 Feasibility study on the creation of a JCM project in Phnom Penh.

Waterworks improvement projects inVietnam

51 Research on block water distribution systems in Haiphong
52 Sewage personnel training operations in Haiphong
53 U-BCF improvement project in Haiphong

Sewage improvement projects in Surabaya

54 Sewage improvement plan development

FS investigation and industrialization

①～④ Yaskawa Electric Corporation：energy-saving project
①JETRO(2008,Dalian) ②Ministry of Economy, Trade and Industry (2010,Beijin)
③Ministry of the Environment(2011, Shanxi Province) ④Sixth Japan-China Energy Conservation and Environmental Forum Cooperation Project(2012,Tianjin)

⑤,⑥ TOTO Ltd. ：Promotion of water-saving home appliance
⑤Ministry of the Environment(2011,Dalian) ⑥Ministry of Economy, Trade and Industry(2012,Ho Chi Minh City & Hanoi)

⑦ TOTO Ltd.: Environmental improvement project for the creation of a large-scale JCM project through the increased adoption of water-saving equipment
• Ministry of the Environment (2013–: Surabaya & Iskandar)

⑧ TOTO Ltd.: Feasibility study on the creation of a large-scale JCM project through the increased adoption of water- and energy-saving equipment
• Ministry of the Environment (2013–: Ho Chi Minh)

⑨～⑫ Nippon Magnetic Dressing Co., Ltd. ：Rare metal recycling
⑨Ministry of Economy, Trade and Industry (2012,Mumbai)
⑩NEDO demonstrations(2012,Mumbai)
⑪Ministry of Economy, Trade and Industry(2012,Hanoi,Ho Chi Minh&Haiphong)
⑫Ministry of Economy, Trade and Industry (2013: Manila & Metro Cebu)

⑬ Hitachi and others:Dahej Eco-city Development Support
・Ministry of Economy, Trade and Industry (2010- ,Dahej Zone,India)

⑭ Eco-Material Corporation：Project for recycling waste plastics
・Ministry of the Environment(2011,Tianjin)

⑮ Kyushu Metal Industry: Project for recycling used automobiles
・Ministry of Economy, Trade and Industry (2012- ,Tianjin)

⑯ Project for cooperation and advancement of recycling-oriented cities through a Kitakyushu-Dalian partnership
・Ministry of Economy, Trade and Industry（2009-2011,Dalian）

⑰ Matsumoto Mitsuharu Shoten: Project for building a used paper recycling system
・Ministry of Economy, Trade and Industry（2012-,Dalian）

⑱ The Japan Research Institute Limited： Building environmentally friendly cities in Malaysia
・NEDO (2011,Putrajaya & Saiba jaya)

⑲ The Japan Research Institute Limited： BEMS Aggregation Project
・Ministry of Economy, Trade and Industry（2012,Putrajaya）

⑳ Shinryo Corporation: Project for total recycling in electronic manufacturing process in Malaysia
Ministry of the Environment(2012, all of Malaysia)

21 Toray Group ：BOP project in Indonesia
・JICA(2011,Sumbawa Regency and elsewhere)

22–23 Nippon Steel & Sumikin Engineering: Cogeneration and energy-saving project in Surabaya Industrial Estate Rungkut
・Ministry of Economy, Trade and Industry（2012,Surabaya）

24 Nisihara Corporation: Pilot project for intermediate waste disposal and recycling facilities
・Ministry of Foreign Affairs(2012,Surabaya)

25 Nishihara Corporation: Project to promote intermediate processing and compost-making for the recycling of waste
• JICA (2013–: Surabaya)

26 Nippon Steel Chemical Co., Ltd.:Licensing of nitrate-nitrogen removal Technology

27 Shinryo Corporation: Project to construct a recycling system spanning the entire electronics industry value chain
• Ministry of the Environment (2013–: Jakarta, etc.)

28 Nishihara Corporation: Project for materials recycling of plastic shopping bags and other flexible plastic waste
• Ministry of the Environment (2013–: Metro Cebu area, Philippines)

29 Kokura Synthetic Industries: Project to demonstrate and promote adoption of castor oil refining technology
• JICA (2013–: Sumbawa Island, Indonesia)

30 Shabondama Sekken: Model project to promote the adoption of firefighting technology for peat and forest fires.
• JICA (2013–: Balikpapan, Indonesia)

31 Kokura Synthetic Industries: Collaborative project for the improvement of farmer's livelihoods, with a focus on castor bean cultivation
• JICA (2013–: West Nusa Tenggara, Indonesia)

