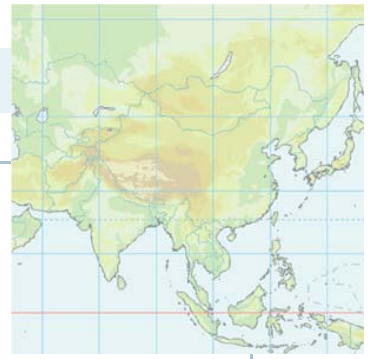
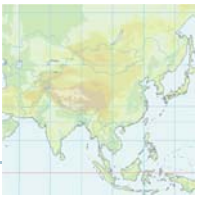


Sustainable Low Carbon Society Scenarios for India

P.R. Shukla
Indian Institute of Management
Ahmedabad, India

Presented in
AWG-KP 9/AWG-LCA 7 Side-event organized by Ministry of Environment, Japan:
"How to realize global emission reductions : long-term pathways and supporting mechanisms"
Barcelona Convention Centre, Barcelona, Spain, November 3, 2009

Presentation Agenda

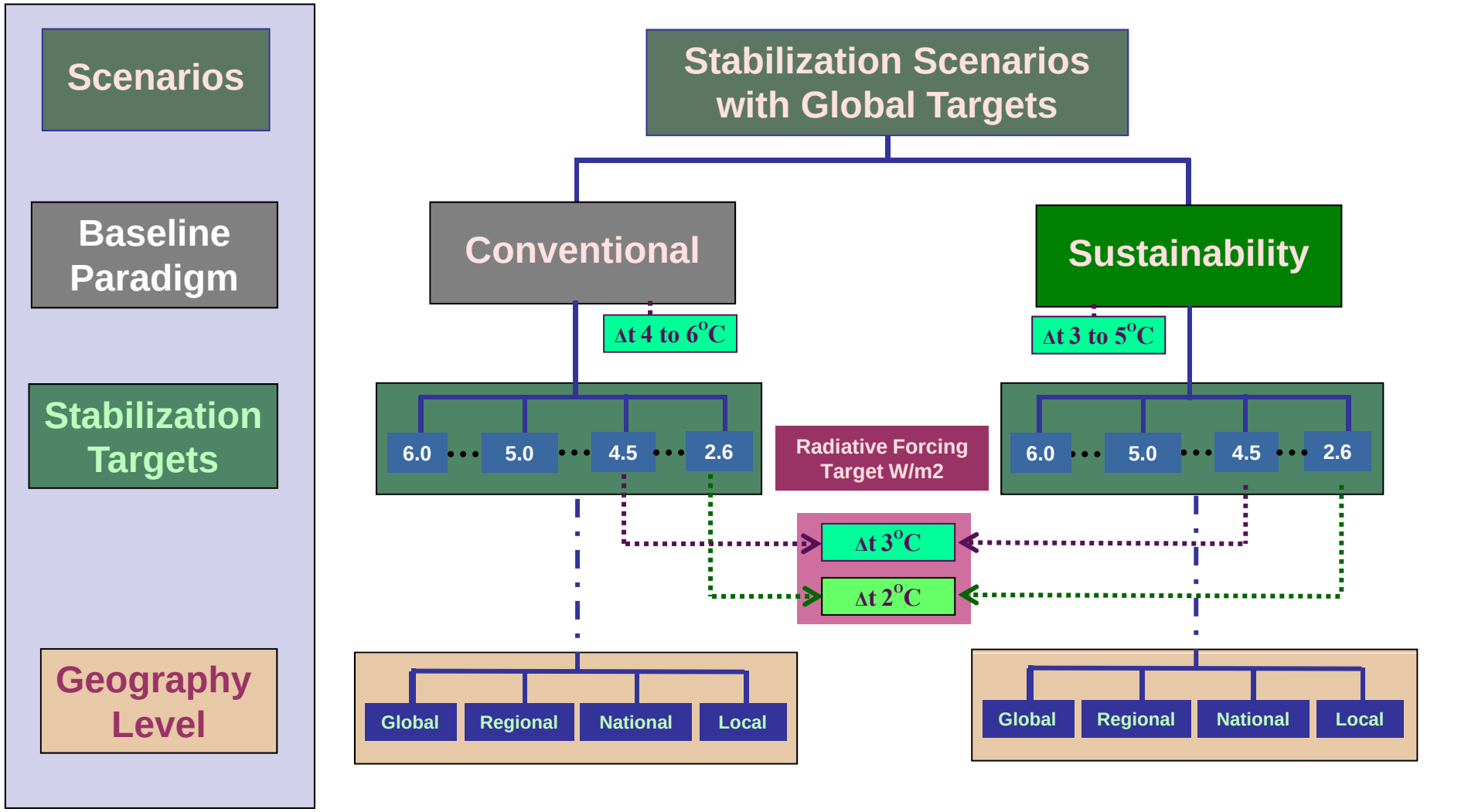


1. **Climate Stabilization, Mitigation & Development:**
   Scenarios, Perspectives and Analysis

