

# Improving the Air Quality in Hong Kong

## A Progress Report November 2005

### Introduction

To improve regional air quality, the Hong Kong SAR Government and the Guangdong Provincial Government have reached a consensus to reduce, on a best endeavour basis, the emission of four major air pollutants, namely sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), respirable suspended particulates (RSP) and volatile organic compounds (VOC) by 40%, 20%, 55% and 55% respectively in the region by 2010, using 1997 as the base year. Achieving these targets will not only enable Hong Kong to meet its air quality objectives (AQOs) but also significantly improve the air quality of the Pearl River Delta (PRD) and relieve the regional smog problem.

2. To meet the above emission reduction targets, the two governments jointly drew up the Pearl River Delta Regional Air Quality Management Plan (the “Management Plan”) in December 2003 to implement specific control measures. 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 monitor the implementation of the Management Plan.

### Progress

3. As a result of various emission reduction measures implemented, Hong Kong has achieved good progress in reducing the total emissions of NO<sub>x</sub>, RSP and VOC. For SO<sub>2</sub>, however, much of the effort has been vitiated by the increase in emissions from the local power plants. Details are presented in Table 1 below –

**Table 1: Progress in Achieving the 2010 Emissions Reduction Target**

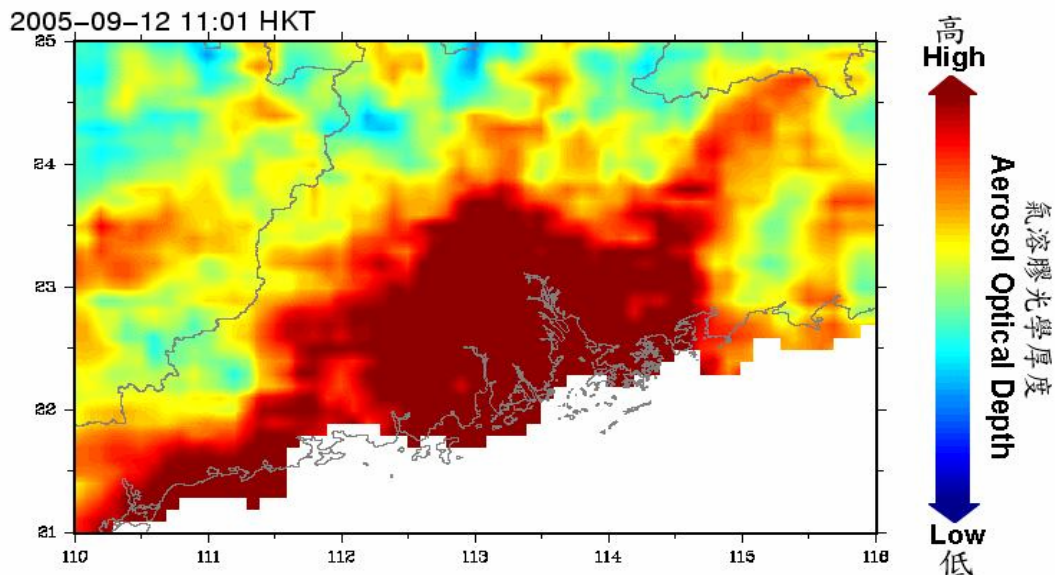
	Emission Level in 1997 (tonnes)	Emission Level in 2003 (tonnes)	Changes in Emission Level during 1997-2003	Reduction Target for 2010
SO <sub>2</sub>	64,500	90,900	+41%	-40%
NO <sub>x</sub>	110,000	96,600	-12%	-20%
RSP	11,200	7,380	-34%	-55%
VOC	54,400	41,800	-23%	-55%

4. Road transport, as the second major source of emissions, accounted for about 21%, 28%, 17% of total  $\text{NO}_x$ , RSP, and VOC respectively in 2003. Compared with 1997, vehicular emissions of  $\text{SO}_2$ ,  $\text{NO}_x$ , RSP and VOC in Hong Kong have been reduced by 93%, 35%, 60% and 46% respectively by the end of 2003. Between 1999 and 2004, the RSP and  $\text{NO}_x$  levels as measured at roadside decreased by 9% and 24% respectively. The number of smoky vehicles also has dropped by 80% during the same period.

