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Session4: International Expansion of Environmental Technologies

Environmental Innovation Sent Out From Kawasaki

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Expansion of Resource-Recycling Network (Eco-Town)

Building and integrating recycling facilities in the eco-town

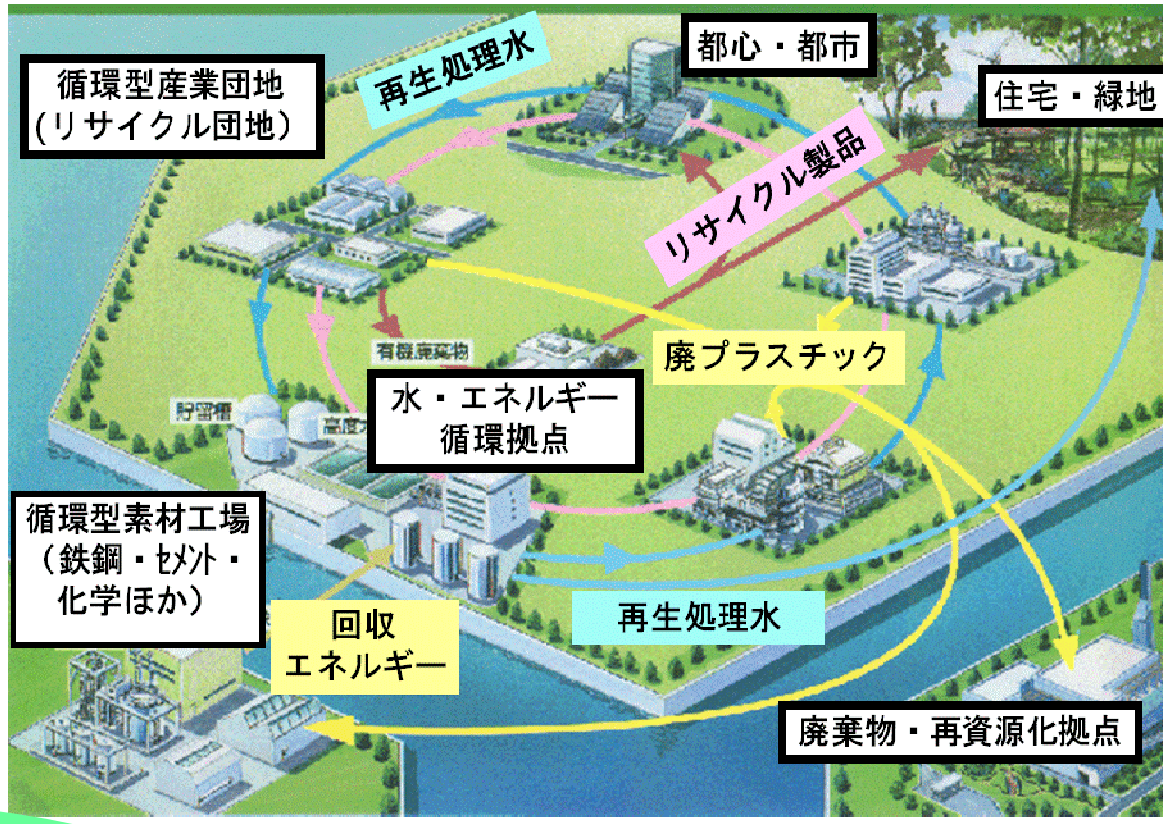
Development Step 1
Resource-recycling network within the eco-town

Development Step 2
Formation of resource-recycling in the area surrounding the eco-town

Development Step 3
Formation of resource-recycling nationwide, irrespective of eco-towns

Building a circular economy and society

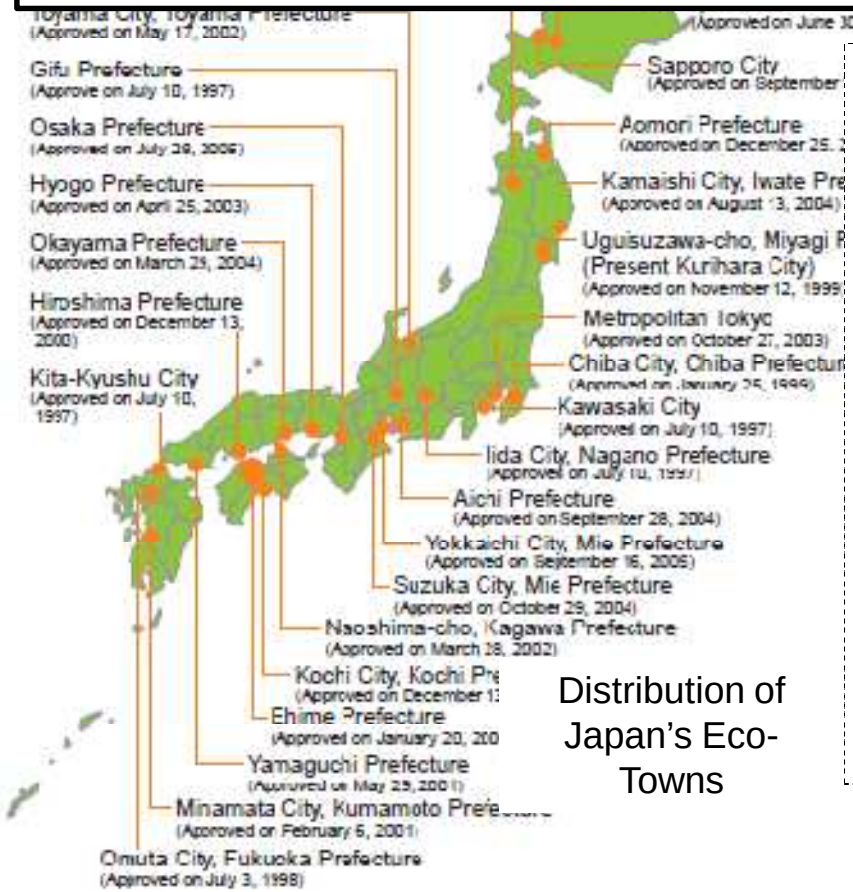
Expectations for formation of a circular industrial network and regional areas, with eco-town facilities at the core



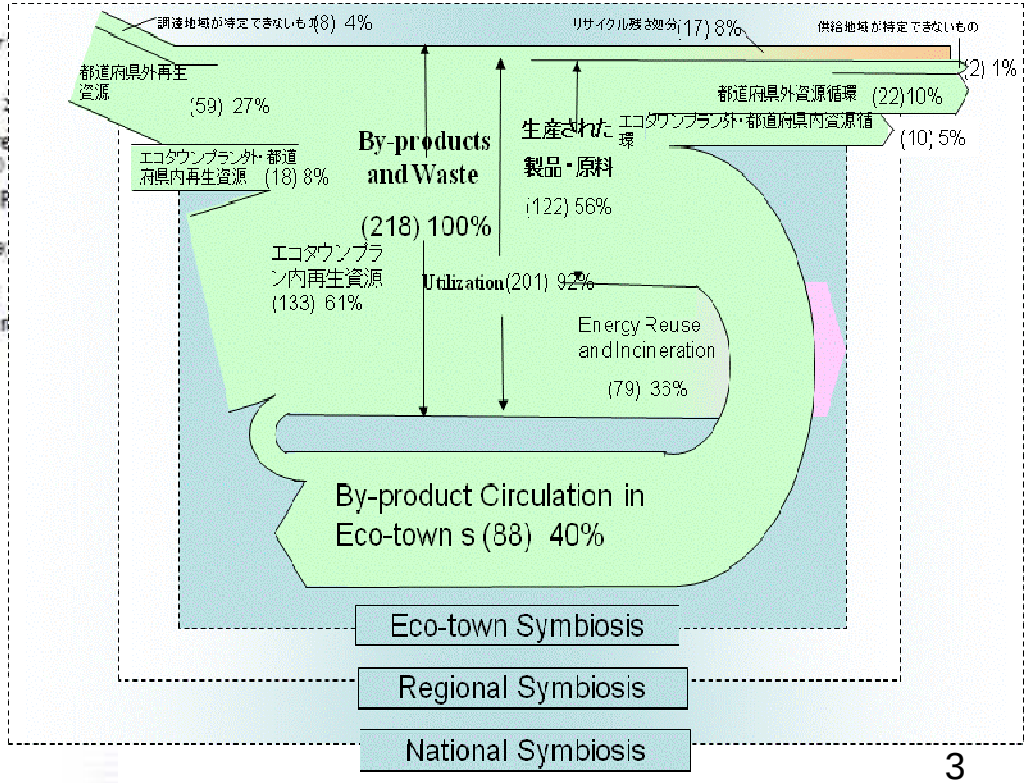
Survey and Analysis of Eco-Town Projects as Bases for a Circular Society

During the ten-year period from 1997 to 2006, the Ministry of Economy, Trade and Industry and the Ministry of the Environment authorized 26 eco-towns, and 62 facilities have been built.