32 Shinryo Corporation: Waste management optimization — recycling of municipal garbage and effective utilization of surplus biomass from the palm industry
• JICA (2013–: Medan, Indonesia)

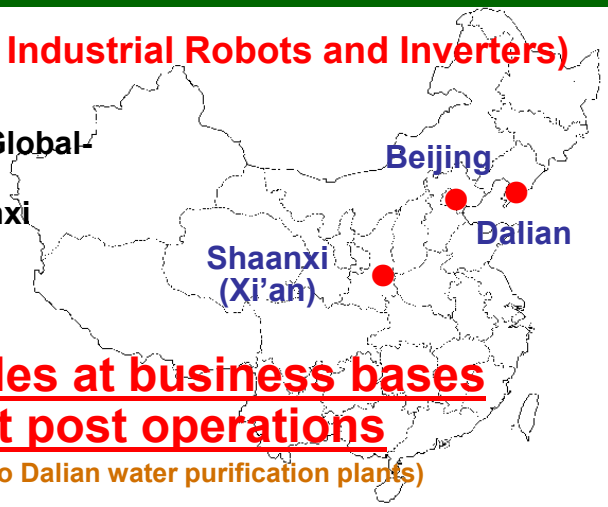
33 Kitakyushu International Techno-cooperative Association: Small and medium-sized enterprise promotion — support for employee training, technology improvements, and sales channel expansion and the like
• JICA (2013–: Haiphong)

34 IGES: Technical cooperation for low-carbon city plan development
• Ministry of the Environment (2013–: Surabaya)

Energy Conservation Projects in China

Yaskawa Electric Corporation (World Market Share Leader in Industrial Robots and Inverters)

JETRO: "Project to Facilitate Trade and Investment" (2008, Dalian) (1)
Ministry of Economy, Trade and Industry: "Project to Promote the Spread of Anti-Global-Warming Technology" (2010, Beijing) (2)
Ministry of the Environment: "Feasibility Study on New Mechanisms" (2011, Shaanxi Province) (3)



Yaskawa is cooperating with the Kitakyushu Asian Center for Low Carbon Society (in Kitakyushu) to provide proof regarding the link between levels of energy conservation and CO_2 reduction in instances where high-efficiency motors and inverters have been adopted in factories across China.

⇒ 30 examples at business bases (in Xi′ an) at post operations
(delivery of inverters to Dalian water purification plants)

〈Anticipated outcome for typical factory〉

Power usage captured by the relevant energy-saving method	Approx. 20,000 MWh/year (capturing approx. 70% for incidental equipment, 25% for factory overall)
Average energy savings rate with variable speed and load-following control with inverters	Approx. 40% (reducing motor speed of relevant equipment by 20% on average)
Reduction rate for factory overall	Approx. 10%
Amount of energy reduction	Approx. 8,000 MWh/year
Reduction cost savings	Approx. 5 million RMB/year
Anticipated return-on-investment	1.5 to 2.5 years
Anticipated scale of operating expenses	7 to 12 million RMB/year

*These are average values calculated on the basis of over 30 projects by Yaskawa in China.

Business model for current projects

1. National feasibility study acquisition ⇒
2. Implementation of model project through public-private partnerships ⇒
3. Relationship-building with national/local governments ⇒
4. Business project presentations from government relations ⇒
5. Evaluation acquisition in relevant locality ⇒
6. Expansion of business to Chinese enterprises

*Close cooperation between private firms and the Center for items 1 to 3

Average factory scenario

Yearly energy consumption: 80,000 MWh
Yearly energy costs: 50 million RMB
Sector: Percentage of energy consumption for incidental equipment for intermediate-final assembly: 35%
Yearly operating time: 8,000 h

High-efficiency motor systems

(premium-efficiency induction motors/high-efficiency simultaneous motors w/inverters)

