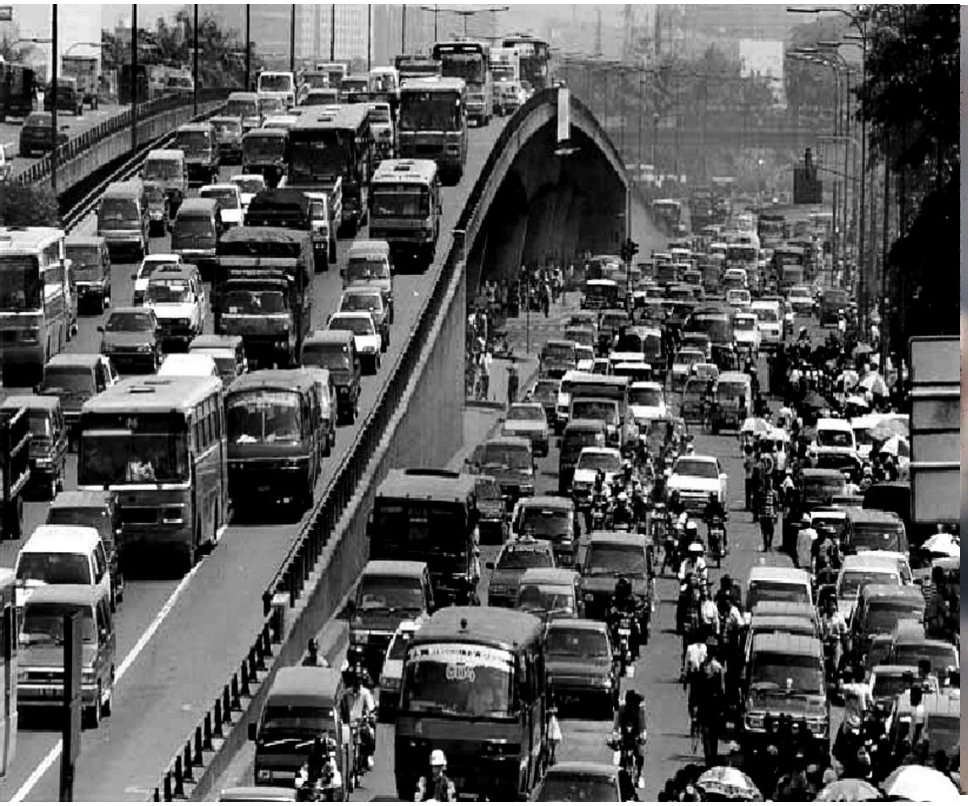
Air Quality, Mobility and Our Health



Anumita Roychowdhury

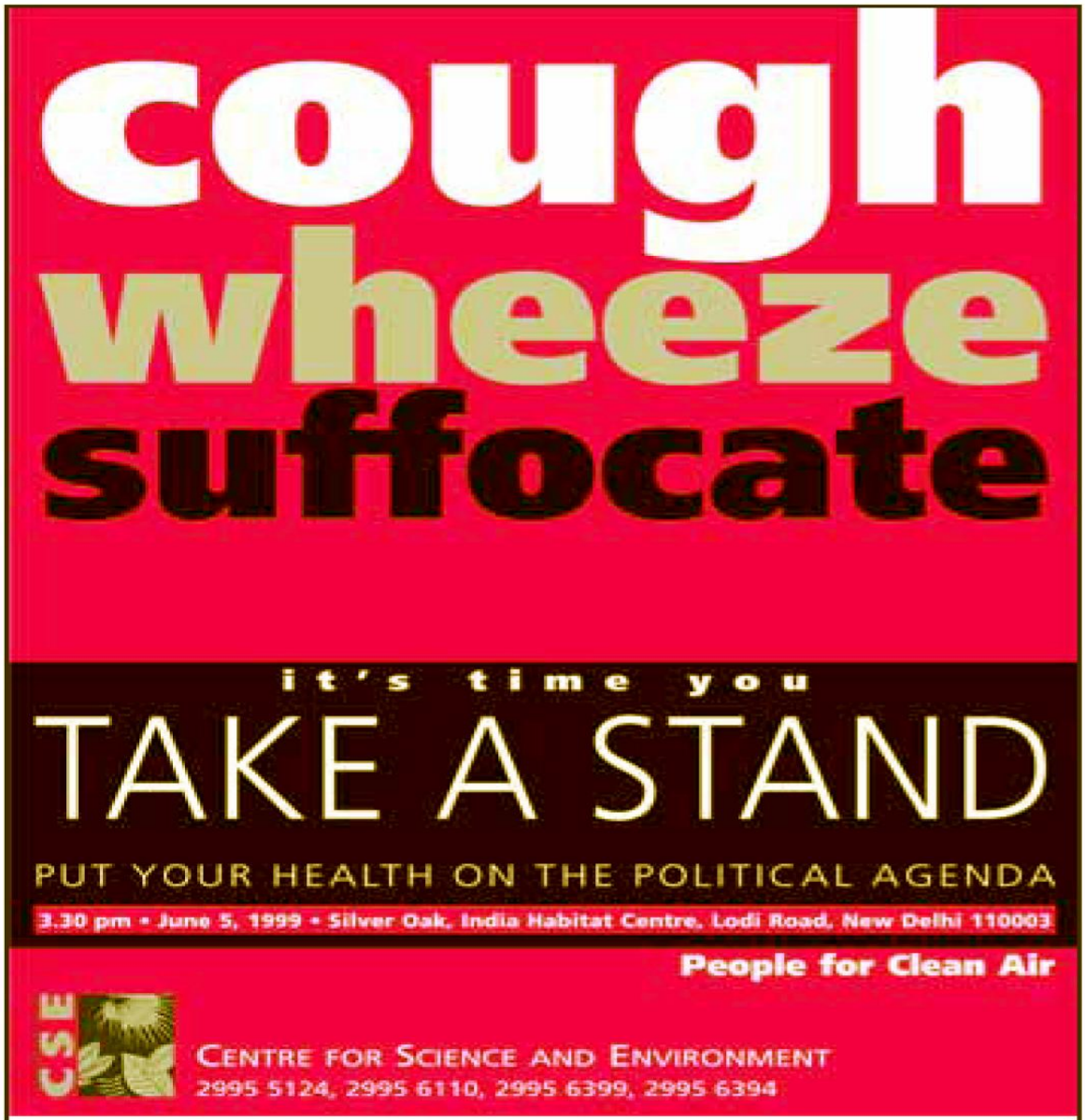
Centre for Science and Environment (CSE)

First India-Africa Dialogue and Media Briefing on Air Quality and Mobility

Joint initiative of MESHA and CSE

February 27, 2015
Nairobi

Our story……



From its early stages, CSE's Right to Clean Air campaign used a variety of communication tools — such as this poster — to put out its message to the public. It built support

We tested the lung of our Chief Minister in the midst of an Auto Show in Delhi

Children demand clean air

51,779 DEAD BY BREATHING

AIR POLLUTION TOLL RISES FROM 40,351 IN 1991-92

30% More Deaths In 1995! In Some Indian Cities Deaths Have Doubled

The Government Is In Control.

So It Thinks.

A DELUSION!

Gas chambers!

Pollution is killing more people in Indian cities

	Delhi	Mumbai	Kanpur	Chennai	Calcutta
1991-92	7,491	4,477	1,894	863	5,726
1995	9,859	7,023	3,639	1,291	10,647

More illness!

Rising pollution-related sicknesses and hospitalisation

	Delhi	Mumbai	Kanpur	Chennai	Calcutta
1991-92	39.5 lakh	25.5 lakh	8.03 lakh	4.5 lakh	29.3 lakh
1995	80.0 lakh	40.0 lakh	15.4 lakh	8.8 lakh	54.5 lakh

1991-92 figures are of World Bank

1995 figures are generated by CSE

All 1995 figures are based on a CSE study. We fed Central Pollution Control Board air pollution data for 1995 — the LATEST AVAILABLE! — to an epidemiological model developed by World Bank staffers to calculate pollution-related health and mortality costs. (The World Bank used 1991-92 pollution data.)

YOU LINE UP FOR A TAILPIPE TEST WHILE REAL CULPRITS GO SCOT-FREE

MINISTRY OF ENVIRONMENT AND FORESTS

No clear air quality reduction targets. No one knows when our air will really become cleaner.

MINISTRY OF PETROLEUM AND NATURAL GAS

Monopoly producer of very, very dirty fuel.

MINISTRY OF SURFACE TRANSPORT

Does not even share with the public the data it collects on the emission of new vehicles. Who knows if the new vehicles have really improved their standards? Not only this, it has no plans to deal with growing urban transport crisis.

MINISTRY OF INDUSTRIES

Soft on polluting industries

MINISTRY OF FINANCE

Shying away from taxing the polluters.

MINISTRY OF HEALTH

Totally silent on health effects of air pollution

AUTOMOBILE INDUSTRY

Trading health for mobility and profits

POLLUTION CONTROL BOARDS

Neither can they control pollution nor do they develop effective control programmes.

POLITICIANS IN GENERAL

No interest in people's health

ONE MORE YEAR OF SLOW MURDER

Centre for Science and Environment (CSE) is a public interest organisation engaged in research, and lobbying for and communicating the urgency of sustainable development. CSE's campaign against air pollution began on November 1, 1996 with a public meeting, an exhibition and the release of a first-time exposé on smoggy secrets: Slow Murder: The deadly story of vehicular pollution. Since then, we have focussed on gathering information to better nail the culprits. We are networking with interested people and institutions to appraise everyone of air pollution's clear and present dangers.

For health's sake, demand your right to clean air!

JOIN OUR CAMPAIGN AGAINST AIR POLLUTION BEFORE YOU BECOME ANOTHER VICTIM

DONATE TO ENABLE RESEARCH AND RAISE A FUSS

Write to: Anil Agarwal, Sunita Narain or Anumita Roychoudhury

CENTRE FOR SCIENCE AND ENVIRONMENT

41, Tughlakabad Institutional Area, New Delhi 110 062

Tel: 698 3394, 698 1110, 698 1124, 698 6399 Fax: 698 5879

Email: anumita%cse@sdalt.ernet.in

CSE

YES, I would like to ❑ Join the campaign

❑ Donate money for the Campaign Against Air Pollution

My contribution, Rs _____ in ❑ Cheque (No _____)

❑ Money Order ❑ Demand Draft is enclosed

All donations are exempted from income tax under Income Tax Act 80G

Please keep me informed.

Name: _____

Occupation: _____

Address: _____

_____

Telephone: _____ Fax: _____

Email: _____

If you want our **votes**

GIVE US CLEAN AIR

- **Air pollution takes one life every hour in Delhi. One out of ten kids wheeze with asthma.**
- **One out of every ten people in Delhi is likely to suffer from cancer**

IT ISN'T EVEN SAFE TO BREATHE IN THIS CITY !

The citizens of Delhi have sought a pledge from the candidates for the Delhi Assembly election that they will take positive action to curb air pollution


The clean air pledge

I shall report back to the people on what I have done in this regard by way of a written public statement at a public meeting at least every two months.

Name of the candidate ——— Signature ———

Constituency ——— Date ———

Promises come easy during elections. Yet even this was denied

Only 22 candidates out of the 85 we contacted have signed the pledge. Nine are from the BJP and 13 from the Congress

The Delhi chief minister was indifferent, among others

This is how much the politicians care for our health. *We will closely watch those who have signed the pledge.* To ensure that they keep their promise if they are elected

Politicians who are indifferent should realise that we don't vote for pollution and illness for our children. Clean air has votes, too

Candidates who endorsed the pledge (keep an eye on them)

- SHEILA DIKSHIT, CONGRESS
- KIRTI AZAD, BJP
- RAJENDRA GUPTA, BJP
- KIRAN WALIA, CONGRESS
- PROF. RAGHUVANSH SINGHAL, BJP
- JAGDISH ANAND, CONGRESS
- RADHEYSHYAM KHANNA, CONGRESS
- ASHOK SINGH, CONGRESS
- MAHABAL MISHRA, CONGRESS
- MANGAT RAM SINGHAL, CONGRESS
- SHASHI PRABHA ARYA, BJP
- DR YOGANAND SHASTRI, CONGRESS
- JAGDISH BHARATI, BJP
- RAM RATTAN GUPTA, CONGRESS
- JYOTSNA AGGARWAL, BJP
- BHISHAMBER SHARMA, BJP
- ABDUL HAMID BABU KHAN VARSI, CONGRESS
- SALAUDDIN, CONGRESS
- DR V V MAHAJAN, BJP
- BHOLANATH VIG, BJP
- AZIZ AHMED SIDDIQUI, CONGRESS
- SARLA KAUSHIK, CONGRESS

Write to: Anil Agarwal, Sunita Narain, Anumita Roychowdhury and Shefali Verma
Right To Clean Air Campaign
Centre for Science and Environment
41, Tughlakabad Institutional Area, New Delhi 110 062
Tel: [illegible] **Fax:** [illegible]
Email: [illegible] **Website:** www.cseindia.org

SOME OF THE CONCERNED CITIZENS WHO SUPPORTED THIS ADVERTISEMENT: [illegible]

Media responds to health evidence…

Health impact…… Stories shock and provoke.

CSE health study released on Nov 1, 1997

Times of India, Nov 2, 1997*: "Tiny killers are believed to be killing 52,000 people in 36 Indian cities prematurely and nobody can apparently escape them…"*

The Statesman, Nov 2, 1997*: "…SPM result in annual economic and health cost of about Rs 4,500 crore…"*

Media follows up and hounds the environment minister

The Hindu Nov 4, 1997*: Soz disagreed that the ministry of environment and forests did not have national perspective on pollution…"*

November 5, 1997: Soz said that a white paper focusing on new and innovative measures to check pollution would be made public soon…."

Battle lines. Should diesel cars be banned or adopt Euro II ? Media attentive

Times of India, September 2, 1999*: Auto manufactures and environmentalists are bracing themselves for September 17 when hearing of diesel as a fuel comes up before the Supreme Court….*

The Hindu, June 14, 1999*: Delhi is now all set to usher in a new era with the manufacturers willingly trying to fall in line thanks to the Supreme Court being firm on the matter…by adopting Euro I and Euro II norms…"*

Diesel fume is carcinogenic. Ban diesel cars.

Indian Express, June 6, 1999*: :According to CARB, chronic exposure to 1 microgramme of diesel exhaust will lead to 300 additional cases of lung cancer per million people…" "A letter sent to Sheila Dikshit .. The greatest threat to our health comes from the high levels of toxic dust in Delhi's air…"*

Adding new dimension to business stories

Hindustan Times, July 4, 1999*: Well aware that tiny particles from diesel exhausts kill thousands in Indian cities, MNCs from Toyota and Mercedes are bent upon introducing diesel vehicles…"*

CSE releases report on pollution

THE CENTRE for Science and Environment (CSE) on Monday released a report blaming vehicular emissions for the Capital's pollution-related woes. Titled "Slow Murder: The Deadly Story of Vehicular Pollution in India", it pegged the amount of pollution from the vehicles at 64 per cent. CSE Director Anil Agarwal said, "Polluting industries can be shifted out, but the city is stuck with its vehicles whose numbers continue to grow at an alarming rate." To better inform the citizens of the evils of vehicular pollution, the CSE will also launch an exhibition at the National Museum for Natural History, Mansen Marg.

CSE blames Naik for CNG crisis

By Our Correspondent

New Delhi, Aug. 9: The Centre for Science and Environment, a city-based NGO, has accused Union minister for petroleum and natural gas Ram Naik for the CNG crisis in the city.

CSE chairman Anil Agarwal said the crisis had been built up slowly and deliberately over the last six months.

CSE flays Mashelkar report on roadmap to achieve clean air

Pioneer News Service

New Delhi

CRITICAL OF the Mashelkar report on the roadmap for cleaning the air of vehicular pollution, an environmental group feels that the Union is enough evidence of people's health falling victim to critical levels of pollution, the NGO feels.

The policy says that most of the cities it targets will get Euro III standards, which are incrementally better than Euro II, in 2010. The CSE feavailable."

On the issue of alternative fuels, the Central Government's roadmap laid no time-bound action plan, despite the Supreme Court's directive to develop national action plan. "The roadmap pays a mere lip service to en-

Fuel adulteration on the rise: CSE

NEW DELHI, Nov 15 (UNI): Motorists in the satellite towns of Delhi face the risk of damage to their car engines due to a shockingly high level of adulteration in the fuel used by them.

period due to rampant adulteration led the companies to conduct a study on the level of fuel adulteration.

At the initiative of the car companies, when the research and development

problem of fuel adulteration in Delhi.

According to the CSE, lax fuel standards that allow a wide range can easily cushion some amount of adulteration. It is possible to adulterate 'intelligently'

Pollution checks bogus, says CSE

HT Correspondent
New Delhi, April 8

DESCRIBING THE current pollution test procedures for securing Pollution Under Control (PUC) certificates as a farce, the Centre for Science and Environment (CSE) has lambasted the Union Government for failing to put in place an effective system to test polluting vehicles.

At a press conference in the Capital, CSE functionaries said that the current standards and

WORTHLESS?

- Only Carbon Monoxide levels are checked in petrol vehicles. This can easily be lowered by adjusting the air-fuel mixture to a lean range
- For diesel vehicles, PUC operators asks drivers to press the accelerator very lightly thus lowering emission levels
- Same standards are followed for all vehicles regardless of age and technology

Today Newspapers have started their air pollution campaigns in Delhi…

City enveloped in smog, back to pre-CNG l…

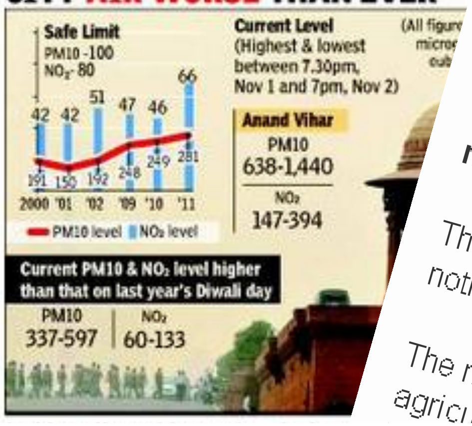
Gains Of Switch To Cleaner Fuel Frittered Away

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 bl… smog. The breeze nearly stopped, and the skies turn… and calm weather led to fumes settling clo… masks, scarves or handkerchie…

The resultant outcry in the smog-h… nothing new and that it happened e…

The new twist came… agricultu…

'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

…ly insisting that this was …e billowing i…

Smog delays Sheila Dikshit's flight to Punjab

…2.44AM IST

| Punjab | NASA | flight | Flashpoint | Apex

…Ludhiana 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

+1 0 Email to Author

email print 0 Comments Like 3 Tweet 0

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…

Media reportage on air pollution in cities of Africa…

PREMIUM Times
Friday, February 20, 2015 | Abuja ☀ 32

Air, air, everywhere, nor a place to breathe in Lagos! By Ogaga Ifowodo

August 21, 2013 Premium Times

NEWS

Aerial measurements shed light on pollution from Lagos

11 December 2009, by Tom Marshall

UK scientists have quantified for the first [illegible] emission of air pollutants including carbon monoxide and [illegible] (VOCs) around the African megacity of Lagos in

Nairobi traffic jam should be marketed as a tourist attraction

Updated Monday, February 17th 2014 at 16:32 GMT +3

Others also read this

Nollywood actor, Hanks Anuku, denies "infecting wife with HIV"

Let Nema explain cause of air pollution in city

By Editorial

Updated Wednesday, May 14th 2014 at 00:00 GMT +3

News / World

10 toxic pollution success stories

Report highlights successful cleanups, including an e-waste zone in Ghana, a contaminated Mexican oil refinery and a lead-battery dumpsite in Indonesia.

Agbogbloshie in Accra, Ghana, was the world's largest e-waste processing site and among the

ve governments a clearer ide
pollution to avoid unnecess

Measuring Africa's Air Pollution

APRIL 16, 2014

Green Column When Jenny Linden, an air quality scientist, tried to measure the

POLLUTION

London, L.A., Beijing, Delhi, Nairobi… Is Smog an Inevitable Urban Growing Pain?

By ANDREW C. REVKIN FEBRUARY 15, 2015 9:46 AM 36 Comments

Nigeria smog: October, 2005

•**Wednesday, October 12, 2005: The first-ever smog in Lagos Nigeria, which lasted for more than six hours.**

This led LAMATA to facilitate the Lagos Air (vehicular emission) Quality Monitoring Study (LAQMS) in February 2007

Air we breathe….

We do not know enough…..

…..air quality monitoring still limited and evolving in our regions…..

India has begun to expand air quality monitoring

India monitors 247 cities…..There are 5000 cities and towns

Only 16 cities have online monitoring facilities….

Some key cities with air quality monitoring stations

Delhi	11 (all online monitors generating real time data
Chennai	11 (5 manual and 6 online)
Kolkata	10
Hyderabad	9
Bangalore	9
Kanpur	9
Visakhapatnam	8

Delhi relays online data that is easily accessible…….

DELHI POLLUTION CONTROL COMMITTEE
(Government of N.C.T. of Delhi)
4th Floor, I.S.B.T. Building, Kashmere Gate, Delhi - 110006
Website : http://www.dpcc.delhigovt.nic.in

REAL TIME AMBIENT AIR QUALITY DATA

Anand Vihar || Mandir Marg || Punjabi Bagh || R.K. Puram || IGI Airport || Civil Lines || Main Index

Date : Wednesday, September 25, 2013 Time (IST) : 06:09 PM

GAS CONCENTRATIONS

Air Quality Monitoring Station : R. K. Puram

Current Air Pollution Levels **Advance Search**

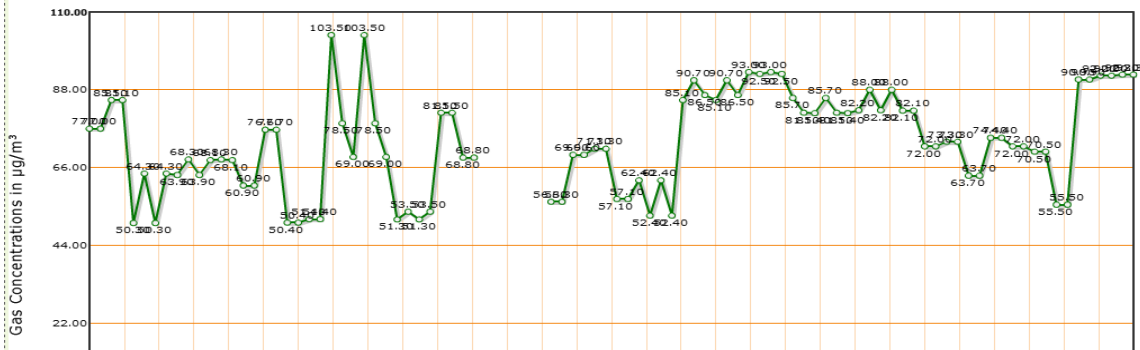
Parameters	Date	Time (IST)	Gas Concentrations	Prescribed Standard	Remarks	View Status of last 6 hours
Ammonia	Wednesday, September 25, 2013	17:40:00	27.9 µg	400 µg/m^3		Line Graph Bar Graph
Benzene	Wednesday, September 25, 2013	17:40:00	1.6 µg/m^3			Line Graph Bar Graph
Carbon Monoxide	Wednesday, September 25, 2013	17:40:00	1.2 mg/m^3	0 mg/m^3		Line Graph Bar Graph
Nitrogen Dioxide	Wednesday, September 25, 2013	17:40:00	66.4 µg/m^3	80 µg/m^3		Line Graph Bar Graph
Nitrogen Oxide	Wednesday, September 25, 2013	17:40:00	10.8 µg/m^3	-		Line Graph Bar Graph
Oxides of Nitrogen	Wednesday, September 25, 2013	17:40:00	76.3 µg/m^3	-		Line Graph Bar Graph
Ozone	Wednesday, September 25, 2013	17:40:00	34.3 µg/m^3	180 µg/m^3		Line Graph Bar Graph
p-Xylene	Wednesday, September 25, 2013	17:40:00	2.2 µg/m^3	-		Line Graph Bar Graph
Sulphur Dioxide	Wednesday, September 25, 2013	17:40:00	15.2 µg/m^3	80 µg/m^3		Line Graph Bar Graph
Toluene	Wednesday, September 25, 2013	17:40:00	7.8 µg/m^3			Line Graph

-- User friendly
-- Station wise continuous realtime hourly update
-- 24 hour average data
-- Back data available

Air Quality Monitoring Station : R. K. Puram

Oxides of Nitrogen for last 24 hours

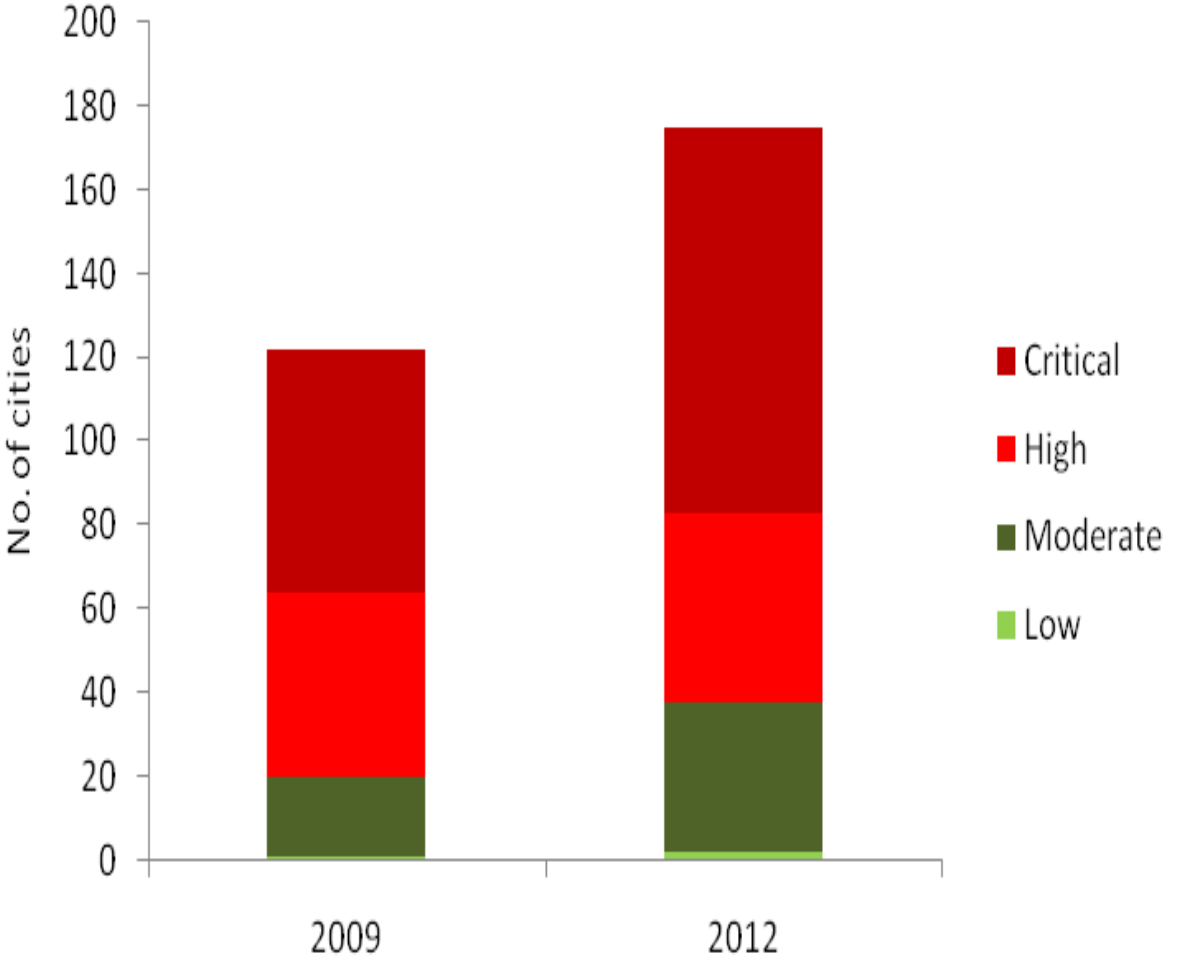
Standard : N/A



India
In grip of killer particles

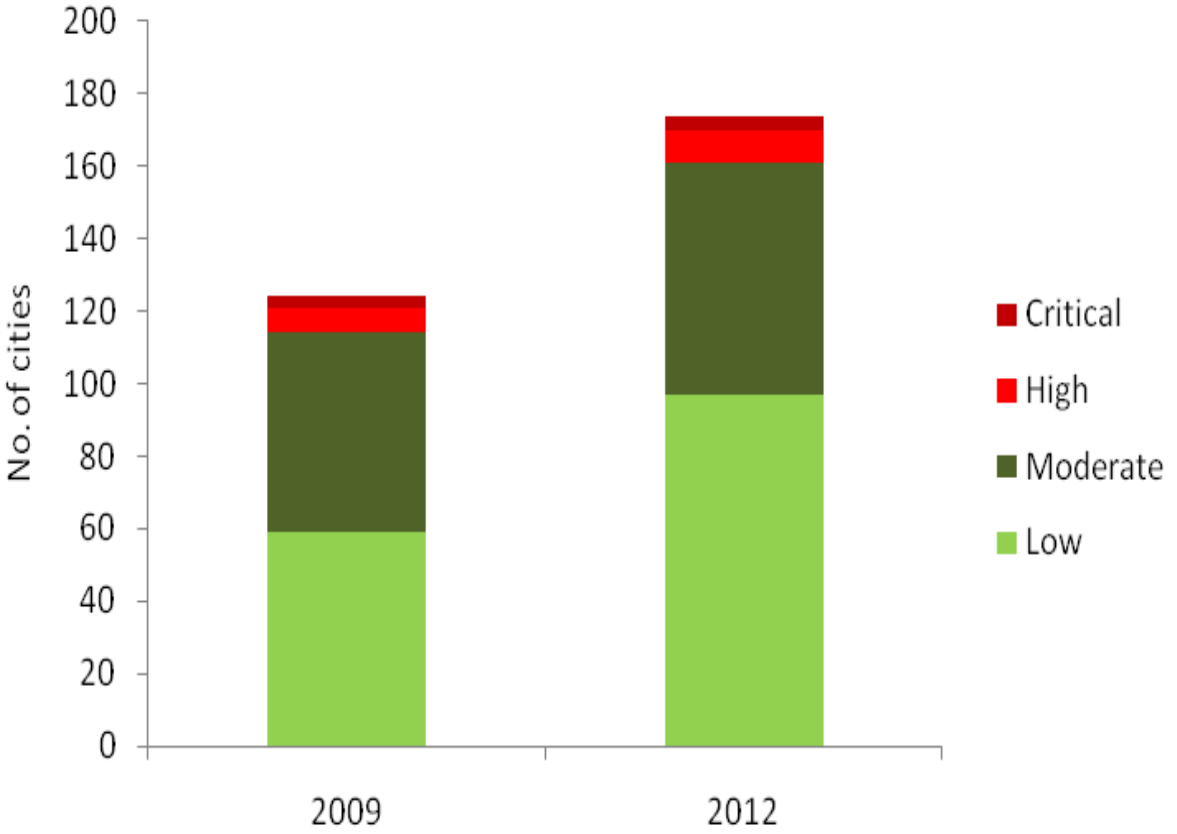
- Close to half of total urban population breath the air which exceeds the standard of PM10.

