



Towards Clean Air: Insights from Thailand's Comprehensive Approach to Air Quality Management

Context

The Air Quality Improvement Program in ASEAN (AQIP) focuses on advancing air quality management across the region; as part of this initiative, a study tour on air quality management took place in Bangkok, Thailand, from October 8 to 11, 2024, to facilitate experiential learning and knowledge exchange. The study tour aimed to lay the groundwork for future strategies and policies towards improving air quality.

The study tour was designed to engage middle-level policymakers, government officials, and environmental practitioners responsible for air quality management and environmental protection, to enhance their understanding of the importance of air quality management including monitoring on public health, environmental sustainability and economic development. The study tour offered participants a comprehensive overview of Bangkok's air quality management strategies and practices. Participants gained comprehensive insights into policies, regulations, and implementation mechanisms while fostering partnerships and collaborative dialogue.

Representatives from ASEAN Member States, including Cambodia, Lao PDR, Malaysia, Myanmar, the Philippines and Singapore, as well as the ASEAN Secretariat, participated in the four-day event led by the AQIP Project Management Team of Expertise France and the Agence Française de Développement (AFD) Southeast Asia Regional Office, fostering a diverse and collaborative learning environment.

Thailand's Clean Air Journey

Bangkok's current success in managing air quality is attributed to collaborative efforts among local government units, academic institutions, public agencies, private entities, civil society organizations, and the in general, its residents, with some support from international bodies. Like most metropolitan cities, air pollution is attributed to industrial processes, vehicular emissions and seasonal biomass burning.

Despite this progress, addressing air pollution remains a priority for Bangkok. The study tour focused on understanding the city's comprehensive approach to air quality management, particularly on:

- Combating PM_{2.5} emissions;
- Operationalizing comprehensive air quality monitoring systems;
- Leveraging emission inventory results to design targeted sectoral measures;
- Developing and implementing clean air action plans; and,
- Mobilizing stakeholder support for air quality initiatives.

By delving into Bangkok's experiences and practices, the study tour offered participants actionable lessons and a roadmap to address air pollution challenges in their respective countries.

Policy Development and Implementation: The Foundation of Air Quality Management

Thailand's success in air quality management rests upon its comprehensive policy framework, which integrates scientific evidence, stakeholder inputs, and international best practices. A key component of this framework is the forthcoming Clean Air Act, supported by organizations such as the Bangkok Breathe Council and the United Nations Environment Programme (UNEP). UNEP plays a crucial role in advancing policy frameworks and advocating for clean air, including providing support for Thailand's draft Clean Air Act and implementing capacity-building programs to align national efforts with global air quality standards.

This Act aims to institutionalize air quality management by comprehensively addressing emissions, enforcing stringent standards, and prioritizing public health.

Policies promoting electric vehicles (EVs) include subsidies, tax incentives, and investment in EV charging

infrastructure. These initiatives are supported by partnerships with international organizations such as United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), which advances the Asia-Pacific Initiative on Electric Mobility (APIEM) to facilitate the adoption of EVs across ASEAN.

However, Thailand continues to face implementation challenges, including limited resources for enforcement of air quality regulations and coordination issues between national and local agencies. These challenges are further compounded by jurisdictional constraints, as air pollution often transcends administrative boundaries, and financial limitations that restrict the scaling of advanced technologies and community-driven initiatives.

Managing PM_{2.5} Emission in Thailand

PM_{2.5}, fine particulate matter less than 2.5 micrometers in diameter, poses a significant threat to public health in Thailand. Cities like Bangkok and Chiang Mai experience periodic surges in PM_{2.5} levels, particularly during the dry season, exacerbated by open burning and transboundary pollution. To combat this, Thailand's approaches to manage PM_{2.5} include combining advanced monitoring technologies (geospatial mapping, satellite data, and real-time monitoring), community-driven initiatives, and science-based policies.