In fiscal 2008 there was a "Survey and Investigative Commission on Measures for Further Promotion of Eco-Towns." 26 eco-town municipalities and 170 circular facilities were surveyed and analyzed.



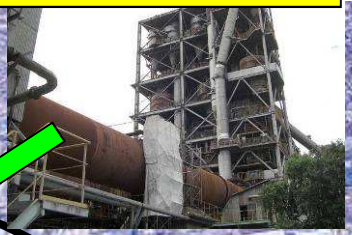
Distribution of Japan's Eco-Towns



Locations of Resource Recycling Facilities in Kawasaki's Eco-Town

Facility for turning waste plastic into ammonia feedstock
(Showa Denko K.K.)

Facility for manufacturing recycled cement
(D.C.)



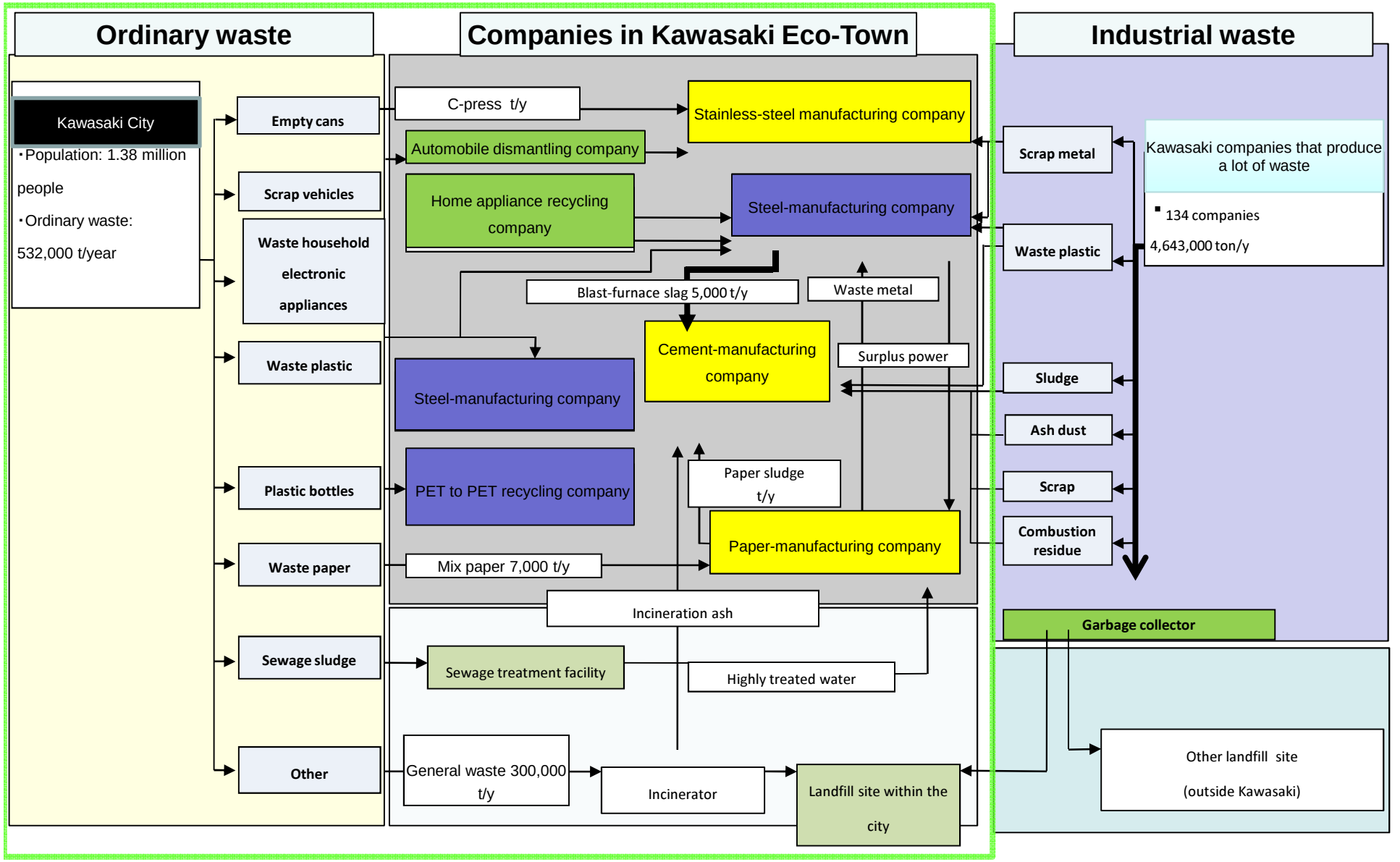
Waste plastic blast-furnace reduction facility / Facility for manufacturing panels for concrete molds made of waste plastic / Facility for recycling waste household electric appliances
(JFE Group)

PET-to-PET recycling facility
(PET Refine Technology Co., Ltd.)

Recycling facility for hard-to-recycle paper
(San-Ei Regulator Co., Ltd.)

Example of an Eco-Town Project: Kawasaki Eco-Town

Formation of a Regional Network for Resource Circulation



Factors for Expansion of Eco-Towns and Research on Regional Circulation Areas

(1) Concentrated building of circulation and recycling facilities

(Scale economies for circulation; accumulation of amounts and quality)

(2) Cooperation between industrial facilities and recycling facilities

(Industrial symbiosis system)

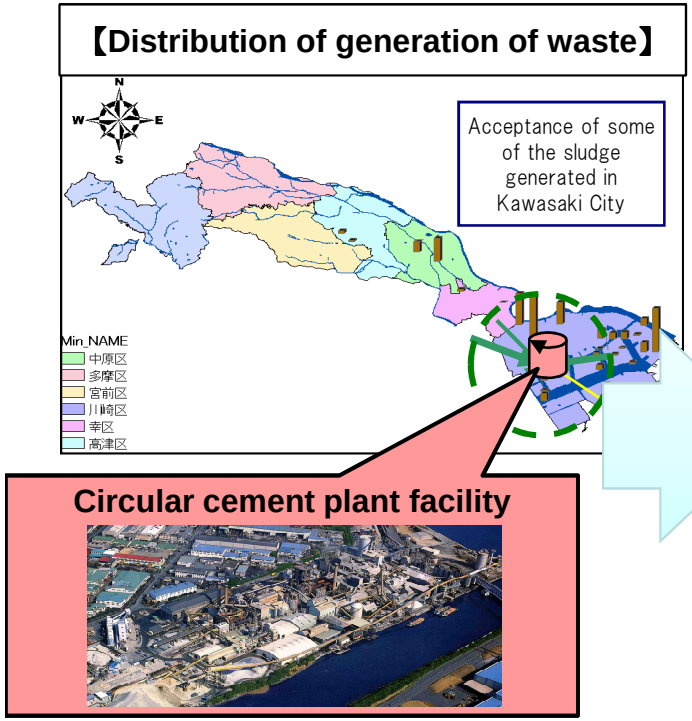
(3) Social system for making the most of circulation technologies

