7th Asia Pacific Eco-Business Forum
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Session 3: Green Innovation Sent Out From Kawasaki

Environmental Innovation Sent Out From Japan
Visions and Strategies for Cities

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Strategies Aimed at Becoming a Low-Carbon Society/Japan

Japan's long-term goal (long-term goal of 60%-80% reduction in Japan by 2050)

- In October 2010 the Cabinet approved a Basic Law for Prevention of Global Warming, aimed at a 25% reduction by 2020 and an 80% reduction by 2050.

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- Development of innovative technologies and promotion of existing advanced technologies (promotion of technological development, renewable energies, and energy conservation)

- Structure to move the entire country toward becoming low-carbon (emissions trading, tax system reform, making emissions visible)

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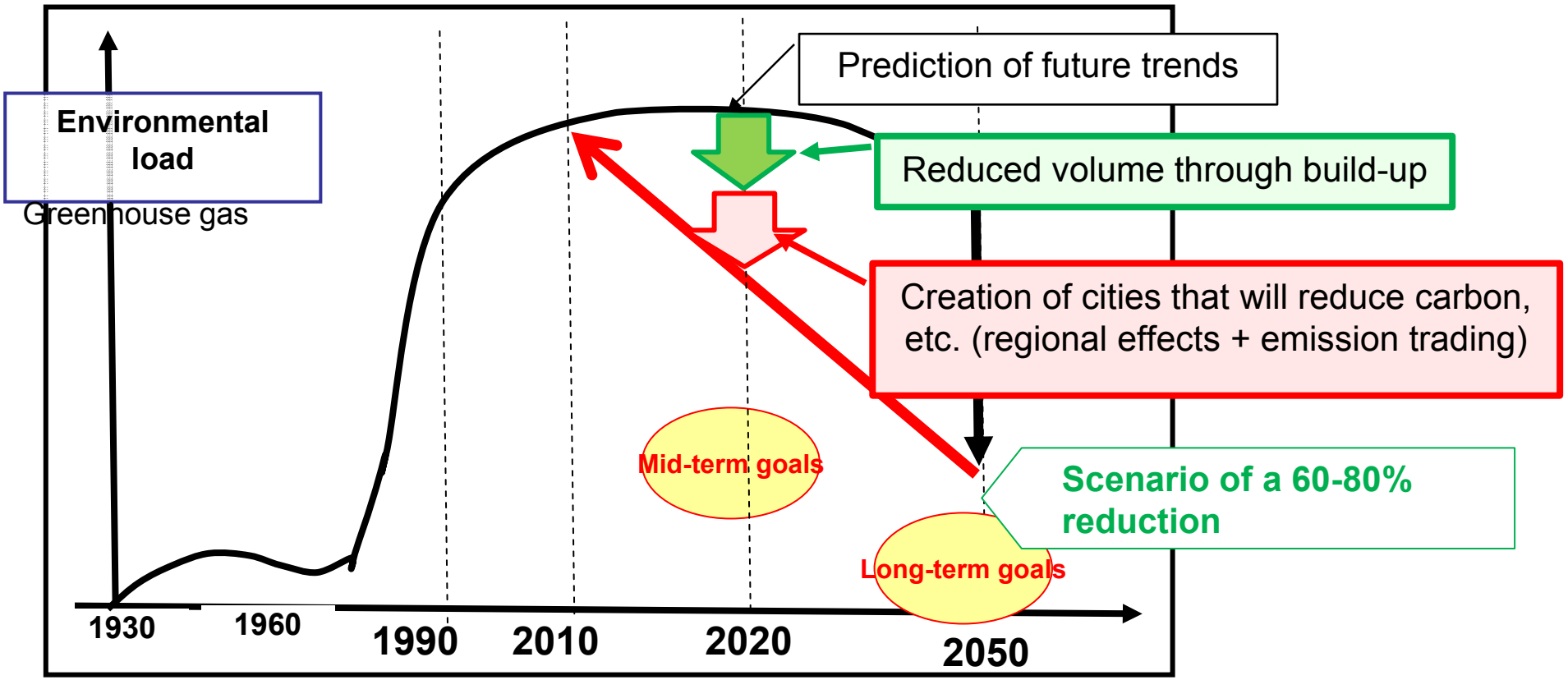
- Power of outlying areas; initiatives by cities and other areas working together

Using Area Action Plans to Handle Mid-Term Goals for Becoming Low-Carbon



Environmentally-friendly cities and regions require environmental resources, proposals for infrastructure that utilizes society's resources, etc.

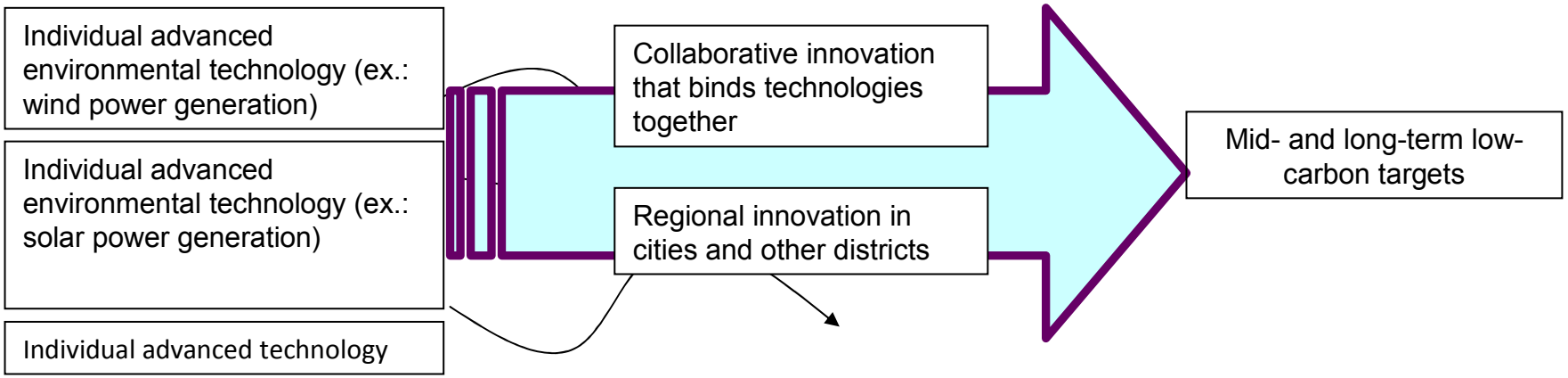
Environmentally-Friendly Cities That Lead the Way for a Low-Carbon Society

