

Policies for achieving a low carbon transport sector in India

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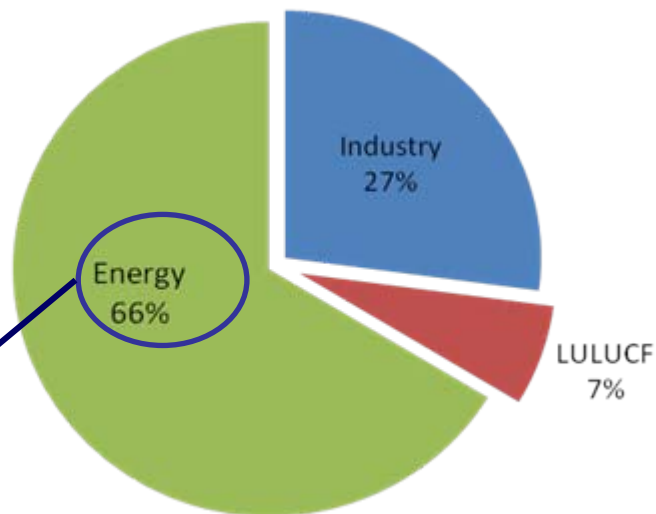
Roskilde

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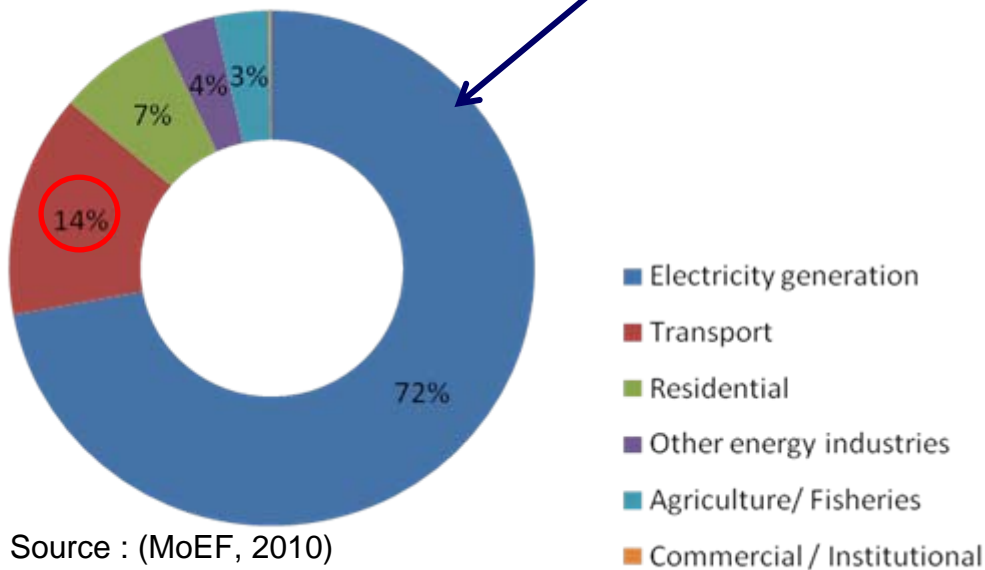
- Transport Sector – Trends for India
- Research Questions
- Low Carbon Transport – Options and Policies
- Preliminary Results

Transport in India's Carbon Emissions

Share of total CO2 Emissions



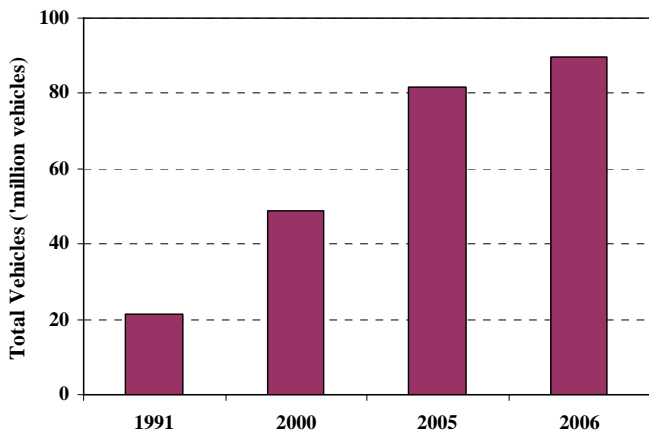
Sectoral share of energy related CO2 Emissions



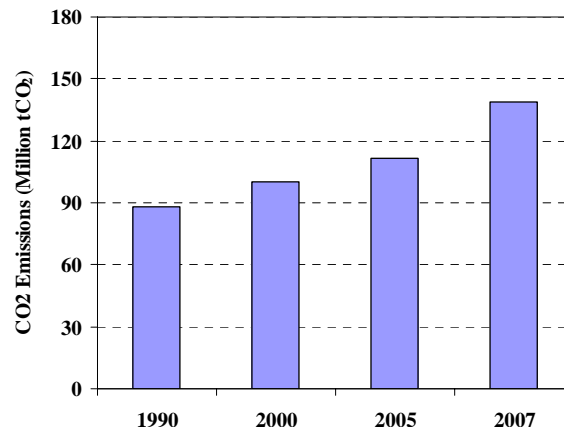
Source : (MoEF, 2010)

