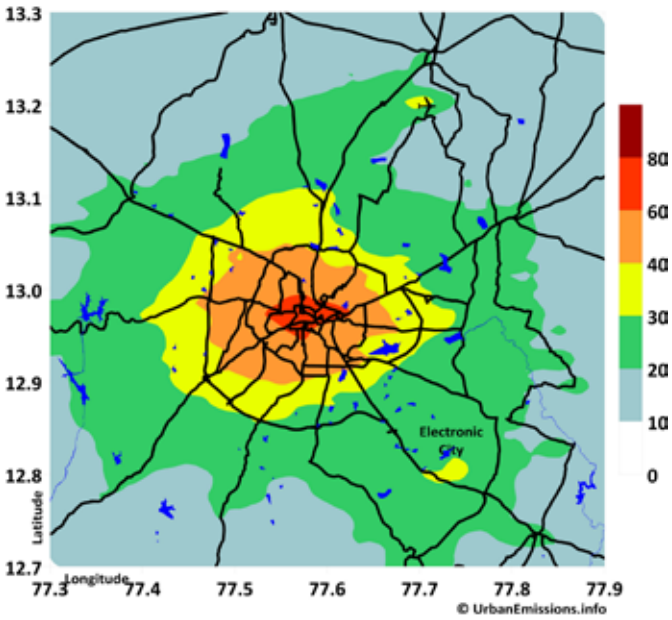
Modeled annual average $PM_{2.5}$ concentration (2015) µg/m³



For urban Bengaluru, average $PM_{2.5}$ concentration was 36.5 ± 9 µg/m³. This is within the national standard (40) but more than three times the WHO guideline (10).

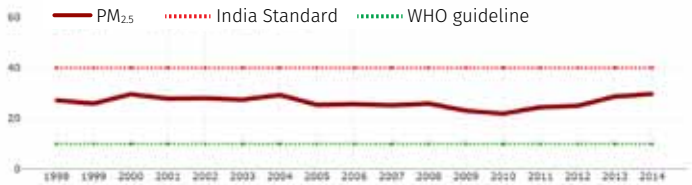
Air monitoring infrastructure

Bengaluru has 5 Continuous Air Monitoring Station (CAMS) reporting data for all the criteria pollutants and 7 manual stations reporting data on PM_{10}, SO_2, and NO_2. There should be at least 41 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
302.5 ± 208.0	69.2 ± 44.0	30.9 ± 23.5

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



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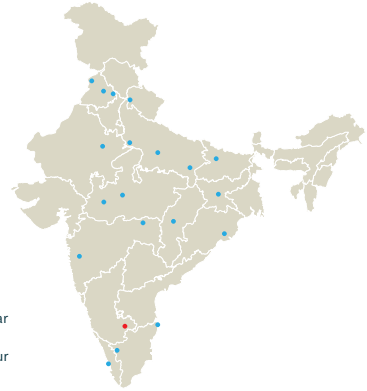
SHAKTI SUSTAINABLE ENERGY FOUNDATION

APnA CITY PROGRAM

Clearing the air with data

The Air Pollution Knowledge Assessment (APnA) City Program

Clearing the air with data



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• 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.

