Low Carbon Asia: Visions and Actions

Scenarios for China, India, Japan and other Asian Countries

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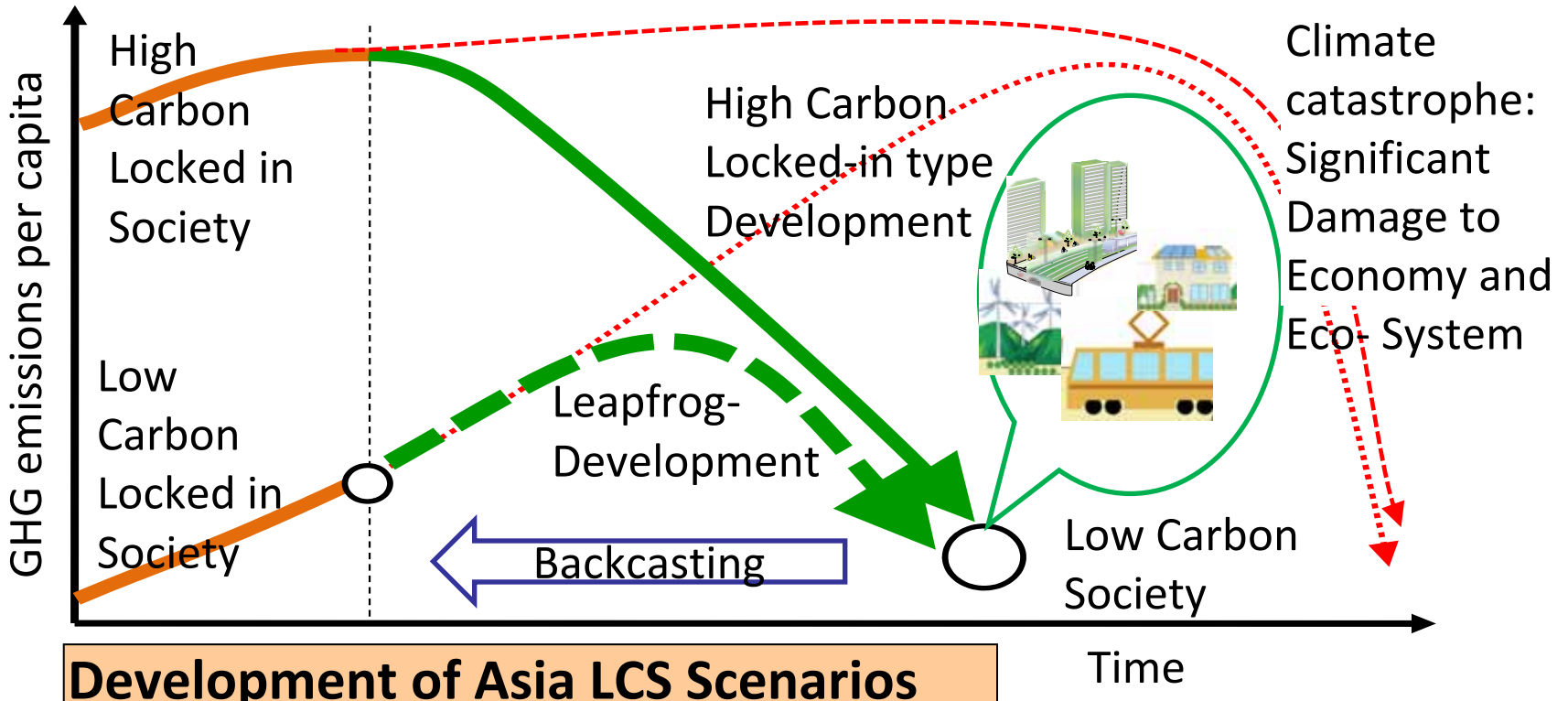
10 December 2009
COP15 and CMP5 Side Event
Bella Center, Copenhagen

How to reach to Low Carbon Society in Asia ?



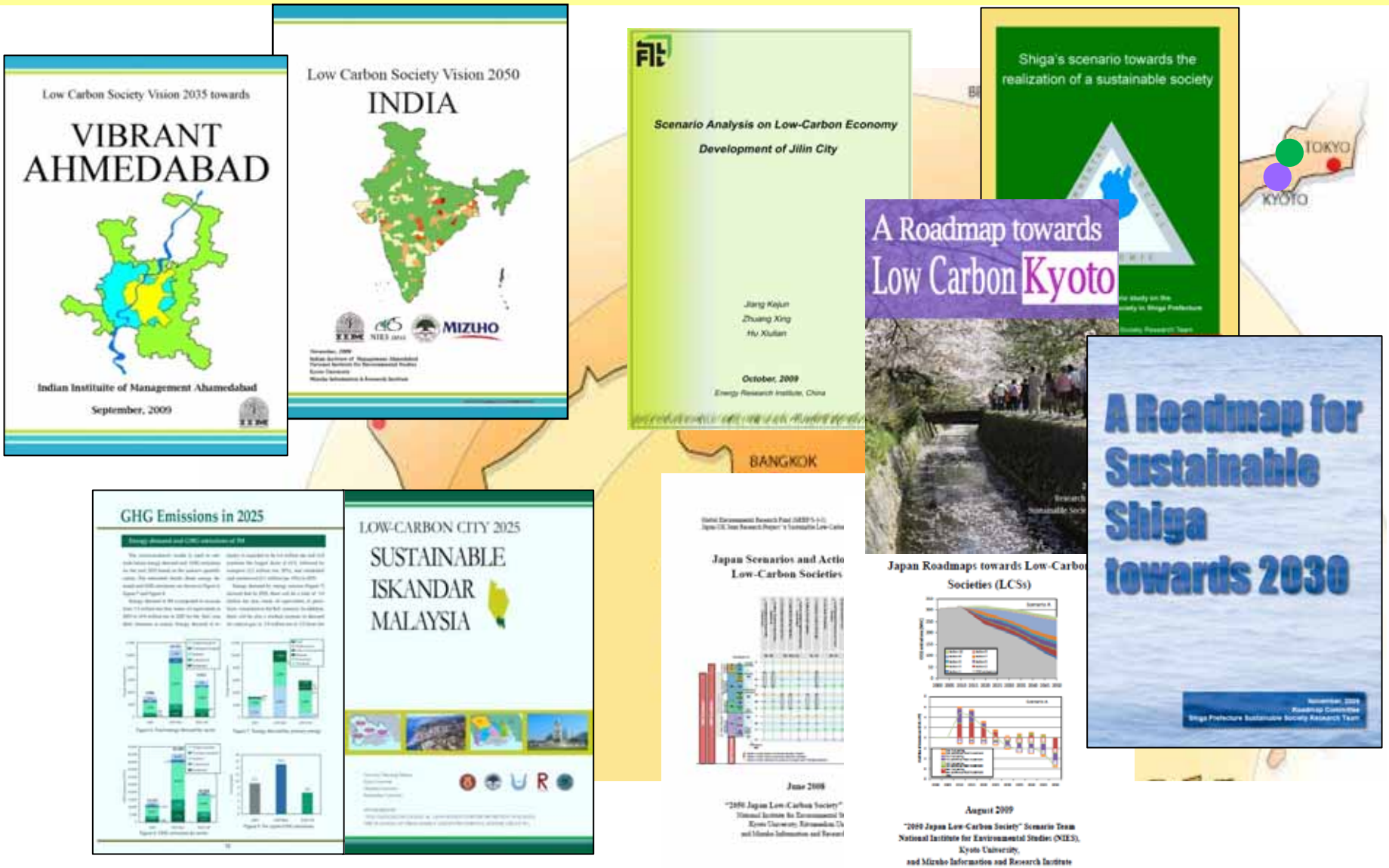
Development of Asia LCS Scenarios

(1) Depicting narrative scenarios for LCS
(2) Quantifying future LCS visions
(3) Developing robust roadmaps by backcasting

