

Strategies for Air Pollution Control

Air Pollution in Hong Kong

At present, Hong Kong faces two different types of air pollution, namely, roadside pollution caused by local vehicles and regional air pollution. Different strategies are required to control these two types of problems.

Roadside Pollution

2. As far as local vehicles are concerned, the road traffic density of Hong Kong is among the highest in the world. There are about 530 000 vehicles in Hong Kong but the total road length is about only 1 900 km, i.e. there are 275 vehicles per kilometer in average. In addition, about one-fourth of these vehicles use diesel fuel, which is relatively more polluting, and they contribute to about half of the vehicle mileage in Hong Kong. Due to the high density of buildings, pollutants cannot be dispersed effectively on the streets. As a result, large quantities of respirable suspended particulates (RSP) and nitrogen oxides (NO_x) accumulate at roadside.

3. To reduce emissions from local vehicles, the Government announced a package of initiatives in the 1999 Policy Address, including the followings -

- To replace diesel taxis with liquefied petroleum gas (LPG) taxis. The LPG taxi incentive scheme was completed in late 2003 and, currently, 99.8% of all taxis in Hong Kong run on LPG.
- Launching of the incentive scheme for replacing diesel light buses with LPG or electric light buses in August 2002. Owners of public light buses who replace their diesel public light buses with LPG or electric light buses are eligible for a lump-sum grant of \$60,000 or \$80,000 respectively. The scheme is in good progress. Over three-fourth of the newly registered public light buses are LPG ones. With the economy improving, it is expected that more owners will

replace their diesel light buses with LPG or electric ones as the application deadline of 2005 draws closer.

- To introduce in 2000, ultra low sulphur diesel (i.e. Euro IV diesel), which is 86% less polluting than Euro III diesel.
- Implemented in 2002 an incentive scheme to help the owners of nearly 40 000 pre-Euro heavy diesel vehicles to retrofit their vehicles with catalytic converters, and to introduce legislation to make the installation mandatory upon completion of the scheme (by end-2004).
- To require newly registered vehicles to comply with Euro III emission standards concurrently with EU with effect from 2001.
- Increased significantly the penalty for smoky vehicles from \$450 to \$1,000 and stepped up law enforcement.

4. These initiatives have already proven to be effective. Compared with 1999, the number of smoky vehicles had dropped by over 70% in 2003. Particulate matters and NO_x at roadside had dropped by 13% and 23% respectively. Although the roadside air quality in Hong Kong had improved, the concentrations of RSP recorded by general air quality monitoring stations had increased from their 1999 levels by 4%, whereas that of ozone had increased by as much as 18% during the same period. It is evident from these figures that the air quality of Hong Kong is increasingly affected by regional air pollution as the Mainland economy continues to grow. To address this regional air pollution problem, we should not only control emissions from local motor vehicles but also co-operate with Guangdong to reduce the total air pollutant emissions in the whole Pearl River Delta (PRD).

Regional Air Pollution

5. Another major source of pollution comes from the industrial and commercial operations in the region. The pollutants generated by these activities have an adverse impact on the air quality of the whole region. Under sunlight, these pollutants undergo photochemical reactions to form ozone and smog. The regional smog problem is especially serious when weak northerly wind prevails in the South China area or when the region is under the influence of subsiding air at the periphery of a typhoon because the ambient air pollutants in the PRD region cannot be dispersed effectively under

such conditions.

6. With the economic development in Guangdong and the increasing affluence of the people, the number of vehicles has risen two-fold from 1.15 million in 1995 to 2.31 million in 2002. In addition, since Euro II emission standards has just been introduced in the Mainland, the regional pollution problem as caused by vehicular emissions has substantially aggravated.

Co-operation between Guangdong and Hong Kong

7. To improve the air quality of the whole PRD Region, the Environmental Protection Department (EPD) of Hong Kong and the Environmental Protection Bureau of Guangdong Province conducted a joint study on regional air quality during 1999-2002. The aim of the study is to analyse 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 control measures can be prioritized accordingly. This is done by quantifying the emissions of pollutants over an area of 42 800 km² in PRD, collecting air samples and accurately evaluating the regional distribution of air pollutants and changes by computer simulation.

