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**Panel on Environmental Affairs**

**Meeting on 23 January 2006**

**Updated background brief on air pollution control**

(Position as at 17 January 2006)

**Introduction**

Air quality in Hong Kong is typical of any large modern city. High concentrations of particulates and nitrogen oxides (NO<sub>x</sub>) in the urban areas are the most pressing problems, causing a nuisance and constituting a health concern. The problems are compounded by a combination of factors, including high population density, high-rise buildings that hinder or prevent circulation of air at street level, and a high concentration of vehicles, especially diesel vehicles, at urban roadside, as well as ambient air pollution in the Pearl River Delta Region.

2. As deteriorating air quality is a major cause of public concern, the Panel on Environmental Affairs (EA Panel) has been closely monitoring the progress of air pollution control measures taken by the Administration to reduce the total emissions of various pollutants, particularly NO<sub>x</sub>, sulphur dioxide (SO<sub>2</sub>), respirable suspended particulates (RSP) and volatile organic compounds (VOC).

**Regional air quality**

3. The ambient air pollution problem has all along been a public concern and a major subject of discussion at meetings of the Council and EA Panel. To improve the air quality of the whole PRD Region, EPD and Environmental Protection Bureau of Guangdong conducted a joint study on regional air quality during 1999-2002. The aim of the study is to analyze the relative significance of different industrial and commercial sources of pollution and their direct and indirect impacts on regional air quality so that air pollution measures can be prioritized accordingly. According to the findings of the study, the economy, population, electricity demand and vehicle mileage in the PRD Region will grow by 150%, 20%, 130% and 180% respectively from 1997 to 2010. In terms of total emissions, Hong Kong accounts for about 5% to 20% of regional air pollution while the PRD Economic Zone of the Mainland accounts for 80% to 95%. Given the continuous economic growth of the PRD

Region, the extensive pollution in the region cannot be mitigated effectively with the existing improvement measures implemented by the two governments. To this end, the Hong Kong Special Administrative Region (HKSAR) Government and the Guangdong Provincial Government (GPG) reached a consensus in April 2002 to reduce by 2010, on a best endeavour basis, the regional emissions of SO<sub>2</sub>, NO<sub>x</sub>, RSP and VOC by 40%, 20%, 55% and 55% respectively, using 1997 as the base year. In December 2003, the two governments jointly drew up the Pearl River Delta Regional Air Quality Management Plan (the Management Plan) with a view to meeting the emission reduction targets. The Pearl River Delta Air Quality Management and Monitoring Special Panel (Special Panel) was also set up under the Hong Kong/Guangdong Joint Working Group on Sustainable Development and Environmental Protection to follow up on the tasks under the Management Plan.

4. The EA Panel has been closely monitoring the progress in mitigating regional air pollution. Members agreed that the problem cannot be resolved by the HKSAR Government alone since the air quality of Hong Kong was increasingly affected by the rapid economic and industrial development in the PRD Region. They are also not optimistic that the emission reduction targets can be met because many industrial activities in the Mainland do not abide by the environmental laws. As such, members consider it necessary for the Special Panel to discharge its duty to follow up on the tasks under the Management Plan. The Administration should also explain to the public the bases upon which the emission reductions targets were arrived at and the means to achieve these targets. More scientific methods, such as satellite mapping and remote sensing, should be used to forecast pollution and to trace the pollution sources more accurately to enhance control. To reduce emissions from power plants from the regional perspective which are a major source of air pollution, the EA Panel supports the early implementation of the proposed emissions trading pilot scheme covering power plants in Hong Kong and Guangdong. Members also urge the Administration to examine the feasibility of introducing renewable energy on a larger scale in Hong Kong through joint ventures with the Mainland counterparts.

### **Air quality in Hong Kong**

5. To improve air quality in Hong Kong, the Administration has introduced a range of measures, mainly in the form of statutory controls, to reduce emissions from the polluting sources. These include reducing emissions from industries, reducing dust emissions from construction activities, reducing emission from motor vehicles and adopting stringent fuel standards.

#### Reducing industrial emissions

6. Major industrial emission sources have been placed under licensing control since 1987 and high sulphur fuels have been banned since 1990. As a result of the control on fuel sulphur content, SO<sub>2</sub> concentrations in industrial areas have fallen by up to 80%. Combined with the reduction in industrial activity, total industrial SO<sub>2</sub> emissions fell from 46 616 tonnes in 1989 (before the ban of high sulphur fuel) to 7 045 tonnes in 2000.

