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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 2009-2010 legislative session.

Background

2. The ambient air pollution problem has all along been a public concern. It has a significant bearing on public health and the quality of life, and 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 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. At the first meeting of the Panel in the 2009-2010 session on 15 October 2009, it was decided that the Subcommittee should continue its work in the current session.

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

Major work

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

5. To improve regional air quality, HKSARG reached a consensus with GPG in April 2002 to reduce, on a best endeavour basis, the emissions sulphur dioxide (SO₂), nitrogen oxides (NO_x), respirable suspended particulates (RSP) and volatile organic compounds (VOC) by 40%, 20%, 55% and 55% respectively in PRD Region by 2010, using 1997 as the base year. In December 2003, the two governments jointly drew up the Management Plan with a view to meeting the emission reduction targets. The Pearl River Delta Air Quality Management and Monitoring Special Panel was also set up under the Hong Kong/Guangdong Joint Working Group on Sustainable Development and Environmental Protection to follow up the tasks under the Management Plan.

6. The Subcommittee has been monitoring the progress of implementation of measures, including those under the Management Plan, to improve air quality and to meet the 2010 emission reduction targets. According to information, emission levels of all the four pollutants had dropped when compared with those in 1997. Details are as follows –

	Emission Level in 1997 (Tonnes)	Change in Emission Level during 1997-2008	Emission Reduction Target for 2010
SO ₂	66 200	-13%	-40%
NO _x	124 000	-29%	-20%
RSP	11 500	-54%	-55%
VOC	68 800	-50%	-55%

7. Given that the emission level of SO₂ is way behind schedule, members have questioned how the 2010 emission reduction targets can be achieved. They have also enquired about the consequences in the event of failure to achieve the reduction targets. According to the Administration, it is confident that the 2010 emission reduction targets could be fully achieved since the emissions of NO_x, RSP and VOC have been reduced to an extent close to or even exceeding the reduction targets. To achieve the 2010 emission reduction target for SO₂, the Administration has imposed stringent emission caps in the specified licences of the power plants, since the power sector is the major emission source accounting for nearly 90% of the local emissions.

From 2010, the total SO₂ emissions of the power generation sector will not exceed 25 120 tonnes a year. Should any power company breach the respective emission cap, it would be liable to a fine of \$30,000 for each tonne of excessive emission upon first conviction, and a fine of \$60,000 for each tonne of excessive emission on a second or subsequent conviction as well as imprisonment for six months. Moreover, the power company's rate of return could be reduced by 0.2 or 0.4 percentage points for emitting more pollutants than permitted under the Scheme of Control Agreement. In this connection, the two power companies have been undertaking SO₂ abatement measures to fulfill the statutory emission requirements. The CLP Power Company Limited is retrofitting its four coal-fired generating units with flue gas desulphurization (FGD) facilities, two of which will be completed in 2010 with the rest in 2011. On the other hand, The Hongkong Electric Company Limited has been retrofitting three more coal-fired generating units with FGD facilities, one of which was completed and has been in operation since July 2009 with the remaining retrofit to be completed in mid-2010. Both power companies will also increase the use of natural gas for power generation with a view to meeting the SO₂ emission cap in 2010.

Measures in addressing serious air pollution incidents

8. Dust plume associated with a distant sandstorm originated from Mongolia and northern China had caused the Air Pollution Index (API) in Hong Kong to reach the "Severe" band (i.e. API 201 to 500) during the period from 21 to 23 March 2010. The Subcommittee has noted that the incident has aroused public concern on the need to enhance the present warning system to give more advance notice on the occurrence of serious air pollution incidents. There are also calls for better cooperation with the Mainland on the advance notification of sandstorms and other adverse weather conditions which would have impact on the air quality of Hong Kong.

