

Secondary Pollutants Now a Major Contributor to India's PM2.5 Burden

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Secondary Pollutants

Secondary Pollutants Latest News

- A recent study has revealed that Secondary Pollutants are responsible for nearly one-third of India's fine particulate matter (PM2.5) pollution.

Understanding Secondary PM2.5 Pollution in India

- Particulate matter smaller than 2.5 microns (PM2.5) is **one of the most hazardous components of air pollution**, responsible for serious respiratory and cardiovascular diseases.
- Traditionally, primary pollutants such as soot and dust from burning fossil fuels have been considered the chief contributors to PM2.5 levels.
- However, new research highlights the rising significance of secondary pollutants, especially ammonium sulphate, as key components of India's air pollution challenge.

Primary and Secondary Pollutants: A Distinction

- Primary pollutants originate directly from emission sources such as vehicle exhaust, coal-fired power plants, and biomass burning.
- In contrast, secondary pollutants are formed when primary pollutants react with each other or with atmospheric elements like water vapour and sunlight.
- These reactions lead to the formation of complex particles like ammonium sulphate and ammonium nitrate, which can be equally or more harmful.

Key Findings of the CREA Study

- According to a study by the **Centre for Research on Energy and Clean Air** (CREA), secondary pollutants, especially ammonium sulphate, constitute up to 34% of India's PM_{2.5} mass.
- This widespread presence was identified using satellite-based imagery and atmospheric modelling.
- **Nationwide Impact:**
 - The average ammonium sulphate concentration across India was found to be 11.9 µg/m³.
 - These concentrations are not limited to cities near pollution hotspots, but extend nationwide due to the transboundary nature of air pollution.
- **Coal Plants as a Major Source:**
 - Over 60% of India's sulphur dioxide (SO₂) emissions, the precursor to ammonium sulphate, are linked to coal-fired thermal power plants. These facilities become the primary driver of secondary PM_{2.5} formation.
- **Higher Concentration near Coal Plants:**
 - Within 10 km of coal power plants, ammonium sulphate concentrations were 2.5 times higher (15 µg/m³) compared to areas beyond that range (6 µg/m³).
 - Near these plants, it accounts for 36% of PM_{2.5} pollution, whereas even distant areas reported a significant 23% contribution.

Status of Emission Control Measures

- Although it is mandatory for Indian coal thermal plants to install Flue Gas Desulphurisation (FGD) systems to reduce SO₂ emissions, compliance has been poor; only about 8% of such plants have installed the required units.
- Further, reports suggest that the government is contemplating rolling back this requirement, which could severely undermine efforts to reduce secondary PM_{2.5}.

Impact Across NCAP Cities

- The findings are particularly significant for the 130 cities identified under the **National Clean Air Programme** (NCAP).
- These cities are mandated to reduce pollution by 20-30% by 2025-26, but face an uphill task given the high concentration of secondary pollutants.
- **Concentration Levels:**

- PM2.5 levels due to ammonium sulphate in these cities ranged from 3.9 to 22.5 µg/m³.

- **Widespread Presence:**

- In 114 out of the 130 NCAP cities, ammonium sulphate made up more than 30% of the total PM2.5 burden.

- **Combined Effect:**

- Including ammonium nitrate, secondary pollutants could constitute up to 50% of PM2.5 pollution in urban areas.

Strategies for Mitigation

- To address the growing burden of secondary pollutants, a multipronged strategy is required:

- **Strict Implementation of Emission Norms:**

- Enforcement of FGD installation in coal power plants must be non-negotiable. Regulatory rollback would be counterproductive to public health goals.

- **Agricultural and Industrial Reforms:**

- Efficient fertiliser management can reduce ammonia emissions, which are a key reactant in forming secondary particles.

- **Source-Specific Action:**

- Pollution mitigation efforts must target both direct emission sources and precursor gases like SO₂ and NH₃.

- **Transboundary Cooperation:**

- Given the dispersal nature of secondary pollutants, regional coordination between states is essential for effective air quality management.

- **Real-Time Monitoring and Research:**

- Investments in air quality monitoring infrastructure and continuous data-driven research are needed to identify evolving patterns in pollution dynamics.

Source : TH

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