- One third of urban population live in cities with PM10 levels officially classified as critical.

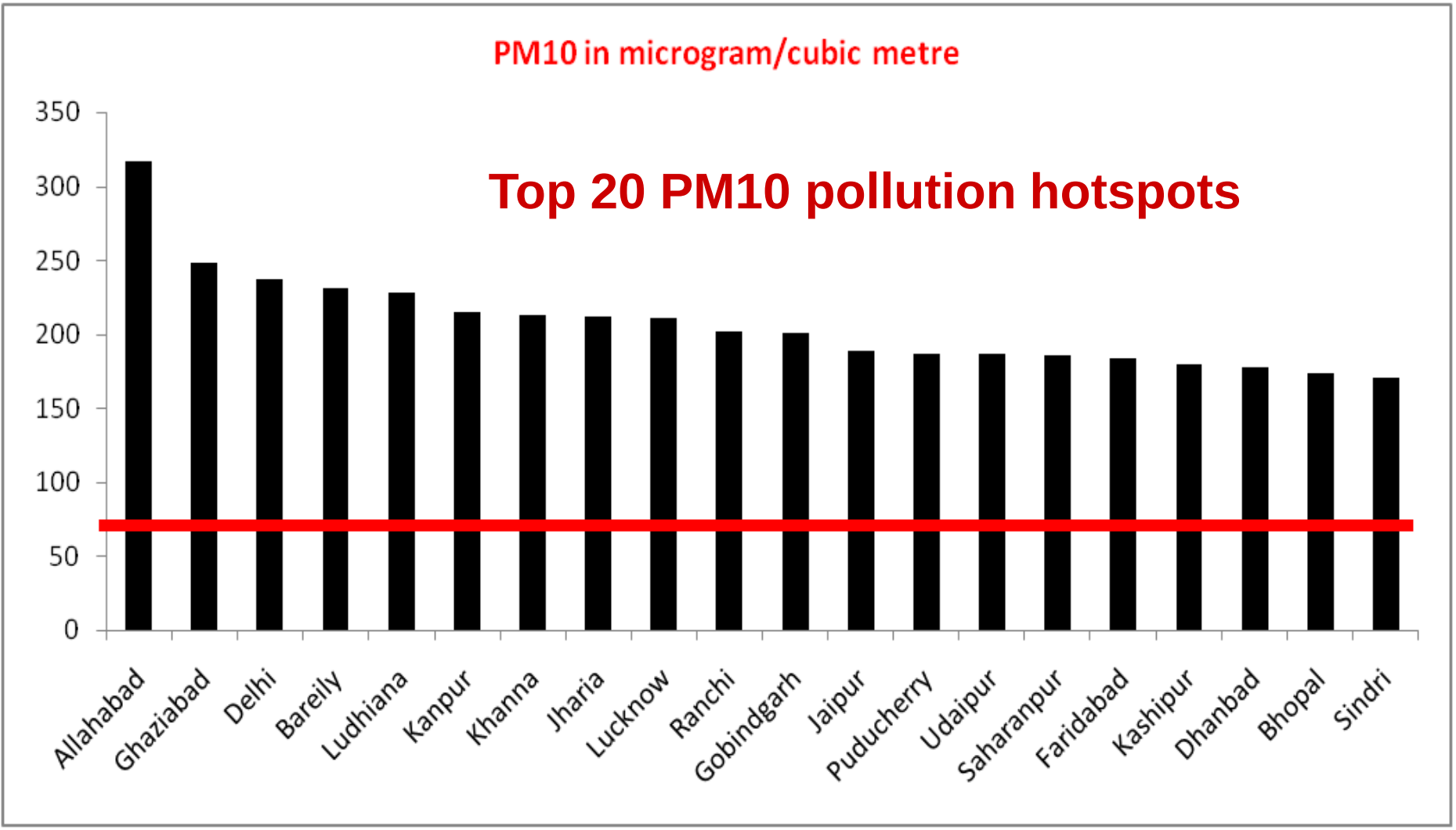


Nitrogen oxide: Emerging concern

- NO_2 is an emerging problem
- Several cities are in high to critical bracket



Smaller cities more polluted



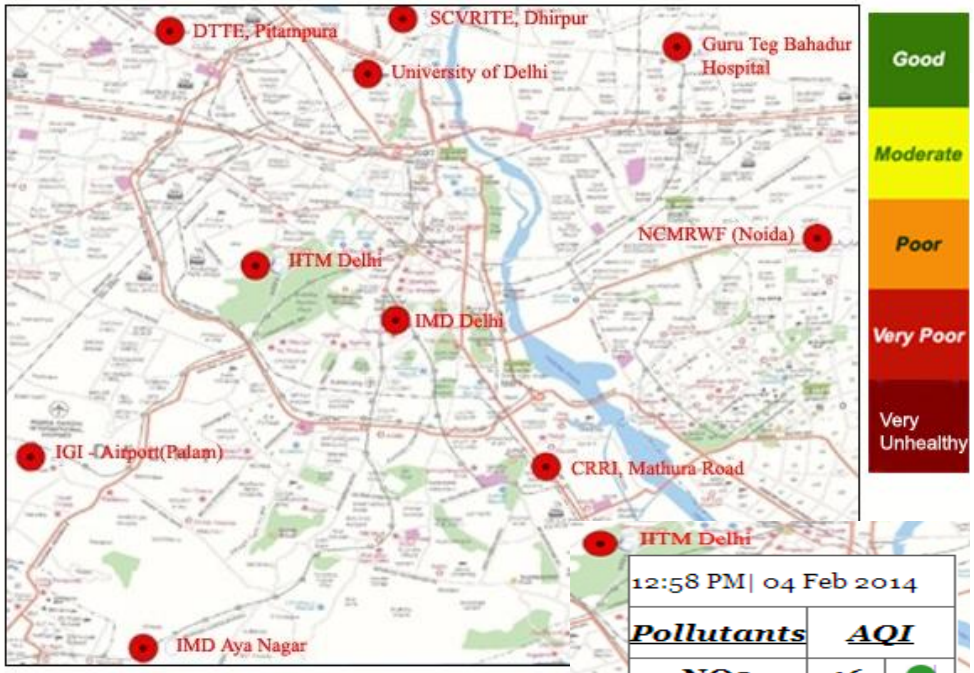
Public information on air pollution in Delhi

.....

Online Visualization

AQI Current | Only AQI attributes are shown below in terms of | Tomorrow's Forecast

Air quality Now



IITM Delhi

12:58 PM| 04 Feb 2014

Pollutants	AQI	
NO2	46	
O3	61	
CO	119	
PM2.5	115	
PM10	198	

AQI is used to simplify the data for common public... Delhi government has not yet adopted AQI defines air quality bands….

Air Quality Forecast | Current Weather

PM: 24-Hr Avg.; O3: 8-Hr Avg.

Delhi Air Quality - 1 - 3 days advance forecast

Pollutants	Delhi Today	Attribute	Tomorrow's Forecast	Attribute	After 3 days Forecast	Attribute
PM_{10} (μgm^{-3})	305	Poor	324	Poor	336	Poor
$PM_{2.5}$ (μgm^{-3})	117	Poor	126	Poor	132	Poor
O_3 (ppb)	28	Good	31	Good	34	Good

Gaseous Pollution: Good

Particulate Pollution: Poor

Source: http://safar.tropmet.res.in/

The beginning in African nations….

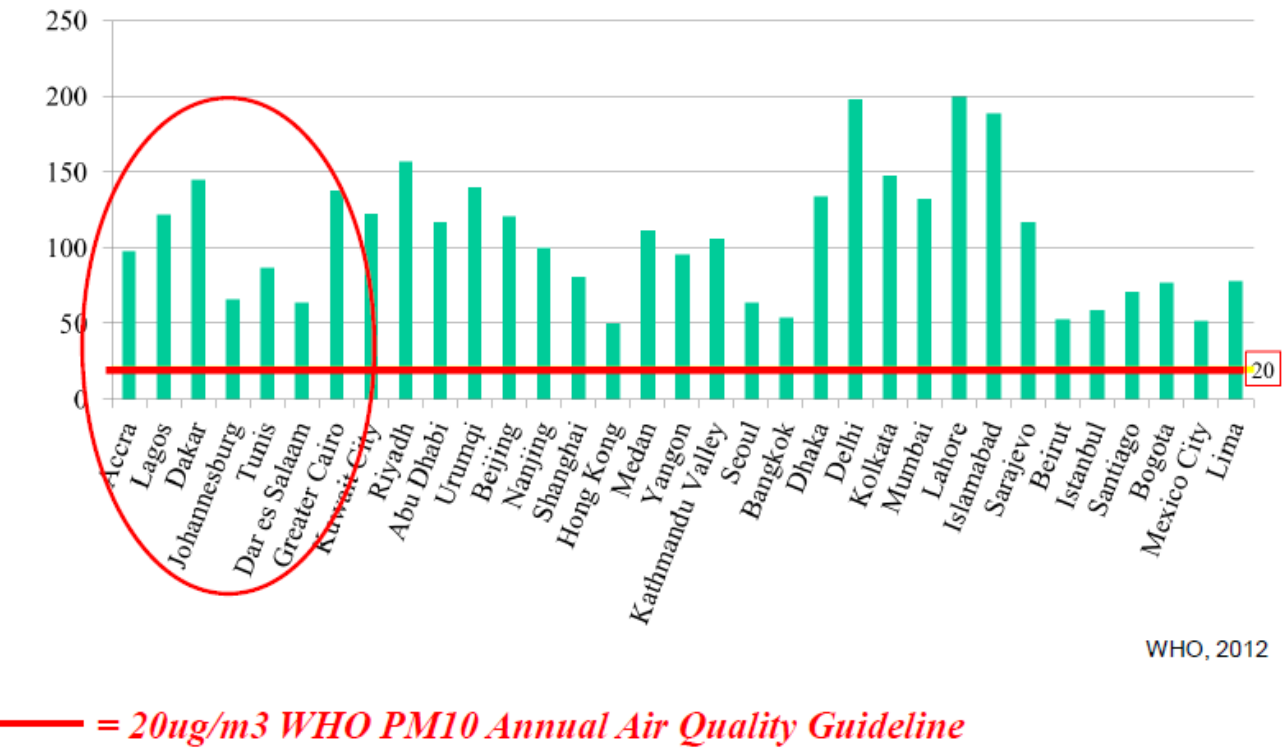
•The WHO database on outdoor air pollution of 2013 has listed African countries that monitor particulate:

- Algeria, Botswana, Ghana, Madagascar, Mauritius, Nigeria, Senegal, South Africa, and Tanzania, Ethiopia and Zimbabwe.

•Also Egypt, Madagascar, Tunisia, and Morocco have published reports of PM monitoring data.

•Nairobi: National Environmental Management Authority (NEMA) has drafted the air quality regulations in 2008. To be notified. Monitoring to begin…

Annual average particulate levels of select African cities are well above WHO guideline



WHO, 2012

= 20ug/m3 WHO PM10 Annual Air Quality Guideline

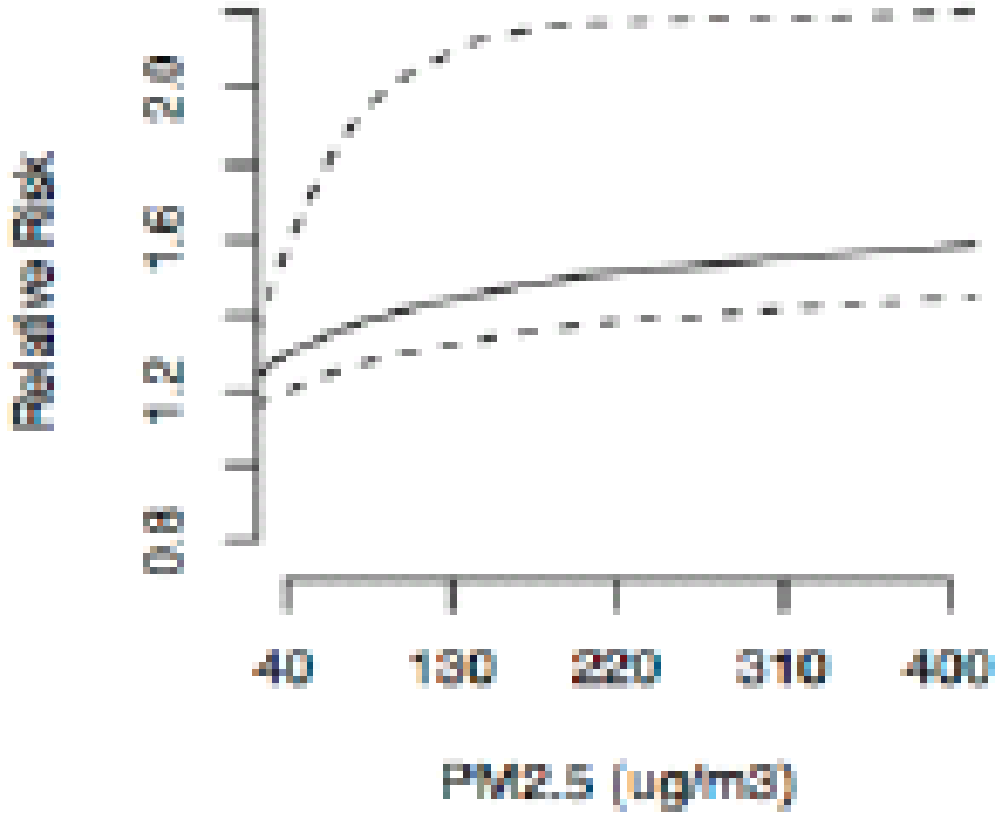
Reported pollution levels in African cities are lower than some of the worst hit cities in India.

But they are still much higher than the stringent WHO guidelines.

PM10 levels are 7.5 times the WHO standards in Dakar, 5 times higher in Accra, 6 times higher in Lagos, and more than 3 times higher in Jo berg and Tunis.

In Delhi levels are 10 times higher.

Be warned …. Most of the health effects occur at much lower levels than reported in our cities…..



Integrated Exposure-Response function for Ischemic Heart Disease

HEI Global Burden of disease, 2013

Air quality monitoring: Senegal takes a step forward

The Senegalese Ministry of Environment and Sanitation has set up a Centre for Management of Air Quality. There are 5 fixed monitoring stations in Dakar. Also a portable air quality monitoring van.

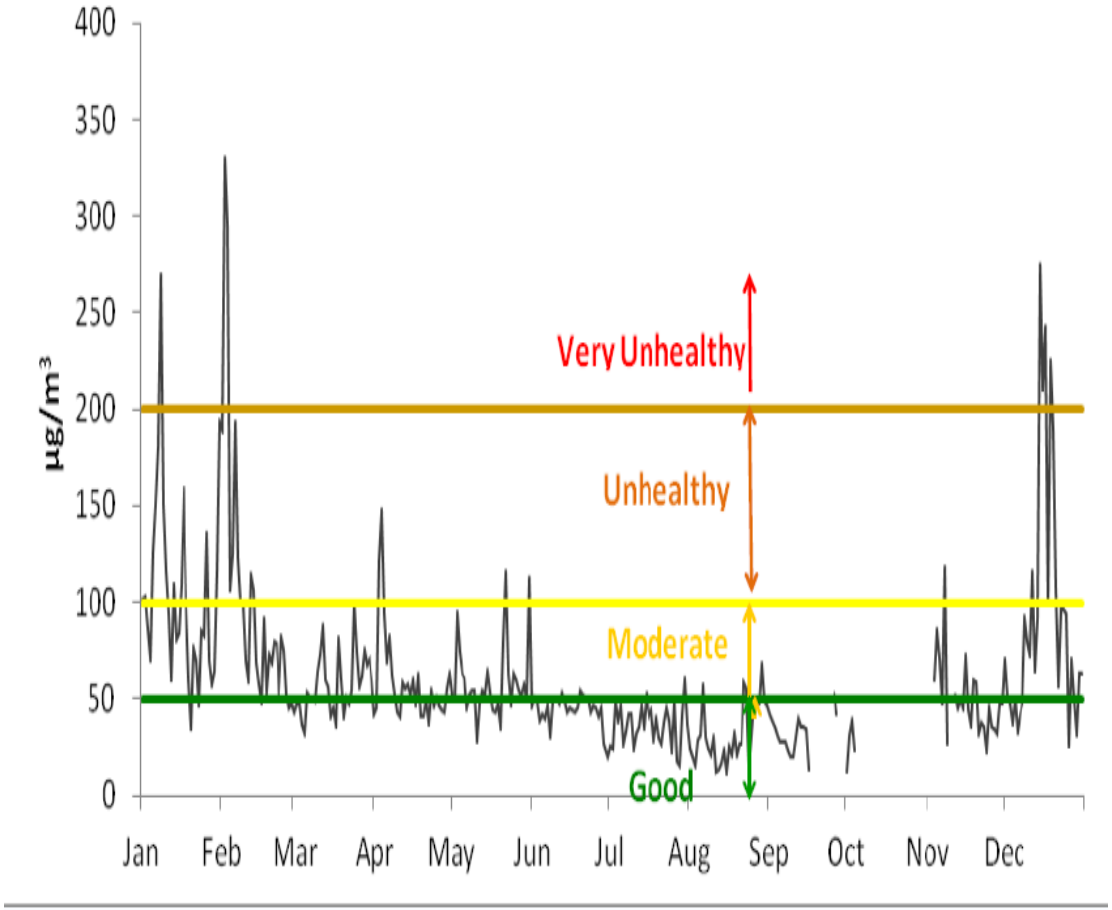
The air quality measurements are characterized and communicated to the public through a simple air quality index.

Pollutant	Averaging time	Maximum Limit Value	
		WHO	Senegal
Sulphur Dioxide (SO_2)	1 hour 24 hours Year	500 (10 min) 125 50	- 125 50
Nitrogen Dioxide (NO_2)	1 hour Year	200 40-50	200 40
Ozone (O_3)	1 hour 8 hours	150-200 120	- 120
Carbon Monoxide (CO)	1 hour 8 hours	30 000 10 000	- 30 000 (24h)
Particles <10 µm (PM10)	24 hours Year	50 * 20 *	260 80
Lead (Pb)	Year	0.5-1,0	2

*) EU limit values

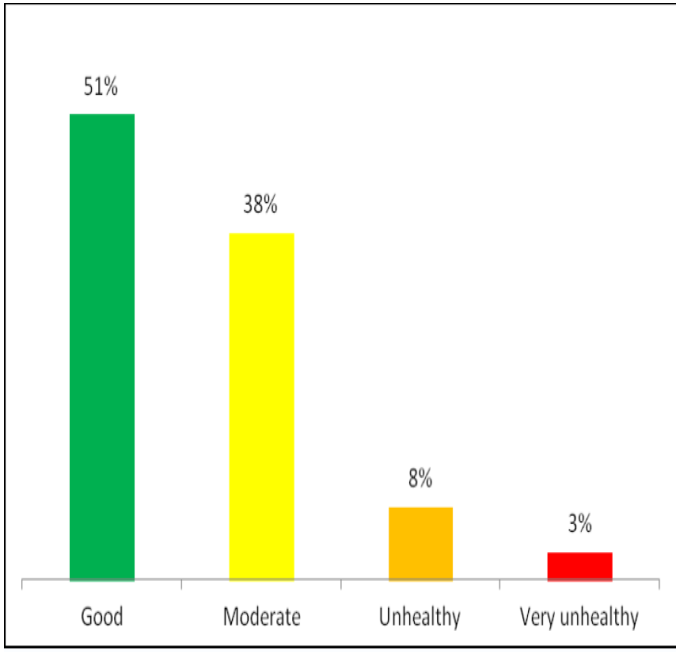
Air Quality Index (AQI) values…	Levels of Health Concern	Colors
When the AQI is in this range…	… air quality conditions are:	… as symbilized by this color:
0 – 50	Good	Green
51 - 100	Moderate	yellow
101 - 200	Unhealthy	Orange
> 200	Very Unhealthy	Red

Air quality monitoring in Senegal



Daily Air Quality Index (AQI) in Dakar for 2013

www.air-dakar.org



Air Quality status in Dakar for 2013

www.air-dakar.org

Scale up monitoring to build public and policy awareness

Our regions need inventive action to expand air quality monitoring: Globally there are efforts to develop advanced but low cost monitoring technologies and guidelines for them to meet requirements of regulatory monitoring.

This can be widely deployed at lower costs to supplement the conventional monitoring system that are very expensive for our regions.

Our cities need to bridge the gap in data availability to citizens and also assess personal exposure.

It is important to invest in data generation to inform policy action on health protection.

But let us not wait for the perfect data….. There are enough evidences out there for us to act and protect public health

Our health matters……

Mounting global health evidences…..

Scale of global studies provide clinching evidences…….

Eg. the Arden Pope study (Journal of American Medical Association 2002) based on American Cancer Society data …..**16 years, about 500,000 people in 116 metropolitan areas** to arrive at **irrefutable findings**.

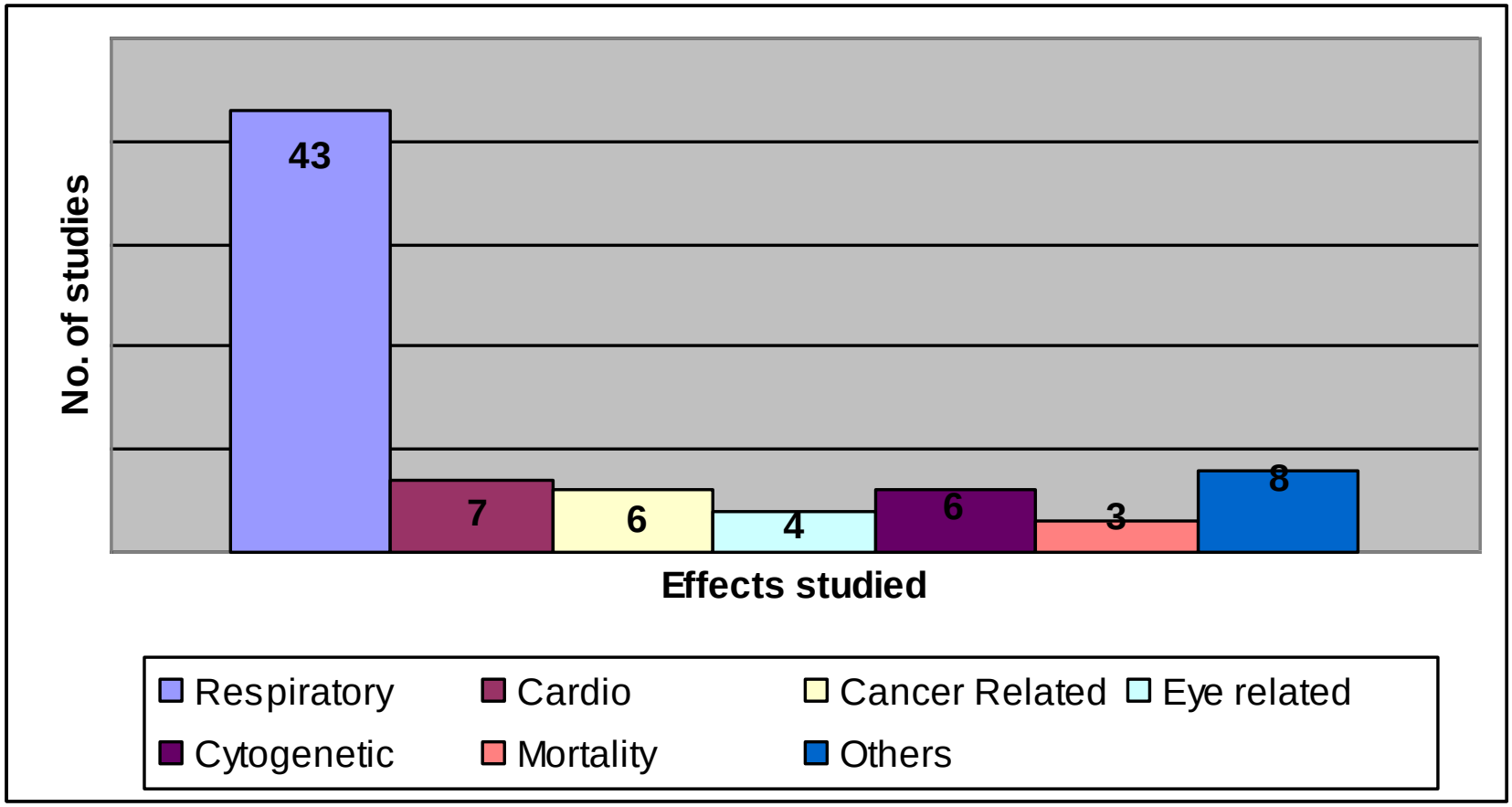
…… a mere increase of 10 microgramme per cum of PM2.5 can increase the risk of lung cancer by 8 per cent, cardiopulmonary deaths by 6 per cent, all deaths by 4 percent.

These findings are equally valid for India …

Lungs are same everywhere…….

Studies looking at a more diverse health end points….

Respiratory health symptoms dominate…. But more health outcomes – cardiovascular, eye disorders, cellular changes, cancer, premature deaths….



Source: CSE

Global studies ….

Looking beyond lungs ……

Diabetes: First large-scale population-based study links diabetes with air pollution. Increase in insulin resistance in lab test …. and an increase in markers of inflammation (which may contribute to insulin resistance) after particulate exposure.

Strong and consistent association between diabetes prevalence and PM2.5 concentrations.

For every 10 µg/m3 increase in PM2.5 exposure, there was a 1 percent increase in diabetes prevalence. Counties with highest versus the lowest levels of PM2.5 pollution had a more than 20% increase in diabetes, which remained after controlling for diabetes risk factors. (Diabetes Care 2011)

Heart:

Acute Effects of Fine Particulate Air Pollution on Cardiac Arrhythmia:Conclusion: PM2.5 exposure within approximately 60 min was associated with increased PVC counts in healthy individuals. (He F et al 2011The APACR Study. Environ Health Perspect)

Blood pressure

Traffic-related Air Pollution and Blood Pressure in Elderly Subjects With Coronary Artery Disease**:** Found positive associations of systolic and diastolic BP with air pollutants. The strongest associations were with organic carbon, multiday average exposures, ect. (Delfino, Ralph J.a et al 2010,, Epidemiology, May 2010)

Effect on foetus: Studies have shown damaging impact of PAH on even fetus

Source: CSE

Health of our children compromised……

Scary evidence from Delhi

2012 epidemiological study on children in Delhi (CPCB and Chittaranjan National Cancer Institute of Kolkata):

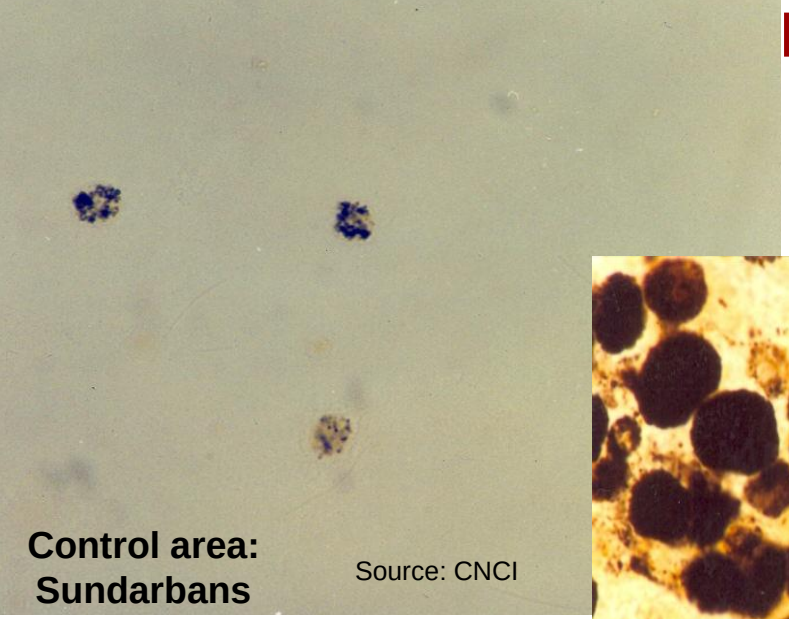
-- Covered **11,628 school-going children from 36 schools**.