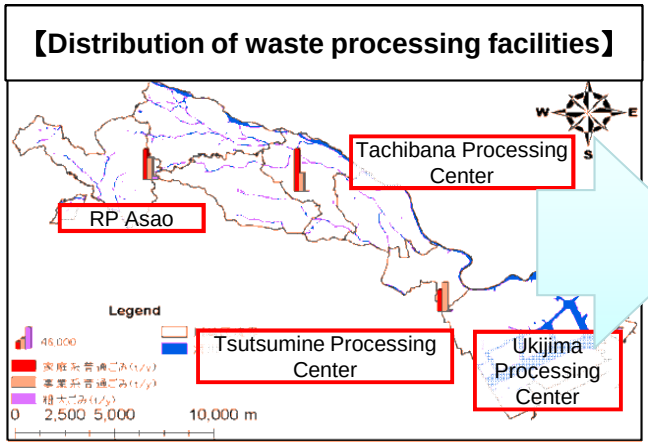
(Circular society system)

(4) Appropriate circulation scale through circulation characteristics

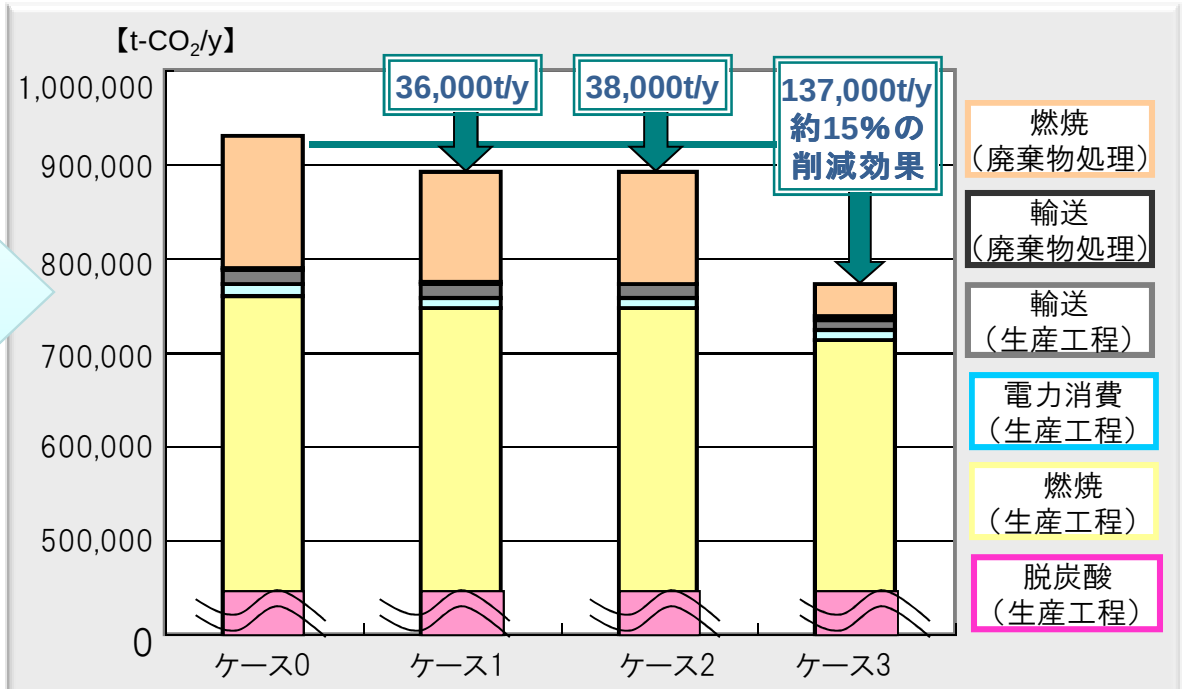
(Appropriate circulation area)

Example of Calculation of Effects of Formation of Regional Circulation in Eco-Towns





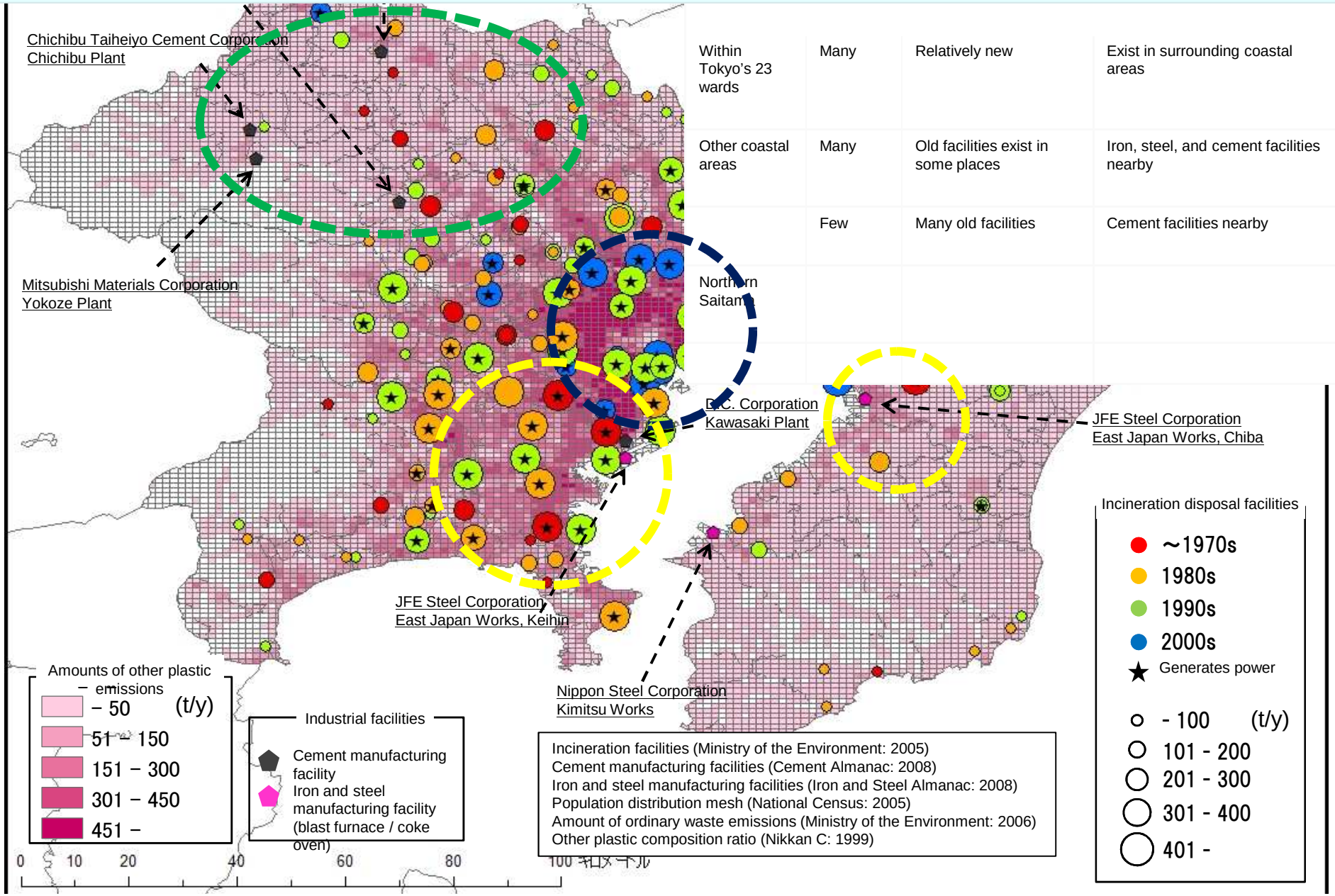
Example of calculation of potential for regional utilization of circular cement industry



