

For Information on
23 January 2006

**LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS**

**Progress of Measures to Improve Air Quality,
Including Those Taken By The Two Power Companies
to Meet The Government's Emission Reduction Targets by 2010**

Purpose

This paper reports to Members the latest progress of measures to improve air quality, including those taken by the two power companies, to meet the Government's emissions reduction targets by 2010.

Background

2. To improve regional air quality, the Hong Kong SAR Government reached a consensus with the Guangdong Provincial Government in April 2002 to reduce, on a best endeavours basis, the emission of four major air pollutants, namely sulphur dioxide (SO₂), nitrogen oxides (NO_x), 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 but also significantly improve the air quality of the Pearl River Delta and relieve the regional smog problem.

3. On 29 September 2005, we informed Members of the progress of measures being pursued by both sides for meeting the 2010 emission reduction targets. At the meeting, Members requested the Administration to provide six-monthly reports on the progress of the 2010 emission reduction targets and measures taken by the two power companies to meet the emissions reduction targets.

Progress of Reducing Emissions In Hong Kong

4. To fully achieve the 2010 emission reduction targets, the following additional emissions reduction measures are being pursued –

- (a) tightening the motor petrol standard to Euro IV with effect from 1 January 2005;
- (b) requiring the installation of vapour recovery systems for vehicle refuelling at petrol filling stations from 31 March 2005;
- (c) preparing for the introduction of Euro IV emission standards to newly registered vehicles in 2006;
- (d) requiring the power companies to take measures to reduce emissions and increase the use of natural gas in electricity generation; and
- (e) introducing a scheme to control VOC emissions from selected products.

5. Hong Kong has achieved good progress in reducing the total emissions of NO_x, 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 Target

	Emission Level in 1997 (tonnes)	Emission Level in 2004 (tonnes)	Changes in Emission Level during 1997-2004	Reduction Target for 2010
SO ₂	64,500	94,800	+47%	-40%
NO _x	110,000	92,500	-16%	-20%
RSP	11,200	8,040	-28%	-55%
VOC	54,400	41,900	-23%	-55%

6. Electricity generation remains the biggest source of air pollution in Hong Kong. It accounts for 92% of the SO₂ and half of the NO_x and RSP emissions. Therefore, to achieve the 2010 emissions reduction targets and sustained improvement in our air quality, the power companies must substantially reduce their emissions.

7. On 12 October 2005, in his Policy Address, the Chief Executive reiterated the Government's commitment to achieve the 2010 emissions reduction targets. We have asked the power companies to accelerate the timing of emissions reduction projects, increase the use of ultra-low sulphur coal and use natural gas for power generation as much as possible. In addition, the Environmental Protection Department (EPD) is progressively tightening the

emission caps upon the renewal of the power companies' Specified Process Licences (SPLs) issued under the Air Pollution Control Ordinance, to ensure that the 2010 emission reduction targets are achieved. A set of emission caps has already been imposed on the Castle Peak Power Station of China Light & Power (CLP) since 1 August 2005. As from 1 January 2006, emission caps have also been imposed onto Black Point Power Station similarly through renewal of the SPL.

8. The 2005 Policy Address has stated that in formulating the Scheme of Control Agreements (SCAs) between the Government and the two power companies which will expire in 2008, the Government will require the power companies to install effective emission reduction facilities to achieve emission reduction targets, as a precondition for licensing. In addition, the Government will explore options to avoid the costs of installing emission reduction facilities being passed onto consumers as far as possible.

9. In the Stage II "Consultation Paper on Future Development of the Electricity Market in Hong Kong" issued on 30 December 2005, we have proposed that the permitted rate of return on all fixed assets of the power companies be linked to their achievement of the emission caps stipulated in the SPLs, and reduced if they do not achieve the emission caps. As a corollary, financial incentives in the form of "bonus" returns will be provided to encourage the power companies to reduce their emissions to levels below those required in the SPLs.

10. We have also proposed that all capital expenditure for emission reduction facilities will be subject to the lowest rate of return. This approach retains the incentives for the power companies to invest in such facilities to help achieving the emissions reduction targets, while lessening the financial burden on consumers. Together with other issues contained in the consultation paper, the Economic Development and Labour Bureau is collecting views and comments on these proposals by 31 March 2006.

