Strategies for sustainable transportation

Anumita Roychowdhury
Centre for Science and Environment

Orientation Workshop
Sustainable Transport Infrastructure and Parking Policy

Gaziabad Nagar Nigam and **Centre for Science and Environment**

Ghaziabad, December 28, 2012

City enveloped in smog, back to pre-CNG ...

Gains Of Switch To Cleaner Fuel Frittered Away

Neha Lalchandani | TNN

New Delhi: Delhi's air pollution has reached alarming levels. For proof, just look out of the window. The grey-white 'haze' that has been covering the city since October 28, say experts, is actually smog that is linked to the rapid rise in

▶High pollution, P 6

CITY AIR WORSE THAN EVER

Delhi winter smog is not an act of God

Nov 22, 2012

During the first week of November, Delhi went under a thick blanket of smog. The breeze nearly stopped, and the skies turned grey and dank. Cool and calm weather led to fumes settling close to the ground. People held masks, scarves or handkerchiefs to their faces.

The resultant outcry in the smog-hit city had officials stubbornly insisting that this was nothing new and that it happened every ...

The new twist came ... agricultu... ...e billowing ...

'सांसों' पर स्मॉग की 'स्याह' परतें

Updated on: Thu, 15 Nov 2012 02:00 AM (IST)

Smog leaves Delhi gasping for breath

TNN | Nov 3, 2012, 01.33 AM IST

Smog delays Sheila Dikshit's flight to Punjab

...2.44AM IST

| Punjab | NASA | flight | Flashpoint | Apex

...udhiana trip by Delhi chief minister Sheila Dikshit in a chartered ...g telecom industrialist family became the flashpoint of the ongoing ...n Delhi and Punjab when the plane was delayed by nearly three hours

Disadvantage Delhi: Smog here to stay

Darpan Singh, Hindustan Times
New Delhi, November 08, 2012

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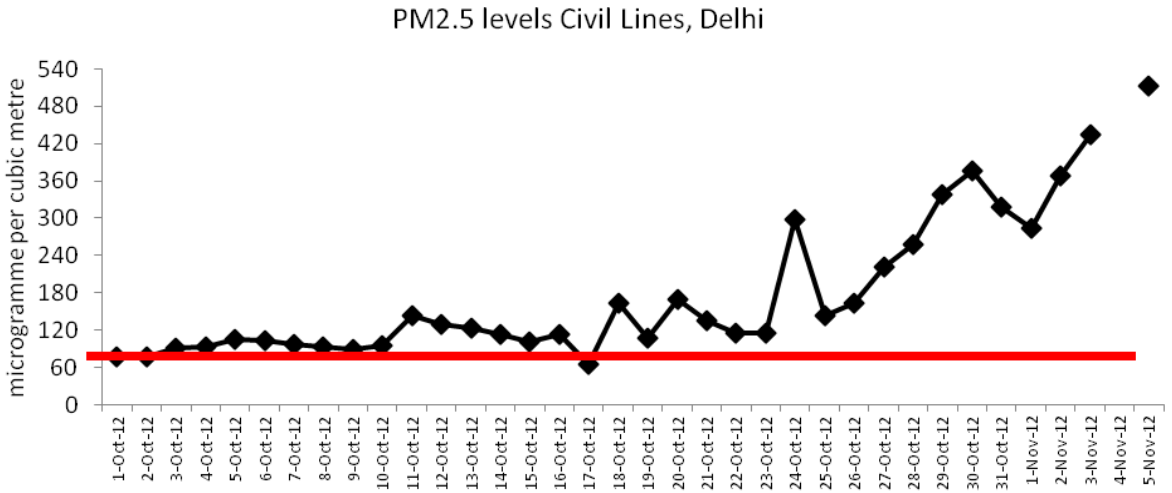
The Centre for Science and Environment (CSE), in its latest report, has delivere... The smog is here to stay. It has also warned that Delhi is in the grip of a multi-p... matter is not the only thing choking us. Nitrog...

Winter woes…..The trigger this year……



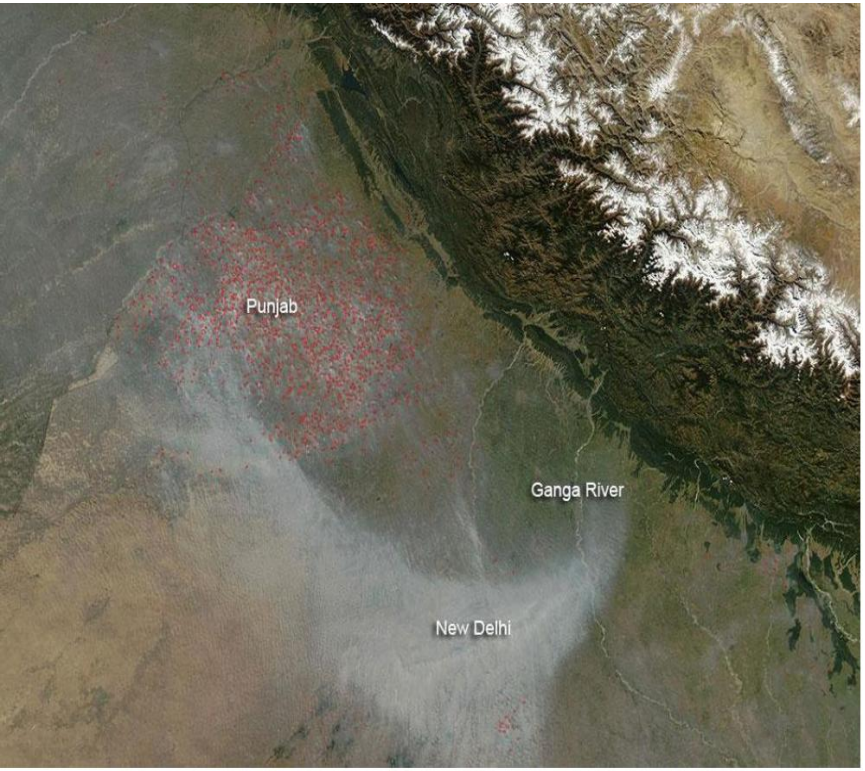
Severe smog episode during first week of November, ---- the breeze nearly stopped., The skies turned grey and dank …... Due to cool and calm weather fumes settled close to the ground. …….particulate levels hit six to eight time the standards. NO2 three times the standards. A toxic cocktail……..

Pollution levels are up manifold –

-- The tiny particle less than 10 micron has increased by 47 per cent between 2000 and 2011.

-- Their levels have exceeded the standards by six to eight times. Nitrogen dioxide, the respiratory assaulter, has gone up by 57 per cent.

Cross boundary pollution in the NCR region



October 2012: **Arial raids…….Smoke from Punjab hogged news this year** This is NASA image of smoke plume from agricultural burning

Action needed on all sources of pollution in the NCR region…….

As many as 1.2 million vehicles enter and exit Delhi daily…..

Need regional approach to air pollution control……

NCR deliberation

Directives related to air pollution control in the NCR: Meeting convened with Environment and Transport Department officials of NCR region (Ghaziabad, Noida, Gurgaon and Faridabad). Following dcisions:

Stringent action on gross polluting vehicles: Organize inspection at five border points – NH-8 Border, NH-24 Border, Singhu Border, Tikri Border and Badarpur Border to stop any vehicle emitting dark smoke from entering or exiting border and take action against the defaulters.

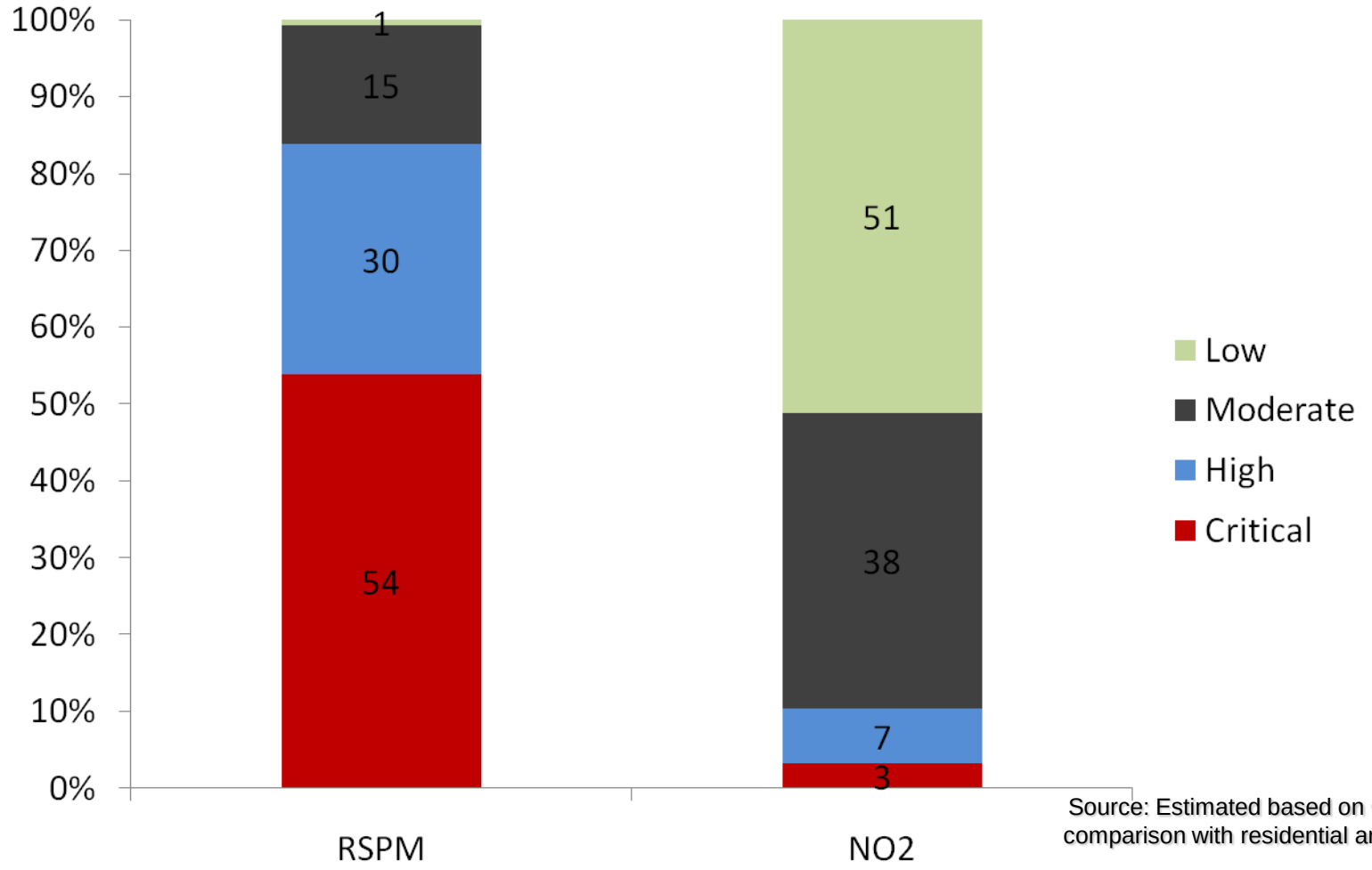
Stringent action and monitoring of all key pollution sources in the NCR: Immediate and stepped up measures to enforce pollution norms by industries and ban on garbage and leaf burning.Ensure that generator sets used by both industries and commercial establishments meet the emissions norms.

Improve air quality monitoring: Installation of continuous ambient air quality, monitoring stations in Critically Polluted Areas and pollution hotspots.

Monitoring of action: Weekly action taken report

India: Proliferating pollution hotspots

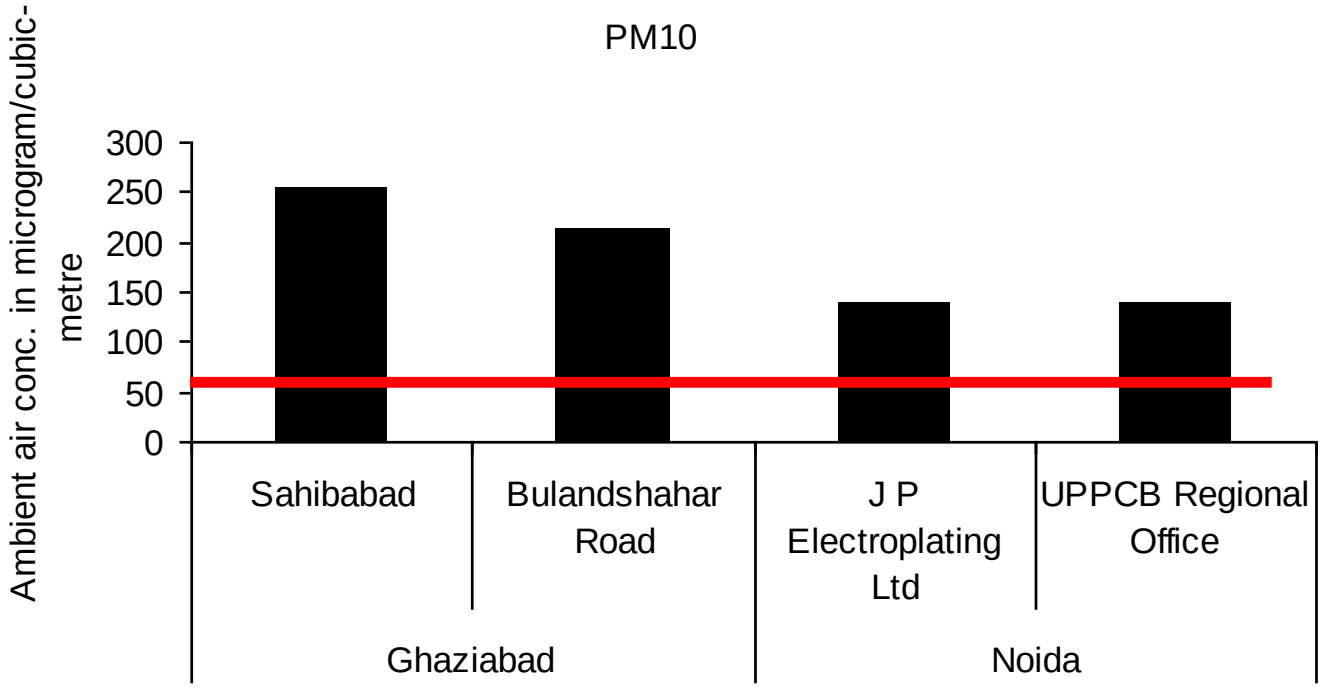
Half of the cities are critically polluted due to high PM10, even NO2 is rising in many of them – a twin trouble



Source: Estimated based on CPCB data, comparison with residential area standard

In grip of sever particulate pollution

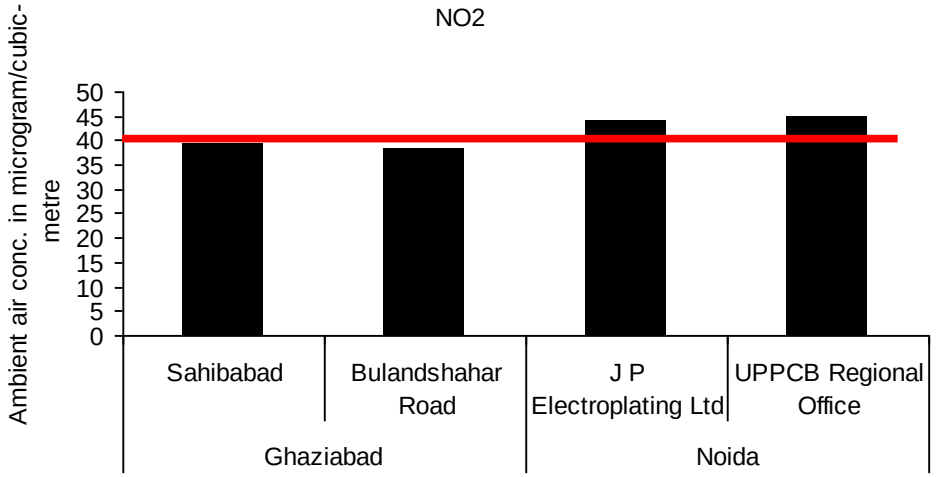
- Two to four times higher than the standards

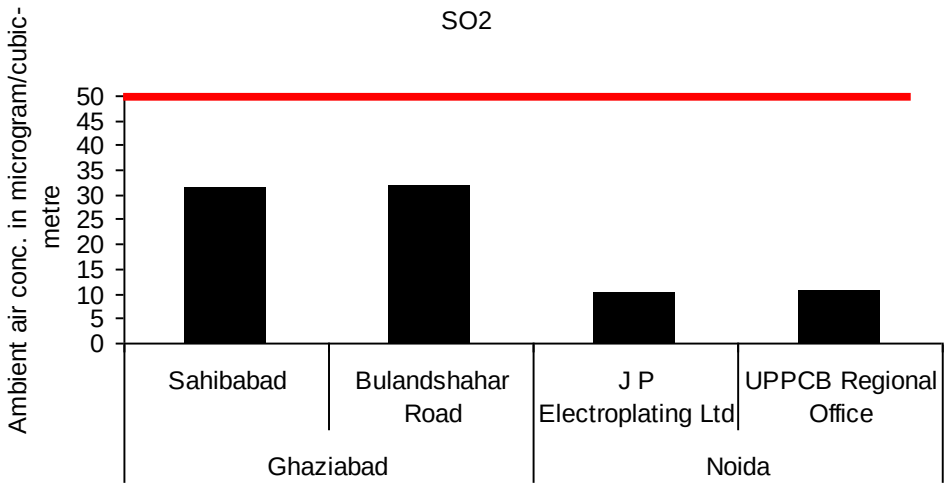


Source: Based on UPPCB data

Trends in other pollutants

- Ghaziabad is on the verge of exceeding the standard for NO2. Noida has already exceeded.
- The SO2 levels in Ghaziabad are relatively higher than the national averag trend.
- Compared to Noida the SO2 levels in Ghaziabad are nearly 3 times higher

