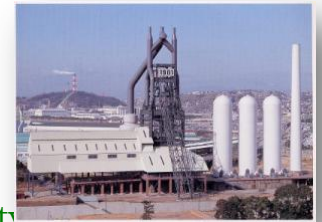


# Building Eco-Cities towards Zero Waste Community

**Kazunori Hisanabe**  
**Chief Executive, Kitakyushu Asian Center**  
**for Low Carbon Society**  
**City of Kitakyushu**



# Contents

- ✓ About Kitakyushu
- ✓ History of overcoming pollution
- ✓ Reduction of waste and promotion of recycling
- ✓ Kitakyushu Eco-Town
- ✓ International environmental cooperation

# About Kitakyushu

## Location (between Tokyo & Shanghai)



Population ~1 million

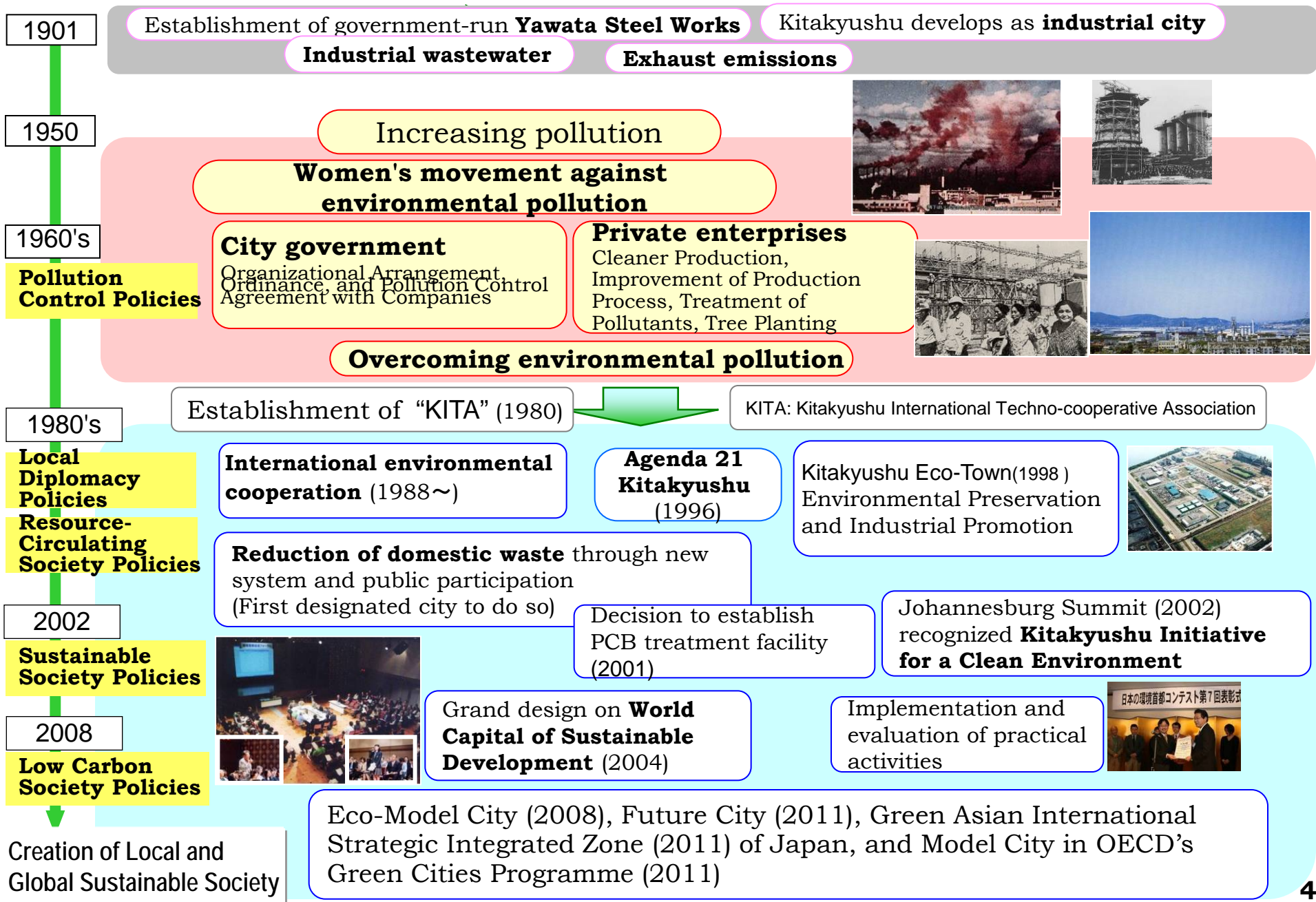
Area 488 km<sup>2</sup>

Status Designated city (similar to prefectural govt)  
Eco-Model City of Japan

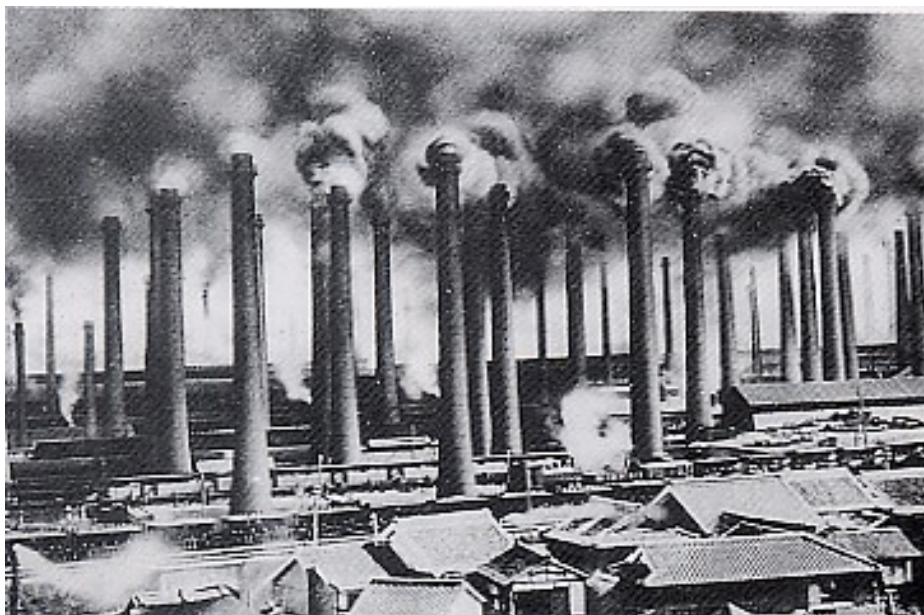
Kitakyushu  
Airport



# ~ Green Frontier ~ City of Kitakyushu's Environmental Policy



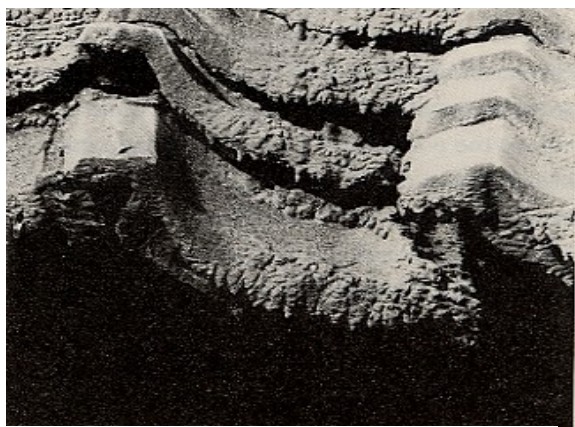
# Environmental Pollution in 1950s and 1960s