9. According to the Administration, an air quality monitoring network has been set up through the joint efforts between the Environmental Protection Department (EPD) and the relevant authority in the Mainland to monitor air quality in the PRD Region. Based on the air quality information collected by the network and weather forecast provided by the Hong Kong Observatory (HKO), EPD provides daily forecast of API. In the light of the incident, the two departments have strengthened the collaborative mechanism for monitoring the impact of dust plume on air quality. HKO would provide reports of sandstorms in the Mainland and additional meteorological information, including trajectory analysis and satellite images to EPD. In addition, the API information for major cities in the Mainland is also available on the website. Such information, together with the weather reports provided by HKO, could help EPD to assess whether there are sandstorms in the nearby region that may affect Hong Kong. When an imminent high API caused by dust plume is considered likely, EPD would alert the public as soon as possible. The Administration has also explained that in line with common international practices, API is made in comparison with both one-hour AQOs limits and 24-hour limits for the relevant air pollutants in deciding whether the air pollution level should be ranked high or above. The API readings would change in a timely manner in tandem with the changes in the concentrations of the dominant air pollutant should breaching the one-hour limit be

the determining factor. If, however, the determining factor is breaching the 24-hour limit of an air pollutant, which is currently the case for RSP due to the fact that RSP had a 24-hour limit and not a one-hour limit, the API reading would lag behind the changes in the concentration of the air pollutant because the average of the past 24-hours concentrations of RSP would be used in the calculation of API. To improve the situation, EPD is exploring the feasibility of using an averaging time shorter than 24 hours in the calculation of API for RSP.

10. Noting that the current API system comprises an API ranging from 0 to 500, some members have enquired about the need for additional indicators to reflect air pollution levels beyond API 500. The Administration has explained that the current API system was introduced in 1995 with reference to USA's Pollution Standard Index. As there are new API reporting systems being examined and introduced in other jurisdictions, EPD has commissioned a study to review the API system. In response to the tender invitation, a study team led by the Chinese University of Hong Kong has submitted a technical proposal which has been subsequently accepted. The membership of the study team comprises leading local medical and air science experts. The scope of work of the study is to develop an API reporting system in Hong Kong for accurate and timely communication of the health risks to the public due to ambient air pollution, to develop a turn-key system to come with detailed instruction manuals, necessary software and thorough staff training courses when the proposed new index system is found to be acceptable, and to recommend a detailed plan for smooth transition from the existing to the new reporting system. In view of the significance of the review study, members have requested the Administration to provide the consultancy brief for the review study, and additional information on the membership of the study team and the institutions involved, expected timeframe for completion of the review as well as resources earmarked for the study. The Administration has also been requested to undertake that the full unedited report of the study team will be provided to the Subcommittee and uploaded onto the Government website for public reference.

11. In view of the health risk associated with air pollution, members have opined that legislation and guidelines should be put in place to enhance protection of employees' health and safety when working outdoors in inclement weather. Consideration should be given to introducing a warning system similar to the typhoon/rainstorm signal system to suspend outdoor work on days with extreme API. According to the Administration, the Occupational Safety and Health Ordinance (Cap. 509) and the Factories and Industrial Undertakings Ordinance (Cap. 59) have stipulated the general duties of employers to, so far as reasonably practicable, ensure the safety and health at work of their employees. Employers are therefore required to assess the risks of their employees performing outdoor work on days with high API, and to take appropriate preventive measures to reduce the risks. Unlike typhoons which would pose an immediate threat to public safety, high API levels would not have such an effect. Besides, it would be impractical to set an API level for requiring suspension of all outdoor work given the widely varied nature of outdoor work, particularly the extent of physical exertion involved, in different industries and occupations, let alone the different impacts of air pollution on different people.

Notwithstanding, the Labour Department would in future issue press release on days of high API reminding employers of their responsibility for ensuring safety and health of their employees working outdoors, and advising employees with heart or respiratory diseases to seek medical advice before taking up outdoor work if they are in doubt of their health condition or feel sick.

Progress of review of Hong Kong's Air Quality Objectives

12. In 2007, the Administration commissioned a consultancy study to recommend a new set of AQOs for Hong Kong with reference to WHO AQGs, and an air quality management strategy to achieve the new AQOs. The Review has recommended a new set of AQOs and a host of air quality improvement measures required for attaining the proposed new AQOs. In July 2009, the Administration launched a four-month public consultation on the recommendations. The general feedback indicates that the community has a strong aspiration for effective actions to improve the air quality. Many respondents have indicated that they are willing to bear some of the costs arising from the implementation of the proposed measures. Some also call for the Government to bear part of the costs so as to reduce their impacts, particularly on the low-income families. The public would like to see a clear timeline as to when the proposed measures for attaining the proposed new AQOs could be implemented. There is also a need for strategic planning, effective prioritization and integrated coordination among the various policy bureaux and departments under the steer of a high-power body to lead and oversee the implementation of the proposed air quality improvement measures.