*Emissions from power generation*

7. Emissions from power plants have all along been a cause of public concern and a major discussion item at meetings of the Council, Panel on Economic Services (ES Panel) and EA Panel. To reduce emissions from power plants, all coal fired plants built after 1991 are required to have flue gas desulphurization system and low nitrogen oxide burners. All new power plants approved after 1996 are required to use natural gas. As a result, the SO<sub>2</sub> emissions from power plants fell from 131 600 tonnes in 1991 to 56 803 tonnes in 2000 and NO<sub>x</sub> emissions dropped from 149 000 tonnes in 1991 to 43 627 tonnes in 2000. At the EA Panel meeting on 25 October 2004, members noted that in the past, nuclear energy, coal and natural gas had more or less the same share in power generation. However, more reliance on coal was seen nowadays as a result of unstable supply of natural gas. As coal-fired power generation was very polluting, members opined that the two power companies should endeavour to control emissions as part of their social and corporate responsibility. The Administration should also liaise with the power companies to work out an economically and environmentally acceptable solution to control emissions from power plants. This might include identifying a suitable storage depot for natural gas to ensure stable supply.

8. When the Financial Plans of the two local power companies were discussed at the meeting of the ES Panel on 25 July 2005, members noted with grave concern that the two companies would not be able to meet the intended emission caps set by the Government for 2010. To follow up the issue, the EA Panel subsequently held a special meeting on 29 September 2005, at which deputations were invited to express their views.

9. It was noted that since the Financial Plans were approved in June 2005, EPD had been discussing with the two power companies with a view to finding a package of effective measures for meeting the emissions reduction targets by 2010. As a result, the Hongkong Electric Company Limited (HEC) had agreed to review the possibility of accelerating the emissions reduction projects proposed in its Financial Plan and to join EPD to set up a Task Force to work out a scheme of emissions trading. The CLP Power Hong Kong Limited (CLP) had responded that they were increasing the use of ultra low sulphur coal, progressing with the upfront engineering work for their emissions reduction projects, exploring the feasibility of optimizing the schedule, pursuing the Liquefied Natural Gas (LNG) project to increase the availability of natural gas, and discussing emissions trading with EDP. EPD also took the opportunity, in the renewals of the Specified Process Licence under the Air Pollution Control Ordinance (Cap. 311) (APCO), to impose emission caps on power plants with a view to reducing the emissions to the practical minimum. The questions of how the 2010 emission reduction targets were set and whether the two power companies were consulted on the targets were raised at the meeting. Members noted that the targets were not unilaterally set by EPD but were agreed between the HKSARG and GPG based on health considerations. The emissions reduction targets were considered achievable and the two power companies had been requested to reduce

their emissions since 2003 in an attempt to reach these targets. According to HEC, it would be able to meet the emissions reduction targets by 2010 on condition that the necessary approval for the construction of the new generation unit L10 could be obtained from the Economic Development and Labour Bureau in time, and that there would be a sufficient supply of natural gas. To tackle the problem of insufficient supply of natural gas, CLP was prepared to put in place a receiving terminal for LNG around the world as a long-term solution. Further emission reduction could be made possible through the early commissioning of the LNG terminal.

10. There was concern about the cost implications, particularly the possible impact on electricity charges, in expediting compliance with the emission reduction targets by the two power companies by 2010, as against their own pledges by 2011 or 2012. It was however pointed out that the costs implications of implementing emission reduction measures would be much less as compared to the health costs associated with deteriorating air quality. Besides, HKSARG should uphold the targets so that GPG would follow suit.

#### *VOC emissions*

11. To control VOC emissions, the Administration has introduced a number of regulations since 1999 to require petrol filling stations and petrol delivery vehicles to be equipped with effective vapour recovery systems to recover VOC vapour during the unloading process. All newly built petrol filling stations are also required to install vapour recovery system to recover petrol vapour during petrol vehicle refueling. The EA Panel was consulted on the relevant legislative proposals. While generally supporting these proposals, members emphasized the need for measures to minimize the inconvenience associated with the suspension of service during the installation period.