Transport Sector – Key Trends

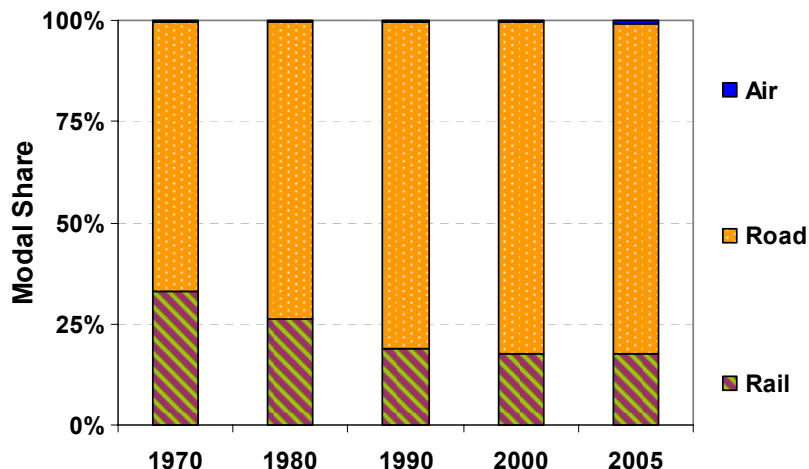
Vehicle Growth- Road Sector



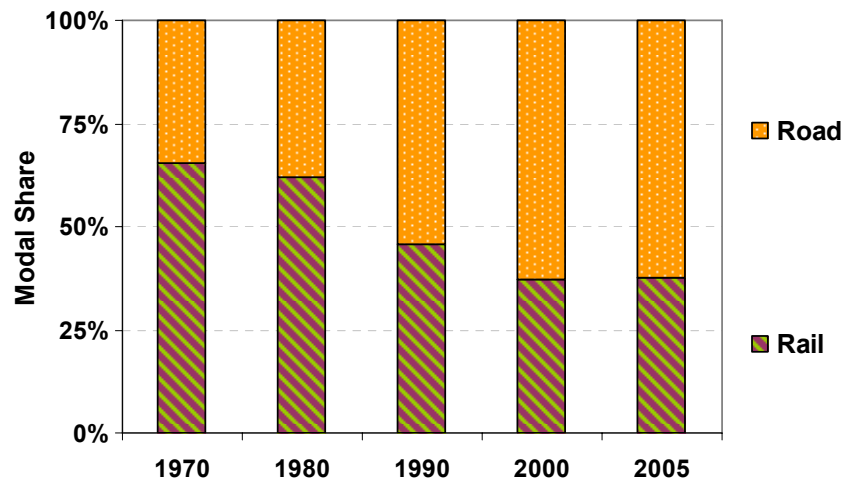
Emission Growth: Transport Sector



Modal Share – Passenger Transport



Modal Share – Freight Transport



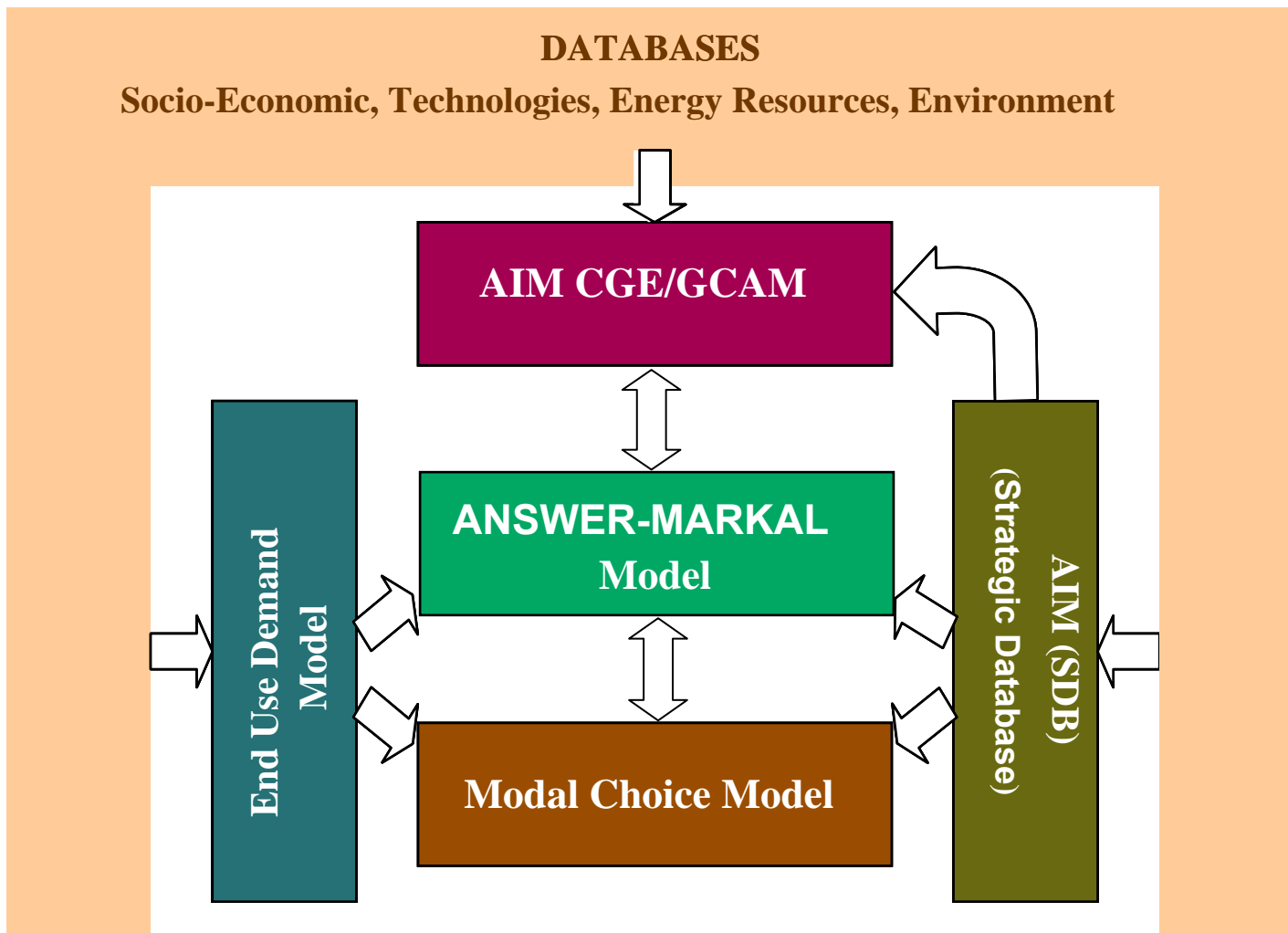
Billion PKM 359 798 1560 2567 3479

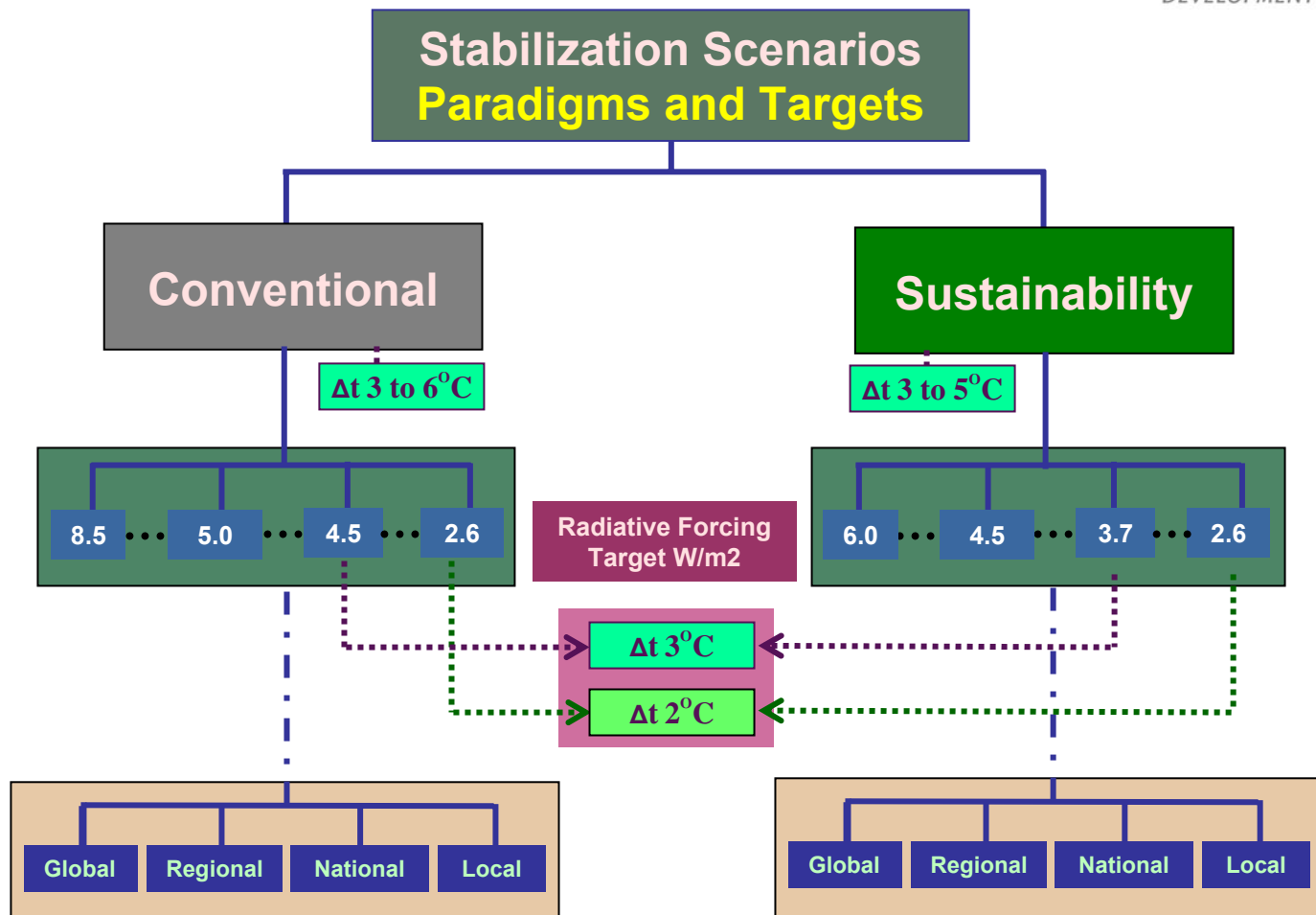