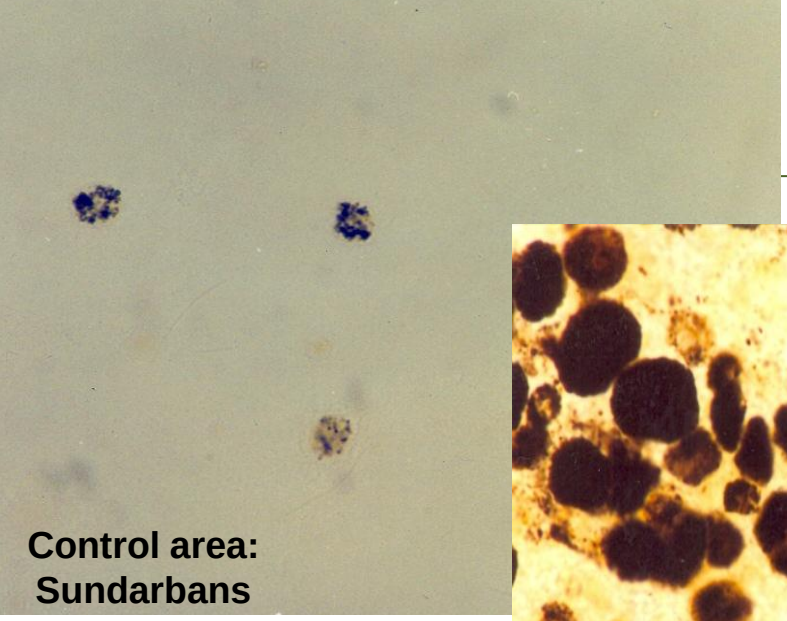




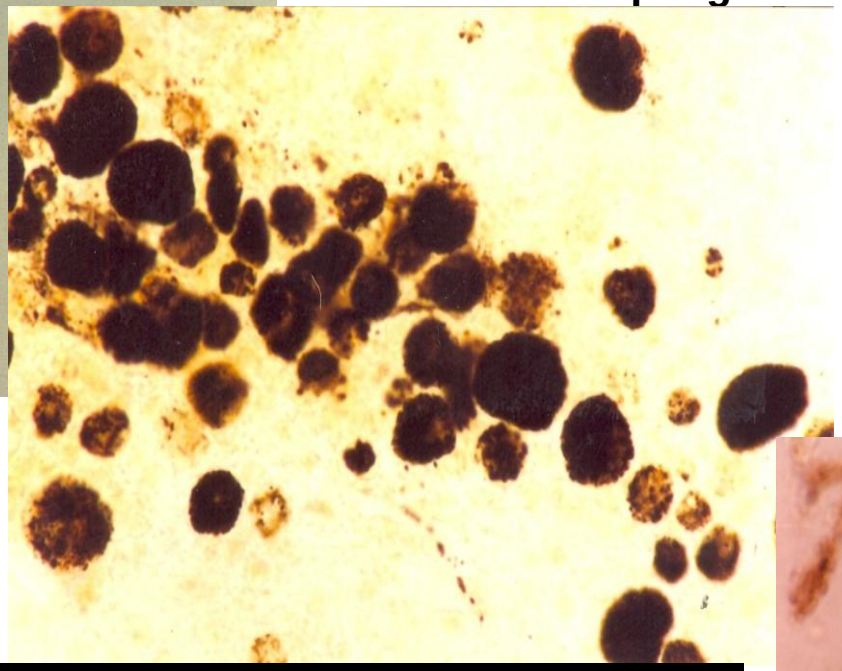
Source: Based on UPPCB data

Emerging evidences of health impacts in India……

Alveolar macrophage - biomarker of air

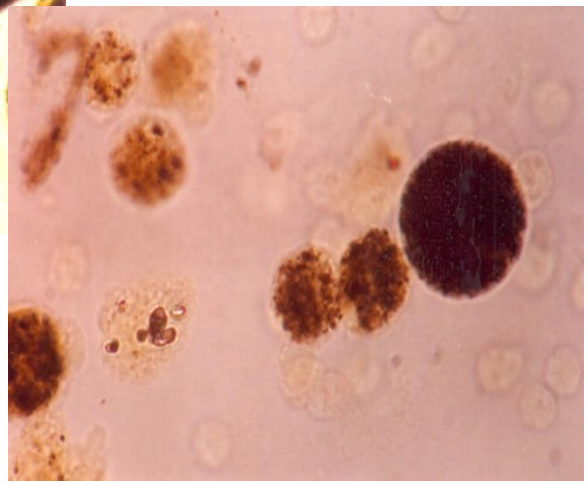


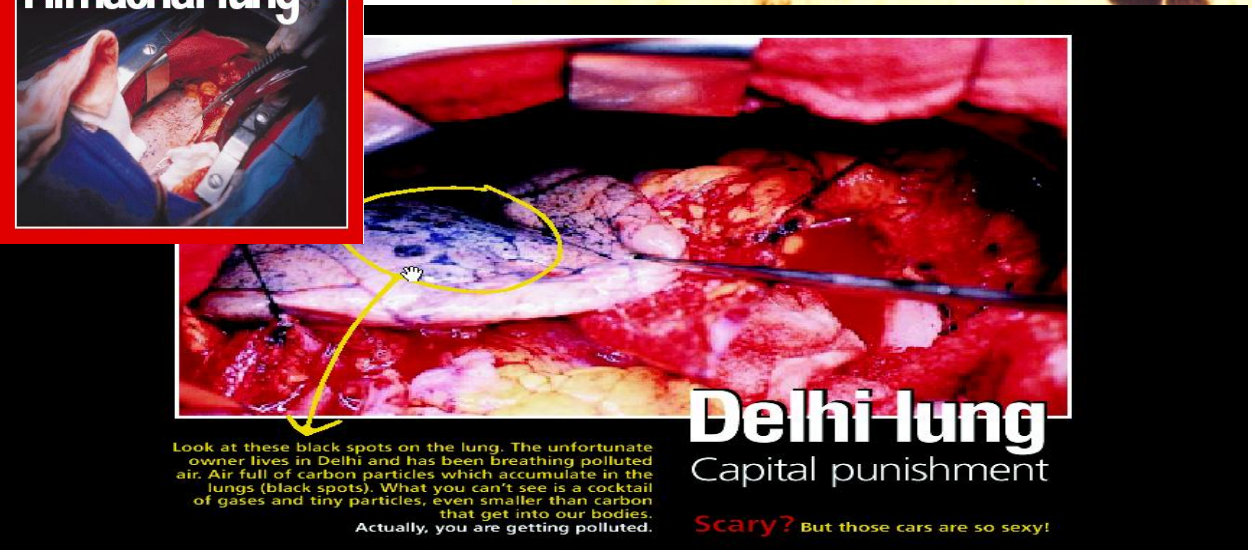
Control area: Sundarbans



Exposed group; Kolkata taxi driver

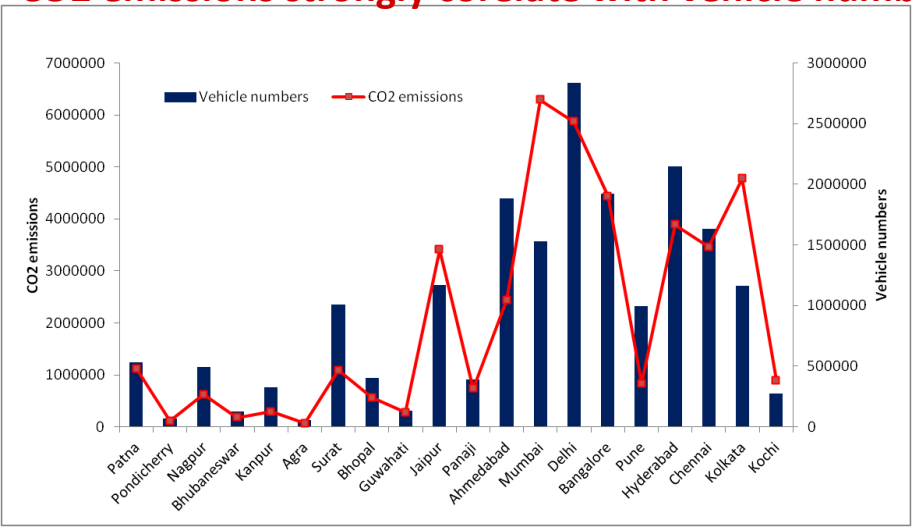
Increase in AM number



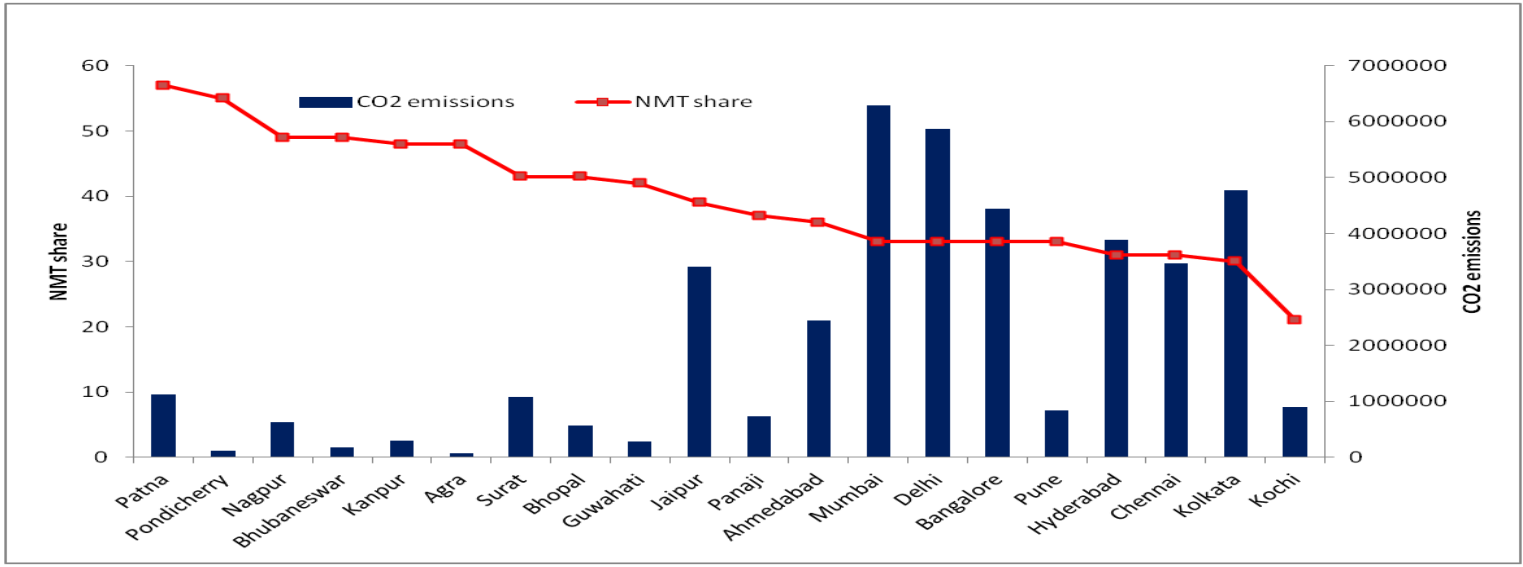


Fuel guzzler cities – Cities with more vehicles guzzle more fuel, emit more CO2

CO2 emissions strongly corelate with vehicle numbers



Cities with high walking and cycling have low CO2 emissions



First generation reforms.....
Soft options are now all exhausted

Delhi has fought hard to get breathing space

On vehicles

- Introduced low sulphur fuels and petrol with 1 per cent benzene
- Mandated pre-mix petrol to two- and three-wheelers
- Moved from Euro I to Euro IV over the last decade
- Implemented largest ever CNG based public transport programme
- Capped the number of three-wheelers
- Phased out 15 year old commercial vehicles
- Strengthened vehicle inspection programme (PUC)
- Efforts made to divert transit traffic
- Set up independent fuel testing laboratories to check fuel adulteration

On industry

- Relocated polluting units
- Tighter controls on power plants. No new power plants.

Air quality monitoring

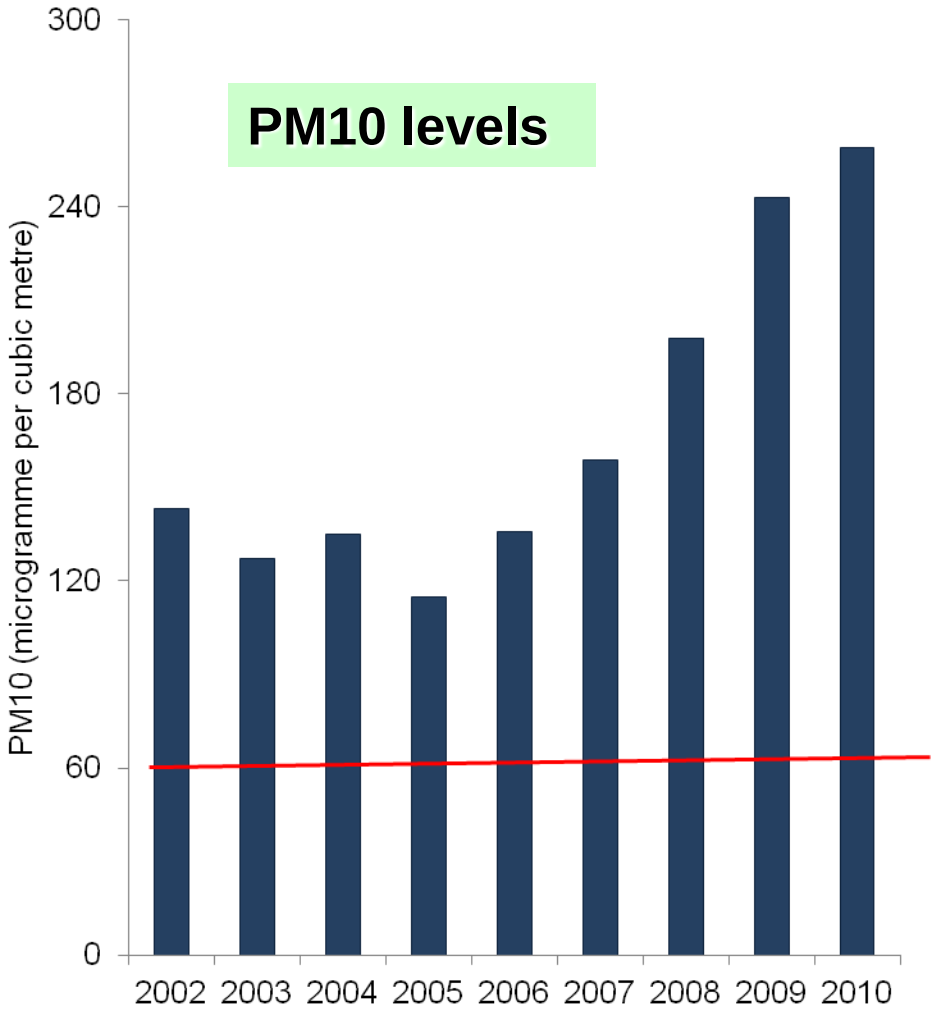
- Adopted new ambient air quality standards
- Expanded air quality monitoring and reporting

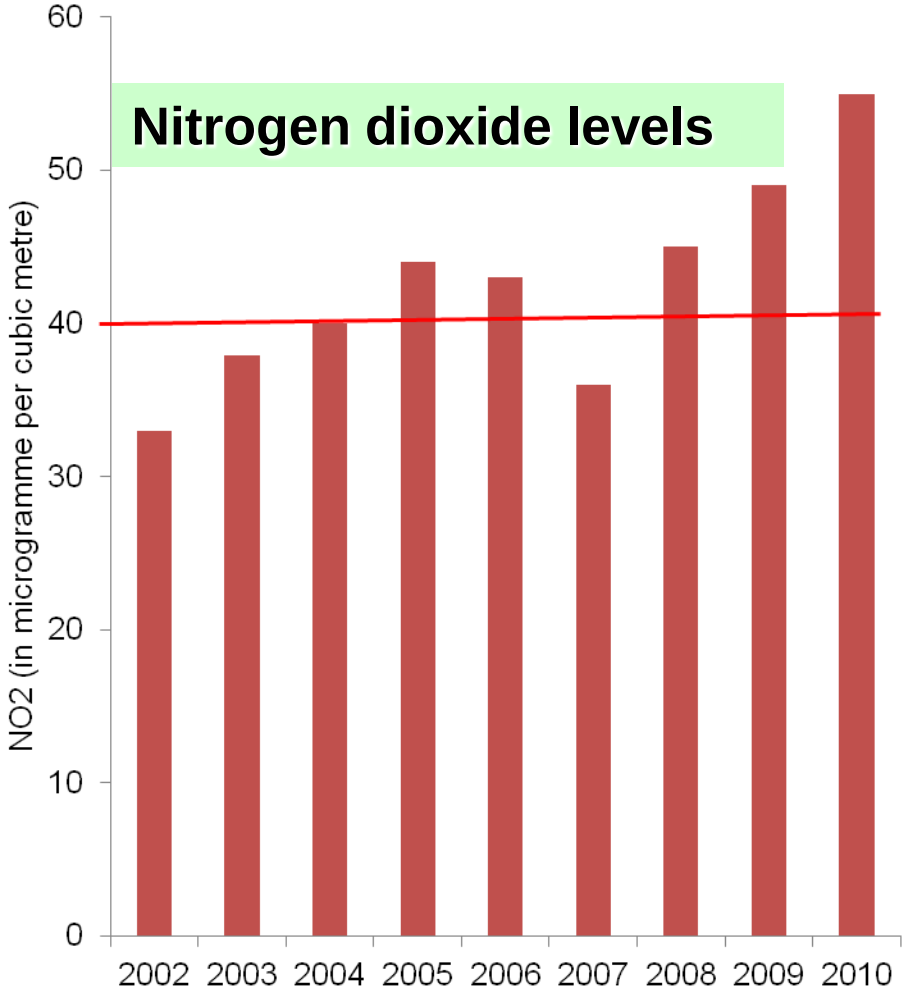
Other sources

- Emissions standards for generator sets
- Ban on open burning of biomass

This now needs scale and stringent enforcement

Delhi has lost its gains. After a short respite pollution curve turns upward





Source: Based on CPCB data

Need legally enforceable air quality targets

- **No punitive action on state governments for not meeting the ambient air quality norms**.
- **Abatement plans are not designed to meet local air quality targets**
- **Emissions regulations are kept weaker for most of India.**
  - In the US the air quality standards are federally enforceable. EPA impose sanctions if states fail to meet the air quality targets -- such as cut highway funds.
  - Civil society can sue the state governments.
  - "Citizen Court Suits" allowed against EPA for failure to promulgate NAAQS, emissions standards or implement state implementation plans.

- **In India the eleventh five year plan mandates the central government to set monitorable target of air quality -- achieve the standards of air quality in all major cities by 2011–12**

Ensure enforcement of air quality standards, accountability and compliance.

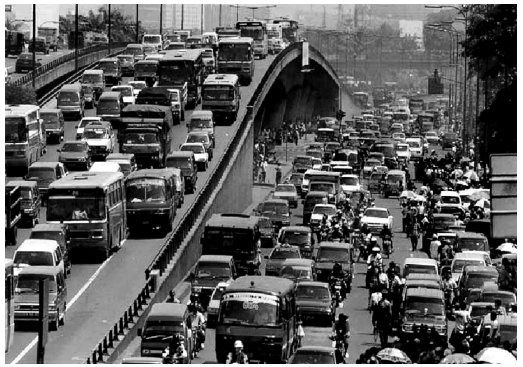
Pollution comes from a variety of sources……

Why are we specially worried about vehicles?

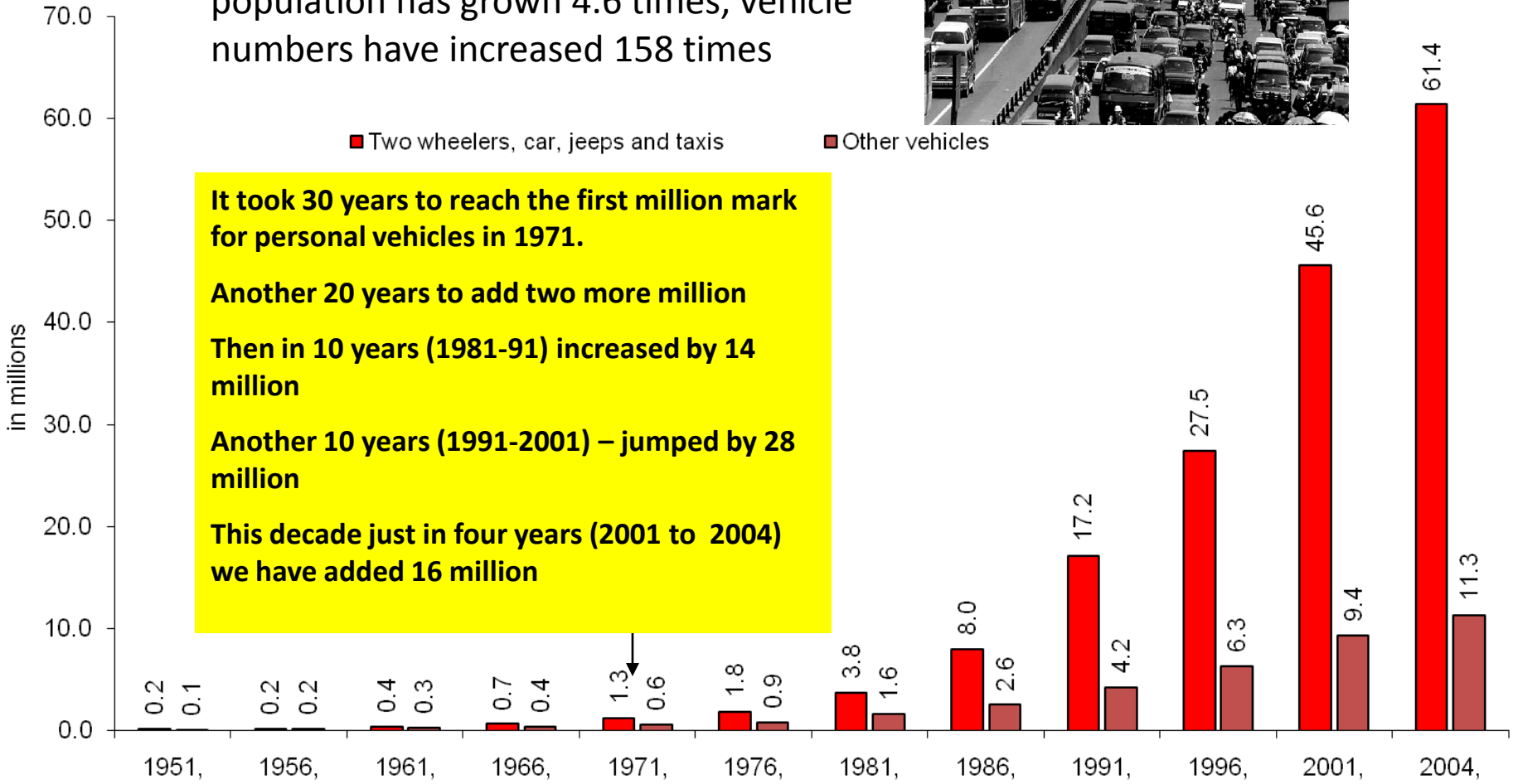
High exposure to vehicular fume

- Vehicular emissions contribute to significant human exposure. Pollution concentration in our breathe is 3-4 times higher than the ambient air concentration.
- In densely-populated cities more than 50 – 60% of the population lives or works near roadside where levels are much higher. This is very serious in low income neighborhoods located close to roads.
- Poor have a higher prevalence of some underlying diseases related to air pollution and proximity to roadways increases the potential health effects.
- In three cities World Bank review found vehicles contributing an average 50% of the direct PM emissions and 70% of PM exposure.
- The WHO report of 2005: Epidemiological evidences for the adverse health effects of exposure to transport related air pollution is increasing.
- Public transport users, walkers and cyclists are the most exposed groups – most of them are also poor.

Explosive numbers



Vehicle registration in India: India's urban population has grown 4.6 times, vehicle numbers have increased 158 times



It took 30 years to reach the first million mark for personal vehicles in 1971.

Another 20 years to add two more million

Then in 10 years (1981-91) increased by 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

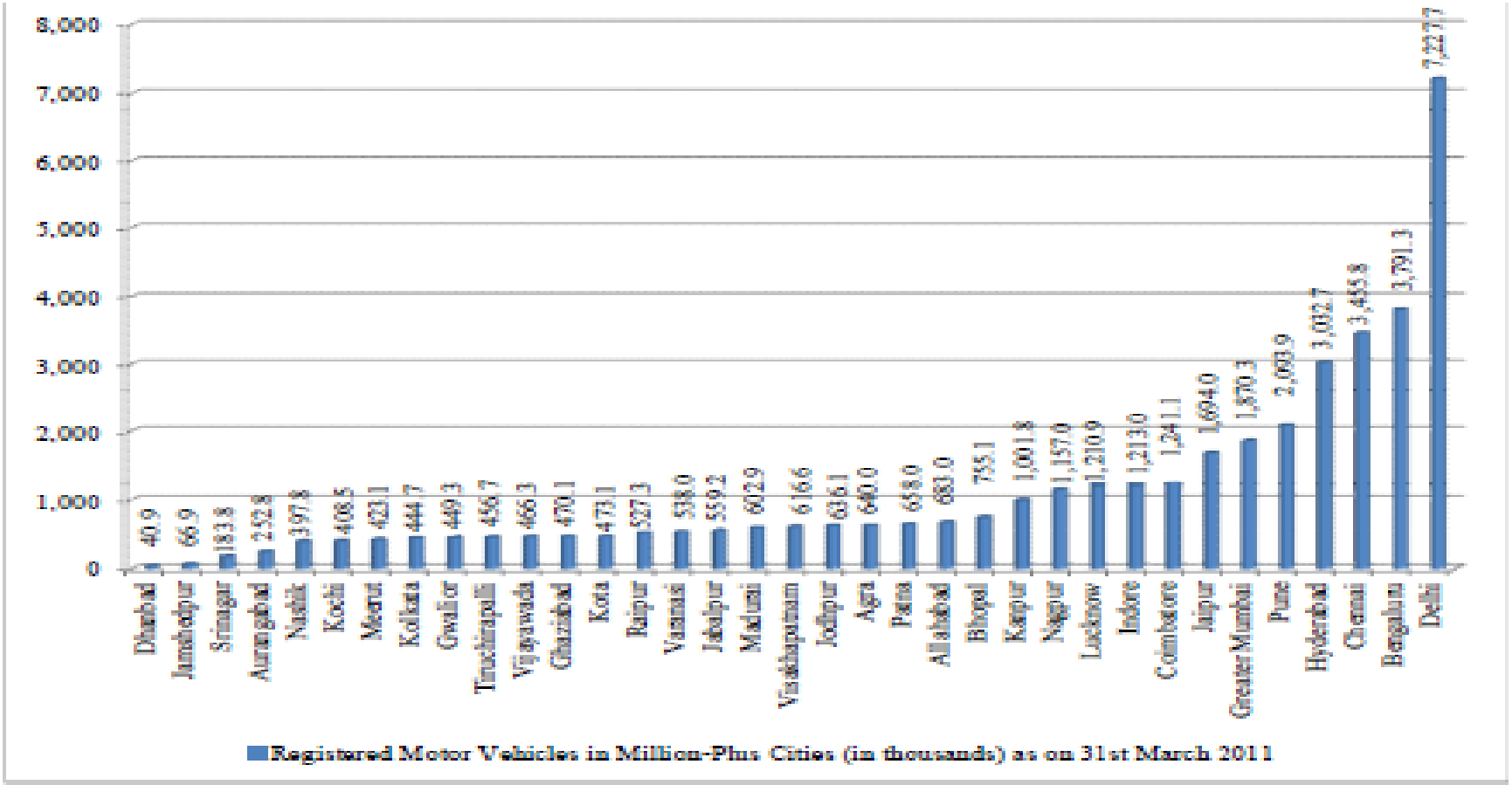
Source: Computed on the basis of MOSRTH motor vehicle registration data

Explosive numbers in Ghaziabad

Share of two-wheelers (71%) and cars (17%). Together they constitute 88% of the registered vehicle fleet

Cars increased by 18% and two-wheelers by 15%

169 vehicles are being added to the city's roads every day



Vehicles cause maximum air pollution in NCR….

2010: The residential areas of Noida more polluted than its industrial areas -- Noida office of the Uttar Pradesh Pollution Control Department -- Study in Noida's Sector 1 and Sector VI.

