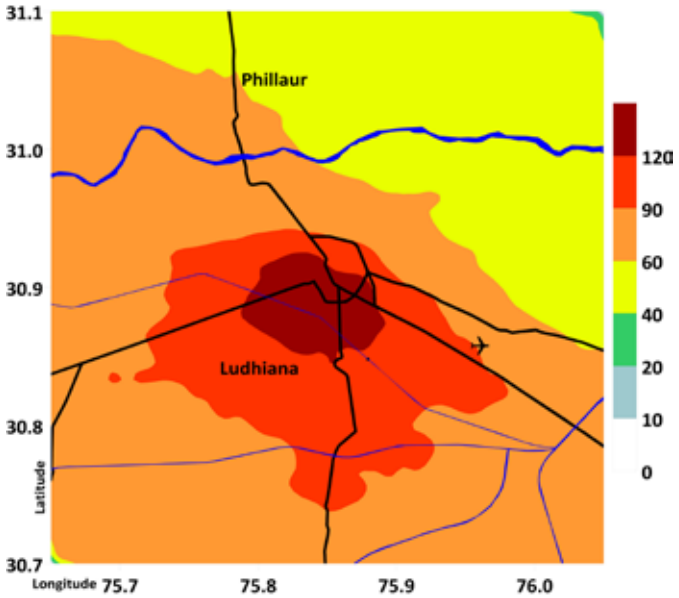
Modeled annual average $PM_{2.5}$ concentration (2015) µg/m³



For urban Ludhiana, average $PM_{2.5}$ concentration was 90.2 ± 20.3 µg/m³. This is more than 2 times the national standard (40) and 9 times the WHO guideline (10).

Air monitoring infrastructure

Ludhiana has 1 Continuous Air Monitoring Station (CAMS) reporting data for all the criteria pollutants and 4 manual stations reporting data on PM_{10}, SO_2, and NO_2. There should be at least 20 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
335.0 ± 149.6	48.0 ± 14.4	18.7 ± 6.0

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

URBAN emissions .info

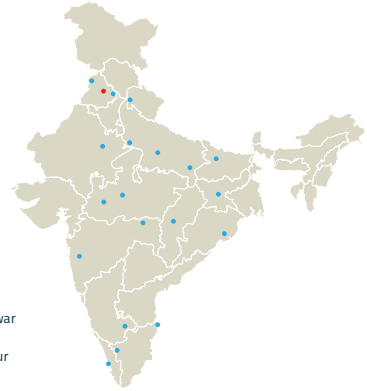
SHAKTI SUSTAINABLE ENERGY FOUNDATION

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 • Bhubaneshwar
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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.

