

# Low Carbon Society Scenario Project

Third Annual Meeting  
Integrated Assessment Modeling  
Consortium (IAMC)

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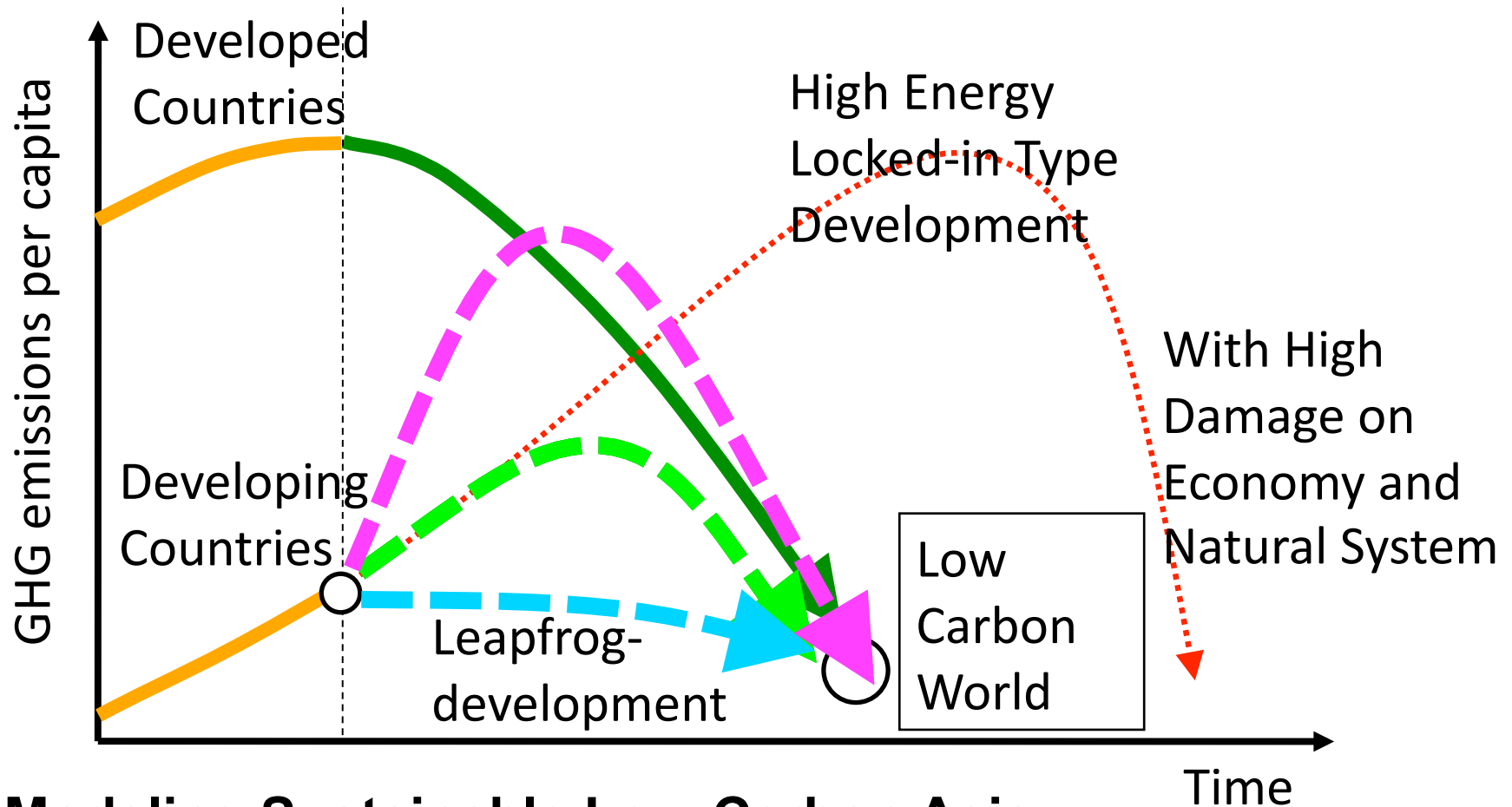
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28-29 October 2010  
Washington D.C.



# Asian LCS scenarios study

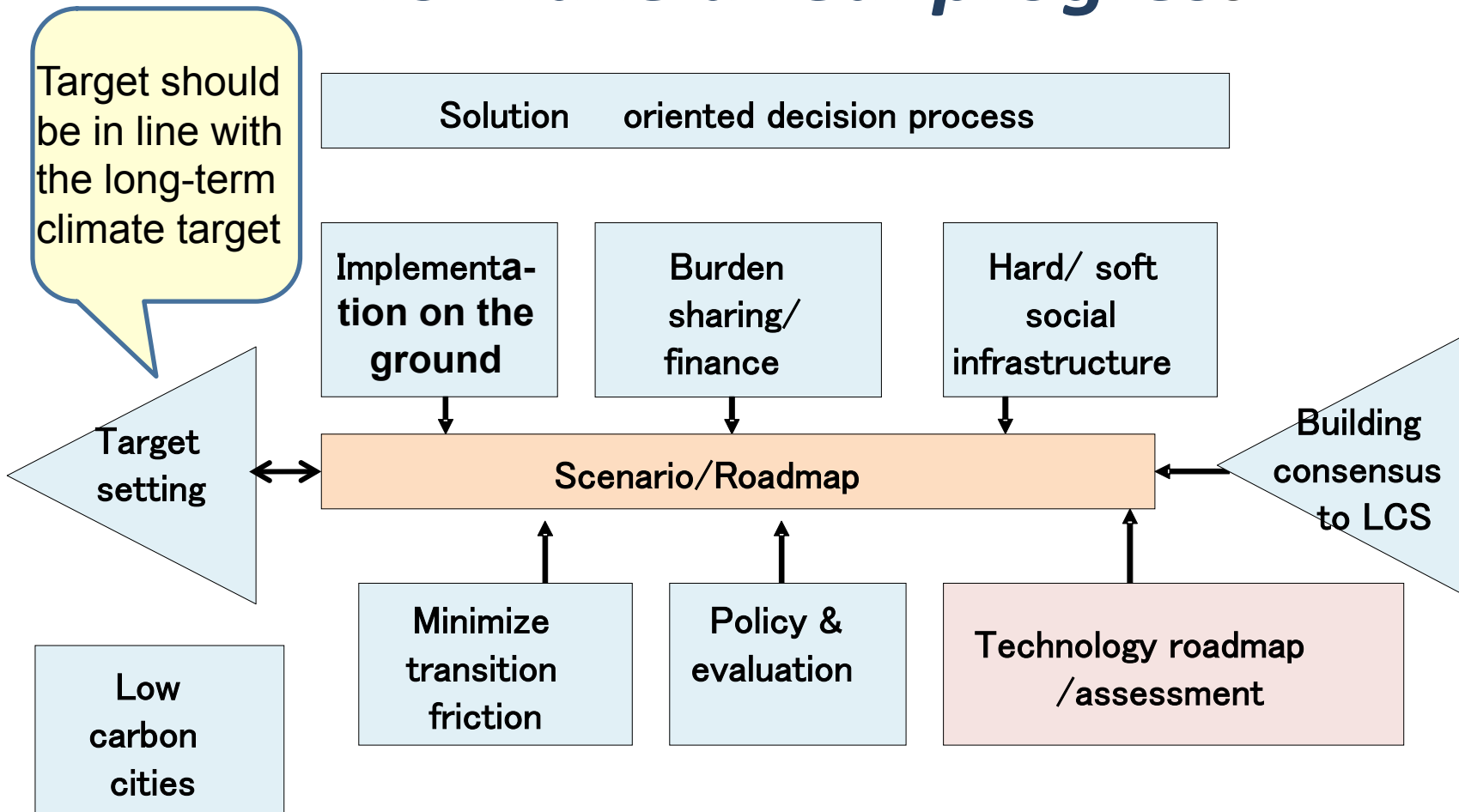


## Modeling Sustainable Low-Carbon Asia

“Asian Low-Carbon Society Scenario” project develops scenarios by (1) Depicting narrative scenarios for LCS, (2) Quantifying future LCS visions and by (3) Developing robust roadmaps by backcasting. This study for FY2009-2013 is funded by Global Environmental Research Program, MOEJ

# *Formulation of LCS*

## *- To make a real progress*



Source: Nishioka (2010) LCS-Research Network

# General objective of the study

**In order to realize Asian Low Carbon Societies, ....**

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1. We focus on domestic and international factors which control the realization of LCS,
2. Describe the development, accumulation, and deepening of factors which control LCS with multi-layered, spatial, and integrated quantification models/tools,
3. Apply quantification models/tools to various Asian regions,
4. Taking account of regional distinctive diversified characteristics,
5. And design positive Asian low carbon societies and roadmaps towards the LC societies, in each region with a back-casting methodology.