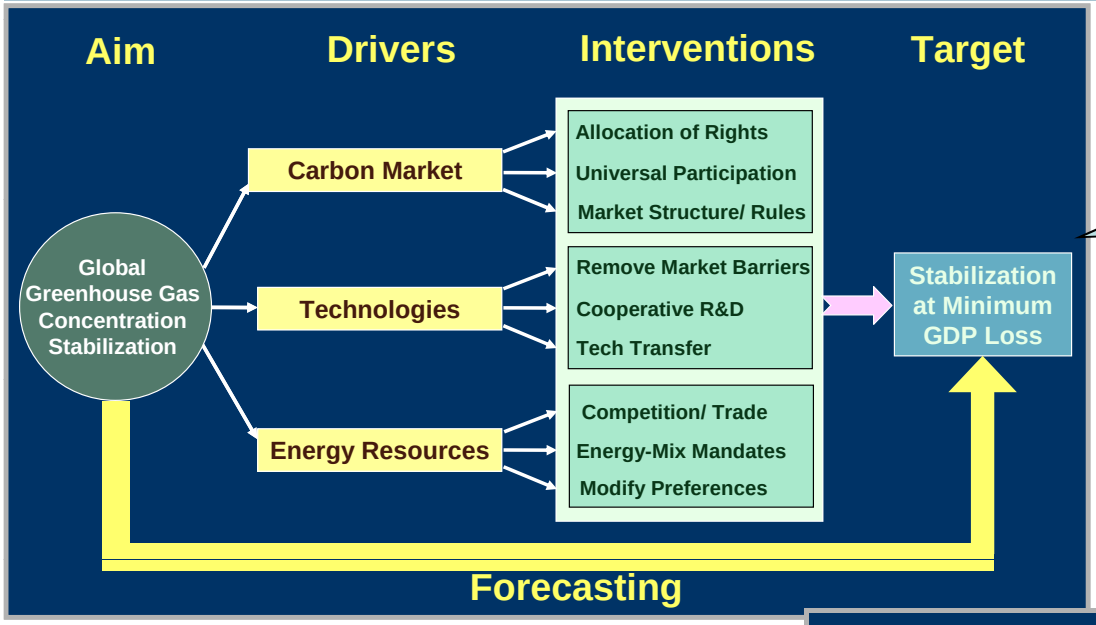
2. **Mitigation Strategies and Options for India:**
   Energy and Technology Transitions