5. In spite of the progress made locally in reducing the emissions of  $\text{NO}_x$ , RSP, and VOC, the general air quality as perceived by the public is far less satisfactory than as suggested by the scientific data. While the increase in emissions of  $\text{SO}_2$  from local power generation is a factor, deterioration in regional air pollution is the main reason. The concentrations of RSP recorded at the general air monitoring stations increased by 15% from 1999 to 2004 due to the increase in regional pollution background. Ozone, the indicator pollutant for regional smog, increased by 26% during the same period.

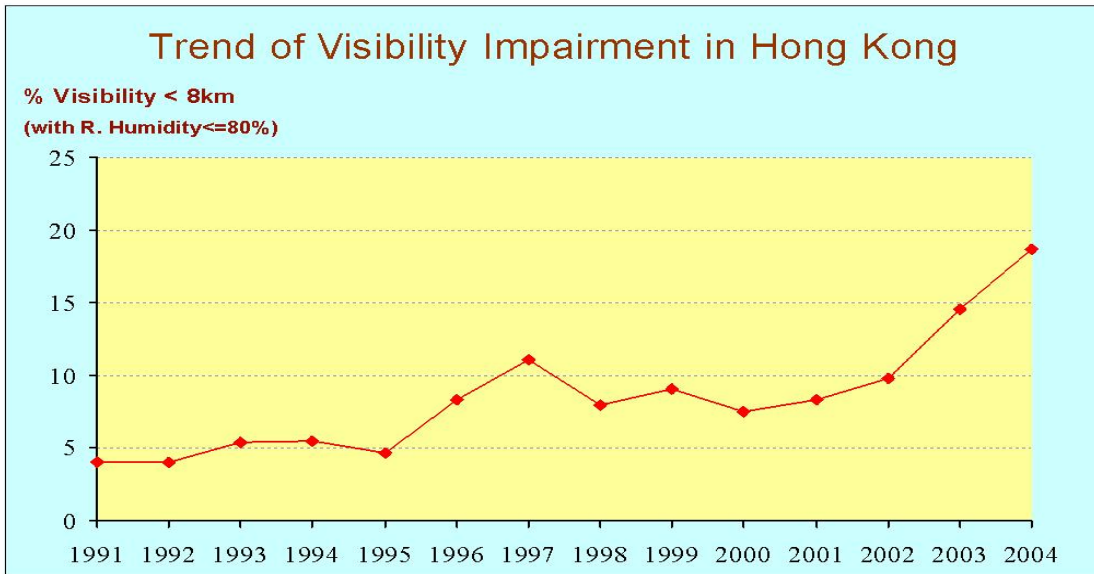
6. Figure. 1 is a satellite image showing the distribution of particulates on a typical smoggy day. The deteriorating regional smog problem is also reflected by impaired visibility as shown in Figure. 2.

(Figure 1#)



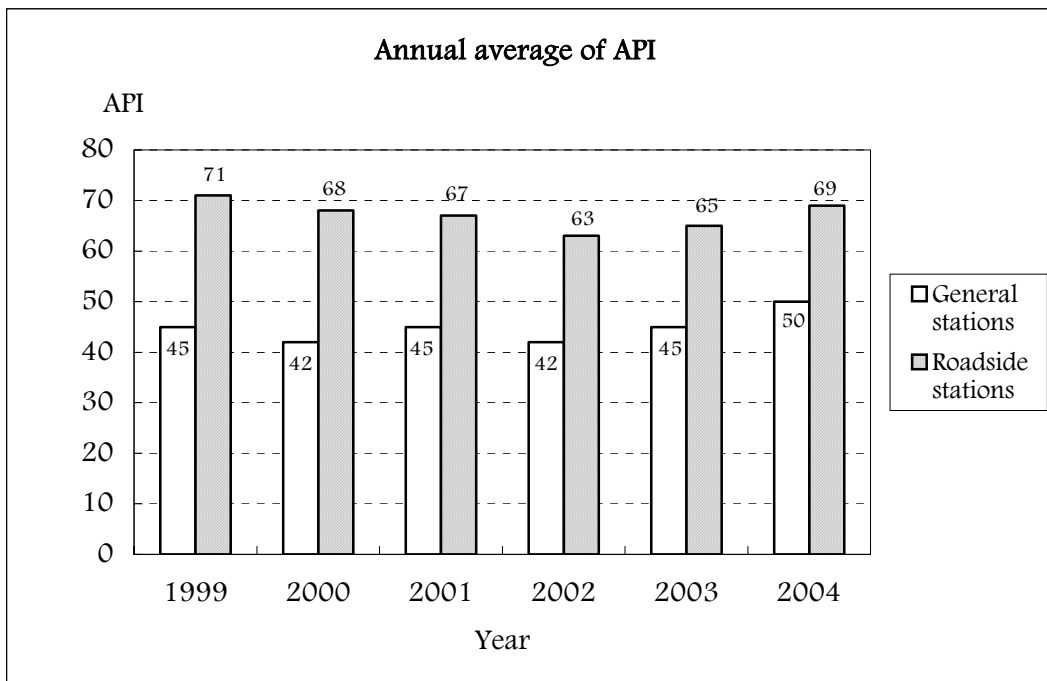
# Aerosol optical depth (AOD) is a measure of the opaqueness of air, and high values of AOD indicate poor visibility. In AOD images, higher values of AOD are represented in red and yellow colours and lower values of AOD are depicted in blue and green colours.

