

Status, Challenges and Opportunities in Air Quality Management in Indonesia.

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Strengthening Air Quality Management in Indonesia



Air pollution is a major environmental and public health concern in Indonesia specially in metropolitan area like Jakarta.



The Government of Indonesia is strengthening policies to reduce emissions from key sectors.



Clean air is closely linked with public health protection, climate action, and sustainable development.



The Ministry of Environment continues to lead national efforts to improve air quality management.



Key Regulations on Air Quality Management – Indonesia



Legal & Policy Framework



LEGAL & POLICY FRAMEWORK

- **Law No. 32/2009** – Environmental Protection and Management
- **Government Regulation No. 22/2021** – Environmental Protection and Management
- **MoEF Regulation No. 5/2026** – Air Quality Protection and Management Planning
- **MoEF Regulation No. 16/2025** – MoE Strategic Plan 2025–2029
- **MoEF Regulation No. 22/2025** – Authority for Issuance of Environmental Approvals



AIR POLLUTION CONTROL & MONITORING

- **MoEF Regulation No. 13/2021** – Continuous Emission Monitoring System (CEMS)
- **MoEF Regulation No. 14/2020** – Pollution Standard Index
- **MoEF Regulation No. 27/2021** – Environmental Quality Index



INDUSTRIAL EMISSION STANDARDS

- **MoE Regulation No. 7/2007** – Boilers
- **MoEF Regulation No. 15/2019** – Thermal Power Plants
- **MoEF Regulation No. 70/2016** – Thermal Waste Incineration
- **MoE Regulation No. 4/2014** – Mining Activities
- **MoEF Regulation No. 17/2019** – Fertilizer & Ammonia Industry
- **MoEF Regulation No. 19/2017** – Cement Industry



MOBILE SOURCES & NOISE

- **MoEF Regulation No. 8/2023** – Motor Vehicle Emission Standards (M, N, O, L)
- **MoEF Regulation No. 56/2019** – Vehicle Noise Standards
- **Presidential Regulation No. 55/2019** – Battery Electric Vehicle Program



COMPLIANCE, REPORTING & CAPACITY BUILDING

- **MoEF Regulation No. 1/2021** – PROPER (Program for Pollution Control, Evaluation, and Rating)
- **MoEF Regulation No. 5/2021** – Environmental Permit & Commissioning Certificate
- **MoEF Regulation No. 6/2018** – Competency Certification (Air Pollution Control)
- **MoEF Regulation No. 87/2016** – Electronic Environmental Reporting System



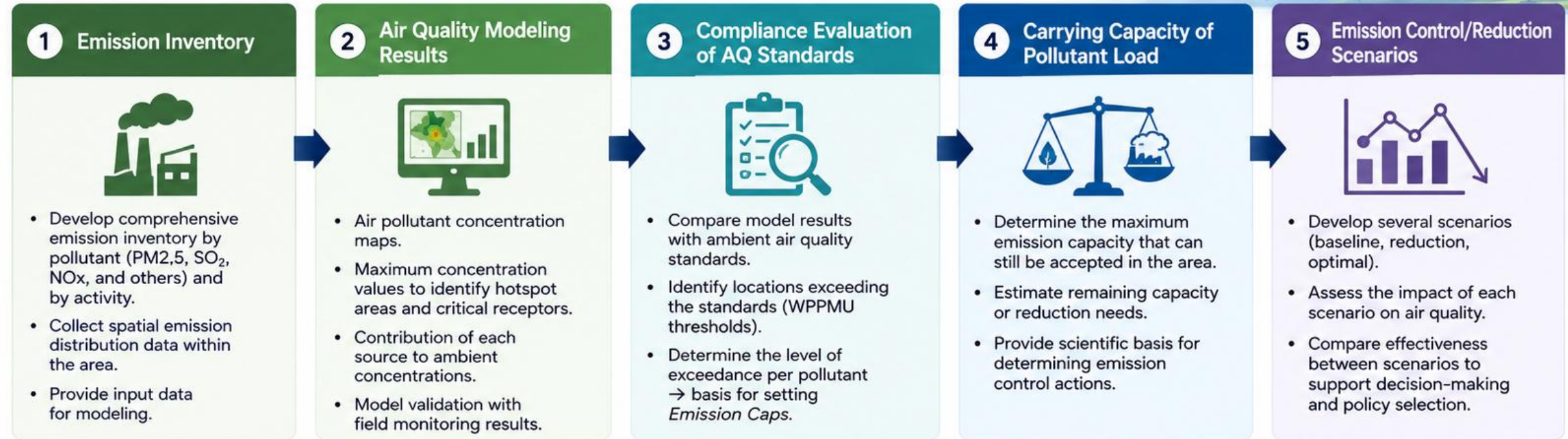
These regulations form an integrated framework to prevent, control, and reduce air pollution, ensure compliance, and build the capacity for effective air quality management in Indonesia.



Paradigm for Planning in Air Quality Management in Indonesia

In accordance with Minister of Environment Regulation Number 5 of 2026

Indonesia adopts an **integrated, science-based, and adaptive** planning paradigm to protect air quality, safeguard public health, and support sustainable development through evidence, collaboration, and continuous improvement.



Guiding Principles



Science-Based
Decisions based on
data and evidence



Integrated & Collaborative
Across sectors, governance
levels, and stakeholders



Precautionary & Adaptive
Anticipate risks and adapt
to changes



Transparent & Accountable
Open data, participation,
and responsible action



Sustainable Development
Balance environment,
economy, and society



In accordance with
**Minister of Environment Regulation
Number 5 of 2026**

Concerning Procedures for Determining Emission Caps, Carrying Capacity
of Pollutant Load, and Air Quality Management Planning.



Protecting health, improving air quality,
and ensuring a better future for Indonesia.

EMISSION CHARACTERISTICS ACROSS REGIONS

Population density plays a significant role in shaping emission characteristics across Indonesia. Java, the most densely populated island, air pollution primarily originates from transport and industrial activities, driven by its extensive road networks, large urban population, and industrial hubs.

In contrast, Sumatra and Kalimantan, with lower population densities and land characteristics such as extensive peatlands, experience episodic but severe air pollution due to large-scale forest and land fires, especially in long dry season. These fires are the dominant sources of particulate matter ($PM_{2.5}$), with impacts that extend beyond regional boundaries.

This difference shows the need for pollution control strategies that match local conditions.



