Sustainable mobility and Passenger Transport

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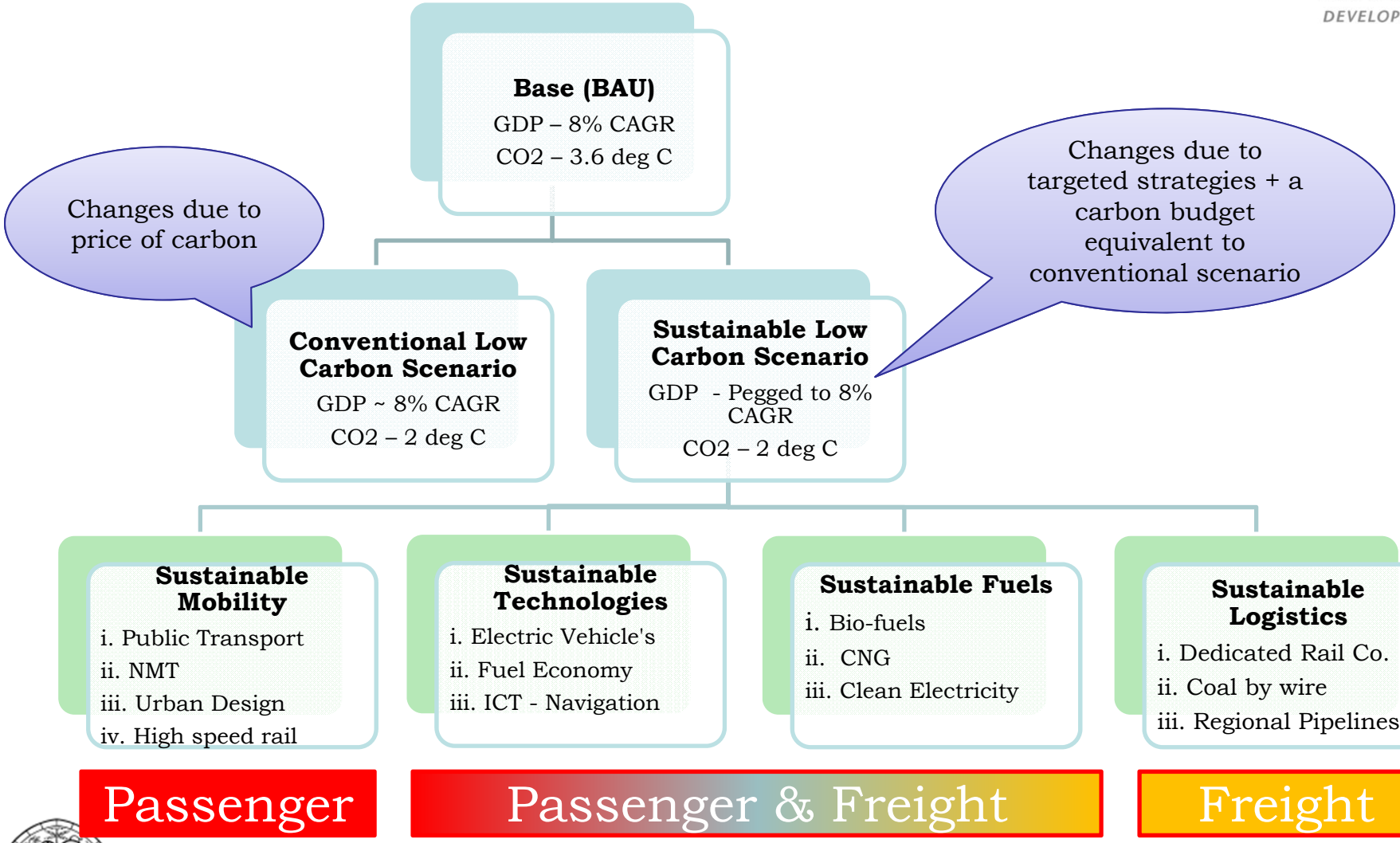
Overview

