

Low Carbon Transport for India

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Agenda

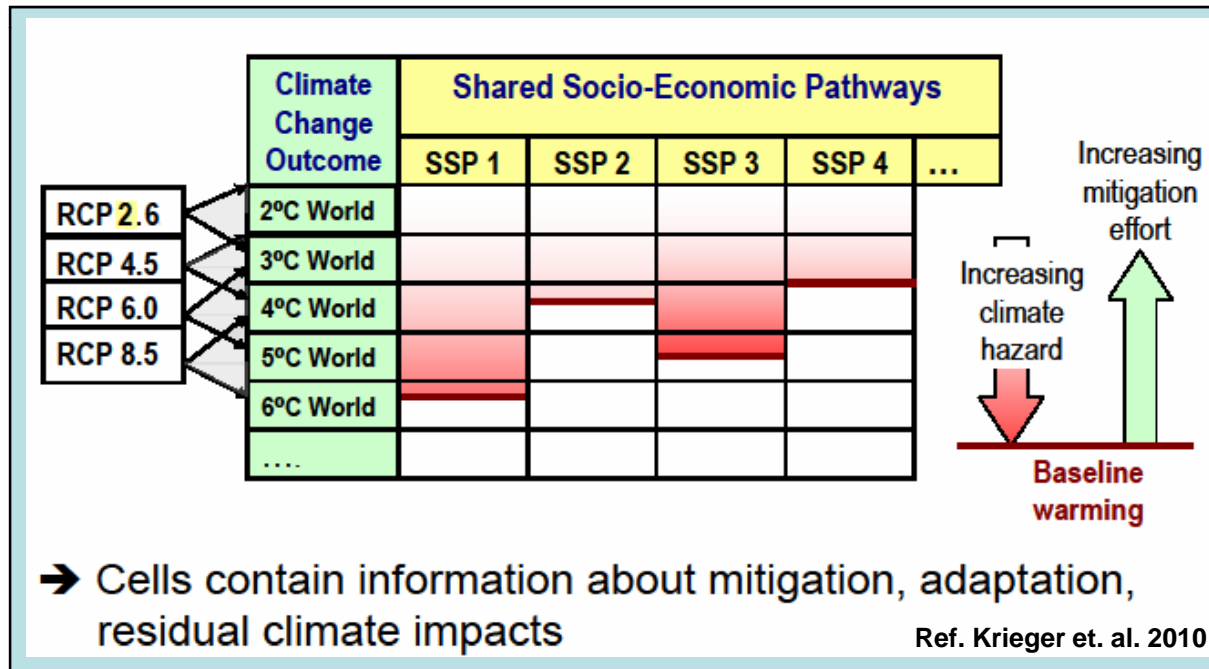
1. **Low Carbon Transport: Trends and Projections**
2. **Low Carbon Transport: Options and Policies**
3. **Conclusions: Sustainable Low Carbon Transport**

Climate Stabilization Target and Scenarios

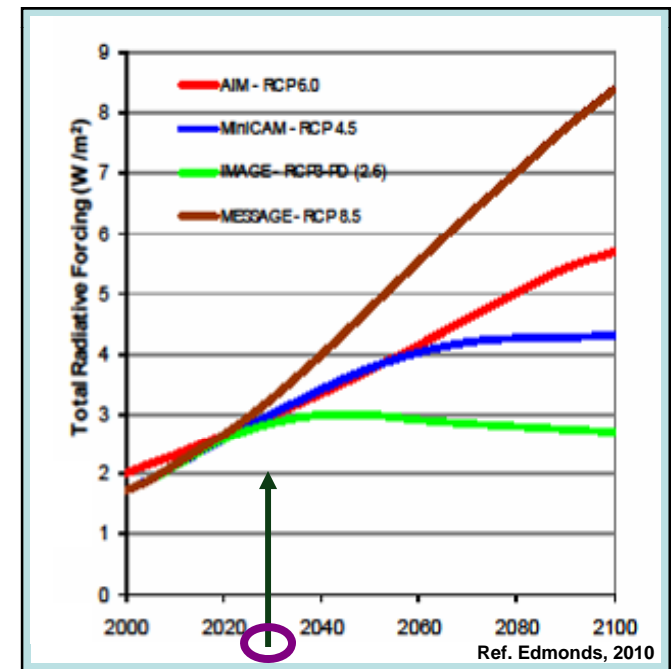
Copenhagen Accord

2°C Temperature Stabilization Target

IPCC Representative Concentration Pathways (RCPs)



Emission Paths for RCPs



INDIA: National Climate Change Action Plan

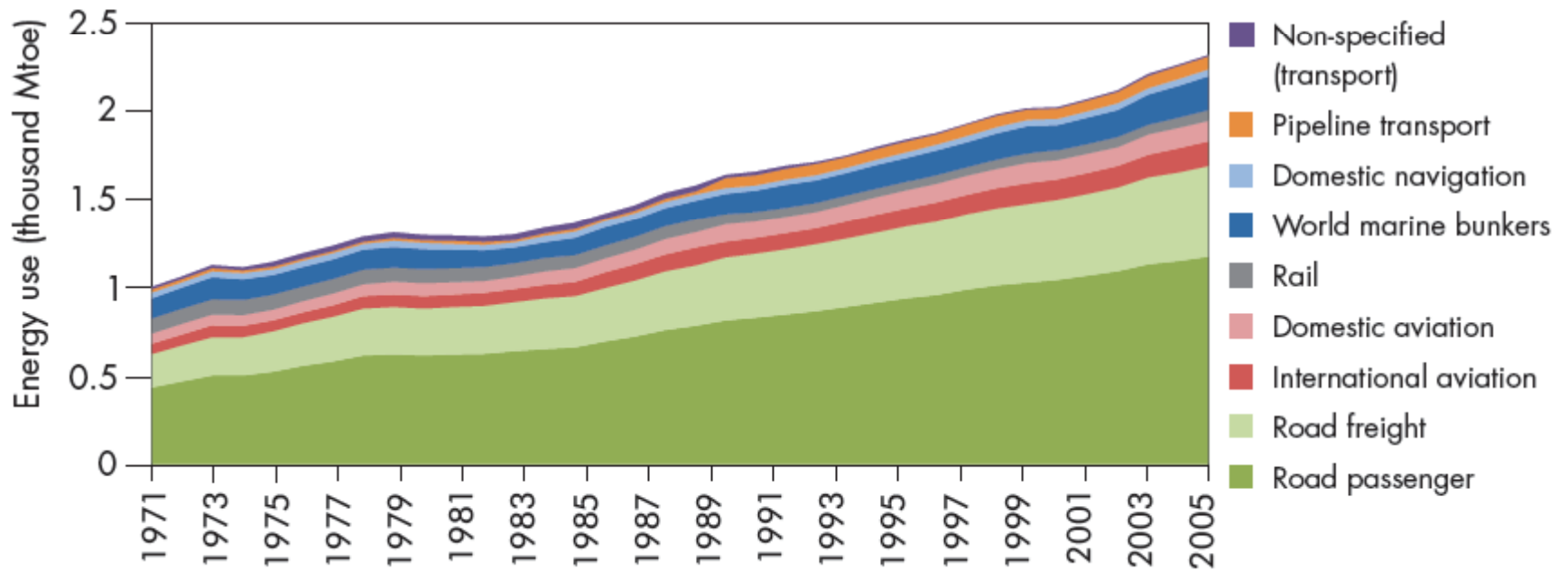
8 National Missions:

1. **Solar Energy** (20 GW by 2022; 2 GW off-grid; 20 m sq. m collectors)
2. **Enhanced energy efficiency** (Avoided capacity of 19000 MW by 2014-15)
3. **Sustainable habitat**
4. **Water Sector** (20% water use efficiency improvement)
5. **Sustaining the Himalayan eco-system**
6. **A “Green India”** (20 Mil. Hectare afforestation by 2020; Forest cover from 23 to 33%)
7. **Sustainable agriculture** (micro irrigation promotion in 40 m ha)
8. **Strategic knowledge for climate change**

Low Carbon Transport: *Trends and Projections*

Global Transport Energy Use

Figure 1.1 ▶ World transport energy use by mode, 1971-2006

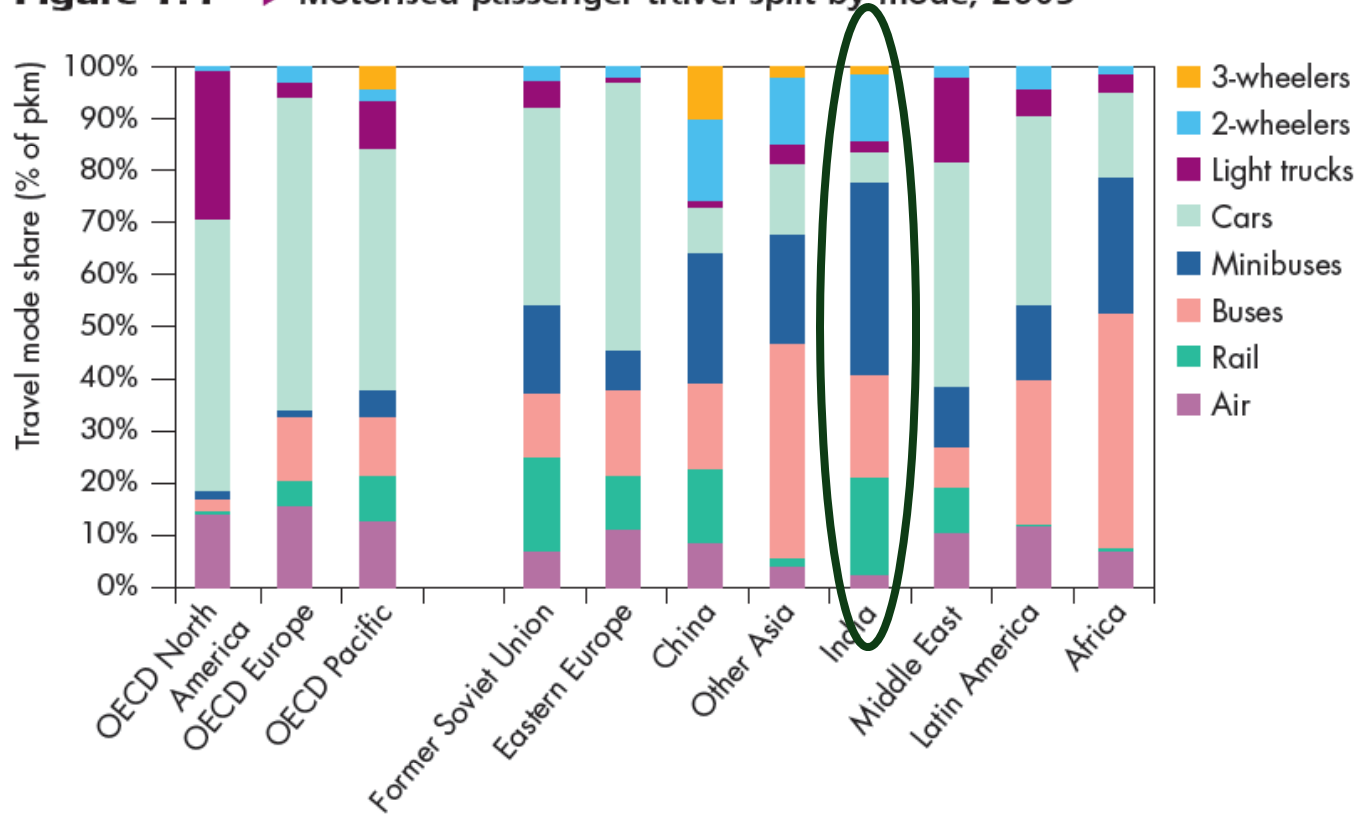


Key point

Transport energy use has more than doubled since 1971, and has been dominated by road transport. (IEA, 2009)

Motorized Passenger Transport Split

Figure 1.4 ▶ Motorised passenger travel split by mode, 2005



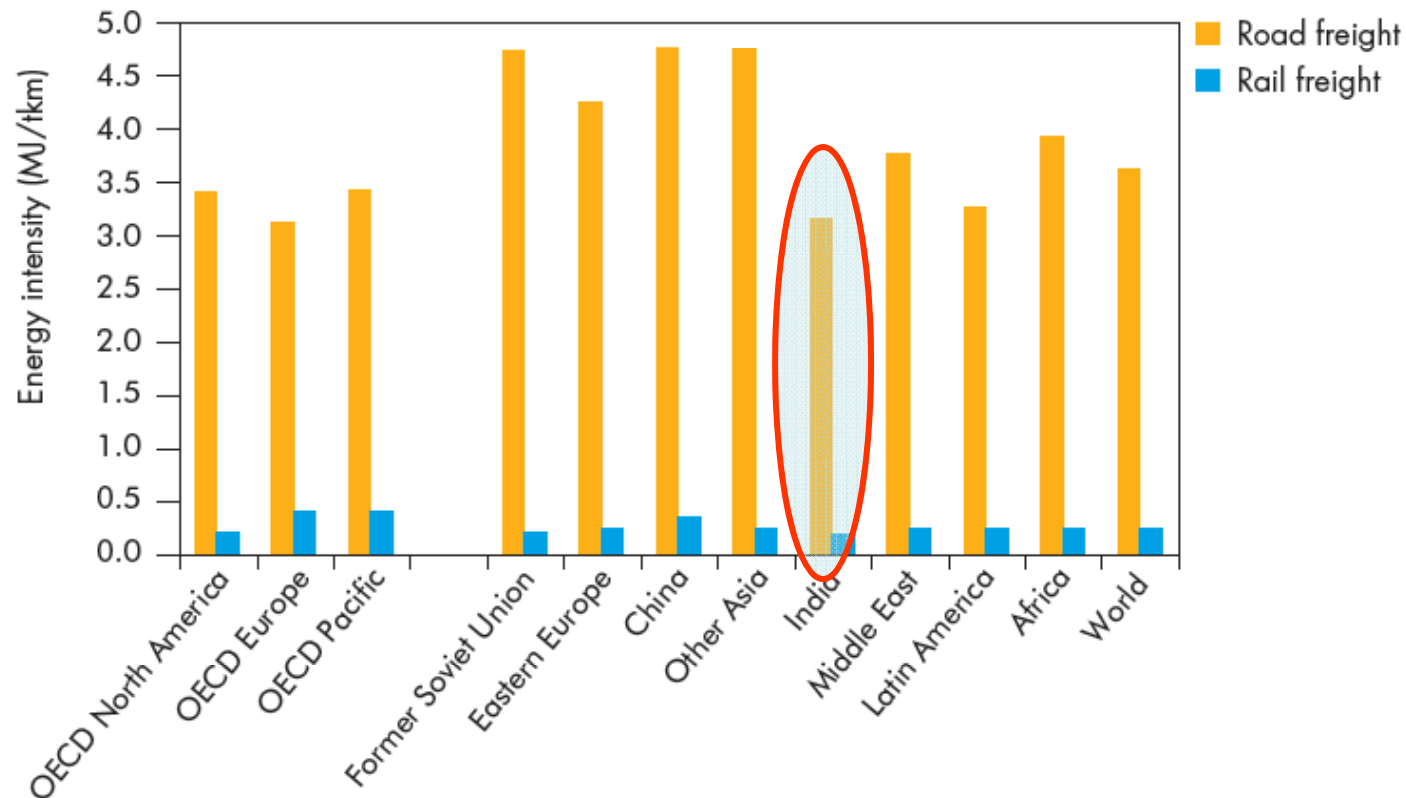
Source: IEA Mobility Model database estimates.