Forest and land fires



Transport sector



Industrial
processes and
energy production



Construction



Waste burning

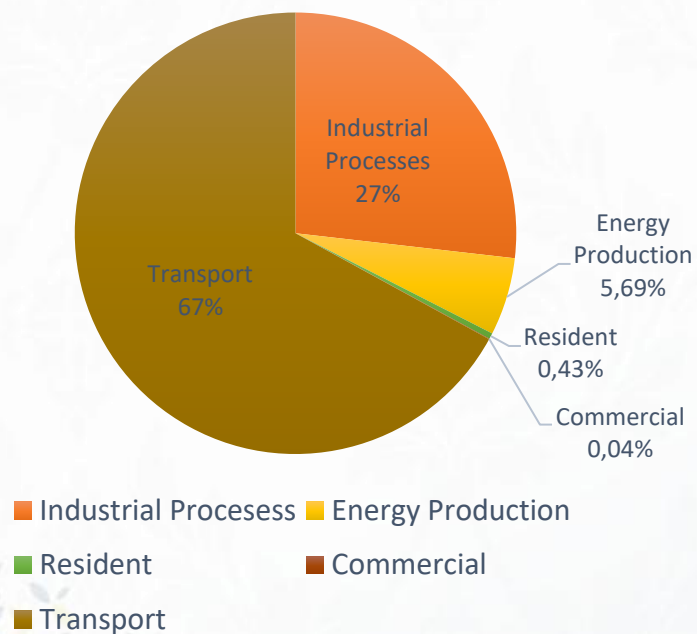
Major Sources
of Air Pollution



Air Pollution Challenges in Urban Areas – Source of Pollutant

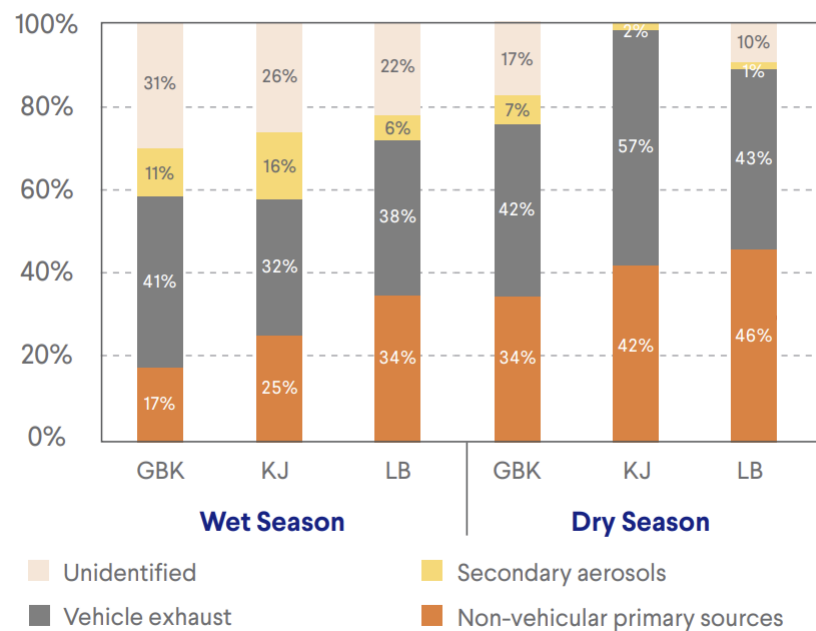
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Percentage Contribution of PM_{2.5} Emission Load in DKI Jakarta by Sector



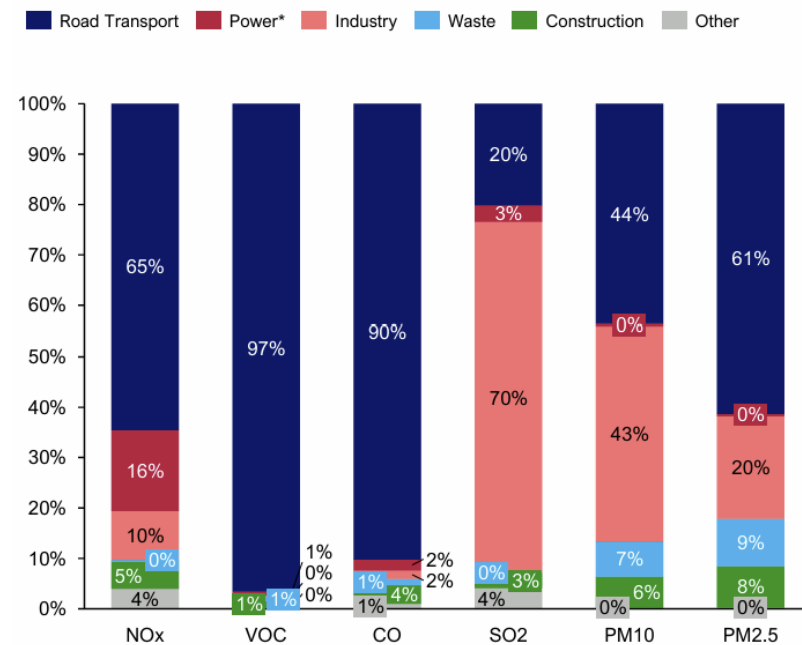
Source: Environmental Agency of DKI Jakarta, 2020

