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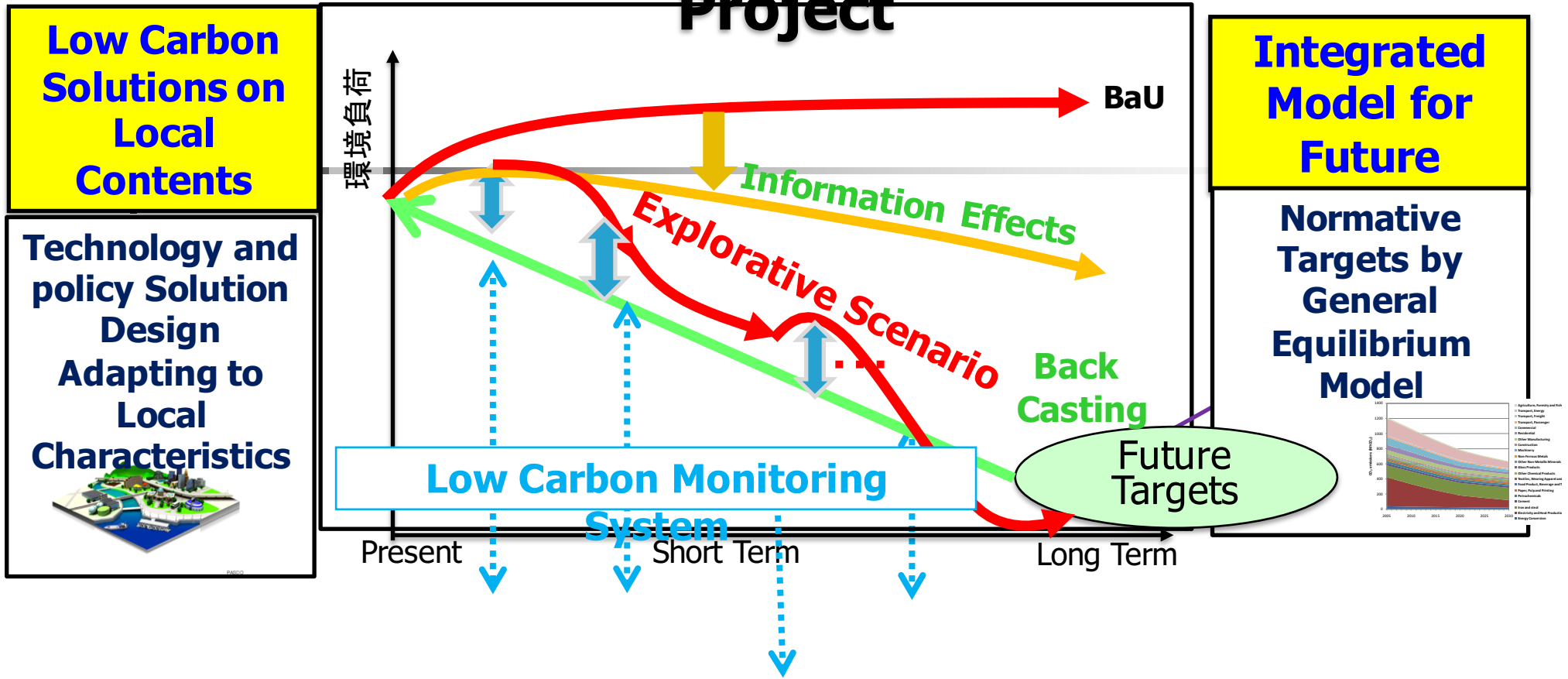


# Research Plan of NIES to Low-Carbon Society

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Akimasa Sumi  
President,  
National Institute of Environmental Studies

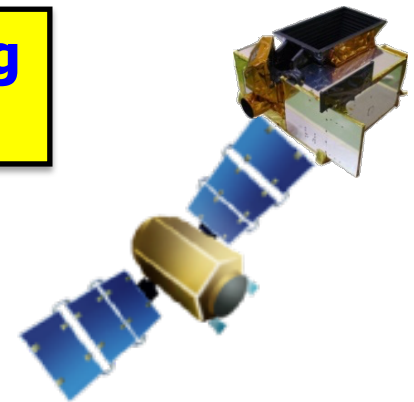
# Innovative Modelling and Monitoring Research Project