Heavy smoke from factory smokestacks



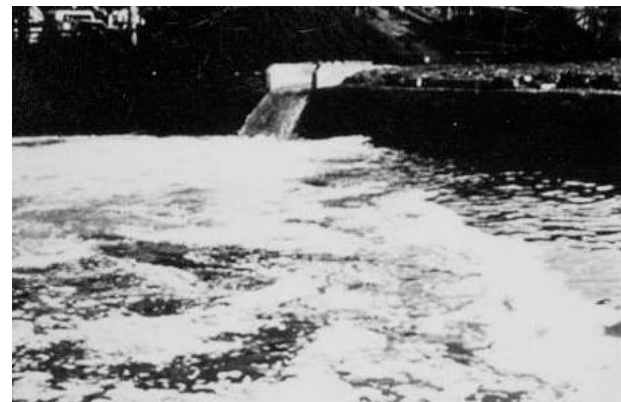
Child covered with soot



Heavy dust fall on roof



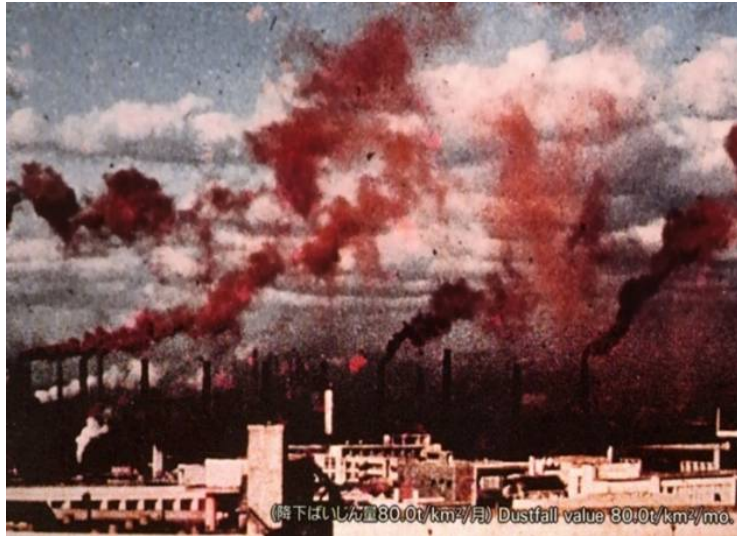
Corroded boat propeller  
in the city's toxic waters



Untreated wastewater discharged  
into Dokai Bay

City of Kitakyushu

# Overcoming Severe Environmental Pollution



Severe air pollution



Kitakyushu's blue sky today



In 1950s & 1960s  Present



Dokai Bay, "Sea of Death"



Recovered blue skies and sea,  
people enjoying the clean environment



Swimming in  
Dokai Bay

# Air Quality Monitoring System

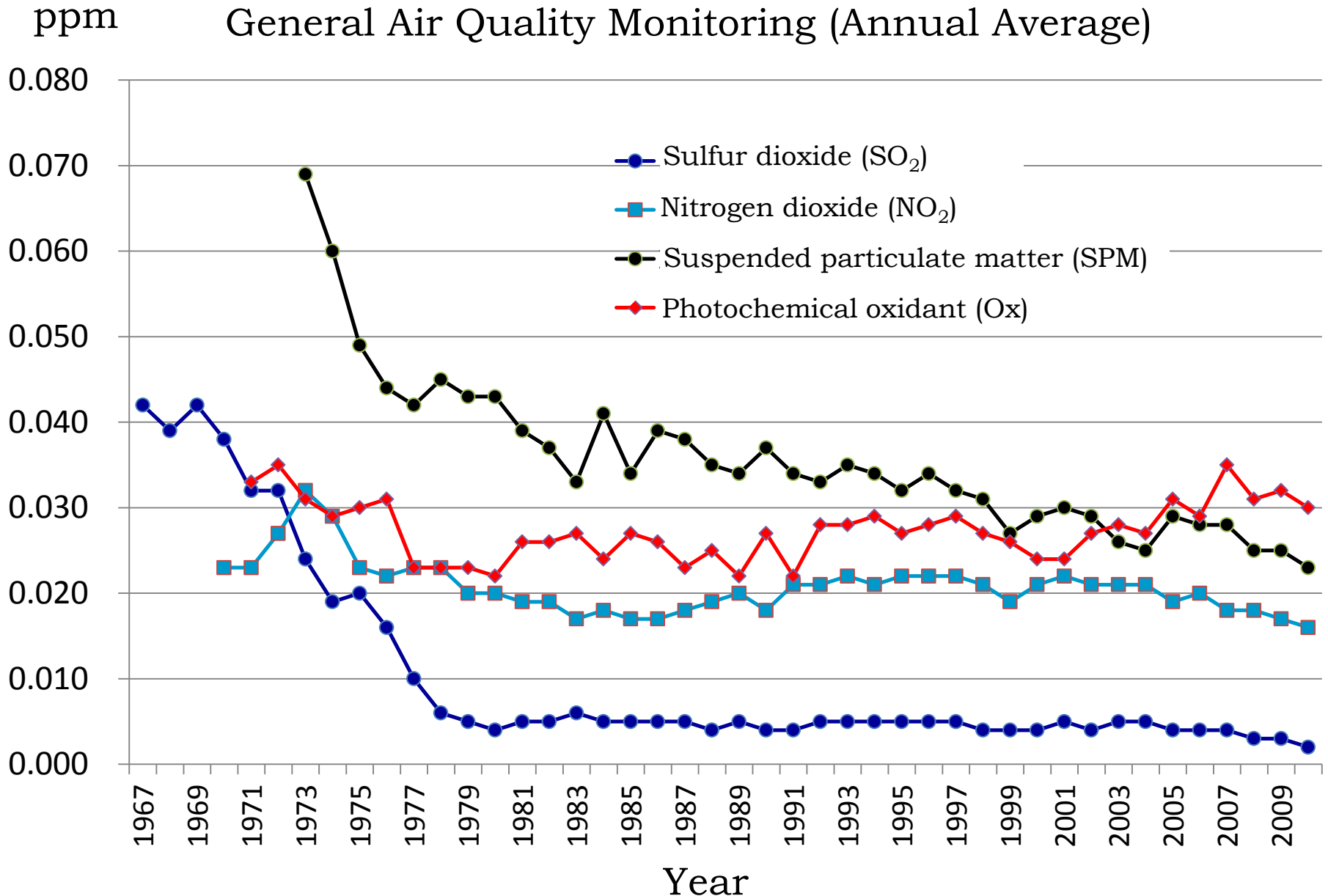


## Monitored items (24 hours)

Sulfur dioxide (SO <sub>2</sub> )		
Nitrogen oxide (NO <sub>x</sub> )		
Carbon oxide (CO)		
Suspended particulate matter (SPM)		
Photochemical oxidant		
Hydrocarbon		
Weather	Wind	Quantity of solar radiation
	Temperature	Amount of ultraviolet rays
	Humidity	Rainfall

# Long-Term Improvement of Air Quality

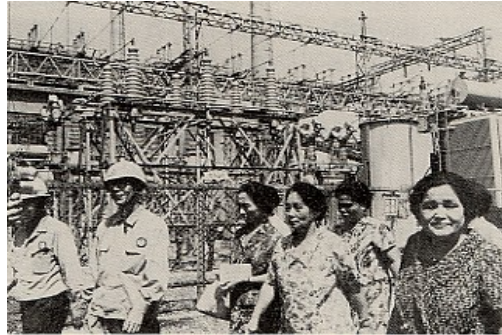
## General Air Quality Monitoring (Annual Average)





