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## **Report of the Subcommittee on Improving Air Quality for submission to the Panel on Environmental Affairs**

### **Purpose**

This report gives an account of the work of the Subcommittee on Improving Air Quality during the 2008-2009 session.

### **Background**

2. The ambient air pollution problem has all along been a public concern. It not only has a significant bearing on public health and the quality of life, but also on the long-term development of Hong Kong. Multinational enterprises are reluctant to set up their regional headquarters in Hong Kong due to the deteriorating air quality. The problem is compounded by a combination of factors, including high population density, high concentration of vehicles, as well as air pollution in the Pearl River Delta (PRD) Region. On the regional front, the Hong Kong Special Administrative Region Government (HKSARG) and the Guangdong Provincial Government (GPG) have jointly formulated the PRD Regional Air Quality Management Plan (Management Plan), which aims at achieving specific emission reduction targets by 2010. On the local front, the Administration is reviewing the Air Quality Objectives (AQOs) taking into account the World Health Organization (WHO)'s Air Quality Guidelines (AQGs). Other measures, including imposing emission caps on power plants, providing financial incentives to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles, banning idling vehicles with running engines, promoting energy conservation and saving, are being undertaken or contemplated.

### **The Subcommittee**

3. To enable more focused discussion on Government's efforts in addressing air pollution, the Panel decided at its meeting on 27 October 2008 to set up a subcommittee to monitor and study policies as well as public concerns on improving air quality. The terms of reference and membership of the Subcommittee are given in **Appendices I and II** respectively.

4. Under the chairmanship of Hon Audrey EU Yuet-mee, the Subcommittee has held eight meetings to exchange views with the Administration and deputations.

## Major work

### Government efforts in addressing climate change

5. The Subcommittee has noted that Hong Kong has adopted the Asia-Pacific Economic Co-operation (APEC) Leaders' Declaration on Climate Change, Energy Security and Clean Development alongside some other 20 APEC member economies to achieve a reduction in energy intensity of at least 25% by 2030 (with 2005 as the base year). Some members have enquired about greenhouse gases (GHG)<sup>1</sup> emissions in Hong Kong and how these compare with the rest of the world. They have also enquired about the targets for measures to address climate change.

6. According to the Administration's submission in April 2009, Hong Kong is a relatively small emitter of GHG since it is a service economy without any energy intensive industries. The total annual GHG emissions in Hong Kong is about 47 million tonnes carbon dioxide (CO<sub>2</sub>)-equivalent<sup>2</sup>, accounting for around 0.1% of global emissions<sup>3</sup>. The GHG emissions per capita in recent years are maintained at around 6.7 tonnes. Hong Kong's carbon intensity of growth, in terms of the amount of CO<sub>2</sub> emitted for every dollar in wealth created, is lower than countries like Australia, the United States, the United Kingdom, Japan and Singapore etc. Taking account of the local situation, the most effective way for Hong Kong to control its GHG emissions in support of the international efforts to combat climate change is to enhance its overall energy efficiency. To achieve the APEC-wide regional aspirational goal of achieving a reduction in energy intensity of at least 25% by 2030, the Administration has set out a host of actions to enhance energy efficiency as well as wider use of cleaner energy. In addition to those measures implemented prior to October 2008, the 2008 Policy Address has also set out new initiatives in support of Hong Kong's transition to a low carbon economy. These measures and new initiatives, as reported in January 2009, mainly include –

- (a) *cleaner fuels for electricity generation* – apart from banning the construction of coal-fired power generation units in favour of cleaner gas-fired units since 1997, HKSARG and the National Energy Administration have signed a Memorandum of Understanding on the continuous supply of nuclear electricity and natural gas to Hong Kong in

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<sup>1</sup> Greenhouse gasses (GHG) are components of the atmosphere, including water vapour, carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide and ozone. GHG act like a blanket around the earth, trapping heat and keeping the planet warm. If the concentration of GHG in the atmosphere increases, the average surface temperature of the earth will increase. With more GHG released to the atmosphere due to human activities, more heat is being trapped near the earth's surface, giving rise to global warming. Associated with global warming are other changes in the climate system, including changes in the frequency and intensity of extreme weather and climate events such as heat wave, cold spells, heavy rain, droughts and tropical cyclone.

<sup>2</sup> CO<sub>2</sub>-equivalent is a metric measure used to compare the emissions from various GHG based upon their global warming potential (GWP). The CO<sub>2</sub>-equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP.