Key point

Passenger travel shares on a passenger-kilometre basis in OECD regions are primarily met by passenger LDVs, while in non-OECD regions buses provide a majority of passenger travel. (IEA, 2009)

Freight Energy Intensity: Truck vs. Rail

Figure 6.4 ▶ Energy intensity, truck and rail, by region, 2005

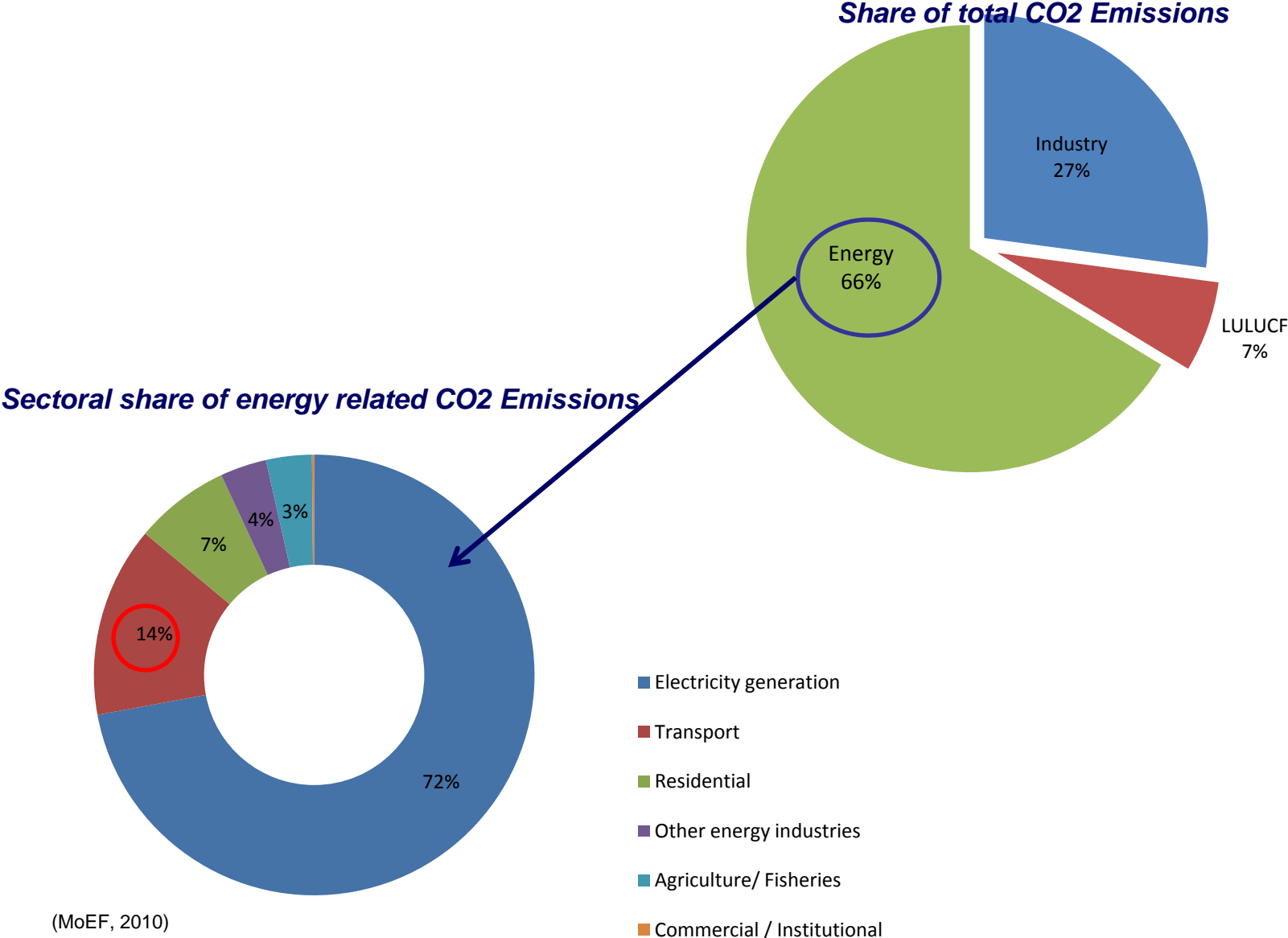


Source: IEA MoMo data and estimates.

Key point

Energy intensity (expressed in units of energy required per tkm) of rail freight transport is just a fraction of the energy intensity for road freight. (IEA, 2009)

Transport in India's Carbon Emissions



(MoEF, 2010)



Low Carbon Transport: *Options and Policies*

Low Carbon Transport: Technology Choices

– 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)

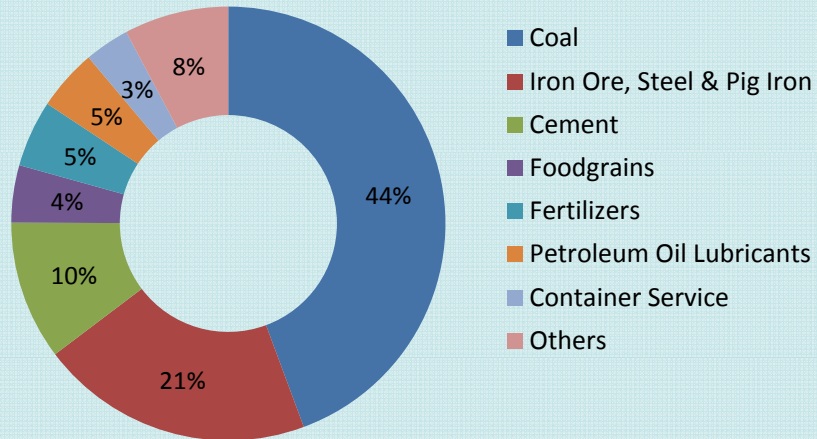
– Soft Solutions

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

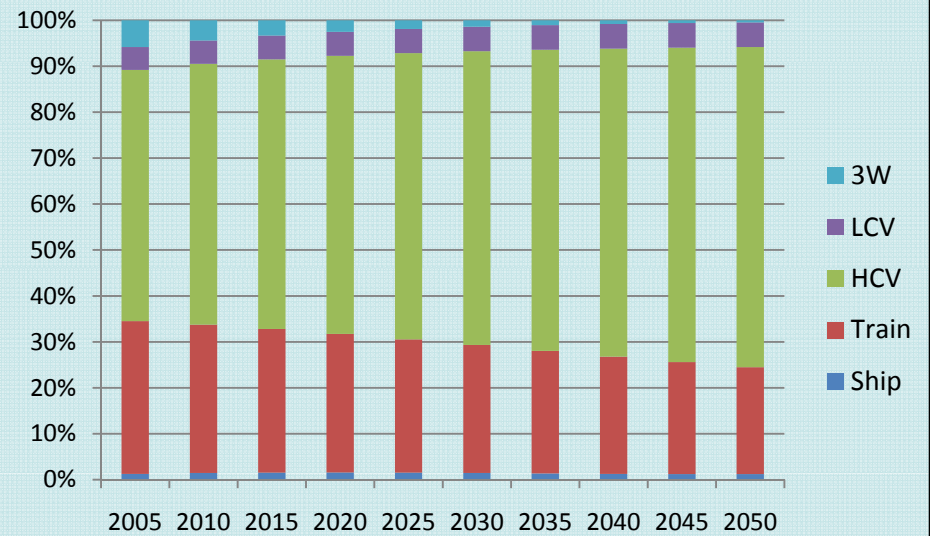
– End-of-Pipe CO₂ Removal: *CO₂ Transport Pipelines for CCS*

