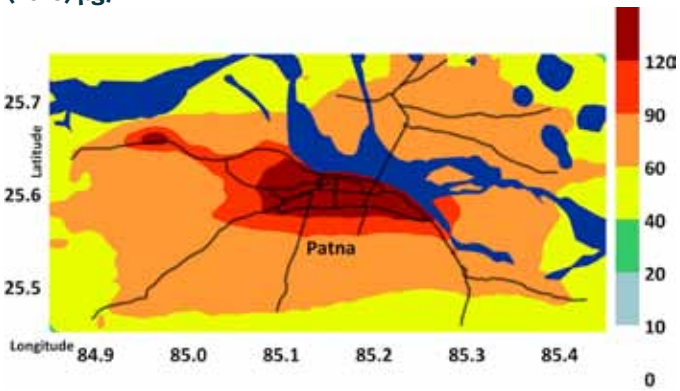
Modeled annual average $PM_{2.5}$ concentration (2015) µg/m³



For urban Patna, average $PM_{2.5}$ concentration was 122.2 ± 23.1 µg/m³. This is more than 3 times the national standard (40) and more than 12 times the WHO guideline (10).

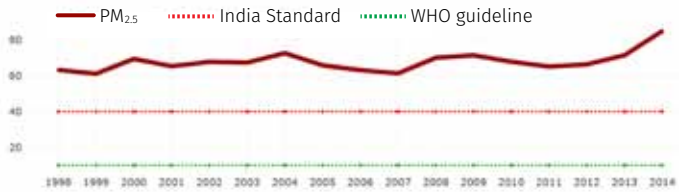
Air monitoring infrastructure

Patna has 1 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 26 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
162.0 +/- 91.7	33.0 +/- 24.3	4.6 +/- 5.0

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



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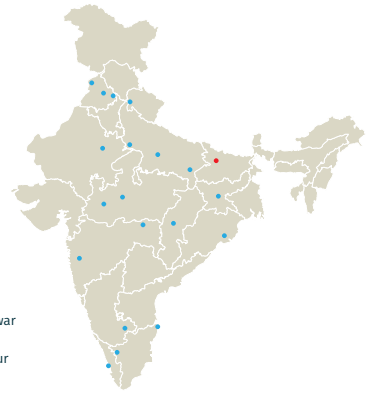
SHAKTI SUSTAINABLE ENERGY FOUNDATION

