

Press release

Thermal power plants emit 240 times more air pollution than stubble burning – Time to take strict action

15 November 2024 – Today, the Centre for Research on Energy and Clean Air (CREA) released a brief revealing the urgent need for accelerated flue gas desulfurization (FGD) installations in India’s coal-fired thermal power plants to combat the nation’s soaring sulphur dioxide (SO₂) emissions. If implemented fully, FGD systems could reduce India’s annual SO₂ emissions by an estimated 64% – from 4,327 kilotonnes to approximately 1,547 kilotonnes – significantly benefiting both air quality and public health, as thermal power plants in India emit over 240 times the 17.8 kilotonnes released from burning 8.9 million tonnes of paddy straw.

As the world’s largest sulphur dioxide (SO₂) emitter, India’s reliance on coal is taking a toll on air quality and public health. However, it doesn’t have to be this way. Implementing the emission standards introduced by the Ministry of Environment, Forests, and Climate Change (MoEFCC) in 2015 could reduce SO₂ emissions by 64% across the country. Yet, with only 8% of India’s thermal power plants adopting these standards nearly a decade later, and with ongoing proposals from the power sector to delay further implementation, India risks significant financial and health costs to the public and the nation.

A comparison between thermal power plant emissions and paddy straw burning emissions in Punjab and Haryana highlights the scale of particulate matter and SO₂ pollution. Thermal power plants emit 277 kilotonnes of particulate matter and 4,327 kilotonnes of SO₂ – over 10 times and 240 times higher, respectively, than the 26.7 kilotonnes of particulate matter and 17.8 kilotonnes of SO₂ from burning 8.9 million tonnes of paddy straw. While paddy straw burning causes seasonal spikes, thermal power plants represent a larger, persistent pollution source year-round, underscoring the need for stricter controls on thermal power plant emissions. Yet, thermal power plants often receive leniency and repeated compliance extensions, especially for installing FGDs, whereas stubble burning is heavily penalized, with strict enforcement on farmers during the burning season.

Controlling SO₂ emissions is essential to curb secondary particulate matter formation (i.e., PM 2.5) as SO₂ quickly transforms into sulfates, a secondary PM that lingers much longer in

the atmosphere. While SO₂ levels may appear below national standards, its conversion to harmful secondary particles poses a hidden risk. Over 96% of particulate pollution from coal-fired power plants in Delhi's national capital region (NCR) region is secondary in nature, primarily from SO₂. Reducing SO₂ emissions can significantly lower the secondary particulate matter load at a national scale, thus reducing health risks associated with prolonged particulate exposure.

Potential SO₂ reduction

According to CREA estimates, 4,327 kilotonnes of SO₂ were released by thermal power plants for the period June 2022 to May 2023, with the state, central, and private sectors contributing 1,563 kilotonnes (36%), 1,426 kilotonnes (33%), and 1,339 kilotonnes (31%), respectively. Adopting FGD technology would reduce emissions to 500 kilotonnes, 420 kilotonnes, and 627 kilotonnes in the state, central, and private sectors, representing reductions of 65%, 69%, and 60%, respectively. These achievements underscore the effectiveness of FGD technology. However, with only 8% of thermal power plant capacity in India having completed FGD installations, the pace of adoption remains insufficient.

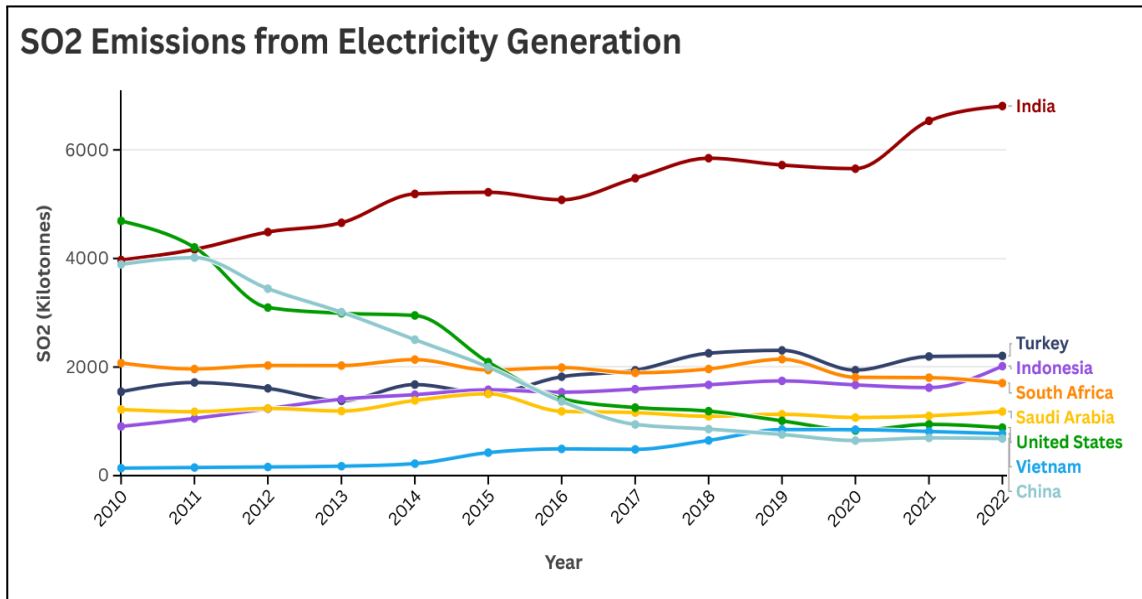
'These figures show the necessity of FGD technology, but without firm timelines and enforcement, we're only scratching the surface of what's possible for cleaner air in India,' said Manoj Kumar, Analyst, CREA.