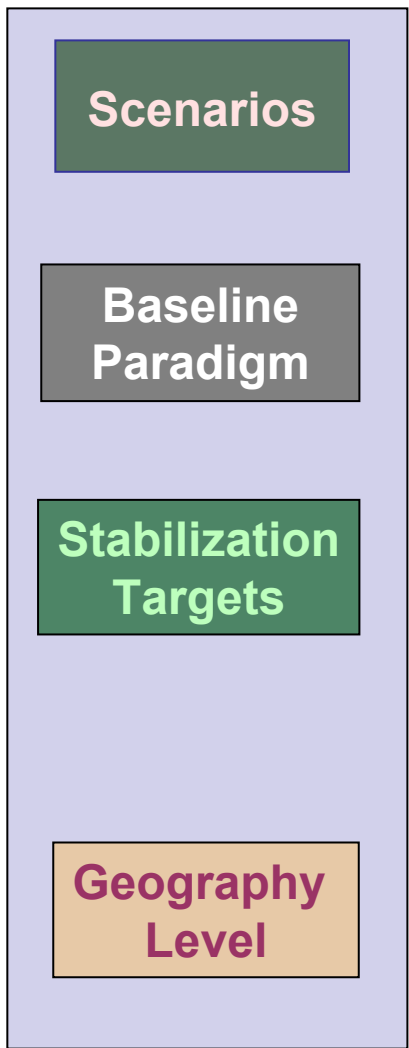
Billion TKM 194 256 532 853 1179



Research Question

- What are the alternative policies for reducing emissions from transport sector?
 - What are emission trajectories for transport sector in BAU?
 - What are the key levers for the emission reduction?
 - What can be possible reductions from each lever?





