10th Urban Mobility India Conference & Expo 2017

Sustainable Urban Transport -- Achieving Smart, Resilient and Low Carbon Cities

CODATU 2017

Chandni Chawk

Kolkata

Lutyen's Delhi ?

Anumita Roychowdhury
Centre for Science and Environment

Technical Session 6 –Linking Urban Transport and The Environment

Urban Mobility India
Ministry of Urban development
Hyderabad, November 4-6, 2017

Deadly challenge of smog

The energy challenge

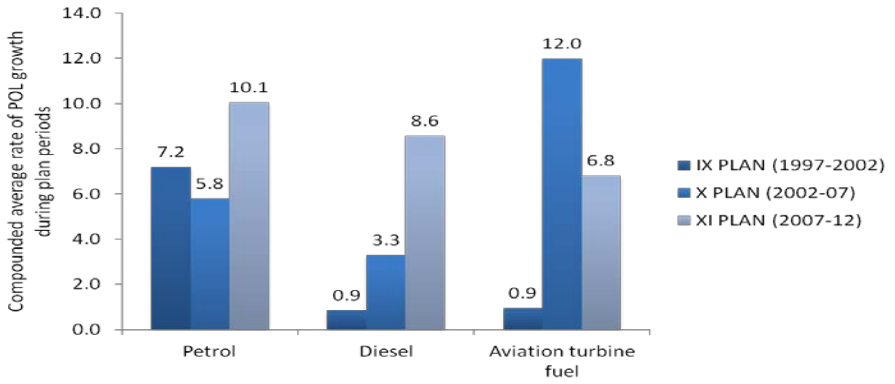
- **Integrated Energy Policy, 2006:**
  - To sustain 8-10% economic growth rate over next 25 years to meet human development goals, primary energy supply to increase by 3-4times from 2003-4 levels.
  - Ministry of Petroleum and Natural Gas's new vision -- reduce crude oil imports by 50% by 2020, 75% by 2025 and achieve energy independence by 2030.
  - To achieve this, seek new energy sources, and make energy use more efficient.

-- This target is a challenge as about 94 per cent — nearly the entire requirement of India will have to be imported by 2030. (International Energy Agency)

How can transport sector contribute to INDC target of reducing energy intensity by 30-35%?

Transport energy challenge…….

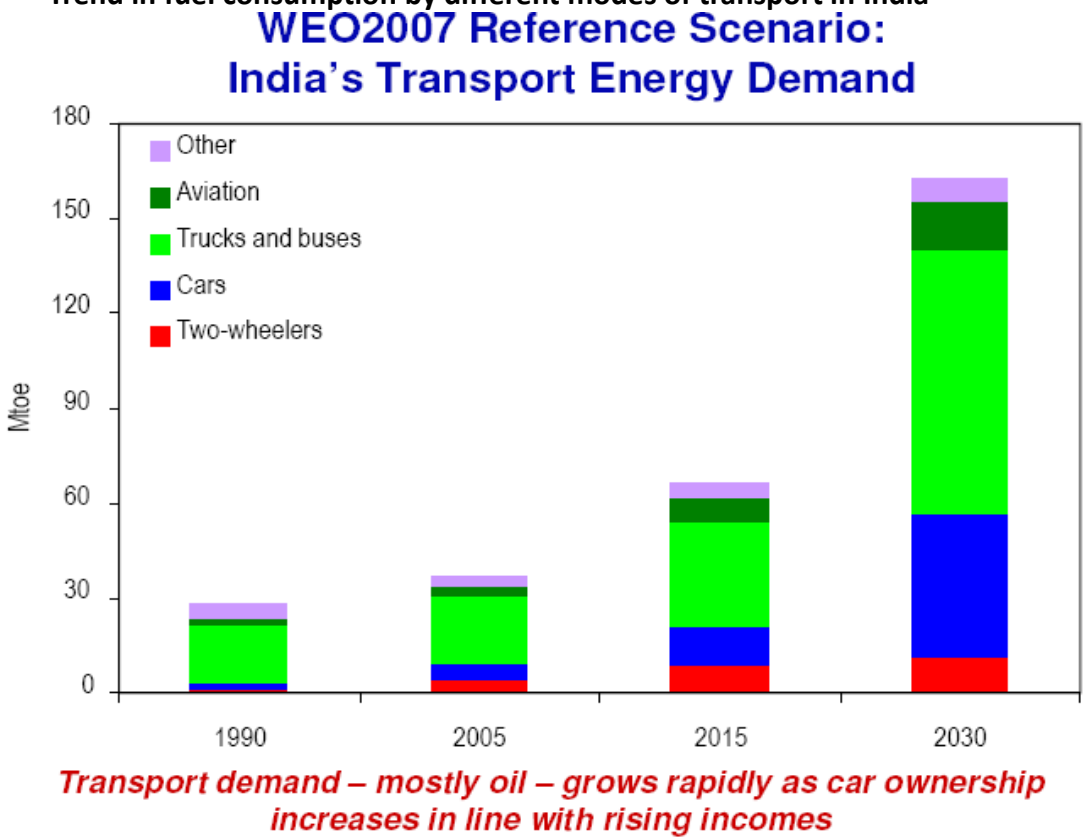
- Transport sector uses up more than 40% of the total oil and oil products
- As much as 98% of the total petrol stock is used up by vehicles; Nearly 62% of India's diesel fuel used by vehicles.
- India is experiencing explosive motorisation
- Petrol and diesel consumption growing.



Source: Based on PPAC data

Cars, trucks and buses will drive the future oil demand…..

Trend in fuel consumption by different modes of transport in India



Transport demand – mostly oil – grows rapidly as car ownership increases in line with rising incomes

Source IEA

Worries…….

Transport energy demand has grown at 1.2 times the GDP growth rate.

Fuel consumption by vehicles in 2035 could be six times that of the 2005 level. (ADB). Personal vehicles will be one of the primary drivers

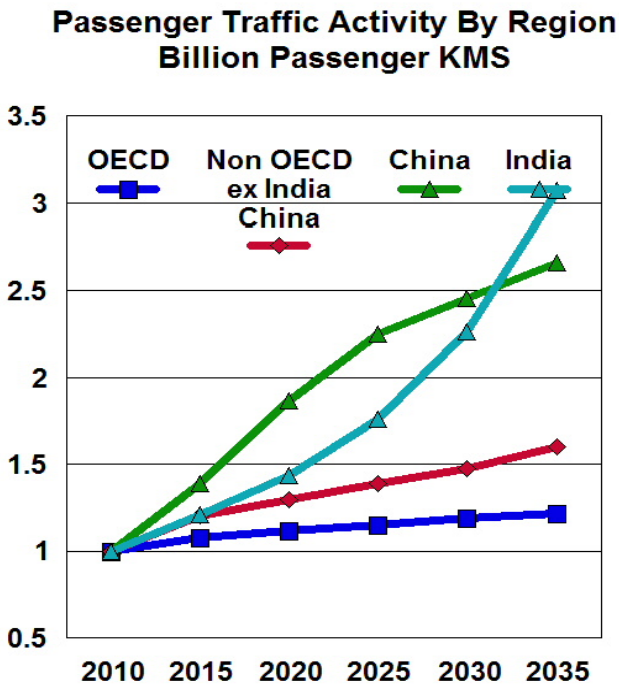
Car travel consumes nearly twice as energy on average as average urban bus travel

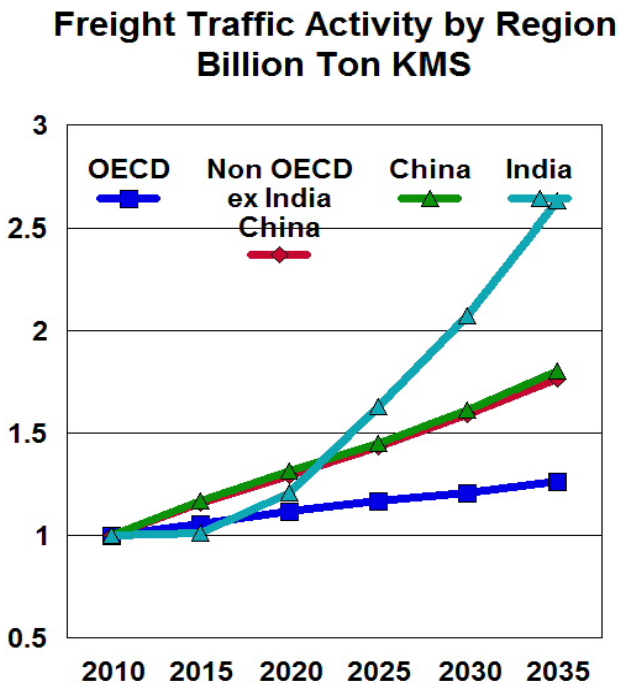
By 2030-31 on an average Indians will travel thrice as many kilometers as they traveled during 2000-01.

Shift of freight from railways to trucks will also add to the energy stress:
(Railway share less than 30%)

High growth expected in India

Forecast Passenger and Freight Growth
Normalized to 2010



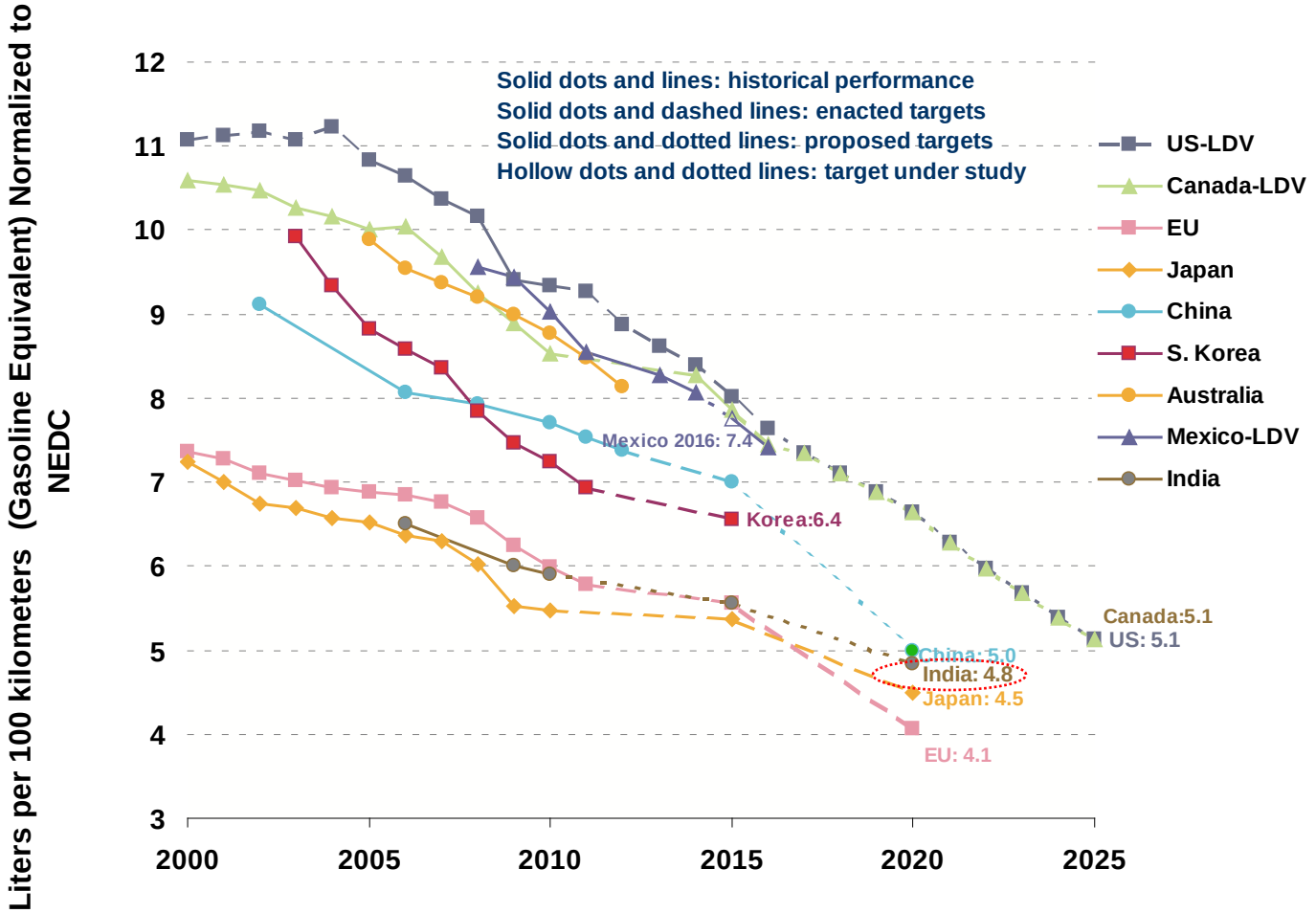


Source: IEA Data

Need co-benefit framework to reduce toxic pollution as well as climate impact of transport

Cars.....

