

# Low Carbon Society Scenarios: *India & Ahmedabad*

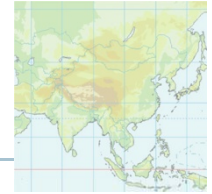
*Prasoon Agarwal*  
*Indian Institute of Management*  
*Ahmedabad, India*

Presented at  
Sustainable and Low-Carbon Development in Indonesia and Asia:  
Dialogues between Policymakers and Scientists on Green Growth  
16-17 February 2010, Bogor- Indonesia



# Agenda

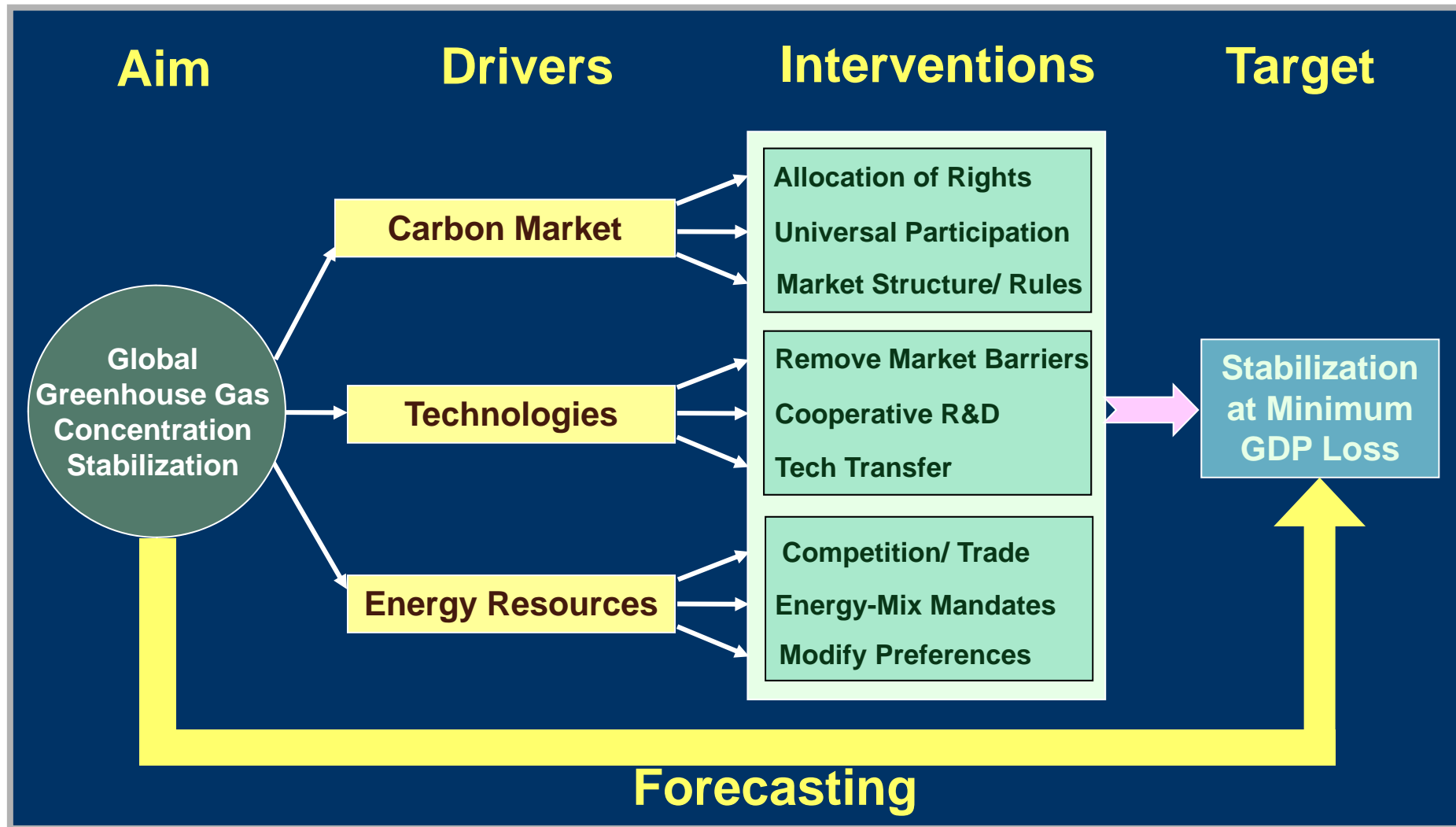
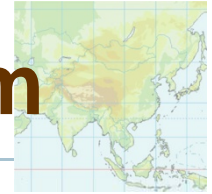
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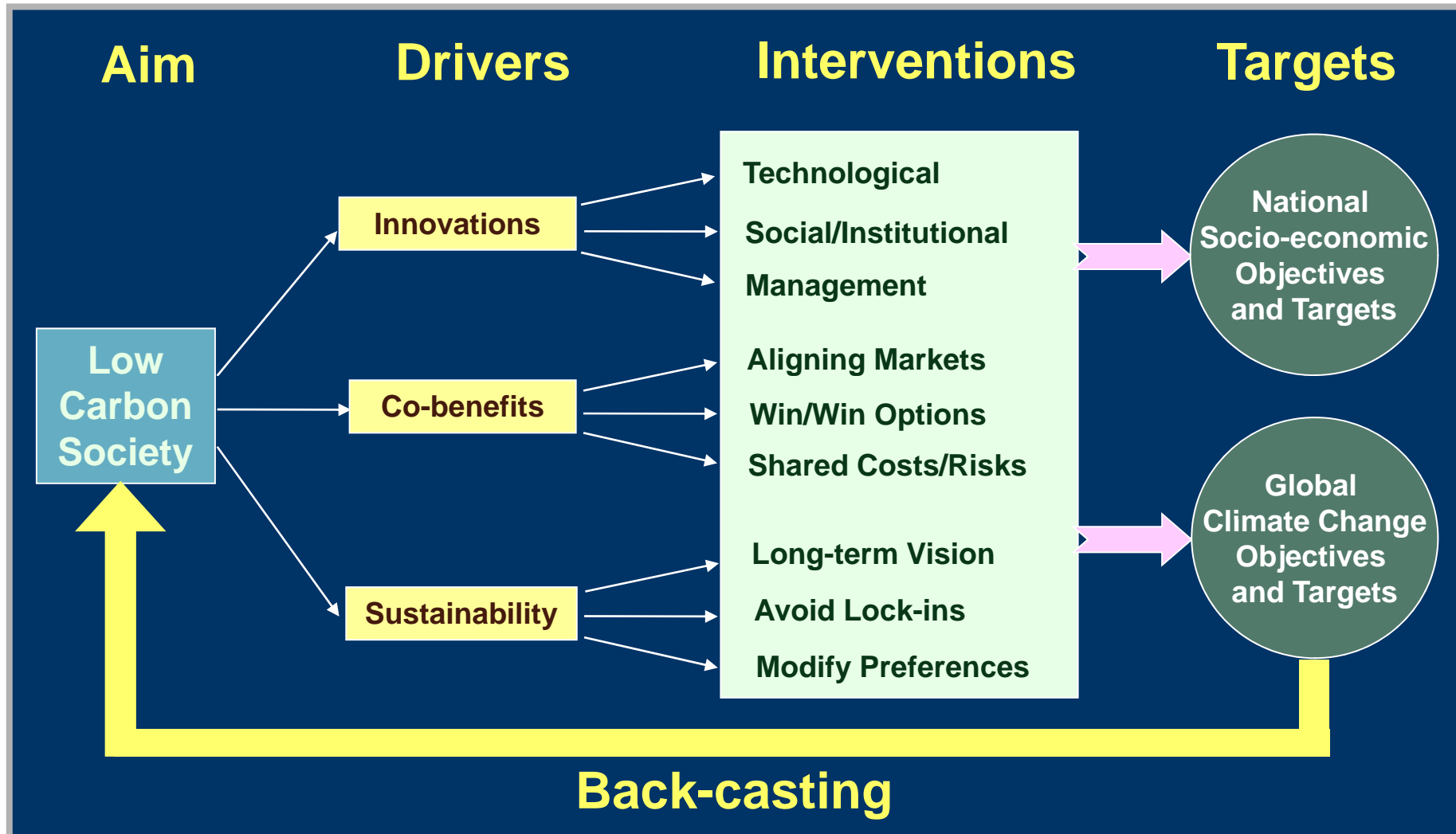
- 1. Alternate Development Visions**
- 2. Scenario Development**
- 3. Ahmedabad & India Scenarios**
- 4. Policy Options**



