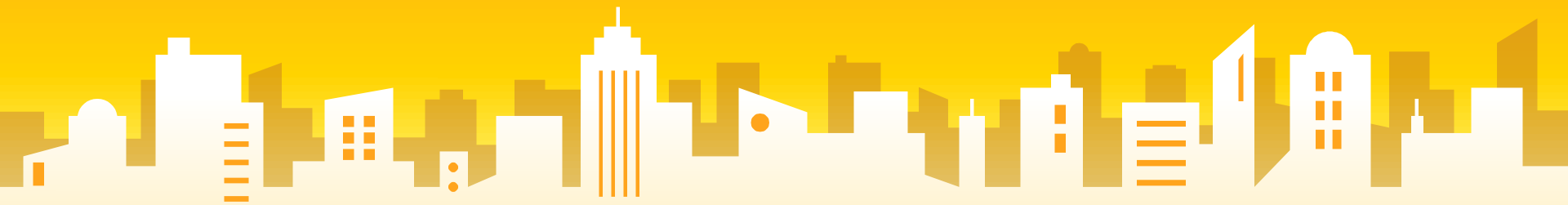
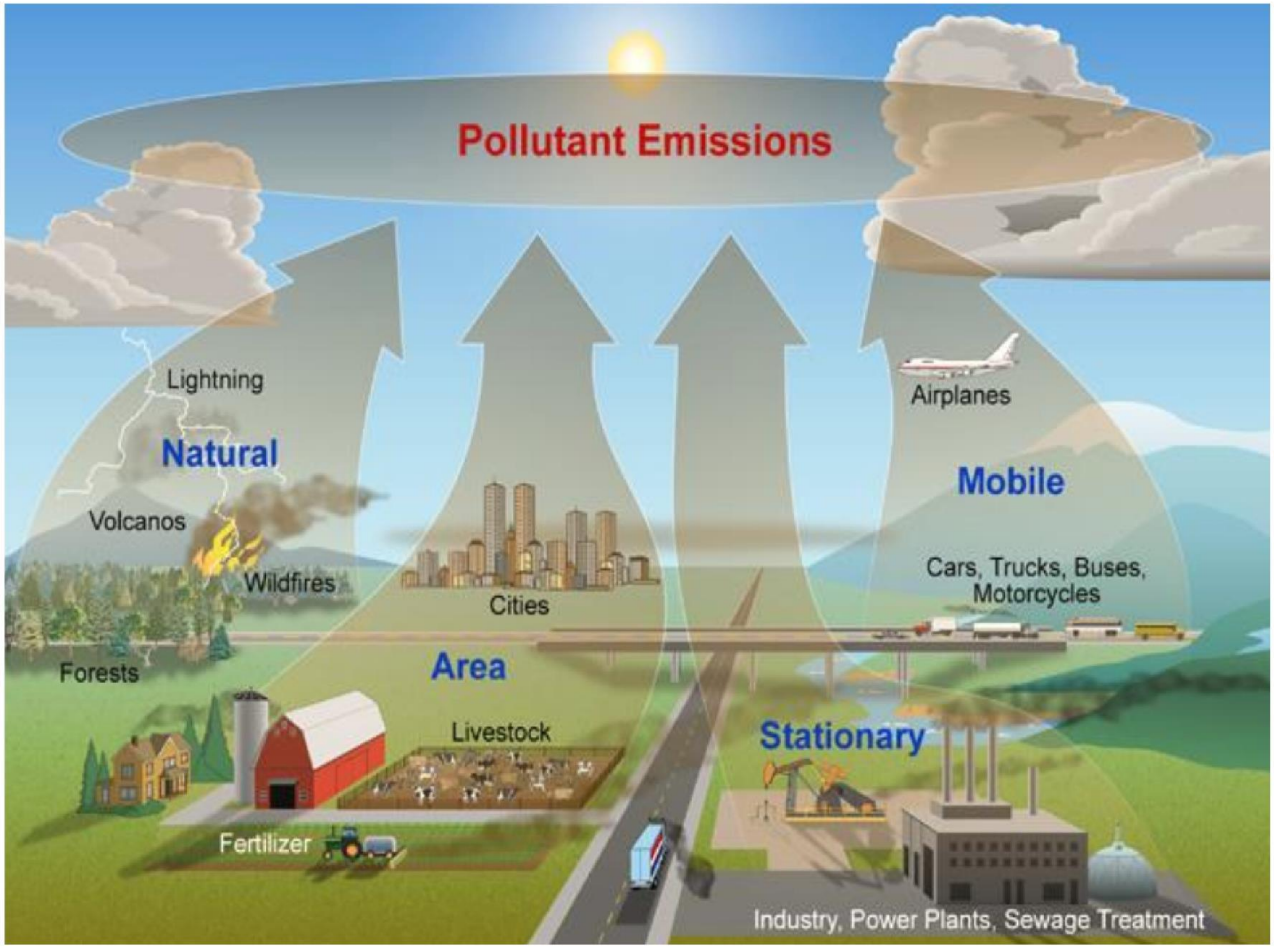
ADDRESSING URBAN AIR POLLUTION