8. 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 air pollution in the region cannot be mitigated effectively even if the two governments continue to implement their existing improvement measures. The study also points out that we must control the total emissions of pollutants in order to address the regional air pollution problem.

9. After the study was completed, the Hong Kong SAR Government and the Guangdong Provincial Government reached a consensus in April 2002 to reduce by 2010, on a best endeavour basis, the regional emissions of sulphur dioxide (SO₂), NO_x, RSP and Volatile Organic Compounds (VOCs) by 40%, 20%, 55% and 55% respectively, using 1997 as the base year. Achieving these targets will not only enable Hong Kong to meet its current Air Quality Objectives, but also significantly improve the air quality of the PRD and relieve the regional smog problem.

10. In December 2003, the two governments jointly drew up the Pearl River Delta Regional Air Quality Management Plan (hereunder the “Management Plan”) with a view to meeting the above 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 on the tasks under the Management Plan. In the past 12 months, the two sides have held nine working meetings and conducted four site visits.

11. Under the Management Plan, the two governments are on the way to set up a regional air quality monitoring network this year. After testing, the network will be in full operation next year to provide comprehensive and accurate air quality data. We will also complete this year a manual for compiling inventories of emissions to enable both sides to follow a consistent approach in assessing emission levels and monitoring the progress of emission reduction tasks from next year onwards.

Enhanced Air Pollution Control Measures

12. As a result of the emission reduction measures implemented, Hong Kong has already achieved some progress since 1997 in reducing the total emissions of NO_x, RSP and VOCs. Details are as follows -

	Emission Level in 1997 (tonnes)	Emission Level in 2002 (tonnes)	Changes in Emission Level during 1997- 2002	Reduction Target for 2010
NO _x	111 000	88 300	-20%	-20%
RSP	11 300	7 210	-36%	-55%
VOCs	58 800	47 100	-20%	-55%

13. Enhanced air pollution control measures must be taken to reduce the total emissions of various pollutants within HKSAR. Apart from vehicles, power plants are also major sources of pollution in the territory. According to the data collected by the EPD in 2002, power plants accounted for 89%, 45% and 37 % of the total emissions of SO₂, NO_x and RSP respectively in Hong Kong. With reduced use of natural

gas, emissions from power plants are expected to soar in 2003 and in the next few years. Apart from the continual implementation of programmes to reduce vehicle emissions, therefore, we also need to put in place measures to reduce emissions from power plants. In addition, we plan to reduce VOC emissions from paints, printing and various consumer products since VOCs play an essential role in the formation of smog.

14. We will implement the following specific emission reduction measures with a view to fully achieving the emission reduction targets set by Hong Kong and Guangdong by 2010 -

- (i) To introduce into the Legislative Council regulations which provide for the tightening of the motor petrol standard to Euro IV with effect from 1 January next year;
- (ii) To draft regulations which require the installation of vapour recovery systems at petrol filling stations and introduce the regulations into the Legislative Council by the end of this year so that they may come into effect in the first quarter of next year;
- (iii) To start the preparatory work for the application of Euro IV emission standards to newly registered vehicles by 2006;
- (iv) To propose to require importers or manufacturers of paints, printing ink and specific consumer products to register the VOC contents of their products with the EPD and provide labelling on the container or packaging of the products in an effort to reduce VOC emissions. Public consultation on the proposal commenced in late September this year; and
- (v) To negotiate with power companies on measures to further reduce power plant emissions and increase the share of natural gas in electricity generation. We will also explore the feasibility of introducing demand-side management and providing economic incentives to save energy.

15. The emission reduction policy of Guangdong Province mainly focuses on power plants, vehicles and the most polluting industrial processes. Measures taken

include the followings -

- (i) To diversify clean energy production and supply systems, construct gas-fired power plants and provide for the transmission of electricity from the western provinces;
- (ii) To restrict the use of high sulphur fuels, close down small power generation units and retrofit such units with flue gas desulphurization systems in order to reduce emissions from the power generation process;
- (iii) To phase out coal-fired boilers, industrial boilers and industrial technologies and equipment with inefficient energy consumption and causing serious pollution;
- (iv) To reduce VOC emissions from paints; and
- (v) To build metro expressway systems, develop green transport and reduce vehicle emissions in order to control pollution caused by the exhaust of motor vehicles.