(Figure 2)



7. The average air pollution indices (APIs) as measured at both roadside and general air monitoring stations tell the same story (Figure. 3)\*. The efforts being made to tackle emissions from motor vehicles have been masked by the increase in general air pollution.

(Figure 3)



\* Roadside APIs normally stand higher than general APIs since they reflect the double effects of both roadside and ambient pollutants.

## **Reinforced Local Efforts**

8. In his recent Policy Address, the Chief Executive has re-affirmed our commitment to the introduction of further measures to reduce local emissions as well as strengthening the co-operation with the Guangdong authorities. To reduce local emissions, some of the additional measures to be introduced/implemented are listed below –

- (a) implementing the Euro IV petrol standard (effected in January 2005);
- (b) introducing Euro IV emission standards for newly registered vehicles by 2006;
- (c) controlling emissions from petrol and LPG vehicles by remote sensing technology ;
- (d) implementing the incentive scheme to encourage the replacement of diesel light buses with LPG or electric models;
- (e) completing the programme on the retrofitting of pre-Euro heavy diesel vehicles with catalytic converters by financial incentives and making the installation mandatory afterwards;
- (f) tightening the caps on the emissions of power plants upon renewal of their “specified process licences” so that emissions from these sources are kept to the practical minimum;
- (g) requiring power companies to install effective emissions reduction devices as a primary consideration in the review of the electricity market after 2008;
- (h) requiring power companies to use ultra-low sulphur coal and maximize the utilization of natural gas in electricity generation, exploring the use of renewable energy in electricity generation and the introduction of Demand Side Management;
- (i) promoting energy saving by setting air conditioning at 25.5°C during the summer months in all Government premises and launching campaigns to encourage the private sector to follow suit;
- (j) promoting energy saving, with the Government taking the lead by cutting electricity consumption in offices by 1.5%;
- (k) switching to ultra-low sulphur diesel in all Government works project;
- (l) requiring Government vehicles to switch off idling engines while waiting, and encouraging private car drivers to do the same; and

- (m) working out a new scheme to control VOC emissions from paints, printing inks and selected consumer products.

### **Emission Reduction Measures in Guangdong**

9. At the same time, the Guangdong Provincial Government has committed to the following emissions reduction measures and is making solid progress –