CHIRAG BHIMANI



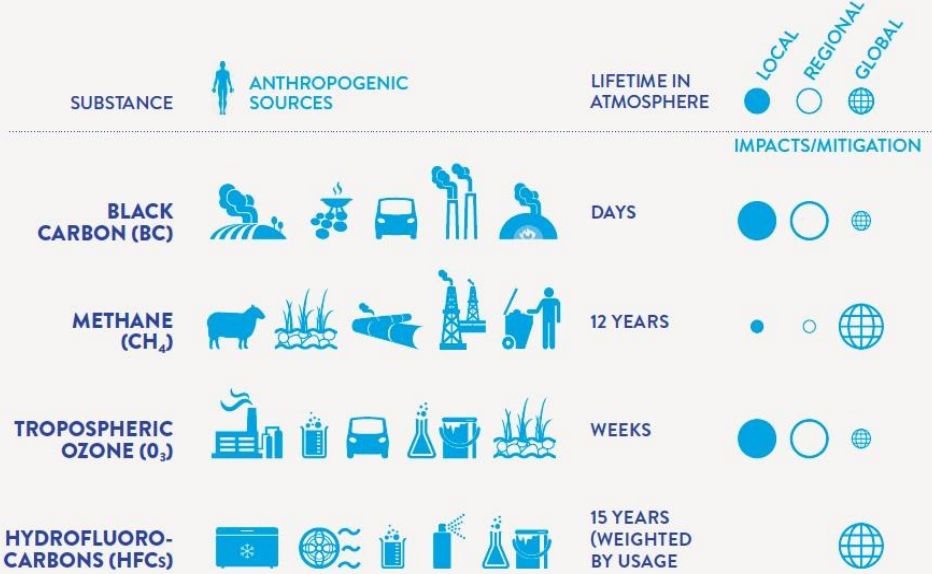
THE AIR POLLUTION CHALLENGE


Pollutant Emissions
Lightning
Natural
Volcanos
Wildfires
Forests
Cities
Area
Livestock
Fertilizer
Airplanes
Mobile
Cars, Trucks, Buses, Motorcycles
Stationary
Industry, Power Plants, Sewage Treatment

LIFE OF POLLUTANTS

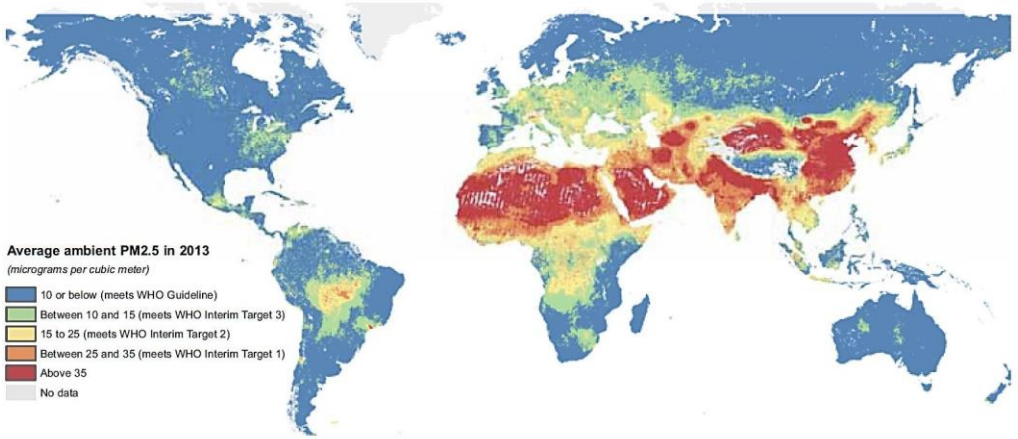
SHORT-LIVED CLIMATE POLUTANTS

Near term response to mitigation



POLLUTANT LEVELS

MAP 2.1 Locations Where 2013 Annual Average $PM_{2.5}$ Concentrations (µg/m³) Meet or Exceed World Health Organization's (WHO) Air Quality Guideline or Exceed Interim Targets