Progress of Emissions Reduction Measures by the Power Companies

CLP

11. CLP has been continuing their efforts to take forward their emission reduction strategy and has indicated that the timely completion of their Liquefied Natural Gas (LNG) receiving terminal will contribute favourably to achieving the 2010 emissions reduction targets. Progress of specific measures of CLP is summarized below –

(a) Retrofit Projects

CLP submitted their application for an environmental impact assessment (EIA) Study Brief for the retrofit of flue gas desulphurization (FGD) and selective catalytic reduction (SCR) in their Castle Peak Power Station on 28 September 2005. In response, EPD issued an EIA Study Brief on 31 October 2005 and is awaiting the submission of EIA Report by CLP. CLP has also awarded a contract to an engineering firm for front-end engineering work and commenced geotechnical and other survey work in November 2005 as well as started discussions with District Lands Office on land-related issues. In addition, CLP is continuing to pursue opportunities to improve the project schedule.

(b) Use of Clean Coal

CLP will reduce their emissions by increasing the use of Envirocoal with an ultra-low sulphur content of 0.1%. By 2007, Envirocoal will account for about one-third of CLP's coal portfolio and reduce the average sulphur content from the current level of 0.46% in 2004 to about 0.3%. This will enable the Castle Peak Power Station to cut SO₂ emissions by one third.

(c) LNG Receiving Terminal

CLP submitted an application for EIA Study Brief for their proposed LNG terminal in Hong Kong on 13 May 2005. In response, EPD issued an EIA Study Brief on 23 June 2005 and is awaiting the submission of an EIA Report from CLP. The project will involve the construction and operation of an LNG receiving terminal and its associated facilities at either the South Soko Island or Black Point in Tuen Mun. CLP is now briefing stakeholders on the project and the site options.

HEC

12. The Hong Kong Electric Company (HEC) has made the following major progress:

(a) Retrofit Projects

HEC has reviewed the FGD retrofit programme and advised that the commissioning date of the second FGD can be advanced by three

months to April 2010. HEC will continue to explore the possibilities of optimization and acceleration of the projects so that the environmental benefit can be fully realised by 2010.

HEC has submitted their application for an EIA Study Brief for the retrofit of Units 4 and 5 of Lamma Power Station on 21 September 2005 and the Study Brief was issued under the EIA Ordinance on 26 October 2005. Accordingly, an EIA Report was submitted on 23 December 2005. EPD is currently reviewing the application and will decide if the Report meets the requirements of the Study Brief and technical memorandum before 20 February 2006.

(b) Use of Natural Gas

The extension of Lamma Power Station of HEC has been granted an environmental permit for installation of six gas-fired units. The first gas-fired unit, L9, is scheduled for commissioning in 2006. Furthermore, an existing oil-fired peak lopping unit will be converted to gas-fired when natural gas is available in 2006.

Emissions Trading

13. Emissions trading is an effective market-based tool aiming to achieve the emissions reduction at a minimum cost while providing flexibility to the power companies in the selection of reduction strategies and management of reduction plans. The Government has proposed emissions trading as an optional measure for CLP and HEC to achieve their 2010 reduction targets.

14. To facilitate discussions on matters relating to setting up an emissions trading pilot scheme between power plants in Hong Kong and the PRD area, a Joint Task Force with members from CLP, HEC and EPD was formed in end 2005.

Cooperation with the Mainland

15. At the Sixth Meeting of the Hong Kong–Guangdong Joint Working Group on Sustainable Development and Environmental Protection (JWG) held on 20 December 2005, the two sides noted that there had been significant progress in implementing the Pearl River Delta (PRD) Regional Air Quality Management Plan (the Management Plan) during 2005.

16. Since 30 November 2005, the Regional Air Quality Monitoring Network jointly established under the Management Plan had been formally

commissioned and the PRD Regional Air Quality Index published on a daily basis. The enhanced control measures under the Management Plan were well on schedule. Moreover, the two sides exchanged ideas and know-how on air quality monitoring, air emissions inventory compilation, preventive measures on vehicles emissions and continuous emissions monitoring of stationary pollution sources.

17. The JWG have agreed to include additional measures in the Management Plan. They include introducing emission caps for the power plants in Hong Kong, tightening control over pollutant emissions from major pollution sources in the PRD, studying the feasibility of advancing the implementation of more stringent motor vehicle emission standards in Mainland cities, and stepping up regular inspection of in-use motor vehicles. The two governments will also strengthen exchanges and co-operation on continuous emissions monitoring of stationary pollution sources and enhance the reliability of the systems on both sides and the comparability of data. The progress of enhanced control measures of the HKSARG and the Guangdong Provincial Government is set out in **Annexes A and B** respectively.

