

# Strengthening state management of air quality

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In recent years, air quality in Vietnam, especially in major urban areas, has been under increasing pressure from urbanization, industrialization, and the growing number of vehicles. Air pollution not only directly affects public health but also poses considerable challenges to sustainable development goals.

Faced with this situation, improving institutions, policies, and strengthening state management capacity for air quality has become an urgent requirement. In recent times, the Ministry of Natural Resources and Environment (now the Ministry of Agriculture and Environment) has proactively implemented many comprehensive measures, from improving institutions and policies, developing monitoring systems, conducting emission inventories, to implementing forecasting, early warning, and emission source control programs.

This article focuses on analyzing and assessing the main achievements in state management of air quality, while also highlighting advantages, challenges, and proposing some solutions to improve the effectiveness and efficiency of management in the coming period.

## 1. STATE MANAGEMENT OF AIR QUALITY

*Improvement of legal documents on air quality management*

In recent years, the Ministry of Agriculture and Environment has taken an active and substantive role in formulating and refining the legal and policy framework for air pollution control and air quality management. To date, the legal framework for air quality management is basically complete, including: the Law on Environmental Protection 2020; the Law on Environmental Protection Tax 2010; Government Decree No. 08/2022/ND-CP dated January 10, 2022, detailing several articles of the Law on Environmental Protection, as amended and supplemented in Decree No. 05/2025/ND-CP dated January 6, 2025; Government Decree No. 153/2024/ND-CP dated November 21, 2024, on environmental protection fees for emissions; Circular No. 02/2022/TT-BTNMT dated January 10, 2022, of the Ministry of Natural Resources and Environment, detailing implementation of several articles of the Law on Environmental Protection, as amended and supplemented in Circular No. 05/2025/TT-BTNMT dated February 28, 2025; Circular No. 10/2021/TT-BTNMT dated June 30, 2021, of the Ministry of Natural Resources and Environment, on environmental monitoring techniques and

management of environmental monitoring information and data, including air quality monitoring. These legal instruments form a synchronized basis and an important foundation for implementing effective air pollution control measures, aiming at sustainable development and protection of public health.

Along with improving the legal system, the Ministry has developed and submitted to the Prime Minister many important directives and decisions, including: Decision No. 1973/QĐ-TTg dated November 23, 2021, approving the National Plan on Air Quality Management for 2021–2025 (the Ministry is now drafting a new Prime Ministerial Decision on the National Action Plan on Air Pollution Remediation and Air Quality Management for 2025–2030); Decision No. 224/QĐ-TTg dated March 7, 2024, approving the Master Plan for the National Environmental Monitoring Network for 2021 - 2030, with a vision to 2050 (replacing Decision No. 90/QĐ-TTg dated January 12, 2016); and Directive No. 03/CT-TTg dated January 18, 2021, on strengthening air pollution control. These documents demonstrate the Government's strong commitment to controlling air pollution, providing unified and consistent guidance for air quality management nationwide.

*Focus on developing and issuing the system of National Technical Regulations (QCVN) for air quality management*

The Ministry has paid special attention to developing and issuing a system of QCVNs to support air quality management. For example, Circular No. 01/2023/TT-BTNMT dated March 13, 2023, promulgated QCVNs on ambient environmental quality, including soil, air, surface water, groundwater, and seawater. Subsequently, to unify the control of emissions from production, business, and service activities, the Ministry issued Circular No. 45/2024/TT-BTNMT dated December 30, 2024, promulgating QCVN on industrial emissions, replacing previous sector-based regulations. The new standard specifies pollutants by emission source type and sets stricter limit values, ensuring tighter control over industrial emission sources.

In the field of transport emissions management - a major source of air pollution - the Ministry has also developed and submitted QCVNs for motor vehicles in circulation. In particular, QCVN on emissions



for automobiles in circulation in Vietnam was completed and promulgated under Circular No. 06/2025/TT-BNNMT dated June 16, 2025, of the Ministry of Agriculture and Environment, along with a draft roadmap for application submitted to the Prime Minister. At the same time, the Ministry is drafting QCVN on emissions for motorcycles and mopeds, ensuring compliance with the Law on Environmental Protection and the Law on Road Traffic Safety, together with an implementation roadmap to be submitted to the Prime Minister.