<sup>3</sup> Intergovernmental Panel on Climate Change estimated that the global GHG emission was 49 billion tonnes CO<sub>2</sub>-equivalent in 2004.

the next two decades to ensure a long-term and stable supply of clean energy to Hong Kong. In addition, effort is being made to promote wider application of renewable energy by local power companies through provision of necessary incentives under the new Scheme of Control Agreements;

- (b) ***enhancing building energy efficiency and carbon auditing*** – a set of carbon audit guidelines for buildings in Hong Kong has been launched in July 2008 to facilitate the users and managers of buildings to calculate amount of GHG emissions due to their building operations and to explore rooms for improvement. In parallel, a “Green Hong Kong • Carbon Audit” campaign has been embarked to encourage different sectors of the community to participate. In addition, \$450 million have been reserved under the Environment and Conservation Fund (ECF) to provide subsidies to eligible applicants to conduct energy-cum-carbon audits and energy efficiency improvement projects in buildings. The Administration has also adopted a comprehensive target-based environmental performance framework for government buildings, and identified Kai Tak Government Offices and an educational building under planning as energy efficiency demonstration projects. The scope of application of the Building (Energy Efficiency) Regulation and the overall thermal transfer value standard of buildings are also being reviewed;
- (c) ***Mandatory Energy Efficiency Labelling Scheme*** – the Administration plans to fully implement the initial phase of the scheme, and prepares to extend the Energy Efficiency (Labelling of Products) Ordinance for the second phase of the scheme;
- (d) ***mandatory implementation of the Building Energy Codes (BEC)*** – the Administration plans to submit legislative proposal for the mandatory implementation of BECs in 2009 which will help achieve, in the first decade of implementation, an energy saving of around 2.8 billion kWh and a reduction in CO<sub>2</sub> emission in the region of 1.96 million tonnes;
- (e) ***district cooling system at the Kai Tak Development*** – the implementation of a central water-cooling system for providing more energy-efficient air-conditioning services for public and private non-domestic developments in the region will achieve an annual saving in electricity consumption by 85 million kWh and a reduction of 59 500 tonnes of carbon emission;
- (f) ***study on phasing out incandescent light bulbs*** – the study will look into the feasibility of introducing statutory restriction on the sale of incandescent light bulbs in order to promote the use of more energy-efficient lighting installations;

- (g) ***Light-emitting diode (LED) traffic light*** – replacement of all conventional traffic signal at 1 900 signalized junctions with LED traffic signals by phases before 2012 will save electricity of some 7.6 million kWh and prevent GHG emissions by 5 300 tonnes each year;
- (h) ***energy wastage of external lighting*** – consultancy study is being conducted to assess the options and feasibility of regulating external lighting;
- (i) ***better utilization of landfill gas*** – landfill gas recovered from both operating and restored landfills is being used to produce energy as in the case of North East New Territories Landfill and Sheung Wan Landfill. Continued efforts will be made to maximize the treatment and utilization of landfill gas from the remaining landfills;
- (j) ***land transport*** – coverage of the public transport system, in particular the railway network, will be continuously extended. To promote the use of energy-efficient vehicles, tax incentives by reducing the First Registration Tax by 30%, subject to a cap of HK\$50,000 per car, will be provided;
- (k) ***greening*** – tree plantation programmes and green roof projects will be implemented in new government buildings;
- (l) ***clean development mechanism (CDM) projects*** – the Arrangements for the Implementation of CDM Projects in HKSAR has been announced to facilitate the commissioning of CDM projects by HK companies; and
- (m) ***raising community awareness*** – consideration is being given to introducing a scheme to extend the existing Hong Kong Awards for Environmental Excellence to recognize carbon reduction efforts by private enterprises.

Moreover, an 18-month consultancy study on climate change is being undertaken to assess its impact on Hong Kong, and to recommend suitable strategies to further enhance the adaptation and mitigation measures.

7. Some members have questioned the need for consultancy studies on initiatives, such as energy wastage of external lighting and phasing out of incandescent light bulbs, given the availability of abundant reference materials from overseas. The Administration has advised that studies on light pollution are considered necessary in view of the different perceptions on what constitutes excessive lighting, and the feasibility of different means to tackle the problem. Studies on phasing out of incandescent light bulbs are also required as alternatives would need to be identified before a phasing-out programme could be devised. As regards efforts to promote carbon audits, the Administration advises that consideration would be given to briefing District Councils and building owners on how

energy-efficient installations and carbon audits could help achieve energy savings. Building owners would also be encouraged to engage relevant professionals to conduct carbon audits using the subsidy under ECF. To facilitate public understanding, the Administration takes on board members' suggestion of using examples to illustrate how energy-efficient installations could reduce electricity consumption of a building, as well as the cost and savings to be achieved.