18. In 2006, the major tasks under the Management Plan include the following –

- (a) On combating air pollution from the power generation industry, Phase I construction of the liquefied natural gas (LNG) trunk pipeline in Guangdong Province will be completed in 2006 and a number of LNG power plants are expected to be commissioned in phases. This will substantially reduce the PRD's reliance on the more polluting fuel oil and coal. Moreover, existing oil-fired and coal-fired power plants in Guangdong Province will continue to install flue gas desulphurization systems;
- (b) On controlling emissions from motor vehicles, the Guangdong Provincial Government will strive to advance the implementation of National III motor vehicle emission standards (on a par with Euro III ones) in PRD cities while Hong Kong will implement Euro IV motor vehicle emission standards in line with the EU in 2006;
- (c) The data collected by the Regional Air Quality Monitoring Network will be analysed by the environmental protection authorities of the two governments. A regional air quality monitoring report will be submitted on a half-year basis, providing the public with more information on the air quality in the PRD;

- (d) The environmental protection authorities of the two governments will continue to strengthen technical exchanges and joint studies, especially on continuous emissions monitoring of stationary pollution sources and commissioning studies on regional air pollution on a need basis; and
- (e) Details of the Emission Trading Pilot Scheme for Thermal Power Plants in the PRD Region being jointly developed by the two sides are expected to be finalised by mid-2006. Subject to agreement of the two governments, details will be presented to the power plants in Hong Kong and Guangdong in the third quarter of 2006 so that prospective participants can identify their trading partners and draw up emission trading agreements.

A summary of the 2006 Action Plan is in **Annex C**.

Education and Public Participation

19. Education and public participation are very important for the successful control of air pollution. On this, some of the recent programmes are highlighted below –

- (a) The Government will continue to appeal to drivers to exercise self-discipline by switching off idling engines through promotional and educational activities. The Government Logistics Department has already issued a circular reminding all government drivers to switch off engines while waiting;
- (b) The voluntary initiative of “Clean Air Charter” by the business community will contribute usefully to Hong Kong’s clean air efforts by reducing energy consumption. Recently, the Federation of Hong Kong Industries has also launched the One Factory-One Year-One Environmental Project campaign to promote cleaner production;
- (c) The Government has been actively promoting energy saving to the public by raising the air-conditioned room temperature from 22.5 °C to 25.5 °C. As undertaken in the Policy Address, the Government will set an example by cutting its electricity consumption at office buildings by 1.5% annually.

Environmental Protection Department
January 2006

**Cooperation with Mainland
《Pearl River Delta Regional Air Quality Management Plan》
2005 Work Progress**

Enhanced Control Measures of the HKSARG

Measures	Implementation Programme	Progress (Up to 30.11.2005)
Encourage the replacement of diesel light buses with cleaner fuel ones	Since 2002, the Government has offered incentives to public light bus owners to encourage replacement of diesel light buses with liquefied petroleum gas (LPG) or electric ones.	An incentive scheme has been introduced since August 2002. Up to October 2005, there were 2361 public LPG light buses, 117 private LPG light buses and 1 electric light bus. Over 80% of the newly registered public light buses run on LPG. The incentive scheme will end by the end of 2005.
Require the retrofitting of particulate removal devices on pre-Euro diesel vehicles	Since 2002, financial assistance has been provided for retrofitting pre-Euro heavy diesel vehicles with particulate removal devices.	<p>Financial assistance was provided in phases from December 2002 to December 2004 to over 34000 non-long-idling pre-Euro heavy diesel vehicles retrofitting with catalytic converters. The HKSARG is proposing legislation to require the installation of approved emissions reduction devices on these vehicles.</p> <p>A programme for the installation of particulate removal devices for about 3300 long-idling pre-Euro heavy diesel vehicles (including lorries with cranes mounted, concrete mixers, pressure tankers and gully emptiers) has started since June 2005. Upon completion of the programme by end December 2005, the HKSARG intends to introduce legislation to require the installation of approved emissions reduction devices for these vehicles.</p> <p>Besides, all pre-Euro franchised buses have been installed with catalytic converters to reduce the emission of particulates.</p>