*Strengthening the development and operation of the automatic, continuous ambient air quality monitoring system*

The development and operation of the automatic, continuous air quality monitoring system has been promoted. At the central level, the Department of Environment has invested in and operated a total of 27 automatic, continuous monitoring stations meeting technical standards (Table 1). These stations are distributed across 22 provinces and centrally-run cities: 4 stations in Ha Noi, 2 in Ho Chi Minh City, 2 in Da Nang, and 1 in each of the remaining provinces/cities.

Among the 27 Stations, 7 Stations (Station 556 Nguyen Van Cu, Ho Chi Minh Mausoleum Station, Nha Trang - Khanh Hoa Station, Viet Tri - Phu Tho Station, Ha Long - Quang Ninh Station, Hue Station, Da Nang Station) were invested in during the period 2011-2013, while 18 stations were put into operation in 2024. In addition to these standard stations, the Department of Environment is currently managing 4 sensor-based stations in Ky Anh - Ha Tinh, serving scientific research purposes.



*Automatic air quality monitoring stations shall be installed in urban areas of provinces and centrally governed cities*

The monitored parameters include: particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>, PM<sub>1</sub>), NO<sub>x</sub>, SO<sub>2</sub>, CO, O<sub>3</sub>, benzene, toluene, xylene, total hydrocarbons, and meteorological parameters such as wind direction, wind speed, temperature, humidity, pressure, and solar radiation.

In addition, there are 10 air monitoring stations combined with hydrometeorological stations managed by the Department of Hydrometeorology with monitoring parameters including: SO<sub>2</sub>, NO<sub>x</sub>, CO, NH<sub>3</sub>, TSP, PM<sub>10</sub>, HC, O<sub>3</sub>, some meteorological factors (wind direction and speed, temperature, humidity, atmospheric pressure, solar radiation, ultraviolet radiation).

Under Decision No. 224/QĐ-TTg dated March 7, 2024, approving the National Environmental Monitoring Network Plan 2021 - 2030, vision to 2050, the Ministry will continue to propose the construction of 16

**Table 1. Number of Air Environment Monitoring Stations managed by the Department of Environment**

No.	Locality	Number of Stations	No.	Locality	Number of Stations
1	Ha Noi	4	12	Quang Nam	1
2	Ho Chi Minh City	2	13	Quang Ngai	1
3	Quang Ninh	1	14	Binh Dinh	1
4	Phu Tho	1	15	Thua Thien Hue	1
5	Thai Binh	1	16	Da Nang	2
6	Hung Yen	1	17	Lam Dong	1
7	Bac Giang	1	18	Ninh Thuan	1
8	Hai Duong	1	19	Khanh Hoa	1
9	Ha Nam	1	20	Binh Duong	1
10	Ha Tinh	1	21	Ba Ria - Vung Tau	1
11	Quang Binh	1	22	Long An	1
<b>Total</b>					<b>27</b>

**Table 2. Statistics on the current status of investment in automatic air environment monitoring stations of localities**

No.	Locality	Number of Stations	No.	Locality	Number of Stations
1	Ha Noi	2	16	Binh Dinh	2
2	Hai Duong	10	17	Khanh Hoa	1
3	Hung Yen	2	18	Gia Lai	3
4	Nam Dinh	1	19	Dong Nai	2
5	Thai Binh	1	20	Ba Ria-Vung Tau	3
6	Bac Ninh	18	21	Binh Phuoc	3
7	Vinh Phuc	3	22	Tay Ninh	2
8	Thai Nguyen	2	23	Can Tho	1
9	Cao Bang	2	24	Long An	3
10	Lang Son	3	25	Vinh Long	3
11	Quang Ninh	11	26	Tra Vinh	2
12	Lao Cai	2	27	Kien Giang	4
13	Thanh Hoa	2	28	Hau Giang	1
14	Nghe An	1	29	Soc Trang	1
15	Da Nang	2	30	Bac Giang	2
<b>Total</b>					<b>95</b>

additional automatic air quality monitoring stations, bringing the total to 43 stations nationwide by 2030.