- Changing from independent innovation to collaborative social innovation

Technology Innovation →

System Innovation or Collective Innovation

- Hierarchal innovation toward a social system from best practice

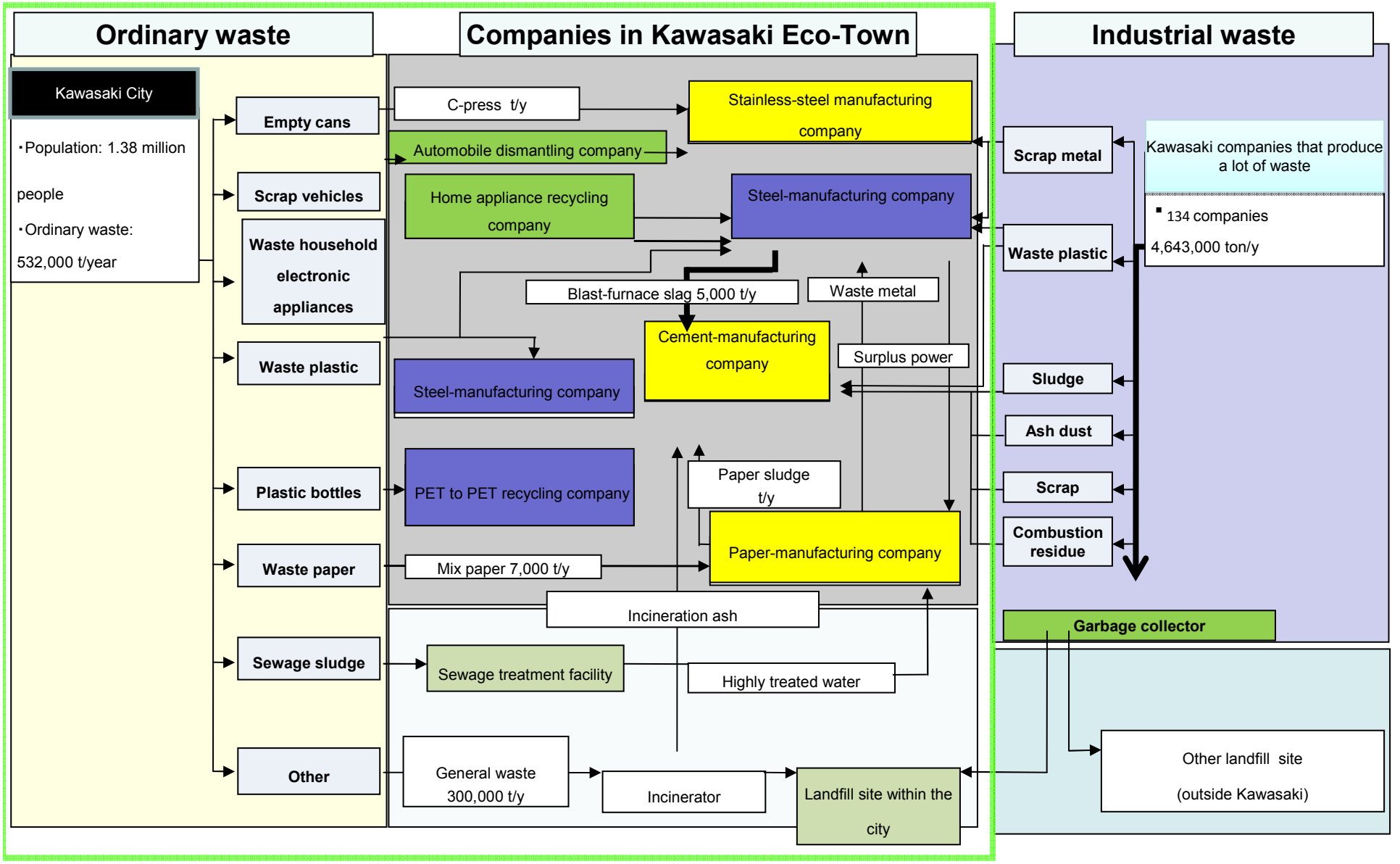


Regional System for Recycling Resources

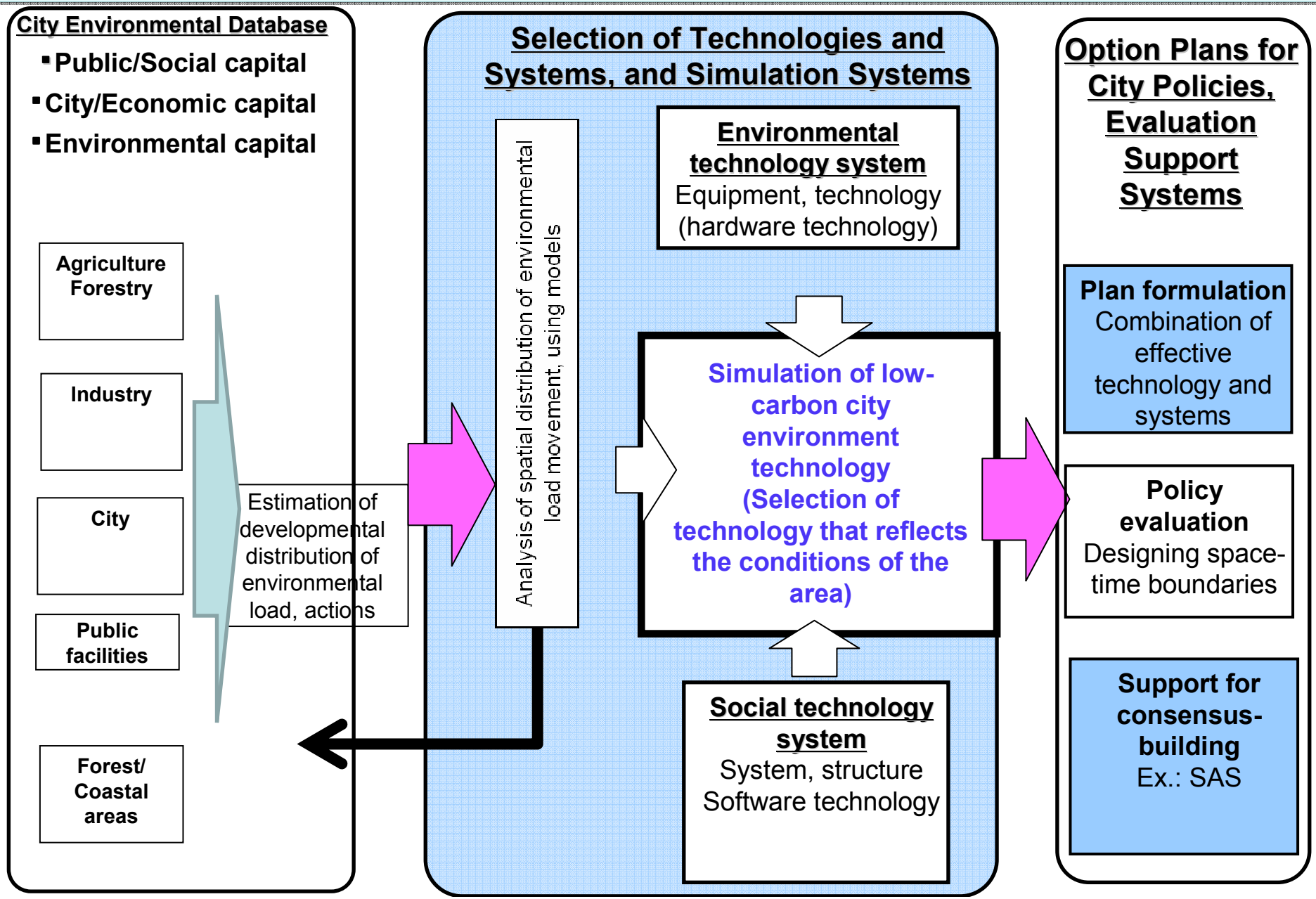
Eco-town and Eco-industrial Developments

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