Source contribution (%) to PM_{2.5} concentration in Jakarta



Source: Vital Strategies & ITB, 2019

Source of Air Pollution in Jakarta, 2023
Based on sectoral energy consumption



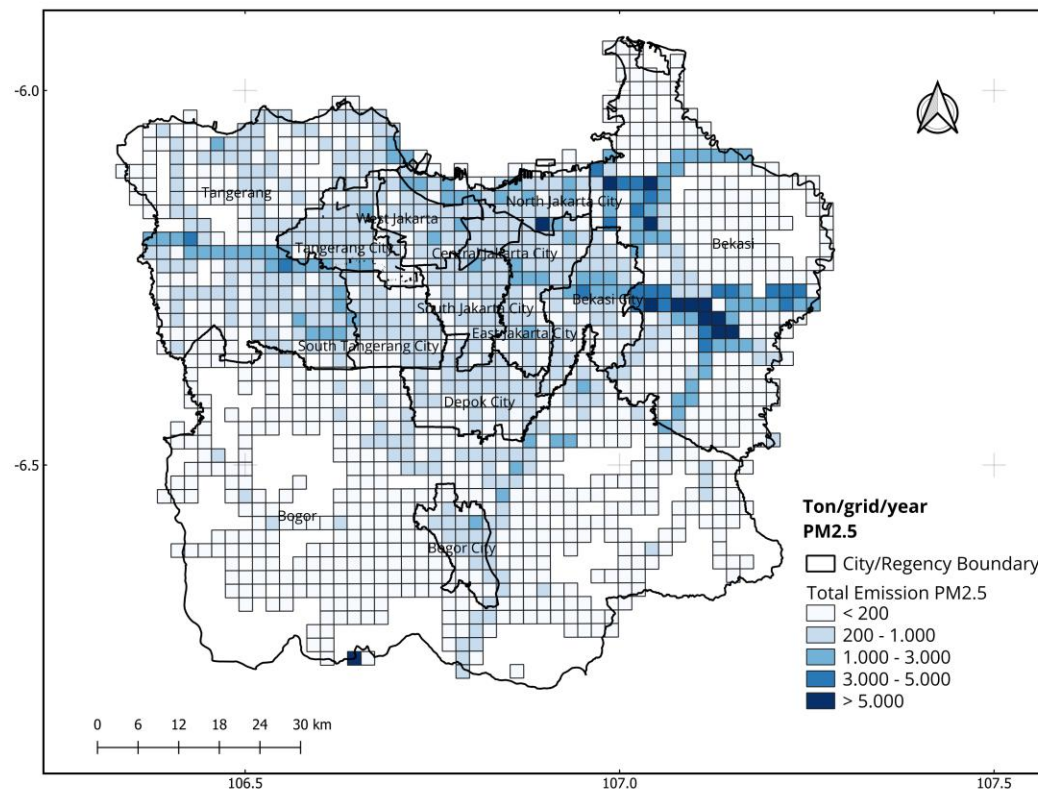
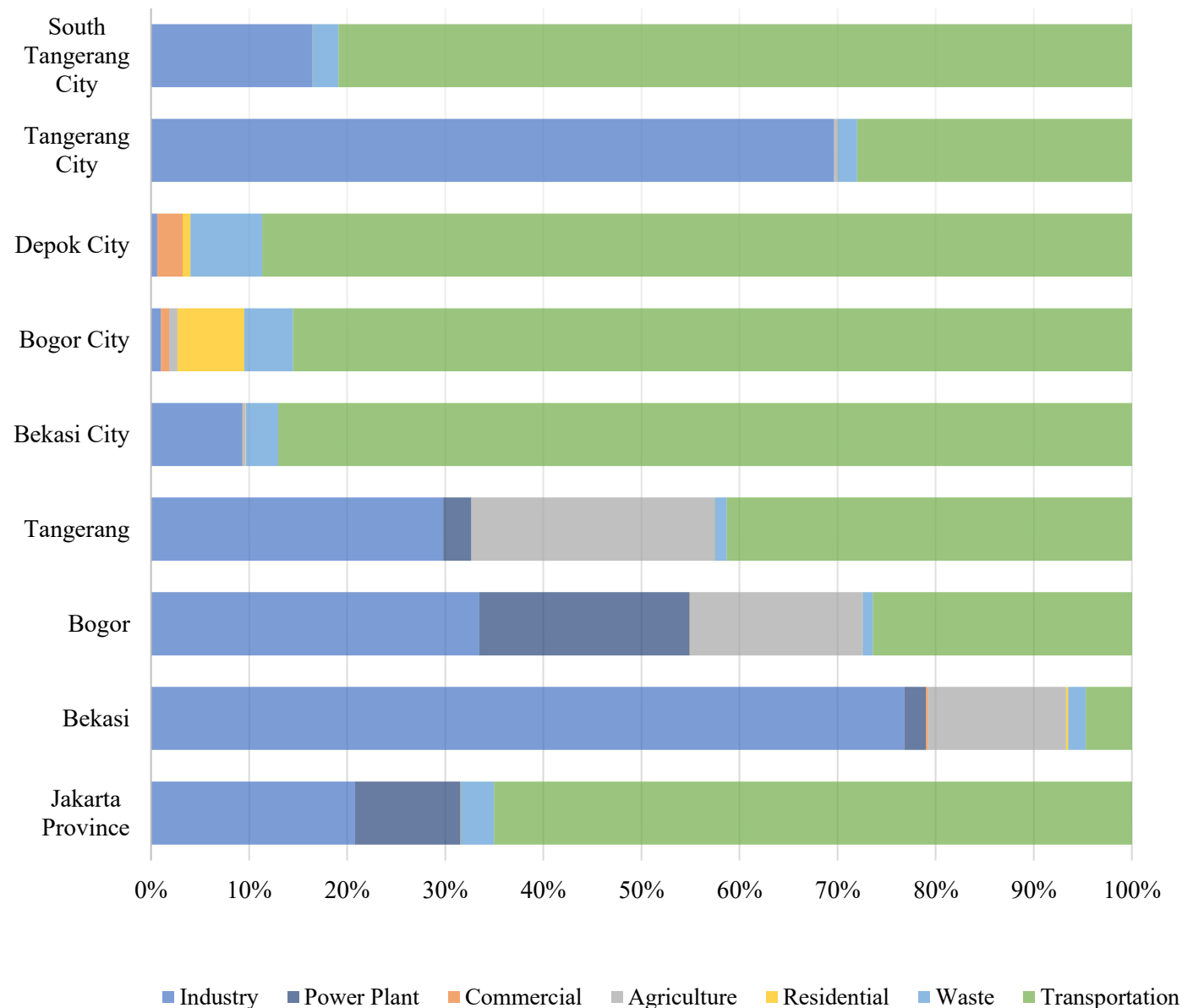
Source: Systemiq & ITB, 2024

Based on emission inventory and source apportionment, the transportation sector is identified as the primary contributor to PM_{2.5} emissions in Jakarta. Therefore, air pollution reduction policies in the city are primarily focused on this sector



Key Sources of PM_{2.5} Emissions in Greater Jakarta

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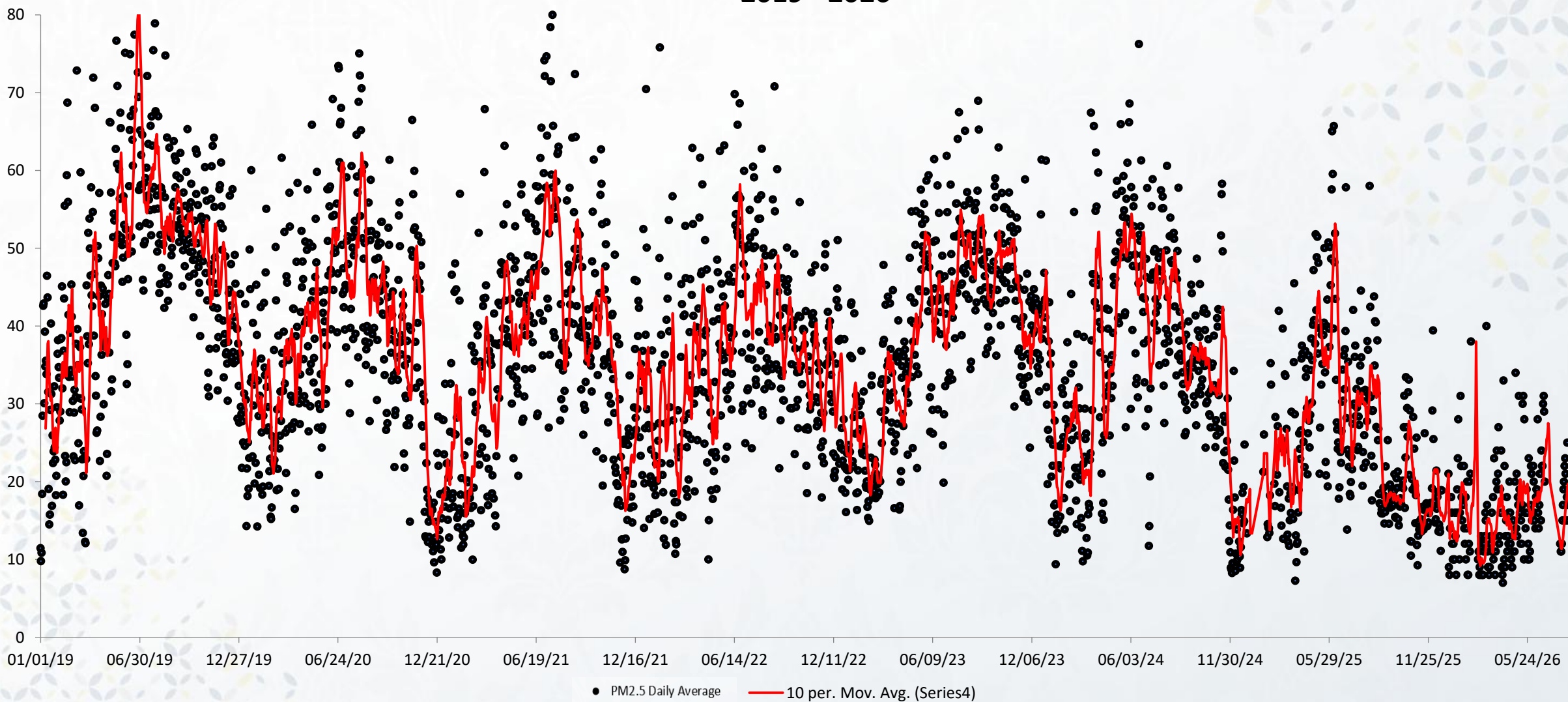
Transportation is the dominant source of emissions in **Jakarta, Bekasi City, Depok City, Bogor City, and South Tangerang City**, while **industry** is the dominant source in **Bekasi Regency and Tangerang City**.