– Infrastructures

- Surface Modes: Rail, Road, Pipelines (Oil, Gas)
- Air (Aviation)
- Water (Ports, Dams, Canals)
- Wires (Electricity T&D, Communication)

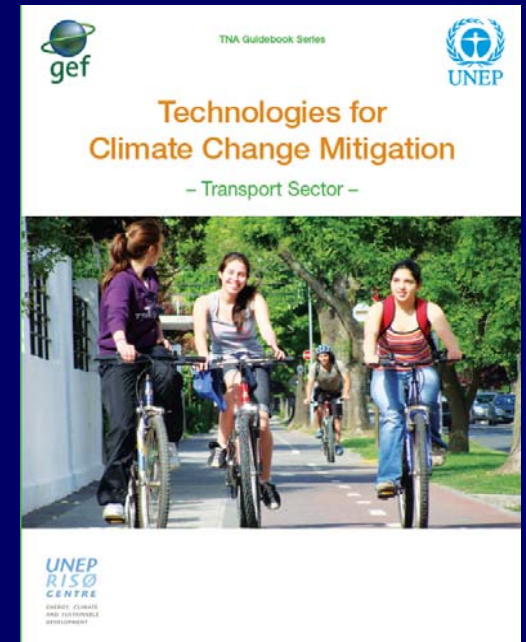
– Energy-use Technologies

- Conservation (Bicycles, Walkways)
- Efficiency (Vehicles)
- Fuel Switch (Ethanol, Electric Car)

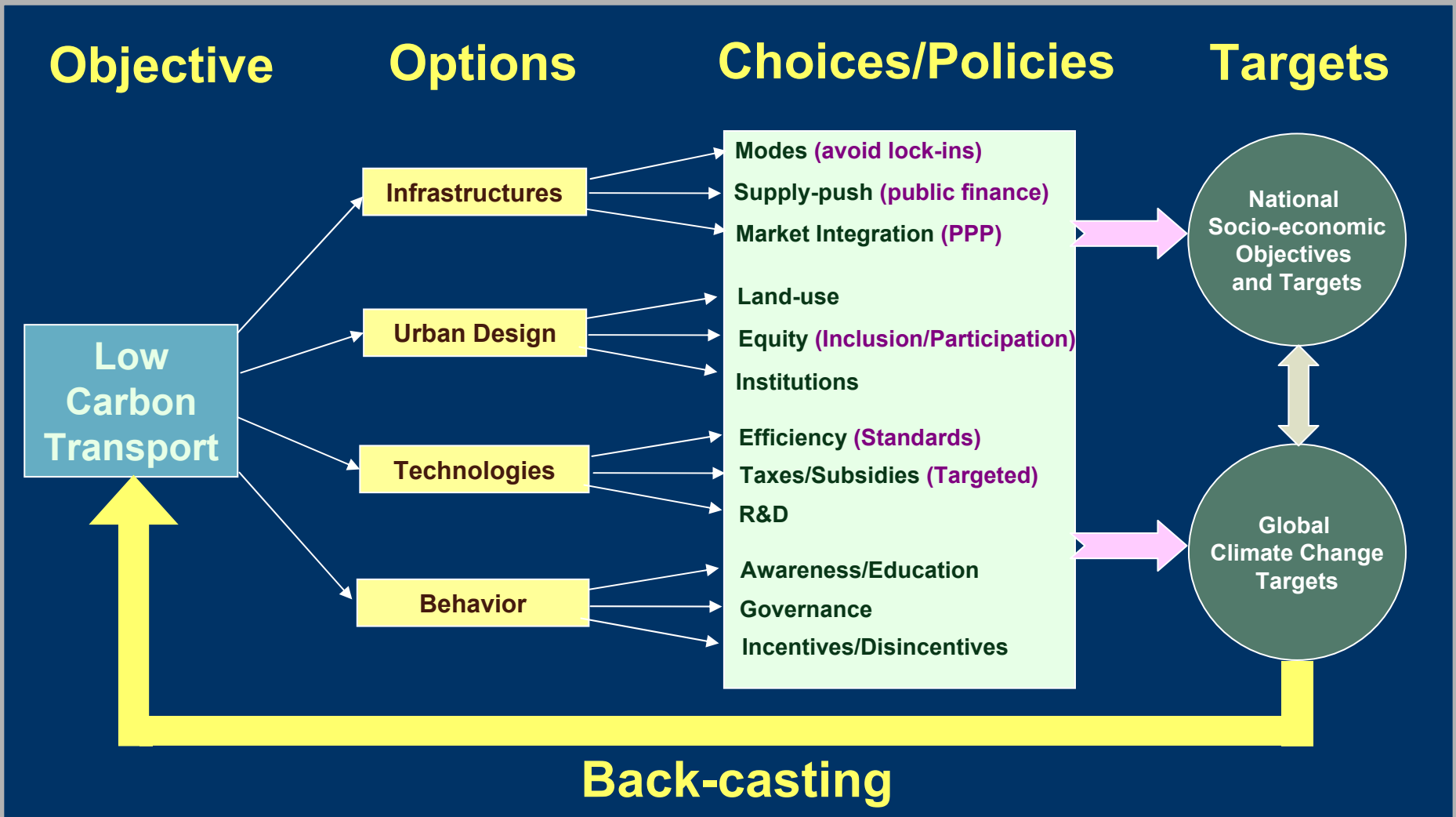
– Soft Solutions

- Planning: Urban design (Compact Cities); Industry locations (DMIC)
- Information Technologies (Telecommuting)