-- **Every third child has reduced lung function. Sputum of Delhi's children contains four times more iron-laden macrophages** than those from cleaner environs, **indicating pulmonary hemorrhage**.

-- **The levels of these biomarkers in children have been found to be higher in areas with high PM10 levels**.

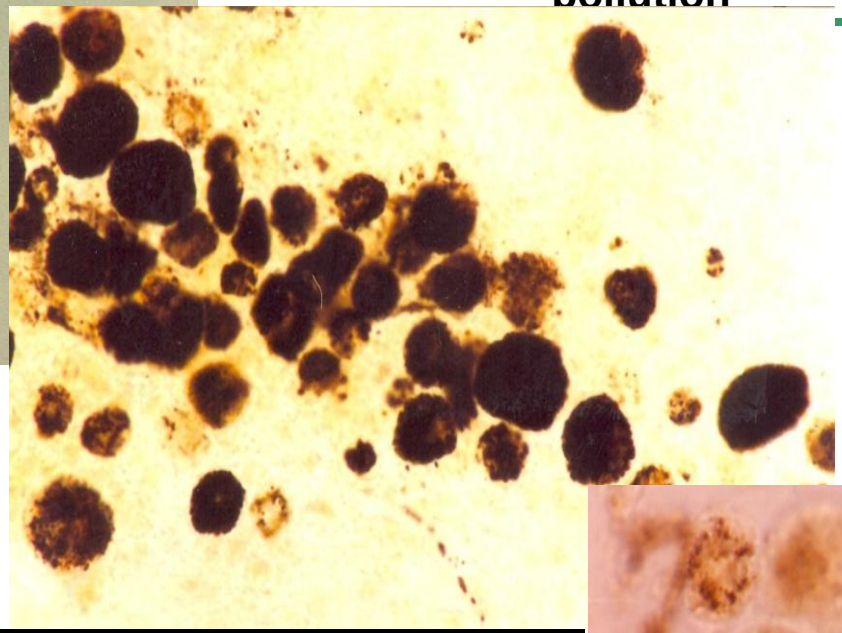
Emerging evidences of health impacts in India……

Alveolar macrophage - biomarker of air pollution



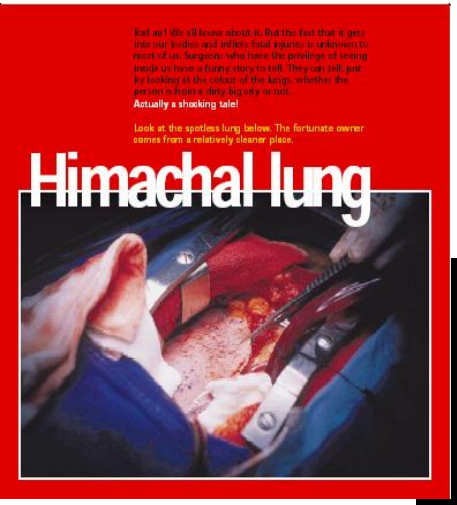
Control area: Sundarbans

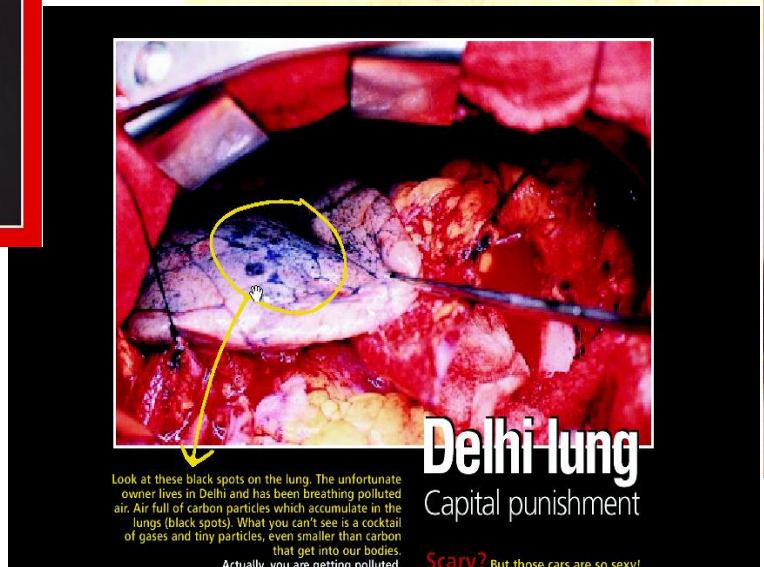
Source: CNCI

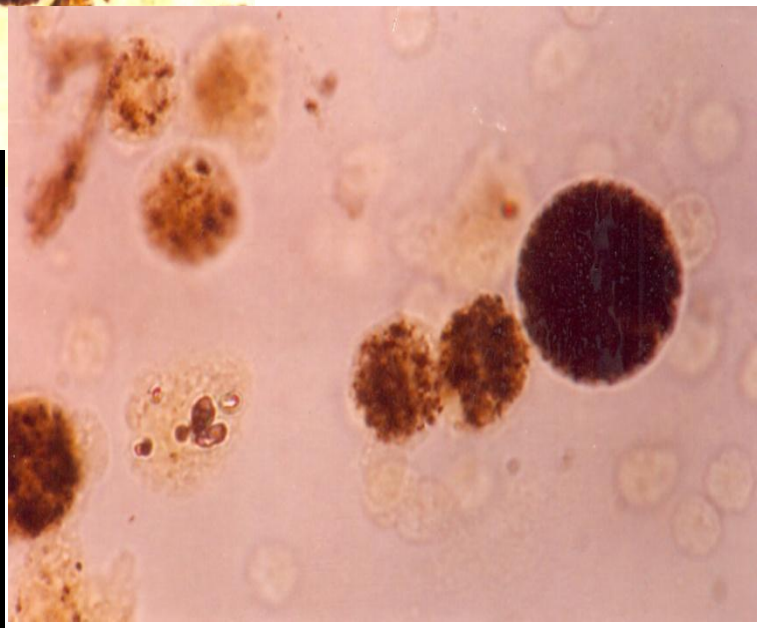


Exposed group; Kolkata taxi driver

Increase in AM number







Source: CSE

Cities in African region: Health cost of air pollution

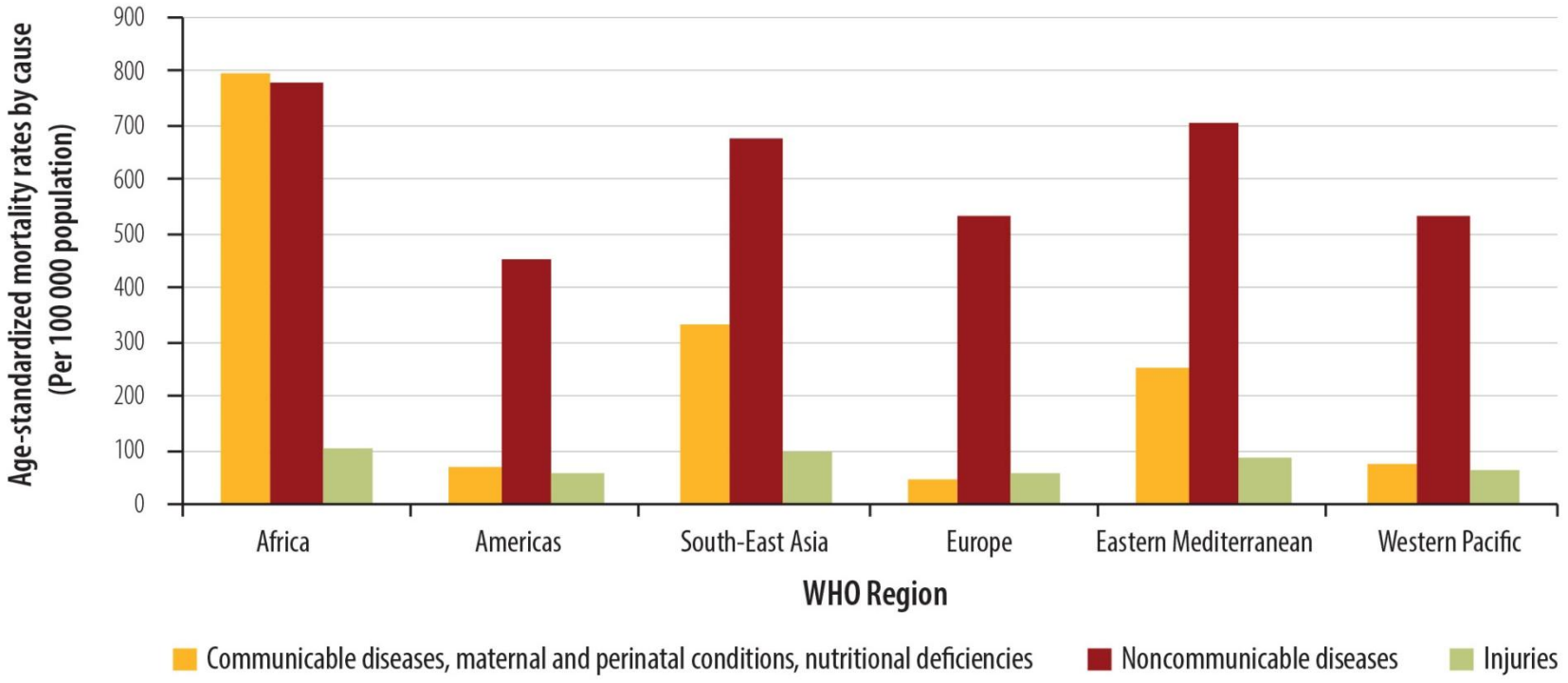
The UN Economic Commission of Africa has estimated that **the cost of air pollution in a number of African cities can be as high as 2.7 per cent of GDP**.

In Africa **about 176,000 deaths permature deaths due to air pollution**. The WHO assessment of pre-mature deaths in Africa is below world average. But data is also a barrier

A study by University of Nairobi: **The economic loss per year in Kenya of vehicle emissions and associated air pollution is 115 million KSh from related illnesses and deaths.**

Africa: One of the highest death rate from non-communicable diseases

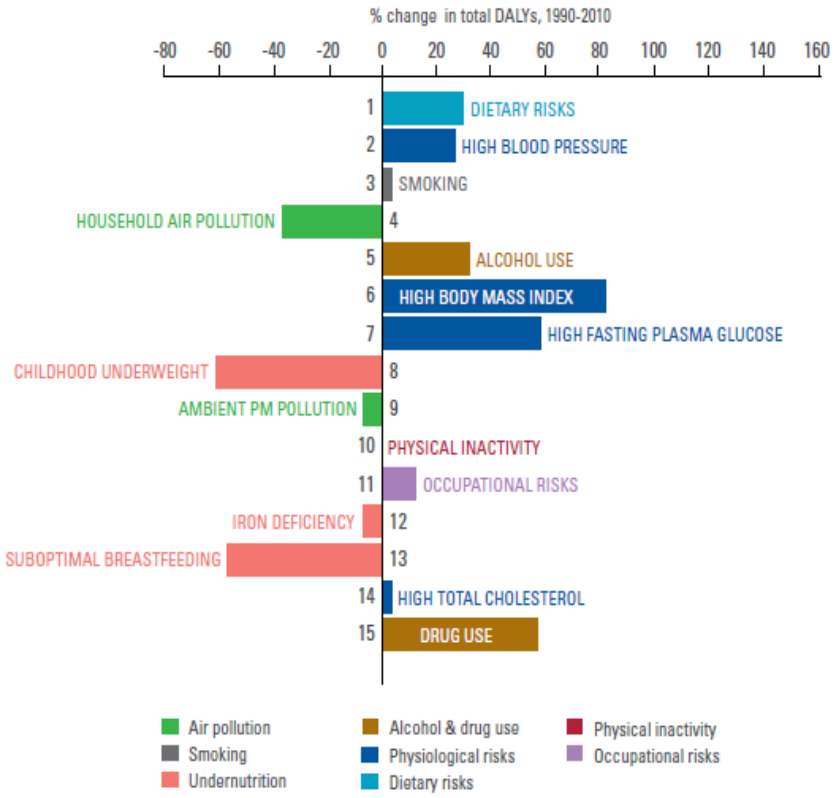
Age-standardized Mortality Rates by Cause, WHO Regions, 2008



Source: World Health Statistics 2013, World Health Organization

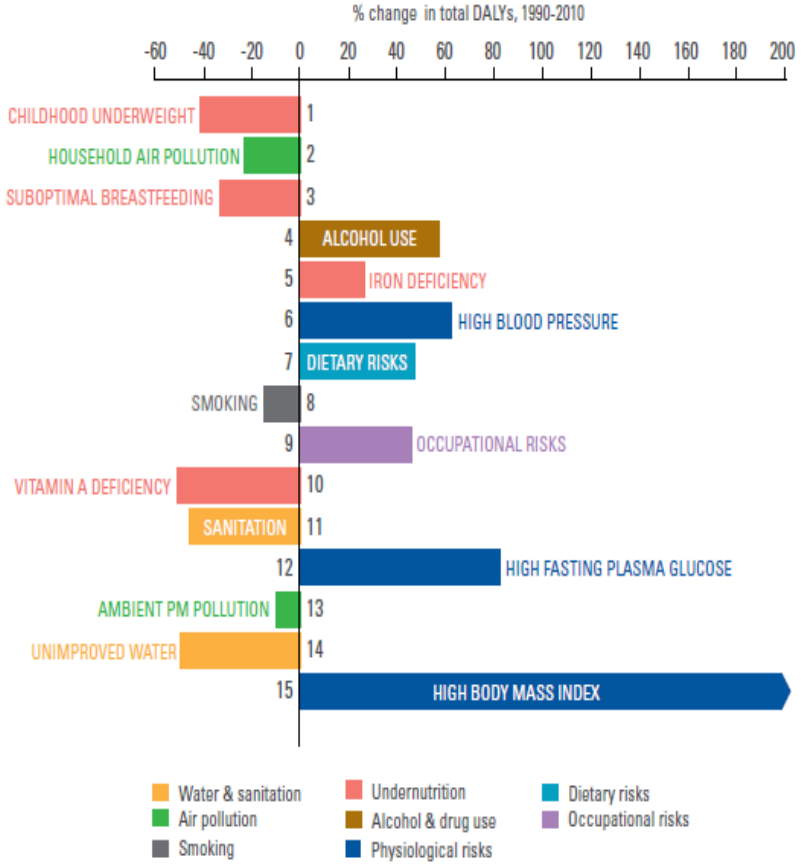
DALYs ranking for top 15 factors: Global and Sub-Saharan Africa

Global shifts in rankings of DALY s for top 15 risk factors, 1990-2010



Note: The leading 15 risk factors are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars to the right of the vertical line show the percent by which DALYs attributable to different risk factors have increased since 1990. Bars on the left show the percent by which DALYs attributable to different risk factors have decreased. Attributable DALYs were not quantified for physical inactivity for 1990.

Shifts in rankings of DALY s in sub-Saharan Africa for top 15 risk factors, 1990-2010



Note: The leading 15 risk factors are ranked from top to bottom in order of the number of DALYs they contributed in 2010. Bars going right show the percent by which risk factors have increased since 1990. Bars going left show the percent by which risk factors have decreased. Pointed arrows indicate causes that have increased by a greater amount than shown on the x-axis.

Source:The Global burden of disease: Generating evidence,Guiding Policy, Sub-saharan Africa Regional edition

Jigsaw of health evidences from cities of Africa

Addis Ababa: A study of patients and their exposure to the pollution level -- **Out of the top 20 leading causes of out patient visit by region in all health centers and hospitals of Addis Ababa, acute respiratory infections is of prime concern**.

- This is due to noxious emissions from vehicles. Cases of acute respiratory infection were about **148,000 in 2006-2007**, which reached up to **207,000 in 2007-2008**.

- Study has identified more than 18 air pollutant elements in the biomonitor samples (lichen) in highly polluted area affected mainly by traffic air pollution.

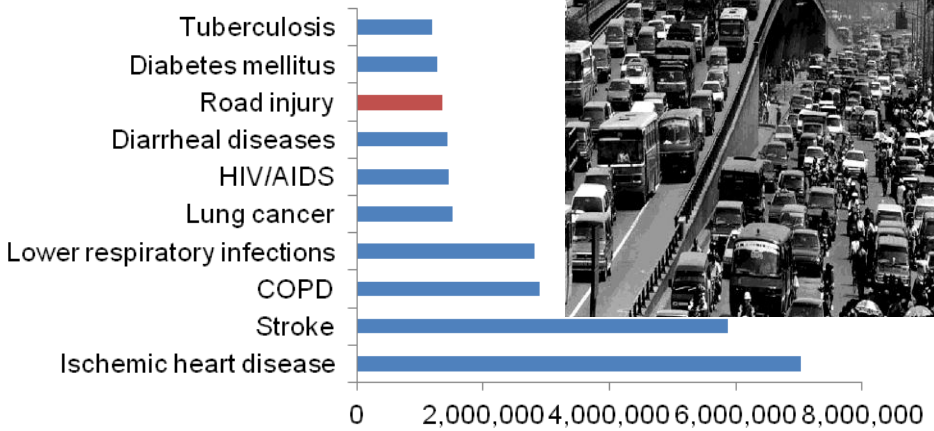
In Ghana acute respiratory illness is among the top 10 causes of out patient hospital visit. The Africa is also reporting one of the highest death rates form non-communicable disease. Air pollution can exacerbate this.

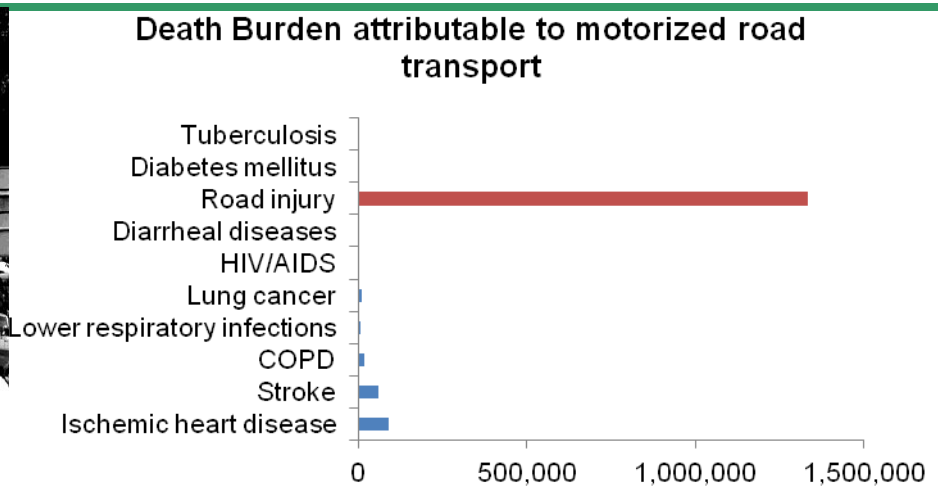
Nigeria: Study by Delta State University on ambient particulate pollution and health impact in Nigerian cities (2001-2006) show significant prevalence of **cough, catarrh, eye infection, asthma, chronic bronchitis etc.**

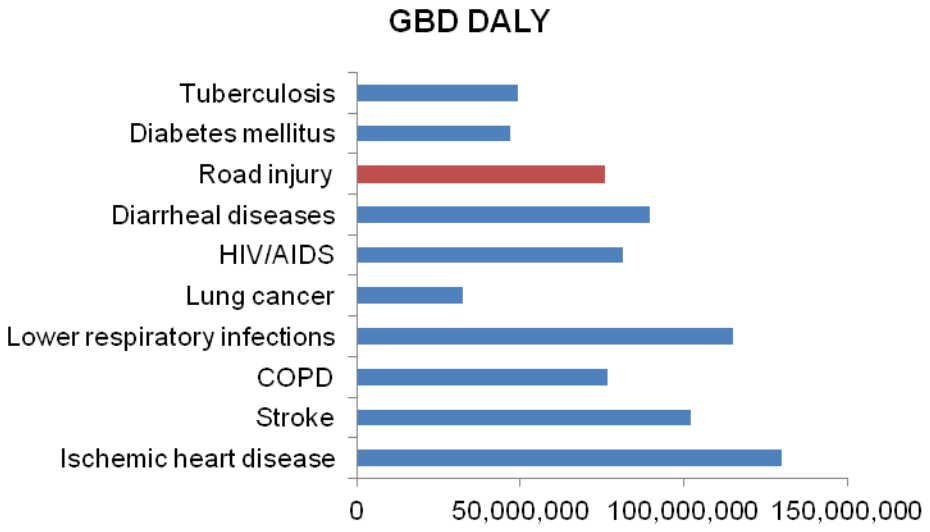
http://www.epostersonline.com/rcog2014/?q=node/2038&posterview=true

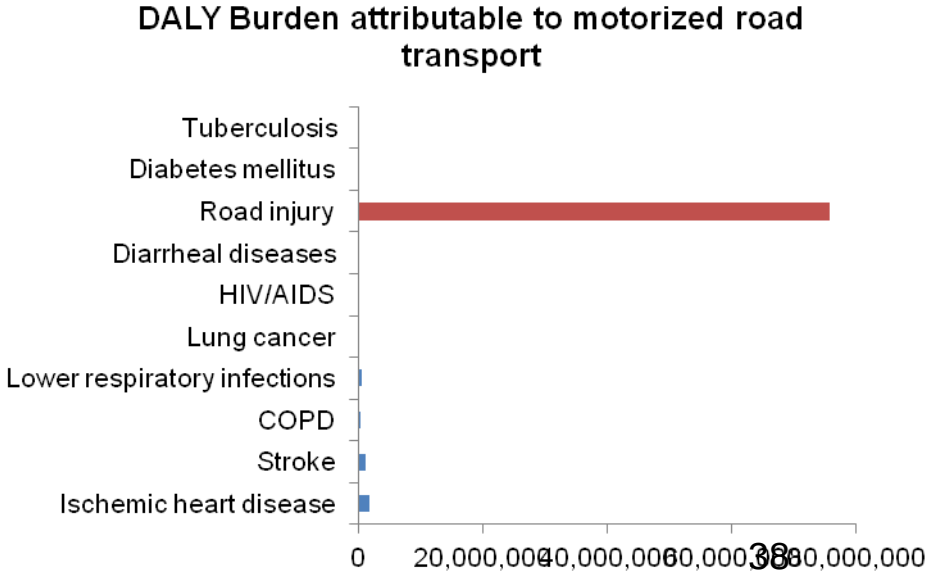
Yet another impact of motorisation…..road injuries and deaths

Global Burden of Disease changed the way we understand health impact of motorisaton Combined burden of road injury and deaths and illness









Source: Global Burden of Diseases 2010 Study, Leading causes of death worldwide, associated DALYs, and burden attributable to motorized road transport, 2010

Underreporting of road death data in Africa and India

The 2009 WHO Global Status Report on Road Safety compared with WHO mortality models, suggested significant under-reporting of the problem.

For 2013, India underreported road death estimates by 78%.
Countries in SubSaharan Africa under-report road crashes by over 500%.

Reported data in African region is 7.2 per 100,000 people. Modelled data shows it is as high as 32.2 per 100,000 people – a five time increase

•WHO 2013: 38% of road traffic deaths in Africa involve pedestrians -- 16 percent higher than the world

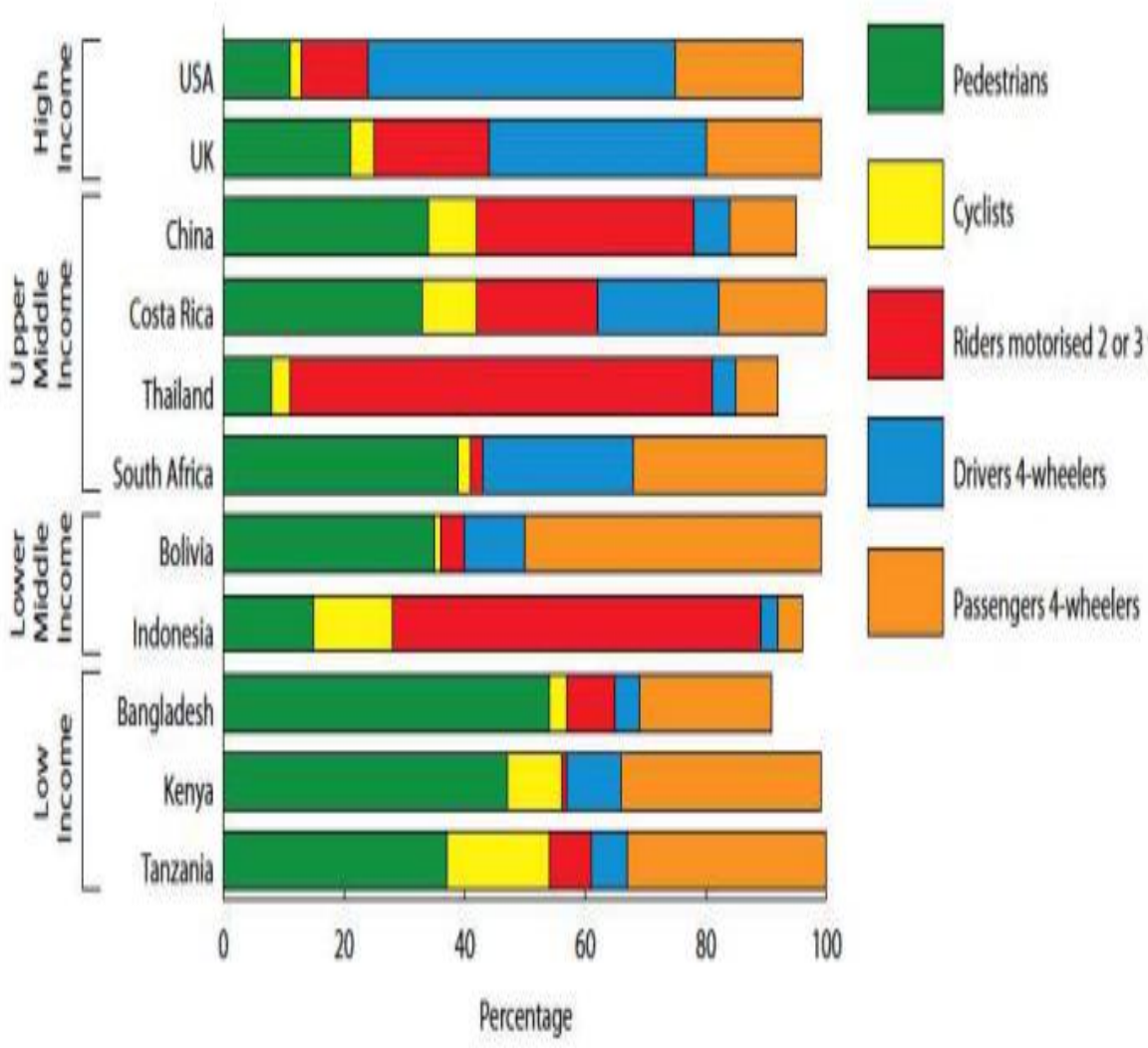
Table 4. Road traffic deaths by WHO region using reported and modelled data

WHO REGION	REPORTED DATA[a]		MODELLED DATA[a]	
	n	RATE PER 100 000 POPULATION	*n*	RATE PER 100 000 POPULATION
AFRICAN REGION	52 302	7.2	234 768	32.2
REGION OF THE AMERICAS	139 466	15.5	142 252	15.8
SOUTH-EAST ASIA REGION	143 977	8.4	285 020	16.6
EASTERN MEDITERRANEAN REGION	76 912	14.1	175 668	32.2
EUROPEAN REGION	113 346	12.8	117 997	13.4
WESTERN PACIFIC REGION	135 316	7.6	278 321	15.6
GLOBAL	**661 319**	**10.1**	**1 234 026**	**18.8**

[a] Adjusted for 30-day definition.

http://www.un.org/ar/roadsafety/pdf/roadsafetyreport.pdf

Road casualties by transport mode
Pedestrians and cyclists are the most vulnerable…..



Ethiopia: Fewer than 10 cars for every 1,000 inhabitants. But road traffic deaths are twice as high as in India and seven times higher than in the United Kingdom.

Kenya: Pedestrians (47%) among the largest group among reported road traffic fatalities, followed by passengers (33%), drivers (9%), cyclists (9%) and motorcyclists (1%)

Nairobi: 50-70% of accidents involve pedestrians

Action on road safety….

Some African cities have begun to initiate action on road safety:

• **Kenya:** National Transportation Safety Authority established to manage road safety

• **Uganda:** Approval of nation wide non-motorised transport policy

• **Gambia**: Developing an inter-ministerial committee on road safety but does not have funding to implement yet.

• **Zambia**: MoU with the relevant organisations

• **Tunisia**: Road safety observatory which includes many parties

• **Senegal:** An inter-ministerial committee to look at the issue and is working with driving schools

• **Nigeria:** Road safety programme

Vehicles are a special problem…

Where is pollution coming from?