# Local Multi-stakeholder Partnerships to Improve the Environment

## Residents



Residents' observation of a private company



Learning how to measure air pollution from a university professor

## Partnership



Environmental regulation and environmental infrastructure

## Local Government



Cleaner Production and pollution control equipment

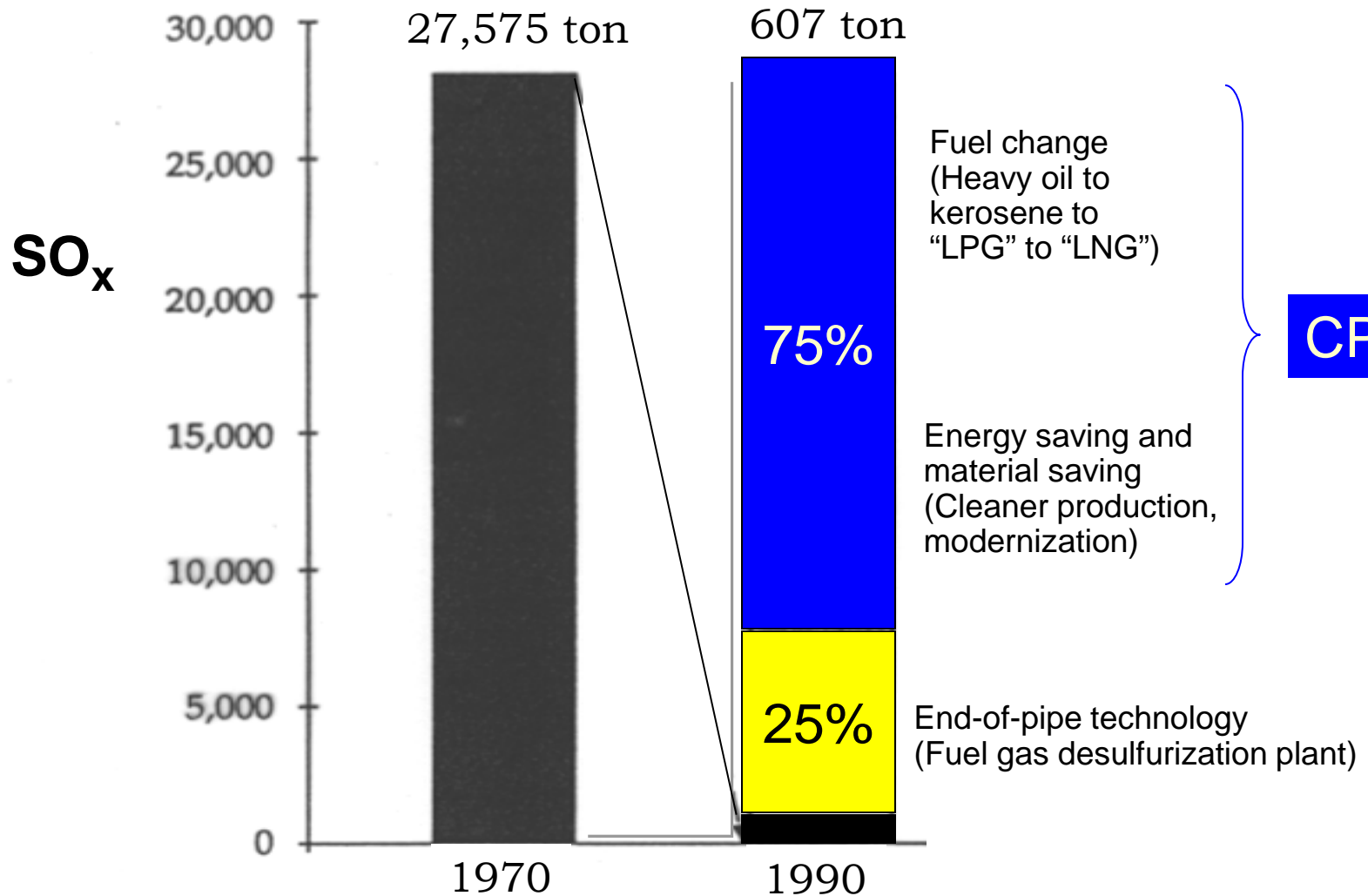
## Private Enterprises

Local initiatives & partnerships  
Environmental technology & environmental investment  
Education & participation of residents  
Environmental governance

Reference: UNESCAP "Kitakyushu Initiative for a Clean Environment"

# Role of Cleaner Production in Reducing Pollutants

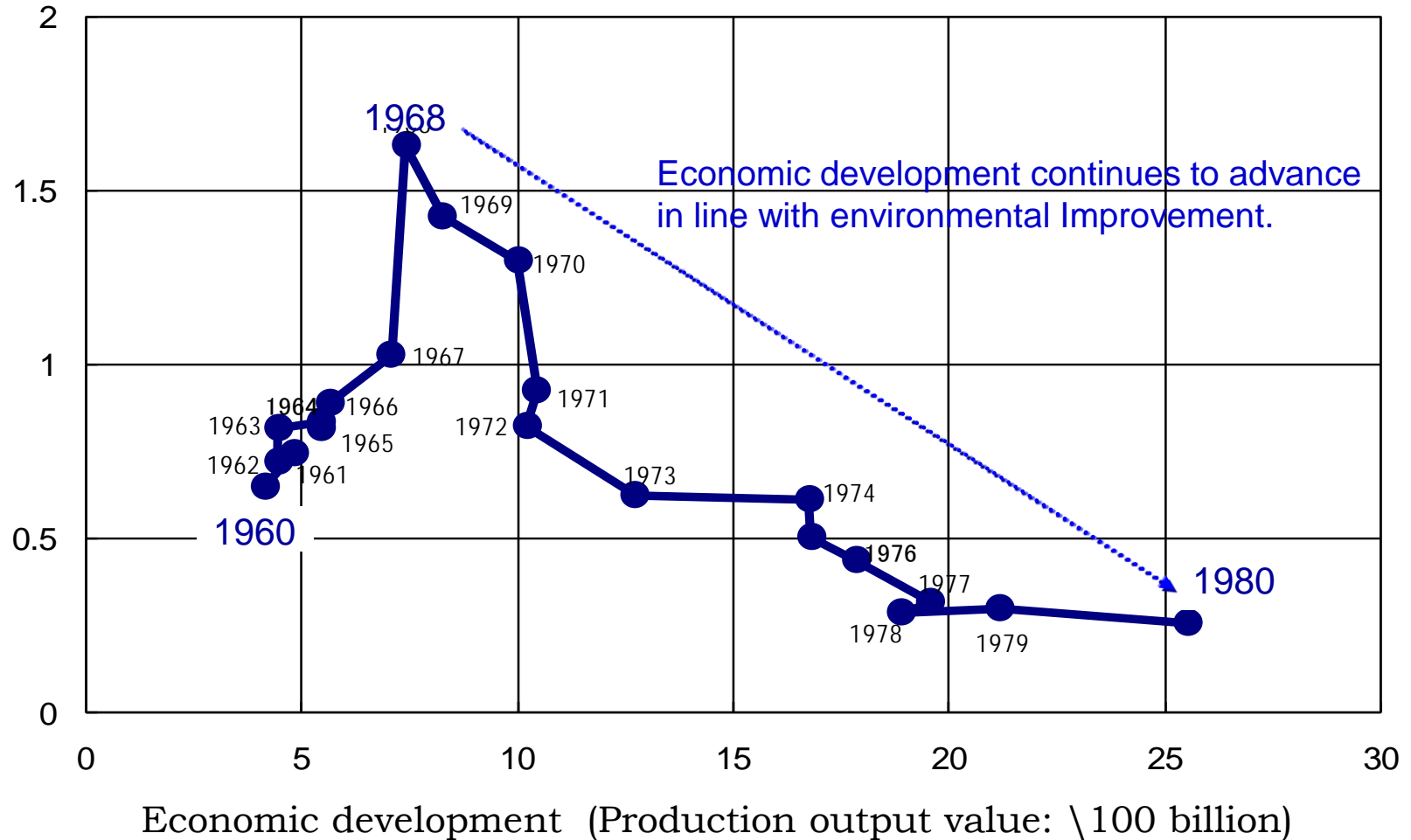
SO<sub>x</sub> Reduction, S, Steel, Kitakyushu