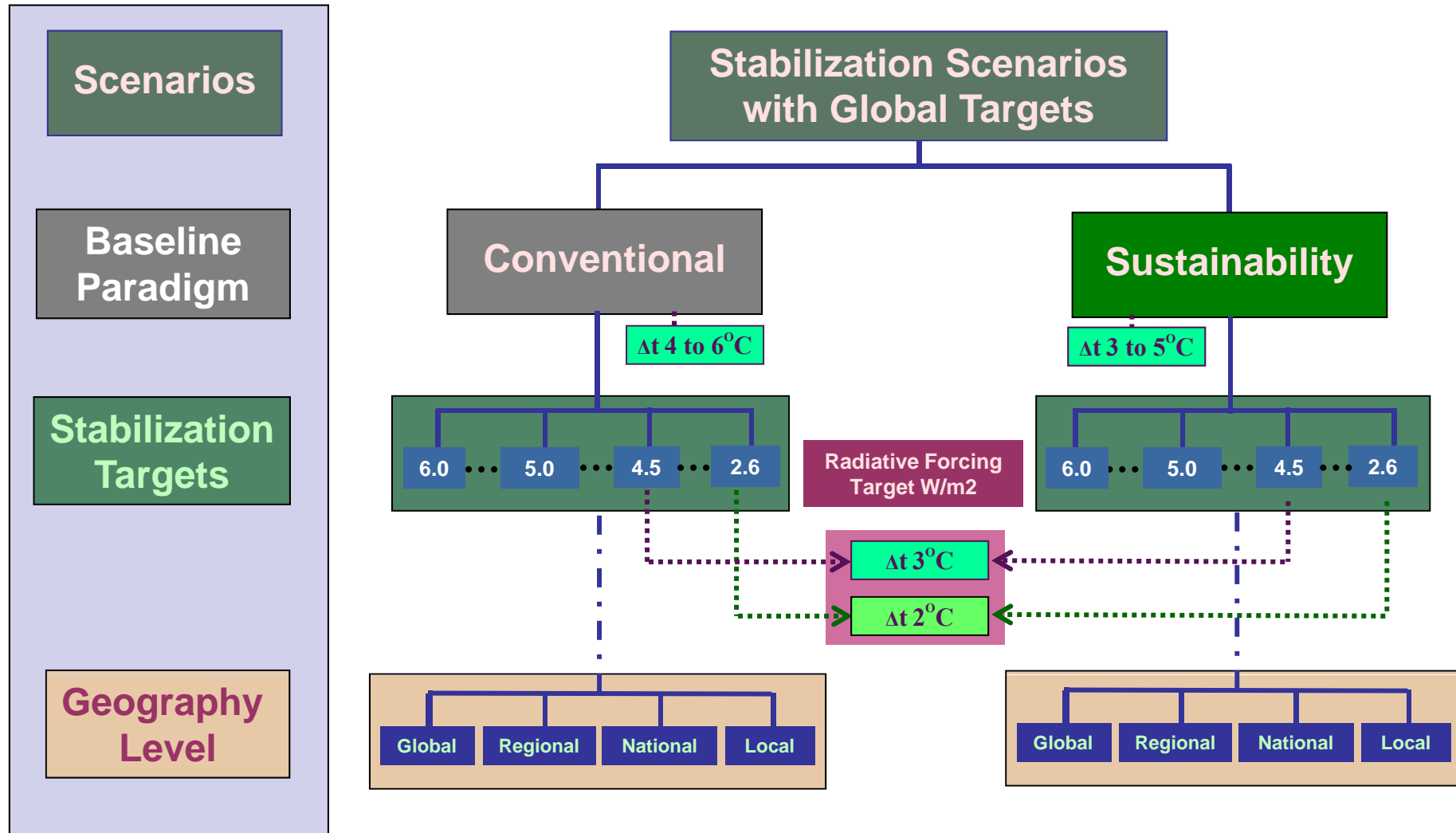
# Conventional Climate Centric Paradigm



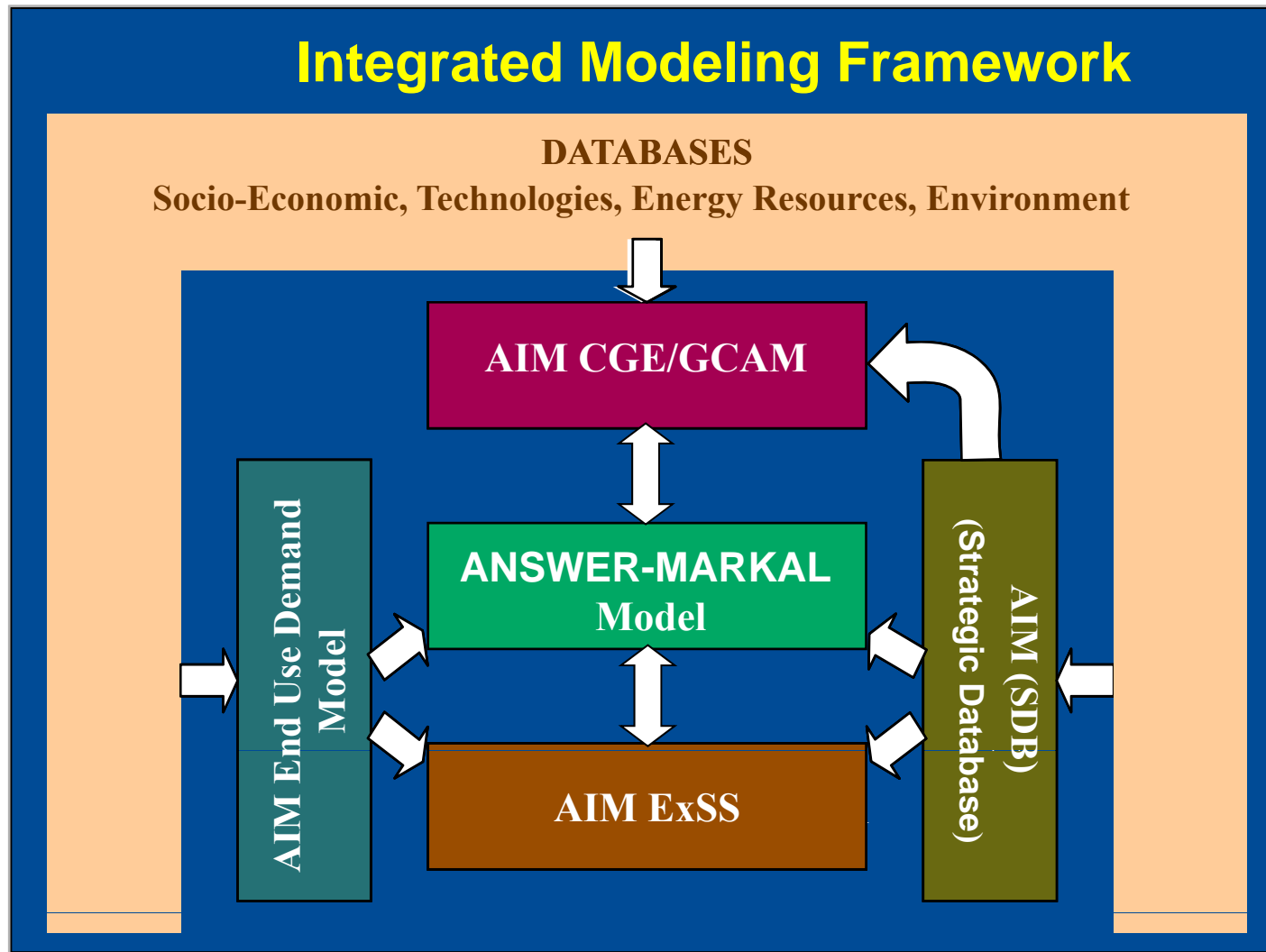
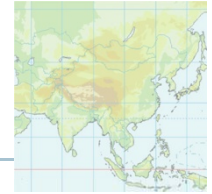
# Sustainable Development & Climate Paradigm



# Global Climate Stabilization Scenarios



# Integrated Modeling Framework



# National Analysis: MARKAL & End-Use Models



## Base Scenario: Growth of Economy and Population

From 2005-2050:

Annual Economic Growth: 7.2%

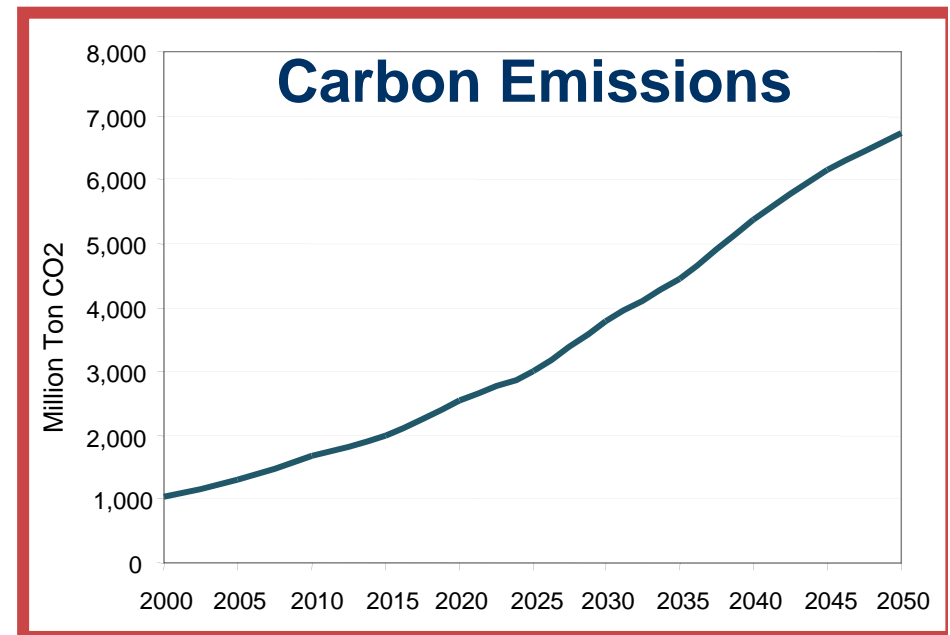
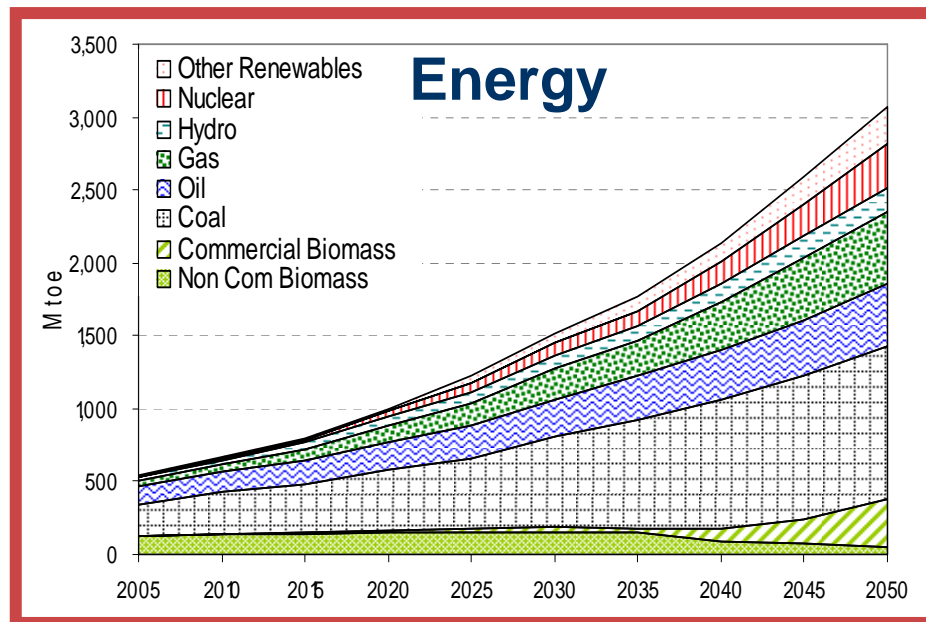
Annual Population Growth: 0.9%

Absolute Growth in 2050 over 2005

Economy 23 times

Population 1.56 times

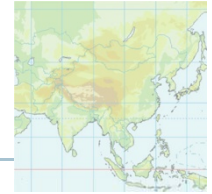
Energy ~ 6 times, Emissions ~ 6.5 times



**Global Stabilization Target: 2°C**



# 2 Degree Stabilization Target

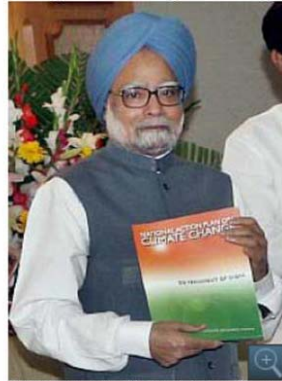


## India unveils National Action Plan on Climate Change

30 Jun 2008, 1545 hrs IST, PTI

Print Email Share Save Comment Text: □ □ □

NEW DELHI: India on Monday unveiled its climate change action plan which does not set target reduction of greenhouse gas emissions but seeks to promote sustainable development through use of clean technologies.



PM releases the 'National Action Plan on Climate Change' in New Delhi (PTI)  
[More Pictures](#)

The National Action Plan on Climate Change categorically states that India's per capita greenhouse gas emissions will "at no point exceed that of developed countries."

The plan, unveiled by Prime Minister Manmohan Singh here, will be implemented through eight missions which represent multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change.

The document underlines that "India will engage actively in multilateral negotiations in the UN Framework Convention on Climate Change (UNFCCC) in a positive, constructive and forward-looking manner."

"Our objective will be to establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and relative capabilities enshrined in the UNFCCC," the plan document said.

## DECLARATION OF THE LEADERS THE MAJOR ECONOMIES FORUM ON ENERGY AND CLIMATE

We, the leaders of Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, Russia, South Africa, the United Kingdom, and the United States met at the Major Economies Forum on Energy and Climate in L'Aquila, Italy, on July 9, 2008, and declare as follows:

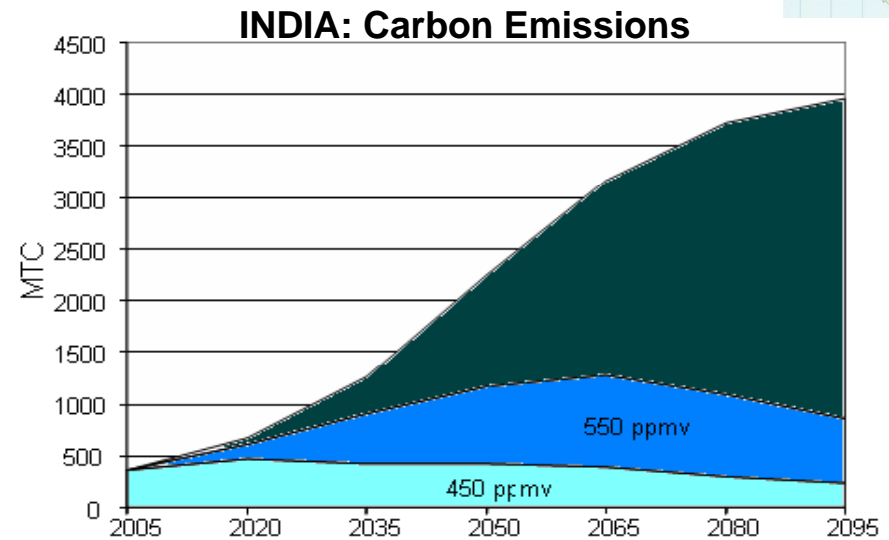
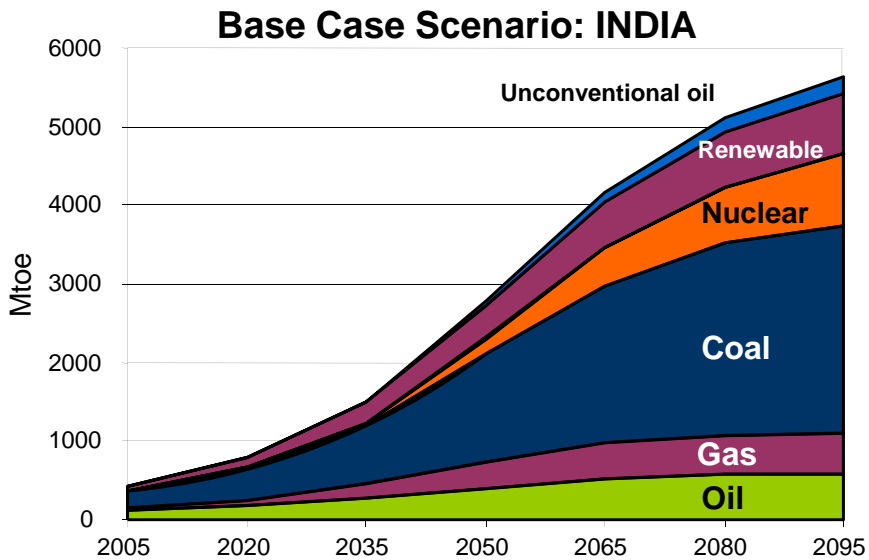
Climate change is one of the greatest challenges of our time. As leaders of the world's major economies, both developed and developing, we intend to respond rigorously to this challenge, being convinced that climate change poses a clear danger requiring an extraordinary global response, that the response should respect the priority of economic and social development of developing countries, that moving to a low-carbon sustainable economy is an opportunity to promote continued economic growth and transformational clean energy technologies at lowest possible cost and urgent, and that the response must involve balanced attention to mitigation and adaptation.

We reaffirm the objective, provisions and principles of the UN Framework Convention on Climate Change. Recalling the Major Economies Declaration adopted in Toyako, Japan, in July 2008, and taking full account of decisions taken in Bali, Indonesia, in December 2007, we resolve to spare no effort to reach agreement in Copenhagen, with each other and with the other Parties, to further implementation of the Convention.

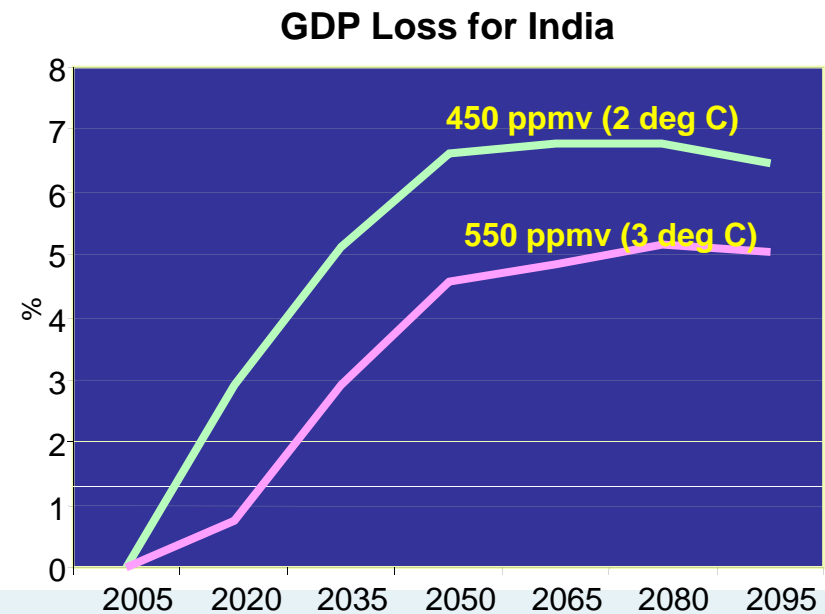
Our vision for future cooperation on climate change, consistent with equity and our common but differentiated responsibilities and respective capabilities, includes the following:



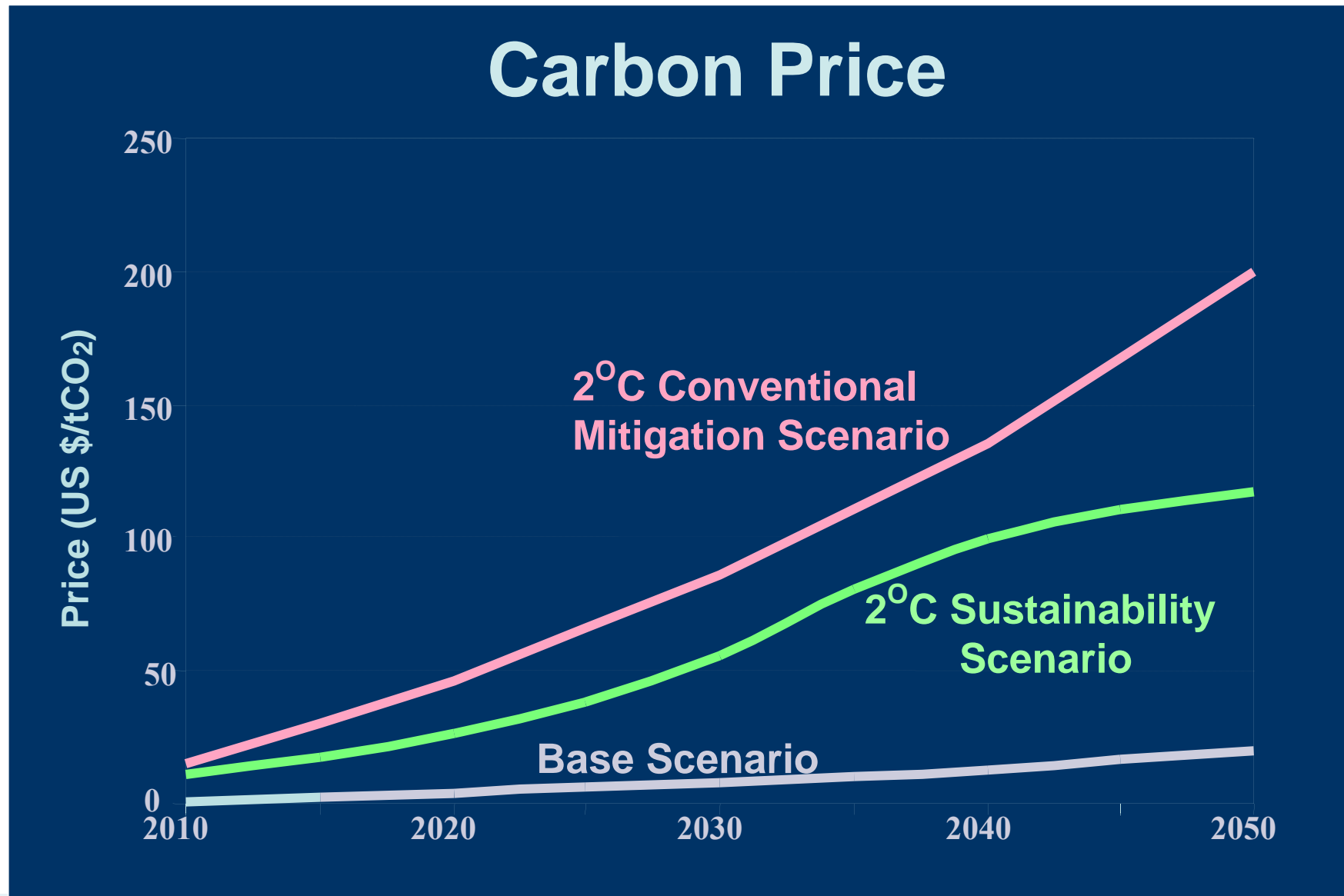
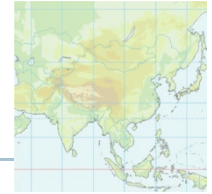
# Global & National Analysis: GCAM & AIM/CGE



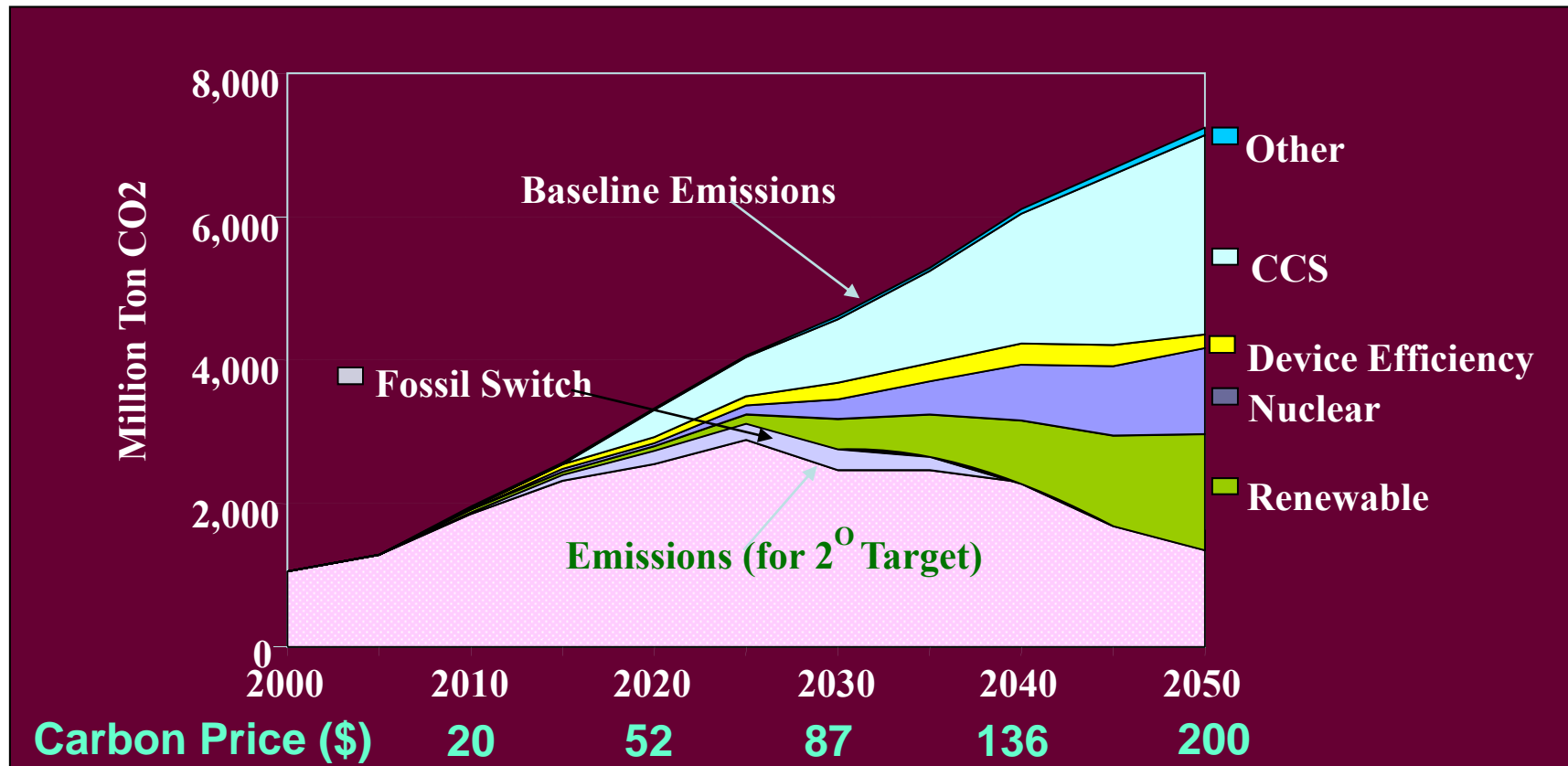
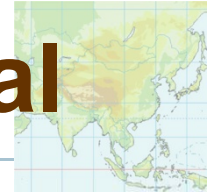
Electricity Production (in EJ) and CCS Share (in %)		2005	2035	2065	2095
Total Electricity Production (in EJ)	BAU	2.55	12.43	43.14	65.43
	450 ppmv	2.55	10.78	43.86	67.35
	550 ppmv	2.55	10.51	39.58	61.91
Coal w/CCS (in %)	450 ppmv	0.00	29.71	36.20	33.38
	550 ppmv	0.00	6.20	21.31	29.08
Gas w/CCS (in %)	450 ppmv	0.00	5.38	5.06	4.03
	550 ppmv	0.00	1.63	2.75	2.85
Biomass w/CCS (in %)	450 ppmv	0.00	5.72	10.67	11.83
	550 ppmv	0.00	0.71	3.19	5.54