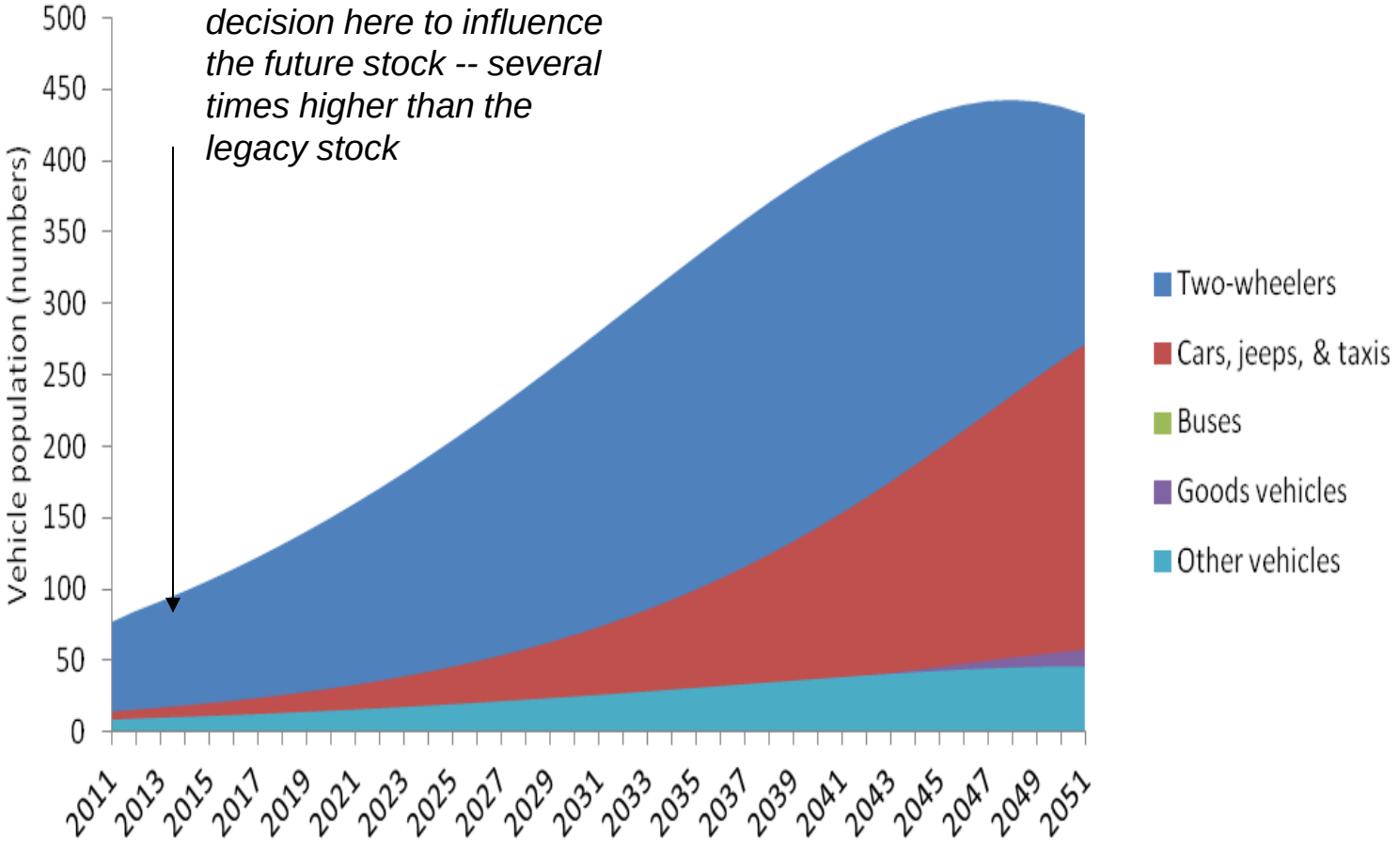
Vehicles? Industry? Power plants? Generator sets? Open burning?

Do not know accurately. Inventories too inadequate

Limited and partial studies constrain policy decision

Motorisation in India …..

Need stringent and preventive action and decision here to influence the future stock -- several times higher than the legacy stock



Source: CSE

Vehicle numbers expected to explode in African cities..

Vehicle numbers in cities of Africa are comparatively less than Indian metro cities… but poised for rapid growth…

Kenya: 2013, Kenya has a registered vehicle fleet of 2.25 million. Of these nearly 30% per cent are in Nairobi. Kenya imports around 200,000 every year. As much as 85.5% registered vehicles in the country are personal – motorcycles and cars. Motorcycles. **Nairobi's car fleet to double in just six years**.

Lagos: If ownership rates grow from 0.05 per capita to 0.06 over the period from **2010 to 2025 there will be an 80% increase in the numbers of vehicles** -- to around 850,000.

Addis Ababa: **Base numbers are still small. But growth rate to increase**… Last year, a total of 30,128 cars were imported, -- an increment of more than 7,000 cars than the previous year. In June 2014 the total stock of registered cars in the nation was 519,816.

Vehicular pollution: High exposure

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.

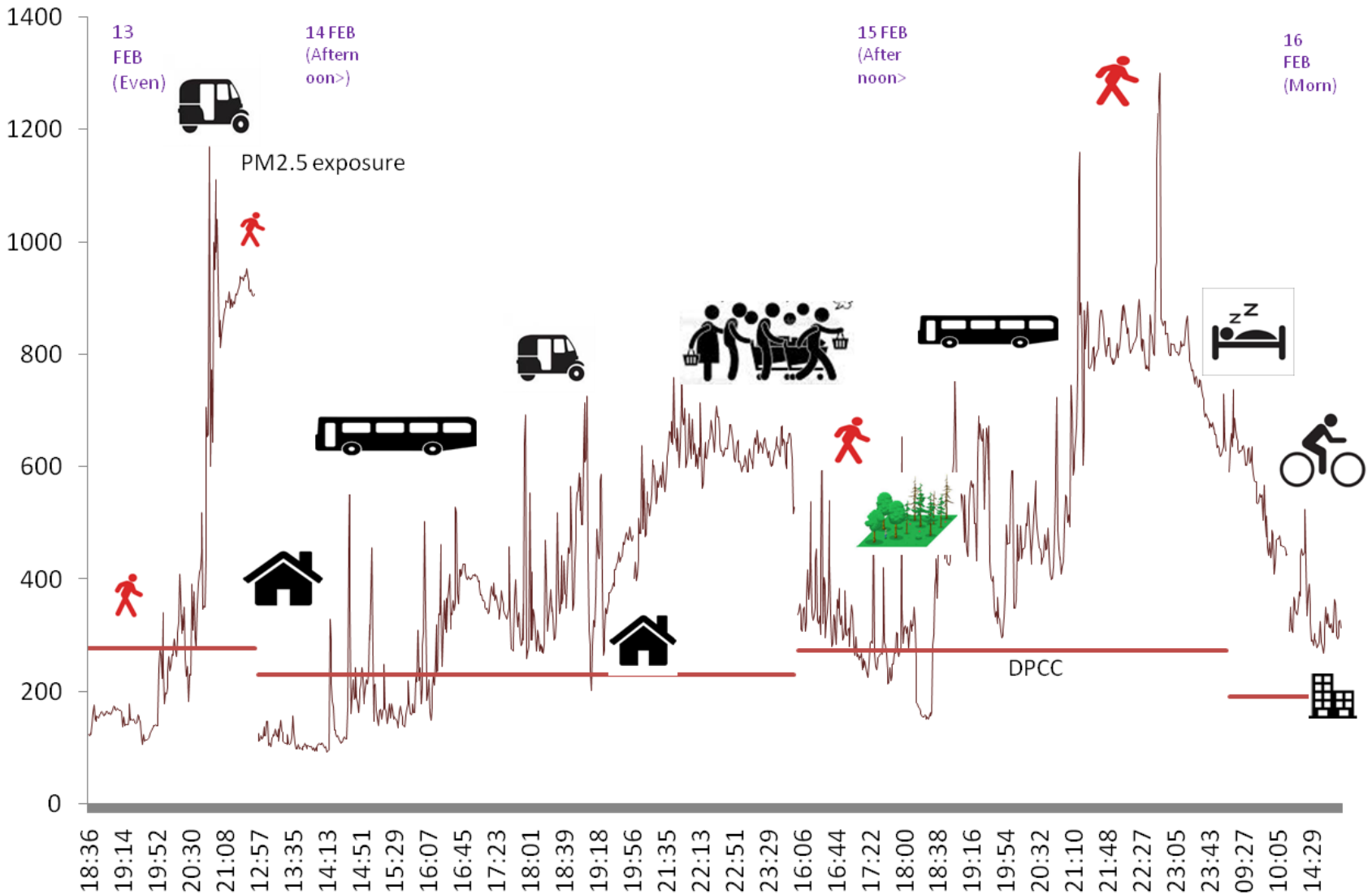
Some of the deadliest air toxics, also carcinogens, are related to vehicular emissions. Blamed even for killing foetus.

About 55% -- more than half of Delhi's population live within 500 meters from arterial roads in Delhi that is the direct influence zone.

About 60% of health studies in India have focused on exposure to traffic pollution…

CSE assessment of exposure to pollution while traveling on roads

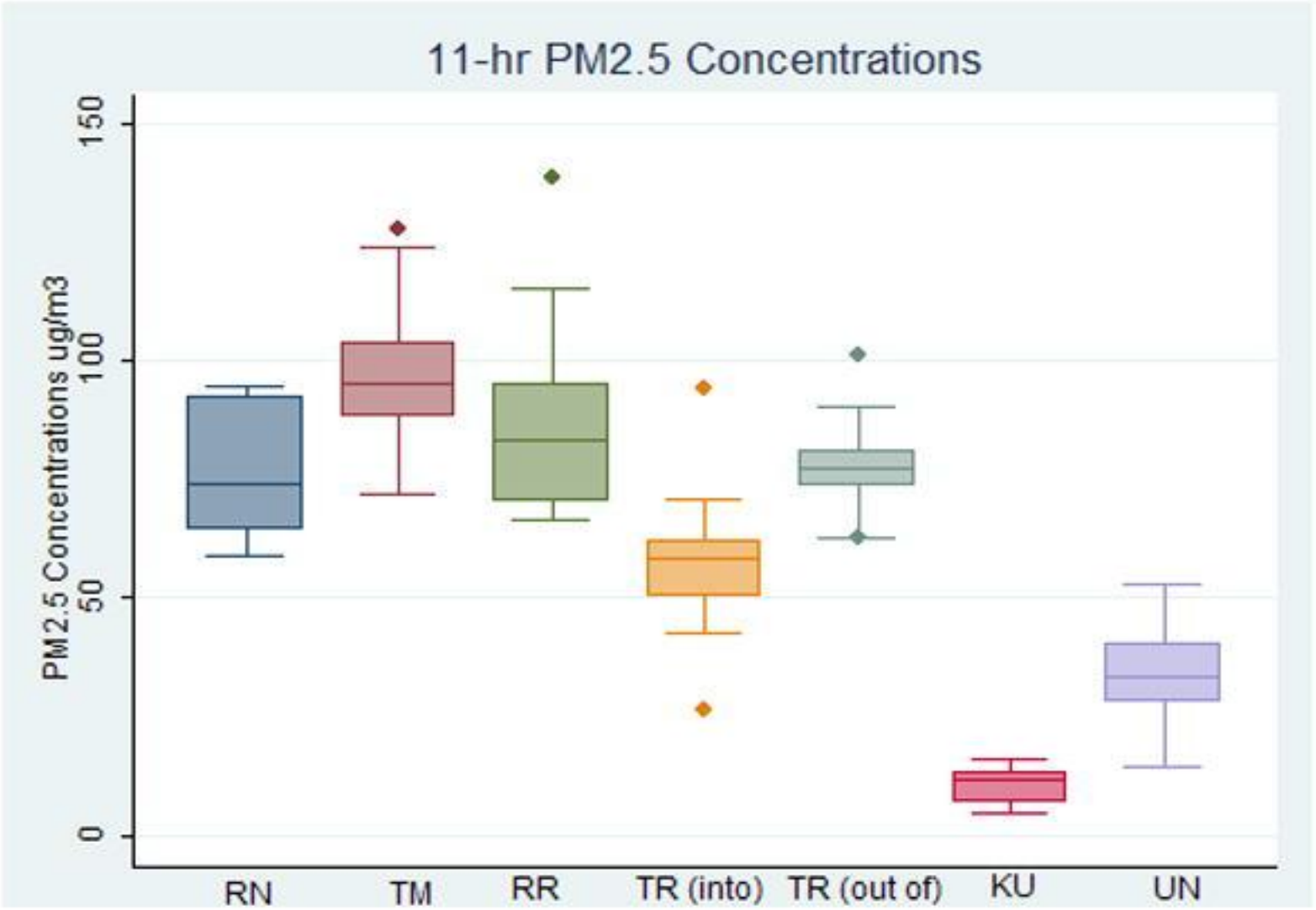
Average exposure to PM2.5 ranged between 192 to 642 micrgramme per cum. Peaks as high as 457 to 1170. The average ambient level ranged between 191 to 277.



Source: Based on CSE exposure monitoring and DPCC data for ambient levels

Traffic Impacts on PM2.5 in Nairobi, Kenya

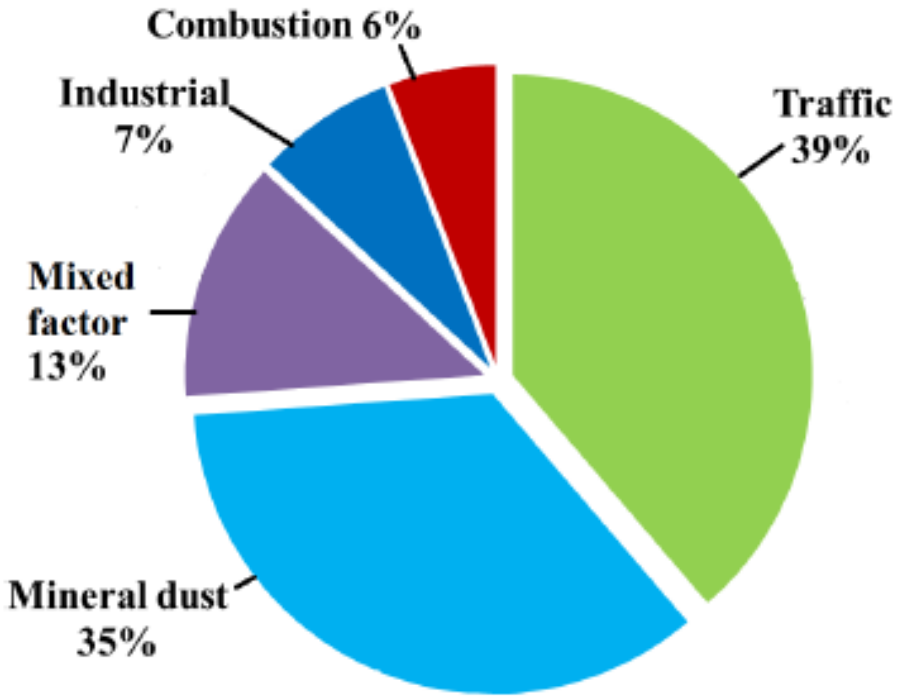
Weekday $PM_{2.5}$ concentrations at five core sites in Nairobi.



http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3138055/figure/F1/

High traffic impacts on PM2.5 levels

Pollution sources in Nairobi: Traffic and mineral dust factors are major contributors to airborne particulate pollutants



Lagos: A study by the Lagos Metropolitan Transport Management Authority (LAMATA) on air quality between 2003 and 2007 indicated that **vehicles contribute about 43% of ambient air pollution**

Greater emissions from **diesel engines.**

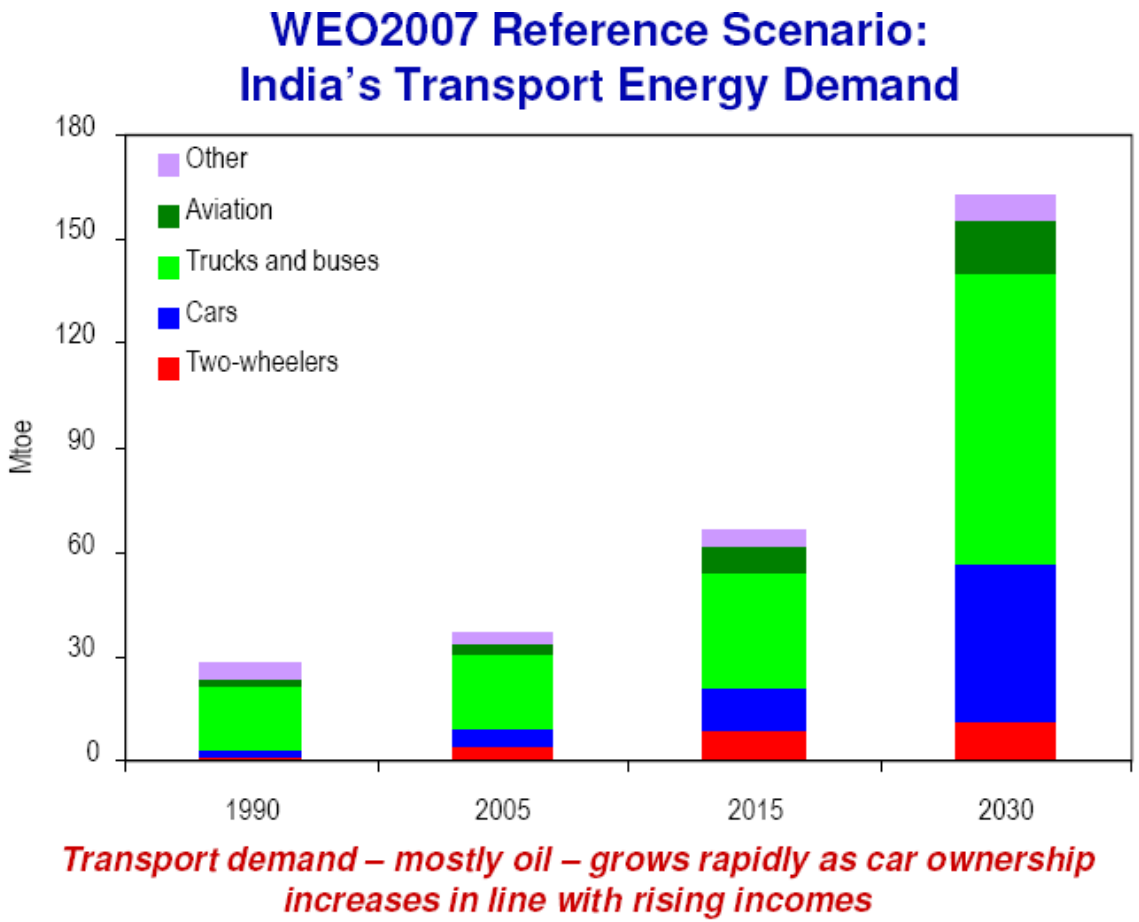
Transportation by trucks and heavy duty vehicles add to pollution load.

Atmos. Chem. Phys., 14, 9977–9991, 2014 www.atmos-chem-phys.net/14/9977/2014/ doi:10.5194/acp-14-9977-2014 © Author(s) 2014.
 Source apportionment and seasonal variation of PM2.5 in a Sub-Saharan African city: Nairobi, Kenya

Energy impacts of motorisation…

Energy impacts of motorisation in India

Trend in fuel consumption by different modes of transport in India



Source IEA

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

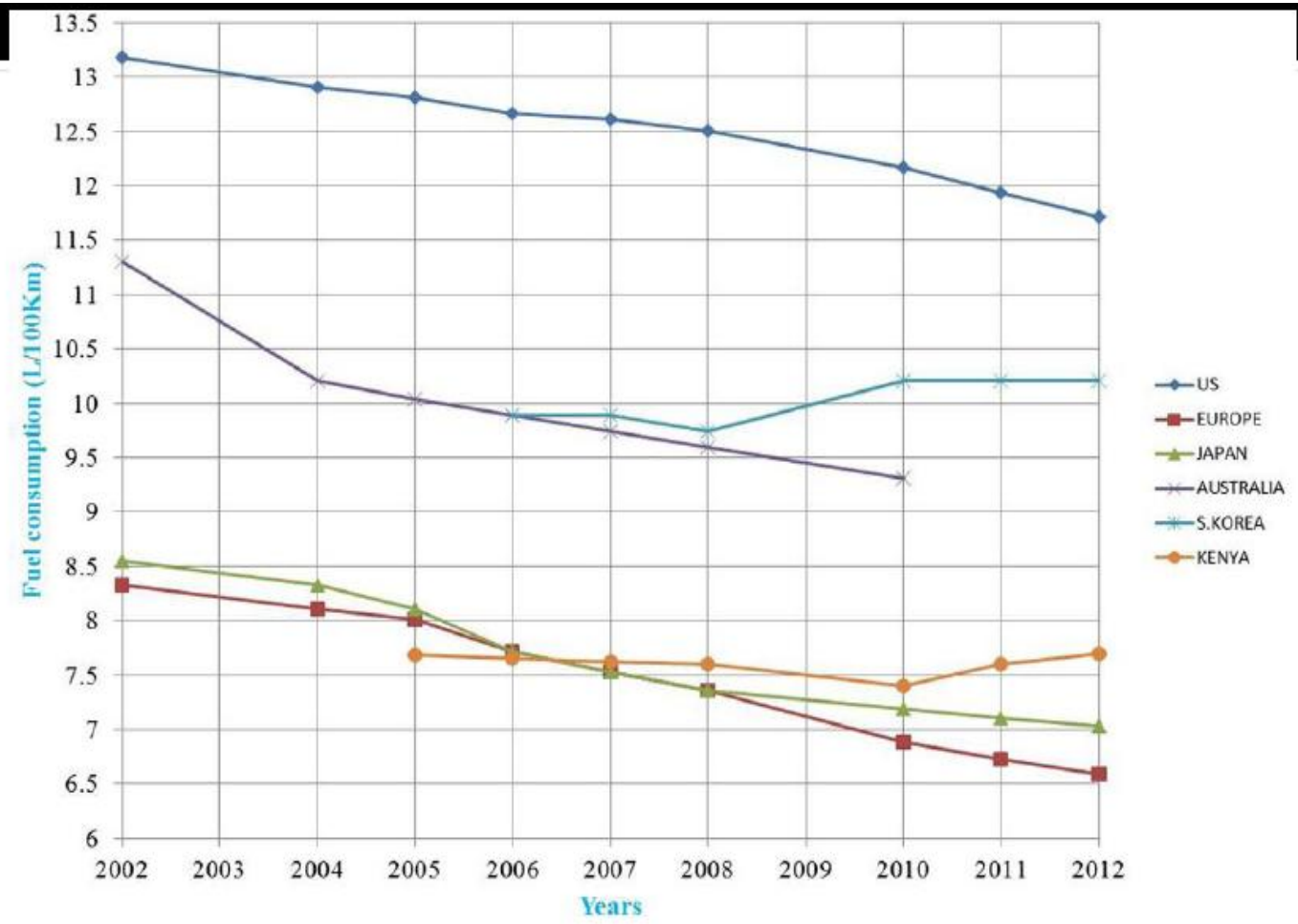
Fuel consumption by vehicles in 2035 could be six times that of the 2005 level. (ADB)

Shift of freight from railways to trucks: Railway share only 26%

Vehicle mass, and size increasing
--- 6-10% increase in average mass,
-- 6% increase in engine size. This means increased guzzling……

Fleet weight increase by 2% a year can lead to a cumulative loss of 6.5 mtoe between 2010 and 2020

High energy impacts in Kenya
Fuel efficiency level of vehicles worsening …



Kenya shows worsening trend….represents high economic and environmental costs

Lack of fuel economy regulations

Shift towards bigger vehicles comes with fuel economy penalty

http://www.unep.org/Transport/astf/pdf/ASTF_Day1_EmissionSolutions.pdf

Addressing fuel efficiency

•**India** has framed **fuel economy regulations for cars**. Now working on heavy duty fuel regulations.

•**Kenya**: The Energy Regulatory Commission (ERC) in partnership with the University of Nairobi **carrying out a baseline vehicle fleet analysis**, including vehicle imports, and will undertake a cost and benefit analysis on fuel economy and cleaner fuels and vehicle policies.

•**Mauritius**: UNEP and its partners are assisting the government in the review of the implementation of its Excise Bill (2011) **that proposes a CO2 levy on motor cars or the granting of a CO2 rebate from the excise duty payable on motor cars**. This is probably the first "feebate" system in the developing world.

Source: http://www.globalfueleconomy.org/documents/publications/gfei_state_of_the_world_2014.pdf

Mobility crisis…

Congestion 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……..

Mobility crisis in Indian cities….

- **Air pollution and congestion to worsen with increased dependence on personal vehicles and erosion of pollution neutral modes….**

- Between 2011- 2030:
  -- Daily travel trips will double;
  -- Share of public transport trips to fall from 26% to 16%;
  -- Share of personal vehicle trips to increase from 34% to 51%;
  -- Peak traffic to crawl at 8km/hour compared to 16 km/hour.

Nairobi: Jammed….

Majority commuters get caught in traffic jams every day.. ..**Results in loss of human hours, and fuel and increase pollution**

- **Traffic jams cost the Nairobi City County approximately KSh 30- 50 million daily** in fuel consumption, manpower time wasted and cancelled business appointments

- On a Monday morning **it takes 2 to 3 hours** to reach CBD In Nairobi

Lagos

http://sunnewsonline.com/new/?p=86252

Whither solutions…..

First generation reforms in Delhi…..

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

First Generation action in African countries

- **Air quality monitoring and management:**
  - Eight countries in the region have operational routine air quality monitoring systems.-- Botswana, Ethiopia, Ghana, Madagascar, South Africa, Tanzania, Zambia and Zimbabwe.
  - Air quality management developed in South Africa; progress in Ghana; intermediate stage in Botswana, Madagascar, Zambia and Zimbabwe etc.

- **Emissions and fuel quality standards:**
  - Sixteen countries have set fuel specifications for gasoline and 14 for diesel; 50 ppm sulphur fuels in east Africa and South Africa;
  - Several countries have sulphur content between 2,000 and 5,000 ppm;
  - Five countries have promulgated emission standards for vehicles, and only eight have set air quality standards (another two have proposed them);
  - The phase-out of lead has now been essentially completed across the region – except Algeria.

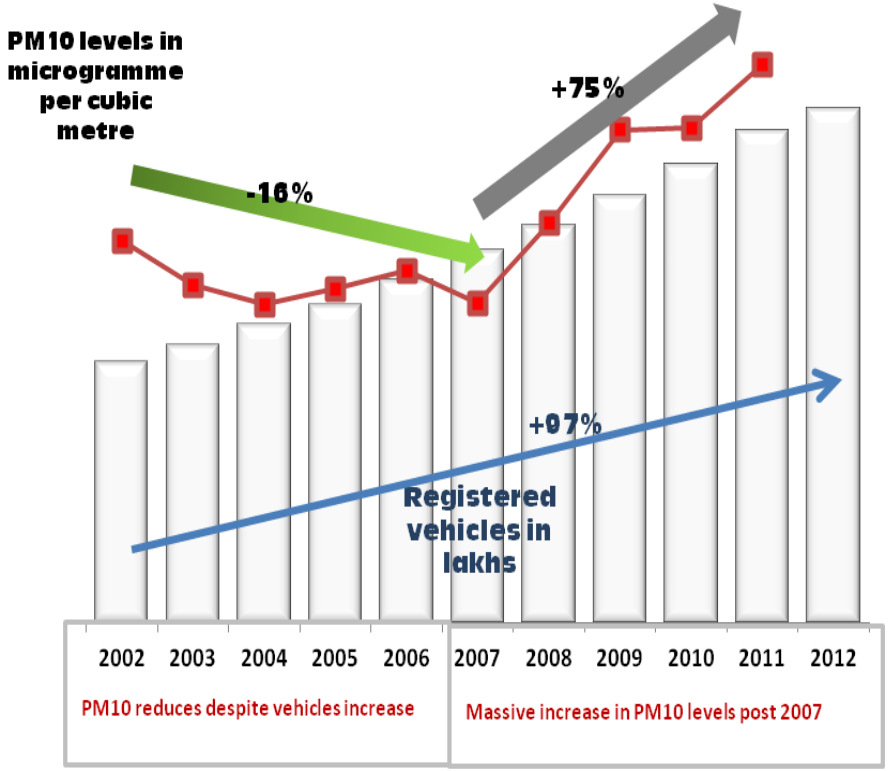
http://www.sei-international.org/mediamanager/documents/Publications/sei-pb-2013-africa-transport.pdf

First Generation action in Kenya

- **Regulations on age of vehicles:** 2003: The government set the age limit for imported vehicles at eight
- **Fuel quality standards:**
  - 2005, The government phased-out use of lead in gasoline
  - 2010: The government reduced the standard limit of sulphur in fuel from 10,000ppm to 500ppm
- **2014: Air quality regulations draft** to regulate vehicular emission limits as stipulated in the Kenya Standard KS 1515.
- **Vehicle inspection centre set up**
- **Completed construction of the Eastern, Northern and Western by-passes** to decongest the city Centre
- **Parking pricing**
- **Rehabilitate and extend the commuter rail transport** within the Nairobi city.

