For discussion on
27 November 2006

LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS

Review of Air Quality Objectives

Purpose

This paper provides information on the Government's plan on reviewing Hong Kong's Air Quality Objectives (AQOs) and development of a long-term air quality management strategy.

Background

2. The Air Pollution Control Ordinance empowers the Government to establish AQOs. In 1987, a set of AQOs comprising seven major air pollutants was established after making references to researches done mainly in the United States (US). The current AQOs and achievement status are at **Annex A**.

3. In recent years Hong Kong has been facing two air pollution issues. One is local street-level pollution. The other is the regional smog problem. Diesel vehicles are the main source of street-level pollution. Smog, however, is caused by a combination of pollutants from motor vehicles, industry and power plants both in Hong Kong and in the Pearl River Delta (PRD) region.

4. To tackle emissions from motor vehicles, the Government embarked on a comprehensive motor vehicle emission control programme in 1999. The key measures include –

(a) replacing diesel taxis and light buses with liquefied petroleum gas (LPG) vehicles;

(b) introducing Euro III emission standards in tandem with the European Union (EU);

(c) retrofitting pre-Euro diesel vehicles with particulate traps or catalytic converters;

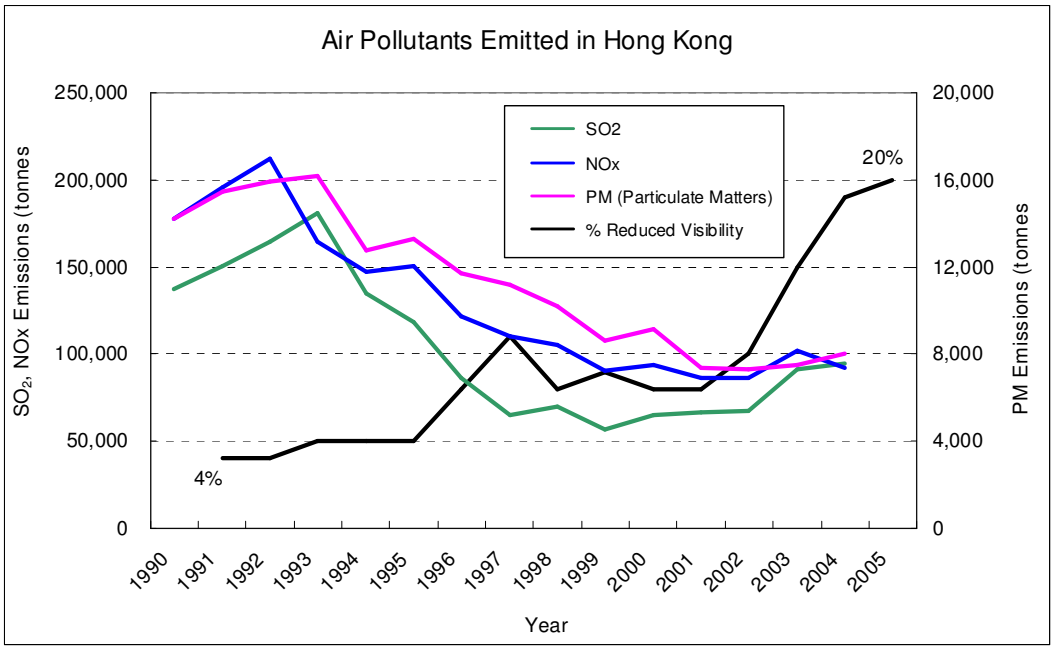
(d) deploying chassis dynamometers to test diesel vehicle smoke and taking stronger enforcement actions against smoky vehicles; and

(e) mandating ultra low sulphur diesel for vehicle use five years ahead of the EU.

5. These measures have brought discernible air quality improvements at the roadside since their implementation. By the end of 2005, respirable suspended particulate (RSP) and nitrogen oxides (NOx) emissions from vehicles in the urban area were reduced by about 80% and 40% respectively, as compared with 1999. RSP and NOx levels recorded at the roadside have also been reduced by 14% and 17% respectively since 1999, in spite of the fast increasing regional air pollution affecting Hong Kong. The number of smoky vehicles has also been reduced by about 80%.

6. Notwithstanding the very substantial reduction in local emissions, the visibility has been deteriorating due to worsening of the regional background air quality, as shown in Figure 1 below. Smog has now become a common phenomenon for the entire PRD area.

Figure 1: Air Pollutants Emitted in Hong Kong and Reduced Visibility Trend #



Percentage of Reduced Visibility refers to the percentage of time in a year with visibility less than 8 km and relative humidity not exceeding 80%.

7. To improve local and regional air quality, the Hong Kong SAR Government reached a consensus with Guangdong Provincial Government in April 2002 to reduce, on a best endeavour basis, the emission of four major air

pollutants, sulphur dioxide (SO2), NOx, 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 enable Hong Kong to meet our current AQOs, significantly improve the air quality of the PRD region and relieve the regional smog problem.