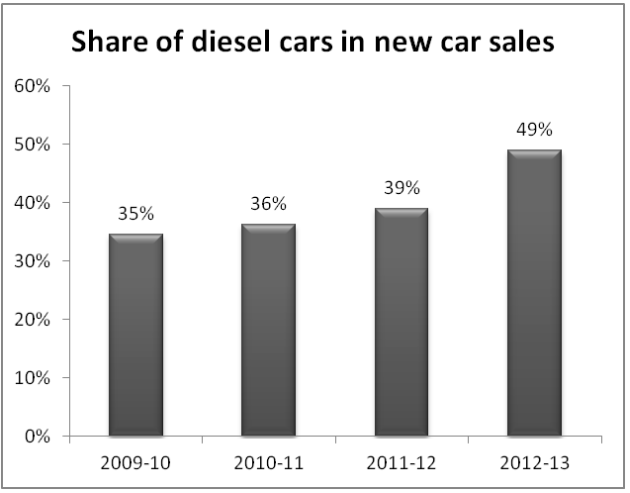
India is the only vehicle producing country without fuel economy standards....

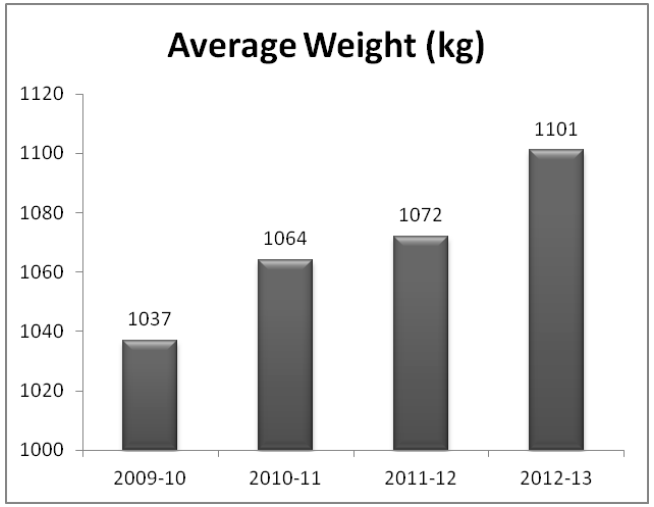


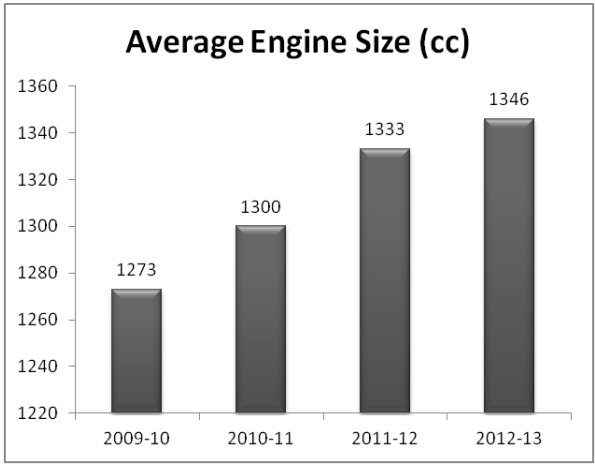
Source: ICCT 2009

In the meantime …..
Average weight of car fleet increasing….
locking up enormous energy and carbon

- Average weight and engine size during 2009-10 and 2012-13 has increased by 6%.
- On an average every year, the weight and size of new vehicles is increasing at a rate of 2%
- This threatens fleet-wide fuel economy

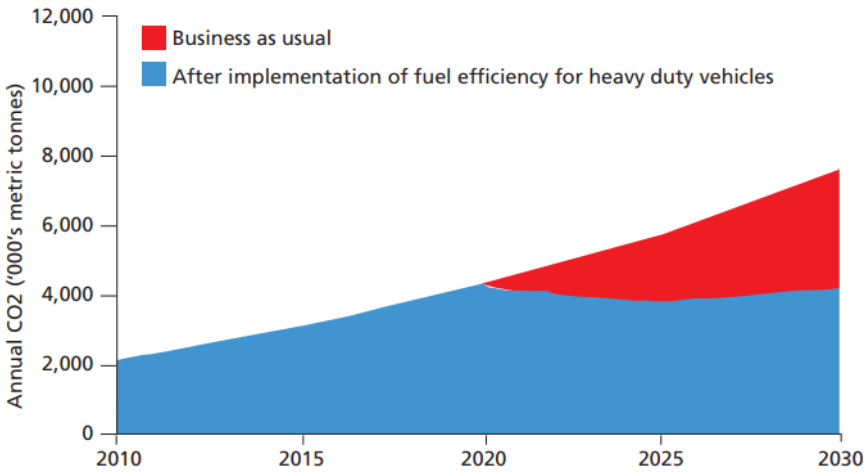






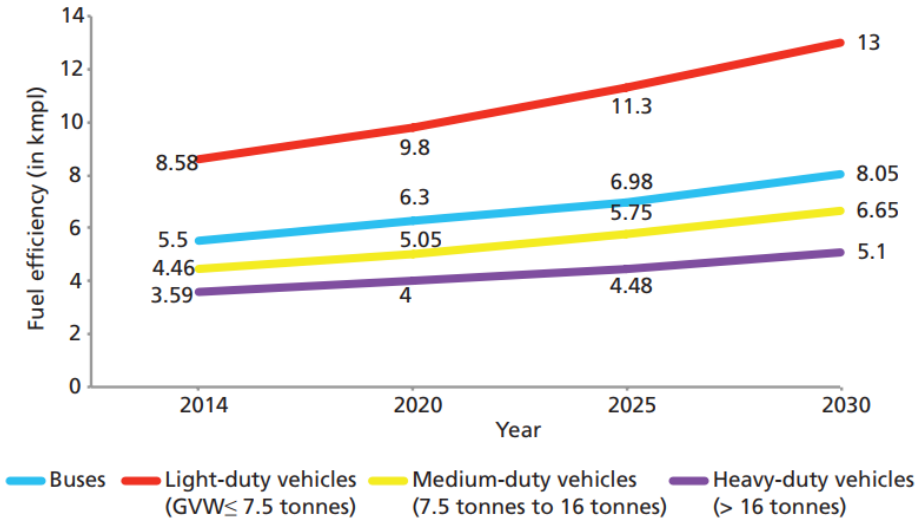
Fuel economy impact…on emissions

CO_2 emission from heavy-duty vehicles are expected to stabilize from a business-as-usual scenario



Source: Anon 2014, Fuel Efficiency Standards of Heavy Duty Vehicles in India, Central Road Research Institute, New Delhi

Heavy-duty vehicles are expected to achieve significant improvements by 2030)



Source: Fuel Efficiency Standards of Heavy Duty Vehicles in India, CRRI

-- **CRRI -- potential reduction in CO2 emission from heavy-duty vehicles -- Reduction in 2025 estimated to be 192 thousand metric tonnes which will further increase to 343 thousand metric tonnes by 2030 from a business-as-usual scenario.**

-- **About 147 billion litres in the year 2025 and 262 billion litres in the year 2030 of fuel is expected to be saved.**

Heavy duty dilemma

Heavy duty fuel economy standards in place. But nearly 65% of buses and commercial vehicles outside its orbit

Improve operational efficiency

Need improved bus operations to cut operational fuel losses:

- Idling, frequent acceleration and deceleration on congested roads can also affect fuel efficiency.

- CAI Asia-BMTC study: by reducing idling by 10 minutes BMTC can save 100 litres per bus or Rs 3 crore annually.

- Also with the help of improved drivers training, and maintenance a savings of Rs 23 crore annually is possible.

Mobility crisis in our cities…..

…… an increasing share of our daily trips are being made by cars that occupy more road space, carry fewer people, pollute more, guzzle more fuel. They edge out pedestrians, bicycles, cycle rickshaws and buses…….

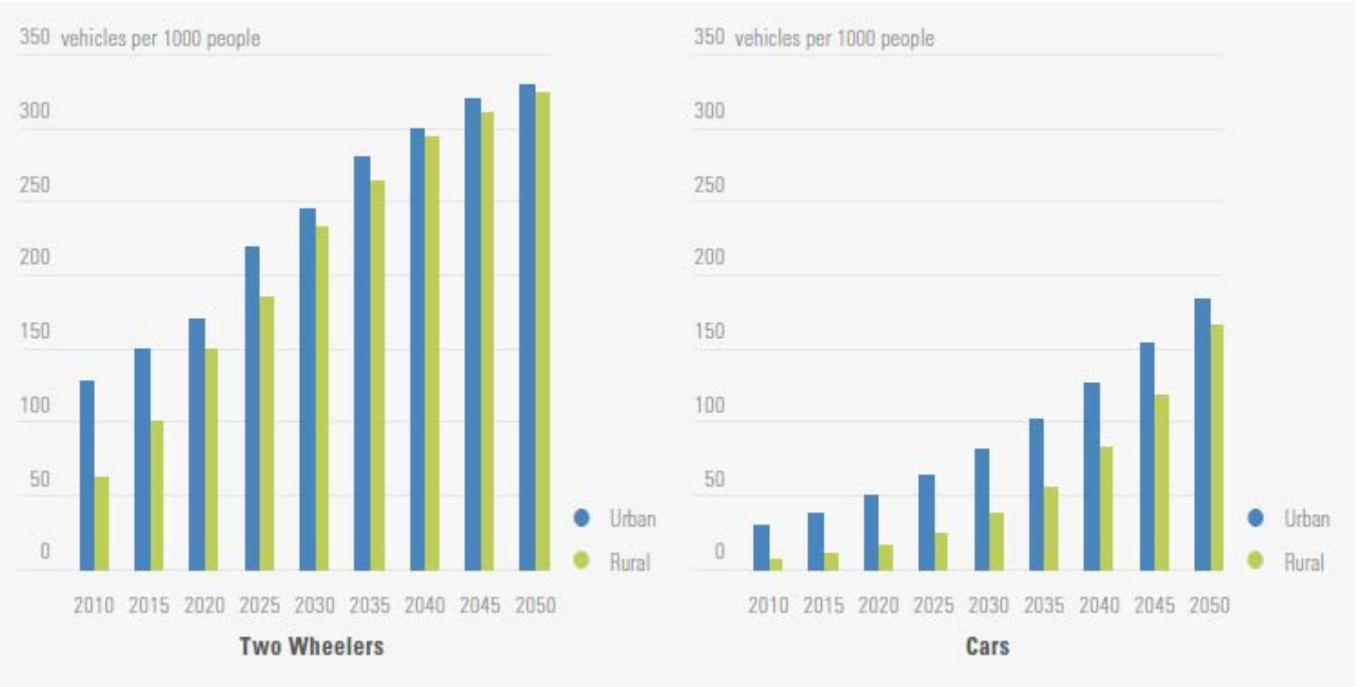
Higher per capita income will lead to more vehicular ownership…

UNEP 2015

•Per capita incomes to increase from US$1158 in 2010 to more than US$15,000 by 2050.

