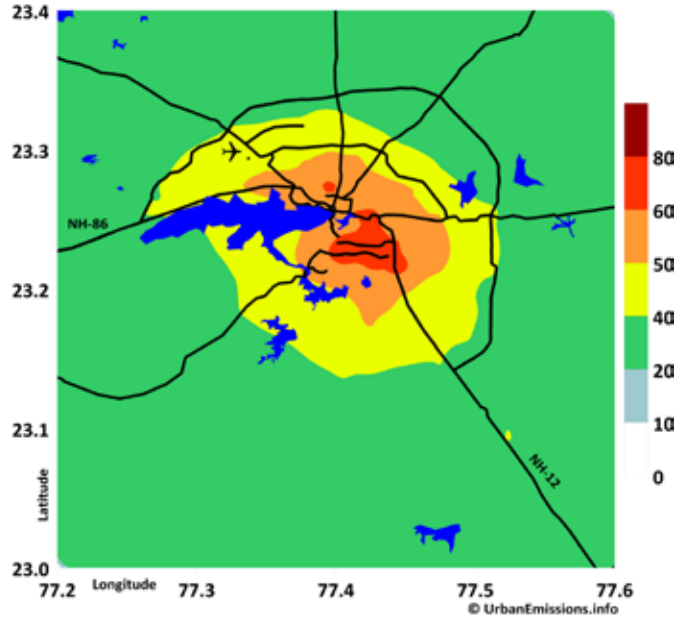


Modeled annual average PM_{2.5} concentration (2015) µg/m³



For urban Bhopal, average PM_{2.5} concentration was $49.9 \pm 6.7 \mu\text{g}/\text{m}^3$. This is a little more than the national standard (40), it is nearly 5 times the WHO guideline (10).

Air monitoring infrastructure

Bhopal has 0 Continuous Air Monitoring Station (CAMS) reporting data for all the criteria pollutants and 5 manual stations reporting data on PM₁₀, SO₂, and NO₂. There should be at least 18 CAMS in the city for efficient reporting.

Annual averages from the national ambient monitoring program (2011-2015) µg/m³

PM ₁₀	NO ₂	SO ₂
196.3 ± 117.3	23.2 ± 16.9	2.9 ± 2.5

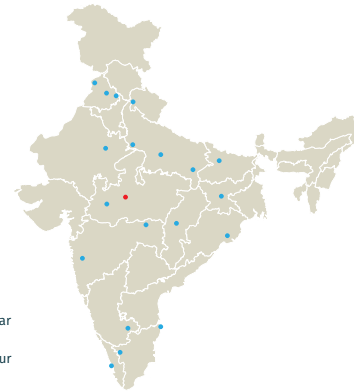
Trend in PM_{2.5} concentrations, based on satellite observations and global model simulations (1998-2014) µg/m³



The Air Pollution Knowledge Assessment (APnA) City Program

Clearing the air with data

- Agra • Amritsar • Bengaluru • Bhopal • Bhubaneswar
- Chandigarh • Chennai • Coimbatore • Dehradun
- Indore • Jaipur • Kanpur • Kochi • Ludhiana • Nagpur
- Patna • Pune • Raipur • Ranchi • Varanasi



Designing an effective Air Quality Management (AQM) plan for a city requires robust data on levels of pollution, affected areas, source contributors, peaking trends and possible control mechanisms.

The Air Pollution Knowledge Assessment (APnA) City Program seeks to make this database available and also serve as a starting point for understanding air pollution.

The program, implemented by Urban Emissions and facilitated by Shakti Sustainable Energy Foundation, seeks to create a comprehensive, city-specific information pool by pulling together data from disparate sources, surveys, mapping and atmospheric modeling.

