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CB(1) 1463/08-09(01)

28 April 2009

Clerk to LegCo Panel on Environmental Affairs
Legislative Council Secretariat
3/F, Citibank Tower
Garden Road,
Hong Kong
(Attention : Miss Becky YU)

Dear Miss YU,

**Panel on Environmental Affairs
Subcommittee on Improving Air Quality
Follow-up to the meeting on 13 January 2009**

As requested by Members at the captioned meeting, we would like to provide the additional information as follows –

- (a) a graph showing the progress of emission reduction of the four major air pollutants, viz, sulphur dioxide (SO₂), nitrogen oxides (NO_x), respirable suspended particulates (RSP) and volatile organic compounds (VOCs) during the period between 1997 and 2007 (**Appendix I**);
- (b) an updated Annex A to the paper to the Subcommittee of reference CB(1) 531/08-09(01) with the completion dates for the enhanced control measures and the environmental benefits included (**Appendix II**). The environmental benefits are expressed in terms of emission reductions, which can indicate the relative significance of various measures in reducing emission levels in Hong Kong;
- (c) three separate papers on the progress of measures to control emissions from the following sources, including new initiatives/alternatives

proposed by Members or the affected trades –

- (i) motor vehicles (**Appendix III**);
 - (ii) ferries (**Appendix IV**); and
 - (iii) power plants (**Appendix V**).
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- (d) a paper setting out the progress of our study on low emission zones, rationalization of bus routes and bus-bus interchange schemes (**Appendix VI**); and
 - (e) a paper on Government efforts in addressing climate change (**Appendix VII**).

Yours sincerely,



(Edmond Kaman HO)
for Director of Environmental Protection

**The Progress of Emission Reduction
of the Four Major Air Pollutants (including Sulphur Dioxide (SO₂),
Nitrogen Oxides (NO_x), Respirable Suspended Particulates (RSP) and
Volatile Organic Compounds (VOC))
during the Period from 1997 to 2007**