•Ownership of cars to increase from 30 per 1,000 persons in 2010 to 183 in 2050 in urban areas and from 7 to 166 in rural areas.

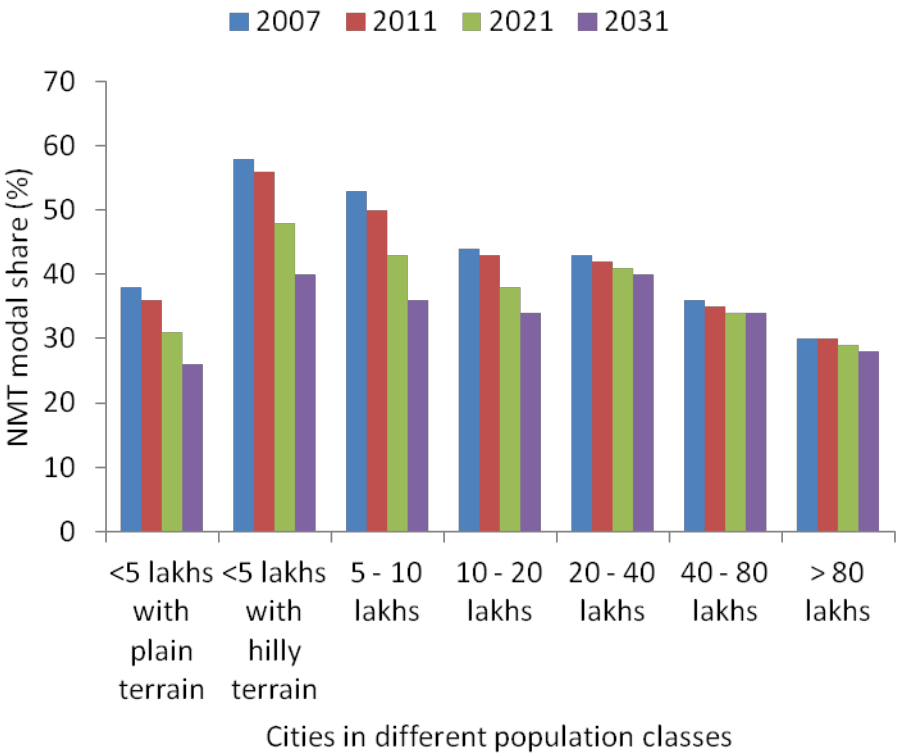
Projected vehicle ownership for two-wheelers and cars

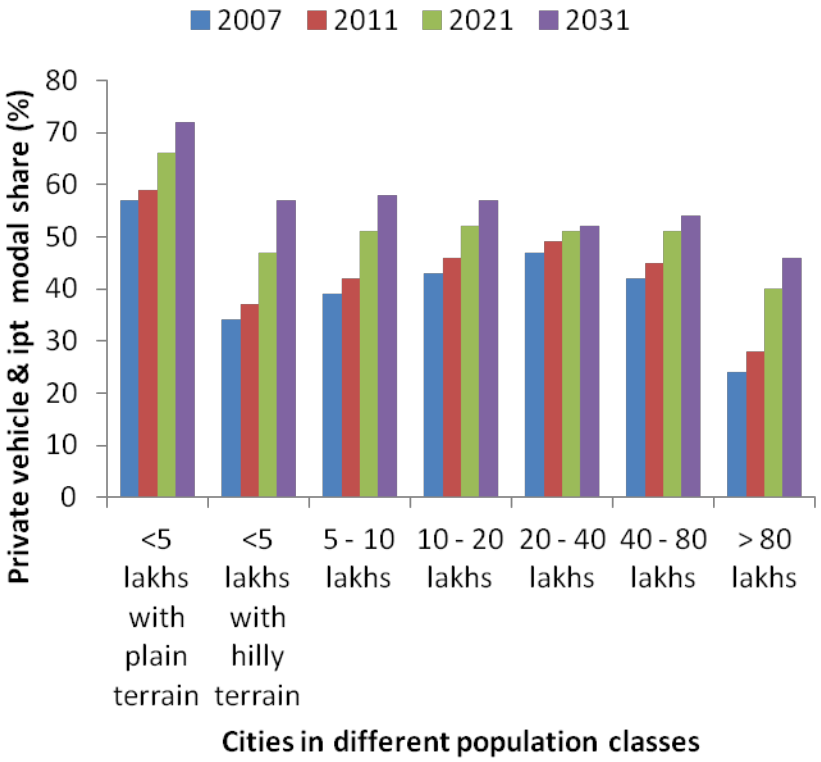


Source: Promoting Low-carbon Transport In India, Transport Scenarios for India: Harmonizing Development and Climate Benefits, UNEP, 2015

Share of walk and cycle declining. Motorised transport gaining…….

Personal motorised travel to gain about 20% additional modal share in most city categories until 2031



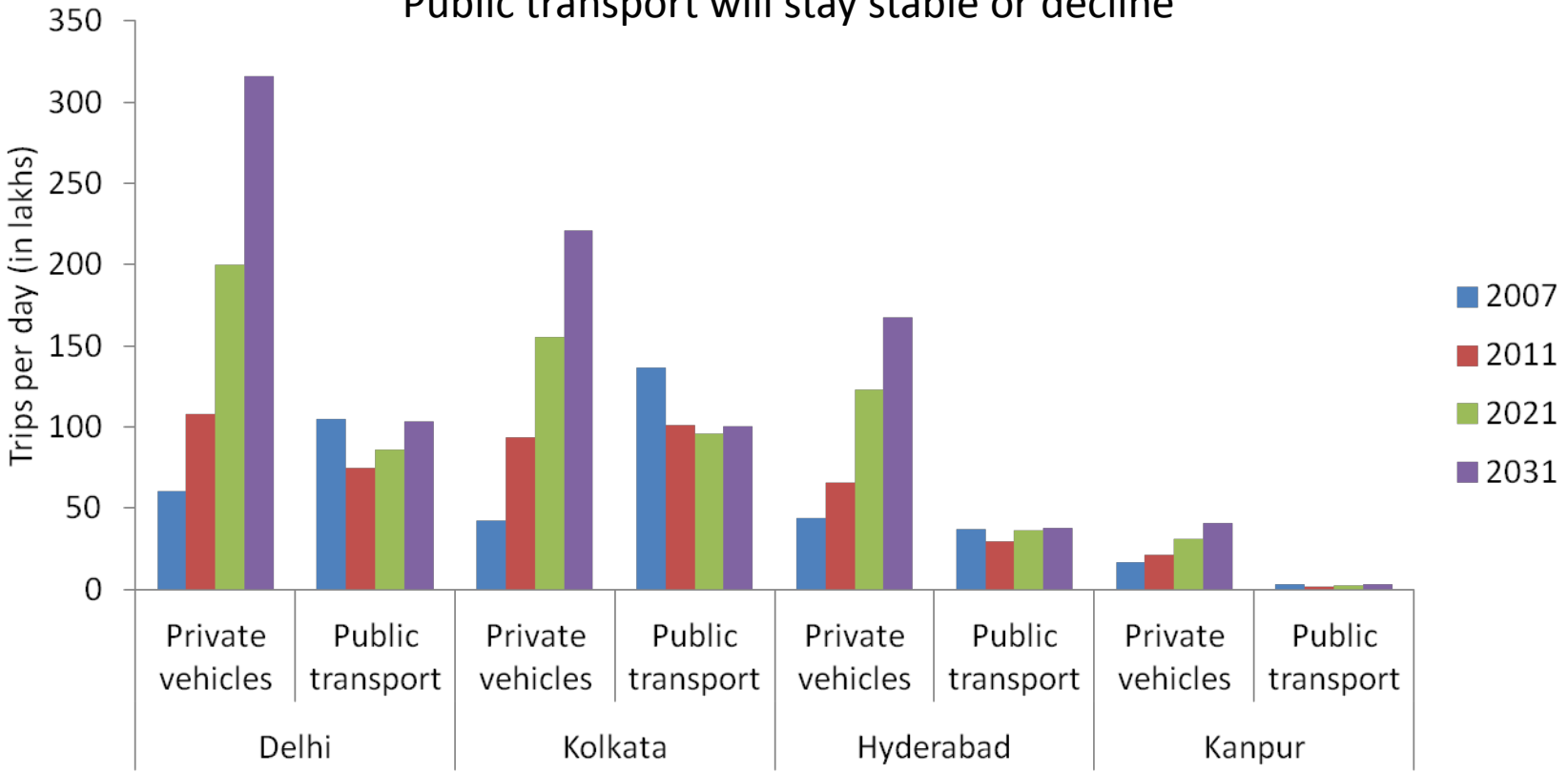


Source: CSE based on MOUD/WSA data 2008

Shadow of things to come

Modal share trend 2007-2031

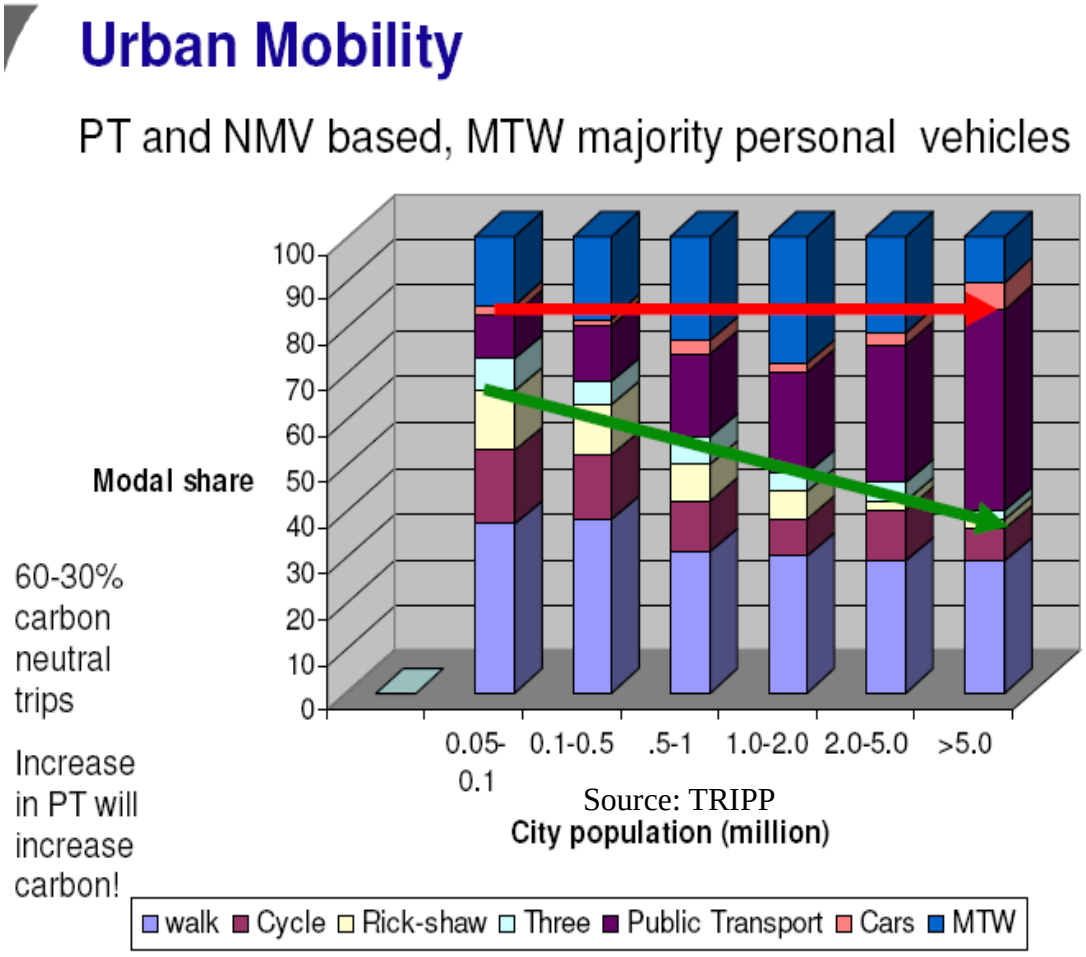
Private vehicle usage will increase.
Public transport will stay stable or decline



