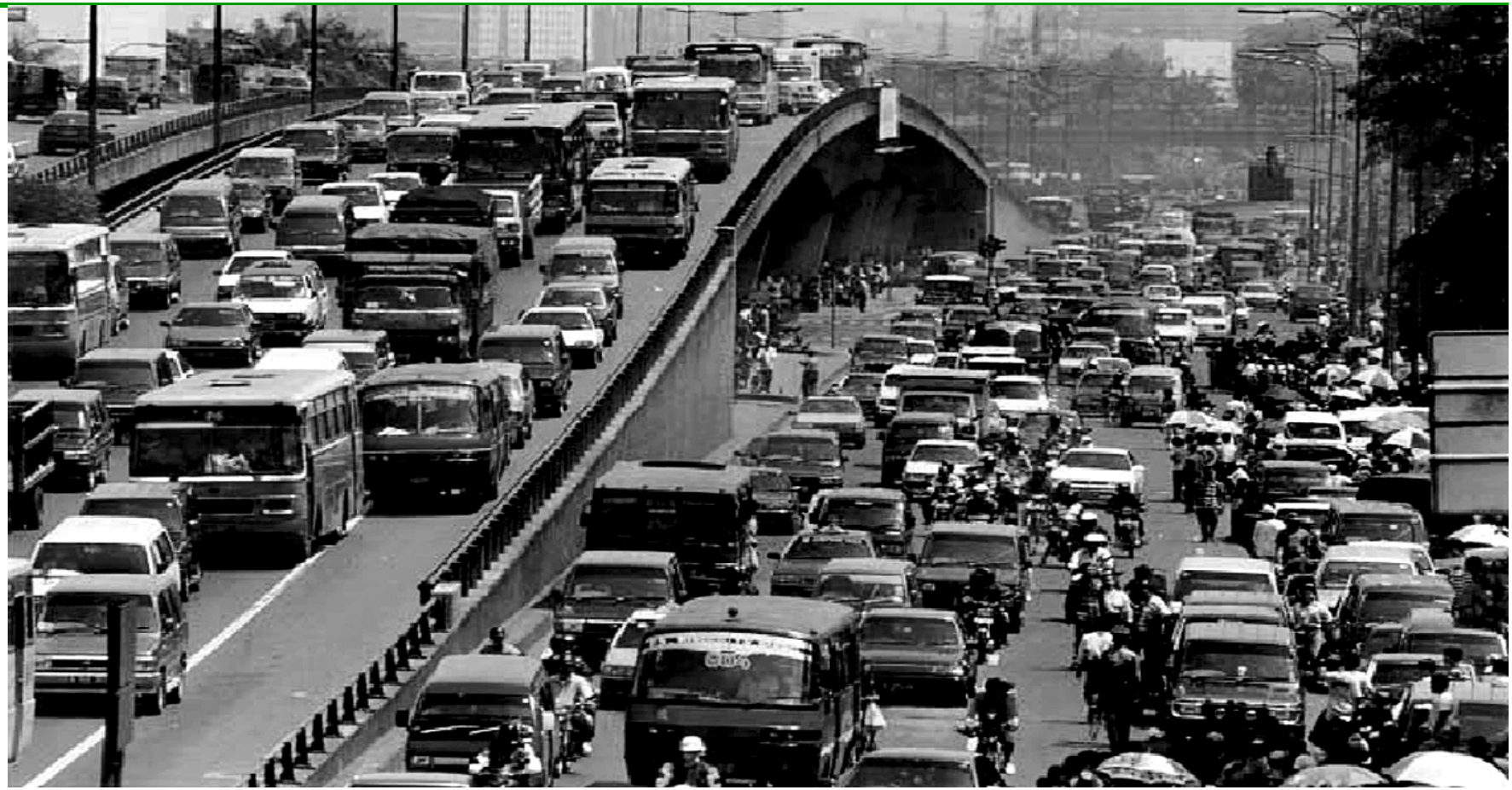
Seeking solutions to air pollution, congestion, and Climate: the role of transportation and mobility

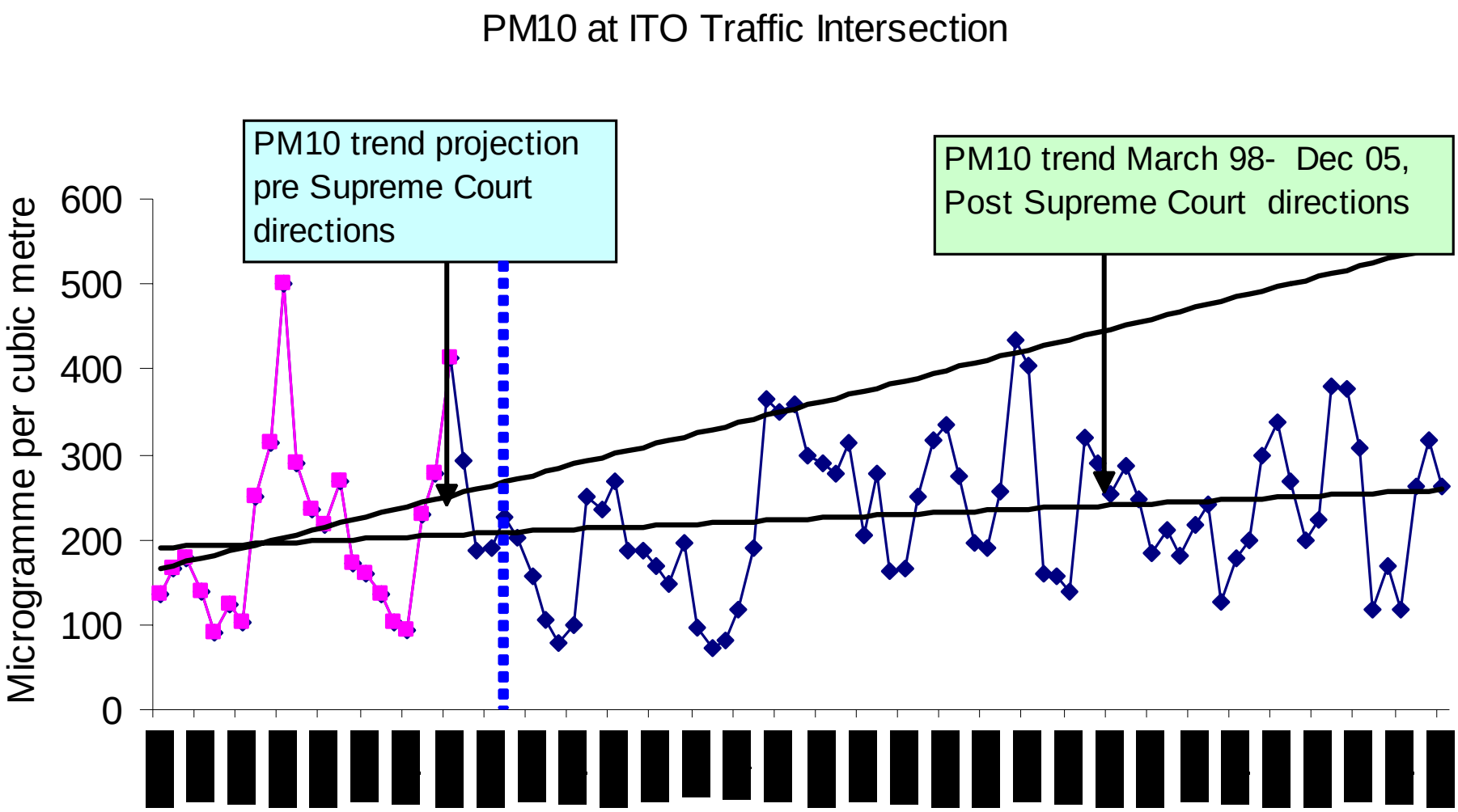


Anumita Roychowdhury

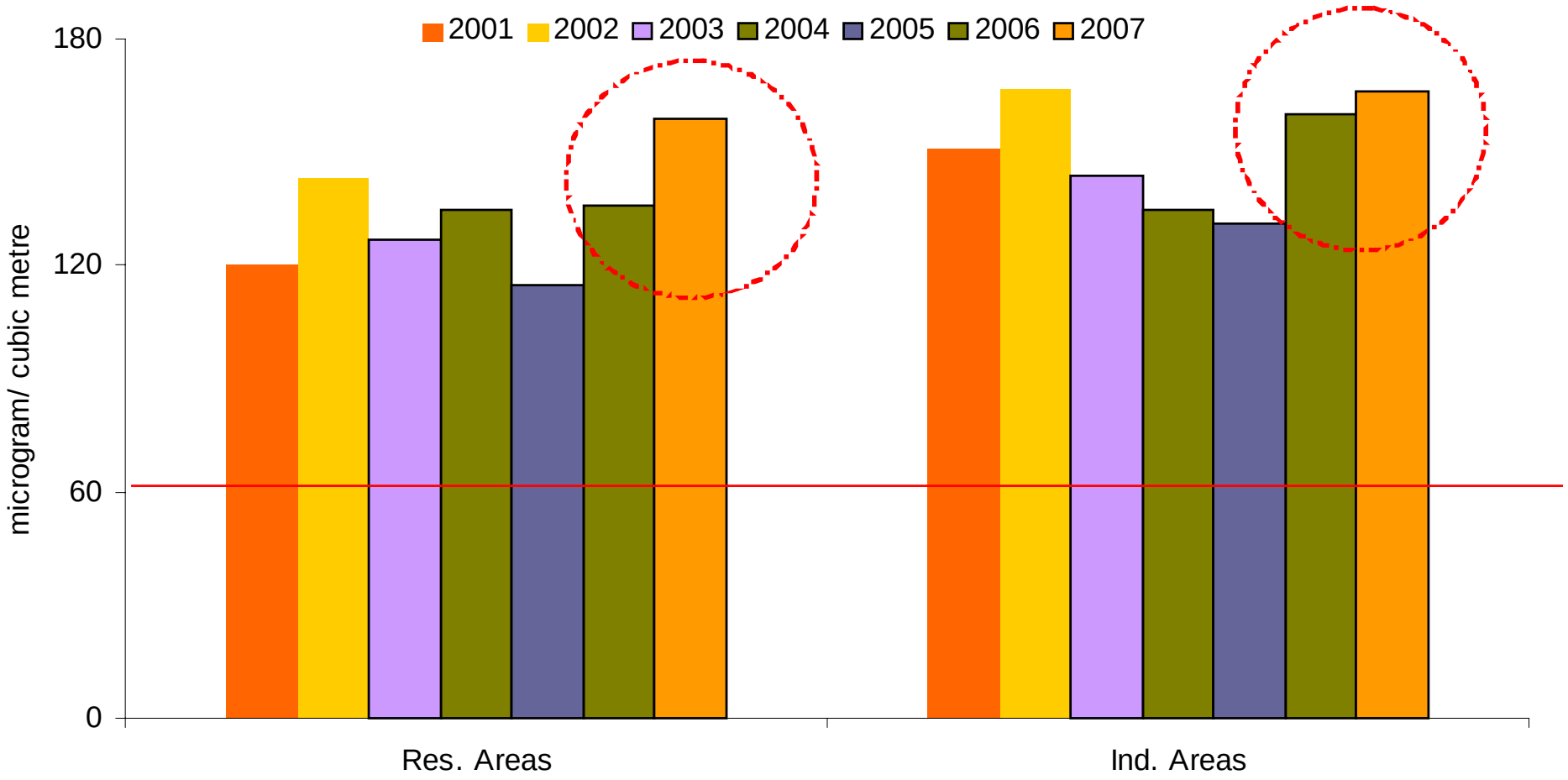
Centre for Science and Environment

New Delhi, November 18, 2009

Delhi got cleaner air: it avoided pollution; got health benefits



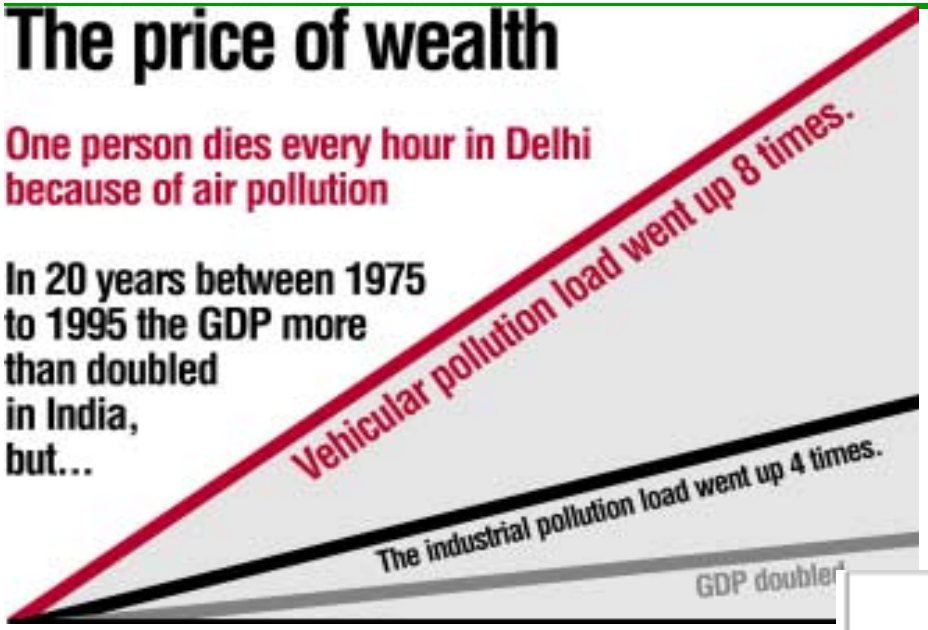
Pollution levels rising again: need big answers again