8. In December 2003, the two governments jointly drew up the PRD Regional Air Quality Management Plan (the "Management Plan") with a view to meeting the above emission reduction targets. The PRD Air Quality Management and Monitoring Special Panel was set up under the Hong Kong/Guangdong Joint Working Group on Sustainable Development and Environmental Protection (JWG) to follow up on the tasks under the Management Plan. The PRD Regional Air Quality Monitoring Network established under the Management Plan is now in full operation to provide comprehensive and accurate air quality data.

Progress of Reducing Emissions in Hong Kong

9. As a result of various emission reduction measures implemented in recent years, Hong Kong has achieved good progress in reducing the total emissions of NOx, RSP and VOC. For SO2, however, much of the effort has been vitiated by the increase in emissions from the power plants. Details are presented in the table below –

Table: Progress in Achieving the 2010 Emissions Reduction Targets

	1997 Emission (tonnes)	2004 Emission (tonnes)	Changes 1997-2004	2010 Target
SO2	64,500	94,800	+47%	-40%
NOx	110,000	92,500	-16%	-20%
RSP	11,200	8,040	-28%	-55%
VOC	54,400	41,900	-23%	-55%

10. We are making steady progress on the following additional local emission reduction measures –

(a) since April 2006, all pre-Euro heavy diesel vehicles (except long-idling vehicles) have to be installed with approved emission reduction devices. The Air Pollution Control (Emission Reduction Devices for Vehicles) Regulation requires that these

devices must be kept in good working condition for reducing particulate emissions. Owners of vehicles failing to comply with the requirements will have their licences cancelled or refused for renewal upon expiry;

(b) we have completed consultation with the transport trades about extending the emission reduction device requirement in (a) to long-idling pre-Euro heavy diesel vehicles and will introduce the legislative proposal shortly;

(c) we have enacted legislation requiring newly registered heavy vehicles to comply with Euro IV emission standards. The tightened emission requirement came into force on 1 October 2006;

(d) we are preparing for a proposal to strengthen the control of emissions from petrol and LPG vehicles including the use of roadside remote sensing equipment and the use of dynamometers for emission testings;

(e) we are about to finalize a draft regulation to impose maximum limits on the volatile organic compound content of paints, printing inks and selected consumers products and mandate the installation of emission reduction device in certain printing processes. We hope to introduce the regulation into the Legislative Council by end 2006;

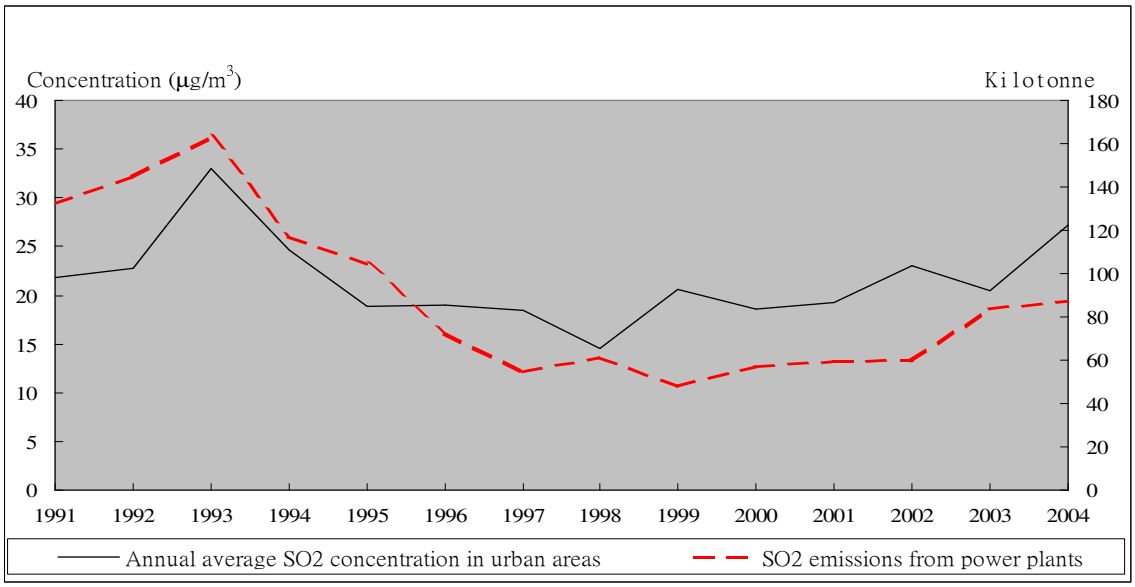
(f) we plan to introduce a programme in the second quarter of 2007 to provide one-off grant totalling HK$3.2 billion to encourage owners of 74,000 old diesel commercial vehicles to replace their old vehicles. If all the owners take up the offer, the emissions of RSP and NOx in Hong Kong will be reduced by 18% and 10% respectively;

(g) we propose, staring from 1 April 2007, to give a 30% reduction in first registration tax to encourage people to purchase environment friendly cars, subject to a ceiling of HK$50,000 per vehicle; and

(h) we will consult the public on whether to legislate against idling engines.