Policy Packages for Asia LCS

Funded by Ministry of Environment, Japan and NIES

Low-Carbon Scenarios for countries and sub-countries in Asian

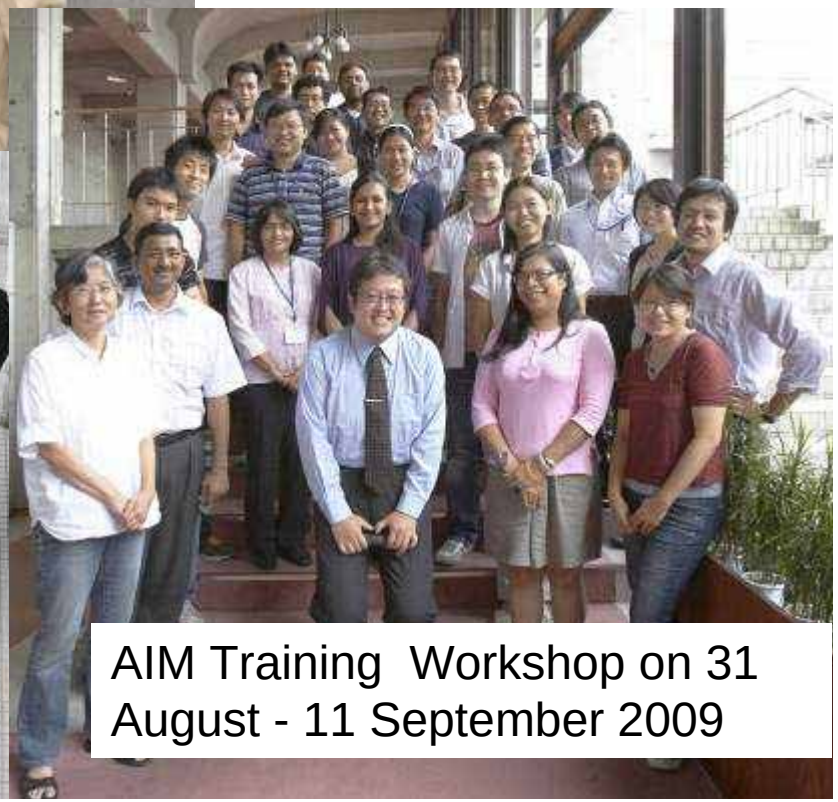


http://2050.nies.go.jp/LCS

Asia Modeling Network

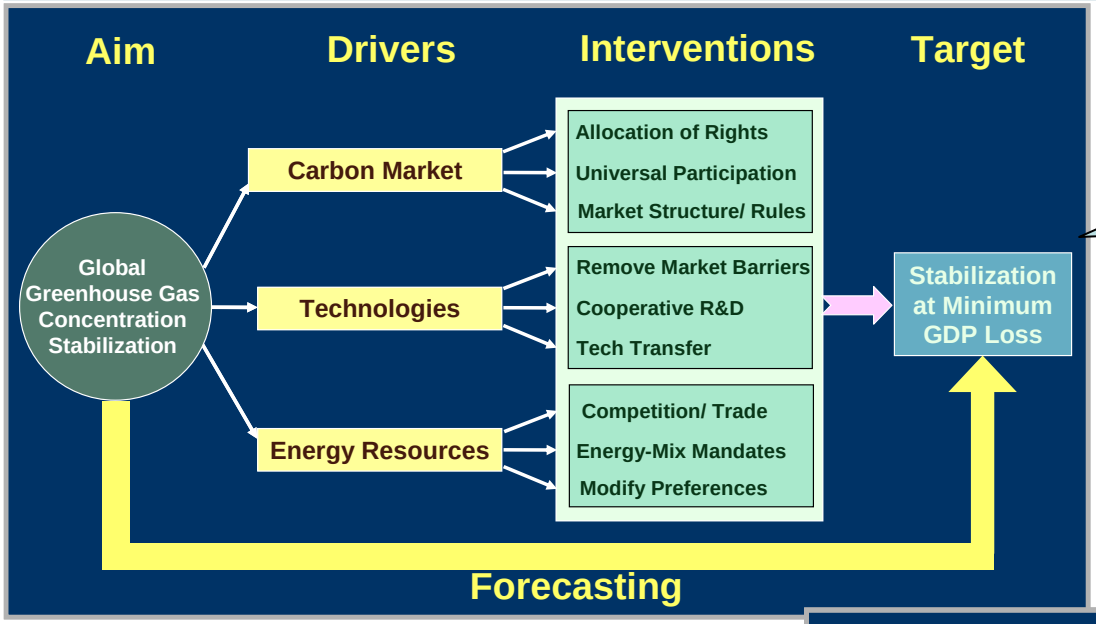
Asian Modeling Meeting at Tsukuba on 17-18 September 2009

14th AIM International Workshop on 14-15 February 2009



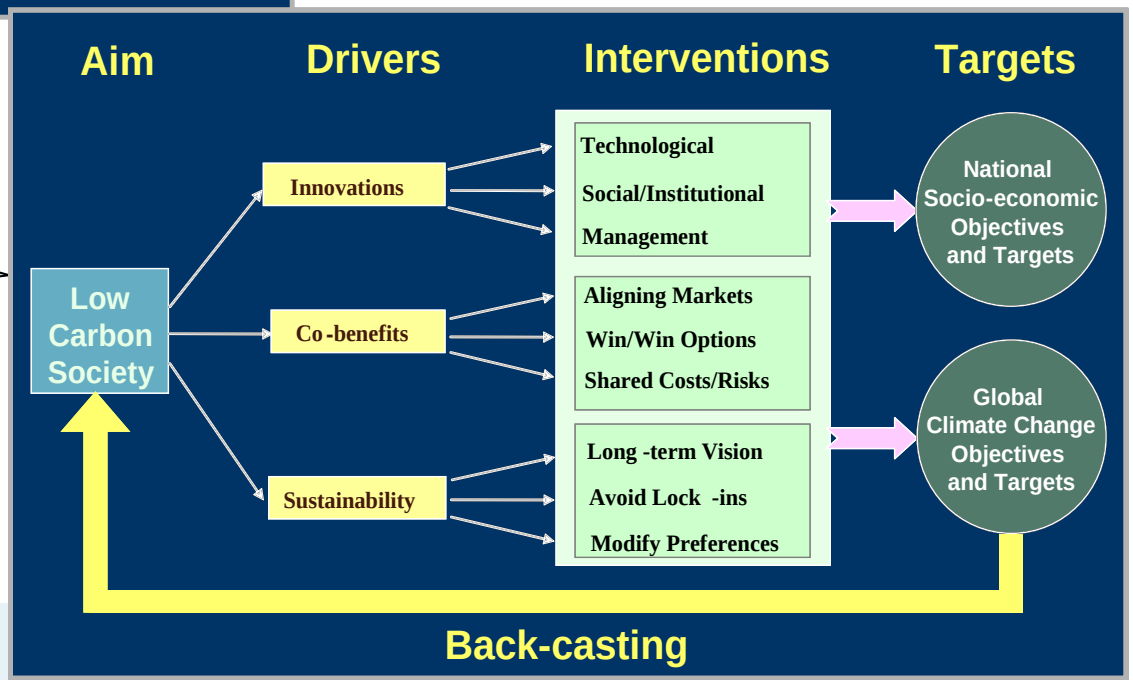
AIM Training Workshop on 31 August - 11 September 2009

