

For Discussion
27 July 2010

**LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS**

SUBCOMMITTEE ON IMPROVING AIR QUALITY

**Review of Air Quality Objectives
Proposed Air Quality Improvement Measures**

PURPOSE

This paper sets out the key considerations in deciding on how best the air quality improvement measures proposed under the Review of the Air Quality Objectives (AQOs) at Annex could be taken forward. It also reports on the progress made on those measures for which more concrete implementation programmes have been drawn up.

BACKGROUND

2. On 28 June 2010, we reported the findings of the consultation on the recommendations of the Review of AQOs to the Panel on Environmental Affairs. The Panel asked to further discuss at this Subcommittee how the Administration intends to pursue the proposed air quality improvement measures.

PROPOSED AIR QUALITY IMPROVEMENT MEASURES

3. The air quality improvement measures proposed under the Review of AQOs encompass a wide range of areas covering power plants, motor vehicles, marine vessels, traffic and transport management, and 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 of the proposed measures envisage a new approach to infrastructure development (such as district cooling system) whereas others may require new legislations (such as mandatory implementation of Building Energy Codes). Some of them would entail increases in expenses for individuals or businesses. There are divergent views on their implementation, especially those measures related to electricity generation, traffic and transport management.

Measures with Firm Implementation Programme

4. We have already embarked on a number of measures recommended in the Review of AQOs to bring early relief to air pollution. These include-

(a) **Strengthening Volatile Organic Compounds (VOC) Control**

In October 2009, we amended the Air Pollution Control (Volatile Organic Compounds) Regulation to extend the control on VOC-containing products to vehicle refinishing paints, vessel paints, pleasure craft paints, adhesives and sealants, and will complete phasing-in the relevant statutory VOC content limits by April 2012.

(b) **Expand Rail Network**

The Kowloon Southern Link has already been in operation since mid 2009. The Government will continue working on the other committed rail projects including the West Island Line, the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link, the South Island Line (East), the Sha Tin to Central Link (the Tai Wai to Hung Hom section and the cross harbour section) and the Kwun Tong Line Extension.

(c) **Mandatory Implementation of Building Energy Codes**

On 9 December 2009, we submitted the Building Energy Efficiency Bill to the Legislative Council for introducing a mandatory implementation of Building Energy Codes. The Bill is now being vetted by a Bills Subcommittee of the Council.

(d) Energy Efficiency Standards for Domestic Electrical Appliances

The initial phase of the Mandatory Energy Efficiency Labelling Scheme, which covers compact fluorescent lamps, room air-conditioners and refrigerating appliances, has been fully implemented since 9 November 2009. The second phase of the Scheme, which covers washing machines and dehumidifiers, has come into force on 19 March 2010 subject to an 18-month grace period.

(e) District Cooling System for Kai Tak Development

The Finance Committee approved a funding of \$1,671 million on 5 June 2009 for implementing a District Cooling System in Kai Tak Development. The first phase of the System is targeted to be commissioned by 2013.

The Power Generation Sector

5. Of the recommended air quality improvement measures, the proposal for raising the share of natural gas for local electricity generation to 50% of the overall local fuel mix has the largest emission reduction potential. The Memorandum of Understanding on Energy Co-operation signed between Hong Kong and the Mainland should make available to Hong Kong extra supply of natural gas in the next couple of years. We are reviewing the Technical Memorandum (TM) for Allocation of Emission Allowances in Respect of Specified Licences issued under section 26G of the Air Pollution Control Ordinance (Cap 311) with a view to reducing the maximum emission allowances for power plants for the emission years from 1 January 2015 by way of issuing a new TM after consultation with the power companies. The possibility of increasing the use of natural gas for electricity generation based on the best practicable means available to the power companies is amongst the options being considered. We aim to submit our proposal to the Panel on Environmental Affairs for consideration at a special meeting in September 2010

The Transport Sector

6. Feedback from the consultation has revealed that the community recognized in general the need to reduce the emissions of the transport sector so as to improve air quality, particularly at the roadside. Some of the proposed measures targeting the transport sector may impact on the operation of the transport trades or commuters. Individuals or businesses may also incur increase in expenses. Many respondents of the public consultation had cautioned against these impacts. There were also requests for further consultation on measures such as low emission zones, car-free zones and bus route rationalization when details of the proposal had been worked out. The following paragraphs set out the key considerations in deciding on how best the proposed transport-related air quality improvement measures may be pursued and the progress made thus far.