# Carbon Price Trajectory



# Mitigation Options: Conventional



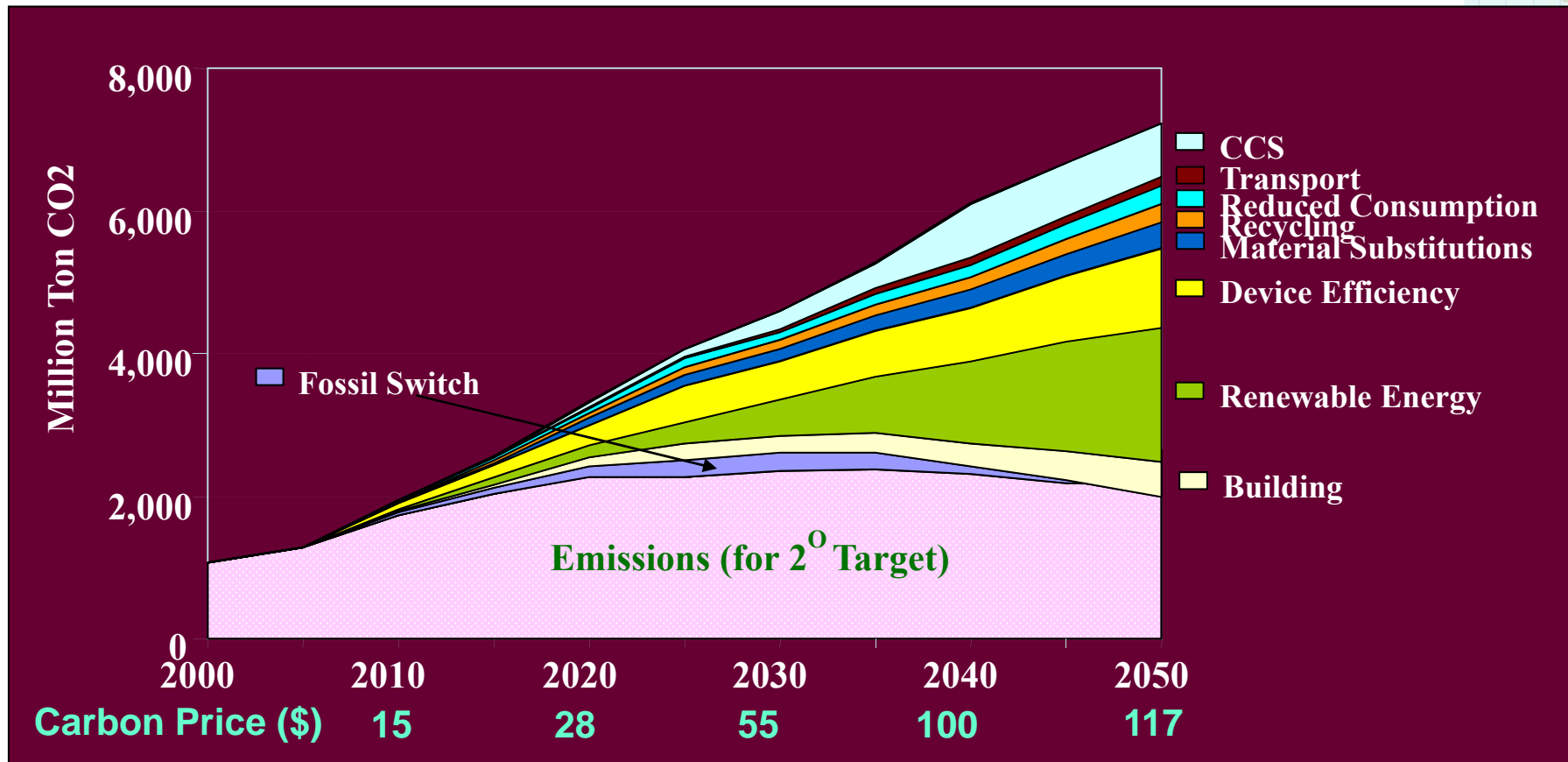
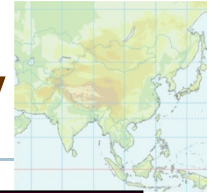
## Mitigation Options

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

## Conventional Approach: transition with conventional path and carbon price

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

# Mitigation Options: Sustainability



## Mitigation Options

- Infrastructure Technologies ( eg. Transport)
- Energy & Resource Efficiency (3R)
- Process Technologies
- Urban Planning, Behavioral Changes

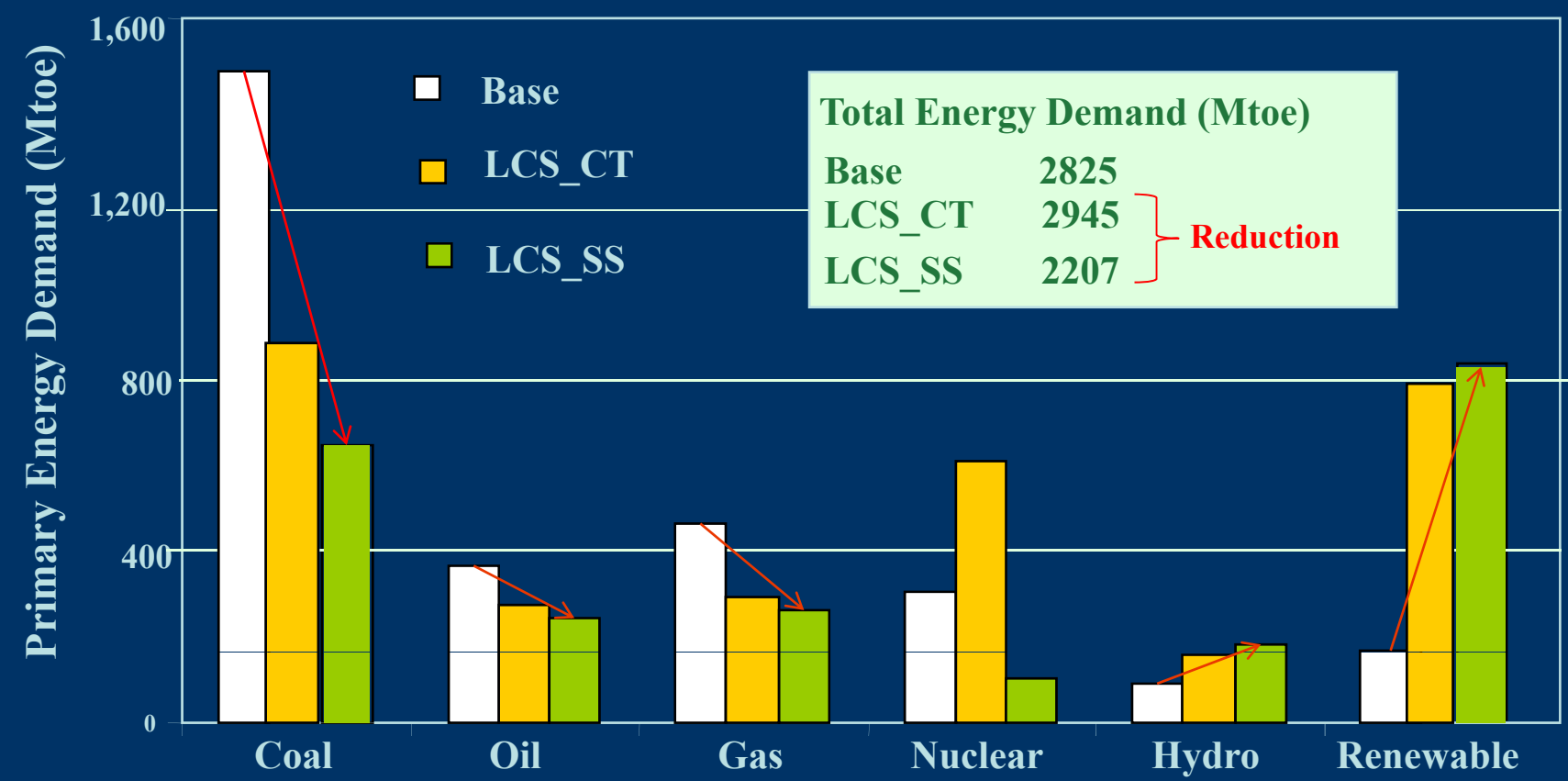
## Sustainability Approach: aligning climate and sustainable development