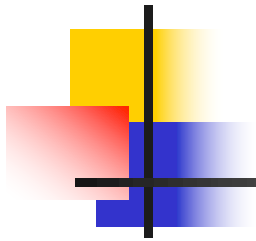


**Low Carbon Solutions on Local Contents**

Technology and policy Solution Design Adapting to Local Characteristics

**Dual Direction Low Carbon Monitoring Information System**

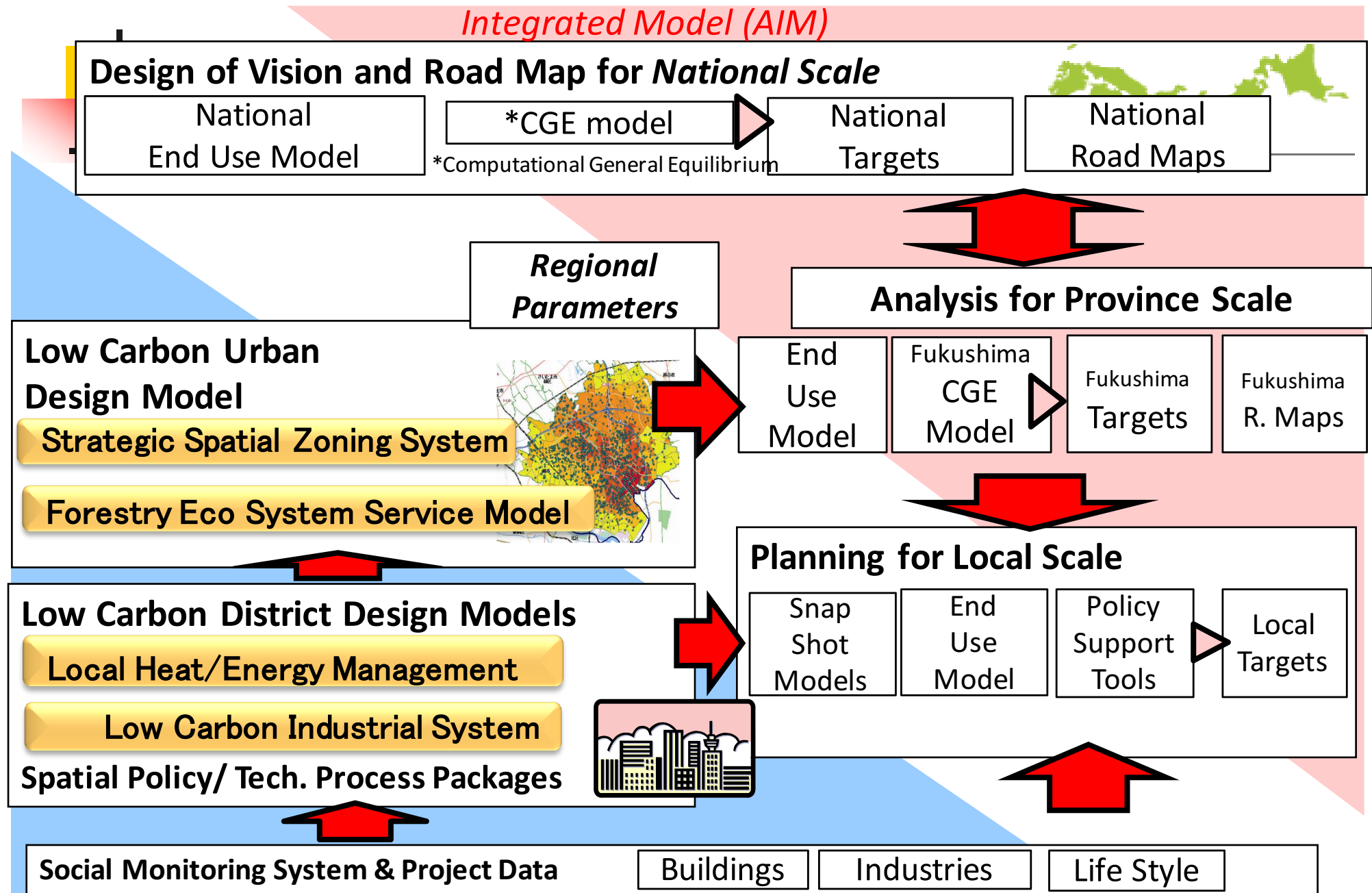




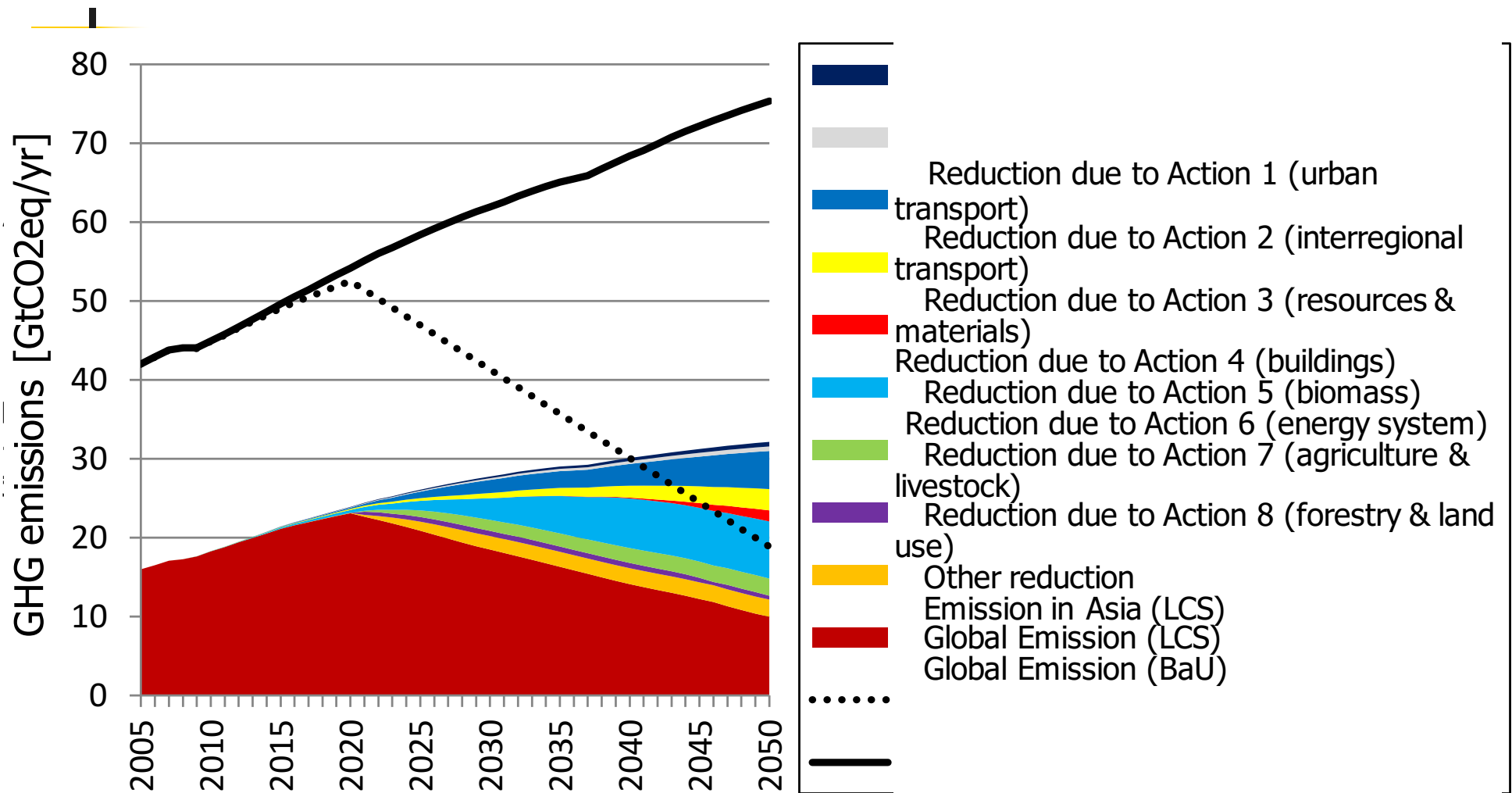
# **Integrated Model for Future**

**NORMATIVE TARGETS BY GENERAL  
EQUILIBRIUM MODEL**

# Development of Regional Integrated Models (Regional AIM) and Spatial Planning Model to design sustainable regions and cities



# Carbon Asia



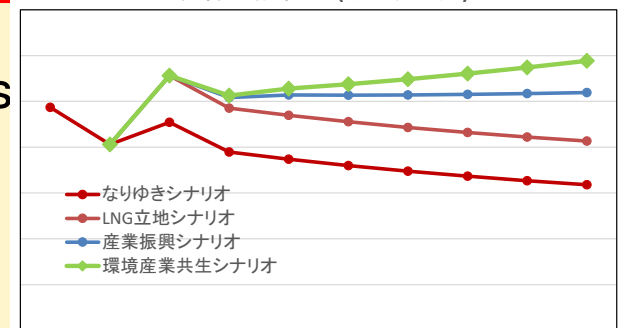
By Dr. S. Fujimori (NIES)

# Multi Stage Approach for Eco-City Planning

## ① Macro-scope

Alternative  
future vision

- population, industries
- core developments
- energy locality



## ② Spatial- scope

Land use zoning  
/network design

- land use distribution patterns
- local energy network
- location of core developments

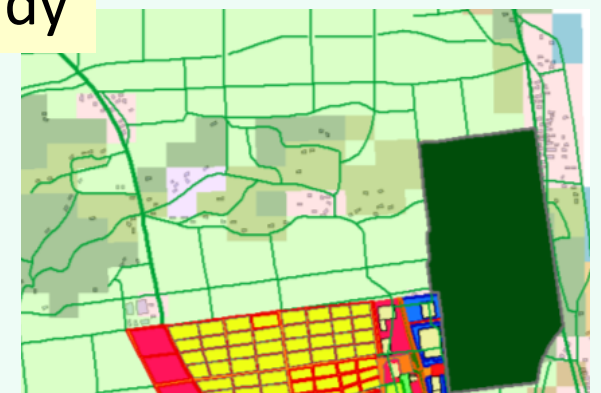


Future frame

## ③ Project Design

Core projects for  
revitalization

- zoning and regulation
- district planning
- key industries



Feasibility Study

### MODELING FRAMEWORK

- Population & GDP (Ex.SS)
- Crop yield (baseline)
- Livestock, Settlement
- **Industrial wood demand and biomass energy from Ex.SS.**
- Trade (*export & import*)