11. Electricity generation remains the biggest source of air pollution in Hong Kong. It accounts for 92% of the SO2 and half of the NOx and RSP emissions. As indicated in Figure 2 below, the SO2 emission by local power plants is highly correlated to the SO2 concentration in urban areas. Therefore, to achieve the 2010 emissions reduction targets, the power companies must substantially reduce their emissions.

Figure 2: SO2 Emitted by Power Companies and SO2 Levels in Urban Areas



12. In his Policy Address on 11 October 2006, the Chief Executive has re-affirmed that emission caps have been imposed on power plants at Castle Peak, Black Point and Lamma Island and will be progressively tightened to meet the 2010 emission reduction targets. He stressed again that the Government would not allow these firm targets to be compromised in any way. We require power plants to regularly review and update their pollution control technology by the best practicable means. The need to protect our environment will be the focus of our consultations with the power companies over their new Schemes of Control. Their permitted rate of return will be linked to their achievement of the emission caps.

13. The progress of emission reduction from power sector is as follows –

(a) on projects retrofitting emissions reduction devices, we granted the Environmental Permit on 25 April 2006 for Hong Kong Electric Company Limited (HEC) to retrofit flue gas desulphurisation (FGD) system to two 350 MW coal-fired units (units L4 and L5) in Lamma Power Station. For CLP Power Hong Kong Limited

(CLP), they have submitted the environmental impact assessment (EIA) report for its retrofit project of FGD and selective catalytic reduction (SCR) systems to four 677 MW coal-fired units (units B1 to B4) in Castle Peak Power Station on 21 June 2006. We approved the EIA report on 25 October 2006 according to the Environmental Impact Assessment Ordinance (EIAO);

(b) on the wider use of natural gas, we issued on 22 June 2006 the licence and emission cap for HEC's first gas-fired generation unit (unit L9). HEC completed its first firing by end June 2006. The emissions from HEC should be reduced after full operation of this gas-fired unit. For the CLP's proposed liquefied natural gas (LNG) receiving terminal, CLP formally submitted the EIA report on 19 October 2006 in accordance with the EIAO. Together with other relevant authorities, we will carefully evaluate the EIA report to determine whether the report can meet the requirements of the Technical Memorandum on Environmental Impact Assessment Process and the EIA Study Brief. According to the EIAO, the public and the Advisory Council on the Environment (ACE) can comment on the EIA report submitted by CLP before we decide whether to approve or not the EIA report. We will take into consideration the comments by the public and ACE before deciding whether to approve the EIA report;

(c) on promoting renewable energy, HEC commissioned the first local commercial scale wind power station on Lamma Island in February 2006. CLP also selected two sites for collecting wind data for the whole year and conducting environmental impact assessment. It is expected that CLP would complete the construction of it's first commercial scale wind power station during 2007 to 2008; and

(d) on the overall retrofit programme, HEC has agreed to compress the programme by optimizing and accelerating the projects such that the environmental benefits can be fully realised by 2010. CLP is also considering compressing their project schedule.

Cooperation with the Mainland

14. Cross-boundary cooperation in environmental protection featured prominently in the Ninth Plenary Session of the Hong Kong/Guangdong Cooperation Joint Conference held in Guangzhou on 2 August 2006. The two sides reconfirmed their determination to achieve the agreed emission reduction targets by 2010 to improve regional air quality.

15. The PRD Air Quality Management and Monitoring Special Panel under the JWG has completed an implementation framework for the Emission Trading Pilot Scheme for Thermal Power Plants in the PRD Region. After consulting with the concerned parties, the implementation framework will be presented to prospective participating power plants later this year so that they can identify trading partners and draw up emission trading agreements.

16. Also, the two governments published the first report of monitoring results of the PRD Regional Air Quality Monitoring Network on 31 October 2006, which covers the regional air pollution situation for the period between December 2005 and June 2006. The report was available at the websites of the environmental protection departments of the two sides. Also, the two governments have started the mid-term review of the Management Plan to assess the effectiveness of various emission reduction measures as well as the emission trends in the region, and to formulate appropriate strategies and enhanced control measures with a view to achieving the 2010 emission reduction targets.