(a) Early Retirement of Aged/Heavily Polluting Vehicles

The Review of AQOs proposed to replace pre-Euro, Euro I and Euro II commercial vehicles with models meeting the latest Euro standards. For pre-Euro and Euro I commercial diesel vehicles, the Government completed by 31 March 2010 a three-year one-off grant scheme to encourage their early replacement. Over the period of the scheme, about 23 000 such vehicles (i.e. about 40% of the eligible vehicles) were retired. Among them, about 16 000 vehicles, or nearly 30% of the eligible vehicles, were replaced under the scheme. In addition, some 1 350 vehicle owners applied for retaining their eligibility for the grant under a special arrangement¹.

As for Euro II commercial diesel vehicles, we launched on 1 July 2010 a three-year one-off grant scheme to encourage their early replacement. The oldest Euro II ones are now about 13 years old, same as the Euro I vehicles at the time when the above one-off grant scheme was launched. Similar to the pre-Euro and Euro I vehicles, the Government has pitched the grant level at 18% of the vehicle taxable values. When setting the grant amount, we have

¹ The special arrangement allows owners of eligible vehicles who had ordered the replacement vehicles in the period of the one-off grant scheme but the vehicles could not arrived on time for applying for the grant to retain their eligibility for the grant until the end of March 2011.

adopted the 2009 average vehicle taxable values to reflect the increase in vehicle prices over recent years. The highest grant amount could reach about \$200 000, depending on vehicle classes.

The responses to the pre-Euro/Euro I one-off grant scheme show that relying on subsidy scheme alone to expedite vehicle replacement may not be as effective as expected. There may be a need to introduce suitable disincentives, such as higher licence fees for older commercial vehicle, to give extra impetus for owners to replace their aged vehicles. We thus revisited the proposal to increase the licence fees of aged commercial vehicles with this Subcommittee at the meeting 10 March 2010. We will follow up with the Subcommittee on this proposal and other appropriate disincentives to expedite the phasing out of aged commercial vehicles to improve roadside air quality.

As for franchised buses, all franchised bus companies are required to operate their franchised bus services with buses under the age of 18, and have been replacing their serving buses accordingly. This arrangement has taken account of the maintenance, operational and financial capability of the bus operators and their obligations to provide proper and efficient service to the public. As at end-March 2010, there were a total of about 5,800 buses from the various franchised bus companies in operation. According to the age distribution of the existing franchised buses, about 2,300 or 40% of the existing franchised buses will retire by 2015, which includes all pre-Euro and Euro I buses and some Euro II buses, leaving about 2,100 Euro II buses in the bus fleet.

The cost of a new double-deck bus is about \$3 million. Mandating an accelerated pace of Euro II bus replacement is likely to impact on bus fare. There are also views that question the cost-effectiveness of pre-mature phasing out of franchised buses. We have therefore examined other more cost-effective options to reduce emissions from the franchised bus fleet, such as retrofitting after-treatment devices on in-use franchised buses.

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% or more. The retrofitting work is expected to be completed within 2010. We are also looking into the feasibility of retrofitting Euro II and Euro III buses with selective catalytic reduction (SCR) devices to reduce NOx emissions from the franchised bus fleet. In this regard, we have consulted the major franchised bus companies and agreed with them that it would be prudent to ascertain the technical feasibility and emission benefits of retrofitting SCRs to the local Euro II and III franchised buses by conducting a trial. We will shortly form a task force comprising representatives from the major franchised bus companies, overseas and local experts as well as relevant Government departments to examine the relevant technical issues and to oversee the trial. Subject to the satisfactory outcome of the trial, we will map out the way forward for implementing the SCR retrofit in conjunction with franchised bus companies.