– End-of-Pipe CO₂ Removal: *CO₂ Transport Pipelines for CCS*



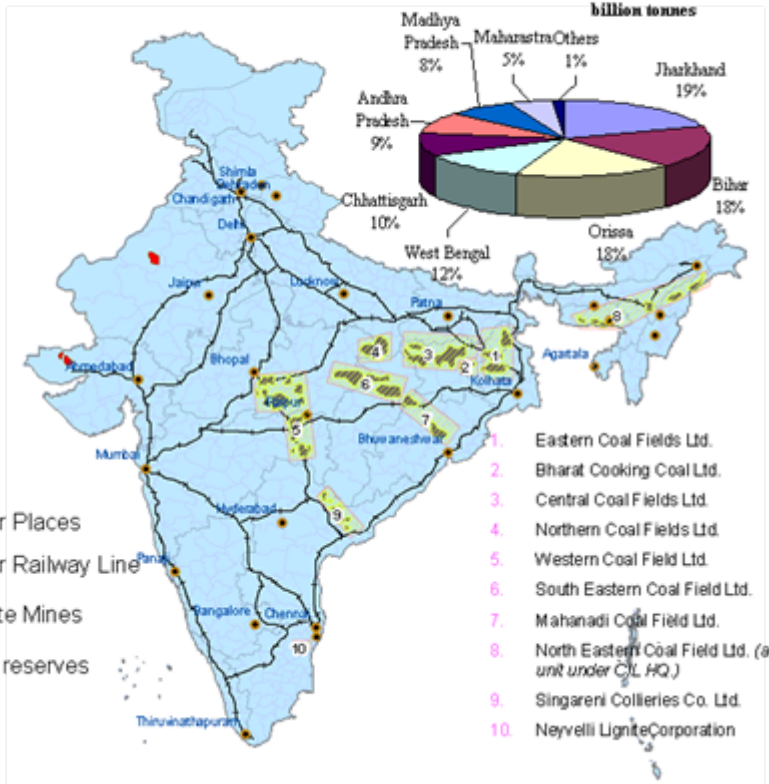
Sustainable Low Carbon Mobility Framework



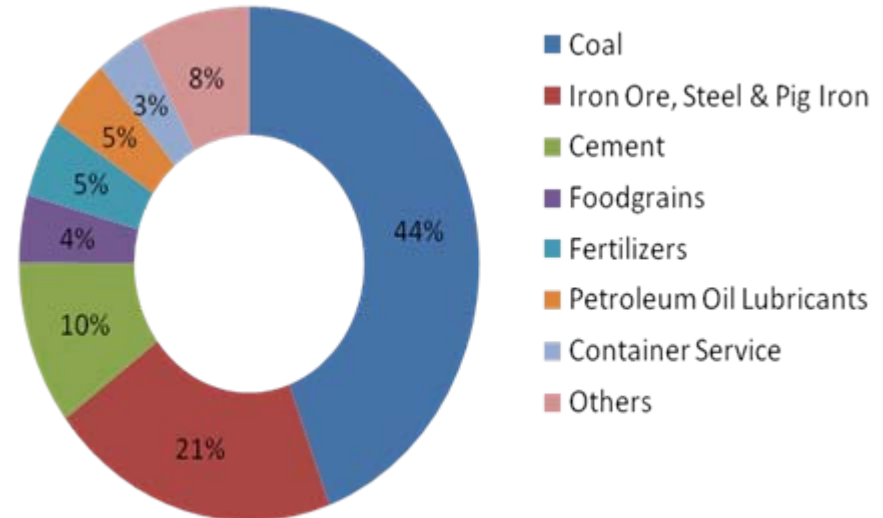
Coal by Wire

State Wise Coal Reserves

Total Proven Reserves 95.9 billion tonnes



Composition of Railway Freight Traffic (%): 2010



Train Corridors





Japan will provide technology and financial support for Delhi-Mumbai Industrial Corridor (DMIC) to be developed similar to Tokyo-Osaka corridor for Rail transport

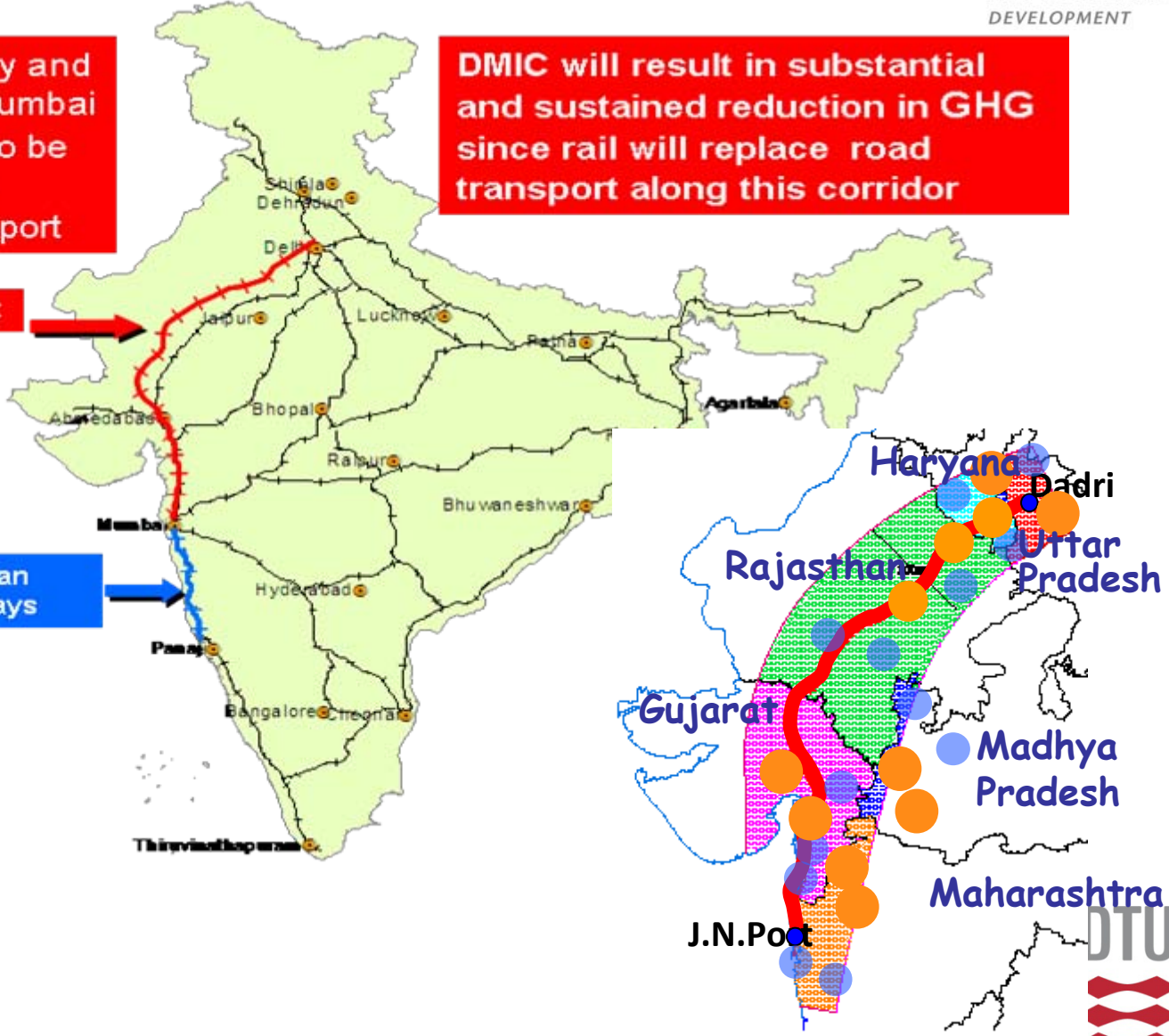
DMIC will result in substantial and sustained reduction in GHG since rail will replace road transport along this corridor

