

# *Recycling Technologies and Evaluation*



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# Potential demands on CE

- A decision support system on promoting circular economy is needed, which integrates different models and databases;
- Carrying capacity based policy scenario analysis;
- Regional CO<sub>2</sub> emission reduction strategy;
- Key recycling technologies;
- Key energy saving technologies and equipment;
- Training service.

# Key recycling technologies

- Sludge treatment;
- Waste paper recycling;
- Waste rubber recycling;
- Waste plastic recycling;
- Waste wood reprocessing;
- Discarded electronic appliances treatment;
- Waste solvent recycling;
- Water purification;
- Waste battery treatment;
- Discarded automobile treatment.

# Background of Shenyang



1. The capital of Liaoning Province;
2. The largest heavy industrial city in China;
3. Total population : 7.6 million;
4. GDP in 2008: 56.7 billion USD;
5. EU cleaner production project: 100 million RMB as revolving fund for CP promotion in Liaoning;
6. Nominated by the central government as the only national environmental construction model city in 2009;
7. Shenyang-Kawasaki circular economy collaboration was selected as the Sino-Japan environmental protection agreement in 2009;
8. Selected by UNEP-IETC as the only Chinese city to join “eco-town” project.



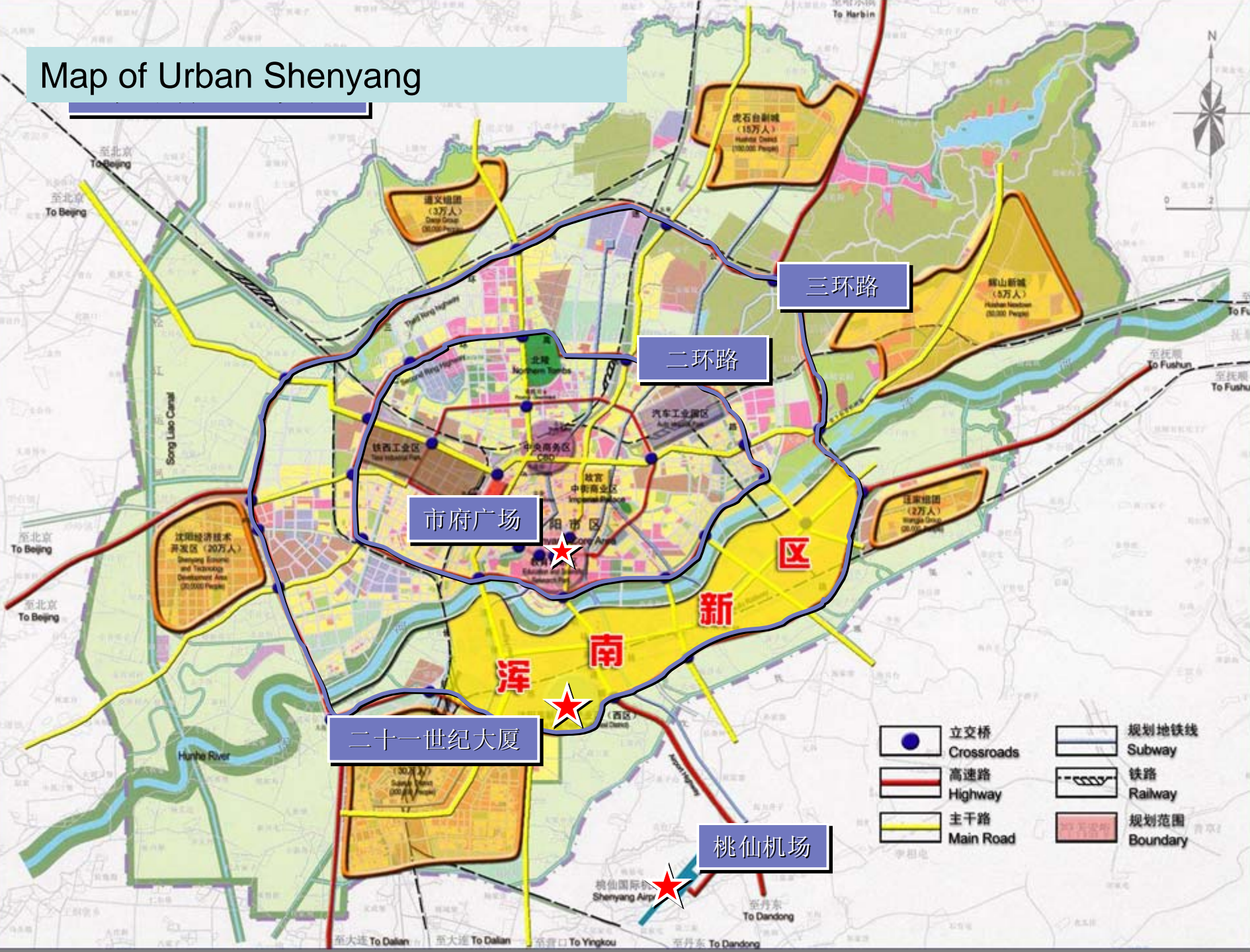
Shenyang



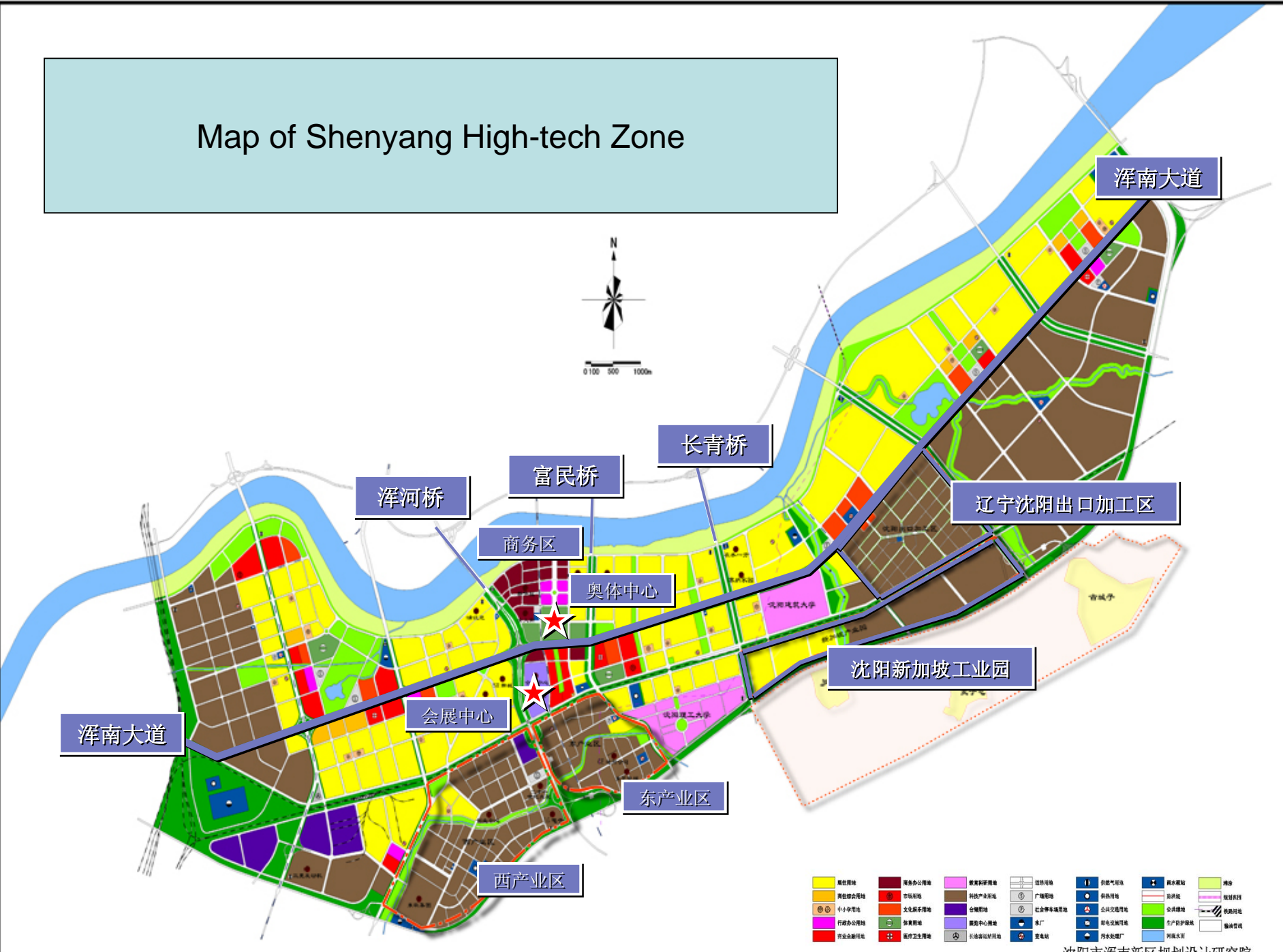


Map of Shenyang and its Surroundings

# Map of Urban Shenyang



# Map of Shenyang High-tech Zone



居住用地	商务办公用地	教育科研用地	道路用地	天然气场	雨水管网	绿地
商住用地	仓储用地	科技产业用地	广场用地	供热用地	防洪堤	规划铁路
中小学用地	文化娱乐用地	合群用地	社会停车场用地	公共绿地	公共绿地	铁路用地
行政办公用地	体育用地	展览中心用地	水厂	邮电及通讯用地	生产防护绿地	输变电线路
市政公用用地	医疗卫生用地	长途客运站用地	变电站	污水处理厂	河流水利	输变电线路