(b) Earlier Replacement of Euro III Commercial Diesel Vehicles with Models Meeting Latest Euro Standards

The proposal is to replace early about 50% of the Euro III commercial diesel vehicle fleet. While there is general support for this proposed measure, some respondents to the public consultation opined that priority should be given to early replacement of the more polluting pre-Euro, Euro I and Euro II commercial diesel vehicles. Given that Euro III commercial diesel vehicles are now between 4 and 9 years old and that pre-Euro III vehicles are up to 7 times more polluting and make up 55% of the commercial diesel vehicle fleet, we agree that effort should focus on the early replacement of pre-Euro III commercial diesel vehicles. We will consider the measures for encouraging early replacement of Euro III commercial diesel vehicles at a later stage.

(c) Wider Use of Hybrid/Electric Vehicles or Other Environment-friendly Vehicles with Similar Performance

To encourage the use of environment-friendly vehicles, the Government offers tax incentives for the purchase of hybrid/electric vehicles, Euro V commercial vehicles and environment-friendly petrol private cars. Since the introduction of the scheme in April 2007, environment-friendly private cars account for about 12% of first-registered private cars. As at end-April 2010, we have approved about 700 applications under the scheme for environment-friendly commercial vehicles.

The Government will take every opportunity to explore the introduction of greener vehicles. Apart from various initiatives in promoting the use of electric vehicles (e.g. setting up a Steering Committee under the Financial Secretary; trials on electric vehicles and setting up of charging infrastructure, etc.), we are also monitoring the development of environment-friendly vehicle technology and keeping watch for opportunity to introduce them to Hong Kong. On wider use of electric vehicles, we are working on introducing more electric vehicles into the government fleet and have been exploring with electric vehicle manufacturers the supply of their electric vehicles to Hong Kong. We are also drawing up the implementation details of the Pilot Green Transport Fund, which seeks to encourage the transport industry to introduce more innovative green technologies to Hong Kong, with a view to rolling out the Fund within the current financial year.

(d) Ultra Low Sulphur Diesel (ULSD) for Local Vessels

Except for Government launches, which have switched to ULSD since 2001, local vessels are mainly using marine light diesel with sulphur content being 100 times that of ULSD. We are conducting a trial to ascertain the technical feasibility of powering our domestic ferries by ULSD. The trial will complete within 2010. The preliminary indication from the vessels joining the trial is that ULSD is likely to be technically feasible for powering local ferries. However, there will be a price premium between ULSD

and marine light diesel, and logistical problem with supply of ULSD for maritime use in outlying areas of the territory. We will analyze the trial results and map out a strategy to help reduce SO₂ emissions from local ferries.

(e) Selective Catalytic Reduction Device for Local Vessels

We are now working to launch a trial of retrofitting SCR devices to ascertain technical feasibility and cost implications in Government vessels to reduce the emission of NOx. Subject to the findings of the trial, we will explore the possibility of a larger scale retrofit for Government vessels. Apart from leading by example, the trial will provide useful information on the technical feasibility of undertaking the same retrofit in similar types of vessels as well as its implications for the operators.

(f) Low Emission Zones

Franchised buses could account for up to 40% of the traffic flow along busy corridors in Causeway Bay, Central and Mong Kok. Restricting franchised buses' access to these corridors to more environment-friendly models could bring significant improvement to the roadside air quality. The data collected by the roadside air quality monitoring stations in these corridors can be used to assess the effectiveness of these pilot low emission zones (LEZs) in improving roadside air quality. We are therefore examining the feasibility of setting up pilot LEZs at one or more of these busy corridors, having regard to the availability of sufficient cleaner buses for setting up the zones. The experience of setting up pilot LEZs for franchised buses can also help us consider the case for extending the scope of the LEZs to other types of vehicles.

