

Press release

First-of-its-kind satellite-based analysis reveals 29 hazardous NO_x hotspots across Indonesia

Major sources include Jakarta and Java coal & gas power complexes and industrial clusters, Sulawesi and North Maluku nickel hubs.

JAKARTA, 13 August 2026 - Indonesia's national NO_x (nitrous oxides) emissions have surged by more than 50% since 2010, driven by a failure to decouple transport, power, and industrial growth from fossil fuels. Yet, the country's national annual standard remains five times more lenient than World Health Organization safety guidelines.

By utilising advanced, top-down satellite remote sensing to bridge a critically sparse public ground-monitoring network, the [Centre for Research on Energy and Clean Air \(CREA\)](#) has identified 29 NO_x point sources across Indonesia—tripling the previous global catalogue. The study also finds that the worst hotspots are mapped at coal & gas power complexes along with industrial clusters surrounding Jakarta and across Java as well as at nickel processing hubs in Sulawesi and North Maluku, showing that NO_x pollution in Indonesia goes far beyond vehicle emissions and urban activities.

This first-of-a-kind study extends [the Beirle et al. 2023 methodology](#), which had to date only enabled the identification of nine NO_x point sources across Indonesia. To connect top-down satellite tracking with ground-level industrial architecture, this analysis categorises Indonesia's 29 identified point sources into four distinct groupings: Urban, in close proximity to major power and industrial facilities; Large plant, small city; Nickel processing; and Mining.

Nine NO_x hotspots sit in Indonesia's most densely populated cities such as Jabodetabek, Surabaya, and Medan, stemming from transboundary transport and heavily compounded by neighbouring coal and gas power complexes and industrial boilers. This is creating acute cumulative air quality crises that impact tens of millions of residents.

North Jakarta and Outer Bekasi rank as the top two highest NO_x hotspots nationwide, followed by Banten Suralaya in third and West Karawang-Cikampek in sixth. Together, these hotspots contribute to Indonesia's largest chronic airshed over the Greater Jakarta metropolitan area.

Another nine sit where major emitters are strategically placed along remote and peri-urban coastlines. These NO_x emissions from Java's coal power complexes and cement kilns alongside

Sumatra's mega kraft pulp and paper mills are shifting the national air pollution burden onto local communities.

Six hotspots are driven by [Indonesia's aggressive nickel downstreaming](#), whose booming coal-based nickel processing and [captive coal power capacity](#)—which has grown more than six-foldsince 2019 from 3 GW to 16 GW—is driving NO_x emissions in Sulawesi and North Maluku that eclipse those of the entire Greater Jakarta Metropolitan Area.

The remaining five hotspots, mainly concentrated across the open-pit coal mining of Kalimantan, are driven by massive diesel machinery fleets, haulage transport, and decentralised mine-mouth power grids. These operate under broad environmental management frameworks rather than standardised, enforceable point-source stack emission caps.

NO_x is a collective term used to represent various highly reactive gases composed of nitrogen and oxygen molecules. Besides already being major pollutants, NO_x acts as precursors, chemical building blocks that react in the atmosphere to create other, often more dangerous, pollutants like ozone and fine particulate matter. Studies link NO₂ exposure to heart and lung diseases, reduced lung development in children, breathing issues, increased emergency asthma visits, heightened allergic reactions, and premature deaths.

To address these highly hazardous pollution hotspots, CREA urges the government to consider institutionalising an environmental externality valuation framework, as well as proactively integrating incoming emission inventory data alongside existing Continuous Emission Monitoring System (CEMS) measurement data and possibly satellite-based tracking. This integrated data network must then be leveraged to launch a public real-time dashboard that upholds accountability, acts as a trigger for automated Early Warning Systems (EWS) to deploy immediate localised mitigation, and mandates the enforcement of Best Available Techniques (BAT) for key contributing sectors within identified pollution hotspots.

'CREA's comprehensive mapping of NO_x hotspots across Indonesia has pulled back the curtain on a rapidly evolving, multisectoral air quality crisis, revealing that industrial air pollution is no longer just an urban dilemma or related solely to vehicle emissions. These hotspots frequently even rival or exceed the emissions footprint of the nation's largest cities, shifting an unprecedented environmental and public health burden onto vulnerable communities detached from traditional public ground-monitoring arrays. To effectively decouple Indonesia's accelerating industrial growth from catastrophic environmental degradation, the government must transition from passive, non-transparent compliance tracking to assertive, data-driven intervention,' said Katherine Hasan, Analyst at CREA.

'The fight in the Jakarta Citizen Lawsuit showed us that real change happens when communities actively care and take action for clean air. Today, air pollution is a national issue, affecting people from industrial zones in Java to nickel processing hubs like Weda Bay. Protecting our health is a shared responsibility between government, industry, and citizens. The government must mandate



industry transparency in pollution data so people know what is in their air, while communities can take an active role in monitoring their local environment. Clean air is a basic human right for everyone that has to be upheld by the state, and together we can protect it,' emphasised Yuyun Ismawati, Senior Advisor and Co-Founder of Nexus3 Foundation.

'Exposure to nitrogen oxides (NO_x) and the formation of secondary fine particulate matter (PM_{2.5}) represent a profound and escalating public health crisis. These pollutants inflict serious damage on the respiratory and cardiovascular systems, with the greatest burden falling on our most vulnerable populations—children, whose growth and development are at risk, and older adults living in industrial areas with high emissions. We can no longer ignore this overwhelming scientific evidence. Preventing an unsustainable rise in national healthcare costs and safeguarding the health of future generations require decisive action. The government must demonstrate a genuine commitment to maintaining national ambient air quality standards through direct interventions and comprehensive evaluation of all energy and industrial policies,' emphasised Prof. Budi Haryanto, Professor of Environmental Health, Faculty of Public Health, Universitas Indonesia (FKM UI).

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Note to editors

The publication related to this press release is available [here](#).

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.

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