3. **Technology and Finance for Mitigation:**
   Architecture for Cooperation

Global Climate Stabilization Scenarios

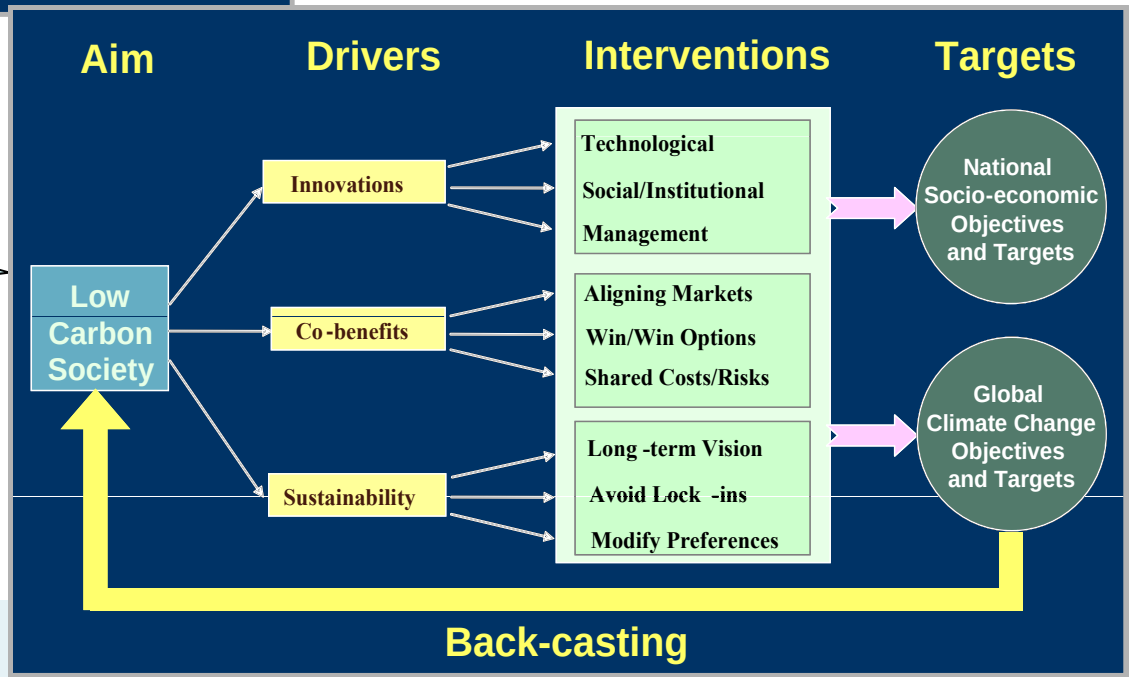


Alternate Development Perspectives

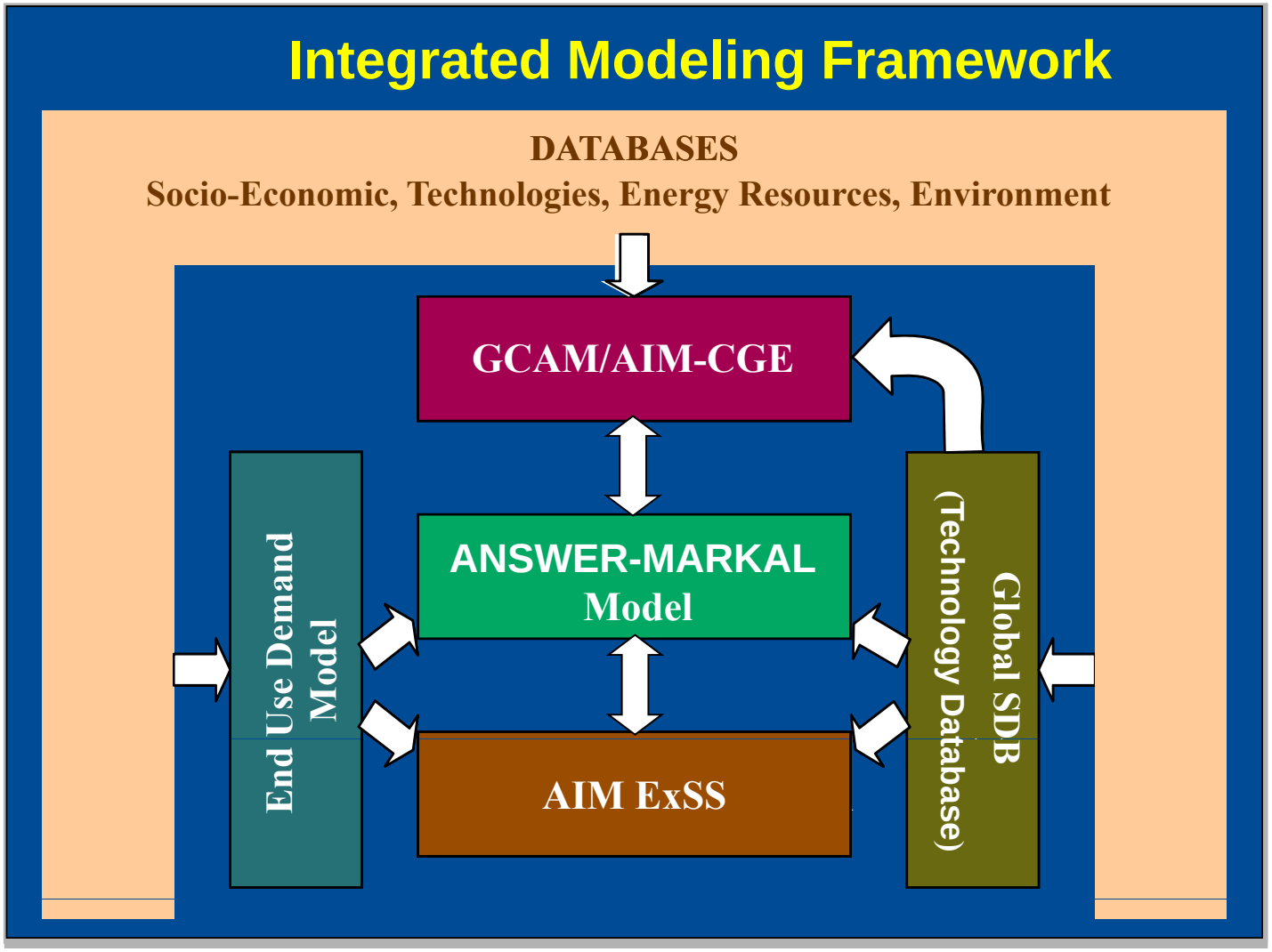


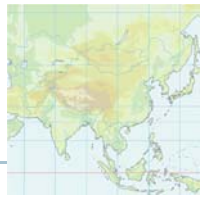
Conventional Climate Centric Paradigm

Sustainable Development and Climate Paradigm



Integrated Modeling Framework

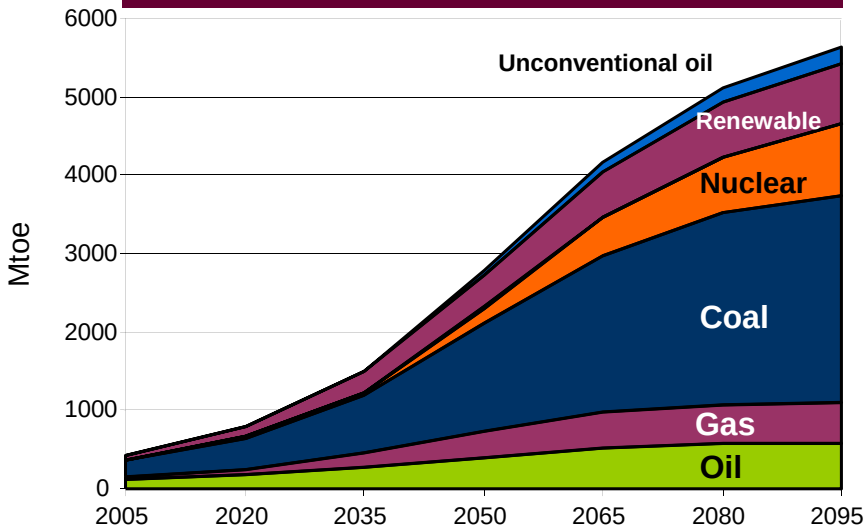




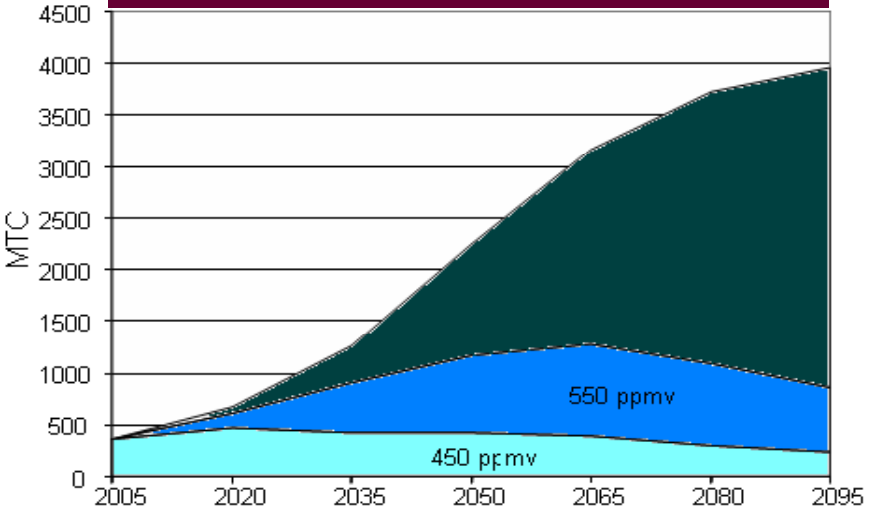
Mitigation Strategies and Options for India: Energy and Technology Transitions