- Emission Factors from IPCC and NC2

- Counter Measures, Cost and Technical Available areas for CM based on LU 2020 and maximum level of CM implementation for agriculture (20%-25%)
- Emission Constraints (26% ER in the TY)

External condition

Endogenous variables

LU Transition Matrix **2000-2006 (BAU)**

AFOLU-Activity model

BaU: LUTM 2006-2020

AFOLU-Bottom up model

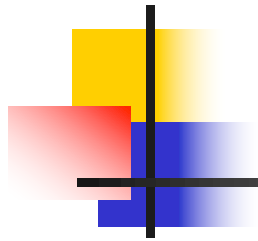
Emission under the **BAU** and List of CMs that can reduce emission by 26% from BAU at minimum cost (AFOLU)

CM: LUTM 2006-2020

**AFOLU A** estimates the demand for land (food including bio-fuel, livestock, and settlement) in target year (2020) and construct the LU TM of the TY in which the LU pattern is made as close as possible with the LU Pattern of the BAU using '*Kullback Leibler*'

**AFOLU B** estimates

- Emission under the baseline scenarios or BAU (LUTM 2006-2020) following IPCC GL 2006 Methodology
- Appropriate CMs that result in 26% ER from the BAU with minimum cost

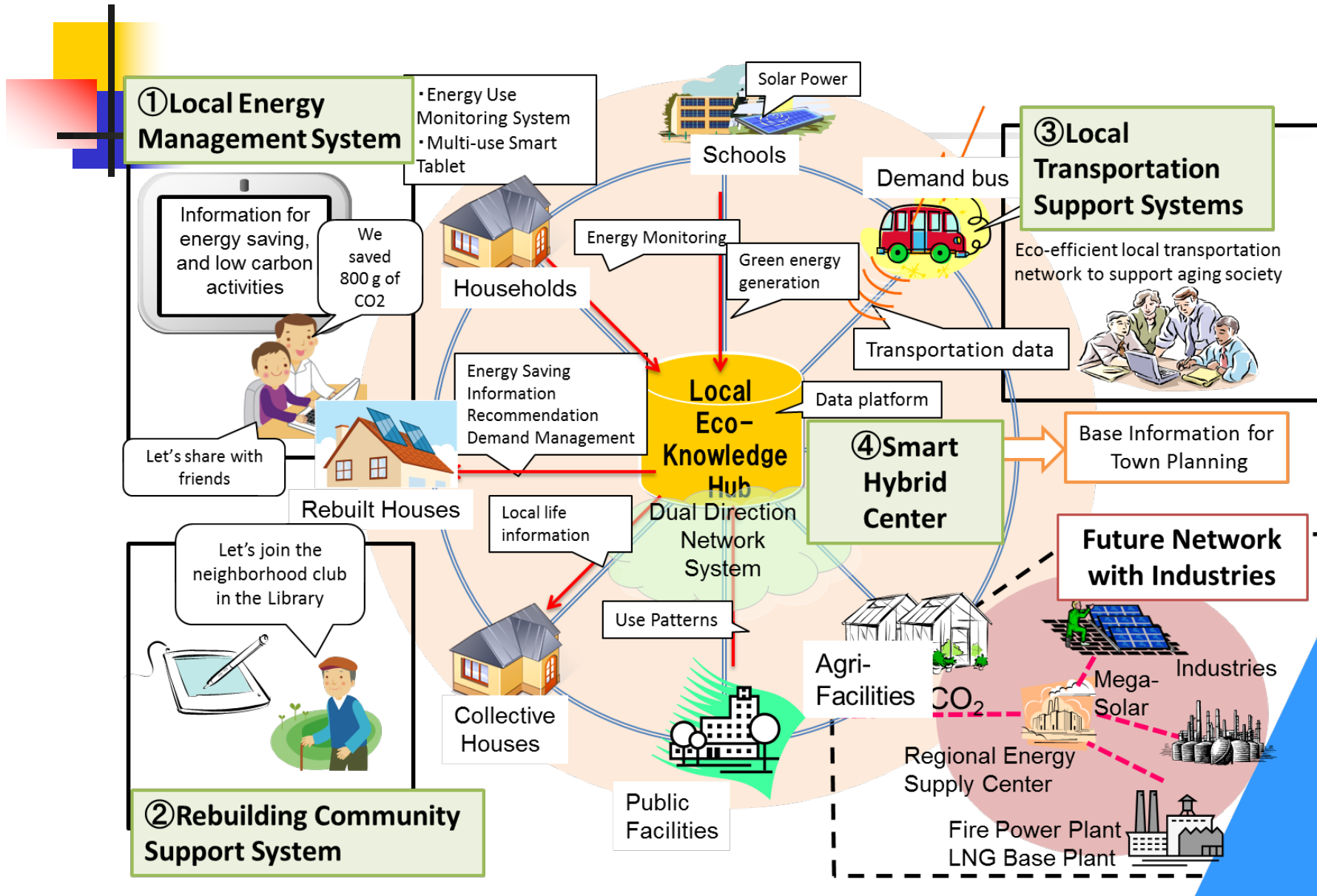


# **Low Carbon Solutions on Local Contents**

**TECHNOLOGY AND POLICY SOLUTION  
DESIGN ADAPTING TO LOCAL  
CHARACTERISTICS**

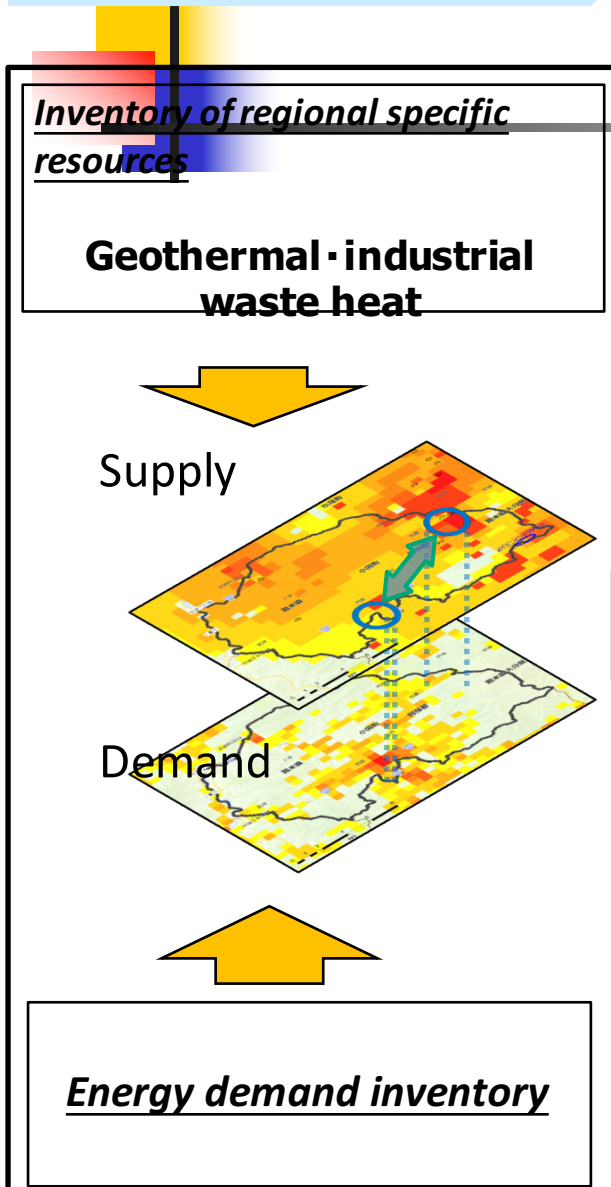


# Energy Management System

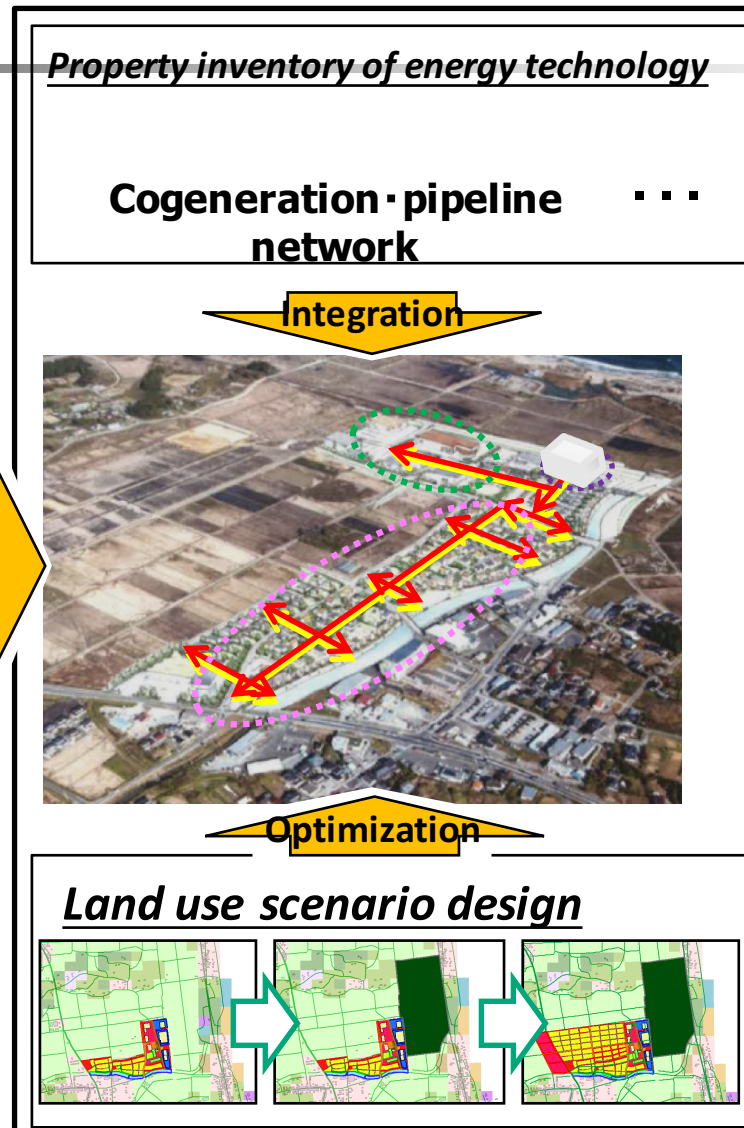


# Planning support model for regional energy project

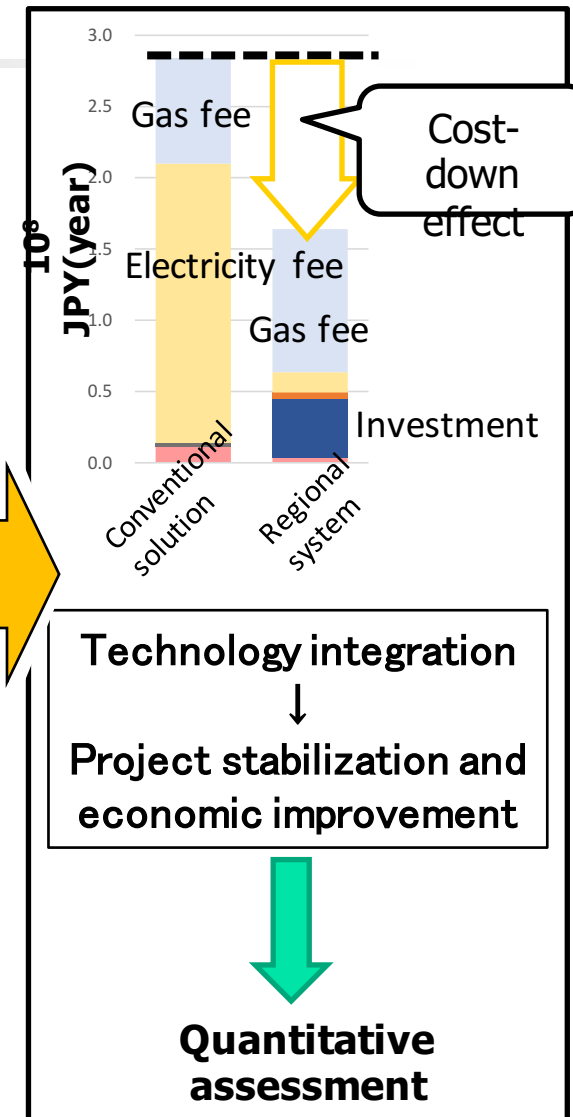
## Analysis of regional conditions



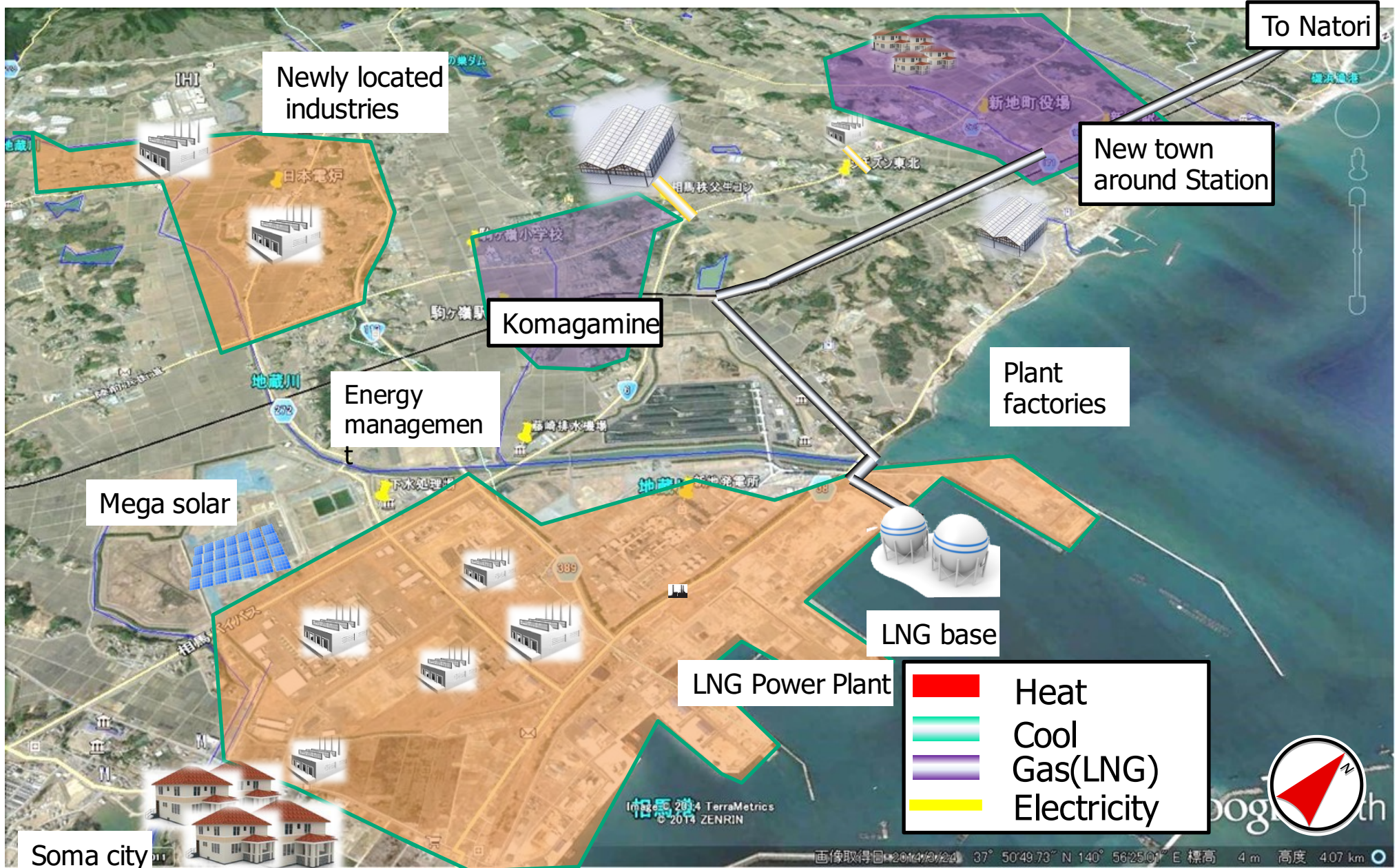