## **What are the Asian Low Carbon Societies, we target in the study?**

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By the middle of this century (2050), the target societies will satisfy the followings;

1. Harmonized with drastically changing future Asian society and economy,
2. Complying with each region's national reduction target that consists with the global low carbon target, under the global, national and regional constraints on fossil and renewal energy resources, and land resource,
3. Developing/devising/promoting LCS policies based on each region's characteristics ,
4. Also utilizing effectively co-benefits of LCS policies and neighboring policies.

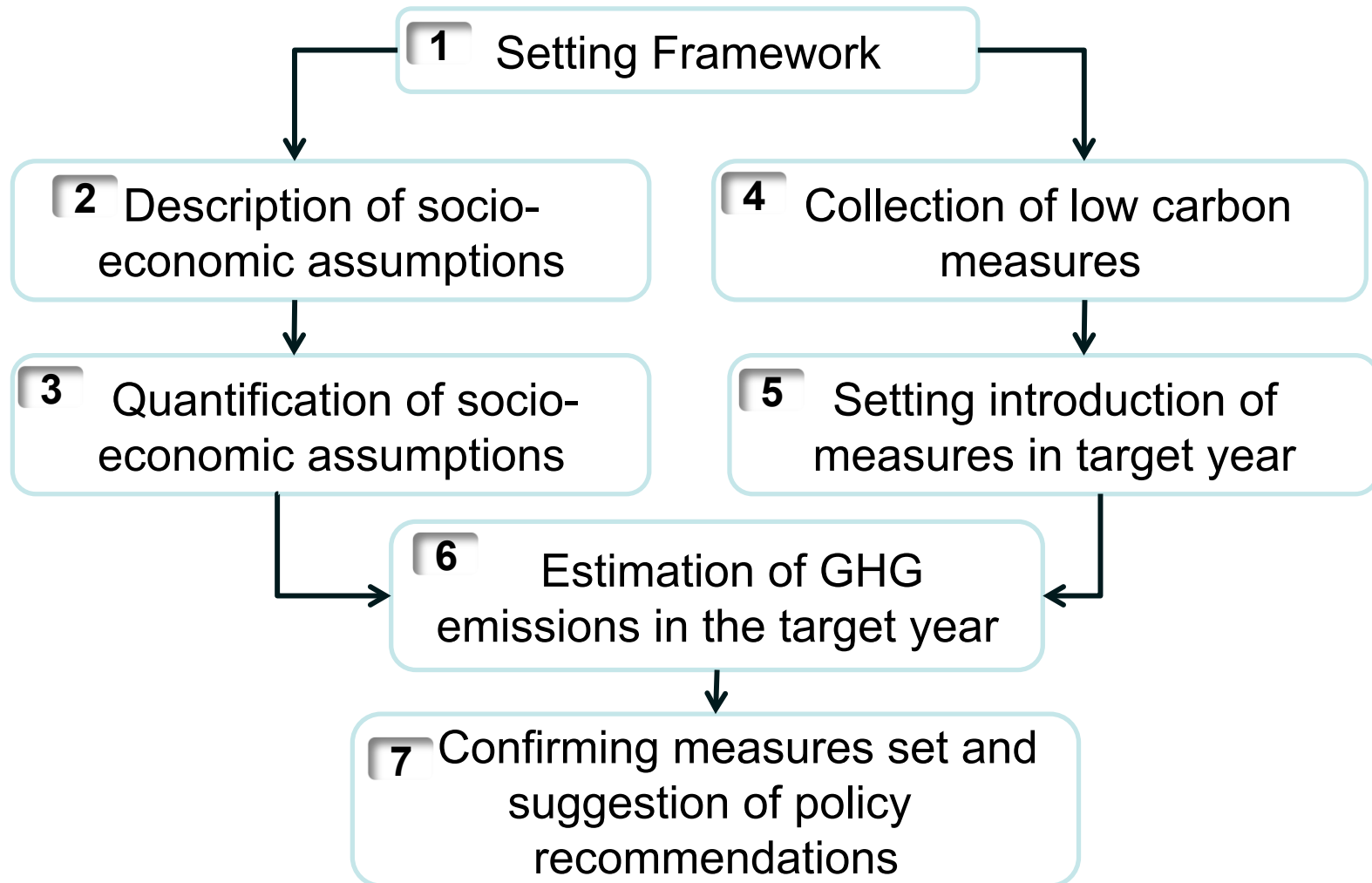
**In order to taking account of multilayered characteristics of Asian LCS issue**

**Two approaches are adopted in order not to loose perspective and reality of LCS**

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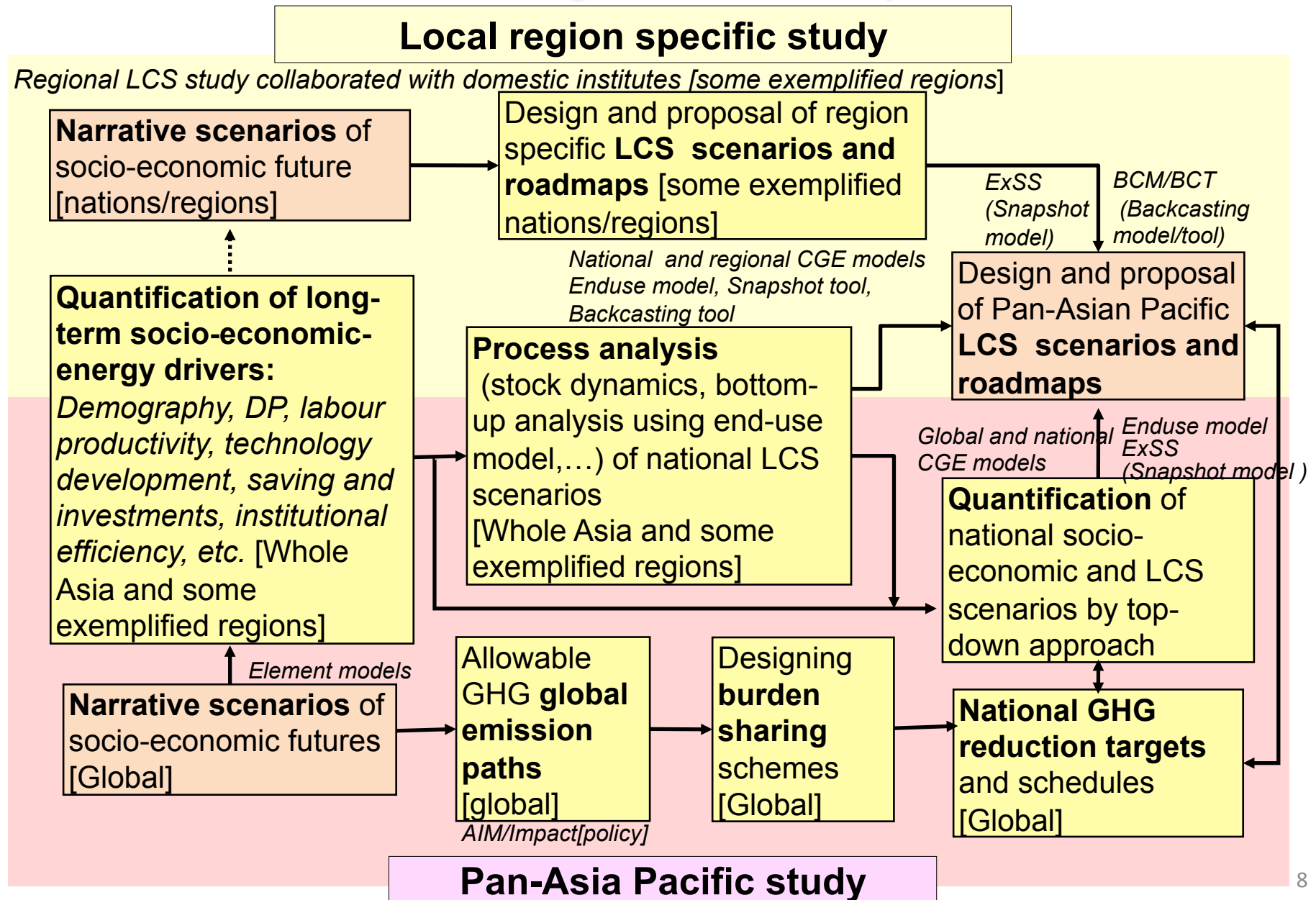
1. Region specific study : Country/region specific approach collaborating with domestic research institutions, and putting more focus on regional initiative and acceptability
2. Pan Asian-Pacific approach : Put more emphasis on comprehensiveness and compatibility among global and pan Asian-Pacific regions