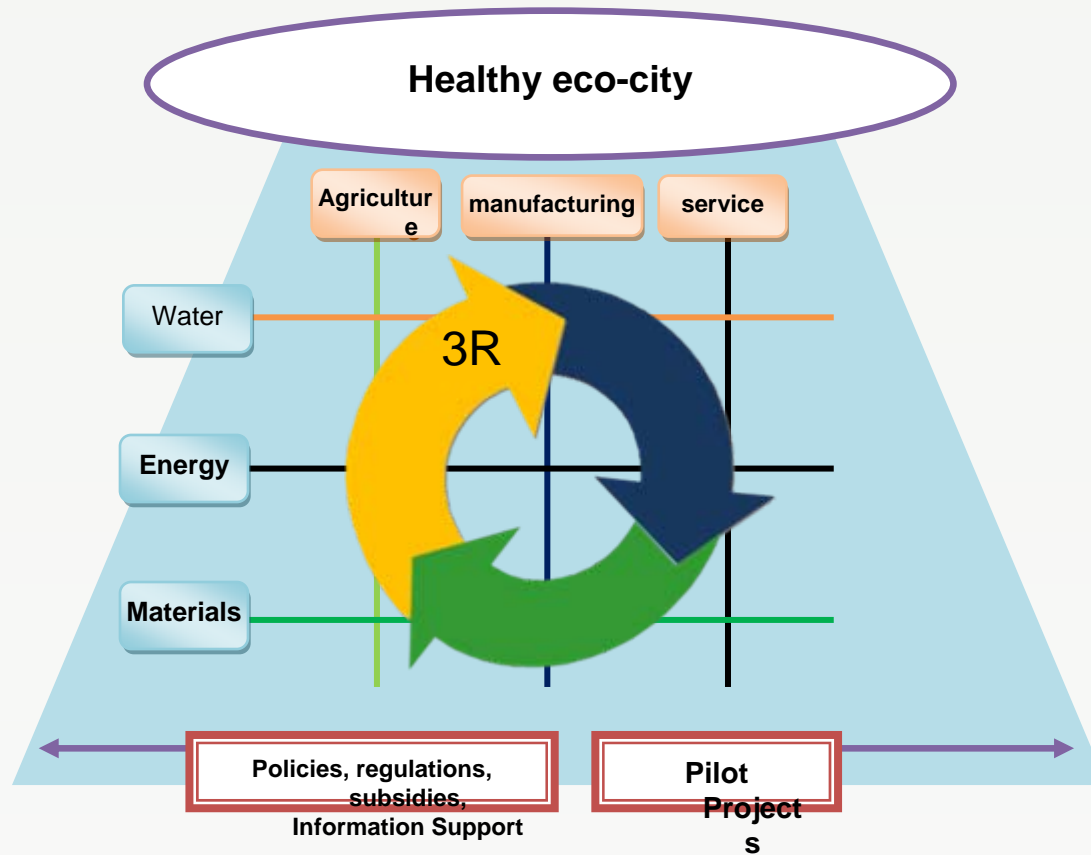


# Map of Shenyang Economic Development Area





# General Framework



# General Targets

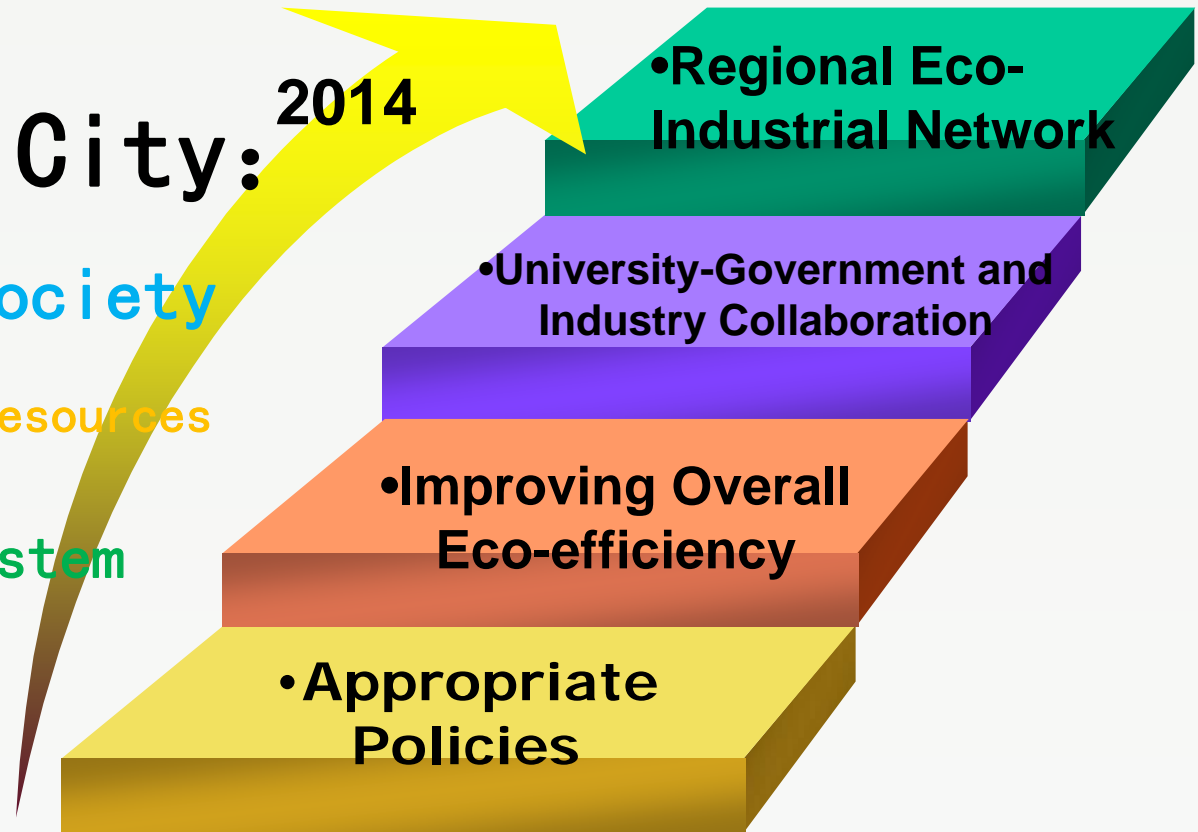