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

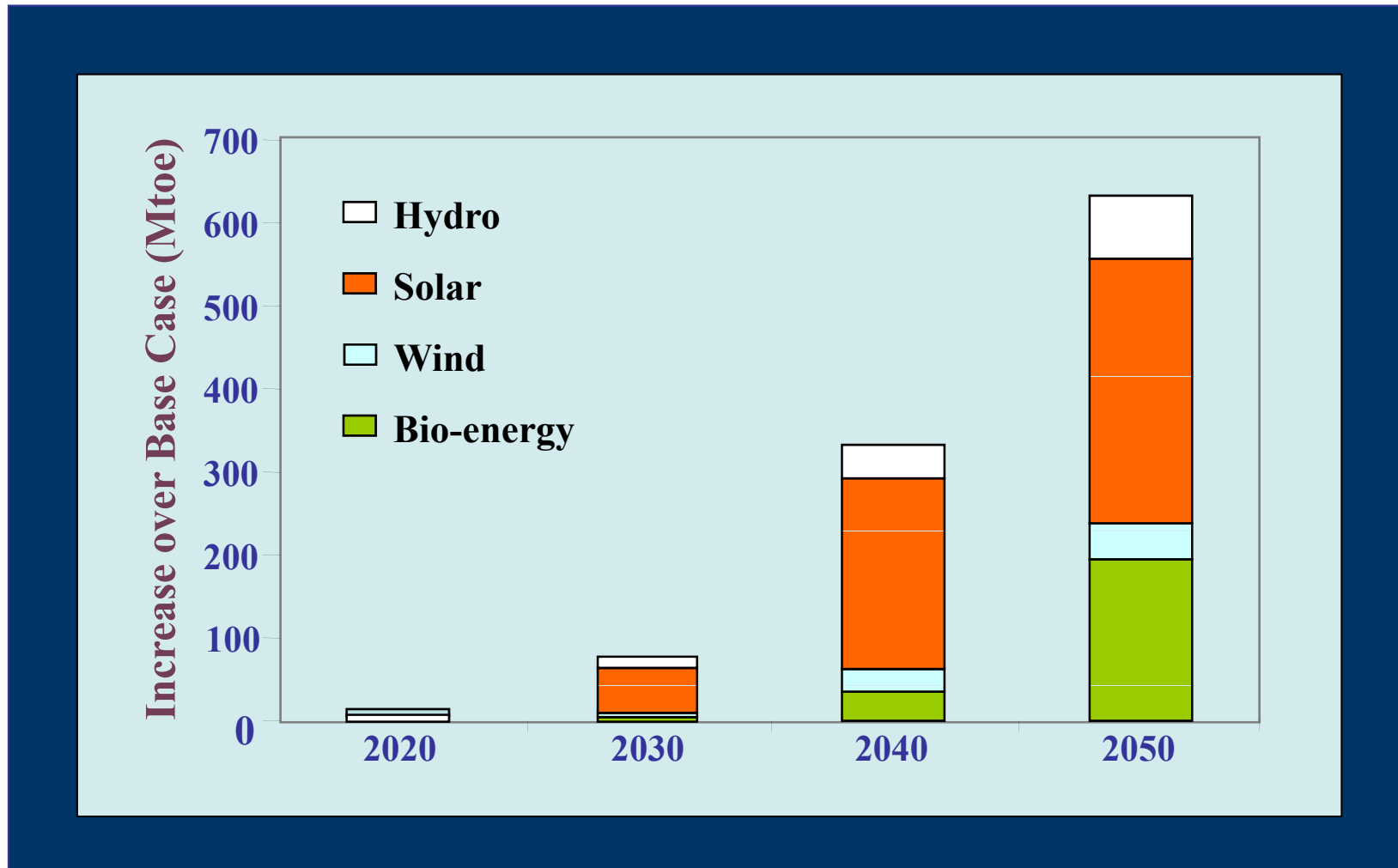
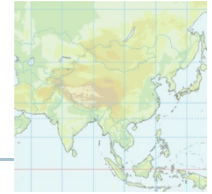
# Implications for Primary Energy Mix

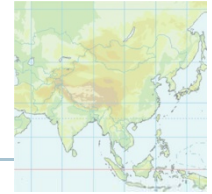


## Energy Mix in 2050



# Additional Renewable Energy (in Sustainability Scenario over Base Case)



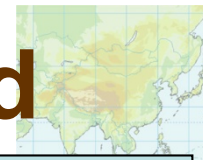


# Developing Local Scenarios :

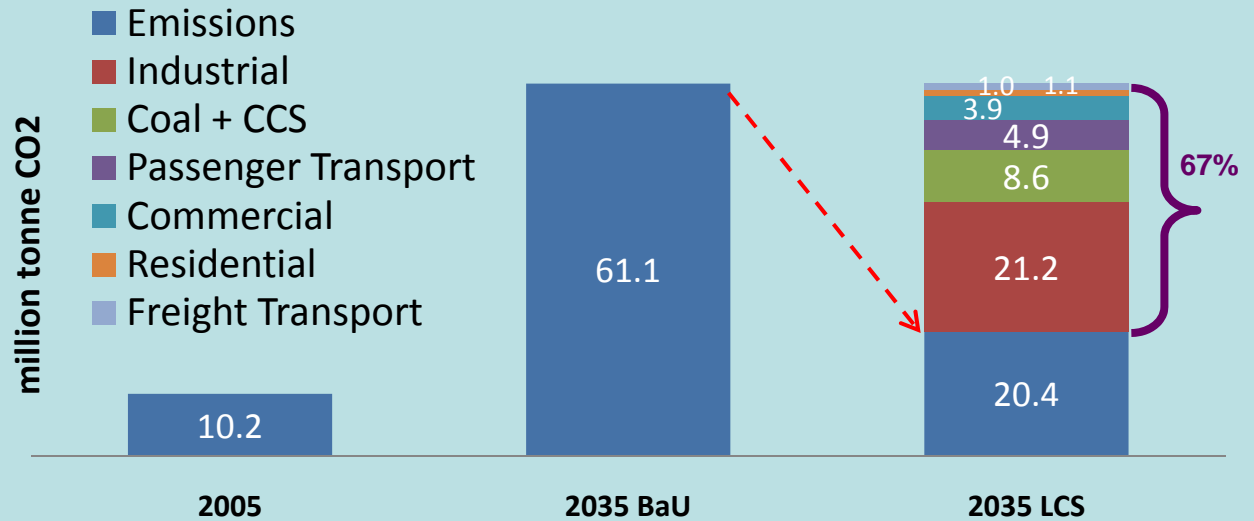
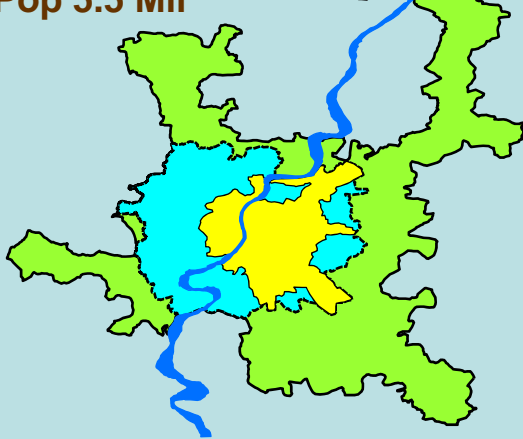
## Ahmedabad LCS Study