Delhi: vehicles contribute 72% of the total air pollution load

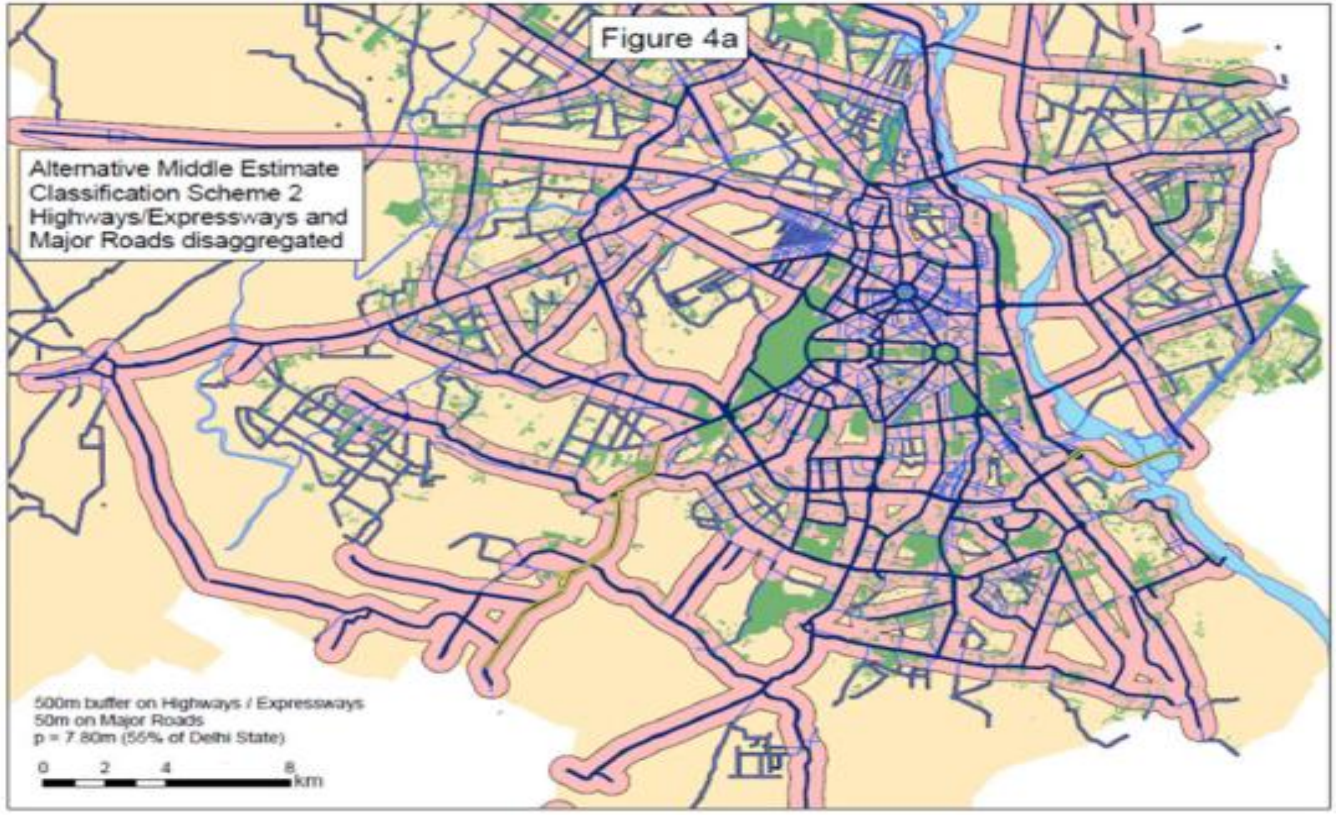
NOIDA: Vehicles contribute 70% of the total air pollution in Noida

People living close to roads are most exposed to vehicular fume

Evidence from Delhi….

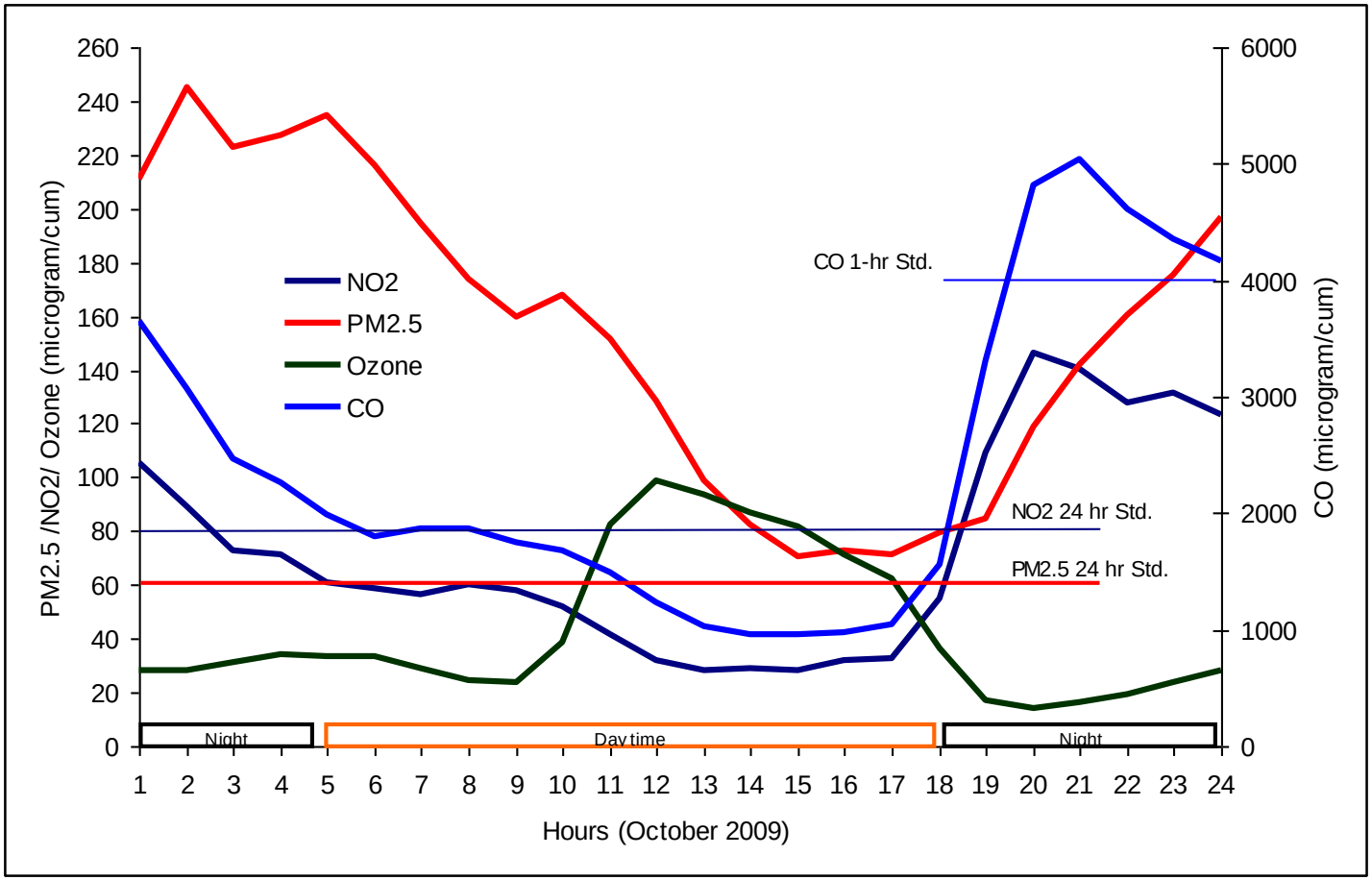
The Traffic Impact Area in Delhi:

*New HEI Analysis: **55% of the Population** within 500 meters of a Freeway; 50 meters of a Major Road*



Given the large number of people living within 300- 500 meters of a major road, the Panel concluded that exposures to primary traffic generated pollutants are likely to be of public health concern and deserve attention.

Effect of traffic on pollution in Delhi

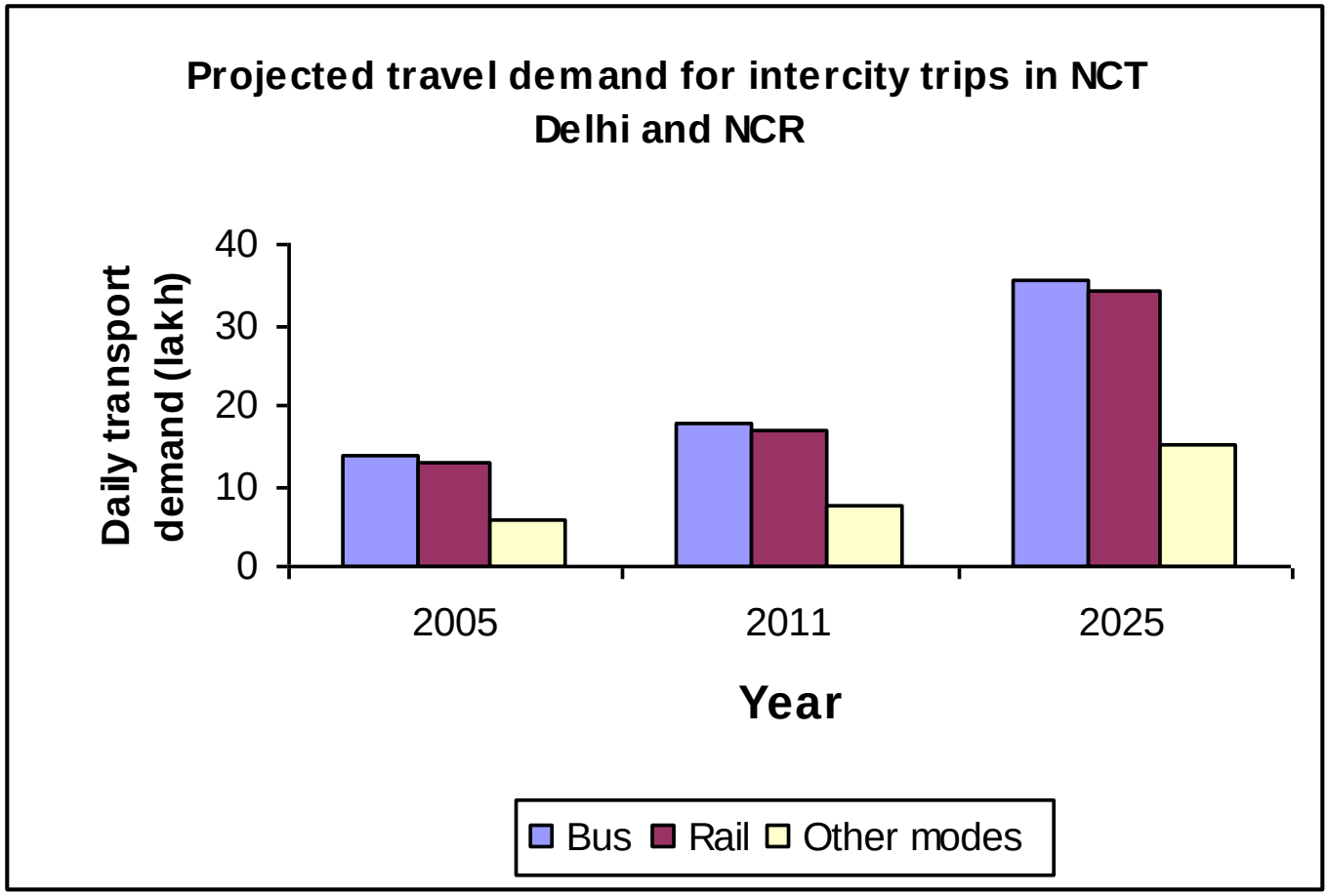


Ozone, PM2.5 and CO levels remain high during morning and evening peak hours. Even night time NO2 levels high – influence of truck traffic

Source: CSE analysis based on CPCB air quality data

NCR: Regional challenge…….

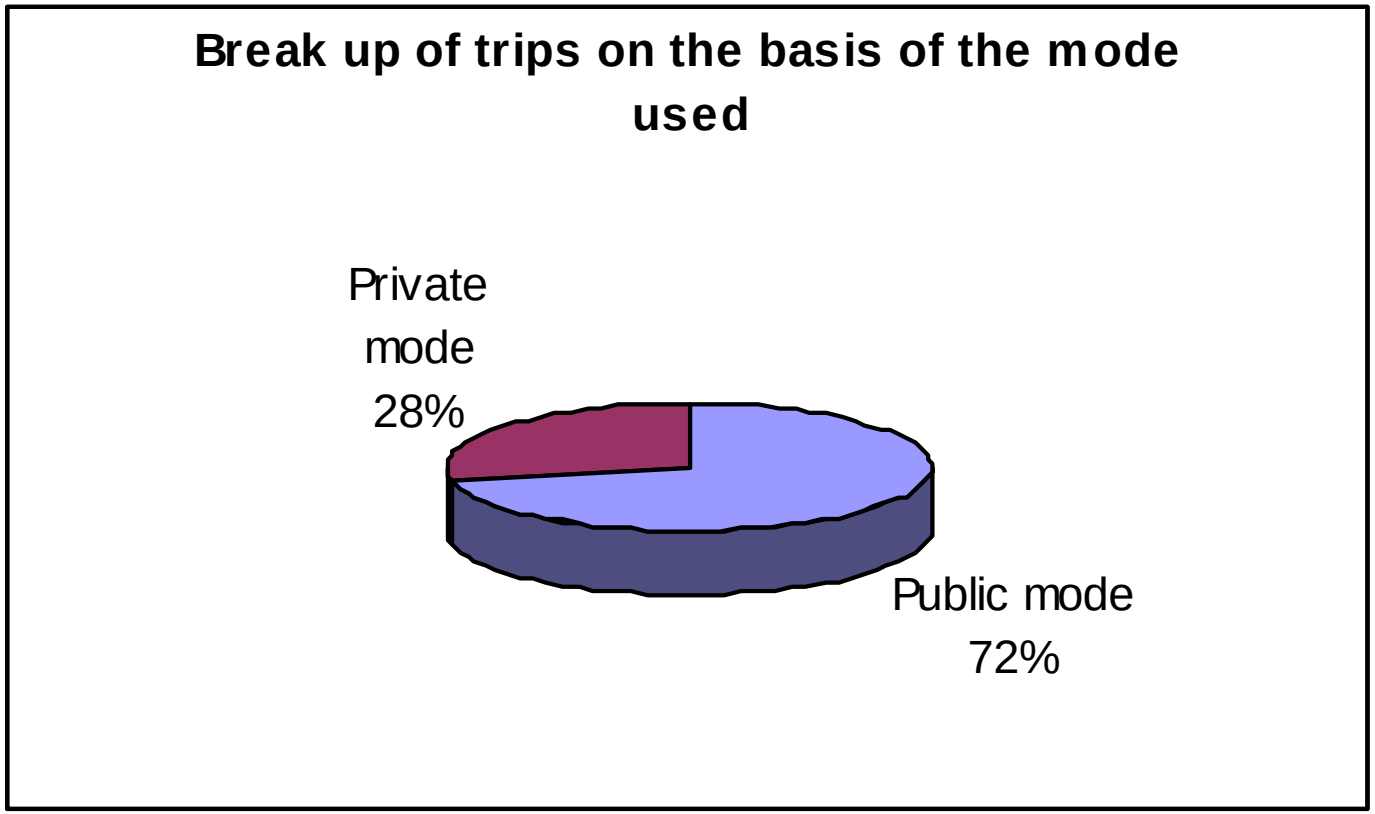
Projected travel demand for intercity trips in Delhi and NCR



Source: RITES 1999, quoted in Anon 2005, *Regional plan 2021 National Capital Region*, National capital Region Planning Board, Ministry of Urban Development, Government of India.

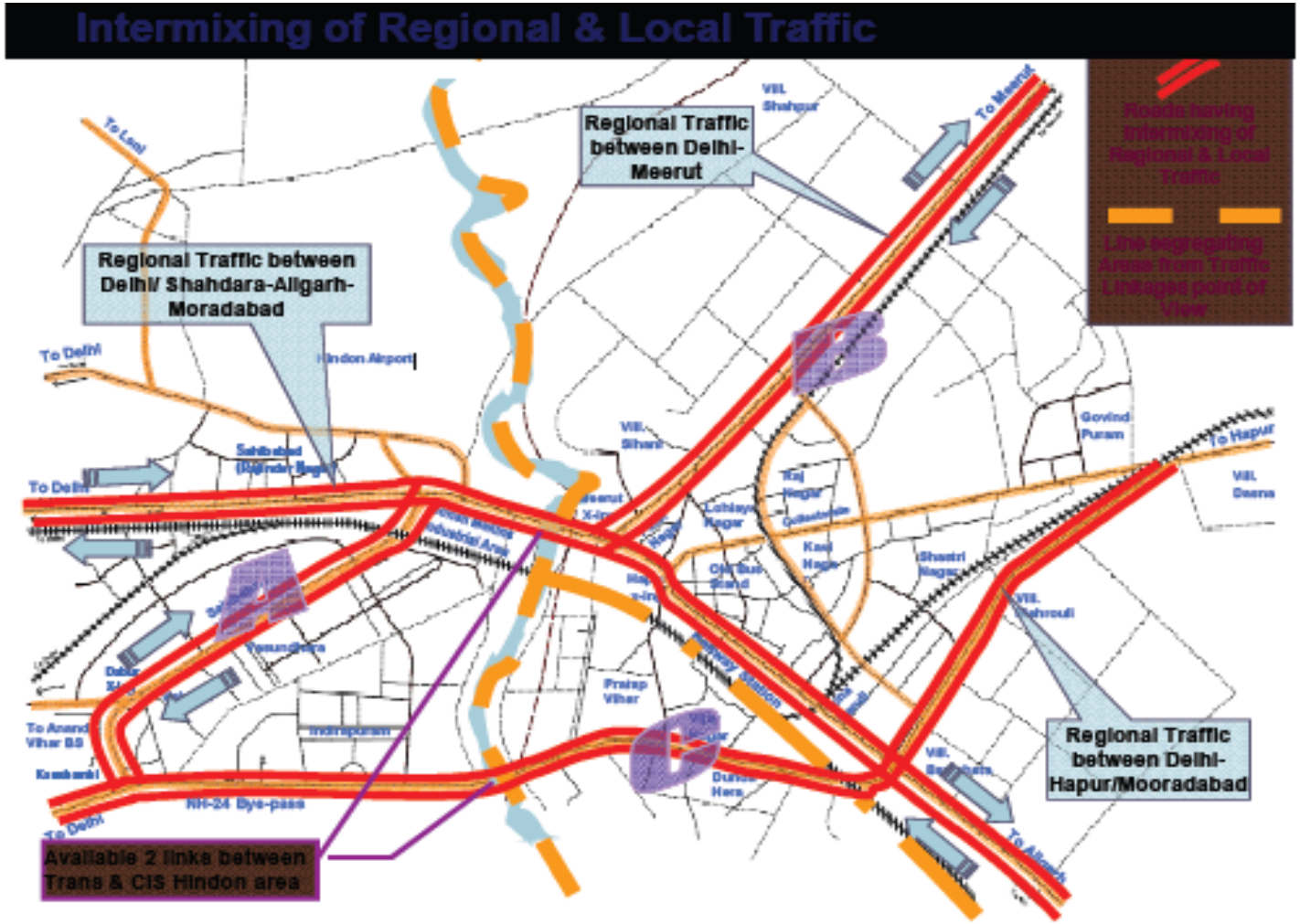
NCR: Regional challenge…….

Personal vehicles dominate



Source: RITES 1999, quoted in Anon 2005, *Regional plan 2021 National Capital Region*, National capital Region Planning Board, Ministry of Urban Development, Government of India.

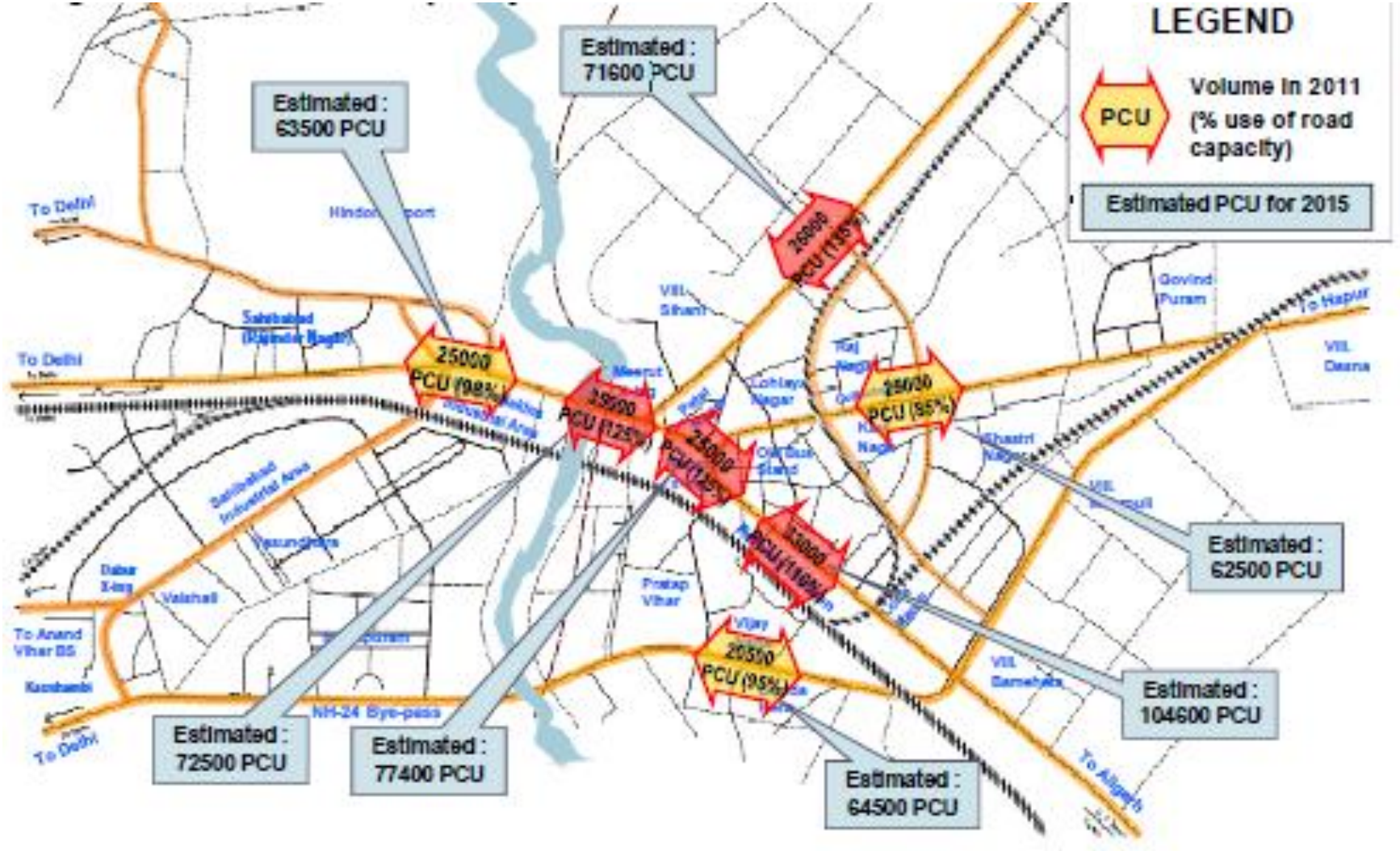
Special challenge of Gaziabad
Heavy traffic – Intermixing of regional and local traffic