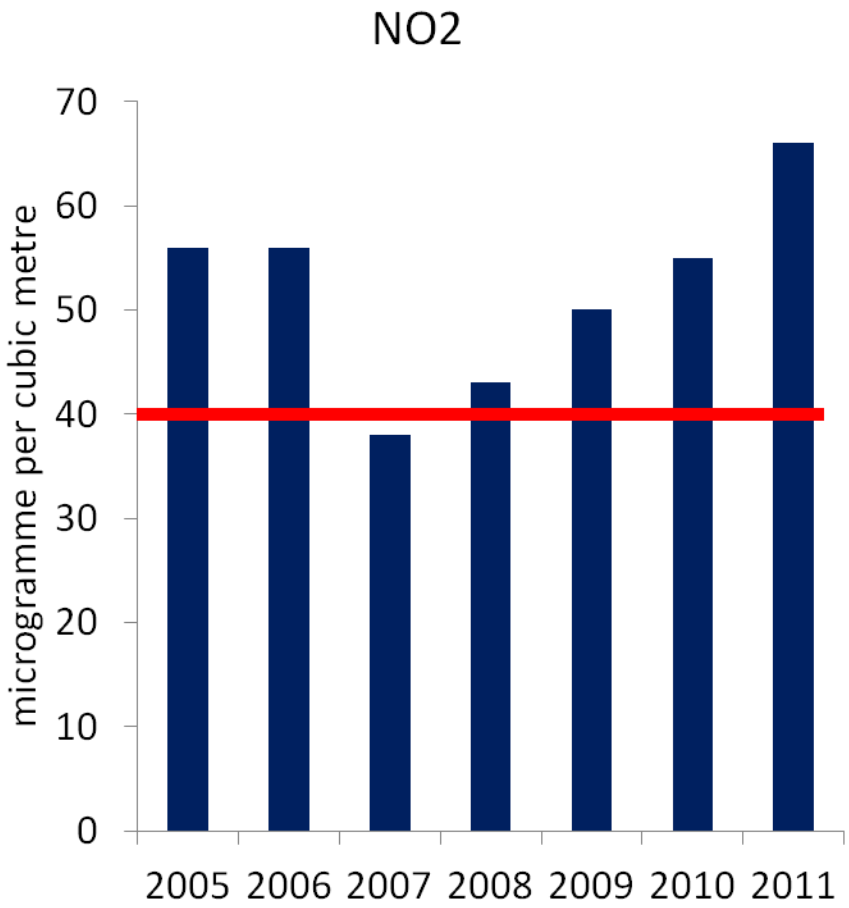
Lesson from Delhi
Lost gains. After a short respite pollution curve turns upward
Need to build momentum……..

Particulate pollution decline and rise again due to rapid increase in vehicle numbers



Based on CPCB data

NO2 levels rising steadily

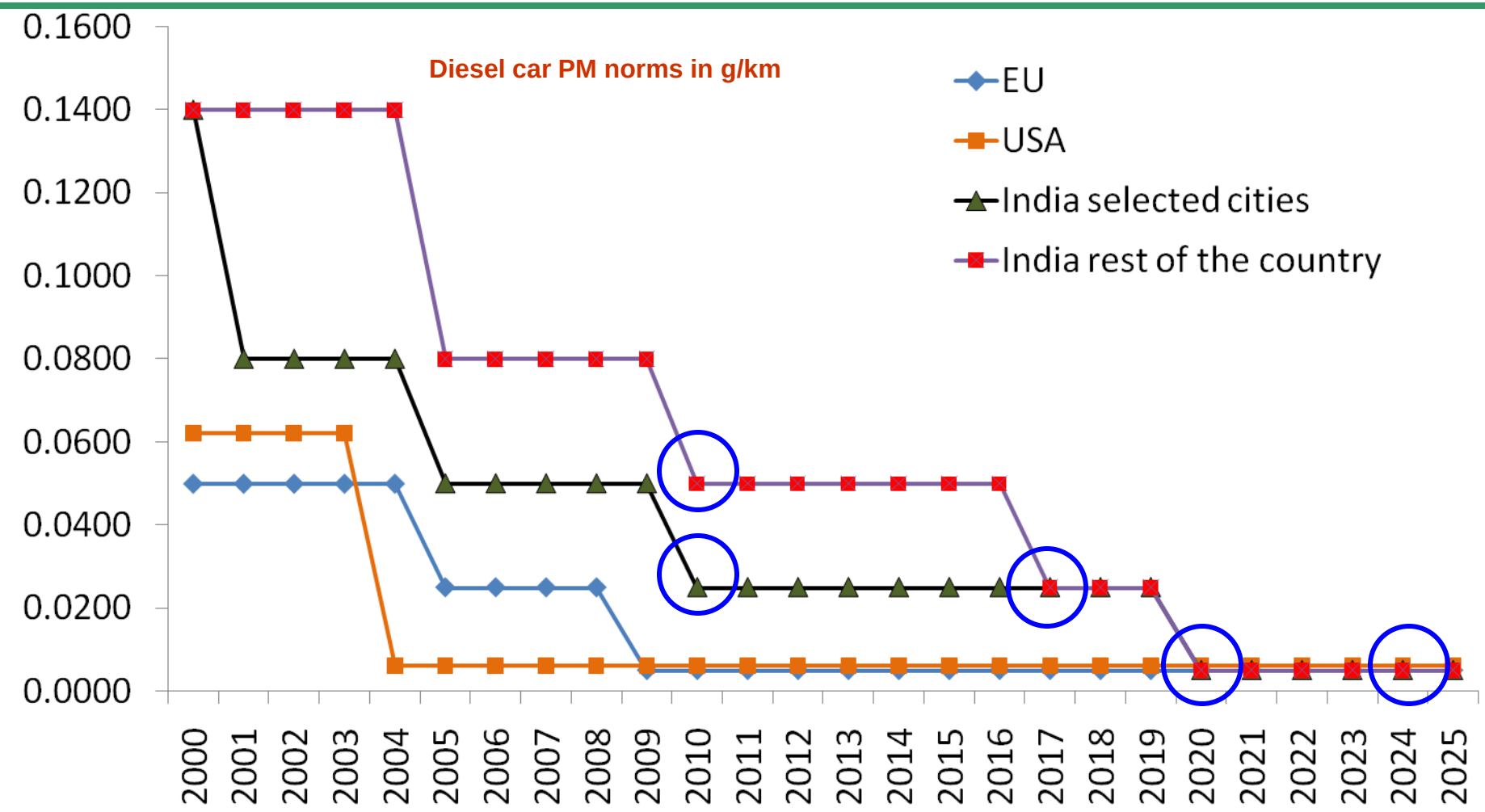


Pushing for effective solutions…..

(1) Vehicle technology and fuel quality roadmap……

Need quick upward harmonization across regions ….

Technology roadmap: Whither India? 10-15 years behind current emissions standards in Europe



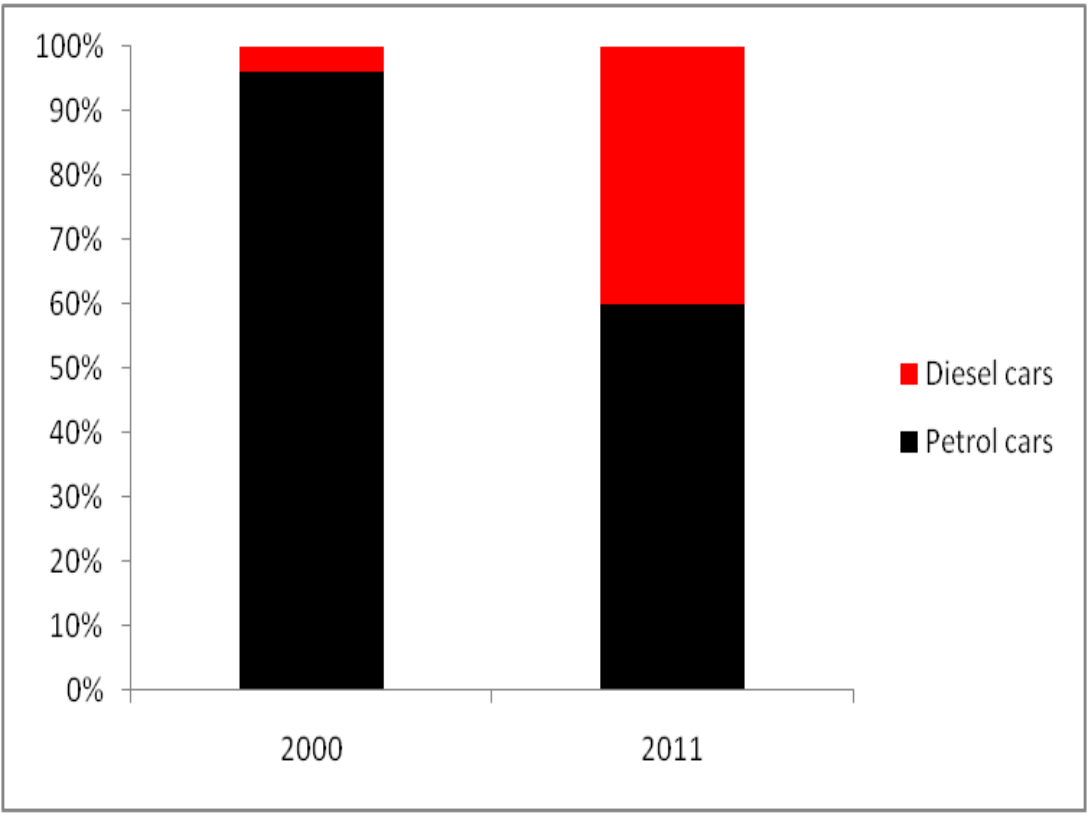
Source: India, Europe compiled from Diesel Net, USA data provided by Axel Friedrich, Germany

Note: Europe has additionally introduced particle number standards at Euro V level

Future norms of US and Europe are tightening NOx norms for diesel more

Serious concern over increasing number of diesel cars in India

Jump from 4% in 2000 to more than half in 2011



In popular car models the share of diesel car is 70-75%

After price deregulation some decline in diesel car sales reported.

Even at a moderate and flat growth rate of 20 per cent a year, the total diesel cars in 2020 will be double the size of the total car sales today.

Source: Based on market data

Why diesel is a bad news?

Diesel cars are legally allowed to emit more particulate and nitrogen oxide than petrol cars

Diesel emissions are branded as class I carcinogen for strong link with lung cancer

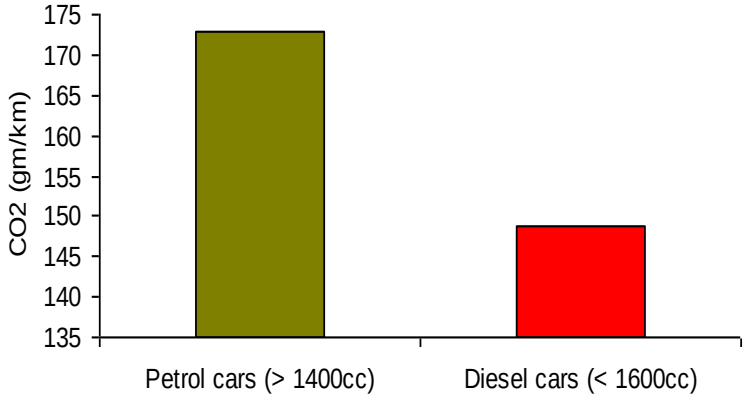
Black carbon emissions from diesel vehicles are several times more heat trapping than CO2

CO2 emissions from the upstream diesel refining process are high:

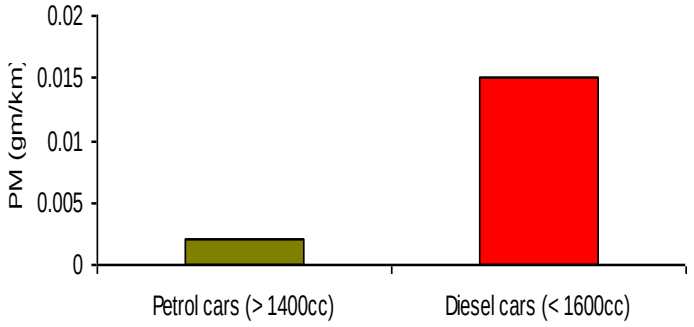
Rebound Effect: Diesel fuel has higher carbon content than petrol. If more diesel is burnt encouraged by its cheaper prices and more driving, more heat-trapping CO2 will escape.

Nullifies marginal greenhouse gas reduction benefit of diesel car ……

CO2



PM



Other countries discourage diesel cars too….

Several countries have discouraged diesel cars.

- **In Brazil** diesel cars are not allowed because of the policy to keep taxes lower on diesel.
- **In China**, taxes do not differentiate between petrol and diesel fuel. Diesel cars are less than 1 per cent of all cars in China. Beijing banned diesel cars as a pollution control measure in 2003.
- **Sri Lanka** has imposed several times higher duties on diesel cars compared to petrol cars and have reduced diesel car sales.
- **In Denmark**, **Germany** and several other European countries the tax on diesel cars including annual taxes is higher than the petrol cars.
- In **Paris** diesel cars are not allowed during severe smog days.
- **France** to phase out diesel cars…

Emerging roadmap in Africa region

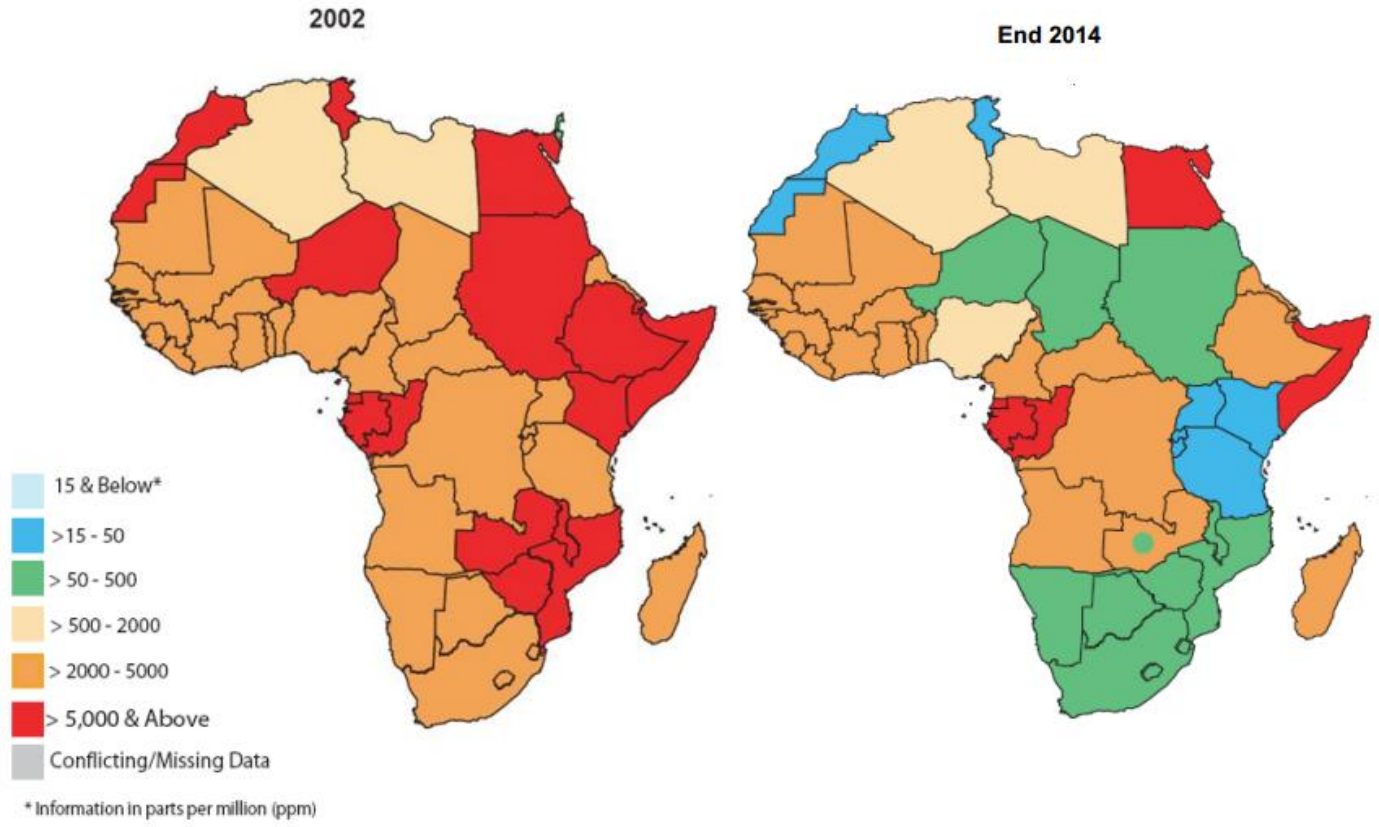
- **Leaded petrol phased out –** except Algeria – A success story

- **Action on low sulphur fuels: Since January 2015:**
  - East Africa: Kenya, Uganda, Rwanda, Burundi and Tanzania moved to 50 ppm.
  - North Africa: Morocco, Tunisia and Mauritius have met 50 ppm or below target
  - Nigeria and South Africa: Euro II emissions standards

- **South Africa**: to introduce 10 ppm by 2017. Six refineries to build capacity. Proposed EU 5 Vehicle emissions

http://www.unep.org/Transport/PCFV/pdf/10gpm/10GPM_AfricaRegionalUpdates.pdf

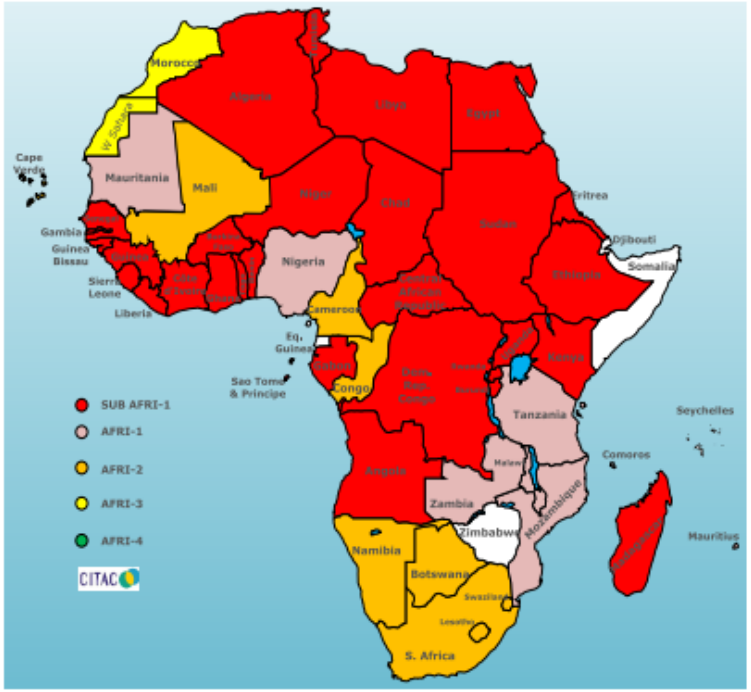
Diesel Fuel Sulphur Levels: Africa



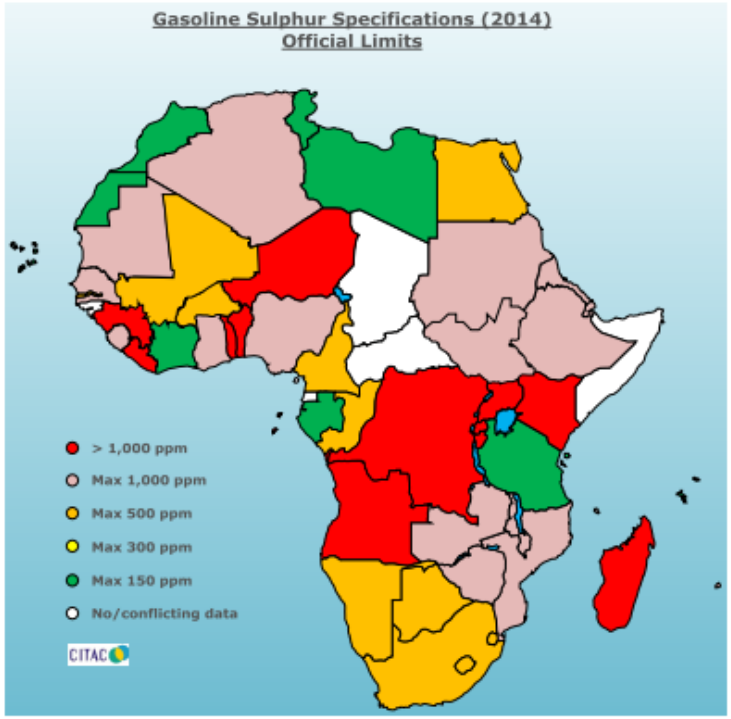
http://www.unep.org/Transport/PCFV/pdf/10gpm/10GPM_AfricaRegionalUpdates.pdf

Petrol Fuel Sulphur Levels

2008



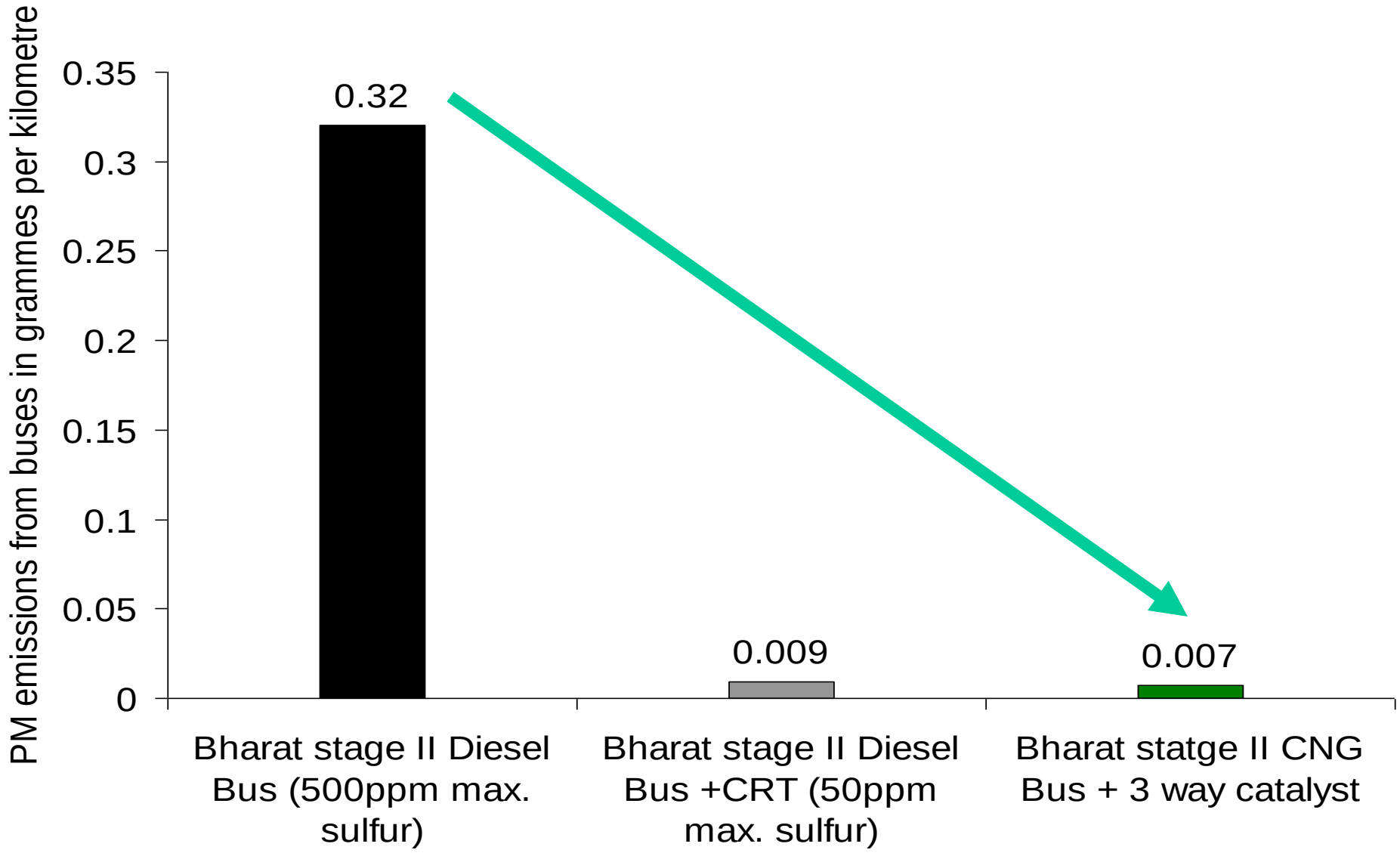
2014



http://www.unep.org/Transport/PCFV/pdf/10gpm/10GPM_AfricaRegionalUpdates.pdf

CNG transition …..An opportunity in our regions when mainstream fuels – petrol and diesel quality languish….

CNG helped Delhi to leapfrog: Euro II diesel bus emits nearly 46 times higher PM than Euro II CNG bus in India.



Source: Teri

December 2002: CNG programme established

Finally, it's bye bye diesel buses

By Shubhajit Roy
Times News Network

New Delhi: It's the end of the road for diesel buses in Delhi. From Sunday, the city will have only CNG buses plying on its roads.

The last batch of about 600 diesel buses will be phased out on Saturday. There are about 7,400 CNG buses plying on Delhi roads.

As on December 1, the entire public transport fleet in Delhi will run on CNG. "Among 40 cities with CNG vehicles in the world, Delhi has the highest number of CNG vehicles," said Delhi state transport minister Ajay Maken. There are about 4,000 mini-buses, 15,000 taxis and 45,000 autorickshaws in the city.

The minister said only about 280 diesel buses have been plying on the roads after pay-

Swati Chakrabarti

GREEN RUN

- 280 diesel buses go off the road after November 30,2002
- In total 600 diesel buses will be phased out.
- 7,400 CNG buses are plying on Delhi road.
- 2141 CNG run DTC buses are plying in the city
- 1000 more CNG buses will be introduced by DTC by June 2003.
- About 4,000 mini buses, 15,000 taxis and 45,000 autos are running on CNG.

Respirable suspended particulate matter

be curbed to reduce further pollution.

The phasing out of diesel buses has taken place over a period spanning the last eight months. After the apex court cracked its whip in April, the Delhi government started phasing out diesel buses at the rate of 800 buses a month. In this manner, more than 6,000 buses were phased out since April.

Now, the owners of the last batch of buses will have to show a proof that they have bought a bus chassis. "Only after they produce documentary evidence, we will give them the permit to bring in buses in two months," said transport commissioner Sindhushree Khullar. It takes about 60 days to build the body of the bus over a chassis.

The victory of the clean air campaign is also worth celebrating as the crucial CNG pipeline is nearly complete. In a couple of

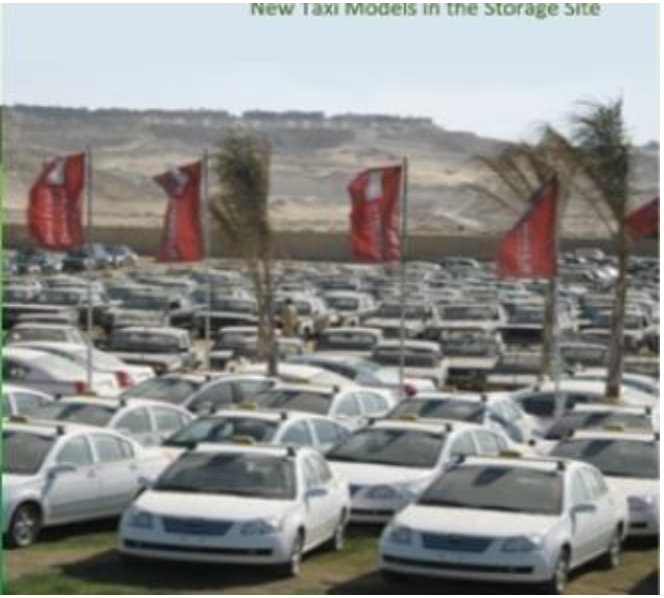
Delhi is mandated to introduce 10,000 CNG buses. Close to 6000 now

More than 70,000 auto rickshaws on CNG

Substantial number of CNG taxis

More than 270 CNG refuelling stations

CNG programme in Africa
Old taxis replacement programme in Cairo, Egypt



- This was a regulatory initiative. Under the Traffic Law owners of mass transport vehicles (e.g. taxis) that are greater than 20 years old are not eligible for operating licenses.

- This programme was initiated as a voluntary programme in 2009

- About 85% of all taxies are 22 years old. 50,000 taxis are eligible for replacement

- Financial incentives provided to the fleet owners to purchase new vehicles

- **Old taxies replaced and scrapped. The new fleet runs on CNG**

Nigeria: CNG taxis

- Pilot project between the Nigerian National Petroleum Corporation (NNPC) and NIPCO, through a joint venture, Green Gas Ltd.

- This drive resulted in significant infrastructure development in and around Benin City.

- Use of natural gas led to significant savings for taxi drivers. Green Gas refuels over 4,000 taxis and cars

- Policy and regulatory support from the government is needed

- **Drive CNG programme with effective emissions and safety regulations**

Need financing strategy for quick transition to clean fuels and vehicles….

