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Eco-town, Circular Economy and Green City Innovation

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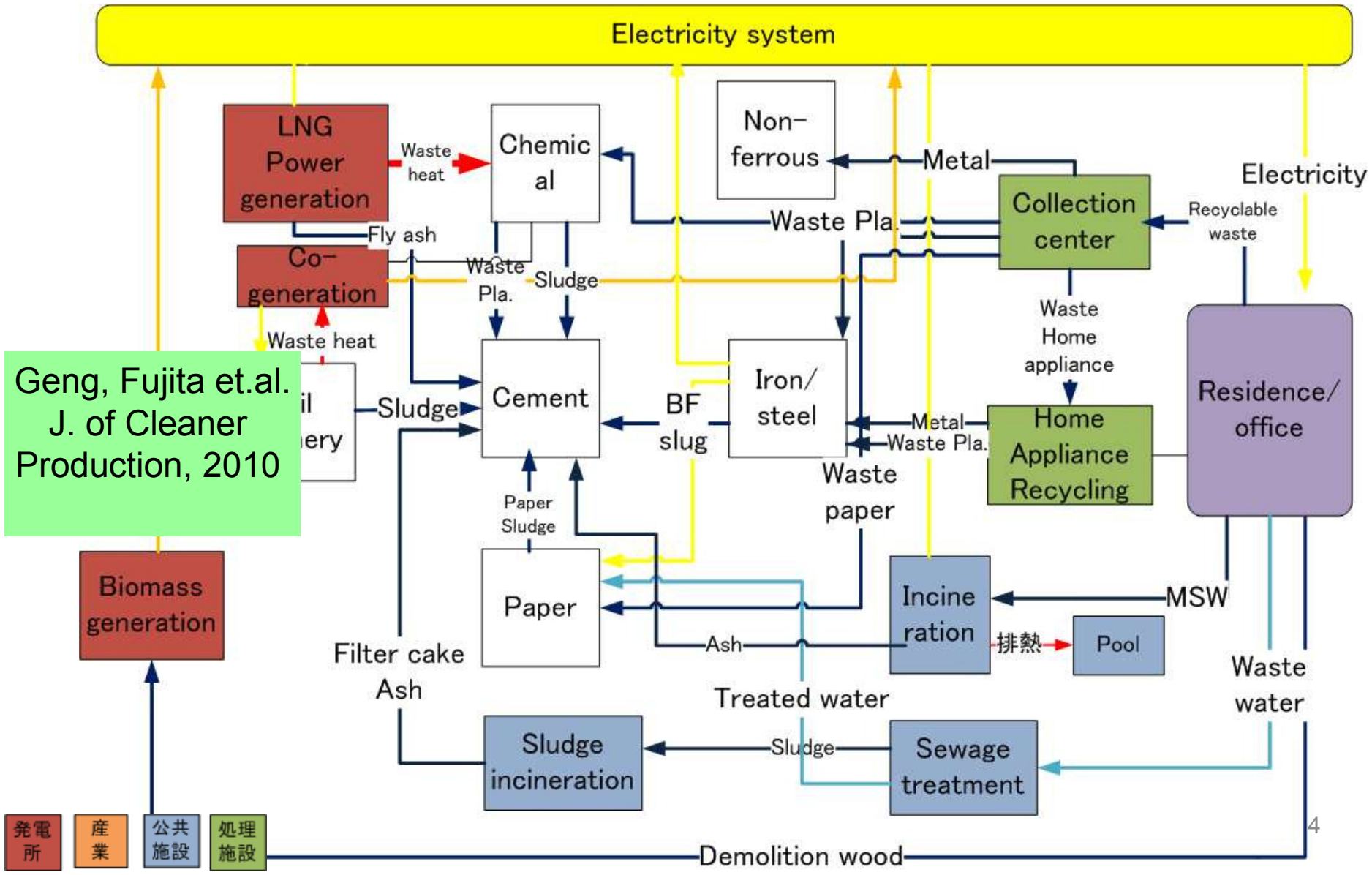
Three Keys for Sustainable Eco-Industrial Conversion from Experiences in Japan

- Regulation and technology development for pollution control
- Transformation toward Eco-industrial park for Material and Energy network
- Green supply chain management

Industrial Symbiosis and Urban Industries to empower cities by circularization

Kawasaki Synergy Network（current situation）

Bio/life science | Power generation & material industry | Treatment or recycling facility | City

