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ADDRESSING AIR POLLUTION IN HANOI, VIETNAM

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KEY MESSAGES

- Air pollution is a major global environmental issue affecting people's health. Hanoi is one of the largest cities in Asia in terms of both area and population impacted by its worsening air quality.
- The main causes of air pollution in Hanoi are emissions from motor vehicles, particle matter released from industrial plants and construction, and the burning of charcoal and agricultural wastes.
- Existing interventions and measures employed by Hanoi need to tighten enforcement, speed up, and/or innovate in order to make some headway in arresting the continuous deterioration of the city's air quality.
- The road to recovery from the COVID -19 pandemic presents an opportunity to draw up a green recovery plan anchored on sustainable development. It is imperative for economic growth to adhere to sustainable development principles if air pollution in Hanoi is to be seriously addressed.



BACKGROUND INFORMATION

Over the past three decades, Vietnam's economic development has been remarkable according to the World Bank. Unfortunately, this economic growth has also been accompanied by environmental degradation, and consequently, increasing air pollution.

In Hanoi, Nguyen, Nagashima and Doan (2020) report that the air quality index (AQI)ⁱ showed levels "unhealthy for sensitive groups" (AQI=101-200) for 40-60% of monitored days between 2010 and 2013, citing the Ministry of Natural Resources and Environment (MONRE). The AQI rose to an unprecedented level of 385 in 2019 as reported by IQAirⁱⁱ. The World Health Organization (WHO) standard of a "good" AQI level is in the 0-50 range. However, according to the ambient air quality observations on PM_{2.5}ⁱⁱⁱ by the Center for Environmental Monitoring (CEM), Hanoi's annual mean concentrations of PM_{2.5} from 2010-2017 ranged from 36.7 µg/m³ to 66.5 µg/m³, values over the acceptable concentration ceiling of 25 µg/m³ provided MONRE. In 2019, the city also only had eight days with a reading lower than the national standard.

Such poor air quality has adverse effects on people's health. Nationwide, this potentially costs Vietnam more than 52,000 premature deaths every year, creating annual losses upwards of US\$ 13.2 billion or about 5% of the national gross domestic product (Ha, Le and Nguyen, 2020).

Several measures pertinent to Hanoi have been started to address the situation such as the relocation of industrial facilities out of the inner districts since 2012, mandating Euro IV emission standards for gasoline engines and Euro V for diesel since 2018. Furthermore, buses using traditional fossil fuel were replaced to ones using compressed natural gas in 2018 and the Hanoi's plan of transportation was approved in 2016 (Decision 519/QD-TTg/2016), promoting the public transport sector that stands currently at 8-10% to target 35-40% of total transport demand by 2030. However, a more comprehensive analysis of the situation and harmonious integration of existing and planned policies and programs still seem necessary as air quality continues to worsen as evidenced by 2019 data.

PROBLEM DEFINITION

The poor air quality of Hanoi can only be exacerbated by the continued urbanization and surge of economic activities even as the whole country recovers and makes up for the slowdown brought about by the COVID-19 pandemic. Prior to the pandemic, more than 1,000 construction projects were underway in the city.

Urbanization puts stress on public services such as transportation. In Hanoi, the extreme daily volume of motor vehicles is one of the biggest contributors to poor air quality. Additionally, increased economic activities are often accompanied by construction boom, flourishing industrial plants and vigorous agricultural production that are known to produce large quantities of air pollutants.

The volume of Hanoi vehicles tripled over 10 years between 2008 to 2018 from 2.2 million to 6.5 million, of which 5.8 million are motorbikes, with private cars and motorbikes becoming the preferred mode of transportation especially since public transport has not yet been able to provide for the city's demand.