Need quick transition to clean fuels

In Kenya refinery investments was estimated that USD 6 billion… but health benefits as much as USD 43 billion…

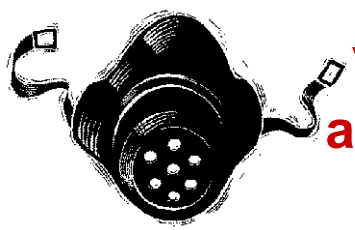
Develop Clean Fuel Fund to improve quality of fuel

-- Generate additional revenue to create the fund from additional taxes on fuels and cars to create the Clean Fuel Fund

-- India has proposed fiscal action. Even a small cess on each litre of fuel sold can help to off set costs. Delhi has implemented this programme to create Air Ambience Fund in Delhi

-- Countries in Africa have already designed subsidies for refineries

Import of old vehicles… a special challenge in the region….

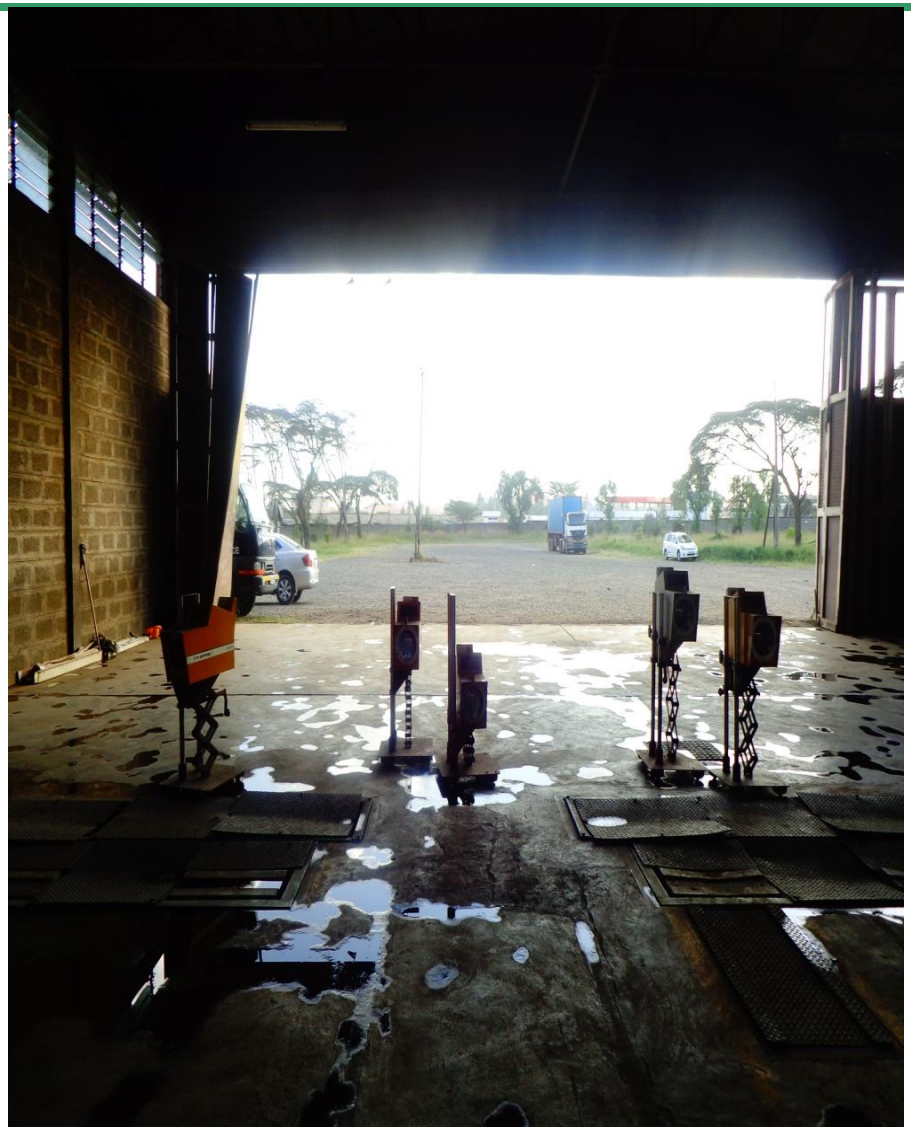


Vehicle import policies -- Opportunity to influence and harmonize policies on vehicle's emission norm, road-worthiness and age

- **Angola:** Motor companies not allowed to import used vehicles; individuals allowed to import regardless of age
- **Botswana:** Maximum of 100,000 kms on the vehicle
- **Burkina Faso:** No import restrictions on vehicle age basis
- **Mali, Malawi, Zambia, Central African Republic, Democratic Republic of Congo, Cameroon:** No import restrictions on vehicle age basis
- **Chad:** vehicle inspection upon importation
- **Côte d'Ivoire**: A fine of FCFA 150.000 is imposed on vehicles older than 10 years and an additional FCFA 10.000 for every year.
- **Gabon:** Used vehicles must be less than four years old
- **Ghana:** Used vehicles over five years old pay graduated penalty according to year of manufacture and capacity
- Seychelles: Used vehicles must be less than five years old
- **Sudan:** -imported second-hand vehicles are illegal, except for immigrants, vintage and racing cars, vehicles adapted for physically disabled, and donated vehicles for welfare organizations
- **The Gambia:** Import of second hand vehicles restricted through taxation – increases in vehicles exceeding 10 years and roadworthiness must be proven before import
- **Mauritius:** Has a three year age restriction
- **Zimbabwe:** Banned importation of vehicles older than 8 years old

http://www.unep.org/Transport/new/PCFV/pdf/Maps_Matrices/Africa/matrix/SSAFuels_Veh_matrix_January2015.pdf

Vehicle inspection system in Nairobi.. A step forward



- There are 19 vehicle inspection centres across Kenya including one at Likoni Road, Nairobi

- Mainly public service vehicles and commercial vehicles – matatus, buses, tuk-tuks, taxis and trucks come for annual inspection

- From January 2015, all private vehicles more than 4 years will also have to undergo the inspection

- At present only visual tests are done. Its basically seen if the vehicles are fitted with a speed governor and are in good mechanical condition

- Emissions testing -- limited

Rwanda Vehicle emissions testing: A step forward

•**Rwanda National Police and Rwanda Environment Management Authority to implement vehicle emissions testing programme:**

•All vehicles to undergo emissions inspection at the inspection centre. Norms for roadworthiness and emissions being implemented.

•Commercial vehicles to undergo test every six months for emission standards compliance. Private vehicles every year.

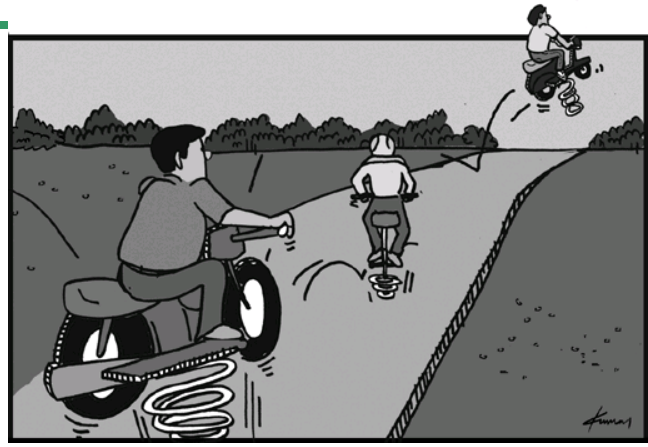
•Traffic Police can ask for impromptu emissions testing for any grossly polluting vehicle.

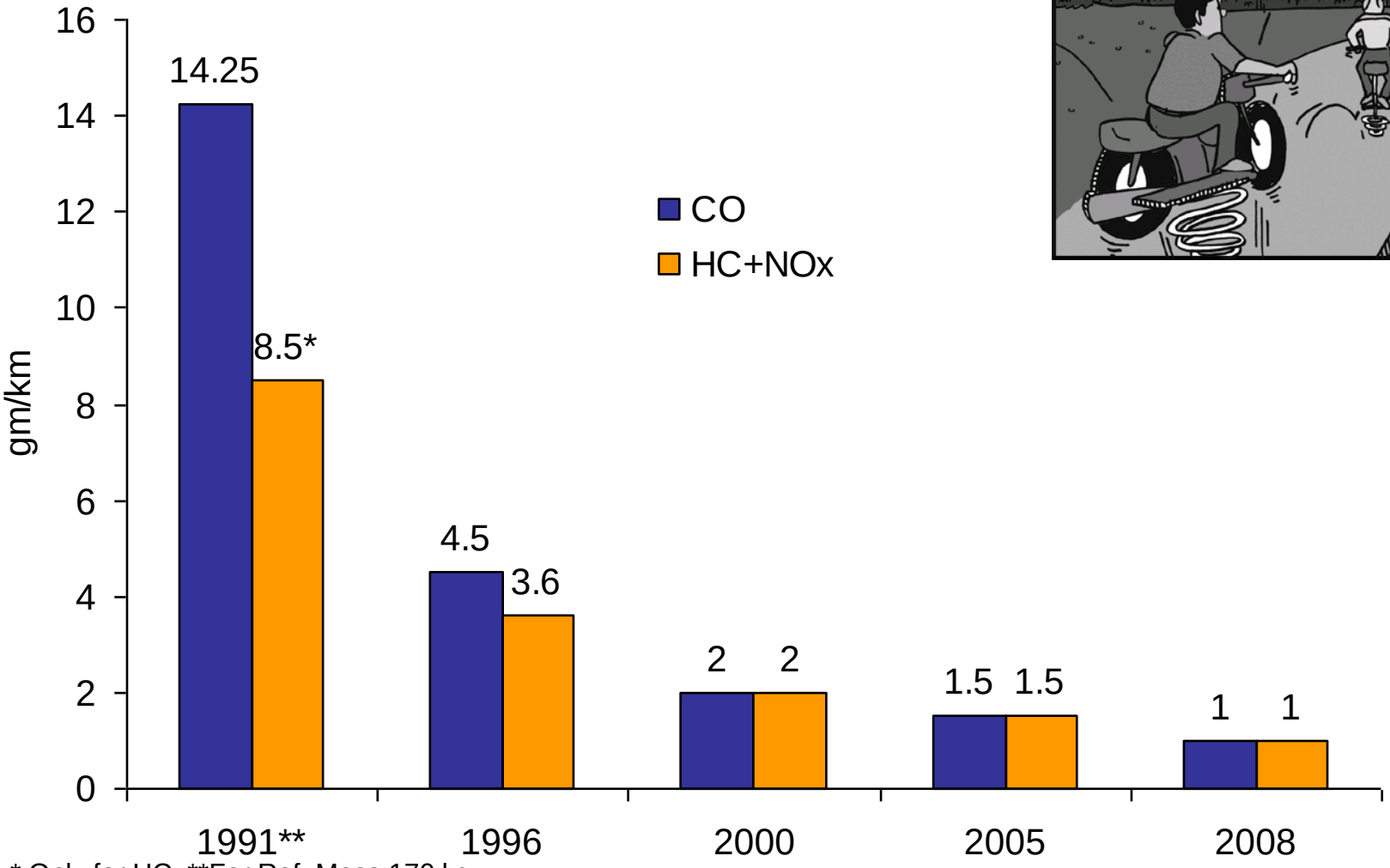
•Failed vehicle to be impounded or pay high monetary penalty

•Challenges: But needs to limit age. Older vehicles pay less tax than the newer vehicles

Motor cycles: Dilemma of Asia and Africa

Motor cycles emissions standards in India





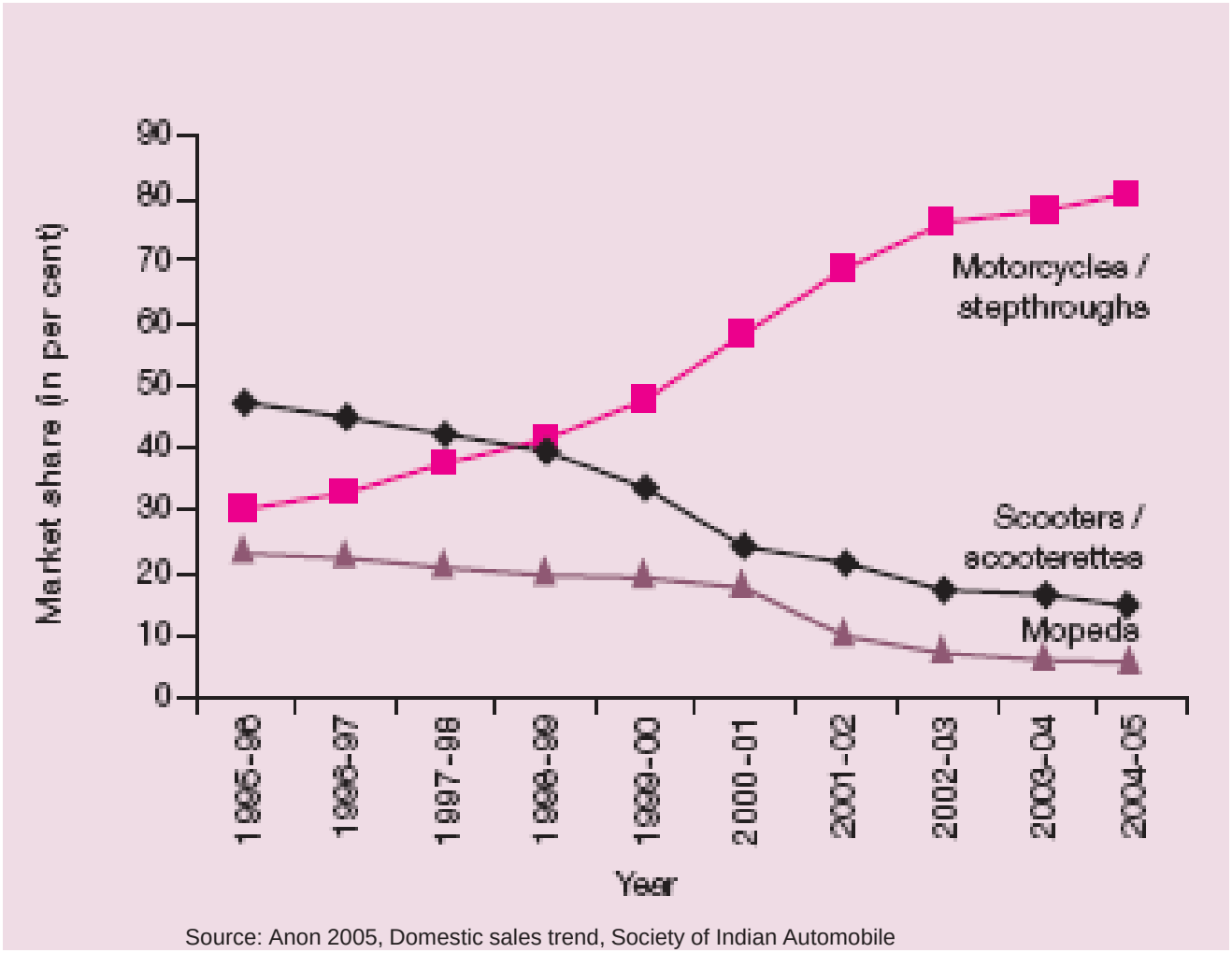
Cold start ?,
TA = COP,
30,000 km,
DF is 1.2

* Only for HC, **For Ref. Mass 170 kg

Source: ARAI

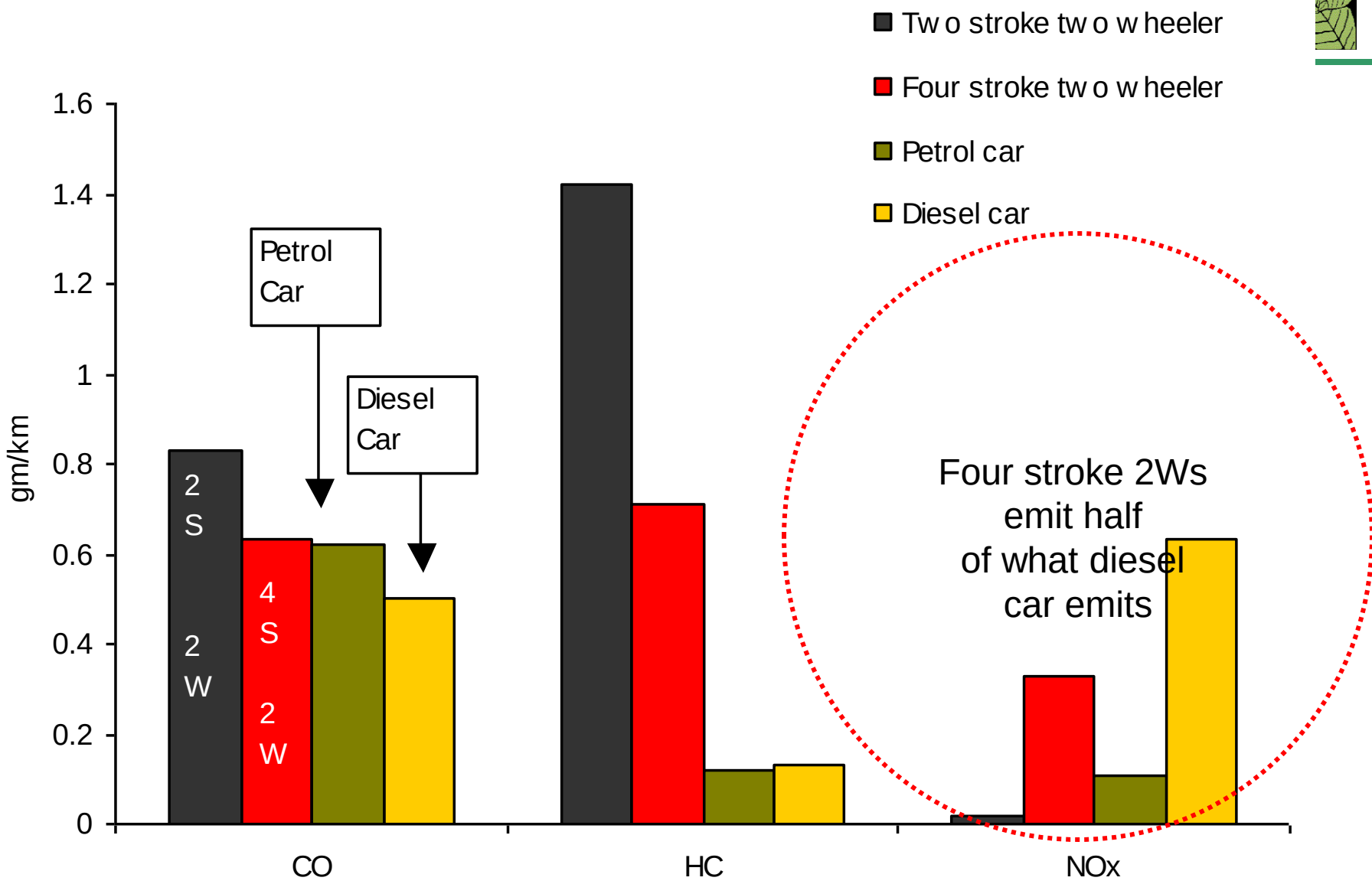
Significant shift towards four stroke engines in India

Customer preference steadily shifts towards four stroke engines –more than 80 per cent of the new two-wheeler sales



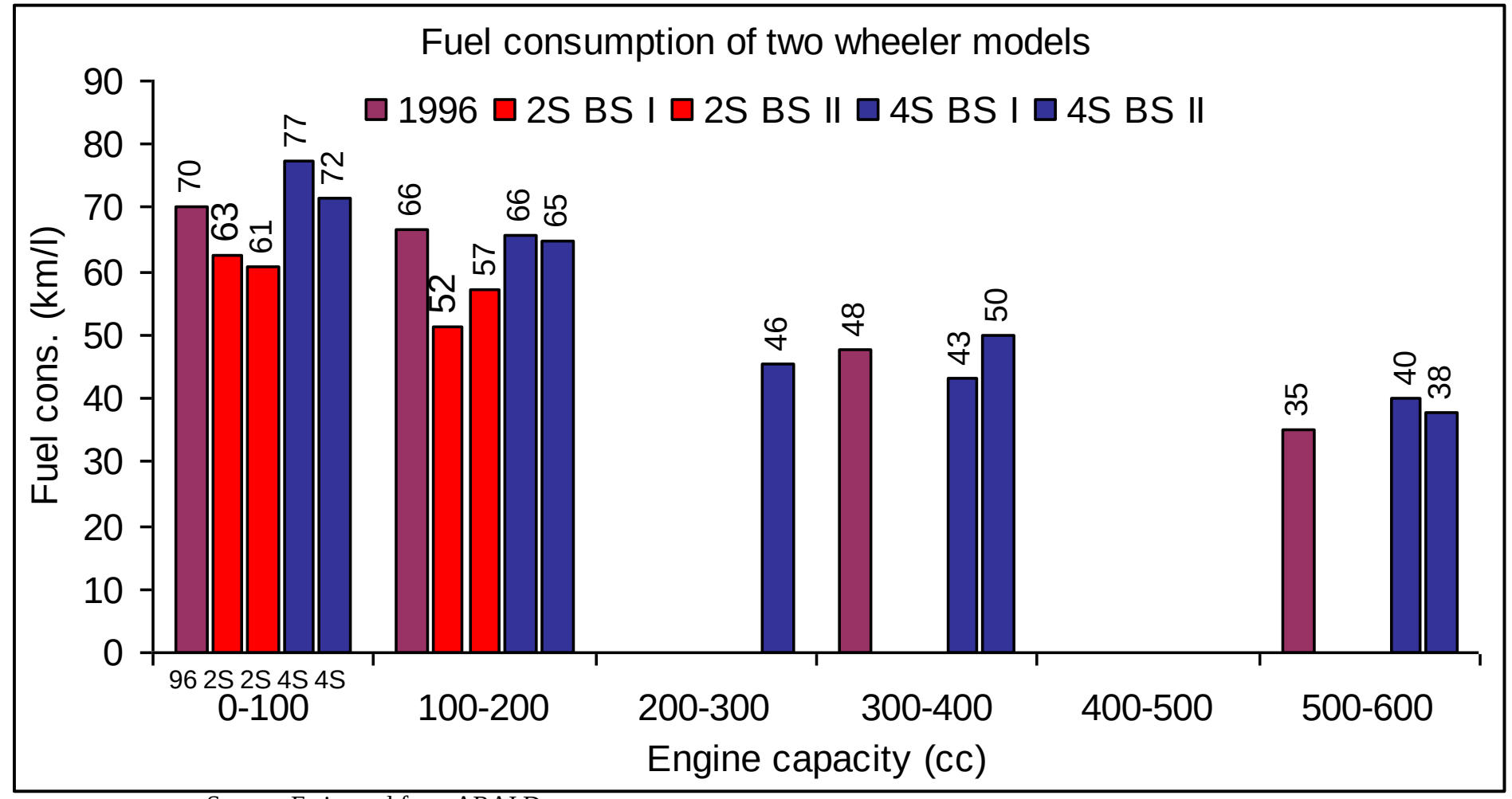
Source: Anon 2005, Domestic sales trend, Society of Indian Automobile Manufacturers, New Delhi, http://www.siamindia.com/General/domestic-salestrend.aspx, as viewed on October 15

Actual emissions levels of two wheelers and cars in India



Note: Bharat Stage I compliant moels. Source: ARAI Type Approval data provided to CSE, 2001

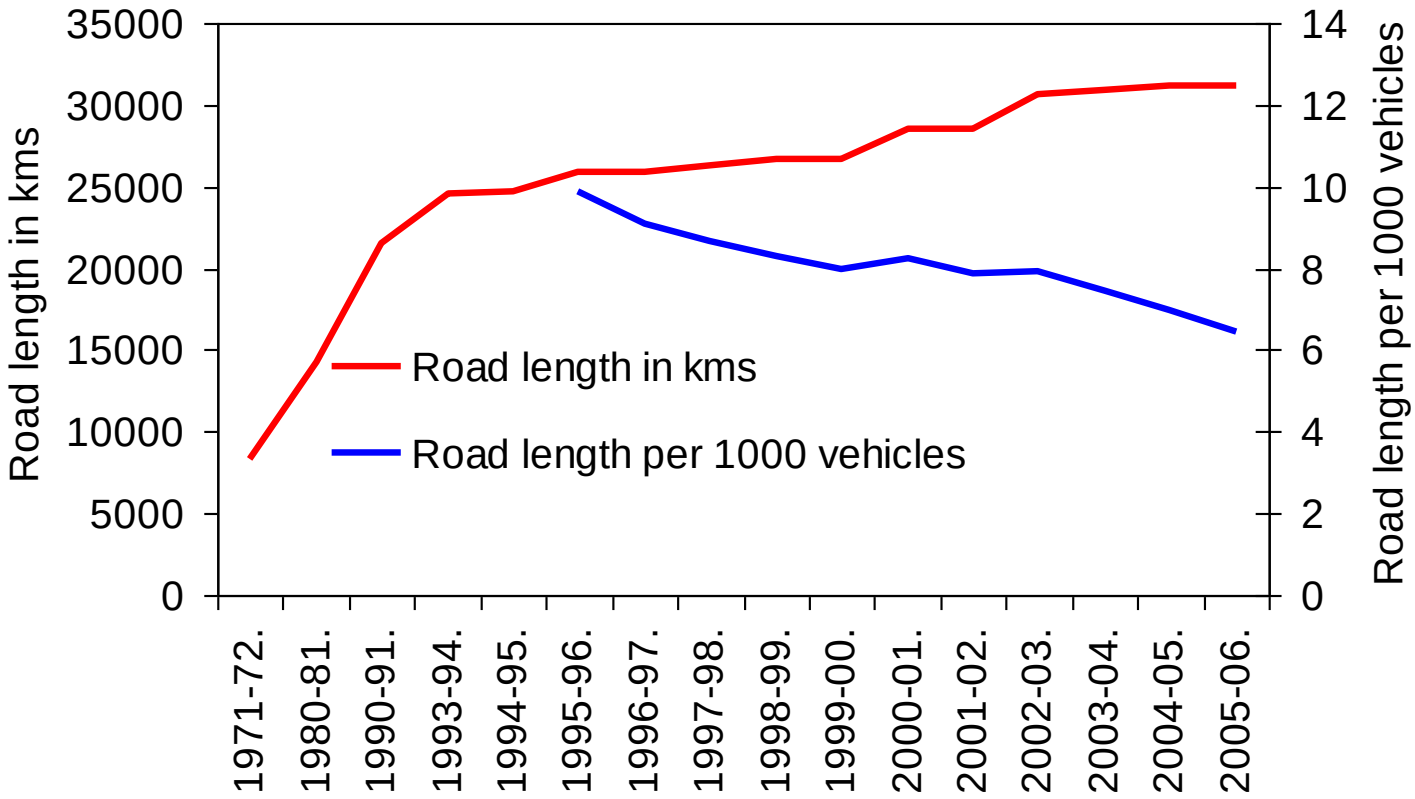
These vehicles are extremely fuel efficient…



Source: Estimated from ARAI Data

Mobility solutions to pollution and congestion…

More roads are not the answer to congestion…Learn from Delhi



More than 21% of Delhi's geographical area under road network.. Delhi is still gridlocked

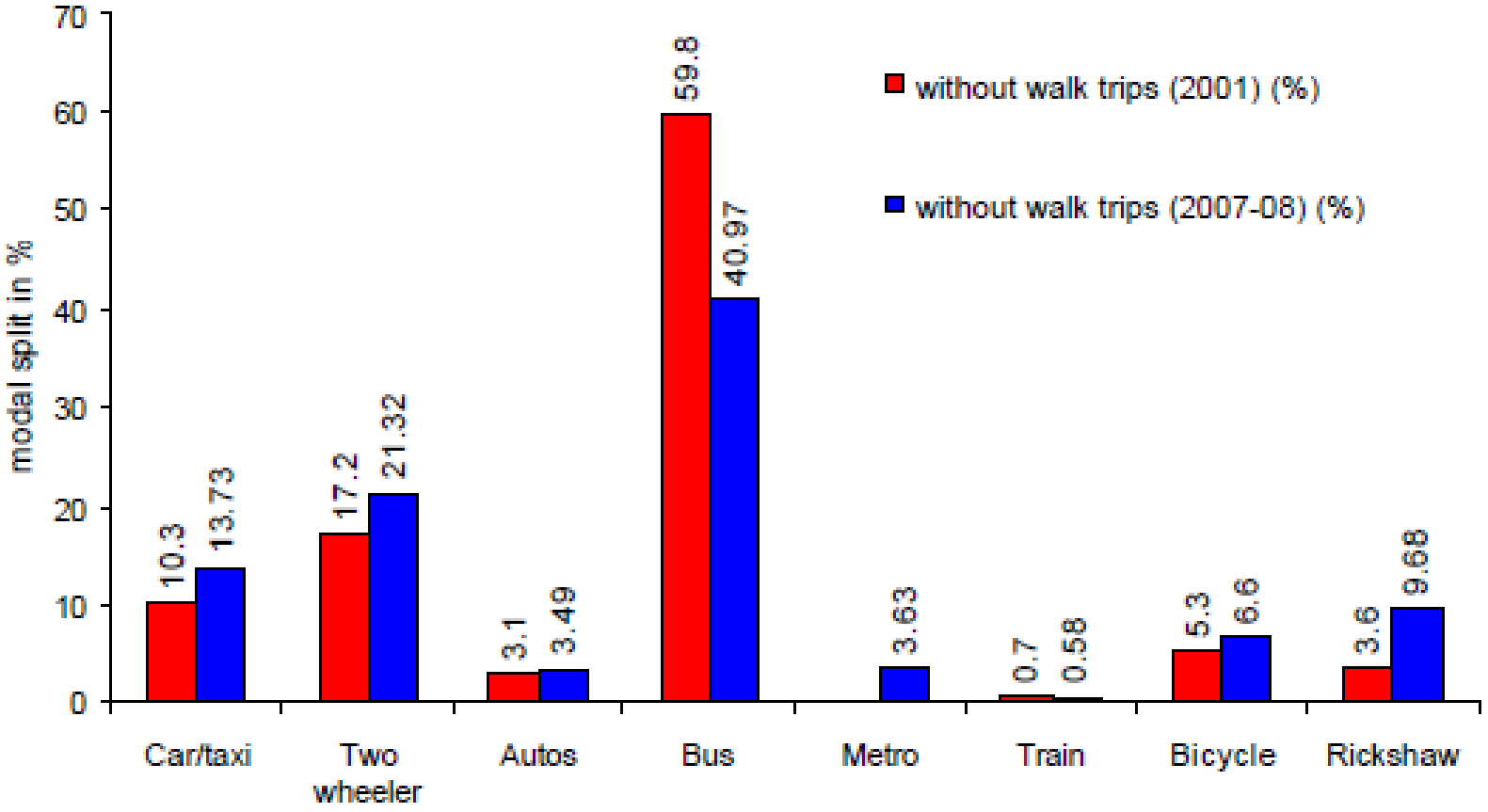
Source: On the basis of Economic Survey, Delhi Govt

Reality check in Delhi

Public transport losing ground

Share of bus ridership in 2000 – 60%

This dropped to 40% in 2008



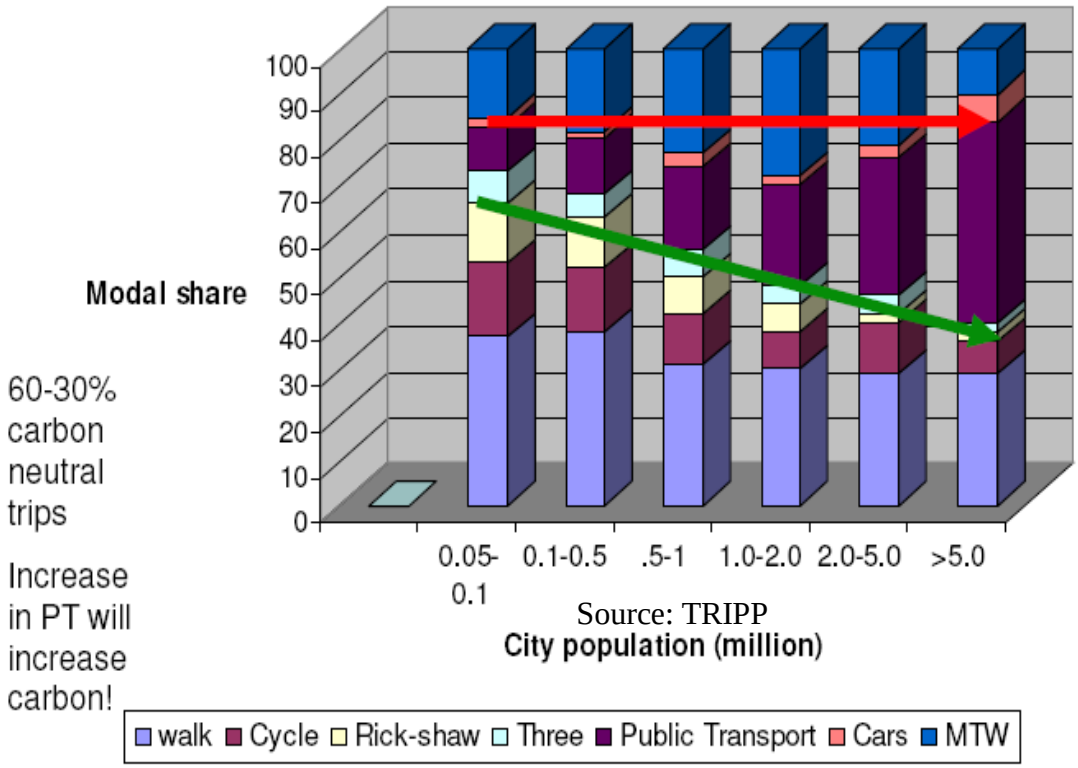
Source: Anon 2008, transport demand forecast study: study and development of an integrated cum multi modal public transport network for NCT of Delhi, RITES, MVA Asia Ltd, TERI, September

Our inherent strength in India…

- Even today majority in our cities walk and use public transport….
- About 30-60% trips are carbon neutral.
- Build on this baseline

Urban Mobility

PT and NMV based, MTW majority personal vehicles



60-30% carbon neutral trips

Increase in PT will increase carbon!