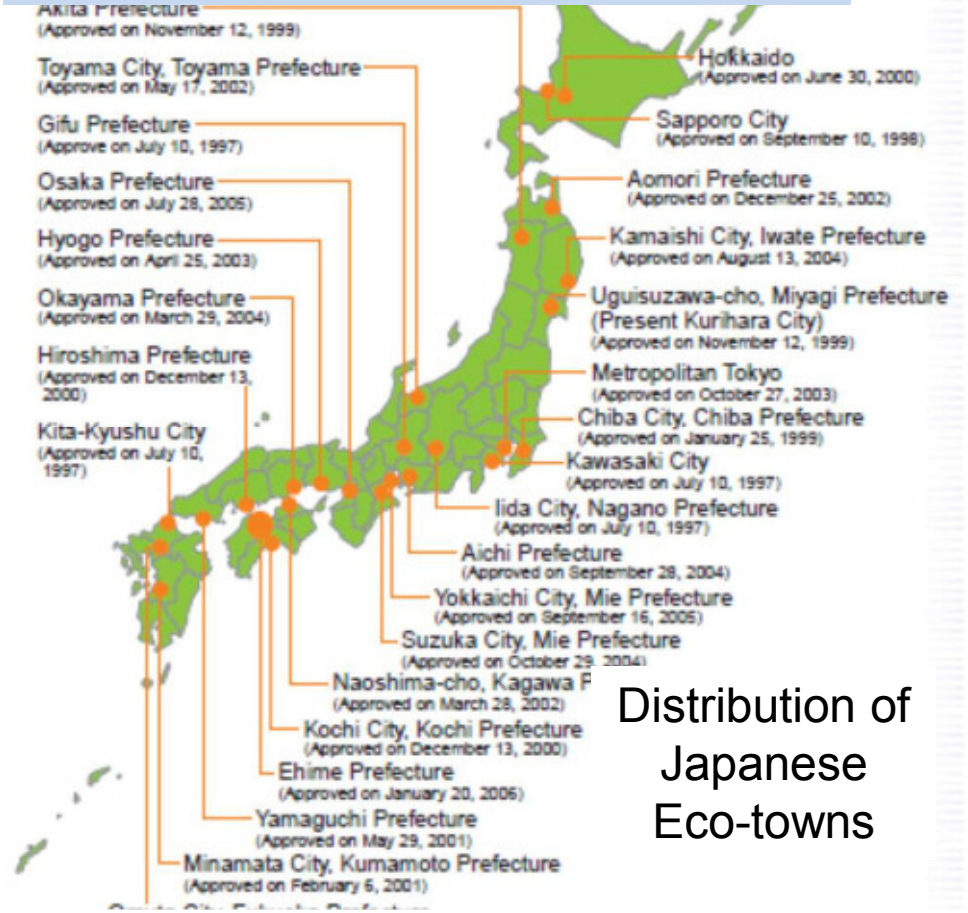


Geng, Fujita et.al. J. of Cleaner Production, 2010

Eco-town area as demonstration project for Sound material cycle society

METI & MOE approved Eco-Town Plans for 26 areas as of the end of January 2006, and they provided financial support to 62 facilities located within the appropriate areas.

Forming the basis of capacity that totally 2.18 mil t of wastes were treated



Distribution of Japanese Eco-towns

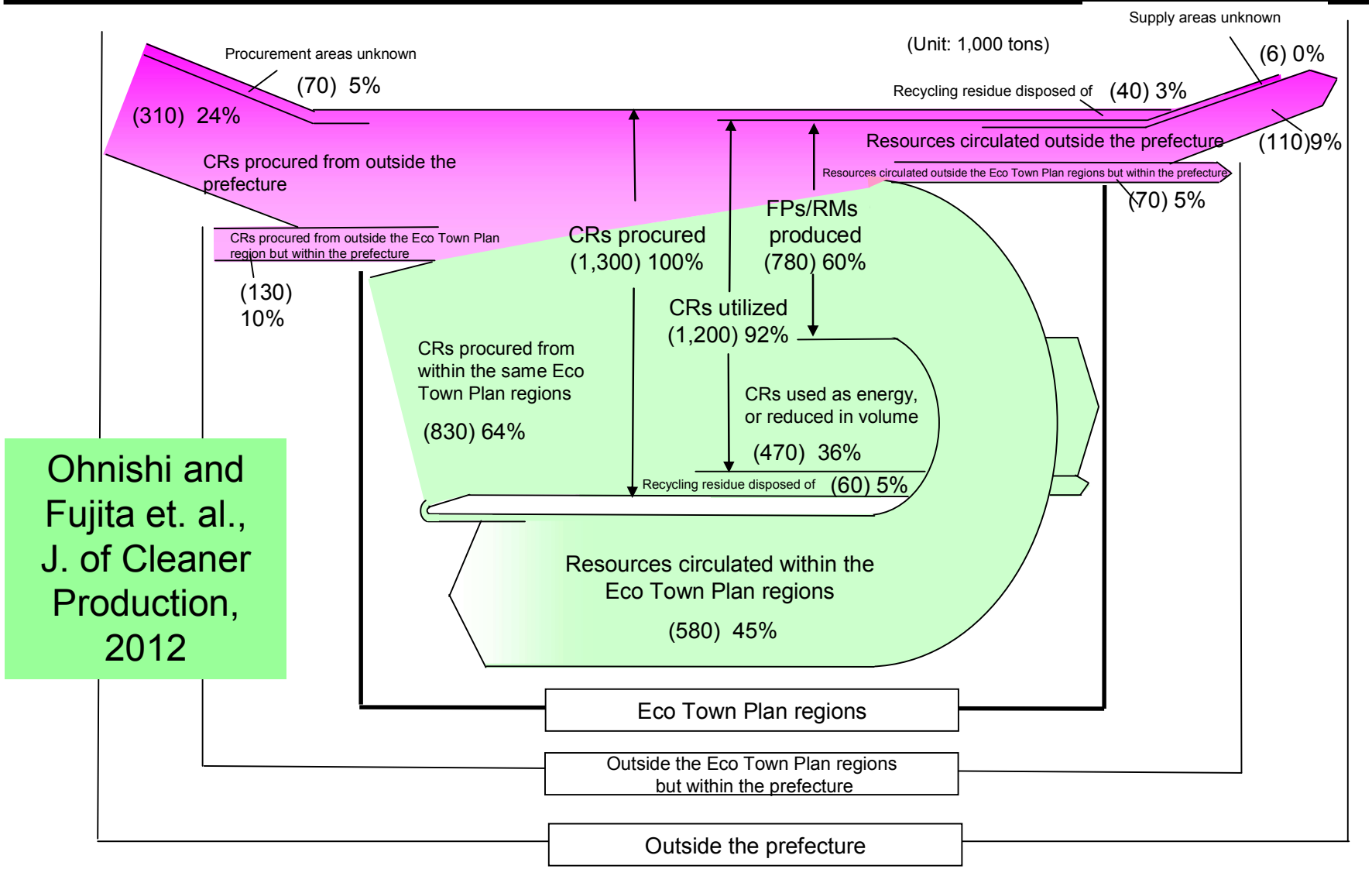
Edited by Prof. Fujita, T., Published by METI,,2006

Distribution of Total Investment Subsidy projects in 24 Eco-Towns 600mil. US$	Distribution of Total Investment 60 projects in 24 Eco-Towns 1.6 bil. US$