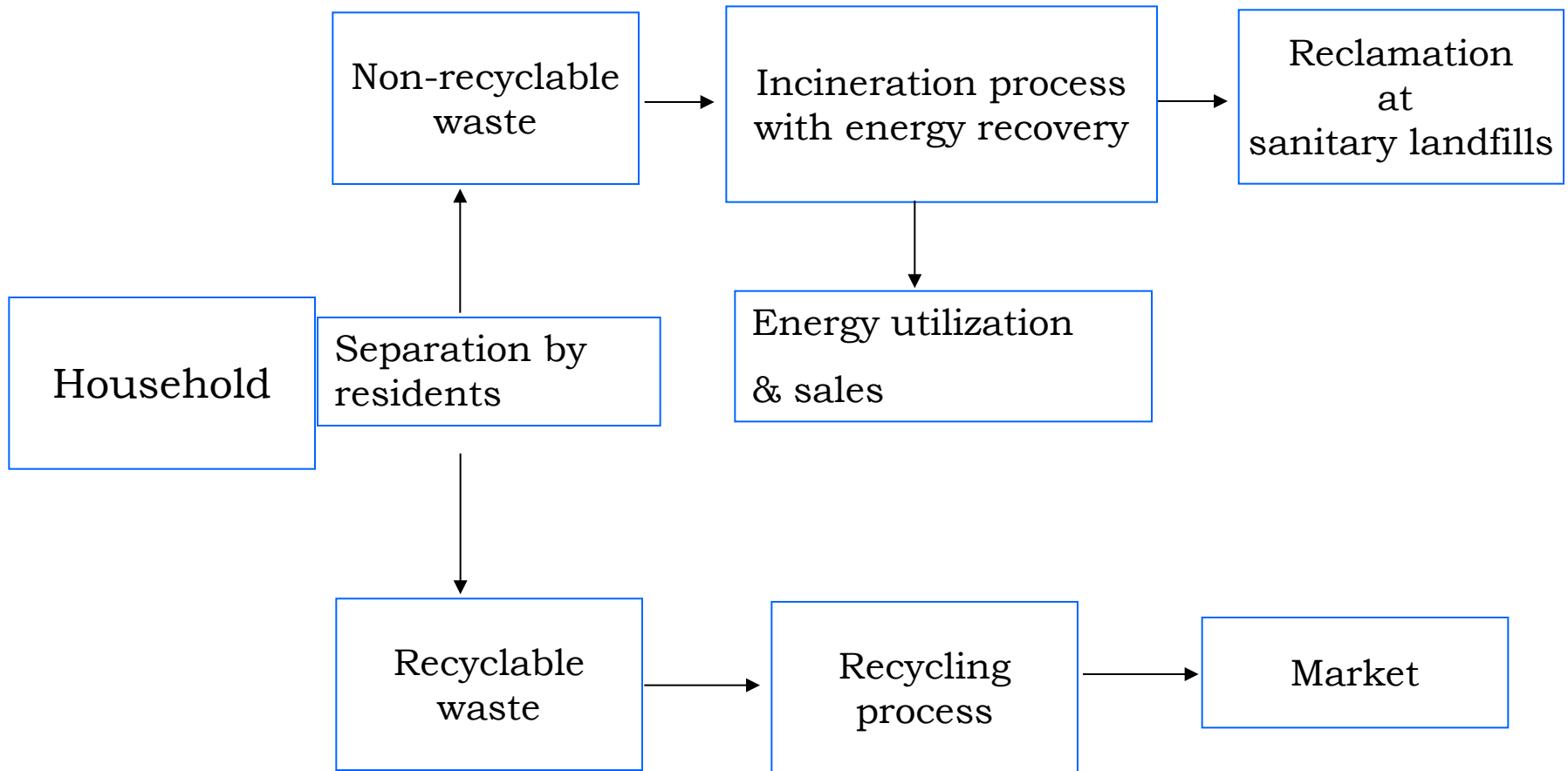
Source: Imai, S. Features of Pollution Control in Japan (Tokyo: Japan International Cooperation Agency)

# Economic Development & Environmental Improvement in Kitakyushu

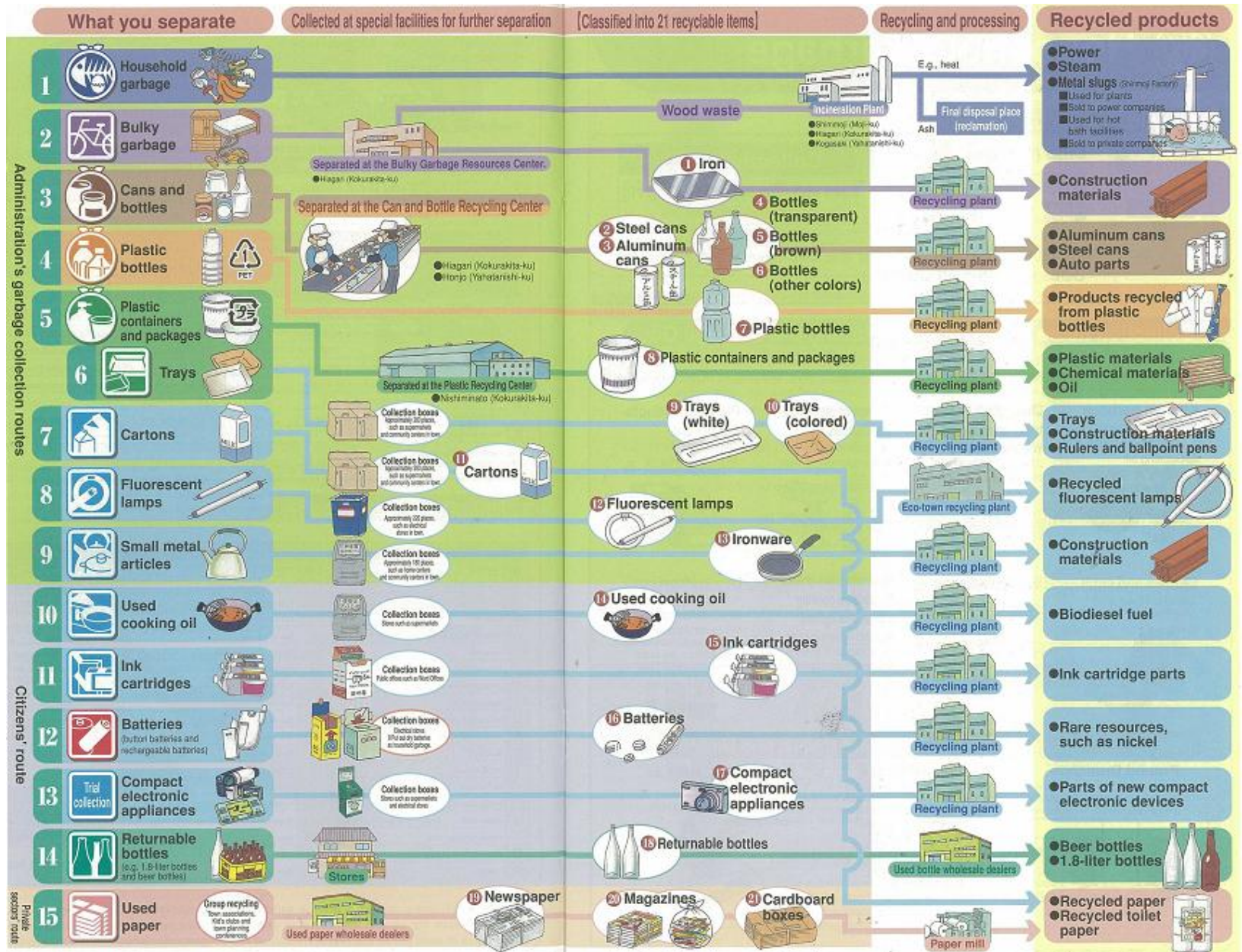
Environmental pollution  
(mg-SO<sub>3</sub>/100cm<sup>2</sup>/day)



# Domestic Waste Management Flow in Kitakyushu



# Destination of Resources and Garbage



# Designated bags of household-related waste

- Take recyclable resources and garbage to designated stations by 8:30 AM on collection days in specified methods.
- Specified bags are sold at supermarkets and convenience stores.

## Household Garbage



- Kitchen garbage
- Grass/Pottery
- Clothes/Cloth

- Collection days

**Twice a week**

(Mon. and Thu. or Tue. and Fri.)

