# The State of Air Pollution

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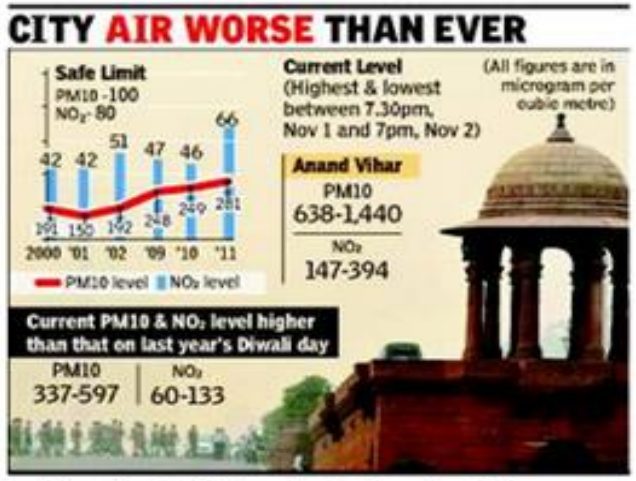
# Is the Airpocalypse real?

## CITY AIR WORSE THAN EVER




## INDIA'S SILENT KILLER

Studies at **400** locations in **190** cities indicate deteriorating quality of air

**PARTICULATE MATTER**

**Toxic states: Delhi**, Jharkhand, Punjab, UP, Bihar, Chhattisgarh, Rajasthan and Haryana

**Five most dirty cities:** Gwalior (**308** ug/m3), West Singhbhum (**302** ug/m3), Ghaziabad (**290** ug/m3), Raipur (**289** ug/m3) and **Delhi (261** ug/m3)

**Top five polluted locations:** Dindayal Nagar (Gwalior), **Town Hall (Delhi)**, Sarora (Raipur), **Janakpuri (Delhi)** and West Singhbhum, Jharkhand.

**Reason:** High vehicular & industrial pollution

**National Standard:** **60 micro grams** in cubic meter of air (ug/m3)

**NITROGEN OXIDE**

**Toxic states:** West Bengal, **Delhi**, Jharkhand, Maharashtra, UP & Rajasthan.

**Five most dirty cities:** Howrah (**75** ug/m3), Barrackpore (**74** ug/m3), Badlapur (**73** ug/m3) and Ulhasnagar in Maharashtra (**68** ug/m3) and Durgapur in West Bengal (**66** ug/m3).

**Reason:** Flux of diesel vehicles.

**National standard:** **40 ug/m3**

**SULPHUR DIOXIDE**

**Toxic states:** Jharkhand and Maharashtra

**Cities with highest level:** Jamshedpur (**35.4** ug/m3), Saraikela Kharsawan (**35** ug/m3), Badlapur in Maharashtra (**32.3** ug/m3) and Marmagao in Goa (**31.8** ug/m3)

**National Standard:** **50 ug/m3**

## एयर पलूशन से खतरे की घंटी

CSE

## Smog leaves Delhi gasping for breath

TNN | Nov 3, 2012, 01.33 AM IST

AIR POLLUTION KILLS NEARLY 8M PEOPLE EVERY YEAR GLOBALLY

## DANGER IN THE AIR

**MAJOR THREATS**

**GREENHOUSE GASES:** Carbon dioxide (CO2), methane, black carbon, nitrous oxide (N2O), hydroflurocarbons (HFC)

**PARTICLES (PM10/ PM2.5):** Nitrogen oxides, sulphur oxides, volatile organic compounds (VOC), ammonia, carbon monoxide (CO), ozone

**TOXICS:** Vehicular exhaust, road dust, construction waste, burning of dry leaves, benzene, heavy metals

**COMMON ILLNESSES CAUSED DUE TO POLLUTANTS**

**Children:** Poorly developed lungs, pneumonia, bronchitis, asthma

**Adults:** Asthma, chronic obstructive pulmonary disease (COPD), lung cancer

**Elderly:** Asthma, COPD, recurrent respiratory tract infection, heart disease, increased risk of stroke

**PREVENTIVE MEASURES**

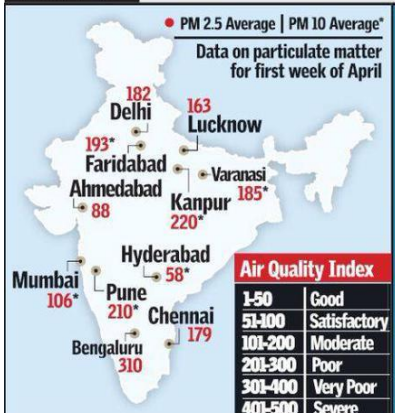
- Avoid crowded vehicular areas
- Drink plenty of water
- Contact doctor for unusual cough or breathing difficulty
- Get vaccinated if you have respiratory problems

**LONG-TERM SOLUTIONS**

- Making people aware of harmful effects of various pollutants such as diesel
- Improving public transport and encouraging people to use it to curb vehicular emissions
- Penalizing heavy vehicles that release high amounts of toxics
- Preserving and promoting greenery

## TOXIC SKIES

AIR QUALITY IN INDIA'S MAJOR CITIES IS FAST DETERIORATING



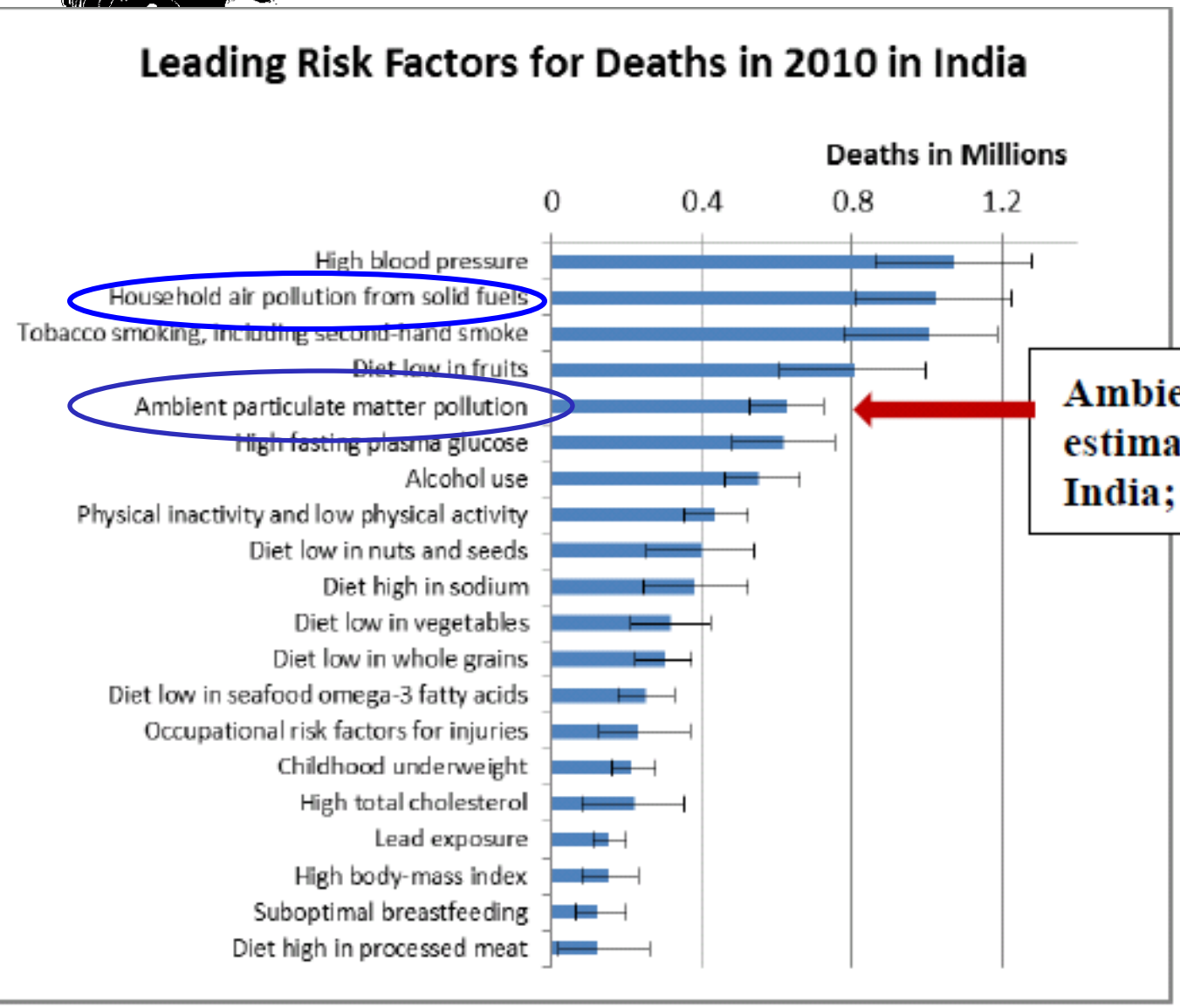

**Air Quality Index**

| | |
|---|---|
| 1-50 | Good |
| 51-100 | Satisfactory |
| 101-200 | Moderate |
| 201-300 | Poor |
| 301-400 | Very Poor |
| 401-500 | Severe |

- Last year the Environmental Preference Index ranked **India 174 out of 178** countries for air quality
- A WHO survey last year found that **13 of the most polluted 20 cities** in the world were in India