As noted above, we are discussing with franchised bus companies possible options to speed up the availability of more environment-friendly buses for the pilot LEZs. If, for example, SCR retrofit to Euro II and Euro III buses is technically feasible in reducing NOx emissions, it would be a cost-effective option and make available cleaner buses for the setting up of pilot LEZs for

franchised buses at busy corridors.

(g) Car-free Zone/Pedestrianisation Scheme

The Transport Department has been implementing pedestrian schemes with the support of District Councils (DCs) and local communities in several areas since 2000. As at June 2010, seven full-time pedestrianized streets, 30 part-time pedestrianized streets and over 40 traffic calming streets have been implemented. During the public consultation, some members from those DCs with existing pedestrianization schemes raised concerns about the adverse impacts of the proposed expansion of the pedestrianization scheme on the operation of the businesses in the areas, noise nuisance to the local residents and public order problems. We will take these concerns into consideration and consult the relevant DCs before taking forward further pedestrianization proposals.

(h) Bus Route Rationalization

Rationalization of bus services is an on-going exercise to achieve the objectives of enhancing bus operation efficiency while meeting passenger demand, reducing traffic congestion and roadside emission, having regard to the changes in passenger demand and the opening of new transport infrastructure. As a result of the efforts, over 3,000 bus trips passing through Central, about 2,000 bus trips passing through Yee Wo Street in Causeway Bay and about 1,600 bus trips in Nathan Road per day were removed between 1999 and September 2009.

The Administration briefed the joint meetings of the Panel on Transport and Panel on Environmental Affairs about the background, planning principles and guidelines in pursuing franchised bus service rationalization, and the results of the consultation with the relevant DCs on the Franchised Bus Route Development Programme for 2010-2011. The Development Programme includes a total of 43 items, and if implemented, will save 31 franchised buses and reduce about 460 (1.4%) bus trips daily on busy corridors. In terms of environmental benefits, the

roadside concentrations of RSP and NOx on busy corridors will be reduced by about 0.2% and 0.5% respectively.

As noted from previous discussions at the joint meetings of the two Panels, local support is critical to further reducing the number of bus routes and trips. The Administration will continue to work with the bus companies to formulate bus route development schemes in accordance with the planning principles and guidelines to strike a balance among passenger demand, bus operation efficiency, road traffic condition and environmental benefits, and secure the support of the concerned DCs for implementing the proposals.

Non-road Mobile Sources

7. Aviation Ground Support Equipment (GSE) and off-road vehicles/equipment are the two main sectors in this category. The Review of AQOs has recommended the electrification of aviation GSE and the introduction of emission control for off-road vehicles/equipment-

(a) Electrification of Aviation GSE

Electrification of aviation GSE would help improve the air quality in the vicinity of the airport. In conjunction with the Airport Authority, we would promote the electrification of GSE and encourage planes to switch off auxiliary power units and to use ground power during stopover. The electrification would take time to evolve depending on the age and maintenance conditions of the GSE fleet and other factors such as the maturity of the alternative equipment, financial position of operators and the business outlook. We would work with the Airport Authority and other relevant parties on how best the proposed measure can be implemented.

(b) Emission Control for Off-road Vehicles/Equipment

Off-road vehicles and equipment are mainly used in construction

sites, container terminals and the airport. We have drawn up a proposal for putting in place a control scheme under which non-road mobile machinery imported (except those for re-export) into Hong Kong or manufactured locally for placing on Hong Kong market shall comply with a set of statutory emission standards. We have consulted the stakeholders and the Panel on Environmental Affairs on the proposal. We are considering the views collected with a view to introducing a statutory control scheme not later than 2012.