Measures	Implementation Programme	Progress (Up to 30.11.2005)
Enhance the vapour recovery systems in petrol filling stations	Legislation requiring the recovery of petrol vapour emitted during vehicle refueling at petrol filling stations was introduced in 2003/04.	The Regulation came into effect on 31 March 2005.
Tighten motor fuel standards	Motor fuel standards will be tightened to Euro IV by 2005 (motor diesel standard has already been tightened to Euro IV since 2002).	Euro IV motor fuel standards came into effect on 1 January 2005.
Tighten tailpipe emission standards	To adopt Euro IV standards for tailpipe emissions from 2006.	Euro IV standards will be introduced on 1 January 2006 for tailpipe emissions.
	To be in line with EU in adopting Euro V standards for tailpipe emissions.	(New item included in December 2005) To be in line with EU to adopt Euro V standards for tailpipe emissions.
Reduce VOC emissions from the printing process, paints and consumer products	Phase I: To introduce legislation in 2004 or 2005 to require labeling of VOC-containing products.	During public consultation held in September 2004 and subsequent discussions with stakeholders, members of the trade generally agreed advance Phase II and impose limits on the VOC content of VOC products, and to set appropriate levels and technical details at an earlier date. Law drafting work has commenced and the legislative process is expected to complete in mid 2006. All VOC-containing products under control will be subject to the statutory limits in phases with effect from 2007.
	Phase II: To introduce legislation in phases to reduce the use of products with high VOC contents and to impose emission standards for the printing process.	

Measures	Implementation Programme	Progress (Up to 30.11.2005)
Reduce emissions from power stations	Effective and flexible mechanisms (which may include emissions trading) will be set up to control the total emissions of SO ₂ , NO _X and RSP from power stations to achieve respective reduction targets by 2010.	The emissions reduction options set out in the financial plans of the two power companies were approved by the Government in June 2005. CLP Power Hong Kong Limited will provide desulphurization and de-NO _X systems for four of its coal-fired generating units each of 677MW. Hong Kong Electric Co. Ltd. will provide low-NO _X burners and desulphurization systems for two of its coal-fired generating units each of 350MW. In order to achieve the 2010 emissions reduction targets, the Government will continue discussions with the two power companies on other options, including the speeding up of emissions reduction projects and participation in emissions trading etc. Furthermore, CLP will increase the use of ultra low sulphur coal and seek to increase natural gas supply through the development of liquefied natural gas facilities.
	Introduce caps on total emissions from power plants.	(New item included in December 2005). An emission cap has been included in the licence for CLP's Castle Peak Power Station starting from 1 August 2005. EPD will continue to introduce emission caps on power plants upon licence renewal with a view to gradually reducing emissions to the level set for 2010.

**Cooperation with Mainland
《Pearl River Delta Regional Air Quality Management Plan》
2005 Work Progress**

Enhanced Control Measures of the Guangdong Provincial Government

Measures	Implementation Programme	Progress (Up to 30.11.2005)
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.	Work in progress.
	To construct liquefied natural gas (LNG) trunk pipeline and carry out 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 LNG power plants.	Phase I works are expected to be completed in 2006 and the four LNG power plants at Daya Bay in Huizhou, Shenzhen East, Qianwan in Shenzhen and Zhujiang in Guangzhou are under construction as scheduled.
	To improve by 2005 the 500KV dual circuit annular core transmission grid to ensure transmission of electricity from western provinces.	The 5 AC 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.

Measures	Implementation Programme	Progress (Up to 30.11.2005)
Reduce emissions from coal-fired and oil-fired power stations	To phase out small-scale thermal power generating units. Power plants with a capacity of over 300MW to account for over 70% of the total installed capacity in the region in 2005, which is 35% higher than that in 2000.	Expected to be completed in 2007 due to electricity demand well exceeding estimation.
	To install flue gas desulphurization systems at the power plants in Shajiao, Huangpu, Taishan and Zhuhai by 2005.	Flue gas desulphurization systems installed in Shajiao Power Plant A (Unit 5), Shenzhen Xibu Power Plant (Units 4, 5 and 6), Guangzhou Hengyun Power Plant, Guangzhou Ruiming Power Plant, Guangzhou Power Plant, Yuancun Thermal Power Plant Boiler 2, Guangzhou Papermaking self-use thermal plant and Taishan Power Plant Units 1 and 2. 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.	
	To require all coal-fired and oil-fired power plants to adopt low-NOX combustion technologies in case of alteration or expansion.	(New item included in December 2005).
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.	Have generally phased out and stopped the operation of coal-fired boilers of less than 2 tonnes/hour in the urban areas of cities in the region.