## Air pollution 5th largest killer in India

# The cost of toxic air quality in our cities

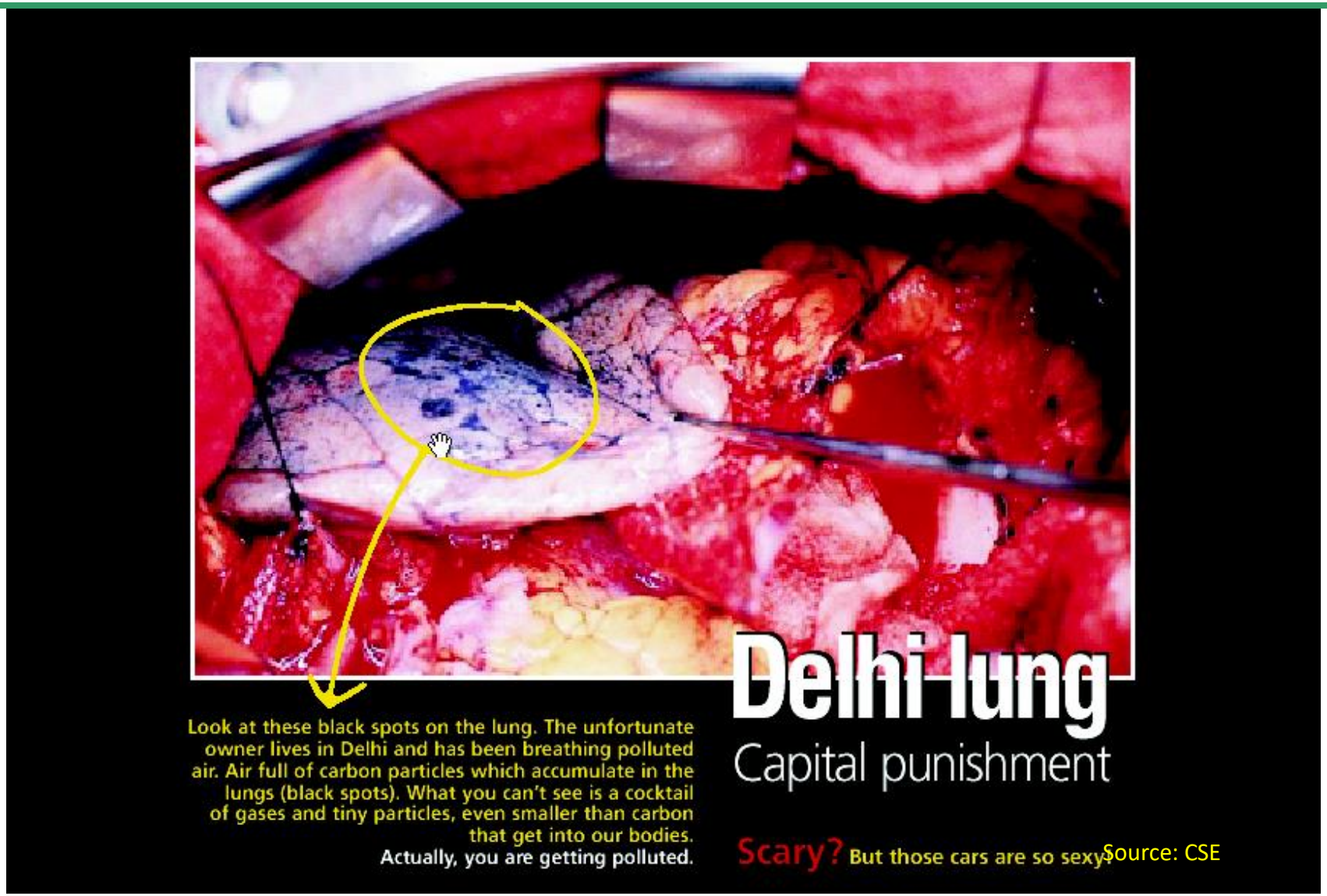


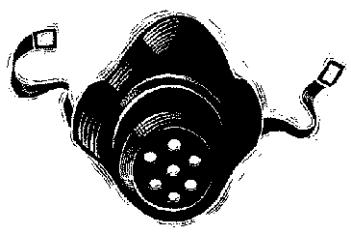

**Ambient $PM_{2.5}$ caused an estimated 627,000 deaths in India; ~6% of all deaths in 2010**

More than 18 million healthy life years lost due to air pollution. Air pollution triggers stroke, cardiovascular and respiratory diseases, cancer…..

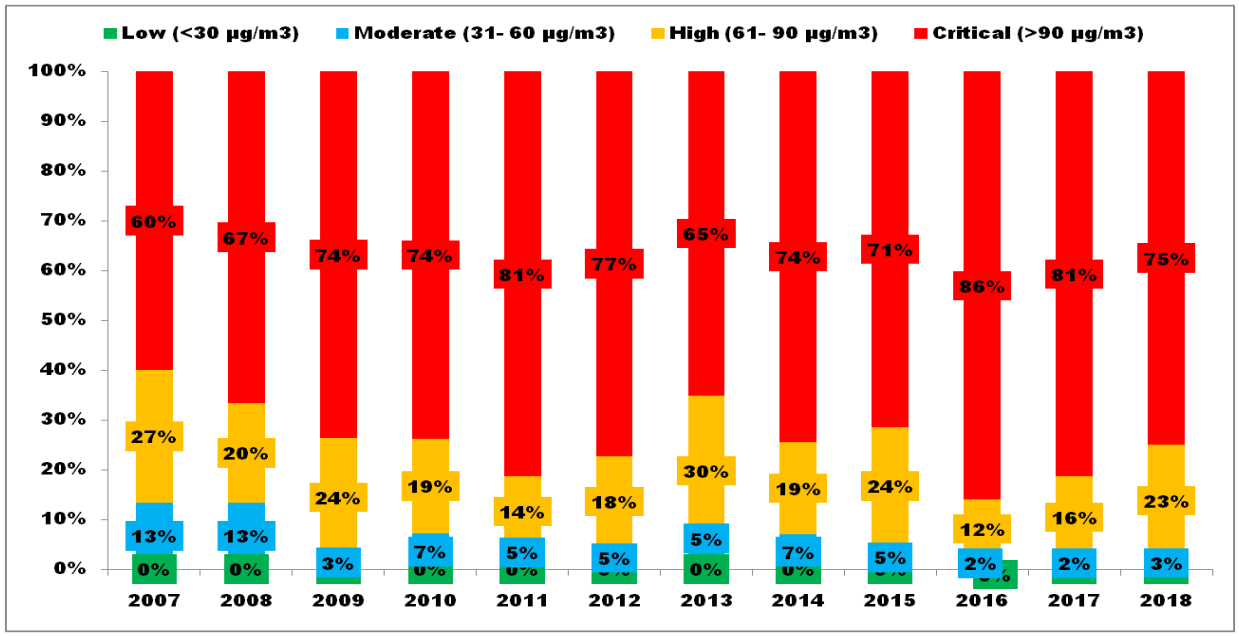
**Air pollution is the 5th largest killer in India…….**

# Polluted Air: The Silent Killer





# More cities in grip of critical level of PM10

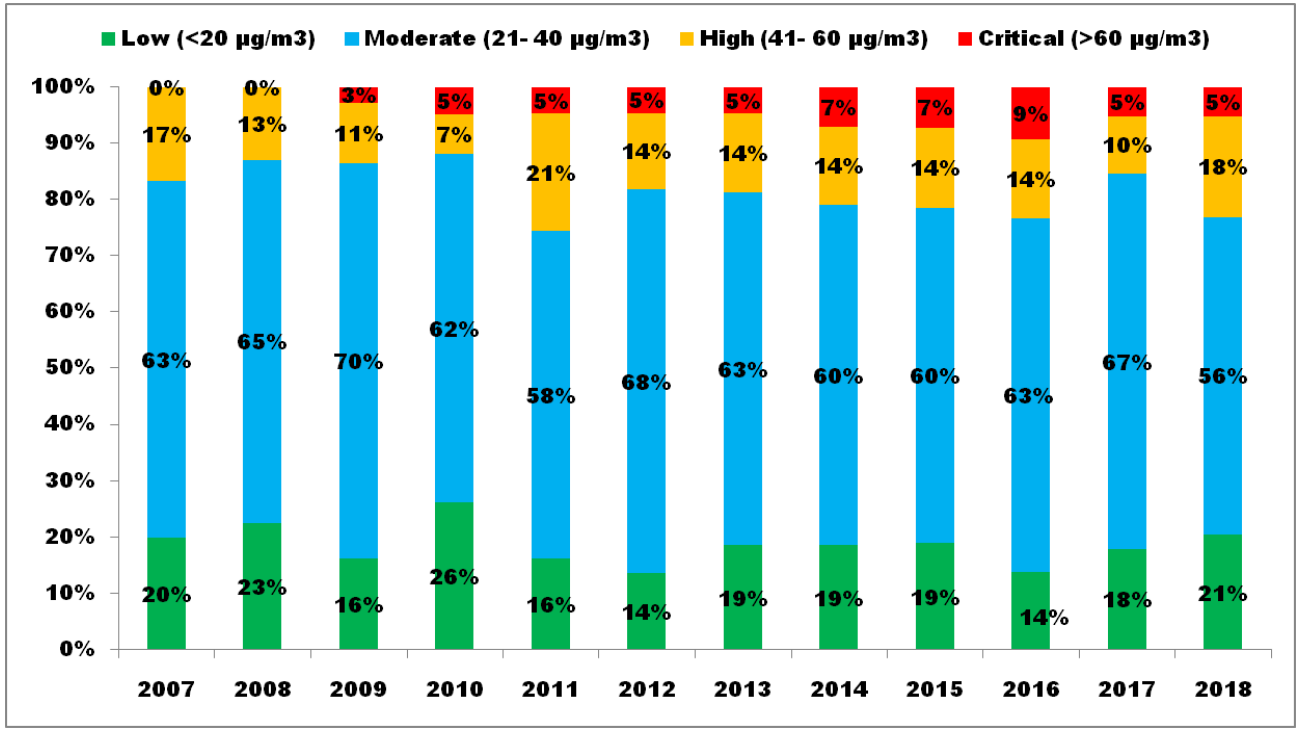



*Source: CSE's analysis of CPCB air quality data from ENVIS centre for million plus population cities*

Cities with critical level of PM10 (more than 1.5 times the standards) has increased from 60% in 2007 to 75% in 2018.