# Approaches to develop LCS scenarios



# How do we implement these approaches?

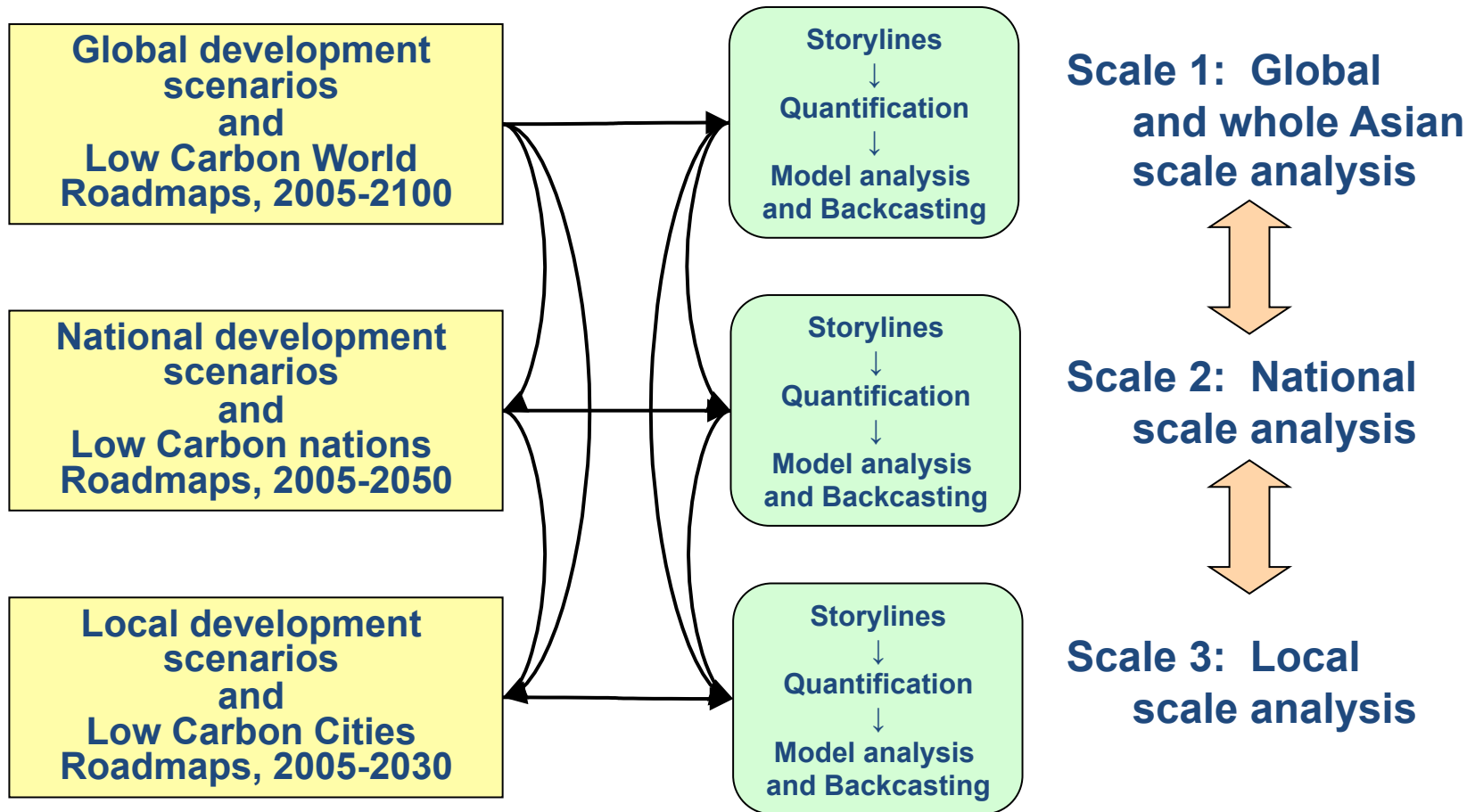
## Flow diagram of the study



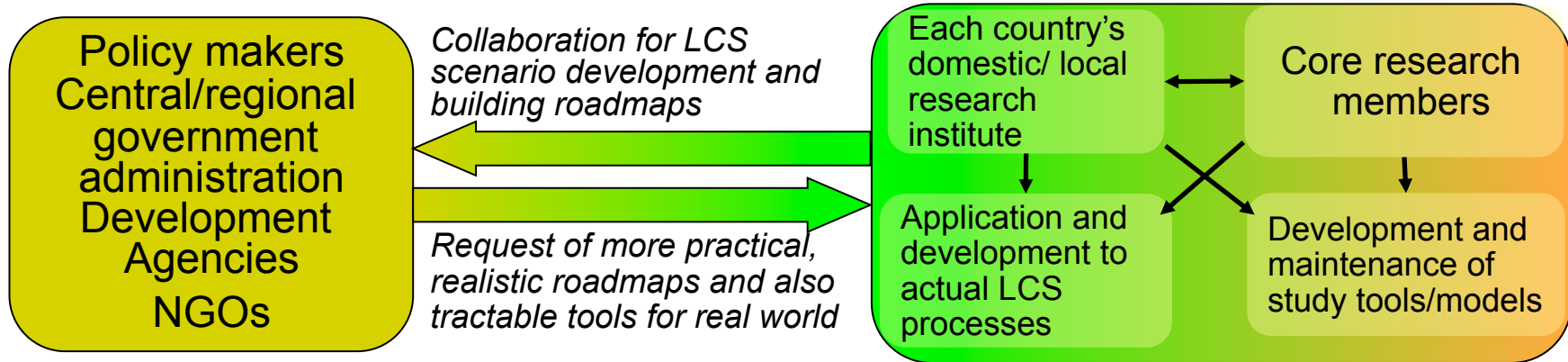


# Three regional/time scales we are concerning

To all scales, our methodology has been applied,  
and they are inter-connected each other.



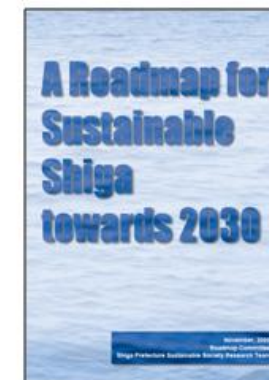
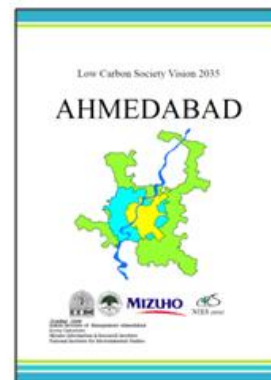
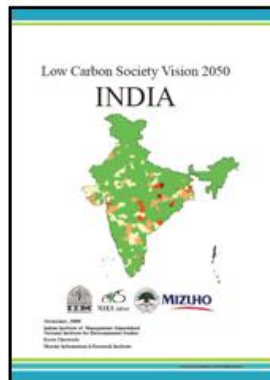
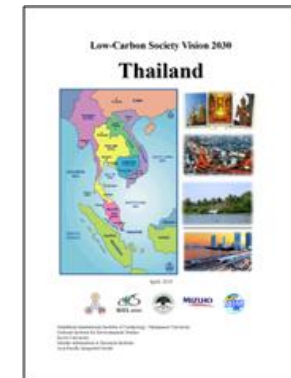
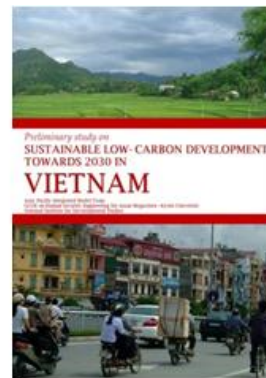
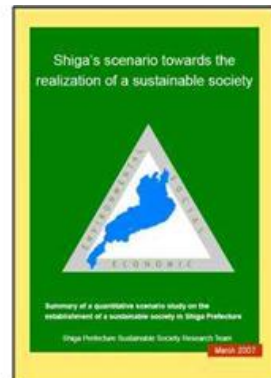
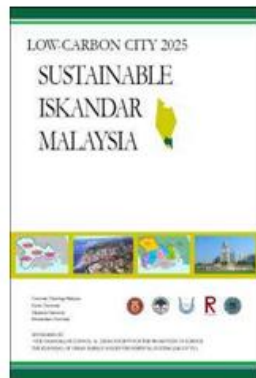
# Region specific studies in progress



Region	Country	Domestic counterpart institutions	Stage
Japan	Japan	NIES, Kyoto Univ. and 23 institutions in Japan	Preliminary stage completed. Implementation to policy making in progress
Iskandar development region	Malaysia	University Technology Malaysia, Iskandar Regional Development Authority, Federal Department of Town and Country Planning Malaysia, Malaysia Energy Centre	Preliminary stage completed. Implementing to policy making in progress
India	India	Indian Institute of Management, Ahmedabad	Preliminary stage completed.
Ahmedabad city	India	Indian Institute of Management, Ahmedabad	Preliminary stage completed.
Bhopal	India	M. A. National Institute of Technology, Bhopal School of Planning & Architecture, Bhopal	Just started
Guangzhou city	China	Guangzhou Institute of Energy Conversion, CAS	Just started
Shiga prefecture	Japan	Lake Biwa Environmental Research Institute	Implementation stage
Kyoto city	Japan	Kyoto city government	Implementation stage
Kyoto prefecture	Japan	Kyoto prefectural government	Just started
Vietnam, Thailand, Indonesia , Korea			Just started