At the local level, 30 provinces currently operate 95 automatic monitoring stations (Table 2). Together with the central system, these contribute significantly to monitoring air quality, especially in urban areas, traffic corridors, and near industrial zones, providing data for pollution warnings to communities.

Along with the Central Air Environment Monitoring Station System, the local automatic continuous air environment monitoring stations are actively contributing to monitoring the current status and changes in ambient air quality, especially in urban areas, inner-city traffic routes, near industrial parks... contributing to comprehensively reflecting the current status of the air environment nationwide, providing data to support environmental pollution warnings to the community.

*Enhancing forecasting and early warning capacity on air quality*

The Department of Environment has mobilized resources and accessed advanced air quality forecasting methods in the world, typically the CMAQ air quality forecasting model (USA), SILAM (Europe, Finland). Up to now, the Department of Environment has built and published the Internal Air Quality Forecast bulletin for short-term air quality for 24-48 hours nationwide and for 6 socio-economic regions; has built the Internal Air Quality Forecast bulletin for the next 2 days in 6 economic regions and for provinces and cities nationwide. In the future, the Department will integrate more data sources to improve forecasting accuracy and publish forecasts through the media.

*Implementing effective emission inventory*

Inventory of emission sources is one of the key contents serving the effective and scientifically based management of air quality. In the past

period, the Department of Environment has advised the Ministry of Agriculture and Environment to issue a Technical Guide for Emission Inventory, as a basis for localities to develop a Provincial Air Environment Management Plan. On that basis, the inventory work is being implemented synchronously with many specialized activities such as: collecting information on emission sources, monitoring and analyzing PM<sub>2.5</sub> dust samples, determining the origin of PM<sub>2.5</sub> dust, and measuring and inventorying emissions from road traffic sources, initially focusing on Ha Noi. It is expected that in 2025, the Department of Environment will complete the inventory of emissions in key economic regions in the North and South, thereby creating an important database serving the work of policy making, action plans and effective control of large emission sources on a regional and national scale.

*Controlling major emission sources from industrial and service establishments*

The Law on Environmental Protection 2020 stipulates that investment projects and facilities with large dust and gas emissions must conduct automatic, continuous and periodic monitoring. Decree No. 08/2022/ND-CP dated January 10, 2022 of the Government detailing a number of articles of the Law on Environmental Protection has detailed regulations on the subjects, types of works, dust and gas emission equipment and the flow rate or capacity of works, dust and gas emission treatment equipment that must conduct automatic,



*Air quality in major cities is polluted by smoke and dust emissions from motor vehicles*

continuous and periodic monitoring. Accordingly, strict control of emission quality is stipulated for a number of types of production, business and services with large scale and capacity of emission.

The Ministry of Agriculture and Environment has conducted research and reviewed the national environmental technical regulations system of Vietnam and issued Circular No. 45/2024/TT-BTNMT dated December 30, 2024 of the Ministry of Natural Resources and Environment promulgating national technical regulations on industrial emissions, effective from July 1, 2025, to control industrial emission sources in order to uniformly control industrial emissions arising from production, business and service activities. Accordingly, more specific regulations have been made on the control of pollution parameters according to the type of discharge equipment and the allowable limit values in emissions have been regulated in a more strict and tight direction.

In addition, to ensure consistency and compatibility between the law on environmental protection, environmental taxes and fees with the law on taxes and fees in general, ensuring the criterion of “polluters must pay”, creating motivation for organizations and individuals engaged in production, business and service activities that discharge dust and emissions into the environment to improve production technology, invest in emission treatment technology to minimize

emissions of pollutants into the environment, the Ministry of Agriculture and Environment has coordinated with the Ministry of Finance to develop and submit to the Government for promulgation Decree No. 153/2024/ND-CP dated November 21, 2024 regulating environmental protection fees for emissions. In particular, clearly defining the subjects subject to fees and the method of calculating fees, focusing on facilities that generate industrial emissions with large volumes, discharge a lot of dust and air pollutants, and also regulating preferential fees to encourage the application of advanced emission treatment technology.