Source: Based on: MOUD 2008, Study on traffic and transportation policies and strategies in urban areas in India, Wilbur Smith Associates, Ministry of Urban Development, May

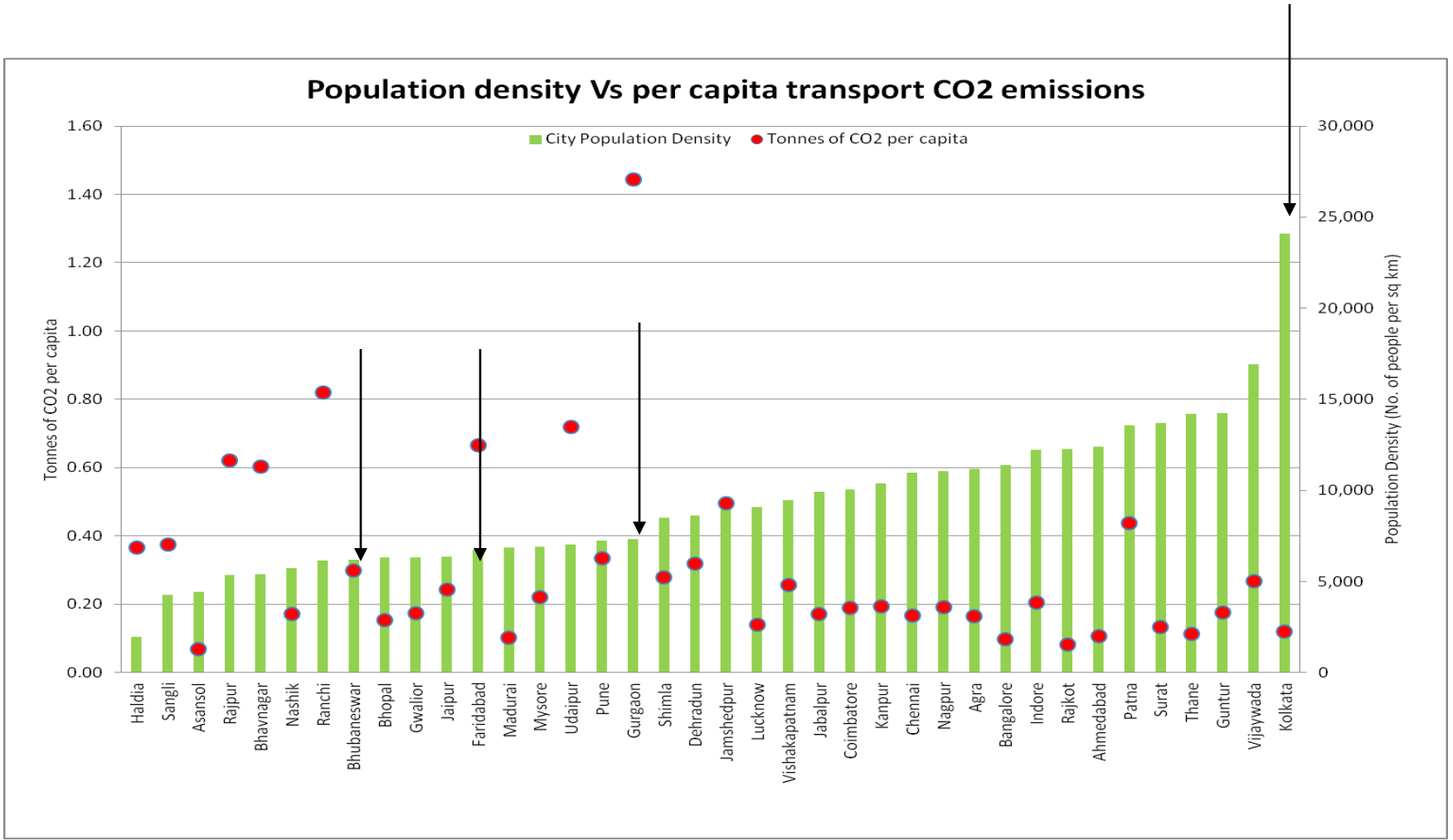
Our inherent strength……

- We have built walkable cities: - 30-60% trips carbon neutral.

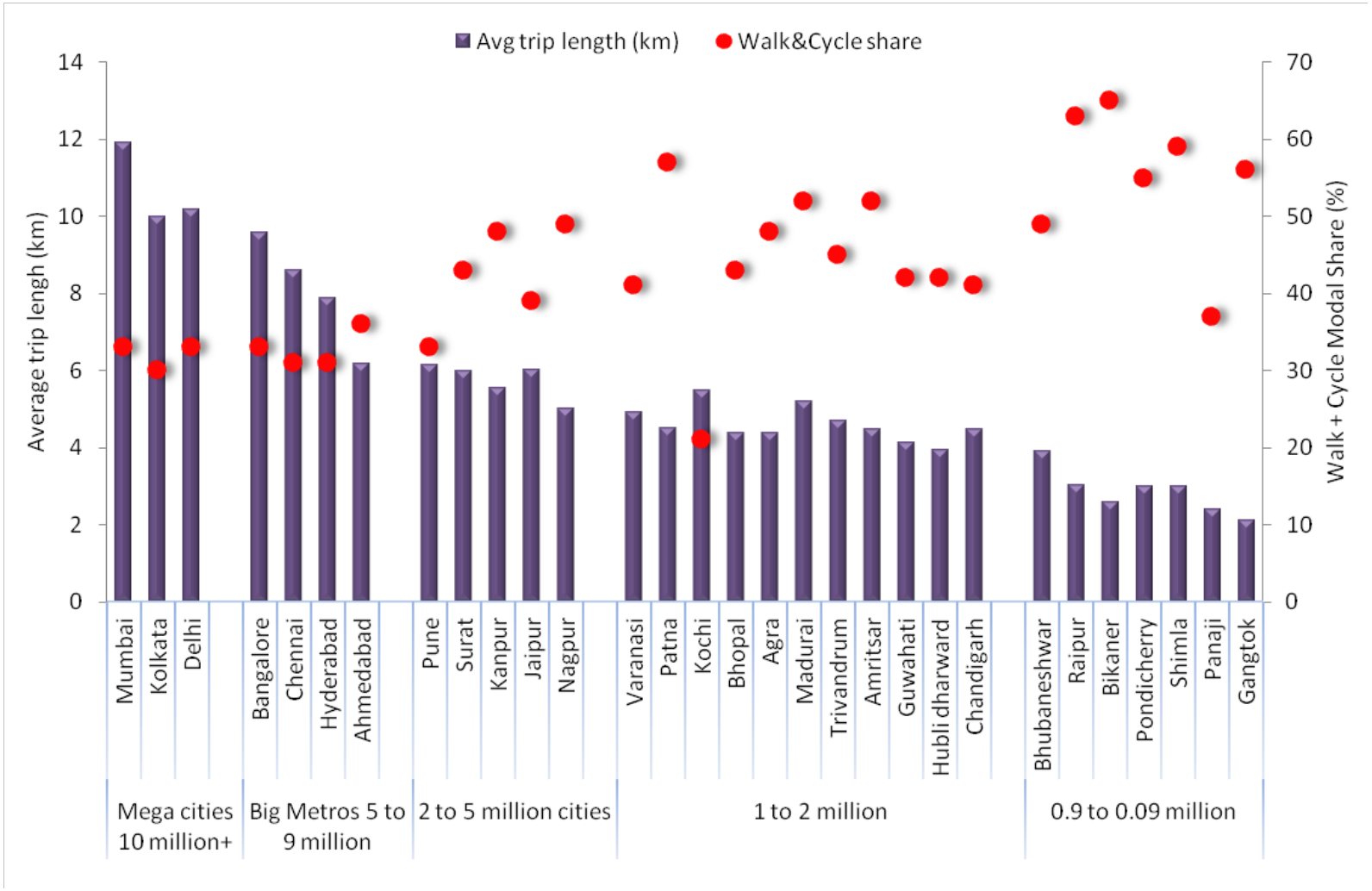


Pattern of per capita CO2 emissions, density and travel pattern……
More dense the city, less CO2 emissions

- **Surprise:** Some smaller cities with lesser density, (eg Faridabad, Gurgaon, Patna etc) have higher per capital CO2 emissions