## Process of technology system



## Quantification of project effects



# BaU scenario in Shinchi town in 2030





# Estimation of Alternative Future Recovery Scenarios

Altern

BAU



+Compact  
City

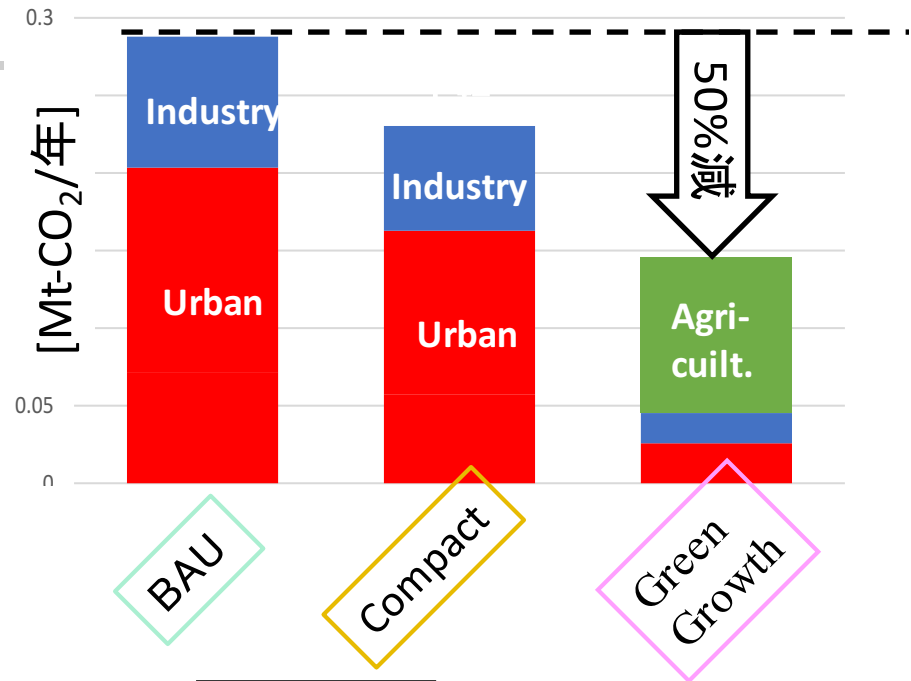


+Green  
Growth



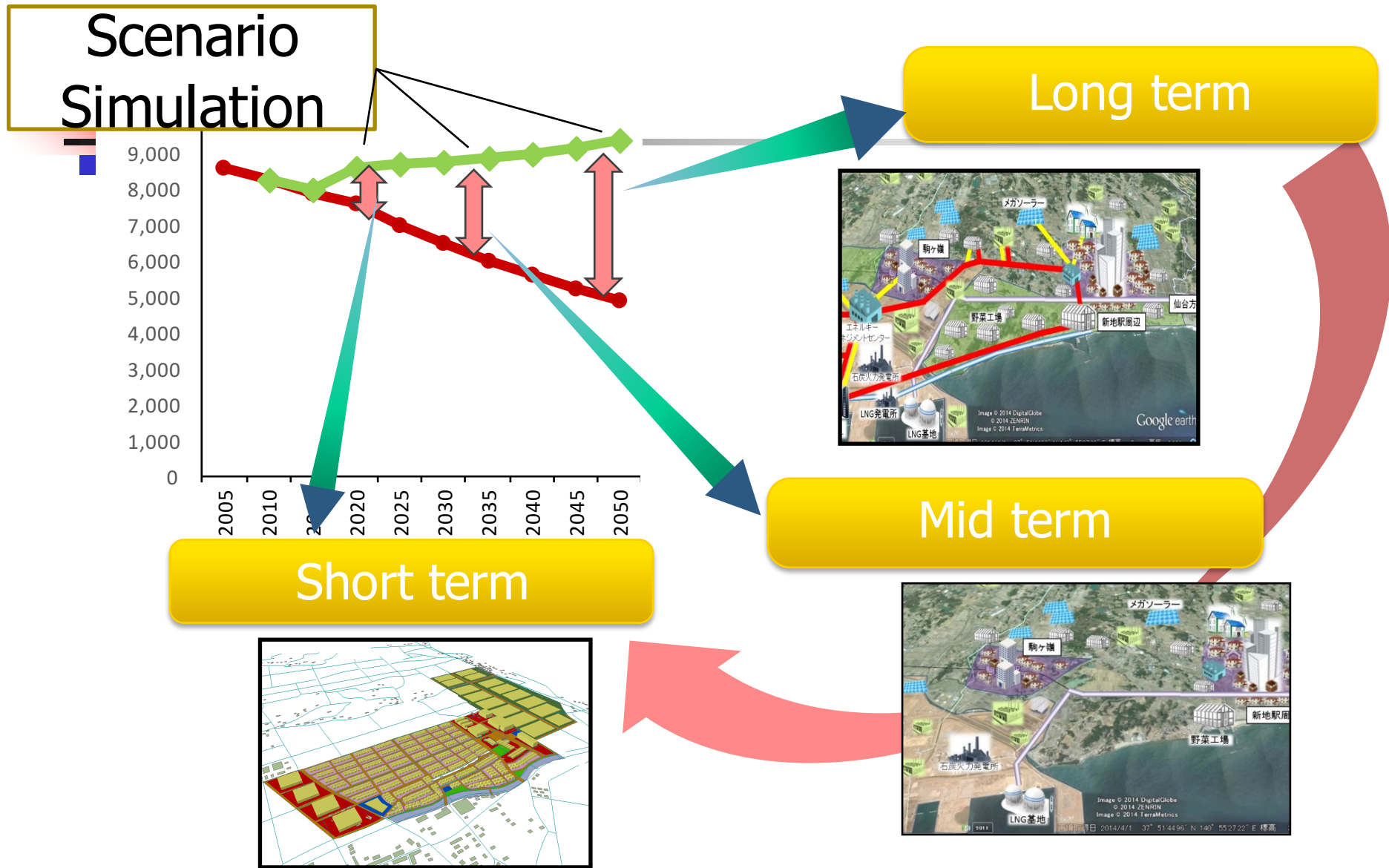
Effects of Local  
Energy Management

Estimation of CO<sub>2</sub> Emission

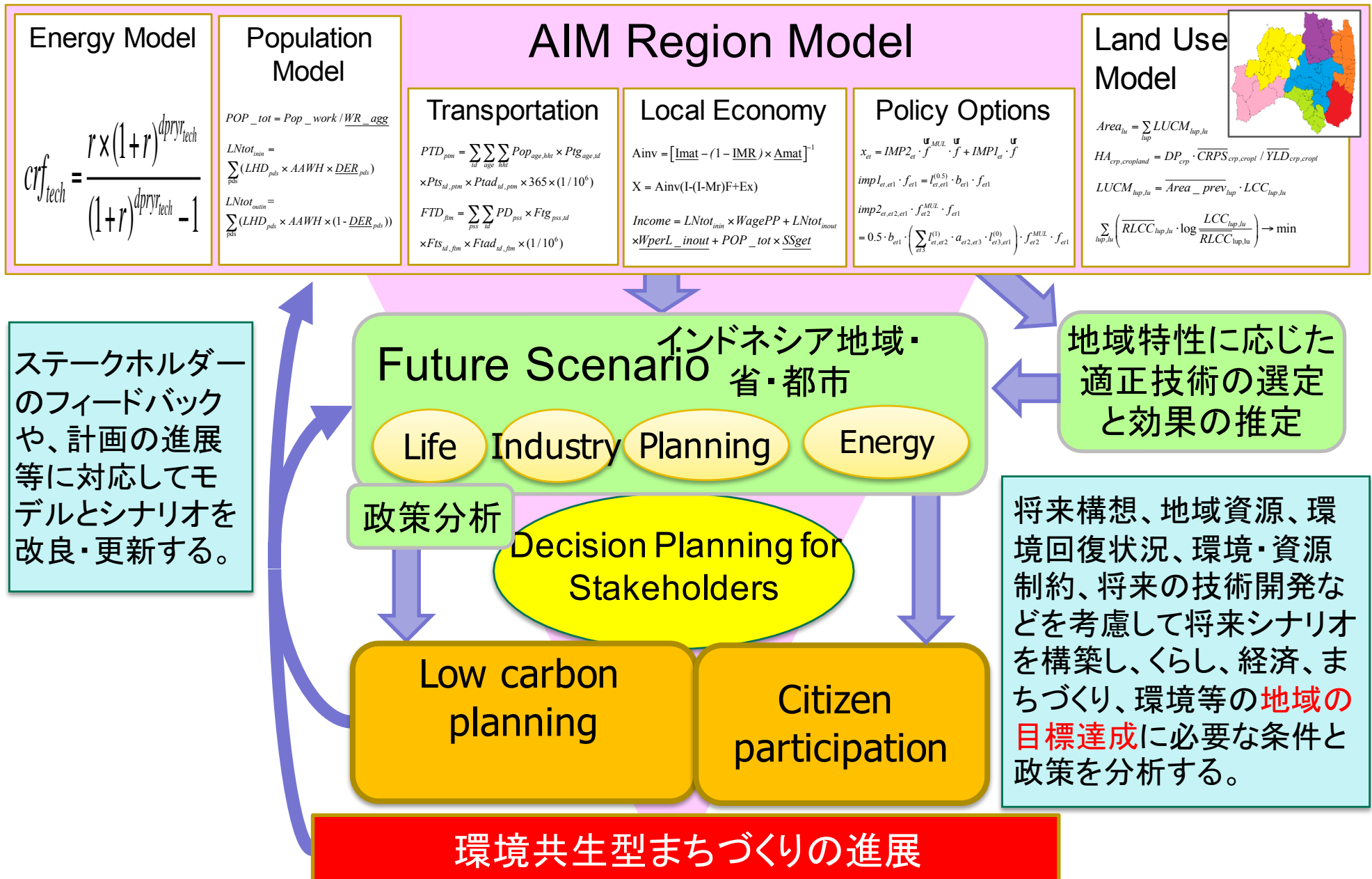


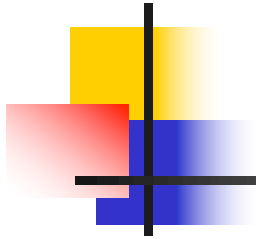
Green growth can double the Carbon Efficiency