BAU: Freight Transport Infrastructure

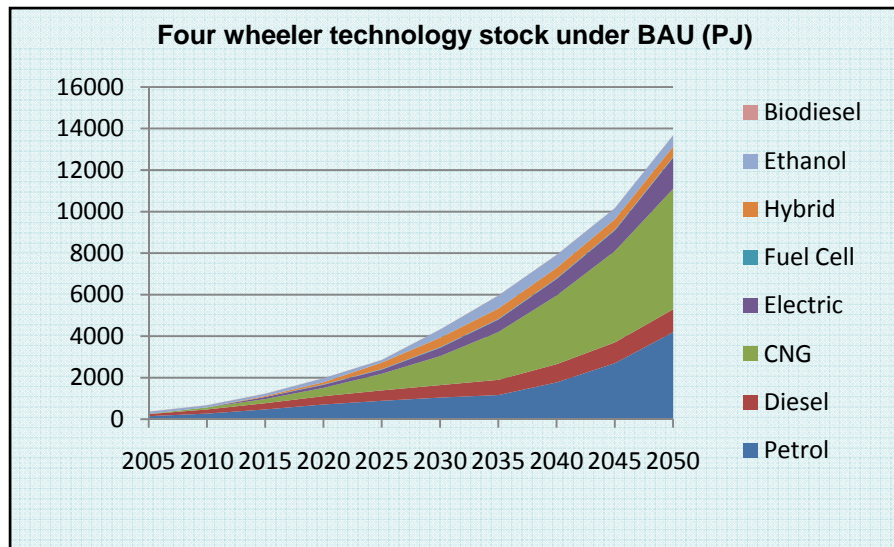
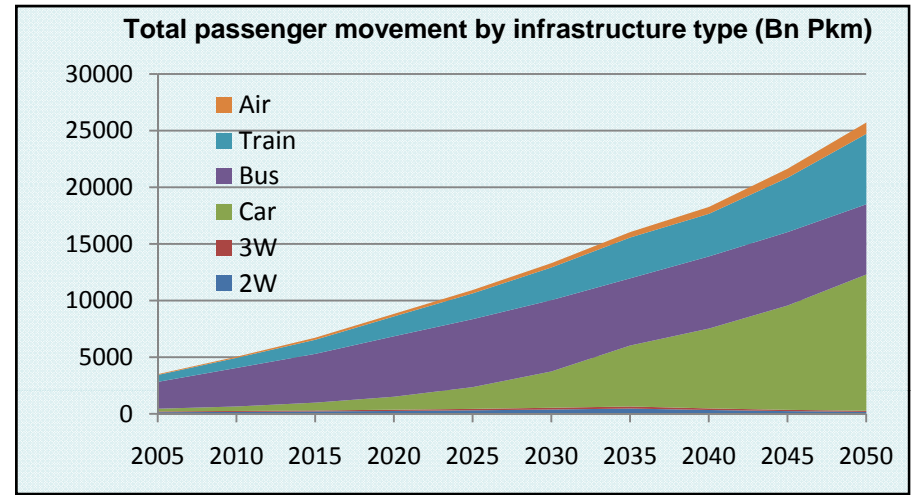
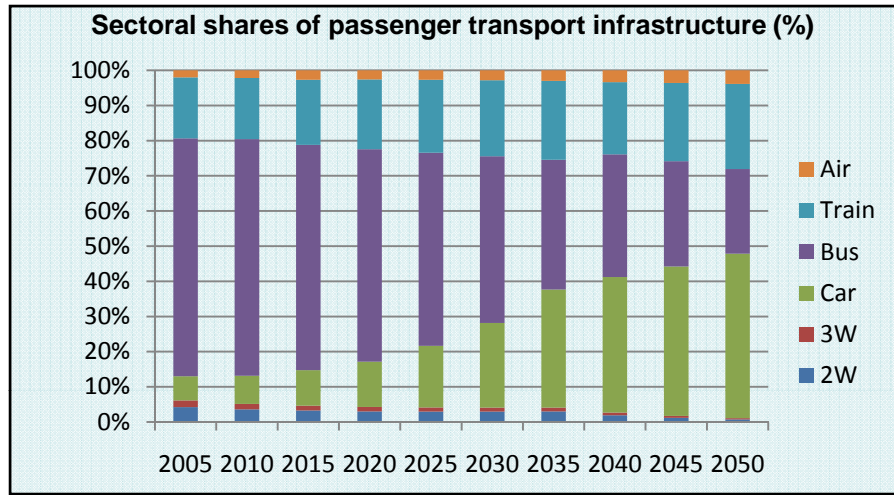
Composition of Railway Freight Traffic (%): 2010