Formation of a Regional Network for Resource Recycling

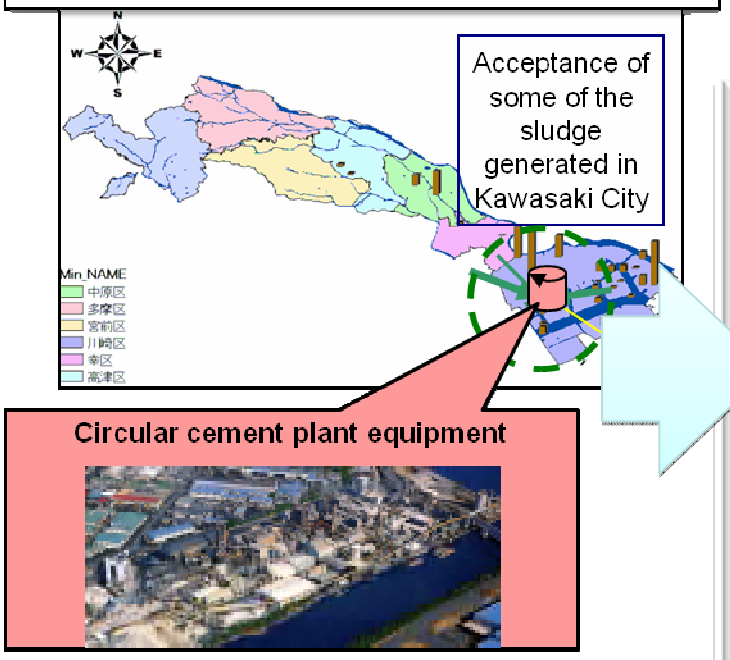


Universalizing Experiences of the Low-Carbon City World, and Developing Plan Evaluation Methods That Will Expand Into Regions (Ex.: Low-Carbon City Simulation Systems)

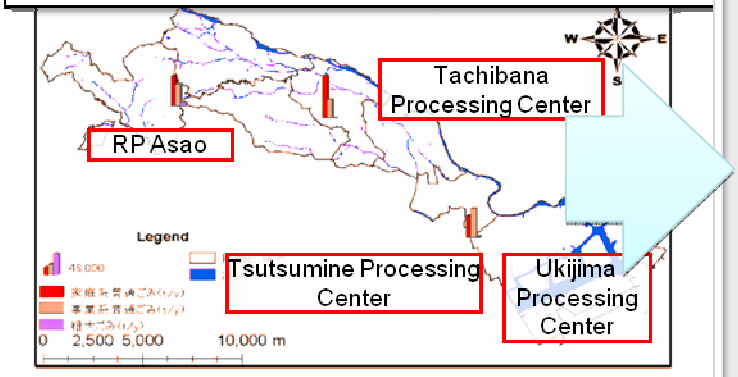


Example of Calculation of Effects of Circular Technology ①: Use of Cement Materials from Ordinary Waste