Progress of measures to achieve the emission reduction targets under the Pearl River Delta Regional Air Quality Management Plan beyond 2010

8. The Subcommittee has noted that while the emission levels of nitrogen oxides (NO<sub>x</sub>), respirable suspended particulates (RSP) and volatile organic compounds (VOC) in Hong Kong have dropped when compared with those in 1997, the emission level of sulphur dioxide (SO<sub>2</sub>) has increased by 3% due to a rise in the use of coal in power generation in the past few years. The use of coal has since been reduced but is still higher than in 1997. Details are as follows –

	<b>Emission Level in 1997 (Tonnes)</b>	<b>Change in Emission Level during 1997-2007</b>	<b>Emission Reduction Target for 2010</b>
SO <sub>2</sub>	66 200	+3%	-40%
NO <sub>x</sub>	124 000	-21%	-20%
RSP	11 500	-51%	-55%
VOC	68 800	-42%	-55%

Some members have expressed concern about the efficacy of emission reduction measures taken by the Administration in achieving the 2010 emission reduction targets. The same also applies to GPG which has to take on board additional control measures targeting at major emission sources as revealed in the Mid-term Review of the Management Plan.

*Power sector*

9. According to the Administration, power generation is the main source of emissions in Hong Kong. To deliver the 2010 emission reduction targets, the Government had adopted the following principles for environmental policy towards the power sector –

- (a) power companies should use the best practicable means to reduce emissions as required in the Air Pollution Control Ordinance (Cap. 311) (APCO), and at the same time enhance the operation efficiency of the power plants as well as the combustion and generation efficiencies;
- (b) power companies must use low-sulphur coal for the existing coal-fired generating units;

- (c) power companies should maximize the use of the existing gas-fired generation units;
- (d) all new generation units to be developed from 1997 onwards should be powered by natural gas;
- (e) emission caps are imposed starting August 2005 on any specified licences issued or renewed to power companies under APCO; and
- (f) power companies should actively consider adopting the most effective economic tools, including emissions trading, to achieve the emission reduction targets.

Moreover, HKSARG has signed a Memorandum of Understanding with the National Energy Administration on 28 August 2008 to ensure a stable and long-term supply of nuclear electricity and natural gas from three different sources, namely offshore gas, piped gas and liquefied natural gas. Efforts are also being made to actively explore ways to gradually increase the use of clean energy by, for example, increasing the proportion of natural gas for local electricity generation from the present 28% to 50% as part of the measures to improve air quality under the review of AQOs.

10. To encourage the power companies to take more proactive steps to reduce emissions and sustain strict compliance with the environmental requirements, the Administration has set out a number of incentives and penalties in the Scheme of Control Agreement signed in January 2008. These arrangements include –

- (a) linking the permitted rate of return of the two power companies to their environmental performance. An incentive on rate of return will be provided for rewarding better than required performance in reducing emissions and improving air quality. Likewise, the new arrangements provide for penalty on rate of return for emitting more pollutants than permissible; and
- (b) providing a higher rate of return to the power companies for their investment in renewable energy facilities, offering them an increase in permitted return depending on the extent of renewable energy usage in their generation.

To achieve the emission caps of 2010 and beyond, both power companies are also actively engaging in retrofitting their existing coal-fired units by flue gas desulphurization for removal of SO<sub>2</sub>, and low NO<sub>x</sub> burner or selective catalytic reduction for reduction of NO<sub>x</sub> emission, as well as increasing the gas-firing power generation. The retrofit projects are expected to complete in phases between 2009 and 2011. With the full implementation of their respective emission reduction programmes, both power companies are confident that they could fully meet the emissions caps.

*Transport sector*

11. The Subcommittee has noted that road vehicles are the second largest source of air pollution, and the main source of roadside air pollution in Hong Kong. To reduce vehicular emission, the Administration has introduced additional measures, inter alia, a \$3.2 billion one-off grant scheme to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles. Some members have expressed concern about the lukewarm response to the scheme, which may be mainly attributed to the fact that many vehicle owners in the trades are facing financial difficulties in continuing their businesses let alone replacing their vehicles. To optimize the use of the one-off grant to keep polluting vehicles off the roads, consideration could be given to increasing the amount of subsidy in order to enhance the attractiveness of the scheme, providing a grant to vehicle owners who scrap their old vehicles without replacement or with replacement by second-hand vehicles with a higher emission standard, or extending the scheme to cover franchised buses and other types of vehicles, including motorcycles.