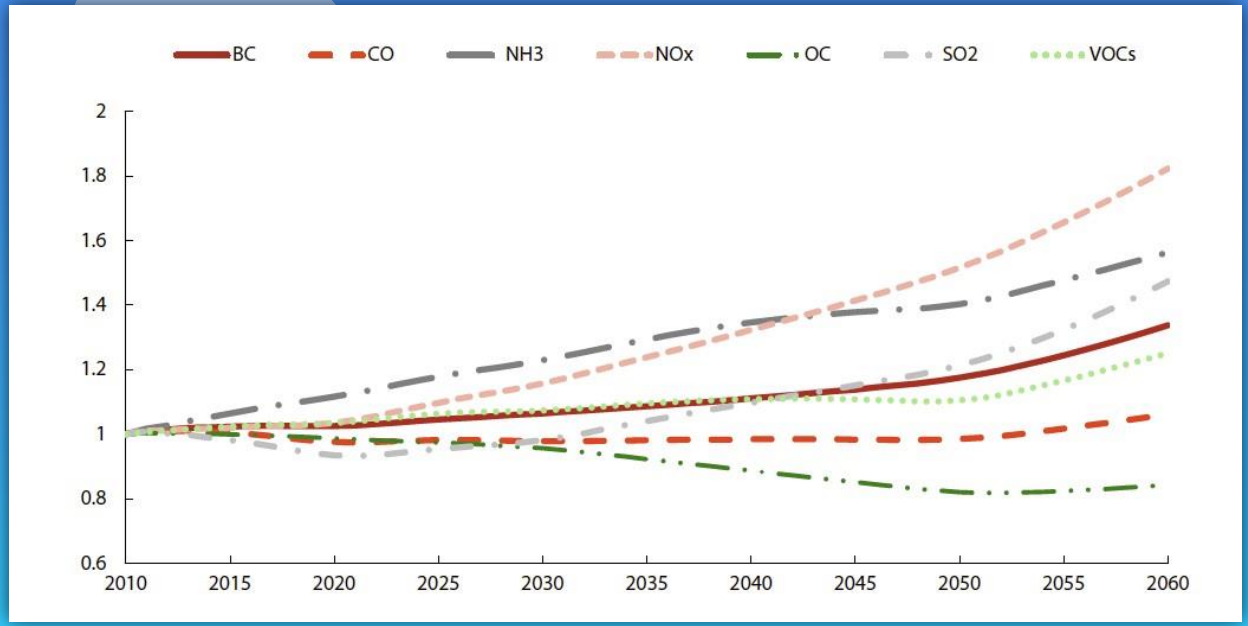
Source: Brauer et al. 2016.

Note: Reprinted with permission from Ambient Air Pollution Exposure Estimation for the Global Burden of Disease 2013. Brauer M, Freedman G, Frostad J, van Donkelaar A, Martin RV, Dentener F, van Dingenen R, Estep K, Amini H, Apte JS, Balakrishnan K, Barregard L, Broday D, Feigin V, Ghosh S, Hopke PK, Knibbs LD, Kokubo Y, Liu Y, Ma S, Morawska L, Sangrador JL, Shaddick G, Anderson HR, Vos T, Forouzanfar MH, Burnett RT, Cohen A. Environ Sci Technol. 2016 Jan 5; 50(1):79–88. doi: 10.1021/acs.est.5b03709. Copyright 2016 American Chemical Society.

Source : World Bank/WHO 2016

- **92% of the world's population lives in places where air quality levels exceed WHO's Ambient Air quality guidelines for annual mean of $PM_{2.5}$ (10 µg/m³)**
- **Nearly 90% of air-pollution-related deaths occur in low- and middle-income countries, with nearly 2 out of 3 occurring in WHO's South-East Asia and Western Pacific regions.**