- Collection place

**Household  
Garbage Station**

- Prices

**Large** (Ten, 45-liter bags): **500** yen

**Medium** (Ten, 30-liter bags): **330** yen

**Small** (Ten, 20-liter bags): **220** yen

**Extra small** (Ten, 10-liter bags): **110** yen

## Cans and bottles



- Collection days

**Every Wednesday**

- Collection place

**Recycling  
Station**

- Prices

Five, **25**-liter bags: **60** yen

## Plastic bottles



- Collection days

**Every Wednesday**

- Collection place

**Recycling  
Station**

- Prices

Five, **25**-liter bags: **60** yen

## Plastic containers and packages



- Collection days

**Once a week**

(specified day in your area)

- Collection place

**Recycling  
Station**

- Prices

**Large** (Five, 45-liter bags): **100** yen

**Small** (Five, 25-liter bags): **60** yen

※ The Recycling Station is where cans, bottles, and plastic bottles are put out.

# A scene of collection of the household-related waste



**Refuse truck**



City of Kitakyushu

# Incineration Plants



**Total amount of waste Incinerated at three plants in the city: 2,130t/d**

**Utilizing excess heat for electric power generation: 192,000MWh / Y  
(FY2008)**

**Revenue by Power Generation: 752million (FY2008)**



# Designated bags of recyclable waste

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- Specified bags are sold at supermarkets and convenience stores.

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## Cans and bottles



● Collection days  
**Every Wednesday**

● Collection place  
**Recycling Station**

● Prices  
 Five, **25**-liter bags: **60** yen

## Plastic bottles



● Collection days  
**Every Wednesday**

● Collection place  
**Recycling Station**

● Prices  
 Five, **25**-liter bags: **60** yen

## Plastic containers and packages



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**Once a week**  
 (specified day in your area)

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**Recycling Station**

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※ The Recycling Station is where cans, bottles, and plastic bottles are put out.

# A scene of separation of the recyclable waste



**Cans and bottles recycling center**



**Plastics recycling center**

# Solid Waste Recycling Activities in Public Participation



Local collection of recycled paper



Recovery station for waste paper packaging and trays



Composting equipment and garden using compost fertilizer

# New Separation System for Domestic Waste (2006~)



Other domestic waste



Cans & glass bottles



Waste plastic PET bottles



Waste plastic packaging



Teaching residents about separating waste at source

Reduced solid waste by 27%

Reduction by **1.9 billion yen** of the cost for waste treatment

**Guidance for sorting domestic waste at source**

**Participation of 10,000 residents (July 2006)**

# Kitakyushu General Federation for Health and Sanitation

Established: October 1962

Organization: Regular members: 155; Supporting members: 34 organizations. General organization of local communities in which 70% of residents (about 700,000 people) take part.

Activities: Citywide promotion of independent, practical activities and public awareness activities related to environmental protection and health.

## Major Activities

Management of waste stations

Guidance and public awareness about waste disposal and separation

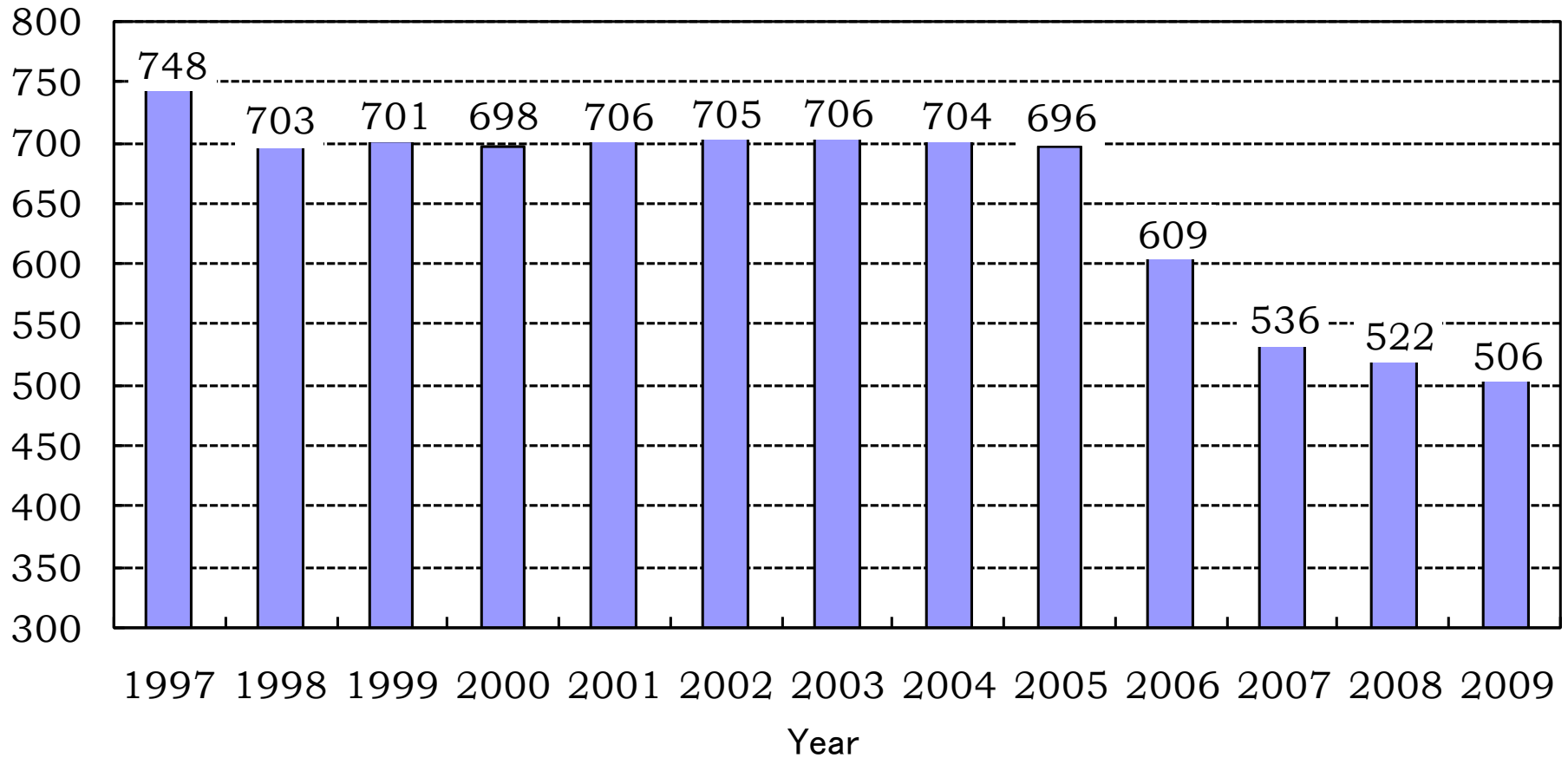
City beautification activities/prevention of illegal dumping