12. According to the Administration, the main objective of the \$3.2 billion one-off grant scheme is to facilitate the transport trades to continue their businesses with new and less polluting vehicles rather than encouraging them to give up their businesses. Hence, the Administration does not consider it justified to provide subsidy under the one-off grant to vehicle owners who decide to end their businesses and scrap their vehicles for whatever reasons. Since the introduction of the incentive scheme, some 12 000 out of the 60 000 existing pre-Euro and Euro I diesel commercial vehicles in Hong Kong have been replaced, and about 6 000 old diesel commercial vehicles taken out of service. It is believed that the existing scheme has provided considerable fiscal incentive for the eligible vehicle owners to replace their old vehicles with new ones.

13. As for franchised buses, the Administration agrees that they are a major and visible source of roadside air pollution at busy corridors. Reducing the number of bus trips and bus stopping activities at busy corridors, and restricting older buses from entering busy corridors will go a long way towards improving the roadside air quality. Apart from requesting franchised bus companies to replace their older buses according to operational needs and, after balancing different requirements, deploy more environment-friendly buses to busy corridors as far as possible, the Administration is also undertaking the following initiatives targeting at busy traffic corridors –

- (a) ***pilot low emission zones (LEZ)*** – a study on the feasibility of setting up a LEZ in one or more busy corridors to restrict franchised buses with higher exhaust emissions from entering LEZ, and to evaluate the effectiveness of the measures in improving roadside air quality is underway. In addition, the Administration will examine possible ways to ensure that the franchised bus companies will continue to provide effective services to passengers in various districts, the road traffic in different districts will not be affected, and the impact of pilot LEZ on roadside air quality in other areas can be minimized or avoided. The study is expected to be completed in 2010;

- (b) ***rationalization of bus routes*** – Transport Department (TD) has been working with District Councils (DCs) and the franchised bus companies to pursue route cancellations, amalgamations, truncations and frequency reductions so as to reduce the number of bus trips and bus stopping activities, particularly on busy corridors. TD will seek to balance the public demand for bus services and the need to improve road traffic and the environment, and pursue further bus service rationalization in consultation with DCs where practicable; and
- (c) ***bus-bus interchange schemes*** – these schemes are pursued as one of the measures to achieve more efficient use of bus resources, relieve congestion, minimize environmental impact on busy corridors, and reduce the need for long-haul point-to-point bus routes. They have also improved the bus network and facilitated inter-district travel while minimizing the need for introducing additional bus routes.

14. On LEZ, members have enquired about the parameters and details of the feasibility study, and the possible locations of LEZ. According to the Administration, overseas experiences have shown that the setting up of LEZ to restrict entry to cleaner vehicles in areas with heavy traffic could help improve roadside air quality. To evaluate the effectiveness of LEZ and the implications of such zones in Hong Kong, the Administration is examining the feasibility of setting up pilot LEZ targeting at franchised buses, which contribute up to about 40% of the RSP and NO<sub>x</sub> in busy traffic corridors. Deploying cleaner buses to run along these corridors could bring about substantial improvement to roadside air quality within the zones. The pilot scheme would further help assess the potential implications on commuters, the affected businesses in the zones and other transport operators. To maximize the environmental benefits and to facilitate maintenance of improvement in roadside air quality, three busy corridors at Causeway Bay, Central and Mongkok where franchised buses make up a substantial amount of the traffic will be selected for setting up LEZ. Given that about 92% of the franchised buses serving the three busy corridors have already met Euro II or above emission standards, the minimum emission standard for franchised buses passing through the pilot LEZ should be more stringent than Euro II, say Euro III or Euro IV standards, in order to further improve roadside air quality in these zones. Exact locations and boundaries of the pilot LEZ are subject to detailed examination with TD and the franchised bus companies. Other stakeholders will also be consulted.

15. Apart from franchised buses, members hold the view that all vehicles with higher exhaust emissions should be restricted from entering LEZ. In addition to the types of vehicles, consideration should also be given to imposing a restriction on the minimum number of passengers on board of vehicles entering LEZ. According to the Administration, the proposed restriction on number of passengers would likely have many practical and enforcement difficulties. For example, franchised bus operators are required to provide scheduled services to commuters, and they could not know beforehand the number of passengers that would be on board the concerned buses before entering the pilot LEZ. The Administration has also advised that it is



examining different options for imposing the minimum emissions standards for franchised buses entering the pilot LEZ. The emission standards could be applied to all the passing franchised buses or certain percentage of them. It could also be applicable during certain time of the day, such as busy traffic hours, or throughout the entire day. As the practicality of launching the pilot LEZ would hinge crucially on the availability of sufficient compliant buses, the Administration would need to take account of the replacement plans of the franchised bus companies in coming years in developing proposed arrangements for the pilot LEZ. Discussions are being held with the franchised bus companies with a view to assessing the feasibility and implications of various LEZ scenarios. The study on LEZ is expected to be completed in 2010.