Modeling Alternate Development Perspectives

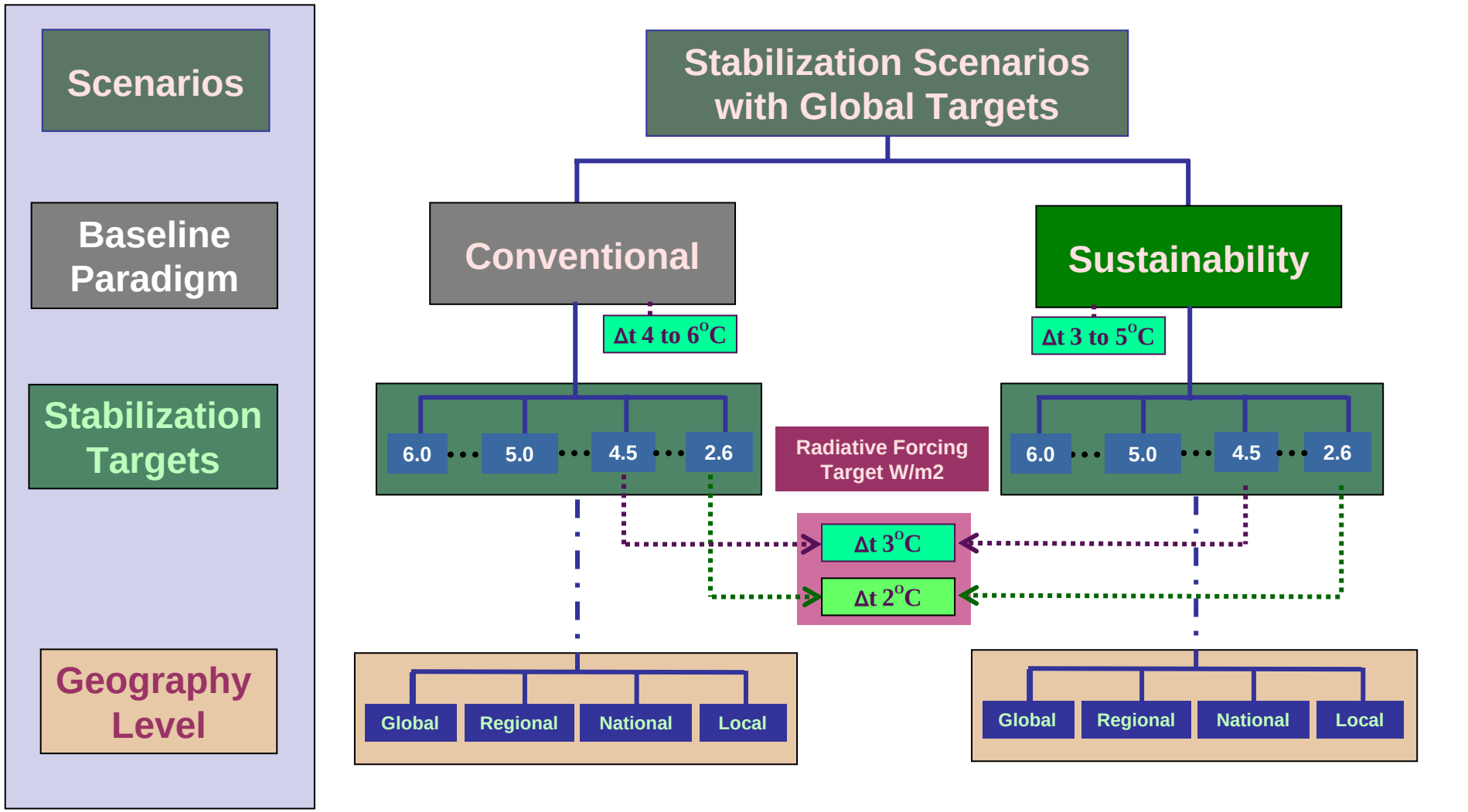


Conventional Climate Centric Paradigm

Sustainable Development and Climate Paradigm



Global Climate Stabilization Scenarios

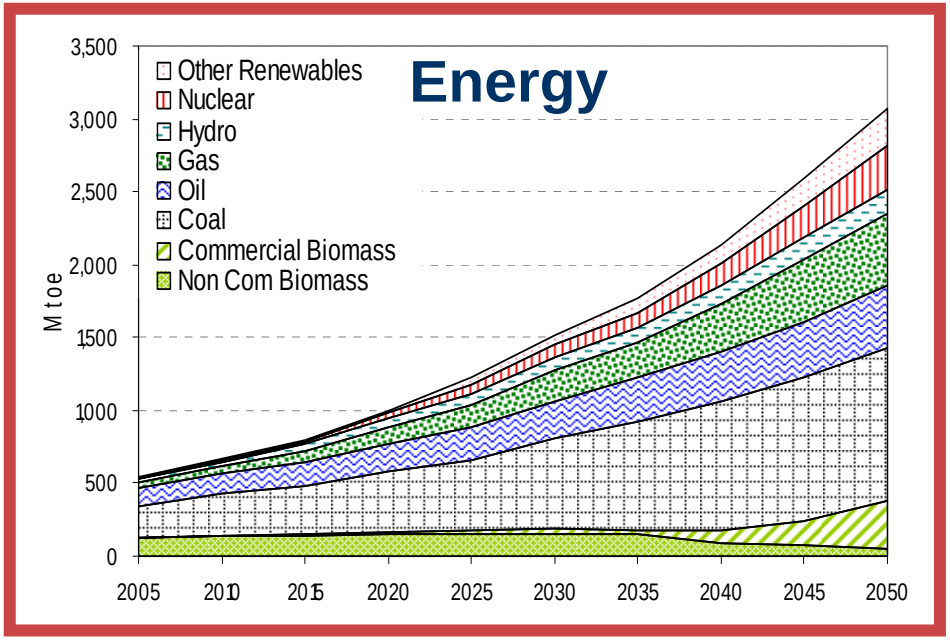


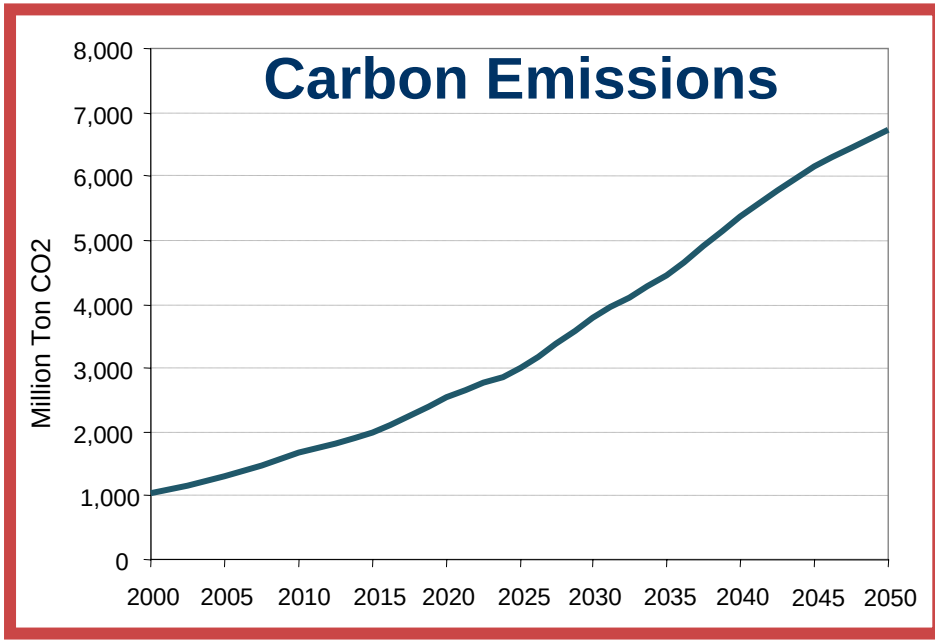
National Analysis: MARKAL & End-Use Models

Base Scenario: Growth of Economy and Population

From 2005-2050:
Annual Economic Growth: 7.2%
Annual Population Growth: 0.9%

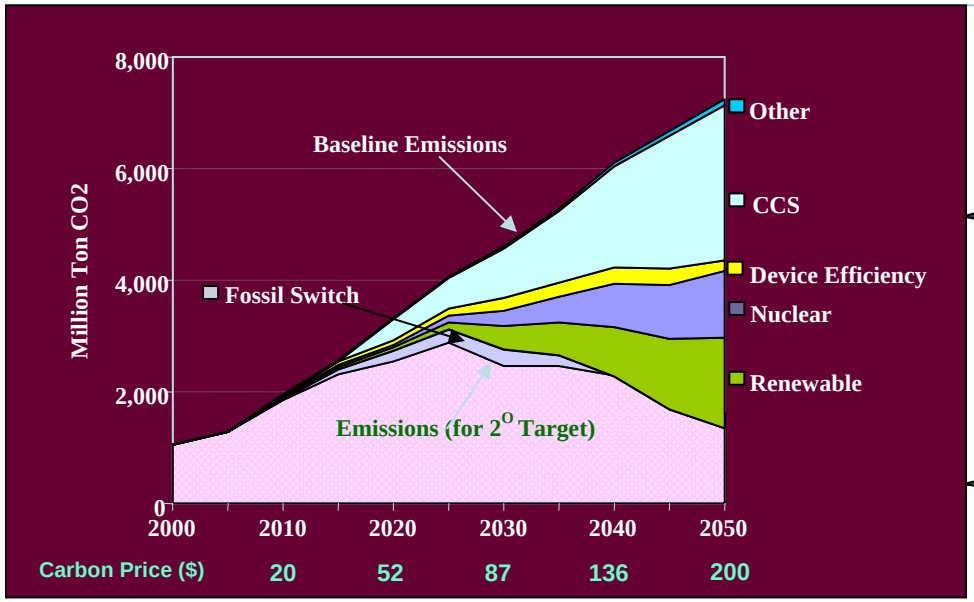
Absolute Growth in 2050 over 2005
Economy 23 times
Population 1.56 times





Global Stabilization Target: 2°C

Mitigation Technology Options



Conventional Approach: transition with conventional path and carbon price

- High Carbon Price
- Climate Focused Technology Push
- Top-down/Supply-side actions

Technology Co-operation Areas

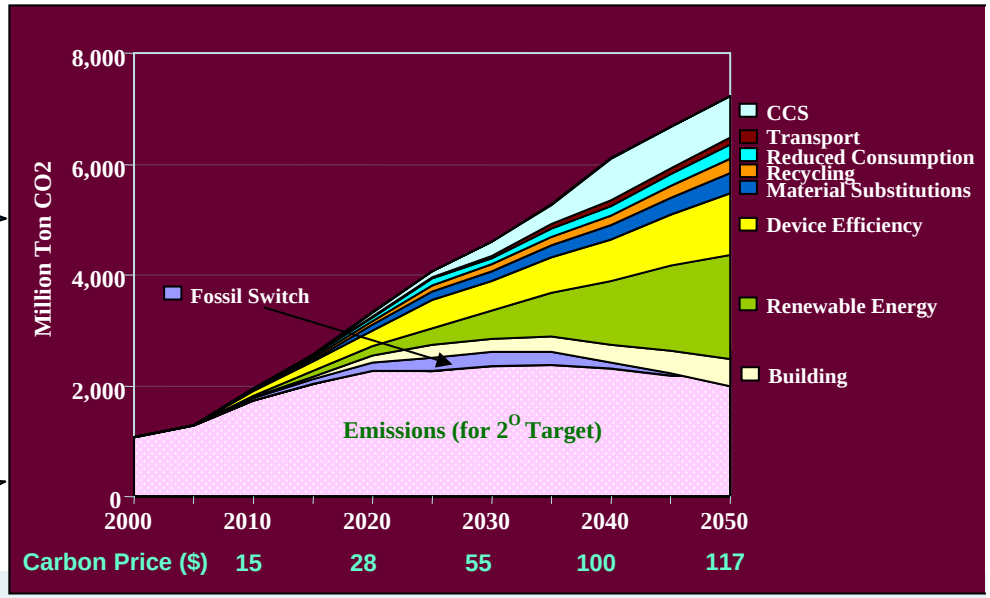
- Energy Efficiency
- Wind/Solar/Biomass/Small Hydro
- Nuclear/CCS

Sustainability Approach: aligning climate and sustainable development actions

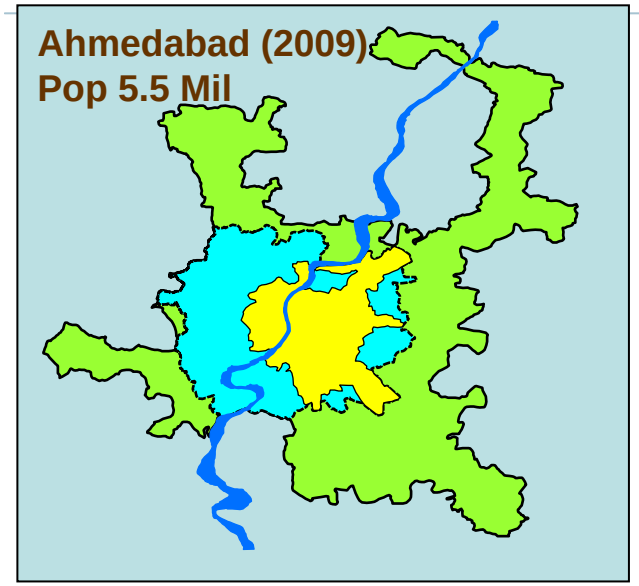
- Low Carbon Price
- Bottom-up/Demand-side actions
- Behavioural change
- Diverse Technology portfolio