Berkel and Fujita et. al., Environment, Science and Technology, 2010

Evaluation of 90 Circular Facilities in 26 Eco-towns

Reduction of Virgin Materials; 900,000.ton /yr
CO2 Emission Reduction 480,000 t-CO2/yr
Circular use ration of by-product 92% Intra-eco-town circulation ratio 61%



Ohnishi and Fujita et. al., J. of Cleaner Production, 2012

Environmental technology inventory and tentative application for cities

Inventory of circular technologies

Urban energy management technologies

- Water retentively pavement
- Permeable pavement
- Town district energy control technology
- Underground water pumping ceramic
- Rainwater storage technology

Industrial symbiosis production technologies

- Cement field fuel making
- Waste plastic blast furnace reduction
- Waste plastic ammonia raw material making
- Waste plastic Concri type frame raw material making
- Used paper manufacture raw material making
- Gasification melting furnace

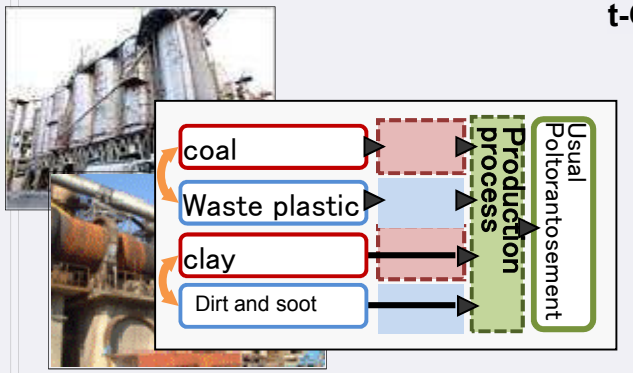
Biomass circulation tech.

- Methane fermentation technology
- Bioethanol processing technology

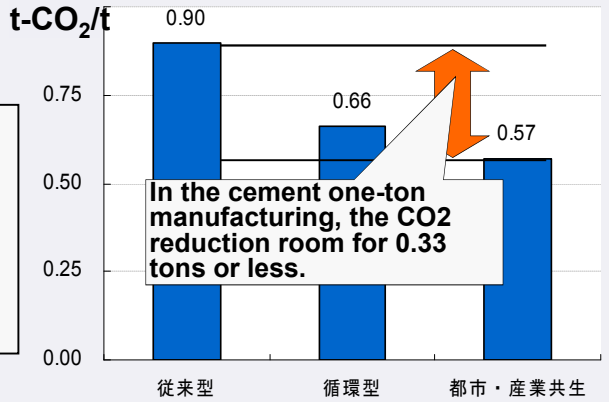
Circular water treatment tech.

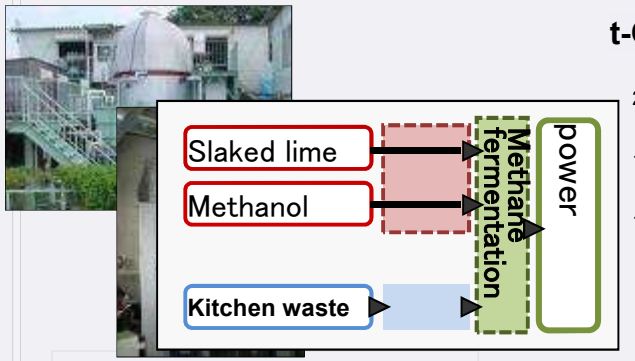
- Septic tank technology
- Sewage disposal technology
- Plant purification