Source: TRIPP

Opportunity in African cities
Majority walks and cycles…..

Based on: International Association of Public Transport (2010) 'Major Trends and case studies'

How do we make buses attractive?

Delhi

Nairobi

State of bus in cities of Africa

- **Bus seats per thousand people:**
  - World Bank's Urban Transport Indicators database-- average number of bus seats per thousand urban residents of Latin America, Asia, the Middle East, and Eastern Europe is around 30 – 40.
  - In Africa the average number is 6 bus seats per thousand residents.
- **Transport affordability:**
  - High travel costs… The average cost of a one-way trip is about 0.30 $, which is high in relation to the average household budget.
  - This has increased walk share

.

http://www.eurist.info/images/Projects/UBA_Finance_Africa.pdf

Bus reorganisation in Delhi

- Delhi has phased out informal bus system
- Replaced with bus cluster system
- This is based on assurance of minimum number of trips bus per day.
- This is monitored with the GPS based traffic control system.
- There is penalty for not meeting the minimum trip requirements.
- This has led to complete renewal of bus fleet. Better and bigger buses and also air conditioned buses.
- More to be done to build reliable service

Bus reorganisation in Kigali, Rwanda: A step forward

- Kigali city has adopted a net cost contracting method to procure privately delivered bus services from three firms to serve four zones and its central business district (CBD).

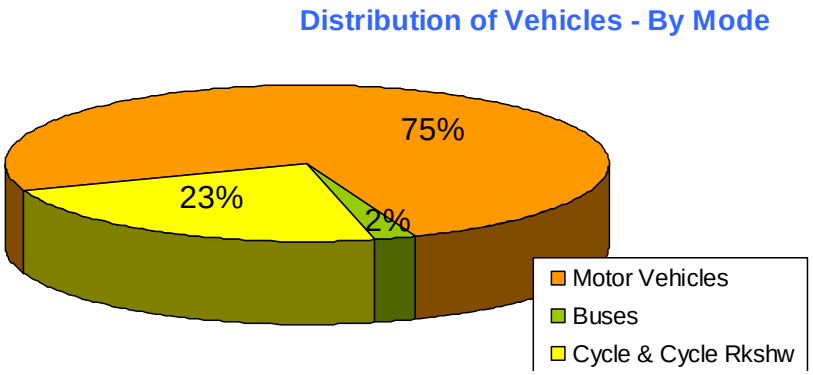
- This has improved service coverage and quality of vehicles. But service schedules, fares, and customer care are failing to meet the performance standards of the contracts.

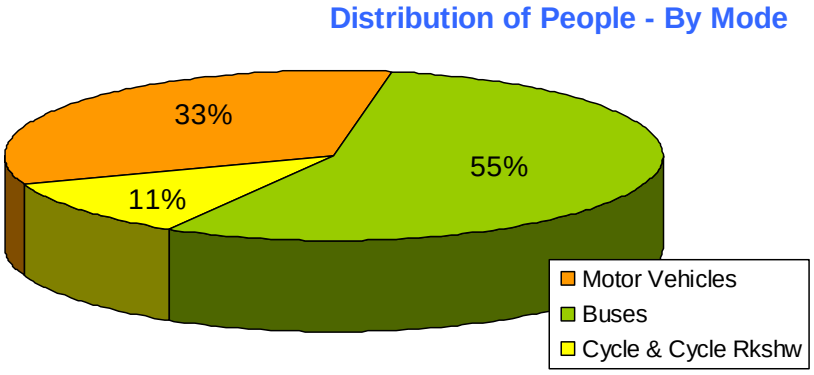
- The reliability and level of service remains inadequate due to the peak hour congestion, shortage of vehicles, and inadequate service provision by operators

http://www.theigc.org/wp-content/uploads/2014/08/Bajpai-2014.pdf

Increase people carrying capacity of roads

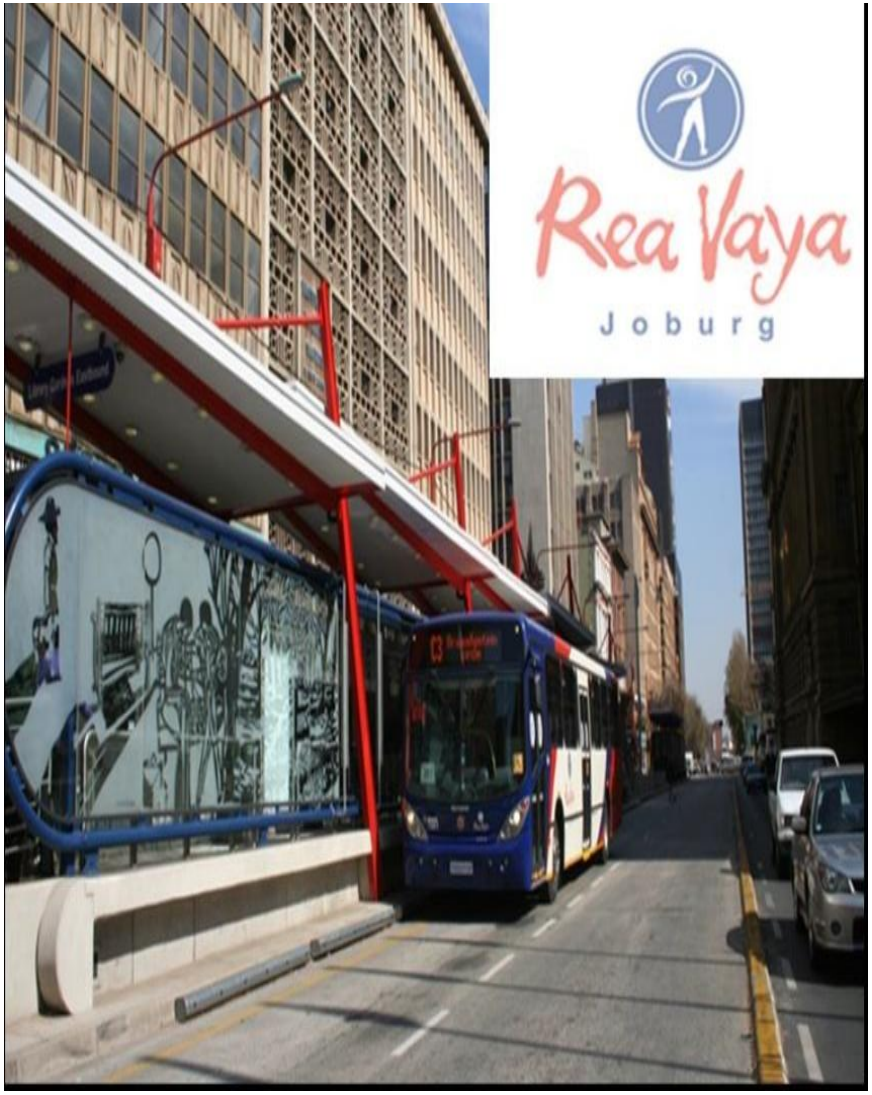
Delhi Bus Corridor: Moving vehicles vs. moving people





A bus occupies twice the road space taken by a car but carries 40 times the number of passengers. Bus can displace anywhere between 5 and 50 other vehicles and save oil and pollution

Progressive action on BRT in African countries



- **Johannesburg's Rea Vaya BRT is the first BRTS system in South Africa**

By 2020, the City to have 122 kilometers of mainline BRT corridors served by 150 stations and 250 kilometers of formal feeder routes. A network of some 330 kilometers planned. About 80% of the people of Johannesburg to access it.

- Found innovative ways to integrate informal sector on that route to diffuse opposition to the system….

- **First BRT Cooperative Limited in Lagos**

- **Dar es Salaam: Public awareness programme on BRT**

Walk and cycle….

Very high share walking in all our cities.. More than half in Nairobi, 60-70%V IN Kigali city, 34% in Delhi; 56% in Mumbai….

Why?

-- Compact city design allow shorter and walkable travel distances

-- Poverty and lack of affordable transport options. Public transport is expensive for many

-- Congestion has increased share of walking …

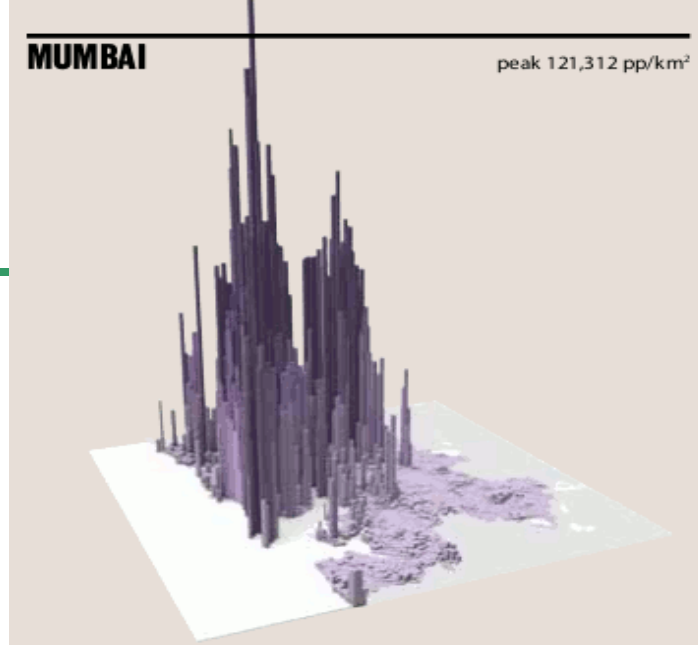
-- Walking and active transportation for health security

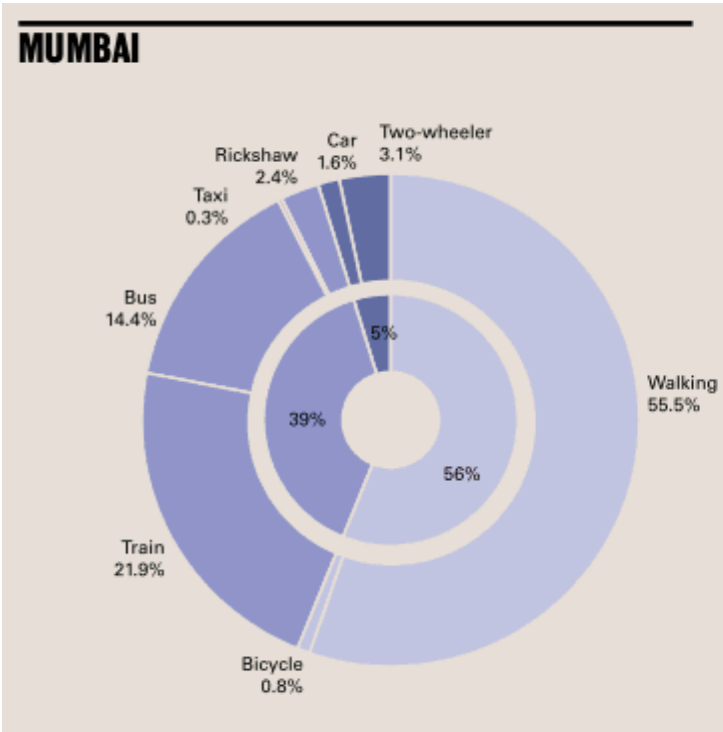
It also depends on how we design our cities

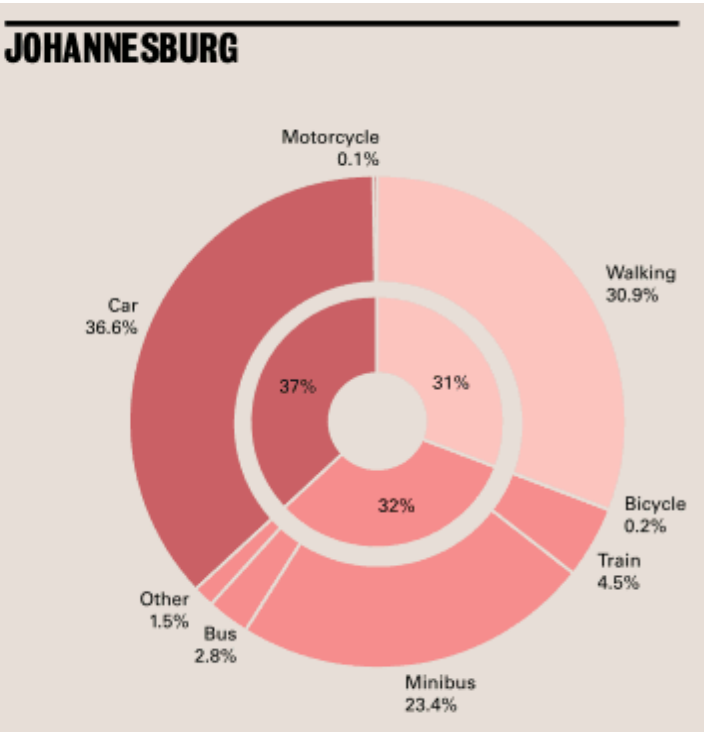
Mumbai: High density development -- cars 1.6%, Walk 56%

Johannesburg: More sprawled cars 37%, walk 31%

http://lsecities.net/media/objects/articles/urban-age-cities-compared/en-gb/



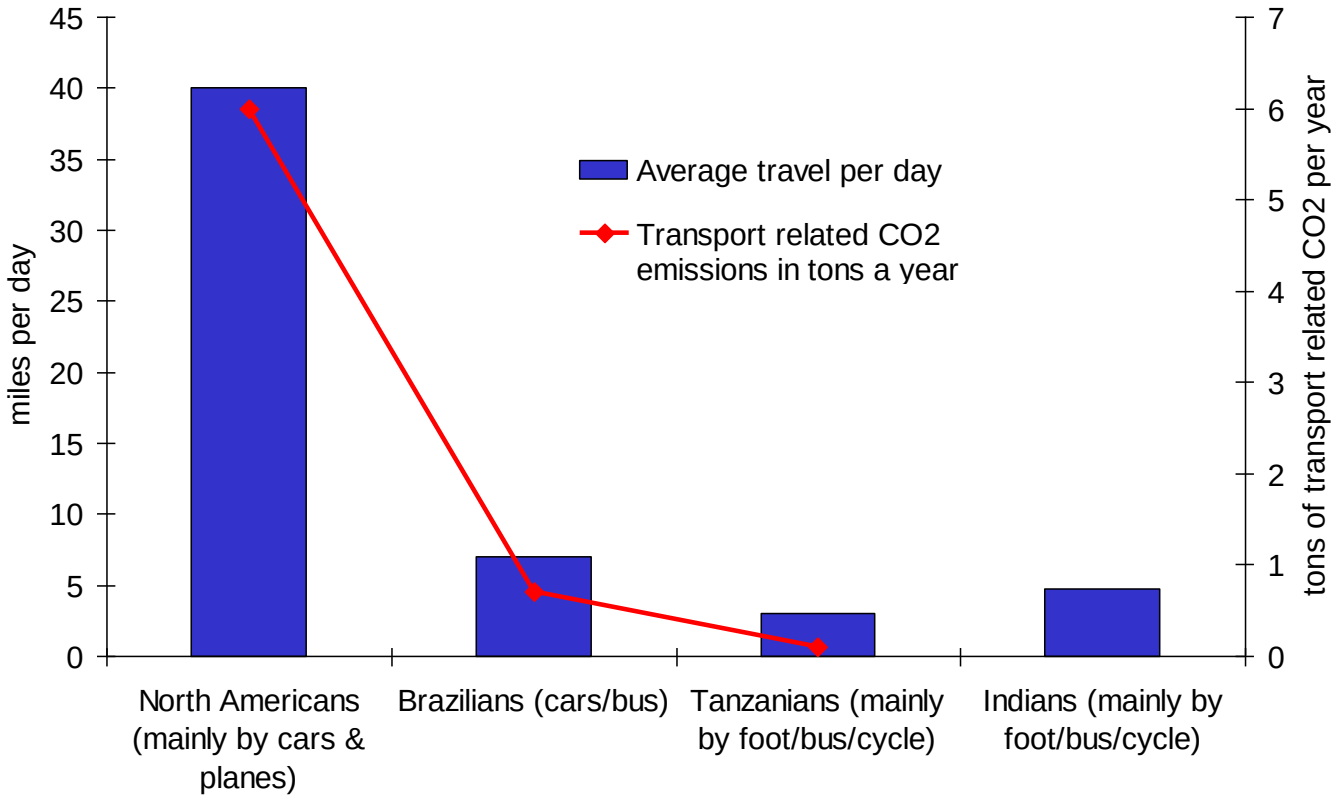




Public transport strategy will require massive expansion of walking infrastructure…

Transport infrastructure locks up enormous pollution and carbon

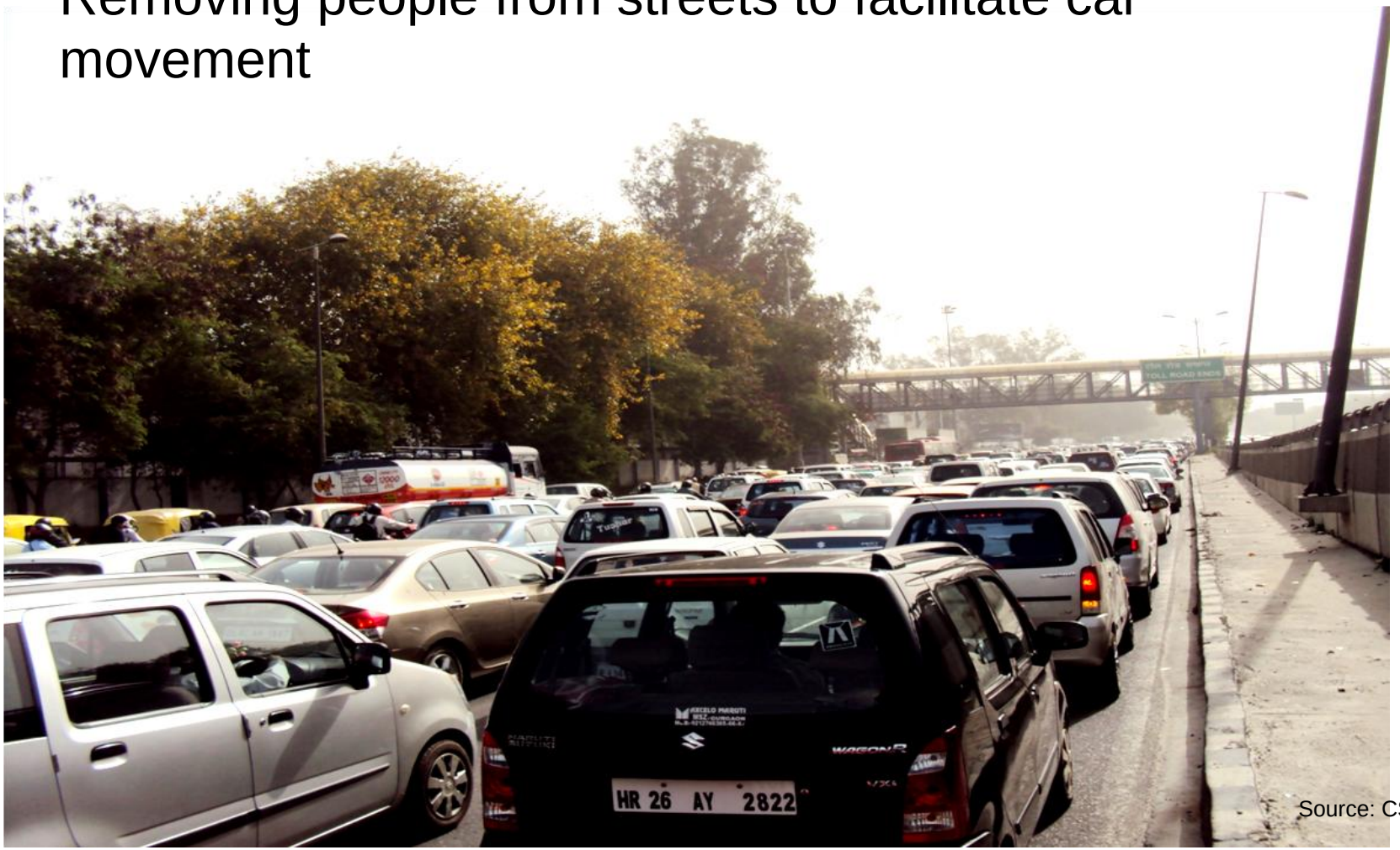
Travel and CO2 emissions



Source: unep

Car centric road infrastructure will increase pollution and congestion

Delhi: Focus on car centric infrastructure:
Removing people from streets to facilitate car movement



Source: CSE

Road design gives advantage to vehicles. Not pedestrians and public transport users

Source: CSE

Disadvantage: Pedestrians

Source: CSE

Source: CSE

Foot over bridges discourage walking and use of public transport….

Citizens TV of kenya reported in 2014 that over 100 pedestrians were arrested in Nairobi's industrial area and arraigned in court for failing to use foot over bridges.

It is inconvenient for people to negotiate stairs to cross roads…

Give priority to peoples movement….