- (a) four large natural gas power plants are being constructed and are expected to be commissioned in phases from 2006, and natural gas trunk pipelines are being constructed to supply a number of cities in PRD;
- (b) flue gas desulphurization (FGD) systems are being retrofitted to all generation units of capacity above 125MW in existing power plants. When these projects are completed by 2007, a total of 225,000 tonnes of SO<sub>2</sub> emissions will be reduced each year. FGD retrofitting works have been completed for Shenzhen Xibu Power Plant (Units 4, 5 and 6), Dongguan Shaojiao Power Plant A (Unit 5), Guangzhou Hengyun Power Plant, Guangzhou Ruiming Power Plant, Jiangmen Taishan Power Plant, resulting in reduction of SO<sub>2</sub> emissions by 72,300 tonnes annually. Works on the 11 remaining power plants have commenced;
- (c) low-NO<sub>x</sub> burner (LNB) will be installed to power generation units being modified and expanded. By 2010, all existing thermal power plants will be retrofitted with LNBs;
- (d) energy consuming and highly polluting coal-fired boilers and industrial furnaces will be phased out or will be required to use clean fuel, clean combustion technology, to install FGD and to adopt NO<sub>x</sub> control measures to reduce emissions;
- (e) various industrial processes and facilities with high SO<sub>2</sub> and dust emissions will be phased out; and
- (f) motor diesel with sulphur content less than 500 ppm has been introduced in PRD since 2004. Tailpipe emissions from motor vehicles are being controlled. Newly registered motor vehicles have to comply with China II (equivalent to Euro II) standards from July 2005. Guangdong is preparing to require newly registered motor vehicles to comply with China III (equivalent to Euro III) standards in 2006 ahead of other Mainland cities and will study the feasibility to adopt China IV (equivalent to Euro IV) and China V (equivalent to Euro V) standards for light-duty and heavy-duty vehicles respectively

by 2010.

10. Meanwhile, the collaboration between the two governments is bearing fruit. In mid 2005, a regional air quality-monitoring network with 16 monitoring stations in the PRD has been established jointly by the two sides and passed the acceptance test. At the Hong Kong Guangdong Cooperation Joint Conference held in September 2005, the Chief Executive and the Governor of Guangdong Province agreed to commence daily reporting to the public the PRD Regional Air Quality Index within this year, so that residents of both places would have more accurate information about the region's air quality.

11. In addition, work is progressing jointly with the Guangdong Environmental Protection Bureau to develop a pilot emissions trading scheme for power plants in Hong Kong and PRD. Details of the scheme are expected to be finalized in 2006 so that prospective power plants can identify their trading partners and draw up emissions trading agreements on a commercial basis. This scheme would also be one of the means for local power companies to meet their assigned emissions caps.

### **Review of Air Quality Objectives**

12.  $PM_{2.5}$  has recently become a frequently discussed issue.  $PM_{2.5}$  are the respirable portion of the particles suspended in air with a diameter smaller than 2.5 micron. They are part of the RSP and the quantities of RSP measured in Hong Kong also include  $PM_{2.5}$ . All the control measures undertaken by the Government which target at RSP will also reduce the emission of  $PM_{2.5}$ .

13. At present, the United States has set a standard for  $PM_{2.5}$  to be achieved by 2015. However, the US is now reviewing its standard and the result is expected to be available by September 2006. The European Union (EU) has recently issued a draft directive on ambient air quality that includes a proposed  $PM_{2.5}$  standard to be achieved by member states by 2015. The proposal is being examined by country members of the EU and a decision on its adoption will not be made until 2007.

14. According to the Air Quality Guidelines for Europe published by the World Health Organization (WHO), when setting air quality standards, considerations such as the prevailing exposure levels, technical feasibility, source control measures, abatement strategies, and social, economic and cultural conditions should be taken into account when setting air quality standards for a particular place. Most importantly, such standards should be realistic and achievable by the government concerned by means of pollution control measures.

15. The EPD will continue close liaison with relevant international experts and organisations on the development of AQOs. We will take into account the review findings in the US and EU, as well as the on-going local studies, when considering the need and justification for the introduction of new standards for PM2.5.

### **Efforts of Business Sector**

16. Concerted efforts within the community can provide substantial impetus to clean air initiatives. Indeed, our business community has taken the initiative to sign a Clean Air Charter, a business sector-wide effort to improve air quality in Hong Kong and the Pearl River Delta. The Clean Air Charter is the focus of the Project Clean Air launched by the Business Coalition on the Environment (a coalition of 29 business associations coordinated by The Hong Kong General Chamber of Commerce). Separately, some Hong Kong manufacturers with factories in the Pearl River Delta (PRD) are keen on contributing to the efforts to tackle air pollution. In this regard, a proposal is being considered on engaging a consultant to conduct a cleaner production demonstration scheme. The purpose of the demonstration scheme is to raise PRD manufacturers' awareness and understanding of energy efficient and cleaner production measures that can be adopted to improve the air quality.

**Environmental Protection Department**  
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