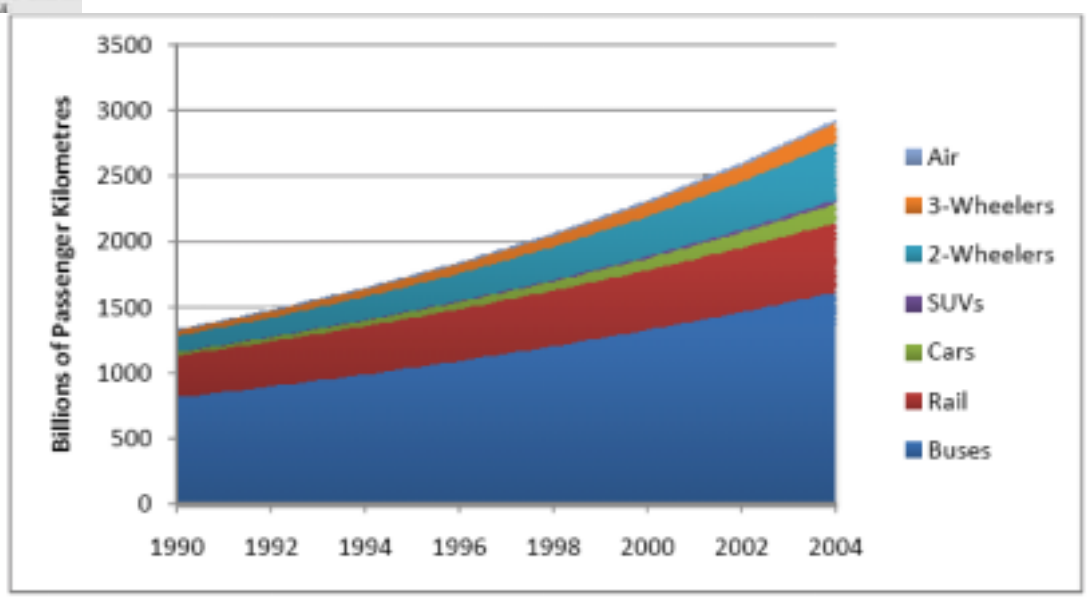
The challenge of convergence

Cities need to find solutions to air pollution, public health and climate impacts of motorisation……

More growth. More pollution. More travel. More oil guzzling and warming… A vicious cycle



Growth in passenger kilometers for different modes of travel



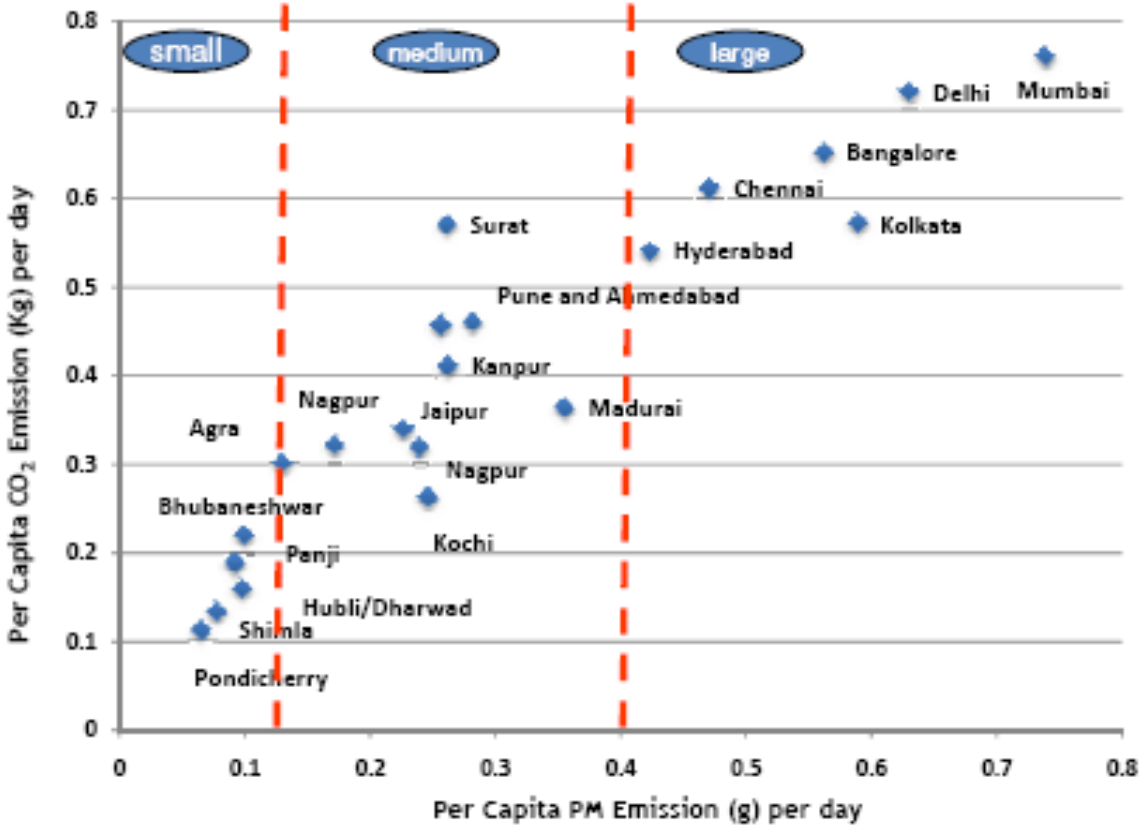
Other studies show by 2030-31 on an average, Indians will travel thrice as many kilometers as they traveled in 2000-01

Polluted and warming…….

Strong co-relation between pollution and CO2 emissions and energy use in Indian cities

Urban Transport & Environment – cont..

Per Capita CO_2 and Per Capita PM Emissions



- Indian cities show strong correlation between emissions of air pollutants and CO_2 emissions
- As cities grow in size, transport emissions increase
- Importance of catching cities early before they start to grow.

Source: 2008. MOUD- Study on Traffic and Transportation Policies and Strategies in Urban Area. Analysis By CAI-Asia using CART model - Sarath Guttikunda

www.cleanairnet.org/caiasia

Source: CAI Asia, 2008

Look at Delhi

CSE study found that while air remains polluted, total heat trapping CO2 emissions load from vehicles is increasing

Cars and two-wheelers contribute as much as 60% of the total CO2 emission load from vehicles

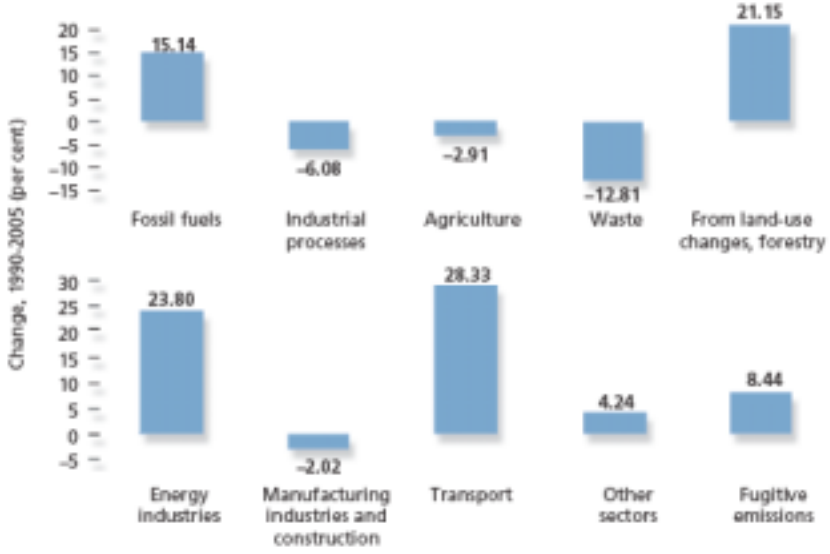
Only in 5 years, (2002 and 2007), CO2 emissions load from cars has increased by 73% and from two wheelers by 61%.

Public transport buses contribute 20%. But buses carry several times more people and consume significantly less fuel and emit less per passenger

Why do we need to worry about motorisation?

Globally transport has remained the most difficult sector for climate mitigation

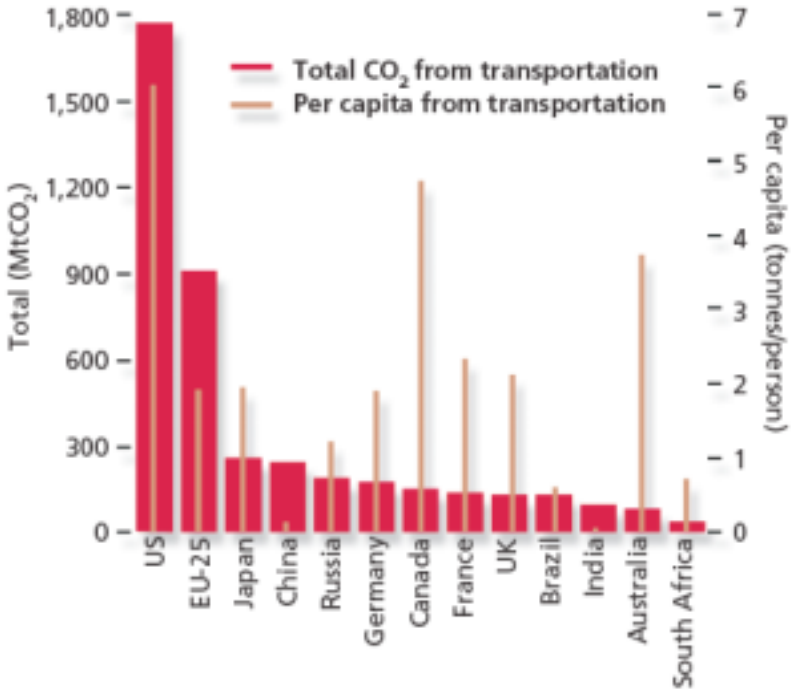
Sectoral change in CO_2 emissions; fossil fuel break-up



Note: Figures for Annex I countries in UN Framework Convention on Climate Change excluding ex-Soviet bloc countries
Source: UN Framework Convention on Climate Change, 2007

Transport sector emissions rising.