Current Status of Air Pollutant in Jakarta

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Daily Average of PM_{2.5} in Jakarta 2019 - 2026

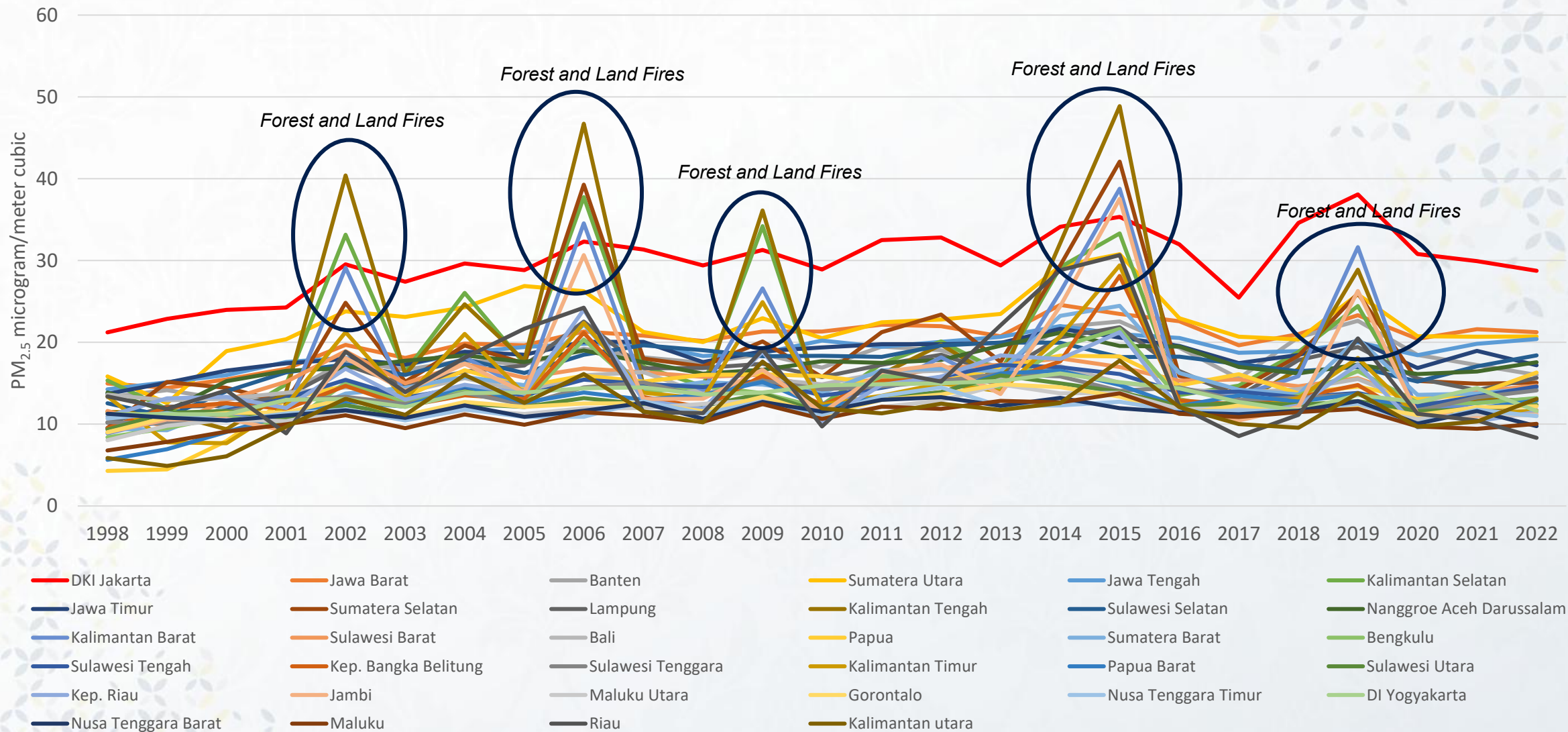




Different Patterns of PM_{2.5} Across Indonesian Regions

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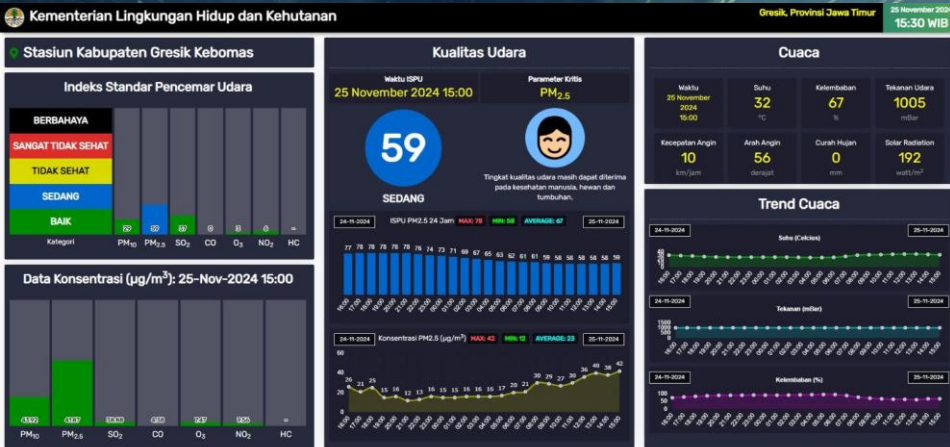
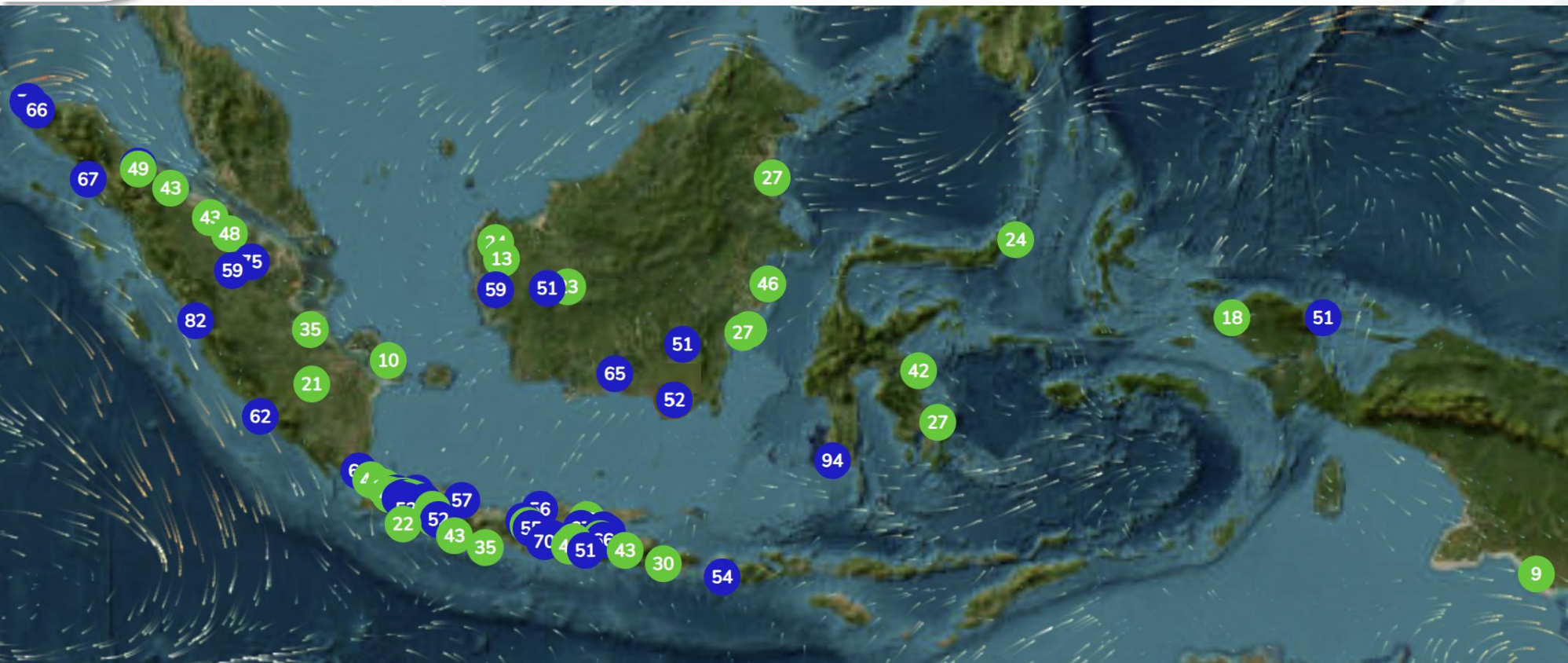
Average Monthly PM_{2.5} by Province 1998-2022





Expansion of Air Quality Monitoring Network

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- As of 2025, 133 Air Quality Monitoring Stations (AQMS) have been established