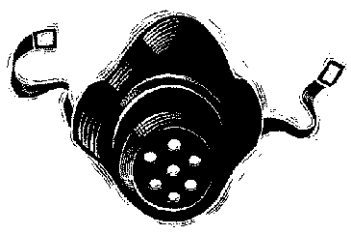
- Drastic fall in number of cities complying with standard -- from 13% in 2007 to 3% in 2018.
- There are no cities in the low pollution category (50% below the standard)

# NO2 – an emerging problem




*Source: CSE's analysis of CPCB air quality data from ENVIS centre for million plus population cities*

- Cities with NO2 levels exceeding annual average standards has increased from 17%in 2007 to 23% in 2018. In 2007 not a single city was in critical category. In 2018 there were 5% of the cities
- NO2 hotspots – Allahabad, Delhi, Ghaziabad, Kanpur, Kolkata, Meerut, Patna, Pune, and Thane



# PM10 trend in cities with million plus population

**Cities with mixed trend:** Delhi, Chennai, Hyderabad, Bengaluru and smaller cities like Surat, Pune, Thane etc

**Cities with stable but high trends:**

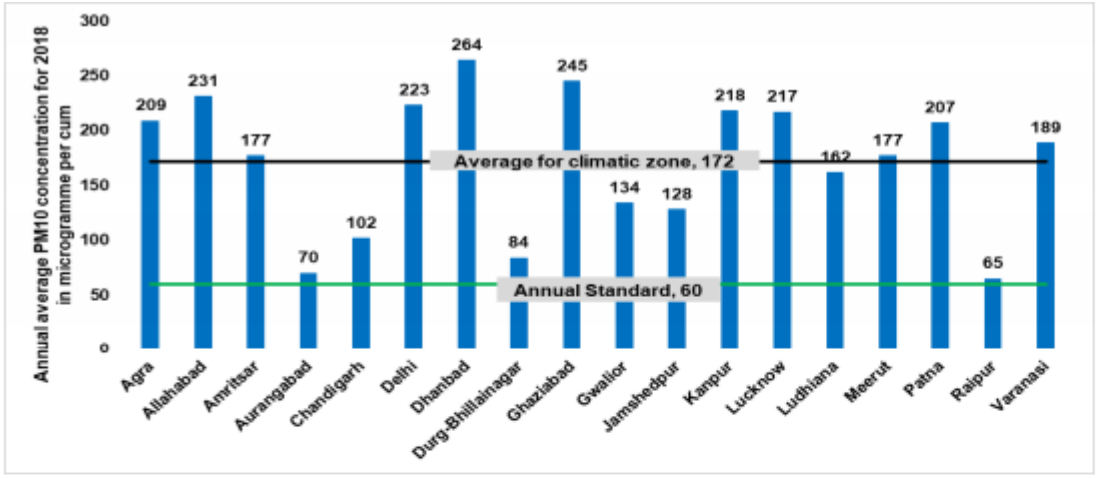
•Agra, Mumbai, Nagpur, Ahmedabad, Faridabad, Kanpur, Kolkata Jodhpur and Vishakhapatnam.

**Cities with declining trend**:

•Amritsar, Coimbatore, Gwalior, Howrah, Indore, Jabalpur, Ludhiana, and Raipur

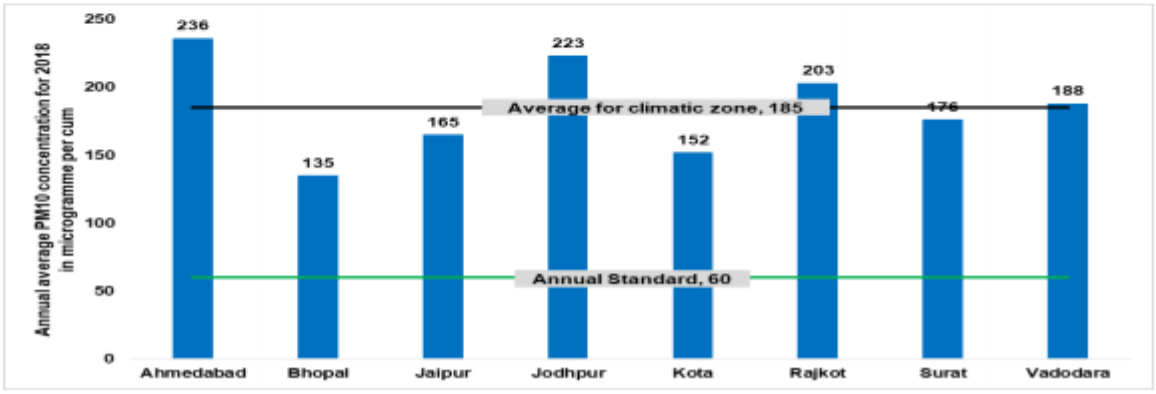
•Need riders. Often a reflection of changes in location of monitoring stations. Also monitors being used for reporting data

# PM10 in different climatic regions




**Indo-Gangetic plain**

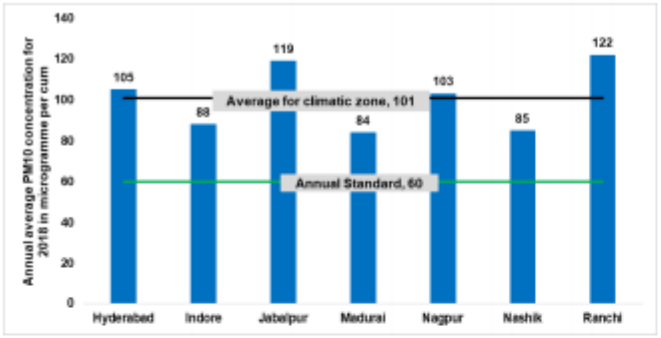
**Hot & Dry (North)**



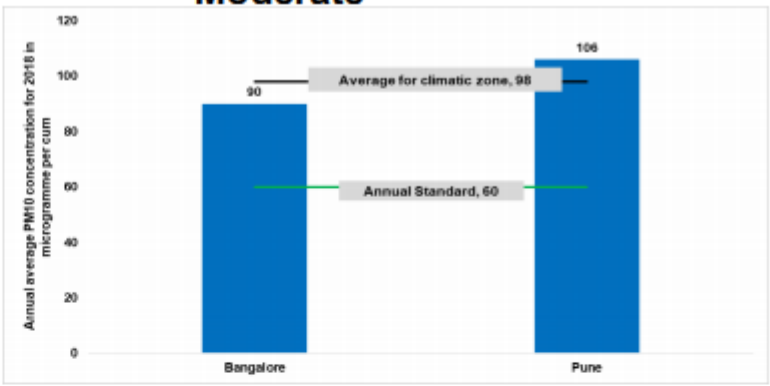

*Source: CSE's analysis based on CPCB Envis centre and data submitted to Lok Sabha*

# PM10 in different climatic regions

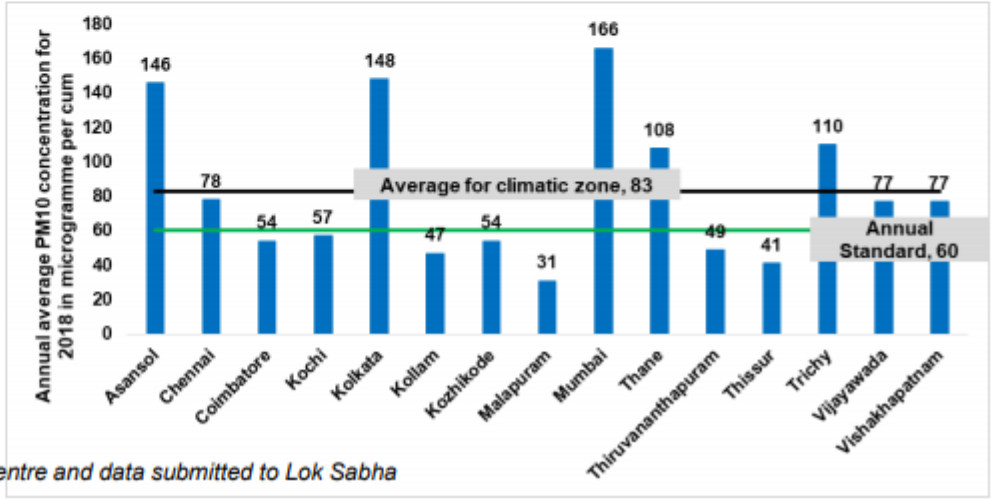
## Hot & Dry (South)