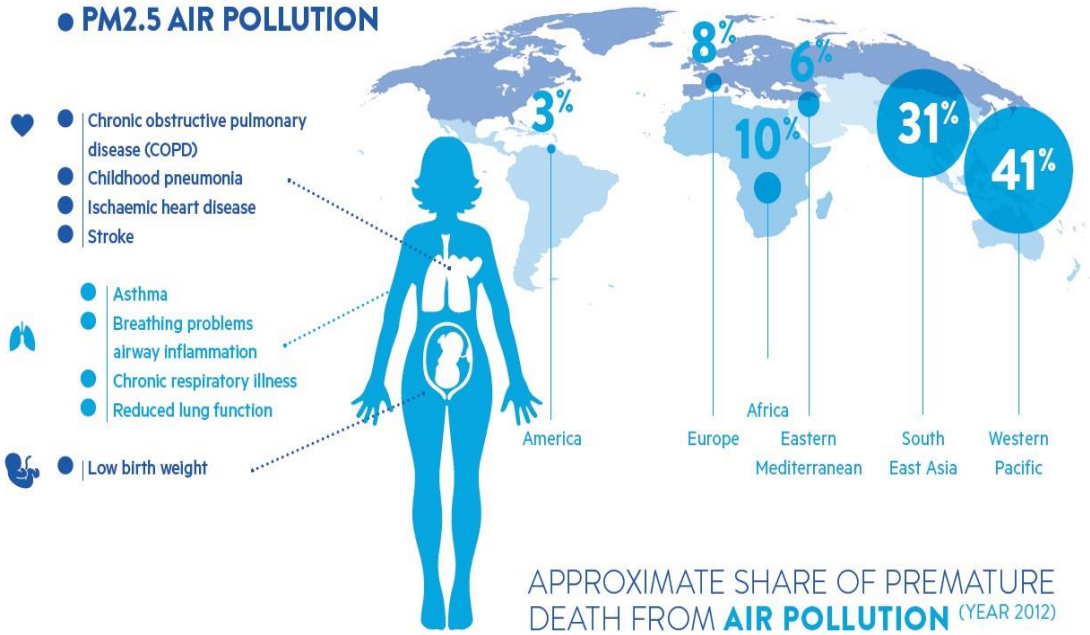
FUTURE EMISSIONS OF OUTDOOR AIR POLLUTANTS



Most air pollutants emissions are projected to increase over the coming decades.
Especially, nitrogen oxides (NO_x) and ammonia (NH_3) due to increases in agricultural products and energy (incl. transport and power generation)

Source : OECD 2016

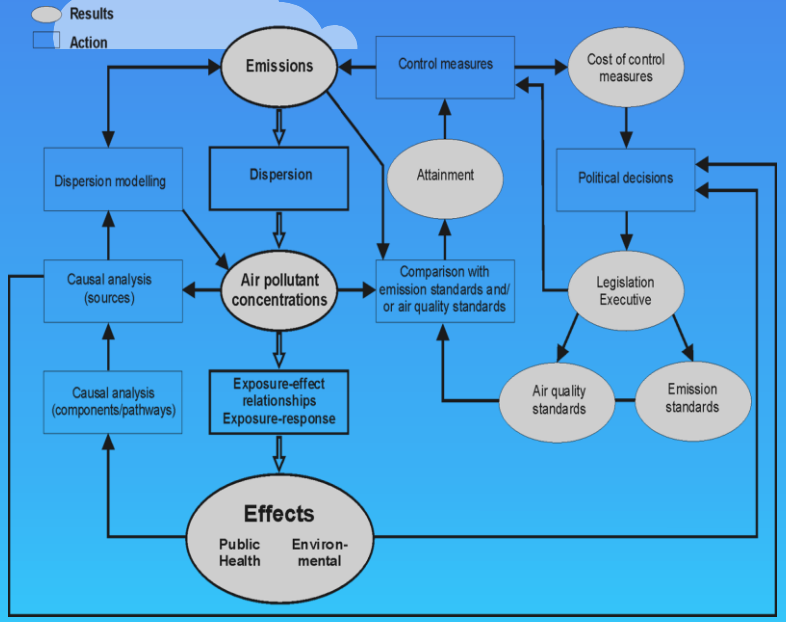
EFFECTS OF AIR POLLUTANTS



RESPONSE

- *Promote measures that support cleaner cities*
- *Take action to address climate change by reducing their greenhouse gas emissions*
- *Strengthen resilience in cities to reduce the risk and the impact of disasters*

AIR QUALITY MANAGEMENT SYSTEM



A collection of air pollution strategies designed to:

- **Eliminate or reduce ambient air pollutant concentrations to acceptable levels.**
- **Avoid adverse effects to human health and the environment.**
- **Prevent material damage and economic loss.**

