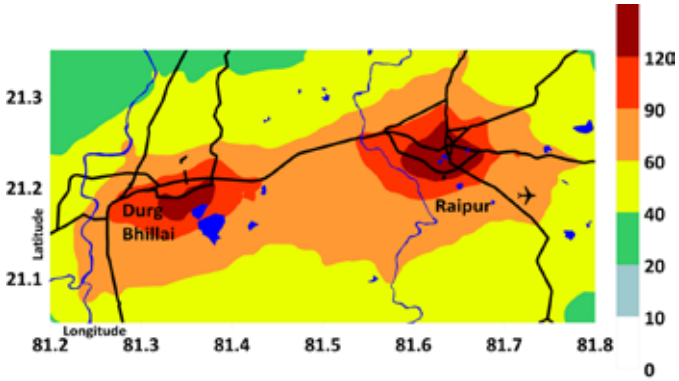
## Modeled annual average $PM_{2.5}$ concentration (2015) µg/m³




For urban Raipur, average $PM_{2.5}$ concentration was 82.3 ± 21.8 µg/m³. This is more than twice the national standard (40) and 8 times the WHO guideline (10).

### Air monitoring infrastructure

Raipur has 0 Continuous Air Monitoring Station (CAMS) reporting data for all the criteria pollutants and 2 manual stations reporting data on $PM_{10}$, $SO_2$, and $NO_2$. There should be at least 19 CAMS in the city for efficient reporting.

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

| $PM_{10}$ | $NO_2$ | $SO_2$ |
|---|---|---|
| 275.2 ± 81.0 | 35.3 ± 13.3 | 12.9 ± 5.0 |

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


URBAN emissions .info

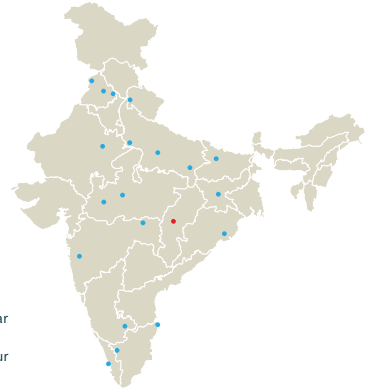
SHAKTI SUSTAINABLE ENERGY FOUNDATION

APnA CITY PROGRAM

Clearing the air with data

# The Air Pollution Knowledge Assessment (APnA) City Program

Clearing the air with data



• Agra • Amritsar • Bengaluru • Bhopal • Bhubaneswar
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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**