Total and per capita emissions

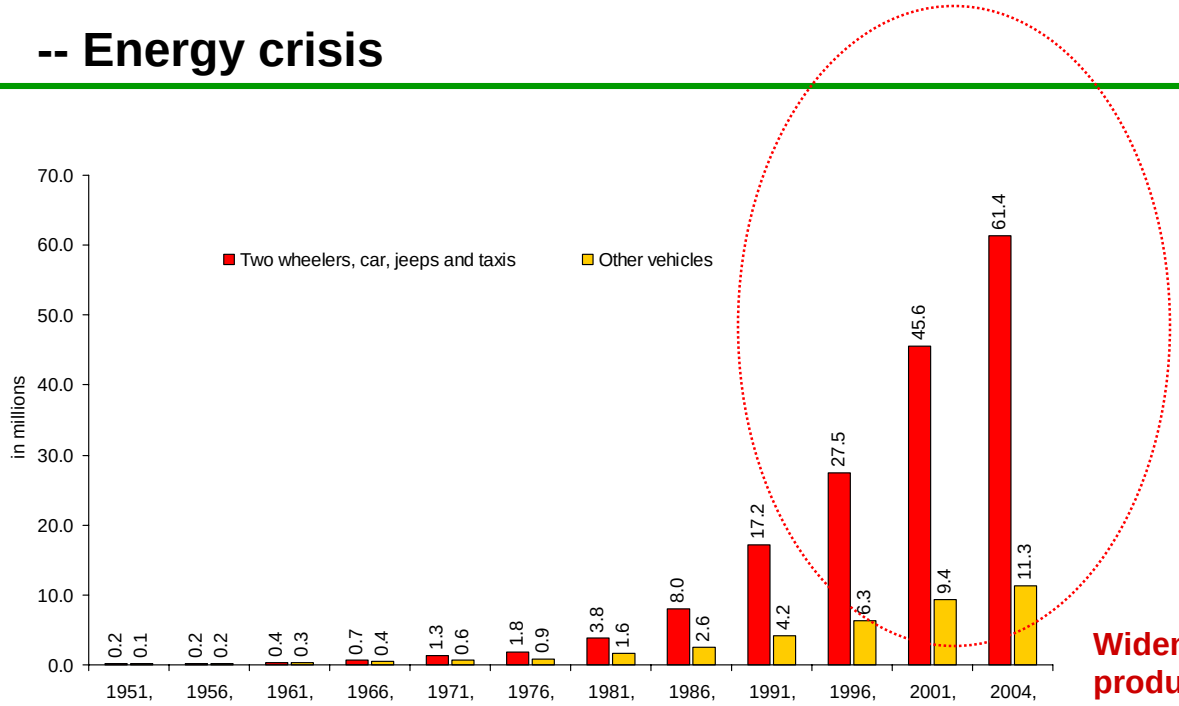


Source: World Resource Institute, 2005

Ominous signs in India…….

-- Explosive increase in vehicles

-- Energy crisis



30 years to reach the million mark in 1971.

Another 20 years to add two more million

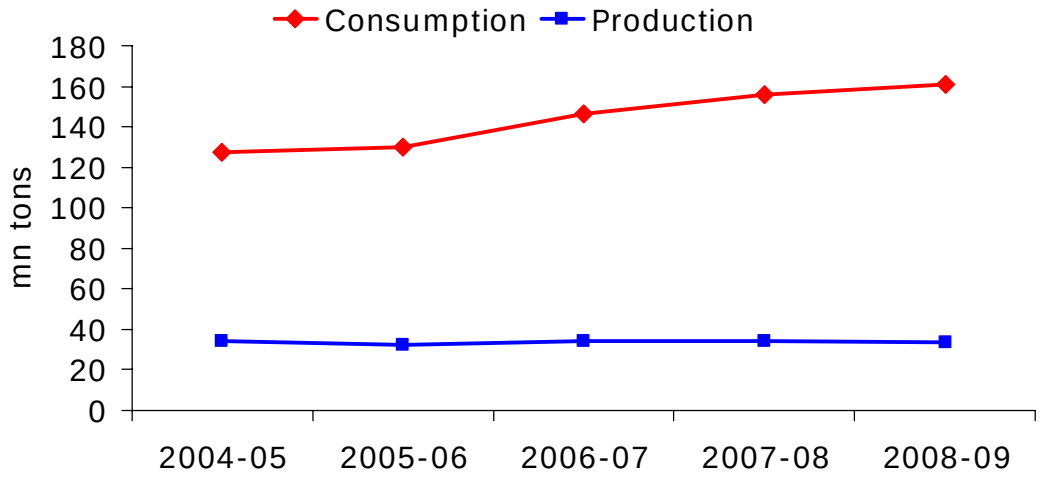
In next 10 years (1981-91) another 14 million

Another 10 years (1991-2001) – jumped by 28 million

This decade just in four years (2001 to 2004) we have added 16 million

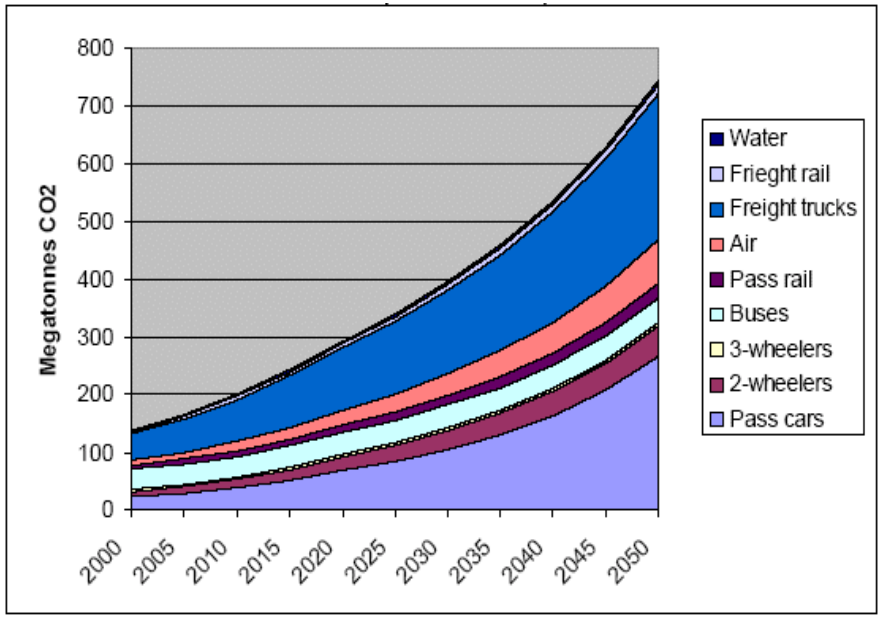
Source: MOSRTH motor vehicle registration data

Widening gap between crude oil consumption and production.



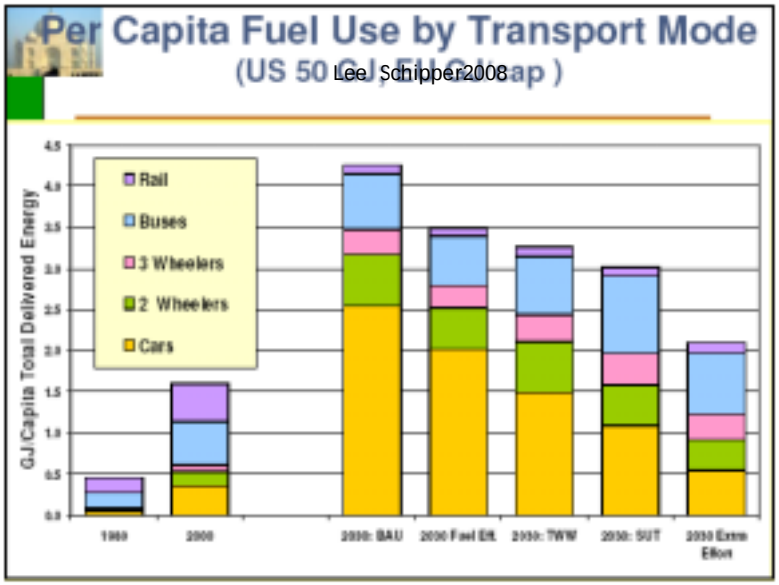
The great guzzle .....

Future CO2 increase from transport will be dominated by cars and trucks. (*IEA*)



G Tiwari, cw

Cars threaten energy security and climate



Lee Schipper2008

-- Transport energy demand up at 1.2 times the GDP growth rate.

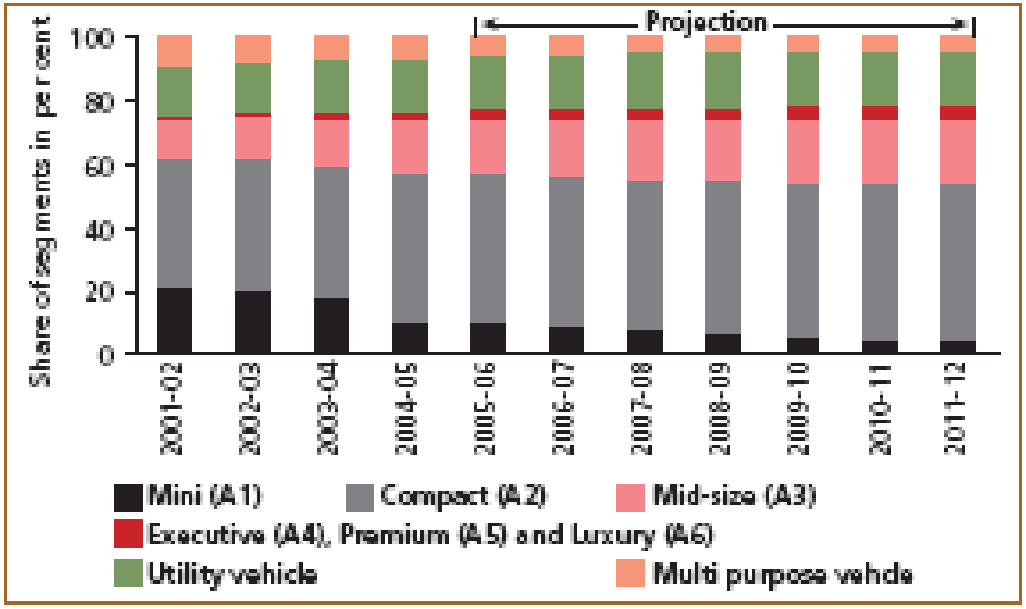
-- Transport uses nearly 40% of total oil. Oil use by vehicles in 2035 to be six times that of the 2005 level.

-- Urban car travel use twice as energy on average as average urban bus travel; 3.7 times more than the typical light rail or tram; 6.6 times more than average electric urban electric train.

-- Share of railways in freight down to 26%.