# Region specific studies in progress

Communication and feedbacks of LCS study to real world



# Case study in Japan

# Roadmap toward LCS

## Policy Target

Minus 80% reduction by 2050, Share of renewable energy: 10% by 2020

## Macro Frame

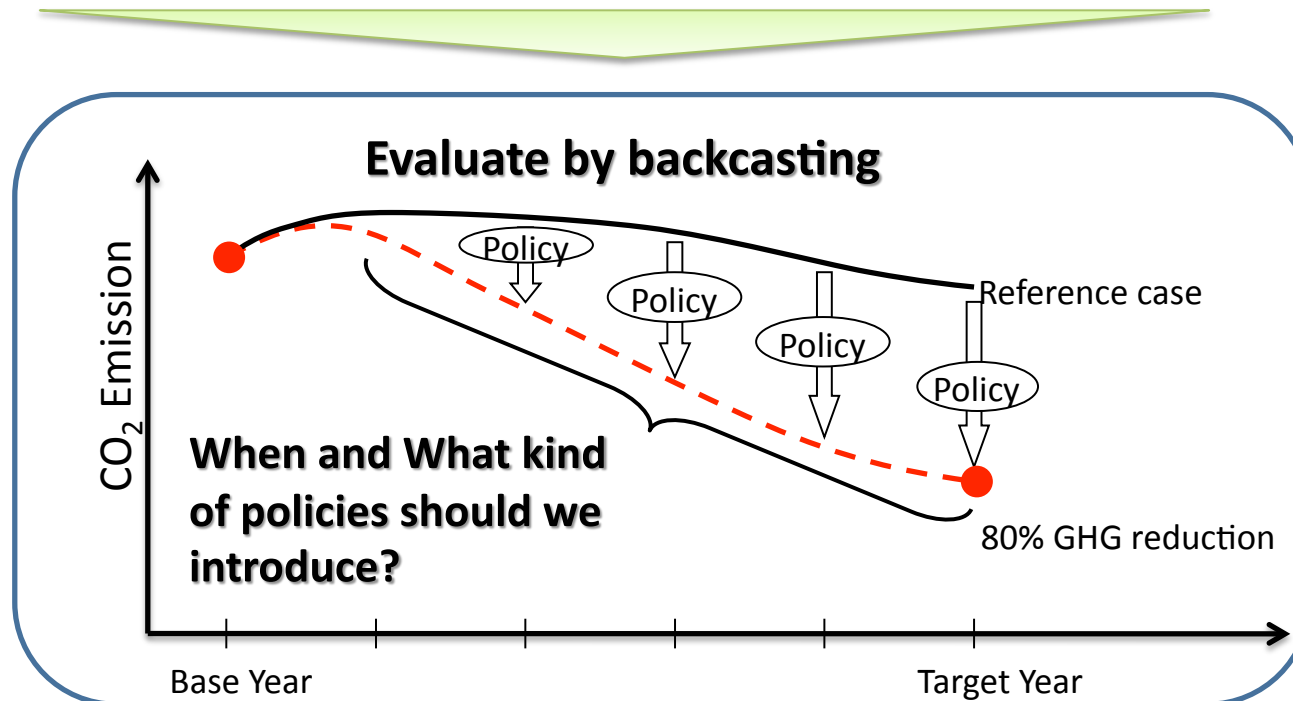
GDP,  
Population,  
Production,  
Unemployment rate, trade, etc.

## Technology Data

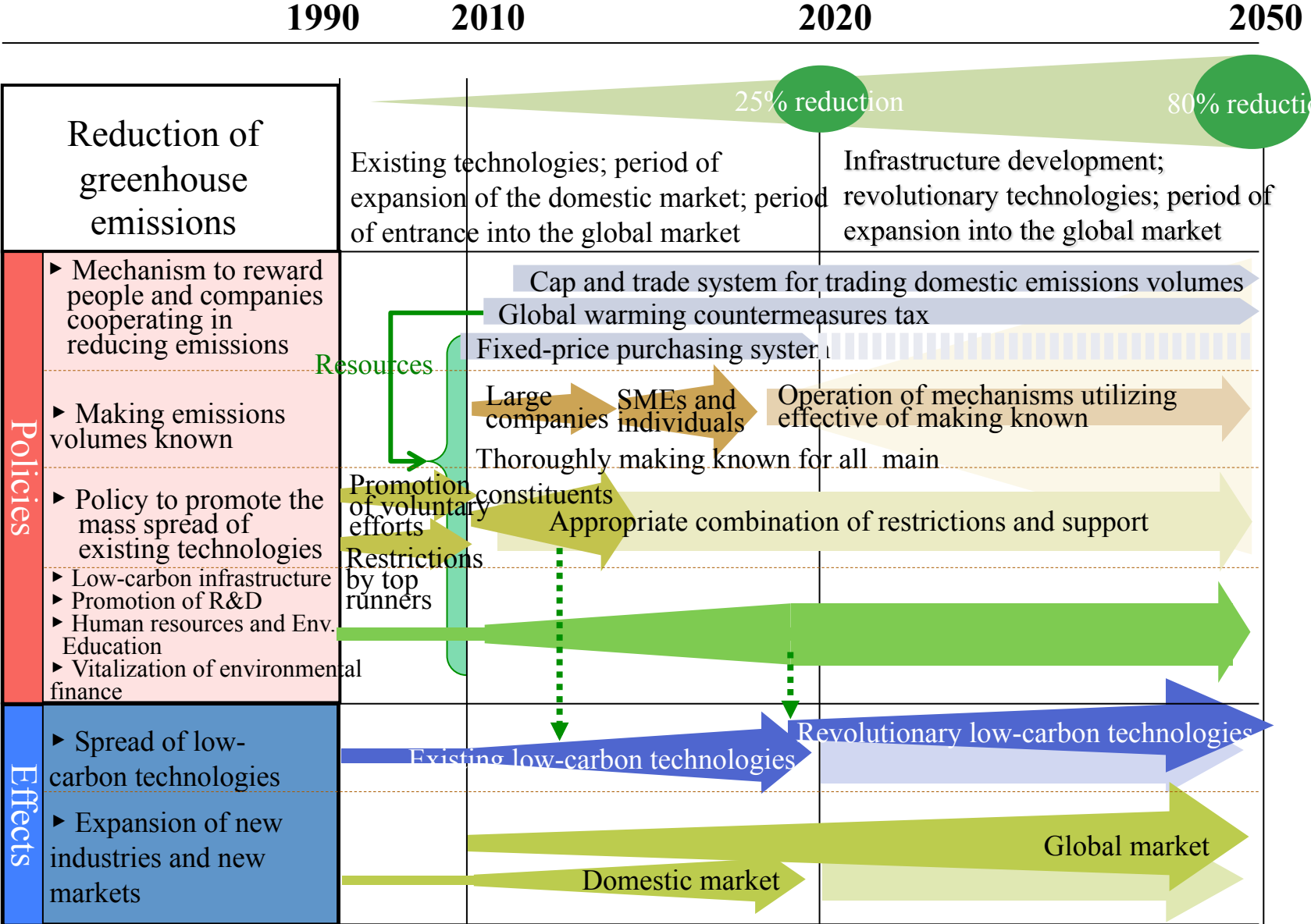
- Energy consumption
- Equipment cost
- Running cost
- Share, etc.

## Supply Constraint

Nuclear power  
CCS  
Renewable energy, etc.