Chart 1: The trend expressed in absolute emissions

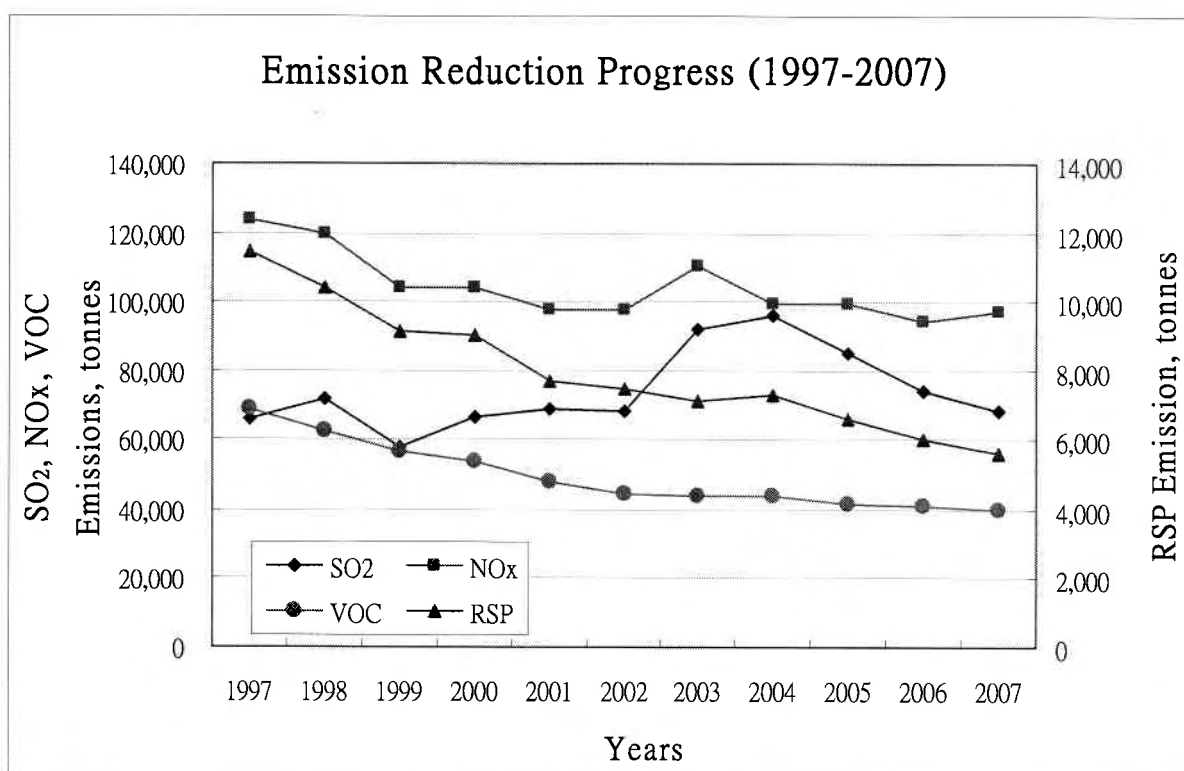
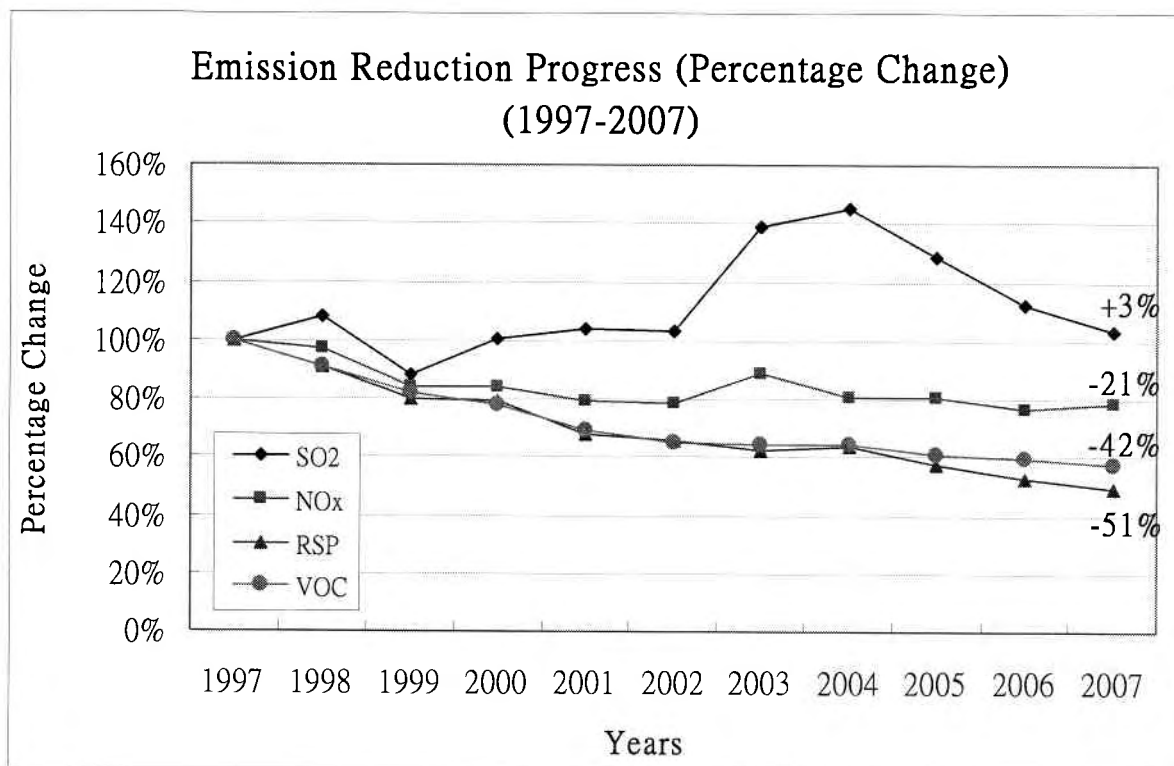


Chart 2: The trend expressed in emissions relative to the emission levels of 1997



Note: The emission of SO₂ in 2007 still registered a slight increase as compared with that in 1997. We expect that the emission level would be reduced substantially following completion of the installation of flue gas desulphurisation facilities at the local power plants in the run up to 2010.