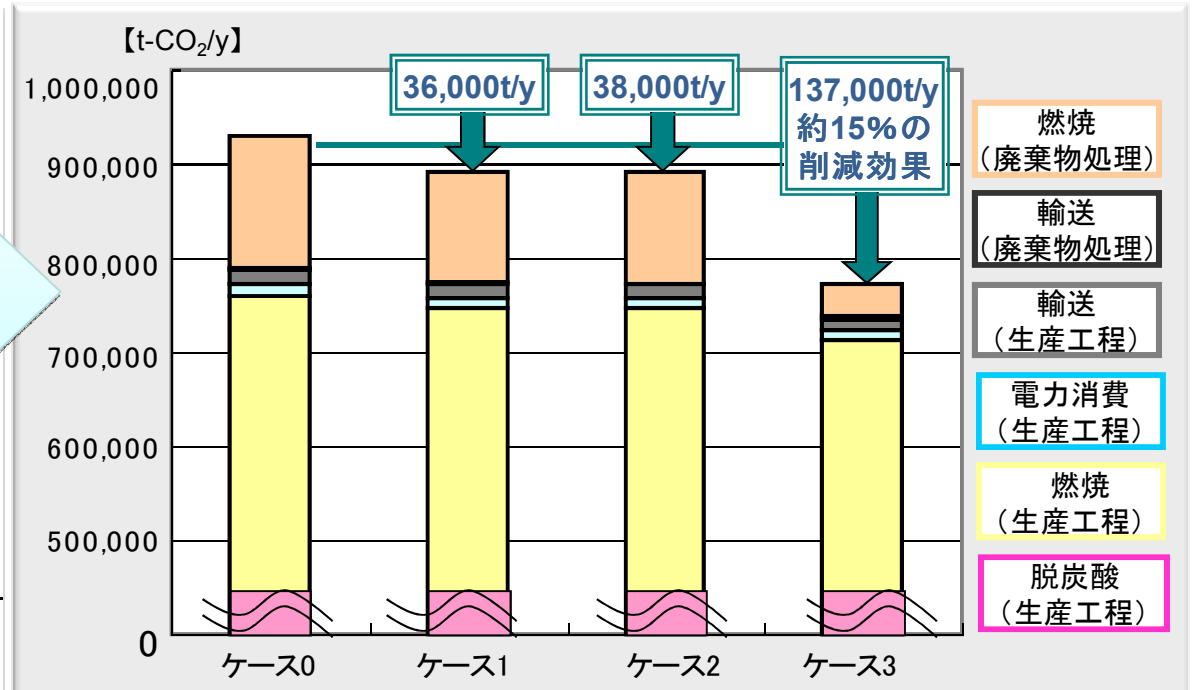
【Distribution of generation of waste】



【Distribution of waste processing facilities】



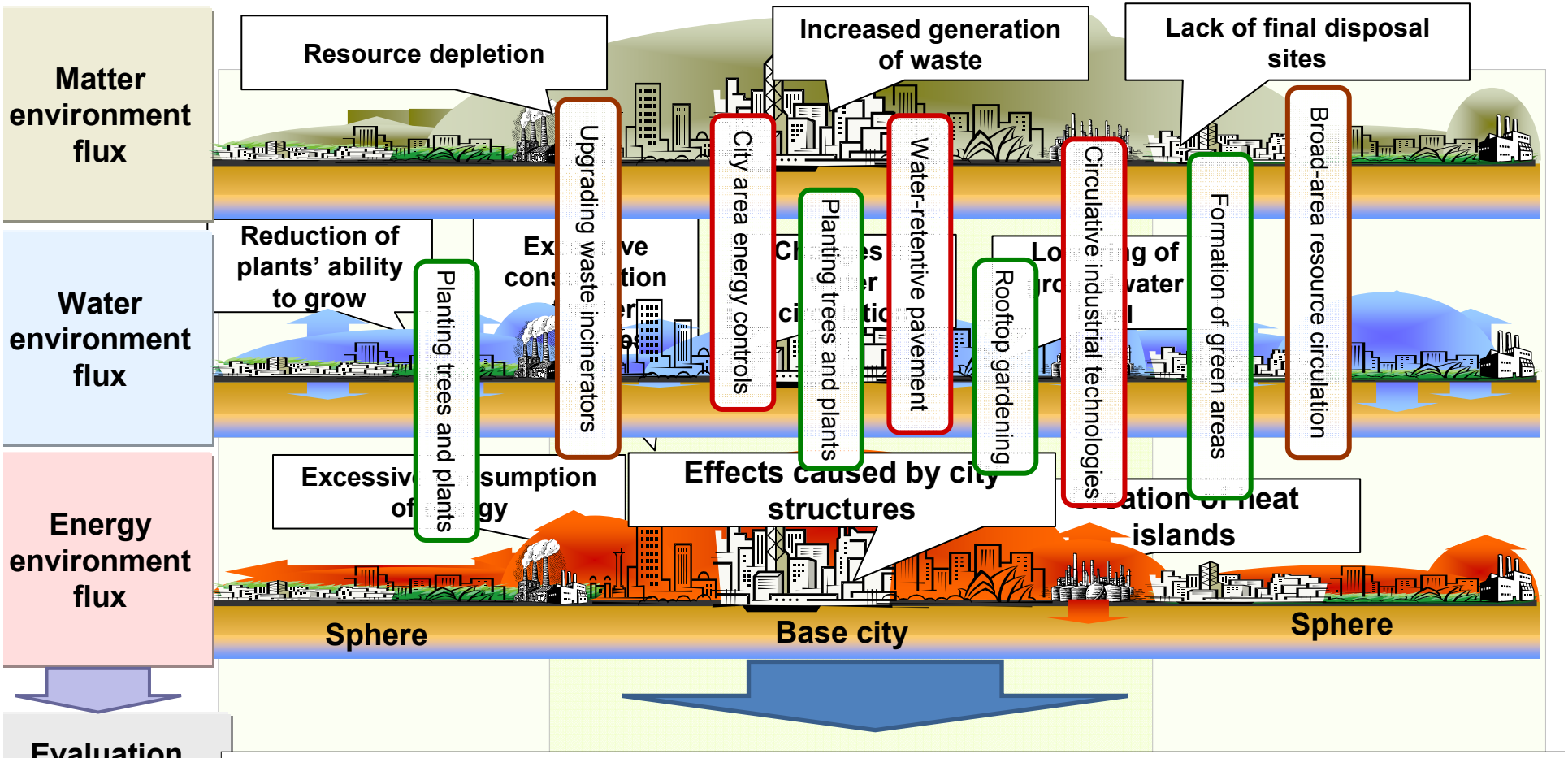
Example of calculation of potential for utilization of circular cement industry