1. Scenario Architecture
2. Scenario Storylines
3. Analysis
4. Conclusions

Architecture for Transport Scenarios



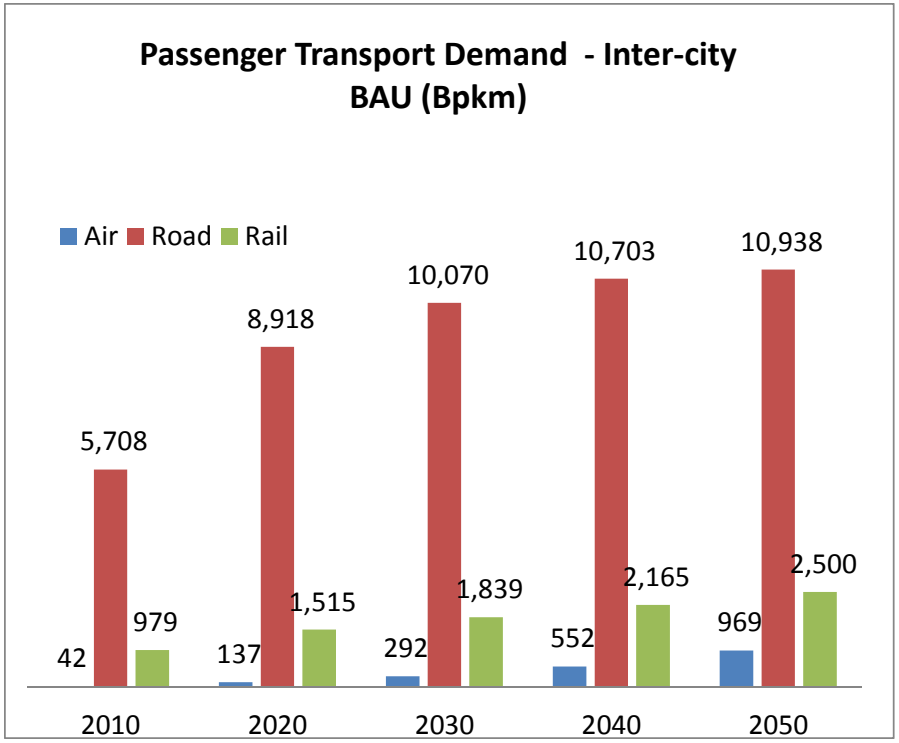
Scenarios: Intercity

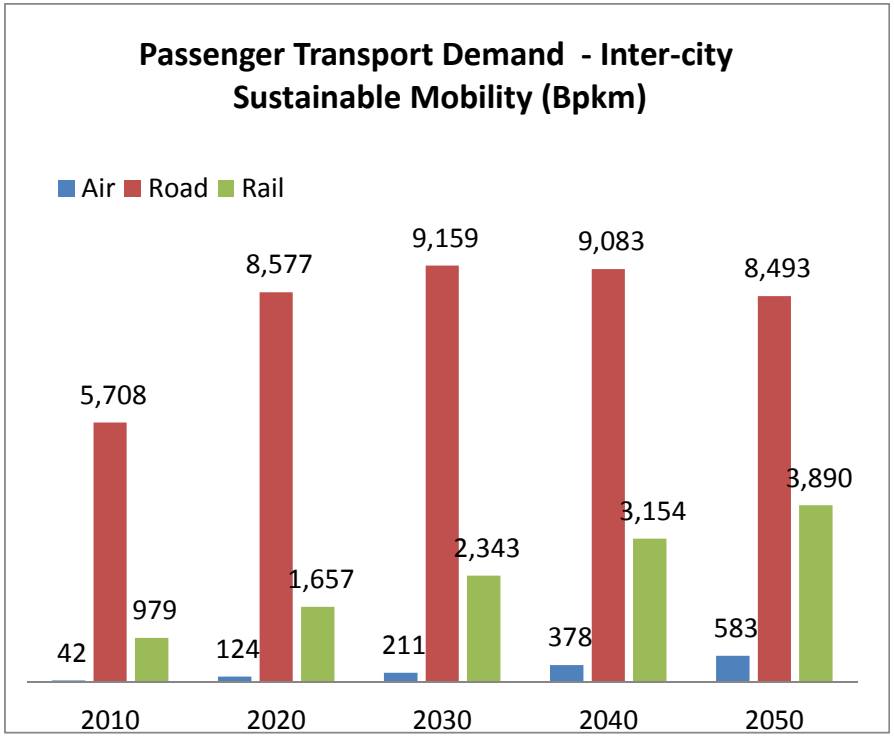
- **BAU Scenario** – Modal Shift to Rail by improving attractiveness of existing rail corridors is the policy objective, achieved by varied interventions, e.g.;
  - i. **By increasing travel speeds** to enable maximum speed of **160-200 km/hr**.
  - ii. **Introducing High Speed Train Corridors** on select corridors
  - iii. **By improving coach services** – through better amenities
  - iv. **Constraints** - Financial and revenue rationalisation constraints

- **Sustainable Mobility** – A major shift towards rail for intercity transport is realised due to **relaxing financial constraints** which enable
  - i. **Adequate investments for improving attractiveness of rail** through incremental approaches (speed and quality of services)
  - ii. **Creation of High Speed Corridors (Max. Speed > 300 km/hr)** beyond current proposals leading to increase in share of Rail from 14.5% in 2010 to **30% in 2050.**

  (Overall travel demand for intercity travel kept unchanged)