We are buying more big cars, SUVs, diesel cars……

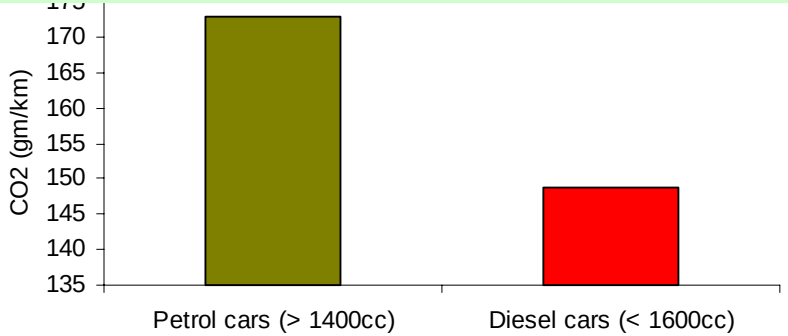
Big cars undermine fleet-wide energy efficiency



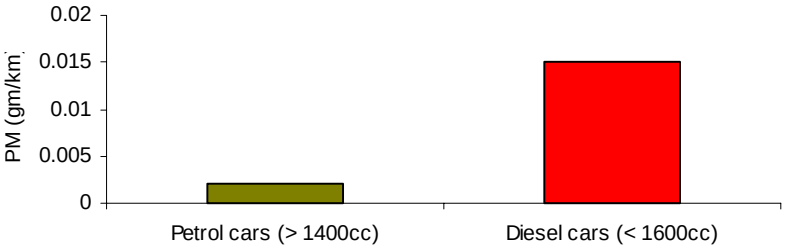
Source: Computed on the basis of sales data published by Society Indian Automobile Manufacturers (SIAM), Delhi

Getting caught in trade-off

Less CO2 from more efficient diesel cars

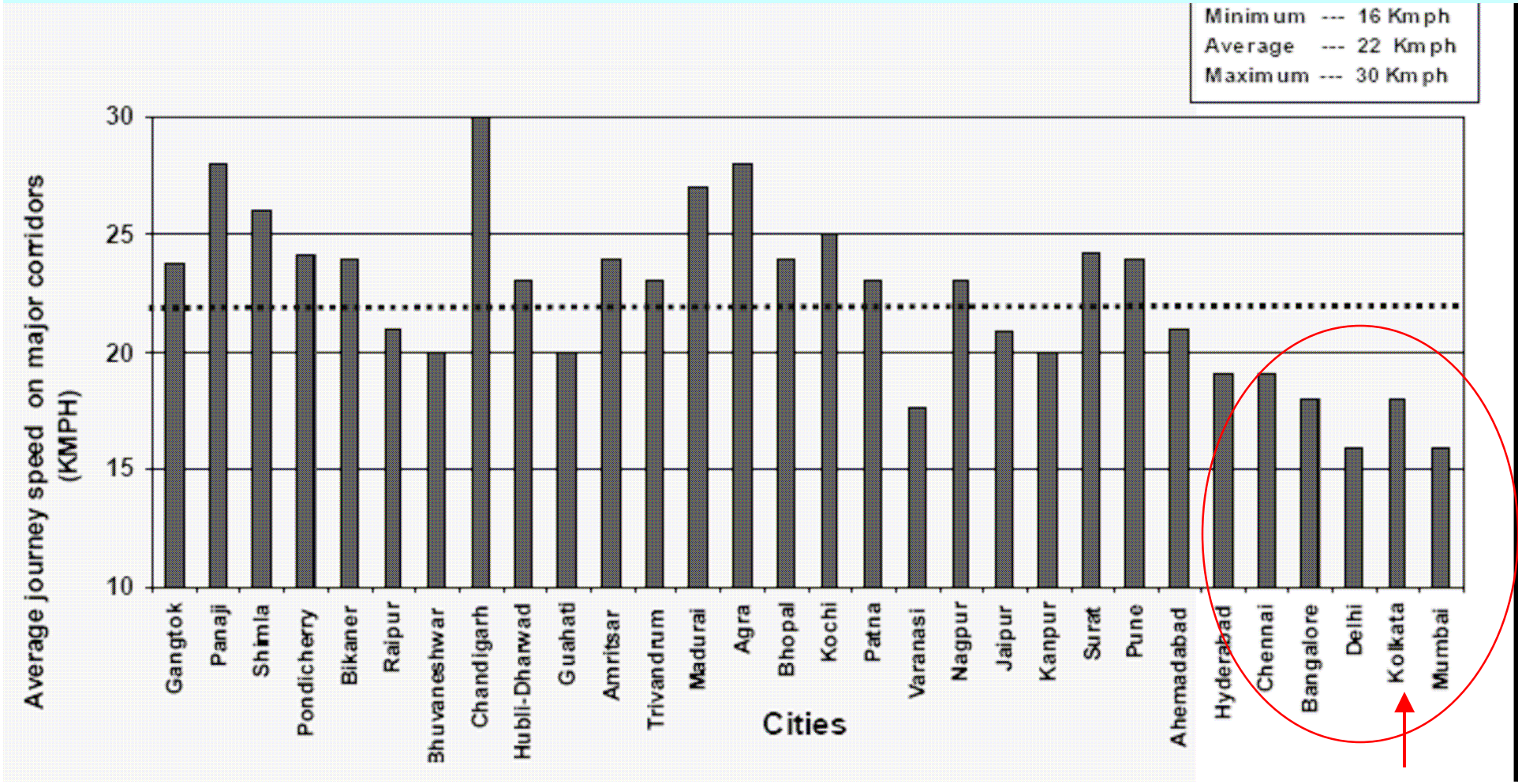


But more health threatening PM from diesel cars



Cities are Paralyzed
The Crawling Traffic

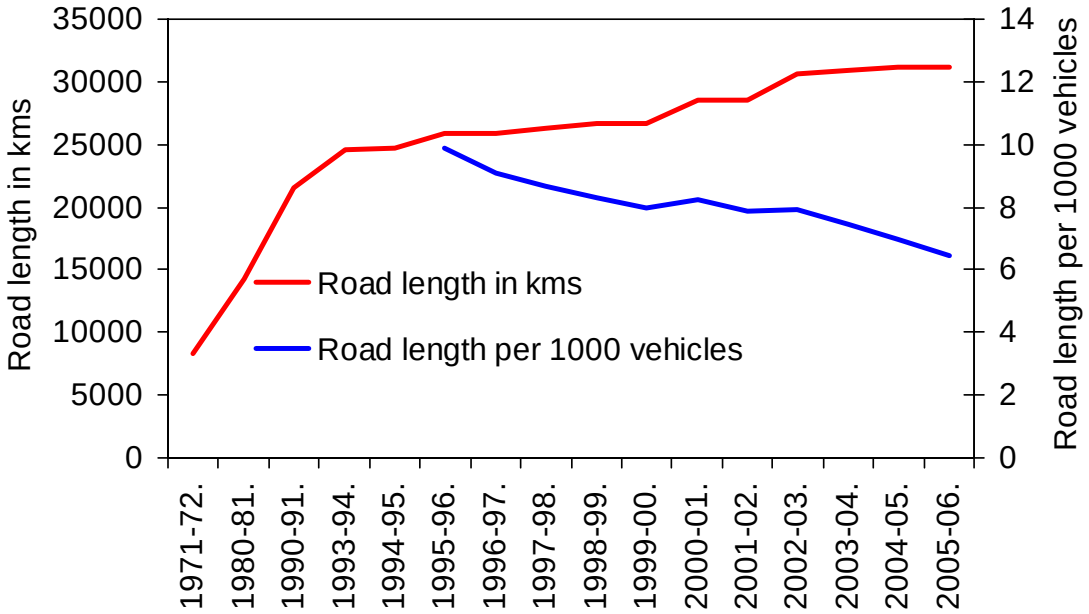
The average journey speed in Delhi (16 km/hr), Mumbai (16 km/hr) and Kolkata (18 km/hr): Abysmally poor compared to smaller cities



Source: Anon 2008, Study on traffic and transportation policies and Strategies in Urban Areas in India, MOUD, p63

Roads hitting dead end

Roads expansion cannot keep pace with rising number of vehicles



Source: Economic Survey, Delhi Govt

Emerging evidence from round the world:

Delhi: Working population of Delhi, Noida, Ghaziabad, Gurgaon and Faridabad lose nearly 2.5 hours daily due to peak jams. (ASSOCHAM)

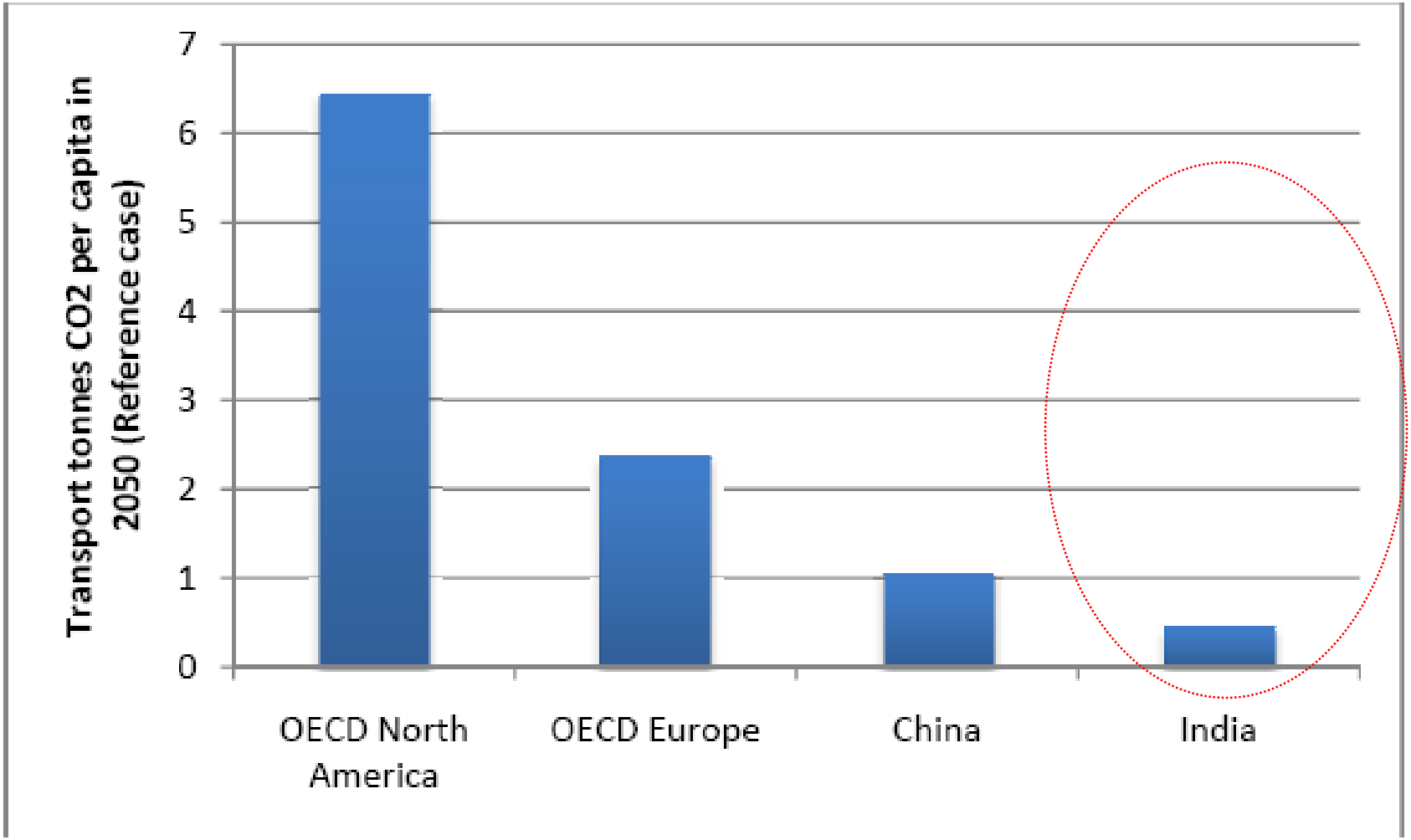
Mexico City: 20% of workers spend more than three hours traveling to and from work each day, and 10% spend more than five hours. (WBCSD)

Congestion cost: Economic cost of congestion 4.4% of GDP in Korea; 6% in Bangkok. (WBCSD) Road congestion costs in India can be as high as Rs 3000 to 4000 crore per year (CIRT)

Its grim. But we still have the chance…….we have a different message for the world….