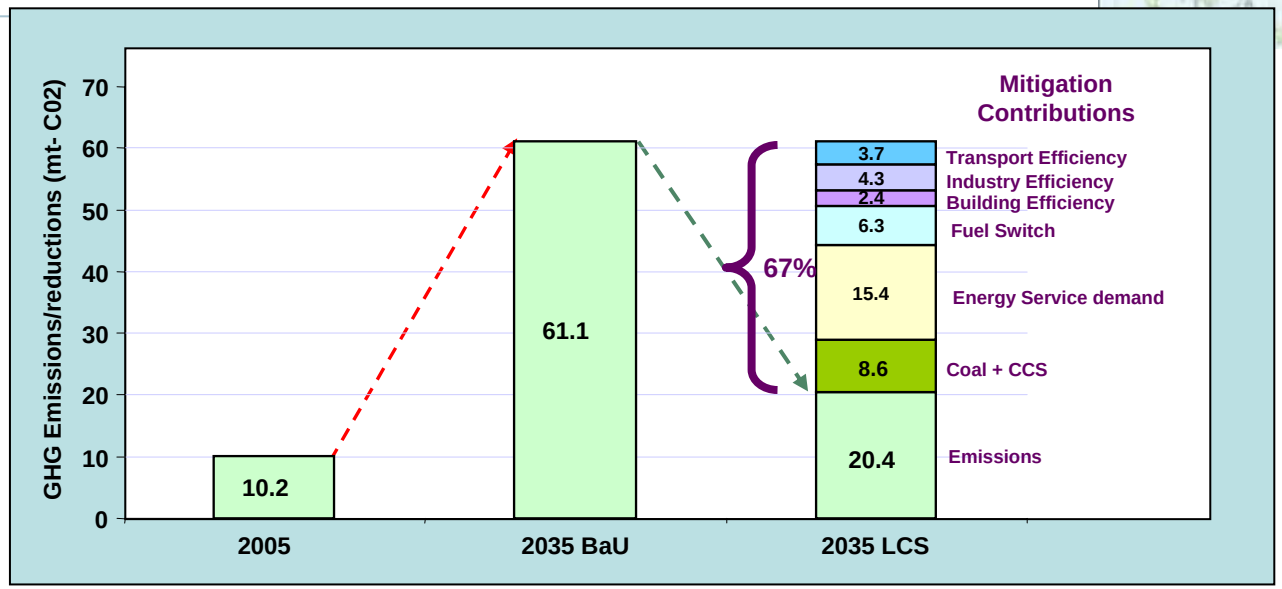
Technology Co-operation Areas

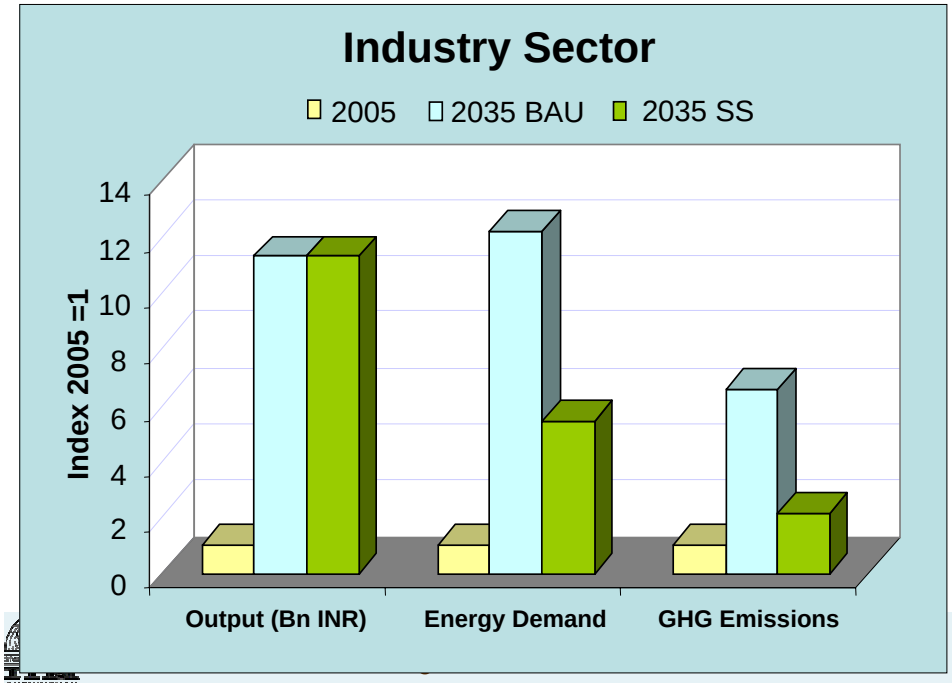
- Transport Infrastructure Technologies
- 3R, Material Substitutes, Renewable Energy
- Process Technologies
- Urban Planning, Behavioral Changes