12. In addition to measures to reduce VOC emissions from petrol filling stations, the Administration has also put forward a plan to adopt a two-stage approach to reduce VOC emissions from paints, printing inks and selected consumer products<sup>Note</sup> in Hong Kong. Under Stage 1 of the proposal, a mandatory registration and labeling scheme will be introduced to require importers or manufacturers of all paints, printing inks and selected consumer products to register with the Environmental Protection Department (EPD) the VOC contents of their products for sale in Hong Kong. They will also be required to ensure that a bilingual label of the VOC contents is either printed upon or securely affixed onto individual containers and/or packaging of the concerned products.

13. When the EA Panel was briefed on the proposed scheme on 28 June 2004, some members expressed concern that the proposal would duly affect those retailers who had to rely on exporters to provide the requisite information on VOC contents.

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<sup>Note</sup> These include general consumables (such as air freshener, insect repellent, cleaner for bathroom and tile, glass, carpet and upholstery etc), personal care products (such as antiperspirant/deodorant, hair shine/spray, nail polish/polish remover etc), car care products (such as automotive wax, polish, sealant, glaze etc) and aerosol coatings.

Besides, the proposed scheme would limit consumers' choice since the registration and labeling requirements would likely affect the import of VOC-containing products manufactured in countries which did not have such requirements. It was also pointed out that the additional cost incurred in complying with the proposed registration and labeling requirements might invariably be transferred to consumers.

14. In September 2004, the Administration embarked a two-month consultation exercise to gauge views of stakeholders. In view of the trades' concerns about the impact of the proposed scheme on their operation, the Panel on Commerce and Industry (CI Panel) held a meeting on 14 December 2004 to receive views from interested parties. While the trades were generally supportive of the need to improve air quality and protect the environment, they held the view that the proposed scheme was at variance with the Government's pledge to improve business environment and employment given the high operating costs arising from testing and labeling of VOC-containing products which might jeopardize the viability of many small and medium enterprises engaged in retail business. Besides, there might not be sufficient laboratories in Hong Kong which were qualified to test VOC levels. There was also concern that the proposed transitional period was too short for importers and retailers to clear their existing stock before the new scheme took effect. They held the view that the Administration should provide clear guidelines on the safety level and testing standards of VOC. Consideration should be given to targeting at products with high VOC content while exempting those of low VOC content. They also requested the Administration to conduct a regulatory impact assessment (RIA) to fully assess the impact of the scheme on the trades.

15. In light of members' concern, the Administration held a number of in-depth discussions with the trades with a view to finding measures that could effectively reduce the emission of VOC and yet minimizing the impacts on the affected trades. A revised control programme was subsequently worked out. In gist, regulatory requirements under the revised control programme will be sector-specific so that they will be the most suitable and effective for the sector concerned. The scope of control for consumer products is also narrowed down to the six largest emitting sources, namely hairsprays, insecticides, insect repellents, air fresheners, floor wax strippers and multi-purpose lubricants. The programme can be expedited and limits on VOC contents can be imposed directly without the first-stage labeling programme. Mandatory registration and testing of VOC products by certified laboratories are no longer required. Products may be imported or manufactured as long as they comply with the relevant VOC limits. The Administration plans to introduce the regulation in 2006 and the first batch of VOC limits will come in force on 1 January 2007 while the majority of the VOC limits will come in force by 1 January 2009. It is estimated that the new regulation can help reduce approximately 8 000 tonnes of VOCs.

16. The revised control programme was discussed by the EA Panel on 28 November 2005. While appreciating the Administration's effort to rationalize the control programme after in-depth discussions with the trades, members emphasized that consultation should have been done well before the control programme was

worked out. To address the concern that importers might need to seek information on VOC content from manufacturers in order to meet the VOC limits, members noted that sufficient time would be allowed for importers/suppliers to re-formulate or source alternative products to meet the VOC limits. They also noted that different implementation dates were proposed for different VOC products, in particular paints and coatings, taking into account the difficulty in finding substitutes and the time required for the re-formulation of paint products. As an interim measure, suppliers of paints had agreed to temporarily affix a warning label on those paints with VOC content in excess of the proposed limits. As regards the effect of the reduction of 8 000 tonnes of VOC in achieving the emissions reduction targets, members noted that the 8 000 tonnes of VOCs to be reduced under the revised control programme constituted a 15% reduction in total VOC emissions. Together with the 23% reduction in VOC emissions resulting from the implementation of a series of measures since 1997 and the continual implementation of the various control programmes, it was expected that the emissions reduction target of 55% of VOC could be met by 2010.