Proposed DMIC

Konkan Railways

Legend

-  Major Cities
-  Proposed DMIC
-  Konkan Railways
-  Broad Gauge Railway Line



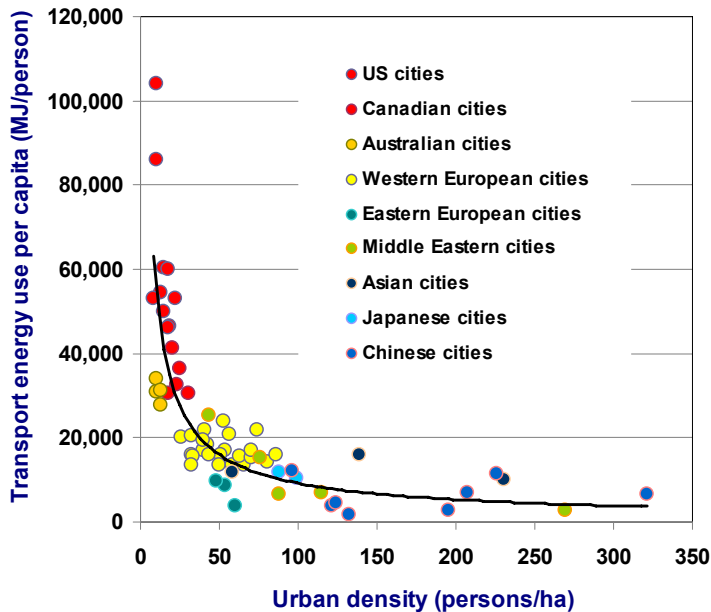
Land Use Policies

- Urban density
- Urban Form

Infrastructures

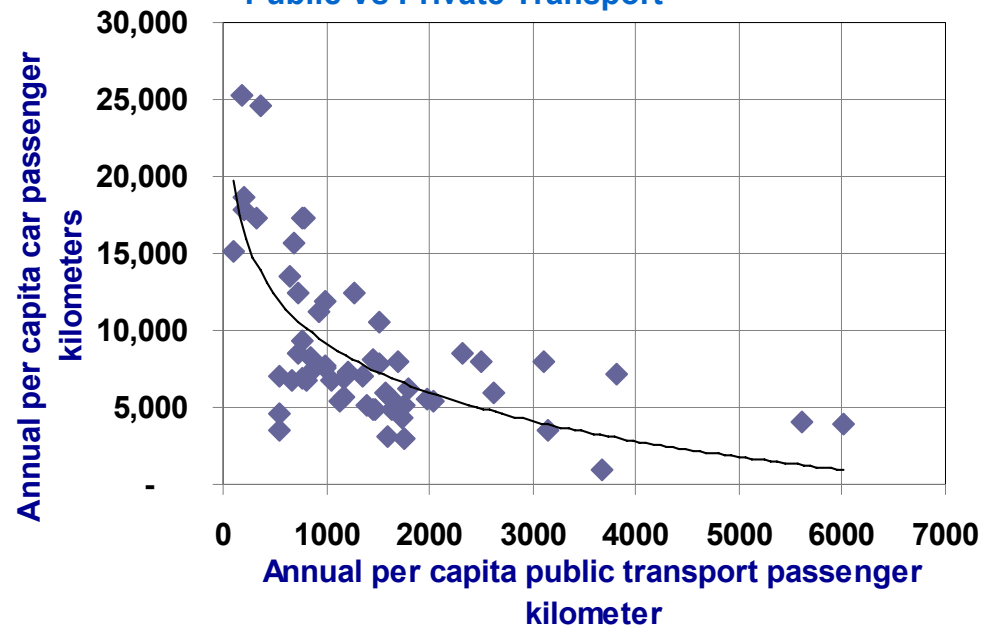
- Metros / Trams
- Bus Rapid Transit System
- Non motorised transport