Environmental Protection Department
April 2009

Appendix II

Pearl River Delta Regional Air Quality Management Plan Enhanced Control Measures of Hong Kong Special Administrative Region

The progress of various local measures for meeting the 2010 emission reduction targets and their environmental benefits in terms of emission reductions are set out in the table below. Full implementation of the measures in Hong Kong and Guangdong under the regional air quality management plan would enable us to achieve the 2010 emission reduction targets, which could in turn help save around 200 premature deaths and 2000 hospital admissions in Hong Kong each year¹.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Encourage replacement of diesel light buses with ones using clean fuel	Since 2002, the Government has offered incentives to diesel light bus owners to encourage replacement of diesel light buses with liquefied petroleum gas (LPG) or electric ones.	The incentive scheme was introduced in August 2002 and completed by 31 December 2005. As at the end of December 2008, there were 2 610 public LPG light buses, accounting for 60% of the entire public light bus fleet.	31 December 2005	At present, light buses contribute to about 5% and 1% of the total vehicular emission of RSP and NO _x respectively. Within the light bus fleet, LPG light buses emit negligible amount of RSP and 50% less NO _x than diesel ones.

¹ It is difficult to examine the air quality benefits and the resulting health benefits of each emission control measures in isolations. The reason is that air pollutants, after emission to the atmosphere, will react with one another to form other air pollutants. For example, nitrogen oxides and volatile organic compounds will react with each other to form ozone, which will accelerate the oxidation of the nitric oxide in nitrogen oxides to form nitrogen dioxide. Another example is that some of the sulphur dioxide and nitrogen oxides emitted in the atmosphere will form sulphate and nitrates, which will add to the ambient particulate concentration. Thus, the resulting air quality/health benefits of the package of measures are not an arithmetic sum of that derived from each of the individual measures but the result of a complicated chemical process.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Require retrofitting of particulate reduction devices on pre-Euro diesel vehicles	With effect from 1 April 2007, pre-Euro diesel vehicles have to be installed with approved particulate reduction devices.	<p>Financial assistance was provided in phases from December 2002 to December 2005 to retrofit pre-Euro heavy-duty diesel vehicles with catalytic converters. All together, about 36 500 eligible vehicles were installed with catalytic converters.</p> <p>Since April 2006, all pre-Euro heavy-duty diesel vehicles (including franchised buses), except those operating under long idling situations (including lorries with cranes mounted, concrete mixers, pressure tankers and gully emptiers), were required to be installed with approved emission reduction devices. This requirement was extended to the "long-idling" vehicles since April 2007.</p>	<p>31 December 2005</p> <p>1 April 2007</p>	<p>From 1 April 2007, all pre-Euro diesel vehicles are required to be installed with approved particulate reduction devices, which can reduce the particulates in the tailpipe exhaust by about 30%.</p> <p>Because of installation of the particulate reduction devices, pre-Euro diesel vehicles, which make up 22% of the diesel vehicle fleet, account for about 35% of the total vehicular emission of RSP.</p>