Increasing Adoption of Water-Saving Home Equipment & Devices in Dalian

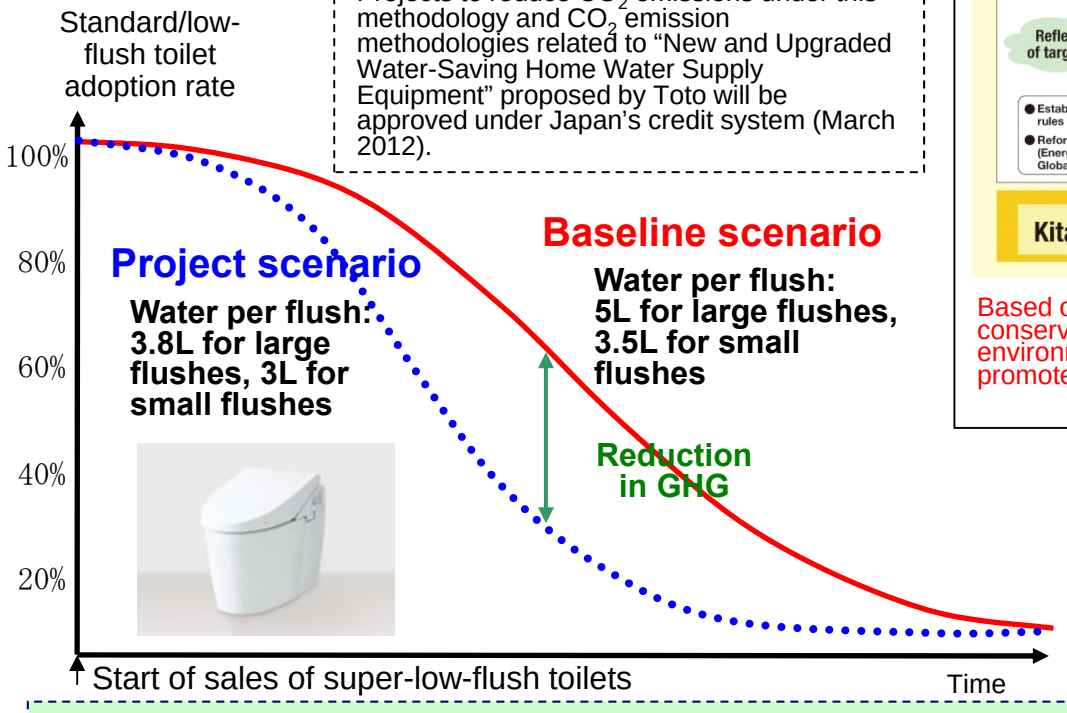
Toto Inc. (a manufacturer of home equipment and appliances active internationally)

Ministry of the Environment: "Feasibility of New Mechanisms" (FY2011) (5)

Details of study

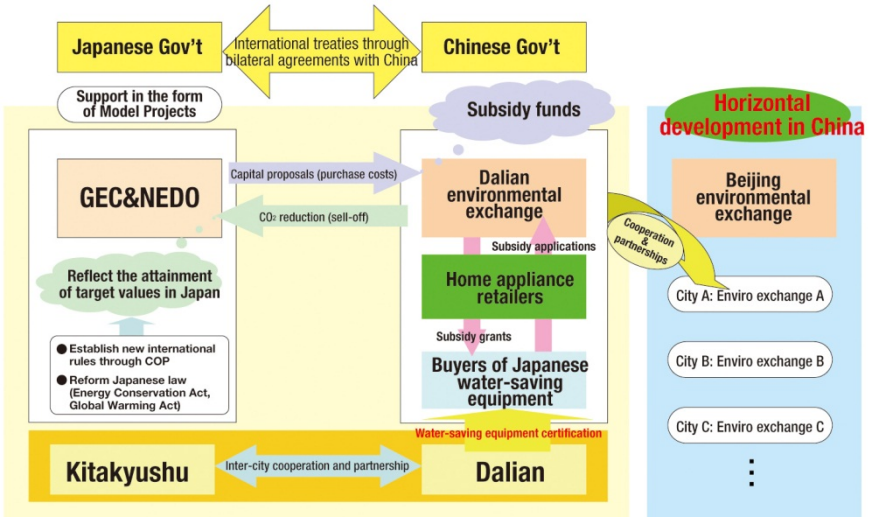
- ○ Devising means of measuring CO_2 emissions due to water
- ○ Studying city/nation bilateral carbon credits
- ○ Studying adoption of policies for promoting water-saving devices

Projects to reduce CO_2 emissions under this methodology and CO_2 emission methodologies related to "New and Upgraded Water-Saving Home Water Supply Equipment" proposed by Toto will be approved under Japan's credit system (March 2012).



Study of water treatment volume and energy usage (electricity and diesel) at water purification plants (9 plants) and sewage treatment plants (10 plants) within Dalian: **Water-related emission coefficient: 1.11 kg-CO_2/m³**

Proposal: Bilateral Japan-China credit scheme



Based on a clear understanding of the effectiveness of water conservation and CO_2 reduction, use bilateral negotiations on environmental performance certification and subsidy system creation to promote greater adoption of water-saving devices.