## Moderate




**Warm and Humid (Coastal)—** PM10 levels have gone up to 2 times the standard in case of Mumbai

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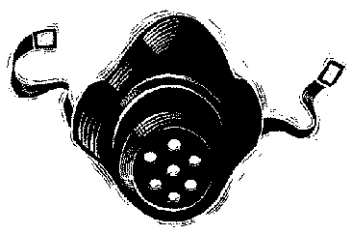
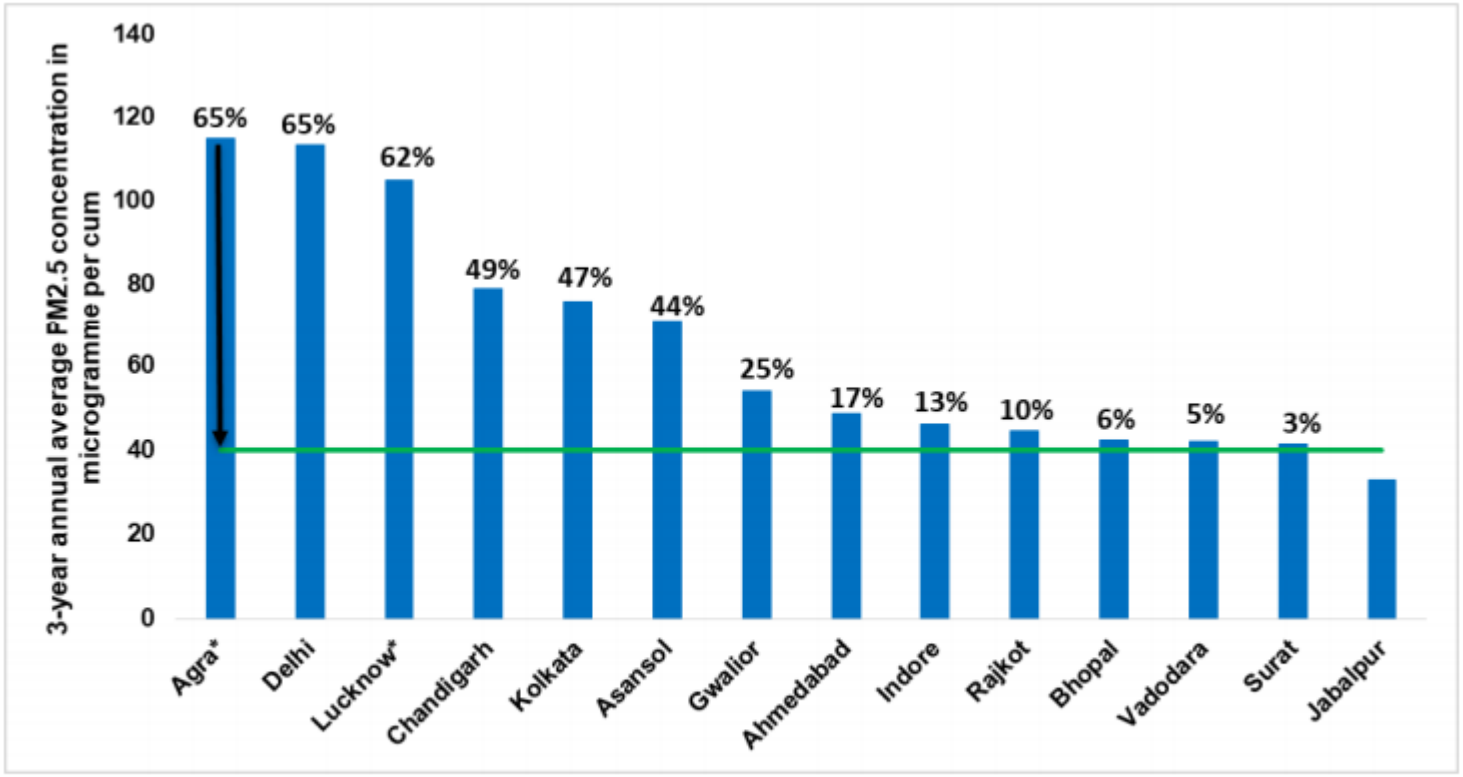
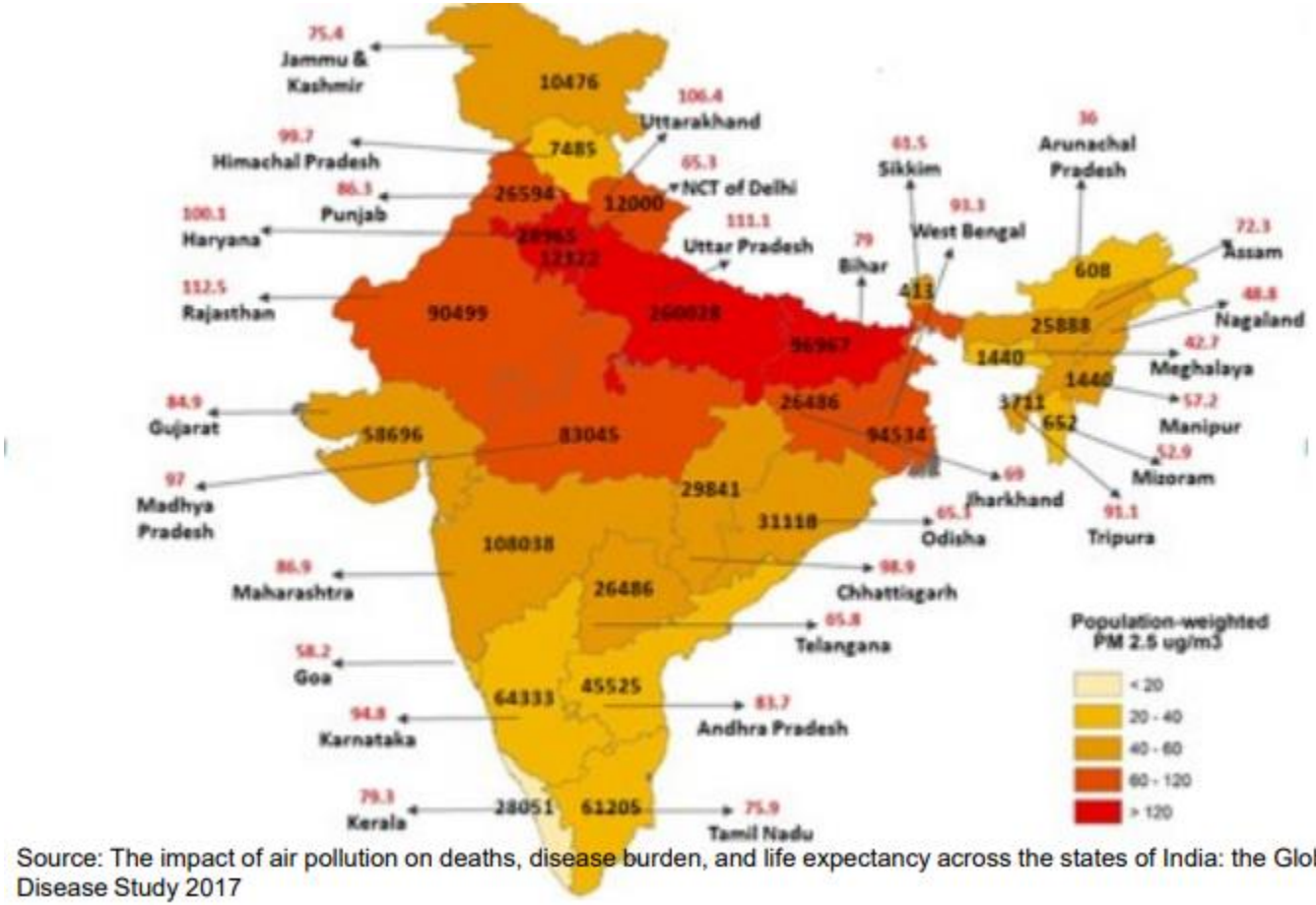


# Reduction target for PM2.5




*Source: CSE's analysis based on CPCB Envis centre and data submitted to Lok Sabha*

# Health is a leveler




Source: The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: the Global Burden of Disease Study 2017

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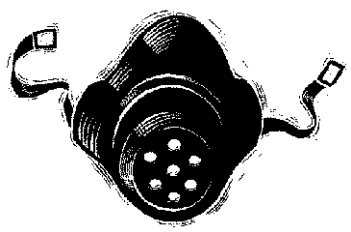
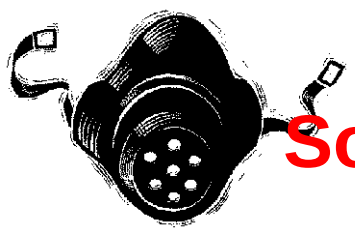


# Poor Air Quality Monitoring in India

-- Only 339 cities/towns in 29 states and 6 Union Territories of the country is monitored under NAMP mandate out of the total 6,166 census cities - mere 5.5%

-- There are currently 779 operating stations under NAMP

--Only 128 cities have continuous real time monitoring stations with 231 monitoring stations. Rest are manual that do not allow daily reporting of real time air quality data.



# 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 heavy traffic
- Set up independent fuel testing laboratories to check fuel adulteration

**On industry**

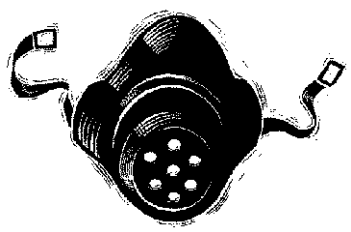
- Relocated polluting units
- Tighter controls on power plants. No new power plants.

**Air quality monitoring**

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

**Other sources**

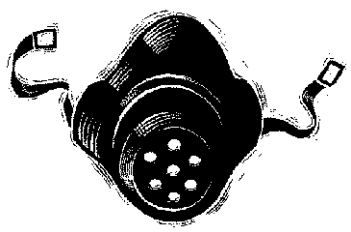
- Emissions standards for generator sets
- Ban on open burning of biomass



# Second generation reforms- Action taken from 2015 onwards

- **Industry**
  - Approved fuel notification (29.06.2018)
  - Petcoke and furnace oil banned in 4 states. At national level, on November 17, 2017, SC requested other states to also ban its usage. Petcoke import also being restricted.
  - SC order of May 2, 2017, has directed NOx and SOx standards for 34 groups of industries. MoEF&CC and CPCB issued Notification on January 29, 2018, for 16 groups of industries.
  - Expansion of piped natural gas (PNG) network to industrial places in Delhi. Total number of industrial units identified for conversion to gas are 1467. Total number of industrial units converted to natural as are 1150. Also, incentives given to move to gas and removing tax on gas.

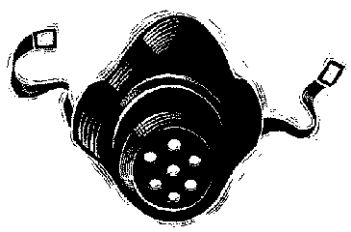
- **Power Plants:** Progressively shutting down coal power plants
  - Indraprastha (405MW): Closed in September 2009
  - Rajghat (135 MW): Closed in May 2015
  - Badarpur thermal power station (705MW): Closed in October 2018
  - Total generation capacity of 1245MW shut down
  - Flyash utilization initiative underway including ecopark on flyash yard.
  - Natural gas made available for Bawana power plant



# Second generation reforms- Action taken from 2015 onwards

- **Vehicular emissions**
  - CNG for public transport expanded
  - BS VI fuels with 10 ppm sulphur introduced in 2018
  - 10 year old diesel vehicles and 15 year-old petrol vehicles are being phased out
  - Favourable taxation for clean fuel introduced; also expansion of CNG stations. About 500 CNG stations have been opened
  - EPC on big diesel cars and SUVs (more than 2000 cc). Diesel cars sales have dropped substantially in Delhi. At the national level, diesel cars accounted for 19 per cent of the total car sales during 2018-19 – dropping from half all sales in 2012-13.
  - Pilot on Hydrogen-CNG buses (CNG with 18 per cent Hydrogen blend)
  - Use of remote sensing technology for monitoring emissions from on-road vehicles
  - Enforcement of PUC improved across NCR.
  - Installation of stage I and Stage II vapour recovery system initiated and expanded. Environmental compensation of Rs 1 crore imposed on oil companies: IOCL, HPCL and BPCL for non-compliance with directions on vapour recovery

- **Trucks**
  - EPE-WPE, 60,000 trucks have been diverted from Delhi.
  - ECC (2015) on - to deter non destined trucks
  - Restriction on entry of 10 year old trucks
  - Introduction of RFID at 13 entry points in Delhi



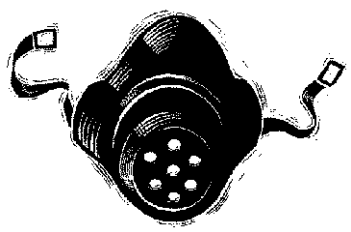
# Second generation reforms- Action taken from 2015 onwards

❖ **Public Transport**

- Average daily ridership of DTC buses- increased by two lakhs compared to 2016-17. The average ridership of DTC buses is 42.03 lakh. DTC bus numbers have reduced
- NCR reciprocal agreement -- autos and buses allowed to run across borders in entire NCR draft in 2008 and effective from 2010; Time for its renewal
- Ridership in the metro increased from 1259000 in 2010-11 to 2708376 in 2018-19. The operational route has increased from 165.5 km in 2010-11 to 373 km in 2018-19; Rolling stock has increased from 844 in 2010-11 to 2194 in 2018-19.
- Parking policy as a demand management tool has been notified. Pilot schemes on parking area management plans initiated.

