

AIR QUALITY OBJECTIVES (AQO) REVIEW WORKING GROUP

Digest of the 4th Meeting
held on 18 December 2018 at 3:00 p.m.
in Conference Hall, 2/F, West Wing, Central Government Office,
2 Tim Mei Avenue, Tamar

Present:

Mr. C. W. TSE	Under Secretary for the Environment (Chairperson), ENB
Mrs. Alice CHEUNG	Deputy Director of Environmental Protection (3) (Vice-Chairperson), EPD
Prof. Peter BRIMBLECOMBE	
Prof. TIAN Lin-wei	
Dr. Loletta SO Kit-ying	
Dr. Steve YIM Hung-lam	
Mr. Alfred LEE Tak-kong	
Mr. LOONG Tsz-wai	
Prof. WANG Tao	
Dr. CHAN Ka-lung	
Ir. YEE Tak-chow	
Mr. Brandon LIU	
Mr. Paul LI	
Ir. Dr. David HO Chi-shing	
Mr. Matthew WONG Leung-pak	
Mr. Stanley Tandon Lal CHAING	
Mr. TUNG Ching-leung	
Mr. Evan AU YANG	
Ms. Suzanne CHEUNG Kit-yee	
Mr. Patrick FUNG Kin-wai	
Mr. Aaron NG Hoi-shan	
Mr. LING Chi-keung	
Dr. Ringo LEE Yiu-pui	
Mr. Jeff BENT	
Mr. FUNG Pak sing	
Mr. KEUNG Siu-fai	
Mr. Danny WU	
Mr. Simon NG	

Prof. John LIU Jianhua

Ms. Irene PANG	Chief Assistant Secretary (Works) 3, DEVB
Ms. Queenie LEE	Principal Assistant Secretary for the Environment (Electricity Reviews), ENB
Ms. Fanny CHEUNG ⁽¹⁾	Assistant Secretary for the Environment (Energy) 1, ENB
Mr. Marquis YIP ⁽²⁾	Assistant Secretary (Transport)10B, THB
Ms. Emily SOM ⁽³⁾	Assistant Secretary (Transport)2B, THB
Mr. Ricky WONG	Deputy Head of Civil Engineering Office (Port & Land), CEDD
Mr. Ringo MOK	Deputy Project Manager (South), CEDD
Mr. M. H. LEE ⁽⁴⁾	Principal Transport Officer / Bus & Railway 2 (Bus & Railway), T
Ms. Cici K. S. CHEUNG	Senior Engineer 1/Transport Planning (Acting), TD
Mr. Nelson HO ⁽⁵⁾	Senior Surveyor of Ships/Planning & Training, MD
Ms. Amy CHEUNG	Assistant Director of Planning/Territorial, PlanD
Dr. Eddy NG	Principal Medical Officer (Non Communicable Diseases, DoH
Mr. Senna NG ⁽⁶⁾	Senior Engineer (Energy Efficiency A3), EMSD
Mr. Dave HO	Assistant Director of Environmental Protection (Air Policy), EPD
Mr. Brian LAU	Principal Environmental Protection Officer (Air Policy), EPD
Dr. Kenneth LEUNG	Acting Principal Environmental Protection Officer (Air Science), EPD
Dr. S.T. MAK	Principal Environmental Protection Officer (Mobile Source), EPD
Mr. Freeman CHEUNG	Consultants' Representative (AECOM)
Mr. Marcus IP	Consultants' Representative (AECOM)
Mr. Ping KONG	Consultants' Representative (AECOM)
Mr. Karl AN	Consultants' Representative (AECOM)
Prof. Jimmy FUNG Chi-hung	Consultants' Representative (HKUST)
Mr. XuGuo ZHANG	Consultants' Representative (HKUST)

Prof. Tze Wai WONG

Consultants' Representative (CUHK)

Note:

1. Representing Mr. Paul WONG, Principal Assistant Secretary for the Environment (Energy), to attend the meeting.
2. Representing Ms. Louisa YAN, Principal Assistant Secretary (Transport)10, to attend the meeting.
3. Representing Mr. Tony LI, Principal Assistant Secretary (Transport) 2, to attend the meeting.
4. Representing Mr. Patrick WONG, Assistant Commissioner/Bus & Railway, to attend the meeting.
5. Representing Mr. K. L. LUI, Chief (Maritime Policy), to attend the meeting.
6. Representing Mr. Barry CHU, Chief Engineer (Energy Efficiency A), to attend the meeting.