Healthy City: 2014

Harmonized Society

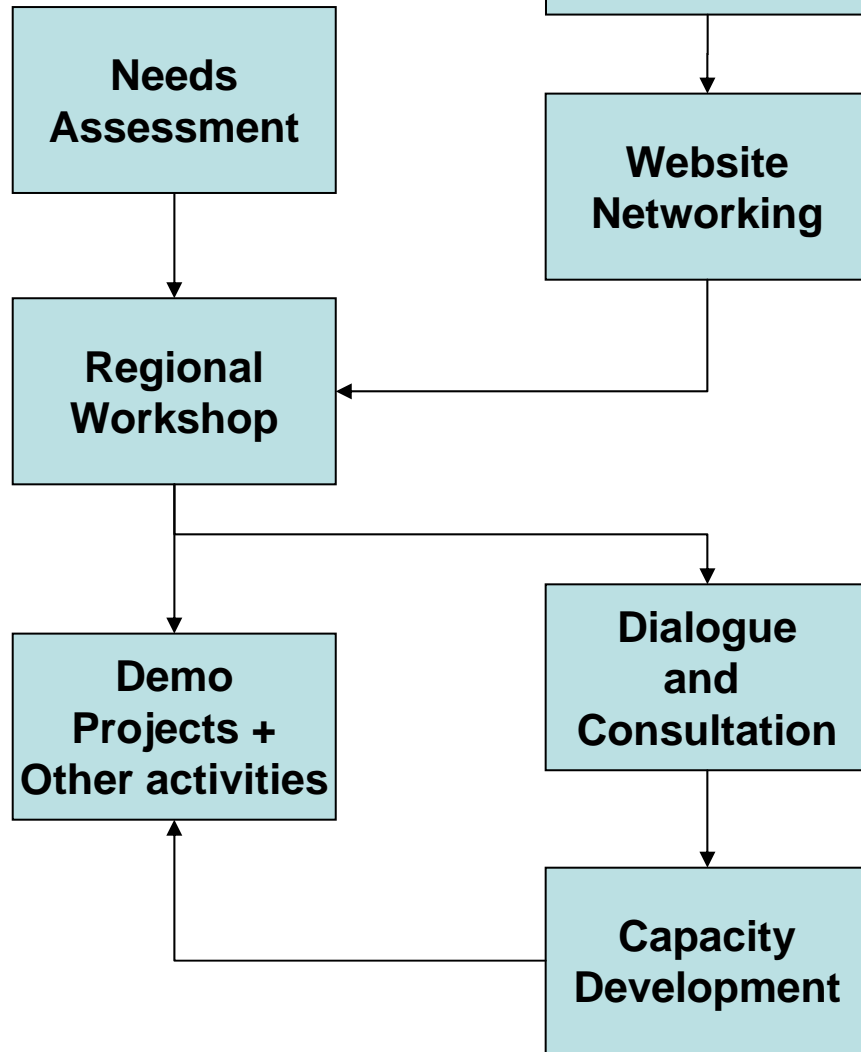
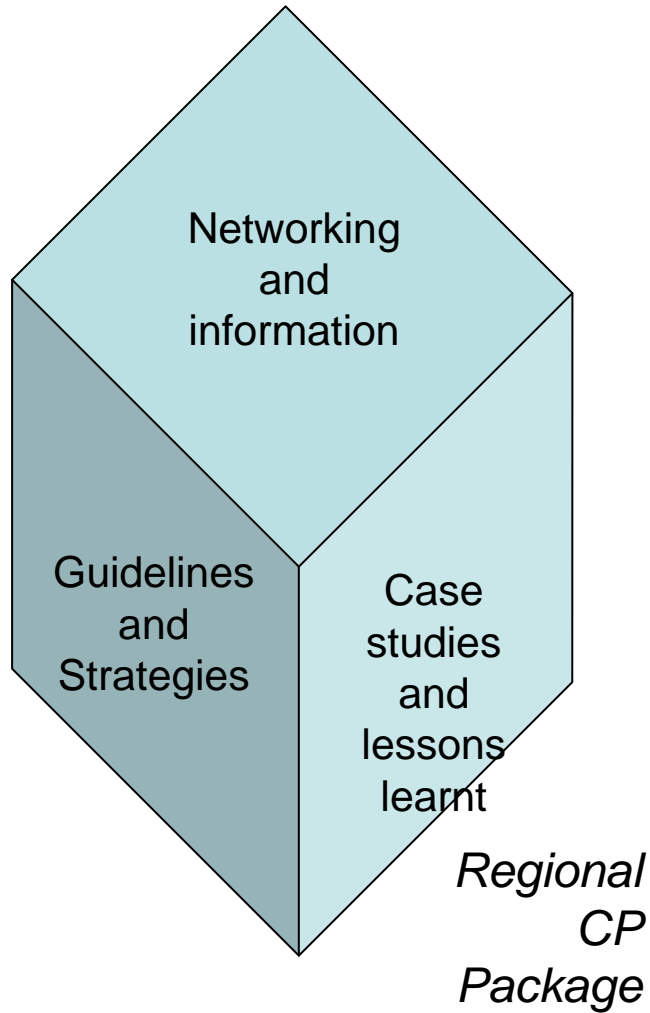
Efficient Use of Resources