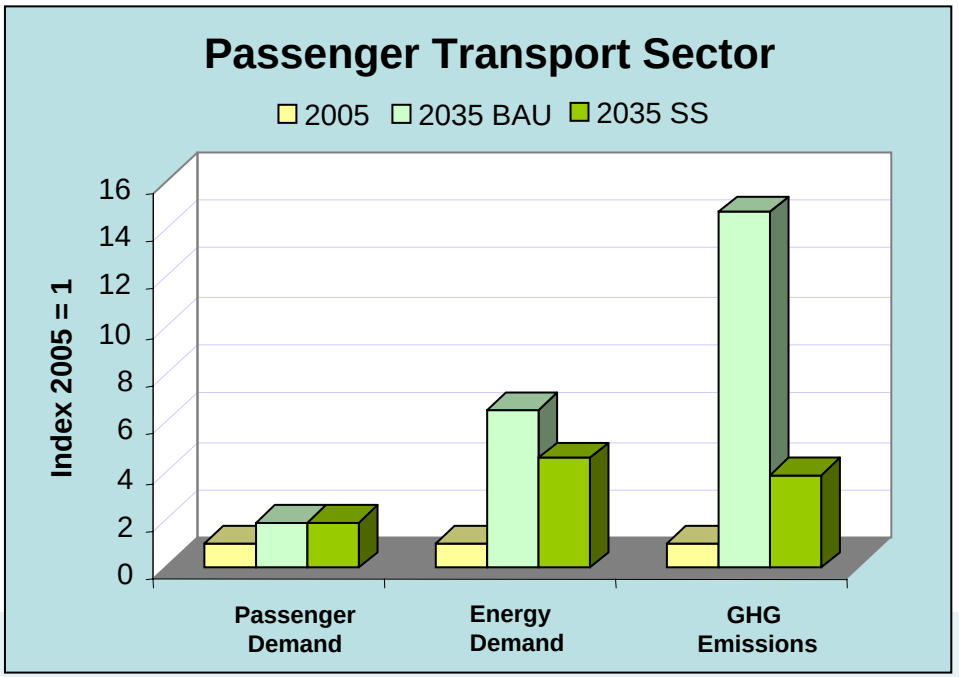


Low Carbon Scenario: Ahmedabad

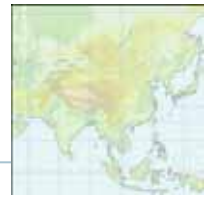


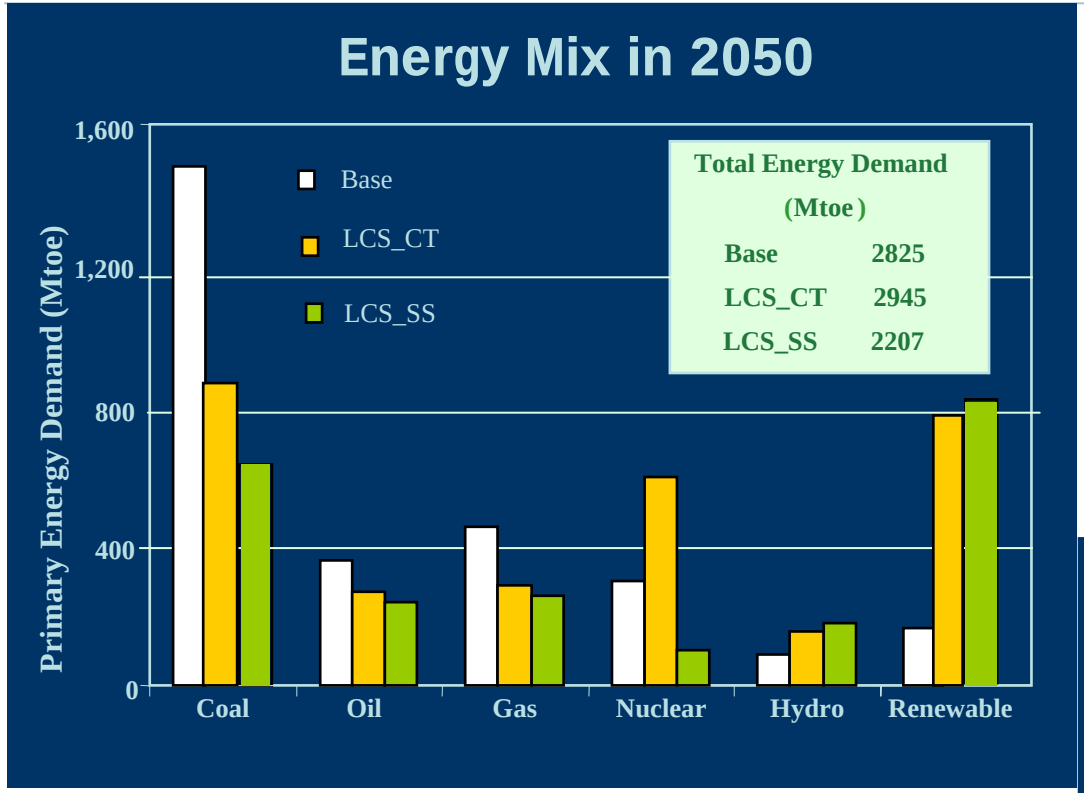


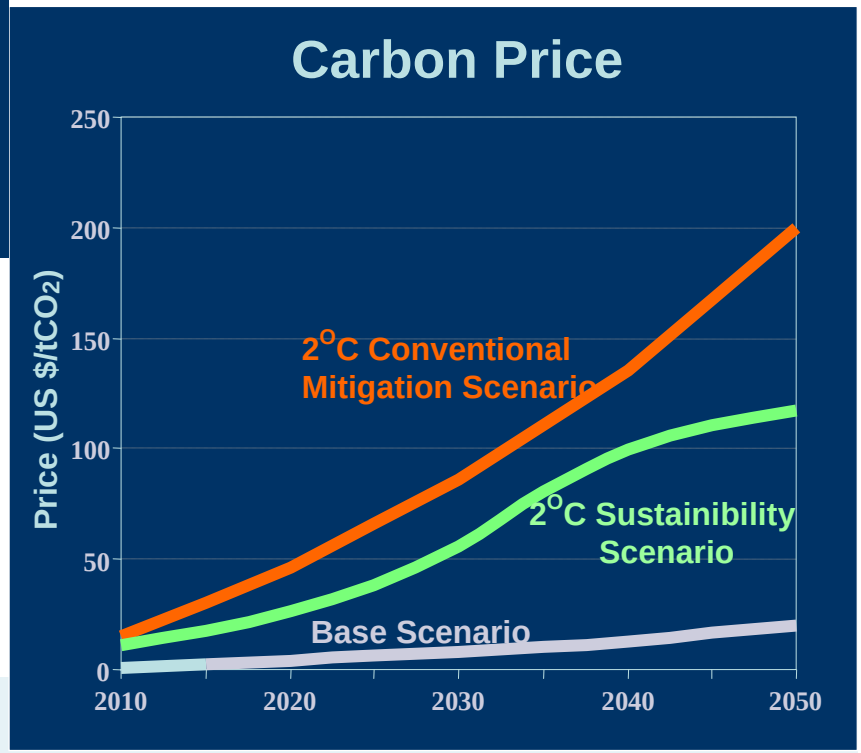


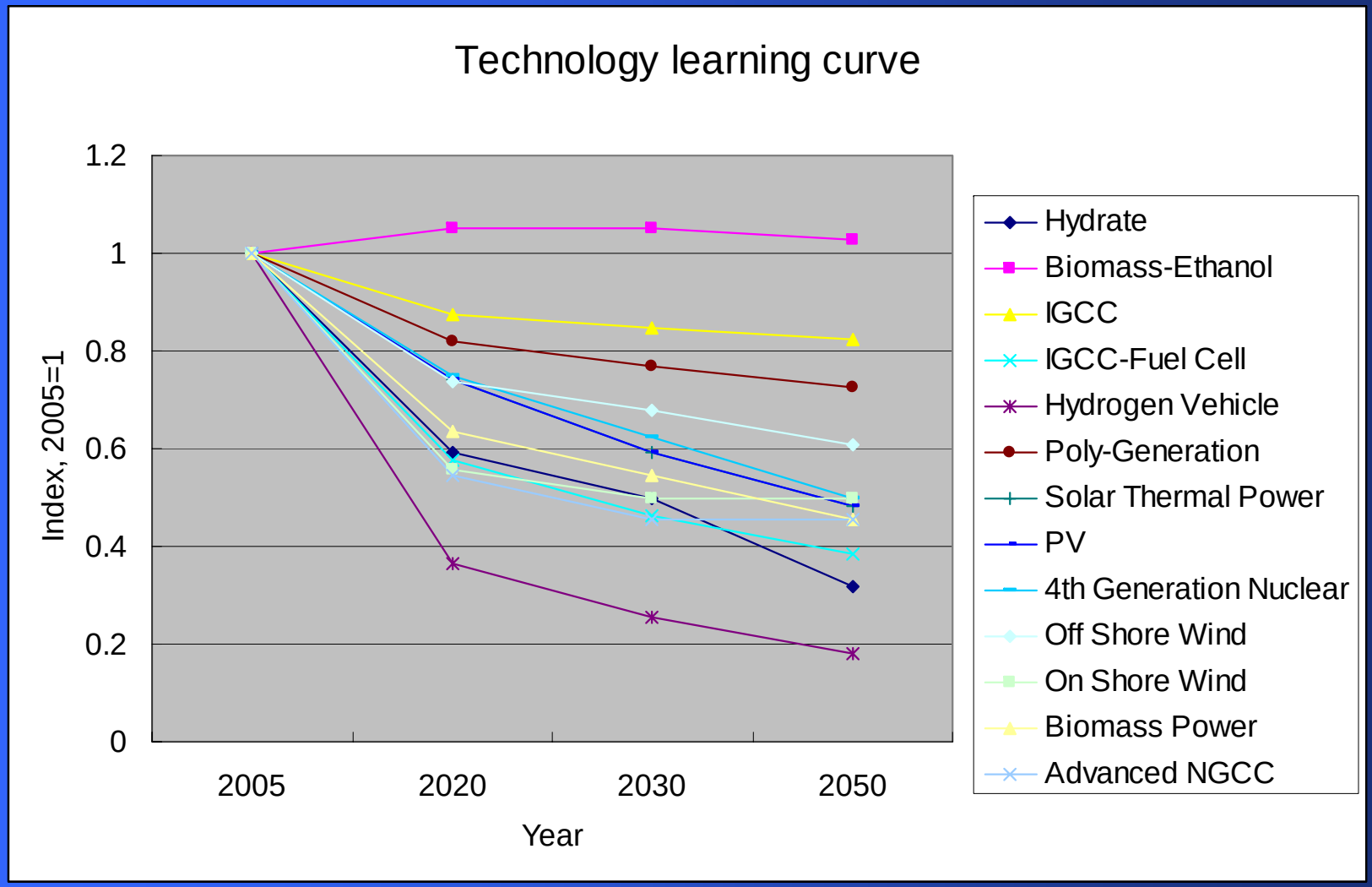


Primary Energy and Carbon Price





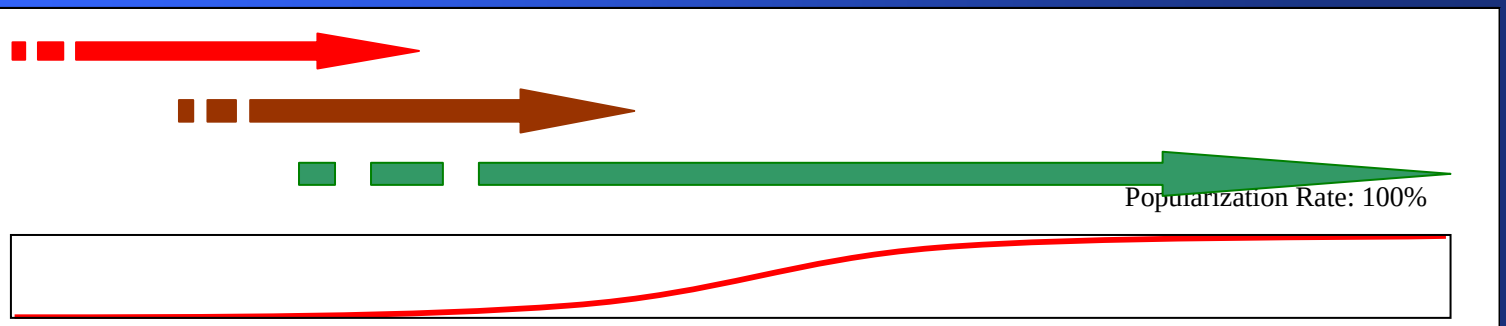
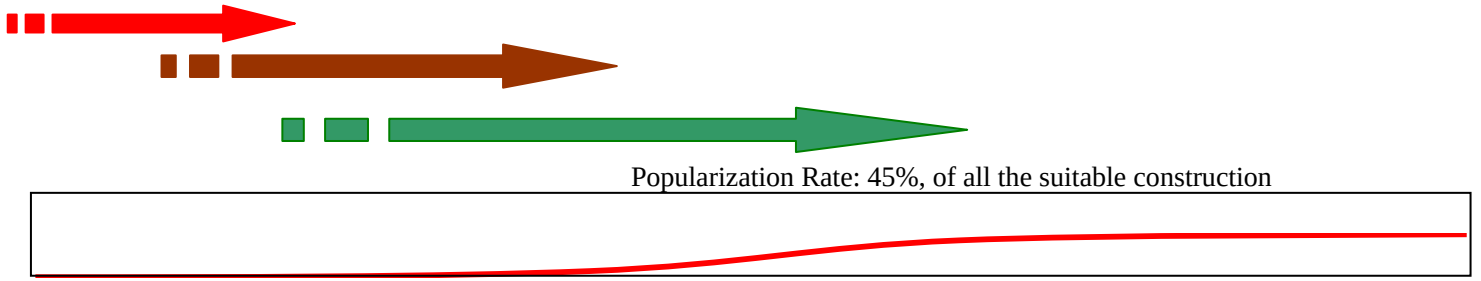


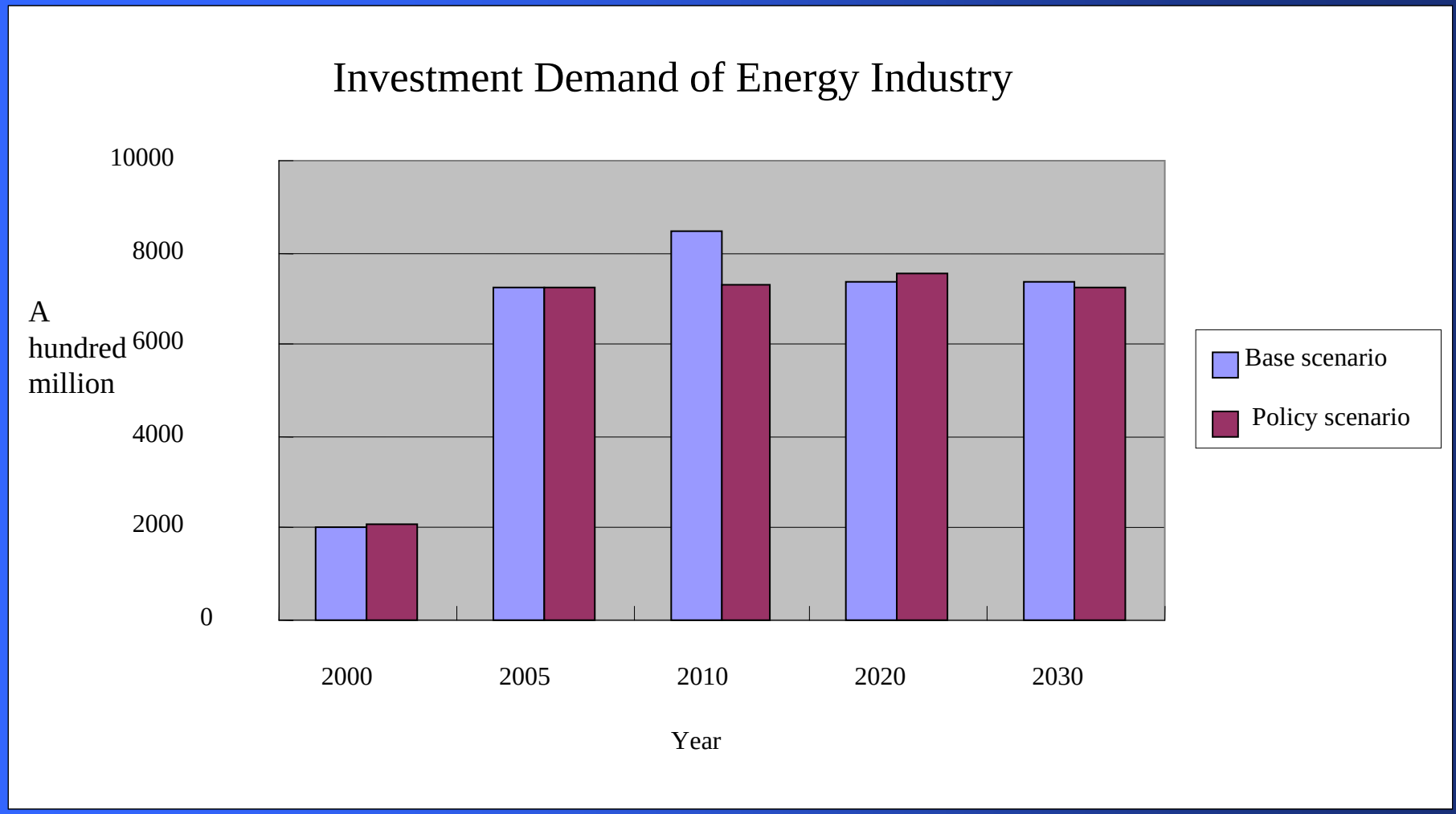

Technology learning curve
1.2
1
0.8
0.6
0.4
0.2
0
Index, 2005=1
2005
2020
2030
2050
Year
Hydrate
Biomass-Ethanol
IGCC
IGCC-Fuel Cell
Hydrogen Vehicle
Poly-Generation
Solar Thermal Power
PV
4th Generation Nuclear
Off Shore Wind
On Shore Wind
Biomass Power
Advanced NGCC

