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Work Plan for the Review of Air Quality Objectives (AQOs)

PURPOSE

This paper seeks Members' views on the work plan to review the AQOs.

BACKGROUND

2. The current AQOs, which relate to seven key air pollutants as set out in **Annex A**, took effect on 1 January 2014. Under Section 7(A) of the Air Pollution Control Ordinance (Cap. 311) (APCO), the Secretary for the Environment (SEN) is required to review the AQOs at least once in every five years and submit to the Advisory Council on the Environment (ACE) a report of the review.

WORK PLAN FOR THE REVIEW

Guiding Principles of the Review

3. To help protect public health, the World Health Organization (WHO) recommends Air Quality Guidelines (AQGs) for key air pollutants including respirable suspended particulates (RSP or PM₁₀), fine suspended particulates (FSP or PM_{2.5}), sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and ozone (O₃) based on a wealth of studies on the health effects and consultation with leading air scientists and health experts worldwide. Recognizing the challenge of achieving the AQGs, particularly in more polluted areas, WHO also sets out Interim Targets (ITs) to promote steady progress towards meeting the AQGs. As it is, no countries have fully adopted the AQGs as their air quality standards.

4. Having regard to WHO's recommendations and the practices of other advanced countries, we adopted the following guiding principles for the last AQOs review—

- (a) the AQOs should be set with a view to protecting public health;
- (b) the AQOs should be updated by benchmarking against the WHO AQGs and ITs; and
- (c) a progressive approach be adopted in updating the AQOs with a view to achieving the WHO AQGs as a long-term goal. The pursuit of such goal will be considered with reference to the international practices, the latest technological developments and local circumstances, as recommended by the WHO.

5. These guiding principles are still valid. We will continue to adopt them in the upcoming review.

Key Tasks

6. In line with the practices of environmentally advanced regions such as the European Union and the United States, the AQOs review will encompass the following key tasks:

- (a) appraising the latest development in respect of air science and the health effects of air pollution;
- (b) examining the current air pollution levels and trends, and progress and effectiveness of committed air quality improvement measures;
- (c) identifying new practicable air quality improvement measures and conducting cost benefit analysis of the measures;
- (d) developing an air quality management plan for further improving air quality; and
- (e) assessing air quality in future under different control scenarios and the scope for further tightening the AQOs for recommending a way forward.

All of the above tasks are technically complicated and need considerable time to complete.

Experts, Stakeholders and Public Engagement

7. In the coming AQOs review, we will proactively engage relevant stakeholders. The Under Secretary for the Environment (USEN) will lead an AQOs Review Working Group (Working Group) to gather views via dedicated sub-groups on four key aspects, namely air science and health, emission reduction in energy and power generation, as well as road transportation, and marine transportation. The Working Group will also look into control measures for other lesser air pollution sources, such as aviation and volatile organic compounds emission sources. The Working Group will reach out to the relevant parties as part of the review process involving participation of relevant group members. Members of the Working Group will include representatives from the field of air science, health, green groups, chambers of commerce, professional bodies, relevant trades and the relevant Government bureaux and departments. The Working Group will also organize public fora to collect views from the public.

8. The Working Group will provide a platform for stakeholders to share views and foster consensus so as to help the Government draw up the review findings and recommendations. The Working Group's report will be presented to SEN for Government's internal deliberations.

Work Plan

9. As the review involves a number of complicated tasks, we aim at completing the review and reporting on the review findings and recommendations to this Council in mid-2018. Thereafter, we will launch a 3-month public consultation on the recommendations.

10. If any of the AQOs is to be tightened arising from the review, we will commence the legislative amendment process including the preparation of a Bill to amend the APCO and consult this Council and the Legislative Council accordingly.