Demand Transition for Intercity Transport : BAU & Sustainable Mobility



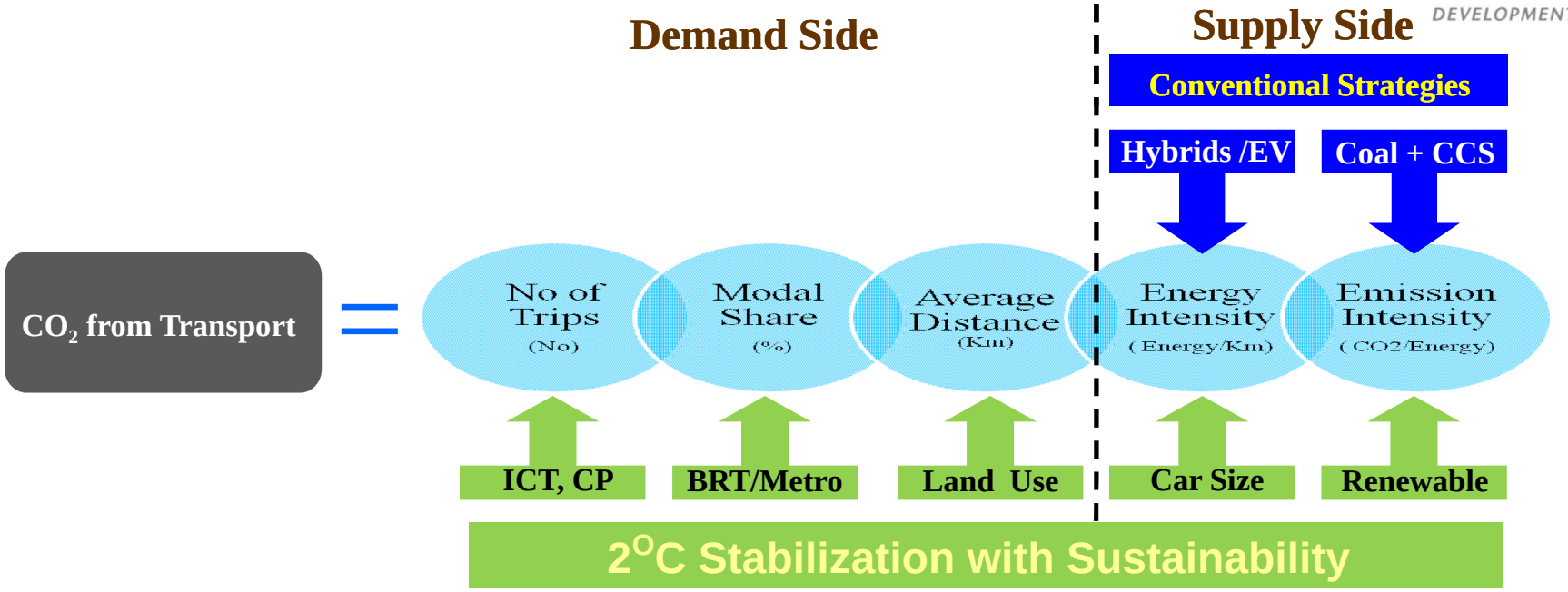


14.5%	14.3%	15.1%	16.1%	17.4%

14.5%	16%	20%	25%	30%

Modal Share of Rail

Demand Side Strategies: Urban Passenger Transport



- Number of Trips – Reduce through
  - ICT –Information & Communication Technology
  - CP – Car pooling
- Average Distance or Trip lengths – Reduce through
  - Urban Planning
- Modal Shift – Urban
  - Investing in public transport infrastructures within cities e.g., BRT, Buses and Metros
  - Investing in NMT infrastructures
  - Urban Planning which facilitates NMT and Public transport

Scenario: Intra City

BAU Scenario – Sustainable mobility within cities by creating better infrastructures for public transport through

i. **By better urban planning for transport**

ii. **Metros:** All 2 million plus cities to have metros.

iii. **By improving bus services** and developing bus rapid transit systems

iv. **Constraints** - Financial and implementation constraints at city level means there will be a limited success and in the long run we will see a greater role for private transport

- **Sustainable Mobility** – A major shift towards public transport through

  i. **Reforms at city level** – which ensure that cities have the financial resources and institutional capacities