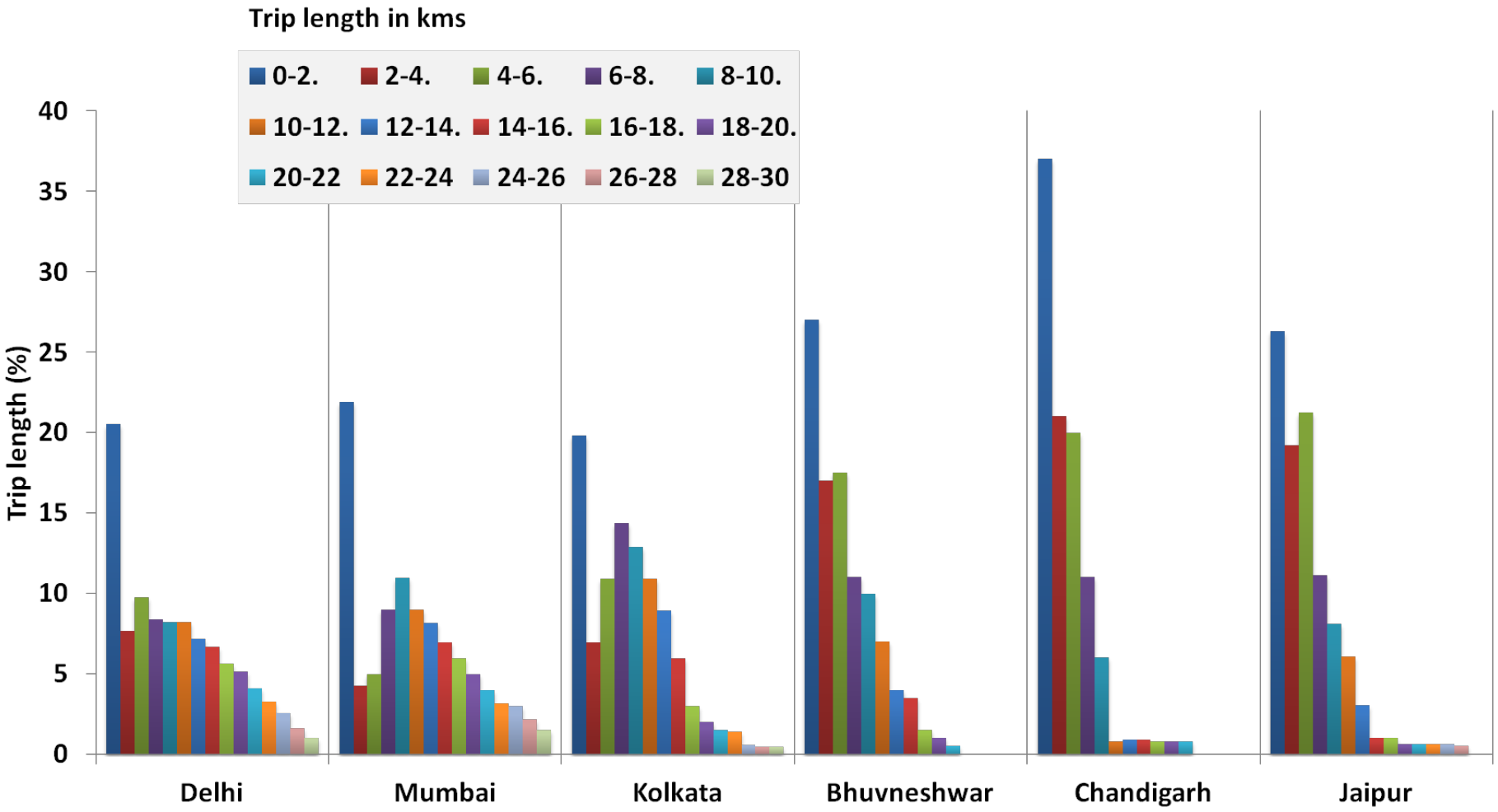


Strong co-relation between trip length and share of walking and cycling



Source: Based on MOUD/WSA 2008

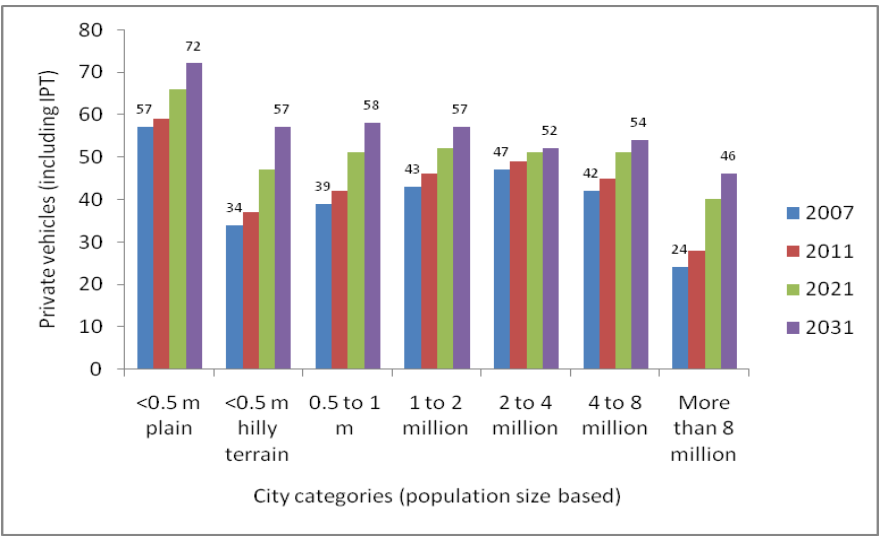
Sprawl effect
Bigger cities show more trips in higher distance range

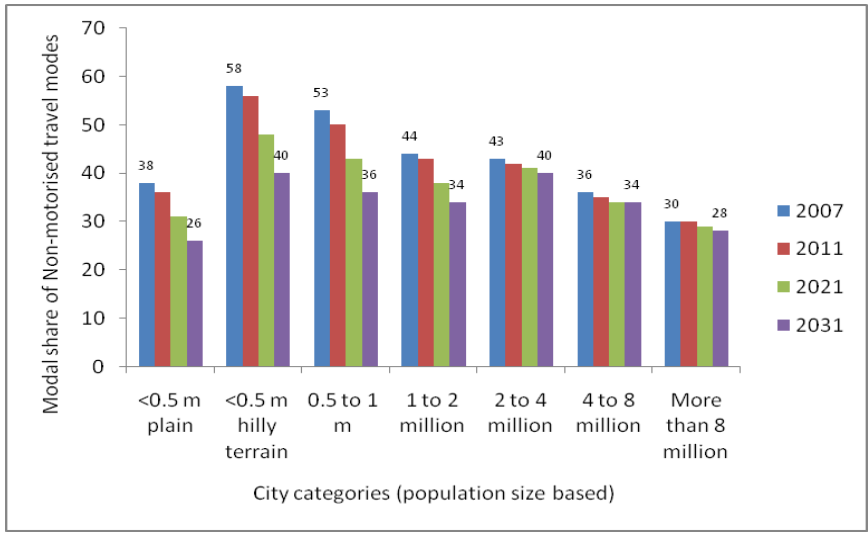


Source: Based on MOUD/WSA 2008 database

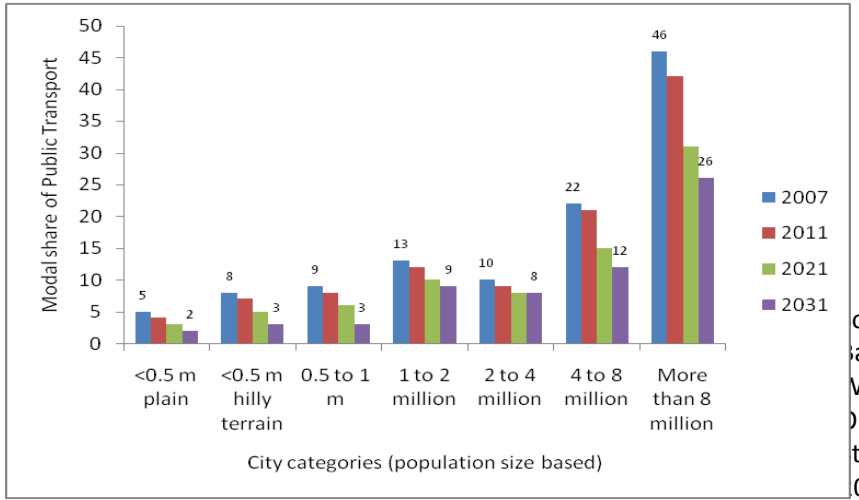
Emerging cities: Special challenge

•WSA/MOUD forecast -- Cities with 0.5 million to 2 million population will have massive share of private vehicles in 2031 -- about 57% -- Mega cities will be at 46%.





- Share of non motorised vehicles high but to decline more rapidly.
- Share of public transport will decline in all cities. But the share of formal public transport which is already low in smaller cities will slide further
- Private vehicles will grow very rapidly



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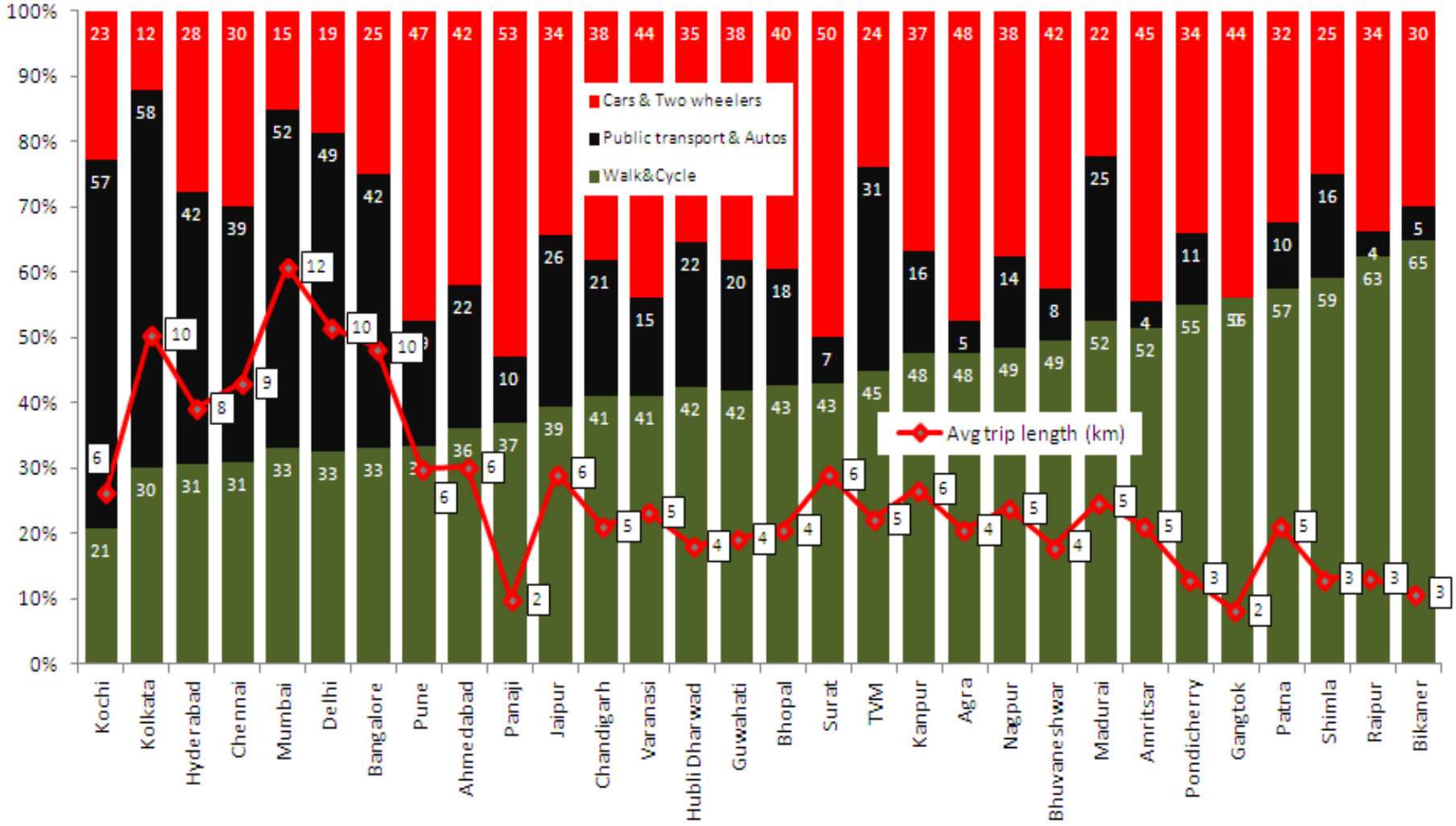
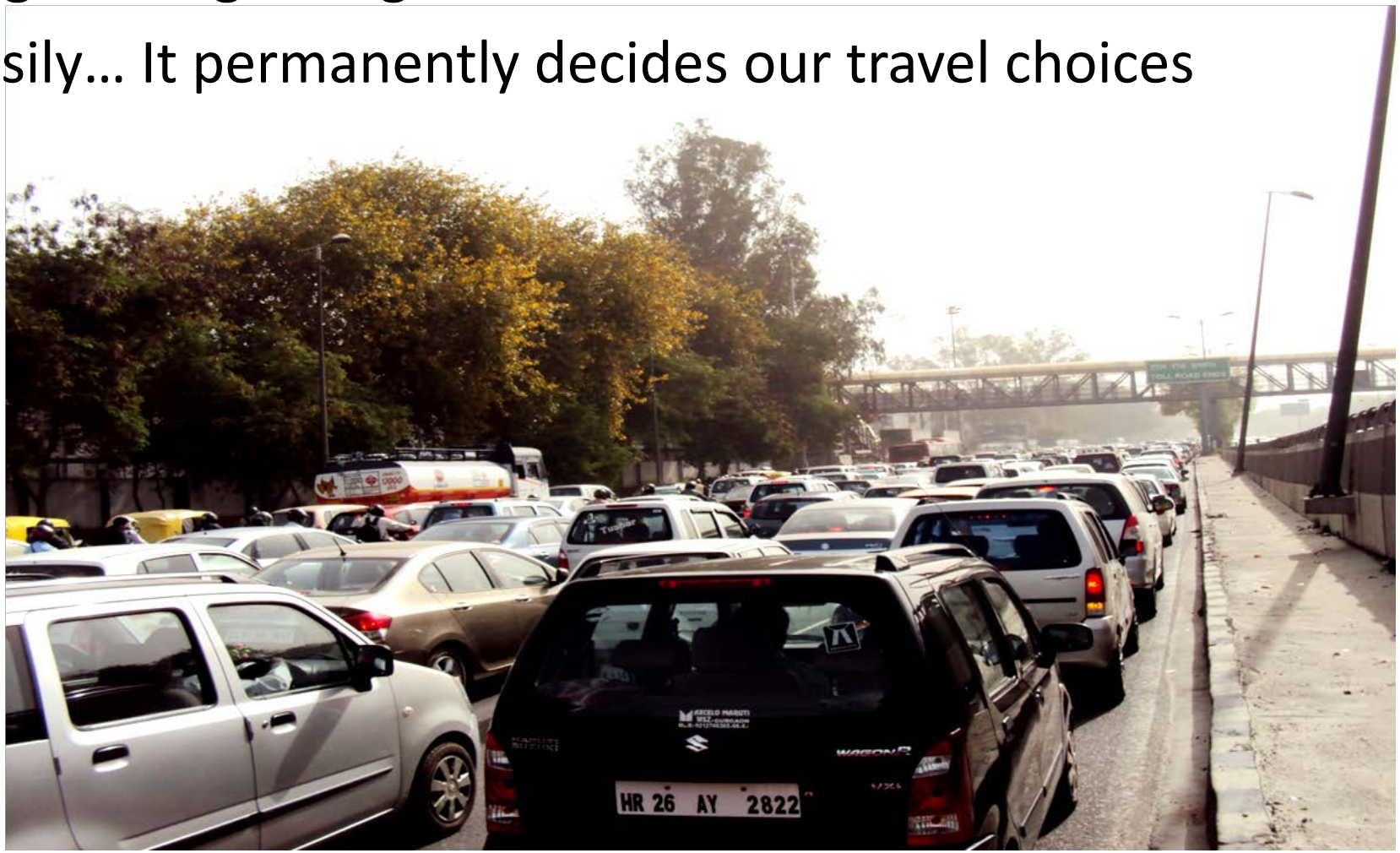
Compact cities have shorter trip length, more walking and cycle share and less CO2 emissions