# Overall roadmap: order of policies and effects

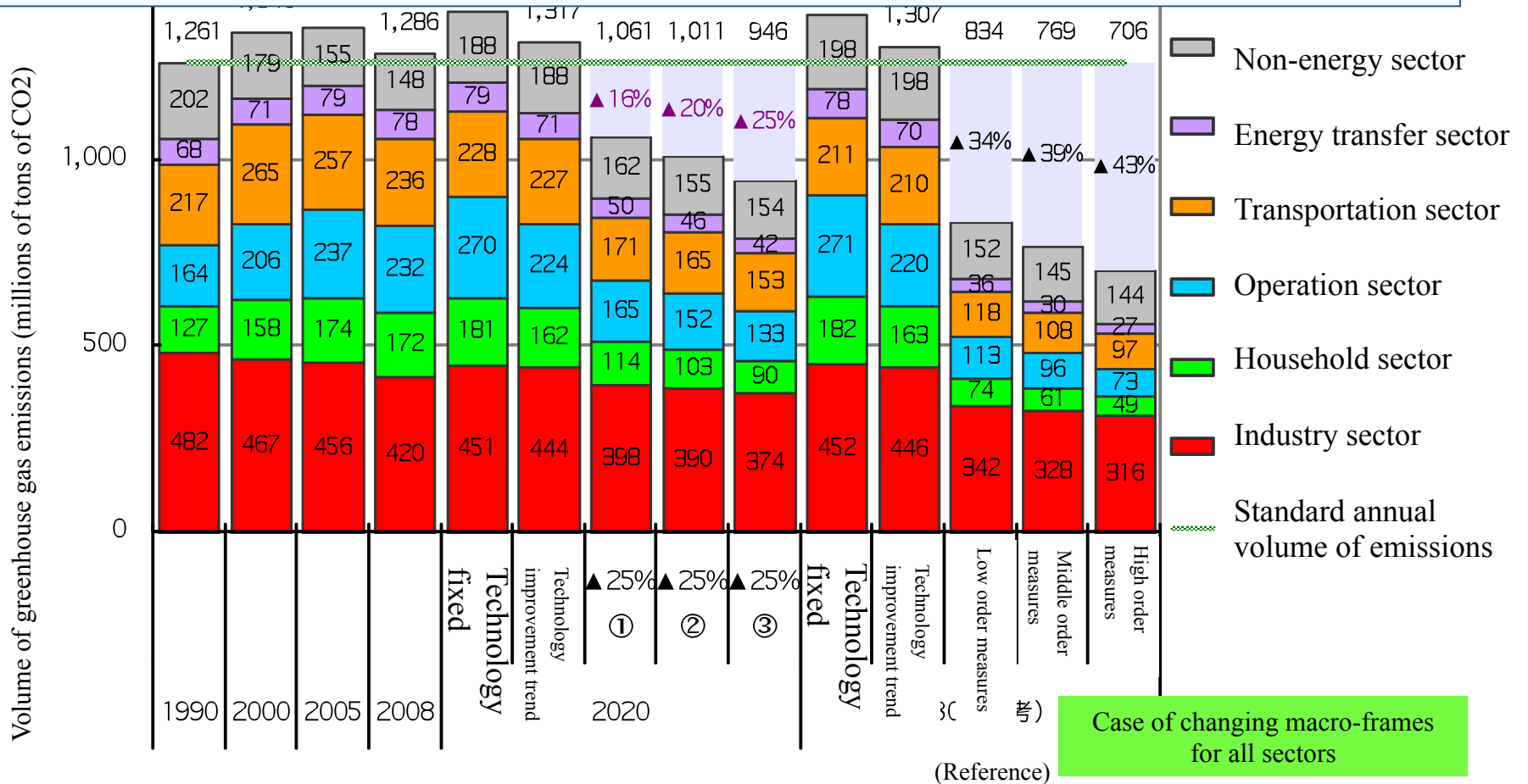


(Nishioka, 2010)

# Short-term target analysis to meet the long-term goal

## Volume of greenhouse gas emissions [2020/2030]

- It is technically possible to domestically reduce the volume of greenhouse gas emissions by 25% in 2020 compared to the level in 1990.
- Efforts in daily life (household, operations, transportation) will have a major effect.



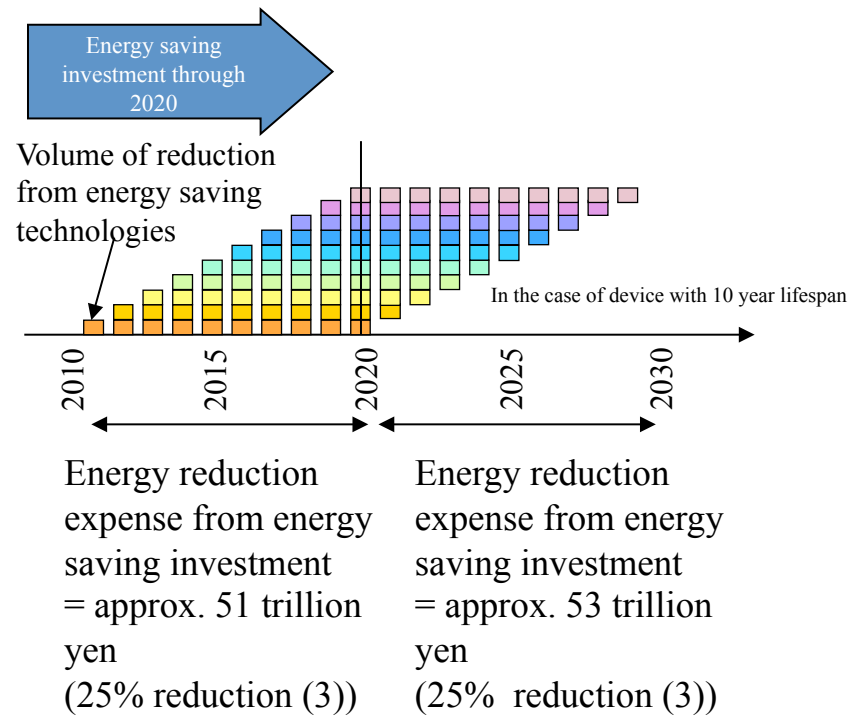
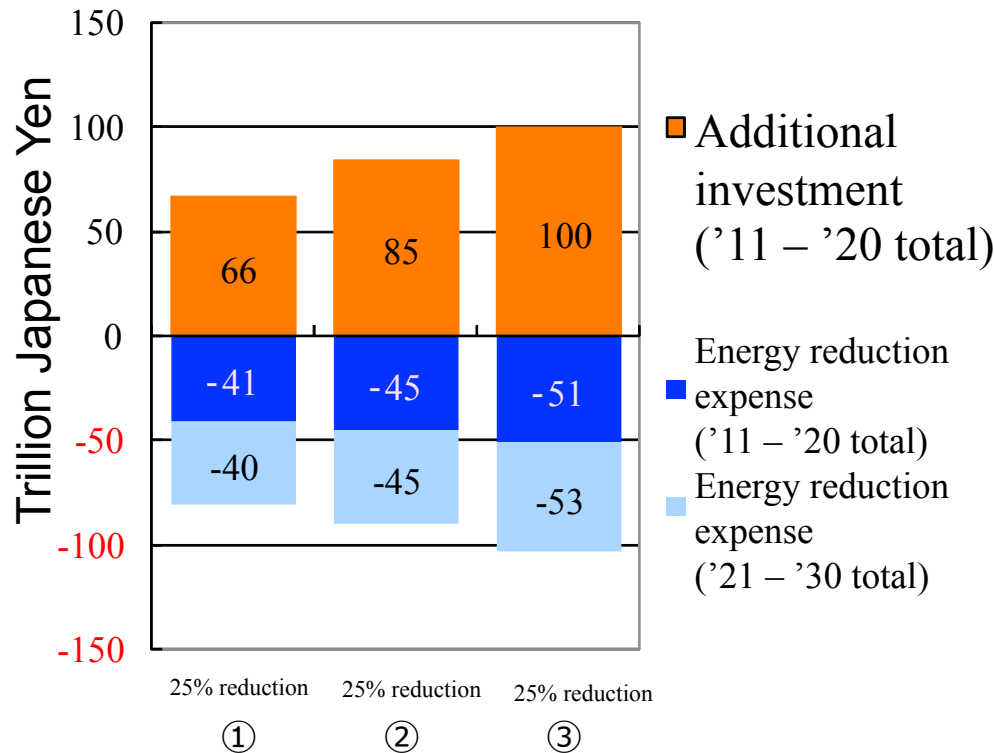
Note: 2020 25% (1): case including around 10% of international contribution and sinks; 25% (2): case including around 5% of international contribution and sinks; 25% (3): case including no international contribution and sinks. 2030 lower order to high order measures: the emissions volume for 2030 is done assuming that the measures that have been carried out in order to reduce emissions toward the 25% reduction in 2020 will continue to be carried out in 2012 through 2030.

# Short-term target analysis to meet the long-term goal

## Relationship between low-carbon investment amount and energy reduction expense

- As for the investment amount for global warming, half of the overall investment amount will be collected by 2020 and an amount equal to the investment amount will be collected by 2030 based on energy expenses that can be saved through technologies introduced.

<Low-carbon investment amount and energy reduction expense>





# Example of concrete execution plan towards Local LCS - Roadmap towards Low Carbon Kyoto study -

## Action 1 Walkable City, Kyoto

The "Walkable City, Kyoto" action will reduce CO<sub>2</sub> emissions in 2030 by 722 kt-CO<sub>2</sub>. These are measures for promoting urban design that prioritizes pedestrians and public transport in order to reduce CO<sub>2</sub> emissions in the transport sector.

In part because Kyoto City has already actively promoted this measure, we estimate that many of the measures in the roadmap can be completed by the year 2020. However, other measures such as road pricing and the introduction of light rail transit (LRT) that involve long-term construction work or more significant changes to the transport structure will take longer, so all of the measures will not be completed until 2028.

The objective of "Promotion of mobility management" is to promote the use of public transport by the general public. "Implementation of transport demand management (TDM)" is needed to bring about a voluntary change in the attitude of the general public. This measure will employ educational pamphlets and related maps to encourage the use of public transport, opinion surveys of transport behavior and so on.

"Construction of pedestrian transit malls" is a measure designed to bring about a shift from the use of privately owned automobiles to public transport as the means of transport used by the general public. The sidewalks along Shijo-dori in the city center will be widened to secure a comfortable pedestrian space and promote a modal shift on the part of the general public. The use of pedestrian transit malls by the general public will enable CO<sub>2</sub> emissions to be reduced by 32 kt-CO<sub>2</sub>.