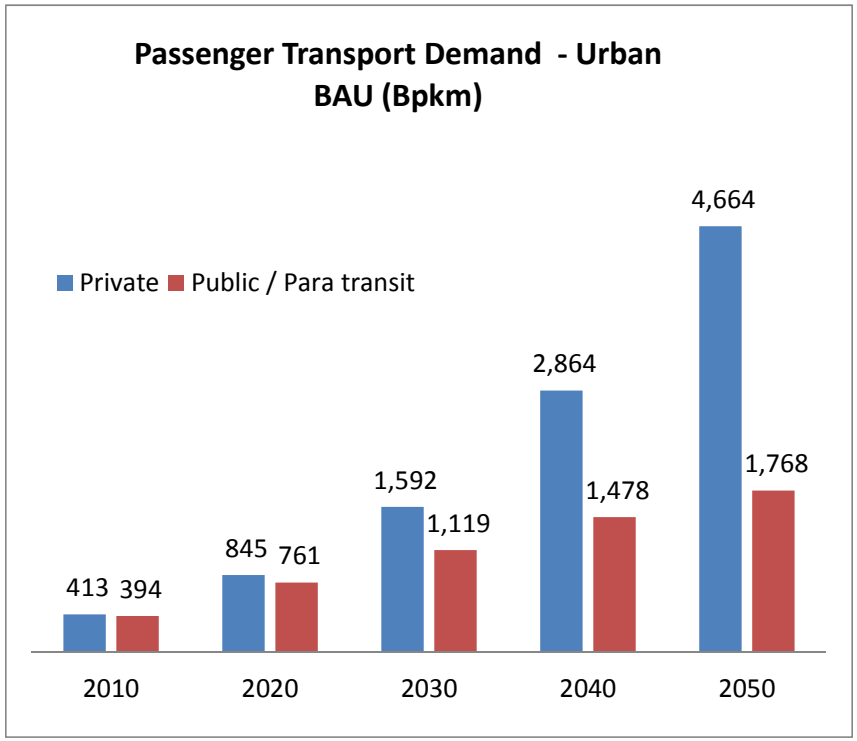
  ii. **By internalising transport planning** –

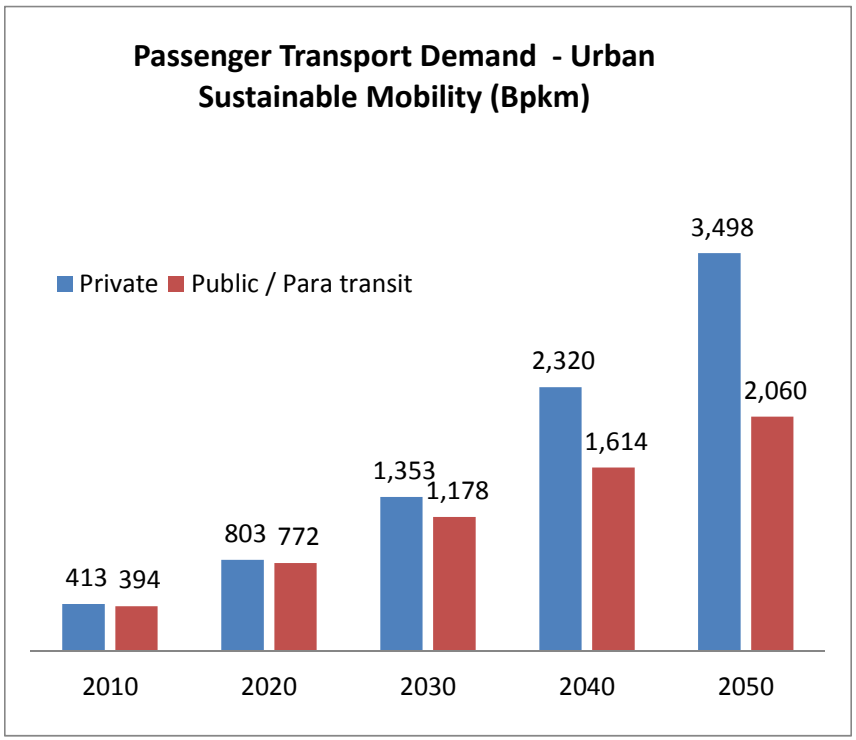
  iii. **Faster rollout of Metros and BRT systems** Planning and implementation at a faster pace to prevent lock ins .

  iv. **By improving bus services** – for safety and security and making public transport inclusive for women, disabled, old and children.

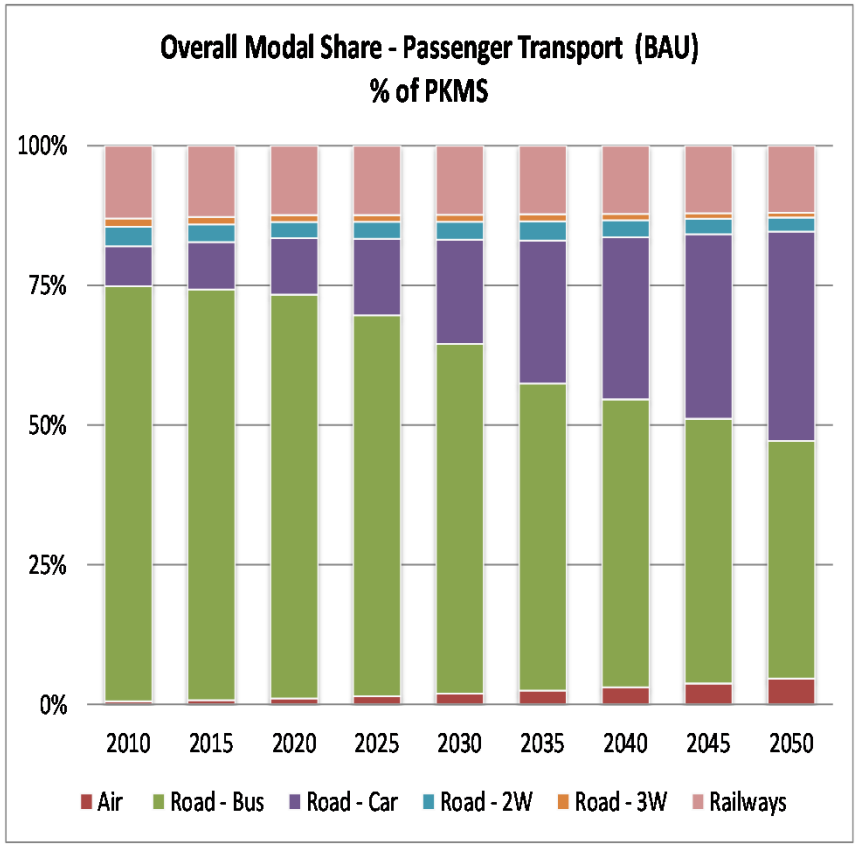
  v. **Transit leverage** concept applied as a result for every 1 pkm shift to public transport demand for private transport reduced by 4 pkm.