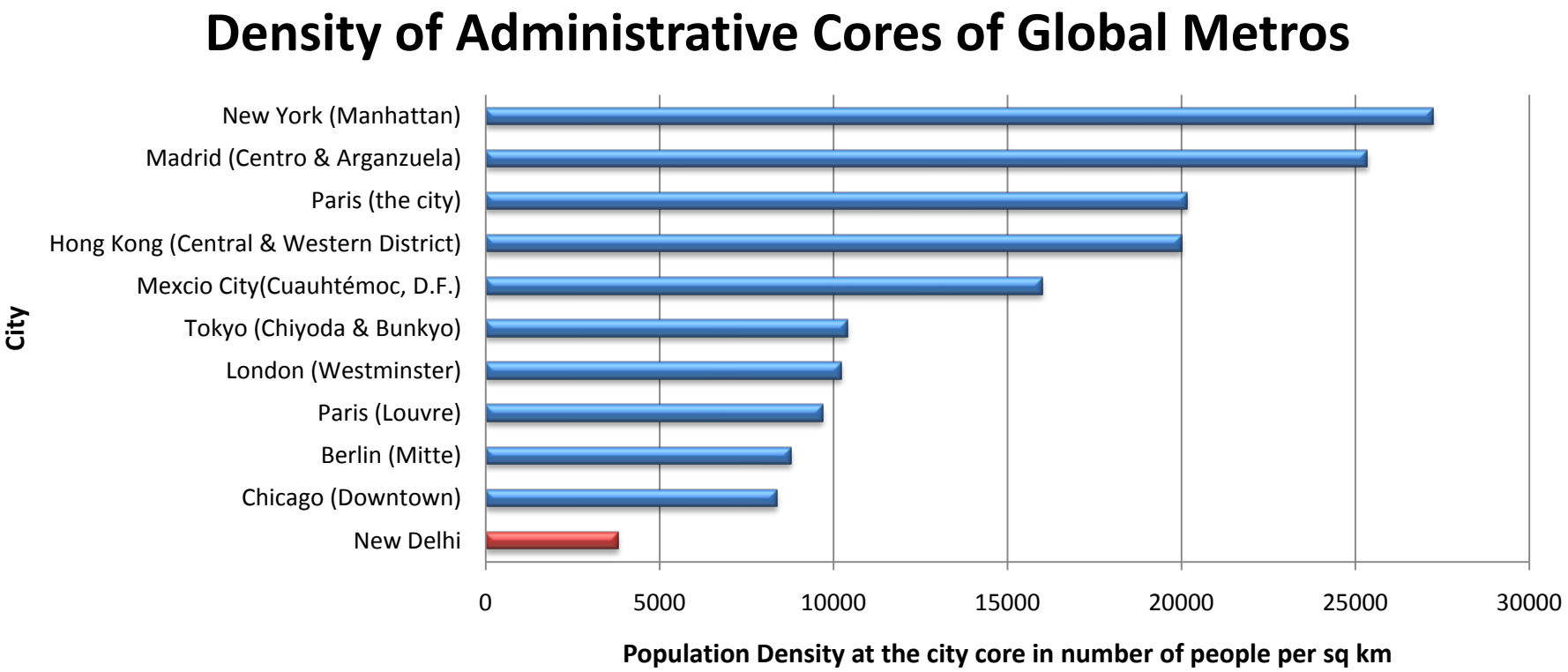
Source: Based on analysis of data provided in reports: 1) ICLEI-South Asia 2009 2) WSA/MOUD 2008

Car centric design -- signal free roads, FOBs…….

Engineering changes once made cannot be reversed easily… It permanently decides our travel choices



Density control in Delhi has pushed people put of the city core

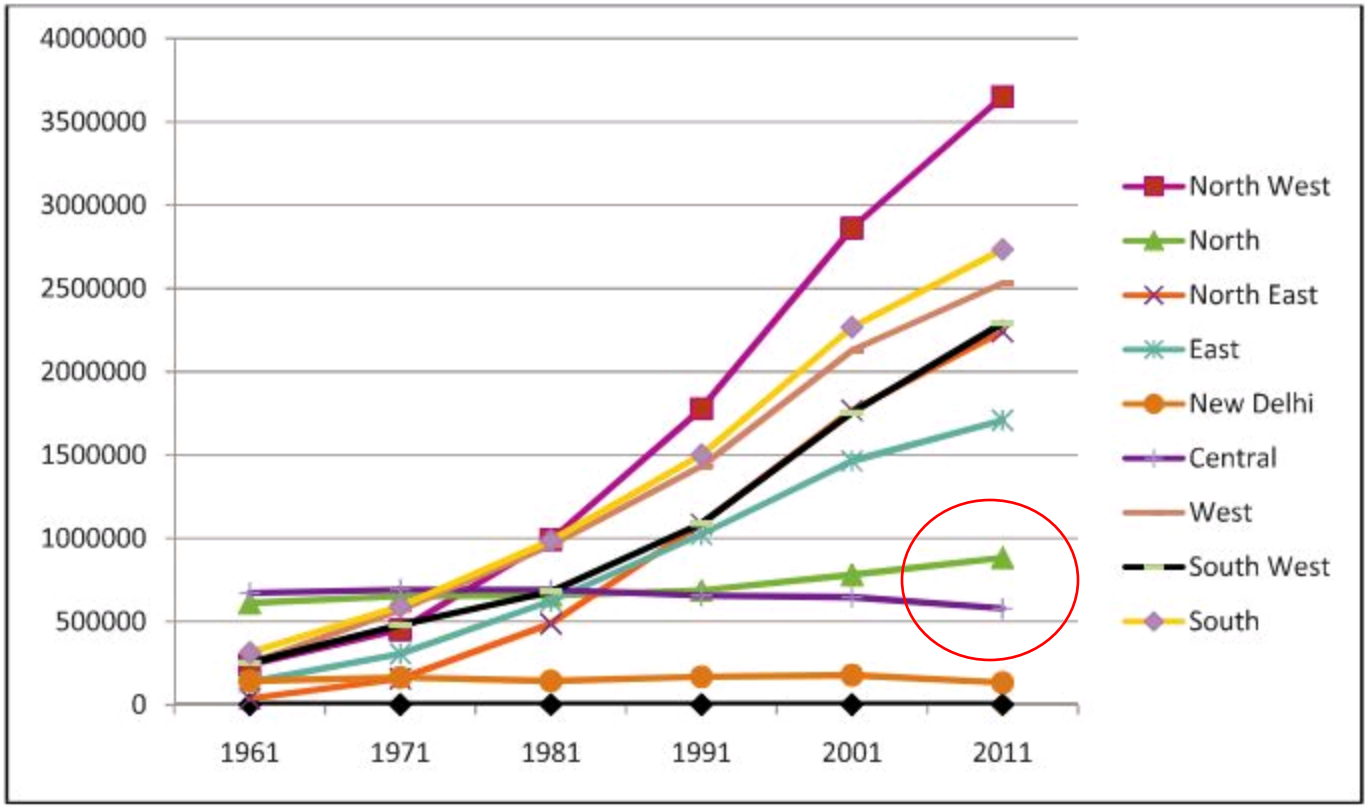


•Delhi with most sparsely populated core. Only 1% of population in the core

• New Delhi's density is more than six times lower than core administrative regions of New York and Madrid