Key measures that have been implemented include traffic management, including low-emission zones and expanded public transportation systems; construction regulations with strict dust control measures; and health interventions, such as mobile medical units, clean air rooms in schools, and public awareness campaigns. These efforts are complemented by real-time air quality updates provided through smart technologies, such as AI-based smoke detection systems and district-level PM_{2.5} tracking platforms. Children are involved in raising awareness of current air quality by putting up flags in their schools to reflect air quality based on a monitoring app. Thus, putting value for clean air is instilled at a young age.

The Bangkok Breathe Council has introduced an innovative and accessible approach to combat air pollution: DIY air purifier or home-made PM_{2.5} filters, which can be assembled using readily available items such as a carton box, a fan, and a carbon filter.



Weerasak Kowsurat, Chairman of the Bangkok Breathe Council, demonstrated a do-it-yourself (DIY) air purifier with a PM_{2.5} filter for home use.

This low-cost solution provides immediate protection against air pollution, especially for vulnerable groups, while simultaneously raising public awareness about air quality issues.

Controlling Pollution from Transportation



Inside the Pollution Control Department's Emissions Lab: Ensuring cleaner transportation through rigorous testing and compliance with Euro 5 standards.

The Pollution Control Department (PCD) plays a crucial role in reducing vehicle emissions through its Automotive Emissions Laboratory. This laboratory conducts rigorous emissions testing and air pollutant analysis to enforce compliance with Euro 5 fuel and vehicle standards, promoting the adoption of cleaner automotive technologies. Furthermore, the PCD encourages the retrofitting of older diesel vehicles with

diesel particulate filters (DPFs) and promotes biodiesel usage to further align the transportation sector with cleaner energy goals.

Public transport systems are also undergoing transformation, with projects to electrify bus fleets and integrate EV technologies into urban transit networks. These efforts, led by entities like the Bangkok Metropolitan Administration (BMA) and private sector stakeholders, highlight a systemic approach to reducing transportation emissions while addressing urban mobility challenges.

Thailand's efforts to electrify its transportation sector aim to reduce dependence on fossil fuels and curtail vehicle emissions, which account for a substantial portion of PM_{2.5} in urban areas. Policies promoting electric vehicles (EVs) include subsidies, tax incentives, and investment in EV charging infrastructure.

International Collaboration

Various organizations are significantly contributing to air quality management and monitoring efforts in Southeast Asia through targeted initiatives, highlighting the importance of collaboration and innovation in addressing regional air quality challenges.

The **Agence Française de Développement (AFD)** supports sustainable air quality improvements at national and regional level. In Southeast Asia, its Air Quality Improvement Program (AQIP) focuses on emission inventory development, capacity building, and enhances monitoring systems and policy frameworks through training programs linking air quality improvements to health and climate co-benefits. Regional dialogue and knowledge-sharing initiatives, such as study tours in Bangkok, promote harmonized strategies across ASEAN to tackle transboundary air pollution. In Chiang Mai, Thailand, AFD facilitated detailed emission inventories, spatial mapping of pollution hotspots, and community-led initiatives like biocharcoal production and composting to reduce agricultural residue burning.

The **Japan International Cooperation Agency (JICA)** collaborates with Thailand's Pollution Control Department (PCD) to enhance PM emission inventories and develop advanced air quality simulation models. Similarly, the **National Aeronautics and Space Administration (NASA)** provides critical satellite and airborne monitoring data through programs like the Geostationary Environment Monitoring Spectrometer

(GEMS) and the Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) initiative, advancing emission quantification and monitoring.

The **United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)** leverages geospatial data and satellite imagery for emission inventories and policymaking via initiatives such as the Clean Air for Sustainable ASEAN (CASA) and the Pan-Asia Partnership for Geospatial Air Pollution Information (PAPGAPI). A UN affiliated network, the **Acid Deposition Monitoring Network in East Asia (EANET)** contributes expertise in acid deposition monitoring and air pollution across East Asia. They are currently conducting meta-analyses of emission inventories and source apportionment studies to identify gaps and improve methodologies. Meanwhile, **Incheon National University** leads the Port Air Quality Management (PAQman) Campaign for ASEAN Ports, utilizing Automatic Identification System (AIS) data to monitor maritime emissions and develop targeted mitigation strategies.