17. Each of the two governments will also implement measures respectively to improve air quality. Measures to be or being taken by the Guangdong Province include –

(a) Guangdong will not plan for construction of new coal-fired or oil-fired power plants in the PRD region;

(b) LNG is being introduced for power generation;

(c) Guangdong will proceed with the retrofitting of FGD systems at existing power plants. It will strive to complete the relevant major works for large-scale generation units by 2008;

(d) Shenzhen will expedite the implementation of National III motor vehicle emission standards (on a par with Euro III ones) while Guangzhou has already implemented the National III motor vehicle emission standards on 1 September 2006 ahead of the schedule;

(e) leaded petrol will continue to be banned; and

(f) a pilot project will be implemented in Shenzhen to install vapour recovery systems at oil depots and petrol filling stations to further control emissions of VOC effectively.

The progress of implementation of the enhanced control measures by the Guangdong Provincial Government under the PRD Air Quality Management Plan is set out in **Annex B**.

International Developments on AQOs Reviews

18. We have been monitoring the international developments on reviews of air quality standards and objectives with a view to examining the need for revising Hong Kong's AQOs from a scientific perspective, taking into account local circumstances. Recent scientific research findings suggest that particulate matters smaller than 2.5 microns have more direct health effects than those of larger sizes. Moreover, the concentration levels of air pollutants capable of affecting human health may be lower than those indicated in previous studies. In view of such findings, in recent years, a number of countries including the US, the Member States of the EU and the World Health Organisation (WHO) have been examining the need for introducing a new set of air quality standards for particulate matters smaller than 2.5 microns (i.e. PM2.5) and revising the current air quality guidelines and standards.

19. The WHO announced in October this year an updated set of Air Quality Guidelines (AQGs). The new AQGs provide a scientific basis for supporting the development of air quality policies and management strategies in various parts of the world to protect human health. Owing to the stringency of the new AQGs, the WHO has recommended interim targets in the new guidelines for countries to improve their air quality progressively.

20. The WHO clearly points out that the actual air quality standards set in each country will vary according to the approach adopted for balancing health risks, technological feasibility, economic considerations and various other political and social factors. It also advises that governments should consider their own local circumstances carefully before adopting the new AQGs as statutory standards.

21. The government of the United Kingdom (UK), in its consultation document published in April this year, considers it impracticable to fully achieve the air quality standards recommended by the WHO across the UK by 2020. The UK estimates that it can only meet the standards for some air pollutants, e.g. particulates, by 2050. The US Environmental Protection Agency (EPA) just announced in late September this year new air quality standards for particulate matters. These new standards are less stringent than those in the new WHO AQGs and the dates for meeting the targets are 2015 or 2020. The EU issued a draft directive in September 2005 on ambient air quality, which includes a

proposed PM2.5 annual average standard purported to take effect in 2010 and be achieved by 2015. The draft directive however needs to go through further examination and will not be finalized until 2007.

Plan to Review the Air Quality Objectives

22. A comparison of Hong Kong's current AQOs, the new WHO AQGs, the US Primary Air Quality Standards, the EU Limit Values for Protection of Health and the air quality standards of other advanced countries is shown in **Annex C**. Since the new WHO AQGs are much more stringent than our current AQOs, achieving the new WHO AQGs in Hong Kong is a challenging task demanding very drastic measures to be taken not only in Hong Kong but also the PRD region over the long term.

23. The emission reduction measures required will include the extensive use of cleaner power generation technologies and fuels, cleaner mass-transit and transportation systems, cleaner production technologies, and highly efficient energy saving technologies. Some of the cleaner production and energy saving technologies required may be very costly or are still being developed overseas. Adopting these measures will have far reaching impact on a wide range of policy areas including energy, transportation, industrial production, urban planning, conservation and people's way of life.

24. To draw up a new set of AQOs for Hong Kong and devise a long-term plan for meeting such new AQOs, we need not only detailed information on required specific measures, their implications and available options, but also full public participation. It is therefore necessary to conduct an in-depth and detailed study to provide the required information and analysis. As such, the Government plans to commission a comprehensive study in 2007 to review Hong Kong's AQOs and develop a long-term air quality management strategy, followed by thorough public consultation. The study will examine in details the newly revised air quality standards in the US, the findings of the reviews in the EU to be published by end 2007, and the new WHO AQGs.

25. The planned consultancy study will include the following –

(a) review and characterize the current state of air quality in Hong Kong, including the prevailing exposure levels, developing trend, major pollution sources and origins, the impacts of external and non-anthropogenic sources on Hong Kong's air quality, as well as policies, programmes and legislation in place for controlling air pollution;

(b) examine and make reference to the different reasoning of the WHO and the US EPA in devising their respective air quality guidelines or standards, including concrete research results on long-term and short-term health impacts;

(c) use methods including air modelling to assess air quality under different scenarios and with mitigation measures adopted; to recommend specific measures required and options available to achieve interim targets and the standards if the new WHO AQGs are to be adopted; to examine in depth the need for co-operation with neighbouring cities and provinces;

(d) assess the implications of implementing the measures identified under different options, including economic costs, the time required for introducing the measures, the need to work with the Mainland as well as impacts on other policy areas such as energy, transportation, industrial development, urban planning and conservation;

(e) taking into account (c) and (d), devise practicable options to revise Hong Kong's AQOs, including whether it is necessary to have different targets for roadside air quality, and to identify strategies and measures required in the form of action plan to achieve the revised AQOs, with implications identified for each option, so as to facilitate public participation and comments; and

(f) review the need and means to harmonize air quality monitoring data with other economically advanced cities to facilitate fair comparison.