Global & National Analysis: GCAM & AIM/CGE

Base Case Scenario: INDIA



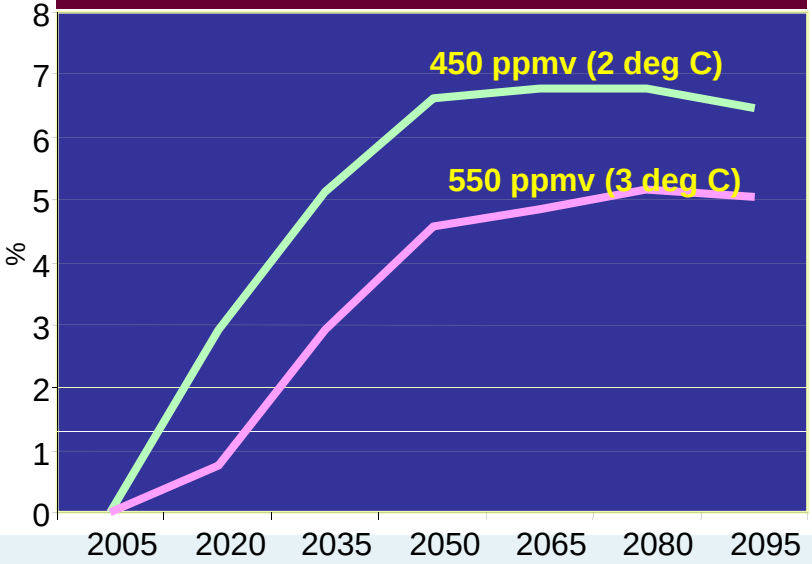
INDIA: Carbon Emissions



Electricity Production (in EJ) and CCS Share (in %)

	Scenario	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	450 ppmv	0.00	29.71	36.20	33.38
(% share)	550 ppmv	0.00	6.20	21.31	29.08
Gas w/CCS	450 ppmv	0.00	5.38	5.06	4.03
(% share)	550 ppmv	0.00	1.63	2.75	2.85
Biomass w/CCS	450 ppmv	0.00	5.72	10.67	11.83
% share)	550 ppmv	0.00	0.71	3.19	5.54

GDP Loss for India

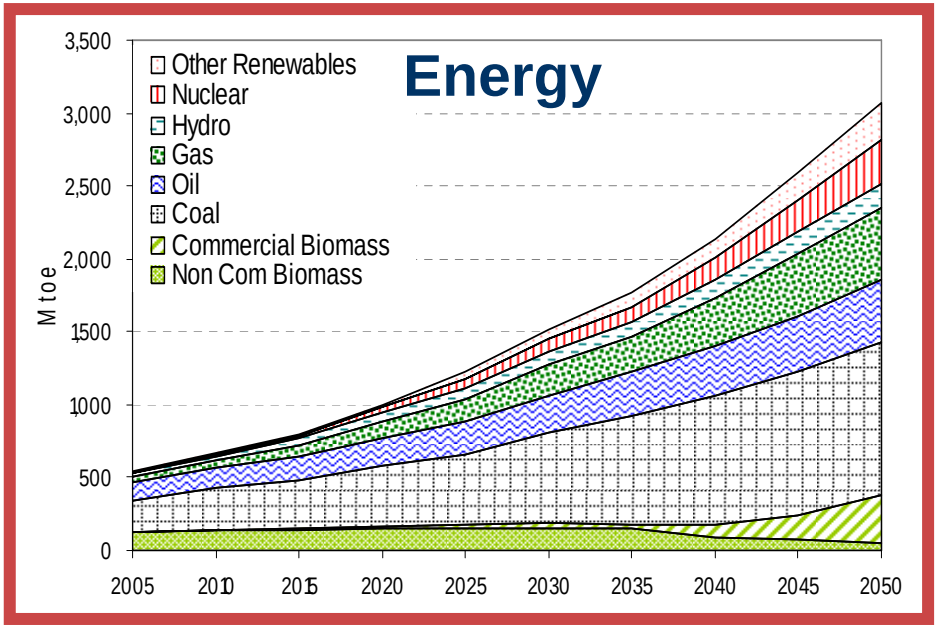


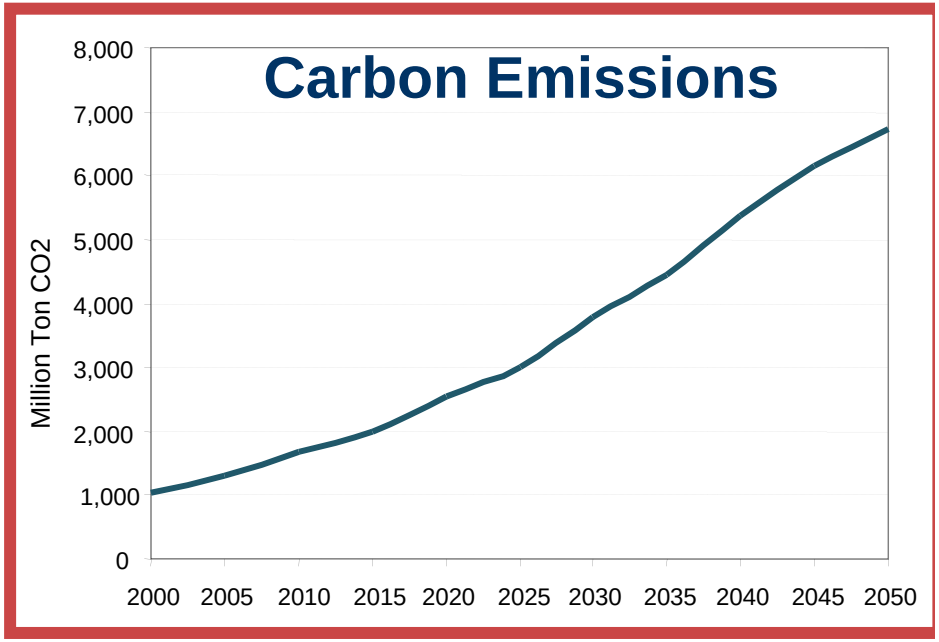
National Analysis: MARKAL & End-Use Models

Base Scenario: Growth of Economy and Population

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

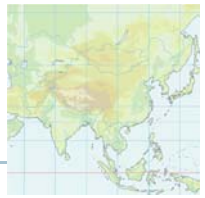
Absolute Growth in 2050 over 2005
Economy 23 times
Population 1.56 times