Ludhiana

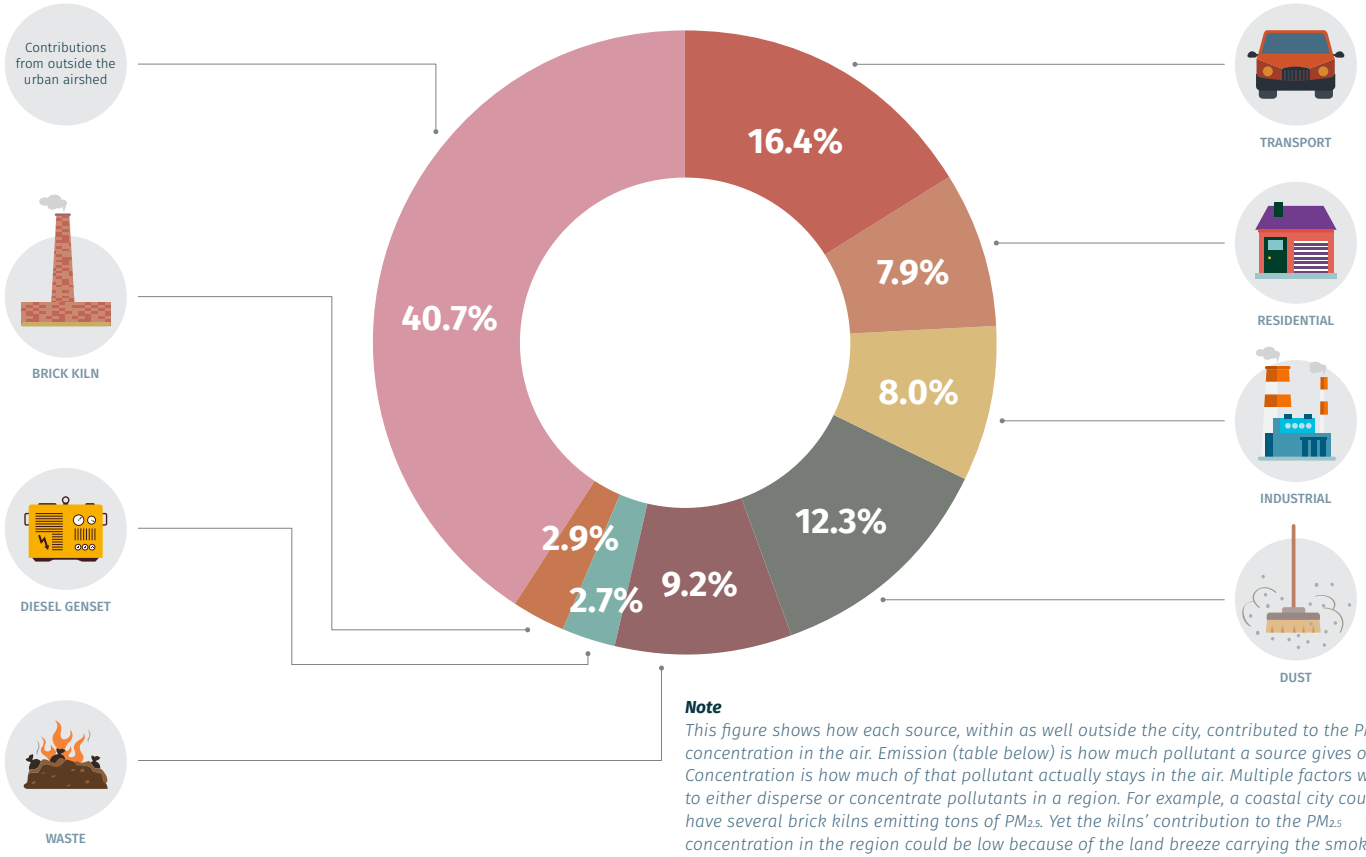
Its business environment is among the best in India, its air amongst the worst with $PM_{2.5}$ levels at 8 times the national standards.

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

www.urbanemissions.info

Photo: Mani5577

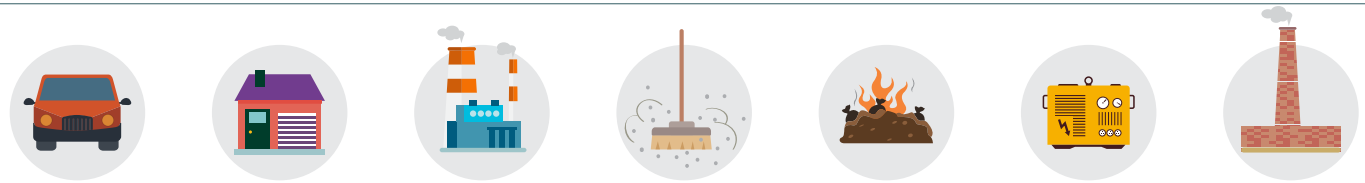
$PM_{2.5}$ concentration : source-wise percentage share in 2015



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)



3,650	1,250	3,800	1,700	1,450	600	2,050
5,450	1,450	6,450	3,000	2,100	700	2,650

Total emissions in 2015 = 14,500 tons **Total emissions in 2030 = 21,800 tons**

Findings & Recommendations

- An estimated 41% of the ambient annual $PM_{2.5}$ pollution (in 2015) originated outside the urban airshed, largely from coal-fired power plants, industries,brick kilns and seasonal crop burning. This strongly suggests that air pollution control policies need a regional outlook, including trans-political boundary.
- Stricter emission standards at the coal-fired thermal power plants in the region will help reduce the share of outside contributions.
- The city needs to aggressively promote public transport and improve road infrastructure to reduce on-road dust re-suspension. Non-motorized transport can play a critical role, given the increasing number of visitors every year.
- By 2030, the share of emissions from residential cooking and lighting is expected to decrease with a greater share of LPG, residential electrification, and increasing urbanization. However, biomass and coal-burning for warmth during winters will continue to be an issue.
- 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
- The small and the medium industries, largely textiles and light engineering, need an energy efficiency management plan to address the emissions from coal, heavy fuel oil and gas combustion, or shift towards using electricity.
- About 200 brick kilns in this urban airshed (and more outside), fueled mostly by coal and agri-waste, can benefit from 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.