16. The Subcommittee has noted that of the 5 800 franchised bus fleet, only 1300 buses are Euro III or above buses (about 1200 Euro III, 90 Euro IV and 1 Euro V buses). The number is far less than the 2 600 plus buses now plying through the three major bus corridors. Given the service life of franchised bus of not more than 18 years, members express concern that it will take a long time for franchised bus companies to replace their more polluting pre-Euro and Euro I buses. To encourage early replacement of the existing bus fleets with more environment-friendly models, some members have suggested extending the \$3.2 billion one-off grant scheme to franchised buses. As a step forward, some members have also suggested that consideration could be given for the Administration to procure and lease the replacement buses to franchised bus companies with a view to expediting the replacement process.

17. The Administration has explained is that the one-off grant has been designed to cover all old diesel commercial vehicles, except franchised buses, because franchised bus companies are required to submit each year a five-year forward planning programme which comprises a vehicle replacement plan. Besides, the franchised bus companies have already committed to using buses below 18 years old for their franchised bus services. This has taken account of the maintenance, operational and financial capability of the bus operators and their obligations to provide a proper and efficient service to the public. Based on the age distribution of the existing franchised buses, it is anticipated that all the pre-Euro, Euro I and Euro II buses will retire by 2012, 2015 and 2019 respectively while Euro III buses will retire by 2026. Accelerating the pace of the bus replacement programme would have an impact on bus fare and the operation of bus companies. As regards the proposal for the Administration to procure and lease the replacement buses to franchised bus companies, the Administration advises that it has read-across implications on other commercial businesses. The capability of bus suppliers in producing double-deck buses, which are the workhorses of local franchised bus companies, is limited. It is also worth noting that the bus suppliers will have to supply on average about 400 buses each year from now to 2015 for replacement of all 1 800 pre-Euro I and Euro buses under the replacement programmes of franchised bus companies. They may not be able to cope with a sudden and major surge in demand for double-deck buses in the short term.

18. Some members agree with the Administration that the proposal for the Administration to procure and lease the replacement buses to franchised bus companies is not feasible on account of the read-across implications. Other members however find the Administration's excuse that bus suppliers may not be able to cope with a sudden surge in demand for double-deck buses unacceptable. Notwithstanding, the Subcommittee concurs that the Administration should seriously examine all possible ways to encourage franchised bus companies to expedite early replacement of their existing bus fleets with more environment-friendly models. These may include requesting franchised bus companies to advance orders for new buses, sourcing compliant bus models from other places say the Mainland etc. Some members have suggested that consideration could also be given to providing incentives, such as allowing franchised bus companies to develop more profitable routes and/or increase bus fare, to encourage early replacement of more polluting franchised buses.

19. On bus service rationalization plan, members have enquired about the number of bus routes which have been cancelled, amalgamated and truncated, as well as the number of buses which have been scrapped as a result. According to the Administration, TD implements annually the bus service rationalization plan in various districts taking into account the situation on the ground, including passengers' demand. Following the commissioning of a number of new railways over the past five years (from 2004 to 2008), TD has cancelled 44 bus routes, truncated 17 routes, reduced the frequency of 54 routes under the bus service rationalization plans taking into account the changes in demand of bus passengers. On the other hand, TD has also introduced 20 new routes and increased the frequency of 66 routes over the same period. The number of franchised buses in service decreased from 6 179 in end 2003 to 5 794 in end 2008.

20. The Subcommittee has noted that apart from vehicles, vessels are also a major source of air pollution. Among local emission sources, vessels ran second in respect of SO<sub>2</sub>, third in NO<sub>x</sub>, and fifth in RSP. Of local vessels, domestic ferries account for 44% of the SO<sub>2</sub>, 54% of the NO<sub>x</sub>, and 66% of the RSP emitted from local vessels. Moreover, their emissions are more visible to the people living or working near to the shore of the harbour area. Hence, there is an imminent need for measures to reduce emissions from ferries to improve the air quality in Hong Kong.