Activities to create a resource-recycling society

Activities to create a low-carbon society

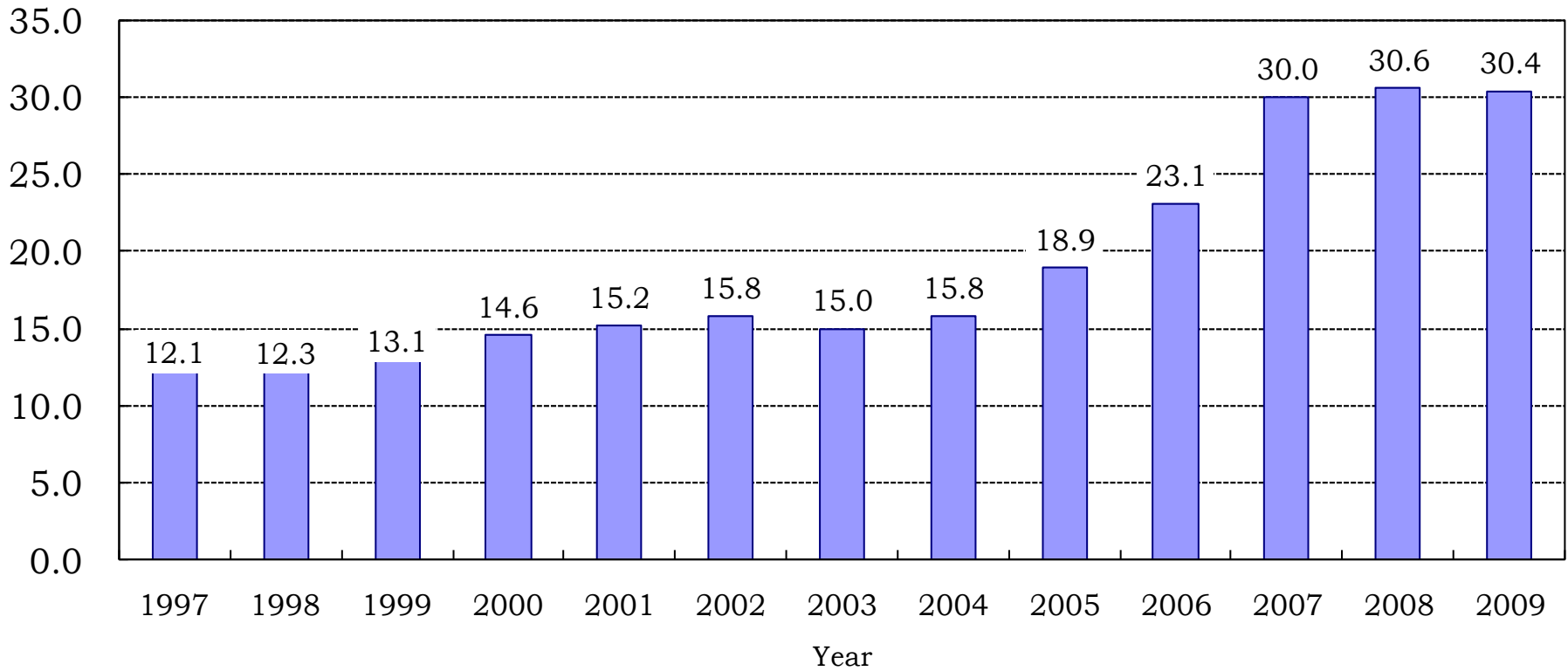
# Reduction of Domestic Waste

Domestic waste generation (g/day/capita)

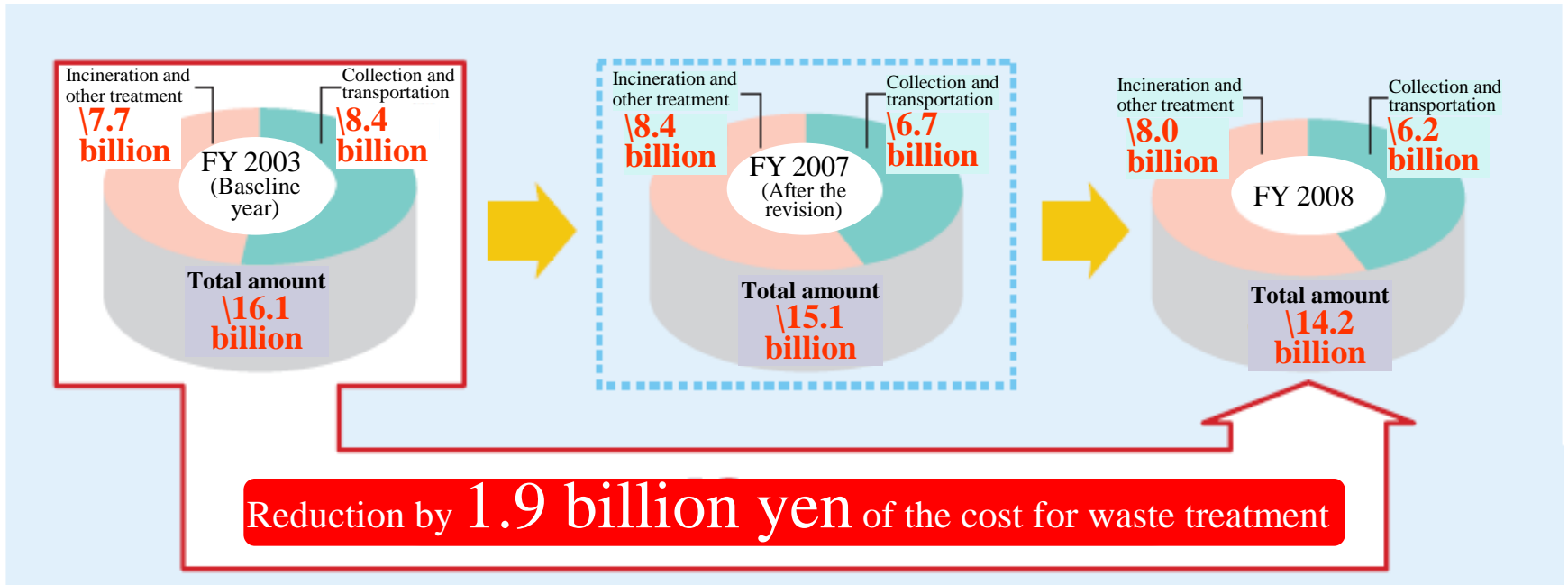


# Recycling Ratio of Domestic Waste from Households

Recycling Ratio(%)



# Recent record of the cost for waste treatment borne by Kitakyushu City (FY 2008)



For reference

Domestic waste bag (5.97kg/45L) = about ¥200/bag



# Kitakyushu Eco-Town (Japan's first)

## Facilitating Resource Circulation and Eco-Industries



Practical Research Area  
Practical Research Facilities : 16  
Practical Research Projects : 56



Comprehensive Eco-Industrial Complex,  
Hibiki Recycling Area  
Industrial Plants: 29

### Outcome of Projects

**Environment:** Reduction of environmental impact / 0.38 million ton CO<sub>2</sub>,  
Resource and energy conservation

**Economy:** Investment: 66 billion yen  
Private sector: 71.7%, national government: 18.2%,  
local government: 10.1%  
Employees: 1,340 people  
Visitors: 1 million people (as of October 2011)

# Promoting Eco-Industry and Resource Circulation in Eco-Town

No.	Projects	Use of National Government's Resources
1	•Plastic Pet Bottle Recycling Project	Ministry of Economy, Trade and Industry
2	•Office Equipment Recycling Project	Ministry of Economy, Trade and Industry
3	•Automobile Recycling Project	Ministry of Economy, Trade and Industry
4	•Home Appliance Recycling Project	Ministry of Economy, Trade and Industry
5	•Fluorescent Tube Recycling Project	
6	•Medical Instruments Recycling Project	Ministry of Economy, Trade and Industry
7	•Mixed Construction Waste Recycling Project	
8	•Complex Core Facility	Agency of Natural Resources and Energy
9	•Comprehensive Nonferrous Metal Recycling Project	
10	•Polluted Solid Purification Project	
11	•Cooking Oil Recycling Project	Ministry of Agriculture, Forestry and Fisheries
12	•Detergent and Organic Solvent Recycling Project / Waste Plastic Recycling Project	
13	•Used Paper Recycling Project	
14	•Can Recycling Project	
15	•Vehicle Recycling Project: <b>End-of-Life Vehicles</b>	
16	•Pachinko Machine Recycling Project	
17	•Wind Power Generation	Ministry of Economy, Trade and Industry
18	•Waste Wood / Plastic Recycling Project	Ministry of Economy, Trade and Industry
19	•Beverage Container and Vending Machine Recycling Project	
20	•Wind Power Generation	Ministry of Economy, Trade and Industry
21	•Sludge and Metals Recycling Projects	
22	•Food Residue Recycling Project	Ministry of Agriculture, Forestry and Fisheries
23	•Styrene Foam Recycling	
24	•Waste Food Recycling Project	
25	•Reuse of Office Electronics	
26	•Waste Paper Recycling into Foam Inhibitors used for Steel Production	Ministry of Economy, Trade and Industry
27	•Melting Furnace Fly Ash Recycling	Fukuoka Prefecture
28	•Waste Plastic Package Regeneration Project	