## **2. ANALYSIS AND ASSESSMENT OF ADVANTAGES AND CHALLENGES IN AIR QUALITY MANAGEMENT**

In recent times, air quality management has achieved important results, creating a favorable foundation for the implementation of air pollution control solutions nationwide. Accordingly, (i) the legal corridor system serving air environment management has been built relatively fully and synchronously, including legal documents from Laws, Decrees, Circulars to directives, administrative documents and technical instructions, in accordance with practical requirements; (ii) the issue of air pollution has increasingly received attention and close direction from the entire political system,

with the active participation of all levels and sectors from the central to local levels; (iii) Environmental monitoring and emission source monitoring have also been promoted and invested in, contributing to improving the effectiveness of monitoring and warning as well as supporting the development of control policies suitable to the specific conditions of each locality; (iv) Localities have proactively developed and implemented the Provincial Air Quality Management Plan according to the guidance of the Ministry of Agriculture and Environment, while the remaining localities are actively completing it for implementation in the coming time.

In addition to the achieved results, the current air quality management work is still facing many major challenges such as (i) investment resources for air quality management are still really modest, while scientific and technological solutions have not been effective; (ii) the genuine engagement and determination of authorities and sectors from the central to the local levels remain insufficient; many localities have been slow in issuing documents, and numerous directives and administrative instructions have only recently been promulgated but have yet to be implemented; (iii) Controlling emission sources, especially dispersed emission sources, is still very difficult, both in terms of resources for implementation, assignment of responsibility for implementation and technical tools and measures for implementation; (iv) The monitoring, supervision, and forecasting of air quality have been implemented; however, the results remain limited. The number of monitoring points is still sparse, and the overall picture of pollution is neither characteristic nor representative. Remote sensing technologies have not yet been applied; monitoring results are insufficient to identify causes for control measures and, in particular, have not enabled the forecasting or early warning of pollution risks; (v) orientations and solutions in green transformation have just been formed and need to be strongly implemented and effectively promoted.

### 3. PROPOSING AND RECOMMENDING SOLUTIONS TO ENHANCE THE EFFECTIVENESS OF AIR QUALITY MANAGEMENT

In the face of increasingly complex developments in air pollution, especially in large cities and concentrated industrial areas, the requirement for air quality management is to have synchronous, fundamental and effective solutions. Air pollution control not only requires the efforts of state management agencies but also requires the active participation of localities, communities and businesses. In that context, proposing and implementing the specific solutions

below is extremely necessary to enhance management effectiveness, protect public health and move towards sustainable development.

*First*, effectively implement the approved National Plan on Air Quality Management and Provincial Air Quality Management Plan.

*Second*, build and establish a network of automatic, continuous air monitoring stations that are large enough to ensure the monitoring, collection and transmission of data to help management agencies monitor, supervise, warn and forecast trends and changes in air quality, especially in large cities.

*Third*, promote investment and conversion from fossil fuels to renewable energy sources such as solar power, wind power and hydropower. Gradually limit the construction and use of coal-fired thermal power plants because they are a major source of emissions causing air pollution.

*Fourth*, develop “smart cities” with traffic systems and automation technology to better control the level of emissions from socio-economic activities.

*Fifth*, build and upgrade a high-quality public transport system that covers all urban areas, helping people easily choose public transport instead of using private vehicles. Establish areas that restrict personal vehicles during rush hours, especially in densely populated areas and city centers. Encourage the use of bicycles and public transport by building a wide-coverage, convenient support infrastructure for people.

*Sixth*, increase information and data sharing and have a mechanism for inter-sectoral, inter-regional and inter-provincial coordination in the work of controlling and reducing air pollution.

*Seventh*, review and strictly implement the provisions of urban planning, particularly the planning of green spaces and water bodies; invest in the development of additional green areas and public spaces, and increase tree planting in urban areas so as to ensure compliance with the per capita standards stipulated in the regulations.

### 4. CONCLUSION

Air quality management is one of the key tasks in national environmental protection. To achieve sustainable development goals, it is necessary to continue improving the legal framework, strictly control emission sources, increase investment in monitoring systems, and enhance forecasting and early warning capacities for air quality. At the same time, intersectoral coordination from the central to the local levels and raising public awareness will play a pivotal role in ensuring effective and long-term air pollution control ■