Super-low-flush toilets

GHG reduction potential for Dalian overall
15,622 t-CO_2/year
Water saving potential for Dalian overall
14,073,600 m³/year

ow-flow shower heads

GHG reduction potential per unit
1,735 kg-CO_2/year
GHG reduction potential for Dalian overall
3,509,111 t-CO_2/year

Project for Cogeneration and Energy Conservation at Surabaya Industrial Estate, Indonesia

We hope for this to be our first overseas export from the Kitakyushu Smart Community Development Project.

Nippon Steel & Sumikin Engineering Co., Ltd., Fuji Electric

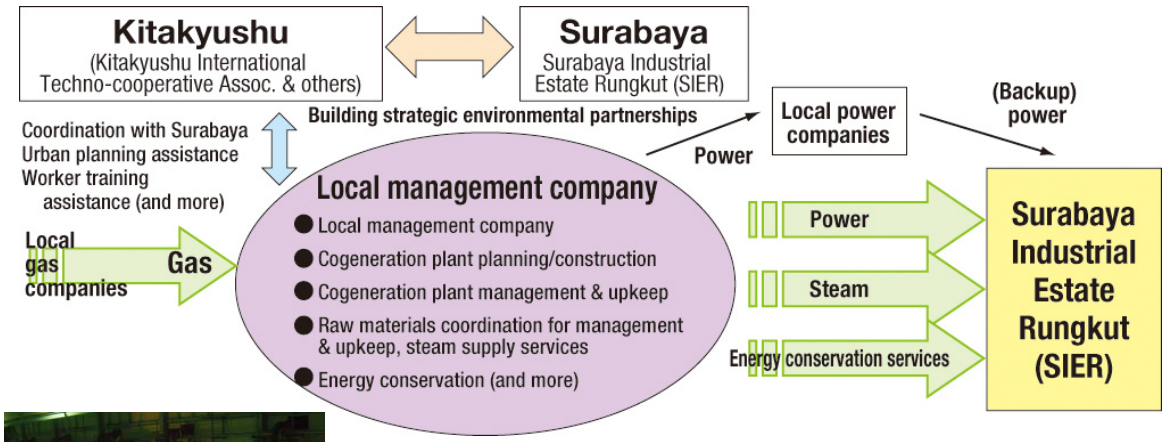
■ We are planning to establish a local management company to offer the following energy and energy conservation services to SIER.
- A cogeneration operation to provide high-quality, efficient power and steam
- Energy maintenance services for industrial estate factories to provide steam systems and energy-conserving systems
- Development of an advanced sewage and waste treatment service centered around the industrial estate

Surabaya Industrial Estate Rungkut (SIER)

The combined heat & power(CHP) with the capacity of 16MW will be installed according to the assumed steam demand(average;37ton/h, maximum;41ton/h）

We assume that the amount of investment will be 3 or 4 billion yen.

*The Surabaya Industrial Estate Rungkut (SIER)
The SIER, which was established with 50% investment from the Indonesian gov't, 25% from State of East Java, and 25% from the City of Surabaya, is an industrial estate some 300 ha in size, and home to about 300 companies.



We intend to develop a successful model in Surabaya and spread it to other parts of Asia with the same issues (insufficient power or low-quality power).

Aim to realize system reform through G to G discussion

1 Electricity sale to consumers

According to new electricity law of 2009, central and local governments have the right to grant approval and license regarding electricity business. The law enabled business operators other than the state-owned electricity company, PLN, to supply power from private power generation to third parties, using PLN's power line. However, to sell electricity, PLN's consent must be obtained, and that is difficult in PLN's supply areas.

2 Sell electricity to PLN (Excess Power)

A rule of 50% self-consumption was removed, and there is no restriction on selling steam. However, an agreement must be renewed annually. Moreover, an Ordinance from the Ministry of Energy and Mineral Resources, ESDM, will be applied to excess power, so selling electricity will be basically at a low price.

Project for Used Electronic Appliance Recycling in India

1st Phase: Importing circuit boards from India to recover precious/rare metals

Nippon Magnetic Dressing Co., Ltd. (a trace metals recycling company)

The world's first import based on the Basel Convention aims to import 200 tons from India in the first year, and 600 tons annually after the first year (anticipated sales of over 100 million yen).

Phase 1

Imports to Japan

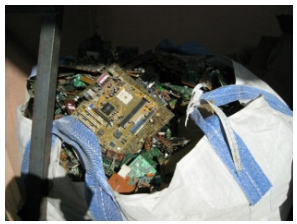
(circuit boards and other items difficult to process in India)

Phase 2

Establishing crushing and dressing technologies as intellectual property and licensing them

Phase 3

Developing joint operations



Overview of Eco-Recycling Ltd.