		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

Technologies That Lower Carbon in a City's Water, Matter, and Energy, and the Effects of Such Technologies

Based on city environment GIS databases and environmental analysis models, calculating environment flux from generation of environmental load, and building a process for a technology evaluation system for low-carbon cities



Evaluation using environmental analysis models

- Space analysis system for water, heat energy, generation of waste environmental load, and movement
- Setting a target area and calculating low-carbon effects per year for introduction of technology
- System for providing information on technology evaluation systems to the government, citizens, and corporations

Research Expansion in Kawasaki City Since 2006, Cooperation Agreement January 2009

Research collaboration with and expansion to Asian cities for "city environment GIS database systems" and "technology evaluation models"

City environment GIS database

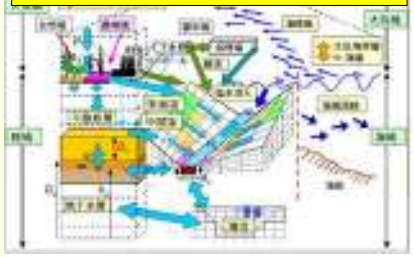
Observation of city heat environment

- Water environment
  - Rivers (water quality and amount)
  - Groundwater (water quality and amount)
  - Sewage (water quality and amount)
- Atmospheric environment
  - Temperature
  - Humidity
  - Wind direction and speed
- Green area environment
  - Dimensions of parks and green areas
  - Positioning of parks and green areas
  - Vegetation
- Buildings
  - How different floors of buildings
  - Use of buildings
  - Building structures
- City infrastructure
  - Use of land
  - Transportation network
  - Population
- City waste
  - Waste from ordinary household activities
  - Ordinary waste from business
  - City waste
- Industrial circulation
  - Circular technologies
  - Information on input resources
  - Information on input fuel

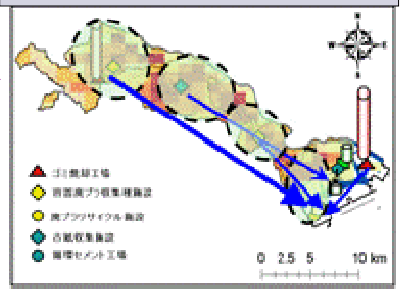
Integrated city environment space analysis model

Multi-scale analysis and interaction between different environments (co-benefits)

Model of water, air, and heat movement (environmental science)



Model of city transport and transportation (social engineering)



Inventory of technologies and policies

Policy factors that combine anti-pollution technologies, environmental improvement technologies and city industrial technologies

Anti-pollution technologies

- ○Anti-pollution technology system inventory
- ○Waste processing and disposal technologies
- ○Sewage treatment

City environment technologies

- ○City area energy controls
- ○Covering, improvement, and conservation of cities and green areas
- ○Technologies that utilize groundwater

Environment industrial technologies

- ○City industrial symbiosis technologies
- ○Resource-circulating-city industrial system technologies
- ○Eco-towns

Bio-mass circulation technologies

- ○Dispersed water processing technologies
- ○Vegetation cleansing technologies
- ○Bio-gas technologies

System for evaluating effects on the environment and society

Calculation of spatial attribution of environmental and economic effects, by combining technology and policies

City environment effects

- ▪Increase of artificial heat and exhaust gas
- ▪Reduction of amount of groundwater cultivated
- ▪Decline in amount of vegetation
- ▪Increase in amount of waste generated

Broad-area environmental effects

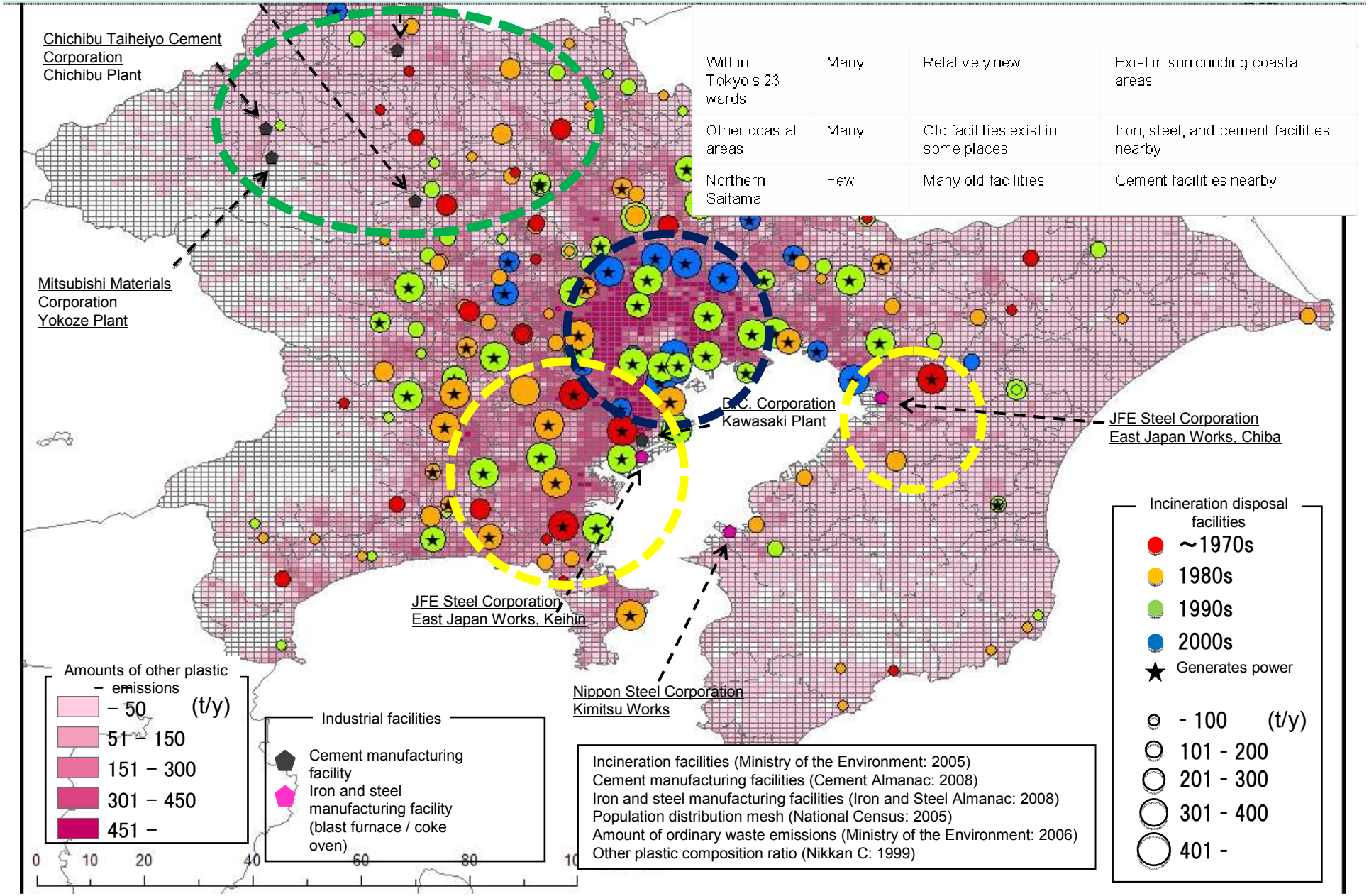
- ▪Heat-island phenomenon
- ▪Trans-boundary air pollution
- ▪Groundwater level change
- ▪Land cover change
- ▪Lack of disposal sites

