

For discussion on  
29 January 2013

**LEGISLATIVE COUNCIL**  
**PANEL ON ENVIRONMENTAL AFFAIRS**  
**SUBCOMMITTEE ON ISSUES RELATING TO**  
**AIR, NOISE AND LIGHT POLLUTION**

**Current legislation and administrative measures on  
the control of air pollution and the associated public expenditure**

**Purpose**

This paper informs Members of the current legislation and administrative measures on the control of air pollution and the associated public expenditure.

**Control of air pollution**

2. The Government has been implementing a wide range of measures through legislative and administrative means to improve ambient and roadside air quality.
  
3. The Air Pollution Control Ordinance (Cap. 311)(APCO) is the principal legislation for managing Hong Kong's air quality. It controls air pollution from power plants, motor vehicles, factories, polluting processes and products, asbestos, construction sites and other sources. A list of environmental legislation made under the APCO is at **Annex I**. Besides the APCO, there are also provisions in the Road Traffic Ordinance (Cap. 374)(RTO), the Shipping and Port Control Ordinance (Cap. 313) and the Merchant Shipping (Local Vessels) Ordinance, (Cap. 548) that tackle pollution from vehicles and vessels. Apart from legislation, we have also implemented various administrative measures to control air pollution. Details of these measures are provided below.

## Power Sector

4. Power generation is a major emission source in Hong Kong. In 2011, emissions from power plants<sup>1</sup> accounted for 44% of sulphur dioxide (SO<sub>2</sub>), 26% of nitrogen oxides (NO<sub>x</sub>) and 17% of respirable suspended particulates (RSP) of the total emissions in Hong Kong.

5. Under the APCO, power plants are subject to licensing control. In gist, they are required to use the best practicable means to prevent their emissions from causing air pollution. The emission control requirements imposed on both power companies are on a par with international practices. In 2008, we amended the APCO to empower the Administration to set the statutory emission caps from 2010 onwards by issue of a Technical Memorandum (TM) for power plants. The first TM was issued in 2008 for implementation in 2010. Two more TMs were issued in 2010 and 2012 to further tighten the emission caps starting 2015 and 2017 respectively. The TM is reviewed every two years. Details of these emission caps are set out in the following table.

Air Pollutant	Baseline Emission in 1997 (Tonnes)	Emission Caps (Tonnes)		
		2010-2014	2015-2016	2017 onwards
Sulphur dioxide	54,434	25,120	12,482	10,399
Nitrogen oxides	56,084	42,600	27,552	25,950
Respirable suspended particulates	2,612	1,260	831	750

6. About 90% of our electricity is consumed in buildings. Improving their energy efficiency can reduce electricity consumption and thus emissions from power plants. We have enacted the Buildings Energy Efficiency Ordinance (Cap. 610) which came into full effect in September 2012. The Ordinance requires the four major types of building services installations, namely, air-conditioning, electrical, lift and escalator, and lighting installations, in newly constructed buildings to meet the minimum energy efficiency standards and requirements as specified in the Building Energy Code (BEC). Existing buildings are also required to comply with the BEC when undergoing major retrofitting works. In addition, the central building services installations of commercial buildings and commercial portions of composite buildings are required to carry out energy audits in accordance with the Energy Audit Code every 10 years.

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<sup>1</sup> 2011 emission data are preliminary and subject to revision.

7. In addition, we have implemented the Mandatory Energy Efficiency Labelling Scheme via the Energy Efficiency (Labelling of Products) Ordinance (Cap. 598). The Labelling Scheme was introduced in two phases. The first phase covers compact fluorescent lamps, air-conditioners, refrigerators while the second phase dehumidifiers and washing machines. We will also review the grading structure and scope of the product coverage under the Scheme. Meanwhile, we will launch a Charter Scheme with the trade to expedite the phasing out of energy-inefficient incandescent light bulbs, while stepping up our publicity efforts to educate the public and major lamp users on the benefits of using more energy-efficient lamps.

8. From 1997 to 2011, the above efforts together reduced the emissions of SO<sub>2</sub>, NO<sub>x</sub> and RSP of local power plants by 74%, 47% and 62% respectively.

## **Vehicles**

9. Vehicles contributed 28% of NO<sub>x</sub> and 16% of RSP of the total emissions<sup>2</sup> in 2011 in Hong Kong. Due to their proximity to receptors, vehicles will pose greater air pollution impacts that threaten public health. To tackle the problem, we have been implementing stringent control measures under the APCO and the RTO.