## Promoting Eco-Industry and Resource Circulation in Eco-Town



Plastic PET Bottle Recycling Project



Office Equipment Recycling Project



Home Appliance Recycling Project



Automobile Recycling Project

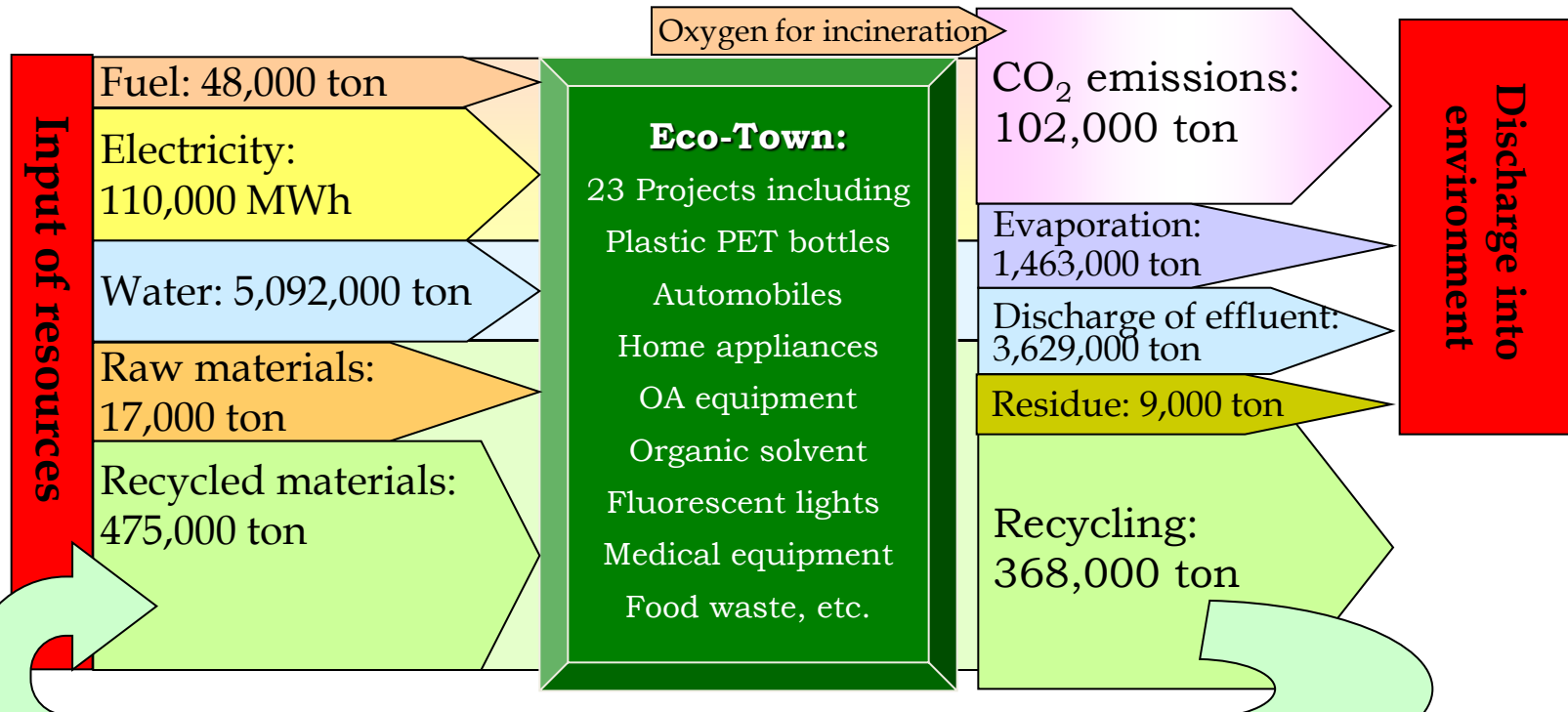
# “Goal Keeper” of Zero Emissions in Kitakyushu Eco-Town

## Kitakyushu Eco-Energy CO., Ltd.



# Eco-Town's Contributions to Reducing Environmental Impacts

~Estimation by Life Cycle Assessment~



Generation of Electricity: 28,000 MWh

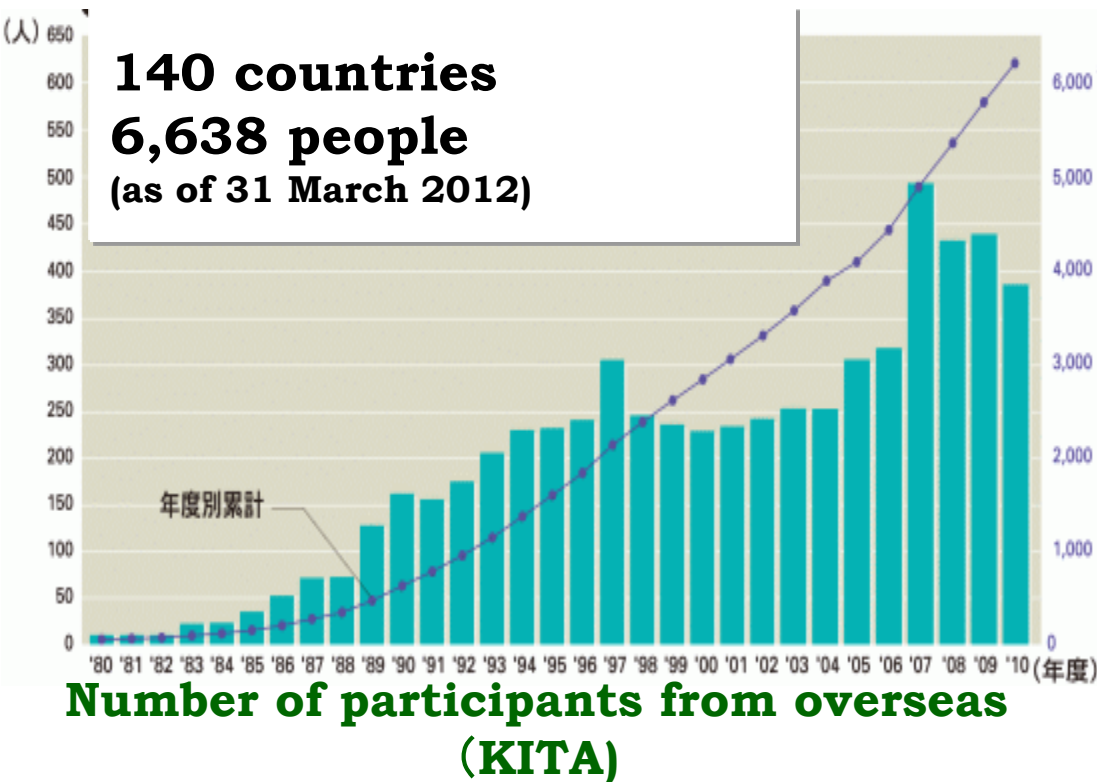
**Reduction of environmental impact: 380,000 ton CO<sub>2</sub>**

CO<sub>2</sub> emissions: 129,000 ton  
(by treatment +  
by using resources and energy)



CO<sub>2</sub> reduction: 509,000 ton  
(when raw materials used)

# International Environmental Cooperation for Green Growth in Asian Countries



## City-to-city international environmental cooperation

### International Cooperation Organisations in Kitakyushu

- Japan International Cooperation (JICA) Kyushu International Centre
- Kitakyushu International Techno-cooperative Association (KITA)
- Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)
- Kitakyushu Forum on Asian Women (KFAW)
- Kitakyushu Asian Center for Low Carbon Society