28 key technologies in the enhanced low carbon scenario in China

No.	Sector	Technology	Description	Note
1	Industry technology	High energy efficiency equipment	High efficiency furnace, kiln, waste heat recovery system, high efficiency process technologies, advanced electric motor	Nearly in market
2		New manufacture process technology for cement and steel		
3		CCS	In cement, steel making, refinery, ethylene manufacture	
4	Transport	Super high efficiency diesel vehicle	Advanced diesel hybrid engine	
5		Electric car		
6		Fuel cell car		
7		High efficiency aircraft	30% higher energy efficiency	
8		Bio-fuel aircraft		
9	Building	Super high efficiency air-conditioner	With COP>7	
10		LED lighting		
11		In house renewable energy system	Solar PV/Wind/Solar hot water and space heating	
12		Heat pumps		Mature
13		High isolation building		Mature
14		High efficiency electric appliance		Mature before 2030
15	Power generation	IGCC/Poly-Generation	With efficiency above 55%	
16		IGCC/Fuel cell	With efficiency above 60%	
17		On shore Wind		Mature
18		Off shore wind		Mature before 2020
19		Solar PV		
20		Solar Thermal		
21		4^{th} Generation Nuclear		
22		Advanced NGCC	With efficiency above 65%	
23		Biomass IGCC		
24		CCS in power generation		
25	Alternative fuels	Second generation bio-ethanol		
26		Bio-diesel	Vehicles, ships, vessels	
27	Grid	Smart grid		
28	Circulating tecnologies	Recycle, reuse, reducing material use		

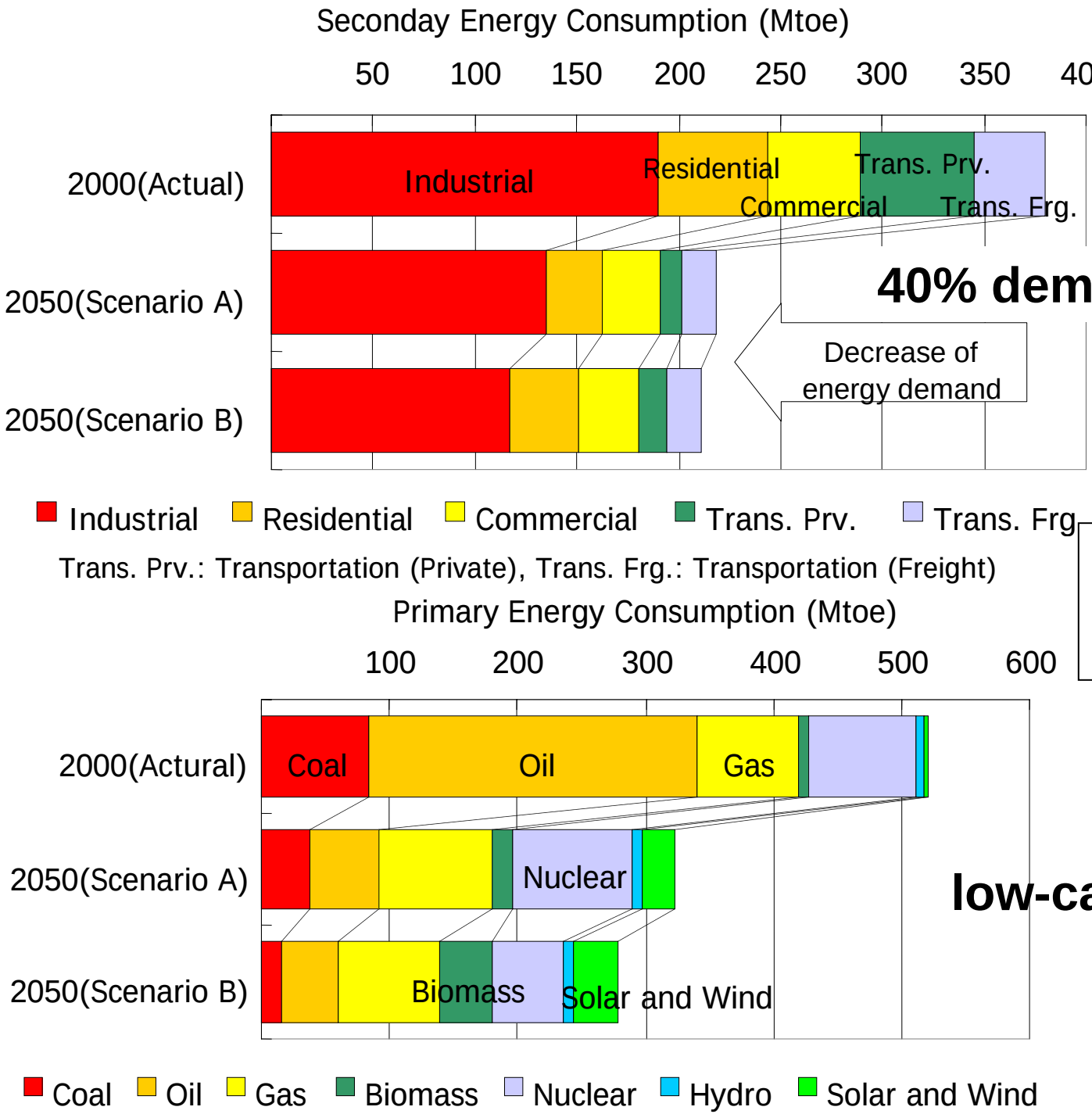
Technology Roadmap

Ultra performance air-conditioning	
Advanced Solar Water heater/ heating	


Investment Demand of Energy Industry
10000
8000
6000
4000
2000
0
A hundred million
2000
2005
2010
2020
2030
Year
Base scenario
Policy scenario

Technology roadmap and perspective

- Technology in sight could lead us to low carbon future(2℃ target)
- If there is new technology coming out, there will be more promising future, such as bio-technologies, geothermal technologies, and space technologies etc.