Source: GDA

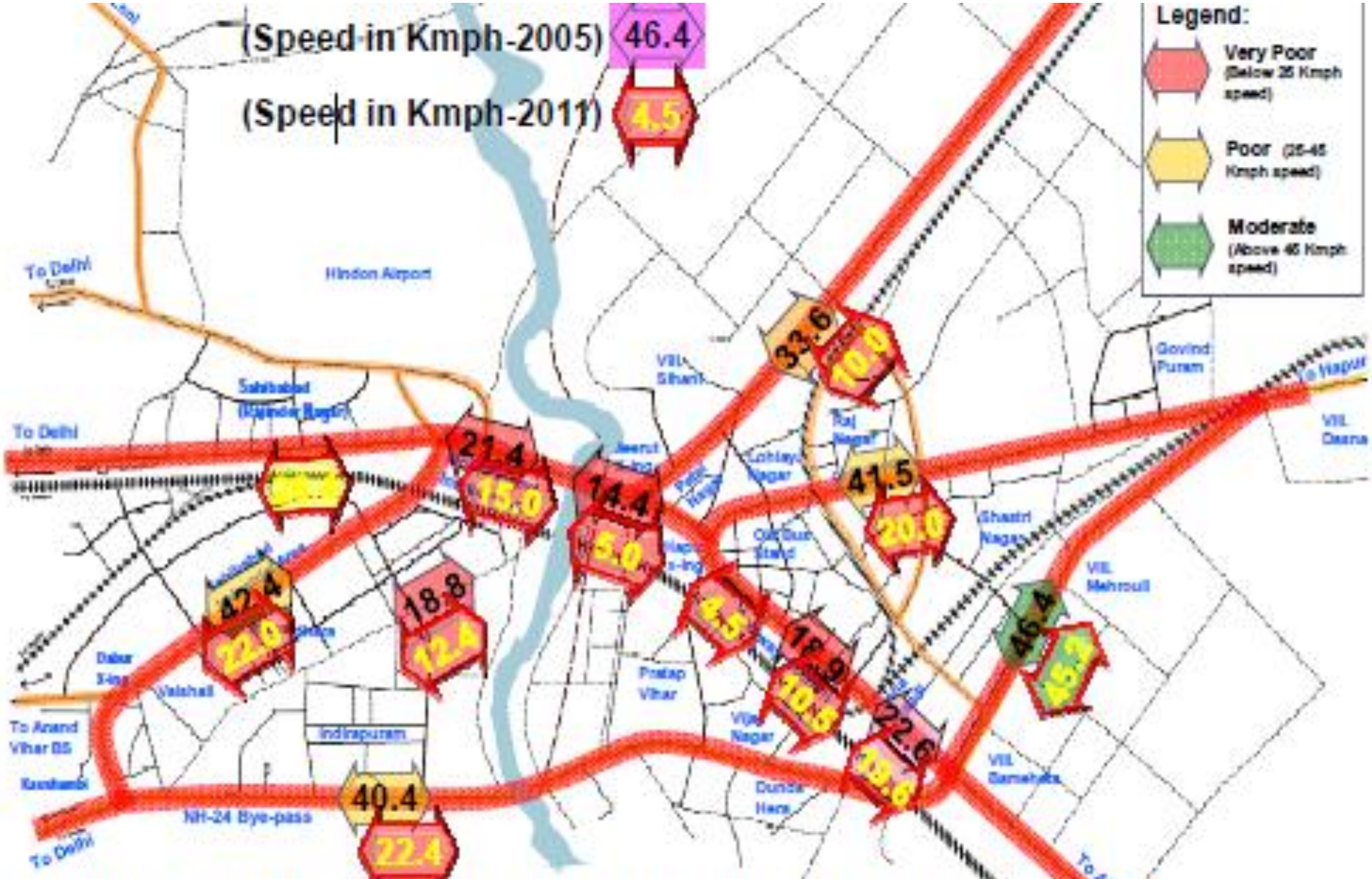
Congestion nightmare in Gaziabad

Almost every road is expected to have much higher traffic than its capacity in next 5-6 years



Source: GDA

Journey speed plummets on major roads



- Alarming reduction in travel speed almost at every sample spot within 5-6 years
- Further reduction expected in coming years

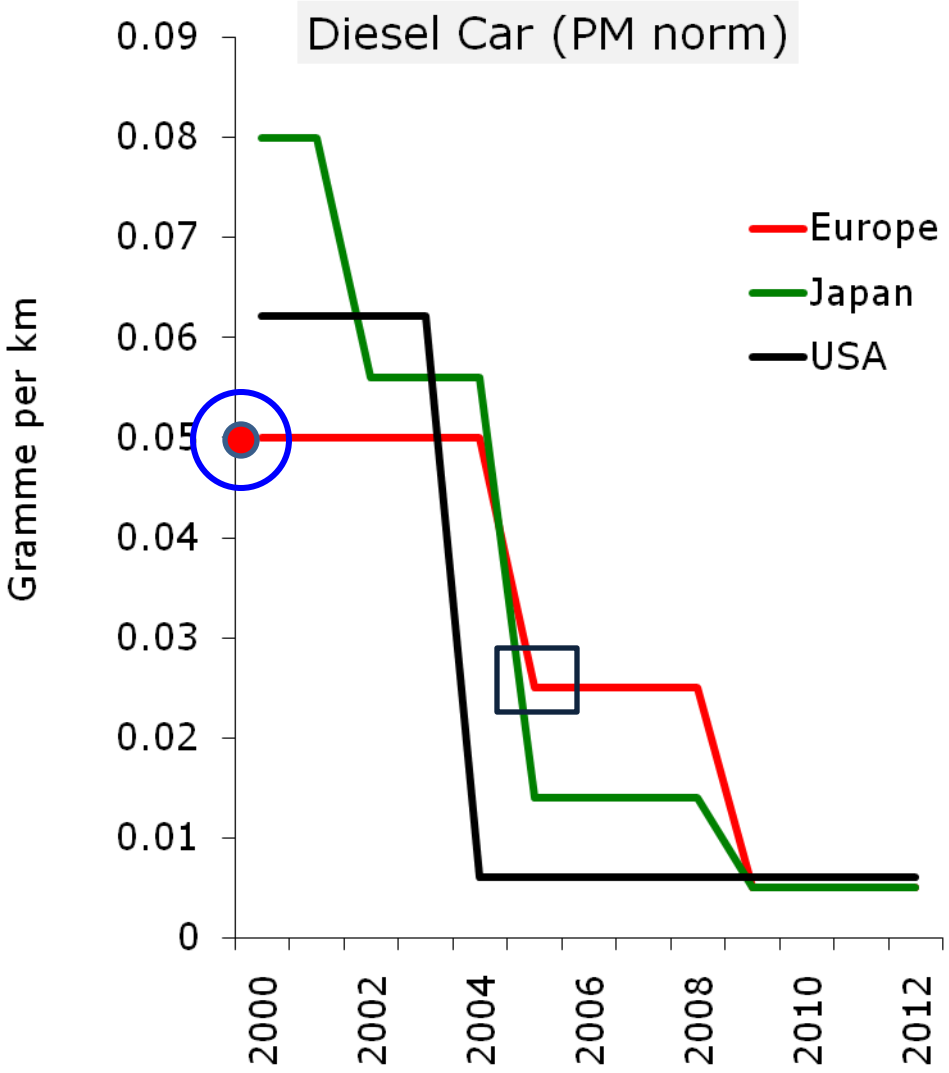
Source: GDA

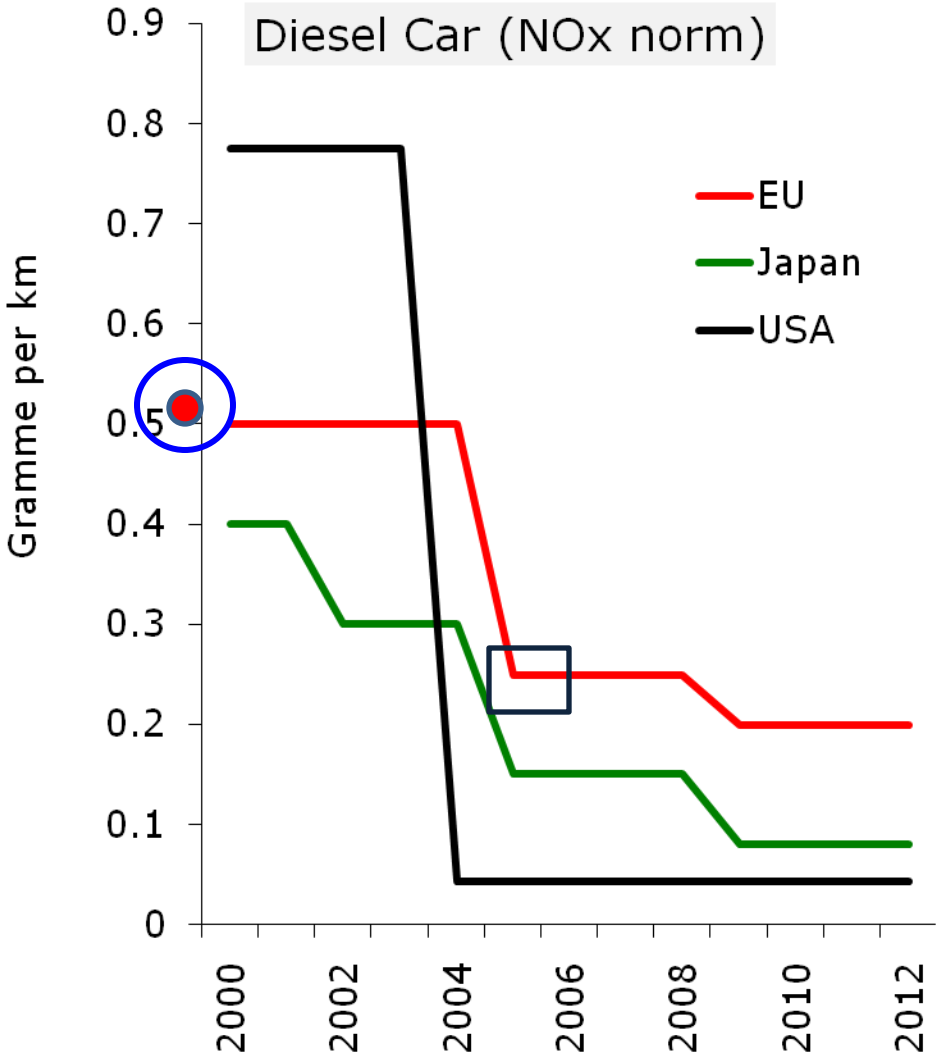
Second generation action……

Technology–lag:
Public policy fails to drive emission regulations to reduce toxic exposure

Rest of country at Euro III including Jaipur

Metro cities





'Why not slap green tax on diesel cars?'

SC Seeks Govt's Reply On Petition

Dhananjay Mahapatra | TNN

New Delhi: The Supreme Court on Monday sought the Centre's response to a radical plea for collection of 25% of the cost of a diesel car or SUV sold in the National Capital Region as green tax at the time of purchase to deter people from buying more pollut... personal vehi...

Auto sector slams cess proposal

The automobile industry has come out against any proposal to impose an additional tax on diesel cars over environmental issues. "Diesel is not as polluting as it is made out to be. How can you tax a technology that is very clean and more fuel efficient?" said Vishnu Mathur, DG of industry lobby group, Society of Indian Automobile Manufacturers. While diesel is not a big polluter, there are other industries that need to be checked into, he said, adding, "What about power producers, the industry and gensets?" P Balendran, VP at General Motors India, also countered the stand that diesel is more polluting. "It is energy saving and is more fuel efficient than petrol," he said.

Mayank Parek, COO at Maruti Suzuki, said that while ... levels certainly need to be controlled, taxin... answer. "It is not only cars th... pollution is very lo...

diesel cars, Salve said in his application, "The market share of diesel cars is more than 50% of sales. This is because of the growing differential between petrol and diesel. The emission norms for diesel cars legally allow higher limits for NOx and particulate matters as compared to petrol cars." Salve, while advocating imposition of 25% of cost of ...

green tax of Rs 1.5 lakh. If the cost of an ... then the bu... pay Rs 4 lak... How do... isting petr... a person o... car which ... then he pa... year as e... pensation ... the insu... amount. If ... priced at R... owner's sh... would be ... owns a Rs ... would pay ... while a per... lakh diesel... annual gre... Salve s... ment Poll... thority (EP... gesting measures through the years but little was achieved in the ground because of poor implementation. "The city needs emergency level action to reduce the growing load of pollution in its air."

CLEAN DRIVE WORLDWIDE

50% European use diesel automobiles
5% American cars run on diesel
40% Rise in sales of clean diesel cars (April 2011) in US
35% Growth of diesel car sales in US first quarter of 2012

DIESEL CARS (%)

Country	%
France	77
West Europe	53
Spain	69
India	49
Germany	44
Japan	2

Source: SIAM

Will tax on diesel cars clear the air?

An SC query to govt whether to tax diesel vehicles to check pollution in Delhi has set off a debate. Greens say its fumes cause cancer, carmakers rubbish the claim. Experts say solution lies in tackling oil pricing

Sanjay Dutta | TNN

REFORM ROADMAP

1991 | Petrol standards issued: Unleaded petrol, catalytic converter introduced
1992 | Diesel standard introduced
1999 | Supreme Court orders Euro norms implementation
2002 | Mashelkar Panel report turned into National Auto Fuels Policy
Bharat Stage IV norms are in force in 20 cities

COURT LOBS BALL AT GOVT

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NEW DELHI, November 27, 2012

TODAY'S PAPER » NATIONAL » NEW DELHI

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'Should polluting diesel cars pay compensation?'

J. VENKATESAN

... application highlighting spiralling levels of air pollution in ... its response on an application ... diesel car to be

Tax bumps ahead for diesel cars

Sharmistha Mukherjee / New Delhi Nov 29, 2012, 00:26 IST

At a time when diesel-powe... otherwise sluggish automo... whammy. First, a proposal t... on diesel sports utility vehic... impose an environment tax ... vehicles to curb the growing...

These have raised concern... sales and high interest rate... tagged 20-23 per cent highe... Euro-V emission norms co...

Limit registration of diesel vehicles in Delhi: SC panel

Neelam Pandey
neelam.pandey@hindustantimes.com

NEW DELHI: Alarmed at the rising pollution levels and the recent smog that had engulfed the city, the Supreme Court-appointed Environment Pollution (Prevention and Control) Authority (EPCA) plans to ask the Delhi government to put a cap on the number of diesel vehicles in the city.

Authority chairman Bhure Lal said he would write a letter to the Delhi government to voice his concerns.

"The registration of diesel vehicles has seen a huge increase from 2000 when it was 4 per cent to 60 per cent in 2012. With a number of sops being offered for diesel cars, more...

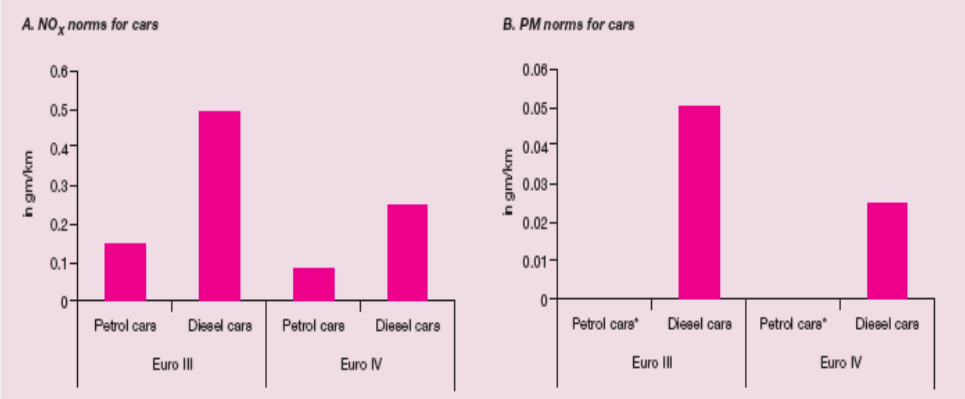
The Delhi government is examining a proposal to levy a fine of

License to Pollute

Diesel cars are legally allowed to emit three times more NOx than petrol cars under the Euro norms

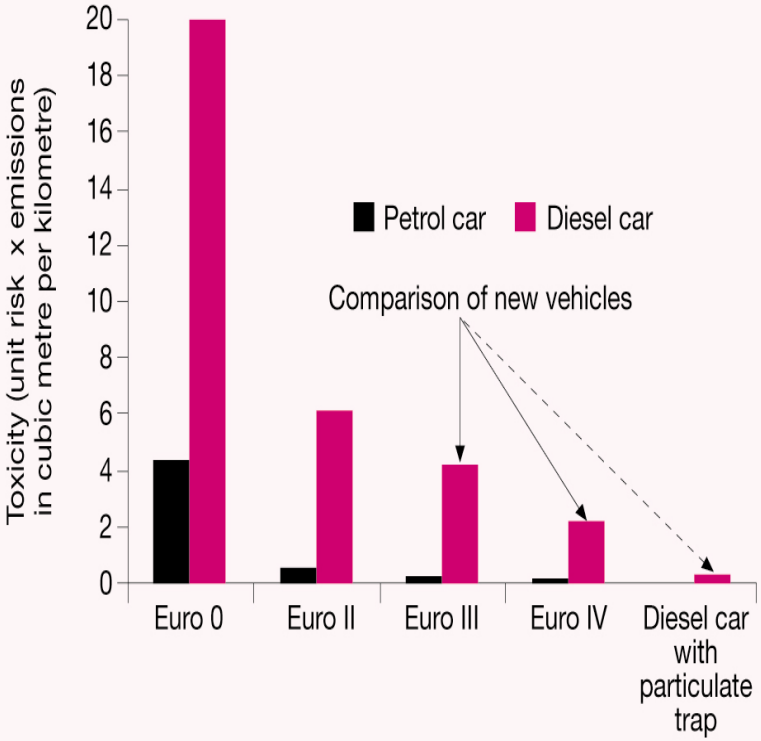
NOx norms for cars

PM norms for cars



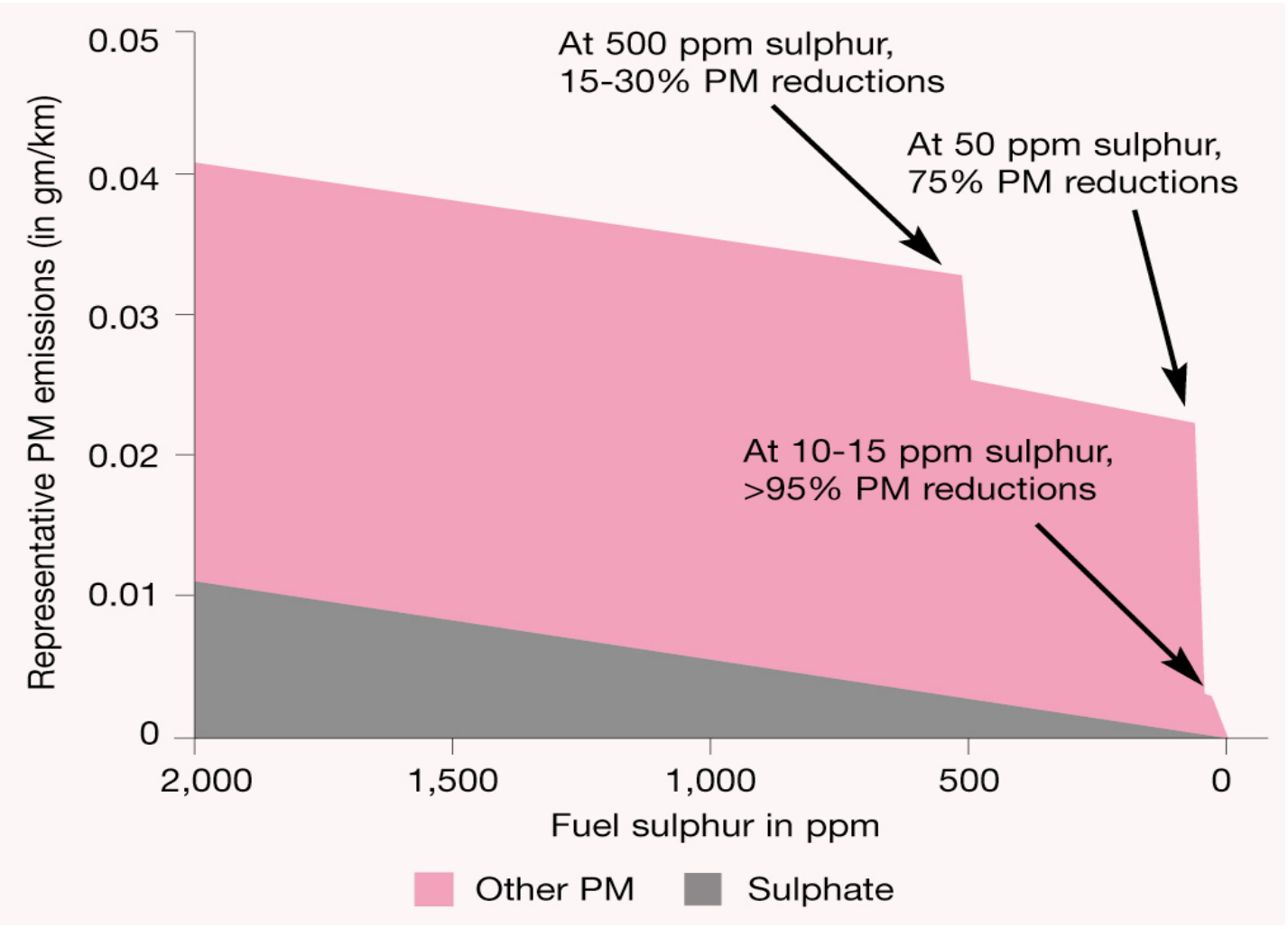
One diesel car emits as much NOx as 3 to 5 petrol cars. PM is several times higher

Toxicity of diesel emissions



Source: MP Walsh

Countries are moving towards Clean diesel technology to reduce harmful diesel emissions drastically. But India is dieselising without clean diesel



Source: ICCT

What experts say?

Do not replace a new petrol car with a diesel, unless they meet:

- US Tier 2 or Euro 5 Standards
- And ULSD is Available

Mobility crisis and air pollution….

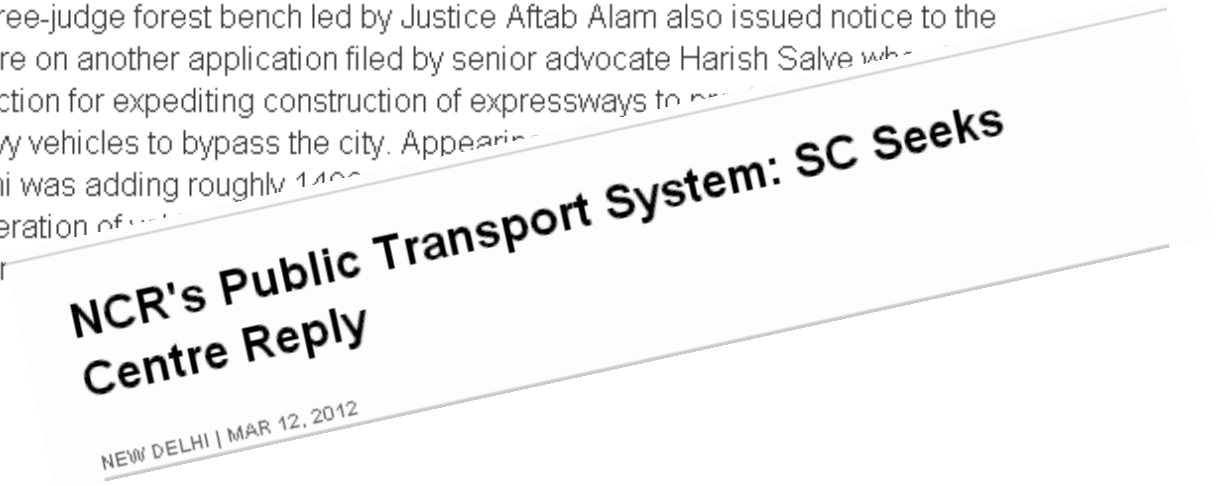
Supreme Court has also asked for public transport strategy to control pollution…….