KEY FINDINGS

- Hanoi currently has 11 automatic air monitoring stations installed and put into operation. By May 2020, 24 automatic air monitoring sensor stations have been added, sponsored by THT Company Limited (Korea), which increases the total number of air monitoring stations in the city to 35 stations.
- The city has completed a three-year greenery program from 2016 to 2018, during which it planted 1 million trees. The Hanoi People's Committee launched the campaign in February 2021 to plant one billion trees in the city in coordination with the Ministry of Natural Resources and Environment.
- The first sky train in Hanoi is under construction and its first line is expected to be put in operation in 2021 (part of Decision 1259/QD-TTg/2011) while the first lines of Bus Rapid Transit (BRT) are in operation since 2017 (part of Decision 519/QD-TTg /2016).
- The city plans to restrict motorbikes, gradually targeting banning all motorbikes in inner districts by 2030 provided that the public transportation network will be operational as an alternative mode of transport.
- 500 tons of charcoal and 700 tons of waste are estimated to be burnt on a daily basis in and around Hanoi according to IQAir, while an estimated 300,000 tons of rice straw are burnt annually.

According to Hanoi's Department of Transportation, an average of 27,000 new private vehicles is registered per month. Adding to this, the monthly estimate of 1.2 million vehicles going in and out of Hanoi from other provinces and the cumulative level of exhaust fumes produced profoundly aggravates the already bad air quality.

Yet, a number of research shows that road traffic is not the dominating source of PM_{2.5} pollution in the Ha Noi province. While it contributes with about one quarter, the largest share originates notably from large power and industrial plants, the residential sector and the open burning of agricultural waste. Nearly 150 out of 400 manufacturing facilities in the city have also been found to be the major air polluters according to Hanoi Department of Natural Resources and Environment (DONRE). Despite the government's program to remove the inner districts of industrial facilities, approximately 200 such facilities remain to be relocated. Further, the traditional farming practice of burning rice straws by farmers in suburban areas has also contributed to the poor air quality, as with the continued prevalence of honeycomb charcoal stoves for household cooking.



- According to Ha et al. (2020), overall air quality improved significantly in March and April 2020 compared to February, corresponding to reduced levels of economic activity during the initial imposed lockdown in Hanoi due to the pandemic. It was also inferred that among the various economic activities, agricultural business appears to have a minimal impact on air pollution while industrial manufacturing activities and road traffic seem to contribute greatly to the air pollution issue in Hanoi. However, in the longer term, despite improvements in air quality during the pandemic, air pollution could worsen quickly in the recovery phase, as daily lives and businesses might go back to the status quo while trying to ramp up productivity to make up for revenue losses.

POLICY RECOMMENDATIONS

At the National Government Level:

- Provide a roadmap for green recovery from the COVID-19 pandemic, integrating economic growth and sustainable development.
- Craft regulatory policies to propel the lowering of emissions. An example would be to leapfrog to Euro VI emission standards ahead of the proposed/planned schedule in 2022/2023.
- Review and strengthen the country's strategy for renewable energy and how this impacts the ways local governments cope with vehicular pollution. A clear and consistent policy framework which guides technology and fuel-related improvements in the transportation sector (e.g., use of electric vehicles, switch to biofuels and compressed natural gas) creates a conducive environment for the needed shift in institutional thinking, as well as, behavioral change in the public.

At the Local Government Level:

- Prepare a local green recovery roadmap that balances economic growth and environmental integrity objectives employing a sustainable development bias.
- Ensure the enforcement of mandatory vehicle inspections and improvement of road conditions. Consider also limitations on allowable travel distances and the banning of vehicles of a certain age to reinforce minimum emission standards. For more co-benefits in public transportation, an integrated effort is needed including gradual phase-out of inefficient vehicles coupled with the aggressive phase-in of low/zero emission vehicles.
- Provide incentives for active transportation and multi-modal modes of transport as these are the optimal ways to lower vehicle emissions while also increasing physical activity and improving health. Encourage walking and the use of bicycles by providing/redesigning the necessary infrastructure to ensure safety and convenience. Pedestrian pathway designs could incorporate the planting of suitable tree types to further help to reduce dust particles.
- Rationalize the city's land use strategies and employ urban planning and urban governance to eliminate/minimize activities that contribute to poor air quality (i.e., the need to travel long distances, inadequately planned transportation routes). Urban governance should account for the quality and efficiency of public transport infrastructure to be coupled with integrated land use/transport planning that will minimize the detrimental impact of economic activities on air quality. The completion of the BRT lines/system and metro lines should be made a priority as Hanoi recovers from the COVID-19 pandemic.
- The congestion charging schemes which apply charges on several groups of motor vehicles operating within congestion zones during certain times should be studied. Low-emission zones/Green zones can be looked into to curb the entry of polluting vehicles (e.g., only Euro V/VI compliant vehicles would be allowed).
- The city should continue enforcing the program of relocating polluting factories/plants out of the city. Planted trees on open spaces and other suitable areas can improve air quality while also providing co-benefits for the living environment and creating carbon sinks.
- Citizen awareness programs via posters, online, training programs should be performed on a regular basis. "Open Streets" or the banning of vehicles on a major street every weekend should be implemented to further raise awareness. High polluted areas can also be identified and a partial/complete vehicle ban on certain days can be imposed as a regulatory measure to further promote walking, cycling and public transport.
- Provide institutional support to farmers and find an alternate solution to burning agricultural wastes/by-products (i.e., incentivize farmers for the collection and use of rice straw as bio-fuel).
- Hanoi should aim to move towards renewable energy. The effort to replace the cheap method of using honeycomb charcoal stove for household cooking should not only provide replacement incentives but also long-term, financially sustainable alternatives for low-income and marginalized groups. Solutions promoted by the local government must espouse social inclusion.



CONCLUSIONS

The impact of the current energy and transport system of Hanoi to air quality and climate change has been clearly demonstrated. Furthermore, the research shows that only a few policies currently address the issue of privately owned vehicles even though its number is growing exponentially. However, there is potential for further research, in particular to identify the most co-beneficial policies that can tackle both GHG emissions and air pollution such as the use of the appropriate fuel and technology mix need to be explored and supported via regulatory policies.

The replacement of the old vehicle fleet constitutes another important element to be incorporated into policymaking. Interestingly, urban policies tend to amplify co-benefits of the outcomes for air quality as for climate change mitigation.

To address the fundamental cause of air pollution, sustainable urban planning and governance are crucial factors in developing successful policies. Cost-effective strategies need to combine technical emission controls including policies that promote structural changes of the power system such as energy efficiency improvements and transition to cleaner fuels.

Finally, it is necessary to observe a more people-centered and socially inclusive approach if any of the policies engendering the right to “clean air for all people” are to succeed. People may not comply with the regulations, not necessarily because they simply oppose the policy but more likely due to the limited resources they have to change or shift from the status quo. Institutionalized support and the sufficient resources must accompany the demand for behavioral change.



Endnotes

- i The Air Quality Index (AQI) of the United States is a standard measurement system used widely to determine the level of airborne pollutants. The figures range from 0 to 500 where the lower the figure, the cleaner the air is.
- ii IQAir is an air quality technology Swiss company that offers practical solutions for better air quality. IQAir operates the world's largest free real-time air quality information at <https://www.iqair.com>. In Hanoi, IQAir receives data from 10 monitoring stations which are operated by local authorities and 4 others operated by non-profit organizations.
- iii PM is the abbreviation for Particle Matter and it refers to a mixture of both liquid droplets and solid particles found in the air. The more specific figure of PM 2.5 refers to ultra-fine particles of 2.5 micrometers or less (which is a fraction of the width of a human hair) and are considered most hazardous pollutants among air pollutants to human health. PM mostly originates from dust storms, grassland fires, incineration, burning of fossil fuels, vehicle emissions, and industrial plants.

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