Modal Shares of Freight Transport (%): BAU



BAU: Passenger Transport Trends

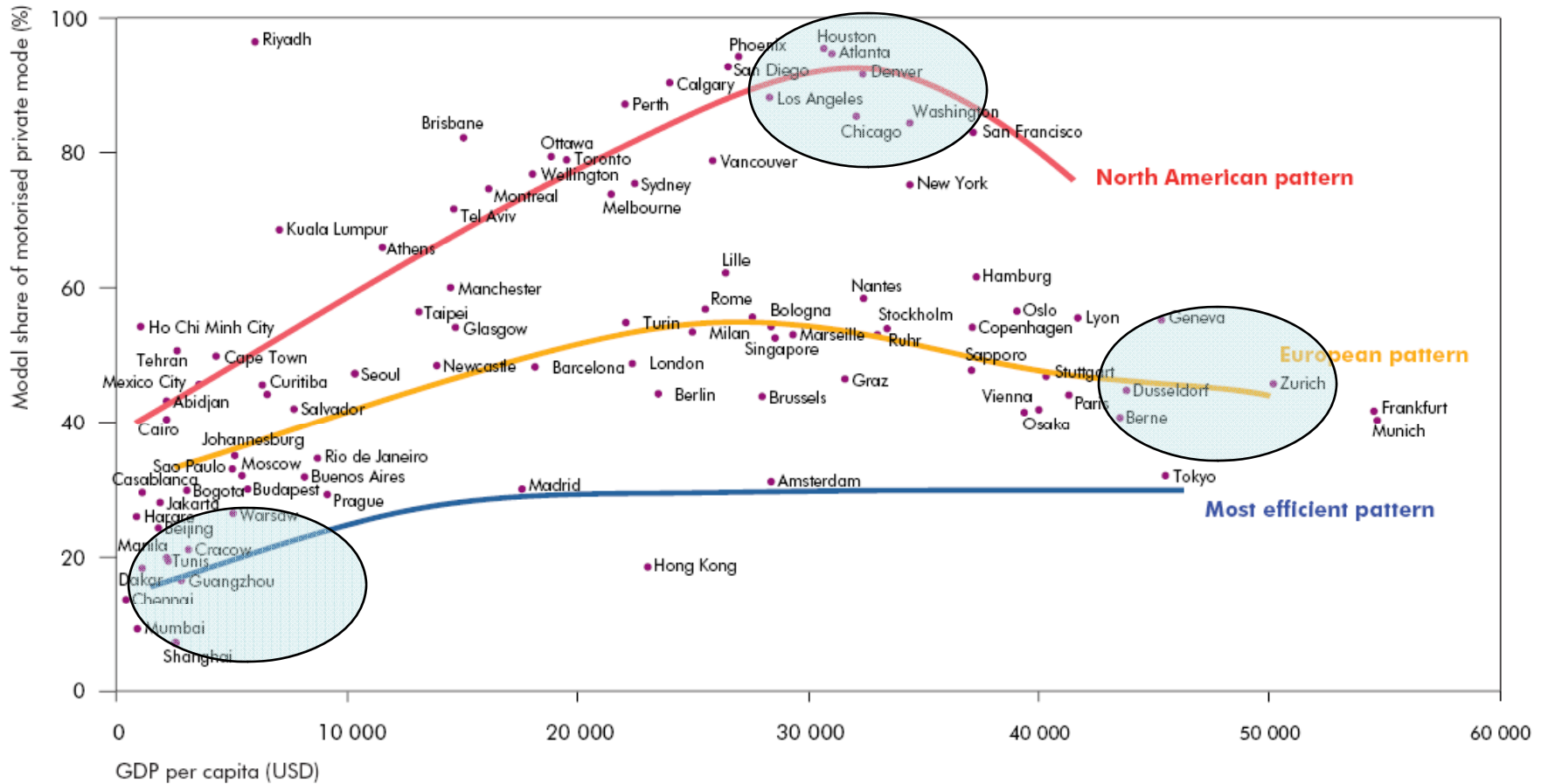


- Substantial rise in transport demand
- Rapid increase in personal vehicles (4W)
- Unsustainable shifts
 - 2W to Car (income effect)
 - Bus to Car (supply constraint)
- Technology Penetration
 - CNG vehicles
 - Some advance technologies



Income and Motorization: Alternate Patterns

Figure 15.11 ▶ Relationship between GDP per capita and motorised modal share

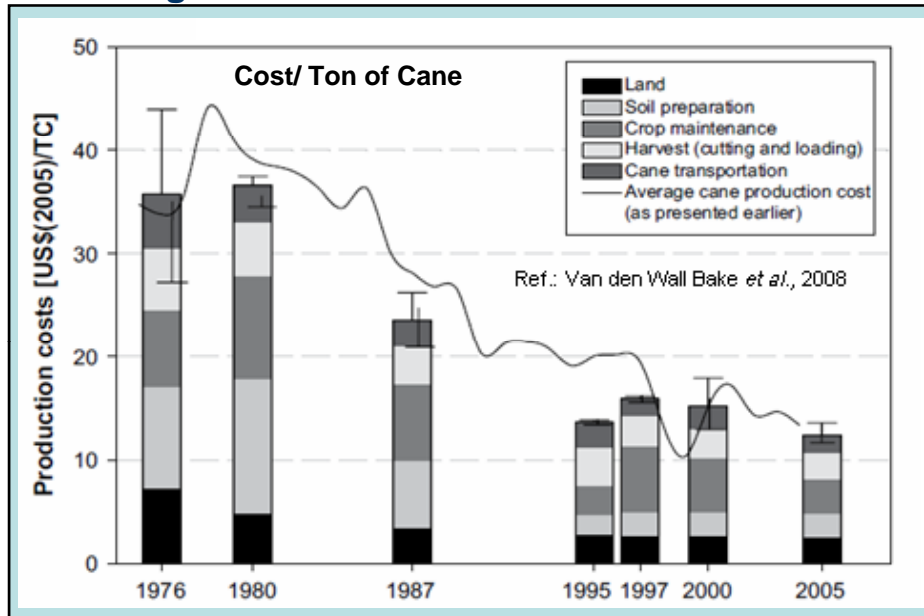


Source: UITP, 2006 (Courtesy of SYSTRA). (IEA, 2009)

