

By post and by email at aqoreview@eeb.gov.hk

31 October 2023

Environment and Ecology Bureau
Air Policy Group (1)
33/F, Revenue Tower
5 Gloucester Road
Wan Chai, Hong Kong

Dear Sir/Madam

**Views from The Hong Kong Institution of Engineers
on the Review of Air Quality Objectives 2030**

On behalf of the Institution, I am pleased to present to you our views and suggestions as set out in the enclosure for your consideration on the captioned subject.

With our expertise and experience, the Institution welcomes the opportunity to work with the Government on the area of concern if and when it is needed.

Thank you.

Yours faithfully



Ir Peter SI
Director
(for President Ir Dr Barry LEE)

BL/AS/PS/SS

Views from The Hong Kong Institution of Engineers on the Review of Air Quality Objectives 2030

Air quality is inextricable from public health and quality of life. The Hong Kong Institution of Engineers (HKIE) is fully supportive of the Government's resolve to further tighten the prevailing Air Quality Objectives (AQOs) and adopt the three new parameters introduced in the World Health Organisation Air Quality Guidelines (WHO AQGs) in projecting air quality improvement by 2030.

2. The HKIE acknowledges the Government's efforts to improve air quality by initiating the Hong Kong Roadmap on Popularisation of Electric Vehicles, Clean Air Plan for Hong Kong 2035 and Hong Kong's Climate Action Plan 2050 in recent years. While we understand the practical need to balance risks against health, effectiveness of control measures, economic considerations, and other political and social factors in working out the implementation programme of air quality control measures, the Government should further expedite the implementation of the abovementioned programmes and the proposed air quality improvement measures such that the current review would be in line with the Government's strategies and goals in meeting the AQOs.

3. The HKIE believes that both approaches consisting of a combination of WHO Interim Targets (ITs) and one that directly adopts all WHO AQGs can be implemented. Whichever approach is adopted, it is necessary to set out a well-defined timetable and long-term roadmap for the implementation of the pollution control strategies and the attainment of carbon neutrality.

New Air Quality Objectives

4. The review proposed the introduction of three new parameters and further tightening of other parameters to align with WHO AQGs' requirements. Importantly, improving air quality is one of the key factors for enhancing a city's living quality especially the health impacts associated with Nitrogen Dioxide (NO₂), Ozone (O₃), Fine Suspended Particulates (FSP, or PM_{2.5}), etc. As such, the HKIE calls for the continuous improvement of air quality for better protection of public health and the acceleration of the tightening of AQOs to control air pollutant levels together with the

implementation of a more progressive framework of policy measures as well as decarbonisation strategies for achieving net zero in 2050.

5. In this review, the HKIE noticed that the AQOs for NO₂ annual (currently at IT-1 (40 µg/m³)) and O₃ 8-hour (currently at IT-1 (160 µg/m³)) were not proposed to be tightened, leaving them at the same level since 2014. Also, the HKIE noted that the FSP or PM_{2.5} 24-hour level is proposed to be tightened to IT-3 (Interim Target) (37.5 µg/m³), but its number of allowable exceedances is only tightened from 35 times per year to 18 times, which does not resume to its original level of 9 times per year as in 2014. In view of the above, the HKIE proposes the following specific recommendations:

- a) The AQO for FSP 24-hour is currently proposed to be updated to IT-3 (Interim Target) (37.5 µg/m³). We recommend that the number of allowable exceedances should be further tightened to 9 times per year instead of 18 times, i.e. reverting it to the level of the prevailing AQO in 2014.
- b) Although the AQO for NO₂ annual at IT-1 (40 µg/m³) is currently proposed to be unchanged in this review, we recommend that it should be tightened to IT-2 (30 µg/m³).
- c) The AQO for O₃ 8-hour at IT-1 (160 µg/m³) is currently proposed to be unchanged in this review. We recommend tightening it to IT-2 (120 µg/m³) with the number of allowable exceedances adjusted to 9 times per year. Furthermore, the Government should further elaborate on the definition of “peak season” such that it is more understandable to the general public.

