



Particulate Matter & SO₂ Control

[Source: DTE](#)

Why in News?

Recently, [CSIR-National Environmental Engineering Research Institute \(NEERI\)](#) advised against further [Flue Gas Desulfurization \(FGD\)](#) installations in [Indian thermal power plants \(TPPs\)](#), stating that [Sulphur Dioxide \(SO₂\) emissions](#) have minimal impact on ambient air quality.

- The report of the institute indicated that the focus should **shift to controlling [Particulate Matter \(PM\)](#)** rather than solely on SO₂ emissions.

Note:

- CSIR-NEERI is a **research institute created and funded by the Government of India**. It functions under the [Ministry of Science & Technology](#).
- It was **established in Nagpur in 1958 with focus on** water supply, sewage disposal, communicable diseases and to some extent on industrial pollution and occupational diseases found common in post-independent India.

What is Flue Gas Desulfurization (FGD)?

- **About:**
 - FGD is the **process of removing sulphur compounds from the exhaust emissions** of fossil-fueled power stations.
 - This is done through the **addition of absorbents**, which can remove up to 95% of the sulphur dioxide from the **flue gas**.
 - **Flue gas** is the material emitted when [fossil fuels](#) such as coal, oil, natural gas, or wood are burned for heat or power.
- **Categorisation:**

Category	Location/Area	Timelines for Compliance
A	Within 10 km radius of NCR or cities with million-plus population (2011 Census)	Up to 31st December 2024
B	Within 10 km radius of Critically Polluted Areas or Non-attainment cities (as defined by CPCB)	Up to 31st December 2025
C	Areas not included in Categories A and B	Up to 31st December 2026

What is Air Pollution?

▪ **About:**

- Air pollution **encompasses the presence of solids, liquids, gases, noise, and radioactive radiation** in the atmosphere, at concentrations harmful to humans, living organisms, property, or environmental processes.
 - These substances, **known as pollutants, can be either natural or human-made** and can originate from various sources such as [industrial processes](#), [vehicle emissions](#), agricultural activities, and natural events like wildfires and volcanic eruptions.

▪ **Particulate Matter (PM):**

- PM **refers to a complex mixture of extremely small particles** and liquid droplets suspended in the air. These particles come in a wide range of sizes and can be made up of hundreds of different compounds.
 - **PM10 (coarse particles)** - Particles with a diameter of 10 micrometres or less.
 - **PM2.5 (fine particles)** - Particles with a diameter of 2.5 micrometres or less.

▪ **Sulphur Dioxide:**

- SO₂ emissions are a significant contributor to air pollution. It can react with other compounds in the atmosphere to form small particles.
 - These **particles contribute to PM pollution.**
- The greatest source of SO₂ in the atmosphere is the **burning of fossil fuels in power plants** and other industrial facilities.
 - **Other sources include** industrial processes such as extracting metal from ore, natural sources such as volcanoes, and locomotives, ships and other vehicles and heavy equipment that burn fuel with high sulphur content.

▪ **Government Initiatives for Controlling Air Pollution:**

- [National Clean Air Programme](#)
- [System of Air Quality and Weather Forecasting and Research \(SAFAR\) Portal](#)
- [New Commission for Air Quality Management](#)
- [Graded Response Action Plan \(for Delhi\)](#)

Note: In [M.C. Mehta vs. Union of India \(1986\)](#), the Supreme Court treated the right to live in pollution free environment as a part of [fundamental right](#) to life under Article 21 of the Constitution.

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Air Pollutants

Sulphur Dioxide (SO₂)



It comes from the consumption of fossil fuels (oil, coal and natural gas). Reacts with water to form acid rain.

Impact: Causes respiratory problems.

Ozone (O₃)



Secondary pollutant formed from other pollutants (NO_x and VOC) under the action of the sun.

Impact: Irritation of the eye and respiratory mucous membranes, asthma attacks.

Nitrogen Dioxide (NO₂)



Emissions from road transport, industry and energy production sectors. Contributes to Ozone and PM formation.

Impact: Chronic lung disease.

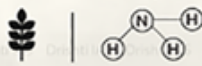
Carbon Monoxide (CO)



It is a product of the incomplete combustion of carbon-containing compounds.

Impact: Fatigue, confusion, and dizziness due to inadequate oxygen delivery to the brain.

Ammonia (NH₃)



Produced by the metabolism of amino acids and other compounds which contain nitrogen.

Impact: Immediate burning of the eyes, nose, throat and respiratory tract and can result in blindness, lung damage.

Lead (Pb)



Released as a waste product from extraction of metals such as silver, platinum, and iron from their respective ores.

Impact: Anemia, weakness, and kidney and brain damage.

Particulate Matter (PM)



PM10: Inhalable particles, with diameters that are generally 10 micrometers and smaller.

PM2.5: Fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

Source: Emitted from construction sites, unpaved roads, fields, fires.

Impact: Irregular heartbeat, aggravated asthma, decreased lung function.

Note: These major air pollutants are included in the Air quality index for which short-term National Ambient Air Quality Standards are prescribed.



UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q1. Why is there a concern about copper smelting plants? (2021)

1. They may release lethal quantities of carbon monoxide into environment.
2. The copper slag can cause the leaching of some heavy metals into environment.
3. They may release sulphur dioxide as a pollutant.

Select the correct answer using the code given below.

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (b)

Q2. With reference to furnace oil, consider the following statements: (2021)

1. It is a product of oil refineries.
2. Some industries use it to generate power.
3. Its use causes sulphur emissions into the environment.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)