Global environment effects

- ▪Increase in CO_2 emissions
- ▪Elevation of average temperature
- ▪Increase in energy consumption
- ▪Resource depletion

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)

Creating packages of low-carbon measures and policies that suit the characteristics of the region

Low-carbon environment model districts that utilize the characteristics of the region

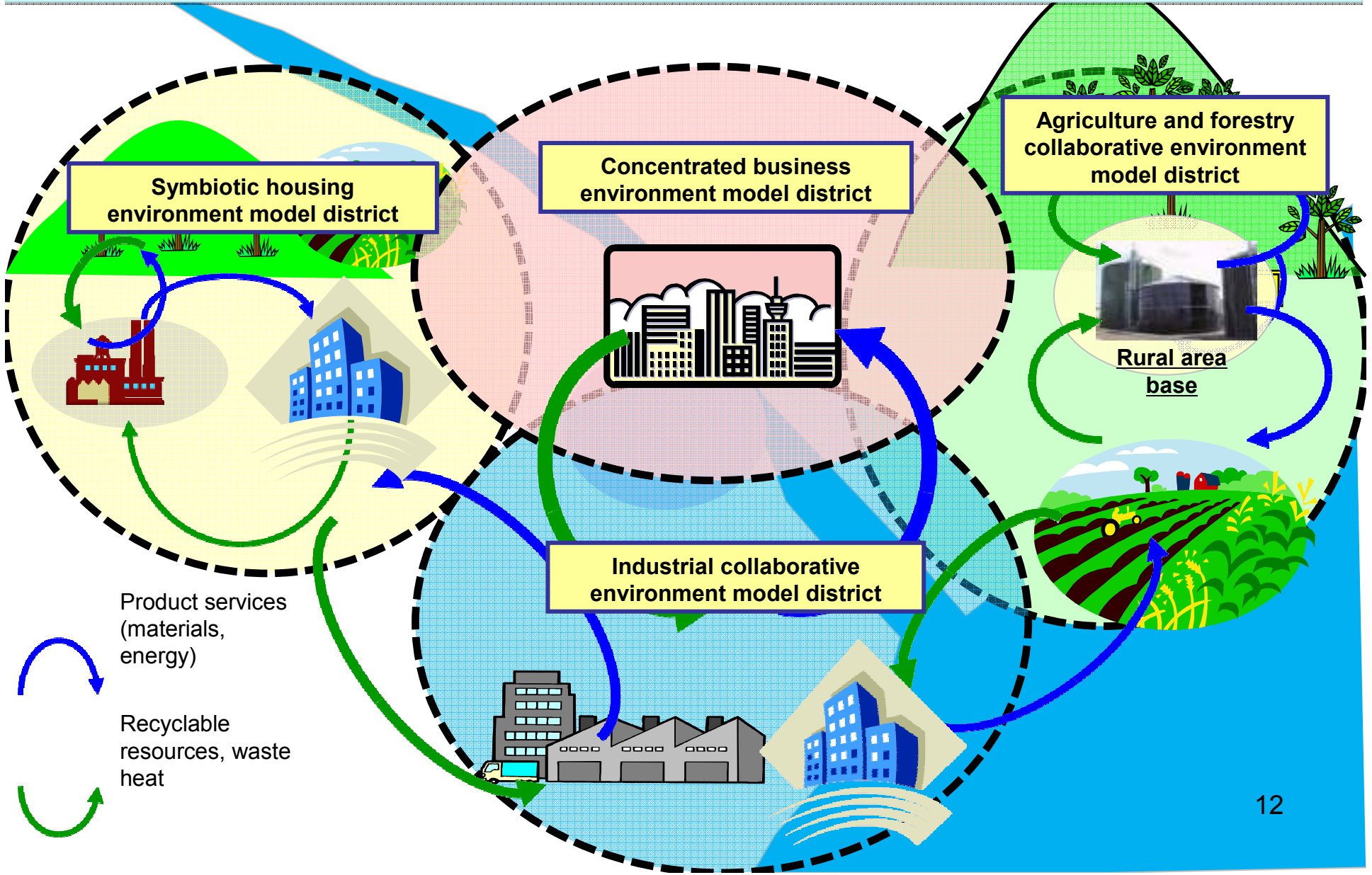


Image of Functions of an Industry Collaborative Low-Carbon Model District (Resource Circulation)