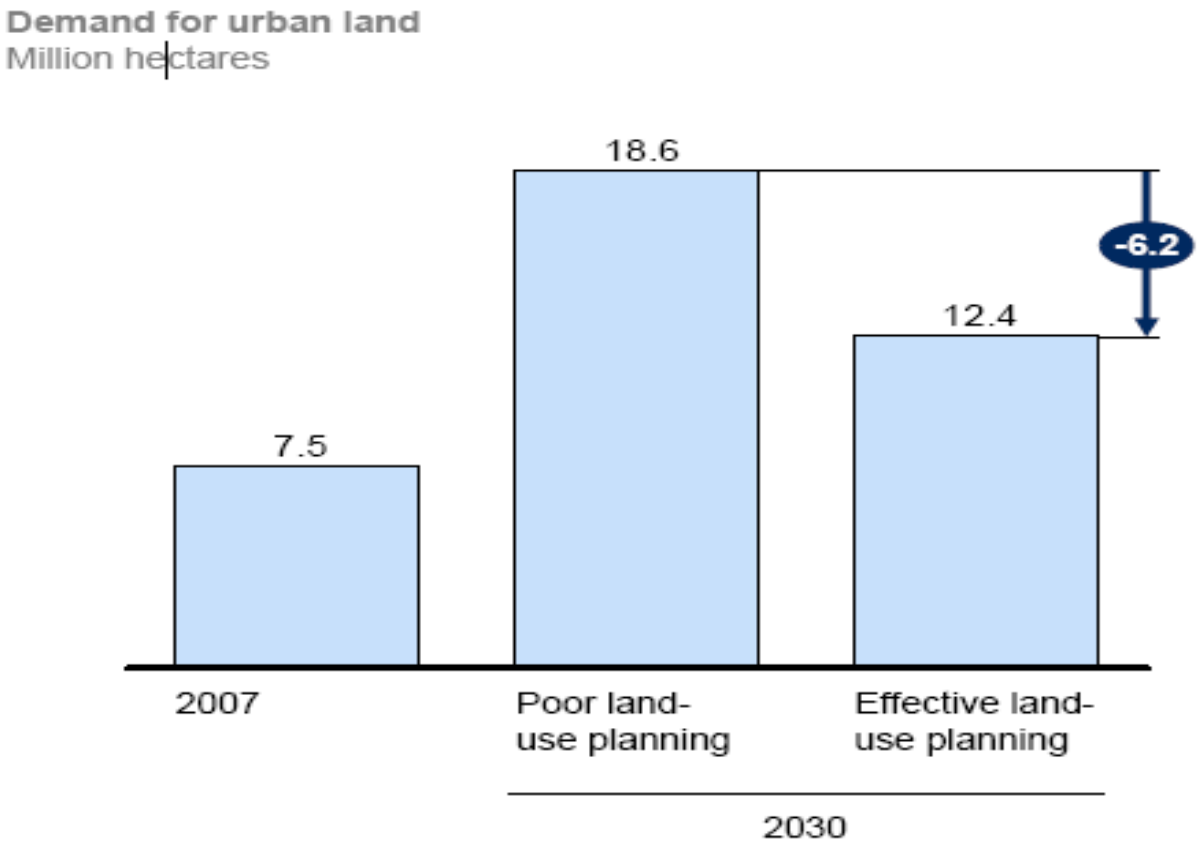
Source: Complied

Delhi: The core stagnates and declines



Graph 2: District wise population, from 1961 to 2011

Effective land use planning in CBD and transit corridors can potentially mitigate loss of land



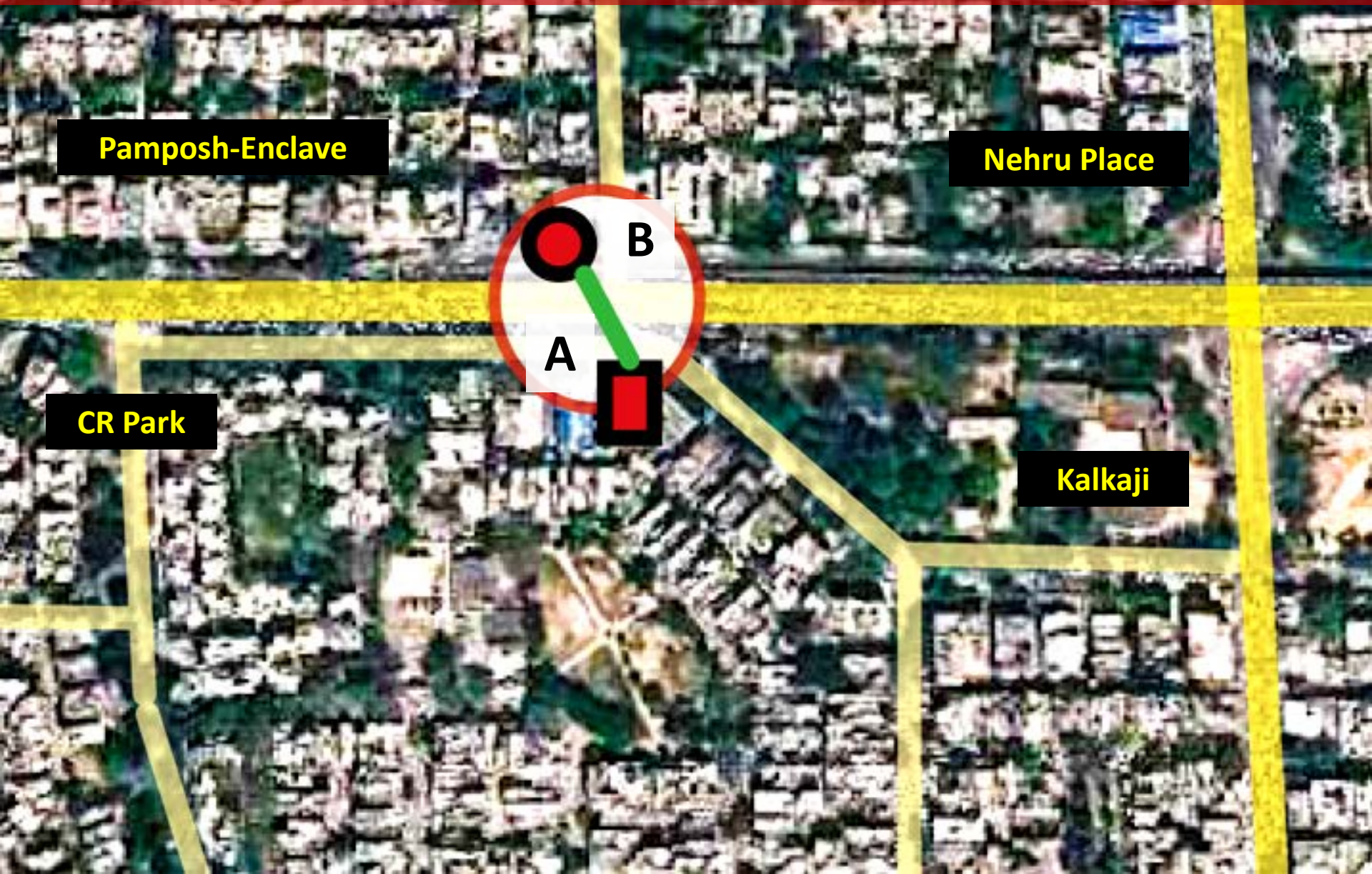
Source:2010, Mckinsey Global Institute

India could potentially save 6.2 million hectares of potentially arable land through effective planning for land use in the next 20 years

Case Study – Outer Ring Road (Nehru Place Flyover)

Travelling from A to B

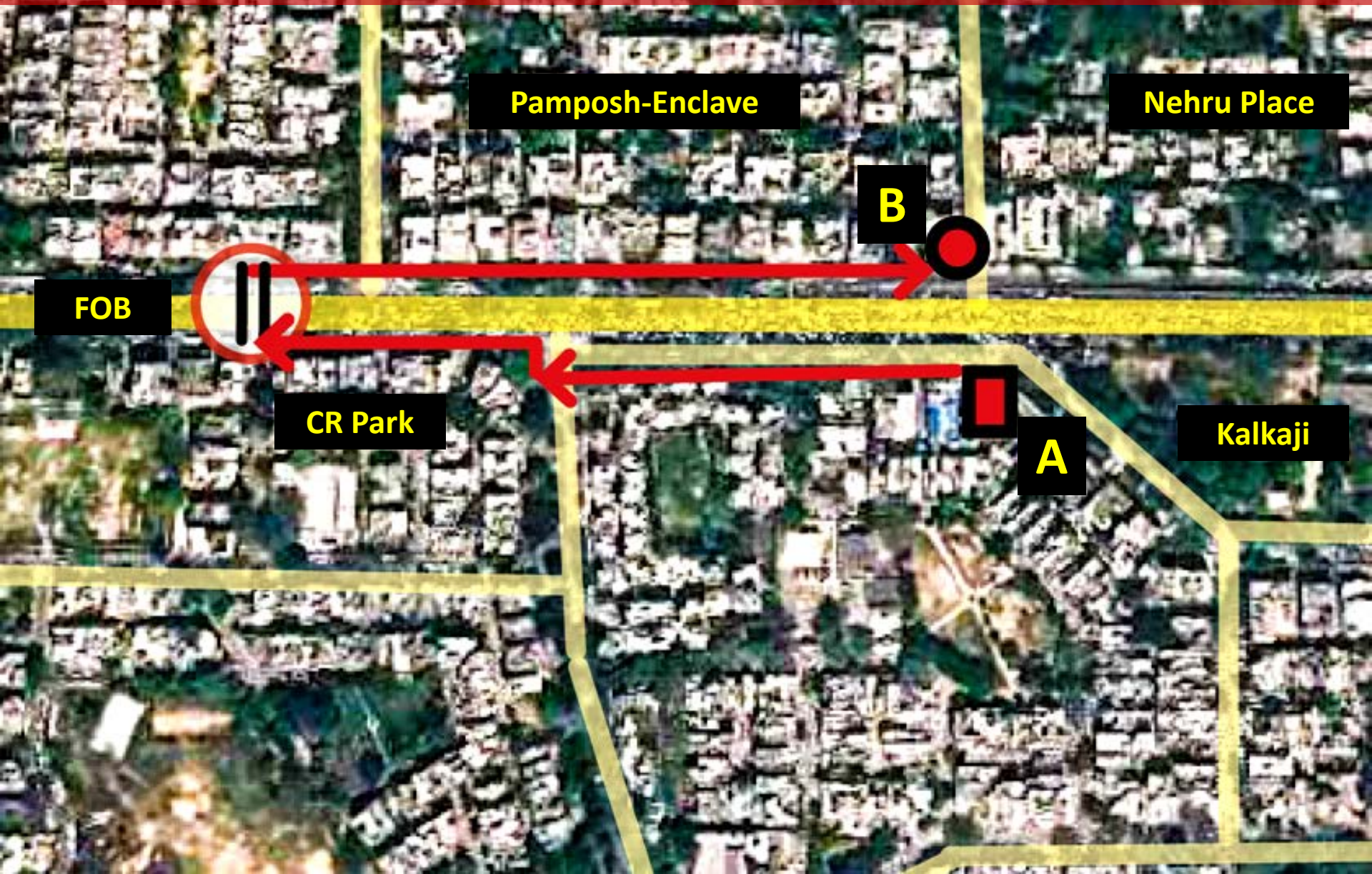
Originally 30M across the road



Case Study – Outer Ring Road (Nehru Place Flyover)