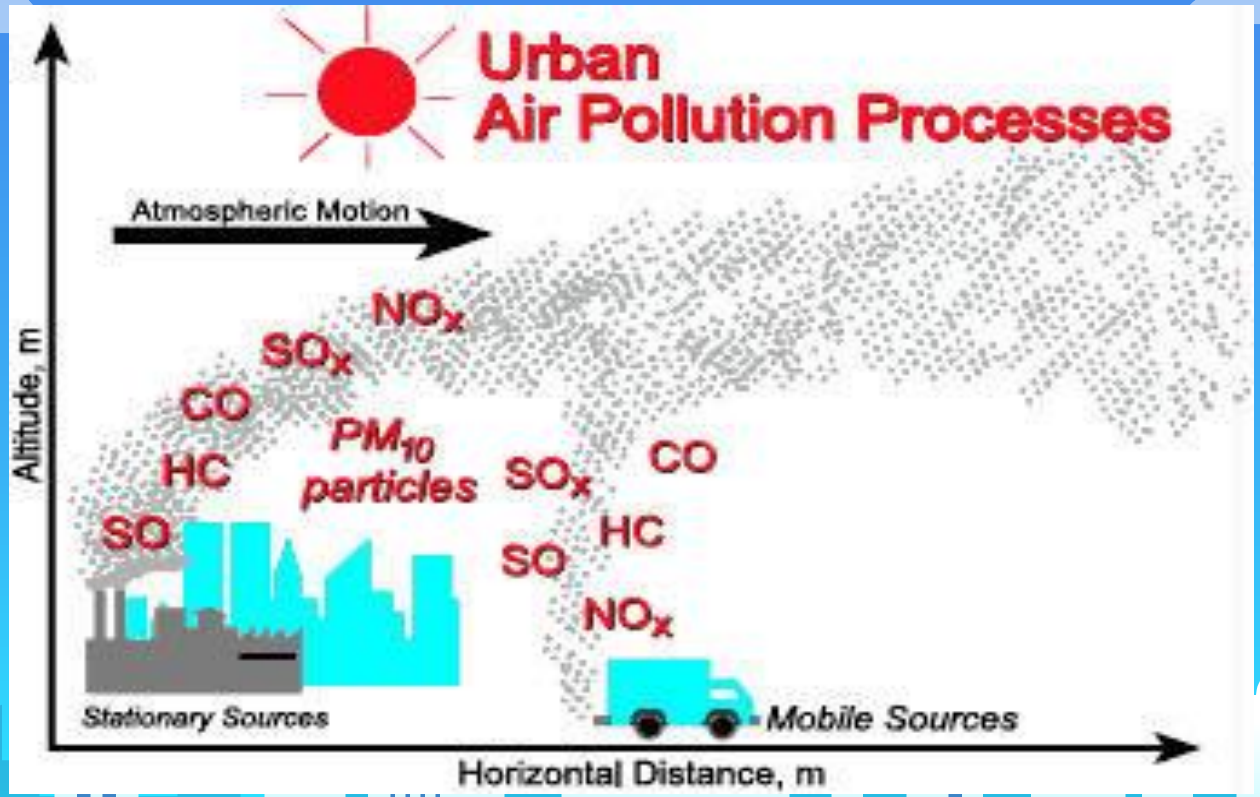
Emission Inventory

Air Pollution Modelling

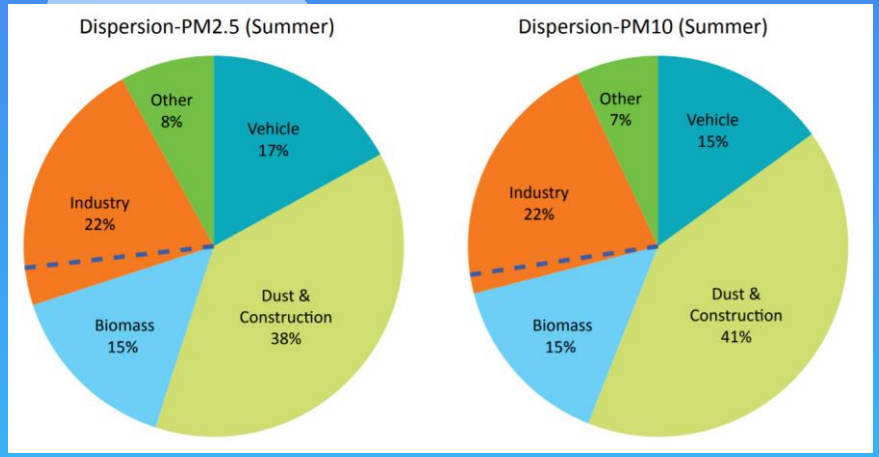
Air Quality Monitoring

Control Measures

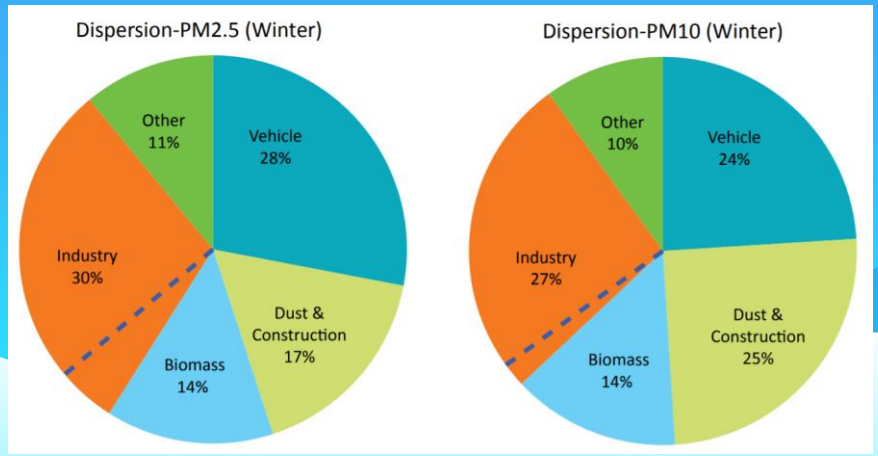
ABOUT URBAN AIR POLLUTION



SOURCES OF URBAN AIR POLLUTION IN INDIA



Source Contributions to $PM_{2.5}$ & PM_{10} Concentrations In Delhi
(TERI-ARAI Source Apportionment Study)