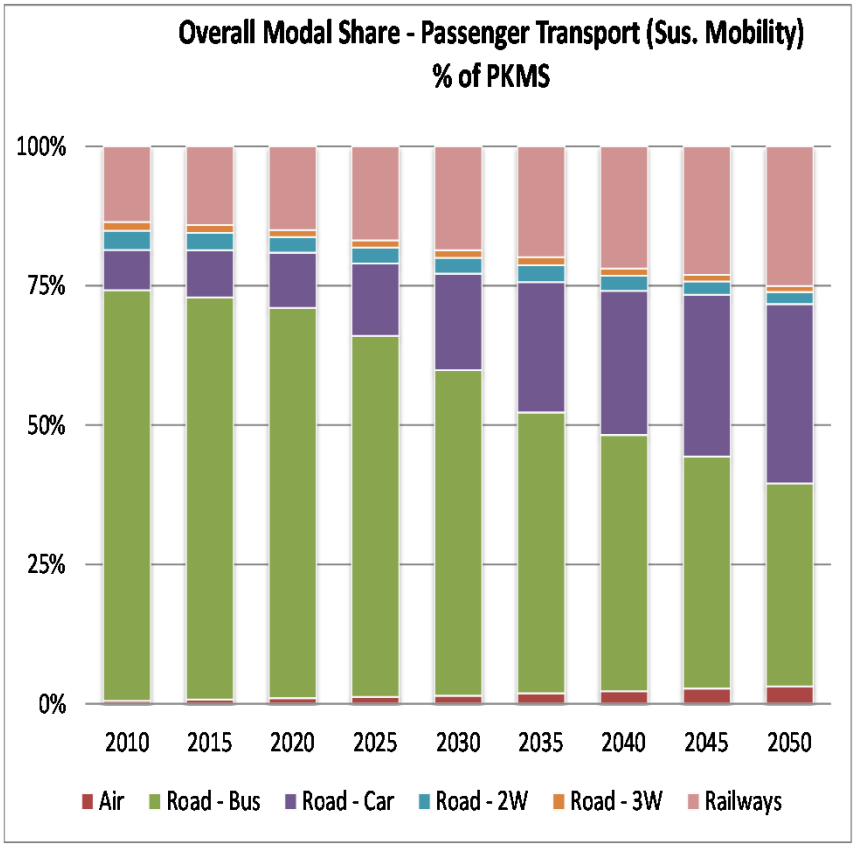
Demand Transition for Urban Transport in BAU & Sustainable Mobility