In Attendance:

Ms. Josephine HO	Senior Environmental Protection Officer (Air Policy) 1, EPD
Mr. K.W. NG	Senior Environmental Protection Officer (Air Science) 2, EPD
Mr. Nelson IP	Senior Environmental Protection Officer (Mobile Source) 3, EPD
Mr. Simon LAM	Environmental Protection Officer (Air Policy) 11, EPD
Mr. Nick TSANG	Environmental Protection Officer (Air Policy) 43, EPD
Mr. Roy TSANG	Environmental Protection Officer (Air Science) 42, EPD
Mr. Ambrose CHEN	Environmental Protection Officer(Mobile Source) 31, EPD
Mr. Leo LAI	Environmental Protection Officer (Air Policy) 12, EPD
Ms. Queenie CHAU	Assistant Environmental Protection Officer (Air Policy) 14, EPD

Absent with apologies:

Prof. Alexis LAU Kai-hon
Dr. Nicky LAM Yun-fat
Dr. NING Zhi

Ir. LO Pak-cheong
Dr. Eunice MAK Hoi-cheung
Dr. MAN Chi-sum
Dr. Roland LEUNG Chung-chuen
Mr. Joseph LAW Ka-chun
Prof. Larry CHOW
Ir. Edmond FONG Wai-man
Ms. Susanna NG
Ir. Cary CHAN
Dr. William YU
Mr. Prentice KOO
Mr. Madison TANG Wing-hong
Mr. Daniel NG
Dr. HUNG Wing-tat
Ir. FUNG Man-keung
Hon CHAN Choi-hi
Hon KWAN Sau-ling
Mr. Roger LEE Chak-cheong
Mr. SO Sai-hung
Mr. Arthur BOWRING
Mr. CHIANG Sui Ki
Mr. Sunny HO Lap-kee
Mr. David KONG
Mr. Tony TONG
Mr. Ellis CHUNG
Ms. Jessie CHUNG
Mr. KWOK Tak-kee
Ms. Sandy MAK
Mr. David WONG Yui-cheong

Opening Remarks

The **Chairperson** welcomed Members to the fourth meeting of the AQO Review Working Group (“Working Group”).

Agenda Item 1 – Confirmation of digest of the third meeting

2. The draft meeting digest of the third meeting was confirmed without further amendment.

Agenda Item 2 – Findings of the AQOs Review (WG paper 1/2018)

3. The WG paper 1/2018 which summarised the findings of the AQOs Review had been circulated to Members before the meeting.

I. Recap background and the work done so far by the Energy and Power Generation (E&PG) Sub-group, Road Transportation (RT) Sub-group, Marine Transportation (MT) Sub-group as reported to the last Working Group in June 2017

4. **Mr. Dave Ho (EPD)** recapped the background of the AQOs Review and the work done by the Working Group:

(a) The three Sub-groups of RT, MT and E&PG had identified 70 possible new measures and deliberated on their practicability of implementation. Of these 70 measures, the Sub-groups agreed that 27 were short term, four medium term, 13 long term, and 26 were considered not practicable for implementation, short of air quality benefits or not suitable to be considered under the current scope of the review. EPD's focus groups on other emission sources had identified eight measures (including three short-term ones) not covered in the three Sub-groups. There were also two new initiatives (short-term) announced in the 2018 Policy Address.

(b) A public engagement exercise had been conducted in September and October 2017 to gauge public views on the possible new air quality improvement measures. About 370 written submissions had been received and most of them were related to measures which had been discussed at the E&PG, MT and RT Sub-groups.

(c) The Air Science and Health (AS&H) Sub-group had discussed and endorsed the methodologies for conducting the air quality assessment and the health and economic impact assessment (HEIA). At its meeting held on 13 December 2018, the Sub-group discussed the assessment on air quality, possible scope for tightening the AQOs and the HEIA. The meeting supported the findings that the AQOs for SO₂ and PM_{2.5} could be tightened in accordance with paragraphs 19 to 20 of the WG paper 1/2018.

5. A member questioned whether the AS&H Sub-group had indeed endorsed the

possible scope for tightening the AQOs at its meeting on 13 December 2018. The **Chairperson** recalled that at the end of the AS&H Sub-group meeting, he as the AS&H Sub-group Chairman, concluded that the meeting had considered the findings of the consultant team including the possible scope for tightening the AQOs. The **Chairperson** said that members of the AS&H Sub-group did not raise any disagreement nor reservation on submitting the findings agreed to this Working Group for consideration.