Apex court bats for public transport in NCR

New Delhi, Nov 26, 2012, DHNS:

The Supreme Court on Monday favoured strengthening public transport system in the national capital and sought Union government's response on a plea seeking imposition of special environment compensation charge on all privately-owned petrol as well as diesel cars here in order to check rising pollution.

A three-judge forest bench led by Justice Aftab Alam also issued notice to the centre on another application filed by senior advocate Harish Salve wh
direction for expediting construction of expressways to
heavy vehicles to bypass the city. Appearin
Delhi was adding roughly 1400
generation of
giver



NCR's Public Transport System: SC Seeks Centre Reply

NEW DELHI | MAR 12, 2012

MOBILITY CRISIS

Cities are losing battle of car-bulge: The rapid increase in vehicles is destroying all gains of air pollution and health

How do we move ahead?

-- Delhi Master Plan has set the target of 80% public transport ridership by 2020……..

What about Gaziabad?

Are Delhi and NCR prepared to meet the growing travel demand sustainably?

Delhi

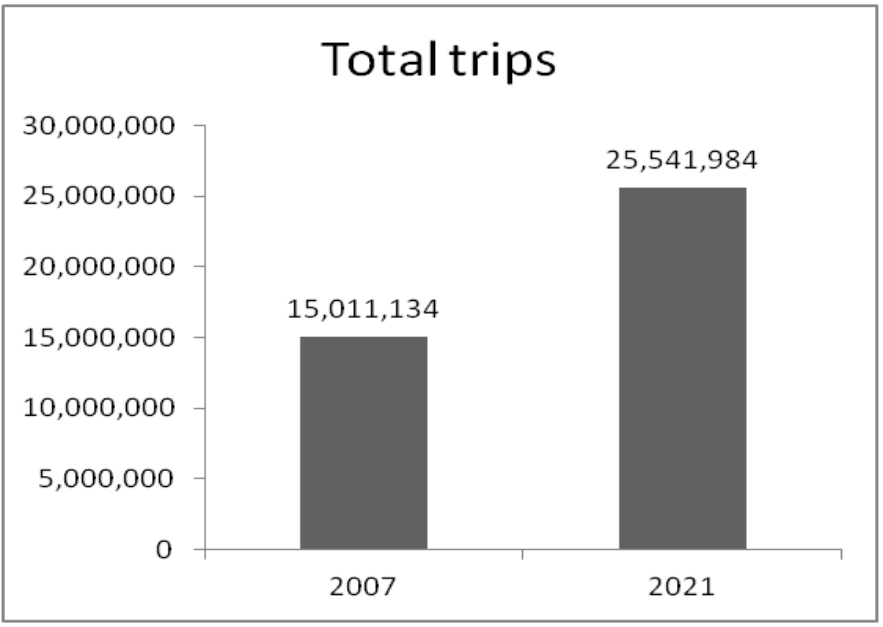
-- Total daily travel trips will almost double in Delhi by 2021

-- But public transport ridership will slide further.

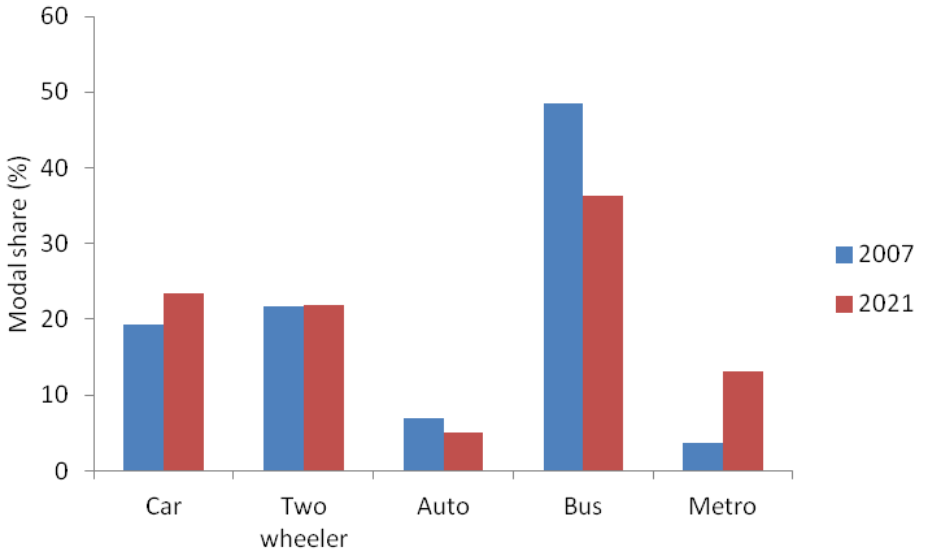
-- Only with 14% of car ridership the city is gridlocked….

-- How will Delhi cope?

Increase in daily travel trips 2007-2021



Trend in modal share 2007-2021



Source: Based on RITES data

First generation action in Gaziabad

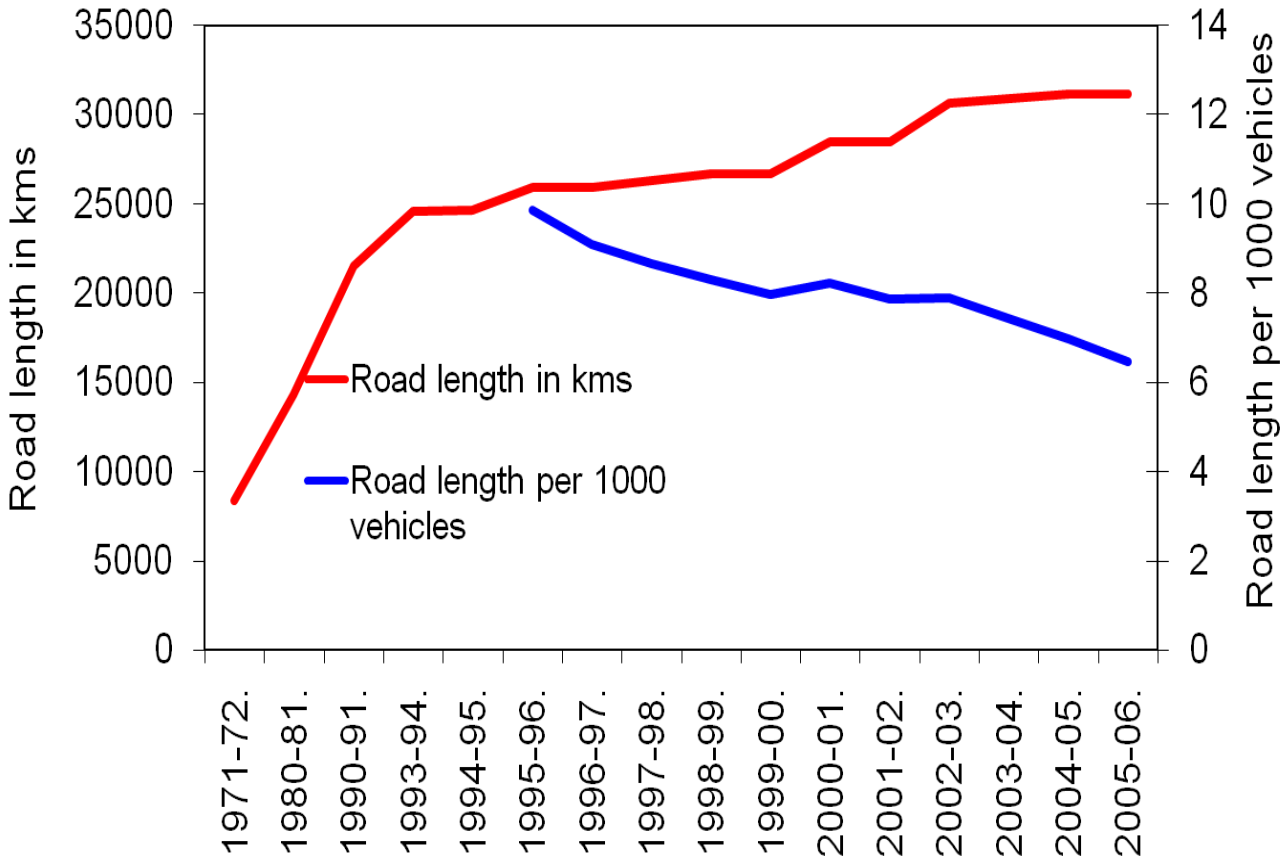
- To **improve connectivity** of trans and CIS Hindon areas by providing more road connections
- **To increase the carrying capacity of major roads**
- To **integrate** **the newly proposed IRBT (rail projects) with proposed transport system of the city**
- To relieve traffic congestion and facilitate regional traffic
- To improve the connectivity of Ghaziabad with Delhi and Noida
- To link various highways outside the urbaniseable areas to act as by-passes also
- To generate adequate financial resources
- Difficulties in land acquisition in NCR

Proposals

- New byepass roads and strengthening of existing roads catering to regional traffic
- Peripheral, elevated and connecting roads
- Increase connectivity between various parts of the city
- Improved linkage with Delhi/Noida through metro and RRTS
- New concepts for reduction of vehicles on roads

Where is the space to build more roads?

Even with 21% of space under road network Delhi has failed to solve the problem of congestion



Source: On the basis of Economic Survey, Delhi Govt

Cities are struggling to find more space to build roads

Mumbai has 12% of its geographical area under road network

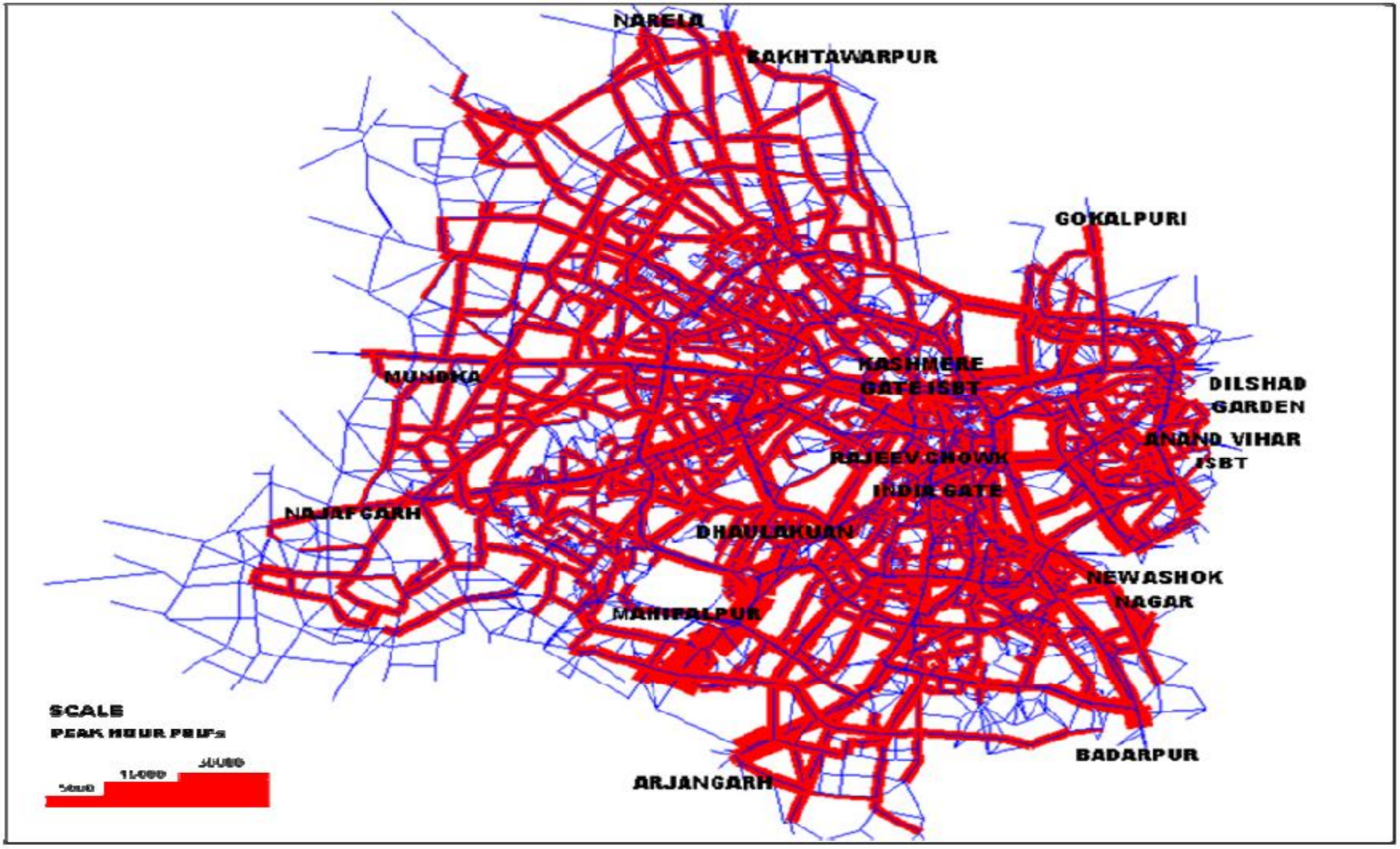
Kolkata only 6%

Public parking has used up nearly 10 percent of Delhi's urbanised land.

How much more public and personal spaces are we prepared to sacrifice to build more roads an flyovers?

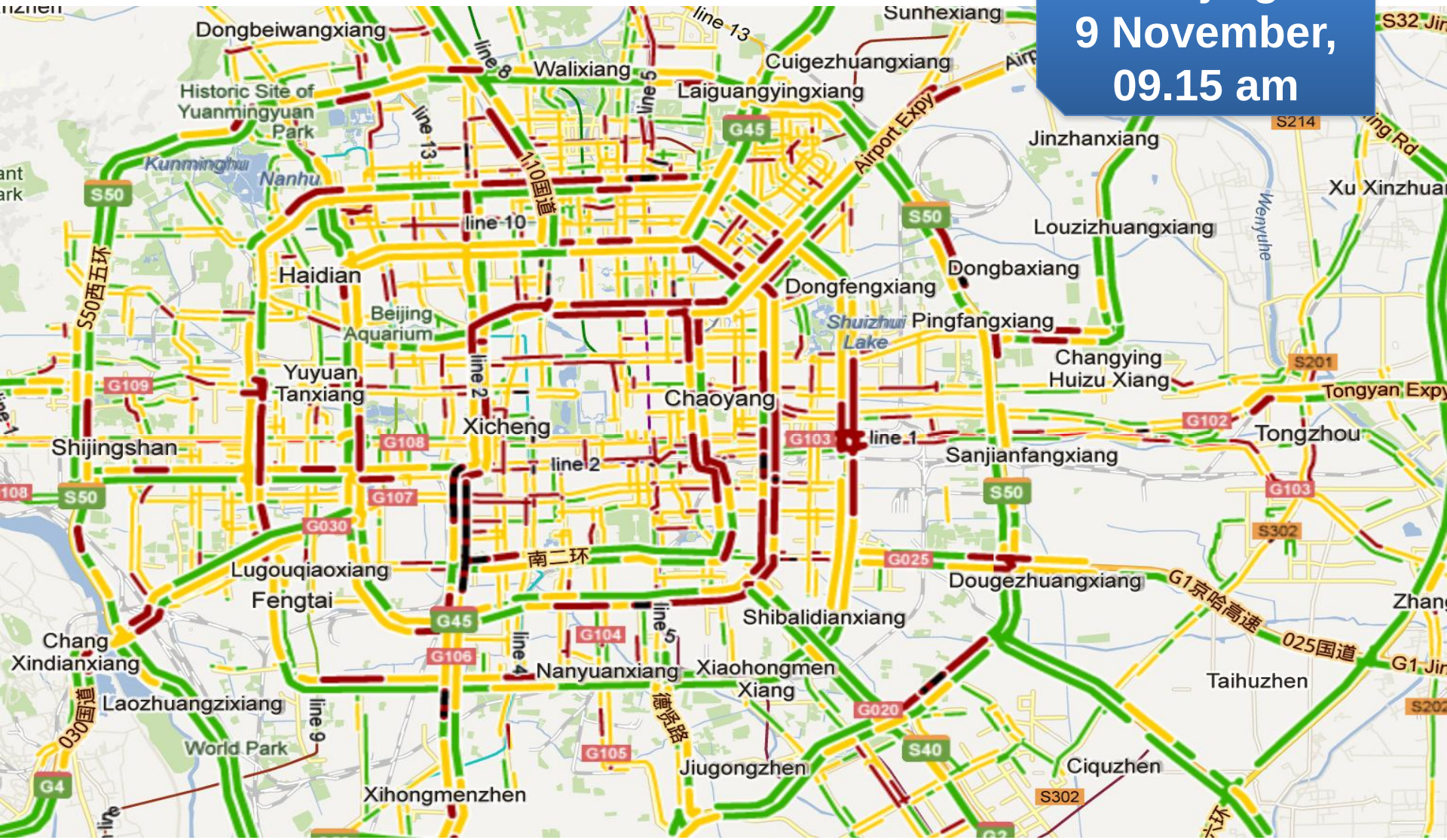
Congestion grid of Delhi in 2021: Is this the kind of city we want?

Figure 4.2 Expected Peak Hour Traffic Volumes (in PCU's) on Road Network in 2021 in BAU Scenario



Source: Based on RITES data

Real time traffic monitoring in Beijing



Where will Delhi find more space for cars?

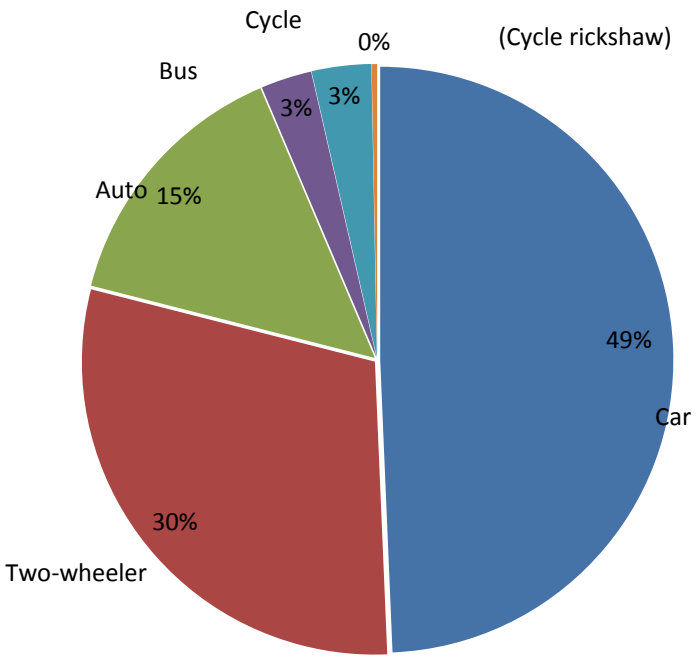
Look at Delhi's Ring Road -- Length of about 48 km……

- The 6-lane carriage has reached saturation capacity with 110,000 vehicles per day.
- Widening Ring Road from 6 lanes to 8 lanes in some stretches.
- But traffic is projected to reach between 1.5- 4 lakh PCUs.
- This will require expansion of the Ring Road to 18-24 lanes ----- Is that possible?

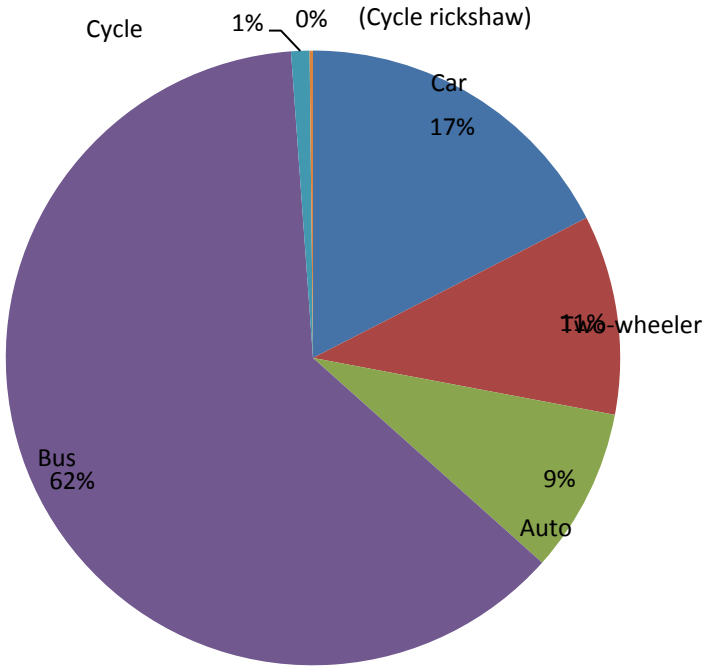
- Source: Delhi Economic Survey

We looked at Delhi roads…….
As cars dominate roads people carrying capacity of roads decline

Aurobindo Marg (near Yusuf Sarai):
Cars are nearly half of all vehicles on the road

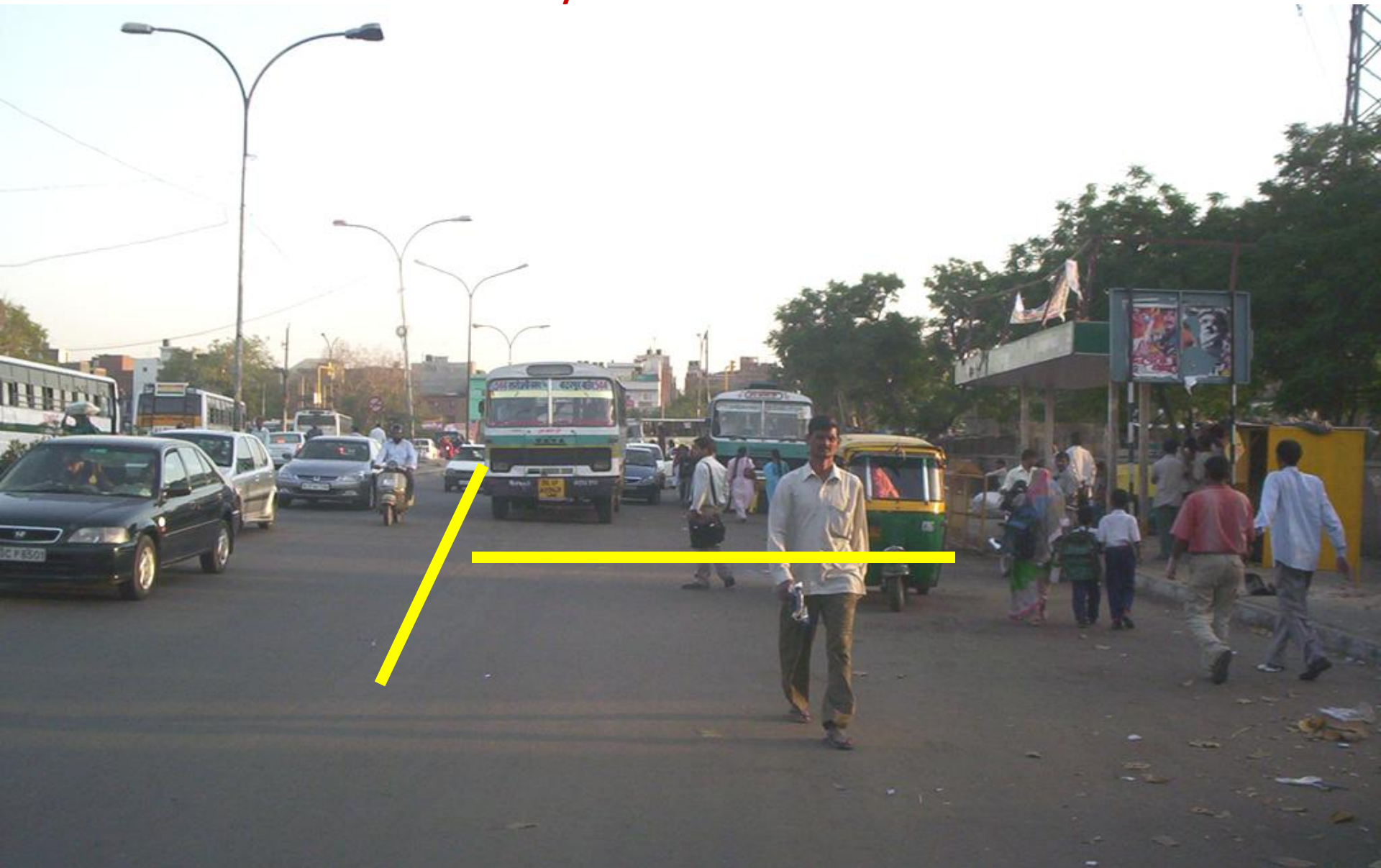


But carry only 17% of the commuting trips



Source: Based on RITES data

But bus needs its space….. Bus caught in congestion is even more unattractive. You may ask – where is the space? But the current road space is used inefficiently. Look at Delhi. How much road space is wasted. Only one lane available to motorists.