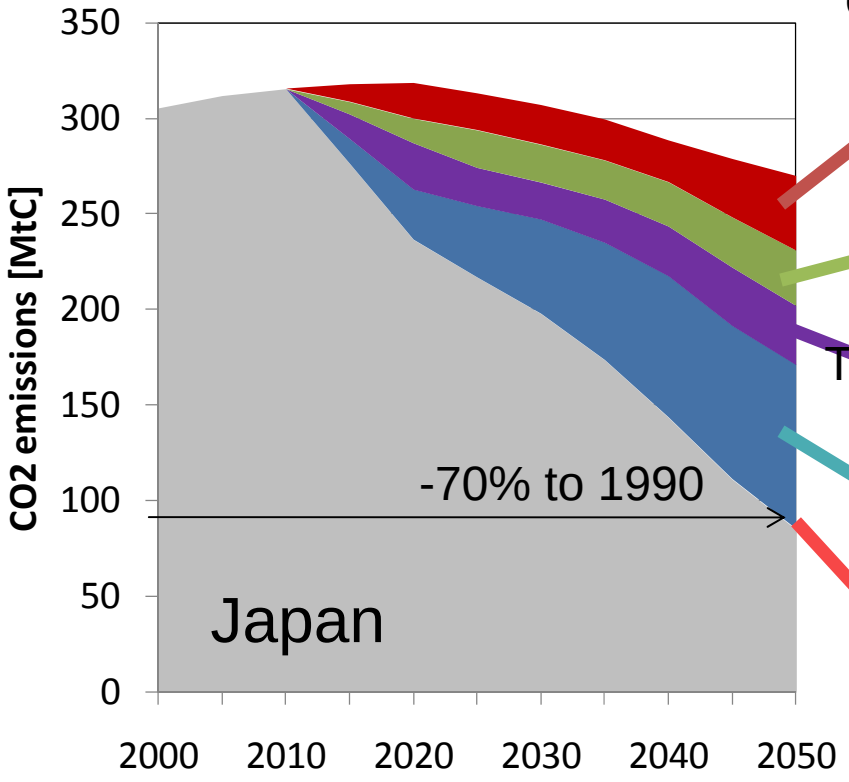
40% demand reductions

70% CO2 cut by 2050

low-carbon energy

Japan

A dozen actions make it possible to reduce 70% CO2 emissions by 2050



Residential/ commercial

Industrial

Transportation

Energy supply

Cross-sector

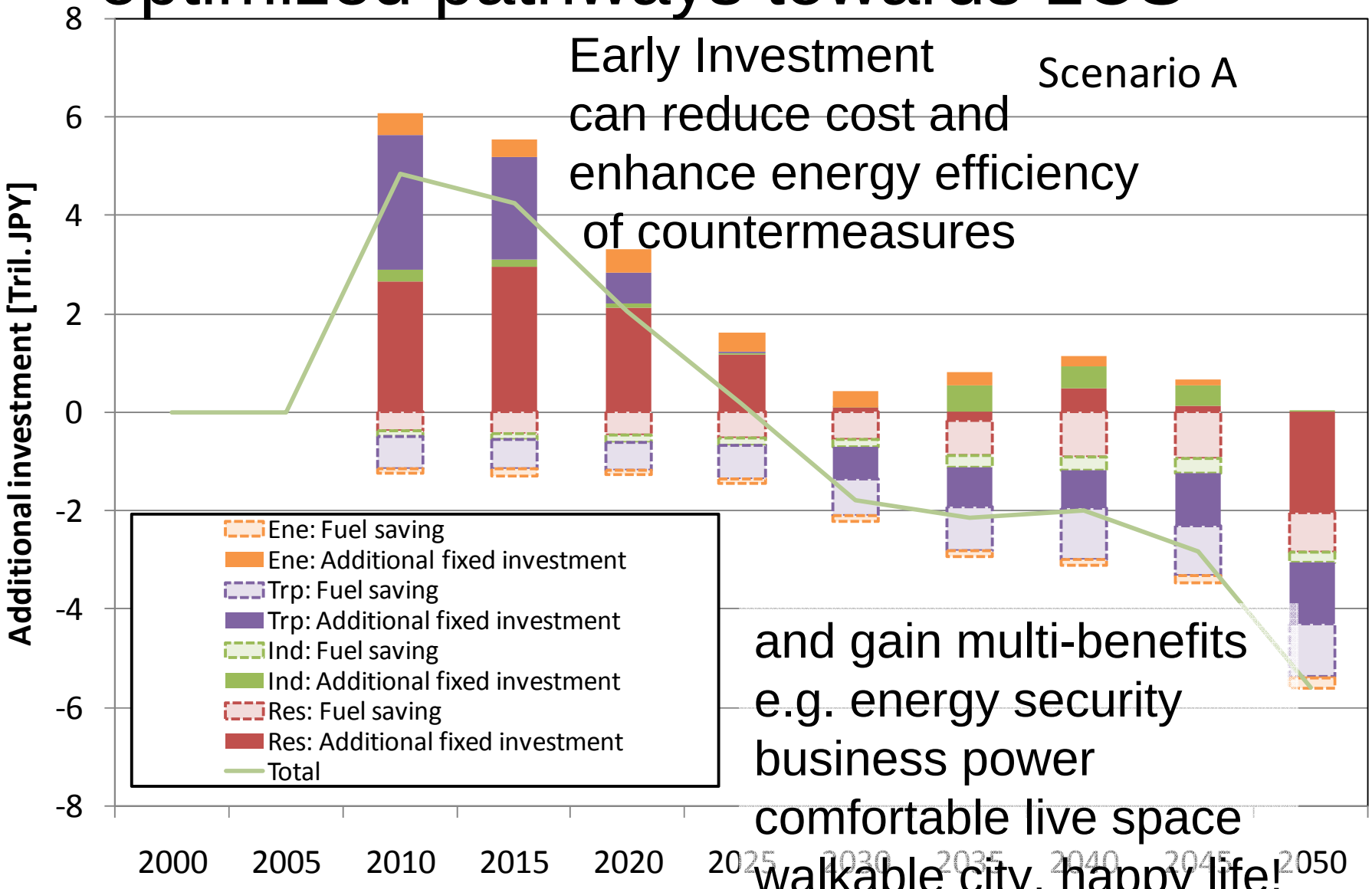
A Dozen Actions

1. Comfortable and Green Built Environment
2. Anytime, Anywhere Appropriate Appliances
3. Promoting Seasonal Local Food
4. Sustainable Building Materials
5. Environmentally Enlightened Business and Industry
6. Swift and Smooth Logistics
7. Pedestrian Friendly City Design
8. Low-Carbon Electricity
9. Local Renewable Resources for Local Demand
10. Next Generation Fuels
11. Labeling to Encourage Smart and Rational Choices
12. Low-Carbon Society Leadership

Japan

Backcasting model can show optimized pathways towards LCS

Japan



Shiga prefecture shows visions and roadmaps for 50% CO2 reductions by 2030

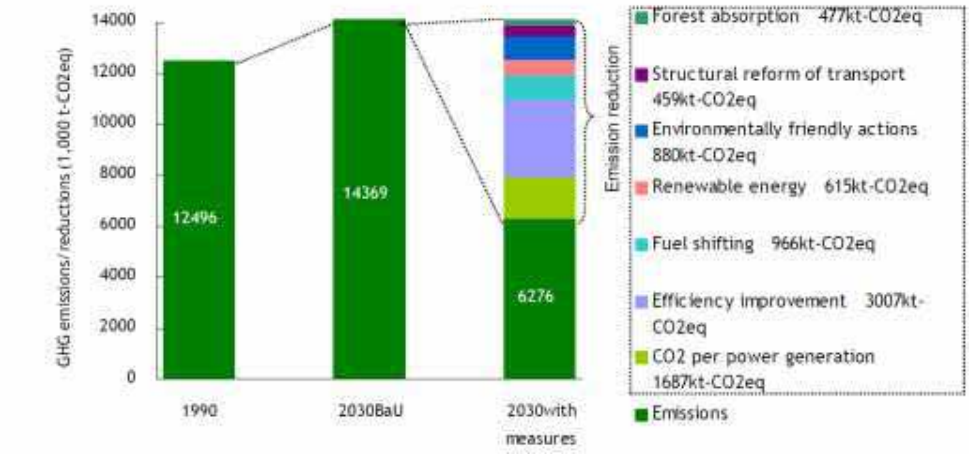
Shiga

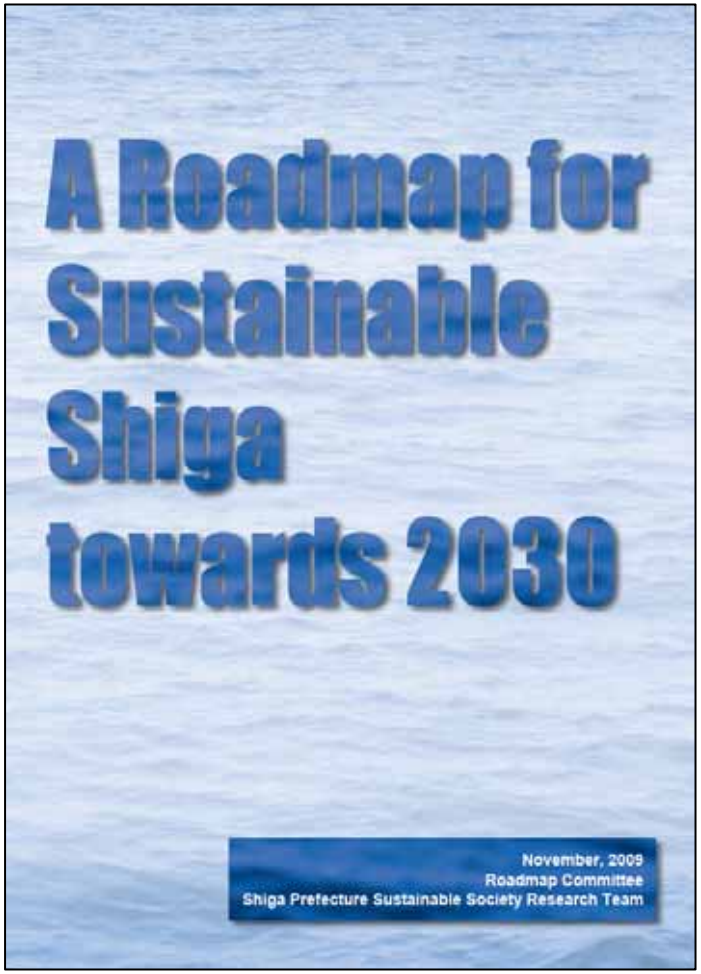
Environmental targets for 2030

- **Reduction of GHG emissions by half**
- **Reduction of pollutant load flows into the lake by half for the conservation of water quality**
- **Reduction of landfill waste by 75%**

Contribution of each measure

The figure below shows CO_2 emission reductions by different types of measures. Efficiency improvement equipment accounts for the largest proportion, 37% of the total reductions, followed by changes in the compo of power sources in Japan as a whole (21%). Among the categories of measures, those especially necessar local governments to take are the structural reform of transport, environmentally friendly actions, penetration newable energy, and forest absorption. The shares of them in reductions are 6%, 11%, 8%, and 6% respecti and 30% in total. To realize a low carbon economy, Shiga Prefecture has to have original policies for encour businesses and citizen to take these measures.





Japan LCS research project and Japanese CC policy

1. Feb 13th 2007, Interim Report "Japan Scenarios torwards Low-Carbon Society (LCS) -Feasibility study for 70% CO2 emission reduction by 2050 below 1990 level-"
   - May 24th 2007 Former Prime Minister Abe launched "Cool Earth 50" to reduce 50% GHG emissions by 2050
   - June 9th 2008 Former Prime Minister Fukuda set the target of Japanese CO2 emissions reduction by 60-80% in 2050

2. May 22nd 2008, Interim Report "Dozen Actions towards LCSs"
   - July 29th 2008 Japanese government set "Action Plan for Achieving a Low-carbon Society"

3. April 2009, The Mid-term Target Committee, "six options for 2020" (including 7%, 15%, 25% reduction compared as 1990 level)
   - September 22nd 2009, New Prime Minister Hatoyama set the year of 2020 target as 25%.

Japan

New Japan's Mid-term Target

Japan's mid-term target was announced by New Prime Minister Hatoyama on September 22nd, 2009. The target is

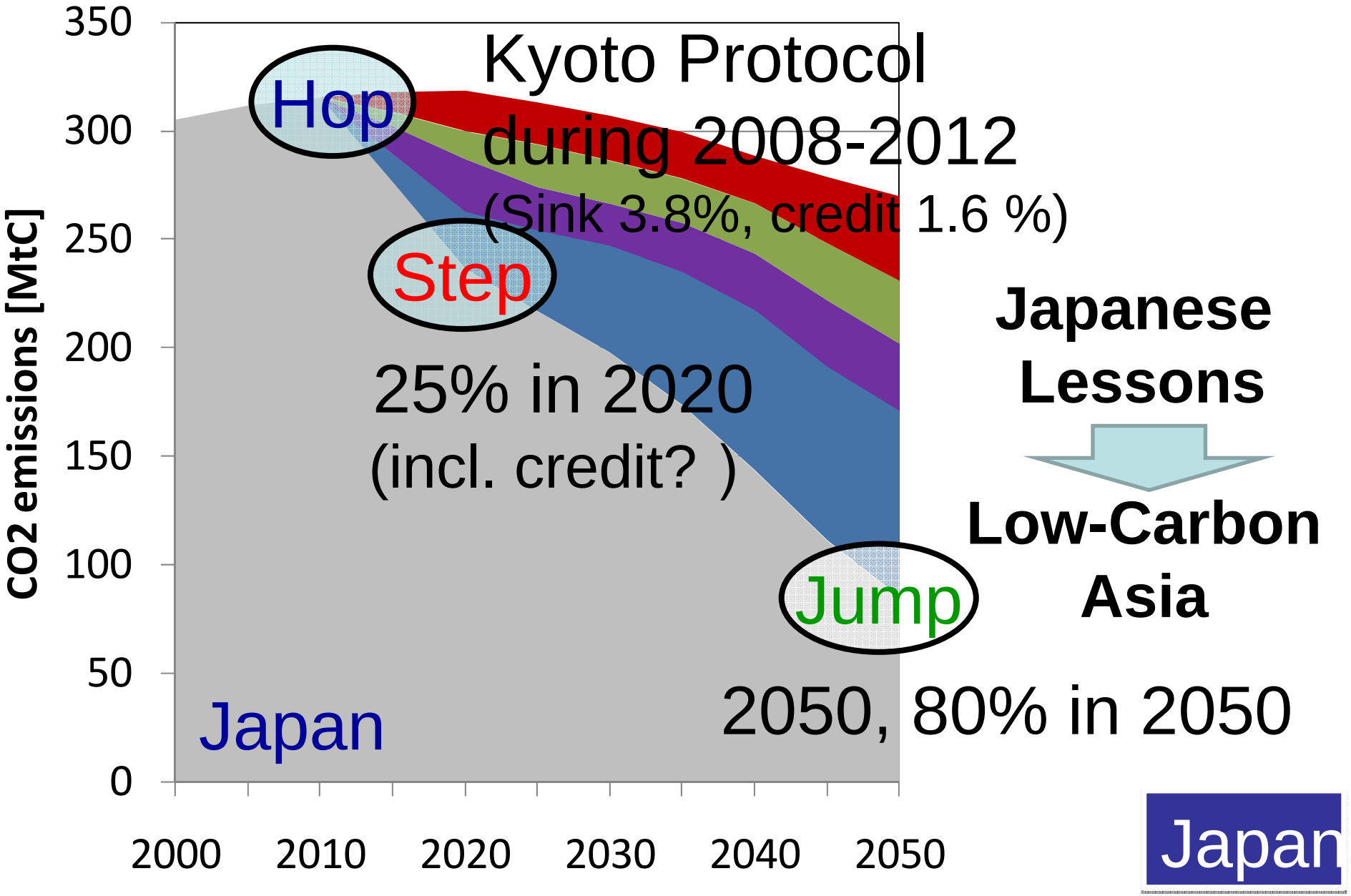
25 percent reduction from the 1990 level by 2020