13. According to the Administration, the proposed air quality improvement measures encompass a wide range of areas, covering power plants, motor vehicles, marine vessels, traffic and transport management, as well as energy efficiency improvement. The nature and degree of complexity of these measures vary. Some require huge capital investment and long planning lead time (such as increasing the share of natural gas for electricity generation), some call for raising public awareness and behavioural changes (such as making smarter choices in using more energy efficient appliances), some envisage a new approach to infrastructural development (such as district cooling system), whereas others may require new legislation (such as mandatory implementation of Building Energy Codes). In addition, some of these measures would entail increases in expenses for individuals or businesses.

Power generation sector

14. The Subcommittee has noted that of the recommended air quality improvement measures, the proposal of raising the share of natural gas for local electricity generation to 50% of the overall local fuel mix has the largest emission reduction potential. Given that Hong Kong and the Mainland have signed the Memorandum of Understanding on Energy Co-operation to make available extra supply of natural gas to Hong Kong, members have enquired if the supply of natural gas from the Mainland for local generation has been fully utilized for power generation and if not, the reason behind the under-utilization. They have also

requested the Administration to advise the best practicable means available to enable power companies to increase the use of natural gas for electricity generation.

Transport sector

15. Motor vehicles are the second largest source of air pollution, and the main source of roadside air pollution in Hong Kong. Of the vehicle fleet, diesel commercial vehicles are the major air pollution emitters, accounting for about 88% and 76% of the total vehicular emission of RSP and NO_x respectively. Phasing out aged commercial vehicles thus holds the key to cleaner roadside air quality. In April 2007, the Administration introduced a \$3.2 billion three-year one-off grant scheme to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles. Up to end February 2010, about 24% of eligible commercial vehicles have participated in the grant scheme.

16. In view of the low take-up rate of the grant scheme, relevant stakeholders, including green groups and the transport trades, have been invited to attend Subcommittee meeting in March 2010 to express views on measures to encourage participation in the scheme with a view to optimizing the use of the one-off grant. The Subcommittee has noted that the transport trades have requested for extension of the application period by one to two years to allow eligible owners to make use of the grant. Some have suggested making it a standing scheme to subsidize vehicle owners to replace their old vehicles. Others have requested to increase the grant levels and to abolish the requirement for owners to acquire new vehicles in order to be eligible for the grant. 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. The suggestions of further extending the one-off grant and making it a standing arrangement are also considered not appropriate as it would go against the objective of encouraging early replacement of more polluting vehicles to bring early relief to roadside air pollution. The one-off grant which amounts to 12% and 18% of the cost of a new vehicle for pre-Euro and Euro I vehicles respectively should be adequate and attractive for vehicle owners to replace their vehicles. Notwithstanding, a special arrangement has been worked out to help those eligible vehicle owners who have ordered new replacement vehicles before that cannot arrive on time or cannot complete preparations (such as vehicle body-building works) before the expiry of the application deadline on 31 March 2010 to retain their eligibility for the grant.

17. To further reduce vehicular emissions, the Administration has proposed to introduce another \$540 million one-off grant scheme, with reference to the scheme for pre-Euro and Euro I diesel commercial vehicles, to encourage early replacement of Euro II diesel commercial vehicles. It has also proposed to revisit the need for suitable disincentive measures, such as increasing the vehicle licence fees for aged commercial vehicles, given that relying solely on incentive schemes has proven to be

not as effective as expected to discourage the continued ownership and usage of older commercial vehicles. While welcoming additional measures to reduce vehicular emissions, members have stressed the need for the Administration to conduct a survey to ascertain the adequacy of the grant level to ensure the success of the proposed one-off grant scheme for replacement of Euro II diesel commercial vehicles. Consideration should be given to testing the performance of Euro V vehicles to ease the concerns of the transport trade and encourage participation in the scheme. They have also pointed out that the proposed increase in licence fees would indeed affect the operation of the transport trades, and thus more consultation with the affected trades should be held.