# From the scenarios to the programs



# NIES Dr. Gomi



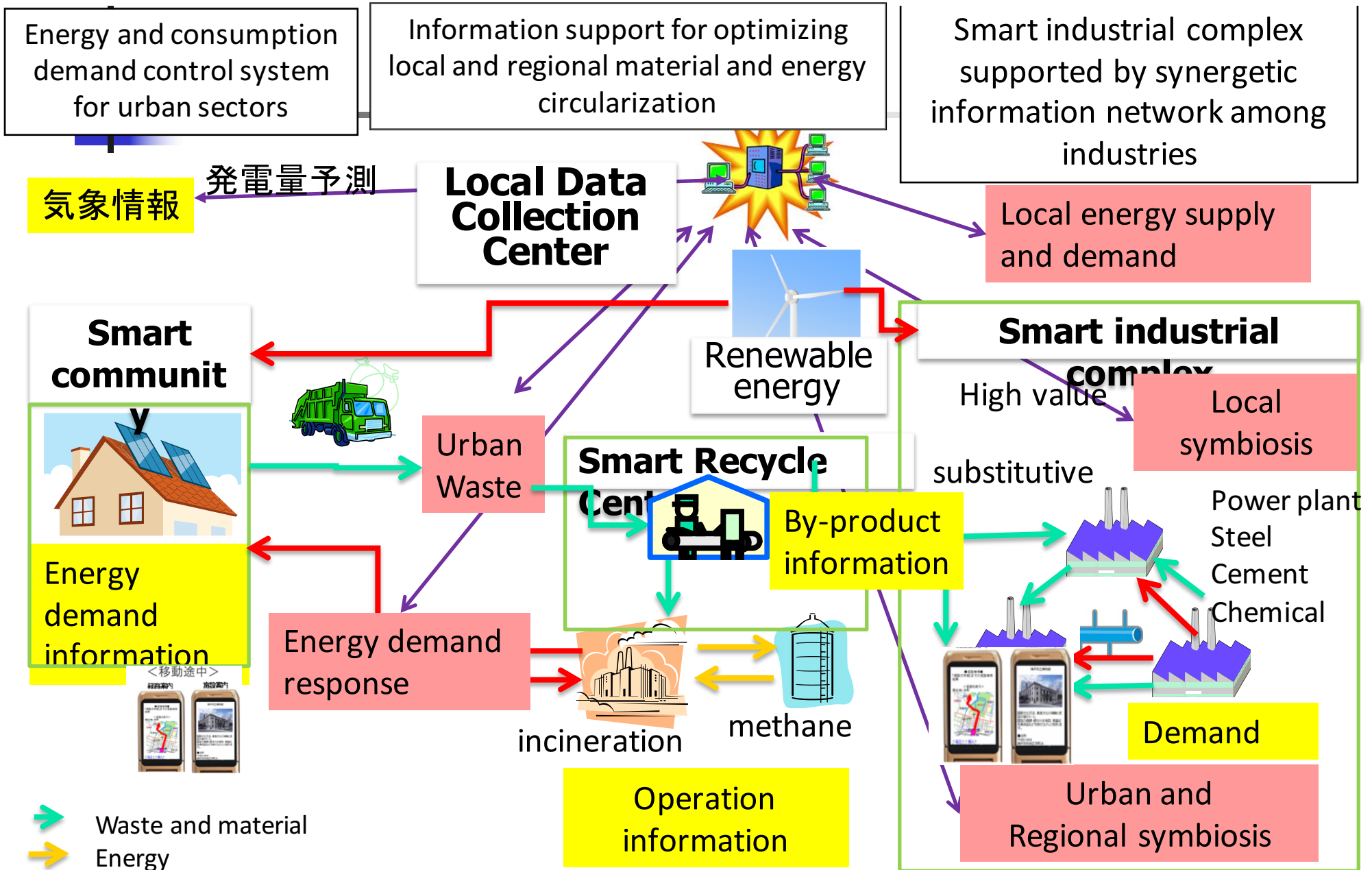


# **Low Carbon Monitoring and Information System**



# Smart Symbiosis Initiatives for Eco town Innovation

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



## Step 2. Visualization of industrial park (area) electricity

### 1. What we can see from Visualization

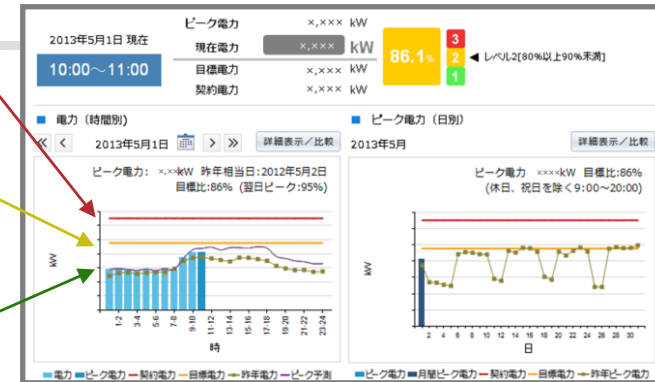


### 2. What we can support by Visualization

Contract electricity

Desired value

Difference Between Last year



Visualize the electricity use in industrial park

Watching the electricity amount and undesired value, it alarms when the usage of electricity come near to desired value, and suggests to move the peak of using electricity

### 3. Effect of visualization in area

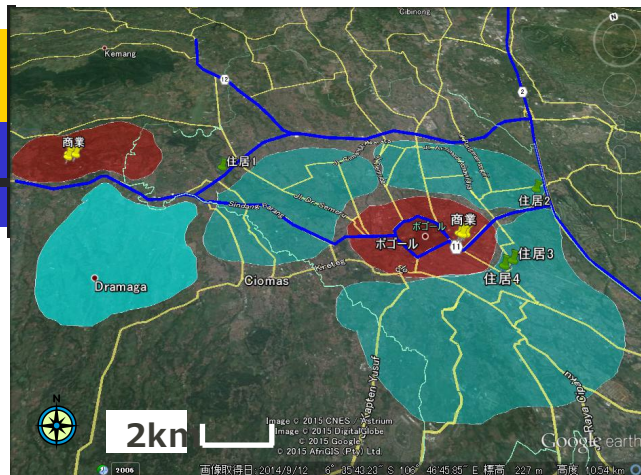
By cutting the peak of electricity use, it will also cut the contract electricity amount in area



Enables to discuss the business capacity of electricity supply business in industrial park

# Social monitoring system facilitated solution for low-carbon society

## Energy consumption behavior monitoring for individual buildings



Commercial building



Households



Factories

Grasp the energy demand trend of facilities (point)

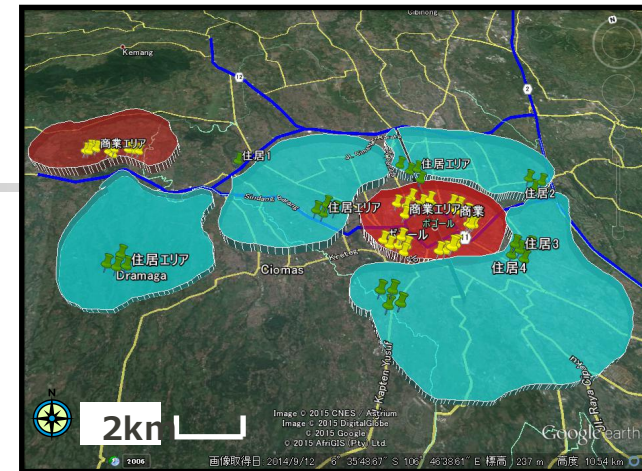


*Houses/Facilities/Factories(point)*

⇒ Grasp energy demand by hours ⇒

Realize energy-saving diagnosis, discussion of Japanese technology module application, low-carbon activity promotion, life style and production planning revolution

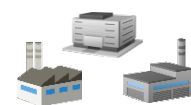
## Extend to regional energy consumption monitoring



Commercial area



Residential area



Industrial area

Grasp the energy demand trend of region (plane)



*Region(plane)*

Regional overall energy demand-supply balancing

Utilize regional spatial economic advantages, discuss the application of Japanese technology modules, build model case for low-carbon society realization in developing countries