Source: CSE

Evidence from Delhi: Photo documentation by Traffic Police shows how wrong road design force people to cross in unsafe manner

Source: Satyendra Garg, Joint CP/Traffic, Delhi, Walkability and pedestrian initiatives

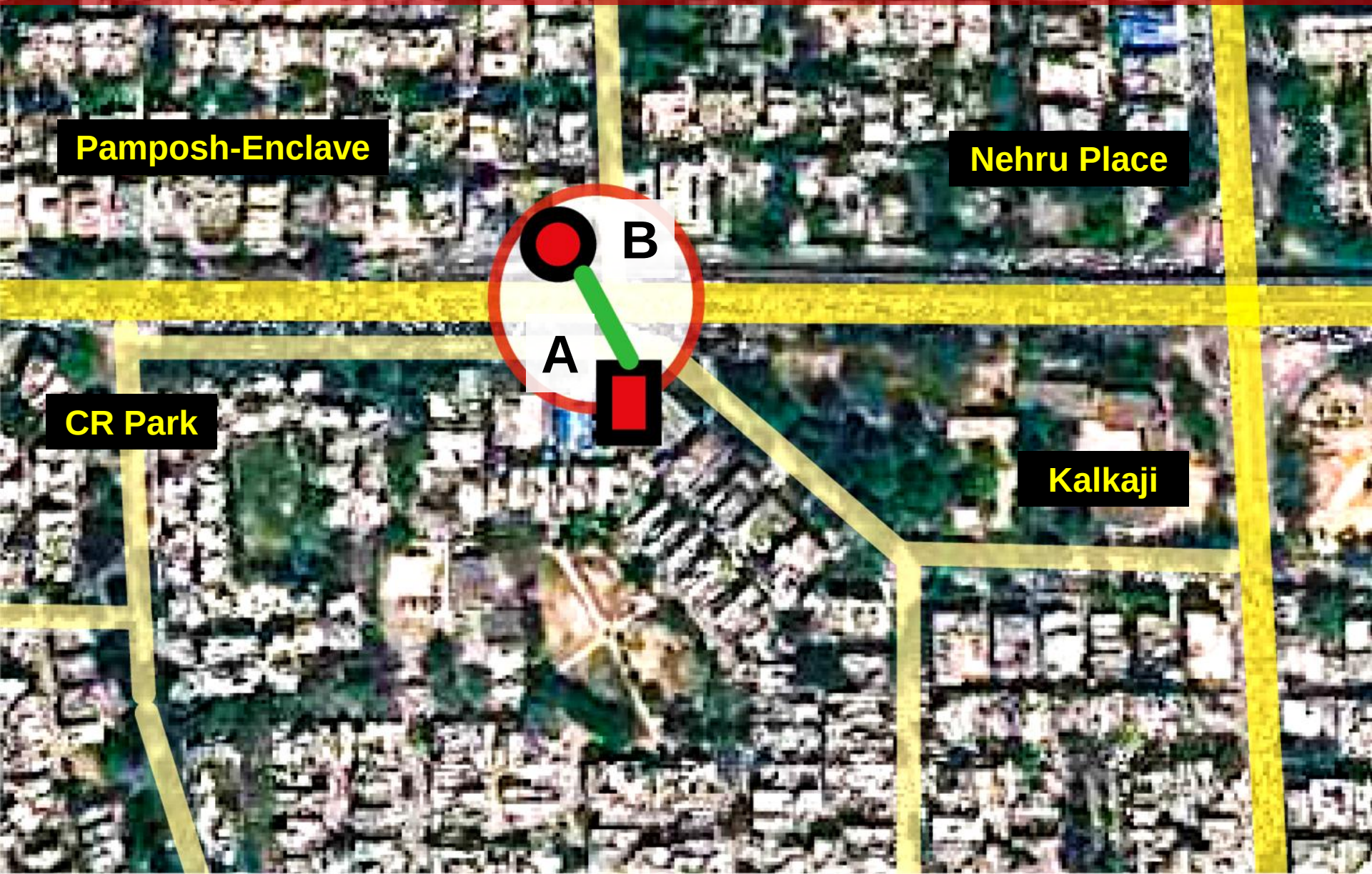
Disadvantage: NMT based freight: They contribute to city's GDP

Source: CSE

Case Study – Outer Ring Road Flyover in Delhi

Travelling from A to B

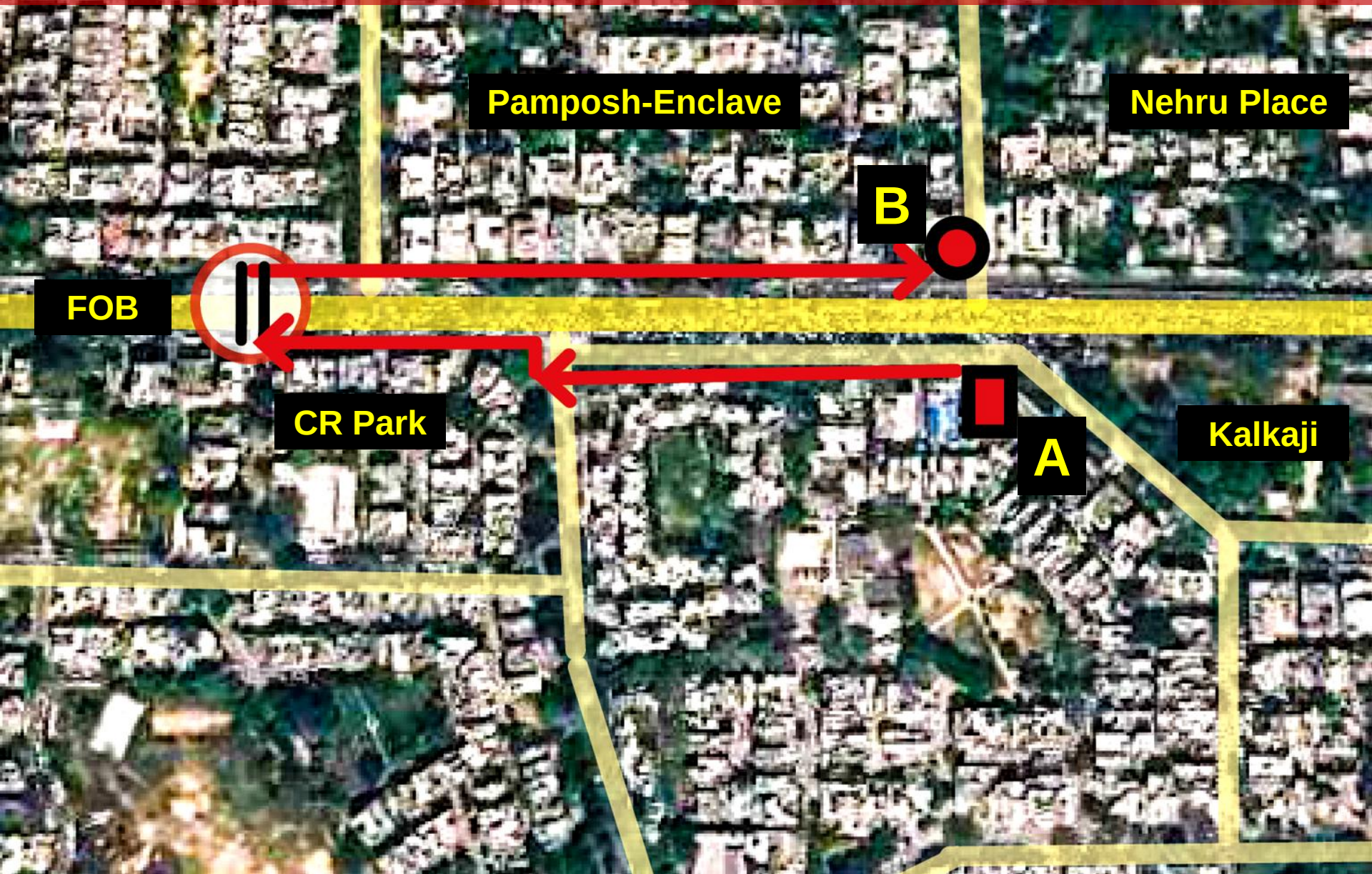
Originally 30M across the road



Case Study – Outer Ring Road (Nehru Place Flyover)

Travelling from A to B – Pedestrian Route 1

1000M via FOB



Nairobi: Retrofitting change

- 1.70km UN Avenue: This includes three-metre wide sidewalk on both sides, and a three-metre two-way segregated cycle lane.
- Redesigning the intersection in Limuru road, adding a slip-turn lane with a corner island to facilitate pedestrian crossing.
- Bus stop relocated a few meters to avoid conflict with turning vehicles abd reduce accidents..

Source: CSE

Pedestrians: a whiff of change

Source: CSE

Design road for all street activities
Vending needs space too…

Source: CSE

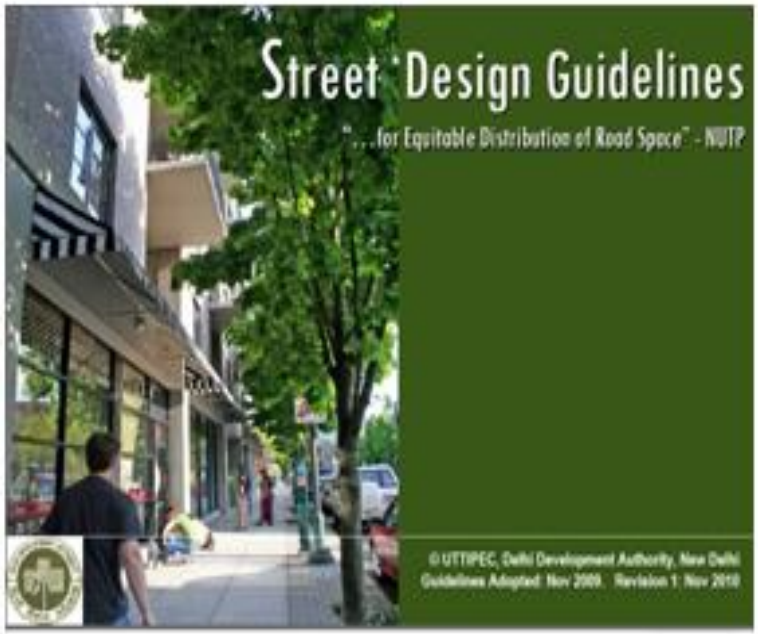
In Indian city of Bhubaneswsar: Space for vending built into road design

Raj path road,
Bhubaneswar, India

Activities make public space safe

Source: CSE

Delhi has adopted street design guidelines



UTTIPEC guidelines

Acknowledgements

The preparation of Draft Pedestrian Design Guidelines was initiated after a detailed presentation on "Great Pavements for Delhi" was made by Sr. Consultant, UTTIPEC in the Governing Body meeting on 24.4.2009. The presentation was appreciated and road owning agencies were requested to adopt some of the best practices on pilot project basis. As a follow up, these set of guidelines were put together, based on best practices available around the world and customized to ground conditions and challenges in India, particularly in Delhi. In this, the UTTIPEC Core team was helped immensely by the advise, time and material provided by several experienced and respected experts in the field, mentioned below:

- Sachdeva, Pradeep, Architect, Pradeep Sachdeva Design Associates
- Gandhi, S., Arora, A., Varma, R., Sheth, Y., Sharma, S., Jawed, F., Interface for Cycling Expertise (ICE), Manual for Cycling Inclusive Urban Infrastructure Design in the Indian Subcontinent, 2009
- Aggarwal, Anjlee, Executive Director, Samarthyam, Guidelines for Inclusive Pedestrian Facilities, Report for IRC, 2009
- Transport Research And Injury Prevention Programme (TRIPP), IIT Delhi, BRT Design Specifications, 2009
- Choudhury, Anumita R., Associate Director, Centre for Science and Environment, Footfalls: Obstacle Course to Livable Cities, Right to Clean Air Campaign, 2009
- Hingorani, Akash, Cesis Designs, Inc.
- INTACH, Delhi Chapter

In due course, a review of Pedestrian Design Guidelines was initiated after 6 months of its publication to include some more chapters related with Storm Water Management, Kerb heights, Slip Roads, Bus Corridors and updates on Signalized left turn lanes, radius of turning movement of left turns, etc. and an overall review was done to incorporate various suggestions received from experts & implementing agencies.

Sh. S.N. Sahai, Chairman of WG-1A and Sh. Ashok Kumar, Commissioner (Plg.) DDA, Co- Chairman of WG-1A have given their complete support with timely advise for revision and completion of this guideline document within a particular time frame. Sh. B. K. Jain, AC (TC&B), DDA has provided necessary guidance/advise, which has helped complete the process of preparing the final document.

Several external consultants have also voluntarily helped in the preparation of drawings and sketches incorporated in the guidelines including Ms. Ran Chen, ui2 International and Mr. Nishant Lall, NilaA Architecture & Urban Design. The document was prepared and finalized by the UTTIPEC Core Team under Ms. Paromita Roy, Sr. Consultant with the assistance of in-house consultants and interns from SPA with a special mention to Mr. Sahil Sasideran, during the period from 19th May to 19th July.

All the other Sub-group members and special invitees who have attended various meetings of Working Group I-A and the Sub-group, have provided necessary inputs for formulating and finalizing the Street Design Guidelines. List of references is placed at Annexure-II. List of Working Group members, sub-group members, UTTIPEC Core Consultants team and other participants/special invitees is placed at Annexure-III.

Shri Ashok Bhattacharjee,
Director (Plg.) UTTIPEC

Uganda NMT National Policy

- With the support of UNEP's Share the Road programme, Uganda frames Non Motorised Policy to increase awareness of walking and cycling; and support effective design and infrastructure provision at a national level.
- The policy recognizes walking and bicycling as non-polluting, sustainable, environmentally friendly and healthy transport options, and the promotion of these modes is part of its environmental policy.
- The strategy also acknowledges the importance of using universal accessibility principles for all new and refurbished transport infrastructures and requires all urban road designs to include a non-motorised transport statement explaining how the needs of pedestrians and cyclists have been incorporated.
- Finally, it recommends the establishment a National Road Safety Authority (NRSA) responsible for road safety, management and coordination.

- **Need implementation strategy…….**

http://www.unep.org/Transport/sharetheroad/PDF/StR_DesignGuidelines_web.pdf

Car free day Kampala, Uganda

http://www.fabio.or.ug/page19.php

Do not destroy informal intermediate public transport service…. Matatus, Boda Boda in African cities Or Auto rickshaw and cycle rickshaws in Indian cities…

Informal public transport in Nairobi (*Matatus*)

• *Matatus* or mini buses are the major form of public transport in Nairobi. Estimates show *matatus* transport 12 million commuters everyday in Kenya .. Meets nearly 70% of demand for motorised travel

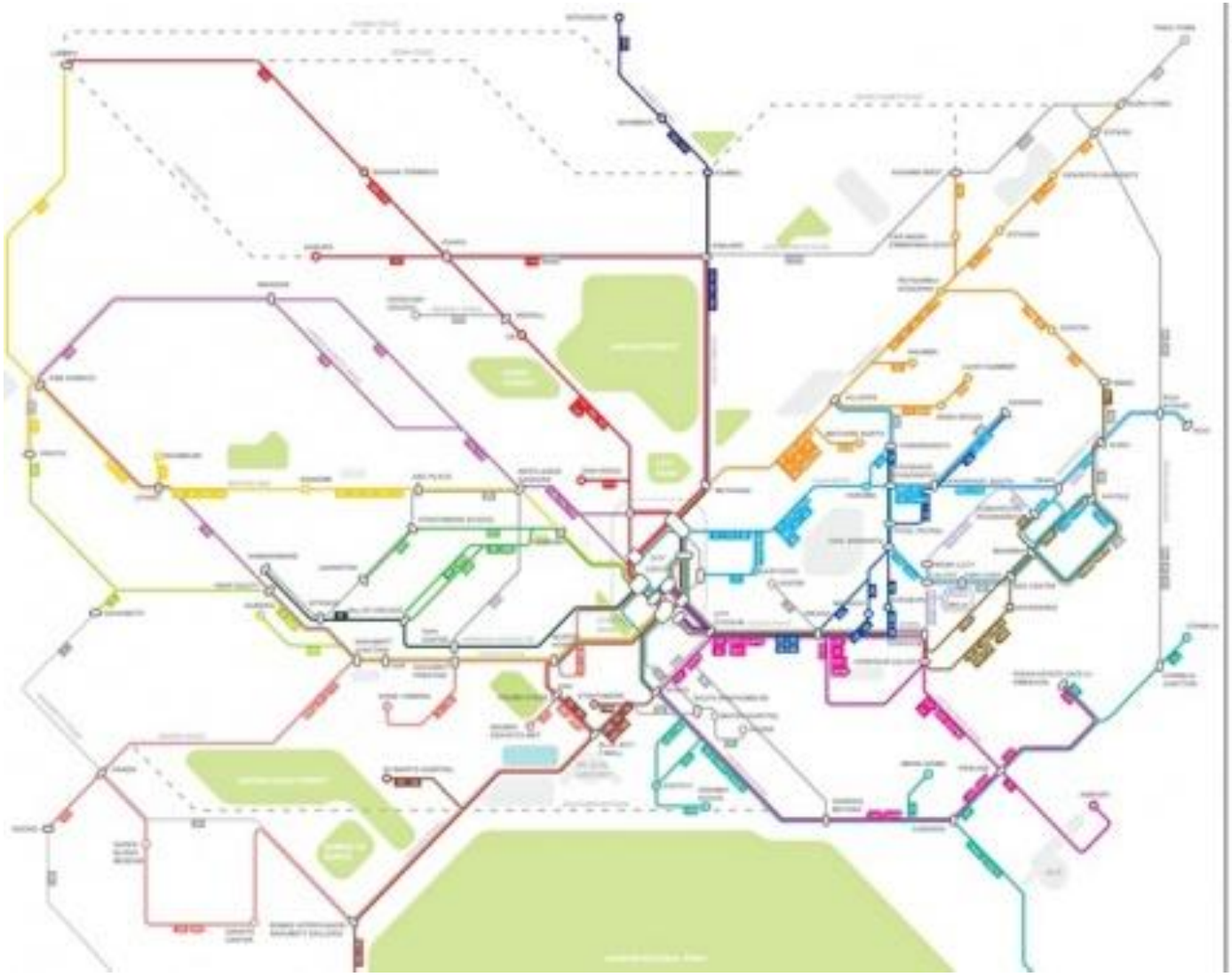
Government regulates the *matatus* – about 87 cooperatives or *Saacos* have been formed in Nairobi. A Sacco should have a minimum of 30 matatus.

Government is trying to phase out commonly seen 14 seater *matatus* and replace with high capacity *matatus*. Their permits will not be renewed.

• These ply on specific routes between downtown Nairobi to the suburbs and charge 30 KSh for a ride

Government is trying to phase out commonly seen 14 seater matatus and replace with high capacity matatus. Their permits will not be renewed.

Digital Matatus: Mapping Nairobi's public transit – a step forward



Boda-bodas – motorcycle taxi

Integrate Motorcycle taxis or *boda-bodas*

Clean them up -- Polluting modes as these are two-stroke engines

Regulations have been enacted that secure the riders safety through safety gear such as helmets and reflective jacket

Intermediate public transport in Delhi..

Patiala Green Cabs:

Auto rickshaws in Delhi

Amritsar Ecocab

Three-wheeler policy in Delhi:

-- All three-wheeler drivers to get public service vehicle badge and smart cards.

-- GPS connectivity to improve the meters and compliance.

-- In-use vehicle fitness and emission testing systems

--Integrate with mass transit system.

Shouldn’t we restrain car usage to escape crippling congestion?

What's wrong?

- **Parking: wasteful use of cars**: For about 90 to 95 per cent of the time a car is parked. (CRRI)
- **Insatiable demand for land**: Annual registration of cars generate demand for land bigger than 310 football fields in Delhi! Land is expensive and can be used for other social and public amenities
- **Inequitous use of land**: A car is allotted 23-26 sq m for parking. Under low cost housing scheme only 18-25 sq m is allotted to very poor families.
- **Parking takes away walkspace from pedestrians**
- **Urban common, green spaces, walkways at risk**
- **Parking --** a serious flashpoint for neighbourhood brawls

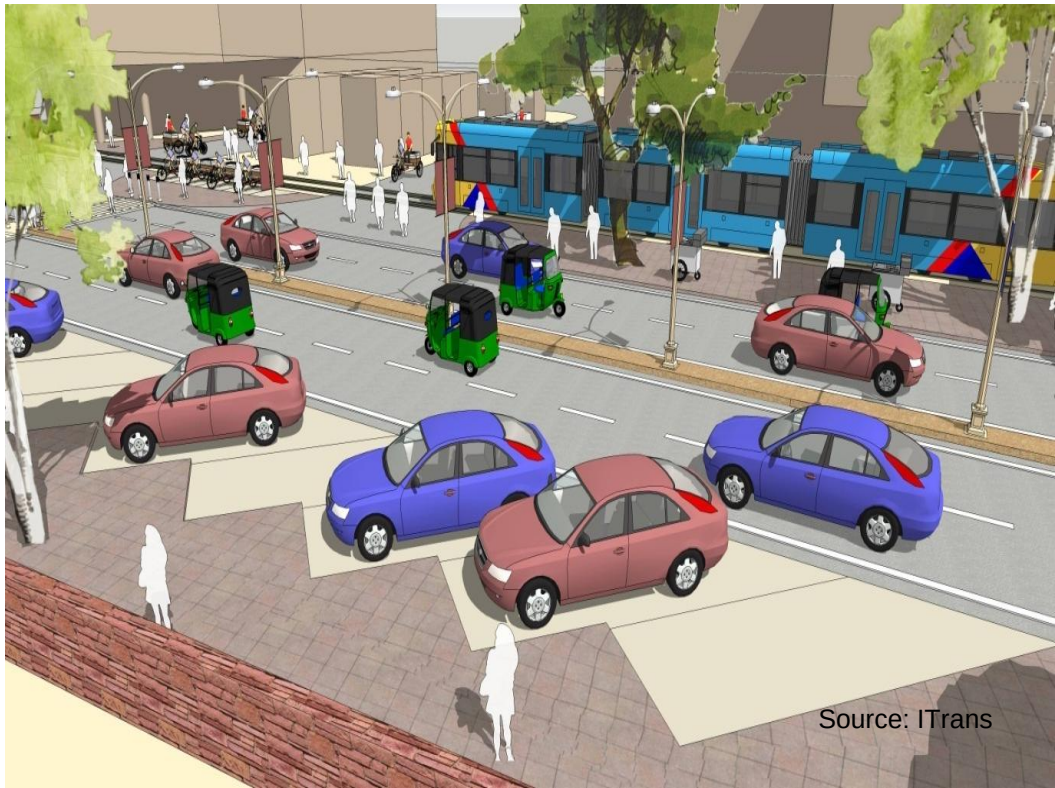
Adopt parking policy as a travel demand measure

Delhi: parking encroachment on pavements

Source: CSE

Manage and organise them well
Need area management plan
High penalty for illegal parking
Variable and high parking charges
Do not allow unlimited parking

Design on-street parking and ensure enforcement



Source: ITrans

Steps in Indian cities

Bangalore:

-- Pay and park scheme to be expanded to cover 85 roads. Roads classified into premium parking, business parking and ordinary parking. Hourly tariff has been increased.

-- Provision of yearly revision of parking fee linked to wholesale price index

-- Parking Information System and parking meters

Aizawl, Gangtok and cities of Rajasthan: Car cannot be bought without proof of parking

Delhi:

-- Parking district management plan included in Delhi Master Plan. Needs implementation. Parking is prohibited in green areas and play grounds.

Parking management in Nairobi: Step forward

- Nairobi introduces priced parking
- Cashless parking strategy
- High penalty
- Build on this. Remove barrier to implementation

Source: CSE

Get the principles of parking right

- **Establish goals of the parking policy –** It is a travel demand management tool to reduce pollution and dependency on personal vehicles
- **Limit parking requirements -** cap absolute supply of parking spaces
- **Make parking standards flexible based on accessibility -** Parking plans need to account for the changes in parking demand with improvement in public transport in different zones
- **Parking should be public, shared and priced**
- **Need good on-street parking management**
- **Prepare parking management plan for a zone and not a site**
- **Need appropriate street geometry to reduce modal conflict and protect walk and cycle lanes from parked cars**
- **Improve efficiency in utilisation of available parking spaces**
- **Design parking for multimodal integration and improving public transport usage**
- **"Park and Walk" facilities may be included in zonal plans**
- **Multi-level parking should not be planned in isolation for a site but as a overall parking plan of a zone**
- **Enforce strict penalty for violation of parking regulations and walkway encroachment**
- **Meet the parking needs of public transport buses, non-motorised transport and freight**
- **No free parking –** introduce high and variable parking rates according to duration of parking etc
- **Promote common public-shared-priced parking in residential and mixed land-use parking**

Fund the transition….need fiscal strategy

Change approaches to vehicle taxation

Implement polluter pay principles.

Motorists should pay the full costs that include congestion, pollution, ill health, and climate change. This can bring additional revenue to pay for the alternatives like public transport, walking and cycling infrastructure

Delhi: Cars pay a miniscule amount of one time road tax when they are purchased. But buses are made to pay much higher road tax annually. The total burden of taxes on buses in India is nearly a quarter of the total cost of the bus. This increases bus fares.

Kenya: Minibuses pay all taxes as those applicable on cars. This should be rationalized.

Public transport services are for public good and should pay lower taxes. Cars that are part of unsustainable modes should pay higher taxes.

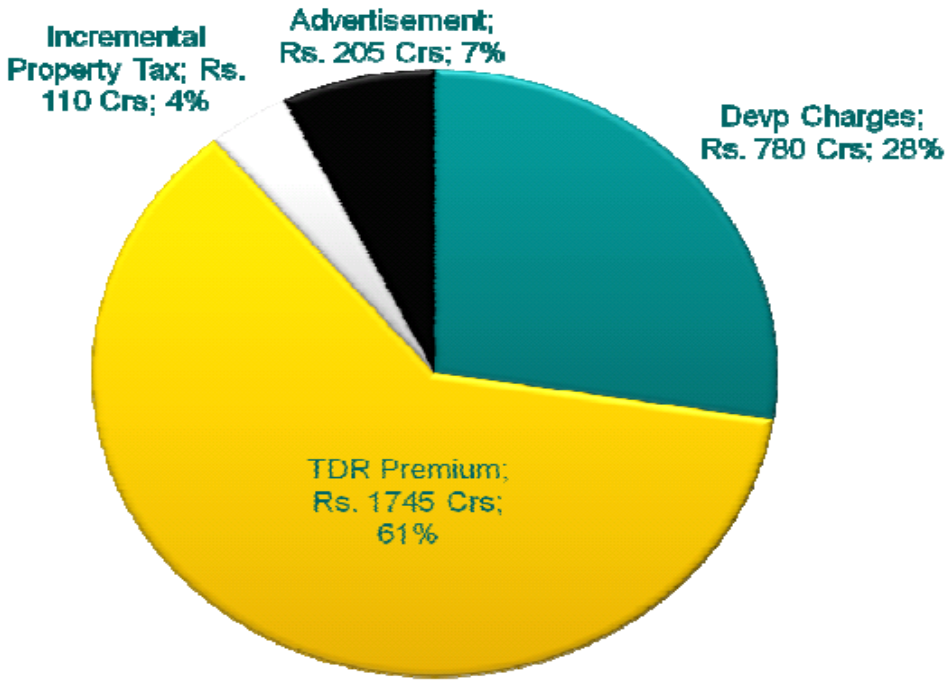
Create dedicated urban transport funds

Pimpri Chinchwad – city in India

Framing innovative funding strategy for public transport

- They allow extra built up area and densification along the BRT corridor – this increases earning from direct beneficieries
- Advertisement revenue and incremental property tax are the key sources
- This has already generated revenue worth Rs 92 crore (2012-13).
- This is used to construct and maintain BRT

Total income potential of BRT corridors



Source: Commissioner PCMC 2013, Financing the development of BRT corridor, Pimpri Chinchwad, Pune, SUTP

ASTF Action Framework: Opportunity for change in African cities

Action on road safety, accessibility and infrastructure, emissions and enabling conditions… This needs support and action

Priority area	Actions	Time bound target
Road safety	Implement the African Action Plan for the Decade of Action for Road Safety 2011 – 2020	
	Set up dedicated institutions for road safety and allocate funding	2017
	Insure comprehensive data collection and reporting mechanisms on road safety incidents and trends	2015
	Develop and adopt a Non-Motorised Transport Policy	2015
	Develop and adopt Non-Motorised Transport Design Guidelines	2015
Vehicle emissions and energy efficiency	Ensure air quality monitoring takes place in all main cities	2017
	Develop vehicle emission standards and suitable inspection and testing	2016
	Develop vehicle import regulations at both regional and national levels, based on either vehicle age, mileage or emissions	2016
	Develop regulations for the adoption of cleaner fuels - especially low sulphur fuels - at a national level	2017
	Undertake a country level fuel economy analysis and develop a national level policy to improve fuel economy	2017
Accessibility and sustainable infrastructure	Develop a national policy on sustainable urban transport	2017
	Develop integrated transport plans with a specific focus on multi-modal transport	2018
	Undertake an assessment and develop a national policy on mass-transit systems	2017

Our cities need upscaled transition to cut pollution and health costs

Strengthen air quality monitoring and management. Inform people and issue health advisory

Leapfrog vehicle technology and fuel quality

- Emissions standards
- Fuel economy standards

Scale up and integrate public transport systems

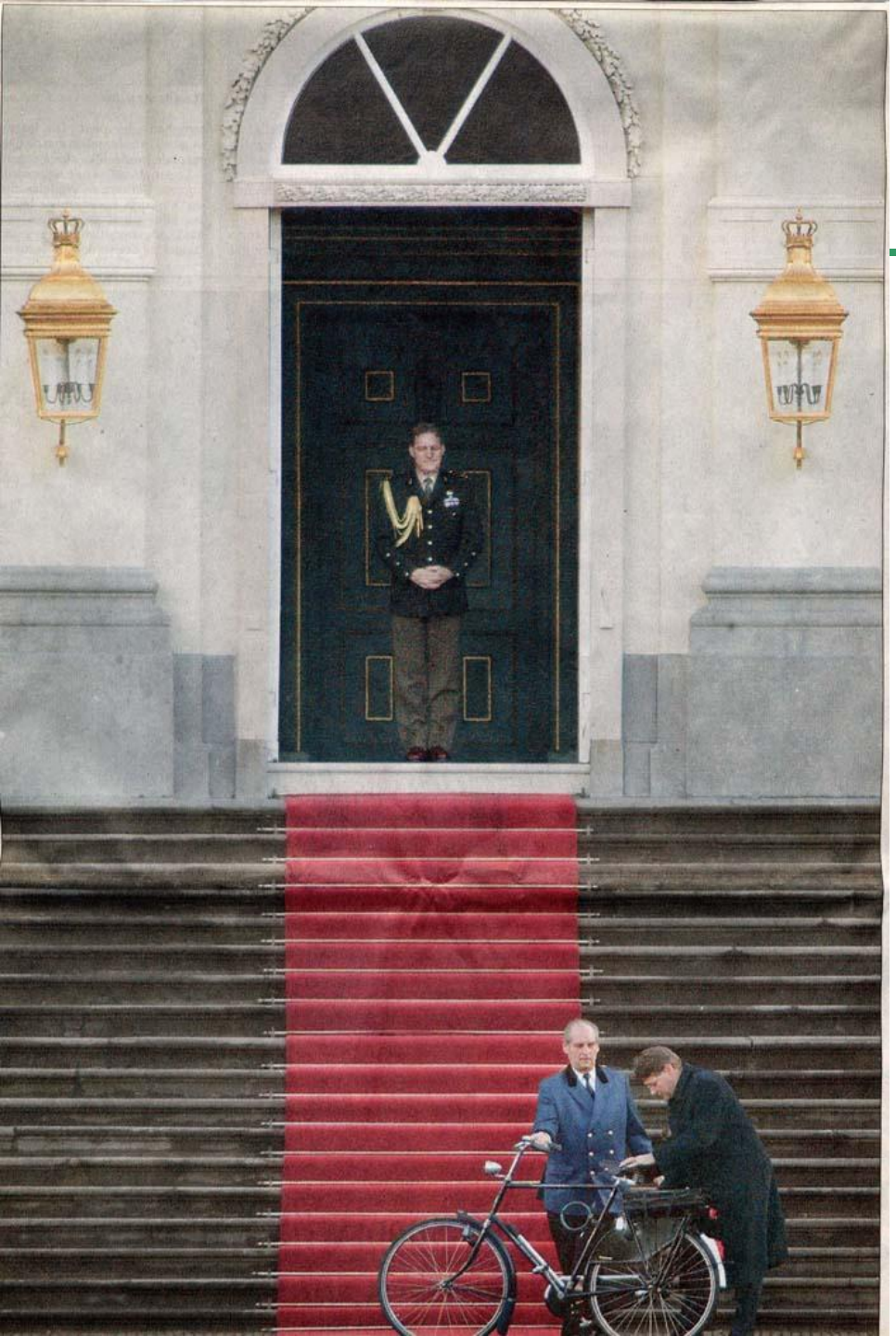
Implement walking and cycling stratgeies

Reduce demand for travel and vehicle usage

- Parking policy as a restraint measure
- Land-use planning
- Road pricing
- Tax rationalisation

Frame fiscal strategy to fund the transition

This needs support. Must not be allowed to fail…Otherwise what??



Dutch Minister visits the queen

Source: GIZ

Thank You


Do you think we are not seeing the point?
AUTO INDUSTRY
GOVERNMENT