Moreover, as many tourists visit Kyoto from other areas, it is important to have these tourists use public transport as well. "Attraction of tourists using public transport" is the measure that will be employed to promote the use of public transport by tourists. Publicity campaigns will be held at major train stations in the Kinki and Chubu districts to invite tourists to come by public transport. Moreover, the introduction of intelligent buses that travel between tourist spots in the city will encourage tourists to use public transport to travel within the city as well. These measures will reduce CO<sub>2</sub> emissions by 12 kt-CO<sub>2</sub>.

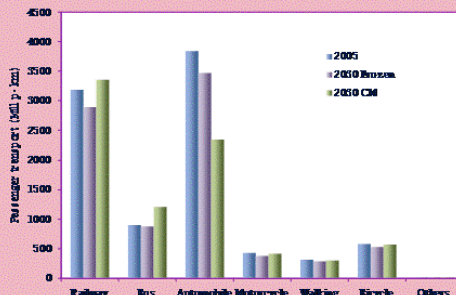


Figure 7 Passenger transport volume

In the "Business as usual" case, the modal share for means of transport is the same in 2050 as it was in 2005. In the "corrective measures" case, a modal shift has occurred from privately owned automobiles to other means of transport, with the result that the automobile share has decreased and the share of public transport, bicycle and pedestrian transit has increased.

In the "corrective measures" case, the modal share for means of transport within the region that was occupied by automobiles has shifted 10% to trains, 20% to buses, 5% to pedestrian transit, and 7% to bicycles. Moreover, inter-regional transport within the city by automobile has shifted 10% to trains, 20% to buses, and 5% each to pedestrian transit and bicycles. Transport to places outside the region by automobile has shifted 50% to trains.

## Six Action Plans in Kyoto

Workable city,  
Kyoto

Decarbonization  
of Industry

Kyoto style  
building and  
forest  
management

Comprehensive use  
of renewable  
energy

Low-carbon  
lifestyle

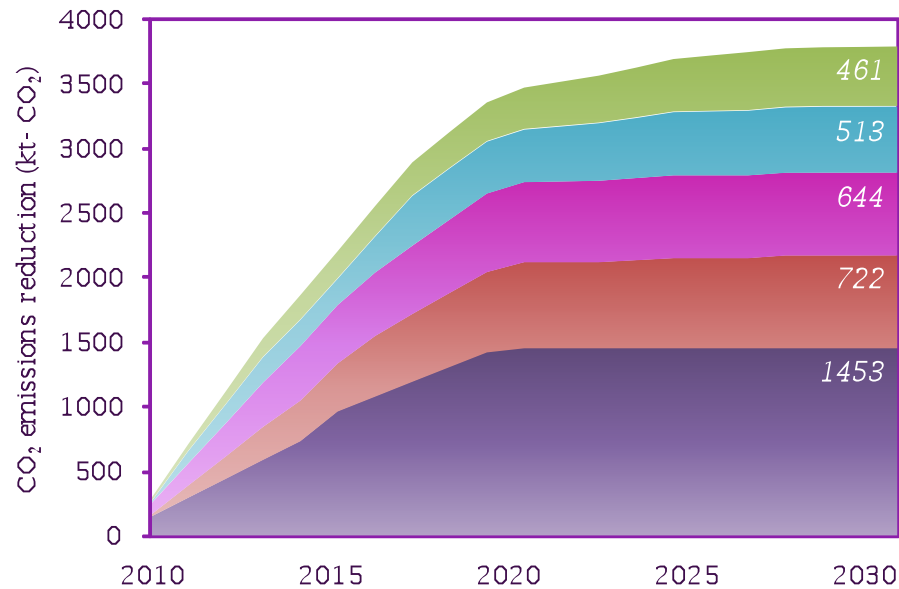
Establishment  
of a funding  
mechanism

# Target in Kyoto

- Base year: 2005
- Target year: 2030
- Target area: Kyoto city area
- Target activity:
  - Residential, commercial and industrial activity in Kyoto city area
  - Transport originated in Kyoto city area
- Target gas:
  - CO<sub>2</sub> from fossil fuel combustion
  - CO<sub>2</sub> from waste (plastic) incineration
- Low-carbon target: -40% compared to 1990 level

Municipal Ordinance was adopted on 14 October 2010

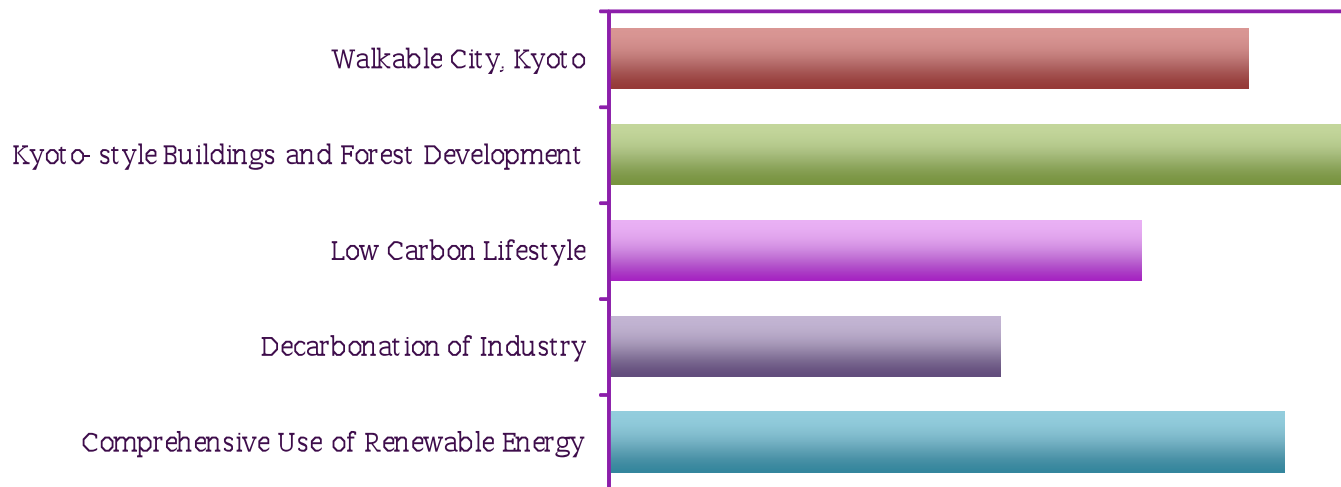
# A roadmap in Kyoko



Kyoto style building and forest management  
 Comprehensive use of renewable energy  
 Low-carbon lifestyle