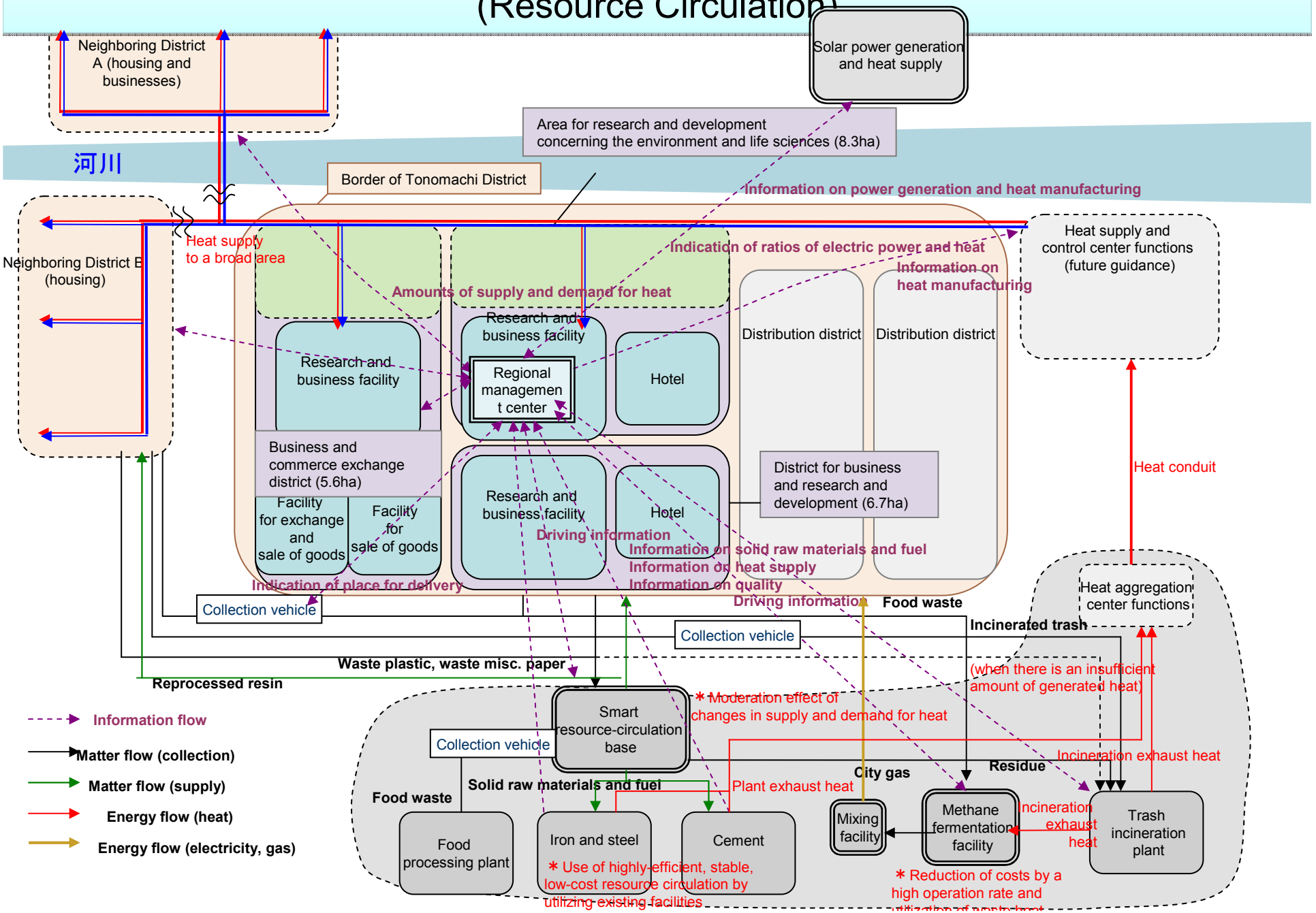
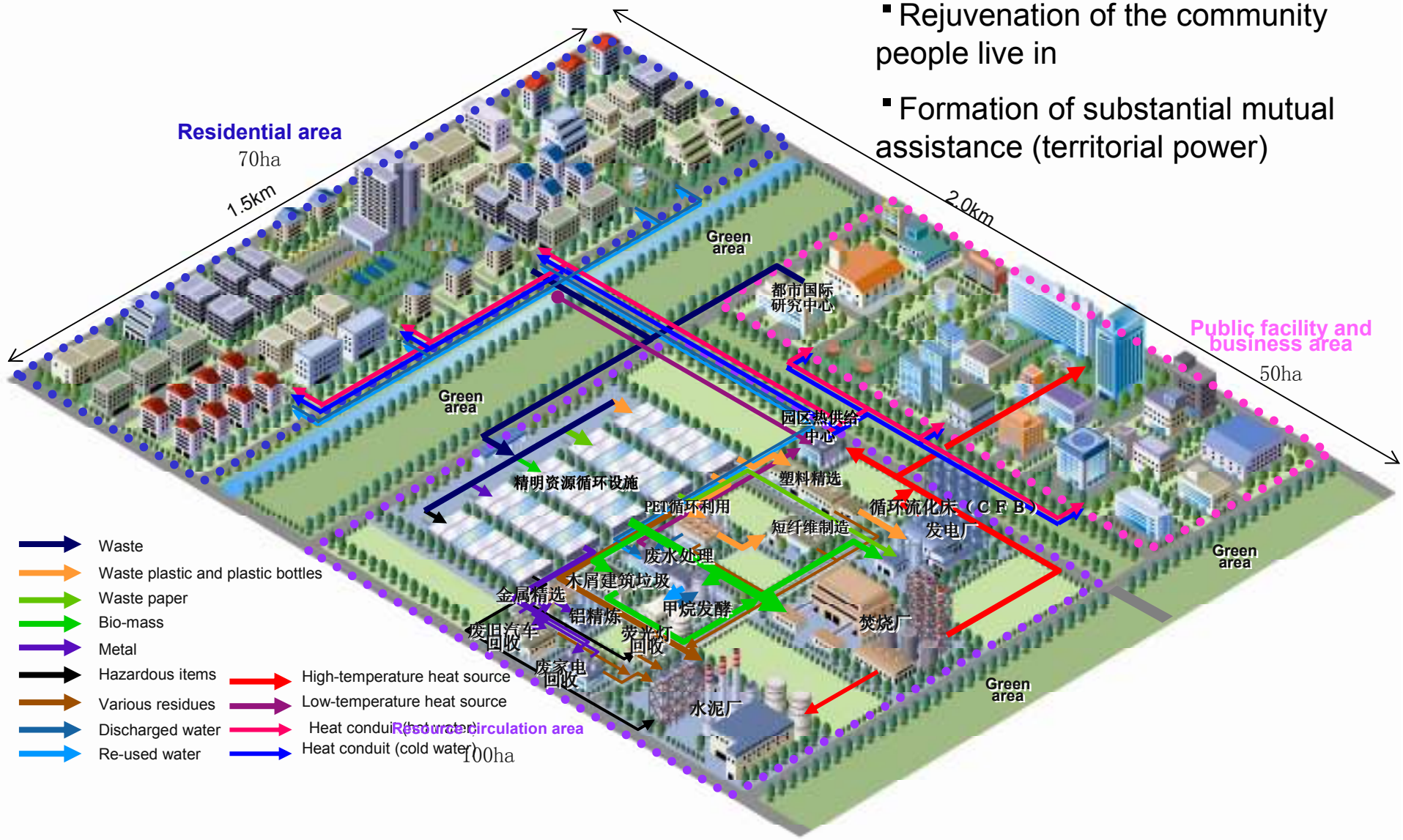