		廃棄物受入量(t/y) 川崎市内	神奈川県	関東圏	関東圏外	輸送距離(km)	廃棄物転換率(重量%)	最大廃棄物転換率(重量%)		産業廃棄物処理量(t/y)	輸送距離(km)	一般廃棄物処理量(t/y)	輸送距離(km)
粘土系原料代替産業廃棄物	ケース1	0	0	0	0	0	0%		処理される廃棄物	490000	52	0	0
	ケース2	28,000	54,000	50,000	113,000	52	100%			245,000	52	0	0
	ケース3	245,000	0	0	0	1.5	100%			245,000	52	0	0
	ケース4	245,000	0	0	0	1.5	100%			245,000	52	0	0
燃料系原料代替廃棄物	ケース1	0	0	0	0	0	0%			19380	50	18620	5.4
	ケース2	0	0	0	12,000	50	10%			7360	50	18620	5
	ケース3	7,360	0	0	12,000	31	14.60%			0	0	18620	5
	ケース4	18,620（一廃） 19,380（産廃）	0	0	0	5	40%			0	0	0	0

Information Systems that Contribute to Building Regional Circulation (1)

Regional Databases of Information on Distribution of Circulating Resources and Information on Industrial Facilities that are Bases for Circulation

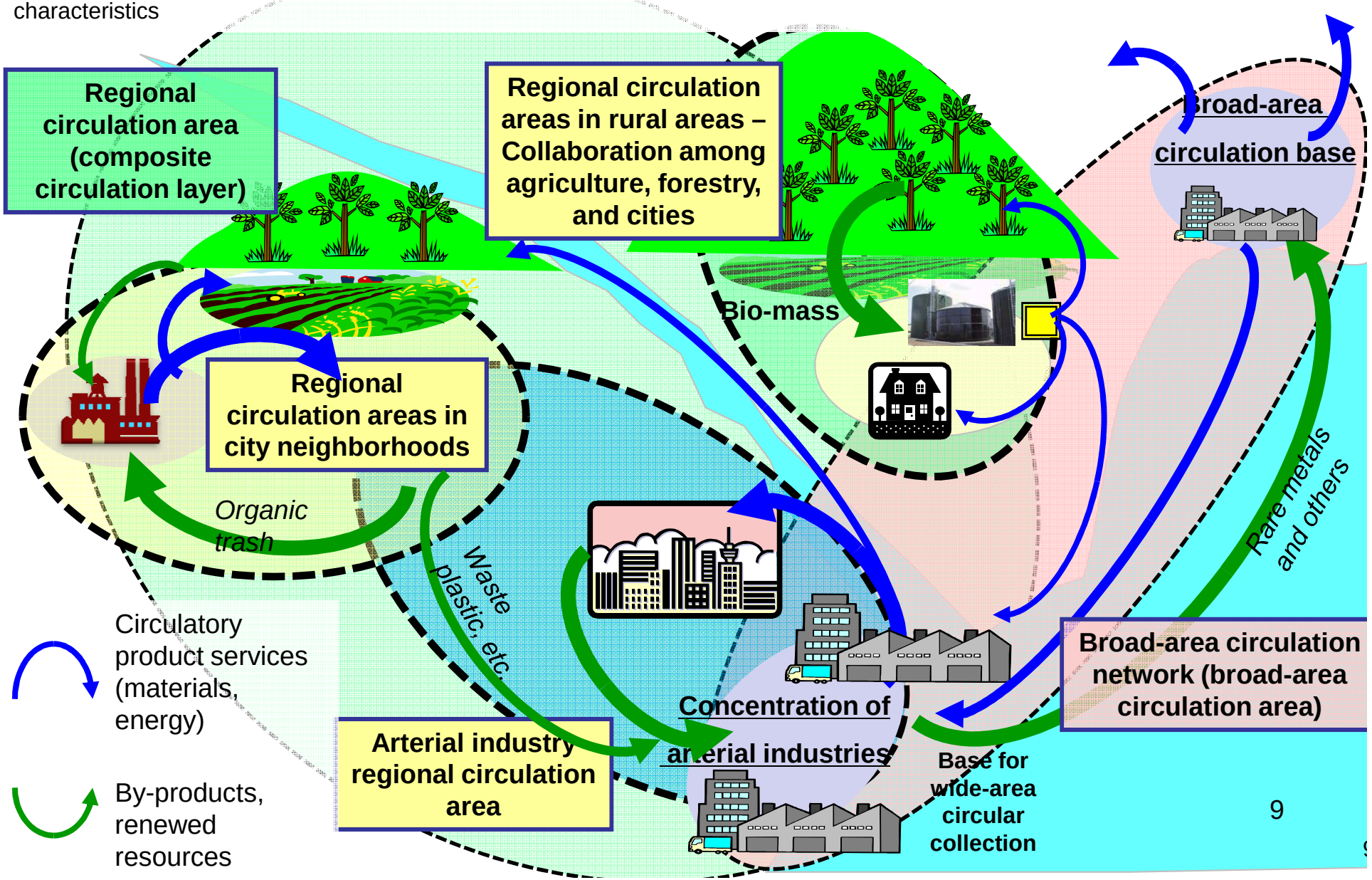


Within Tokyo's 23 wards	Many	Relatively new	Exist in surrounding coastal areas
Other coastal areas	Many	Old facilities exist in some places	Iron, steel, and cement facilities nearby
Northern Saitama	Few	Many old facilities	Cement facilities nearby

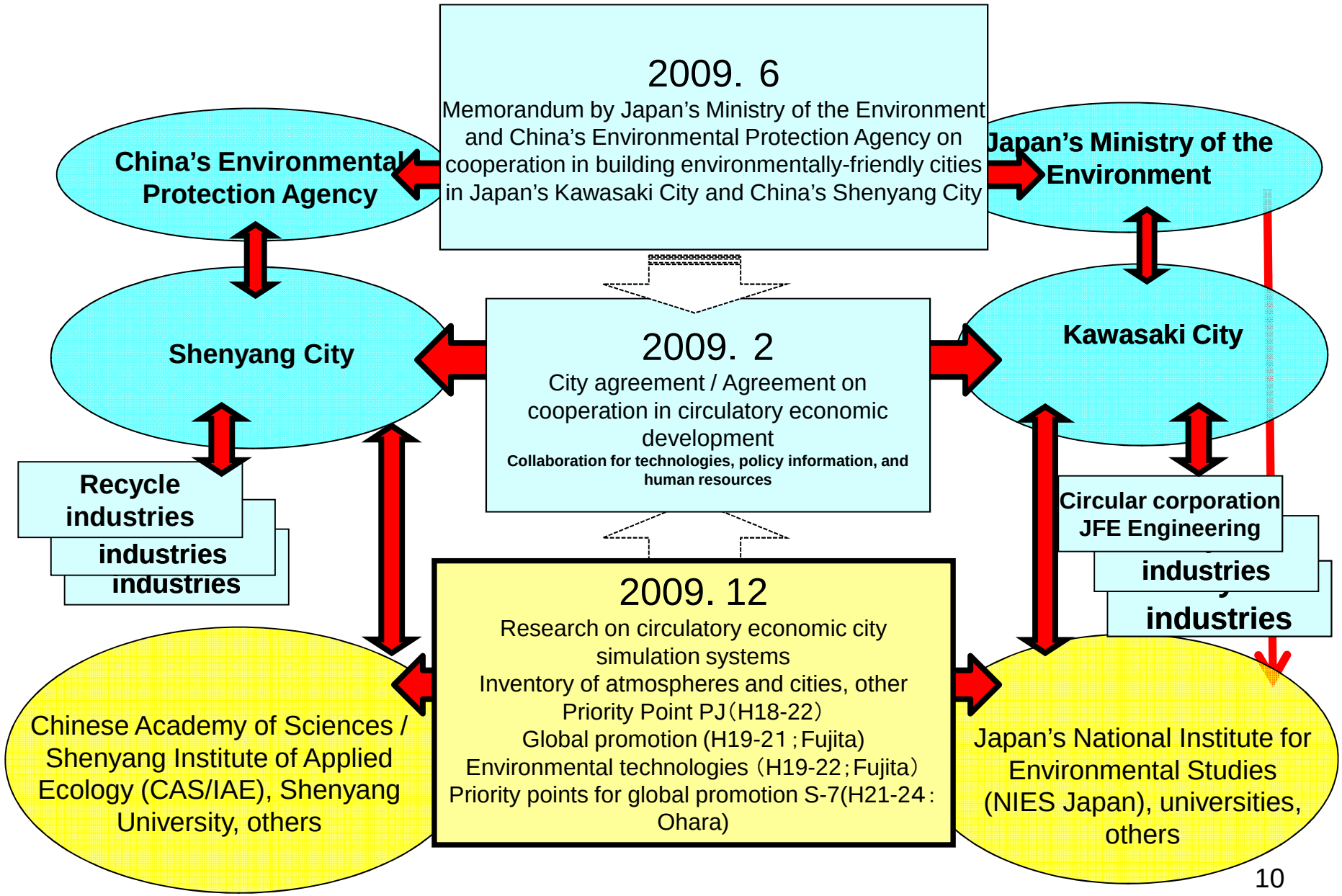
Incineration facilities (Ministry of the Environment: 2005)
Cement manufacturing facilities (Cement Almanac: 2008)
Iron and steel manufacturing facilities (Iron and Steel Almanac: 2008)
Population distribution mesh (National Census: 2005)
Amount of ordinary waste emissions (Ministry of the Environment: 2006)
Other plastic composition ratio (Nikkan C: 1999)