### *Vehicle emission standards*

10. In April 1995, we started requiring newly registered vehicles to comply with stringent emission standards via the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations (Cap. 311J). We have been tightening the vehicle emission standards as soon as practicable, and started implementing in phases the Euro V emission standards for newly registered vehicles since June 2012. Since August 2001, we have required all newly registered taxis to run on either liquefied petroleum gas (LPG) or petrol.

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<sup>2</sup> 2011 emission data are preliminary and subject to revision.

### *Control of Smoky Vehicles*

11. Since 1988, the Environmental Protection Department (EPD) implemented a smoky vehicle control programme under the provision of the RTO, in which spotted smoky vehicles are required to pass a test, failing which their licences would be cancelled. The test procedure was upgraded to the more stringent chassis dynamometer test in 1999, which greatly helped reduce the number of smoky vehicles by over 80%. In addition, EPD and Police conduct joint roadside pullover inspection of vehicle smoke, and a fixed penalty of \$1,000 is issued to owners of vehicles emitting excessive smoke.

### *Vehicle fuel standards*

12. Under the Air Pollution Control (Motor Vehicle Fuel) Regulation, we are requiring the cleanest possible vehicle fuels for vehicles. In order to promote the use of cleaner diesel, the Government has reduced the fuel duty of Euro V diesel since December 2007. Since July 2010, we have been adopting the Euro V standards for both motor vehicle diesel and unleaded petrol as the statutory requirements.

### *Ban on idling engines*

13. To tackle the environmental nuisances caused by idling vehicles with running engines, we enacted the Motor Vehicle Idling (Fixed Penalty) Ordinance (Cap. 611), which came into force in mid-December 2011.

### *Reducing emissions from franchised buses*

14. To reduce emissions of the existing franchised bus fleet, we undertake a trial on retrofitting Euro II and III buses with selective catalytic reduction devices to reduce their NOx emissions. We will report on the trial findings to the Panel on Environmental Affairs later. If the trial is successful, the Government will fund the retrofitting of the devices on Euro II and III franchised buses, for which \$555 million has been earmarked. The ultimate policy objective of the Government is to have zero emission buses running across the territory. To this end, we are also funding the purchase of six hybrid buses (at a total cost of \$33 million) and 36 electric buses (at a total cost of \$180 million) and related charging facilities for trial by franchised bus companies. The franchised bus companies have already placed orders for the

procurement of hybrid buses and are making preparation to procure electric buses for trial. We expect that the trials can start in 2014.

### *Green transportation technologies*

15. The Government has set up a \$300 million Pilot Green Transport Fund in March 2011 to encourage the transport trades to apply for grants for testing out green and low-carbon transport technologies. So far we have approved 37 applications with total subsidies amounting to some \$87 million. Electric goods vehicles and hybrid goods vehicles are now put on trial under the Fund.

### *Incentives for replacement of old vehicles and use of environment-friendly ones*

16. We launched a \$540 million one-off grant scheme in July 2010 to encourage owners of Euro II diesel commercial vehicles to replace their old vehicles with those complying with the prevailing emission requirements for newly registered vehicles. A similar incentive scheme for encouraging early replacement of pre-Euro and Euro I diesel commercial vehicles was completed in March 2010. Some 17,100 vehicles took part in the scheme. We have also been encouraging the use of environment-friendly petrol private cars and commercial vehicles by offering first registration tax concession.

17. In view of the lukewarm response to the voluntary incentive schemes introduced by the Government over the past few years, the Administration has proposed in the 2013 Policy Address to set aside \$10 billion as subsidies to owners of over 80,000 heavily polluting pre-Euro and Euro I to III diesel commercial vehicles in order to progressively phase out these vehicles having regard to their pollution level. The scheme will significantly reduce the overall emissions of particulates and NO<sub>x</sub> by 80% and 30% respectively. We also propose to set a service life limit for newly registered diesel commercial vehicles at 15 years.

### *Strengthening emission control on petrol and LPG vehicles*

18. We will strengthen the control of emissions from petrol and LPG vehicles through the use of remote sensing equipment and chassis dynamometers for emission testing. Vehicles emitting excessively will need to be repaired and pass an advance emission test using dynamometer within 12 working days. The Finance Committee of the Legislative Council has approved the funding of \$150 million for providing a one-off subsidy to owners of LPG taxis and light buses to replace their catalytic

converters and oxygen sensors. We are inviting tenders for parts supply and replacement contractors. Subject to the positive outcome of the tender exercise, the replacement will commence in mid-2013 and will take about nine months. Immediately after its completion, we will deploy remote sensing equipment to catch those LPG or petrol vehicles emitting excessively for repair by their owners.