18. According to the Administration, the suggestion of conducting a survey to ascertain the adequacy of the grant level is not practicable because it is not easy for a third party to obtain the actual transaction prices of second-hand vehicles, the market of which is less transparent than the new vehicle market. Apart from the market factors, such as the state of economy, demand and supply etc, the prices of second-hand vehicles would vary according to vehicle age, mileage and vehicle conditions. Therefore, the transaction price of an individual second-hand vehicle should not be used as an objective reference to reflect the overall price levels of second-hand vehicles in the market. The Administration has further explained that the oldest Euro II vehicles have now entered their 13th year of operation, same as the Euro I vehicles at the time when the relevant grant scheme was launched. It is hence reasonable to set the grant level for replacing Euro II vehicles at 18% of the 2009 average vehicle taxable values, the same percentage used in Euro I replacement scheme. Besides, the highest amount of a vehicle owner may receive is about \$200,000, which is higher than that of similar schemes in Japan and European Union countries, such as France and Germany, and should be attractive to vehicle owners. As regards the performance of Euro V vehicles, the Administration has explained that following the launching of the tax incentive scheme for environment-friendly commercial vehicles on 1 April 2008, there are currently more than 130 Euro V commercial vehicle models and the numbers are continuously increasing. Among the current registered commercial vehicles, over 240 are Euro V ones covering light buses, franchised and non-franchised buses, as well as light, medium and heavy goods vehicles. So far, these vehicles are operating normally. It is believed that the actual operational performance of these Euro V vehicles could help ease the trades' concerns.

19. As franchised buses are a major and visible source of roadside air pollution, replacing the more polluting franchised buses will go a long way towards improving the roadside air quality. The Subcommittee therefore urged the Administration to re-consider subsidizing the early replacement of more polluting franchised bus fleet so that the cost incurred will not be transferred to the public through increase in bus fare. According to the Administration, all franchised bus companies are required to operate their franchised bus service with buses below 18 years old. 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. The Administration has been exploring with the bus companies ways to expedite the

replacement of franchised bus. Given the cost of \$3 million of a new double-deck bus, mandating an accelerated pace of bus replacement would likely have impact on bus fare. When considering using public money to subsidize the bus companies to expedite their replacement programme, the Administration has to carefully balance the effectiveness of reducing roadside pollution on one hand and the cost-effectiveness of pre-mature phasing out of franchised buses. Hence, other more cost-effective options, including retrofitting after-treatment devices on in-use franchised buses, were being examined to reduce emissions from the franchised bus fleet. In this regard, franchised bus companies have retrofitted their pre-Euro and Euro I buses with diesel oxidation catalysts that can reduce the particulate emissions by about 30%. They are also in the process of retrofitting their Euro II and Euro III buses with diesel particulate filters, where technically feasible, which can reduce the emissions of particulates, hydrocarbon and carbon monoxide by about 80%. The retrofitting work is expected to be completed within 2010. To reduce NO_x emissions from the franchised bus fleet, the Administration is looking into the feasibility of retrofitting Euro II and Euro III buses with selective catalytic reduction (SCR) devices. A trial would be conducted, and a task force comprising representatives from the major franchised bus companies, overseas and local experts as well as relevant Government departments would be set up to examine the related technical issues and oversee the trial. Subject to the satisfactory of the trial, the Administration will map out the way forward for implementing the SCR retrofit in conjunction with the bus companies. To facilitate better understanding of the trial, the Administration has been requested to provide a paper setting out the coverage of the trial, membership of the task force, expected time for completion of the trial, and whether an independent third party will be engaged to oversee the trial.

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 SO₂, third in NO_x, and fifth in RSP. Of local vessels, domestic ferries account for 44% of the SO₂, 54% of the NO_x, 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. According to the Administration, Government vessels have since 2001 switched to ultra low sulphur diesel (USLD) with a sulphur content 100 times less than that of marine light diesel currently used by local vessels. To ascertain the technical feasibility of powering domestic ferries by USLD, the Administration has launched a trial which is expected to be completed within 2010. The preliminary feedback from the vessels joining the trial indicates that USLD is likely feasible for powering local ferries. However, there will be a price premium between USLD and marine light diesel, and logistical problem with supply of USLD for maritime use in outlying areas of the territory. Some members have pointed out that the Administration should consider providing direct subsidy to ferry companies if it is the policy intent to mandate the use of USLD by local vessels.