Recovered ecosystem

Rapid Economic  
Development



# Planning Activities



# Resource efficiency evaluation system

## National scale target

Carrying capacity

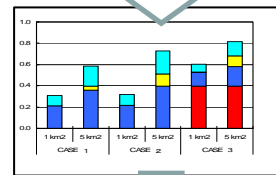
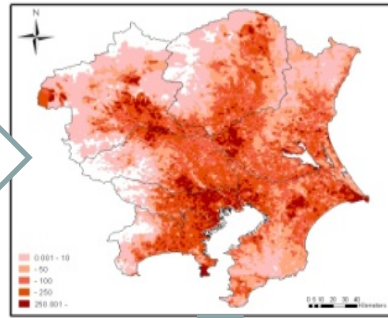
- Energy efficiency
- CO<sub>2</sub> emission reduction
- recycling rate, etc.

## Regional scale

### Regional scale capacity

1. Water resource
2. Land use, etc

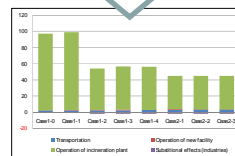
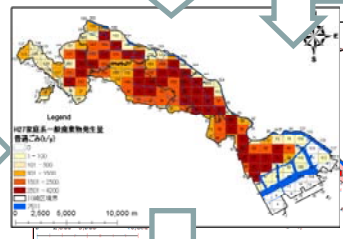
1. Solid waste emission
2. Waste water emission
3. CO<sub>2</sub> emission, etc.



## City scale

### local consideration

1. Local policy strategy/ targets
2. Infrastructure renovation schedule
3. Policy plausibility



Technology effectiveness comparative analysis

Circulation policy effect analysis

## Conversion Technology Inventory

- Centralized Treatment System
- Incineration plant
  - Wastewater treatment plant
  - Landfill

- Small Scale Circulation Treatment System
- Methane fermentation system
  - Joukasou (Septic tank system)
  - Food grinder

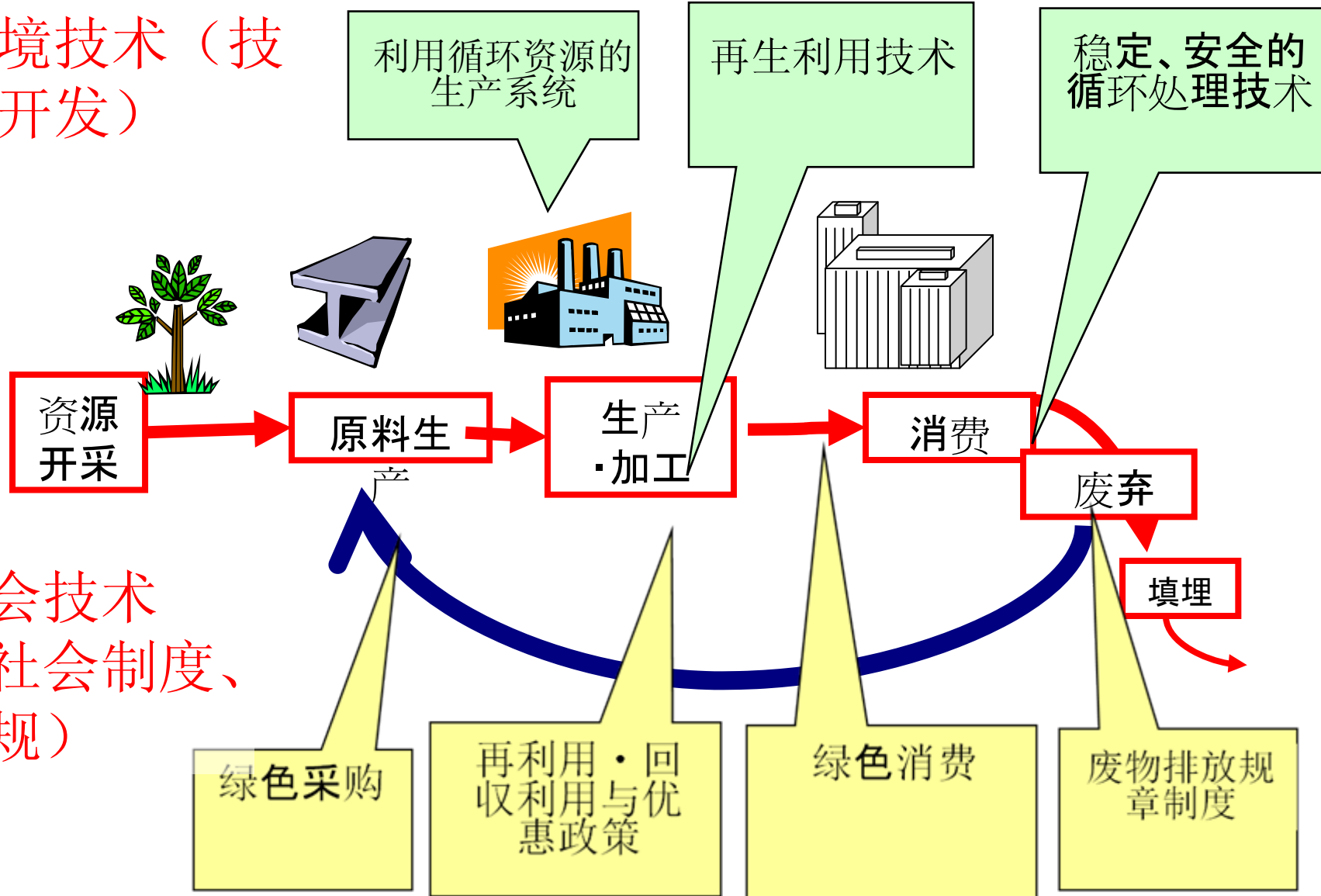
- Symbiotic Industrial Technology (locally oriented)
- Paper making
  - Steel blast furnace (steel making)
  - Cement making, etc