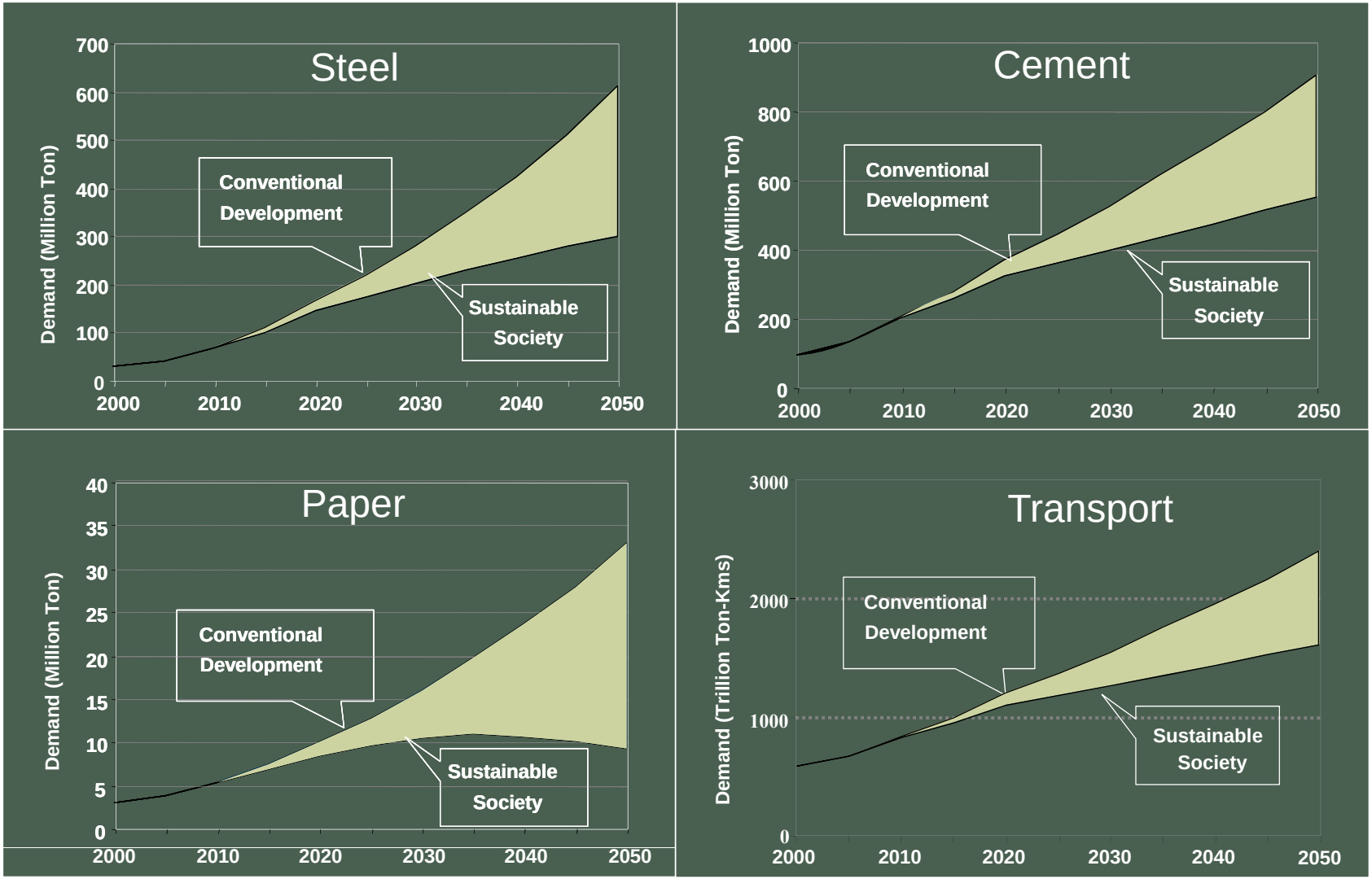




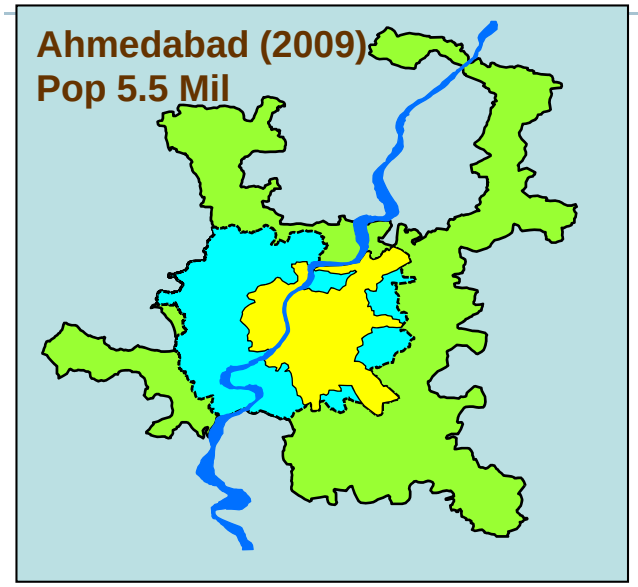
Global Stabilization Target: 2°C

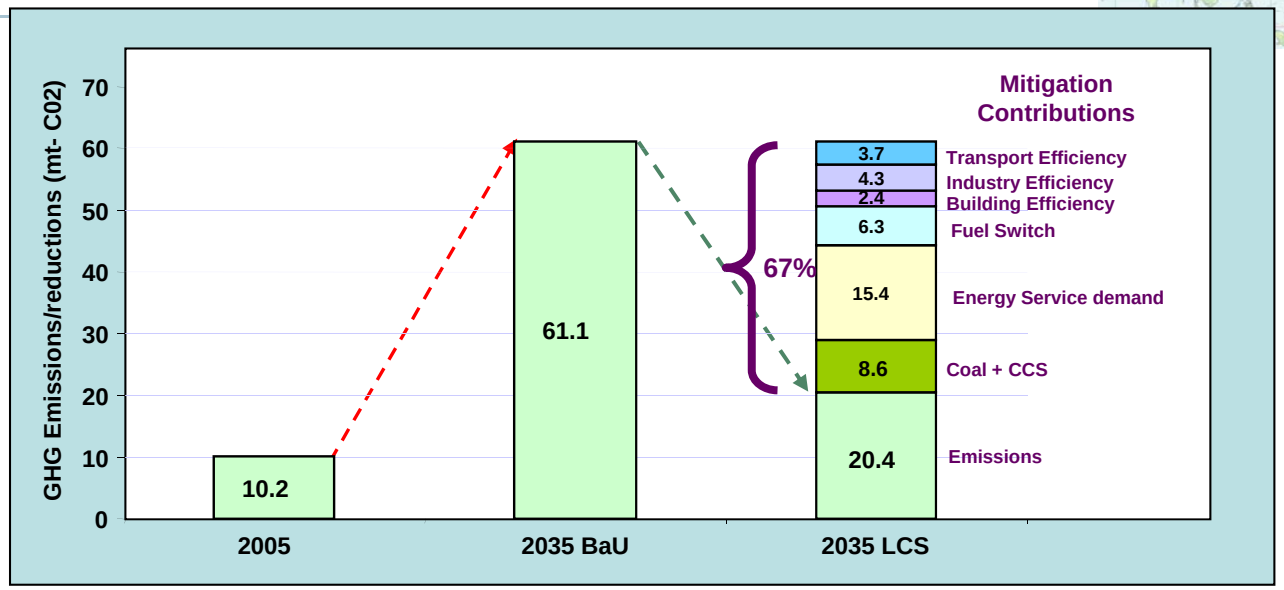
3R & Dematerialization

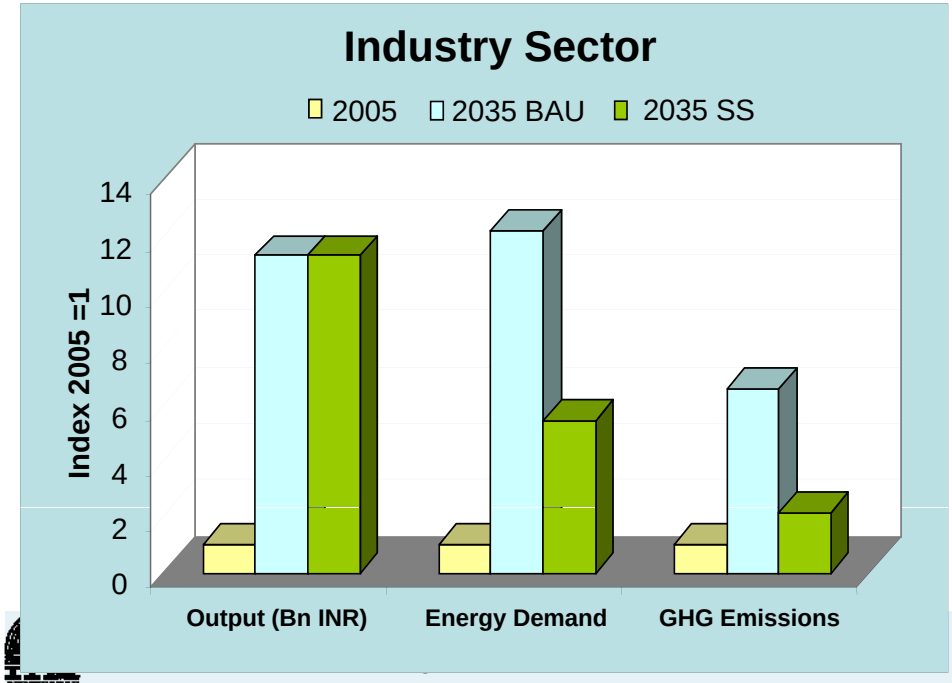


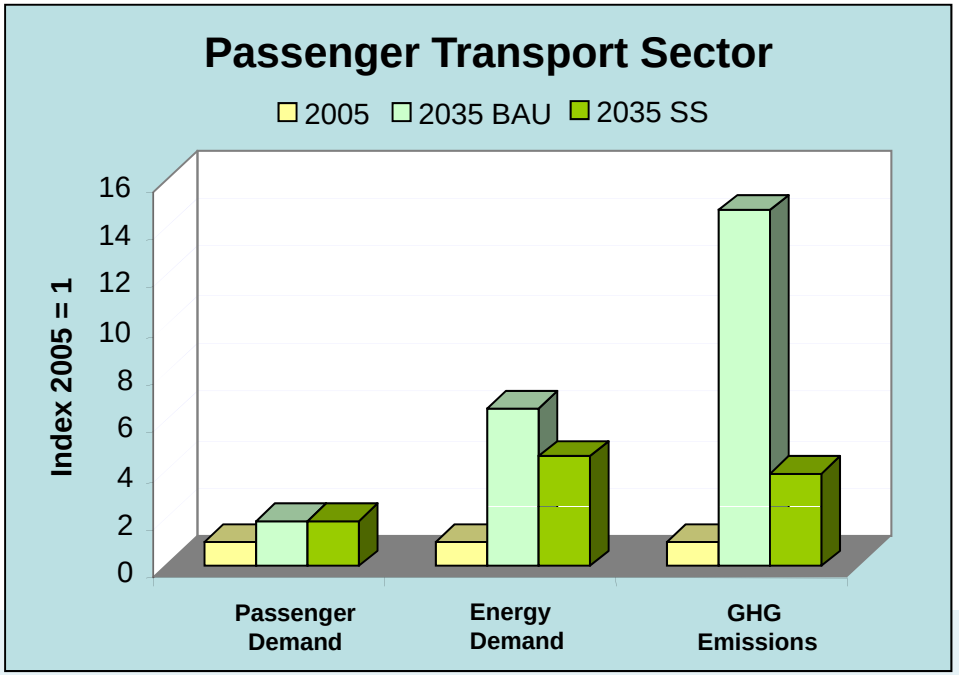