- 17 AQMS from various local government agencies and other institutions have been integrated



Continuous Emission Monitoring System (CEMS)

Continuous emission monitoring is intended to obtain real-time emission monitoring data. This system is integrated with the Ministry of Environment's system. The company will receive notification via email if the monitoring results exceed the emission quality standards.

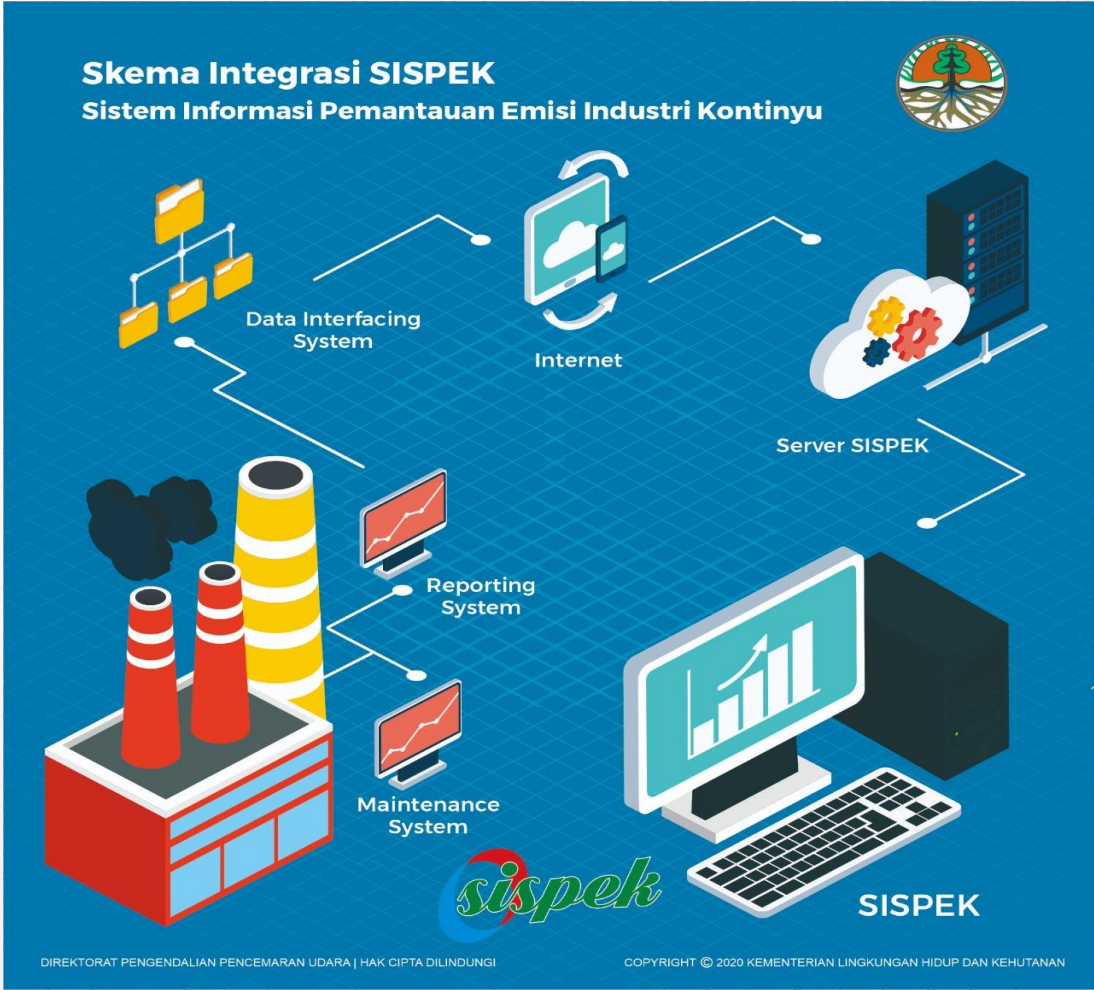
Emission monitoring with CEMS is mandatory for 10 industries with high emission loads, including:

Power Plant	Rayon
Oil & Gas	Iron & Steel
Fertilizer	Mining
Cement	Carbon Black
Pulp & Paper	Lithium Battery Recycling