## Societal System

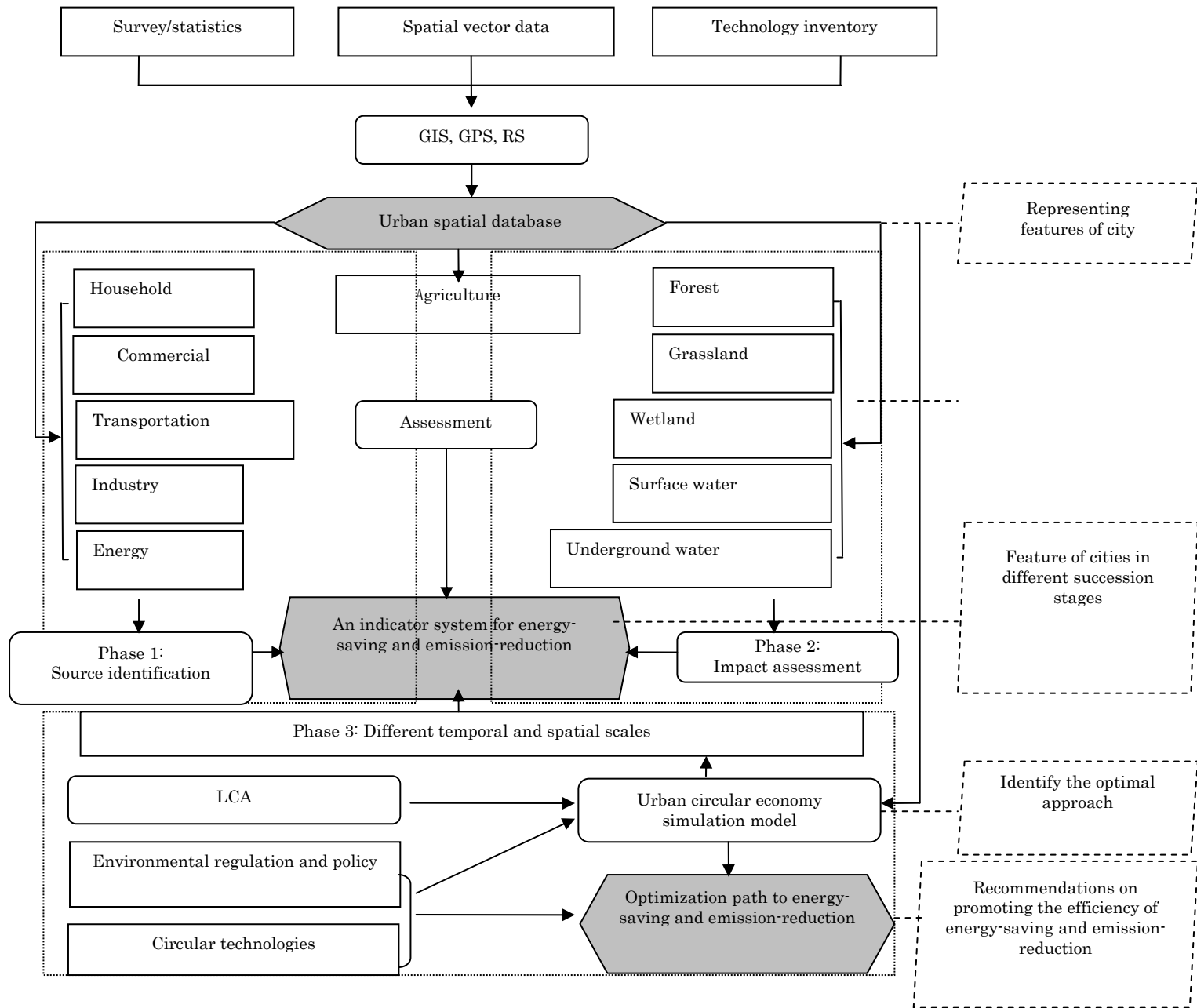
- Waste treatment infrastructure
- Incineration plant
  - Wastewater treatment plant
  - Landfill