6. All in all, current measures may not be adequate or sufficient to bring Hong Kong’s air quality close to WHO standards. In this connection, the HKIE urges the Government to actively formulate policy measures towards the goals of having Hong Kong’s air quality on par with international cities by 2035 and attaining carbon neutrality by 2050 and the “3060 target¹” by the Central People’s Government.

¹ The Central People’s Government in 2020 proposed its new objective to peak CO₂ emission before 2030 and achieve carbon neutrality by 2060 (“3060” target).

Air Quality Improvement Measures

7. As mentioned above, there is a practical need to balance risks to health, effectiveness of control measures, economic considerations, and other political and social factors in working out the implementation programme of air quality control measures. The HKIE opines that an all-out implementation of air quality improvement measures in power generation, road transportation, marine transportation and other emission sources should be expedited.

Electricity Generation

8. As electricity generation accounted for 60% of the total carbon emissions in Hong Kong in 2020, decarbonisation strategies to replace coal by natural gas associated with carbon capture and storage (CCS) in the power sector is the most important measure Hong Kong should be explored in the longer term so that a certain percentage of generation plant could be kept locally for energy security consideration.

9. Moreover, the HKIE suggests the Government to establish a target for the reduction of energy consumption of new and existing commercial buildings. The target should be backed by a roadmap to ensure industry stakeholders are able to work together to realise the AQOs.

10. The Government should target principally at reducing the total carbon emissions by 50% (with reference to the 2005 level) before 2035 and to achieve carbon neutrality before 2050. The HKIE's recommendations in this connection are as follows:

By 2035

- a) No coal for electricity generation: To phase out the use of coal in electricity generation, replacing it by low to zero-carbon energy sources.
- b) Increase the use of renewable energy to 7.5-10% (and to 15% subsequently): To boost the public and private sectors' adoption of renewable energy proactively, increasing its share in the fuel mix for electricity generation, e.g. Wind: 3.5-4%; Waste-to-Energy: 3-4%; Solar: 1-2%.

- c) Increase the use of zero-carbon energy sources for electricity generation to 60-70%: To enhance the closer cooperation with neighbouring areas to increase the supply of zero-carbon electricity; and to carry out trials of new energy sources (e.g. hydrogen) for electricity generation.
- d) Enhance the comprehensiveness of Hong Kong Energy End-Use Data: To provide a consolidation of energy consumption with the fuel and statistics published by the Census and Statistics Department, as well as detailed information on emission reduction in relation to each policy measure against the backdrop of the overall emission reduction commitment.
- e) Increase cooperation and innovation: To seek investment and development opportunities; to participate in and operate zero-carbon energy projects near Hong Kong, e.g. through dedicated transmission links to Hong Kong, links which collect highly traceable zero-carbon energy sources from power plant in Guangdong Province; and to explore new decarbonisation technologies e.g. CCS or Carbon Capture Utilisation and Storage, etc.

By 2050

- f) Net-zero carbon emissions: To increase the fuel mix ratio of zero-carbon energy for electricity generation, to upgrade the electricity generation units to adopt zero-carbon energy source such as green hydrogen, etc.
- g) Deep emission reduction scenario should be combined with other strategies, including the development of local renewable energy, investment in regional renewable energy projects, enhancement and diversification of regional nuclear energy sourcing, investment in green hydrogen, improvement of electricity storage system, and optimisation of the green power demand response.