Non-road mobile sources

21. Non-road mobile sources include mobile machines, transportable industrial equipment and non-road vehicles powered by an internal combustion engine used primarily off the roads. At present, these non-road mobile machineries (NRMMs) are neither required to comply with statutory emission standards as a pre-requisite for entering the local market nor subject to any legislative air pollutant emission control, except that they must not cause air nuisance and the diesel-driven ones must use diesel with a sulphur content not higher than 0.005%. As NRMMs contribute to about 7% and 11% of the local emissions of RSP and NO_x respectively, there is a need to put these emission sources under control. Under the proposed control scheme, importers must obtain approval regarding emission compliance¹ from EPD before importing NRMMs. Each piece of NRMM (except that for re-export) shall bear a durable and visible engine emission information label for identification. Failure to comply with the requirements will be liable to a fine ranging from \$50,000 to \$200,000 and imprisonment from three to six months.

22. Subcommittee members have enquired about the environmental benefits to be achieved through the proposed control of emissions from NRMMs, and the basis upon which the penalty regime under the control scheme is arrived at. They have also stressed the need for consultation with the affected importers and the logistical trades. According to the Administration, if all NRMMs are replaced with ones meeting the prescribed emission standards, 4.7% and 9% of the local emissions of NO_x and RSP will be reduced. The environmental nuisance generated at container terminals and construction sites near the urban centres could be reduced. The smoke emitted by NRMMs would also be reduced, enhancing the green image of Hong Kong. The Administration has further explained that when drawing up the penalty regime, reference has been made to the provisions in the Air Pollution Control Ordinance (Cap. 311) and the Ozone Layer Protection Ordinance (Cap. 403) and their subsidiary regulations on the import, manufacture and sale of controlled substances. Reference has also been made to overseas jurisdictions' penalty regimes in controlling emissions from non-road mobile sources. A comparison of the proposed penalty regime with those of the United States, Japan and Canada is given in Annex B to LC Paper No. CB(1) 2620/09-10(01). The logistical trades and importers of NRMMs would be included in the consultation exercise.

Promoting energy efficiency

23. The Subcommittee has noted that the Transport Department is replacing conventional traffic signals with light-emitting diode (LED) in three stages for Hong Kong, Kowloon and New Territories regions respectively. The whole replacement programme is expected to be completed in the third quarter of 2010. Based on the results of preliminary technical assessments on the trial of LED street lights along designated streets and LED light tubes on footbridges, the Highways Department has commenced a larger scale trial scheme to replace more than 200 fluorescent light

¹ Emission compliance means meeting relevant emission standards, which are broadly in line with the standards of the European Union, US and Japan.

tubes by LED light tubes at six footbridges and two subways. About 100 LED street lights will also be installed in various districts to further test the reliability and efficacy of LED light fittings. A member has opined that Hong Kong has lagged behind the Mainland in the development and use of renewable energy. Unlike Hong Kong where LED street lights are still on a trial stage, all the street lights in Su Zhou are powered either by solar energy or wind energy. Besides, the responsible Mainland officials have the vision and commitment in taking forward environmental initiatives. In this regard, members requested the Administration to map out a future street lighting system based on the use of solar energy, wind energy or LED. Consideration should also be given the use of photovoltaic panels in mandatory requirement for new buildings to promote the use of renewable energy.

Way forward

24. In view of the far-reaching implications of the AQOs review and the anticipated Government initiatives in improving air quality, members have decided that the Subcommittee should continue its work in the next legislative session.

Advice sought

25. The Panel is invited to note the work of the Subcommittee and the recommendation set out in paragraph 24.

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

Membership list

Chairman	Hon Audrey EU Yuet-mee, SC, JP
Members	Hon Miriam LAU Kin-ye, GBS, JP Hon LEE Wing-tat Hon Jeffrey LAM Kin-fung, SBS, JP Hon KAM Nai-wai, MH Hon Cyd HO Sau-lan Hon CHAN Hak-kan Hon CHAN Kin-por, JP Hon Tanya CHAN (up to 28 January 2010)(rejoined on 24 May 2010)
	(Total : 9 Members)
Clerk	Miss Becky YU
Legal Adviser	Miss Kitty CHENG
Date	24 May 2010