Other Air Quality Improvement Measures

8. Other air quality improvement measures include-

(a) Cycling Network to Major Public Transport Hub

A well-planned cycling track connecting to public transport hubs could help replace short vehicle trips. The Transport Department is studying the adequacy of existing cycle tracks and parking provisions at major transportation hubs in the existing new towns. The objective is to help link up isolated segments of cycle tracks, improve cycle parking facilities and enhance cycling safety. Cycling in urban built-up areas is however generally not encouraged for the safety of the cyclists and other road users.

(b) Light-emitting Diode or Equivalent Alternatives for Traffic Signal/Street Lighting

On this proposed measure, the Transport Department is already replacing the conventional traffic signals with Light-emitting diode (LED) in three stages for the Hong Kong, Kowloon and New Territories region, respectively. The first stage for the Hong Kong region commenced in February 2009 and was completed in May 2010. The second stage for the Kowloon region commenced in September 2009 and is scheduled to complete in March 2011. The whole replacement programme is expected to complete in the third quarter of 2012. In parallel,

the Highways Department has been conducting trials on LED street lights along designated streets and LED light tubes on footbridges since October 2009. The results of preliminary technical assessments on these LED lamps are satisfactory. The Highways Department has therefore commenced a larger scale trial scheme to replace more than 200 fluorescent light tubes by LED light tubes at six footbridges and two subways in the territories. All the installation will be completed in August 2010. About 100 LED street lights will also be installed in various districts to further test the reliability and efficacy of LED light fittings. Besides, about 600 white lights such as ceramic discharge metal halide lamps will be installed in 2010 to further compare the cost effectiveness and suitability of these lights with LED light.

(c) Tree Planting/Roof-top Greening

Apart from improving the quality of our urban environment, tree planting/roof-top greening also helps reduce urban heat island effect thus discouraging the chemical reactions for air pollutant formation and re-circulation. With funding approval from the Finance Committee, the Development Bureau (DEVB) established a new Greening, Landscape and Tree Management (GLTM) Section, supported by the Tree Management Office and the Greening and Landscape Office, in March 2010 to implement a holistic approach to greening, landscape and tree management as recommended by the Task Force on Tree Management led by the Chief Secretary for Administration. Among others, Government will seek to enhance greening initiatives in the territory (including maximisation of greening opportunities through proactive involvement in the land use planning process as well as collaboration with external parties, promotion of new greening technologies such as sky-rise greening and vertical greening, formulation and implementation of Greening Master Plans, etc.) and uphold the quality of landscape works and services.

ADVICE SOUGHT

9. Members are invited to note the relevant considerations in deciding on how best the proposed air quality improvement measures may be pursued and the progress we have made so far as set out in paragraphs 4 to 8.

Environment Bureau/Environmental Protection Department
July 2010

Proposed Air Quality Improvement Measures for Meeting the Proposed New AQOs

● *Emission Capping and Control*

- Increasing the ratio of natural gas in local electricity generation to 50% with additional emission abatement measures
- Early retirement of aged / heavily polluting vehicles
- Earlier replacement of Euro III commercial diesel vehicles with models meeting latest Euro standards
- Wider use of hybrid / electric vehicles or other environment-friendly vehicles with similar performance
- Ultra low sulphur diesel for local vessels
- Selective catalytic reduction for local vessels
- Electrification of aviation ground support equipment
- Emission control for off-road vehicles / equipment
- Strengthening volatile organic compounds control

● *Transport Management*

- Low emission zones
- Car-free zone / pedestrianization scheme
- Bus route rationalization

● *Infrastructure Development and Planning*

- Expand rail network
- Cycling network connecting to major public transport hubs

● *Energy Efficiency Measures*

- Mandatory implementation of the Building Energy Codes
- Energy efficiency standards for domestic electrical appliances
- Light-emitting diode or equivalent alternatives for traffic signal / street lighting
- Tree planting / roof-top greening
- District cooling system for Kai Tak Development