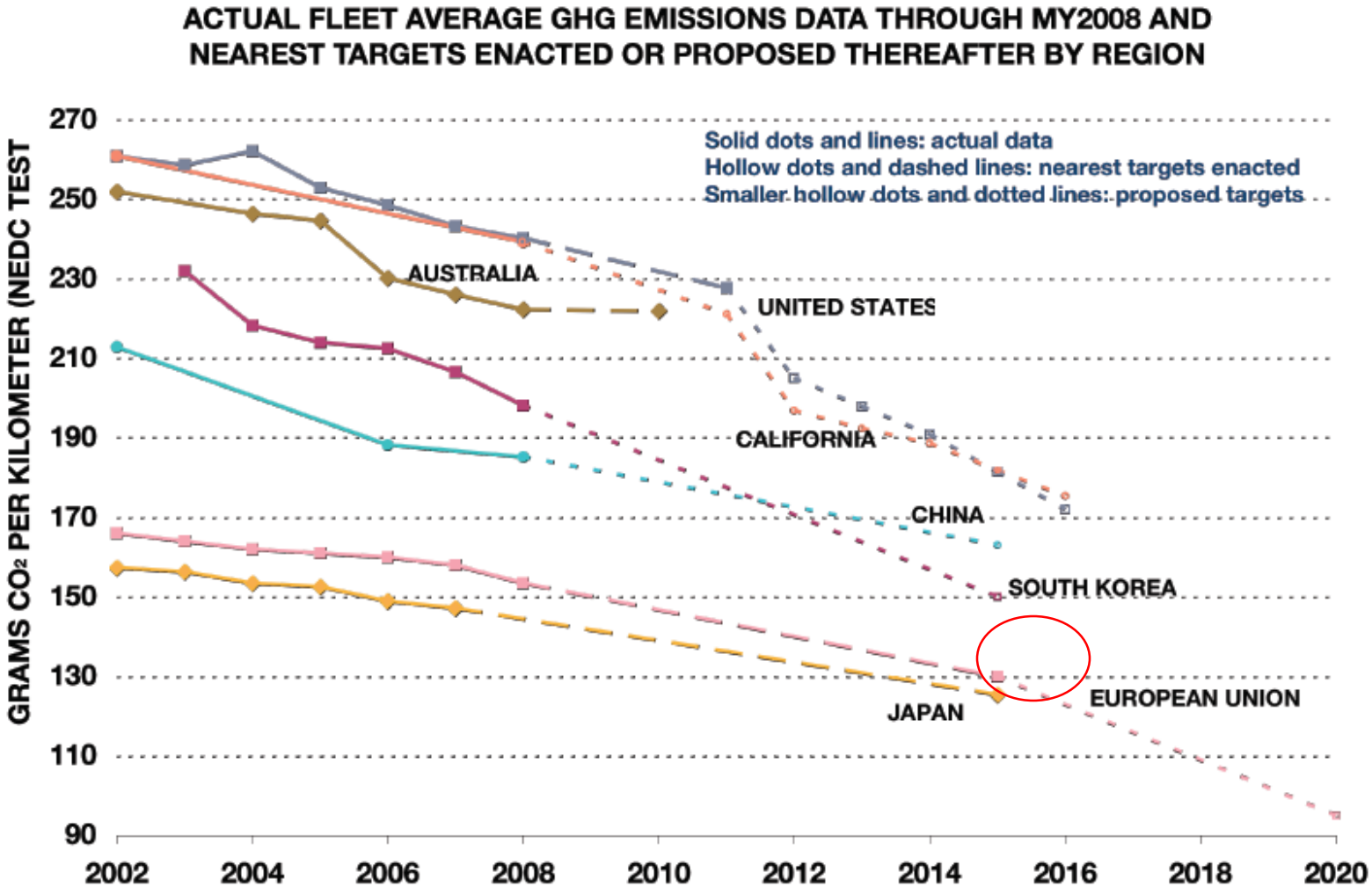
We have the chance to grow differently….

Per Capita Emissions from Transport (IEA/SMP Transport Model 2005: Reference scenario)



What are our opportunities?…….

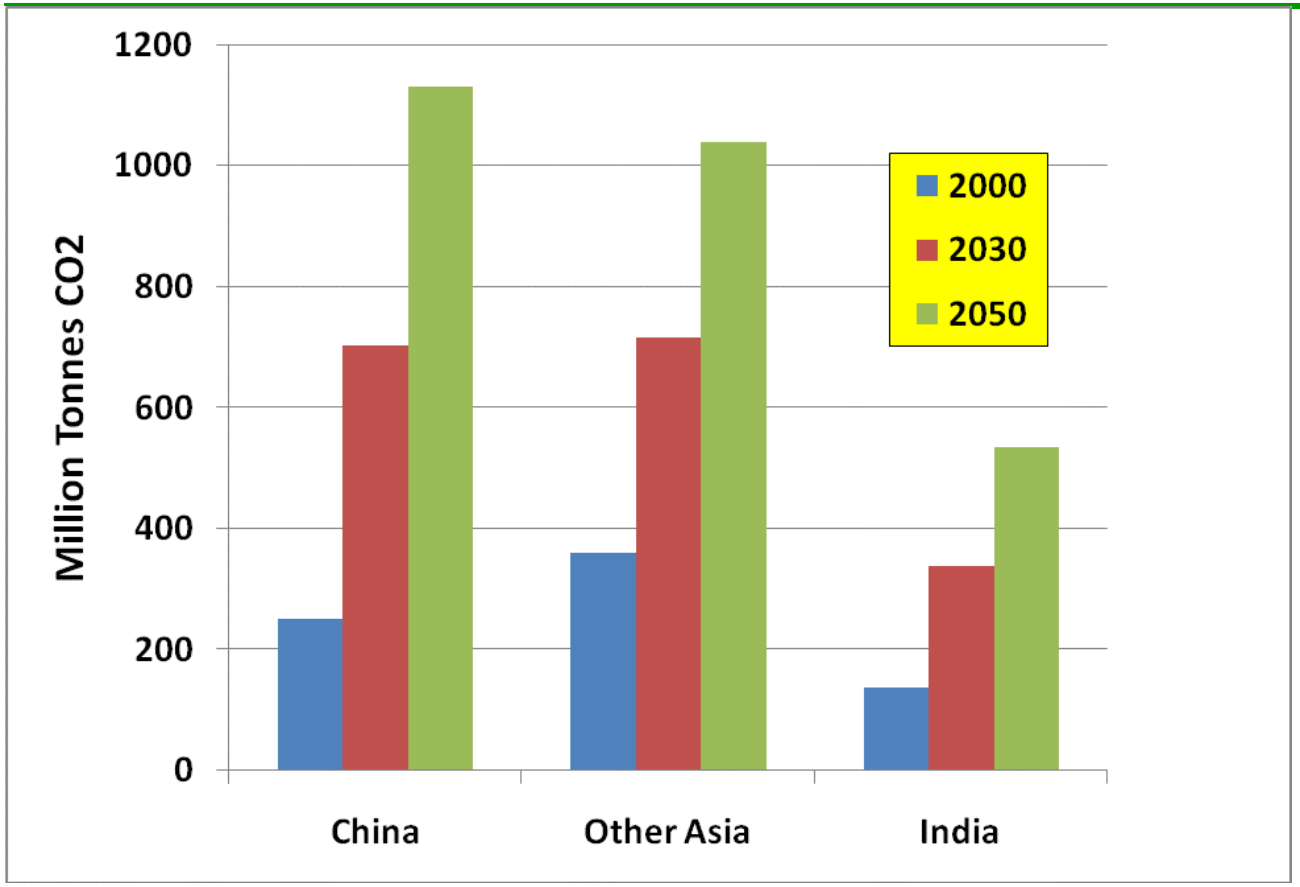
The world is arriving where we are beginning. Small and low powered cars, two-wheelers are our advantage. But we must only get better….



Source: ICCT 2009

Our vehicles need to be more efficient. But we will have to do a lot more….

CO2 Emissions from Transport in Asian Regions 2000- 2030



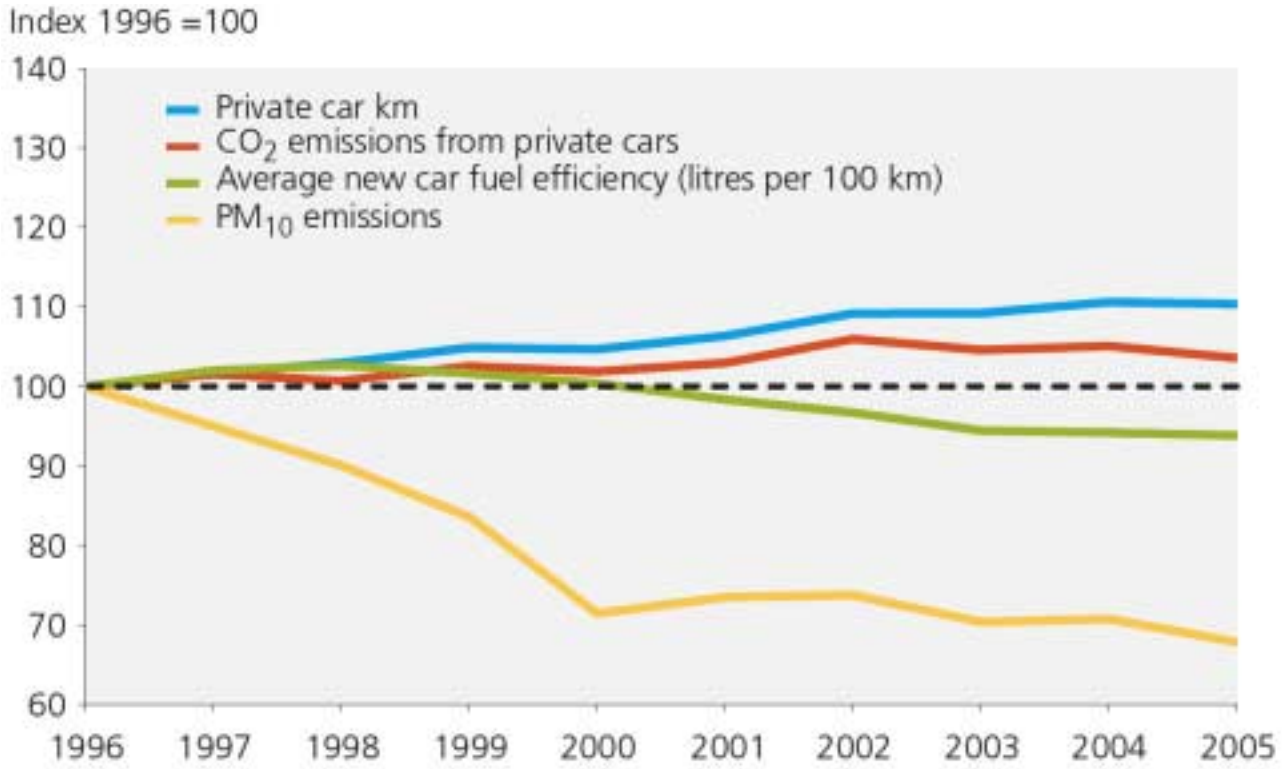
New ADB study shows that even after accounting for nearly 25% improvement in fuel efficiency transport sector CO2 will increase