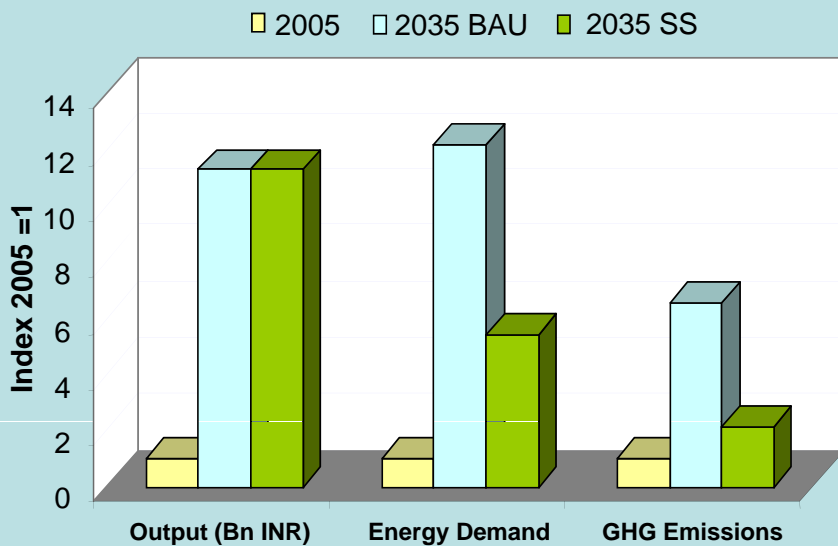
# Low Carbon Scenario: Ahmedabad



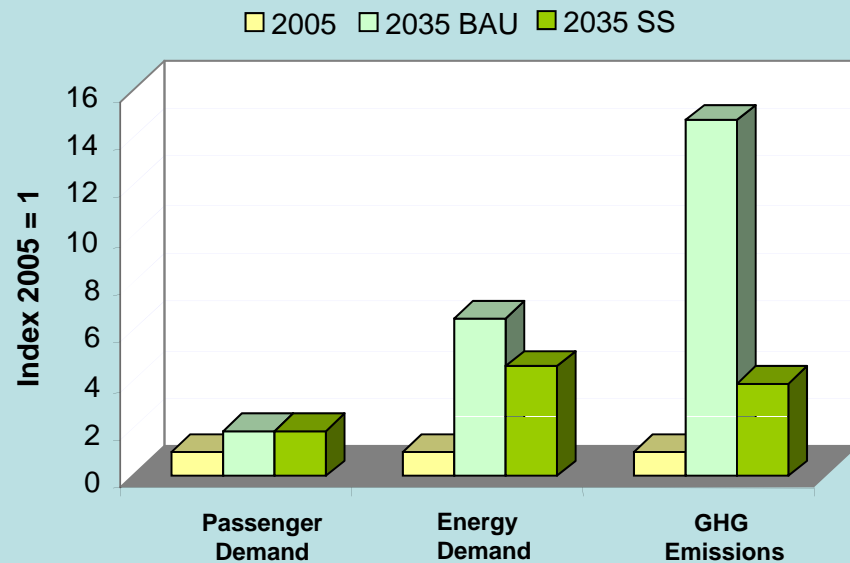
Ahmedabad (2009)  
Pop 5.5 Mil



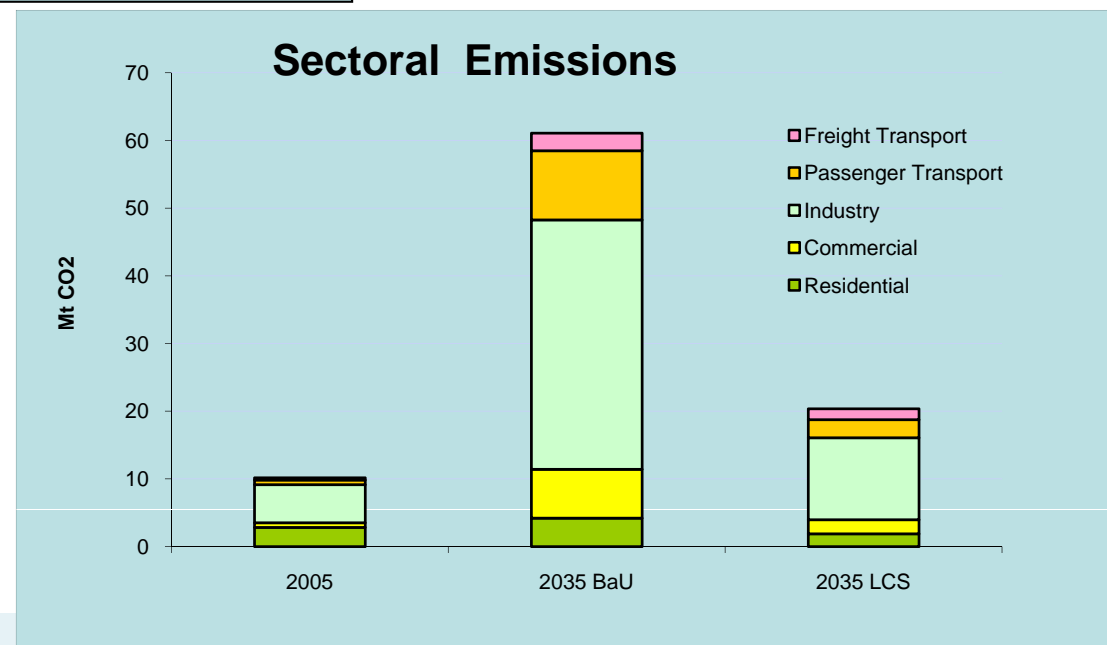
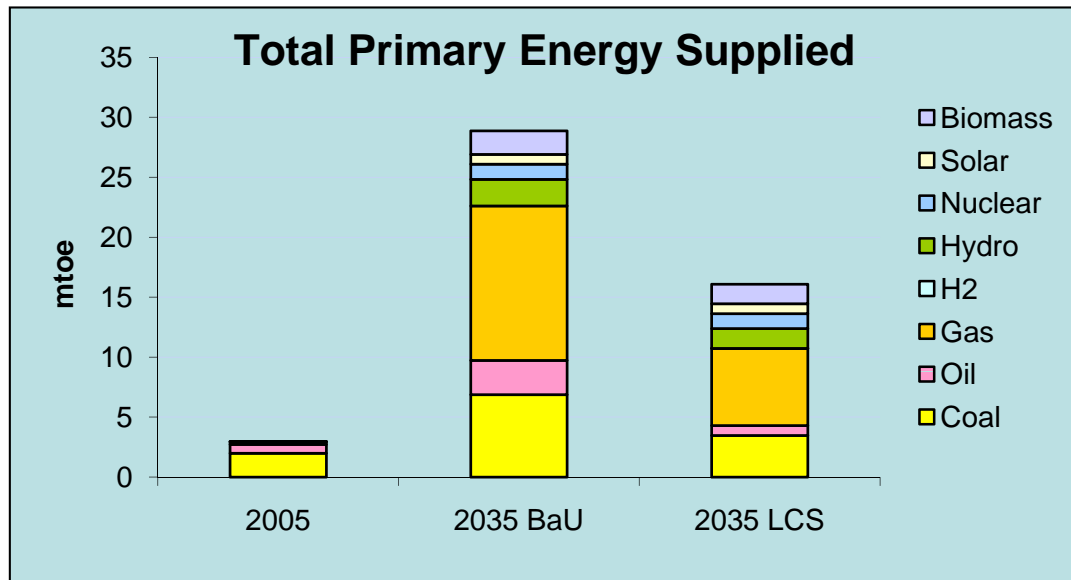
### Industry Sector



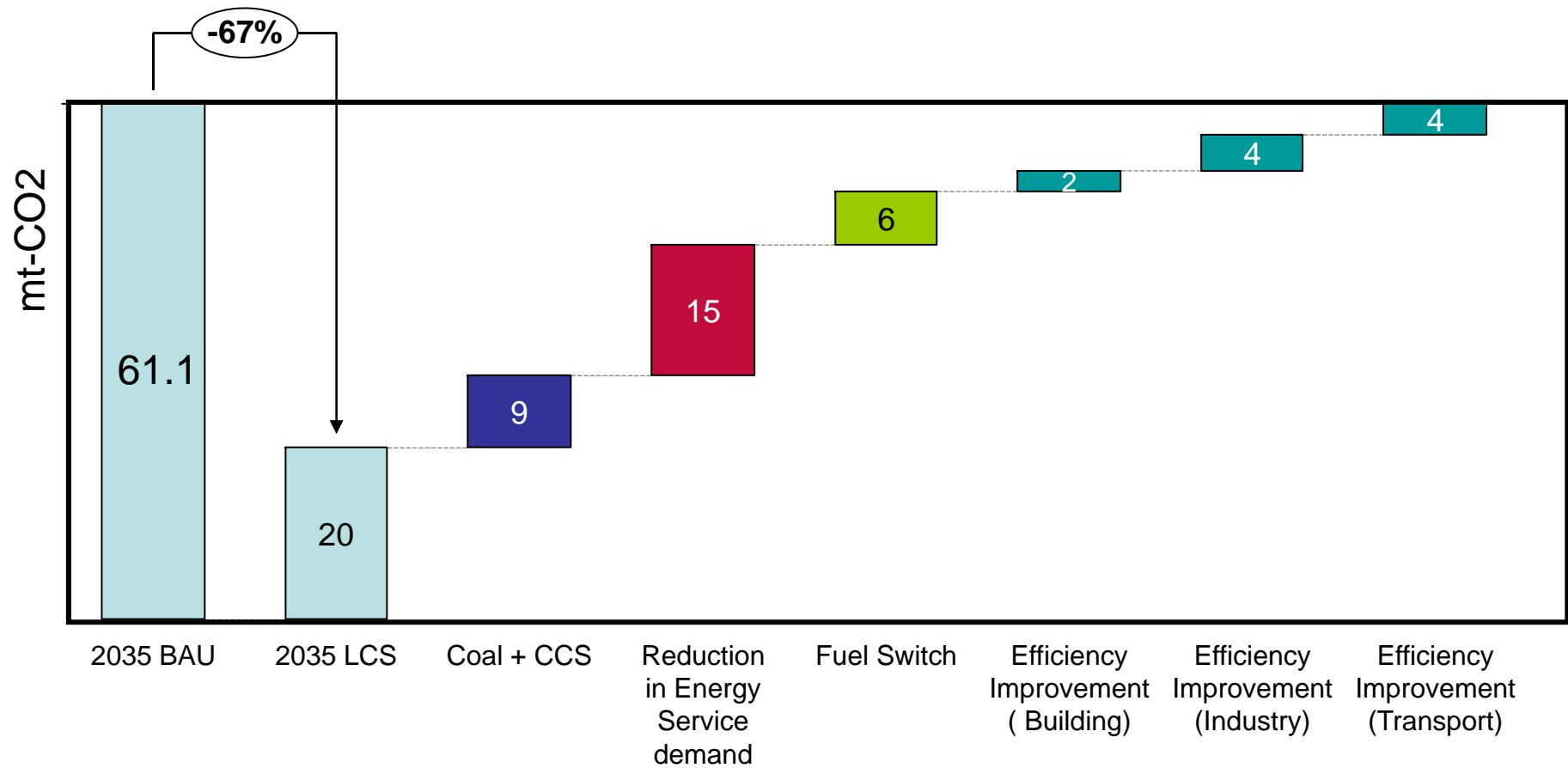
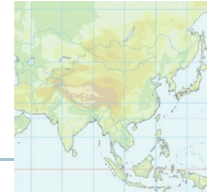
### Passenger Transport Sector