16. Guangdong Province has by now already achieved the following in emissions reduction -

- (i) New emission standards equivalent to Euro II was adopted in July 2004 for new vehicles. With effect from July 2005, all vehicles will have to meet such standards in order to be sold and registered;
- (ii) The sulphur content of motor diesel was reduced from 0.5% to 0.2% in 2002 and diesel with a sulphur content of 0.05% has been introduced into some areas;
- (iii) Subway lines are under construction in the region and the Inter-City Fast Rail-Communication Network Project in the PRD Economic Zone has been submitted for approval;
- (iv) Paints using VOCs such as xylene as solvents are being replaced;

- (v) Four Liquefied Natural Gas (LNG) power plants are being constructed and expected to be commissioned by 2006;
- (vi) Flue gas desulphurization systems were installed in Shenzhen Xibu Power Plant (Units 5 and 6), Dongguan Shajiao Power Plant A (Unit 5) and Taishan Power Plant (Units 1 and 2) during the year. Retrofitting works for Shenzhen Mawan Power Plant, three power plants in Shajiao of Dongguan, Guangzhou Huangpu Power Plant, Zhujiang Power Plant and Zhuhai Power Plant have also commenced and are expected to complete in 2005-06. Preparation for retrofitting other power plants in the region is also underway. The target is to retrofit all power generation units of a capacity above 125MW with flue-gas desulphurization systems by 2007. (The relevant project will involve power generation units with a total capacity of 11,290 MW and can reduce emission of SO₂ by 225,000 tonnes each year).

17. We are also exploring with the Environmental Protection Bureau of Guangdong Province on ways to set up an emissions trading pilot scheme covering the power plants in Hong Kong and Guangdong. The scheme has already obtained the endorsement of the CPG (State Council) and the State Environmental Protection Administration. Hong Kong and Guangdong will be the pilot places for the scheme, and will make reference to and exchanges on the relevant experiences of the pilot emissions trading of seven provinces including Jiangsu.

Conclusion

18. Although we have made some headway in reducing local vehicle emissions and the Hong Kong and Guangdong governments have also made some progress in the implementation of the Management Plan, the air quality of the PRD Region will only improve significantly when all the control measures are fully implemented.

19. The Government needs to address the following four issues in its future work -

- (a) A greater share of natural gas and other clean fuels (e.g. waste-to-energy) in power generation may raise the production cost of electricity. Whether this will be affordable by and acceptable to the public should be carefully

considered.

- (b) Hong Kong's economic recovery in the past year has increased the demand for energy. Together with the fuel problem, there is evident increase in the pollution from electricity generation process. At present, the most important task is to implement energy saving measures. The participation of private sector is key to the success of energy saving. The Electrical and Mechanical Services Department has already been promoting Energy Efficiency Labelling Scheme for various products and Energy Efficiency Registration Scheme for Buildings. The Bureau has also required all government offices to maintain room temperature at or above 25.5 degrees Celsius, which could save 10% of electricity used in air conditioning. We hope that this measure can be promoted to private sector. In addition, we will encourage power companies and private sector to participate in Demand Side Management.
- (c) Guangdong Province is very interested in our experience in reducing vehicle emissions and monitoring pollution. The EPD has been working closely with the Environmental Protection Bureau of Guangdong Province and has frequent exchanges with it on technical and policy matters. We would very much like to deepen and widen the scope of such exchanges on technologies, policies and the promotion of environmental education; and
- (d) Build up partnership with Hong Kong companies operating in PRD and through planning and implementation of effective emissions control measures, fasten the improvement of air quality.

20. Due to resources constraint, we cannot yet make available sufficient manpower to fully implement the above-mentioned items (c) and (d). We hope that through the merger between Environment Branch and EPD, some manpower resources released can be redeployed to these two areas of work in need of urgent attention.

Environment, Transport and Works Bureau
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