Energy Use Vs Urban Density



Source: Newman & Kenworthy, 2011

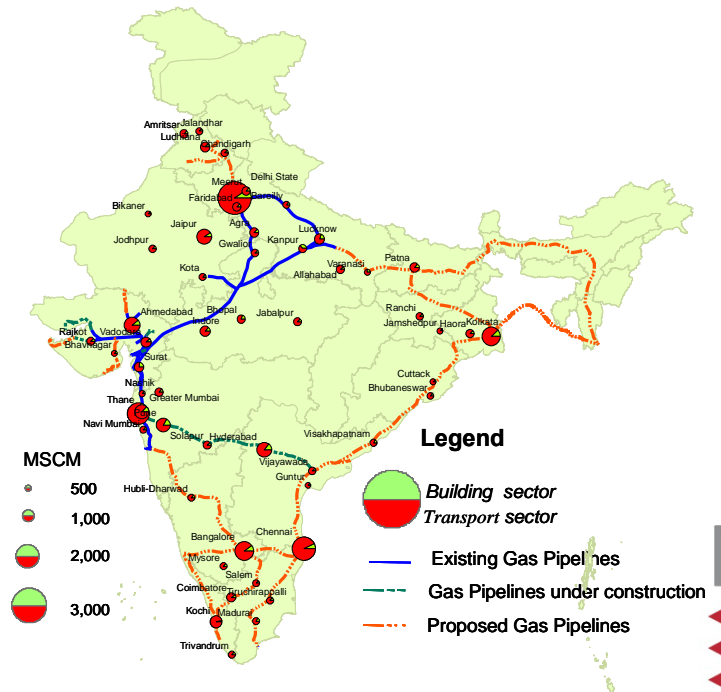
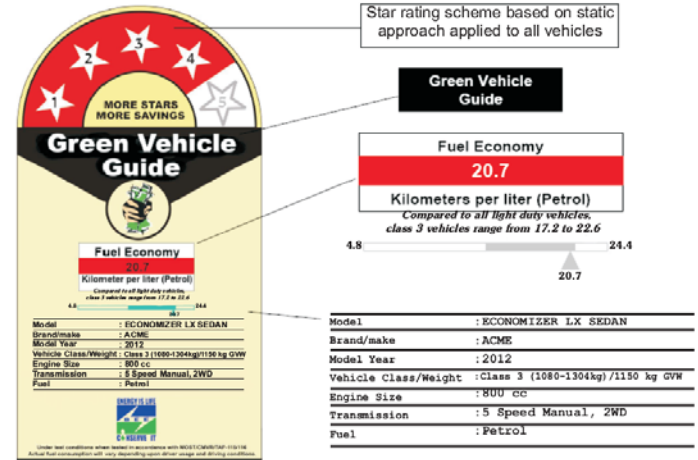
Public Vs Private Transport



Source: Newman, Kenworthy & Glazebrook, 2008

Technology Policies

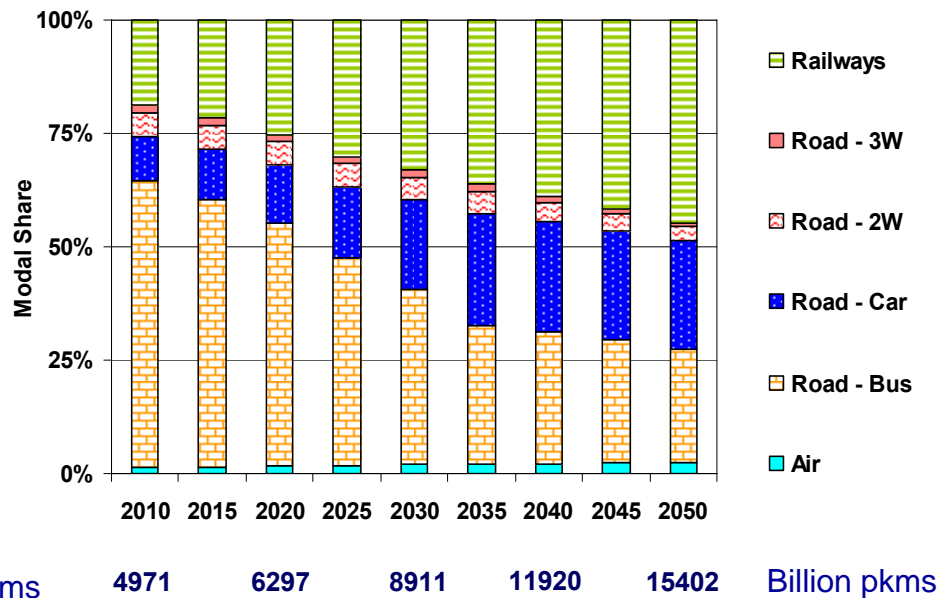
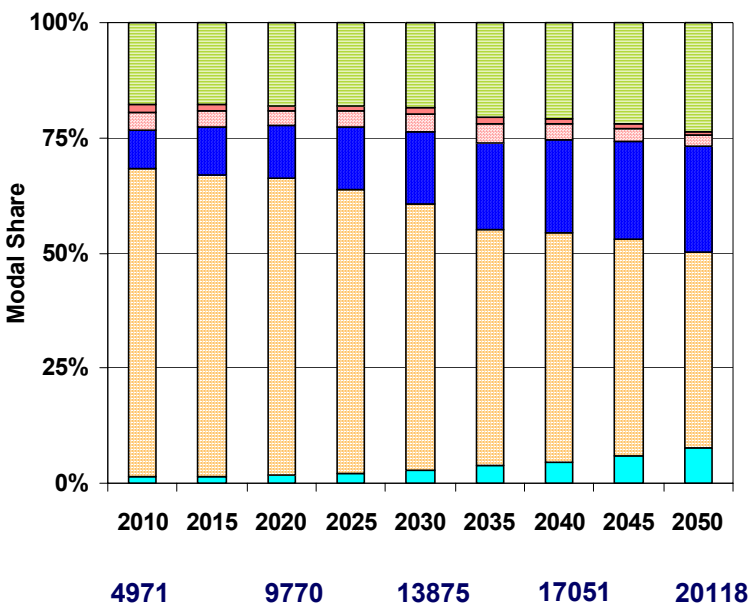
- Auto Fuel Policy: Road map for emission standards
- Efficiency standards: BEE Green Vehicle Guide
- Promotion of CNG for public transport within cities
- Bio fuels – Ethanol and Bio diesel blending in petrol and diesel