Various Regional Circulation Areas that Utilize the Location of Environmental Resources

Building a wide variety of regional circular areas that utilize the regions' circular society base (resource recycling and processing facilities, and circular arterial industry facilities), accumulation of agriculture and forestry environmental capital, and locational characteristics



China's Shenyang City Research Collaboration System for an "Environmentally-Friendly City"



Creation of a Simulation System for Evaluation of City Technologies and Policies

① Building a Kawasaki prototype in Shenyang (Japan-China collaboration)

② Customizing the NIES model for Shenyang, Liaoning (Japan-China collaboration)

③Typifying Japanese corporations' technologies and local governments' systems (NIES)

④ Planning process involving collaboration between CAS and the Chinese government (CAS + Shenyang City)

Analysis of effects on sphere

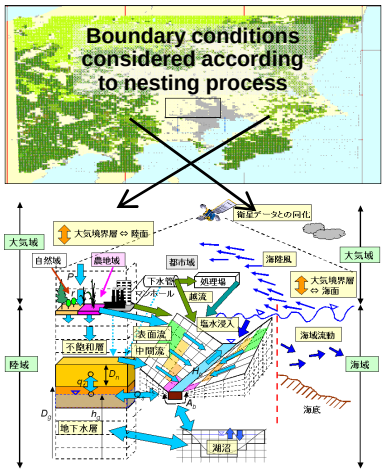
Base city environment information

①City environment GIS database

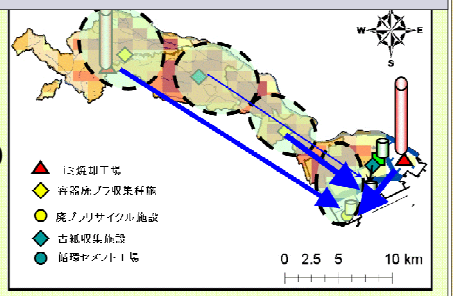
- **Topographic environment**
  - Atmosphere, weather
  - Land use and coverage
  - Terrain, soil conditions
- **Atmospheric environment**
  - Temperature
  - Humidity
  - Wind direction and speed
- **Water environment**
  - Rivers (Water quality and amount)
  - Groundwater (Water quality and amount)
  - Sewage (water quality and amount)
- **Green area environment**
  - Positioning of parks and green areas
  - Dimensions of parks and green areas
  - Forms of vegetation
- **City base**
  - Use and coverage of land
  - Transportation infrastructure
  - Population
- **Buildings**
  - Number of building floors
  - Use of buildings
  - Building structures
- **City waste**
  - Ordinary waste (household)
  - Ordinary waste (business)
  - Industrial waste

②Integrated city environment analysis model

Model to analyze flux of water and heat



Model of transporting resources and waste



③ Inventory of technologies and policies

Anti-pollution technologies and policies

- Sewage treatment technologies
- (activated sludge method))
- Dispersed water processing technologies
- Incineration and melting technologies
- Landfill disposal technologies, etc.

Technologies and systems for an environmentally-supportive society

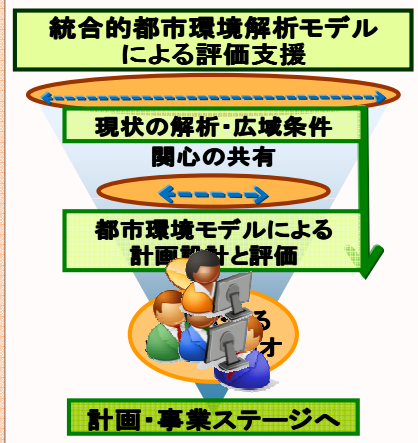
- Green supply chain management (GSCM)
- Waste regulation systems
- Systems to support circulation
- Resource circulation monitoring, etc.

Technologies and policies for resource-circulation

- Technologies for iron-manufacturing
- blast furnace reduction
- Technologies for creating
- cement materials
- Policies on sorting waste for collection
- Policies for broad-area
- resource-circulation, etc.