Members' Comments on Measures to Improve Air Quality

6. Some Members suggested that the Government undertake the following measures to improve air quality:

- (a) Explore and promote the use of liquefied natural gas (LNG) to ocean-going vessels as many new cruise ships will use LNG as fuel;
- (b) Explore the use of lightweight materials (e.g. carbon fibre) in vessels and facilitate the installation of charging facilities for electric vessels;
- (c) Expedite bus route rationalization;
- (d) Continue to subsidize the road transport trade to phase out old diesel commercial vehicles (DCVs);
- (e) Support the development and use of electric vehicles, including electric commercial vehicles; and
- (f) Continue to collaborate with the Guangdong (GD) Provincial Government to improve regional air quality.

[Post-meeting note: a member who did not attend the meeting submitted a comment after the meeting suggesting that the use of LNG for marine vessels should be brought forward as a short-term measure for its large emission benefit and the capability to enhance port competitiveness.]

7. **The Chairperson** noted Members' comments and advised Members that the Government would continue to keep abreast of the relevant technological developments with a view to introducing new practicable measures to improve air quality. The Government had long been collaborating with the GD Provincial Government to improve regional air quality. Emission reduction targets for the region for 2015 and 2020 had been set and both sides had already started a joint study on the post-2020 emission reduction targets.

8. A member said that the meeting paper did not reflect some of views on road transport

measures expressed by members from the transport trade at the meetings of the RT Sub-group, such as construction of new cross-harbour tunnels or roads to alleviate traffic congestion. **Mr. Dave HO (EPD)** responded that the proposed measures had already been included in the relevant Annexes of the paper. **The Chairperson** supplemented that the focus of this meeting was on the assessment findings of the AQOs Review and the possible scope for tightening the AQOs.

Members' Comments on Emission Reduction Quantification of the Possible New Measures

9. A member commented that among the 14 short-term possible new measures on road transportation, the Government had only quantified the emission reduction of one measure, i.e. "Enhance district-based publicity on bus route rationalization". The emission reduction of the remaining 13 short-term measures, as well as the medium and long-term road transportation measures that are more effective had not been quantified, thus the improvement in air quality in 2025 might be under-estimated. A few other members suggested that the quantification of emission benefits of the short-term possible new measures, in particular those involving significant capital costs or challenging to pursue, might help canvass support from the District Councils and the public when pursuing the measures.

10. **Mr. Dave HO (EPD)** clarified that the emission reduction of most of the short-term possible new measures on road transportation identified by the RT Sub-group were much less significant or would depend on a lot of uncertain factors; hence their emission reductions had not been quantified. **The Vice-chairperson** supplemented that the 2025 air quality assessment had already taken into account all major on-going, committed and possible new measures which have significant emission reduction potentials (e.g. tightening of vehicle emission standards, phasing out of aged and polluting diesel commercial vehicles, etc.). She added that in presenting the estimated emission benefits to the public in the upcoming public consultation exercise, the Government would set out clearly which were quantified, and which were not.

II. Report on the Air Quality Modelling Results as discussed by the Air Science and Health (AS&H) Sub-group

11. **The Consultant** gave a presentation on the air quality modelling results in 2015, 2020 and 2025:

- (a) The 2015 air quality modelling results demonstrated a good agreement with the air quality monitoring data recorded at EPD's general air quality monitoring stations;
- (b) Hong Kong could broadly attain the prevailing AQOs in 2020 except for ozone (O₃)(8-hr);
- (c) The air quality modelling results in 2025 indicated that the implementation of on-going, committed and new measures would lead to continuous improvement in the concentration of air pollutants, except for O₃ which would have a slight increase. The projected slight increase in O₃ would be largely due to the projected reduction in nitric oxide (NO) emissions from motor vehicles as a result of emission control measures that were being/would be implemented. While such vehicle emission control measures would help effectively reduce the concentrations of nitrogen dioxide (NO₂), the reduction in NO would reduce the titration effect on O₃ (i.e., removal of O₃ from its reaction with NO), thereby leading to a projected slight increase in O₃ levels especially in areas with higher traffic flow ;
- (d) The air quality assessment results indicated that the SO₂(24-hr) concentrations in 2025 could meet the next higher level of World Health Organization (WHO) Interim Target (IT), i.e. IT-2, with the current number of exceedance allowable (three) remains unchanged;
- (e) The air quality assessment results showed that the annual averaged concentrations of PM_{2.5} could possibly meet the next WHO level at IT-2. As for PM_{2.5} (24-hour), there was potential to meet the next WHO level at IT-2, if the number of allowable exceedances were to be relaxed from the current nine to 35; and
- (f) The air quality of a hypothetical scenario assuming there is no emission in Hong Kong was also presented for comparing with the projected air quality in 2025.