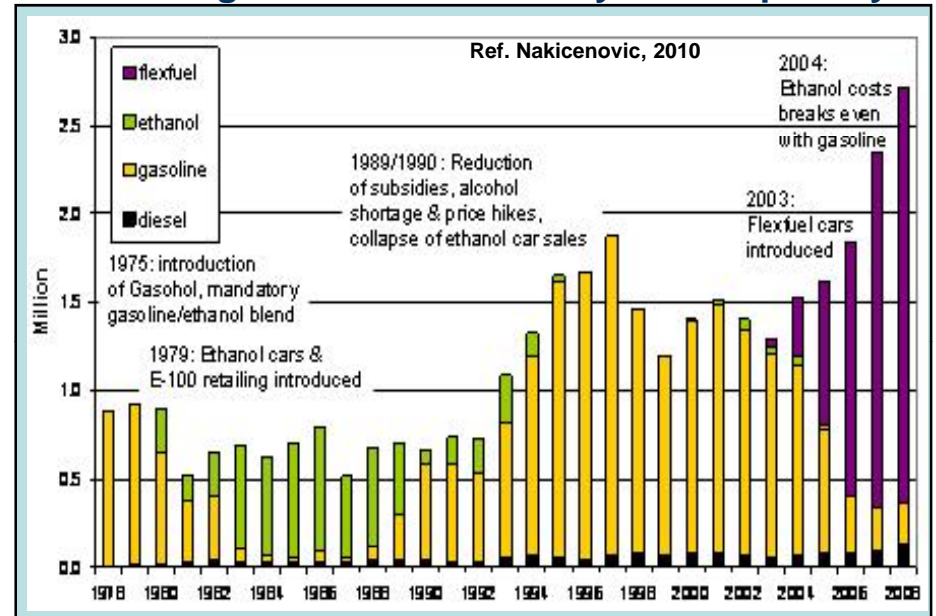


Ethanol in Transport: Brazil

Sugarcane Production Cost Breakdowns



Vehicle Registrations in Brazil by Fuel Capability

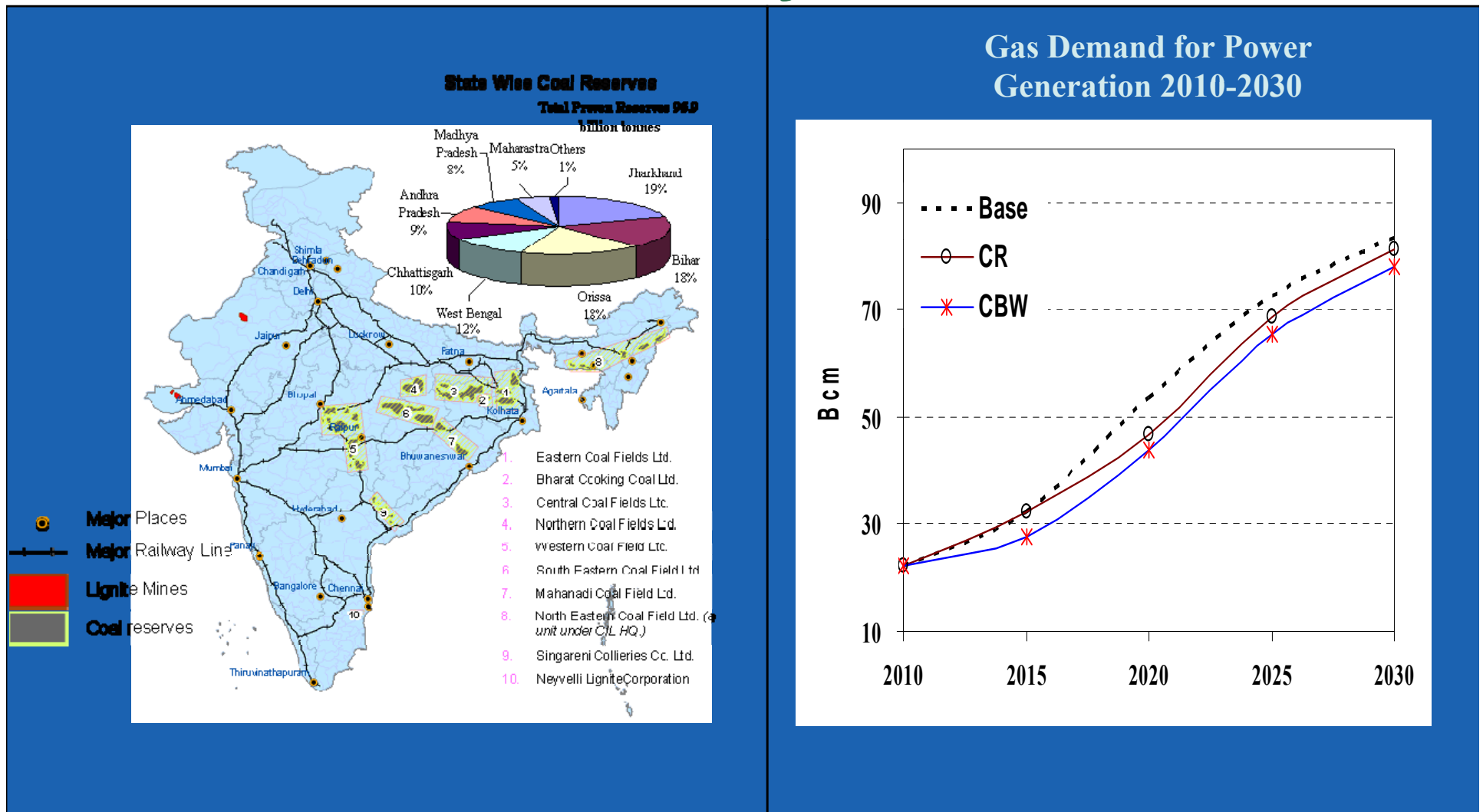


Ethanol for Low Carbon Transport: Issues

- CO₂ Mitigation (+++)
- Food (--) Vs. Energy Security (+)?
- Water Stress (--)
- Deforestation (--)

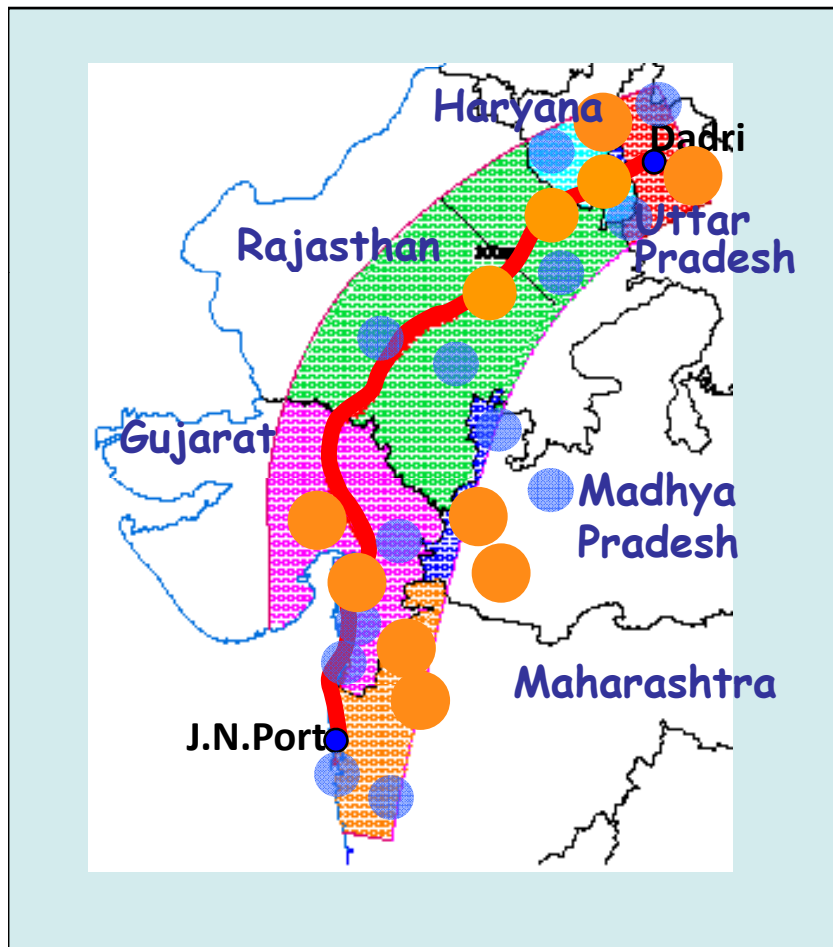
Infrastructures to Overcome Lock-ins - 1

Coal by Wire



Infrastructures to Overcome Lock-ins - 2

Train Corridors



- Sustainable modal shift
- Efficient logistics
- Infrastructures investments
- Associated development