#### Reducing dust emissions from construction activities

17. Dust emissions contribute to high ambient levels of an air pollutant known as Total Suspended Particulates. To prevent and minimize dust emissions, the Administration introduced the Air Pollution Control (Construction Dust) Regulation in 1997 to require contractors of construction sites to implement specified dust measures, including installation and proper operation of dust control systems, enclosing dusty materials and stockpiles or spraying them with water or dust suppression chemicals, treating unpaved surfaces, and implementing good on-site housekeeping measures. As a result, dust emitted from individual construction activities has been reduced by up to 80% in 2000.

#### Reducing emissions from motor vehicles

18. A multi-pronged approach has been adopted by the Administration to reduce emissions from motor vehicles as follows -

- (a) adopting stringent motor fuel and vehicle emission standards;
- (b) retrofitting in-use diesel vehicles with particulate removal devices;
- (c) replacing in-use diesel vehicles with cleaner alternatives;
- (d) promoting better vehicle maintenance; and
- (e) enhancing enforcement against smoky vehicles.

*Stringent motor fuel and vehicle emission standards*

19. To eliminate lead emissions from motor vehicles, the Administration has introduced unleaded petrol in 1991 and completely banned leaded petrol since April 1999. It has also been following the mandatory maximum sulphur content standard adopted by the European Union (EU) since 1995. As a result, the SO<sub>2</sub> emissions from diesel vehicles have been reduced by over 90%. In order to achieve a quicker reduction in the particulate and NO<sub>x</sub> emissions from diesel motor vehicles, the Administration has mandated the Euro IV standards for diesel (i.e. ultra low sulphur diesel (USLD)) since 1 April 2002 and for petrol since 1 January 2005. To provide a fiscal incentive for the use of environmentally cleaner fuel, the Administration has granted a concessionary duty rate on USLD since 1 July 2000 and the concession has been extended to 31 December 2005 through a number of extensions to take account the economic situation during the interim. When the EA Panel was consulted on the proposals to tighten the specifications for motor fuel, members were generally supportive of measures to reduce roadside pollution. Some members however expressed concern that the oil companies would make use of the opportunity to increase the pump price, which in their view was already very high. As consumers would have no other choice of fuel, they considered it necessary for the Administration to put in place a mechanism to keep the pump price under control.

20. In 1995, all newly registered vehicles were required to comply with the Euro I emission standards. Following the tightening of the emission standards for newly registered vehicles by EU, the Administration had implemented the Euro II standards in 1997 and introduced the Euro III standards since January 2001. As EU will start tightening in phases its vehicle emission standards for new light duty vehicles (vehicles of 3.5 tonnes and below) to Euro IV level, the Administration intends to implement the Euro IV emission standards for newly registered light duty vehicles in tandem with EU and upgrade the emission standards for diesel private cars to the latest California standards. The EA Panel was consulted on the proposal in February 2005. While supporting the proposal to tighten emission standards, Panel members held the view that this would not bring about much environmental improvement if replacement of existing vehicles was on a voluntary basis since owners would tend to optimize the service life of their vehicles. In the absence of incentives, the pace of vehicle replacement would be very slow as evidenced by the many aged light and heavy diesel vehicles on the road. The Administration was therefore urged to consider providing financial incentives such as tax concessions to encourage early replacement of vehicles.

*Retrofitting in-use diesel vehicles with particulate reduction devices*

21. While no new pre-Euro diesel vehicles have been registered since 1 April 1995, there is a need to reduce particulate emissions from the existing fleet of pre-Euro diesel vehicles which emit up to seven times more particulates than vehicles meeting the prevailing Euro III standards. In May 2000, the Finance Committee (FC) approved a commitment of \$50,880,000 for providing a one-off grant to assist owners

of pre-Euro diesel light vehicles of up to four tonnes to retrofit their vehicles with particulate reduction devices. The voluntary retrofitting programme was completed in October 2001 with over 80% of eligible vehicles participated in the programme. The installation of particulate removal devices has been made mandatory by law since 1 December 2003. Another financial commitment of \$600 million was approved by FC in May 2002 for a similar retrofitting programme for pre-Euro heavy diesel vehicles weighing more than four tonnes, except those requiring the operation of on-board equipment when idling (long idling vehicles). The retrofitting programme was completed in 2004 with about 97% of eligible vehicles participated in the programme. The Administration is in the course of making it a mandatory requirement to retrofit pre-Euro heavy diesel vehicles with emission reduction devices. Through collaboration with the transport trades and the Hong Kong Polytechnic University, the Administration has found catalysts that can work on long idling vehicles without causing white smoke problem. In June 2004, the Administration has secured funding approval of \$70 million from FC to assist owners of the remaining category of pre-Euro diesel vehicles with suitable emission reduction devices. The retrofitting programme will be completed within 2005.