Numerical Formulation of circular technologies and preparatory estimation

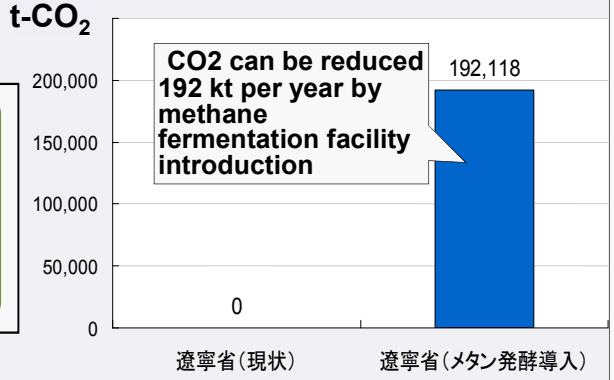


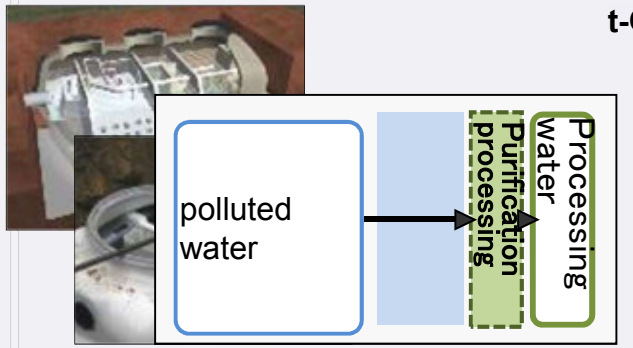
Cement production technology



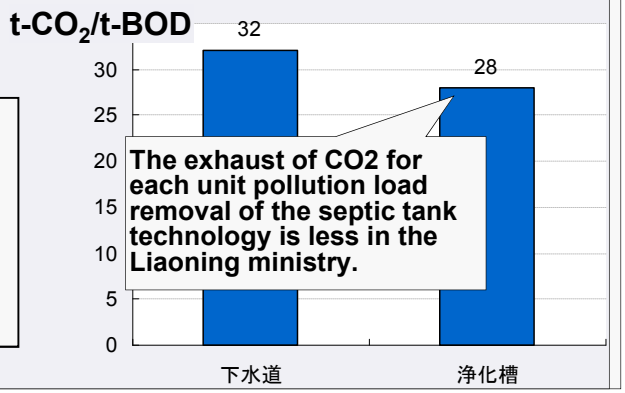


Gasification melting furnace





合併浄化槽技術



Variation of Eco-Industrial Parks(EIP) Strategies in Eco-towns

URBAN REDEVELOPMENT TYPE EIP

Kitakyushu

Recycle goods retail & sale*

Ecological consulting company*

Sustainable technology research company*

Environmental Information Business Support CCR

EIP Center; Demonstration building*

Environmental data bank

Collaborative marketing purchase

·Waste collection and recycling

-Eco-material, Recycled Material

-Design for environment

Ecological equipment manufacturing

Clean Energy Supply System

Energy Storage System*

Chen and Fujita et. al., Euro. J. of Operation Research, 2013

INDUSTRIAL SYMBIOSIS TYPE EIP

Cement factory

Chemical factory

Fertilizer

Heat

Fly ash

Heat

Power plant*

Heat

Oil

Petro chemical factory

Industrial symbiosis type

Kawasaki, Minamata

Green Institute (Minneapolis)

Rural Area

Cape Charles Sustainable Technology Park (Virginia)

CITY-FARM COLLABORATION TYPE EIP

Farm

Hokkaido

Compost

Fuel Cell

Methane Fermentation

Environmental education*

Environmental communication*

Residential Districts

Urban Area

Brownfield Neighborhood

Industrial complex

Akita, Osaka

Organic waste Methane fermentation Composting

Plastic recycle center*

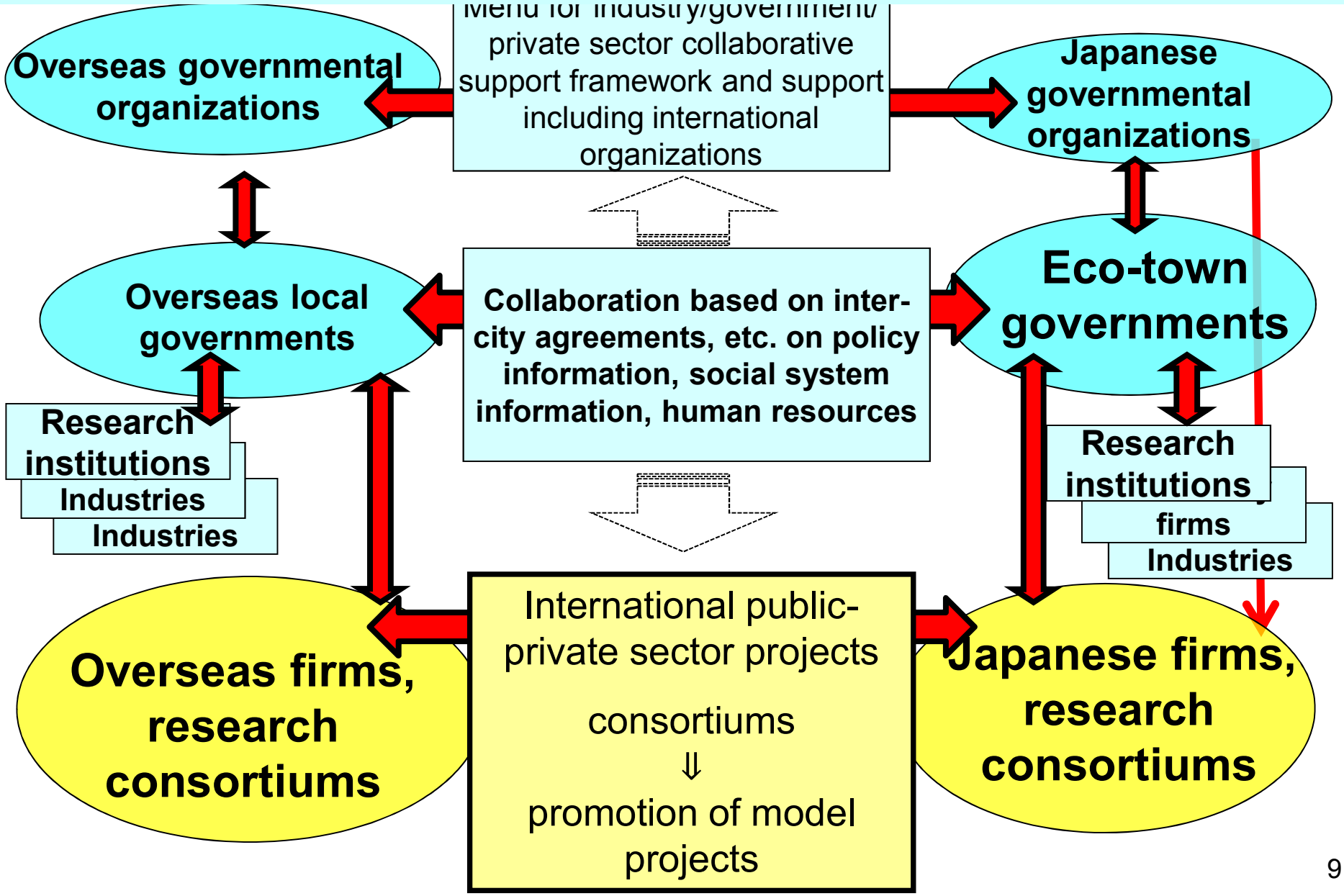
Collaboration reverse logistics District heat supply