(Source : NCAP Report, MoEFCC)

ABOUT ENVIRONMENTAL TECHNOLOGY

Environmental Science, Green Chemistry, Environmental Monitoring and Electronic Devices

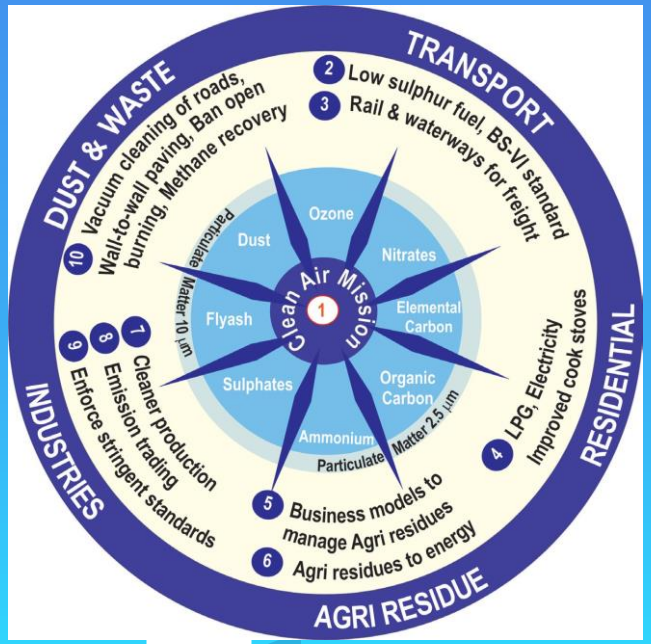
Environmental Technology (EnviroTech) OR Green Technology (GreenTech) OR Clean Technology (CleanTech)

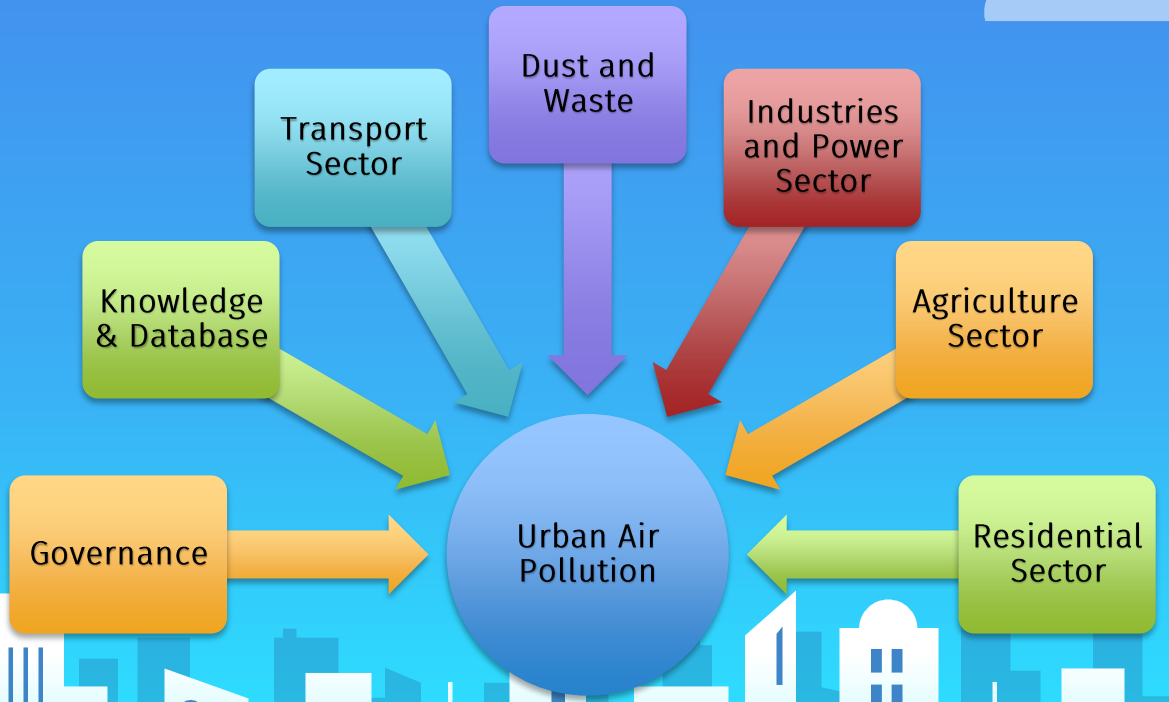
To Monitor, Model and Conserve the Natural Environment and Resources