Collaborative Approach: Clean Air Beyond Borders

A major building block in addressing air quality issues is the ability to unite diverse stakeholders across public, private, and community sectors. The Bangkok Breathe Council, a coalition of academics, activists, and former policymakers, exemplifies grassroots collaboration by promoting science-based strategies and driving initiatives such as the Thailand Clean Air Act.

FHI 360's efforts in Thailand highlight the importance of multi-stakeholder engagement. One of the key initiatives is the **Thailand National PM_{2.5} Forum**, held in December 2023 in Chiang Mai. This event gathered over 1,000 participants, including policymakers, healthcare professionals, and community representatives, to explore actionable solutions for managing PM_{2.5}. The forum resulted in several significant outcomes, which are the inclusion of health considerations into Thailand's draft Clean Air Act; implementation of low-dose CT scans for vulnerable populations in eight northern provinces; and creation of dust-free rooms in healthcare facilities and schools to safeguard public health. This forum serves as a model for collaboration between policymakers and communities, emphasizing practical solutions to improve air quality and health outcomes.

Industries, being stationary sources of emissions, are subjected to fine and penalty schemes under the polluter pays principle with the small businesses being hit the hardest. As such, the triple bottom line of *people, profit and planet* is a major consideration. The Thai Chamber of Commerce plays a pivotal role in engaging the private sector, fostering business innovation and community initiatives, such as developing small-scale power plants to manage agricultural burning.

Regional and international cooperation are equally critical. Thailand actively participates in frameworks like the ASEAN Agreement on Transboundary Haze Pollution (AATHP) and the Regional Action Programme on Air Pollution (RAPAP) to ensure its efforts align with regional and global best practices. The RAPAP, adopted in 2022 to enhance air quality monitoring, data sharing, and policy harmonization, facilitates capacity building and technology transfer while addressing transboundary pollution through multilateral frameworks like the ASEAN Haze Agreement.

ESCAP's Transboundary Airsheds Project, which focuses on science-based policy support and regional collaboration to mitigate pollution across shared airsheds, aligning with initiatives like the ASEAN Haze-Free Roadmap, underscores the importance of transboundary cooperation, and implementing actionable plans to address shared air pollution challenges, particularly in regions like the Indo-Gangetic Plain and Southeast Asia.

GIZ supports clean air initiatives in Thailand through two regional strategies: Air Quality Management & Climate Change in Southeast Asia (AQM&CC) and the Southeast Asia Clean Air Initiative (SEACAI). AQM&CC works with PCD to align air quality management with climate protection goals. This partnership strengthens stakeholder engagement, capacity building, and the implementation of science-based policies, contributing to regional frameworks for sustainable air quality and climate action. SEACAI targeting the mitigation of short-lived climate pollutants (SLCPs), especially in the Greater Mekong Subregion (GMS), which includes Thailand, Laos, Cambodia, and Vietnam, addressing cross-sectoral challenges in agriculture, forestry, and waste management. By collaborating with PCD and other national bodies, it supports Thailand's clean air initiatives while advancing ASEAN-wide objectives for reducing transboundary pollution and SLCPs.

Building a Culture of Environmental Responsibility

Thailand recognizes that sustainable air quality management requires public buy-in and active participation. Awareness campaigns by organizations like the Thai Health Promotion Foundation (ThaiHealth) and FHI360 educate citizens on the health impacts of air pollution and promote behavioral change.

ThaiHealth supports the mitigation of the health impacts of air pollution through health impact assessments, public awareness campaigns, and stakeholder collaboration. ThaiHealth focuses on bridging the gap between air quality and public health by working closely with government agencies and community stakeholders to develop targeted interventions. Their efforts include producing campaign tools, to raise awareness about the health risks of air pollution and climate change. ThaiHealth is unique as it is funded through “sin taxes” levied on tobacco and alcohol manufacturers.

Youth engagement through the Bangkok City Lab’s Youth Innovation Sandbox, which encourages young people to develop innovative solutions to the PM_{2.5} problem in Bangkok, has empowered youth teams to create impactful technologies, such as developed a low-cost filtration device to reduce PM_{2.5} emissions from vehicle tailpipes; integrated AI software with public CCTV cameras to detect vehicles emitting excessive smoke; and created a platform displaying PM_{2.5} insights for each district, enabling targeted problem assessment and policymaking.