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Encourage vehicle owners to replace pre-Euro and Euro I diesel commercial vehicles with Euro IV models	Since 1 April 2007, the Government has offered a time-limited one-off grant to vehicle owners to encourage the early replacement of pre-Euro and Euro I diesel commercial vehicles with new ones which comply with the statutory emission standards for newly registered vehicles (which is now the Euro IV emission standards).	A total of 10 922 applications have been approved (as at the end of February 2009).	31 March 2010	Compared with their Euro IV counterparts, pre-Euro vehicles emit 30 times more RSP and two times more NOx whereas Euro I vehicles emit 15 times more RSP and 1.5 times more NOx.
Encourage members of public to use environmentally friendly private petrol vehicles	With effect from 1 April 2007, a 30% reduction in the First Registration Tax (FRT) was offered to the purchasers of environment-friendly private petrol vehicles, subject to a cap of \$50,000 per vehicle.	A total of 7 191 environment-friendly private petrol vehicles were registered under the scheme (as at the end of February 2009).	On-going	Environment-friendly petrol private cars emit 50% less hydrocarbons and nitrogen oxides and consume 40% less fuel than conventional Euro IV petrol private cars.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Encourage use of environment-friendly commercial vehicles	With effect from 1 April 2008, a reduction in FRT was offered for the purchase of environment-friendly commercial vehicles.	A total of 222 environment-friendly commercial vehicles were approved under the scheme (as at the end of February 2009).	On-going	Compared with Euro IV vehicles, Euro V heavy duty diesel vehicles emit about 40% less nitrogen oxides (NOx). For light duty diesel vehicles, Euro V models emit about 80% less respirable suspended particulates and 30% less NOx. As regards Euro V petrol/LPG vehicles, they emit about 30% less NOx.
Require drivers to stop the engines of idling vehicles	To introduce the enabling legislation to require drivers stop the engines of idling vehicles within 2009.	<p>After considering the outcome of the public consultation, the Government has put forward a revised proposal to introduce a statutory ban on idling vehicles with running engines to the Panel on Environmental Affairs (the Panel) for discussion on 15 January 2009.</p> <p>We have since consulted the taxi trade again and reported the outcome to the Panel on 23 February 2009. We shall commence law drafting shortly. Our target is to introduce the bill into the Legislative Council for scrutiny in the current legislative year for implementing the proposed ban as soon as possible.</p>	2009	Mainly to reduce environmental nuisances and greenhouse gas emissions.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Strengthen control of emissions from petrol and LPG vehicles	To consult stakeholders on proposals to strengthen the control of emissions, including the use of roadside remote sensing device and chassis dynamometer for emission testing.	The Government plan to commence the consultation in 2009.	2009	A local study has found replacing the worn-out catalytic converter of an LPG taxi can reduce its emissions by 70 to 80%. Other overseas experience also shows that strengthening control can reduce fleet emission. Vancouver of Canada, which implemented dynamometer emission check similar to our proposed one, has calculated that the reduction of the emission of its private car fleet was 13% for hydrocarbons, 12% for carbon monoxide and 6% for nitrogen oxides. We expect that the emission reduction of our proposal will be similar.
Tighten emission standard for in-use diesel vehicles	To study the further tightening of dark smoke emission standard for in-use diesel vehicles.	A proposal will be prepared for consultation with the transport trades in 2009.	2010	The proposed measure can raise the maintenance standard of in-use diesel vehicles and reduce the emissions of smoke and particulates.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Enhance vapour recovery systems in petrol filling stations (Item completed)	The Air Pollution Control (Petrol Filling Stations) (Vapour Recovery) Regulation was amended in 2004 to require the recovery of petrol vapour emitted during vehicle refuelling at petrol filling stations, with effect from 31 March 2005.	Since 31 March 2005, all newly built petrol filling stations have to be installed with vapour recovery systems. Since 31 March 2008, all petrol filling stations have been retrofitted with such systems to recover petrol vapour emitted during refuelling.	31 March 2008	Reduce 740 tonnes of VOC emission a year.
Tighten motor fuel standard	The motor fuel standard were tightened to the Euro IV standard by 2005 (the motor diesel standard has already been tightened to the Euro IV standard since 2002).	The Euro IV petrol standard came into effect on 1 January 2005.	1 January 2005	A petrol vehicle meeting the Euro IV emission standards and using Euro IV petrol will emit 45%, 50% and 55% less NO _x , HC and CO respectively, than a petrol vehicle meeting Euro III emission standards and using Euro III petrol.
	To introduce the supply of motor vehicle fuels meeting the Euro V standard.	With effect from 14 July 2008, the duty rate for Euro V motor vehicle diesel has been waived to further encourage drivers to use this more environment-friendly fuel.	2009/2010	Compared with ultra-low sulphur diesel, Euro V diesel has 80% less sulphur content. Using Euro V diesel can reduce the sulphur dioxide and RSP emissions of diesel vehicles by 80% and 5% respectively.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
	To develop specifications and regulations on the use of biodiesel as vehicle fuel in Hong Kong.	The Government is now consulting the trades on the draft biodiesel specifications and regulatory framework for preparing the enabling legislation for implementation in 2009.	2009	Biodiesel is a renewable energy because the carbon dioxide emitted in the atmosphere can be recycled through the photosynthesis of the plant providing the feedstock (e.g. rapeseed, soy bean, etc.) for producing biodiesel.
Tighten emission standard for newly registered vehicles	The Euro IV emission standard was adopted since 2006.	The Euro IV emission standard was introduced on 1 January 2007 for all newly registered vehicles.	1 January 2007	Compared to Euro III petrol vehicle, a Euro IV model will emit about 45%, 50% and 55% less NO _x , HC and CO respectively. For light diesel vehicles (other than diesel private cars), the emission reduction will be about 50% for both NO _x and RSP. Compared to Euro III heavy duty vehicles, a Euro IV model emits about 30% and 80% less NO _x and RSP respectively.
	To follow the European Union in adopting the Euro V motor vehicles standard for tailpipe emissions.	We are consulting vehicle suppliers about the availability of Euro V compliant models for Hong Kong market.	2010/2011	Compared with Euro IV vehicles, Euro V heavy duty diesel vehicles emit about 40% less NO _x . For light duty diesel vehicles, Euro V models emit about 80% less RSP and 30% less NO _x . Euro V petrol / LPG vehicles, they emit about 30% less NO _x .