21. In this connection, the Administration has explained that for ocean-going vessels, the Government has since June 2008 implemented in Hong Kong a limit on the sulphur content of the fuel oil used as well as control on pollutants (including NO<sub>x</sub> and ozone depleting substances) and onboard incineration. As for local vessels, Government vessels have since 2001 switched to ultra low sulphur diesel (USLD). To reduce the emissions of local ferries, the Government has decided to launch a trial of local ferries using USLD. The purposes of the trial are to ascertain the technical feasibility of the fuel switch for local ferries, and to collect essential operation data such as change in fuel consumption and engine power, fuel refilling requirement, maintenance requirement etc. The trial is expected to be launched in the second half of 2009 for nine months. Three ferry operators will set aside altogether five ferries

for the trial, namely three passenger ferries from New World First Ferry Services Limited, one passenger ferry from Hong Kong & Kowloon Ferry Limited, and one vehicular ferry from Hong Kong & Yaumati Ferry Co Ltd. While not opposing to the trial, some members have pointed out that the proposed switch to USLD is impractical because ferry operators are experiencing financial difficulties under the present state of economy. Any policy on the use of USLD by ferries should be worked out in consultation with the Transport Branch of the Transport and Housing Bureau.

#### Progress of review of Hong Kong's Air Quality Objectives

22. In October 2006, WHO released a new set of AQGs which provide a scientific basis for supporting the development of air quality policies and management strategies in various part of the world to protect human health. In response to WHO AQGs, the Administration commissioned a consultancy study in 2007 to recommend a new set of AQOs for Hong Kong and an air quality management strategy to achieve the new AQOs. An Advisory Panel comprising members from various sectors with different background and interests, such as transport, energy and power, as well as from districts, medical, air science, planning, community health etc, has been set up to steer the review. The scope of the review includes the following areas –

- (a) review and characterize the current state of air quality in Hong Kong;
- (b) examine and make reference to the findings and rationale of other governments in devising their respective air quality guidelines or standards;
- (c) assess air quality in Hong Kong under different scenarios with mitigation measures, recommend specific measures and available options to achieve the interim targets and standards if WHO AQGs are to be adopted, and examine in depth the need for co-operation with neighbouring cities and provinces;
- (d) assess the implications of measures identified under different options, the time required to introduce these measures, the need to work with the Mainland and other air quality management authorities outside Hong Kong, and the impacts on other policy areas; and
- (e) derive practicable options to revise Hong Kong's AQOs, as well as identify strategies and measures required in the form of action plan to achieve the revised AQOs.

23. To facilitate a better understanding on AQOs and their associated health impacts, academics in the relevant fields were invited to present their view to the Subcommittee on 12 February 2009. Subsequently, the Subcommittee received a briefing on the preliminary findings of the review on 19 March 2009.

24. The Subcommittee has noted that the consultant recommends a progressive and forward-looking approach in determining the new AQOs taking into account the local situation, technological developments and international practices. Details of the proposed new AQOs are as follows –

Pollutants	Averaging Time	Existing AQOs		Proposed AQOs*									
		( $\mu\text{g}/\text{m}^3$ )	#	<i>IT-1</i>		<i>IT-2</i>		<i>IT-3</i>		<i>AQG</i>			
		( $\mu\text{g}/\text{m}^3$ )	#	( $\mu\text{g}/\text{m}^3$ )	#	( $\mu\text{g}/\text{m}^3$ )	#	( $\mu\text{g}/\text{m}^3$ )	#	( $\mu\text{g}/\text{m}^3$ )	#		
<b>Sulphur dioxide</b>	10-min	-		-								<b>500</b>	<b>3</b>
	24-hour	350	1	<b>125</b>	<b>3</b>	50		-		20			
<b>Respirable Suspended Particulates (PM10)</b>	24-hour	180	1	150		<b>100</b>	<b>9</b>	75		50			
	1-year	55	0	70		<b>50</b>	<b>0</b>	30		20			
<b>Fine Suspended Particulates (PM2.5)</b>	24-hour	-		<b>75</b>	<b>9</b>	50		37.5		25			
	1-year	-		<b>35</b>	<b>0</b>	25		15		10			
<b>Nitrogen dioxide</b>	1-hour	300	3	-								<b>200</b>	<b>18</b>
	1-year	80	0	-								<b>40</b>	<b>0</b>
<b>Ozone</b>	8-hour	240 <sup>1</sup>	3	<b>160</b>	<b>9</b>	-					100		
<b>Carbon Monoxide</b>	15-min	-		-								100,000	
	30-min	-		-								60,000	
	1-hour	30,000	3	-								<b>30,000</b>	<b>0</b>
	8-hour	10,000	1	-								<b>10,000</b>	<b>0</b>
<b>Lead</b>	1-year	1.5 <sup>2</sup>	0	-								<b>0.5</b>	<b>0</b>

Notes

\* The proposed AQOs are presented in bold faces with greyish background.

# Number of exceedances to be allowed:

Any exceedance measured at the general air quality monitoring station(s) at any one time would be counted as one exceedance against the number allowed for a calendar year. The number of exceedances is recommended with reference to the current practices overseas as well as to the predicted air quality situation of Hong Kong after full implementation of the Phase I measures.