### *Bus route rationalization*

19. Bus route rationalization is an on-going exercise to achieve the objectives of enhancing bus operation efficiency while meeting passenger demand, reducing traffic congestion and roadside emissions. As a result of changes in passenger demand and development of new transport infrastructure in recent years, some of the franchised bus routes at present may overlap substantially or are not operating optimally. The Transport Department, in collaboration with EPD and District Councils, will step up efforts in the implementation of more route rationalization proposals through providing more attractive fare concession packages and better passenger facilities at the bus interchange points. Meanwhile, the railway network will continue to expand in the years to come. The commissioning of new railways provides a major opportunity for reducing duplicated or under-utilized services through implementation of large-scale bus route rationalization.

### **Vessels**

20. With the control efforts on land-based emissions taking effects, vessels have become the largest local air pollution sources in Hong Kong in 2011, contributing to 54% of SO<sub>2</sub>, 33% of NO<sub>x</sub> and 39% of RSP of the total emissions<sup>3</sup> in Hong Kong.

21. As an international maritime centre and an associate member of the International Maritime Organization (IMO), Hong Kong endeavours to adopt and implement the latest international requirements governing maritime matters, including control of marine emissions. Annex VI to the “International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, and as further amended by the Protocol of 1997” (“MARPOL”) is the main international convention adopted by IMO for the prevention of air pollution to the marine environment from ocean-going vessels (OGVs). Annex VI to the MARPOL is enforced locally by the Marine Department through the Merchant Shipping (Prevention

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<sup>3</sup> 2011 emission data are preliminary and subject to revision.

of Air Pollution) Regulation (Cap. 413M). In addition, the Marine Department enforces control of dark smoke emissions from vessels as part of port control under the Shipping and Port Control Ordinance (Cap. 313) and the Merchant Shipping (Local Vessels) Ordinance, (Cap. 548). Details of the legislation and their scope of control are summarized at **Annex II**.

22. The emissions of OGVs while at berth account for about 40% of their total emissions within Hong Kong waters. OGVs are our primary targets as they are powered by heavy fuel oil with an average sulphur content of 2.8%<sup>4</sup>, i.e. 2,800 times of that of motor diesel. Requiring OGVs to switch to cleaner fuel while at berth can improve the air quality around the port area. We launched in September 2012 a three-year incentive scheme, under which OGVs that switch from residual oil (with sulphur content of 2.8% on average) to low sulphur fuel (less than 0.5%) while berthing in Hong Kong waters would enjoy 50% reduction in port facilities and light dues. We will consult the shipping sector and are making preparations to mandate the fuel switch for OGVs at berth in Hong Kong waters.

23. To help further reduce the emissions from cruise vessels, the Government will seek funding from the Finance Committee for the installation of on-shore power facilities at the new cruise terminal in Kai Tak.

24. We also plan to further reduce the sulphur content of locally supplied marine light diesel from the existing nominal value of 0.5% to 0.05%. We are conducting a trial with the local marine sector on the technical feasibility. Subject to satisfactory outcomes of the trial which is due to complete in the first quarter of 2013, we will draw up the implementation proposal and timetable later in the year.

25. We are also exploring with the Guangdong, Shenzhen and Macao authorities on the feasibility of jointly implementing "fuel switch at berth" in the Pearl River Delta (PRD) waters and, in the longer term, setting up an Emission Control Area in PRD waters.

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<sup>4</sup> Already lower than the IMO standard of 3.5% sulphur content.

## Other sources

26. The APCO and its subsidiary legislation also regulate air pollutant emissions from all major industrial processes (e.g. cement plant and concrete batching plant) that are classified as "specified processes (SP)" requiring the use of best practicable means to reduce air pollution; asbestos and dust from building and construction works; volatile organic compounds (VOC) from petrol filling stations, VOC containing products and printing industry; and smoke and malodor from chimneys and open burning activities.

27. We are now drafting the legislations for controlling emissions from non-road mobile machinery and banning all forms of asbestos.

## Regional emission control

28. Our air quality is subject to strong regional influence and hence regional cooperation is very essential. To improve regional air quality in PRD region, we have been working closely with the Guangdong Provincial Government. In November 2012, the Hong Kong and Guangdong authorities jointly endorsed a new air pollutant emission reduction plan which sets out the emission reduction targets/ranges (**Annex III**) for 2015 and 2020 for Hong Kong and PRD Economic Zone.