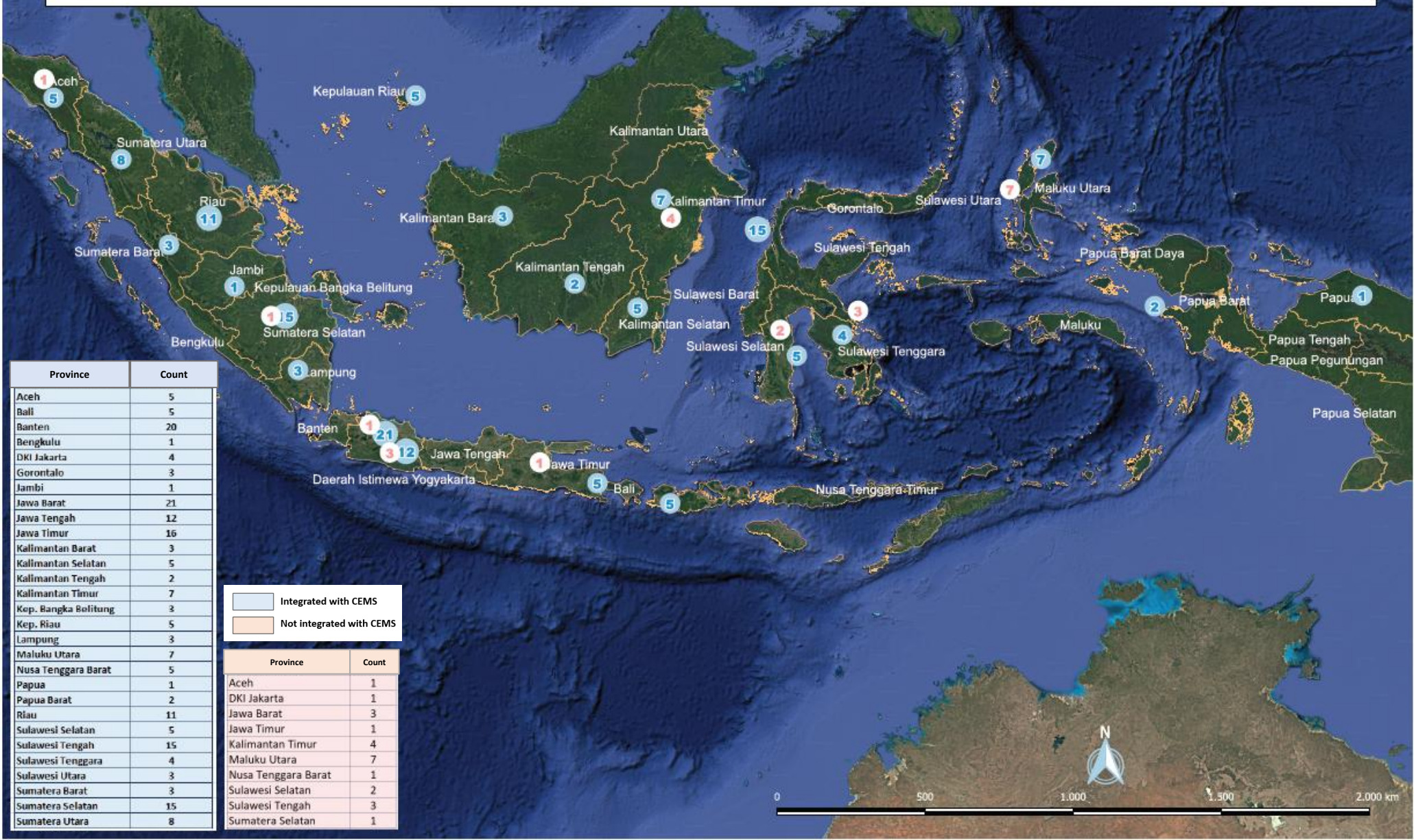
Sistem Informasi Pemantauan Emisi Industri Kontinu (SISPEK)

Integration Scheme



Before being integrated with SISPEK, CEMS must obtain QAL 1 certification and pass RATA, RA, RCA, CGA audits.

THE DISTRIBUTION OF COMPANIES REQUIRED TO IMPLEMENT CEMS ACROSS VARIOUS PROVINCES IN INDONESIA FROM 2021 TO 2026



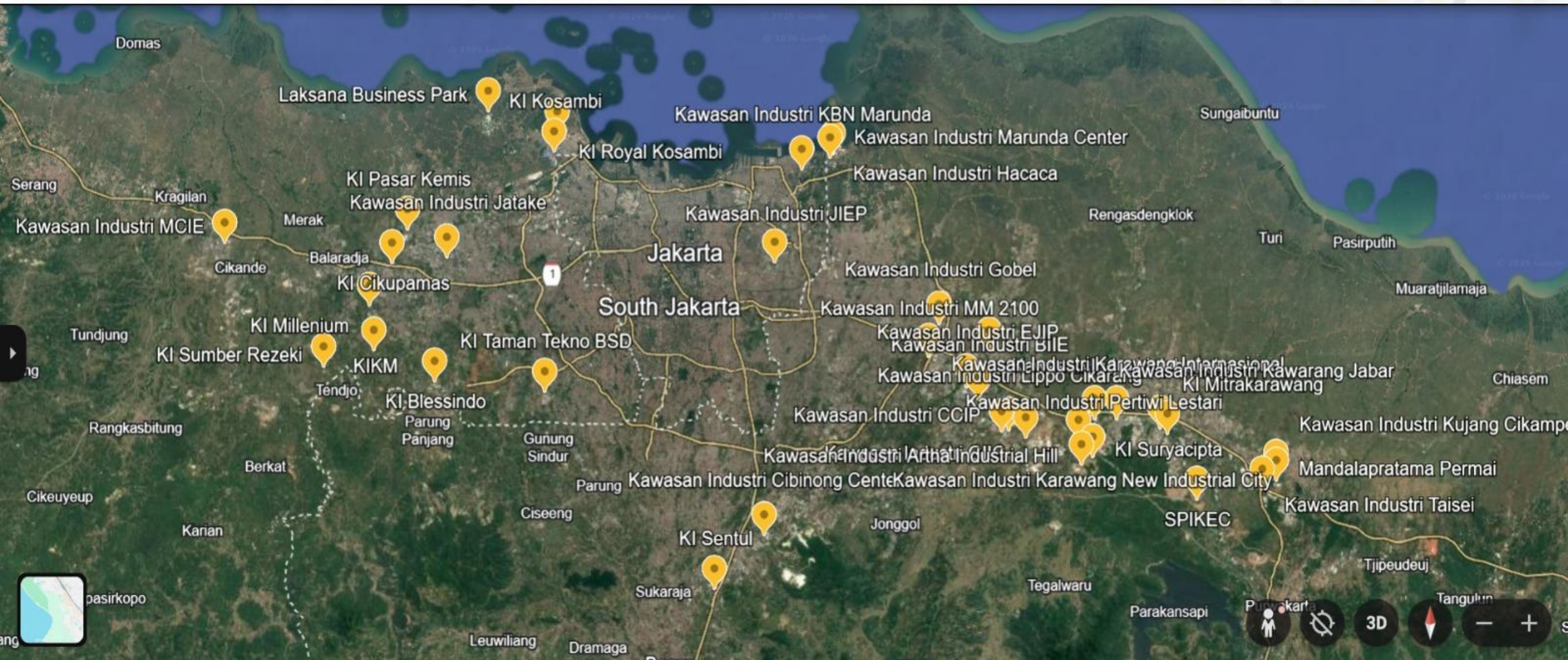
Province	Count
Aceh	5
Bali	5
Banten	20
Bengkulu	1
DKI Jakarta	4
Gorontalo	3
Jambi	1
Jawa Barat	21
Jawa Tengah	12
Jawa Timur	16
Kalimantan Barat	3
Kalimantan Selatan	5
Kalimantan Tengah	2
Kalimantan Timur	7
Kep. Bangka Belitung	3
Kep. Riau	5
Lampung	3
Maluku Utara	7
Nusa Tenggara Barat	5
Papua	1
Papua Barat	2
Riau	11
Sulawesi Selatan	5
Sulawesi Tengah	15
Sulawesi Tenggara	4
Sulawesi Utara	3
Sumatera Barat	3
Sumatera Selatan	15
Sumatera Utara	8