Need equity in the usage of road space
Reorganise the road space according to road users

Bus Rapid Transport in Delhi:

Right of the way segregated according to users --- bus users, walkers, cyclists and motorised vehicles. Bus speed increased from 11km/h to 19km/h. Benefits nearly 60% of road users. Delhi working on the next phase of the network.

Improve people carrying capacity of roads

Bicycle tracks are very efficient

5 times more people can move per hour on a bicycle track compared with a traffic lane

Source: Manfrd/GIZ

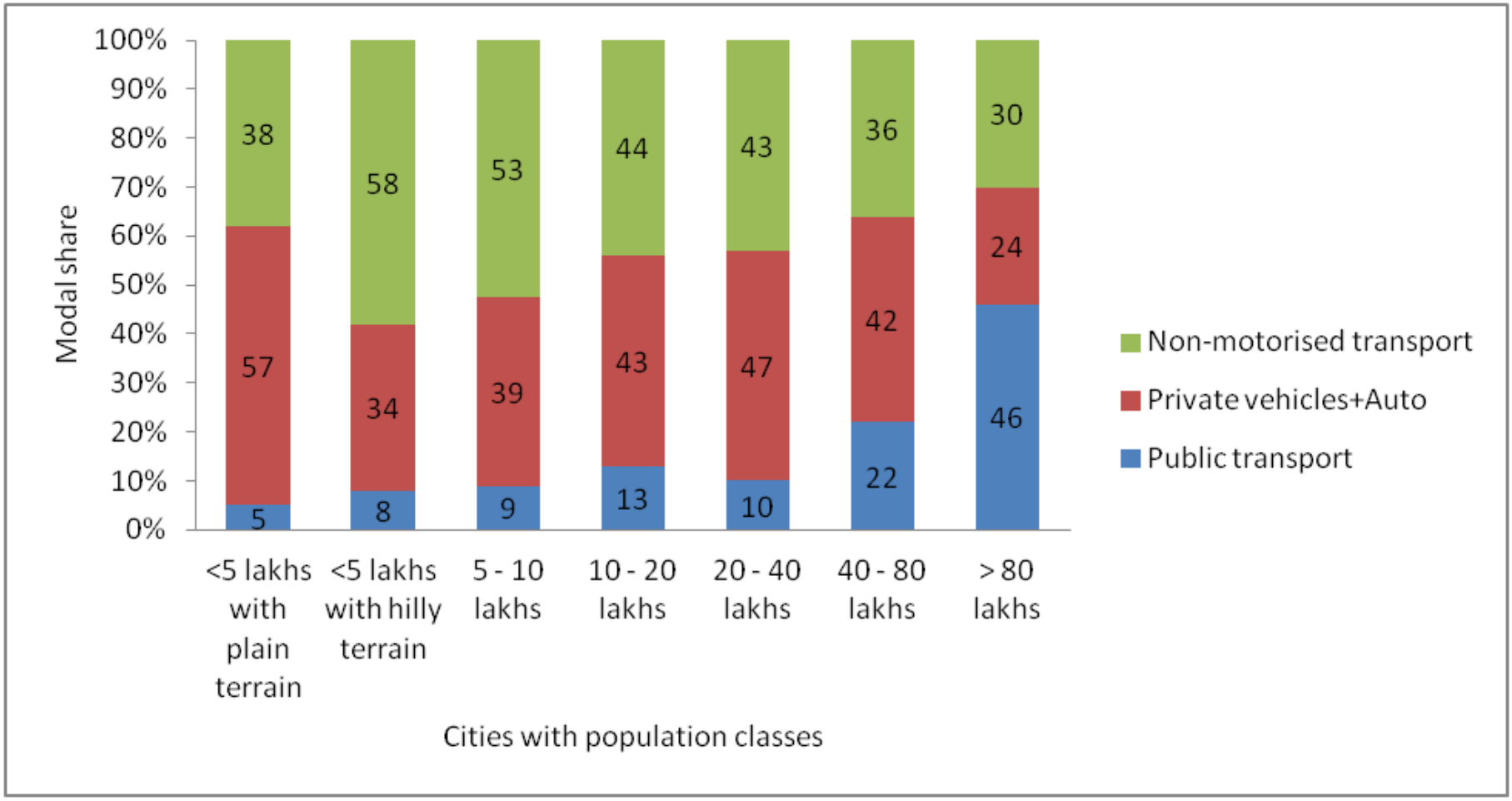
Understand the strategies for sustainable transport

- Public Transport with priority over all other modes on the road
- Non-motorised transport
- Creating/conserving public space
- PT Integration
- TDM measures

Do you see these factors here?

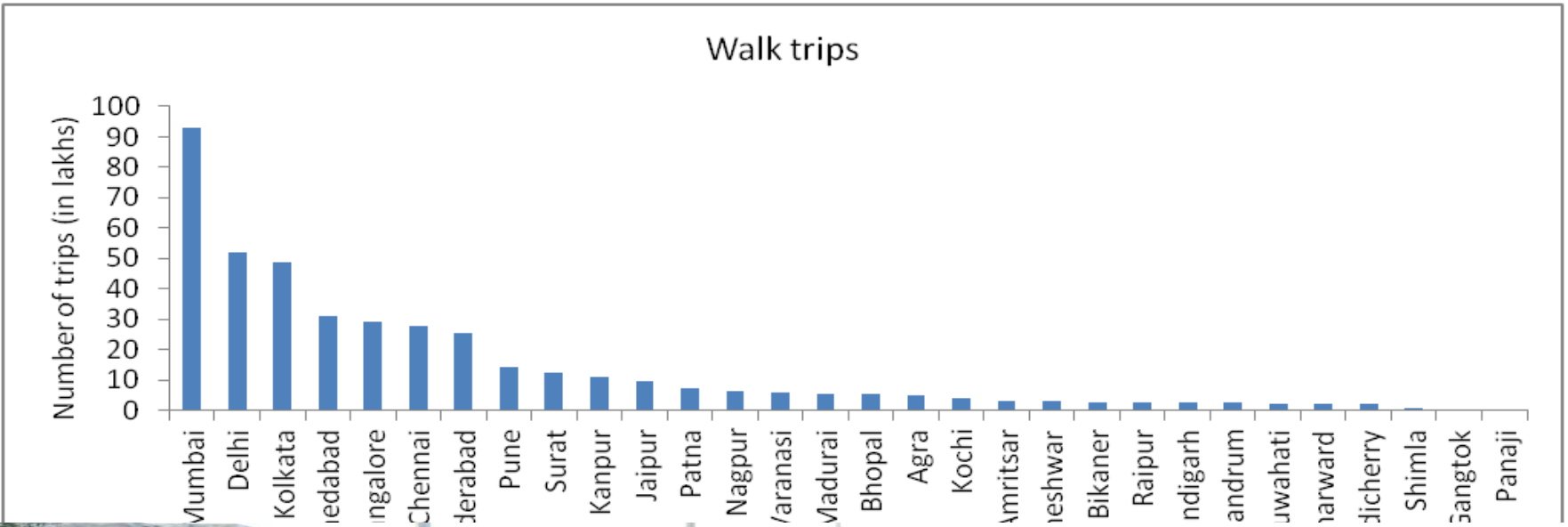
Source: Manfrd/GIZ

Indian cities have inherent strength in walking and cycling (modal share %)



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

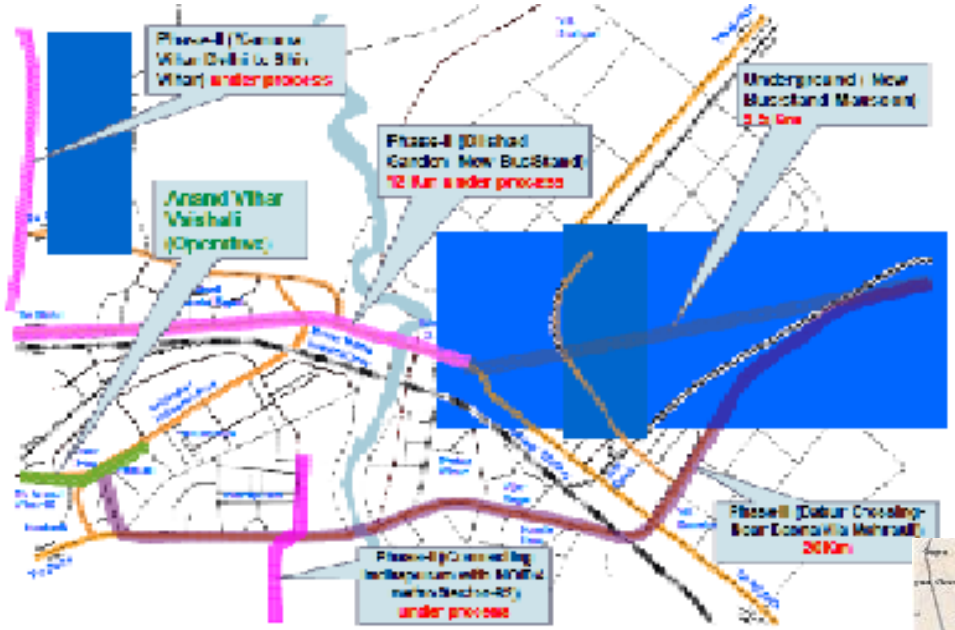
Absolute numbers change the ranking of cities…
Delhi has one of the highest count of cycle and walk trips



Integrate, integrate integrate…….

Proposed metro network in Ghaziabad

Proposed metro network in Ghaziabad

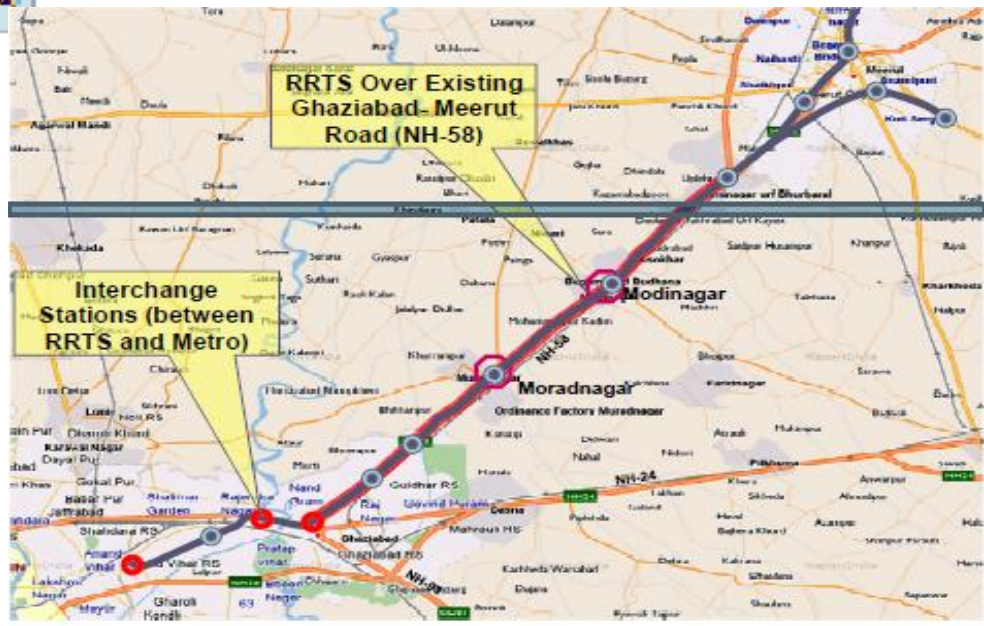


Source: GDA

Ghaziabad needs intracity buses

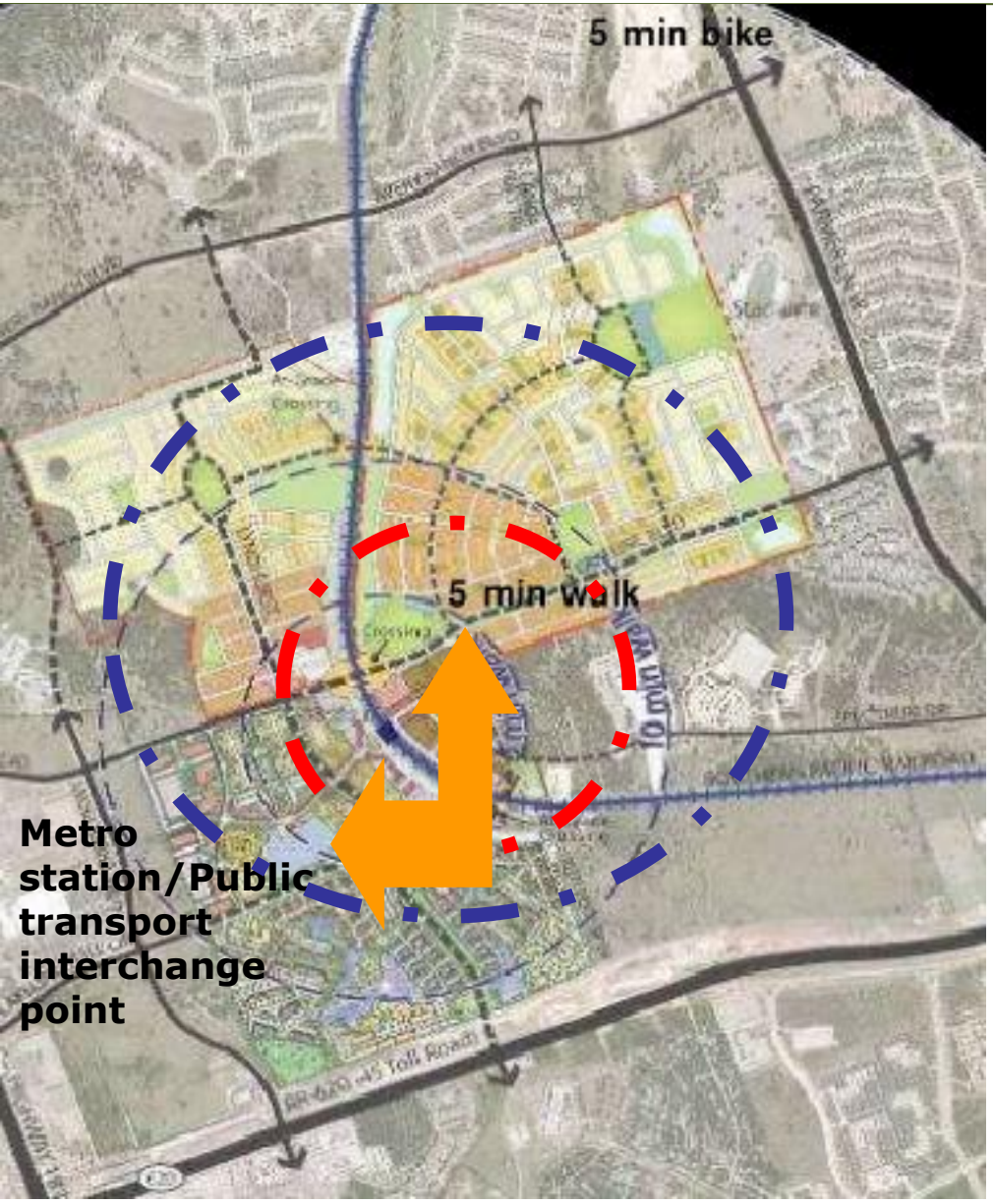
- Metro is operational on Anand Vihar-Vaishali
- Few more corridors are proposed and are under process

Proposed RRTS (Ghaziabad-Meerut-Delhi)



Delhi is developing guidelines for modal interchange location

Delhi-- UTTIPEC/DDA guidelines



Bus stop, cycle rental: within 50 meter level walk from station exit

Cycle and two wheeler parking :within 100 meter level walk from station exit

Auto rickshaw stand: within 150 meter level walk from station exit

Private car/taxi/auto rickshaw "drop off": with barrier-free of exiting pedestrians and NMT

Pedestrian exits, bus-stops and Cycle-rickshaw stands must be closest to main pedestrian exits from station.

Car parking if provided, must be BEYOND 250 M distance of Station/ or PT interchange point

Pairing of Origin-Destination (O-D) Nodes:

Provide cycle/ auto stands at nearby important destinations.

Signages at both end locations.

Private car parking only at Terminal Stations.

Discourage car parking at Stations within inner-city urbanized areas.

Feeders to metro

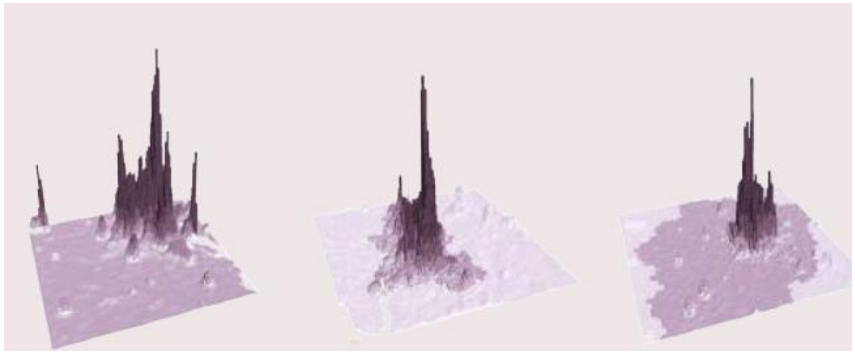
Saket metro

Gaziabad metro

Source: CSE

Our cities are built differently

High density, mixed land use, and narrow streets -- an opportunity to plan mobility differently



Delhi Kolkata **Bangalore**

Mumbai

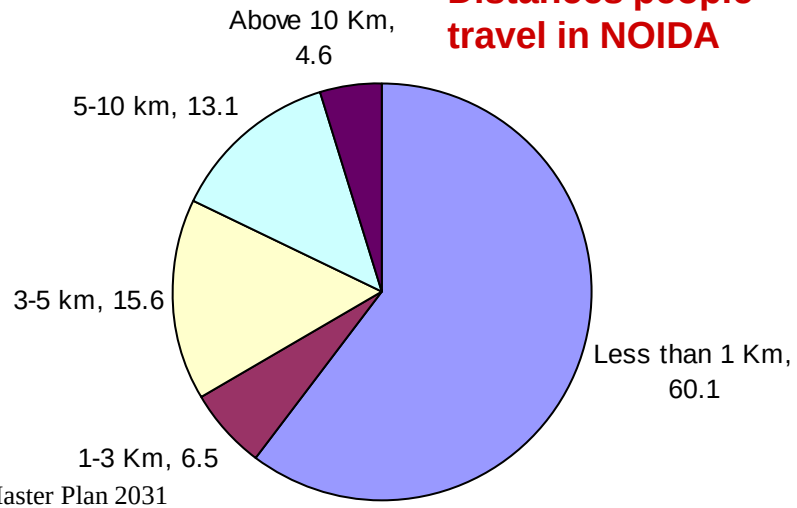
London

Source: Urban age

-- 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% of the daily trips in many cities have distances less than 5 kilometers. In Kolkata its 3 km.
-- These have enormous potential to convert to walking and non-motorised trips.

Understand how most people travel in NCR ……

Distances people travel in NOIDA



NOIDA Master Plan 2031

Surprise!

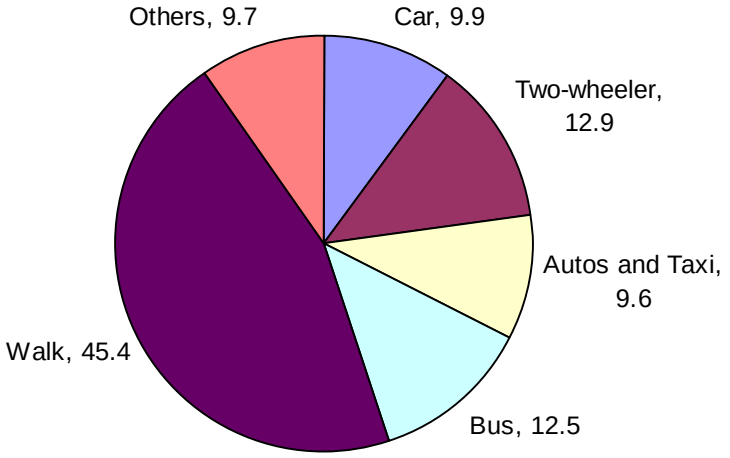
NOIDA Master Plan 2031 states -- 60% of daily travel trips in NOIDA are less than a km.

82% of all trips are within 5km

Interesting! Personal vehicle trips are 23%.....

Master Plan states -- The modal shift is towards private vehicles. Per capita trip rates and trip lengths also increasing. Improving the network system in Noida to protect sustainable ridership.

How people travel in NOIDA



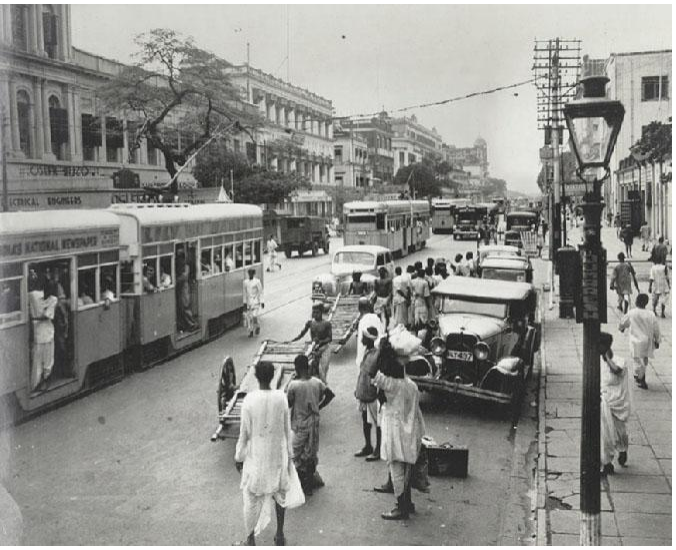
NOIDA Master Plan 2031

Public transport cannot work in isolation…..

Need walkways, intermediate public transport, and non-motorised transport…… Why?

We built walkable cities…….

Kolkata: 1900s



Jaipur walled city

Substantial number of people in our cities walk to work….. 16-58% in our cities. In Delhi nearly half of education and even business trips are walk trips

Walking and urban poor…….A great part of urban people live in low income localities and slums. Many of them are too poor to even take a bus….

Disability and walking……Survey in Delhi shows 58% of the disabled people find steps, ramps, difficult to negotiate; 45% of elderly find steps and ramps daunting; 20% find uneven, narrow sidewalks difficult. Engineering guidelines for disables are not implemented

Public transport can be successful only if our cities walkable:

Urbanity and life style……Co-relation between active transportation (walking and cycling) and obesity.