State-by-state potential for SO₂ reduction

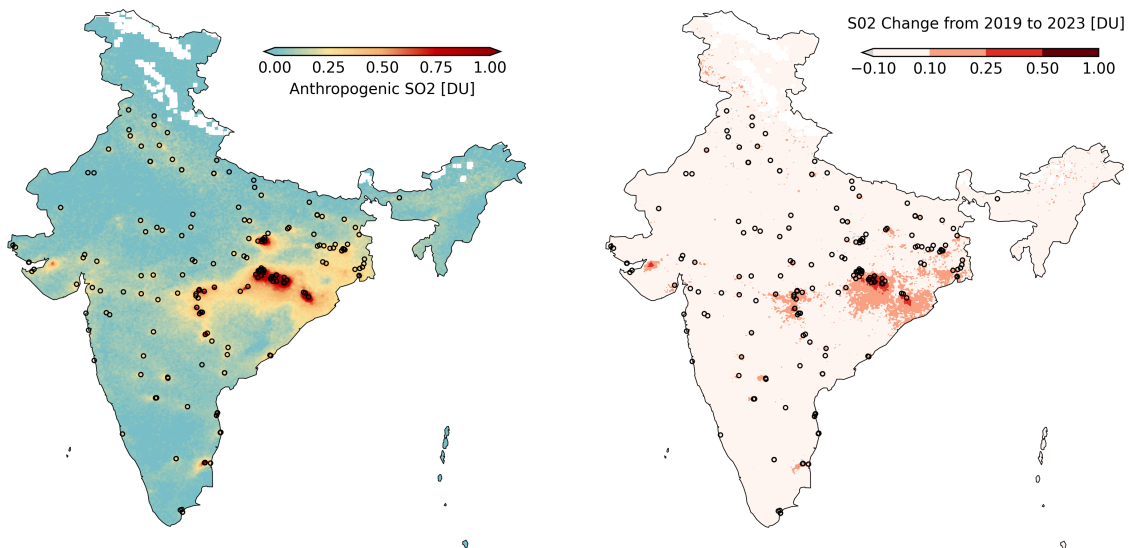
The CREA brief also demonstrates the potential impact of FGD technology in high-emission states. In **Maharashtra**, SO₂ emissions could decrease by 71%, from 542 kilotonnes to 158 kilotonnes. **Chhattisgarh** has the potential to cut its emissions by 68%, from 509 kilotonnes to 165 kilotonnes. Similarly, **Madhya Pradesh** could achieve a 67% reduction, bringing emissions down from 470 kilotonnes to 156 kilotonnes, and **Uttar Pradesh** could see a reduction of 58%, lowering emissions from 447 kilotonnes to 187 kilotonnes. These projections illustrate the substantial air quality improvements that FGD installations could bring to some of India's most affected regions.

India's global standing as the largest SO₂ emitter

India is currently the world's largest SO₂ emitter, responsible for over 20% of global anthropogenic SO₂ emissions, primarily due to its coal-dependent energy sector.



According to CREA’s analysis, the highest concentrations of atmospheric SO₂ are found in coal-heavy regions such as the Mahanadi basin and the Indo-Gangetic Plain. India’s SO₂ emissions from electricity generation were measured at 6,807 kilotonnes in 2023, surpassing emissions from other major emitters like Turkey (2,206 kilotonnes) and Indonesia (2,017 kilotonnes).



A study from the Indian Institute of Technology (IIT) Delhi highlighted that, ‘FGD systems can reduce SO₂ concentrations by 55% within 60-80 km and sulfate aerosol concentrations by 30%, extending up to 100 km from the thermal power plants’.



CREA's key recommendations for action

To address the escalating SO₂ levels and protect public health, CREA urges immediate action through:

1. **Enforceable deadlines:** Setting binding timelines for FGD installations across all sectors.
2. **Strict regulatory measures:** Penalties for delays to ensure compliance with installation targets.
3. **Transparency and accountability:** Publishing regular updates on FGD progress and emission reductions to encourage accountability.

'The health and economic benefits of FGD far outweigh the costs, offering a pathway to improved public health and cleaner air,' emphasised Manoj Kumar.

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Notes

The publication related to this press release is available [here](#)
All CREA publications can be found here:
energyandcleanair.org/publications

About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions, to air pollution. CREA was founded in December 2019 in Helsinki and has staff in several Asian and European countries. The organisation's work is funded through philanthropic grants and revenue from commissioned research. www.energyandcleanair.org

About the methodology

SO₂ emissions from 537 CFPP units were calculated using a bottom-up approach, incorporating four key parameters: coal consumption, stack emissions, flue gas flow, and the gross calorific value of coal.

Monthly coal consumption data for CFPPs is published by the [CEA](#). Since this study aims to estimate emissions at the unit level, unit-wise average energy generation data from the [National Power Portal](#) was used to calculate unit-level coal consumption. Initially, the total plant generation was calculated by summing unit-level generation data.

The full methodology is available in the report.