## Public expenditure

29. The expenditure incurred by EPD in financial year (FY) 2011-12 on air programme was about HK\$ 566 million, accounting for about 23% of the total expenditure of EPD. Besides providing expenditures on various air programmes, the Government has also funded various air quality improvement initiatives through revenue forgone and compliance by stakeholders concerned, such as:

<b>Air quality improvement initiatives</b>	<b>Revenue forgone in FY 2011-12 (million \$)</b>
(i) Tax incentive for environment-friendly petrol private cars	633
(ii) Tax incentive for environment-friendly commercial vehicles	154
(iii) Fuel duty foregone for supporting the use of	2,018



Euro V diesel with virtually no sulphur content	
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30. Over the years, the Government has also earmarked financial revenues for the following air quality improvement schemes:

<b>Air quality improvement schemes</b>	<b>Financial revenues (million \$)</b>
(i) LPG taxis incentive scheme	about 720
(ii) LPG or electric light bus incentive scheme	about 140
(iii) One-off grant to assist owners of pre-Euro diesel heavy vehicles to retrofit their vehicles with emission reduction devices	about 420
(iv) One-off grant to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles	about 770
(v) One-off grant to encourage early replacement of Euro II diesel commercial vehicles	about 540 earmarked
(vi) Setting up a Pilot Green Transport Fund	300 earmarked
(vii) Subsidizing franchised bus companies to purchase six hybrid buses and 36 electric buses for trial	about 210 earmarked
(viii) Subsidizing owners of LPG vehicles to replace the catalytic converters of their vehicles	about 150 earmarked
(ix) Retrofitting Euro II and III franchised buses with selective catalytic reduction devices	about 550 earmarked

31. It should also be noted that the public expenditure reflects only a fraction of the total expenditures to clean up the air of Hong Kong. Most of the emission reduction efforts were made through the mandatory control programmes, e.g., the imposition of stringent emission caps on power sector, implementing various energy saving measures to reduce electricity demands, upgrading the emission limits on vehicles, tightening the fuel sulphur content of commercial/industrial diesel fuel, prohibition of the import and manufacture of commercial and consumers products with excessive VOC contents.

## **The New Clean Air Plan**

32. Air quality improvement is one of priority agenda of the Administration. To tackle air pollution more effectively, we have identified a package of comprehensive measures which will be set out in the New Clean Air Plan to be released in the first quarter of 2013.

**Environment Bureau/Environmental Protection Department**

**January 2013**

**Legislation on the control of air pollution**

<b>Legislation</b>	<b>Description of Control</b>
Air Pollution Control Ordinance (Cap. 311) 1983	Provides for the control of air pollution from stationary sources and motor vehicles. Also enables promulgation of regulations and technical memorandum.
Air Pollution Control (Air Control Zones) (Declaration) (Consolidation) Order 1993	Provides for consolidated declaration of Air Control Zones.
Air Pollution Control (Appeal Board) Regulations 1983	Stipulates the procedures and run down of an appeal.
Air Pollution Control (Asbestos) (Administration) Regulation 1996	Provides for the qualifications and fees for registration of asbestos consultants, contractors, supervisors and laboratories.
Air Pollution Control (Construction Dust) Regulation 1997	Requires contractors to take dust reduction measures when construction work is being carried out.
Air Pollution Control (Dry-cleaning Machines) (Vapour Recovery) Regulation 2001	Requires dry-cleaning machines using perchloroethylene (PCE) as a dry-cleaning agent to be equipped with a vapour recovery system and to meet the stipulated emission standard.
Air Pollution Control (Dust and Grit Emission) Regulations 1974	Stipulates the emission standards, assessment procedures and requirements for particulate emissions from stationary combustion sources.
Air Pollution Control (Emission Reduction Devices for Vehicles) Regulation 2003 and its Amendment	Requires pre-Euro diesel vehicles to be retrofitted with approved emission reduction devices for licence renewal.
Air Pollution Control (Fuel Restriction) Regulations 1997 and its Amendment of 2008	Prohibits the use of high sulphur content solid and liquid fuel for commercial and industrial appliances. (In Shatin, only gaseous fuel is allowed.)
Air Pollution Control (Furnaces, Oven and Chimneys) (Installation and Alteration) Regulations 1972	Requires prior approval to ensure suitable design for the installation and alteration of furnaces, ovens and chimneys.
Air Pollution Control (Motor Vehicle Fuel) Regulation 1994 and its Amendments	Sets out the specifications of liquid motor vehicle fuel to be used in motor vehicles and prohibits the sale of leaded petrol and the regulatory control on motor vehicle biodiesel.