China – 1.8kg weigh gain after and twice as likely to get obese for a Chinese who acquired a car.

King County – people weigh 7 pounds less on an average in walkable neighbourhoods

Lessons from Delhi
Poor walking infrastructure in Delhi

Captive walker in poor neighbourhood (Govindpuri and Zaffrabad): Traffic and people on collision course…..

- Discontinuous, poorly paved footpaths, and not easily accessible
- Height and width of pavements violate norms
- Poor signages, no pedestrian refuge islands -- crosswalks are ordeal
- No kerbed ramps or blended crossings to access the crosswalk facilities
- Exposure to traffic very high.

Source: CSE

Car infrastructure severing neighbourhoods and pedestrian routes in Delhi (All India Institute of Medical Sciences intersection)

Before

After

Cloverleaf flyover disrupt at-grade continuity and direct shortest route, increase walking distance for the ailing visitors using public transport
At least in one direction use of subway is unavoidable

Source: CSE

As cars get advantage on roads pedestrians are either pushed out of roads to FOBs or subways……..But people and public transport need to be at grade

Mumbai to sink Rs 600 crore to erect 50 skywalks that are poorly sued

Seamless, signal free travel for motorized vehicles disrupts direct shortest routes. Impeded access

Increasing distances and travel time for them. This will reduce public transport usage, walking and cycling.

FOB near Batra Hospital, M.B. Road, Delhi

Direct access blocked

Unusable infrastructure: Wasteful

Unusable infrastructure: Wasteful
Guidelines of Indian Road Congress are inadequate

Eg. In the absence of proper guidelines on height of pavements unacceptably high pavements without proper gradients are being made…..

Source: CSE

- FOBs are not popular
- People must remain at grade

No pedestrians, Near Jaipur golf course

No walker, FOB at collector circle

No walker, FOB at Narain Singh Circle

Proper signages for walkers and cyclists

BRT Corridor

Source: CSE

Retrofitting changes…..

Connaught Place

- Sidewalks are now being rebuilt in Delhi

Source: CSE

Smooth ride on a well design wide track…..

Source: CSE

Disable friendly design….

BRT corridor has good disable friendly features

Source: CSE

It is possible to change

Redesigned streets in a small town of Nanded in Maharashtra

Before

After

Source: Pradeep Sachdeva

Beautiful well designed stretch. But design bars entry. No amenity

VIKAS MARG

Source: CSE

Checking out the universal design

City regulators crossing roads on wheelchair to understand universal road design

Disability and walking……Samarthy am survey: 58% of the disabled found steps, ramps, difficult to negotiate; 45% of elderly found steps and ramps daunting; 20%found uneven, narrow sidewalks difficult. Engineering guidelines for disables are not implemented

Source: CSE

Need to change the practice

While car owners resent expansion of walk space ….. **…public voice gets stronger for liveable walking city**

PROTESTS PERSIST: Locals says the government body doesn't have necessary approval to undertake the work

Source: Times of India

Public protest against PWD road-widening for the Commonwealth Games at Siri Fort to save the footpaths

Need safe city……..

Design for people……Focus on urban planning and safety

Have people on roads by design

Credit: SG Architects

… car infrastructure make cities unsafe

Look beyond the structure
Transit oriented guidelines in Delhi

To ensure Safety of Pedestrians:

Transit oriented guidelines must guide impact assessment of buildings

Remove setbacks to make streets safe, walkable…..

Discourage use of cars as feeder to buildings and more…….

Remove hidden subsidies to cars……..

Free and discounted parking creates more incentive for car use for all kinds of travel….

Parking: wasteful use of cars: Out of 8760 hours/year the total steering time of an average car is 400 hours. For about 90 to 95% of the time a car is parked.

Insatiable demand for land: If demand for land for an average car is computed based on average car size and multiple parking spaces per car -- the total cars already use up 10% city's urbanised area. The forest cover in Delhi is 11.5 %.

Annual registration of cars in Delhi is generating demand for land equivalent to 310 football fields! Land is expensive and has other opportunity costs. Jaipur about 50 football fields every year.

Inequitous use of land: A car is allotted 23 sq m for parking. Under low cost housing scheme only 18 sq m is allotted to poor families. Car owning minority using up more urban space.

Cars are biggest encroachers in Jaipur: 58% of roads in Jaipur are taken up by parking

Parking crisis in Gaziabad

Parking pressure

- On-street parking is rampant in Ghaziabad
- Parking pricing is non-existent in the city except at some designated parking sites
- The parking fee is miniscule at these designated sites
- There are proposals to develop multilevel parking sites to combat the problem of parking

Ghaziabad is in the process of formulating a parking policy

- It will be have to address the parking issue in commercial as well as residential areas.

Enforcement: The first steps……

Find method in the madness….Tame the chaos

MCD, NDMC in Delhi to:

-- Demarcate legal parking spaces. Organise them well.

-- Inventorise the parking spaces. Put out the list on the website

-- Prevent encroachment of walkways

-- Put up signages and information systems

-- Introduce metering

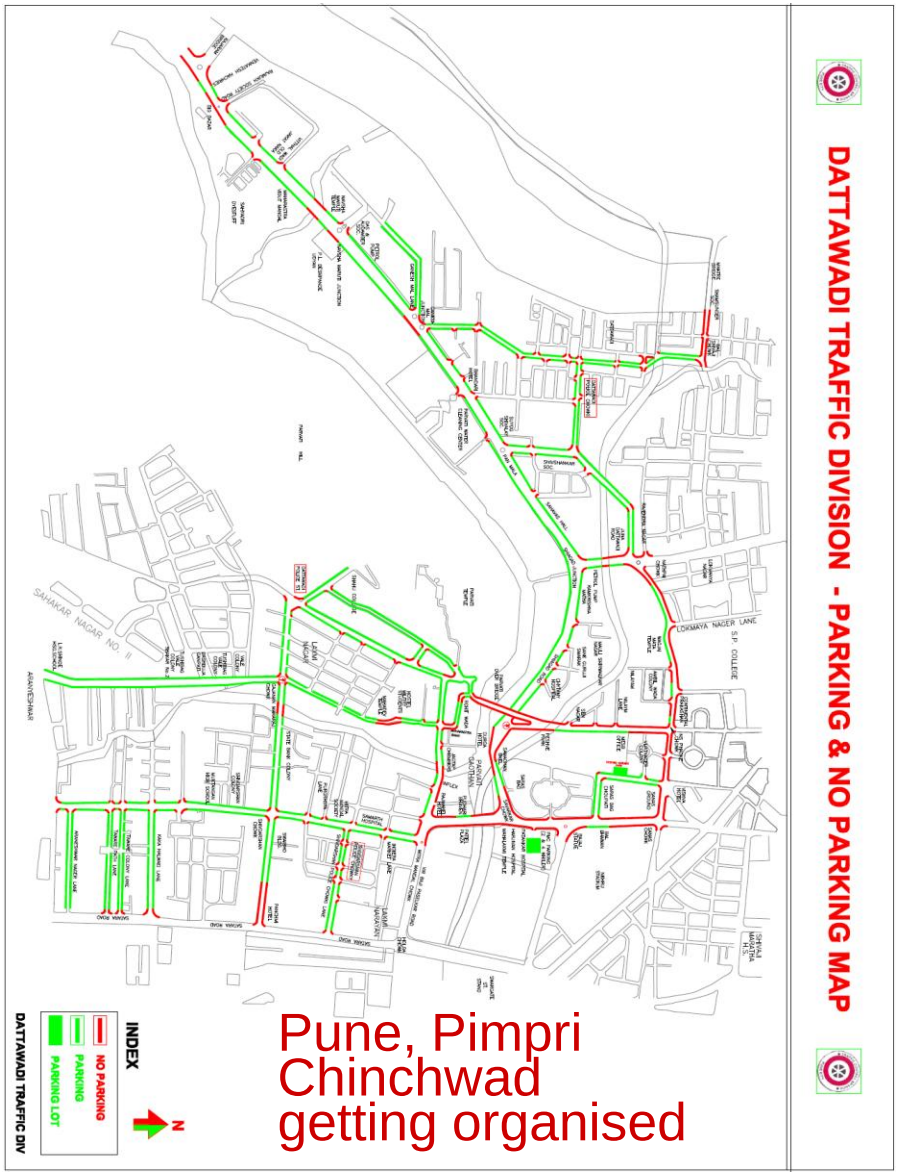
-- Impose penalty

-- IT applications as necessary

Similar moves in other cities – Chennai, Pune, Pimpri Chinchwad etc

On-street parking: A serious challenge

On-street parking cannot be eliminated. Need to find strategies to reduce it and ensure optimal use of curb side



Use parking policy to reduce demand for parking and cars. Influence commuter choice

Should we keep supplying more parking?

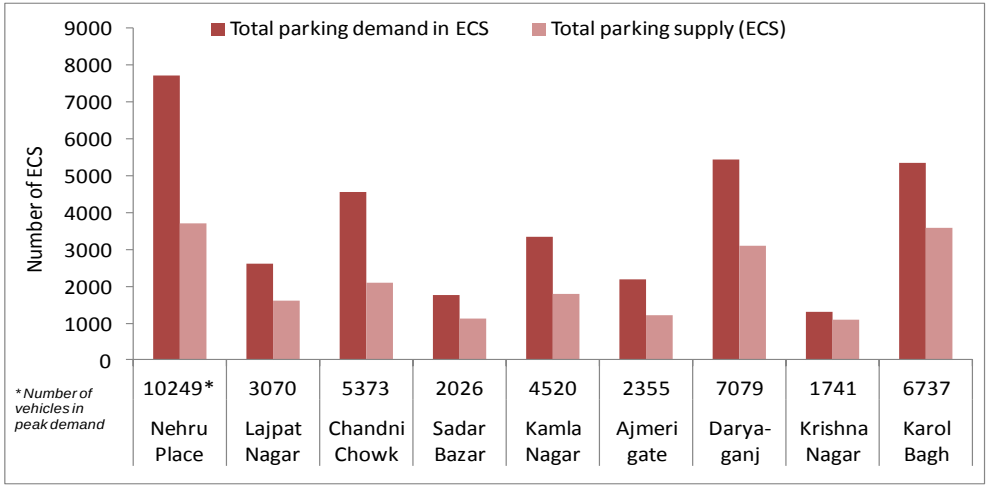
Delhi provides 3 parking slots per 100 sqm in commercial areas

Jaipur provides one slot/ 50 sq m built up area

Tokyo has highest car ownership in Asia – 350 cars per 1000 people. But its parking standards in commercial areas is 0.5 parking slots per 100 sqm.

But Delhi with 105 cars per 1000people provides 3 parking slots per 100 sqm.

Example from Delhi: Yawning gap between peak parking demand and supply and short fall



Source: CSE estimates based on CRRI report: (2006), New Delhi,

Need good management

But..Multi level car parks without local area management plans ….

Multi-level car park

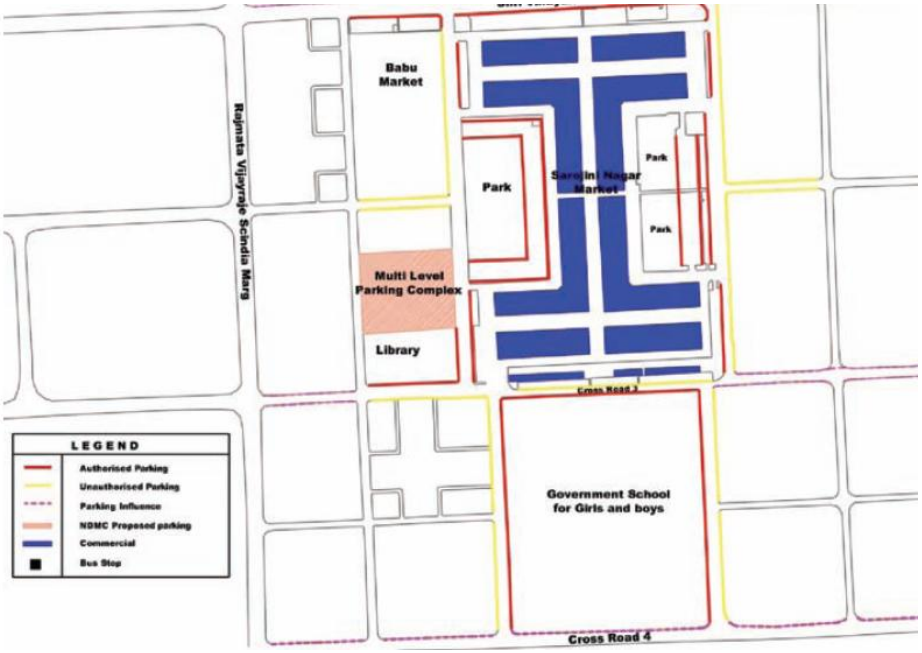

…….But cars taking over public space

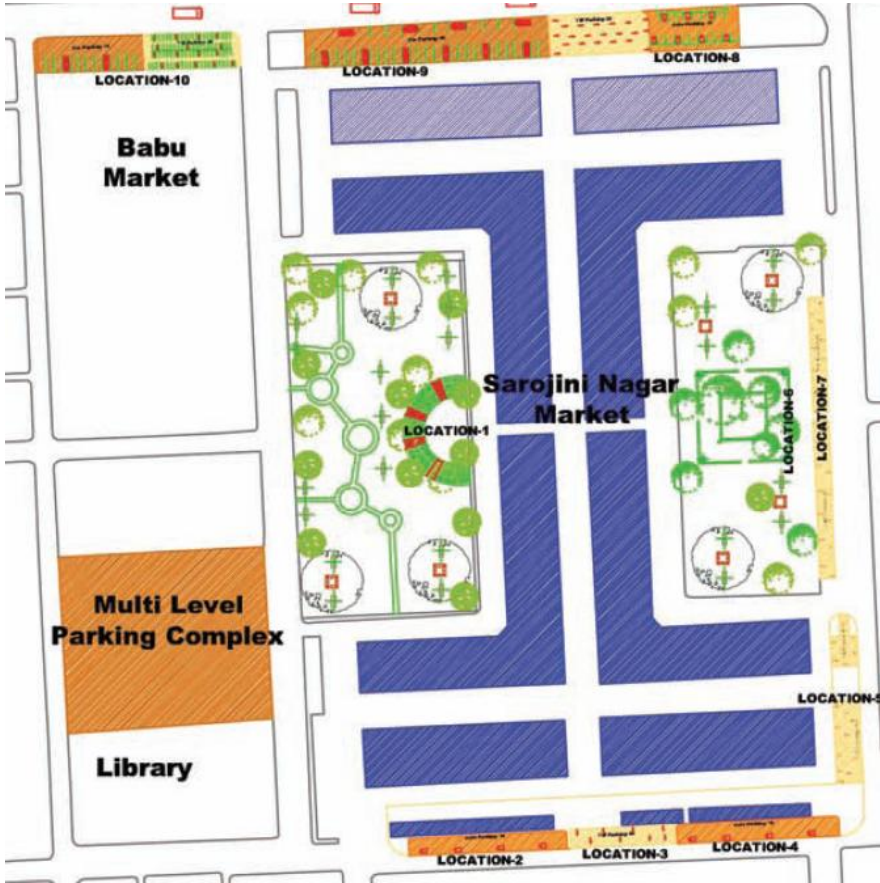
Eg. Sarojini Nagar, New Delhi

-- MLP underutilised
-- Poor guidance and signals
-- Approach roads ill designed, get clogged. Long queues.
-- Delays due to long retrieval time
-- Technical hurdles and delays
-- Rebound effect – additional parking demand from the commercial area in the MLP

-- Poor design of surface parking
-- Poor enforcement
-- Shopkeepers' cars dominate
-- Para transit and cycles not integrated with parking plan
-- Illegality

Enforcement plan in Sarojini Nagar …….. A non-starter





Proposal:

-- Curtail on-street parking, free up some surface area

-- Common management for MLP and surface parking. But developers resist

-- Rationalise and coordinate parking rates for surface parking and MLP.

-- IT application and public information system,

-- management strategy for surface parking

Multi-level parking must be leveraged to reclaim public space….

Eg. Sarojini Nagar Parked cars adversely effects the shopping experience

Reform parking pricing

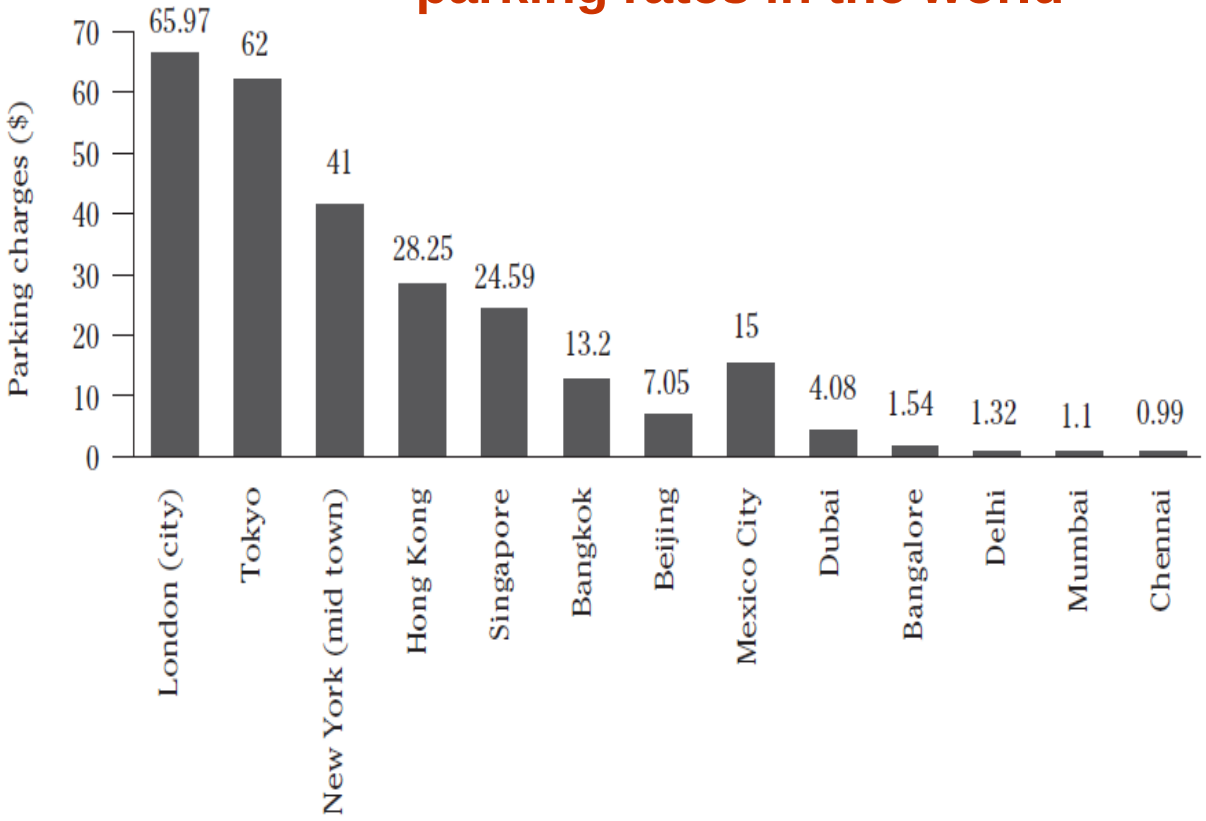
Global studies show :

Shifting from free to cost recovery parking rates can reduce automobile commuting by 10-30 per cent especially if linked with other transportation choices

Parking charges influence commuting choices:

People will opt for alternatives; delay journey to avoid peak parking charges; or go somewhere else……

Indian cities have the lowest parking rates in the world



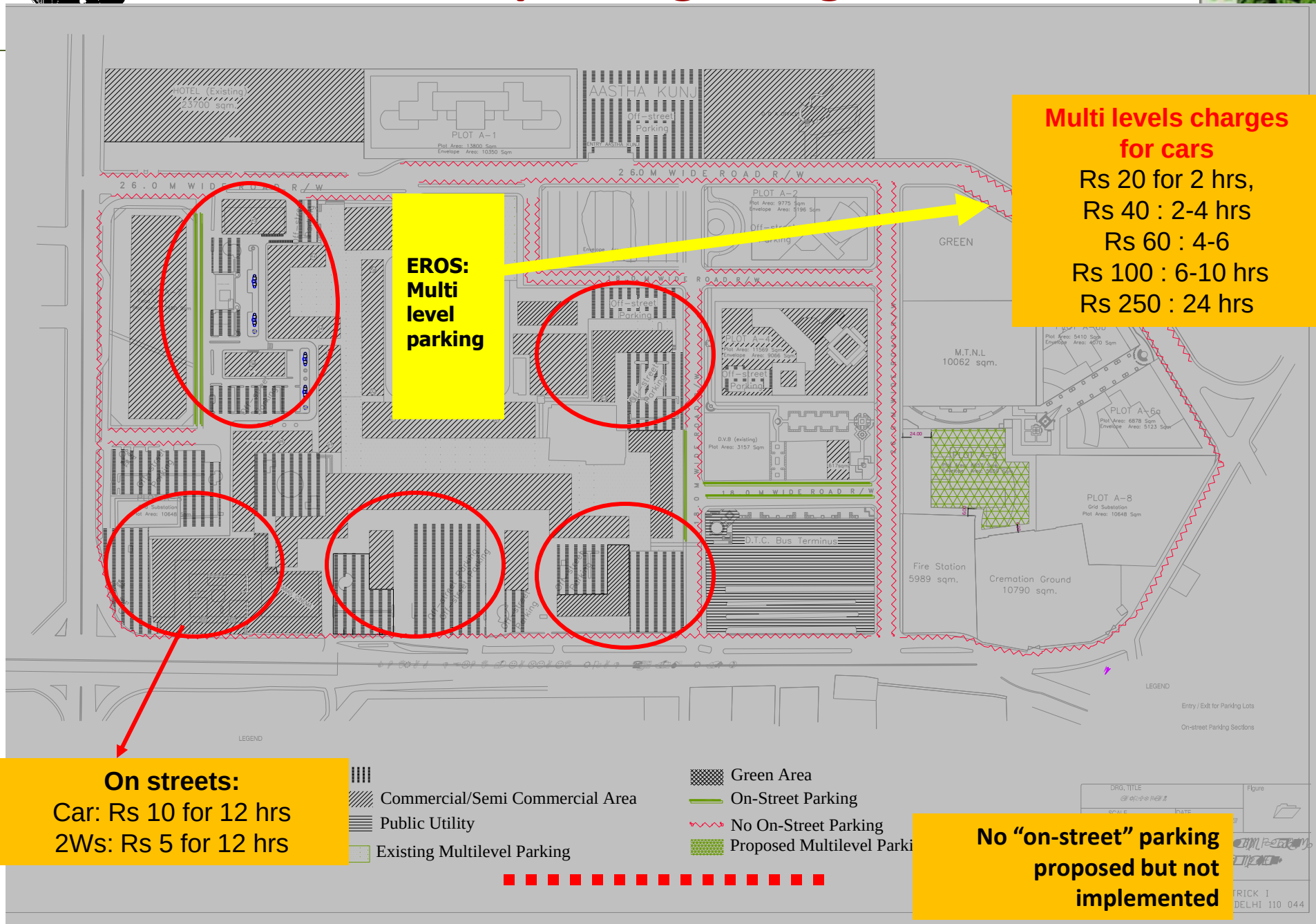
Source: Colliers International (2011) - CBD daily parking charges (in US $)

Understanding cost of multi level parking

Example from Delhi

	BKM multi level parking		HT multi level parking	
	Parking and commercial	Parking only	Parking and commercial	Parking only
ECS	**941**	**780**	**1,209**	**1,025**
Cap. Cost Rs in lakh per ECS	4	4	4	4
Total Cost in lakhs (including cap, working, taxes etc) (Net Present Value)	**5,290** (Rs 1672 per sq feet)	**3,849**	**7,523**	**5,310**
Revenue in lakhs (NPV)	**6,724**	**4,168**	**9,352**	**5,574**
IRR in %	12.68	12.67	12.68	12.69
Parking charges	**Rs 10/h**	**Rs 30.25/h**	**Rs 10/h**	**Rs 39/h**

Irrational parking charges in Delhi



Need parity of rates between structured and surface parking

Lesson from Mumbai: Discrepancy in rates can lead to underutilisation of MLP

INOX the multiplex in Nariman Point

Before construction of MLP: No. of surface parking spaces: **140,** Utilisation: **100%** during office hours

After: No. of parking spaces: **540,** Utilisation of MLP during office hours: **10%** Parking rates are Rs 5 per 30 minutes or Rs 10 per hour.