Joint beach cleaning project by 10 cities in 3 countries

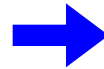
City of Kitakyushu

# Results of Environmental Cooperation in Asia

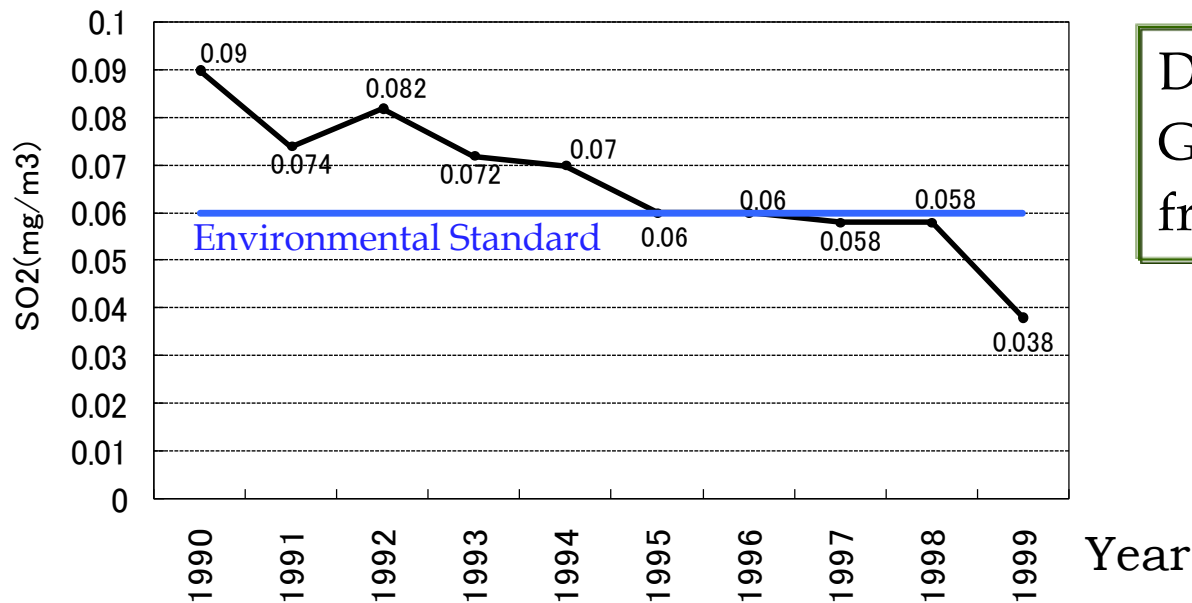
## Dalian Environmental Demonstration Zone Project in Dalian, China



In 1994



Present



Dalian received the  
Global 500 Award  
from UNEP in 2001

# Results of Environmental Cooperation in Asia

## Water Supply Improvement in Phnom Penh, Cambodia

in 1993	→ <b>Improvement</b> →	in 2006	
22 people	Number of personnel / 1,000 water tap	4 people	
65,000	Daily water supply (max) (m <sup>3</sup> /day)	235,000	
25%	Water supply diffusion ratio	90%	
10 hours	Operation time	24 hours	
0.2 kgf/cm <sup>2</sup>	Average water pressure	2.5 kgf/cm <sup>2</sup>	<b>Direct supply possible up to three stories</b>
26,881	Number of households serviced	147,000	
72%	Ratio of non-revenue water	8%	<b>Same level as Kitakyushu</b>
48%	Ratio of payments for water charges	99.9%	

At present, there has been improvement in hygienic conditions of water supply and residents can drink water directly from the tap.



# Results of Environmental Cooperation in Asia

## Composting Project in Surabaya, Indonesia



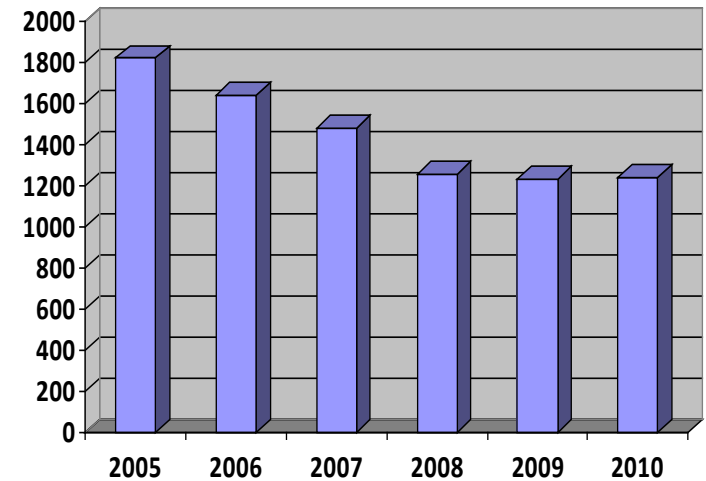
Environmental pollution at landfill site (before)



Compost from solid waste



Expert from Kitakyushu instructs community residents about making compost



Reduction of reclaimed solid waste

Project has been expanded to **30,000 households**, as well as other cities and countries, and has resulted in a **30% reduction of solid waste** in Surabaya's landfill

## Environmental Education Project in Balikpapan, Indonesia

Kitakyushu City has original Environmental Education program. Balikpapan City and Kitakyushu City are sharing each education programs supported by CLAIR.



# International Environmental Cooperation

## International projects implemented by private enterprises in collaboration with the Kitakyushu Asian Center for Low Carbon Society

Projects and related companies	Scheme utilized
Energy Saving Project in Beijing, China YASKAWA Electric Corporation, <i>Largest world share of industrial robots and inverters in Kitakyushu</i>	Ministry of Economy, Trade and Industry of Japan
Promoting Water Saving Equipment in Dalian, China TOTO Ltd., <i>International housing equipment company in Kitakyushu</i>	Ministry of the Environment of Japan
Promoting Waste Water Purification with Provision of License for Nitrate Nitrogen Removal Technology to Chinese Company in Dalian, China Nippon Steel Chemical CO., Ltd., <i>Coal chemical company in Japan</i>	Providing the license of pollutant removal technology to Chinese companies
Promoting Recycling Business in Tianjin, China Eco-Material Corporation, <i>International recycling business company in Japan</i>	Ministry of the Environment of Japan
Received an order from the City of Siem Reap, Cambodia, related to water works planning project Kitakyushu Water Supply Bureau and Hamagin Research I Institute, Ltd.	Japan International Cooperation Agency



# International Evaluation of Kitakyushu's Environmental Policies

<b>1985</b>	OECD report describes Kitakyushu as “Gray City to Green City”
<b>1990</b>	UNEP's Global 500 Award, first local government recipient in Japan
<b>1992</b>	Local Government Honours Programme at United Nations Conference on Environment and Development (UNCED), one of 12 cities in the world
<b>2000</b>	The “Kitakyushu Initiative for a Clean Environment” is adopted at UNESCAP Ministerial Meeting
<b>2002</b>	Partnership Award / Environmental Ambassador from United Nations and Stockholm City, only one in Japan
	The “Kitakyushu Initiative for a Clean Environment” identified by World Summit on Sustainable Development (WSSD) in Plan of Implementation
<b>2006</b>	Ms. Wangari Maathai, Recipient of Nobel Peace Prize, said “I will say to the world that let us ask to Kitakyushu about the environment.”
	“TIME” magazine carried a report about Kitakyushu as Environmental Model City
	UNU certificated the Kitakyushu as Regional Centre of Expertise (RCE) of Education for Sustainable Development (ESD)
	First prize in Japan's Eco-Capital Contest
<b>2007</b>	First prize in Japan's Eco-Capital Contest
<b>2008</b>	Eco Model City, one of six cities in Japan
<b>2010</b>	Model City on Smart Community, one of four cities & areas in Japan
<b>2011</b>	Model City for OECD's Cities and Green Growth Programme, one of four cities worldwide

- **Citizen participation in 3Rs (reduce, reuse, recycle)**
- **Social system for resource circulation**
- **Technologies**
- **Cost benefits**
- **Economic market for recycling...**

## **Direct inquiries to:**

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Environment Bureau, City of Kitakyushu  
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