Only efficiency is not the answer
Lesson from other regions

Better technology x number of vehicles**= pollution, congestion, warming**

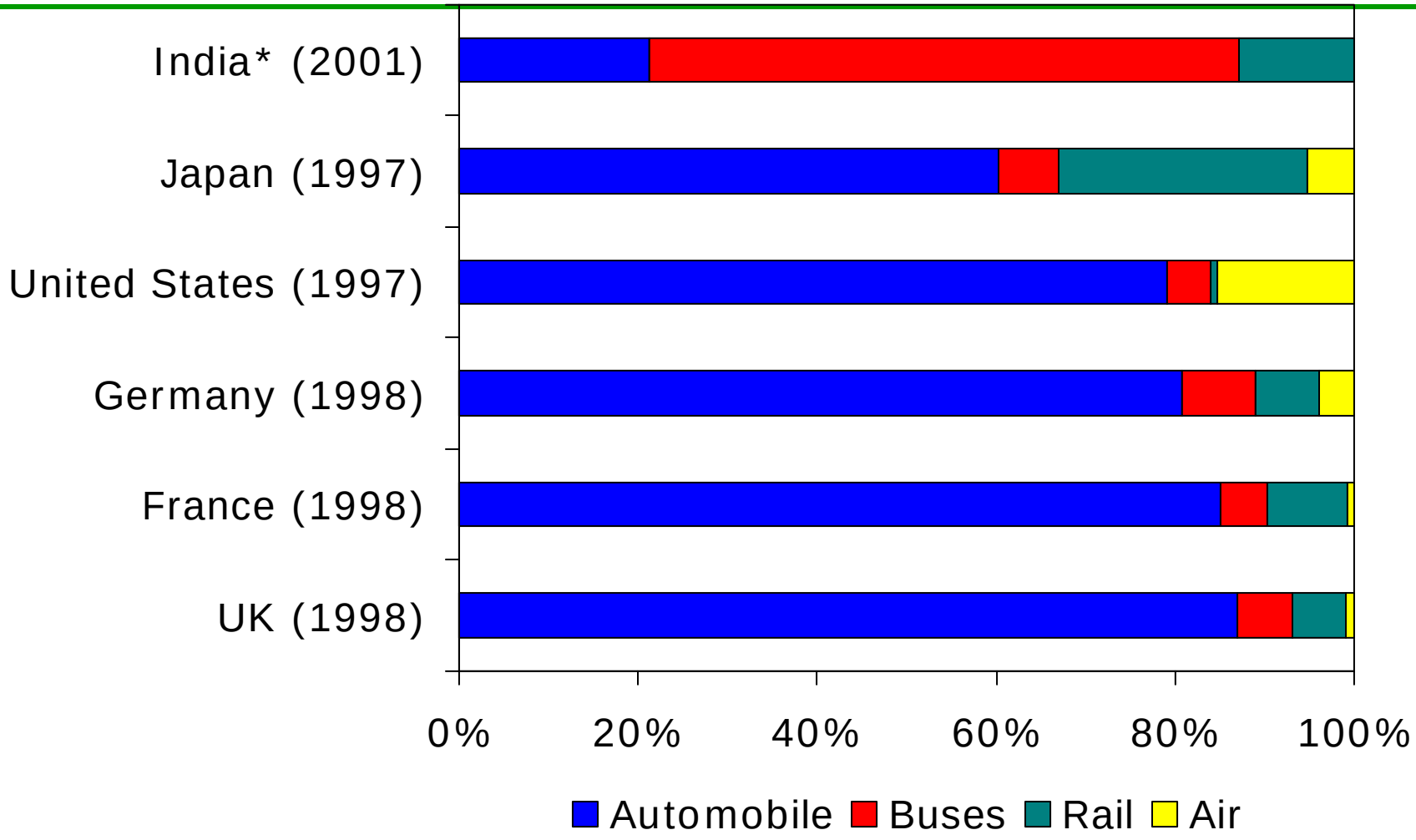
The numbers negate all impact

In UK, cars became more efficient; emissions increased as people bought more; drove more



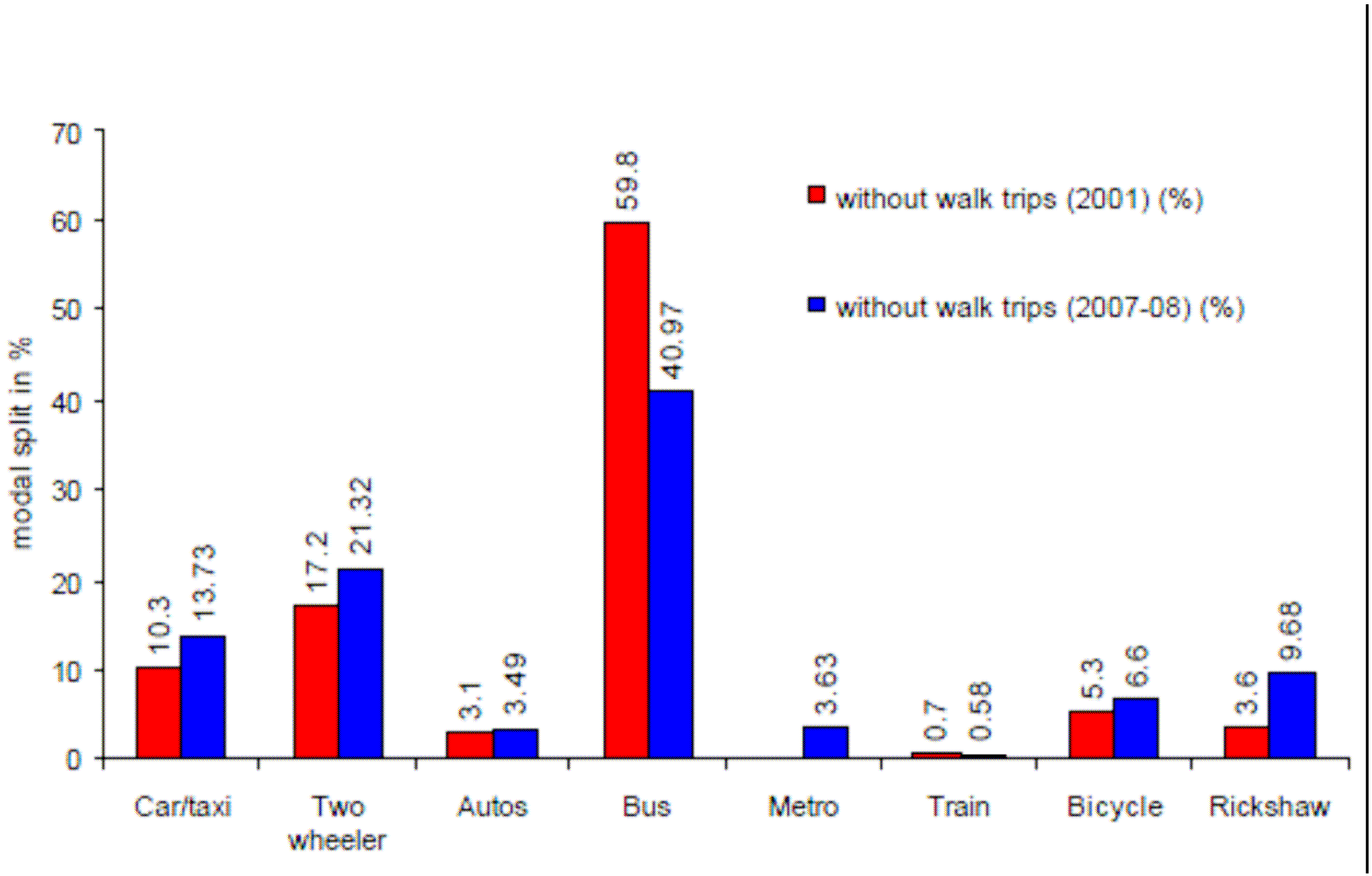
Understand our strength….nearly the largest user of public transport

Modal split for passenger transport in selected countries



Source: Compiled from Modal Split in Different Countries (2000), Institut für Verkehr Fachbereich 13 Bauingenieurwesen und Geodäsie, S Singh Delhi IIT

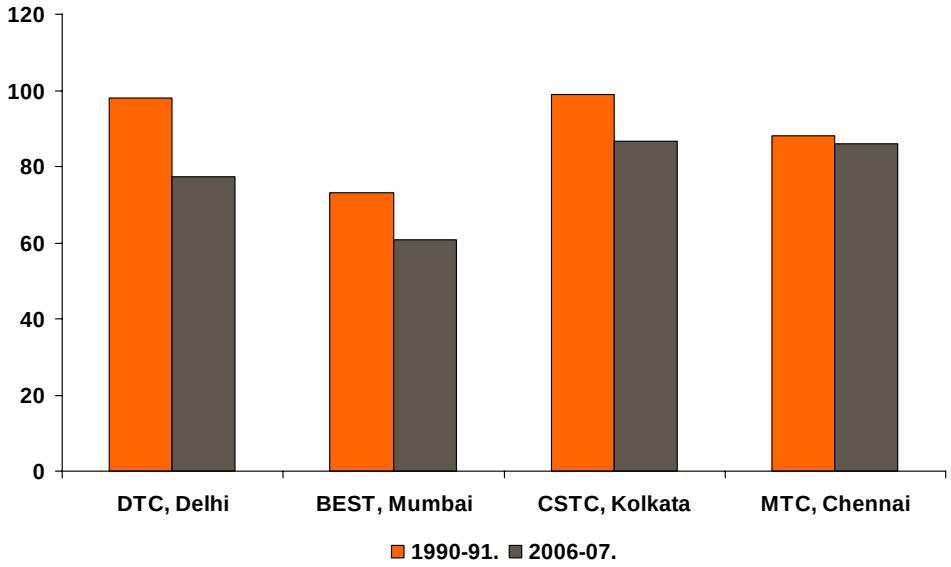
If we are not careful now we can lose our strength…



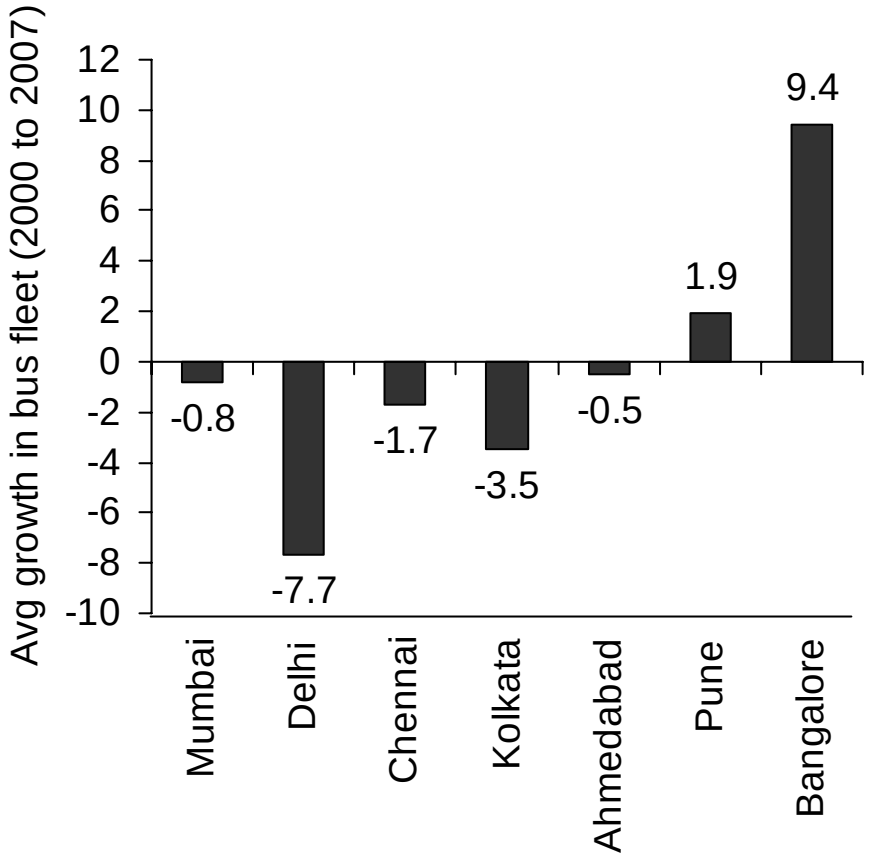
Source: Anon 2008, transport demand forecast study: study and development of an integrated cum multi modal public transport network for NCT of Delhi, RITES, MVA Asia Ltd, TERI, September

It is already happening….