❖ **Waste Burning**

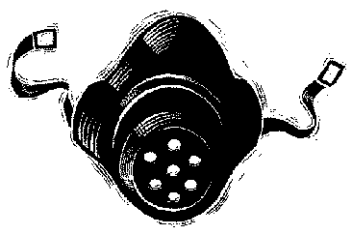
- Solid Waste Management Rules and Regulations 2016 notified
- Delhi byelaws amended based on these rules and notified in January 2017. To be implemented
- The city has over 2,300 waste dumps. Over 80 per cent of the waste is processed through incineration
- Large-scale burning of plastics in Mundka area of Delhi that caused enormous poisonous gases. Now factories have been linked with waste to energy plant for safe removal and disposal of plastic waste in that area
- The status of segregation in the city is not more than 10 per cent and is restricted to a few institutions and colonies only. 12 wards from different MCDs in Delhi have been selected as model wards. To prevent littering 6,000 roadside twin bins have been procured.



# Second generation reforms- Action taken from 2015 onwards

- **Construction and Demolition waste and dust**
  - Checklist for dust control at construction sites made. According to the latest Economic Survey, DPCC has so far since January 2018, has imposed fine to the tune of Rs 3,55,50,000 in respect to dust control. DPCC has imposed fines on construction projects who have taken environmental clearance (for built up area more than 20,000 sq meter).
  - The Construction and Demolition Waste Management Rules, 2016 notified and BIS rules modified in 2014 to allow use of recycled C&D waste in building construction
  - There are 60 mechanized road sweeping machines in Delhi
  - Environmental compensation of Rs 1 crore has been imposed on Municipal bodies (New Delhi, South, East, North and Cantonment Board) over open dumping/ burning of garbage and C&D waste vide directions dated January 16, 2019
  - City has expanded recycling capacity of it's C&D waste recycling plant at Burari from 500 MTD to 2,000 MTD.
  - City has also added two more recycling plants to combined capacity of 650 MTD

- **Monitoring and Graded Response Action Plan (GRAP)**
  - Air quality monitoring stations expanded to 38 in Delhi and over 50 in total in the region
  - Early Warning System for Delhi launched in October, 2018
  - GRAP implemented during 2017-18 and 2018-19

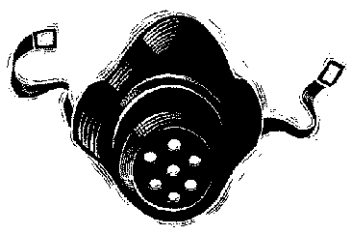


# Mandate of the Clean Air Action Planning

- NGT order dated October 8, 2018: 102 non-attainment cities to prepare action plan and submit it to the review committee by December 31, 2018

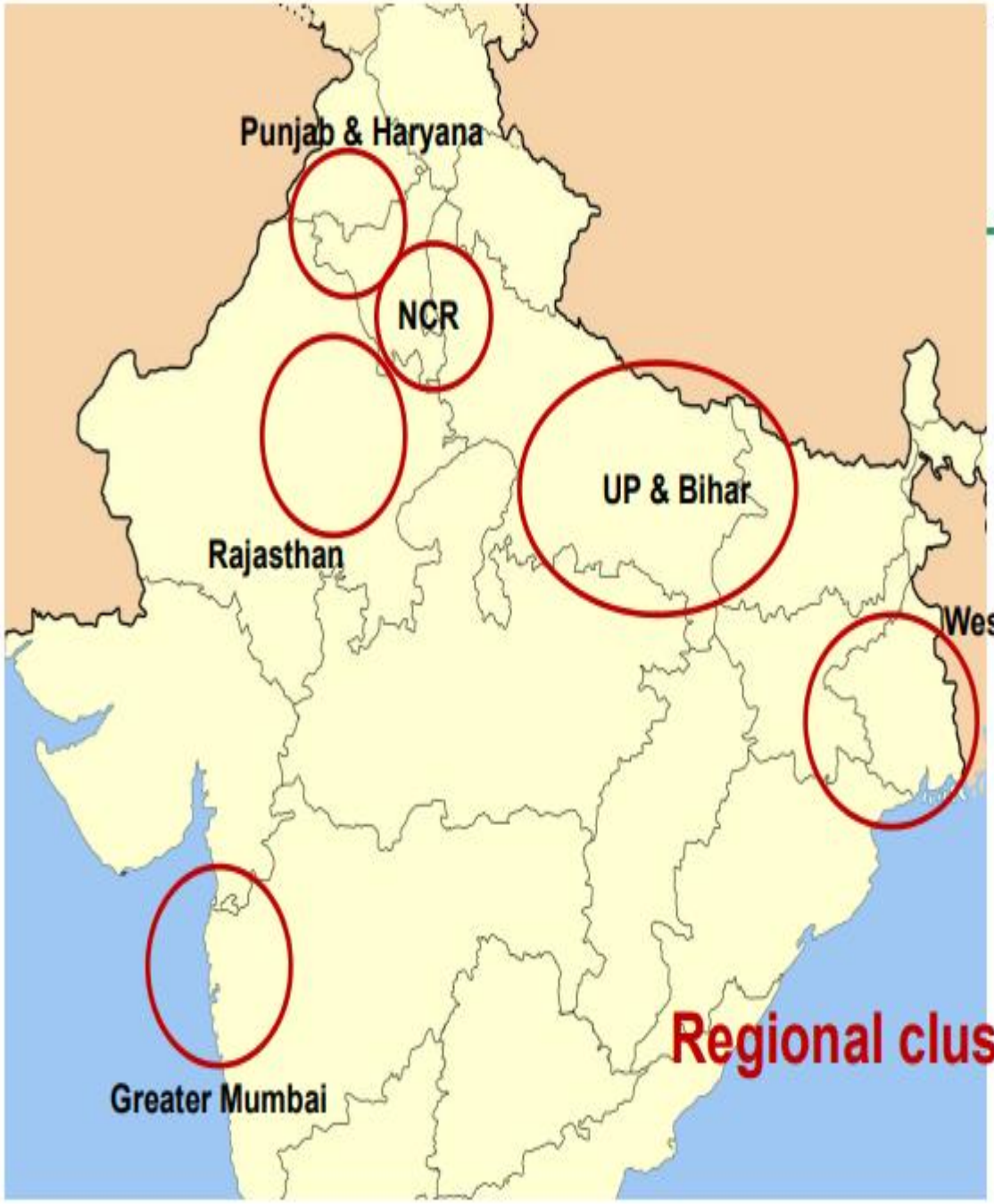
- NCAP released- January 10, 2019

- NGT order dated August 6, 2019: 20 more cities added to the non-attainment whose action plan has to be prepared