Travelling from A to B – Pedestrian Route 1

1000M via FOB



Case Study – Gurgaon Sector 28

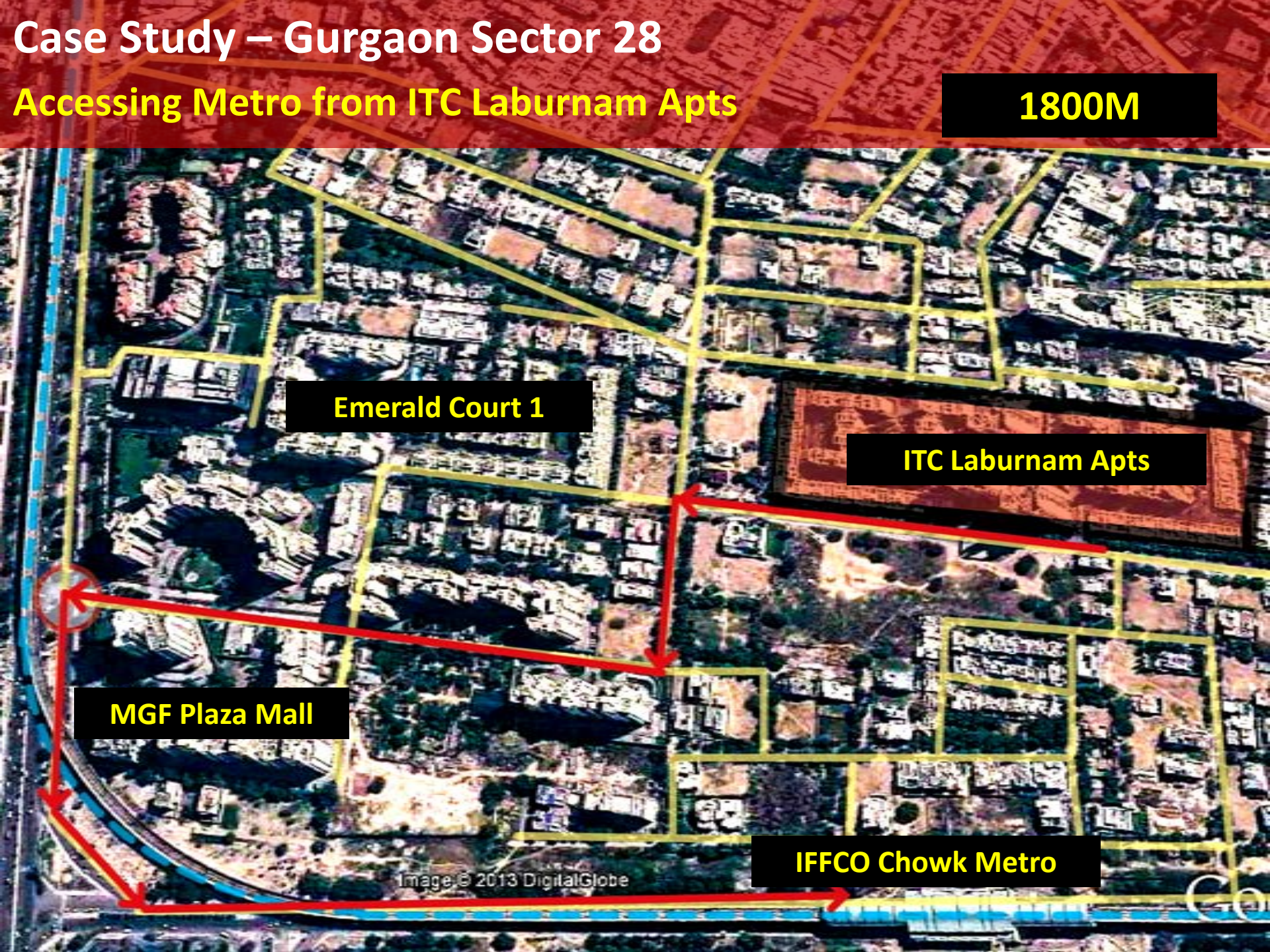
Accessing Metro from ITC Laburnam Apts

400M

- **Shortest route not possible.**

Case Study – Gurgaon Sector 28

Accessing Metro from ITC Laburnam Apts



Design safe, active and livable cities to reduce lock in of carbon

Credit: SG Architects

Need active and safe streets

Not lonely roads cutting off walkers, cyclists, and public transport users

Transport CO2 emissions in Delhi poised to gallop

	Aggregate Transport CO2 Emissions	Transport CO2 Emissions Per Person (tCO2/ person)	CO2 Emissions Increase on 1990 (%)
2004 Delhi	6,146,651	0.4	97%
2010 Business as Usual (BAU)	8,268,298	0.5	165%
2030 Scenario 1: BAU	19,550,693	0.8	526%
2030 Scenario 2: Low Carbon Motor Vehicles (LCD)	17,069,668	0.7	447%
2030 Scenario 3: Active Transport (AT)	10,458,736	0.4	235%
2030 Scenario 4: Sustainable Transport (ST)*	9,327,207	0.4	199%

http://ncrpb.nic.in/latest_news/26Transport%20Department,%20Government%20of%20NCT%20Delhi.pdf

Global learning curve

Eg. Lessons from California

Car centric urban design led to transit use of only 5% and 75% drive alone to work

Step towards reversal

- California has **enacted Sustainable Communities and Climate Protection Act (SB 375) since 2008**
- SB 375 aims to reduce per capita emissions by about 7% by 2020; and about 15% by 2035
- California's 18 Metropolitan Planning Organizations to develop a regional strategy for reducing vehicle miles traveled to address climate change
- Integrated landuse and transportation plans, to focus development around transit
- **Cities who comply with SB 375's regional plans receive a larger share of transportation funds and regulatory streamlining for projects**

Targets

- **Increase Density-** Existing Density in a Station Area; Developable Land
- **Mix Land Uses-** Current Mix of Land Uses Community Amenities in a Station Area
- **Improve Walkability-** Block Size in a station Area; Mobility Barriers in a Station Area
- **Enhance Access to Job centers-** Regional Destinations, Proximity and Regional Transit Links to Existing Job Centers
- **High Quality Transit-** Housing + Transportation; affordability Index

Evidence of change in Los Angeles

- **Lower Car Ownership**: 2/3rd households living near transit in LA own 1 or fewer cars, compared with 46% of the region.
- **More Transit Commutes:** Nearly 1/4th of commuters living near transit in LA take transit, walk, or bike, compared with just 8% of the region
- **More car free lifestyle:** 20 stations in the city are intense enough to potentially support car-free living
- **Many Connected Destinations:** Many regionally important job, entertainment/educational/institutional destinations linked on the transit system.
- **About 22% of the jobs in LA County are within walking distance of high quality, fixed-guideway transit**
- **Increase Residential Density:** Increasing the number of people who live in the half-mile radius around stations from 7,000 to 12,000 which equates to an increase in gross density of 3-5 units/acre–can reduce per-household vehicle miles traveled by 30%

Source: Center for Transit-Oriented Development (CTOD)

Build compact city

……Devil is in detail

National Habitat Standard Mission and Transit Oriented Policy of the Ministry of Urban Development

Eg. Guidelines for compact mixed land use

-- 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible **within 400m walking distance.**

-- 95% residences should have access to employment and public and institutional services by public transport or bicycle or walk or combination of two or more.

-- At least 85% of all streets to have mixed use development.

-- Need small block size with high density permeable streets etc

UTTIPEC guidelines

Hierarchy of Facilities	Accessibility Standard from each home/ work place.*
MRTS Station	Approx. 800 m or 10 min walk
Metro feeder/ HOV feeder Stop	Approx. 400 m or 5 min walk
Bus Stop	Approx. 400 m or 5 min walk
IPT/ auto-rickshaw Stand	Approx. 250 m or 3 min walk
Cycle Rickshaw Stand	Approx. 250 m or 3 min walk
Cycle Rental Stand	Approx. 250 m or 3 min walk
Shared private parking garage	Approx. 500 m or 6 min walk

Sustainable transport allows significant energy savings…

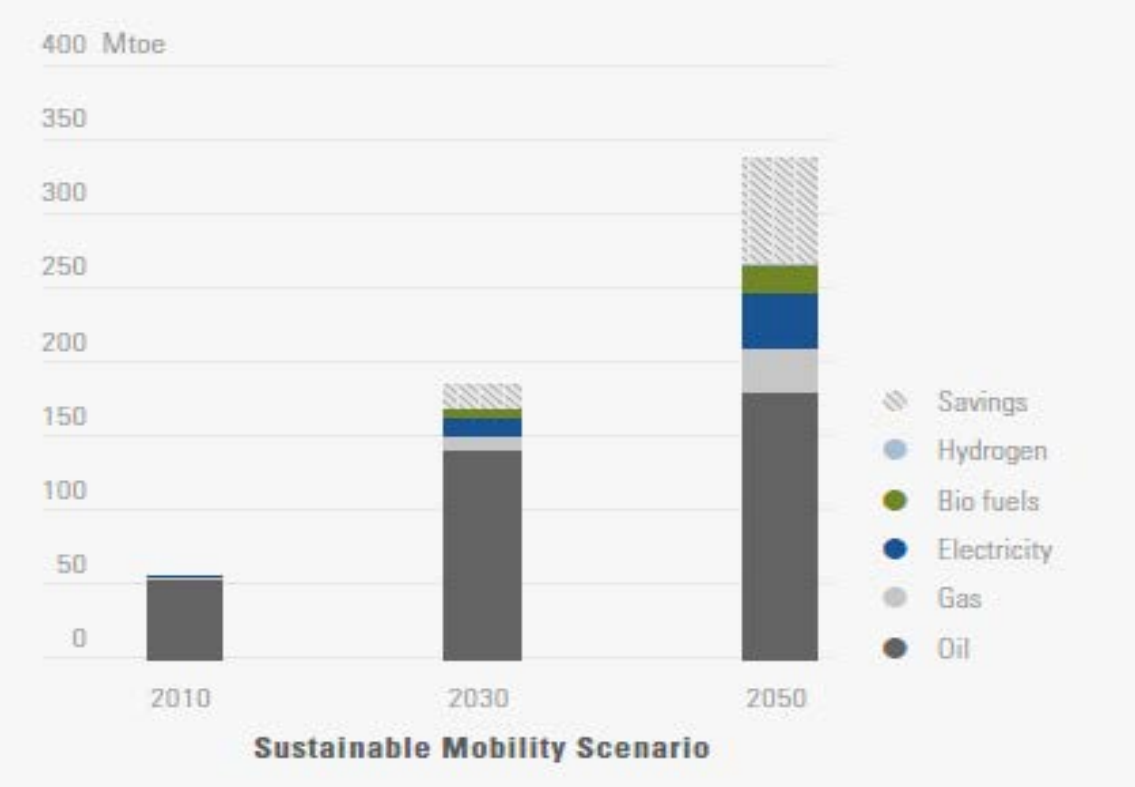
UNEP 2015

With sustainable mobility –

•In 2030, energy demand is lower by 9.1% compared to BAU

•By 2050, -- reduction in energy demand more than doubles to 21.6%.

Energy demand and savings – Sustainable Mobility



Source: Promoting Low-carbon Transport In India, Transport Scenarios for India: Harmonizing Development and Climate Benefits, UNEP, 2015

Way forward…

-- **Ensure dense and compact city** to reduce travel distances. Bring people and jobs closer to public transport systems.

-- **Improve walking, cycling, and public transport access**.

-- Discourage car centric infrastructure (flyover, signal free roads, foot over bridges, etc) that impede walking, cycling and use of public transport

-- Design cities to enhance safety.

-- Need car restraint policies

Parking as a travel demand management measure

Fiscal policies to influence travel choices

Vehicle taxation policy, Congestion and road pricing etc

-- **Tighten fuel economy norms** for cars, trucks, buses and commercial vehicles

--- Need integrated plan for freight and passenger movement – promote fuel efficient freight modes. Improve modal share of railways and waterways.

Thank You