New Prime Minister Hatoyama　鳩山由紀夫

	New Mid-term target	Old Mid-term target	Kyoto target
Target Year	2020	2020	2008 - 2012
Base Year	1990	2005(1990)	1990
Domestic reduction	**Totally 25%**	15(8)%	0.6%
Carbon sinks		-	3.8%
Credits		-	1.6%

*Japan's Kyoto target (6% reduction) includes carbon sinks and credits through the Kyoto mechanisms.

Japanese Emissions Targets towards 2050



Low-Carbon Asia: Scenarios and Insights

Japan, India, Ahmedabad, Jilin, Iskandar, Shiga, Kyoto

AIM, IIM, ERI, UTM, LBERI, MHIR, KU, NIES

http://2050.nies.go.jp/LCS/

Supplement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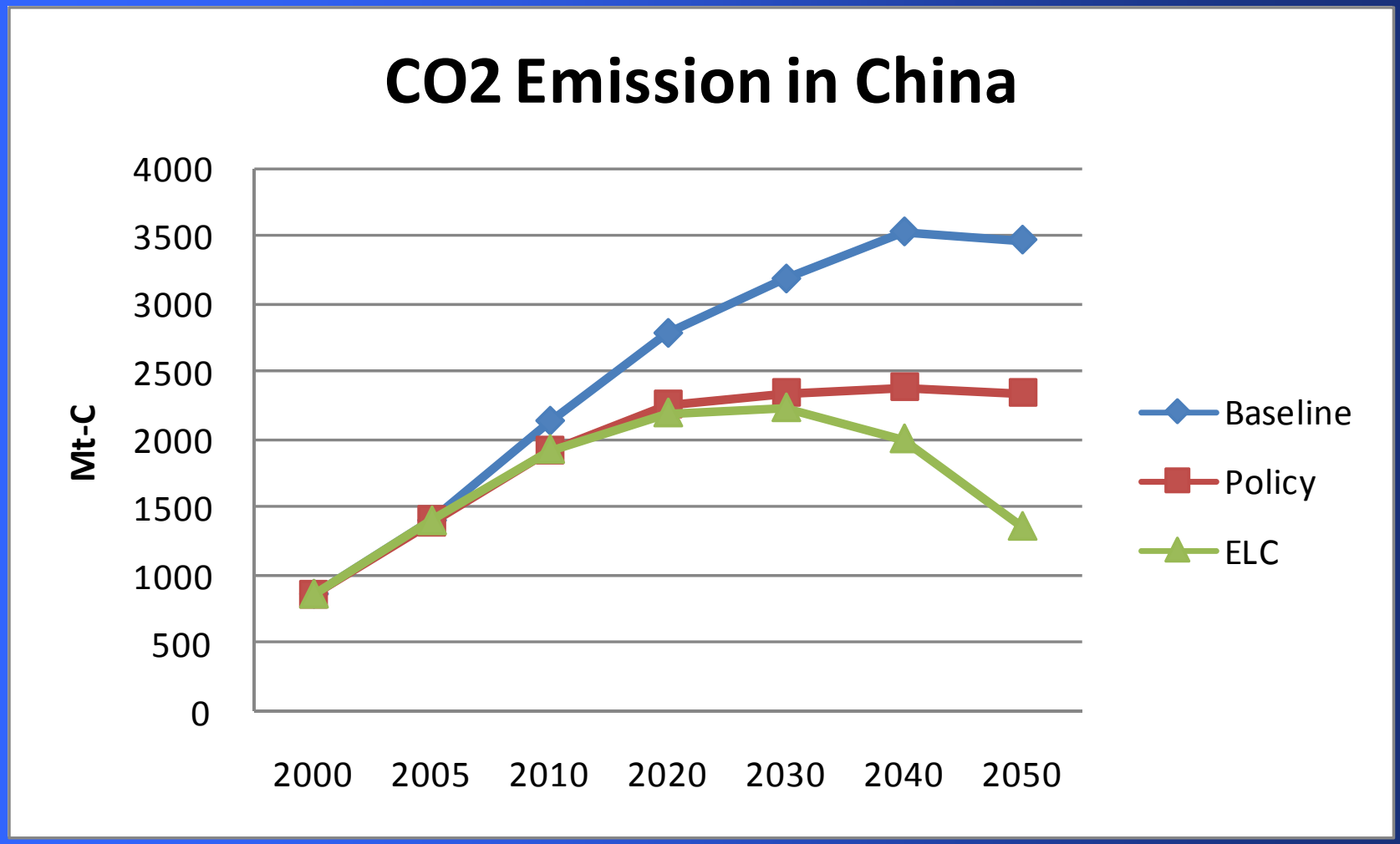
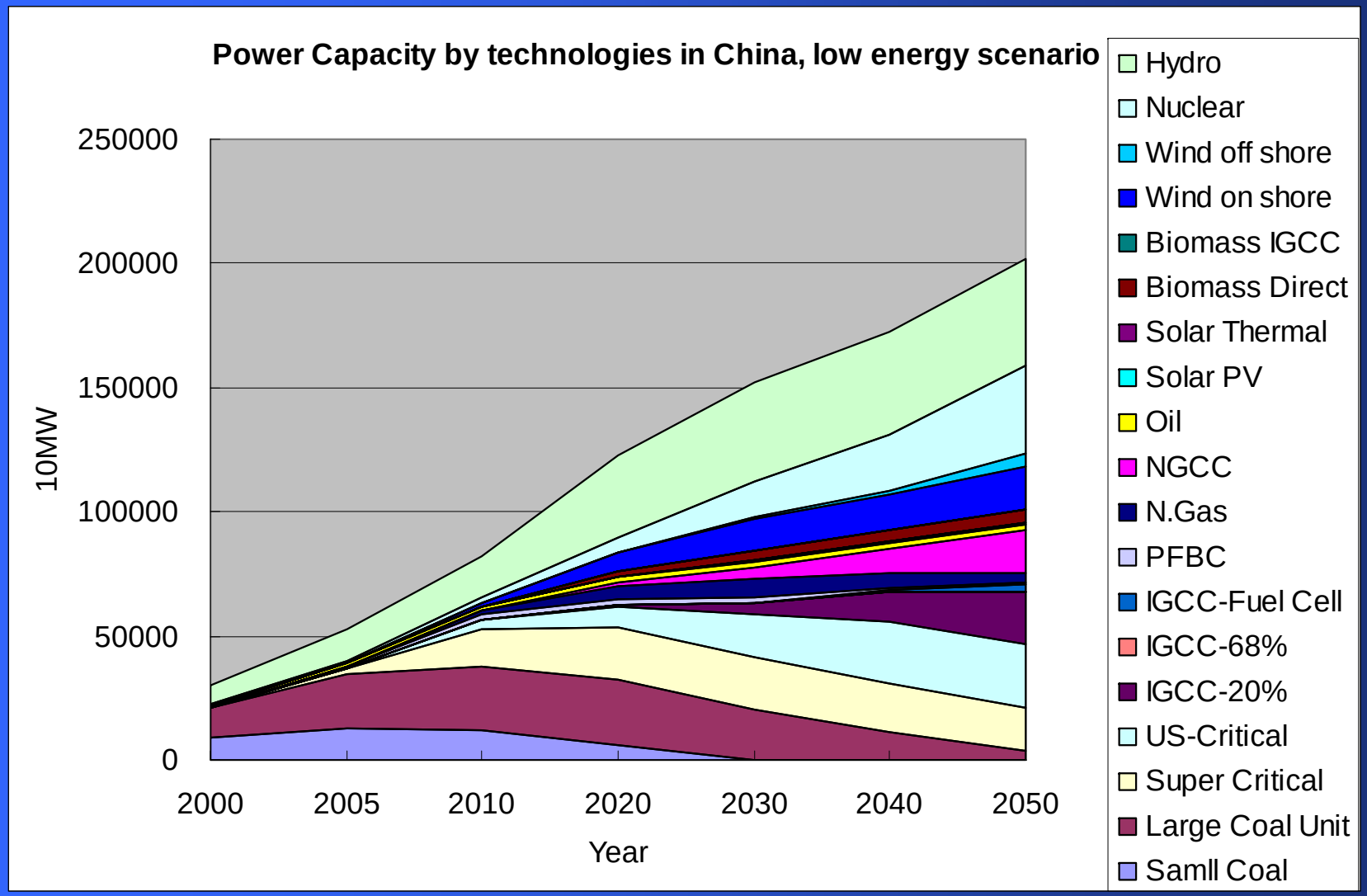

CO2 Emission in China
Mt-C
4000
3500
3000
2500
2000
1500
1000
500
0
2000
2005
2010
2020
2030
2040
2050
Baseline
Policy
ELC


Power Capacity by technologies in China, low energy scenario
250000
200000
150000
100000
50000
0
10MW
2000
2005
2010
2020
2030
2040
2050
Year
Hydro
Nuclear
Wind off shore
Wind on shore
Biomass IGCC
Biomass Direct
Solar Thermal
Solar PV
Oil
NGCC
N.Gas
PFBC
IGCC-Fuel Cell
IGCC-68%
IGCC-20%
US-Critical
Super Critical
Large Coal Unit
Samll Coal