Mitigation Technology Choices in Cities

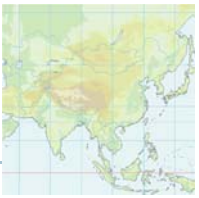


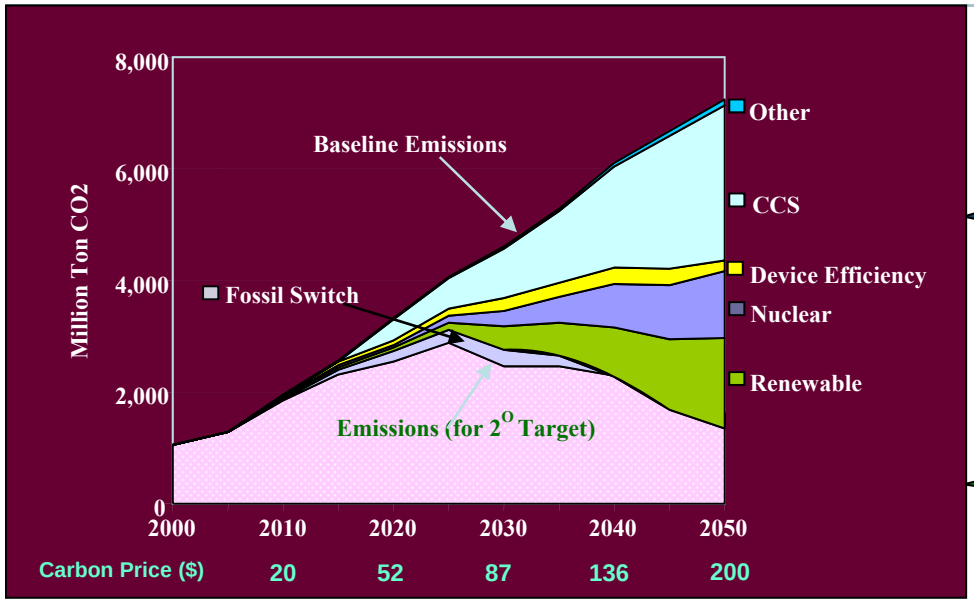






Mitigation Technology Options





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

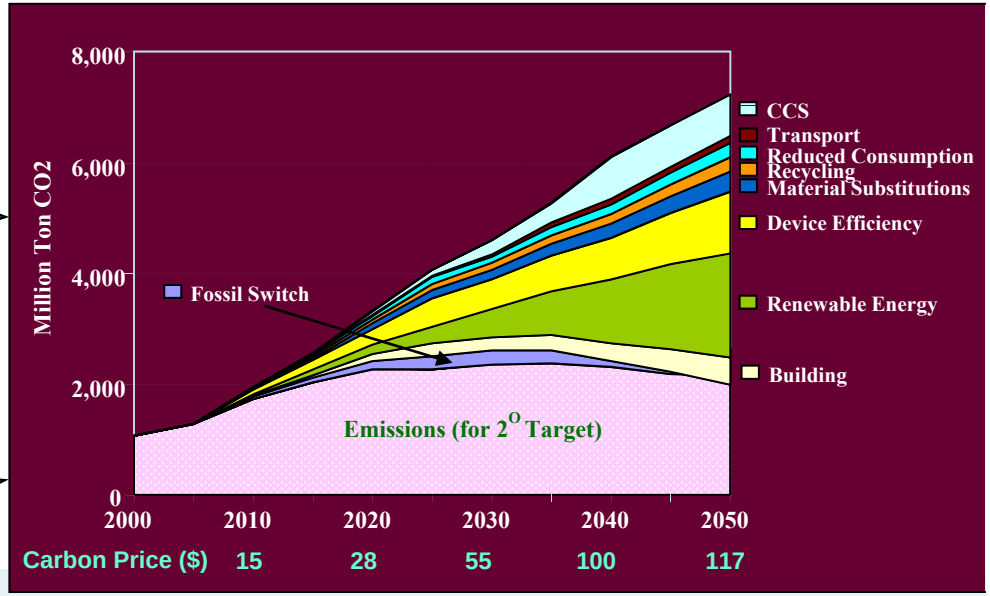
- Energy Efficiency
- Wind/Solar/Biomass/Small Hydro
- Nuclear/CCS

Sustainability Approach: aligning climate and sustainable development actions

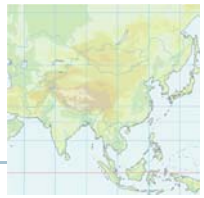
- Low Carbon Price
- Bottom-up/Demand-side actions
- Behavioural change
- Diverse Technology portfolio