Licensed in the very earliest stages, Eco-Recycling Ltd., located in Maharashtra state, has operated a recycling facility for e-waste since 2009. The company owns simple crushing/sorting facilities that use a refurbishment process. It is listed on the Mumbai stock market and has a good reputation within India.

Developments at Nippon Magnetic Dressing Co., Ltd.

Under NEDO's "Project to Subsidize Practical Application Development of Trace Metals Substitution and Reduction Technology (Adopted March 2011)," the company has been developing technologies for enriching recovery (secondary processing) of rare metals and trace metals from cell phones, small electronics, and discarded circuit boards (with plant operation begun in May 2012). Materials thus recovered are supplied to refiners and materials manufacturers.

As part of this operation, the aim is to import discarded circuit boards from India and combine them with Japanese items for processing (phase 1). The company has already begun the procedure for purchasing and importing discarded circuit boards from Eco Recycling Ltd. (in compliance with the Basel Convention).

Additionally, the company is in negotiations with Eco Recycling Ltd. to provide local licenses (phase 2) and establish joint operations (phase 3) to improve India's conventional recycling and refining methods.

Exporting Advanced Water Purifying System (U-BCF) to Viet Nam

【Step 1】JICA Grassroots Technical Cooperation Project (FY2010-2012)
Location: Hai Phong, Viet Nam (friendship city exchange with Kitakyushu)
Details: Establish Kitakyushu U-BCF demo plant. Transfer related water purification technology (includes verifying benefits)

Effectiveness of U-BCF confirmed from results of 1-year demo project.

【Step 2】Introduction of small-scale treatment plant
Hai Phong **decides to self-finance the introduction and maintenance of U-BCF** in a small-scale treatment plant (5,000m3/day).
Construction starts May 30, 2013.

Verification that Kitakyushu BCF can be exported to developing countries.

【Step 3】Introduction to main treatment plants

U-BCF should be introduced to main water treatment plants in early stages, and be rated highly by many of Hai Phong's residents. Hai Phong shall become a showcase for the spread of U-BCF in Viet Nam.

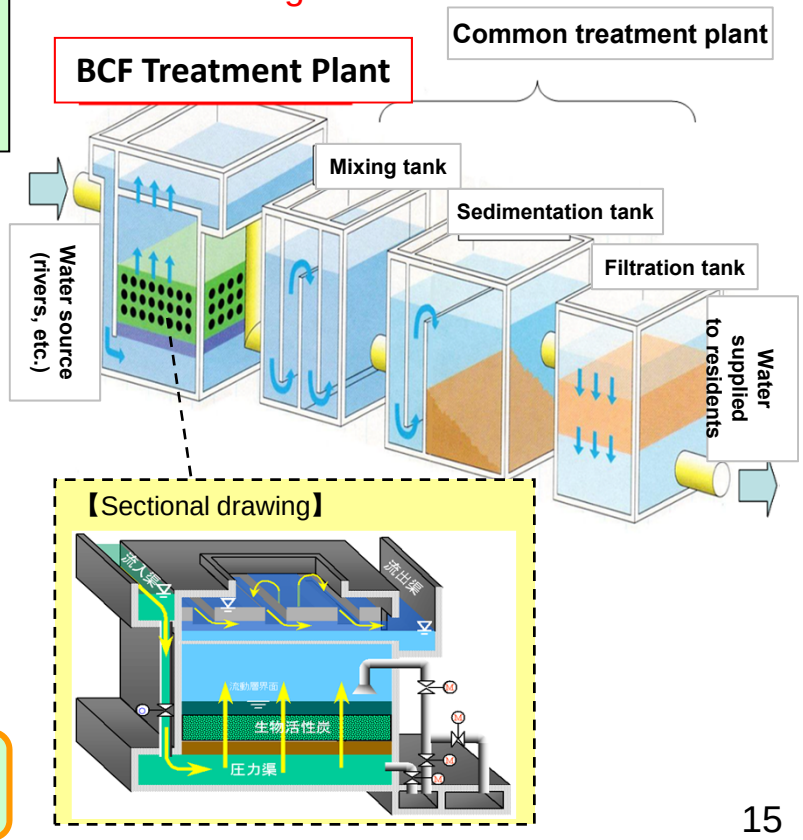
Expansion to other areas in Viet Nam and SE Asia

Development of overseas business opportunities for Kitakyushu's advanced water treatment technology (U-BCF)

Upward Biological Contact Filtration system for which Kitakyushu holds national patent

Effective against THM with treatment of raw water using purification effects of microbes
Comparison with most common advanced water treatment technologies:

- Construction costs: about 1/2
- Running costs: about 1/20



Creation of a WIN-WIN Relationship