These projects demonstrate how youth-led initiatives can drive innovation and community-based problem-solving to address urban air quality challenges.

Citizen Science Approach, promoted by FHI360, encouraging public participation in scientific research activities. By engaging citizens in air pollution mitigation, the organization aims to improve science-society-policy interactions and foster democratic research and evidence-based advocacy.

Community-driven efforts, such as Bangkok’s “Planting a Million Trees” campaign initiated by the BMA enhances urban green spaces and improve air quality. The campaign has received widespread participation from district offices, private firms, state enterprises, and individual residents. BMA’s program on clean air rooms in kindergartens and schools, ensure that public health is prioritized, especially for vulnerable populations.

Key Lessons

Integrated Governance for Air Quality

Effective air quality management necessitates a comprehensive policy framework that integrates scientific evidence, stakeholder input, and international best practices. This framework should be supported by strong governance structures that promote accountability and facilitate coordination across sectors and jurisdictions.



The ASEAN Member States representatives gain valuable insights into Bangkok’s comprehensive air quality management strategies during a session with the Bangkok Metropolitan Administration as part of the AQIP Study Tour.

Technological Advancement and Innovation

Harnessing technological advancements and promoting innovation are crucial for effective air quality management. Investing in research and development, supporting the adoption of clean technologies, and utilizing data-driven approaches can enhance monitoring, mitigation, and management efforts. NASA's ASIA-AQ initiative integrates satellite, airborne, and ground data to enhance emission quantification and forecasting, while the PAQman system uses AIS data to monitor real-time ship emissions in ASEAN ports like Laem Chabang. These innovations bridge data gaps, combining localized measurements with regional insights to support targeted mitigation and global air quality efforts.

Collaborative Frameworks for Transboundary Action

Air pollution transcends geographical boundaries, requiring collaborative frameworks for regional and international cooperation. Active participation in multilateral agreements, knowledge sharing initiatives, and joint action programs are crucial for addressing transboundary air pollution challenges.

Community Empowerment and Participation

Sustainable air quality management requires an empowered citizenry actively engaged in contributing to solutions. Promoting environmental awareness, facilitating community-driven initiatives, and providing access to information and resources are essential for fostering a sense of shared responsibility and ownership. The ThaiHealth provides a compelling example of how this can be achieved.

ThaiHealth: Catalyzing Change for Clean Air and Sustainable Futures in Thailand

ThaiHealth has emerged as a key player in Thailand's clean air initiatives, leveraging a unique mandate and innovative financial model to drive sustainable health and environmental outcomes. As an autonomous government agency, ThaiHealth operates with flexibility and collaborates across diverse sectors. Its funding, derived from a surcharge on excise taxes from tobacco and alcohol products, ensures financial sustainability while aligning with the "polluter pays" principle.

Central to ThaiHealth's operation is its tri-power strategy, emphasizing knowledge creation, social mobilization, and policy advocacy. This approach enables the organization to act as a catalyst for systemic change, identifying gaps and opportunities, and coordinating diverse stakeholders. ThaiHealth's contributions to clean air efforts by conducting widespread public awareness campaigns on the health impacts of air pollution, particularly in rural areas and among vulnerable populations; supporting localized programs, such as urban greening initiatives and DIY air purifier projects, to empower community participation in improving air quality; and advocating for clean air measures within broader health

Air Quality Improvement Program (AQIP) in ASEAN

The Air Quality Improvement Program (AQIP) is an initiative (2023–2025) funded by Agence Française de Développement (AFD) and implemented by Expertise France in collaboration with the ASEAN Working Group on Environmentally Sustainable Cities (AWGESC). The program aims to strengthen air quality management across ASEAN by enhancing awareness, improving monitoring capabilities, and building local capacity to develop and implement effective air quality policies. AQIP supports ASEAN Member States in crafting comprehensive public policies to improve air quality regionally and nationally.

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