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Study the feasibility of setting up a pilot low emission zone	Examining the feasibility of setting up one or more pilot "low emission zones" targeting at franchised buses at busy corridors.	We are working out the details with the Transport Department and the franchised bus companies. We plan to draw up an implementation framework by 2009/10.	2009/2010	If only Euro III franchised buses are allowed to enter the low emission zone, the RSP and NOx emissions within the proposed pilot zone will reduce by about 20% and 10% respectively.
Use of cleaner fuels by ferries	To look into the use of cleaner fuels by local ferries.	The Government set up an inter-departmental working group in December 2007 to develop a trial scheme on the use of ultra low sulphur diesel ("ULSD") (sulphur content not more than 0.005%) by local ferries. The trial is expected to commence in the first half of 2009 and initial findings will be available around early 2010. Subject to the findings, the Government would draw up a scheme to encourage local ferry operators to switch from using marine light diesel (sulphur content not more than 0.5%) to ULSD.	2010	This will reduce sulphur dioxide and respirable suspended particulates emissions from each vessel by about 99% and 10% respectively.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Control emissions from off-road mobile sources operating within airport and container terminals	To draw up measures to control emissions from off-road mobile sources operating within the airport and container terminals (including mobile machinery and vehicles). Measures will include implementation of statutory emission standards for mobile machinery.	We plan to consult the relevant trades in 2009.	2009	A piece of mobile machinery meeting prevailing emission standards will emit at least 60% less RSP and NO _x than a non-complying one.
Reduce volatile organic compounds (VOC) emissions from printing process, paints and consumer products	To introduce legislation in 2004 or 2005 to require the labeling of VOC content on VOC products. Legislation will then be introduced in phases to reduce the use of products with high VOC contents and to impose emission standards for the printing process.	Since 1 April 2007, the Government has enforced the new Regulation in phases to restrict the VOC content of architectural paints/coatings, printing inks and six major types of selected consumer products (i.e. air fresheners, hairsprays, multi-purpose lubricants, floor wax strippers, insecticides and insect repellents). Lithographic heatset printing machines are also required to be installed with emission control devices from 1 January 2009. We plan to amend the Air Pollution Control (Volatile	The extension of the control to vehicle refinishing and marine paints/coatings, adhesives and sealants is planned to take effect in phases starting from 1 January 2010.	Reduce about 8,700 tonnes of VOC emission a year after full implementation of the control.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
		Organic Compounds) Regulation in mid-2009 to extend the control to cover vehicle refinishing and marine vessel paints/coatings, adhesives and sealants.		

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Reduce emissions from power stations	Effective and flexible mechanisms will be set up to control the total emissions of SO ₂ , nitrogen oxides (NO _x) and respirable suspended particulates from power stations to achieve respective reduction targets by 2010.	<p>The Government approved the emission reduction options set out in the financial plans of the two power companies in June 2005. CLP will provide desulphurization and denitrification systems for four of its coal-fired generating units each of 677MW. HEC will provide low-NO_x burners and desulphurization systems for two of its coal-fired generating units each of 350MW and a desulphurization system for a coal-fired generating unit of 250MW.</p> <p>CLP has been increasing the use of ultra low sulphur coal. HEC commissioned its first natural gas generation unit of 335MW in October 2006. The first commercial scale wind turbine power generation unit of 800kW was also commissioned in Hong Kong in February 2006.</p>	2011	<p>Emissions from power stations in 1997 as follows: SO₂: 54,400 tonnes NO_x: 56,100 tonnes RSP: 2,610 tonnes</p> <p>The emission caps for power stations set under the TM for 2010 are as follows: SO₂: 25,120 tonnes NO_x: 42,600 tonnes RSP: 1,260 tonnes</p> <p>Reduction will be as follows: SO₂: 29,280 tonnes (-53.8%) NO_x: 13,500 tonnes (-24.1%) RSP: 1,350 tonnes (-51.7%)</p>