12. A member asked for clarification on the policy guidelines, if any, regarding the setting of the number of allowable exceedance for the AQO of PM_{2.5} (24-hour). **Mr. Dave HO (EPD)** responded that reference had been made to the WHO's guidelines that the allowable number of exceedance should be able to cater for exceedances due to uncontrollable factors (e.g. unfavorable meteorological conditions). For instance, the European Union also allows 35 exceedances for the 24-hour air quality standard for PM₁₀.

13. A member commented that the hypothetical scenario of "zero emission in Hong Kong" strongly suggested that the Government should step up the collaboration with the

Mainland to improve air quality. Another Member suggested that the Government should prepare a work plan to comply with the prevailing AQOs. The **Chairperson** informed that the Government had been working closely with the Guangdong Provincial Government and had established regional air quality management plans to reduce emissions in Hong Kong and the PRD region with a view to improving regional air pollution.

14. A member supported the tightening of the AQO of PM_{2.5} as there were scientific evidences that the long-term exposure of PM_{2.5} (in terms of annual concentration) had major health benefits whereas short-term concentration variations were susceptible to unfavorable meteorological conditions. He supported the relaxation of the number of allowable exceedances of the PM_{2.5} (24-hr) AQO but suggested that the scientific evidences should also be presented to the public.

III. Report on the Findings of Health and Economic Impact Assessment (HEIA) as discussed by the AS&H Sub-group

15. **The Consultant** gave a presentation on the findings of the HEIA:

- (a) Both long term (in terms of mortalities) and short term (in terms of morbidities including hospital admissions and clinic visits) health benefits arising from the improvement in air quality in 2025 had been assessed, using the 2015 health data as baseline value;
- (b) About 1848 premature death, 1528 hospital admissions and 262,277 clinic visits could be saved as a result of the improvement in air quality in 2025.
- (c) The increase in O₃ concentration in 2025, however, would slightly offset some of the short term health benefits;
- (d) The direct savings from hospital admissions and clinic visits were estimated at about HK\$96 million while the saving in productivity loss was broadly estimated at about HK\$150 million. Based on the Value of Statistical Life (VOSL) approach, the monetary gain in preventing the premature death was estimated at HK\$33 billion);
- (e) As with all HEIA, there were limitations to the methodology used, e.g. data on emergency hospital admission data in private hospital were not available, and the adoption of the Value of Statistical Life (VOSL) was an important source of uncertainty. .

16. A member commented that the HEIA assessment should include a scenario which

all AQOs were set at AQGs levels. He also opined that standalone cost benefit analysis (CBA) for individual possible new measures should be conducted, similar to what EPD had presented in the last AQO review report. Another member considered that health targets should be set at the outset of the review to drive policy changes, and questioned the purpose of the HEIA conducted under this review. There were also opinions that the HEIA results are on the conservative side given that health impacts to healthy individuals as a result of air quality improvement have not been assessed.

[Post-meeting note: a member submitted his comments before the meeting suggesting that CBA be conducted and economic benefits (e.g. increase in HK's competitiveness) aside from those in the HEIA be quantified. Another member submitted his comment after the meeting suggesting that the HEIA may also consider the economic impacts of air quality improvement, e.g. the cost of reaching and maintaining the AQGs levels.]

17. **Mr. Dave HO (EPD)** reminded Members that the approach and methodology for conducting the HEIA had been fully considered and endorsed by the AS&H Sub-group. New air quality improvement measures considered in the AQOs Review were prioritized primarily based on their practicability. The **Chairperson** further explained that detailed CBA on individual air pollution control measures might be more relevant when deciding on the relative priorities of the measures based on detailed CBA. For the purpose of the current AQOs Review however, all practicable short-term new air quality improvement measures were included in the projection of the 2025 air quality. The HEIA findings were for reference purpose and not for prioritizing or justifying the measures.

18. In response to a member's view that further tightening the AQOs would enhance the driving force for improving air quality to protect public health and practicability should not be the primary factor to be considered, the **Chairperson** elaborated that under the current air quality management system of Hong Kong, the driving force to improve air quality was to achieve the WHO AQGs to protect public health, and the means were by introducing various measures to reduce emissions from various sources such as power stations, industrial activities, road vehicles, etc. Instead of a driving force, the main function of the AQOs served as a benchmark for consideration of designated projects under the statutory Environmental Impact Assessment (EIA) process. When the overall air quality had been improved, naturally the AQOs should be tightened accordingly to uplift the benchmark. The law also required that the AQOs be reviewed once every 5 years, to ensure a progressive process to achieve the ultimate goal of the WHO AQGs. Since the AQOs served as a benchmark of the statutory EIA process, practicability was a necessary consideration. Otherwise all developments in Hong Kong could be stopped due

to the setting of impracticable AQOs. Regarding protection of public health, unless the WHO AQGs had been attained, the Government would continue to introduce suitable measures to improve air quality, irrespective of the AQO values.