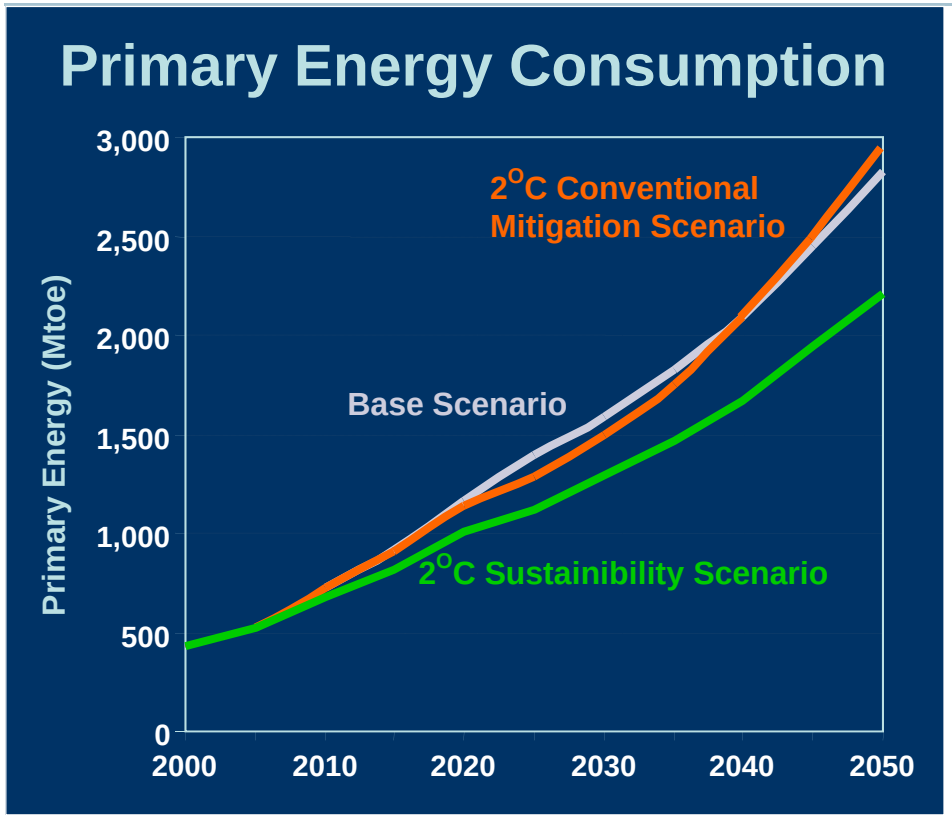
Technology Co-operation Areas

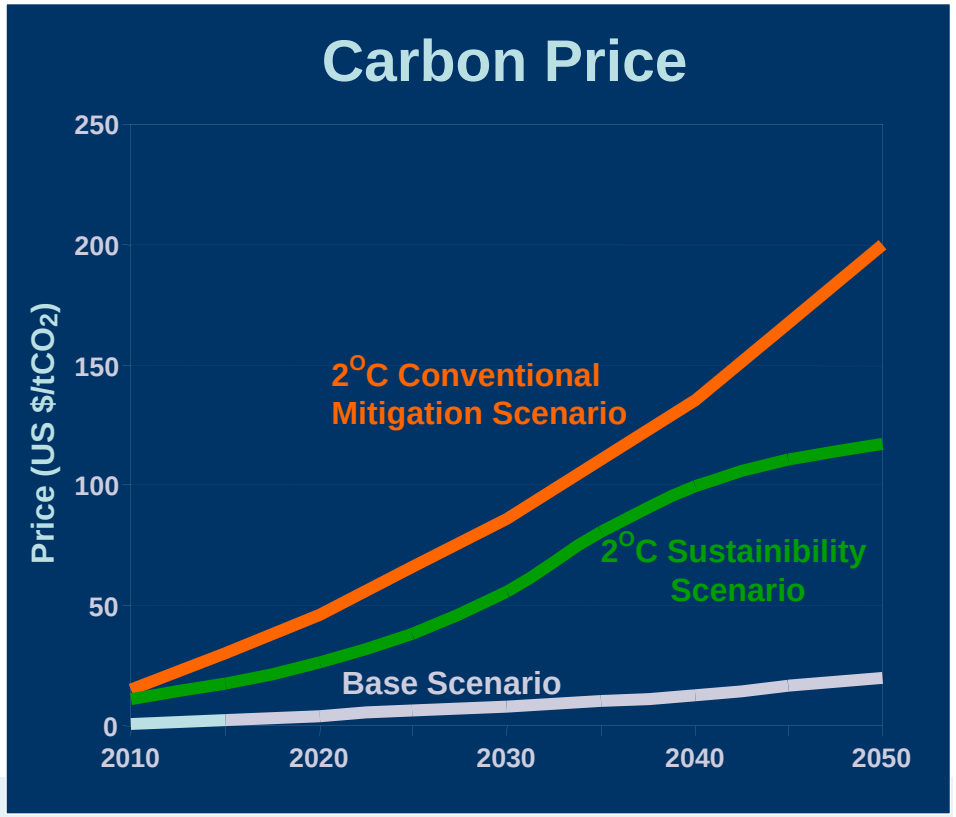
- Transport Infrastructure Technologies
- 3R, Material Substitutes, Renewable Energy
- Process Technologies
- Urban Planning, Behavioral Changes

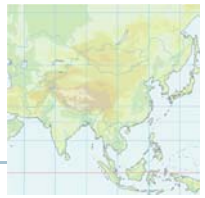


Primary Energy and Carbon Price









Technology and Finance for Mitigation: Architecture for Cooperation

INDIA: National Climate Change Action Plan

8 National Missions:

1. Solar Energy (100 MW PV/yr; 1000 MW Thermal by 2017)
2. Enhanced energy efficiency (10000 MW saving by 2012)
3. Sustainable habitat
4. Water Sector (20% water use efficiency improvement)
5. Sustaining the Himalayan eco-system
6. A “Green India” (6 Mil. Hectare afforestation; Forest cover from 23 to 33%)
7. Sustainable agriculture
8. Strategic knowledge for climate change

Cooperation for Technology & Finance

1. Expanding Areas of Cooperation for Mitigation

- Industrial Process: Cement, Steel, Paper
- Infrastructure: Transport, Pipelines, Electricity T&D, Hydro (+Canals)
- Soft Solutions: Communication
- Conservation/Behavioral: 3R, Material Substitutes
- Planning: Urban design, Industry locations
- End-of-pipe Solutions: CCS

2 . Technology Cooperation Architecture

- Shared R&D Investments
- Technology transfer Pathways: Technology Import/JV/ Royalty
- R&D Investment Structure / Ownership of IPR
- Local adaptation, deployment and development
- Creating National R&D and production base

Cooperation for Technology & Finance

3. Technology Development, Transfer & Deployment

- Public Investments in Technology Innovations
- Market Instruments for Technology Push and Pull
- Finance for Technology Transfer

4. Coordination for Co-benefits

- Aligning ‘Development and Climate’ Policies to gain Co-benefits
- Aligning ‘Development and Climate’ Finance Instruments

5. Global Technology Market and Industry

- Aligning Global/Regional/National Technology Market & Industry
- Joint Ventures to share ‘Knowledge, Costs, Benefits & Risks’

Thank you