Workable city, Kyoto

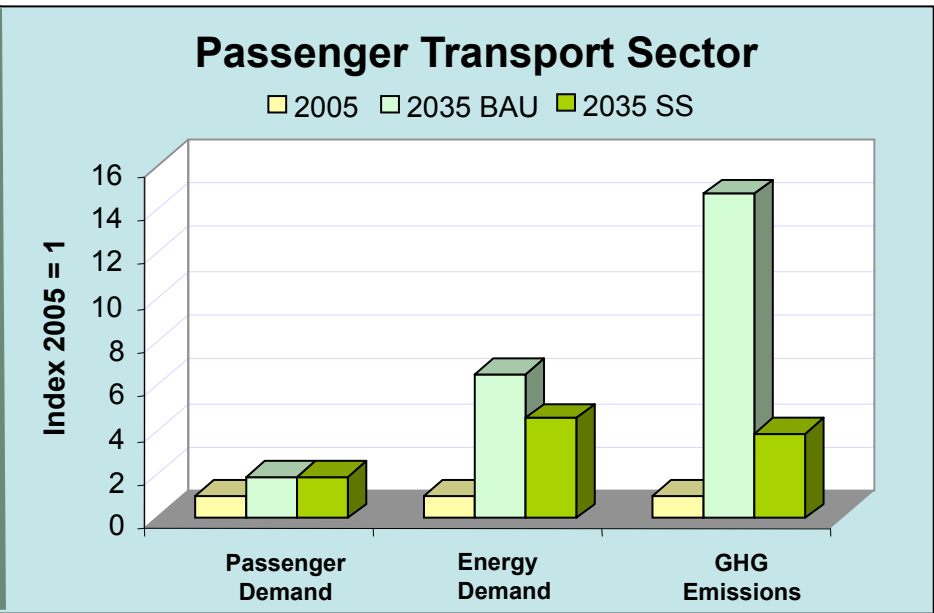
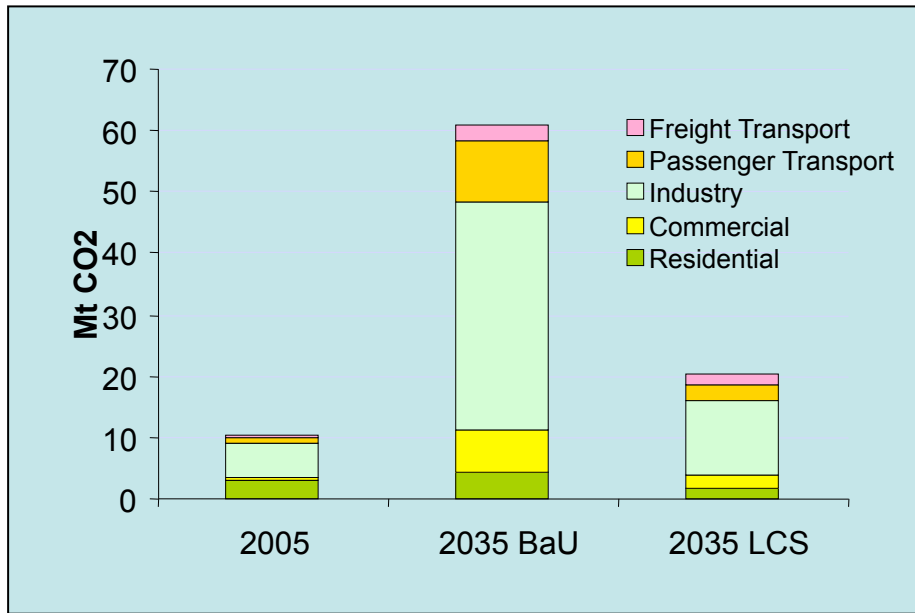
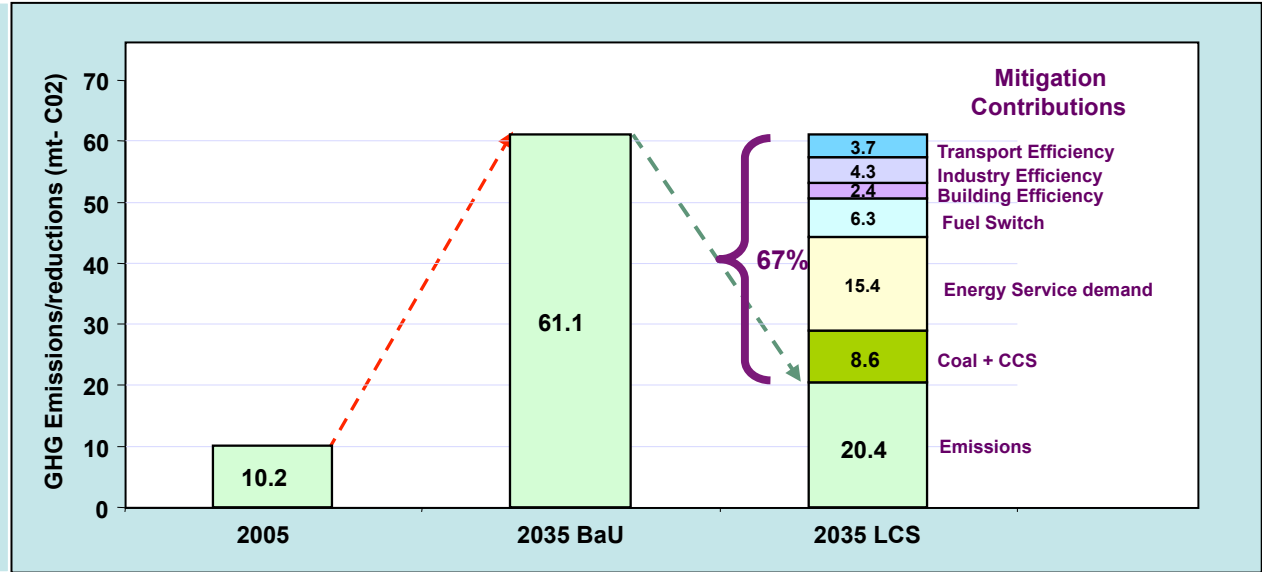
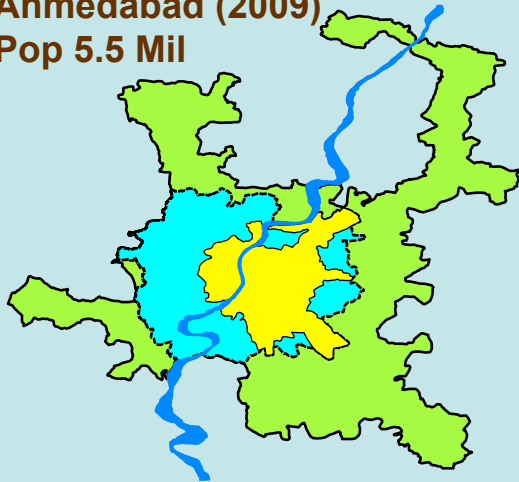
Decarbonization of industry



# Case study in India

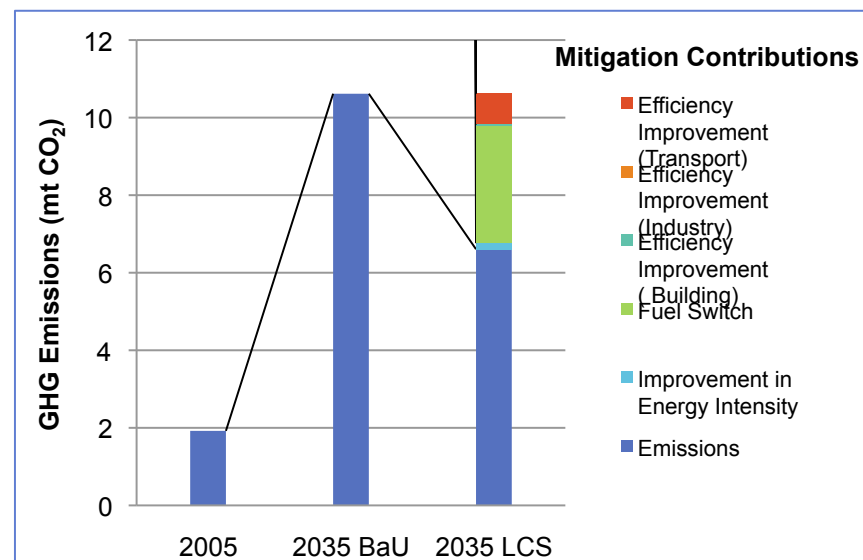
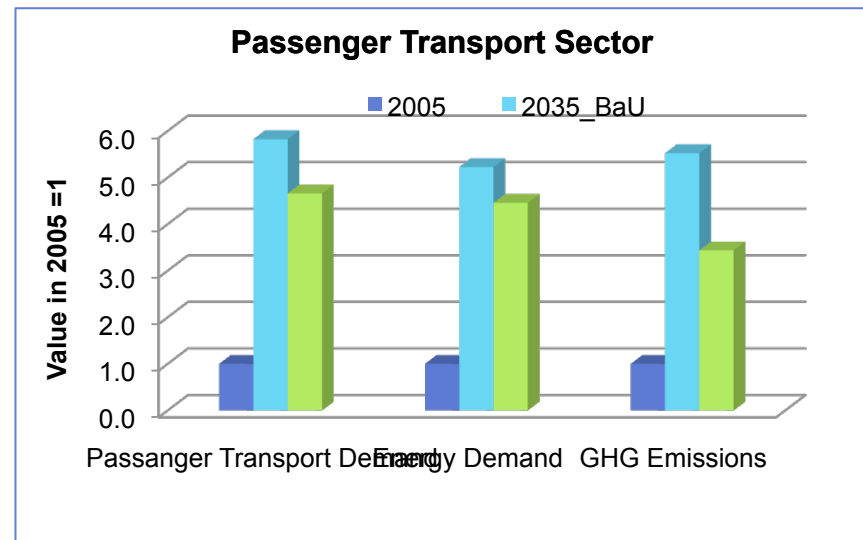
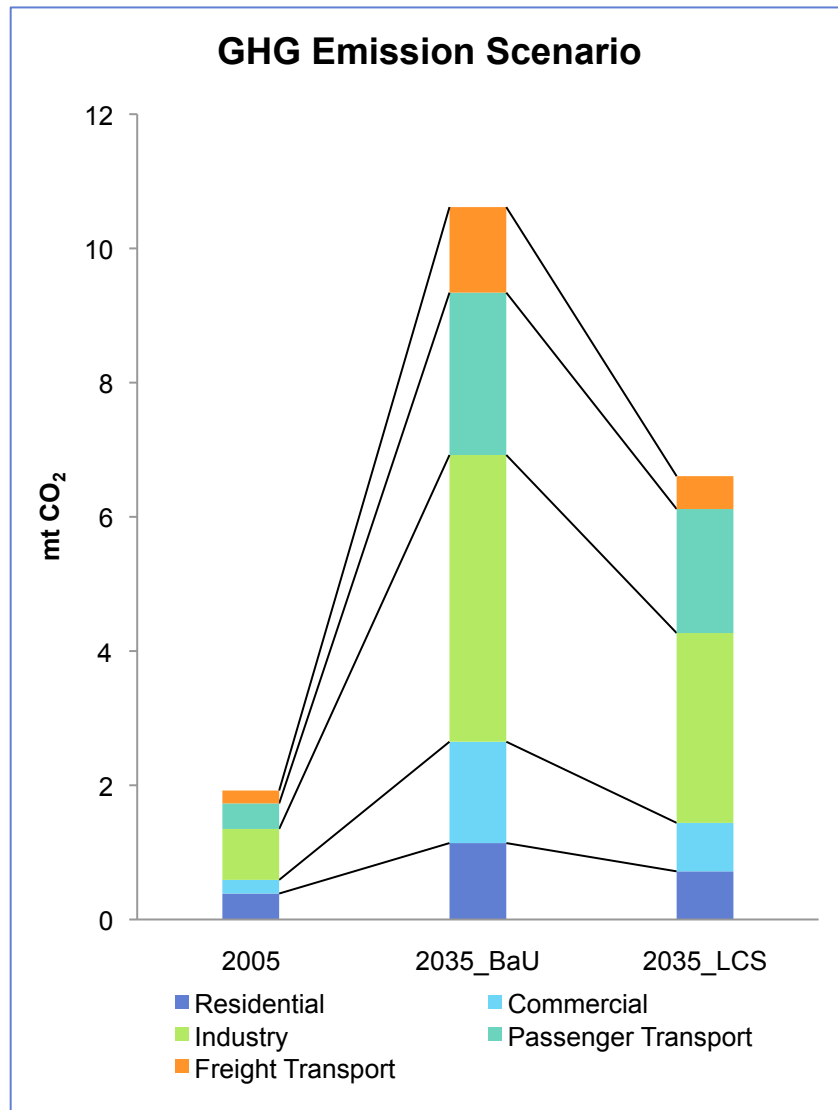
# Sustainable Low Carbon Cities: Ahmedabad