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
	To control total emissions from power plants and allow emission trading.	<p>Emission caps have been included in the Special Process Licences renewed to CLP's Castle Peak Power Station, Black Point Power Station and Penny's Bay Power Station as well as HEC's Lamma Power Station. The caps are being progressively tightened with a view to reducing emissions for achieving the 2010 emission reduction targets.</p> <p>The Air Pollution Control (Amendment) Ordinance 2008 was enacted in July 2008. The emission caps for the power plants in Hong Kong in 2010 and beyond are specified in the Technical Memorandum, which was promulgated in December 2008. Power plants are also allowed to use emissions trading as an alternative means for compliance with the emission caps.</p>		

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
	(New item included in 2008) To promote the wider use of clean fuels.	After signing the Memorandum of Understanding (MOU) on energy co-operation between the Hong Kong Government and National Energy Administration on 28 August 2008, the Government and CLP has set up a Working Group to follow up on the implementation of the MOU. Relevant energy enterprises on both sides are pursuing cooperation to follow up the implementation.	The Shenzhen – Hong Kong spur line of the Second West-East Gas Pipeline and the LNG terminal in Shenzhen to be jointly constructed by energy enterprises of both sides are anticipated to be completed in 2013. Both projects would help provide new sources of natural gas to Hong Kong.	Electricity generation is the major source of air pollution in Hong Kong. Hong Kong can benefit from improved air quality by increasing the use of clean energy and reducing the emissions of power plants under the MOU.
Reduce emissions from industrial and commercial processes	To mandate the use of ULSD in industrial and commercial processes.	LegCo enacted the Air Pollution Control (Fuel Restriction) (Amendment) Regulation, which came into effect on 1 October 2008.	The regulation came into force on 1 October 2008	The use of ULSD will reduce SO ₂ emissions from the industrial and commercial sectors by 99%, thereby reducing Hong Kong's total SO ₂ emissions by about 2,480 tonnes which is equivalent to about 3.6 % of Hong Kong's total SO ₂ emission in 2007.

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Enhance energy efficiency of buildings	Mandatory implementation of the Building Energy Codes (BECs).	<p>The Government concluded the public consultation on the proposed mandatory implementation of BECs on 31 March 2008. The Government is preparing the relevant legislative proposal taking into account comments received. We aim to introduce the legislation into the Legislative Council in 2009.</p> <p>The Government has reserved \$150 million and \$300 million under the Environment and Conservation Fund to subsidize building owners to conduct energy-cum-carbon audits and energy efficient projects respectively. The schemes have been opened for application since 8 April 2009.</p>	On-going	<p>It is estimated that new buildings will achieve an energy saving of approximately 2.8 billion kWh and a reduction in carbon dioxide emission in the region of 1.96 million tonnes in the first decade of the mandatory implementation of BECs. Additional energy saving could be achieved from improving energy efficiency in existing buildings.</p> <p>The Buildings Energy Efficiency Funding Schemes will provide incentives to building owners for enhancing the energy efficiency and reducing the level of greenhouse gas emission of their buildings.</p>

Measures	Implementation Programme	Progress	Completion Date / Tentative Completion Date	Environmental Benefits
Mandatory Energy Efficiency Labelling Scheme	To launch the Mandatory Energy Efficiency Labelling Scheme (MEELS).	The Legislative Council passed the Energy Efficiency (Labelling of Products) Ordinance. The first phase of the MEELS will be fully implemented in November 2009. The Government will propose amendments to the Energy Efficiency (Labelling of Products) Ordinance for the second phase of the scheme to cover additional appliances.	On-going	The full implementation of the first phase of the MEELS can achieve an annual electricity saving of around 150GWh with a reduction of carbon dioxide emission of 105,000 tonnes.
Encourage to adopt cleaner production technologies and processes	A five-year programme to be launched to give professional and technical support to Hong Kong-owned factories in the PRD Region to adopt cleaner production technologies and practices.	The Government launched the "Cleaner Production Partnership Programme" in April 2008 to engage Hong Kong-owned factories in the PRD Region to adopt cleaner production technologies and practices in the coming five years.	The programme will be completed by 2013.	The programme will encourage and facilitate Hong Kong-owned factories in the PRD Region to adopt cleaner production technologies and practices, thereby making a positive contribution to improving the regional air quality.