26. On 17 July 2006, we consulted the ACE and obtained their endorsement on the proposal to conduct the comprehensive study for supporting the review of the AQOs and developing a long-term air quality management strategy to achieve the new AQOs. We plan to commission the study in early 2007 and expect it will take about 18 months to complete, i.e. by the third quarter of 2008. To ensure that the study will be properly conducted, we plan to set up a steering committee comprising representatives from relevant policy bureaux and departments, members of the ACE, as well as relevant experts and academics.

27. Upon completing the study by the third quarter of 2008, we plan to launch a thorough public engagement process so as to finalize the new AQOs and the required long-term strategy on air quality management within 2009.

Advice Sought

28. Members are invited to note and comment on our plan to review the Hong Kong AQOs and to develop a long-term air quality management strategy.

Environment, Transport and Works Bureau
November 2006

Annex A

The Current Hong Kong AQO and Achievement Status

Pollutants	Averaging Time	Air Quality Objectives (μg/m3)	Measured highest Concentrations in 2005 (μg/m3) (In bracket is/are the station(s) where the highest data was/were recorded)		Status of Achievement	
					% of AQO at Highest Concentration	Evaluation of Achievement
Sulphur Dioxide (SO2)	1-hour	800	General Station	453 (Tap Mun)	57	Well achieved
			Roadside Station	476 (Mong Kok)	60	Well achieved
	24-hour	350	General Station	138 (Yuen Long)	39	Well achieved
			Roadside Station	114 (Mong Kok)	33	Well achieved
	Annual	80	General Station	32 (Kwai Chung)	40	Well achieved
			Roadside Station	25 (Central)	31	Well achieved
Nitrogen Dioxide (NO2)	1-hour	300	General Station	309 (Central/Western)	103	Not yet achieved
			Roadside Station	345 (Central)	115	Not yet achieved
	24-hour	150	General Station	147 (Tung Chung)	98	Achieved
			Roadside Station	195 (Causeway Bay)	130	Not yet achieved
	Annual	80	General Station	65 (Sham Shui Po)	81	Achieved
			Roadside Station	99 (Central)	124	Not yet achieved
Respirable Suspended Particulates (RSP)	24-hour	180	General Station	217 (Tung Chung)	121	Not yet achieved
			Roadside Station	191 (Causeway Bay)	106	Not yet achieved
	Annual	55	General Station	62 (Yuen Long)	113	Not yet achieved
			Roadside Station	84 (Causeway Bay)	153	Not yet achieved
Total Suspended Particulates (TSP)	24-hour	260	General Station	322 (Kwai Chung)	124	Not yet achieved
			Roadside Station	205 (Mong Kok)	79	Achieved
	Annual	80	General Station	104 (Yuen Long)	130	Not yet achieved
			Roadside Station	112 (Mong Kok)	140	Not yet achieved
Ozone (O3)	1-hour	240	General Station	365 (Tap Mun)	152	Not yet achieved
Carbon Monoxide (CO)	1-hour	30,000	General Station	5730 (Tung Chung)	19	Well achieved
			Roadside Station	4370 (Central)	15	Well achieved
	8-hour	10,000	General Station	4541 (Tung Chung)	45	Well achieved
			Roadside Station	3693 (Central)	37	Well achieved
Lead (Pb)	3-month	1.5		0.069 (Tsuen Wan, Annual average)	5	Well achieved

Annex B

Pearl River Delta Regional Air Quality Management Plan
Work Progress up to early 2006