④System for supporting city environment policies

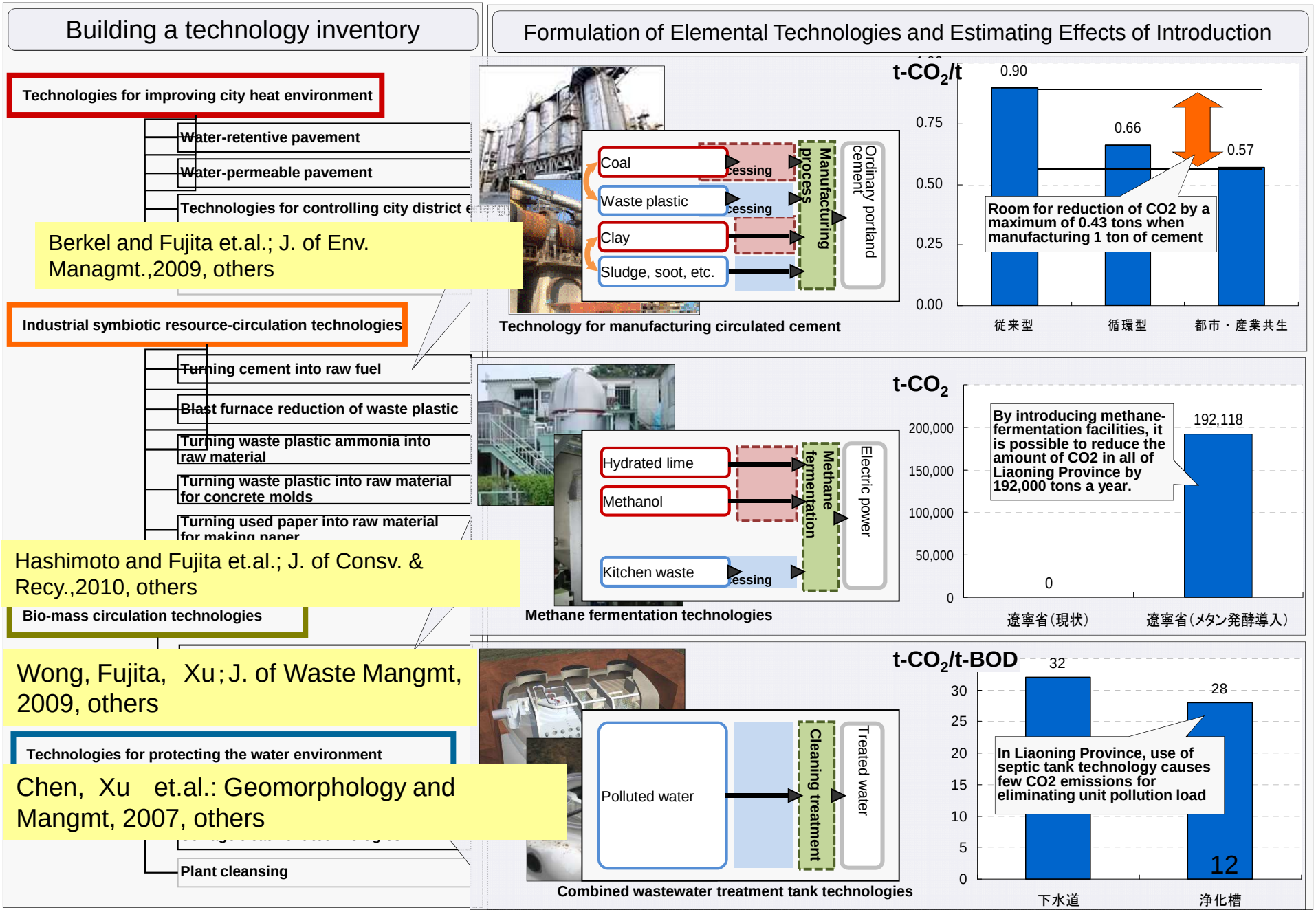
Planning and evaluation process



Environmental indicators for the city or sphere

- Low-carbon effects (reduction of greenhouse gases)
- Amount of waste generated (amount of substitution by new resources, final amount disposed of)
- Amount of natural vegetation (eco-service)
- City activity and production volume.
- City quality of life (QOL).

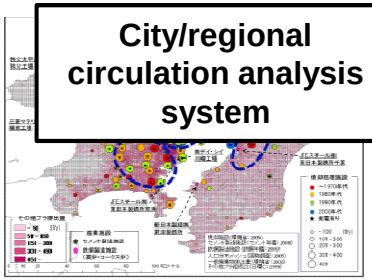
3.3 Example of Application of a Resource-Circulation Technology and Policy System in a Chinese City



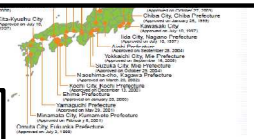
Examples of Simulation Research on Resource-Circulation Technologies and Policies in Japanese and Chinese Cities

Simulation research on evaluation of Japan's eco-town technologies and policies

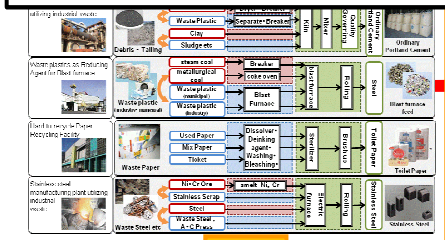
City/regional circulation analysis system



Analysis of eco-towns throughout Japan (90 facilities in 26 districts)



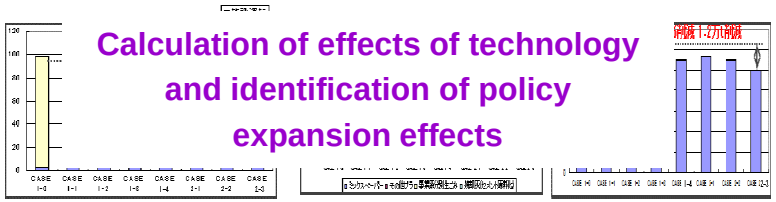
Analysis of eco-town circulation technologies



Resource-circulation effects and low-carbon effects

Simulation evaluation of environmental technologies and policies

Calculation of effects of technology and identification of policy expansion effects



CO2 reduction

Amount of resource-circulation

Final disposal of waste

Berkel and Fujita et. al; Env. Sci.& Tech.,2009, others

Policy stage

Planning stage

Guidelines for Japanese and Chinese low-carbon industrial eco-parks

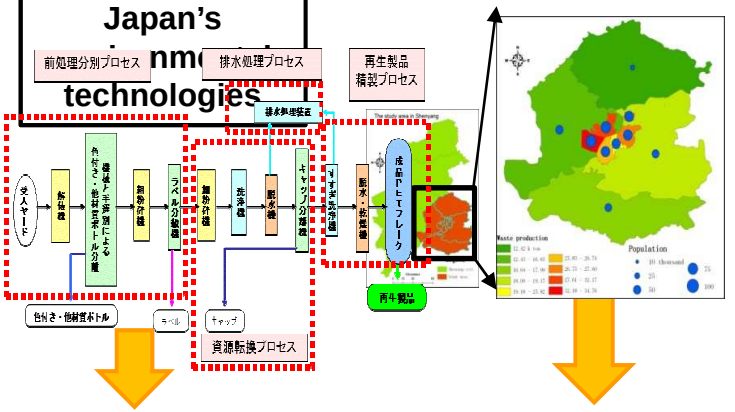
Execution design stage

Project execution stage

Simulation research on evaluation of China's city environment technologies and policies

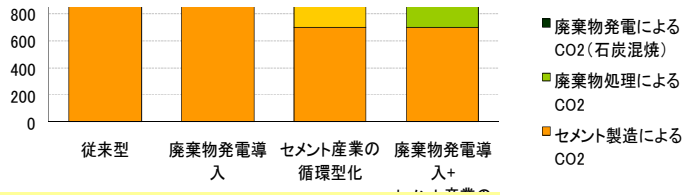
Circulation analysis system for China's cities