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

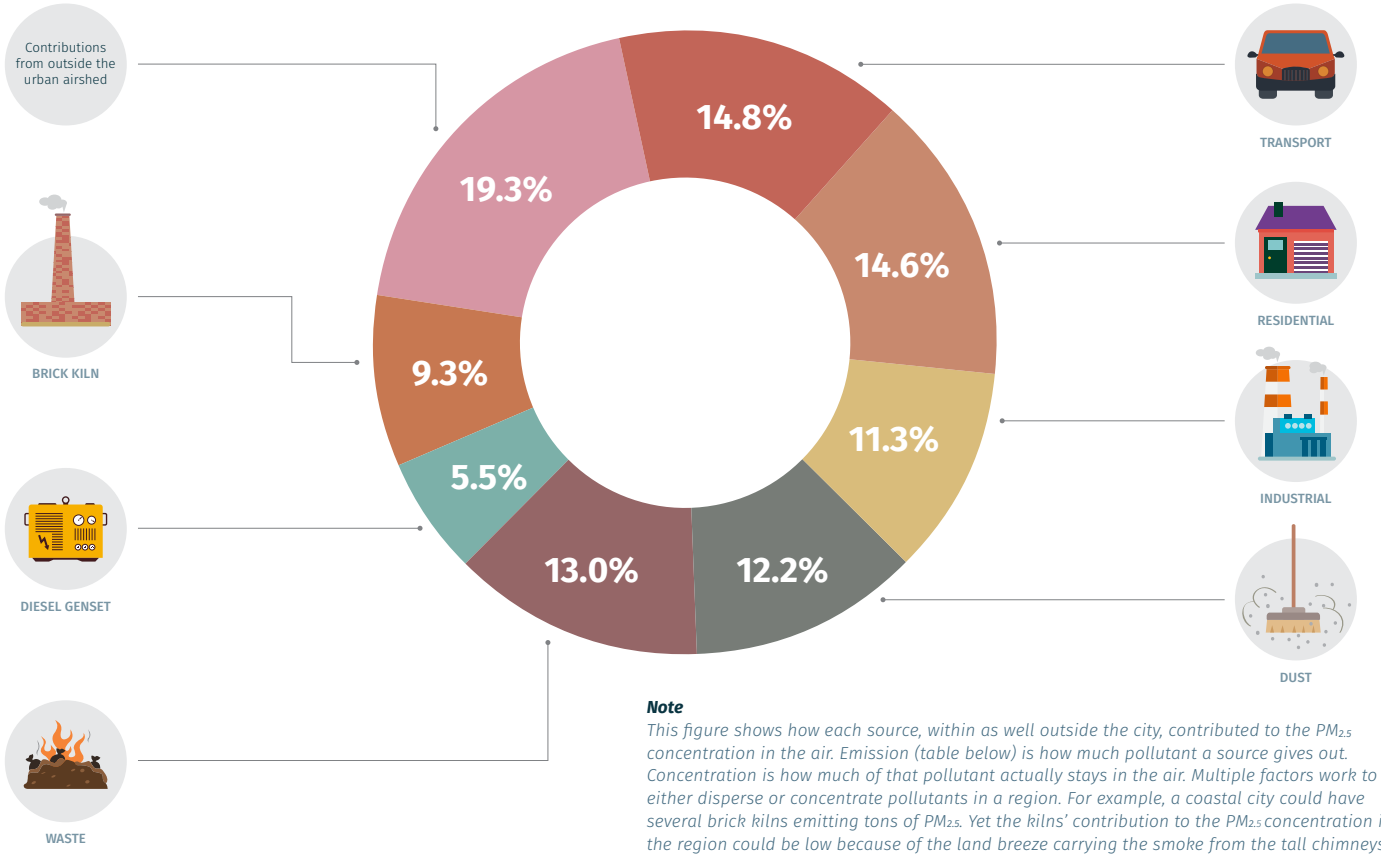
Photo: Wikirapra

Patna

The air of this ancient city is rich with history and $PM_{2.5}$ that's thrice the national standard.

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

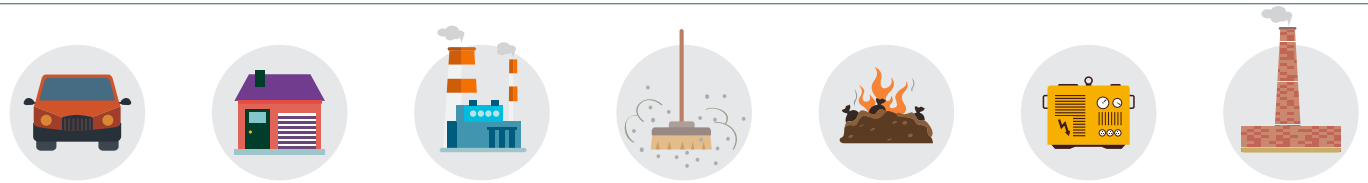
$PM_{2.5}$ concentration : source-wise percentage share in 2015



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)



3,750	3,000	2,350	2,100	2,450	750	3,650
5,400	3,500	4,200	3,400	3,500	900	4,800

Total emissions in 2015 = 18,050 tons **Total emissions in 2030 = 25,700 tons**

Findings & Recommendations

- The modeled source contributions present an even share of transport (including on-road dust), domestic cooking and heating, industries, open waste-burning, and influence of outside sources.
- An estimated 19% of the ambient annual $PM_{2.5}$ pollution (in 2015) originated outside the urban airshed. It came from coal-fired power plants, large (metal and non-metal processing) industries and brick kilns located outside the urban airshed. Some regional interventions could reduce the pollution loads.
- By 2030, increase in LPG consumption, residential electrification and urbanisation will decrease emissions from residential cooking and lighting. However, use of biomass and coal for warmth in the winter will still be an issue.
- The city needs to aggressively promote public and non-motorized transport and improve road infrastructure to reduce on-road dust re-suspension.
- Vehicle exhaust emissions are expected to remain constant by 2030, if and only if, Bharat 6 fuel standards are introduced nationally in 2020, as recommended by the Auto Fuel Policy.
- The 300 brick kilns in the urban airshed can benefit from a technology upgrade from the current fixed-chimney and clamp-style baking to (for example) zig-zag, in order to improve their overall energy efficiency.
- Most of the small and the medium industries need an energy efficiency management plan to address the emissions from coal, heavy fuel oil and gas combustion, or they need to shift to electricity.
- Patna is generating more garbage without a corresponding increase in its ability to sort and dispose it. Open burning, which is prevalent across the city, needs stricter regulations.