Falling load factor despite the growing demand



The Annual Average Growth in % in STU Bus Fleet (2000 to 2007) declining

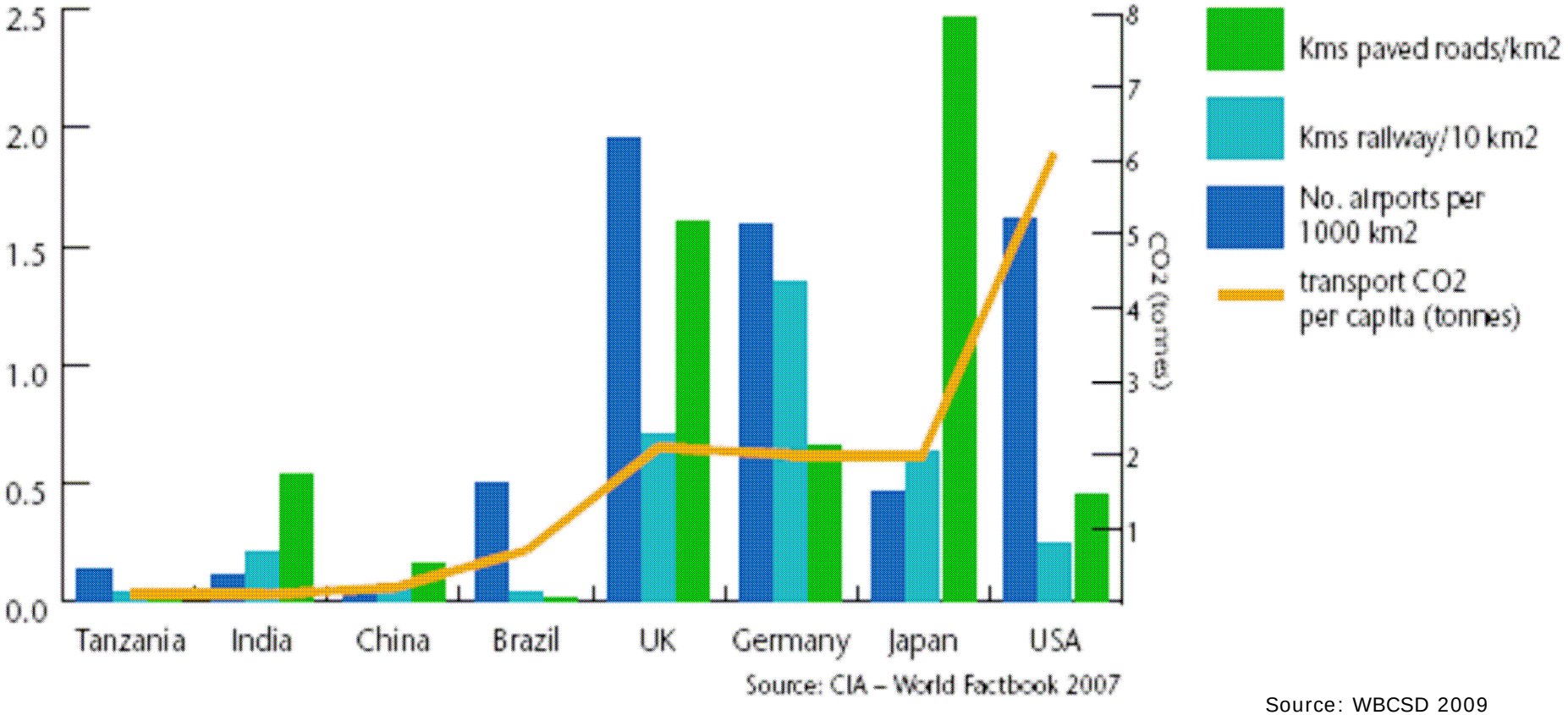


Source: Study on traffic and transportation policies and Strategies in Urban Areas in India, 2008 MOUD

Time to act……..

Transport infrastructure (roads, railway, airports) locks up enormous amount of carbon

Transport infrastructure and per capita CO2 emissions in different countries



Source: WBCSD 2009

These are the early stages of infrastructure development…
…..Let us not repeat the mistakes

We have the chance to plan it differently……

JNNURM and other programmes can be leveraged to influence. Under JNNURM approved cost of transport projects (Roads, flyovers, etc) is nearly 2 billion dollars. Cities have planned additional investments……

Design roads and spaces sustainably …. Do not lock in carbon, energy and pollution…..

Our cities need upscaled transition

Avoid future emissions

Shift to sustainable modes of mobility

Our cities have begun to work with a variety of strategies…….

Take the bus……

Cities are investing in buses

Delhi plans to add 5000 more buses; Other cities are buying buses

Cities want modern, convenient and even air conditioned buses

Industry has to build capacity to cater to this demand

Only increasing numbers will not help. Need reform in the bus sector …..

Revitalise the public bus agency
Implement new model for private operations…

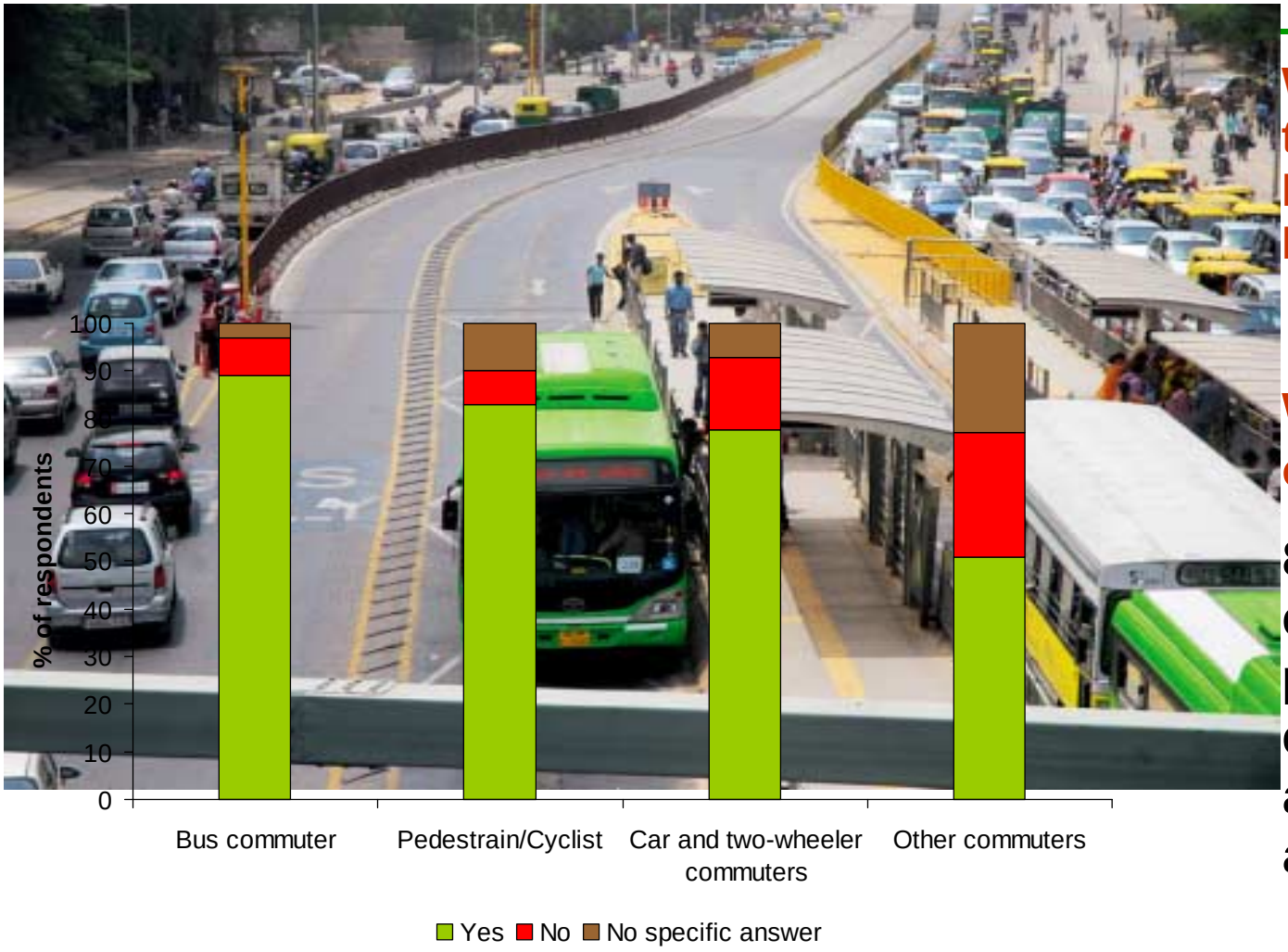
Bus transport can make a difference…

BANGALORE: An increase in bus share from 62% to 80% saves equal to 21% of the fuel consumed in the base case. 23 per cent reduction in total vehicles; Frees-up road space equivalent to taking off nearly 418,210 cars. CO2 emissions can drop by 13 per cent. PM can drop by 29 per cent and NOx 6 per cent.

DHAKA: An increase in bus share from 24% to 60% saves fuel equal to 15 per cent of the fuel consumed in the base case. Frees up road space equivalent to removing 78,718 cars from the roads. CO2 emissions drops by 9 per cent. PM can drop by 13 per cent and NOx less than 1 per cent.

COLOMBO: A increase in bus share from 76% to 80% can save 104,720 tonnes of oil equivalent, or 3% of the fuel consumed in the baseline case. This means 5% reduction in total vehicles and freeing up of roadspace equivalent to removing 62,152 cars.

The Transition……Reallocate road space. More space to low carbon and clean modes. More space to urban majority and urban poor…



We asked people on the corridor: Are you happy with dedicated lane system of BRT?

We heard the voice of urban majority…

88% of bus commuters; 85% of pedestrians and cyclists, 45% of cars ad two-wheelers said a resounding **YES**

Delhi Bus Corridor

We have seen the difference…..

Technical asessment of BRT at Chirag Delhi Junction during morning peak hours (Ambedkar Nagar to Moolchad) reveals:

-- Buses are 2% of all vehicles but carry 55% of people

-- Cars and two-wheelers 75% of the vehicles but carry 33% of the people

Bus Corridor has reduced the average travel time for the majority of the commuters on the corridor

-- Overall average travel time reduce by 19%

-- For bus users travel time has improved by 35%

-- For personal vehicles travel time has improved by 14%

-- Journey speed for bus users: 19-21 km/hour

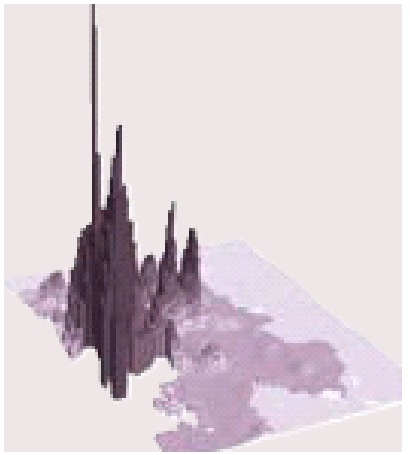
-- Cars and two-wheelers: 14-18 km/hour

Pedestrian walkway in BRT corridor: Well designed, well maintained, and well surfaced. Disabled friendly. At grade crossings comfortable for old, disabled and visually impaired.

Our other advantage…

Our cities are built differently. Dense, walkable, cyclable,….