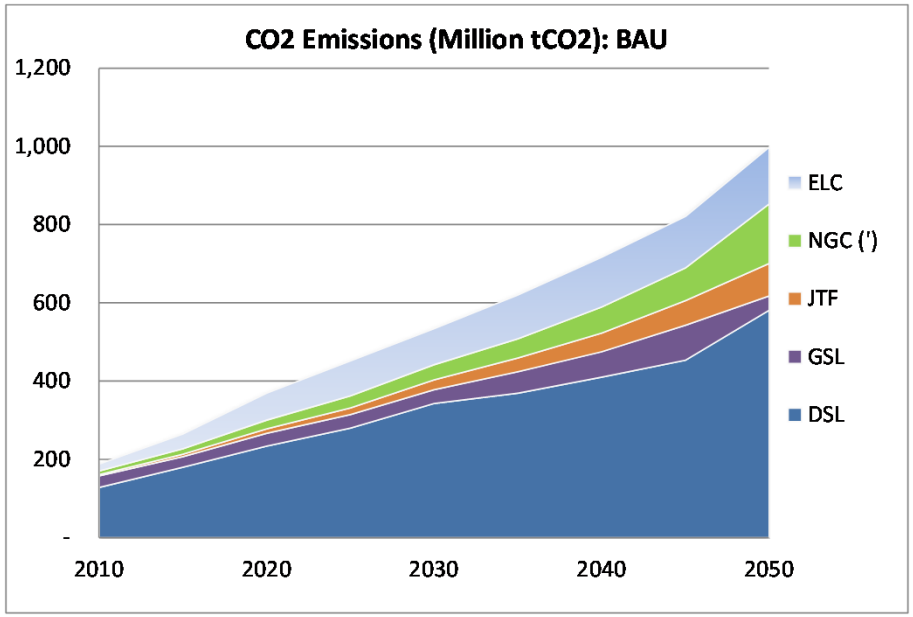
Overall Modal Shares

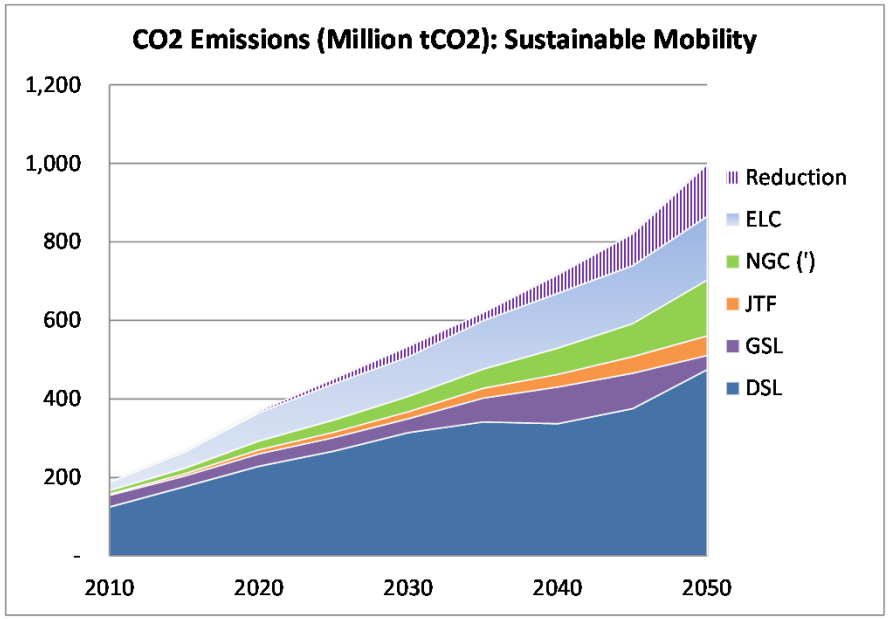




Analysis

CO2 Emissions: Transport



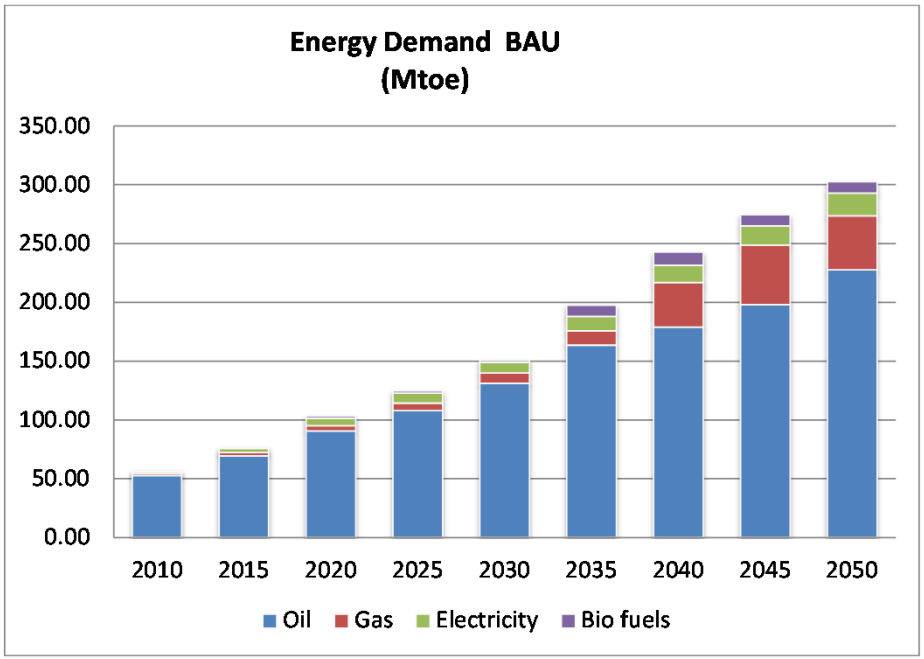


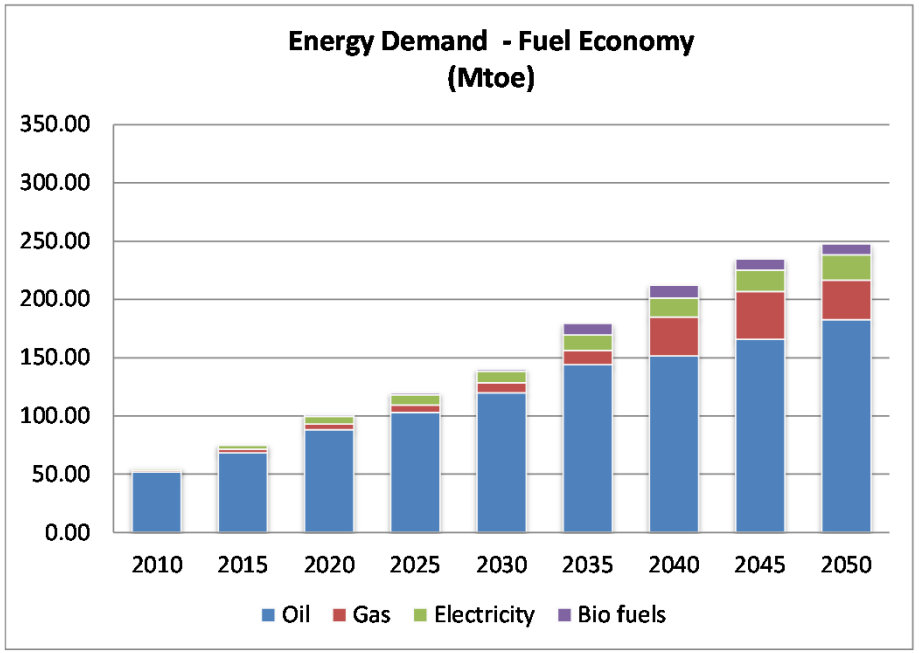
(*) Natural Gas emissions include both emissions from energy and fugitive emissions