www.urbanemissions.info

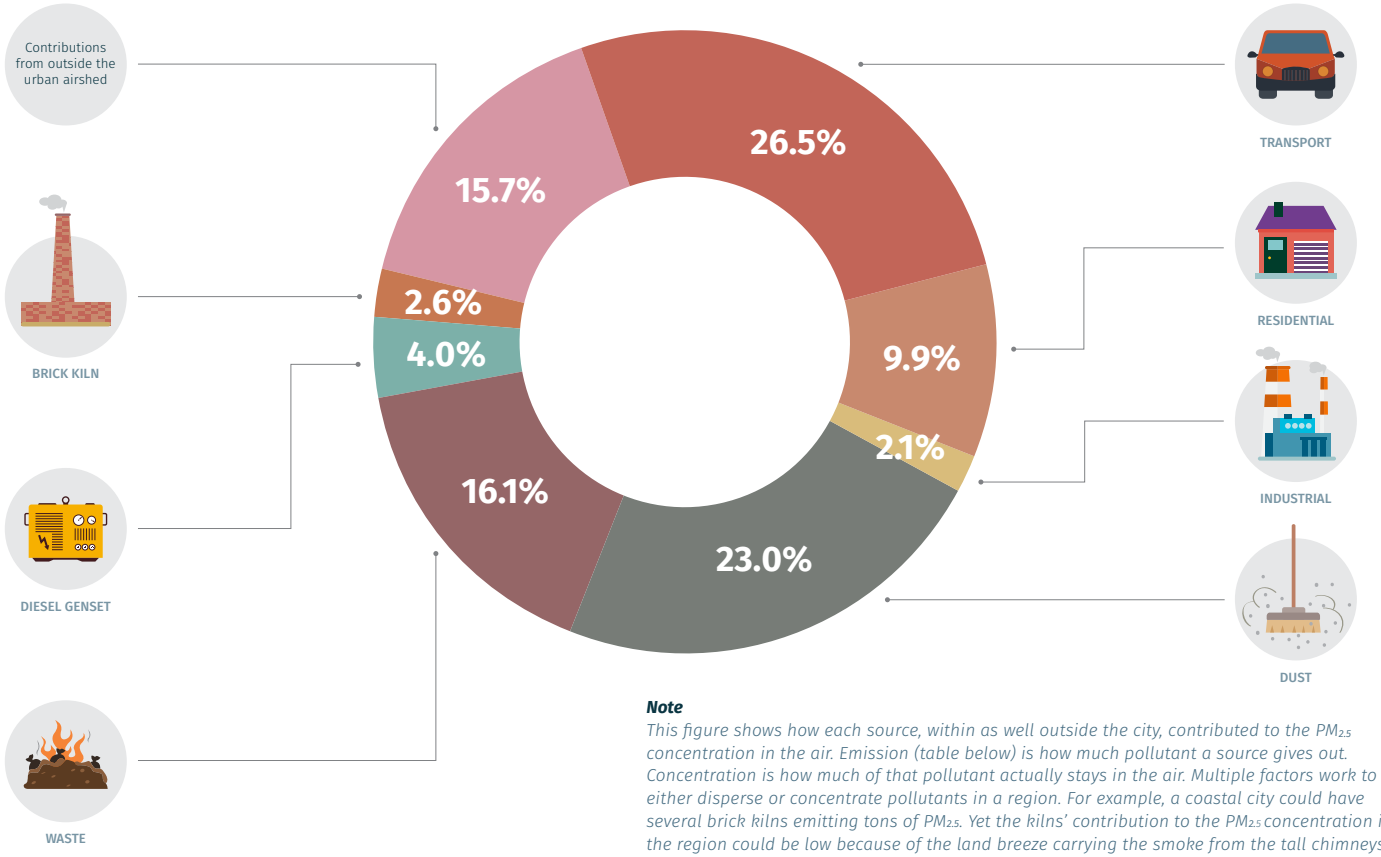
Photo: Ishwar [CC BY 2.0]

Bengaluru

The hi-tech Garden City now faces a new age dilemma: $PM_{2.5}$ levels that are more than three times the WHO guidelines.

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

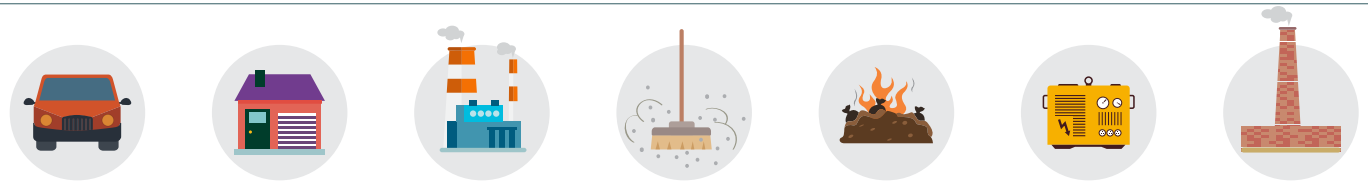
$PM_{2.5}$ emissions : source-wise share in tons in 2015 and 2030 (projected)



Note

This figure shows how each source, within as well outside the city, contributed to the $PM_{2.5}$ concentration in the air. Emission (table below) is how much pollutant a source gives out. Concentration is how much of that pollutant actually stays in the air. Multiple factors work to either disperse or concentrate pollutants in a region. For example, a coastal city could have several brick kilns emitting tons of $PM_{2.5}$. Yet the kilns' contribution to the $PM_{2.5}$ concentration in the region could be low because of the land breeze carrying the smoke from the tall chimneys to the sea. To know how source concentration is calculated please visit the APnA city website.

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



12,550	2,050	2,650	6,400	3,500	1,250	2,900
19,050	2,400	4,750	11,700	5,050	1,450	3,750

Total emissions in 2015 = 31,300 tons **Total emissions in 2030 = 48,150 tons**

Findings & Recommendations

- The modeled source contributions highlight transport and open waste burning as the key sources in the urban areas.
- An estimated 16% 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.
- The city needs to aggressively promote public and non-motorized transport and improve road infrastructure to reduce on-road dust re-suspension. The metro system is under construction and is expected to share the traffic loads on major roads.
- 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 share, residential electrification and urbanization. However, biomass and coal burning to provide warmth in the winter will still be an issue.
- About 500 brick kilns in this urban airshed are fueled mostly by coal and agri-waste. These are located to the east of the city and due to strong westerlies, throughout the year, their contribution to the urban areas is minimum. These kilns can benefit from a technology upgrade from the current fixed chimney to (for example) zig-zag, in order to improve their overall energy efficiency.
- Open waste burning is dispersed across the city and requires stricter regulations for addressing the issue.