<sup>1</sup> There is no existing 8-hour AQO for ozone in Hong Kong. The figure presented above is the 1-hour AQO.

<sup>2</sup> There is no annual AQO for lead in Hong Kong. The figure presented above is the 3-month AQO

25. To achieve the new AQOs, the consultant has preliminarily identified a total of 36 improvement measures to be implemented in three Phases. These measures include increasing the proportion of natural gas in the fuel mix for local electricity generation, advancing the replacement of more polluting vehicles (including franchised buses) and promoting the use of more environment-friendly vehicles,

further tightening the control of emissions from vessels and other sources, introducing traffic management measures (including LEZ) to reduce roadside emissions, expanding rail network, and promoting energy efficiency. The consultant also recommends that regular reviews should be conducted to ascertain the extent to which the new AQOs have been achieved, the progress of the air management strategy, as well as the need and practicality to further tighten AQOs.

26. Some members are disappointed that the consultant has not recommended amending APCO to include the protection of public health as the key parameter in setting AQOs. They have also questioned the rationale for not adopting WHO AQGs in one go but different interim targets for different pollutants, adding that there would not be any incentives for further improvements if AQOs are set too low. According to the Administration, section 7(2) of APCO has already provided that AQOs “should be achieved and maintained in order to promote the conservation and best use of air in the zone in the public interest”. The protection of public health, even though not explicitly stated, is already a key consideration because to do otherwise will not be in “public interest”. Having reviewed the practices of other countries/economies, one possible option for further reinforcing the need to consider “the protection of public health” in setting AQOs would be to spell out this principle in the Technical Memorandum under which the new AQOs are promulgated. The Administration has further advised that AQOs to be set would be stringent yet practicable. The new proposed AQOs are a combination of AQGs and Interim Targets of WHO. In fact, half of the new AQOs in the initial findings of the consultant are at the AQG levels. Interim targets are only proposed for AQGs which cannot be achieved in one single step. Other than those for RSP and fine suspended particulates (FSP or PM-2.5), which are subject to strong regional influence, the proposed new AQOs are comparable to those adopted by advanced countries, such as European Union, United States and Australia. The ultimate goal is to achieve WHO AQGs in the long run.

27. The Subcommittee has studied the basis upon which the cost-benefit analysis for the proposed improvement measures is arrived at. In gist, the cost and benefit values are assessed for a 50-year period from 2009. The cost includes capital cost and operating cost of the measures. The benefits are primarily savings of a direct nature (principally short and long-term related cost savings, including the reduced costs of illness and reduced premature mortality, and savings in electricity cost) and indirect nature (principally impacts on the workforce and costs of maintenance and repair to buildings and structures arising from material damage caused by air pollutants). Some members have enquired about the costs to be borne by different parties and the periods within which the costs are to be recouped. According to the Administration, the cost-benefit analysis is undertaken by the consultant to provide a broad indication on the relative cost-effectiveness of the improvement measures. The analysis only focuses on the economic cost of the proposals to the community as a whole, making no distinction as to whether the costs would eventually be borne by the Government, operators or consumers. As these proposals are at the conceptual stage, the estimates on costs and benefits are subject to uncertainties and variations depending on the timing, implementation details, market situations and community’s response etc.

28. Given that many of the improvement measures proposed by the consultant have already been discussed over a prolonged period of time, members have enquired about the implementation plan of these measures, particularly the two Phase I measures with the highest emission reduction potential viz. increasing the share of local electricity generation by natural gas to 50% or more, and early retirement of aged/heavily polluting vehicles. The Administration's explanation is that of the 36 improvement measures recommended for implementation in three phases by the consultant, some are already in the pipeline while others are new initiatives or involve technologies which are still under development. The Administration aims to implement these measures as soon as possible. However, it is worth noting that the actual implementation plan for some of the Phase I measures would be subject to certain factors and pre-conditions. For instance, to increase the share of local electricity generation by natural gas to 50% will depend on a number of factors. These include the adequate supply of natural gas; lead time required for building additional gas-fired generation units, additional emission abatement measures, and the associated gas supply infrastructure; as well as acceptance of consumers and businesses to bear the additional cost which is expected to increase by phases to at least 20% from the current level. Another proposal to early retire aged/heavily polluting vehicles will likewise carry tariff implications due to an increase in the capital expenditure and operational costs of the transport trades. Depending on the scale of the exercise, advancing the replacement of franchised buses could drive the fare increase pressure to about 15% in a single year. Apart from fare increase, there are also implications on bus companies' financial accounts and operation which need to be addressed. Besides, some measures may require legislation and impose significant resource implications on the Government. All these would need to be carefully assessed when the full consultation is being rolled out.