Enhanced Control Measures of the Guangdong Provincial Government

Measures	Implementation Programme	Progress (Up to 31.5.2006)
Use cleaner energy	To reduce gradually the energy consumption per 10000 Yuan GDP. To establish by 2010 a diversified energy production and supply system that is safe, stable, economical, efficient and clean.	The 500KV grid for transmitting electricity from the western provinces was completed on schedule. The Guangdong Liquefied Natural Gas (LNG) Project is being constructed according to plan. The construction of a number of major electric power sources and clean energy programmes is being speeded up. To reduce reliance on more polluting fuel like coal and oil, Guangdong is developing two new natural gas projects apart from the Guangdong LNG Project – (a) CNOOC Zhuhai Natural Gas Pipeline Project, with a capacity of 1.19 million tonnes/year, utilizes natural gas from the South China Sea since February 2006; and (b) Zhuhai LNG Receiving Station Project, with a capacity of 3 million tonnes/year for Phase I, is expected to be commissioned partially by 2010. Zhongshan Hengmen Power Plant and Zhuhai Hongwan Power Plant have been converted to use natural gas as fuel since February 2006.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
	To construct natural gas trunk pipeline and the associated works. To complete Phase I in 2005 that will have a capacity of 3 million tonnes/year. In 2009, to complete Phase II that will increase the total capacity to 6 million tonnes/year and finish construction of a number of natural gas power plants.	The capacity of Guangdong LNG Project Phase I has been expanded from 3 million tonnes/year to 3.7 million tonnes/year. The total capacity for Phase II will be expanded to 7 million tonnes/year. The first shipment of LNG of Phase I arrived Dapeng receiving station on 26 May. It is expected to start supply of gas from mid-2006. Four new natural gas power plants at Daya Bay in Huizhou, Qianwan in Shenzhen, Shenzhen East and Zhujiang in Guangzhou are under construction with a total generating capacity of 4,650 MW. The generation units will be commissioned in phases starting later this year. Residents in Shenzhen, Guangzhou, Dongguan and Foshan can also use natural gas supplied through pipeline network.
	To improve by 2005 the 500KV dual circuit annular core transmission grid to ensure transmission of electricity from western provinces.	The 5 AC and 3 DC main transmission channels from western provinces have been completed.
Control the sulphur content of fuel	To control the use of high sulphur fuel (sulphur content of coal and fuel oil should be below 0.8% in the acid rain control zone by 2005).	Being implemented. By 2010, enterprises which have not installed desulphurization system would have their fuel sulphur content controlled at below 0.7% for coal and below 0.8% for fuel oil. Those not meeting the limits would need to use, sulphur fixing agents or sulphur removal agents.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
Reduce emissions from coal-fired and oil-fired power stations	To phase out small-scale thermal power generating units. Power plants with a capacity above 300MW to account for over 70% of the total installed capacity in the region in 2005, which is 35% higher than that in 2000.	All small thermal power generating units with capacities equal or below 50MW to be phased out by end 2007. About 240 generating units with a total capacity of approximately 2,500 MW are involved.
	To install flue gas desulphurization systems at the power plants in Shajiao, Huangpu, Taishan and Zhuhai by 2005.	Flue gas desulphurization systems installed at Shajiao Power Plant A (Unit 5), Shajiao Power Plant C (Unit 3), Shenzhen Xibu Power Plant (Units 4 to 6), Guangzhou Hengyun Power Plant, Guangzhou Ruiming Power Plant, Guangzhou Power Plant, two boilers at Yuancun Thermal Power Plant, Guangzhou Papermaking self-use thermal plant, Taishan Power Plant (Units 1 and 2), Jiangmen Xinhui Shuangshui Power Plant and Guangzhou Huangpu Power Plant (Units 5 and 6). Flue gas desulphurization systems are being retrofitted to all other generation units.
	To require all oil-fired and coal-fired generation units of capacity above 125MW to be equipped with flue gas desulphurization systems by 2007.	
	(New item included in December 2005) To require all coal-fired and oil-fired power plants to adopt low-NOx combustion technologies in case of alteration or expansion.	Power plants under alteration or expansion are already required to install desulphurization equipment and on-line continuous emissions monitoring system. Low-NO_X combustion technologies will be implemented at all units.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
Control emissions from industrial boilers and industrial processes	To phase out coal-fired boilers with a capacity of less than 2 tonnes/hour in the urban areas of cities. By 2005, to stop using such coal-fired boilers in build-up areas of key cities. To require all large and medium-size industrial boilers to install desulphurization systems or adopt clean combustion technologies to reduce emissions.	The operation of coal-fired boilers of less than 2 tonnes/hour has been largely phased out in the urban areas of cities in the region.
	To continue phasing out various production technologies and installations that have caused serious pollution by emitting sulphur dioxide, smoke and particulates.	Programmes to phase out high energy consuming and highly polluting cement plants and vertical kilns are being implemented. The relocation project of Guangzhou Cement Plant, completed by end 2005, was estimated to reduce particulate emissions in the Region by 3,000 tonnes/year.
	(New item included in December 2005) To actively study the technologies for controlling emission of nitrogen oxides from stationary sources such as power plant boilers, industrial boilers and restaurant boiling water furnaces.	Preparatory work is being conducted.
Reduce the emission of VOC from paints	To replace by 2003 paints using VOCs with xylene as solvents.	Work completed.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
Reduce tailpipe emissions from motor vehicles	To commence the construction of a regional rapid light-rail system by 2005. To construct expressways in major cities, such as the district expressway in Southern Guangzhou and the Shenzhen-Shenping Express Trunk Road.	Phase I of Shenzhen-Shenping Express was completed in 2005. The whole expressway is expected to be commissioned in 2006. Rail system between Guangzhou and Zhuhai started construction in December 2005. The system, 144km in length with a maximum speed of 200km/hr, is expected to be completed by 2009.
	To develop green transport by implementing clean vehicle action programmes in major cities of the region. To encourage the use of clean fuels, develop electric vehicles and actively promote the use of advanced clean fuel motor vehicles.	Shenzhen • Formulated the "Medium to Long Term Planning for the Development of Clean Vehicles in Shenzhen". Drew up and implemented the 2003-2008 general work programme for the use of clean fuel in public transport vehicles. All in-use public buses will be replaced by National III vehicles by end 2006 in advance of the schedule. • All public transport vehicles must use diesel with sulphur content of less than 500 ppm. Introduction of motor diesel supply with sulphur content of less than 500 ppm. • Preparations for promoting installation of vapour recovery systems at petrol filling stations, petrol tanker trucks and storage tanks are being pursued. Work plan will be formulated for implementation in phases at selected locations from end 2006.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
		Guangzhou • Motorcycles are prohibited from using certain road sections in the urban areas and will be banned in the urban districts from 1 January 2007. • Introduction of motor diesel with sulphur content of less than 500ppm. Active promotion of LPG public transport and taxis. By end 2005, all modification and replacement programmes had been completed for state-owned public transport companies. By end 2006, all public buses and taxis are expected to use LPG. By February 2006, there were over 5,800 LPG public transport vehicles and more than 10,000 LPG taxis.
	To require all new motor vehicles to fully meet emission standards. To step up annual inspection and on-road spot checks of in-use vehicles. To strengthen the control of in-use vehicles to ensure that over 90% of motor vehicles in the cities within the region will meet tailpipe emission standards by 2005.	National II emission standards have already been adopted since 1 July 2005. Striving to adopt National III standards by end 2006. Shenzhen • All newly registered public transport vehicles are already required to comply with the National III emission standards. • To establish reporting and joint investigation system for smoky vehicles. 30,000 roadside inspections would be carried out by end 2006.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
		• To implement motor vehicles inspection / maintenance system. • Adopted a labeling system on the environmental categorization of motor vehicles. <u>Guangzhou</u> • To implement in-use vehicles emission standards and to introduce cycle test for motor vehicles in phases by 2007. • To establish a database for motor vehicles emissions control management for strengthening controls on motor vehicle testing industry. • To improve the measures on roadside inspection and random check of vehicles with excessive emissions. • To establish labeling system on the environmental categorization of motor vehicles. • To implement phase out programme for highly polluting motor vehicles.
	(New item included in December 2005) To study the feasibility of advancing the implementation of the National IV emission standards for light-duty vehicles by 2010. To study the feasibility of advancing the implementation of the National V emission standards for heavy-duty vehicles by 2010.	Preparatory work is being conducted.