Passenger Transport Demand

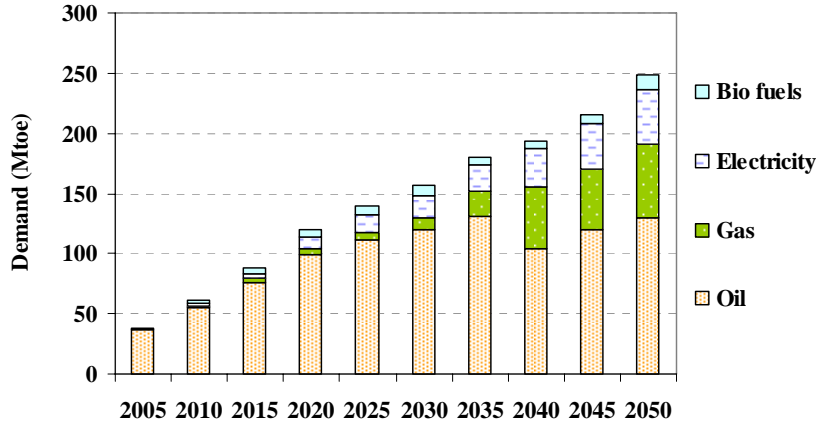
Base Case

450 ppm + Sustainability

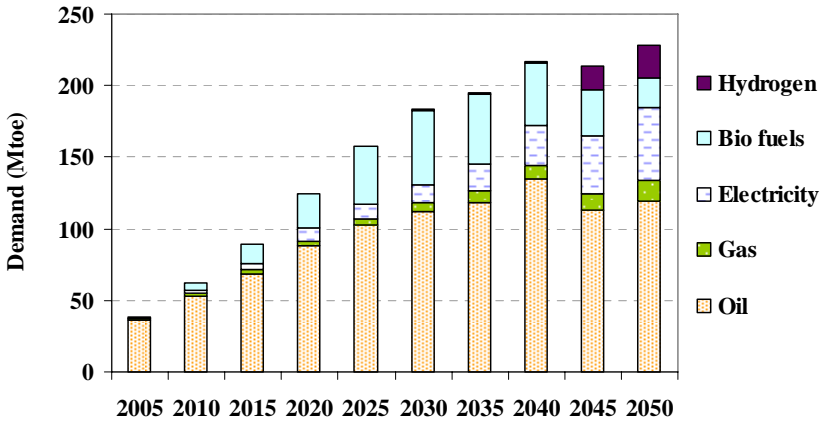


Energy Demand

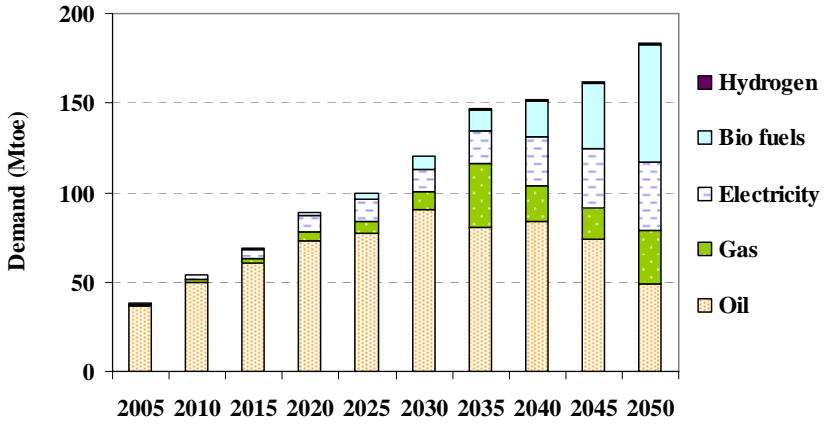
Transport Energy Demand : Base Case



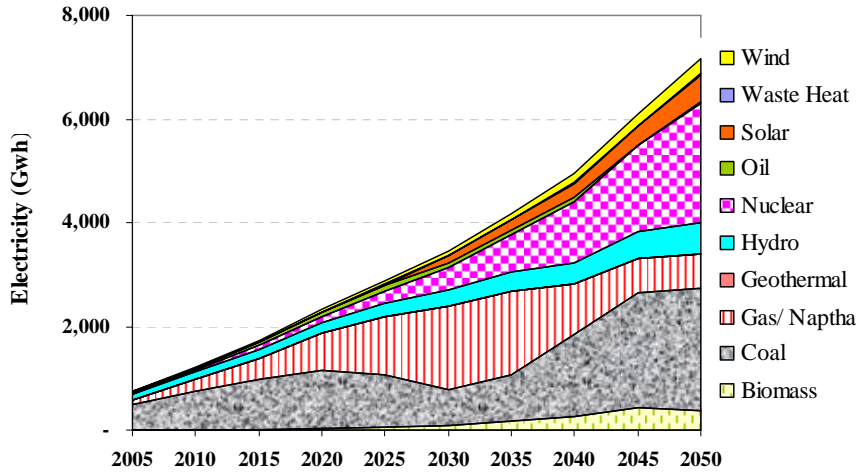
Transport Energy Demand : 450 ppm + Conventional Paradigm (CT)



Transport Energy Demand : 450 ppm + Sustainability Paradigm (ST)



Electricity Energy Demand : 450 ppm



Conclusions

- **Energy Security:** Conventional (↓) and Sustainability (↑↑)
- **Environment :** Conventional (↑↑) and Sustainability (↑↑)
- **Climate:** Conventional (↑↑) and Sustainability (↑↑)
- **Ancillary Risks:** Conventional (↓) and Sustainability (↑↑)

Key Indicators for transport in 2050

	Unit	Base Case	450 ppm CT	450 ppm ST
Energy for transport				
Fossil fuel demand	Mtoe	190.96	133.78	78.71
Biofuels demand	Mtoe	11.93	21.43	64.93
Hydrogen demand	Mtoe	0.50	22.5	1.1
Electricity demand	Gwh	524.77	589.10	449.45
Energy Use per person	MJ/person	6,533	6,004	5,762
Environment		tbc	tbc	tbc
Climate				
CO ₂ Intensity of Grid	Million tCO ₂ /Gwh	0.69	0.35	0.43
CO₂ Emissions	Million tCO₂	898.26	611.65	600.52
Mobility demand - motorised	Pkm pa / person	12631	12631	11558



Thank You

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