Province	Count
Aceh	1
DKI Jakarta	1
Jawa Barat	3
Jawa Timur	1
Kalimantan Timur	4
Maluku Utara	7
Nusa Tenggara Barat	1
Sulawesi Selatan	2
Sulawesi Tengah	3
Sumatera Selatan	1



Industrial Zones Monitored Through Emission

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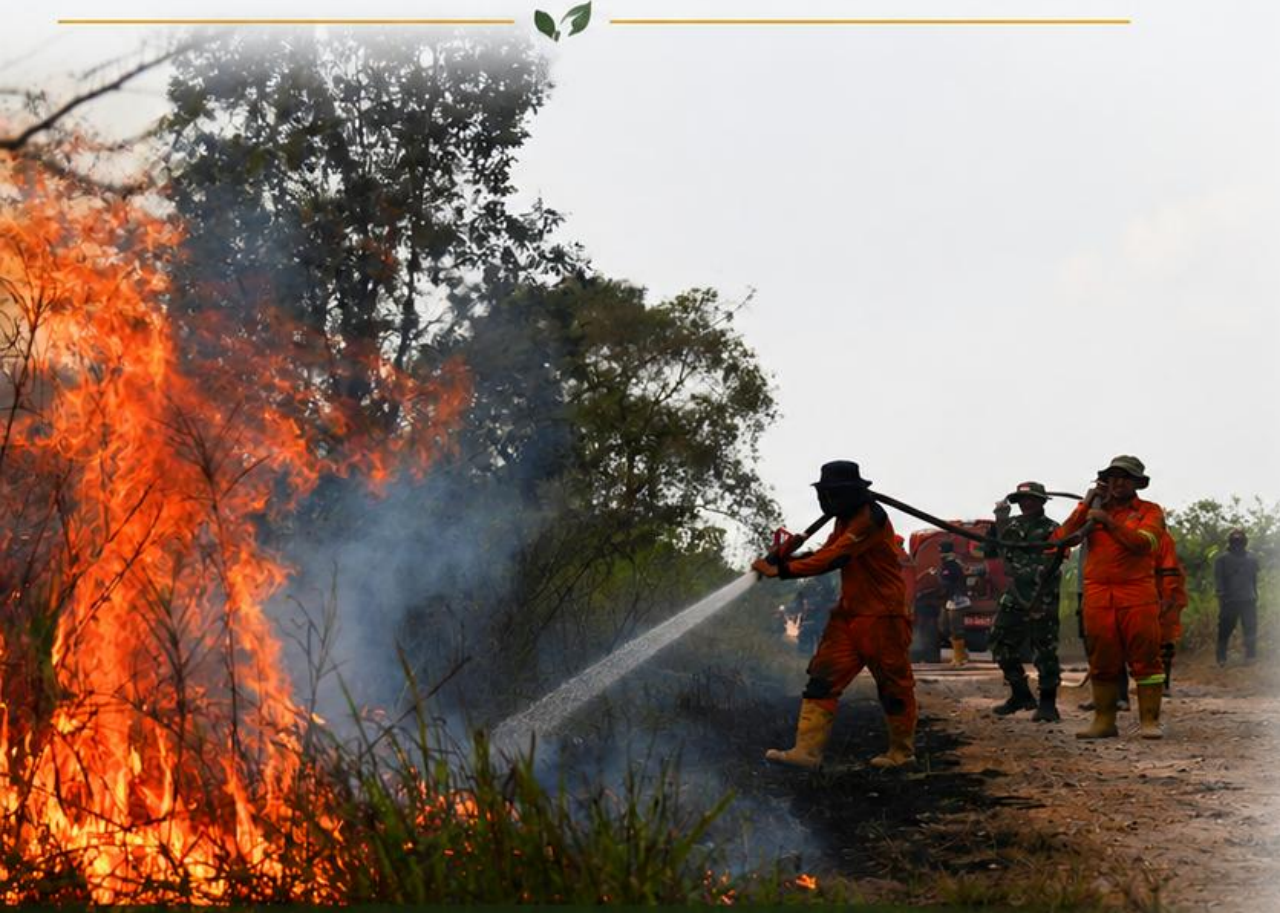
Law Enforcement on Waste Burning Activities and Emission Patrol (High Opacity Emission)

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Law enforcement through regular patrols to prevent open waste burning in Jakarta and the Greater Jakarta area, as well as emission patrols to monitor industrial stacks. Facilities with high-opacity emissions are required to immediately stop the emission source and take corrective actions

Handling Forest and Land Fires in Sumatra and Kalimantan



Firefighters and military personnel spray water on Aug. 9, 2026, in an attempt to extinguish a forest fire in Ogan Ilir regency, South Sumatra (Source: [thejakartapost.com](https://www.thejakartapost.com)).



During the dry season, forest and land fires can generate significant amounts of particulate matter, particularly PM2.5, and under certain meteorological conditions, smoke may affect neighboring countries.



In preparation for the 2026 fire season, the **Government of Indonesia has strengthened national preparedness and coordination**. A Task Force for Forest and Land Fire Control, led by the Coordinating Minister for Political and Security Affairs, has been activated, with the national coordination desk reactivated since early this year.



Coordination has been strengthened among relevant ministries and agencies, local governments, and stakeholders in fire-prone provinces. The Government has also evaluated the readiness of fire prevention and control facilities and infrastructure of plantation and forest concession holders in high-risk areas.



As part of preventive measures, Indonesia has also conducted weather modification operations in Riau (Sumatra) and West Kalimantan to increase rainfall, reduce fire risks, and maintain moisture in peatland areas.