Ahmedabad (2009)  
Pop 5.5 Mil



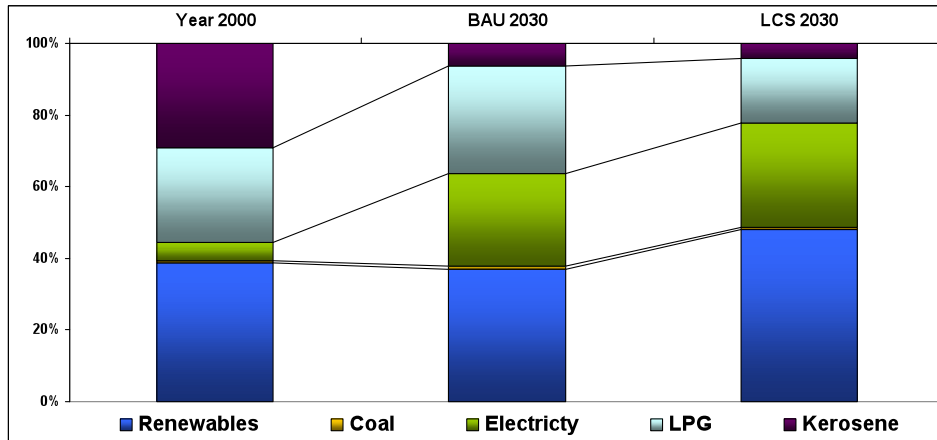
Source: Shukla

# Bhopal LCS Preliminary Results

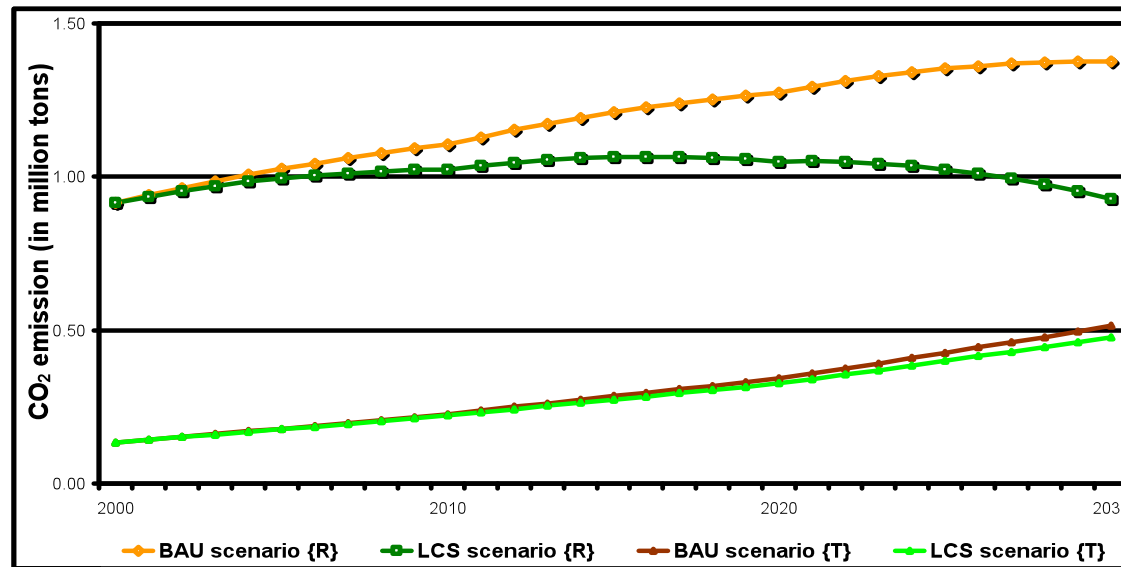
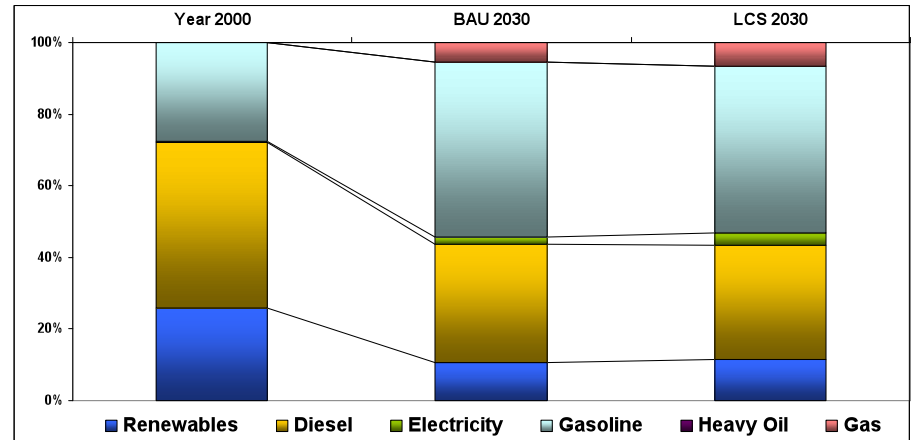


# Study results from AIM/Enduse Study: Bhopal

- Residential Sector



- Transport Sector



Bhopal - BAU and LCS scenarios in Residential and Transport Sectors

# Barriers to overcome in LCS Pathways

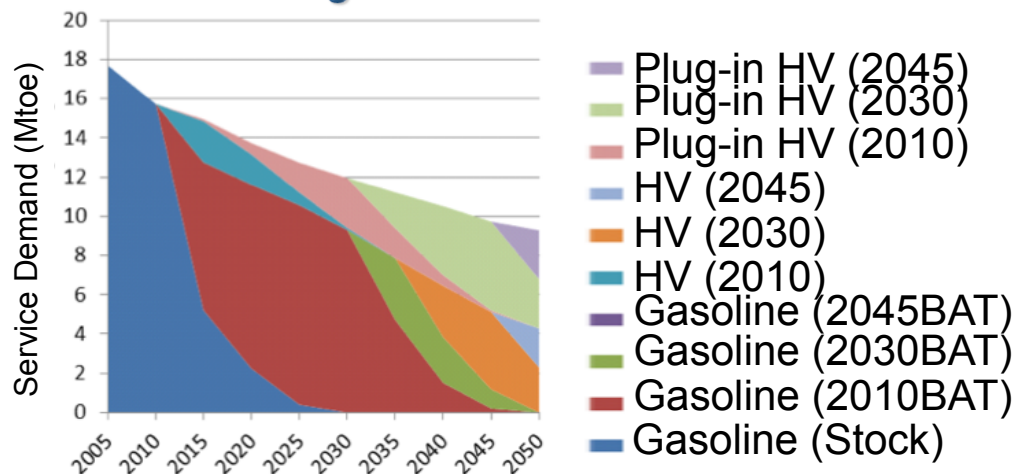
- No common generalized policies can be developed, Individual solutions are needed for each of the city
- Success depends on the participation of local government / people
- Almost no awareness in smaller cities
- Capacity building is slow and time taking
- Good quality infrastructure and services are almost always necessary that are already stressed
- Development priorities may not be in line with LCS objectives
- Economic implications are not easy to anticipate



**Thanks for your attention!**

# Example of technology deployment through 2050

## Passenger Vehicle



## Lighting in residential sector