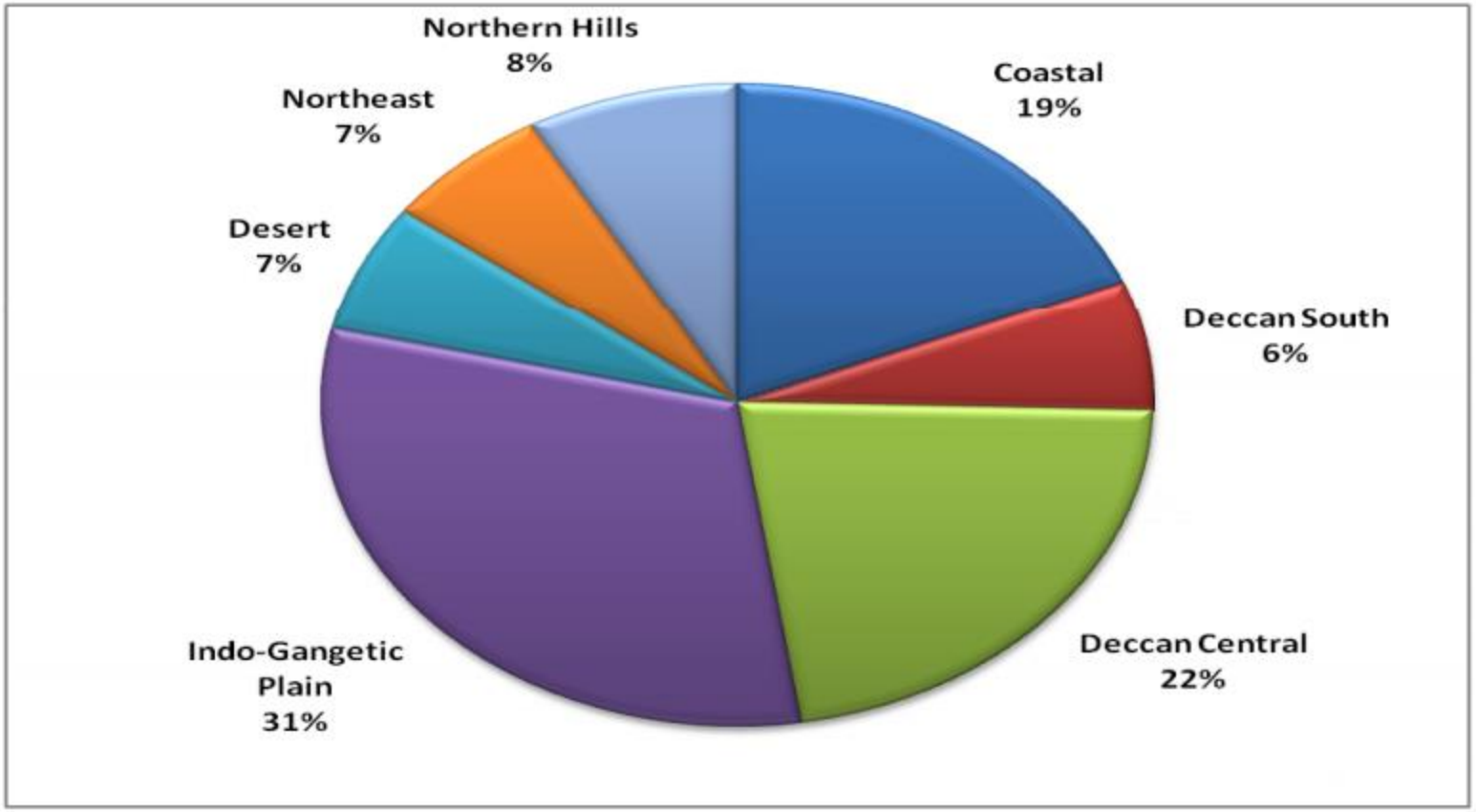


**NCAP target for 122 cities:**

**Reduce particulate pollution by 20-30 per cent by 2024 from 2017 levels…….**

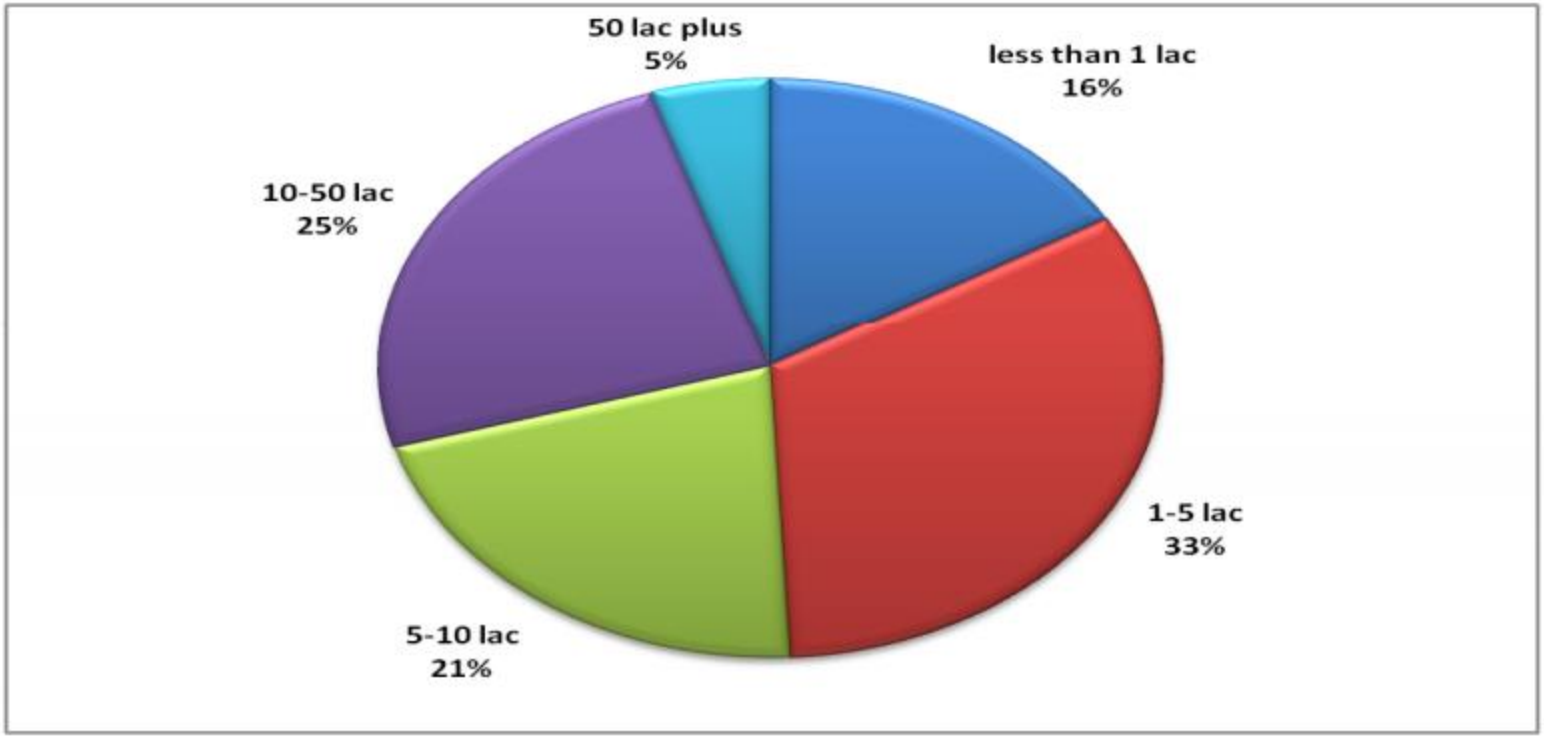

Punjab & Haryana
NCR
Rajasthan
UP & Bihar
West Bengal
Greater Mumbai
Regional clusters

# 60% of non attainment cities in North India




*Source: Based on data available with CPCB*

# 70% of Non-attainment cities have population less than 10 lakh

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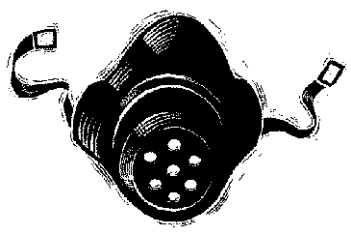
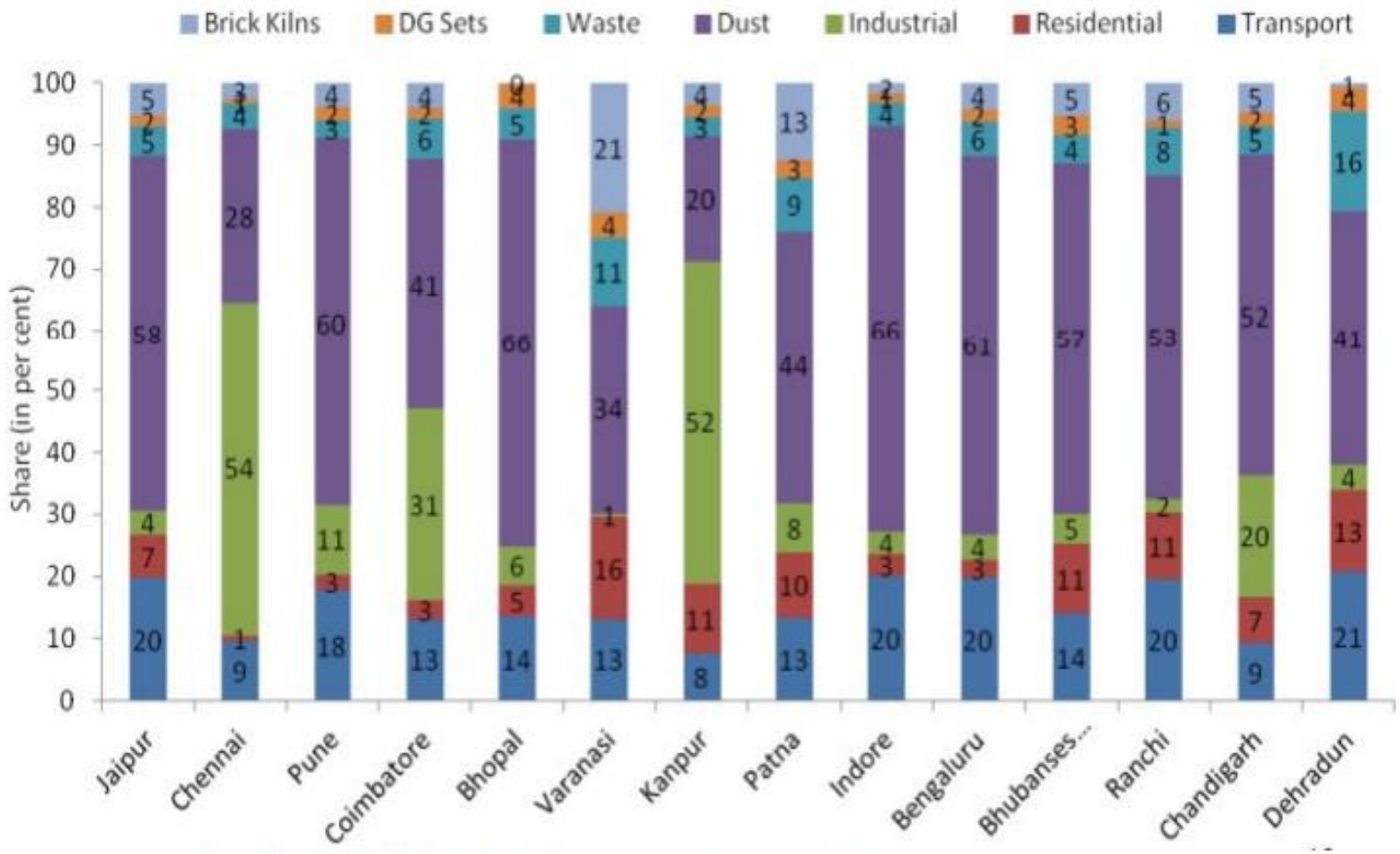


# Action planning begins

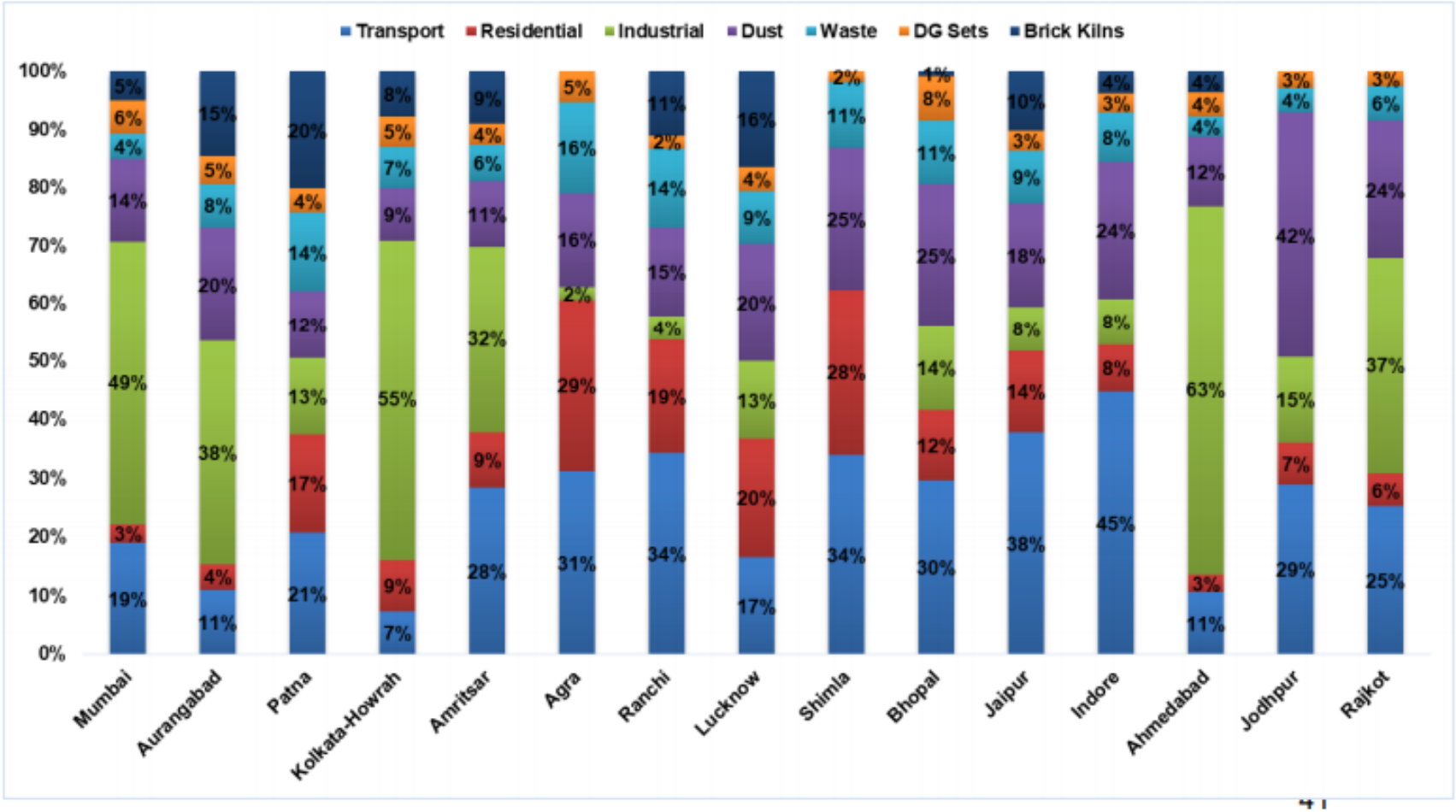
-- Air quality management and monitoring strategies
-- Industry
-- Power plants
-- Vehicle and transportation strategies
-- Open burning
-- Construction activities
-- Diesel Generator Sets
-- Solid fuel burning (cooking and open eateries)
-- Road dust
-- Greening