# Support System

## Local Energy Assist

Electricity sensor: sensor networked with server and tablets

distributor



Real time monitoring



Incentives for efficient energy saving activities



Dual Direction ICT Communication System



役場

## Community Information Assist

## Local Life Assist



Emergency



Health



Public Service

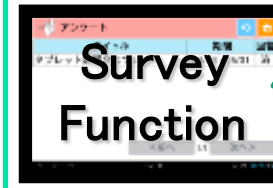


Local Event

Dual-direction information sharing system



GIS Maps



Survey Function



Bulletin Board

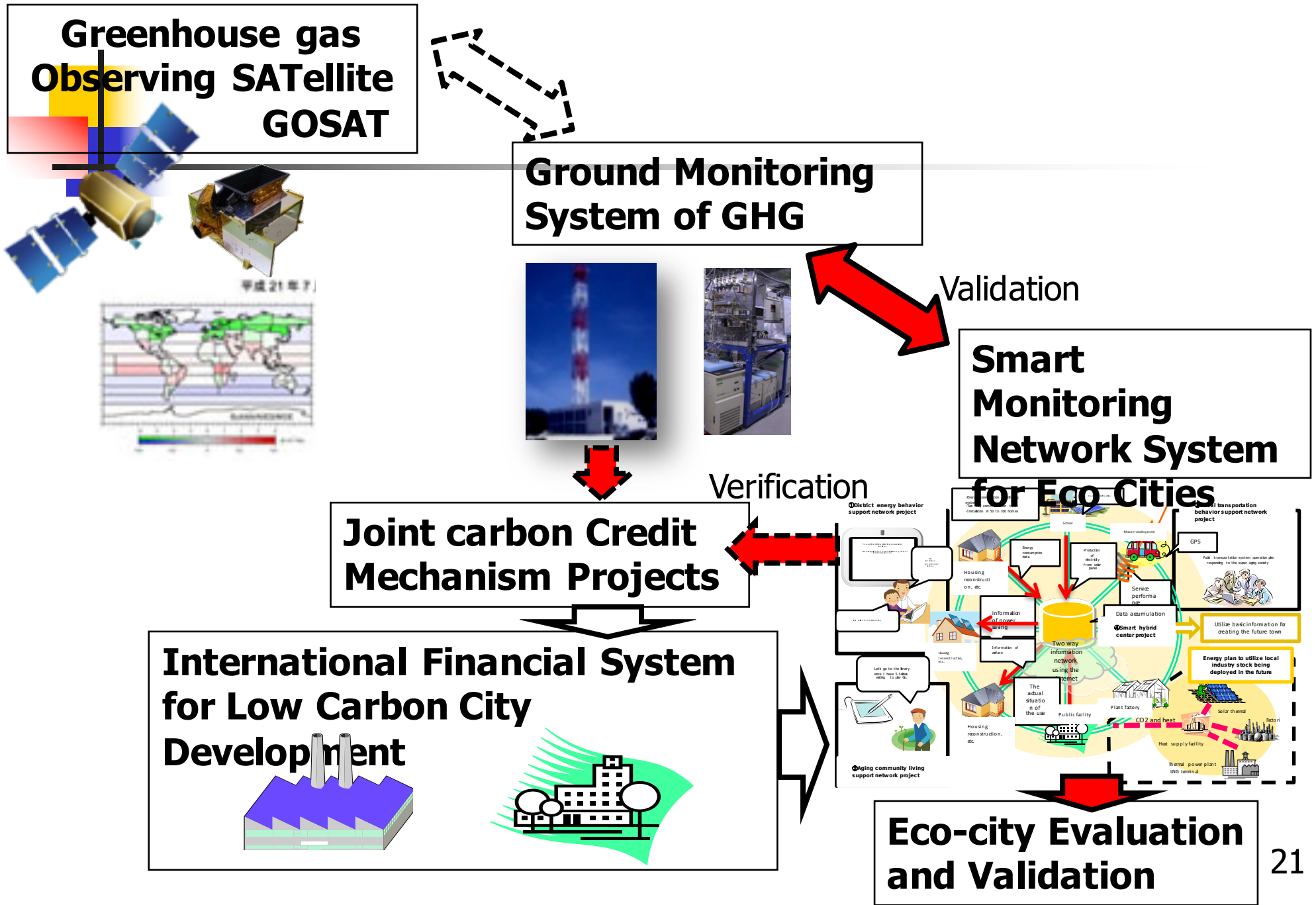
Multi user information sharing system

Frequent questionnaire system

Information sharing among uses

Electric Message Board

# Innovative Monitoring and Reporting, Verification System in Asian Countries



## Steps to realize the goal

### Function for each step

**Step 1**

Visualization of each factory

---> **factory**

**Step 2**

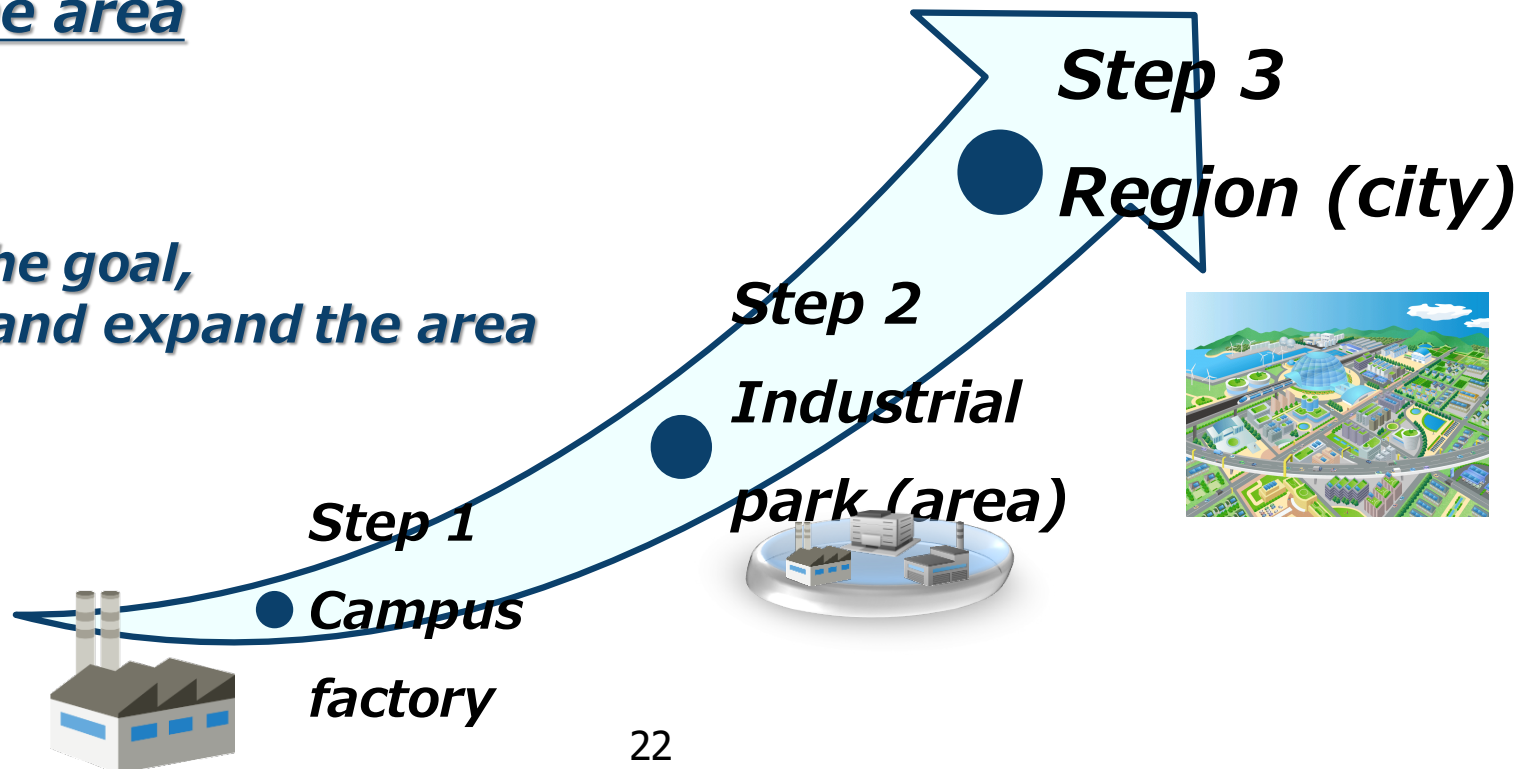
Visualization of industrial park (area) electricity  
-> **Shinchi-town**

**Step 3**

Visualization of Region (city) electricity  
-> **Shinchi-town**

### Expand the area

**To realize the goal,  
Take steps and expand the area**



# List or related publications

- Yong Geng, Fujita Tsuyoshi, Xudong Chen; Evaluation of Innovative Municipal Solid Waste Management through Urban Symbiosis: A Case Study of Kawasaki, Environmental Sci and Tech., 2009 (revised)
- 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, Qinghua Zhu, Brent Doberstein, Tsuyoshi Fujita ; Implementing China's Circular Economy Concept at the Regional Level: a review of progress in Dalian, China, Journal of Waste Management, vol.29,pp996-1002,2009
- 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*