<b>Legislation</b>	<b>Description of Control</b>
Air Pollution Control (Open Burning) Regulation 1996	Prohibits open burning of construction waste, tyres and cables for metal salvage, and controls other open burning activities by permit system.
Air Pollution Control (Petrol Filling Stations) (Vapour Recovery) Regulation 1999 and its Amendment of 2004	Requires petrol dispensers and petrol storage tanks of petrol filling stations and petrol delivery vehicles to be equipped with effective vapour recovery systems and to observe good practice during petrol unloading and vehicle refuelling.
Air Pollution Control (Smoke) Regulation 1983	Restricts emission of dark smoke from stationary combustion sources.
Air Pollution Control (Specified Processes) Regulations 1987 and its Amendment of 2009	Provides the administrative framework for the licensing of Specified Processes.
Air Pollution Control (Specified Processes) (Removal of Exemption) Order 1993, 1994 and 1996	Removes the exemption granted to the owner of premises for conduct of certain specified processes.
Air Pollution Control (Specified Processes) (Specification of Required Particulars and Information) Order 1993 and 1994	Provides for the supply of information and specifications by owners of certain existing specified processes to the Air Pollution Control Authority.
Air Pollution Control (Vehicle Design Standards) (Emission) Regulations 1992	Sets out the emission standards for newly registered vehicles.
Air Pollution Control (Volatile Organic Compounds) Regulation 2007 and its Amendment of 2009	Imposes limits in phases on the Volatile Organic Compounds (VOC) content of architectural paints/coatings, vehicle refinishing paints/coatings, vessel and pleasure craft paints/coatings, adhesives, sealants, printing inks and six selected consumer products - air fresheners, hairsprays, multi-purpose lubricants, floor wax strippers, insecticides and insect repellents, and requires emission reduction devices to be installed on lithographic heatset web printing machines.
Technical Memorandum for Allocation of Emission Allowances in respect of Specified Licences	Stipulates the emission caps for the power sector from 2010 onwards.

<b>Legislation</b>	<b>Description of Control</b>
Second Technical Memorandum for Allocation of Emission Allowances in respect of Specified Licences	Stipulates the emission caps for the power sector from 2015 onwards.
Third Technical Memorandum for Allocation of Emission Allowances in respect of Specified Licences	Stipulates the emission caps for the power sector from 2017 onwards.

**Legislation on control of marine emissions**

<b>Legislation</b>	<b>Description of Control</b>
Shipping and Port Control Ordinance (Cap. 313)	Provides primarily for the regulation and control of ports and of vessels in Hong Kong or in the waters of Hong Kong, as well as other related matters. There is a provision in Cap. 313 that regulates dark smoke emissions from vessels.
Merchant Shipping (Prevention of Air Pollution) Regulation (Cap. 413M)	Implements international requirements on marine emissions as laid down in Annex VI to the “International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, and as further amended by the Protocol of 1997”.
Merchant Shipping (Local Vessels) Ordinance, (Cap. 548)	Provides for the regulation and control of local vessels in Hong Kong or in the waters of Hong Kong and for other matters affecting local vessels, including their navigation and safety at sea (whether within or beyond the waters of Hong Kong). There is a provision in Cap. 548 that regulates dark smoke emissions from local vessels.

**Emission reduction targets for 2015 and 2020**

Pollutant	Area	2010 Emission (Tonnes)	Reduction Targets / Targeted Ranges (as compared with 2010)	
			2015	2020
Sulphur dioxide	Hong Kong	35,500	25 %	35 - 75%
	PRDEZ	507,000	16 %	20 - 35%
Nitrogen oxides	Hong Kong	108,600	10 %	20 – 30 %
	PRDEZ	889,000	18 %	20 – 40 %
Respirable suspended particulates	Hong Kong	6,340	10 %	15 – 40 %
	PRDEZ	637,000	10 %	15 – 25 %
Volatile organic compounds	Hong Kong	33,700	5 %	15 %
	PRDEZ	903,000	10 %	15 – 25 %

Note: “PRDEZ” stands for “Pearl River Delta Economic Zone”