# 结合环境技术和社会技术发展循环经济

环境技术（技术开发）



社会技术（社会制度、法规）



# Methodology



# To built spatial databases for understanding current materials, water and energy consumption perspectives

Based on GIS and remote sensing techniques, we will establish a spatial database that can reflect resource inputs, waste outputs, energy and water consumption scenarios, and their spatial distribution;

To establish inventories of environmental policies and technologies

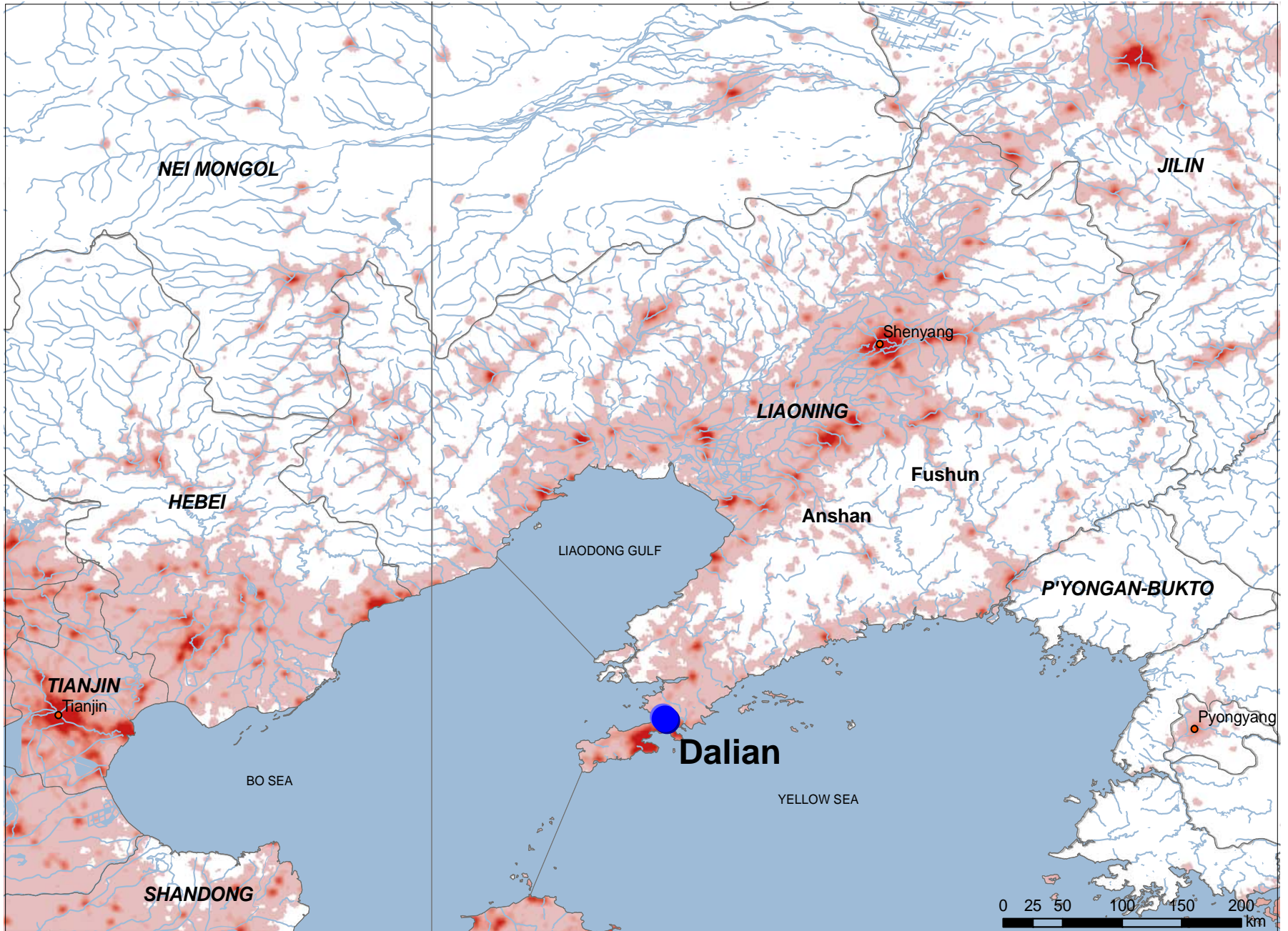
# To design an indicator system for evaluating urban energy-saving and emission-reduction efficiency

- To identify key urban sectors related with urban energy-saving and emission-reduction;
- To assess the GHG emissions of urban activities by analyzing the energy and material flows from different urban sectors by adopting life cycle assessment (LCA); and
- To design an indicator system and guidelines for evaluating urban energy-saving and emission-reduction efficiency.