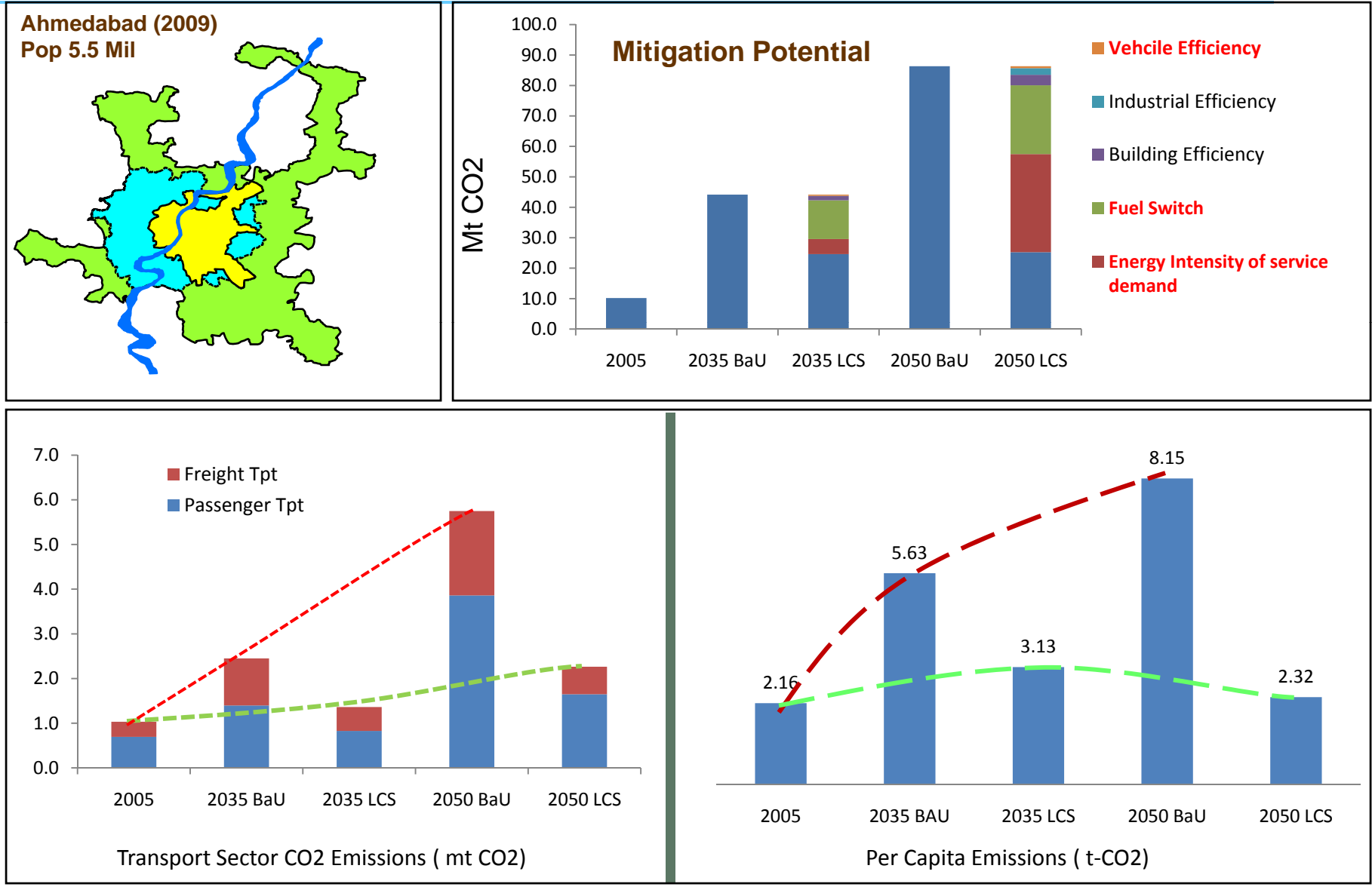
Technologies for Train Corridors

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



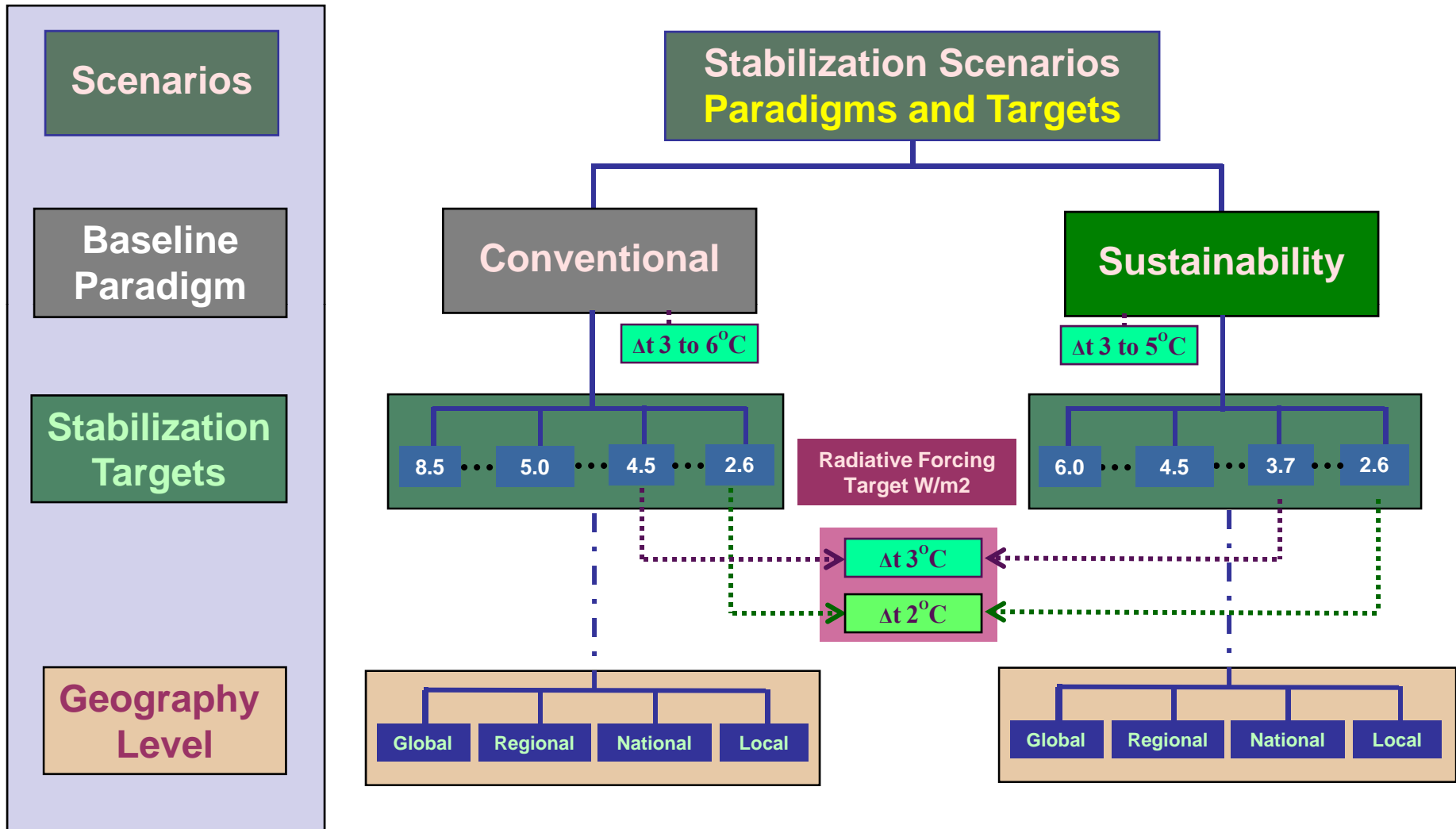
Co-benefits in City Planning: Ahmedabad



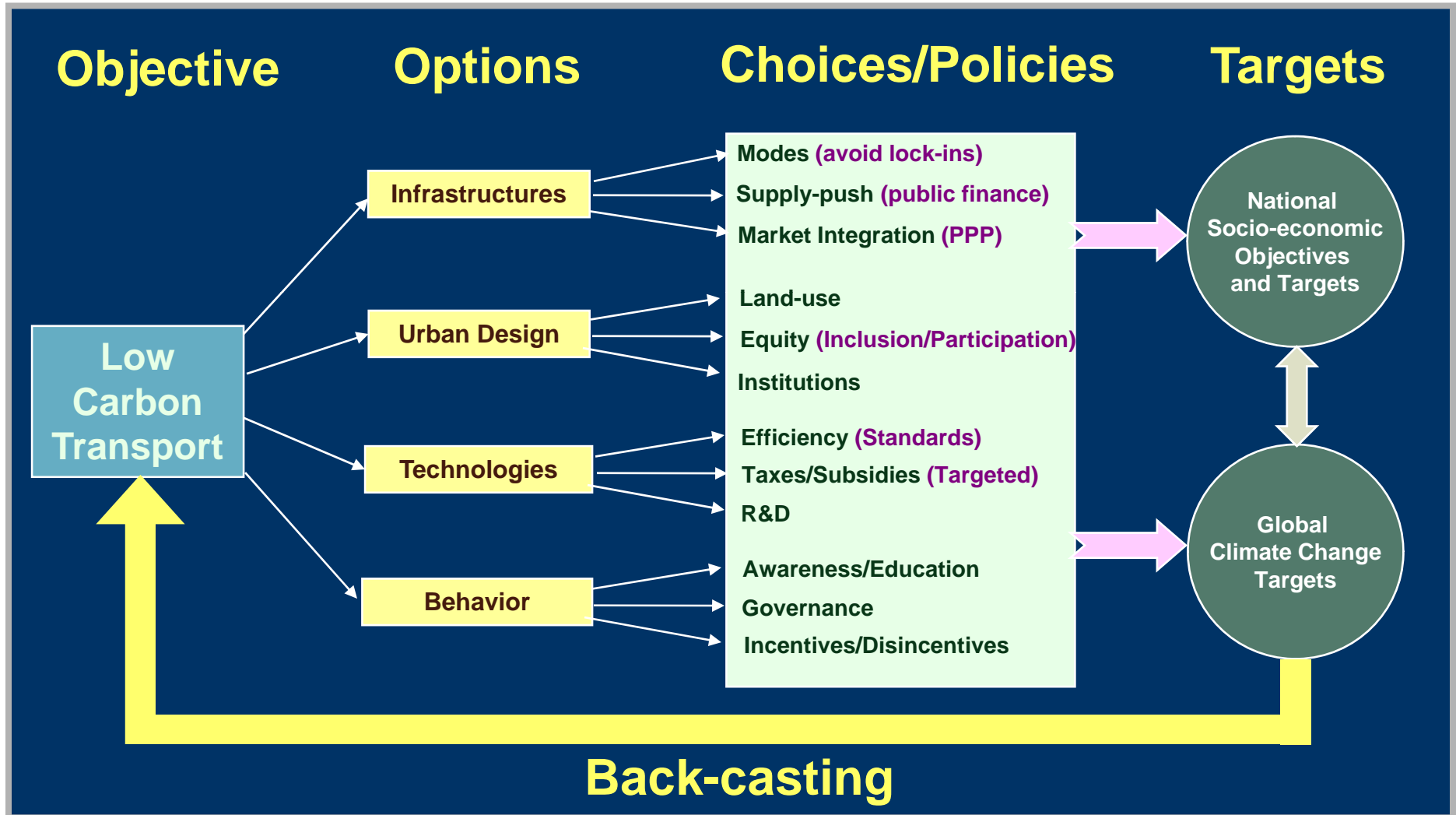
Conclusions:

Sustainable Low Carbon Transport

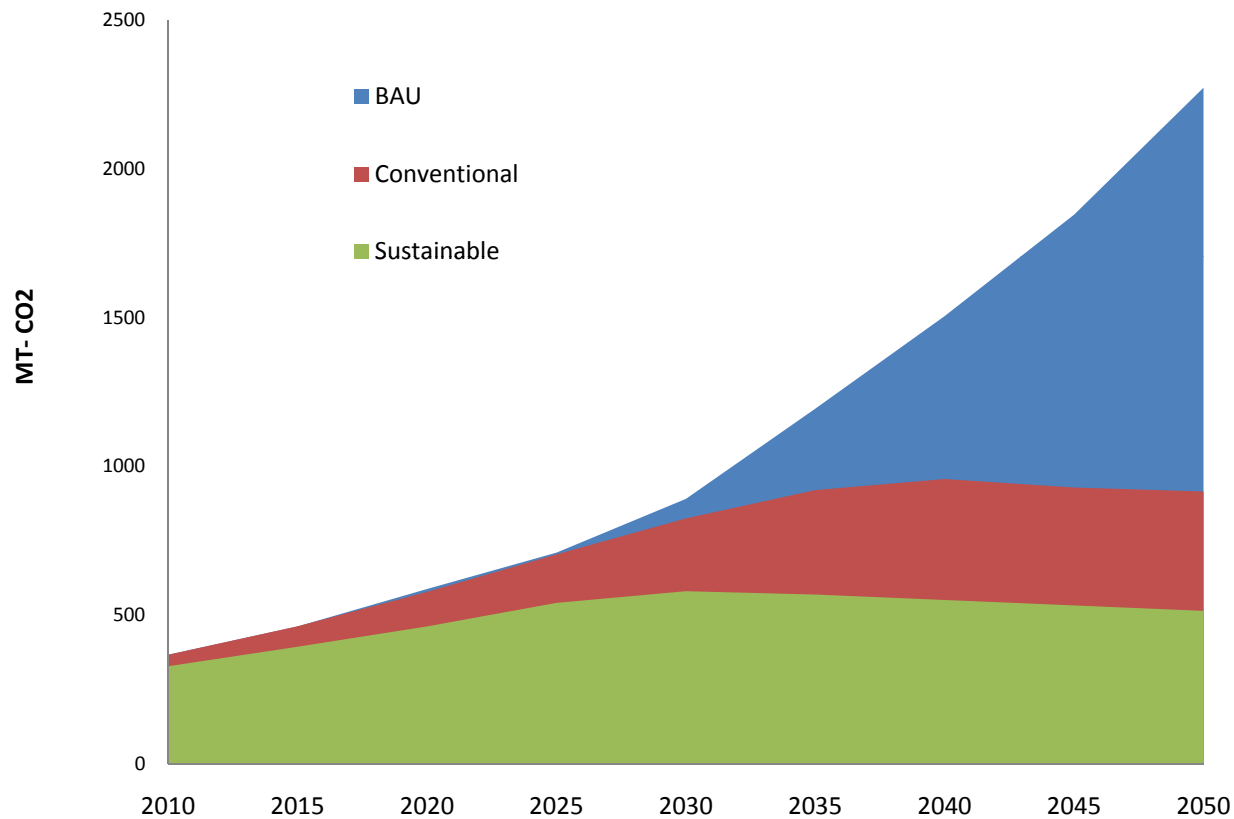
Climate Stabilization and Sustainability



Sustainable Low Carbon Mobility Framework

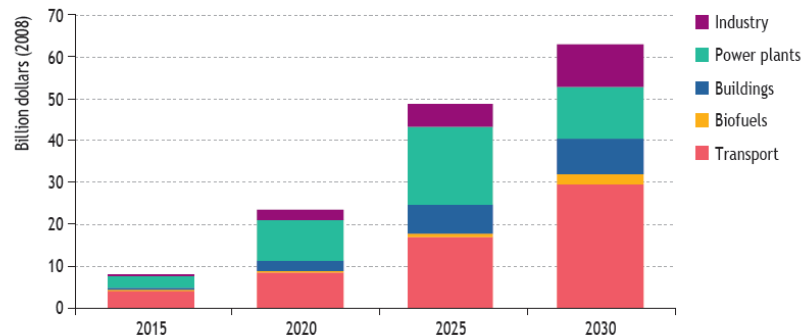


Transport Emissions (2010-2050): India

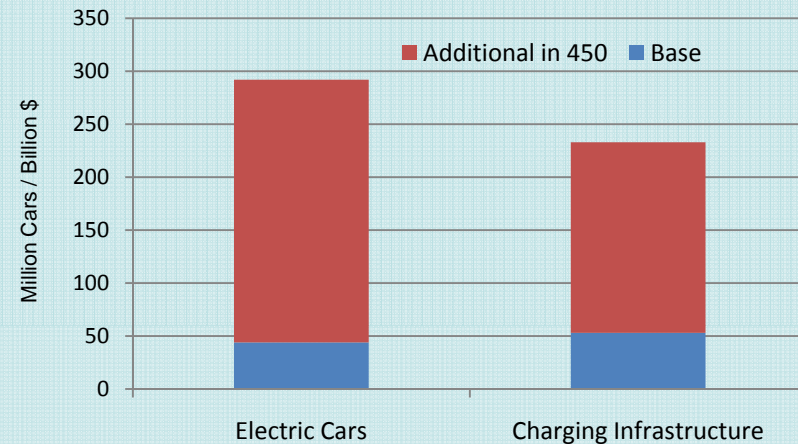


Transport Investments 2010-2050: India

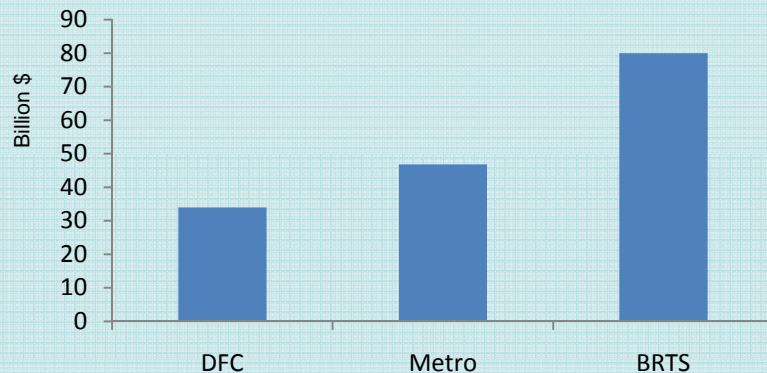
Figure 9.50 • India additional investment in the 450 Scenario relative to the Reference Scenario (IEA, 2009)



Electric vehicle penetration and infrastructure investments



Investments to facilitate modal shifts in 450S (Bn \$)



- Transport sector needs major share of additional investments for 450 scenario
- Substantial penetration of electric vehicles in 450 Scenario
- Significant investments needed in public transport

Thank You