Building material recycle center*

PRODUCT REMANUFACTURING TYPE EIP

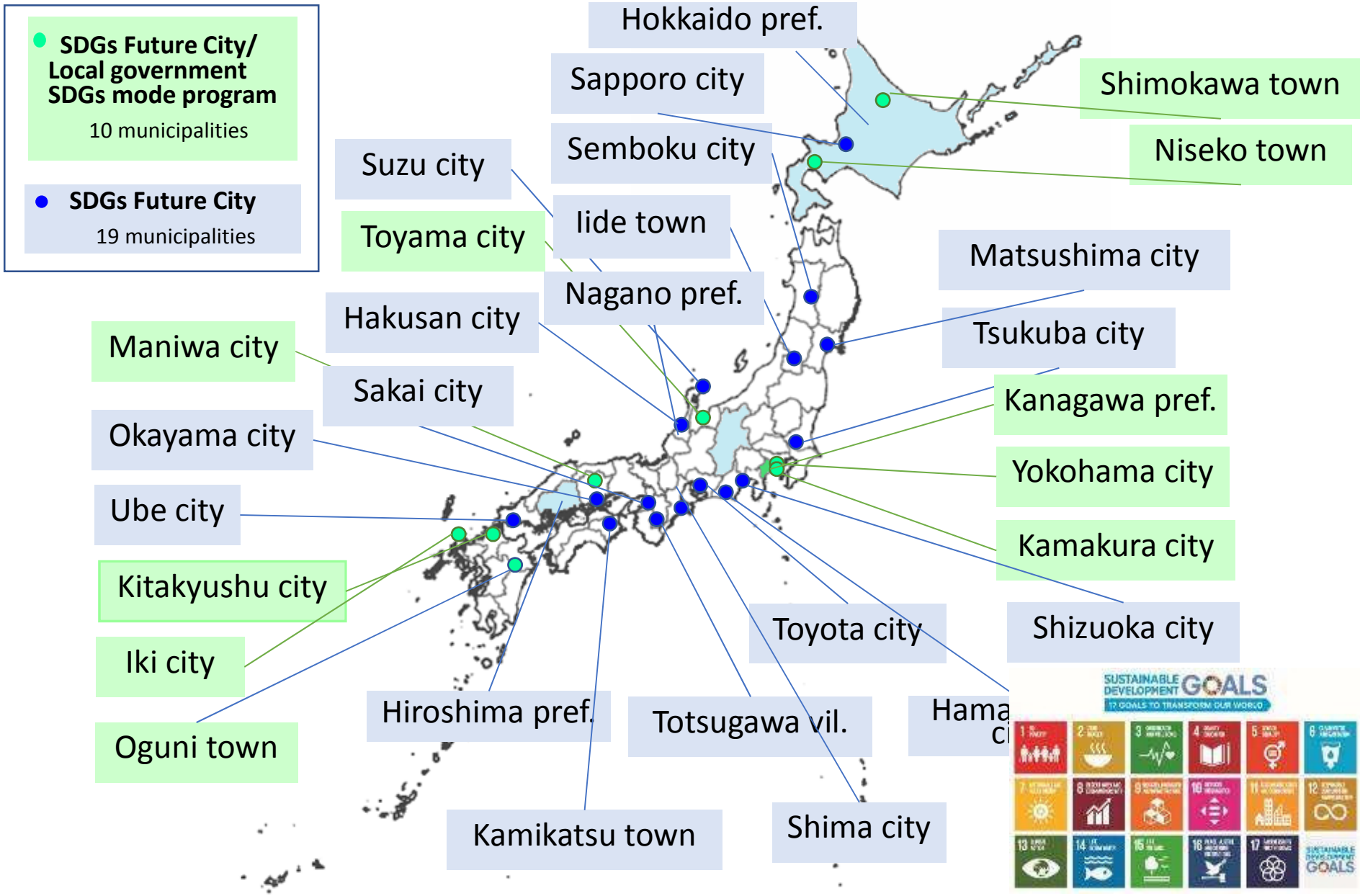
Water Front

Promoting Projects between Japan and Overseas through “Eco town ” Collaboration



SDGs Future City Initiatives

Announced on June 15, 2018

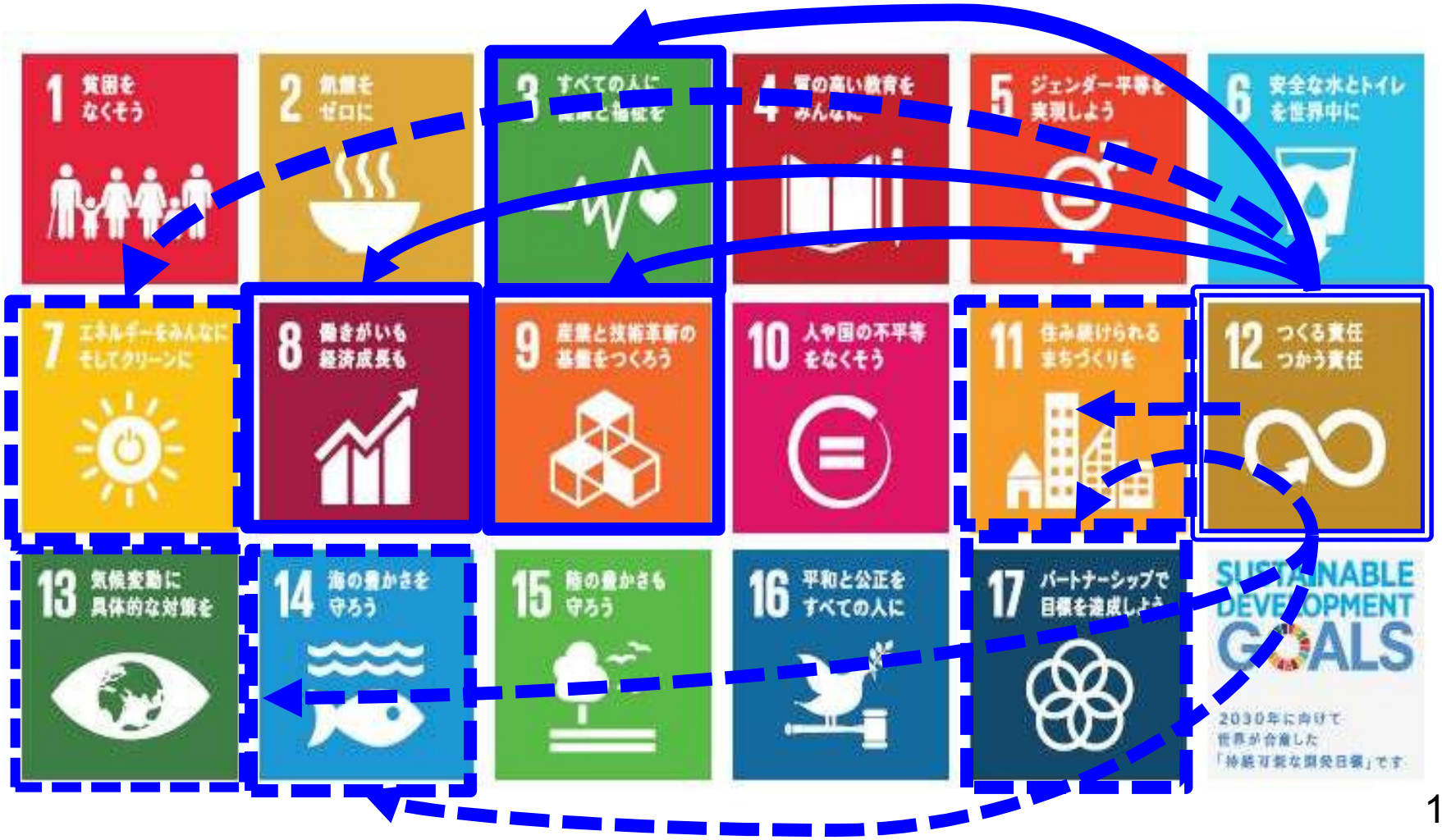


