

FUEL GAS DESULPHURISATION (FDG)

Context

On June 4, The Hindu reported that a committee of experts, chaired by Principal Scientific Advisor (PSA) Ajay Sood, has recommended that India do away with a decade-long policy of mandating Flue Gas Desulphurisation (FGD) units in all coal-fired thermal power plants (TPPs)

What is Flue Gas Desulphurisation (FGD)?

- Flue gas is produced as a result of burning fossil fuels and contains several harmful pollutants such as carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides, and particulate matter.
- Among these, flue gas desulphurisation (FGD) systems are specifically designed to remove SO_2 emissions. Since SO_2 is acidic in nature, it is neutralised using a basic substance within the FGD process.
- There are three main types of FGD technologies used globally: dry sorbent injection, wet limestone scrubbing, and seawater-based removal. In the dry sorbent method, a fine powdered material such as limestone is introduced into the flue gas stream, where it chemically reacts with SO_2 . The resulting compounds are then extracted using equipment like electrostatic precipitators or fabric filters.
- The wet limestone technique, which is widely adopted due to its high efficiency, uses a slurry of limestone instead of dry powder. When SO_2 comes into contact with this slurry, it forms gypsum—a stable byproduct that has commercial use, particularly in the construction sector.
- For power plants located near coastlines, the seawater method is often employed. In this process, seawater captures the SO_2 from the flue gas. The used water is then treated adequately before being released back into the ocean, ensuring minimal environmental impact

Status of FDG units in India

- In 2015, the Union Ministry of Environment introduced regulations requiring all 537 coal-based thermal power plants (TPPs) across India to install flue gas desulphurisation (FGD) systems in order to curb sulphur dioxide (SO_2) emissions. The initial deadline for compliance was set for 2018.

- However, only a small number of power plants managed to meet this target. By April 2025, the timeline had been extended, with revised deadlines staggered between 2027 and 2029, based on the classification of each TPP. Notably, the installation of an FGD unit typically requires about two years.
- As per a government update released on August 1, 2024, only 39 out of the 537 coal-fired TPPs had completed FGD installation. Subsequently, on December 30, 2024, the Ministry of Environment, Forest and Climate Change (MoEFCC) issued another notification, postponing the compliance deadline by an additional three years, but without providing any justification for the delay.
- In April 2025, a report commissioned by the Principal Scientific Adviser's (PSA) office recommended that the Ministry consider withdrawing the 2015 directive that mandated FGD units across all coal-fired power plants in India

Why are SO₂ emissions bad?

- SO₂ emissions are dangerous due to their role in **acid rain formation, air pollution, and public health hazards**. That is why technologies like **Flue Gas Desulphurisation (FGD)** are crucial in reducing SO₂ from industrial sources like power plants
- Sulphur dioxide (SO₂) is a significant pollutant that contributes to global warming and poses serious respiratory health risks. In the atmosphere, SO₂ can transform into other sulphur compounds, which may then interact with various chemicals to generate particulate matter.
- Research based on atmospheric modelling indicates that approximately 15% of India's ambient PM_{2.5} levels are linked to coal combustion. Of that, around 80% results from **secondary particulate matter** created by SO₂ emissions from burning coal.
- Therefore, implementing Flue Gas Desulphurisation (FGD) systems is crucial to reducing this major source of PM_{2.5} pollution

FDG units are Contentious

- Installing flue gas desulphurisation (FGD) systems involves substantial financial investment. According to estimates by the Central Electricity Authority, the installation cost is around ₹1.2 crore per megawatt (MW). As of April 2025, India's coal-based power generation capacity was 2,19,338 MW—accounting for over 46% of the nation's total installed power capacity—and this figure is projected to grow.
- At a press briefing on June 10, Union Power Minister Manohar Lal Khattar noted that an additional 97,000 MW of capacity is planned, and incorporating FGD systems for this expansion would require an estimated ₹97,000 crore. He emphasized the need to weigh this carefully, ensuring public health isn't compromised, while also avoiding a sharp rise in electricity tariffs or increased emissions.

Way forward

The issue of installing Flue Gas Desulphurisation (FGD) units in India's thermal power plants lies at the intersection of environmental responsibility, public health, and economic feasibility. While FGDs are essential to control sulphur dioxide (SO₂) emissions—major contributors to air pollution and PM_{2.5} formation—implementation has been sluggish due to high installation costs, regulatory delays, and lack of political urgency. With India's coal power capacity set to expand, the environmental costs of inaction could be significant, undermining the country's clean air targets and affecting millions of lives.

At the same time, the power sector faces pressure to keep tariffs affordable and ensure energy security. Although installing FGDs will raise electricity costs modestly, experts argue that these represent necessary and predictable investments in public health and environmental sustainability. The way forward requires a balanced approach: one that internalizes the cost of pollution, streamlines implementation timelines, and ensures the power sector does not externalize its environmental burden onto the public.