Surface parking rates : Rs 5 per hour and Rs 3 for every additional hour.

Source: Mumbai Environmental Social Network

Situation in INOX Parking area on 5th May 06 – a weekday at peak time of 11:am

Poor utilization of multi level lot

Delhi the cost of providing multi level parking is nearly Rs 4 lakh to 6 lakh per car space. Accordingly parking fee should be **Rs 30-39 per hour**. But people are used to paying paltry sum. This is a hidden subsidy to rich car owners.

Sarojini Nagar multi level Parking: Lessons

- **This Rs 80 crore structure has huge inbuilt subsidy for car owners**: The cost works out to be Rs 10 lakh per car. Operational cost -- Rs 3 crore a year. Charge Rs 10/hour

- **Developers can recover only 1.6 per cent of the operational costs from parking**. In **best case utilization**, the full revenue from the current **parking rates can at best recover only one-fifth of the operational costs**.

- **Little interest in integrated management of surface and MLP --** 98% of the earnings for the developer from shops. Developers resist common management of the surface parking area and MLP as that adds to investments and management complexity

- **Lesson -- Make integrated local area plan conditional to construction of multilevel parking.** Need integrated management of both surface and multilevel parking, pricing strategy for both, enforcement of legal parking, pedestrianisation of the area, and planned improvement of public transport connectivity among others.

- **CSE survey: People are willing to consider a shift to other modes only if the minimum parking rates are three times the rate in multilevel parking:** People are willing to consider a shift to public transport only if the minimum rates for parking cross Rs 30 per hour and much more. This is three times the rate of Rs 10 in multi-level parking.

On-street pricing I

No meters

Meters

Prices quadrupled

Grosvenor square, London

Source: TRL in ITDP (2011): Europe‘s Parking U-Turn

Parking revenue for public good

- **Parking revenue to be earmarked to create dedicated urban transport funds under JNNURM**

-- **Periodic license renewal pegged to the market driven parking rates** can be an important source of revenue.

-- **Tax parking spaces at the same rate** – if the land was used for other developments. Offset revenue losses from the other potential uses of the land

-- **Use parking pricing revenue to fund transportation** and other local area development programmes,

-- **Finance special transportation and pollution reduction projects** etc.

Delhi: Based on the available parking slots, parking demand, an average parking duration of 3.5 hours, and current effective parking rates of Rs. 8.57/ hour for 4-wheelers and Rs. 4.2/ hour for 2-wheelers – potential parking revenue collection is **Rs. 280 crores**

If parking charges are hiked to at least Rs. 30 per hour the parking revenue potential can rise to **Rs. 1000 crores**. Higher rates can fetch more.

Other countries are limiting and pricing parking

Capping parking supply

Portland, Oregon Overall cap of 40,000 parking spaces downtown. This increased public transport usage from 20-25 per cent in the 1970s to 48 per cent in mid 1990s.

Seattle allows a maximum of one parking space per 100 square metres at downtown office

San Francisco limits parking to seven per cent of a downtown building's floor area

Parking pricing strategy to reduce car usage. Benefits public transport

New York: Very high parking fees and limited parking supply lowers car ownership far below the US average.

Bogota Removed limit on the fees charged by private parking companies. The revenue goes to road maintenance and public transit improvement.

Shenzhen: Hike in parking fees during peak hours leads to 30% drop in the parking demand.

Bremen: No free parking in city centre. Parking charges higher than public transport cost.

Barcelona– Parking revenue directed to a special fund for mobility purposes.

London: parking income channeled to transportation projects.

Strong enforcement and penalty

Tokyo: Enforcement against parking violations cuts congestion drastically . Private firms allowed to issue tickets for parking violations. This makes on-street parking expensive.

Antwerp: parking fines are invested into mobility projects

Free up public space

Paris: Street space freed for bike sharing and trams

Copenhagen: Streets freed up for bike lanes etc

Deepen public awareness about the benefits of parking management and restraint

Public support can be stronger if people understand the benefits of parking management

Car user will benefit:

Reliable and predictable information about parking availability reduce cruising time, fuel cost and pollution.

Efficient billing makes payment more transparent and accurate.

Chances of finding a space improves and reduces waiting time.

Decreases traffic chaos due to indiscriminate on-street parking.

Non-car user will benefit:

Protects footpaths and allow barrier free walking;

Frees up public spaces for cycle tracks, rickshaw parking, autoriskshaw-parking, play grounds etc

Improves access to bus-stops, metro stations.

Improves safety of children, women and elderly people.

Improves visibility of shops, shopping experience and throughput of customers.

Improve overall environment, green areas and public recreational spaces.

Makes it easier for emergency vehicles like ambulances, fire trucks, police, etc. to negotiate

Urban local bodies to benefit: Public revenue generation for transportation projects

Public health and climate benefits: Reduced dependence on cars **reduce air pollution, GHG emisisons, congestion, noise level and fuel loss**.

Build public support for parking tool that restrains car usage

Parking policy: Guiding principles….

- Adopt flexible parking standards and review parking standards. Do not create oversupply. Account for improved public transport access and reduction in personal vehicle travel.
- Integrate parking design with multi-modal integration. Priority to NMT and public transport
- More stringent parking controls and enforcement in areas well served by public transport. Phase out on-street parking in targeted areas.
- Parking pricing -- Minimise free parking, restrict on-street parking, use variable parking rates, avoid fixed annual payment, price parity between surface and multi-level parking
- No parking on green spaces, pavement, NMT lanes, and service lanes. Non-negotiable.
- Need parking strategy for residential areas and mixed land use areas.
- Use parking revenue for other congestion reduction strategies and local amenities
- Stringent penalty on parking violations.
- Develop parking strategy for special localities like hospitals, railway station, cinemas, shopping malls, schools, high impact events etc
- Provide parking for public transport vehicles
- Need innovative parking strategies for residential areas for demand management

Policy opportunity: National Urban transport policy provides for parking as a restraint measure; JNNURM reform agenda; Supreme Court directives on parking and congestion.

The affordability challenges……..

National JNNURM: What's wrong?

In India National Urban Renewal Mission has a reform based funding scheme for transport.

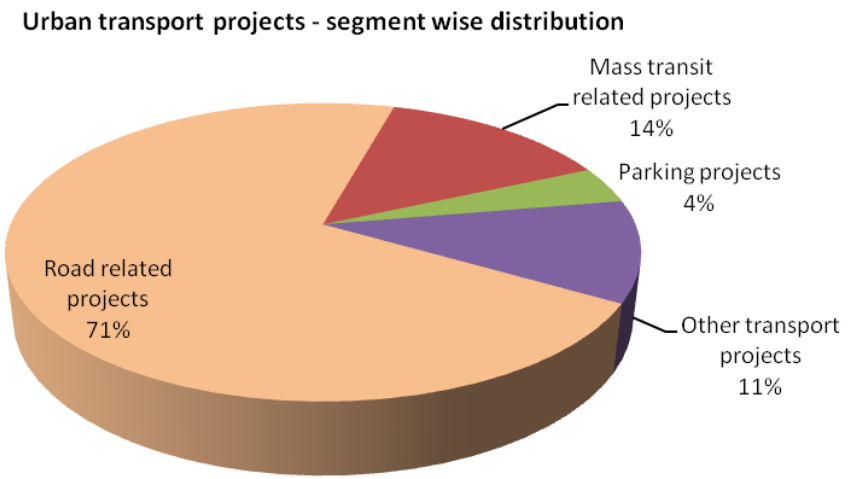
But…..

The investment so far is heavily biased towards road infrastructure.

More than 71% of the transport related projects are road related projects.

Little on public transport and barely any in cycling and walking infrastructure.

Funding ignores sustainable modes in 63 cities



Source: CSE analysis of JNNURM data

Indian style socialism

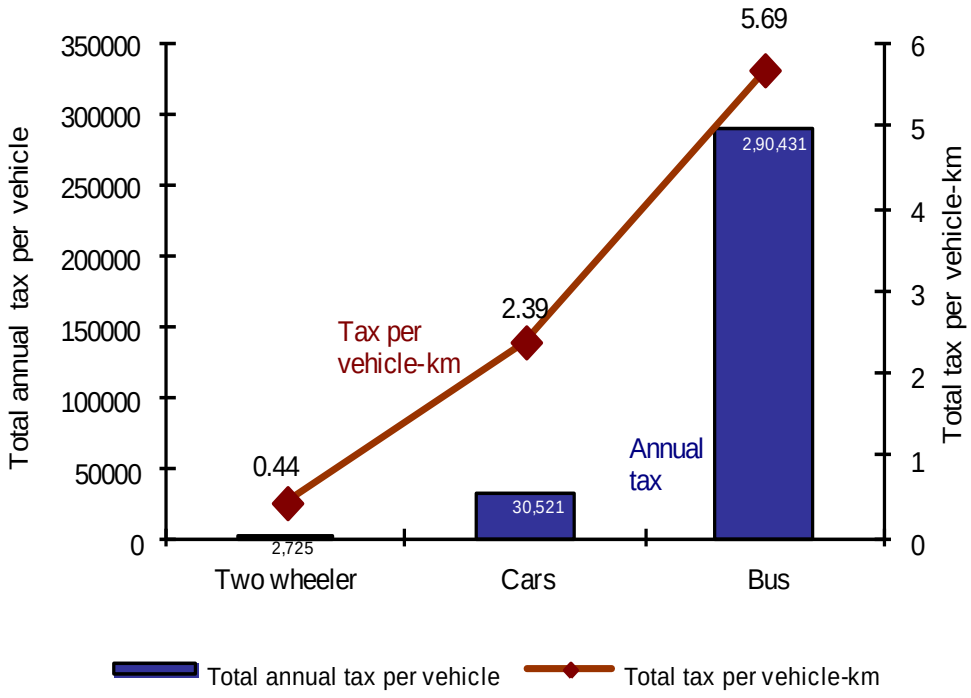
We tax our public transport more than cars…

Correct distortions…

Buses bear high tax burden than cars and two-wheelers. If lifetime tax is amortised then car pays roughly Rs 300 per year. But buses pay about Rs 13,000 per year – 43 times more than cars. Thus, penalised for carrying more passengers

If bus fares are raised, a substantial public transport ridership can be lost to two wheelers with running cost of just Re 1/km

For example -- Delhi with nearly the highest per capita income and car pays the lowest taxes.



Buses pay more taxes than Metro

Tax burden of DTC and Metro

Comparison of Tax liabilities of DTC and DMRC

S.No.	Tax liability	DTC	DMRC
1	Land Acquisition tax	Liable	Exempted
2	Property tax	Liable	Exempted
3	VAT on bus acquisition	Liable	Exempted
4	VAT on consumables	Liable	Exempted
5	VAT on spare parts	Liable	Exempted
6	Excise on bus acquisition	Liable	Exempted
7	Excise on consumables	Liable	Exempted
8	Excise on spare parts	Liable	Exempted
9	MV Tax	Liable	N.A.
11	Customs	Liable	Exempted
12	Wealth tax	N.A.	Liable
13	Fringe Benefit tax	N.A.	Liable
14	Capital gains tax	N.A.	Exempted
15	Works' contract tax	N.A.	Exempted

Source: CSE's own compilation

Source: CSE estimates based on data from data from Operational Statistics, December, 2011, March 2010, and April, 2005 issues, Delhi Transport Corporation

A small whiff of change.....

JNNURM mandates dedicated urban transport fund

Identifies the following as the possible sources of funds that can act as a fiscal brake on car centric growth……

- Waive off/reimburse all its taxes on urban buses and city bus service
- Need advertisement policy to tap newer source of revenues
- Need parking policy as a car restraint measure
- Additional cess on automotive fuels
- Additional registration fees on cars especially diesel cars and two-wheelers
- Annual renewal fee on driving license, vehicle registration
- Congestion tax

Nascent beginning…

Indian cities have begun to apply fiscal instruments

Delhi

Air Ambience Fund from environment cess on diesel fuel:

Air Ambience fee of 25 paise per litre on sale of diesel fuel has been implemented. Revenue from this cess is used to create Air Ambience fund to meet the cost of Delhi's clean air action plan. The power that has been conferred on the state boards – Delhi Pollution Control Committee – under section 31 (A) section 17 (1) of the Air (Prevention and Control of Pollution), Act 1981.

Air Ambience Fund used to subsidise battery operated vehicles from the 15 per cent subsidy and 12.5 per cent VAT reimbursement. The registration charge and one-time road tax levied at the time of registration to be reimbursed. Also subsidise conversion of old commercial LCVs.

CNG fuel has been fully exempted from sales tax

Subsidized loan for conversion of auto rickshaws and taxis

More instances.....

Jaipur: **Differentiated green tax** on old and new vehicles.
Created urban transport fund

Surat **Dedicated urban transport fund**: Its revenue components to include vehicle tax amounting to Rs 8 crore, pay and park charges of Rs. 2 crore and license fee for advertisement rights of all kinds amounting to Rs. 5 crore

Bangalore

Green tax: Bangalore has taken the lead to introduce Green tax that is imposed on the older vehicles.

Fiscal incentive for LPG conversion

Comprehensive **parking Policy** proposed

Hyderabad

Exemption of motor vehicles tax on vehicles running on CNG, battery and solar power

Learn from global approaches to tax reforms

Annual registration or road fees on personal vehicles.

US – Cars pay more taxes and also differentiates the tax according to engine size – fuel inefficient bigger cars pay more.

Singapore – Road tax differentiated by engine size, fuel type

Germany – Cars complying with older emissions standards pay more than the current standards.

China has a range of taxes on vehicles –

On purchase- Excise, VAT, Tariff, Vehicle acquisition tax

On ownership – New car check out fee, License plate fee, Vehicle usage fee,

Vehicle use – Insurance fee, Road maintenance fee, Consumption tax

London, Singapore -- Direct fees for using roads and congestion. London reduced congestion by 26%. Increased in public transport ridership.

There is no one silver bullet. Need a package of fiscal strategy to make the difference

Change is possible: Early Singapore

- **Severe Traffic Congestion**
- **Rising travel demand**
- **Unreliable bus services**

Some of the SIA slides have been provided by Monhinder Singh, Director LTA Academy

Other global cities are dismantling car centric infrastructure…….

Before

After

Seoul's Cheonggyecheon restoration proj

Cities that have destroyed roadways

San Francisco

Milwaukee

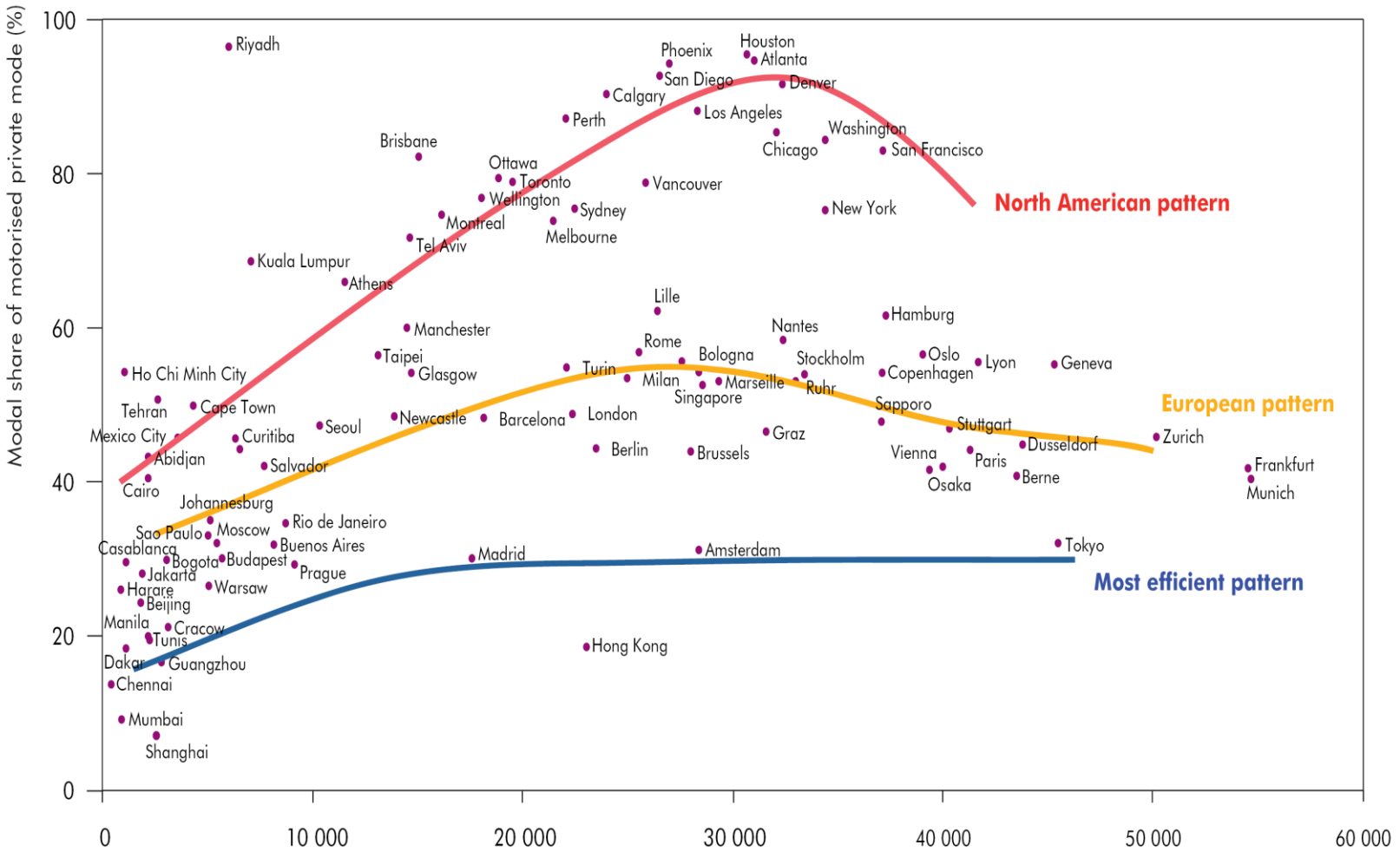
New York

Portland

Toronto

Seoul

Relationship between GDP per Capita and Individual Motorised Modal Share



Decoupling of economic growth and individual motorised transport achievable!

Source: IEA, Energy Technology Perspectives, Paris 2008

Our cities need upscaled transition
Avoid future emissions
Shift to sustainable modes of mobility

Opportunity to provide scaled up alternatives

- Public transport and integration
- Infrastructure for walking and cycling

Reduce demand for travel and vehicle usage

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

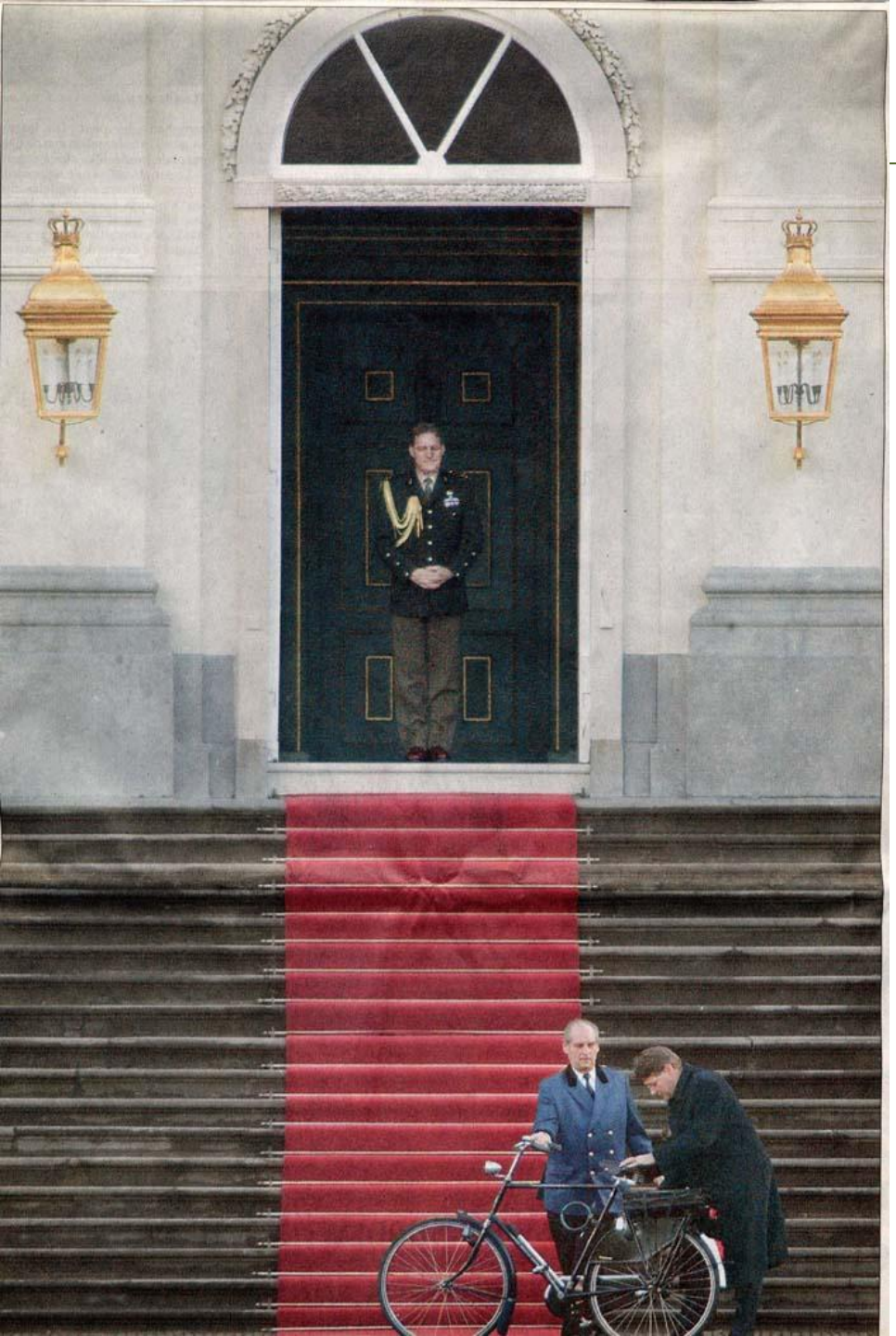
Leapfrog technology

- Emissions standards
- Fuel economy standards

Fund the transition: Need tax measures to allocate resources efficiently and raise revenue. Taxes on public transport is 2.6 times higher.

This needs support. Must not be allowed to fail..

Otherwise what???



Dutch Minister visits the queen

Thank You…