This map is made based on the blank map of Geospatial Information Authority of Japan〔http://www.gsi.go.jp/〕

SDGs Cities from Circular Economy

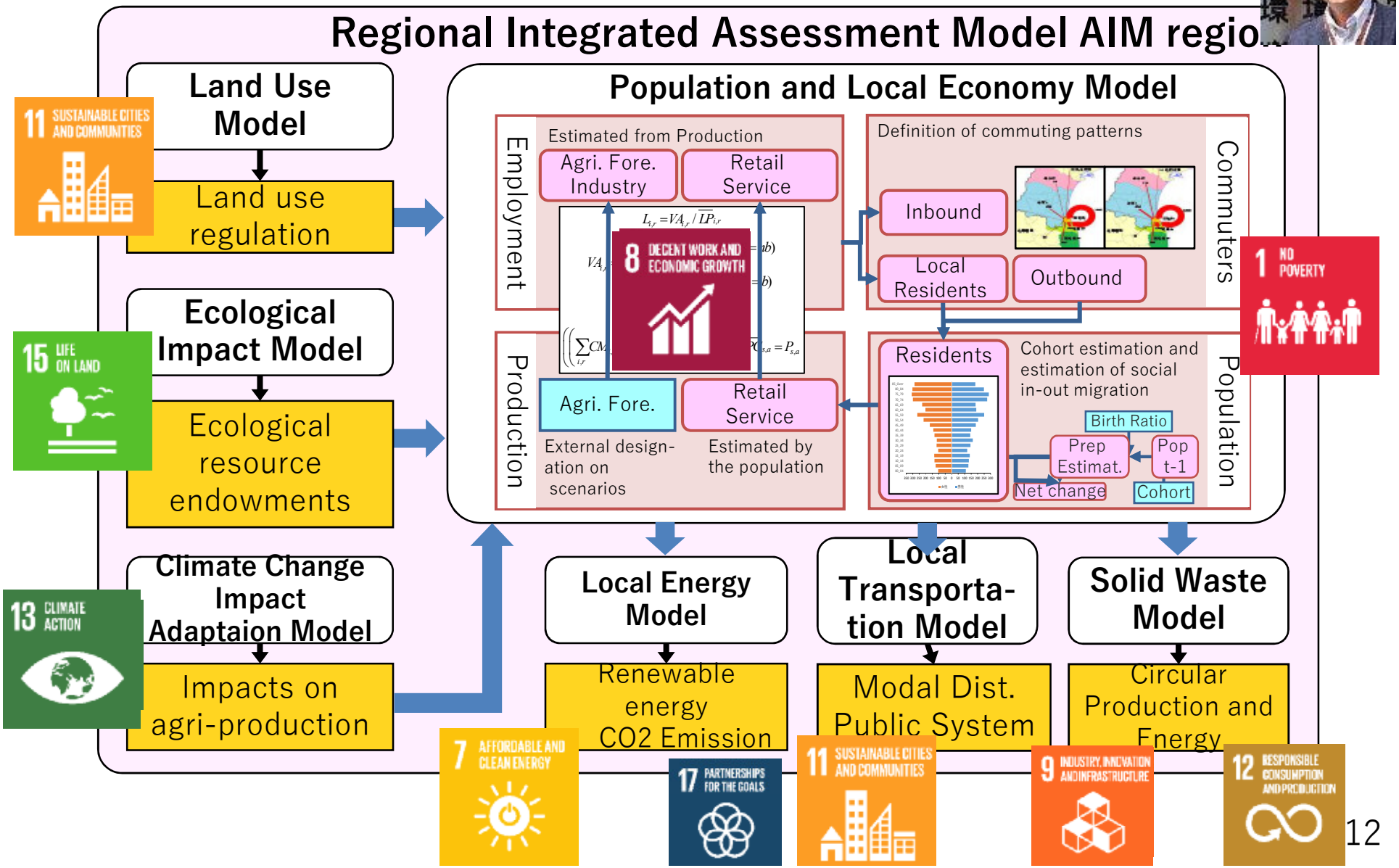
・Circular region through local circularization and energy management

・Information and infrastructure system for resource circularization, local energy management and eco-system utilization