# What's causing the problem? Source assessment Need deep cuts and multi-sectoral approach



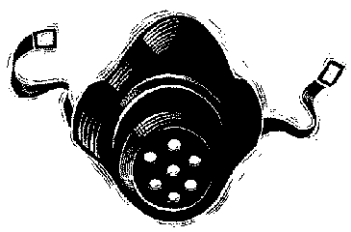

*Source: Urban Emissions, 2017, http://www.urbanemissions.info/wp-content/uploads/apna/frontpage/index.html*

# Emission inventory– PM2.5




*Source: Urbanemissions.info,* http://www.urbanemissions.info/india-apna/

## Key approach... National policies and norms – Common minimum Aligning ongoing action in different sectors



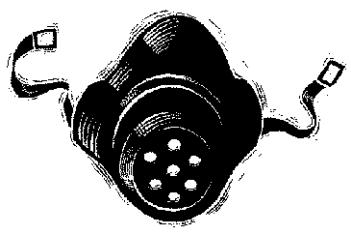
# National action: Common minimum Air quality monitoring and management

- Expansion of air quality monitoring grid (including rural monitoring)

- National Air Quality Index (AQI) for public information system

- SOP for source apportionment and emission inventory studies

- Satellite monitoring



# National action: Vehicles

**Vehicle technology**

• BS-VI norms from April 2020

• PUC revised norms

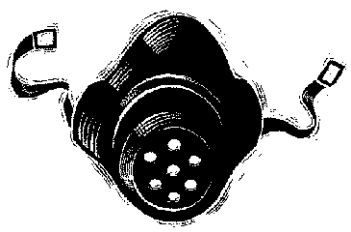
• Faster Adoption and Manufacturing of Electric Vehicles in India (FAME-II) scheme to be implemented over a period of three years, with effect from April 1, 2019.

**Public transport**

• Reform based funding for public transport – Funding for electric buses for selected cities; Metro funding linked to reforms

• Transit oriented development policy

• No strategy for smaller towns



# Industries and power plants

**Industry**

• CPCB notification for SOx and NOx standards for 16 groups of industries; Other emissions standards

• Ban on petcoke and furnace oil in four states; restriction on import of petcoke (allowed as feedstock in select industries)

• CEPI programme being reformed

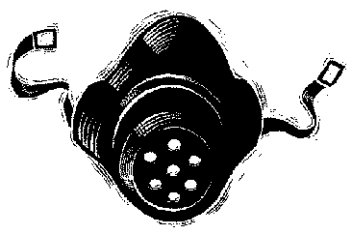
• CPCB's 2017 notification on CPCB's 2017 notification on improved improved kiln for brick kilns (kiln for brick kilns (zig zag brick setting)

• Smart monitoring of industries -- Online Continuous Effluent/Emission Monitoring System (CEMS) since 2016-17.

**Power plant**

• New emission norms for power plants: Deadline 2022.

• Fly ash management



# Area sources

**Waste**

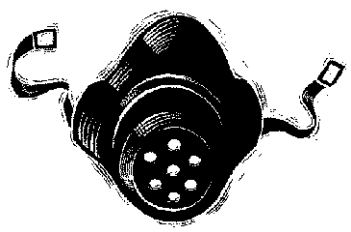
- **Solid waste management**: **Notifications for management of six wastes streams** -- solid waste, plastic waste, e-waste, bio-medical waste, C&D waste and hazardous wastes issued in 2016.
- Notifications for dust mitigation measures during construction and demolition activities.

**Clean household fuels**

- Pradhan Mantri Ujjwala Yojana launched in 2016, under this scheme LPG connections given to BPL families

**Stubble burning**

- Central Sector Scheme on 'Promotion of Agricultural Mechanization for in-situ management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi' 2018-19 and 2019-20



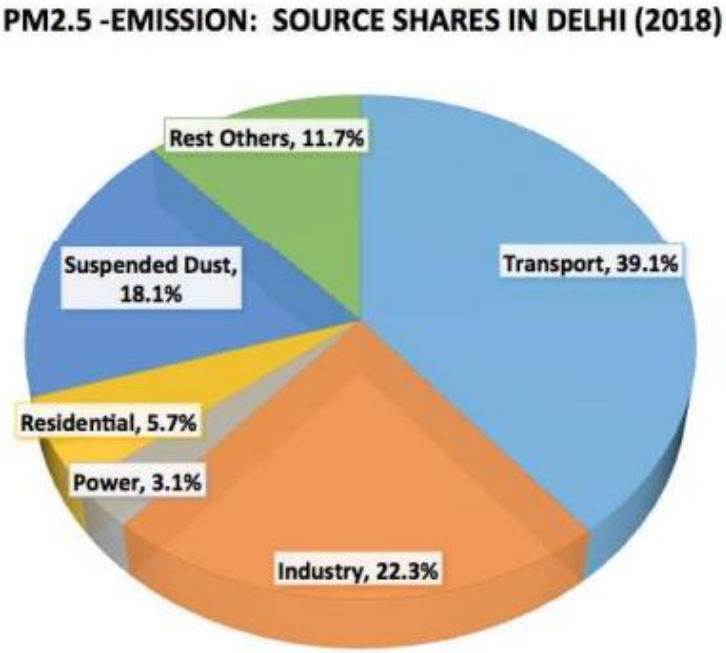
# Delhi: Sources of pollution: constant through the year; impact felt in winter most

**Transport** – trucks, diesel vehicles, large number of 2-wheelers

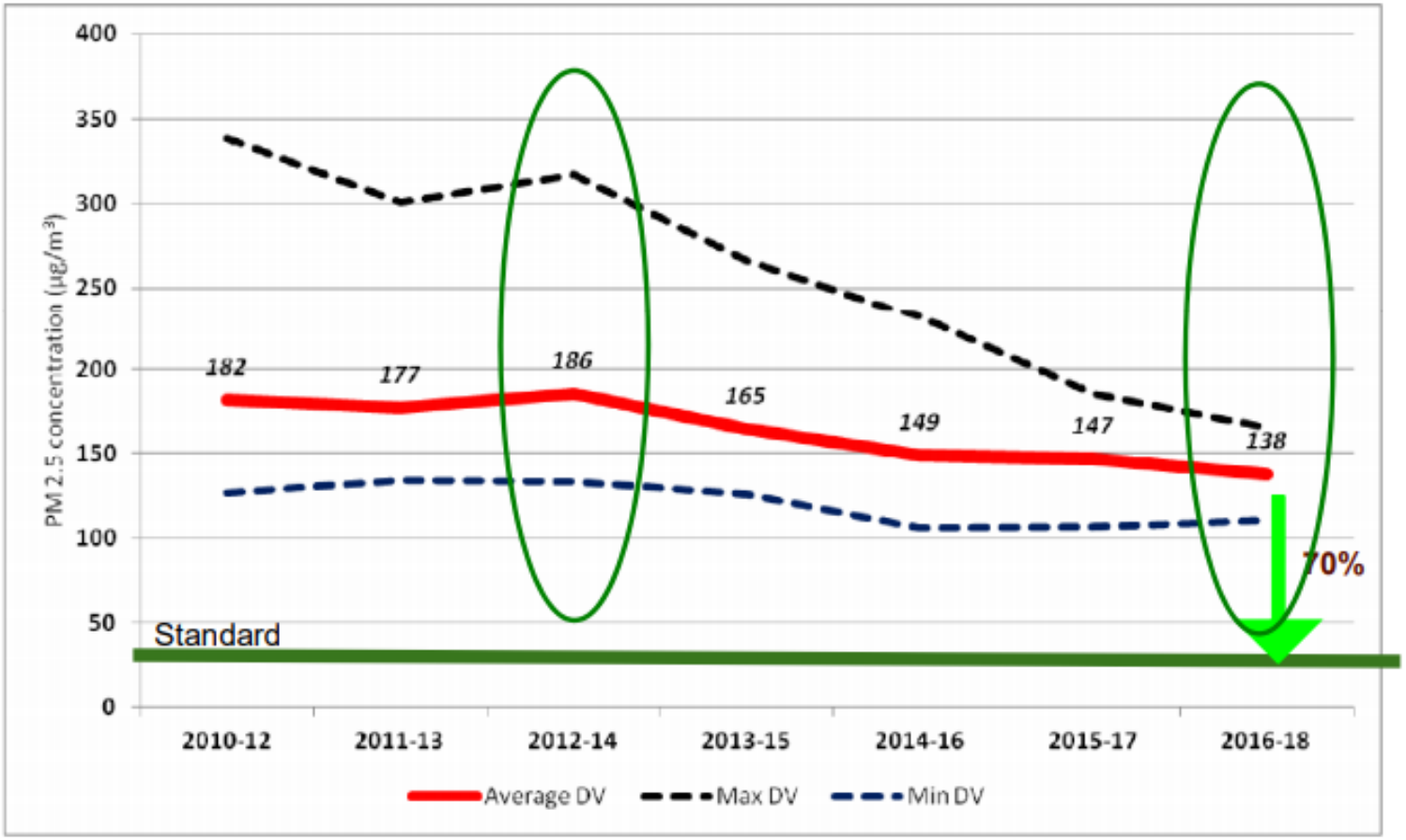
**Industry** – poor quality fuel being used

**Dust**

**Others** – includes garbage burning and biomass burning



# Delhi: Decadal PM2.5 trend 25% drop; Need to cut another 65-70%

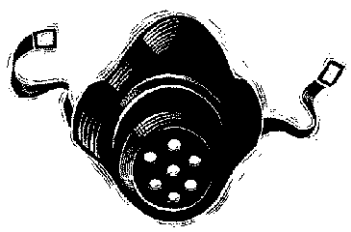



**Source:** CSE analysis of CPCB real-time PM2.5 data using US EPA methodology

# Push for compact urban form and pedestrianisation and low emissions zones

**Car-free Ajmal Khan Rd of Delhi:** Exposure to PM2.5 on nearby heavy traffic) road 35% higher than pedestrian street

**Spurs decision to pedestrianise 22 commercial streets/areas in Delhi**

# Children more susceptible to the harmful effects of air pollution

•Children breathe more air per pound of body weight, so their exposure to air pollution is much greater than adults.