Emission Intensity of Grid (Million tCO2/GWh)

Scenario	2010	2020	2030	2040	2050
Base Case	0.99	0.94	0.86	0.74	0.69

Overall Energy Demand: Transport

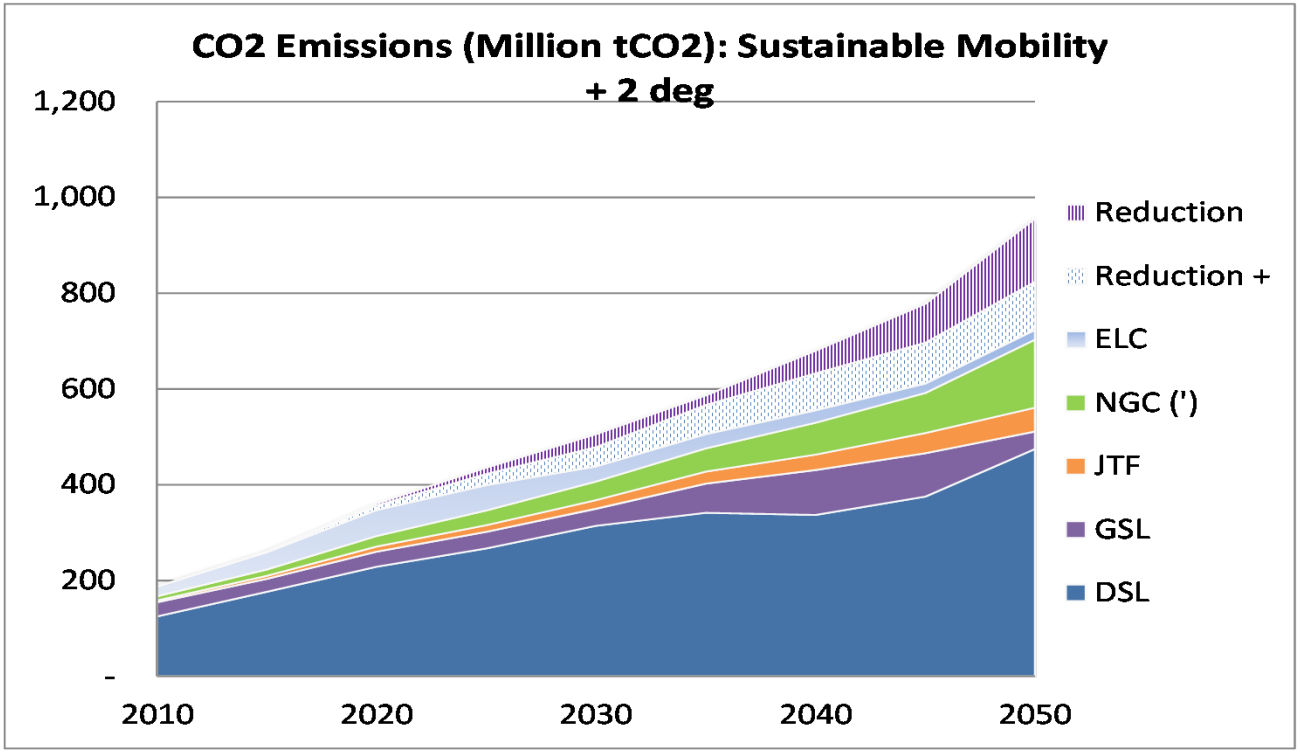




Energy Savings

- In 2020 Oil demand less by 2.6% and by 2050 by 19.9%
- Electricity demand is however higher by 11.9% by 2050