To curb the Negative Impacts of Human Involvement

Sustainable Development is the core of Environmental Technologies

REDUCING URBAN AIR POLLUTION IN INDIA



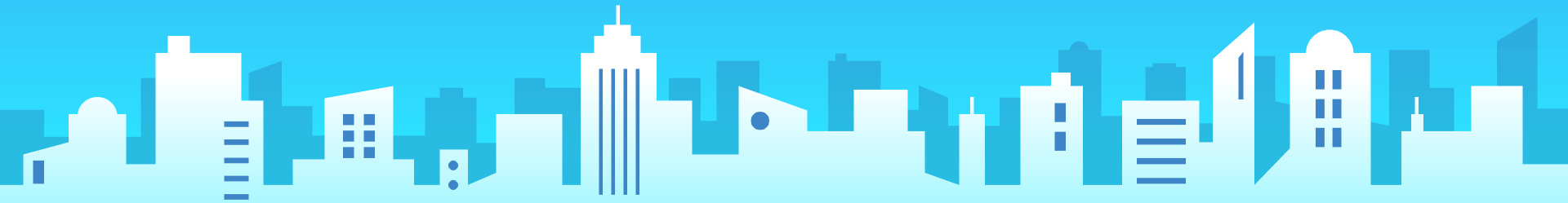


REDUCING URBAN AIR POLLUTION IN INDIA

Governance

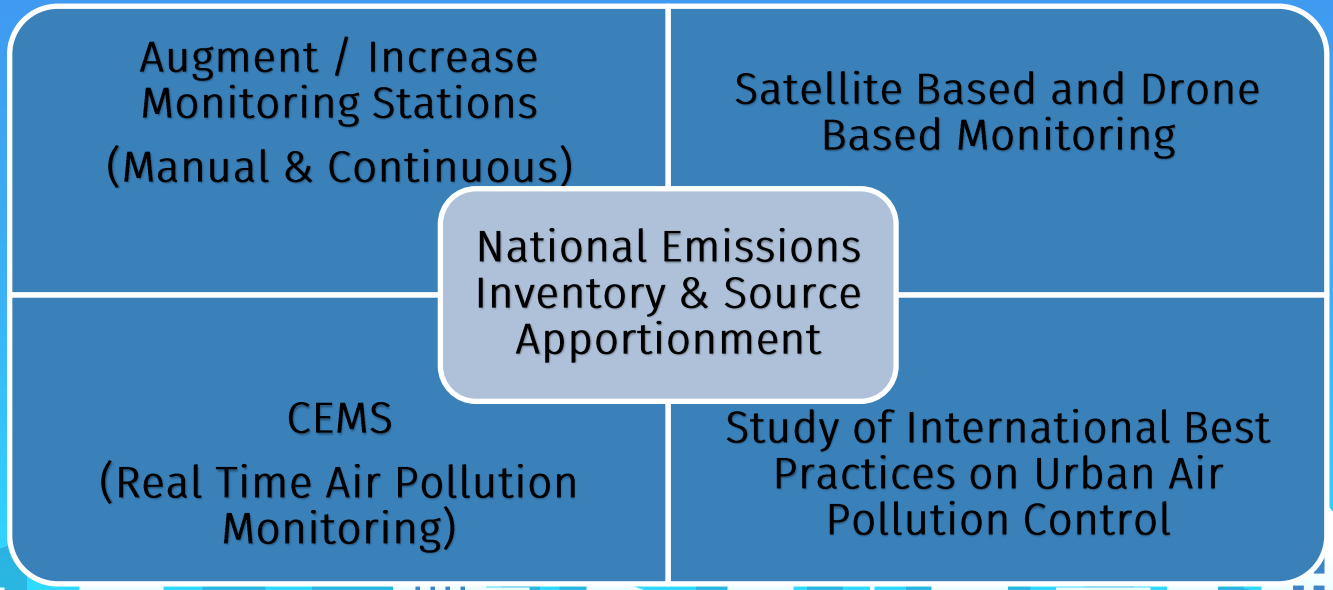
National Clean Air Program (NCAP)