Measures	**Implementation Programme**	**Progress (Up to 31.5.2006)**
	To strengthen management on regular inspections of in-use motor vehicles to make sure that the required environmental performance is met.	

Annex C

Comparison of HK AQOs, WHO Air Quality Guidelines, US Primary Air Quality Standards, EU Limit Values for Protection of Health and Air Quality Standards of other advanced countries in μg/m^3

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards[5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
Sulphur Dioxide	10-minute	-	500	500	-	-	-	-	-	-	-	-
	1-hour	800 (3 exceedances per year)	-	-	-	-	350 (24 exceedances per year; To be achieved by 1.1.2005)	-	262 (0.1 ppm)	390 (<0.15 ppm)	350 (9 exceedances per year) 570 (no exceedance allowed)	-
	24-hour	350 (1 exceedance per year)	125	20 (IT-1: 125, IT-2: 50)	365 (1 exceedance per year)	-	125 (3 exceedances per year; To be achieved by 1.1.2005)	-	105 (0.04 ppm)	130 (<0.05 ppm)	-	90 (no exceedance allowed)
	Annual	80	50	-	80	-	-	-	-	52 (<0.02 ppm)	-	-
Total Suspended Particulate	24-hour	260 (1 exceedance per year)	-	-	-	-	-	-	-	-	-	-
	Annual	80	-	-	-	-	-	-	-	-	-	-

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards[5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
Respirable Suspended Particulate (PM10)	1-hour	-	-	-	-	-	-	-	200	-	-	-
	24-hour	180 (1 exceedance per year)	No guideline values are recommended but provided the dose response relationships.	50 (IT-1: 150, IT-2: 100, IT-3: 75)	150 (1 exceedance per year)	150 (1 exceedance per year)	50 (Stage I: 35 exceedances per year; To be achieved by 1.1.2005) (Stage II: 7 exceedances per year; To be achieved by 1.1.2010)	50 (35 exceedances per year but Member States may allow up to 55 exceedances)	100	<150	50 (1 exceedance per year)	50 (Stage I: 25 exceedances per year; To be achieved by 2005) (Stage II: 7 exceedances per year; To be achieved by 2010)
	Annual	55	-	20 (IT-1: 70, IT-2: 50, IT-3: 30)	50	Revoked	40 (To be achieved by 1.1.2005) 20 (To be achieved by 1.1.2010)	40 (Until 31.12.2009) 30 (To be achieved by 1.1.2010)	-	<70	-	-