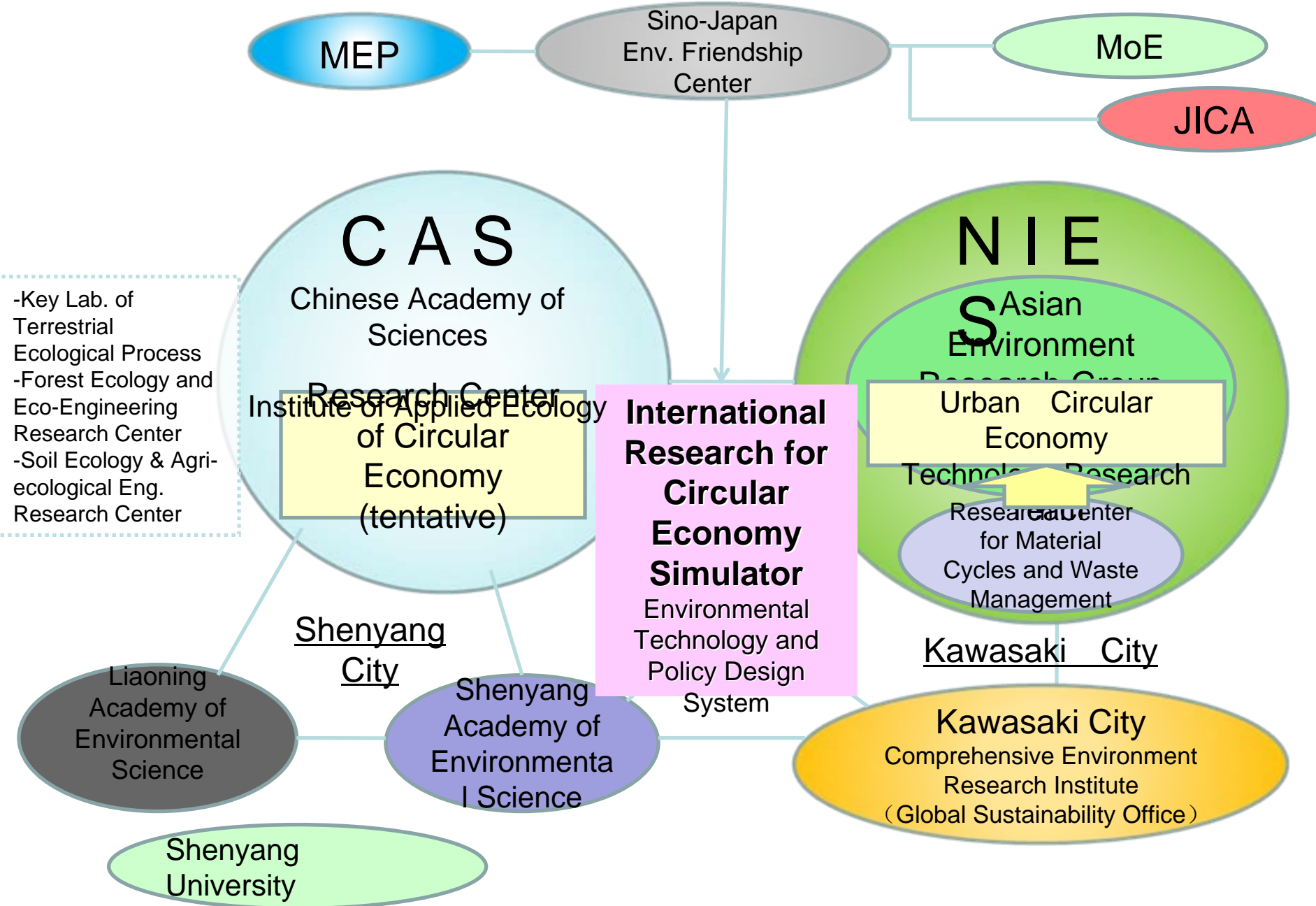
# To conduct dynamic simulation analysis and to explore the optimized approach on promoting urban energy-saving and emission-reduction efficiency at various temporal and spatial scales

- To screen appropriate environmental technologies and policies for realizing the potential symbiotic opportunities;
- To assess, by scenario simulation, combinations of possible environmental technologies and policies that can potentially contribute to promoting urban energy-saving and emission-reduction efficiency;
- To explore the optimal approach on promoting urban energy-saving and emission-reduction efficiency;
- To propose appropriate strategies for promoting urban energy-saving and emission-reduction efficiency by considering the local conditions.

# Liaoning



# International Collaboration for Circular Economy Technology and Simulator(tentative)





**THANKS!**