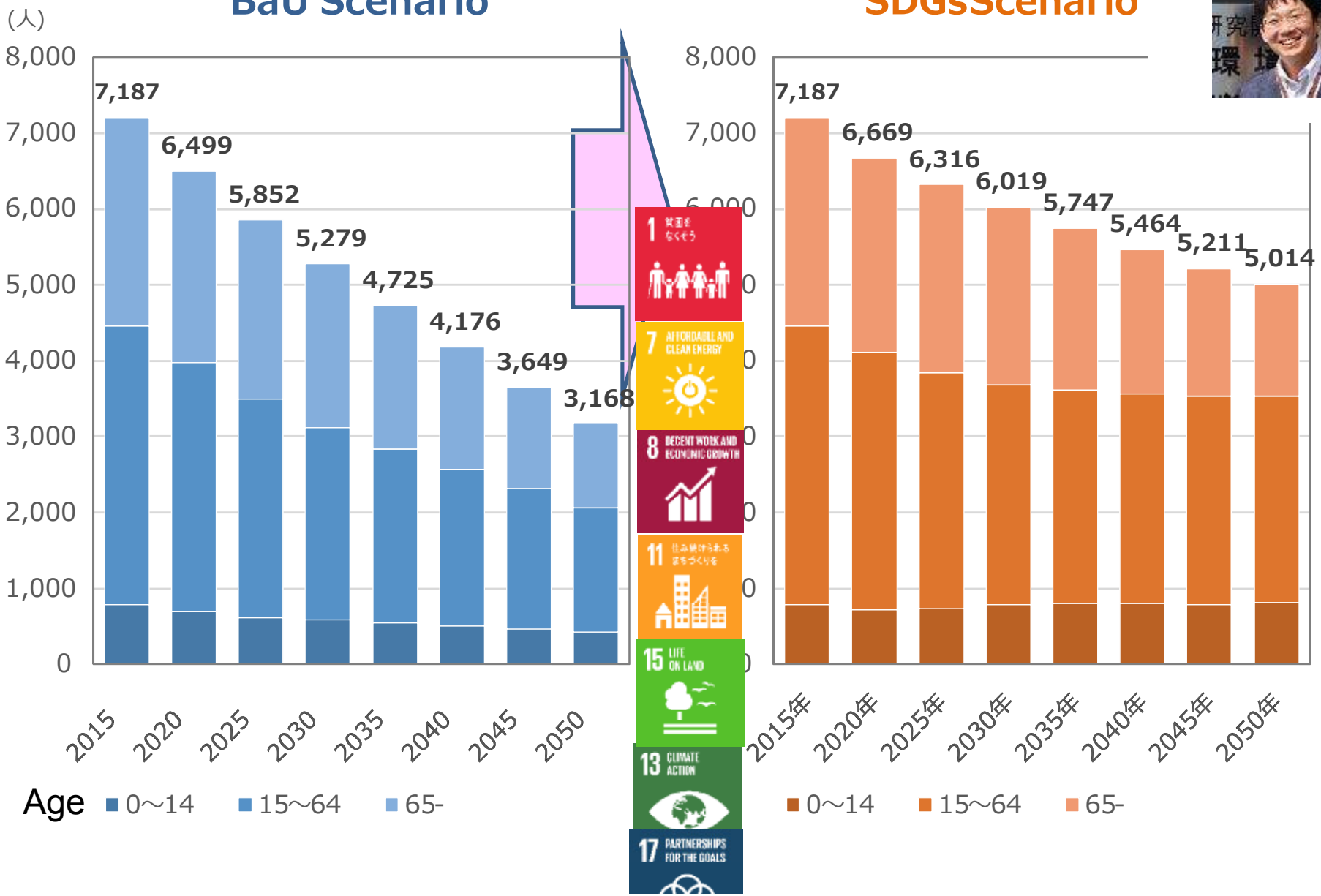
AIM Regional Model to Quantify the SDGs Accomplishments