IV. Possible scope for tightening the AQOs

19. **The Chairperson** recapped the identified scope for tightening of the AQOs as set out in paragraph 28 of WG Paper 1/2018:

- (a) the 24-hour AQO for SO₂ can be tightened from the WHO AQGs IT-1 level at 125µg/m³ to IT-2 level at 50µg/m³ with the current number of exceedance allowed (three) remains unchanged; and;
- (b) the annual AQO for PM_{2.5} can be tightened from IT-1 (35µg/m³) to IT-2 (25µg/m³), and its 24-hr AQO from IT-1 (75µg/m³) to IT-2 (50µg/m³), with the number of exceedances allowed increased from the current nine to 35.

20. **The Chairperson** advised Members that a Member who did not attend this meeting had written in to clarify that media reports' on his position were factually incorrect. He clarified that "...for a "health-led" revision of air quality objectives, we should progressively tighten objectives that have already been achieved (unless they are already at AQG levels), and then determine the policies needed to achieve that tightening; for those pollutants that are not in compliance, the approach should be keeping its existing level, but focus on implementing policies that can improve the corresponding pollutant. For ozone, since we are still not in compliance with the 8-hour objective, the focus should be on identifying the policies that can lower the peak 8-hour ozone concentrations..... Finally, I want to state my support of the proposed revision of the AQOs (tightening the SO₂ and PM_{2.5} objectives, and the other objectives remain the same."

21. The **Chairperson** then invited comments from Members on the possible scope for tightening the AQOs.

22. A member indicated disagreement with the review findings that there was only scope for tightening the AQOs of SO₂ and PM_{2.5}, but not the AQOs for respirable suspended particulates (PM₁₀) and O₃. He also opined that the AQO for SO₂ (24-hr) should be tightened to WHO AQGs level since the annual averaged concentration of SO₂ in Hong Kong in 2018 was in single digit (less than 10 µg/m³) and did not see any reason for setting the AQO for SO₂ (24-hr) at IT-2 level (50µg/m³).

23. Other members suggested that, aside from tightening the AQO for SO₂ (24-hr) to IT-

2 with the current number of exceedance allowed (three) remains unchanged, the Government could also consider whether to tighten the AQO to AQG level with relaxation in the number of allowable exceedance.

24. A member suggested the Government conduct supplementary air quality modelling analysis to explore if there was any scope to tighten the AQOs of PM₁₀. *[Post-meeting note: A technical meeting between EPD, the consultant and the concerned Member was held on 3 Jan 2019 and supplementary air quality analyses provided by the consultant and EPD were discussed. Based on the supplementary analyses, it was agreed that the scientific findings as presented in the 4th WG meeting remained valid (i.e. the projected 2025 PM₁₀ concentration could not meet the WHO-IT-3 standard) and the supplementary analysis would be incorporated in the consultant's study report].* Some members suggested that if the analysis results indicate that the AQOs of PM₁₀ could not be tightened, the Government should clearly inform the public on the works undertaken to reduce PM₁₀ emission in both local and regional context and conduct further studies in the next review with a view to identifying suitable measures targeting at PM₁₀.

25. The Consultant responded that there was no scope to tighten the AQO of O₃ as revealed from the air quality assessment results. The assessment results of the hypothetical scenario of “zero emission in Hong Kong” also indicated that the concentration of O₃ in most of the Hong Kong areas still could not comply with the prevailing AQO, indicating that the O₃ concentration is subject to strong regional influence. The Chairperson remarked that Hong Kong and Guangdong were taking joint efforts to improve regional air quality.

26. Considering the views expressed above, the **Chairperson** proposed and the meeting agreed that, subject to supplementary assessments on SO₂ and PM₁₀ as proposed by Members in paragraph 23 and 24 above, the meeting endorsed the findings of the AQO review as set out in paragraph 28 of WG Paper 1/2018. The Secretary for the Environment would report the findings and recommendations to the Advisory Council on the Environment (ACE) with a view to conducting a public consultation in 2019. Findings of the supplementary assessments would be included in the report to ACE and in the relevant public consultation documents.

Agenda Item 3 – Any Other Business

27. No other business was raised.

28. The **Chairperson** advised Members that this meeting would be the last meeting of

the Working Group. The **Chairperson** thanked Members for their participation in the Working Group and the valuable contributions to the AQO review for improving the air quality of Hong Kong,

29. The meeting was adjourned at 7:15 p.m.