•Developing organs in children absorb pollutants more readily than adults and retain them in the body for longer periods of time.

•Children are exposed to greater levels of pollution as their breathing rate is higher than adults relative to their s

# Children in the Chulha trap eliminating toxic exposure in Anganwadis of Bihar

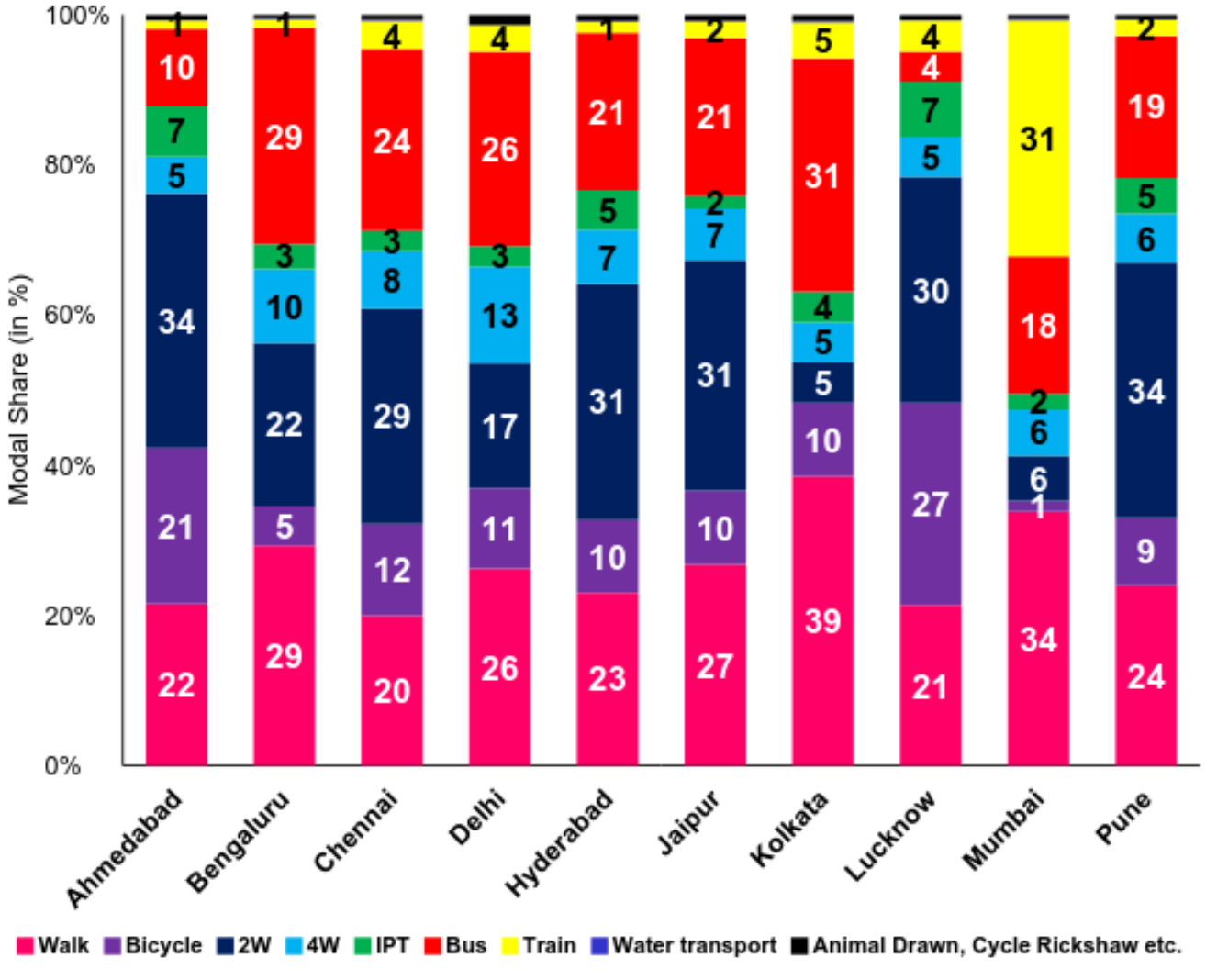
•CSE team visited Gaya in February 2016 to carry out the monitoring at the anganwadis just before the introduction of LPG for cooking of midday meals in the anganwadis

•The monitoring was done in two points—close to the stove or chulha, to capture direct exposure concentrations, and at some distance from the stove near the children, to mimic real exposure of children.

Cooking inside a new ICDS type building

Improperly ventilated rooms are quickly filled with smoke which remains trapped with the children for at least two hours

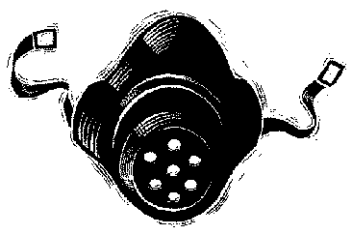
# Roads flooded with cars but, Indian cities have one of the best baselines in the world….




**Even today majority in our cities walk, cycle and use public transport.**

**Paradox: 90% space occupied by cars!!!**

Source: Census of India, http://www.censusindia.gov.in/2011census/B-series/B_28.html



# Must recognise the threat and opportunity

Cars occupy 90 per cent of road space in cities

**Cars have not replaced the bus, the bicycle or walking**

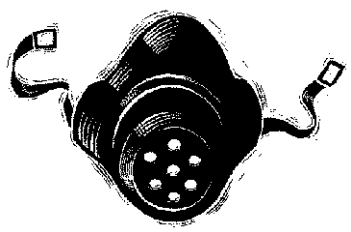
**Cars have only marginalised the bus**

40-60% use bus

10-20% cycle

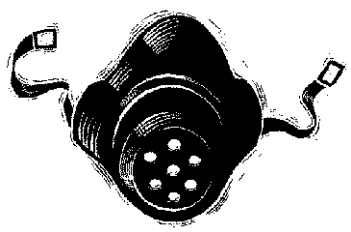
20-30% walk

Only **10-20% use car+2-wheeler**



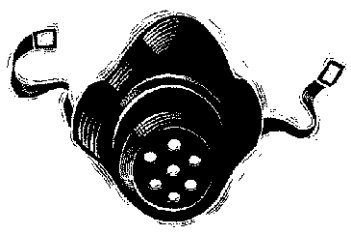
# We are only taking small steps

- Need massive augmentation of fleet – metro, bus, taxi
- Need last mile connectivity – right to walk, cycle
- Need car restraint measures – increased parking charges after 2 years of battle
- Need strict and innovative enforcement for illegal parking; road use



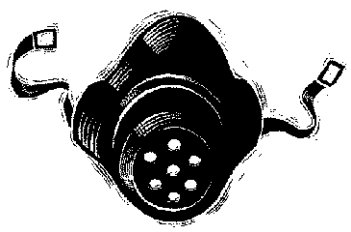
# 78% cities recorded ‘good’, ‘satisfactory’ AQI during COVID-19 lockdown: CPCB

- CPCB monitored the cities between March 16 and April 15, 2020.
- The air quality index (AQI) of **78 per cent cities was ‘good’ and ‘satisfactory’ during lockdown** as compared to **44 per cent cities in the pre-lockdown phase.**
- During the lockdown period, no city recorded ‘very poor’ AQI. However, two-four cities recorded ‘poor’ AQI on some days.
- In Delhi, data generated from continuous ambient air quality monitoring network was analysed from 38 stations; a 46 per cent reduction in PM2.5 levels and 50 per cent in PM10 was observed during the lockdown period.



# What is CSE doing about it?

- Policy-sided interventions, in the form of capacity building and advocacy driven by real-world data driven experiences
- Improving accountability by setting goals and deadlines
- Increasing public awareness, so that everyone can do what we do



# What can we do?

## Be part of the solution….Reduce pollution footprint

-- Chose public transport, walk and cycling

-- Convert all short distance motorised trips to walking and cycling to reap health benefit

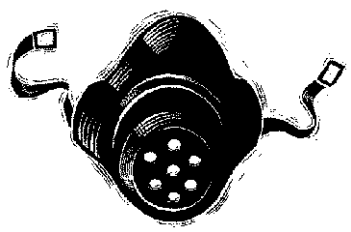
-- Reduce car trips with shared mobility

-- Community vigilance to stop waste burning and prevent construction activities without dust control in neighbourhoods

-- Adopt energy efficiency measures at household level to reduce power plant pollution

-- Support community action to protect forests and trees

-- Lend strong public support to hard policy decisions on pollution control



# Air pollution: great equalizer

- **Air pollution is a great equalizer**: rich cannot buy their way out of the air pollution crisis – air purifiers will not work

- **Airshed is one and has no boundaries** – poor will add to toxins if they have no access to clean energy. Rich will pollute with diesel SUVs. Luxury vs survival emissions.

**Therefore, we are taking action. Governments are responding to control air pollution; much has been done. But much more needs to be done and this needs us to think differently. Act with scale, speed and with difference in strategy**


Thank you!
Questions?