Reconstruction analysis of Japan's environmental technologies



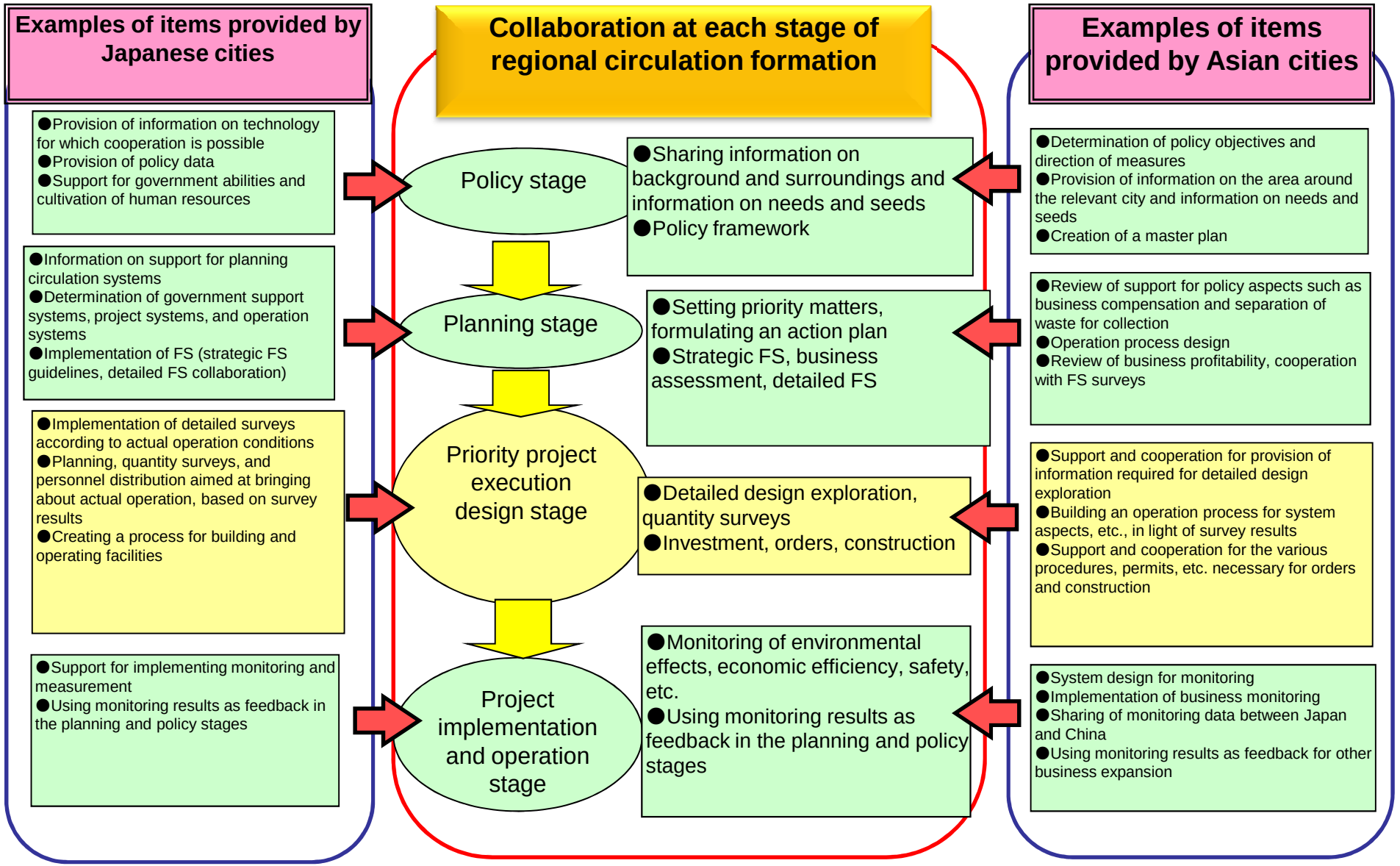
Simulation evaluation of environmental technologies and policies

Identification of technologies and policies for resource-circulation and low-carbon co-benefits



Chen and Fujita et. al; J. of Waste Mangmt., 2010(in print), others

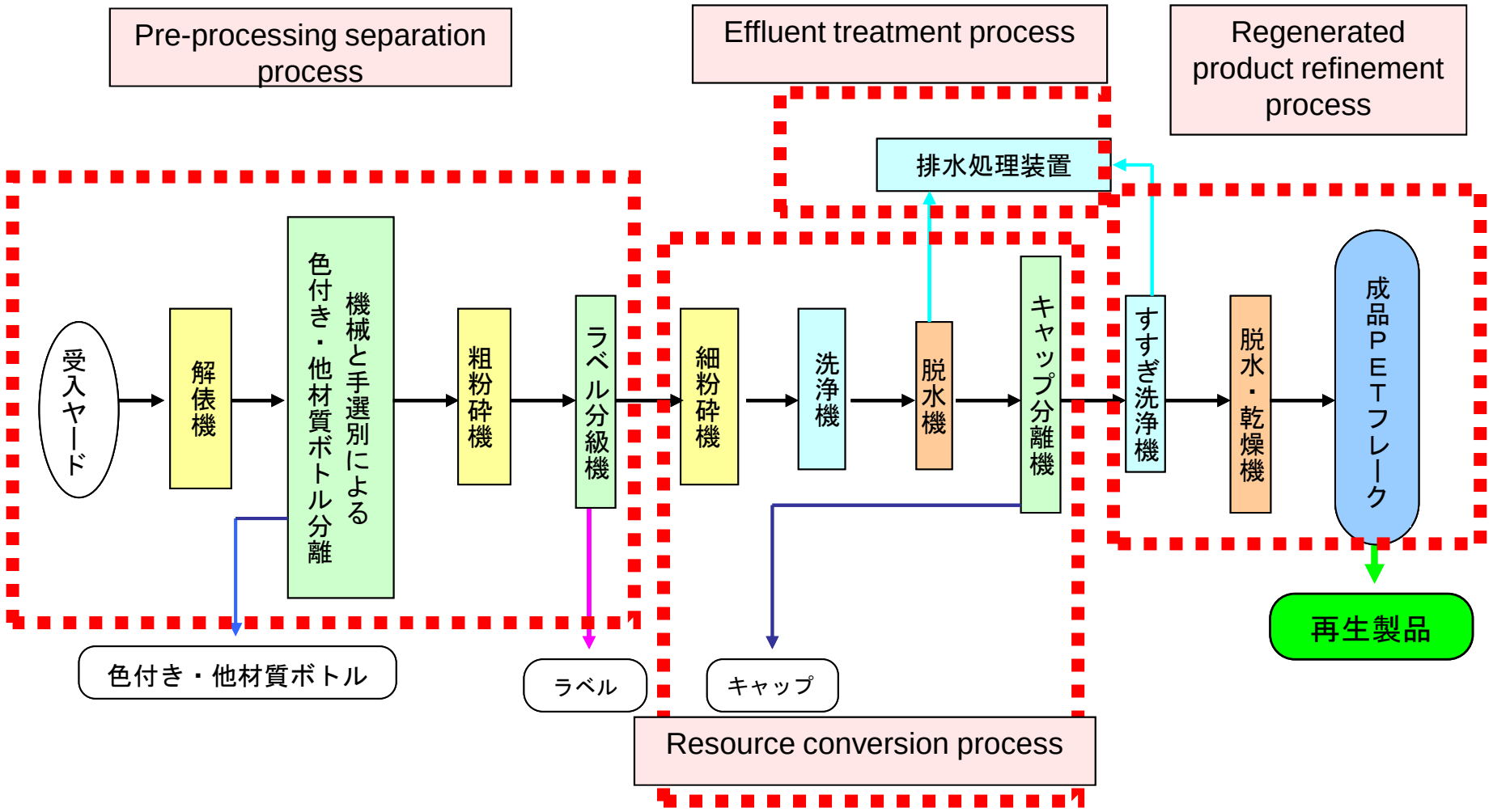
Building a Platform for Reviewing Japanese-Style Regional Circulation Systems



Ministry of the Environment 2009; Extracted and modified from materials for the “Investigative Commission for Supporting Model Businesses for Building Environmentally-Friendly Cities in Kawasaki and Shenyang (chaired by Fujita)”

Re-Building the Process for Circulation Technologies that are Appropriate for Regional Characteristics (Re-Engineering)