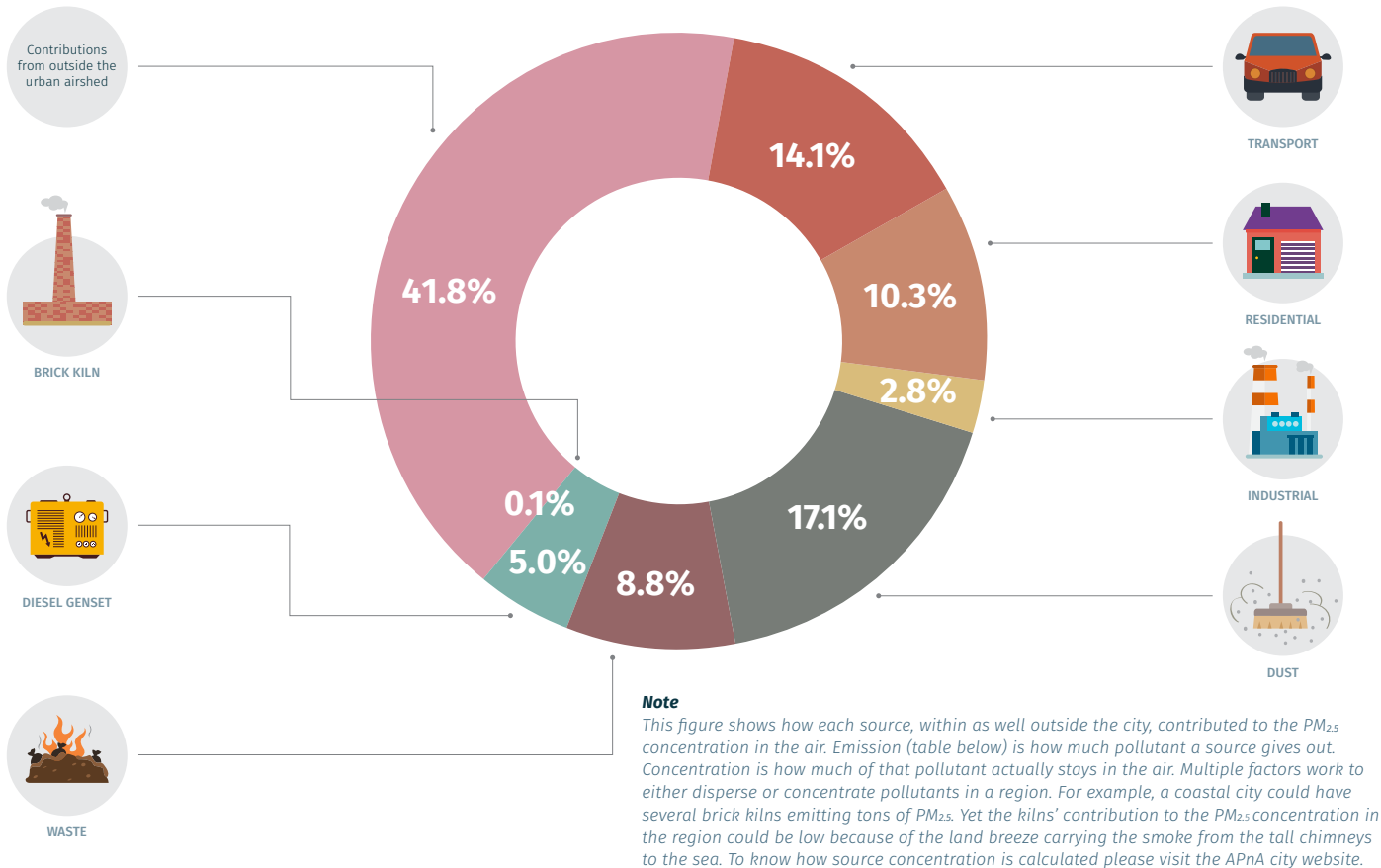
Policy options based on this information, and their implementation, would be the effective next steps in improving the air quality of our cities.

Bhopal

One of India's greenest cities, Bhopal's air is on red alert with PM_{2.5} levels at nearly 5 times the WHO guidelines.

For detailed information on Bhopal Air Quality, visit www.urbanemissions.info/india-apna

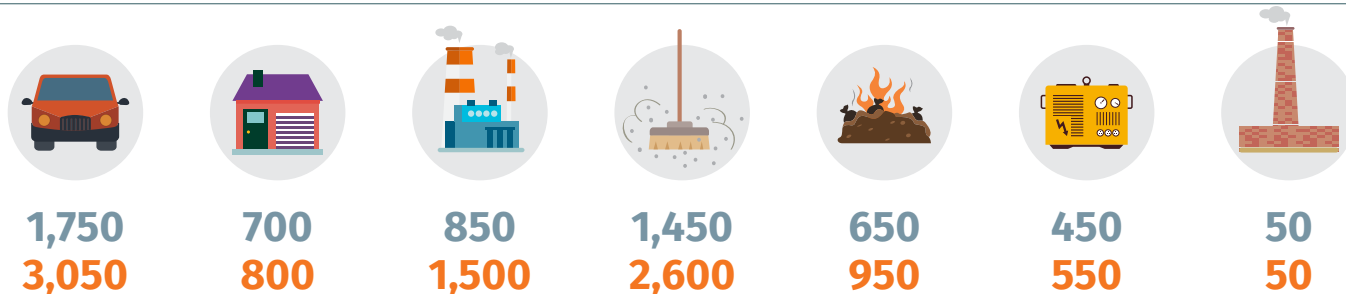
PM_{2.5} concentration : source-wise percentage share in 2015



Findings & Recommendations

- The modeled source contributions highlight transport (including on road dust), domestic cooking and heating, and open waste burning as the key air pollution sources in the urban areas.
- An estimated 42% of the ambient annual PM_{2.5} pollution (in 2015) originated outside the urban airshed, which suggests that some regional interventions could reduce the pollution loads. This contribution largely stems from coal-fired power plants, large (metal and non-metal processing) industries, and brick kilns located outside the urban airshed towards Indore.
- The city needs to aggressively promote public and non-motorized transport and improve road infrastructure to reduce on-road dust re-suspension.
- By 2030, the vehicle exhaust emissions are expected to remain constant, if and only if, Bharat 6 fuel standards are introduced nationally in 2020, as recommended by the Auto Fuel Policy.
- By 2030, the share of emissions from residential cooking and lighting is expected to decrease with an increase in LPG, residential electrification and increased urbanization. However, since the availability of biomass and coal in the region is high, a fair share of its use is expected to continue, unless an aggressive program is pursued for a 100% technology shift to cleaner options like LPG and electricity.
- Outside the urban airshed, the brick kilns are fueled mostly by coal and agri-waste. These kilns can become more energy efficient by upgrading from the current fixed-chimney and clamp-style baking to (for example) zig-zag. Similarly, the coal-fired power plants need to practice and enforce stricter environmental standards for all the criteria pollutants.
- Open waste burning is dispersed across the city and requires stricter regulations for addressing the issue.

PM_{2.5} emissions : source-wise share in tons in 2015 and 2030 (projected)



Total emissions in 2015 = 5,900 tons | Total emissions in 2030 = 9,500 tons