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards[5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
Fine Suspended Particulate (PM2.5)	24-hour	-	No guideline values are recommended but provided the dose response relationships.	25 (IT-1: 75, IT-2: 50, IT-3: 37.5)	65 (3-year average of the 98th percentile of 24-hour concentration; To be achieved by 1.4.2010 or 1.4.2015 for those areas with extension approved)	35 (3-year average of the 98th percentile of 24-hour concentration; To be achieved by 1.4.2015 or 1.4.2020 for those areas with extension approved)	-	-	-	-	-	-
	Annual	-	-	10 (IT-1: 35, IT-2: 25, IT-3: 15)	15 (3-year average of the weighted annual mean To be achieved by 1.4 2010 or 1.4.2015 for those areas with extension approved)	15 (3-year average of the weighted annual mean; To be achieved by 1.4.2010 or 1.4.2015 for those areas with extension approved)	-	20 (To be met by 1.1.2015)	-	-	-	-

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards [5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
Nitrogen Dioxide	1-hour	300 (3 exceedances per year)	200	200	-	-	200 (18 exceedances per year; To be achieved by 1.1.2010)	-	-	282 (<0.15 ppm)	200 (9 exceedances per year)	150 (8 exceedances per year)
	24-hour	150 (1 exceedance per year)	-	-	-	-	-	-	75 – 113 (0.04 -0.06 ppm)	150 (<0.08 ppm)	-	-
	Annual	80	40	40	100	-	40 (To be achieved by 1.1.2010)	-	-	94 (<0.05 ppm)	-	-
Ozone	1-hour	240 (3 exceedances per year)	-	-	238 (USEPA revoked this standard on 15.6.2005 in all except 14 areas)	-	-	-	120 (0.06 ppm)	200 (<0.1 ppm)	150 (no exceedance allowed)	-

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards [5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
	8-hour	-	120	100 (High levels: 240, IT-1: 160)	160 (3-year average of the fourth highest daily maximum 8-hour concentration To be achieved (i) within 5-10 years after designation taken effect on 15.6.2004; or (ii) 2007-2021 for the 14 non-attainment areas of 1-hour standard)	-	120 (Target value; 25 exceedances per year averaged over 3 years; To be achieved by 1.1.2010)	-	-	120 (<0.06 ppm)	-	-
Carbon Monoxide	15-minute	-	100,000	-	-	-	-	-	-	-	-	-
	30-minute	-	60,000	-	-	-	-	-	-	-	-	-
	1-hour	30,000 (3 exceedances per year)	30,000	-	40,000 (1 exceedance per year)	-	-	-	23,000 (20 ppm)	29,000 (<25 ppm)	-	-

Pollutant	Averaging Time	HK AQO	WHO AQGs 2000	WHO AQGs [2] 2005 Global Update	Existing USEPA NAAQS	New USEPA NAAQS for Particulates [3]	Existing EU Limit Values	Proposed New EU Limit Values for Particulates [4]	Japan's Air Quality Standards[5]	Korea's Air Quality Standards	New Zealand's Air Quality Standards	Norway's Environmental Goal for Air Quality
	8-hour	10,000 (1 exceedance per year)	10,000	-	10,000 (1 exceedance per year)	-	10,000 (To be achieved by 1.1.2005)	-	-	10,000 (<9 ppm)	10,000 (1 exceedance per year)	-
	24-hour	-	-	-	-	-	-	-	11,500 (10 ppm)	-	-	-
Lead	3-month	1.5	-	-	1.5	-	-	-	-	-	-	-
	Annual	-	0.5	-	-	-	0.5 (To be achieved by 1.1.2005	-	-	<0.5	-	-

Notes:

(1) Singapore does not have its own standards but just follows USEPA's standards.

(2) As announced by the WHO on 5 October 2006. IT stands for interim target.

(3) Only the particulate standards revised by the "National Ambient Air Quality Standards for Particulate Matter – Final Rule" promulgated by the USEPA on 21 September 2006 are included. No change for standards of other air pollutants has been made.

(4) Only the particulate standards listed in the Co-decision Report (First Reading) on the European Parliament on European Parliament Legislative Resolution on the Proposal for a Directive of the European Parliament and of the Council on Ambient Air Quality and Cleaner Air for Europe which was adopted by the European Parliament on 26 September 2006 are included. No change for standards of other air pollutants has been proposed.

(5) Japan's Air Quality Standards, no exceedance allowed.