CO2 Reduction: Sustainable Mobility



Emission Intensity of Grid (Million tCO2/GWh)

Scenario	2010	2020	2030	2040	2050
2 deg C Stabilization	0.99	0.73	0.34	0.19	0.11
BAU	0.99	0.94	0.86	0.74	0.69

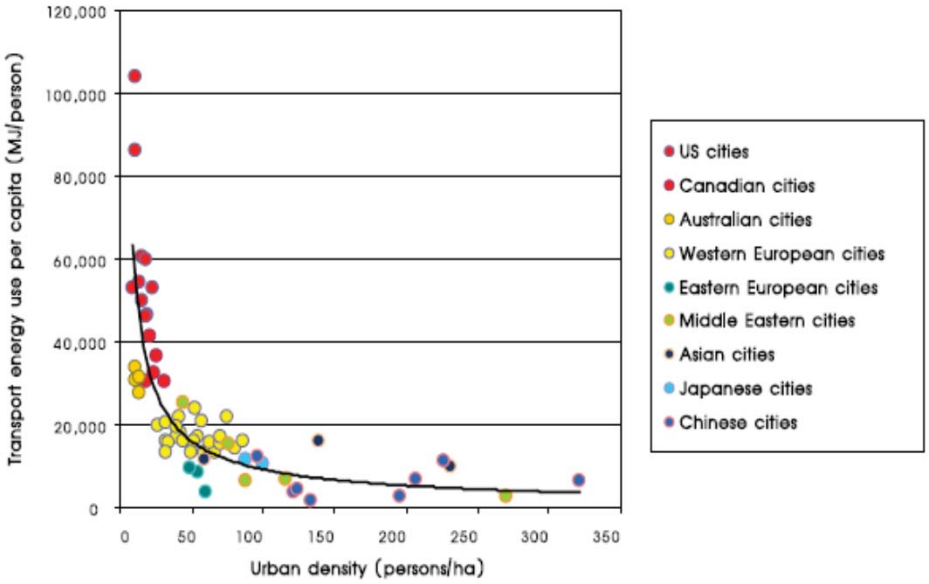
Guidebook on Transport Technologies

TNA Guidebook Series

Technologies for Climate Change Mitigation

– Transport Sector –

Urban density Vs Private Passenger Car Travel



http://tech-action.org/Guidebooks/TNA_Guidebook_MitigationTransport.pdf

Snapshots of Technology Data

Table 2.2: Conversion of energy to CO_2 (eq) for each mode in a study of 46 global cities

Transport Mode (fuel)	Measured Average Vehicle Efficiency (MJ/km)	Measured Average Vehicle Occupancy (passengers)	Average Fuel Efficiency: MJ/ pass km	CO_2 (eq): g/ pass-km
	X	Y	A = X/Y	= A x Emission co-efficient
Car (Petrol)	4.51	1.48	3.05	219.6
Bus (Diesel)	20.89	12.74	1.64	118.1
Heavy Rail (electric)	13.62	30.96	0.44	2.6 – 182.2
Heavy Rail (diesel)	40.23	27.97	1.44	103.7
Light Rail/Tram (electric)	20.62	26.06	0.79	4.7 – 327.1

Table 2.5: Greenhouse gas emissions from transport per capita in high income cities

Greenhouse Indicators	Unit	USA	ANZ	CAN	WEU	HIA
Total passenger transport CO_2 emissions per capita	kg/ person	4,405	2,226	2,422	1,269	825
Total private transport CO_2 emissions per capita	kg/ person	4,322	2,107	2,348	1,133	688
Total public transport CO_2 emissions per capita	kg/ person	83	119	74	134	162
Percentage of total passenger transport CO_2 emissions from public transport	%	1.9	5.3	3.1	10.6	19.7

Conclusions

1. Sustainable Mobility strategy will require major changes in infrastructures and urban design.
2. Sustainable mobility strategy can deliver reductions in CO_2 emissions, but would fall short of what is needed for efficient response to achieve $2^{O}C$ global climate stabilization target.
3. Sustainable low carbon mobility would require alteration in fuel mix, especially clean electricity supply.
4. A portfolio of options is needed to achieve low carbon mobility transformation in India.

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Thank You

Questions / Suggestions

IIM AHMEDABAD

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