Measures	Implementation Programme	Progress (Up to 30.11.2005)
	To continue phasing out various production technologies and installations that have caused serious pollution by emitting sulphur dioxide, smoke and particulates.	Work in progress.
	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.	(New item included in December 2005).
Reduce the emission of VOC from paints	To replace by 2003 paints using VOCs like xylene as solvents.	Work completed.
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.	The "Planning of the Transport Routes for Inter-City High Speed Railway Network in the PRD Region (2005-2020)" was endorsed by the State Council in March 2005 and incorporated into the State's medium to long term railway network planning. The Pearl River Delta High Speed Transportation Network Project has started.

Measures	Implementation Programme	Progress (Up to 30.11.2005)
	<p>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.</p>	<p><u>Shenzhen</u></p> <ul style="list-style-type: none"> • 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. 2000 public buses will be replaced by Euro III vehicles by end 2005. • All public transport vehicles must use diesel with sulphur content of less than 500 ppm. • Introduction of motor diesel with sulphur content of less than 500 ppm. • Preparations for promoting installation of vapour recovery systems at petrol filling stations being pursued. <p><u>Guangzhou</u></p> <ul style="list-style-type: none"> • Motorcycles are prohibited from using certain road sections in the urban areas. Introduction of motor diesel with sulphur content of less than 500 ppm. • Active promotion of LPG public transport and hired vehicles. As at 30 May 2005, there were 3,547 LPG public transport vehicles and 8,100 LPG hired vehicles.

Measures	Implementation Programme	Progress (Up to 30.11.2005)
	<p>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.</p>	<p>National II emission standards have already been adopted since 1 July 2005, and will strive to adopt National III standards by end 2006.</p> <p><u>Shenzhen</u></p> <ul style="list-style-type: none"> All newly registered public transport vehicles are required to comply with the National III emission standards. Established the reporting and joint investigation system for smoky vehicles. Implemented the I/M system. Adopted a labeling system on the environmental categorization of motor vehicles. <p><u>Guangzhou</u></p> <ul style="list-style-type: none"> Initiated control actions against smoky motor vehicles.
	<p>To study the feasibility of advancing the implementation of the National IV emission standards for light-duty vehicles by 2010.</p> <p>To study the feasibility of advancing the implementation of the National V emission standards for heavy-duty vehicles by 2010.</p> <p>To strengthen management on regular inspections of in-use motor vehicles to make sure that the required environmental performance is met.</p>	<p>(New item included in December 2005).</p>

**Pearl River Delta Air Quality Management and Monitoring Special Panel
Summary of 2006 Action Plan**

Assess the Progress of the Management Plan

- Conduct at least 2 site inspections to assess the progress of implementing various measures in the Management Plan.
- Review the progress and effectiveness of the Management Plan and recommend additional measures.

Regional Air Quality Monitoring Network

- Publish on a daily basis the Regional Air Quality Index to the public.
- Submit the Monitoring Report on the PRD Regional Air Quality Monitoring Network and the Report on the Operation of the Regional Air Quality Monitoring Network in April and October 2006.
- Carry out thematic studies by making use of the data collected by the Regional Air Quality Monitoring Network, where necessary.
- Recommend and commence thematic research projects.

Regional Emissions Inventory

- Complete the 2003 PRD Regional Emissions Inventory in the first quarter.
- Complete the review and amendment of the 1997 Emissions Inventory.
- Evaluate the trend of regional emissions with reference to the audit results and draw up corresponding strategies and follow-up actions.

Enhance Technical Exchanges and Training of Personnel

- The scope of technical exchanges includes –
 - Operation of the regional monitoring network and compilation of emissions inventories;
 - Studying the feasibility of adopting National IV/V motor vehicle emission standards in the PRD Economic Zone in 2010;
 - In-use vehicles emissions inspection technologies and management;
 - Continuous emissions monitoring systems for stationary pollution sources;
 - Flue gas de-NO_x technology for thermal power plants; and
 - Emissions reduction technology for industrial pollution sources.

Emission Trading Pilot Scheme for Thermal Power Plants in the PRD Region (the “Pilot Scheme”)

- Report the study findings on the implementation details to both governments by mid-2006.
- As agreed by the two governments, details of the Pilot Scheme will be presented to the power plants in Guangdong and Hong Kong in the third quarter of 2006 so that prospective participants can identify trading partners and draw up emissions trading agreements.