11. Key milestones of the review are shown in the table below –

Key Milestones	Timeline
Set up the AQOs Review Working Group and engage stakeholders and the public to collect their views on the AQOs review	Q2 2016 to Q3 2017
Consolidate review recommendations and prepare a review report	Q1 2018
Report to this Council and the Panel on Environmental Affairs of the Legislative Council (LegCo EA Panel) on the review recommendations	Mid 2018
Launch a 3-month public consultation on the review recommendations	Q3 2018
Consult this Council and the LegCo EA Panel on the final recommendations	Q2 2019
Introduce the Air Pollution Control Ordinance (APCO) Amendment Bill to the LegCo if the AQOs are to be tightened	Mid 2019

We aim to report back to this Council on the findings and recommendations of the review by mid-2018.

AIR QUALITY IMPROVEMENTS

12. The overall air quality of Hong Kong has been improving in the past years. From 2011 to 2015, the ambient concentrations of RSP, FSP, NO₂ and SO₂ reduced by 21%, 24%, 13% and 31% respectively. The roadside air quality has also been improving. From 2011 to 2015, the roadside concentrations of RSP, FSP, NO₂ and SO₂ reduced by 26%, 21%, 19% and 33% respectively. Only ozone exhibited a rising trend due to the strong influence of regional pollution. The concentration levels of the key air pollutants at the ambient and roadside from 2011 to 2015 are set out in **Annex B**.

13. The above improvement is attributed to the implementation of a number of local air quality improvement measures targeting at vehicles, marine vessels and power plants as well as the gradual improvement in air quality in the Pearl River Delta (PRD) region. Latest progress of key air quality improvement measures is set out in **Annex C**.

14. The AQOs of SO₂, lead and carbon monoxide were attained in 2015 while we are still working towards the attainment of the AQOs for RSP, FSP, NO₂ and ozone. The status of compliance with the AQOs in 2015 is set out in **Annex D**.

15. With the rolling out of more new air quality improvement measures and the collaboration with the Guangdong authorities, we will continue to improve the air quality in Hong Kong with a view to broadly attaining the AQOs by 2020.

ADVICE SOUGHT

16. Members are invited to give comments on the work plan of the AQO review as set out in paragraphs 3 to 11 of the paper.

Environment Bureau
Environmental Protection Department
April 2016

Hong Kong's Air Quality Objectives

Pollutant	Averaging time	Interim Target-1 ($\mu\text{g}/\text{m}^3$)	Interim Target-2 ($\mu\text{g}/\text{m}^3$)	Interim Target-3 ($\mu\text{g}/\text{m}^3$)	WHO AQGs ($\mu\text{g}/\text{m}^3$)	Number of Exceedances Allowed
Sulphur Dioxide (SO ₂)	10-min	-	-	-	<u>500</u>	3
	24-hour	<u>125</u>	50	-	20	3
Respirable Suspended Particulates (RSP/PM ₁₀)	24-hour	150	<u>100</u>	75	50	9
	Annual	70	<u>50</u>	30	20	Not Applicable
Fine Suspended Particulates (FSP/PM _{2.5})	24-hour	<u>75</u>	50	37.5	25	9
	Annual	<u>35</u>	25	15	10	Not Applicable
Nitrogen Dioxide (NO ₂)	1-hour	-	-	-	<u>200</u>	18
	Annual	-	-	-	<u>40</u>	Not Applicable
Ozone (O ₃)	8-hour	<u>160</u>	-	-	100	9
Carbon Monoxide (CO)	1-hour	-	-	-	<u>30,000</u>	0
	8-hour	-	-	-	<u>10,000</u>	0
Lead (Pb)	Annual	-	-	-	<u>0.5</u>	Not Applicable

Note :