Image of the Circular City Planned in China's Shenyang City

(Population: 7 million)

- Circulation of resources and energy
- Rejuvenation of the community people live in
- Formation of substantial mutual assistance (territorial power)



Aiming for Environmental Innovation Sent Out From Kawasaki

○ Expansion of Japan's package of "environmental innovation" technologies and measures into other places in Asia by forming low-carbon cities

- Formation of concentrated social demonstration models of environmental innovation, by forming low-carbon model districts

○ Shared knowledge about low-carbon and complementary effects, through environmental city collaboration among Japan, other Asian countries, Europe, and North America

— Space formation that improves the effects of city and environmental technologies (smart zoning), and regional management systems

- Lenient environmental project finance system that includes parties that benefit from indirect or internal low-carbon effects and environmental effects

— ***Low-carbon that includes district management (independence)***

Governance system

Main Dissertations, Etc. Related to Today's Presentation

- Tsuyoshi Fujita, Chen Xudong, Takahiro Ukai, Rie Arai；Review Aimed at Formation of Regional Circular Areas, and System Proposals; Compilation of Lectures from the 38th Presentation of Dissertations on Environmental System Research, pp.145-148, 1023.2010
- Tsuyoshi Fujita, Minoru Fujii, Yujiro Hirano, Chen Xudong, Satoshi Onishi；Evaluation of Environmental Technology Policies Aimed at Achieving Co-Benefit Cities – Calculation Example for Kawasaki City; Compilation of Outlines of Research Presented at the 2010 Meeting of the Society of Environmental Science, pp.12, 0916.2010
- Ying Sun, Masashi Watabe, Tsuyoshi Fujita；Research on Factors for Promoting Environmentally-Conscious Operations by Small- and Mid-Size Companies – Example of Kawasaki City; Compilation of Outlines of Research Presented at the 2010 Meeting of the Society of Environmental Science, pp.61, 0917.2010
- Rene Van Berkel, Tsuyoshi Fujita, Shizuka Hashimoto, Minoru Fujii；Quantitative Assessment of Urban and Industrial Symbiosis in Kawasaki, Japan, Environmental Science & Technology , Vol.43, No.5, 2009 ,pp.1271-1281,0129.2009
- Rene van Berkel, Tsuyoshi Fujita, Shizuka Hashimoto, Yong Geng；Industrial and Urban Symbiosis in Japan : Analysis of the Eco-Town Program 1997-2006；Journal of Environmental Management, vol.90,pp.1544-1556,2009
- Shizuka Hashimoto, Tsuyoshi Fujita, Yong Geng, Emiri Nagasawa； Achieving CO2 Emission Reduction through Industrial Symbiosis: A Case of Kawasaki , Journal of Environmental Management, 2008 (submitted)
- Yong Geng, Rene Van Berkel , Tsuyoshi Fujita ；Regional Initiatives on Promoting Cleaner Production in China: A Case of Liaoning, Journal of Cleaner Production, 2008 (submitted)
- Zhu Qinghua, Yong Geng, Tsuyoshi Fujita , Shizuka Hashimoto ；Green supply chain management in leading manufacturers: Case studies in Japanese large companies, International Journal of Sustainable Development and World Ecology, 2008 (submitted)
- Yong Geng, Pang Zhang, Raymond P. Cote, Tsuyoshi Fujita；Assessment of the National Eco-industrial Park Standards for Promoting Industrial Symbiosis in China, J. of Industrial Ecology, Vol.13, No.1, pp.15-26, 2008
- Looi-Fang Wong, Tsuyoshi Fujita, Kaiquin Xu； Evaluation of regional bio-energy recovery by local methane fermentation thermal recycling systems, Journal of Waste Management,vol.28, pp.2259-2270, 2008

Thank you for your attention.