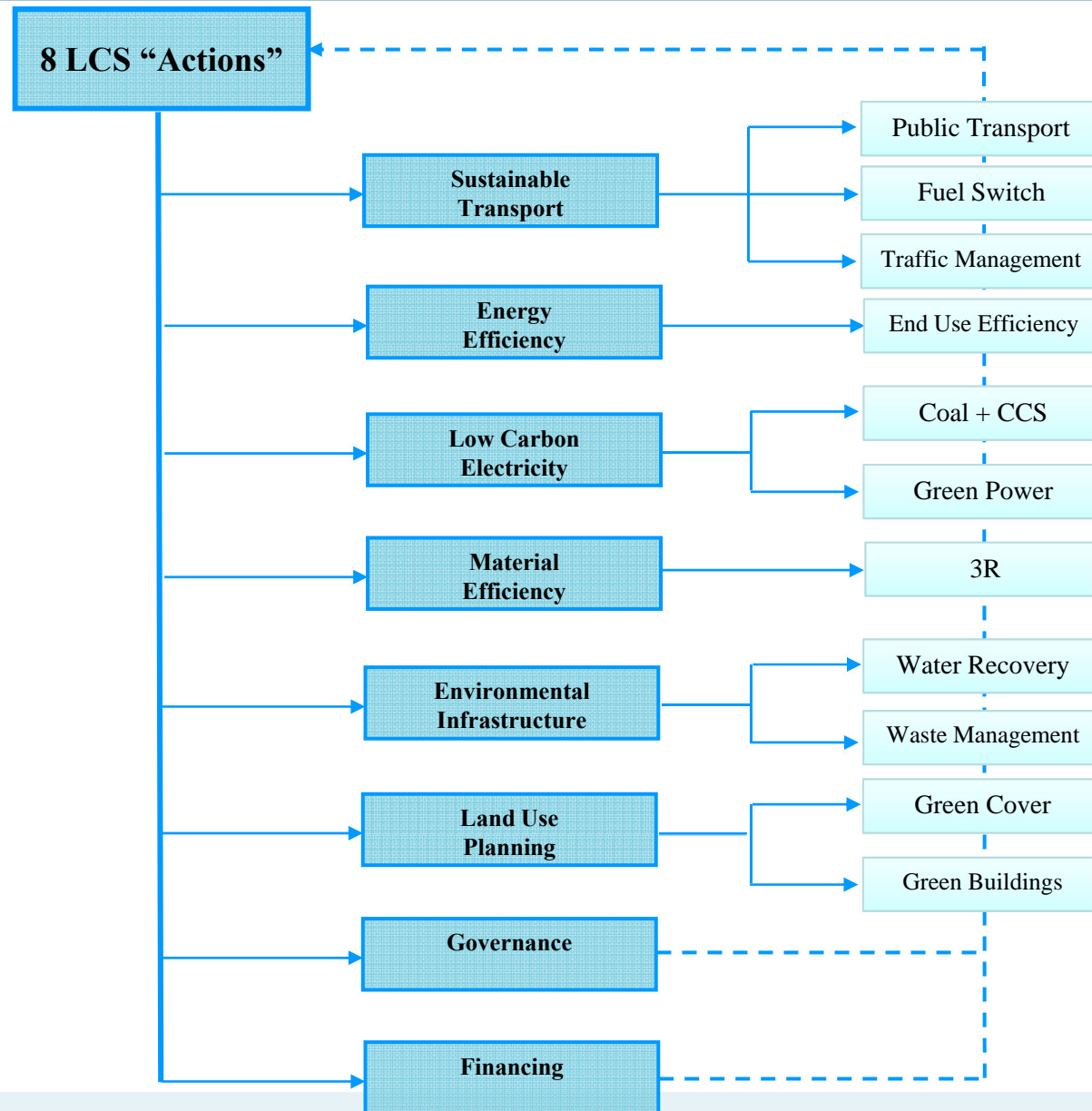
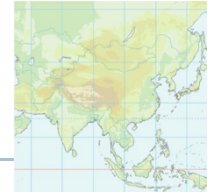
# Low Carbon Scenario: Ahmedabad



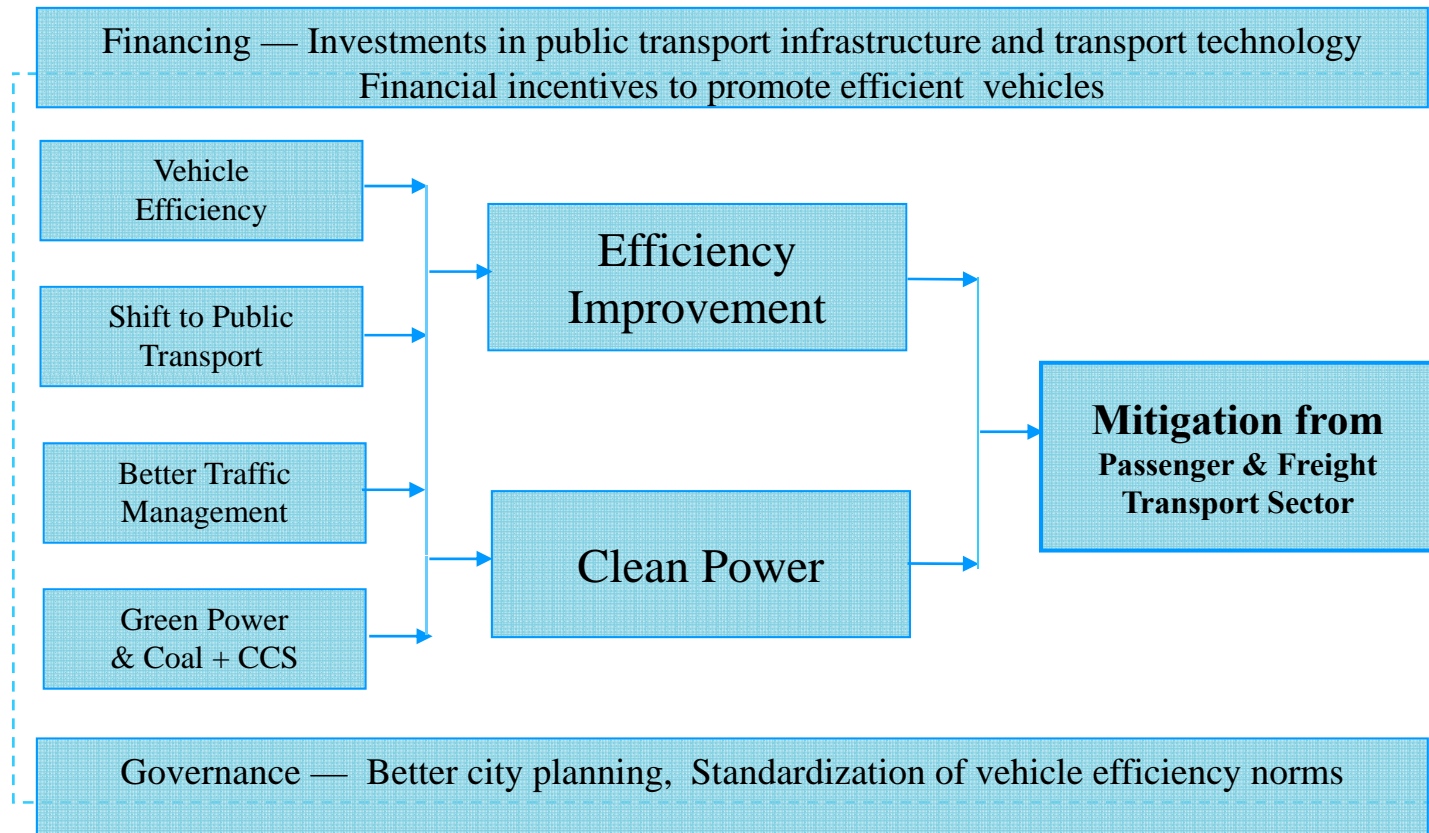
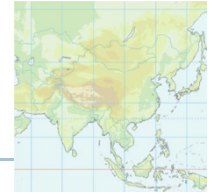
# Emission Reduction Potential



# Ahmedabad Policy Package

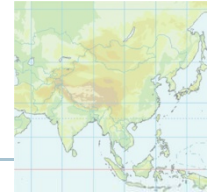


# Action : Sustainable Transport



*Mitigation policy package for passenger and freight transport sector*

# Sustainable Transport Options



- Land-use Planning
- Demand Management
- Infrastructures
- Integration of Services



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## AHMEDABAD, INDIA WINS 2010 SUSTAINABLE TRANSPORT AWARD

Posted: 12 Jan 2010

Related to: [BRT in India, Developing High-Quality, Low-Cost Mass Transit, India](#)  
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Press Contact: [Claudia Gunter, Institute for Transportation and Development Policy](#)  
(846) 839-8479, [cgunter@itdp.org](mailto:cgunter@itdp.org)

Ahmedabad's Janmarg Bus Rapid Transit System Reduces Carbon Emissions, Dramatically Improves Residents Access  
*Cities in Developing World Dominate Award*

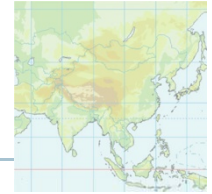
Washington, D.C., January 12, 2010—The developing world is leapingfrogging developed countries when it comes to urban transport, with the city of Ahmedabad, India, today announced as winner of the 2010 Sustainable Transport Award for the successful implementation of Janmarg, India's first full bus rapid transit (BRT) system.



ITDP Board President Enrique Peñalosa with city representatives from the city of Ahmedabad, India



# Policy Options

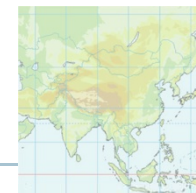


- **Energy** : Efficiency, Renewable, Nuclear
- **Industrial Process**: Energy & emission intensity , Logistics
- **Infrastructure**: Transport, Pipelines, Electricity T&D, Hydro (+Canals)
- **Soft Solutions**: Tele commuting, Demand Reduction, NMT
- **Conservation/Behavioral**: 3R, Material Substitutes
- **Planning**: Urban design, Industry locations
- **End-of-pipe Solutions**: CCS

***There is no silver bullet !***



# Thank You !



Indian Institute of Management, Ahmedabad, India