

PRESS NOTE

New Study Reveals More Than Half of PM_{2.5} Emissions in Ludhiana and Varanasi Districts Originate from Unmitigated Fuel Use

First-of-its-kind district-level assessment highlights a major blind spot in India's clean air strategies and identifies pathways to reduce emissions by over 60% by 2035

New Delhi, June 19, 2026: A new study released today by the International Forum for Environment, Sustainability and Technology (iFOREST) has identified unmitigated fuel use as a major and largely overlooked contributor to air pollution in the Indo-Gangetic Plain (IGP). The report, titled *"Reducing Emissions from Unmitigated Fuel Usage: Data-Driven Strategies for Air Quality and Climate Action in IGP"*, presents the first district-level assessment in India to quantify unmitigated fuel use and the associated emissions across sectors. *Unmitigated fuel refers to the combustion of any fuel, whether for productive end uses or other purposes, without the application of air pollution control devices (APCDs).*

The study focuses on two contrasting districts in the Indo-Gangetic Plain - Ludhiana in Punjab, a major industrial and manufacturing hub, and Varanasi in Uttar Pradesh, a prominent heritage and tourism centre. It reveals that a significant share of particulate matter emissions in both districts originates from fuel use occurring without adequate pollution controls or regulatory oversight.

According to the study, Ludhiana generates approximately **21,000 tonnes of PM_{2.5} emissions annually**, of which **54% originates from unmitigated sources**. In Varanasi, annual PM_{2.5} emissions are estimated at **14,000 tonnes**, with **62% remaining unmitigated**. These findings point to a substantial gap in existing emission inventories and clean air planning approaches. The study also found that 65-70% of PM_{2.5} emissions originate outside city boundaries.

The study demonstrates that targeted interventions across key sectors could deliver substantial air quality improvements. Under an ambitious mitigation pathway extending to 2035, total PM_{2.5} emissions could be reduced by **60-70% in both districts**, highlighting the significant potential for cleaner fuel and technologies, along with stronger compliance and enforcement.

The findings have important implications for India's National Clean Air Programme (NCAP) and future air quality management strategies. By introducing a new framework for identifying and quantifying unmitigated fuel use, the study provides policymakers and regulators with a more comprehensive understanding of emission sources and mitigation opportunities beyond the city boundary.

The report was launched during a webinar titled **"The Missing Piece in India's Clean Air Puzzle: Unmitigated Fuel Use and the Hidden Emissions Challenge"**, which brought together policymakers, regulators, industry representatives, researchers, and clean air experts.

Speaking at the report launch webinar, experts emphasized that current air quality management frameworks often focus on sectors while overlooking whether fuel use is adequately mitigated through pollution control technologies and regulatory compliance. As a result, a significant portion of emissions remains unaccounted for in mitigation strategies.

Experts noted that the study could reshape the way clean air plans are being developed in India by incorporating mitigation status as a key parameter in emission estimation and air quality planning. The

approach also offers a scalable methodology for other districts and states seeking to identify hidden emission sources and prioritize effective interventions.

Key Highlights of the study

- 62% of PM_{2.5} emissions in Varanasi district and 54% of PM_{2.5} emissions in Ludhiana district are unmitigated emissions from sectors such as un-regulated industries, agriculture burning, ferries, diesel generators, domestic and commercial cooking.
- Around 65-70% of PM_{2.5} emissions in both districts originate outside city boundaries
- Commercial cooking sector is characterized by an exceptionally high level of unmitigated emissions. Around 98% of commercial sector emissions occur without pollution controls, contributing.
- Despite high-level LPG penetration in both district Varanasi and Ludhiana district (more than 90%), domestic cooking using solid fuel remains the largest contributor to unmitigated emissions.
- The transport sector demonstrates that Bharat Stage emission norms have been effective, with newer vehicles contributing less than 30% of total emissions. With nearly 69% of emissions coming from vehicles older than 10 years, the next priority should be accelerating the replacement or retrofit of aging trucks and heavy commercial vehicles.
- In agriculture, apart from stubble burning, farm equipments are also a significant source of unmitigated emissions.
- Total PM_{2.5} emissions can be reduced by **60-70% in both districts through** switch to cleaner fuel and technologies, along with stronger compliance and enforcement.
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About iFOREST

The International Forum for Environment, Sustainability and Technology (iFOREST) is an independent not-for-profit research and innovation organisation that works to identify, promote, and scale up solutions for environment and development challenges. Through evidence-based research and policy engagement, iFOREST supports governments and stakeholders in advancing sustainable and inclusive development pathways.

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