Dr. Gomi NIES



Socio Economic Impacts of SDGs Policies in a township, Oguni

Dr. Gomi NIES



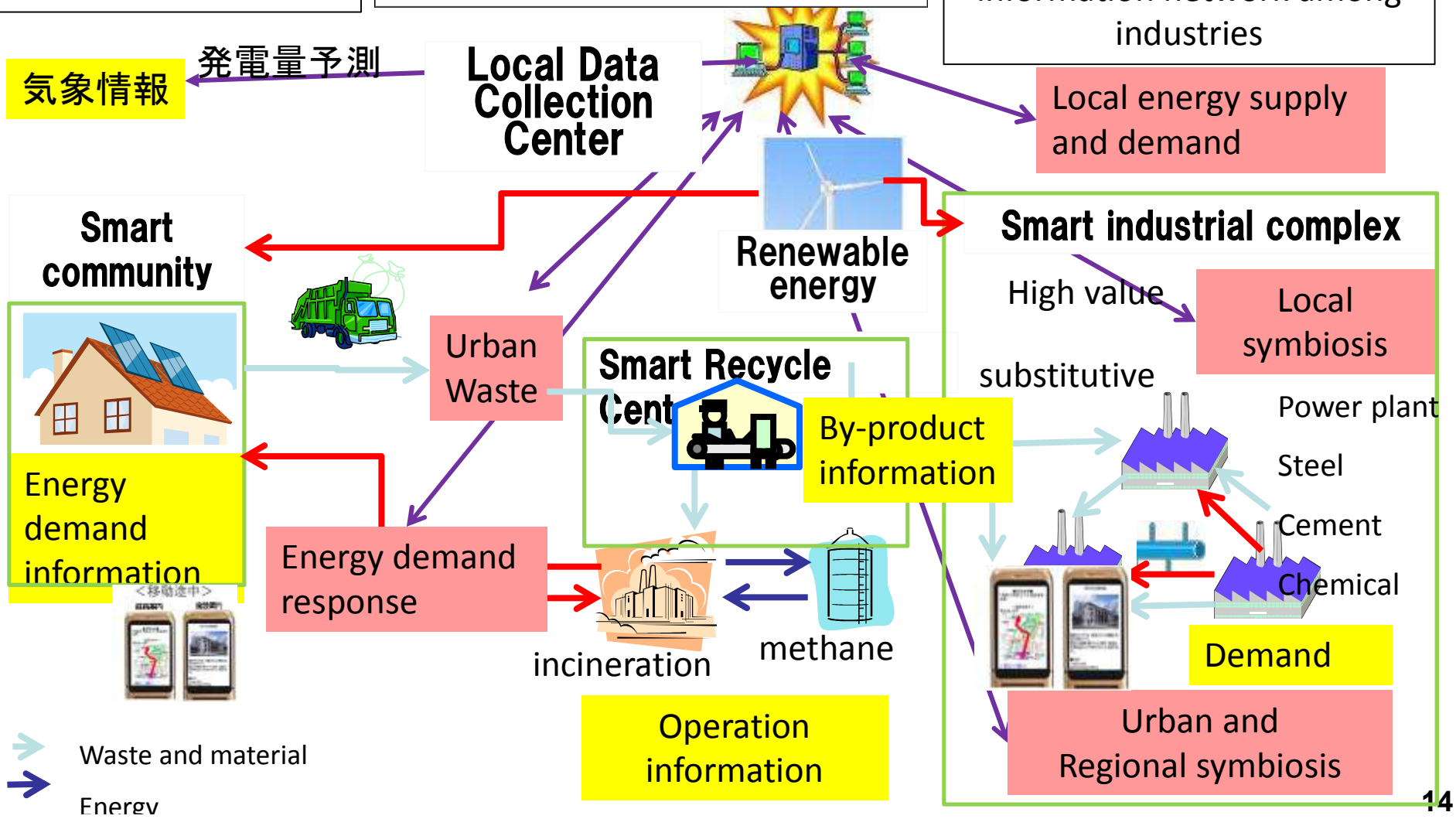
Smart Symbiosis Initiatives for Eco town Innovation

Smart ICT network will promote and complement the synergetic network functions among stakeholders

Energy and consumption demand control system for urban sectors

Information support for optimizing local and regional material and energy circularization

Smart industrial complex supported by synergetic information network among industries



Locally suitable scenario development

- Many local LCS scenarios have been developed with limited statistics and “default” parameters from national or international information. Such scenarios may not reflect local conditions properly.
- We combines modeling with monitoring of local activity so that we can propose more suitable mitigation scenario and Action plans for a city/region.
- Wider questionnaire survey is also adopted in order to supplement the monitoring.

Energy Monitoring

- Current and future energy consumption pattern
- Energy saving potential

+ Questionnaire survey

Transport Monitoring

- Transport structure
- Vehicle speed
- Fuel efficiency etc.

Statistics

Current environmental initiative

The model to project future scenarios: ExSS/AFOLUA

Industry ↔ Population → Agriculture

Transport

Waste

Land use and Forestry

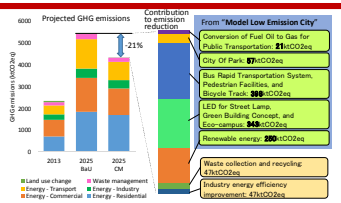
Energy technologies

Energy Demand

Energy Supply

GHG emissions

Locally suitable mitigation scenarios



Mitigation potential

Policy actions

Roadmap and investment

Selected list of recent publications in the related topics

- Seiya Maki, Shuichi Ashina, Minoru Fujii, Tsuyoshi Fujita, et.al (2018); Energy consumption monitoring system and integrative time series analysis models - case study in the green city demonstration project in Bogor City, Indonesia , Frontiers of Energy
- Remi Chandran, Tsuyoshi Fujita, et.al.(2018); Expert networks as science-policy interlocutors in the Implementation of a Monitoring Reporting and Verification (MRV) system, Frontiers of Energy, in press
- Yi Dou, Takuya Togawa, Liang Dong, Minoru Fujii, Satoshi Ohnishi, Hiroki Tanikawa, Tsuyoshi Fujita (2018) Innovative planning and evaluation system for district heating using waste heat considering spatial configuration: A case in Fukushima, Japan. Resources, Conservation and Recycling, 128, 406-416
- Yujiro Hirano, Kei Gomi, Shogo Nakamura, Yukiko Yoshida, Daisuke Narumi, Tsuyoshi Fujita (2017) Analysis of the impact of regional temperature pattern on the energy consumption in the commercial sector in Japan. Energy and Buildings, 149, 160–170
- Yujiro Hirano, Tsuyoshi Fujita (2016) Simulating the CO2 reduction caused by decreasing the air conditioning load in an urban area. Energy and Buildings, 114, 87-95
- Yong Geng, Tsuyoshi Fujita, et.al. (2016) Recent progress on innovative eco-industrial development. Journal of Cleaner Production, 114, 1-10
- Hiroto Shiraki, Shuichi Ashina, Yasuko Kameyama, Seiji Hashimoto, Tsuyoshi Fujita (2016) Analysis of optimal locations for power stations and their impact on industrial symbiosis planning under transition toward low-carbon power sector in Japan. Journal of Cleaner Production, 114, 81-94
- Satoshi Ohnishi, Minoru Fujii, Tsuyoshi Fujita, et.al. (2016) Comparative analysis of recycling industry development in Japan following the Eco-Town program for eco-industrial development. Journal of Cleaner Production, 114, 95-102
- Takuya Togawa, Tsuyoshi Fujita, et.al. (2016) Integrating GIS databases and ICT applications for the design of energy circulation systems. Journal of Cleaner Production, 114, 224-232
- Minoru Fujii, Tsuyoshi Fujita, et.al. (2016) Possibility of developing low-carbon industries through urban symbiosis in Asian cities. Journal of Cleaner Production, 114, 376-386

Thank you for your Attention