Figures in bold and underlined in the above table are Hong Kong's AQOs

WHO – World Health Organization

AQGs – Air Quality Guidelines

**Annual Average Concentration of Key Air Pollutants in Hong Kong
from 2011 to 2015 (in $\mu\text{g}/\text{m}^3$)**

Station		2011	2012	2013	2014	2015*	Change between 2011 and 2015
RSP (PM ₁₀)	General	48	42	47	43	38	-21%
	Roadside	61	53	57	50	45	-26%
FSP (PM _{2.5})	General	33	28	31	29	25	-24%
	Roadside	38	36	37	32	30	-21%
NO ₂	General	53	51	54	49	46	-13%
	Roadside	122	118	120	102	99	-19%
SO ₂	General	13	11	13	11	9	-31%
	Roadside	12	10	11	9	8	-33%
O ₃	General	41	40	43	46	45	10%
	Roadside	13	15	14	21	19	46%

Note:

* 2015 data are preliminary only.

Progress of Key Air Quality Improvement Measures

Air Quality Improvement Measures	Latest Progress
<i>1) Vehicle emission control</i>	
<p>Launched an incentive-cum-regulatory scheme to phase out about 82 000 Pre-Euro IV diesel commercial vehicles (DCVs) in stages by 2019.</p>	<p>The scheme was launched in March 2014. As at end of February 2016, about 39 700 pre-Euro IV DCVs or 48% of the eligible pre-Euro IV DCVs participated in the ex-gratia payment scheme and retired. All eligible pre-Euro DCVs had been phased out by 31 December 2015.</p>
<p>Strengthened emission control of LPG and petrol vehicles</p>	<p>The program was implemented in September 2014. As at end of February 2016, our roadside remote sensing devices checked some 940 000 vehicle counts. About 5 600 Emission Testing Notices were issued to vehicle owners concerned requiring them to have their vehicles repaired and passed an emission test with the aid of a chassis dynamometer at a Designated Vehicle Emission Testing Centre within 12 working days. The Transport Department cancelled licences of about 270 vehicles for failing to pass the emission test.</p> <p>The strengthened control has helped to reduce the number of taxis and light buses with excessive emissions from over 80% before the control regime to about 10%, 15 months after implementation.</p>
<p>Retrofitting Euro II and III franchised buses with selective catalytic reduction devices</p>	<p>The franchised bus companies are fully subsidized by the Government to retrofit some 1 400 eligible Euro II and III franchised buses with SCRs to upgrade their emission performance to that of Euro IV or above level. As at end of February 2016, about 360 eligible franchised buses have been retrofitted with SCRs. Our target is to complete the entire retrofit programme by the end of 2016 on a best endeavour basis.</p>

<p>Promoting the use of green transport technologies</p>	<p>The Government has been taking the lead in promoting a wider use of EVs and working with the private sector in expanding the charging network. As at end of February 2016, there were 4 629 EVs in Hong Kong, up from 96 in end 2010. 245 EVs are in the Government fleet. There are about 1 300 public chargers across the territory, including over 200 medium chargers, 15 CHAdeMO quick chargers and 142 quick chargers of other charging standards. The First Registration Tax for EVs has been waived since 1994 and the current exemption will last until 31 March 2017.</p> <p>The trial run of six double-deck hybrid buses is in progress as they have commenced operation by end 2014 on six bus routes. Five single-deck electric buses have been put into service since end of 2015. The remaining 31 electric buses would be put into service progressively in 2016.</p> <p>As at end of February 2016, the Pilot Green Transport Fund approved 87 trials with a total subsidy of about \$88 million to test out various green transport technologies including electric taxis, buses and trucks as well as hybrid trucks.</p>
<p>2) Marine Emission Control</p>	
<p>Mandated ocean-going vessels (OGVs) to switch to low sulphur fuel (with a sulphur content not exceeding 0.5%) while berthing in Hong Kong</p>	<p>Since the implementation of the regulation on 1 July 2015, we have seen notable reduction in the concentrations of SO₂ in the vicinity of container terminals and other port areas. For example, when the wind was blowing from the container terminals, the average SO₂ concentration recorded at Kwai Chung air quality monitoring station had been reduced by around 50% as compared with the average of 2010 to 2014. As at end of February 2016, about 16000 OGV calls had switched to low sulphur fuel while berthing in Hong Kong.</p>
<p>3) Non-road Mobile Machinery</p>	
<p>Imposed emission standards for all non-road mobile machinery (NRMMs) newly supplied for use in Hong Kong</p>	<p>The regulation took effect on 1 June 2015. Starting from 1 December 2015, only approved or exempted NRMMs with proper labels shall be used in specified activities such as the airport, port facilities, construction sites, designated waste disposal facilities, etc. As at end of February 2016, about 40000 applications were approved covering about 35000 exemptions of existing NRMMs and 5000 newly supplied NRMMs</p>