Delhi Kolkata Bangalore



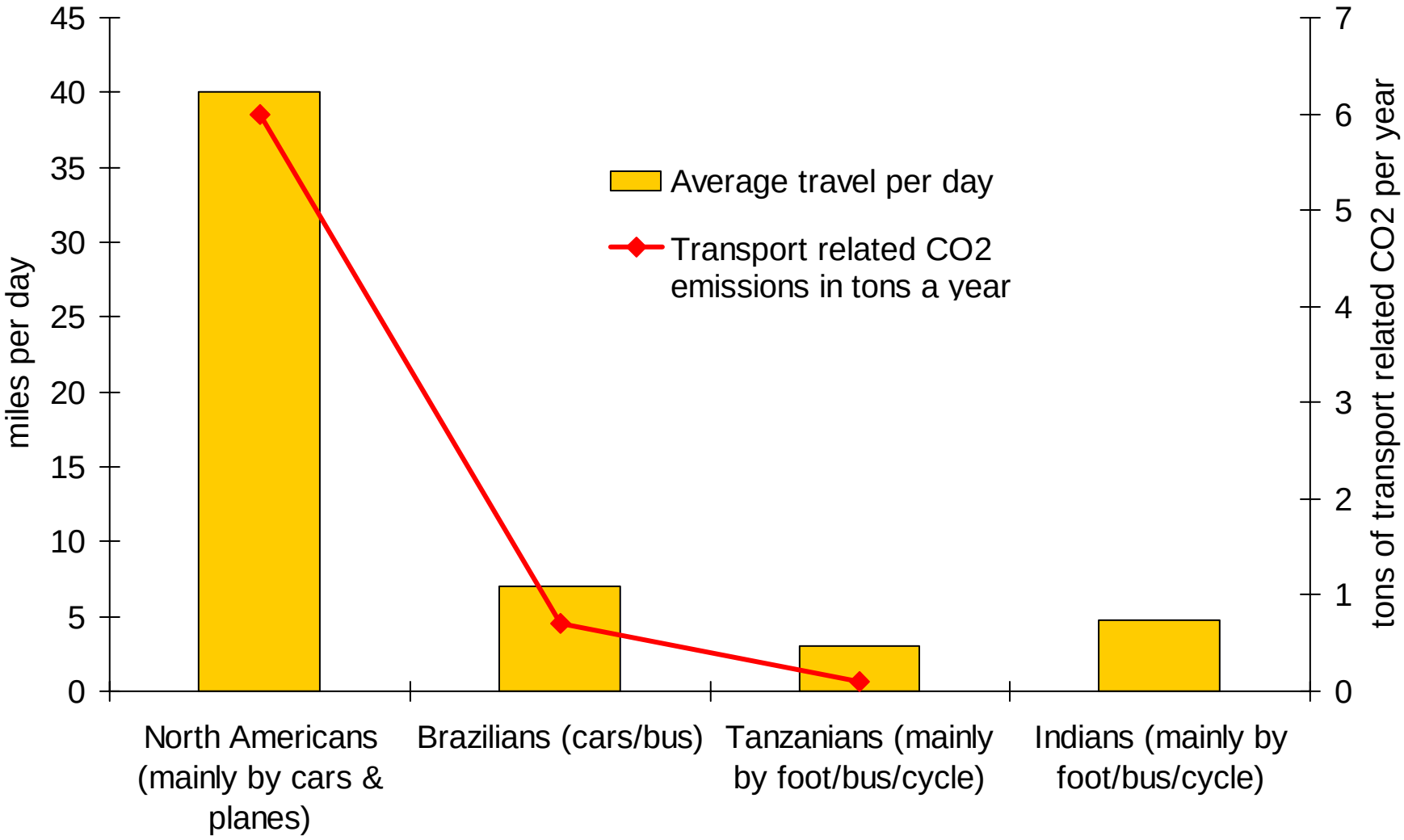
Mumbai

Source: Urban age

-- High density, mixed land use, and narrow streets make our cities walkable
-- In a typical city the core can just be 5 km across and easily walkable within a reasonable time.
-- Studies show more than 40 to 50 per cent of the daily trips in many of our cities have distances less than 5 kilometers.
-- These have enormous potential to convert to walking and non-motorised trips.

Difference is showing up in carbon emissions

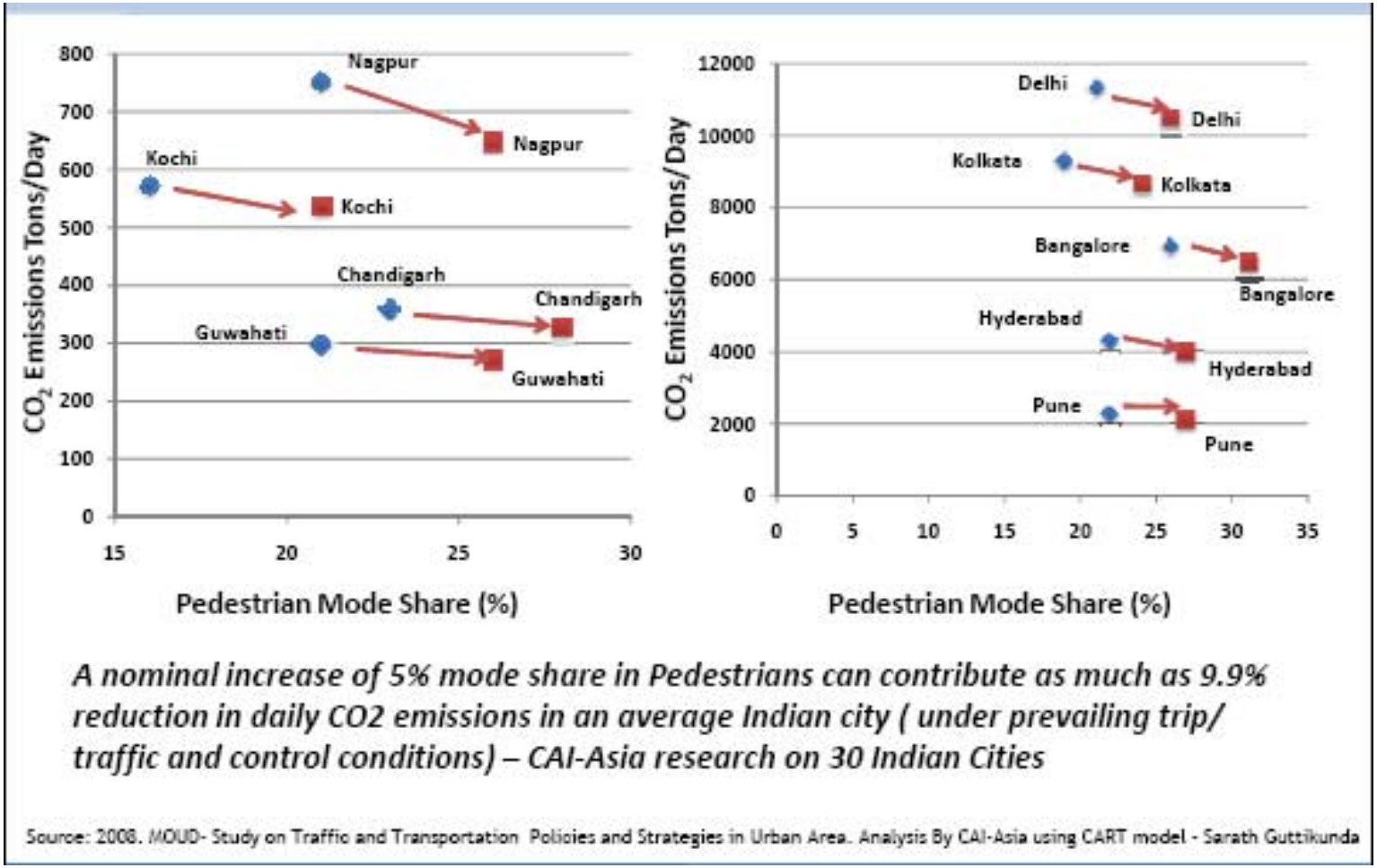
Cities with more and longer car based travel have more carbon emissions



Source: WBCSD and MOUD data

Increase in walking reduces CO2 emissions

Even today one third of our daily trips are walk trips….

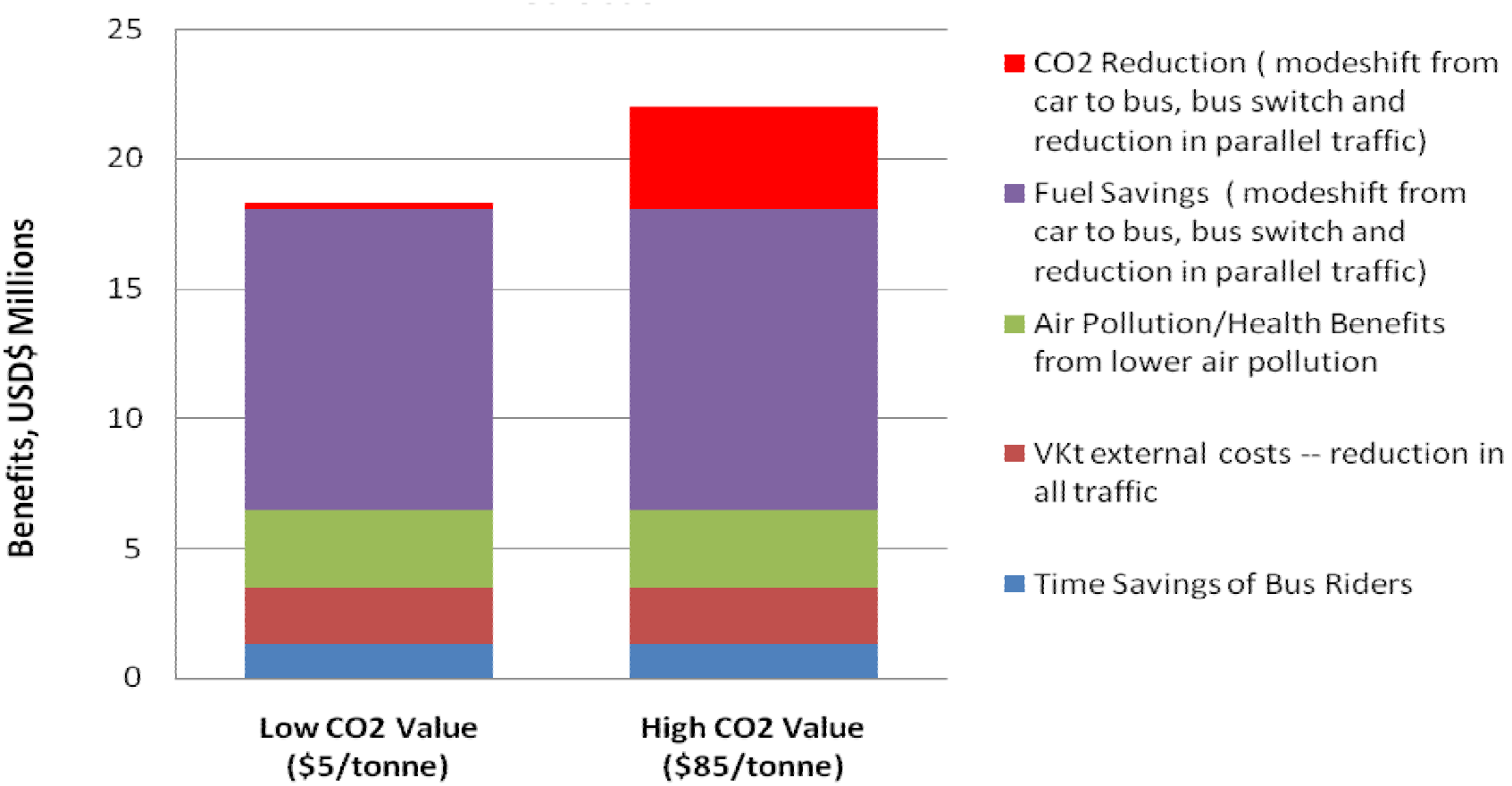


Source: CAI Asia, 2008

Important to understand the range of benefits of sustainable transportation

Other countries have begun to assess co-benefits of their transportation projects as a measure of success

Fuel savings and CO2 savings of a BRT corridor in Mexico City



ADB 2009

Reform agenda in Indian cities can reinvent mobility

Indian cities have begun to work towards policies for low carbon and clean transportation. This will have to be enabled and scaled up.

Opportunity to provide scaled up alternatives

- Public transport
- Infrastructure for walking and cycling

Reduce demand for travel and vehicle usage

- Land-use planning
- Road pricing
- Tax rationalisation
- Parking policy and charges

Leapfrog technology

- Emissions standards
- Fuel economy standards

Fund the transition: Create transportation fund. Enforce tax measures to reallocate resources efficiently and raise revenue. (Currently, taxes on public transport is 2.6 times higher.)

Global action on low carbon transport

How can low carbon transport be enabled under the global climate regime?

Transportation groups are coming together to debate and act on this: *Global Partnership on low carbon transport; Bridging the gap initiative; Bellagio principles …….*

Get transportation recognised as a key sector for mitigation in AWG on long term cooperation

Financial mechanism has not worked for low carbon transport. **Reform it**.

Only 9 out of 4474 CDM projects are transport related. **Only 2 registered** – Delhi metro – To reduce 41160 tonnes C/year. TransMileno BRT: to reduce 246563 TC/year.

Reasons: Difficult to prove additionality; Difficult to prove change because of the project; widely dispersed emissions; CDM money too small for the total cost of transport project……

Demand for reform – **Eg, take programmatic approach** to allow a number of similar projects for scale and impact

Enable national and city action

Account for co-benefits

Need low carbon transportation for adaptation as well……..

So where do we go from here?

How do we partner in this change?

How do we build knowledge, capacity, will to change, resources and mindset?

Lets debate…….