Transportation

11. As the limited electric vehicle (EV) charging network remains the bottleneck for accelerating the wider use of EVs in Hong Kong, the HKIE urges the Government to speed up the development and establishment of public infrastructure and facilities associated with EVs. In addition to the electrification of public transport and commercial vehicles, the popularisation of hydrogen fuel cell vehicles

should be expedited. A full emission reduction action-plan (approaches to green and clean vehicle technology, re-fueling infrastructure, regulatory framework, and funding model) should be set up to address key challenges. The actions recommended by the HKIE are as follows:

By 2035

- a) Exploring the feasibility of preponing the cessation of new registration of fuel-propelled and hybrid private cars to a time prior to 2035, e.g. before 2030;
- b) Setting an appropriate roadmap and investment strategy to achieve a quantified modal shift target for green and clean public transport system;
- c) Enlarging the scale of trials for both electric and hydrogen fuel cell buses;
- d) Facilitating and removing the regulatory barriers to green technology development; and
- e) Identifying areas requiring cross engineering actions for the relevant green transport infrastructure development.

By 2050

- f) Extensive use of zero carbon energy sources including zero-carbon electricity and green hydrogen fuel for public transportation and commercial vehicles and full electrification of private vehicles are essential. The Government should put forward different policies and strategies to support the development of the green hydrogen economy. These strategies are able to potentially increase the share of zero-carbon emissions and reduction of heavy air pollutant sources in Hong Kong by 2050.

Health and Social Benefits

12. To enhance the promotion of the new set of AQOs, the Government is suggested to provide cost-benefit analysis of the proposed air quality improvement measures, such as the economic benefits resulting from preventing a premature death or other diseases, and other social benefit. The analysis will facilitate the general public's understanding of these measures' benefits.

Air Quality Assessment

13. It is noted that the Pollutants in the Atmosphere and their Transport over Hong Kong (PATH) modelling system is widely adopted in assessing localised air impact, the Environmental Impact Assessment as well as this AQOs Review. While we noted the projections conducted in this review had considered regional air improvement measures and air quality improvement measures proposed in the AQOs Reviews, we suggest further improving the model by incorporating considerations of local specified process plants. The Government should also elaborate on the methodology used in the PATH model such as the emission limits used, modelling period or sources of emission data.

14. To facilitate a deeper understanding of the current review of AQOs for the benefits of the entire public at large, the HKIE urges the EEB to disclose the air quality assessment in the PATH model with detailed information, including the modelling setup, assumptions, scenarios, and adjustments.

Air Quality Governance Synergy Enhancement in the Greater Bay Area

15. To tackle air pollutants from regional source (e.g. ozone) more effectively, enhancing the transboundary air quality governance synergy in the Greater Bay Area might be the key to dealing with the regional ozone and episodic haze formation issues in Hong Kong. The Government should take the lead and establish regional engineering collaboration on cleaner, lower carbon, and reliable emerging green technologies.

16. The HKIE recognises the Government's efforts in monitoring regional air pollutant (e.g. ozone), including the establishment of a supersite at Cape D'Aguilar in 2017; the study "Photochemical Ozone Pollution in Greater Bay Area and Characterization of Regional and Super-Regional Transport of Ozone" to be completed in 2024; and the Guangdong-Hong Kong-Macao Greater Bay Area Air Quality Laboratory and Meteorological Monitoring Supersite, which costs at least HK\$261 million and planned for full operation in 2027 for monitoring and analysing haze formation, etc. The HKIE looks forward to the Government's sustained effort and collaboration with regional partners to improve regional air quality. Sustained

compliance with the AQOs could only be achieved with longer-term emission reduction in the Pearl River Delta Economic Zone (PRDEZ).

Coupling AQOs and Decarbonisation Strategy

17. The HKIE believes that AQOs play a pivotal role not only in the improvement of air quality, but also in the overall decarbonisation strategy. Therefore, the HKIE suggests the AQOs Review Working Group to work closely and in total synergy with the Steering Committee on Climate Change and Carbon Neutrality (SCCCCN) in order to devise a holistic emission abatement approach and strategy. Enhancing the transparency of both the AQOs Review Working Group and the SCCCCN, through the publication of their agendas, minutes, papers and proposed measures, could stimulate the public with innovative ideas about air quality improvement and carbon neutralisation. The Government should also consider establishing a legal framework for AQOs and decarbonisation actions.