- Collaborative, Multi-scale and Cross-Sectoral Coordination
- Institutional Strengthening and Capacity Building
- Dynamic and Evolving with time and as information / experiences are available
- Mainstreaming / Integrating of existing & programmes
- Air Quality Management Including Monitoring



REDUCING URBAN AIR POLLUTION IN INDIA

Knowledge & Database



REDUCING URBAN AIR POLLUTION IN INDIA

Transport

Fuel Control

Switch to low sulphur fuel

Bharat- Stage VI Standards

Setting up low-emission zones within the city

Lowering Emissions from vehicles

Inspection & Maintenance System

Encourage Fleet Modernization

Incentivise use of Electric & Hybrid Vehicles

Strengthening public transport (both bus and rail- based)

REDUCING URBAN AIR POLLUTION IN INDIA

Dust & Waste

Wall-to-wall paving of streets, grassing / paving of open spaces

Vacuum cleaning of roads, water spraying during peak hours

Enforce ban on open burning of solid waste

Management of waste and recovery of methane from landfills

Management of Construction & Demolition Waste

REDUCING URBAN AIR POLLUTION IN INDIA

Industries & Power

Physical Planning and Zoning for Siting of Industries

Installation of CEMS for better and self-regulation

ETS – Cap & Trade for Power and Large Industries

Use of Cleaner Fuel & Improved Emissions Control System

Cleaner & Efficient Production Technologies (BAT)

Stringent Pollution Control Norms in Industries

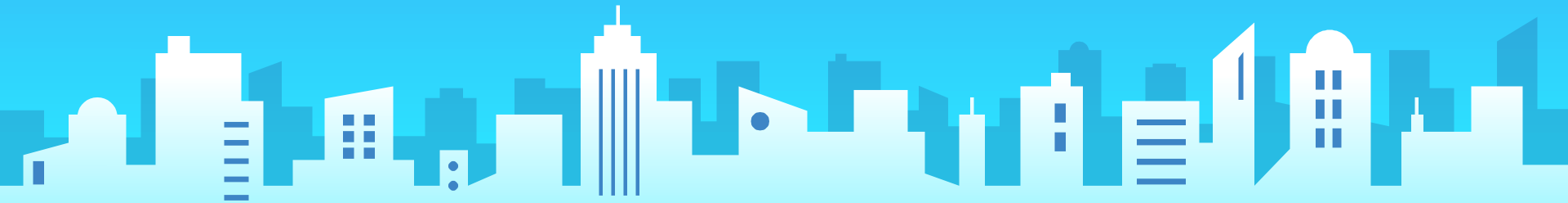
REDUCING URBAN AIR POLLUTION IN INDIA

Agriculture

New Business Models for collection, transport, and storage of agriculture residues and farm manure

Convert agriculture residues and farm manure into Energy or Electricity

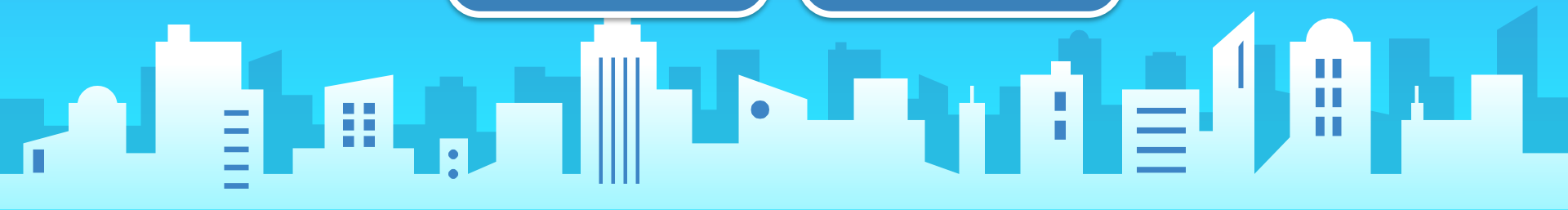
Make Biomass pellets for households which depend on biomass stoves



REDUCING URBAN AIR POLLUTION IN INDIA

Residential

- Shift to Cleaner Fuels like LPG
- Provide Biomass stoves with efficiency more than 50%
- Provide solar powered induction stoves
- Add SO_2 absorbing agents to fuel



THANK YOU

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