CENTRE FOR RESEARCH ON ENERGY AND CLEAR AIR: ENVIRONMENT

NEWS: Secondary pollutants constitute up to third of PM2.5 pollution

WHAT'S IN THE NEWS?

A CREA study reveals that secondary pollutants like ammonium sulphate, largely from coal-fired power plants, contribute significantly to India's PM2.5 pollution, accounting for up to 50% in urban areas. Despite mandates, Flue Gas Desulphurisation (FGD) is installed in only ~8% of plants, highlighting urgent policy and enforcement gaps.

Context: CREA Study on PM2.5 and Secondary Pollutants

- The **Centre for Research on Energy and Clean Air (CREA)** conducted a study highlighting the **major contribution of secondary pollutants**, especially **ammonium sulphate**, to PM2.5 levels in India.
- It underscores a shift in pollution science from just **primary emissions** to understanding the **chemical transformation and formation** of harmful secondary particles in the atmosphere.

Understanding Particulate Matter and Pollutants

1. What is PM (Particulate Matter)?

- PM stands for **particulate matter**, a mixture of **solid particles and liquid droplets** suspended in the air.
- Includes both **naturally occurring** particles (dust, pollen) and **anthropogenic pollutants**.

2. Types of PM

- **PM10**: Particles with a diameter of **10 micrometres or smaller** – can be inhaled and cause respiratory issues.
- **PM2.5**: Fine particles with a diameter of **2.5 micrometres or smaller** – can penetrate deep into lungs and bloodstream, causing cardiovascular and pulmonary diseases.

3. Primary vs. Secondary Pollutants

- **Primary Pollutants**: Directly emitted from sources (e.g., **vehicles, biomass burning, power plants**)
    - Examples: **Carbon monoxide, Nitrogen oxides (NOx), Sulphur dioxide (SO_2)**
- **Secondary Pollutants**: Formed through **chemical reactions** between primary emissions and atmospheric agents (e.g., **sunlight, water vapour**)
    - Examples: **Ammonium sulphate, ammonium nitrate, ground-level ozone**

Key Findings from the CREA Study

1. Role of Secondary Pollutants

- **Ammonium sulphate** contributes **34%** of total **PM2.5 pollution** nationally.
- **Average concentration** across cities: **11.9 µg/m³**
- In **114 of 130 NCAP cities**, ammonium sulphate forms **over 30%** of PM2.5 levels.
- **Ammonium nitrate**, another secondary pollutant, may **raise total PM2.5 contribution to 50%** in urban areas.

2. Source Analysis – Coal-Fired Power Plants

- Account for **over 60%** of India's **SO_2 emissions** – a key precursor to ammonium sulphate formation.
- Near coal plants (within 10 km):
    - Ammonium sulphate concentration: **15 µg/m³**
- Farther areas (beyond 10 km):
    - Ammonium sulphate: **6 µg/m³**
- Indicates both **localised pollution** and **long-distance transport** of secondary particles.

National Clean Air Programme (NCAP): Policy Context

1. Launch and Objective

- **Launched**: January 2019 by the **Ministry of Environment, Forest and Climate Change (MoEFCC)**
- Aim:
    - Originally: **20–30% reduction** in **PM10 and PM2.5** by **2024–25**, baseline year 2017
    - Revised Target: **40% reduction in PM10** by **2025–26** or achieving national standards of **60 µg/m³**

2. Scope

- Applicable to **131 cities**, of which **130 cities** were studied by CREA for PM2.5 trends.
- **Ammonium sulphate levels** range from **3.9 to 22.5 µg/m³**
- **Contributions to PM2.5** range from **20% to 43%** across cities

Technological and Regulatory Implementation Gaps

1. Flue Gas Desulphurisation (FGD)

- Technology used in coal power plants to remove **sulphur dioxide** (SO_2) from exhaust gases.
- **Mandated by law**, but only **~8%** of coal plants have installed FGDs so far.
- Despite its effectiveness, the government is **considering diluting** the enforcement due to industry pressure.

2. Consequences of Inaction

- Failure to curb SO_2 emissions will continue to **elevate ammonium sulphate formation**
- Urban air pollution and health costs will rise, especially for vulnerable populations

Policy Recommendations from CREA

1. Strict Enforcement of SO_2 Control Measures

- Ensure full and **time-bound compliance** with FGD mandates
- Avoid dilution or deferral of pollution control standards

2. Efficient Fertilizer Use to Control Ammonia (NH_3)

- Ammonia is a major precursor to **ammonium sulphate and ammonium nitrate**
- Promote **precision agriculture**, balanced fertilizer application, and **low-emission practices**

3. Targeted Emission Reduction Strategies

- Focus on both **primary emissions** (coal, vehicles) and **precursor gases** (SO_2, NOx, NH_3)
- Develop **source-specific action plans** for high-pollution sectors

4. Regional Coordination Mechanisms

- Air pollution travels across states—need for **inter-state collaboration**, especially in shared airsheds (e.g., Indo-Gangetic Plain)
- Joint strategies for **monitoring and enforcement**

5. Investments in Monitoring and Research

- Expand **real-time air quality monitoring** networks
- Fund research on **chemical formation of PM2.5**, public health impact, and climate linkages
- Support **evidence-based policymaking** using high-quality data

Source: https://www.thehindu.com/business/indian-economy-remains-a-key-driver-of-global-growth-rbi-report/article69756308.ece