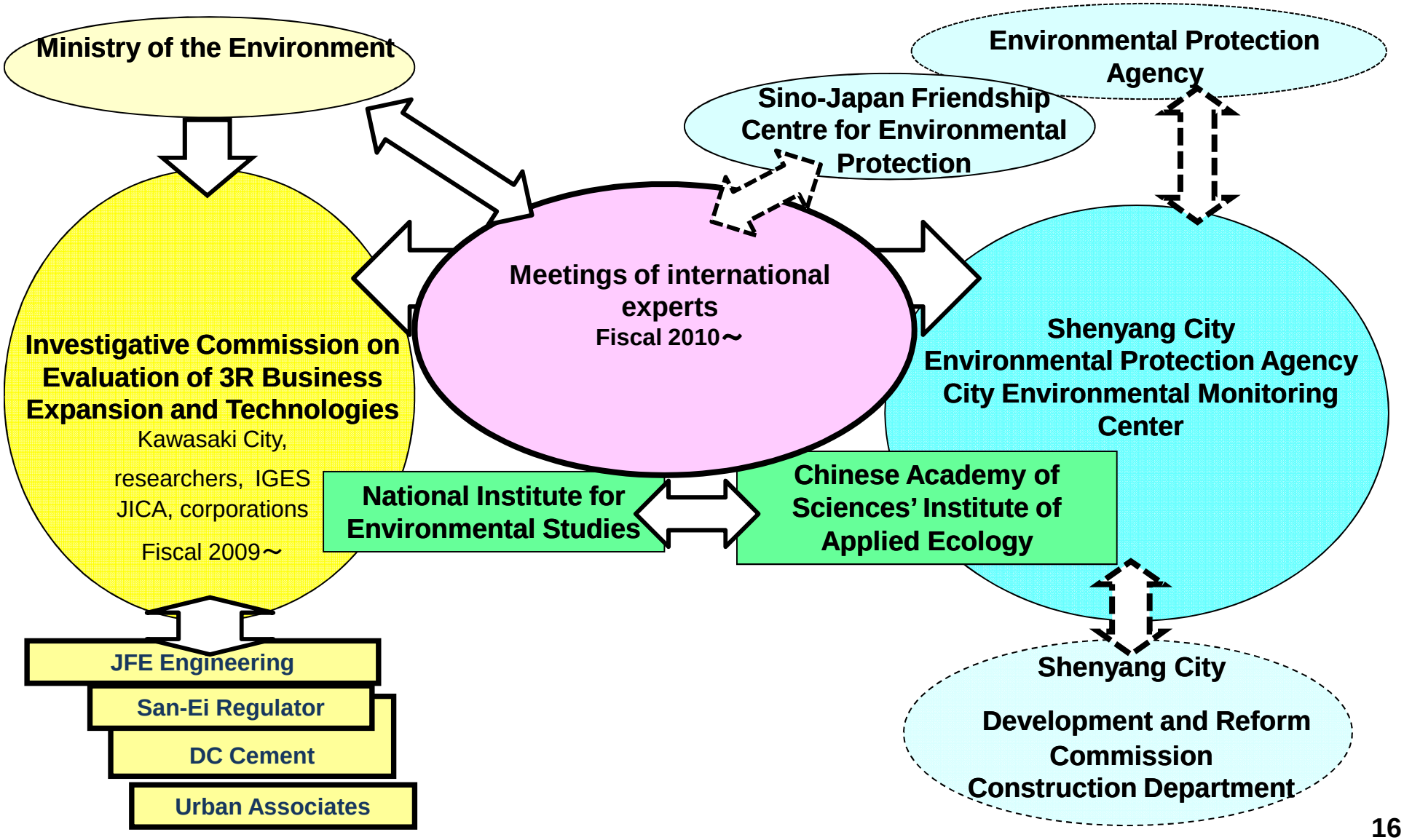
Re-building technology and policy systems that are appropriate for the characteristics of Asian cities, by dividing and rebuilding (re-engineering) Japan's technologies (in the example of plastic bottles, an initial eight-fold monetary divergence)



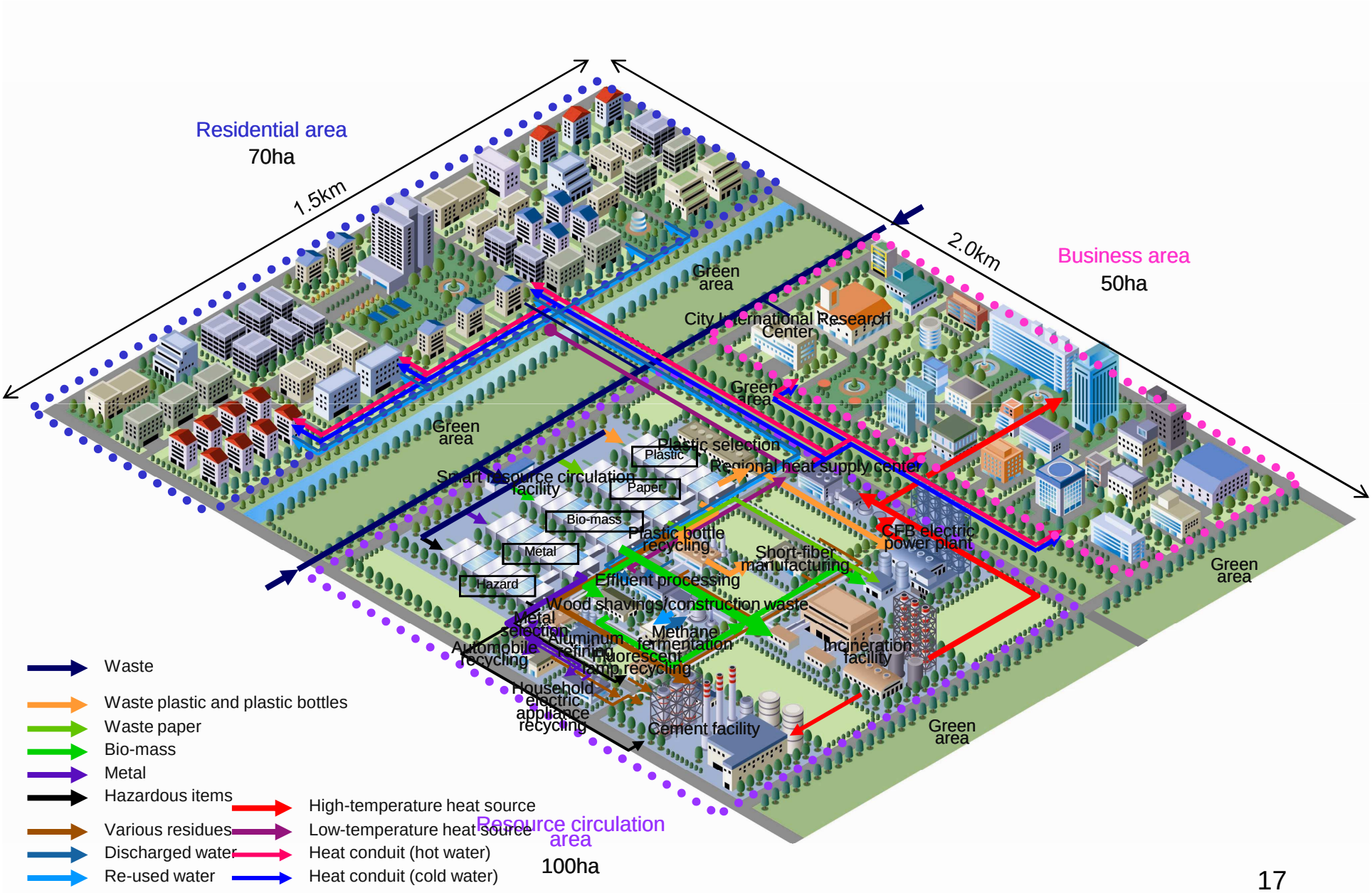
Inventory of input factors (energy, water, required land, operation staff, etc.) and quantification of equipment and operation costs, etc. for each circulation technology process, through business surveys in Japan

Framework for Review and Support of the Shenyang-Kawasaki Circulation Project

In January 2010 an investigative commission on support in Japan was launched with members from industry, the government, and academia. In January 2011 meetings of international experts began to be held as a channel for sharing information with Shenyang City and sending out information from Japan.



Shenyang City, China　　Image of Sino-Japan Collaborative Low-Carbon Venal Eco-Industrial Park (Investigative Commission Proposal by the National Institute for Environmental Studies)



Japan's Low-Carbon Cities in International Society

Knowledge and wisdom of resource circulation in Europe: European style

- Resource circulation amid increasing de-industrialization and de-materialization
- High level of environmental consciousness among citizens and corporations; ability for collaboration by many main constituents and ability for city management

Knowledge and wisdom of resource circulation sent out from Japan: *Japanese resource-circulation style*

- Ability to develop technologies by achieving objectives, ability for regional circulation by utilizing ability to develop products (combination of equipment technologies, network technologies, and social technologies)
- Social governance system that includes brewing environmental awareness among citizens and corporations
- Regional societies that are able to take environmental action based on their experiences with pollution

Resource-circulation initiatives in Asia: Asian style

- Promotion of becoming low-carbon in the process of industrialization and economic growth
- Top-down business promotion, and government ability to enact policies