4) Power plant,	
Tightening the emission caps of power plants	We have been progressively tightening up the statutory emission caps of power plants via the promulgation of Technical Memorandum (TM) issued under the Air Pollution Control Ordinance. We issued the fifth TM in December 2015 to further tighten the emission caps from 2020 onwards. Compared to the emission caps set in the first TM issued in December 2008, the emission caps for SO ₂ , NO _x and RSP in the fifth TM will be reduced by 50% to 69%.
5) Regional Collaboration	
Reducing emissions in Hong Kong and the PRD region	In November 2012, both Governments agreed to set emission reduction targets for four key air pollutants, namely SO ₂ , NO _x , RSP and volatile organic compounds (VOCs) in Hong Kong and the Pearl River Delta (PRD) region for 2015 and 2020. In February 2015, both sides started a joint mid-term review with a view to concluding the emission reductions for 2015 and finalizing the emission reduction targets for 2020. The review is expected to be completed in 2017.
Setting up a marine emission control area (ECA) in PRD waters	In December 2015, the Ministry of Transport (MoT) issued an implementation plan for controlling marine emissions in three major regions in the Mainland including the PRD region. Under the plan, an ECA will be established in the PRD waters requiring OGVs to switch to low sulphur fuel (with sulphur content not exceeding 0.5%) while at berth in PRD ports progressively from 2017. We will collaborate with MoT and Guangdong authorities on the setting up of the ECA which will further reduce emissions from OGVs in the PRD region.

Compliance Status of Air Quality Objectives in 2015

Pollutants	Averaging time	Air Quality Objectives ($\mu\text{g}/\text{m}^3$)	Number of Exceedances Allowed	Compliance Status ⁽¹⁾	
				General Station	Roadside Station
Sulphur Dioxide	10-min	500	3	Yes	Yes
	24-hour	125	3	Yes	Yes
Respirable Suspended Particulates (RSP/PM ₁₀)	24-hour	100	9	No (maximum number of exceedance up to 18)	No (maximum number of exceedance up to 11)
	Annual	50	Not Applicable	Yes	No (maximum level up to $55\mu\text{g}/\text{m}^3$)
Fine Suspended Particulates (FSP/PM _{2.5})	24-hour	75	9	No (maximum number of exceedance up to 11)	No (maximum number of exceedance up to 10)
	Annual	35	Not Applicable	Yes	No (maximum level up to $37\mu\text{g}/\text{m}^3$)
Nitrogen Dioxide	1-hour	200	18	No (maximum number of exceedance up to 67)	No (maximum number of exceedance up to 460)
	Annual	40	Not Applicable	No (maximum level up to $64\mu\text{g}/\text{m}^3$)	No (maximum level up to $106\mu\text{g}/\text{m}^3$)
Ozone	8-hour	160	9	No (maximum number of exceedance up to 24)	Yes ⁽²⁾
Carbon Monoxide	1-hour	30,000	0	Yes	Yes
	8-hour	10,000	0	Yes	Yes
Lead	Annual	0.5	Not Applicable	Yes	Yes

Note:-

- (1) An AQO is not in compliance with if any of the general or roadside stations fails to meet that AQO.
- (2) Roadside ozone level is usually low due to its rapid reaction with nitrogen oxides emitted from vehicles.