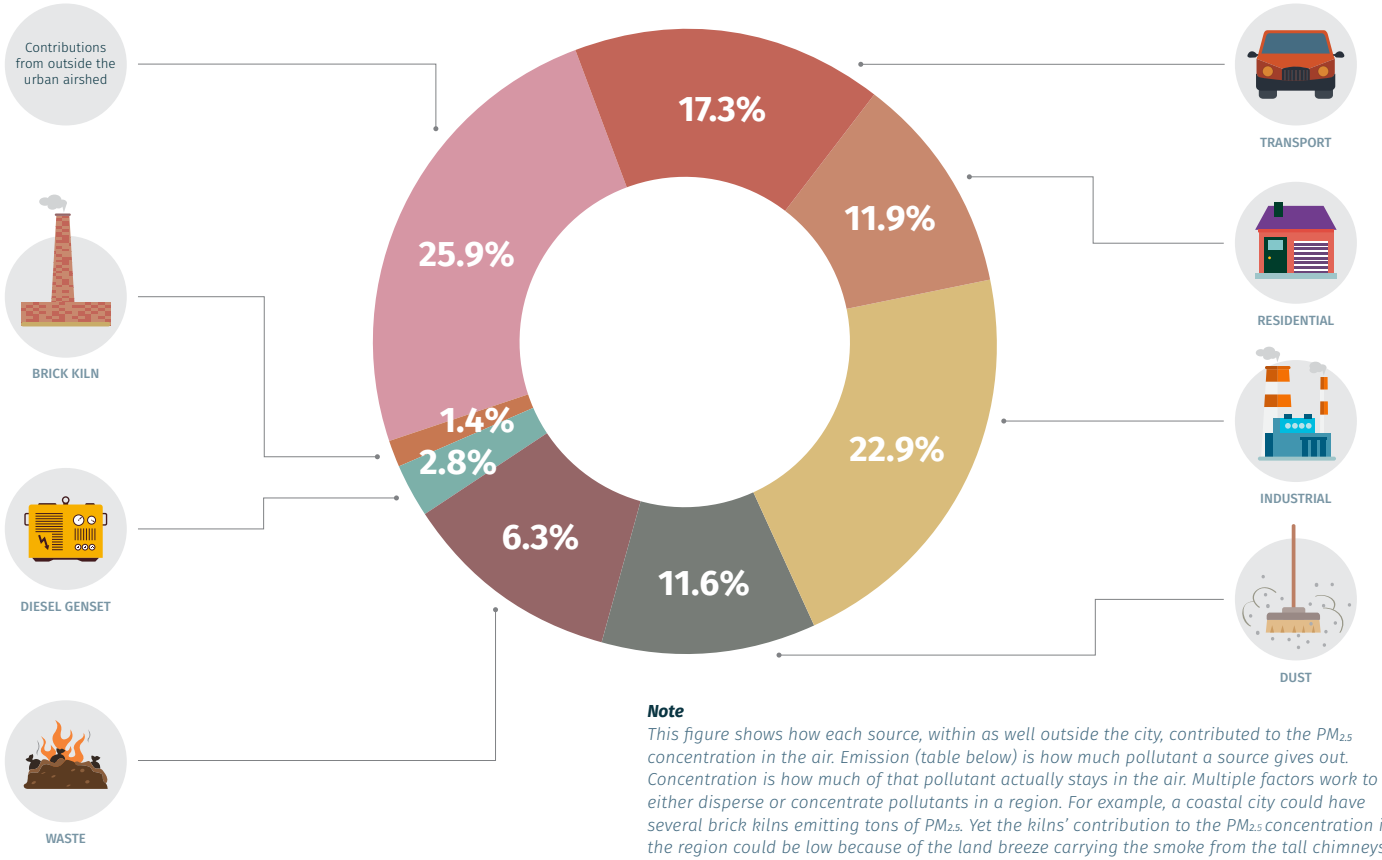
Photo: Ambuj.kulshresth [CC BY 3.0]

# Raipur

## The city is growing richer but not it's air quality. The $PM_{2.5}$ level is already twice the national standard.

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

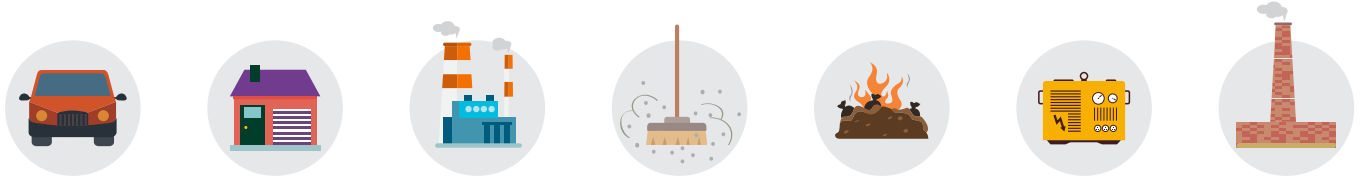
## $PM_{2.5}$ concentration : source–wise percentage share in 2015




***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)



| | | | | | | |
|---|---|---|---|---|---|---|
| 5,900 | 2,750 | 26,350 | 2,650 | 1,600 | 850 | 1,400 |
| 7,050 | 3,250 | 31,950 | 4,000 | 2,300 | 950 | 1,800 |

Total emissions in 2015 = 41,500 tons | Total emissions in 2030 = 51,300 tons

# Findings & Recommendations

- The modeled source contributions highlight the heavy industries (mostly steel), transport (including on road dust), domestic cooking and heating, industries, open waste burning, and influence of outside sources as the key air pollution sources in the urban area.
- In 2015, an estimated 26% of the ambient annual $PM_{2.5}$ pollution originated outside the urban airshed, which suggests that some regional interventions could reduce the pollution loads. This main contributors were coal-fired power plants, large (metal and non-metal processing) industries, and brick kilns.
- 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 due to increase in LPG, residential electrification and urbanization. However due to teh abundance of biomass and coal, its use is expected to continue, unless an aggressive program is in place a 100% technology shift to cleaner options.
- The 115 brick kilns in the urban airshed are are fueled mostly by coal and agri-waste. These kilns can become more energy efficient by upgrading to (for example) zig-zag and fixed-chimney kilns. Coal-fired power plants also need to adhere to stricter environmental standards for all the criteria pollutants.
- Open waste burning is dispersed across the city and requires stricter regulations to address the issue.