22. The EA Panel has been monitoring the progress of these retrofitting programmes. While welcoming measures to improve air quality at street level, members have repeatedly urged the Administration to consider allowing vehicle owners to have a choice between retrofitting their vehicles with emission reduction devices and replacing their vehicles with the more environmentally friendly new Euro III models. The latter would be more effective in improving air quality without the need for additional financial resources.

#### *Replacing in-use diesel vehicles with cleaner alternatives*

23. With the approval of a commitment of \$725,520,000 by FC in June 2000, the Administration launched the Diesel Taxi Replacement Programme to encourage the early replacement of the entire fleet of 18 000 diesel taxis with ones that are run on liquefied petroleum gas (LPG) by end-2005. Under the scheme, a one-off grant of \$40,000 will be offered for each diesel taxi that is replaced by a LPG one. The importation of diesel taxi has also been stopped from 1 August 2001. As at end-August 2005, about 99.9% of diesel taxis have been replaced.

24. In November 2001, the Administration announced the Diesel Light Bus Replacement Programme to offer incentives to encourage the early replacement of diesel light buses with LPG or electric ones. Under the scheme, owners of diesel public light buses (PLBs) who replaced their vehicles with an LPG or electric model would be offered a one-off grant of \$60,000 or \$80,000 for each diesel PLB that is replaced with a LPG or electric one respectively while owners of diesel private light buses would be offered First Registration Tax (FRT) exemption. To be eligible for the one-off grant or FRT exemption, owners of diesel public and private light buses aged 10 or above at the time of de-registration must replace their vehicles by end-2003. Owners of diesel public and private light buses below 10 years old at the time of



de-registration must replace their vehicles by end-2004. The EA Panel and the Transport Panel held a number of joint meetings to monitor the progress of the incentive scheme. While expressing in-principle support to the scheme, concern was raised on the limited supply of LPG light bus models in the market that could meet the specifications laid down by the Government. To prevent possible monopolization of any vehicle manufacturer, the Administration was urged to take proactive measures to enable the supply of a wider choice of LPG light bus models. Two motions were also passed urging the Administration to include private school light buses in the proposed incentive scheme, and to extend the deadlines of applications for the incentives from end-2003 to end-2005 and from end-2004 to end-2006 for owners of existing diesel light buses aged 10 or above and below 10 years respectively at the time of de-registration. Instead of extending the deadlines by two years as proposed, the Administration only agreed to extend these by one year. As at end-August 2005, about 40% to 50% of PLBs and 6% of private public buses have been replaced.

25. The Administration's decision to shelve the introduction of LPG light vans and light goods vehicles into Hong Kong had aroused much concern of the EA Panel as this was a change in policy to improve air quality through the introduction of more environmentally friendly vehicles. Members also found it not convincing for the Administration to use impracticality as an excuse to justify its decision to shelve the conversion programme since the provision of inadequate LPG filling supporting infrastructure only reflected the lack of vision and consistency on the part of the Administration in implementing its fuel policy. Given that the fuel market could quickly adjust itself to meet the demand if the existing diesel light vans and light goods vehicles were to switch to LPG ones, members were skeptical that the decision to shelve the switch was attributed to budget deficit as duty was imposed on diesel but not LPG.

#### *Enhancing enforcement against smoky vehicles*

26. The fixed penalty on smoky vehicles has been increased from \$450 to \$1,000 since December 2000. In an attempt to mitigate the roadside pollution problem, some members of the EA Panel suggested that that the penalty should be further increased from \$1,000 to \$1,500 to bring it on a par with the penalty for littering since the emission of smoke was a more serious offence given its irrevocable damage to air quality and public health. The heavier penalty would achieve a greater deterrent effect as evidenced by the drop in the number of smoky vehicles since the last increase in 2000.

27. As a result of the above measures, particulate matters and NO<sub>x</sub> at roadside have dropped by 13% and 23% in 2003 as compared with 1999. The number of smoky vehicles has also dropped by over 70% in 2003.