29. The Subcommittee has questioned that the Administration is trying to use the high costs to discourage the public from demanding for more vigorous measures to improve air quality. Noting from the cost-benefit analysis that there will be medical savings due to better air quality, members have urged the Administration to consider ploughing back the medical savings to cover the anticipated increase in cost/tariffs such that this will not be passed onto consumers.

30. According to the Administration, the pace for implementing the proposed improvement measures or achieving the new AQOs would depend on the feasibility and readiness of the community to adopt the 19 measures, which will require lifestyle changes and incur additional expenditure for households as well as individuals. The Administration has maintained that the estimated cost figures are merely to help the community to discuss in perspective this very important subject. While some of the 19 measures might incur additional expenditure, this could be off-set by measures that would result in savings, such as the promotion of energy efficiency and rationalization of bus routes. The Administration has further advised that the cost-benefit analysis only focuses on the economic cost of the proposed improvement measures, the cost of which is not equal to the actual financial cost of implementing these proposals. Hence, it is not appropriate to compare directly the tariff and fare implications with economic benefit of the proposals. As for the medical savings, these have been

estimated by the consultant based on a host of assumptions and are subject to a great deal of uncertainties. They represent no more than the best attempt to assess the potential medial savings in theoretical sense and should, least of all, be taken as any definitive indication on the actual impact on the medical cost or expenditure. Any suggestion of using public funding to cushion the community from possible increase in electricity tariff and bus fare following implementation of the proposed improvement measures, which runs against the “polluter-pays” principle, will have to be thoroughly deliberated. Any possible impact on the medical expenditure should also be considered separately. Subject to the views collected in the public consultation, the Government will consider how best the proposed air quality improvement measures are to be taken forward.

31. The Subcommittee has examined the feasibility of imposing penalty on service providers who insist to use polluting production methods despite the availability of cleaner options. The Administration has advised that under APCO, emission caps have been imposed on local power plants, which will continue to be tightened up to ensure, among others, the use of best practicable means and hence the choice of cleaner options to prevent the emission of air pollutants from power plants. Failure to meet the emission cap requirements will be liable to prosecution. The penalty for non-compliance is a fine of \$30,000 in respect of each tonne of excessive emissions on a first conviction and a fine of \$60,000 in respect of each tonne of excessive emissions plus imprisonment for six months on a second or subsequent conviction. The concerned power plant will also be required to reduce in the following year extra quantity of emission which is equal to the exceeded quantity of concerned air pollutant. To further ensure strict compliance with the emission cap requirements by the power companies, the Administration has linked their permitted rates of return to their environmental performances in the Scheme of Control Agreements. If the power company exceeds any of their corporate emission caps by 10% and 30%, their rate of return will be reduced by 0.2% and 0.4% respectively.

32. Since air quality in Hong Kong is greatly affected by regional air quality, members consider that concerted efforts from the Guangdong side are necessary. According to the Administration, there is close cross-boundary liaison and cooperation on emission reduction. The 2010 emission reduction targets have provided a solid starting point for both HKSARG and GPG for taking forward the cooperation between the two places. Besides, both Governments have reached consensus to transform the PRD Region into a green and quality living area. The transformation will help further improve the air quality of the PRD Region.

33. Given the far-reaching implications of the review of AQOs, members are very concerned about the timing for the release of the consultation document, and emphasize the need to allow sufficient time for the public to express their views. According to the Administration, the public will be consulted on the proposals as well as the pace, priority and price for their implementation before a view on how best the current AQOs are to be updated and what measures are to be adopted. In the light of the Subcommittee’s concerns, the consultation period for the “Air Quality Objectives Review – Public Consultation” released on 23 July 2009 has been extended from three months to 30 November 2009.

34. The Panel has taken the decision that initial discussions on the consultation document should be held by the Panel whereas the details should be followed up by the Subcommittee. In this connection, the Panel held a meeting on 29 July 2009 to receive a briefing on the consultation document by the Administration. Another meeting has been scheduled for early October 2009 to exchange views with interested parties on the consultation document.

**Advice sought**

35. The Panel is invited to note the work of the Subcommittee.

Council Business Division 1  
Legislative Council Secretariat  
6 October 2009



**Panel on Environmental Affairs**  
**Subcommittee on Improving Air Quality**

**Terms of Reference**

To monitor and study policies as well as public concerns on improving air quality.

**Panel on Environmental Affairs**

**Subcommittee on Improving Air Quality**

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**Date** 14 May 2009