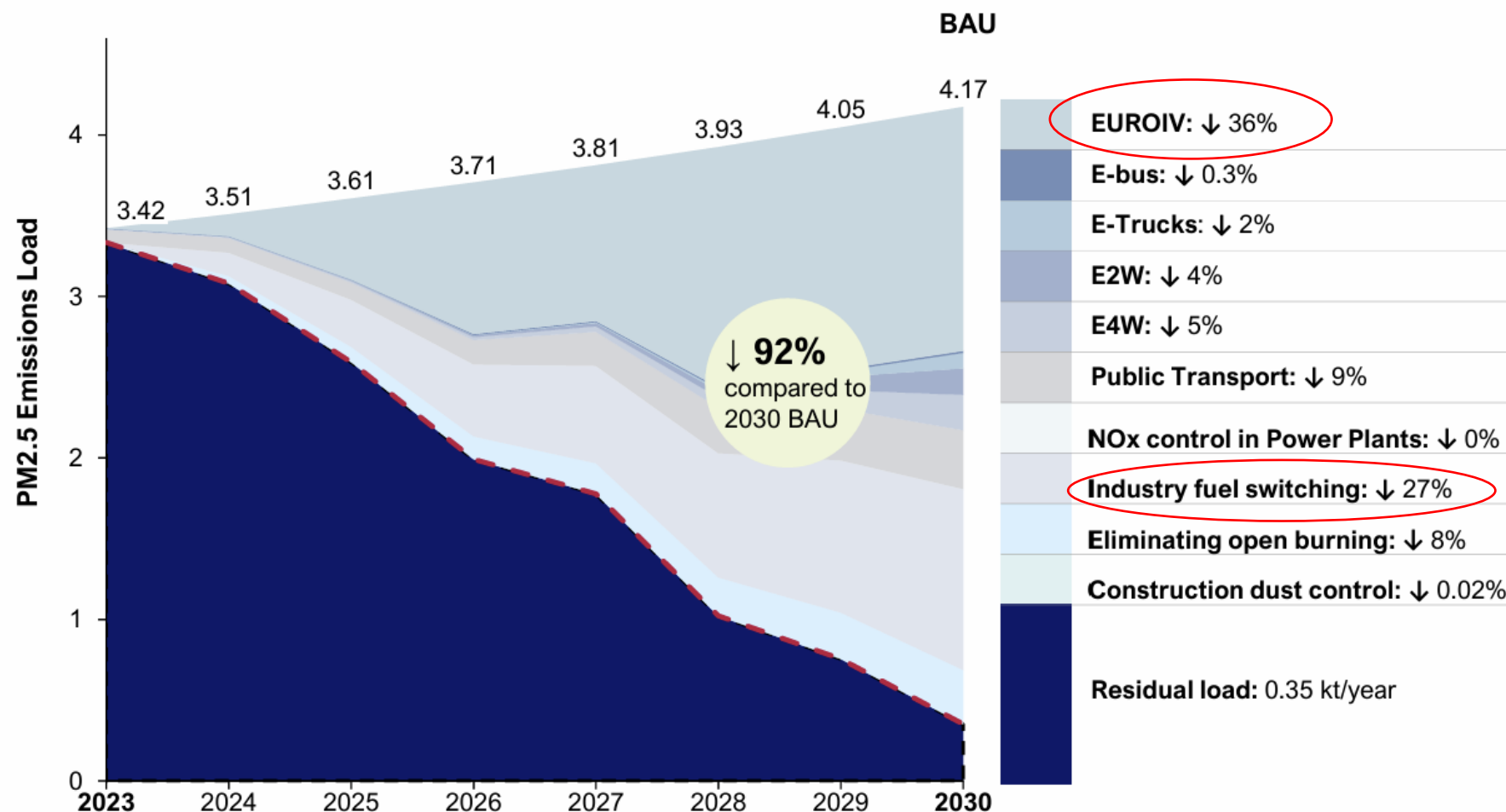


These measures are supported by hotspot monitoring, satellite observations, meteorological information, and early warning mechanisms, allowing authorities to better anticipate risks and respond more rapidly when fire conditions develop.



PM2.5 Projections 2023-2030: BAU vs. Levers

Kilotons/year



2030 Targets

- **100% Euro IV fuel adoption** (supported by Low Emission Zone & truck retrofits) in Jakarta
- **100% electrification (~10k E-Buses)** of TransJakarta e-bus¹
- **15% electrification (~115k E-Trucks)** of commercial trucks in Jakarta, assumed target¹
- **45% electrification (~5.5M E2W)** of 2W in Jakarta share, based on GOI nat'l target 13m
- **23% electrification (~800k E4W)** of 4W in Jakarta share, based on GOI national target 2m
- **60% Public Transport ridership**
- **100% coal-to-gas fuel switching** in industrial boilers
- **NOx control installations** at combined-cycle power plants (CCGT)
- **100% waste handling** (zero waste open burning)
- **100% construction dust control**

Source: Systemiq, 2024



CHALLENGES

Key Challenges in Air Quality Management in Indonesia



DATA & MONITORING

- Uneven monitoring coverage across regions, especially outside major cities
- Data integration and interoperability across monitoring systems are still limited
- Need for stronger QA/QC, long-term data continuity, and capacity at local level



EMISSION SOURCES

- Increasing emissions from transportation, industry, construction, and waste
- Rapid urbanization, population growth, and energy demand
- Limited availability and quality of activity data for emission inventories



REGIONAL & TRANSBOUNDARY POLLUTION

- Air pollution influenced by meteorology and regional atmospheric transport
- Episodic pollution from biomass/peatland fires and open burning
- Need for stronger regional information sharing and coordinated assessment



POLICY IMPLEMENTATION

- Gap between monitoring/assessment and concrete emission reduction measures
- Need for stronger coordination among national and local governments
- Limited enforcement capacity and resources at local level



CAPACITY & RESOURCES

- Limited technical capacity for advanced modeling, source apportionment, and integrated assessment
- Need for continuous training and knowledge transfer
- Sustainable financing for air quality management programs remains a challenge



These challenges need to be addressed in an integrated and collaborative manner to achieve effective air quality management and protect public health.



From Data to Action: Overcoming Challenges to Achieve Cleaner Air for All



WAY FORWARD

Strengthening monitoring, data utilization, capacity, cooperation, and sustainable financing

For better air quality in Indonesia



STRENGTHENING MONITORING

- Expand and optimize air quality monitoring networks (AQMS, passive samplers, mobile monitoring).
- Ensure data quality, QA/QC, and standardization.
- Integrate ground-based and satellite observations for broader coverage.



DATA UTILIZATION

- Improve data management, integration, and accessibility.
- Use data for decision making, policy evaluation, and public information.
- Develop tools for modeling, forecasting, and source apportionment.



CAPACITY BUILDING

- Strengthen technical skills in monitoring, inventory, modeling, and analysis.
- Continuous training and knowledge sharing.
- Support institutional strengthening at national and local levels.



COOPERATION

- Enhance multi-stakeholder collaboration (government, academia, private sector, civil society).
- Strengthen regional and international cooperation on transboundary air pollution.
- Leverage platforms such as EANET for shared learning and best practices.



SUSTAINABLE FINANCING

- Mobilize sustainable and innovative financing mechanisms.
- Integrate air quality in development planning and budgeting.
- Promote cost-benefit approaches and green investments.



COLLABORATION WITH EANET

Working together with EANET to:



Share data and information across the region



Conduct joint studies and assessments



Build capacity and exchange expertise



Promote best practices and policy learning



Stronger partnerships for cleaner air, healthier people, and a sustainable future for Indonesia and the region.



THANK YOU