Progress of Measures to Control Emissions from Motor Vehicles

Purpose

This paper gives an overview of the measures to reduce vehicle emissions. It also provides a brief evaluation of the options raised by Members or the transport trades but have not been taken on board. Details on the progress of individual measures are set out at **Appendix II** and **Appendix IV**.

Background

2. Road vehicles are the second largest source of air pollution in Hong Kong, contributing to about 30% and 22% of the territory-wide emissions of respirable suspended particulates (RSP) and nitrogen oxides (NO_x) respectively in 2007. They are also the main source of roadside air pollution.

3. To improve air quality, particularly at the roadside, the Government announced in 1999 a package of measures to reduce vehicle emissions. It includes -

- (a) tightening the motor vehicle emission and fuel standards;
- (b) strengthening control on smoky vehicles;
- (c) implementing the liquefied petroleum gas (LPG) taxis incentive scheme;
- (d) encouraging the replacement of diesel light buses with ones using clean fuel; and
- (e) retrofitting particulate reduction devices on pre-Euro diesel vehicles.

Recent Measures

4. To further reduce vehicle emissions, the Government has launched the following additional measures -

- (a) encouraging vehicle owners to replace pre-Euro and Euro I diesel commercial vehicles with Euro IV models through a \$3.2 billion one-off

grant scheme;

- (b) encouraging members of public to use environment-friendly private petrol vehicles by reducing the first registration tax of these vehicles; and
- (c) encouraging use of environment-friendly commercial vehicles by reducing the first registration tax of these vehicles.

New Initiatives

5. New initiatives targeting at busy traffic corridors are being examined. They include examining the concept of a low emission zone, rationalization of bus routes and bus-bus interchange scheme. Details are at **Appendix VI**.

Alternative Proposals

6. Some Legislative Members and the transport trades proposed to extend the scope of the \$3.2 billion one-off grant scheme for replacing pre-Euro and Euro I diesel commercial vehicles with new commercial vehicles. Their proposals are summarized as follows -

- (a) extending the incentive scheme to cover franchised buses;
- (b) increasing the amount of subsidy in order to enhance the attractiveness of the scheme;
- (c) providing a grant to vehicle owners who scrap their old vehicles without replacement; and
- (d) providing a grant to those who scrap their old vehicles and replace them with second-hand vehicles that are of an emission standard higher than Euro I.

7. We have carefully considered the above suggestions. An important consideration is that the main objective of the \$3.2 billion scheme is to facilitate the transport trades in continuing to carry out their businesses with new and less polluting vehicles, but not to encourage them to give up their businesses. If for whatever reasons they decide to end their businesses and scrap their vehicles, we cannot see that there are compelling reasons for Government to provide them with compensation by way of this one-off grant. So far some 11,000 pre-Euro and Euro I diesel

commercial vehicles have been replaced with the help of the one-off grant provided under the scheme. We believe the existing scheme has provided considerable fiscal incentive for the eligible vehicle owners to replace their old vehicles with new ones. As for franchised buses, we will continue to require the franchised bus companies to replace their older buses according to operational needs and, after balancing different requirements, deploy more environment-friendly buses to busy corridors as far as possible.

Environmental Protection Department

April 2009

Progress of the Measures to Reduce Emissions from Ferries

Purpose

This paper reports on the progress of measures to reduce emissions from ferries for improvement of the air quality in Hong Kong.

Background

2. Vessels are a major air pollution emission sources. In 2007, they accounted for 5% of local emissions of sulphur dioxide (SO₂), 16% nitrogen oxides (NO_x) and 7% respirable suspended particulates (RSP). Among local emission sources, vessels rank second in respect of SO₂, third in NO_x and fifth in RSP. As for ocean-going vessels, the Government has since June 2008 implemented in Hong Kong the requirements of MARPOL Annex VI, which impose a limit on the sulphur content of the fuel oil used (4.5%) and control the emissions of pollutants (including NO_x and ozone depleting substances) and onboard incineration. Among local vessels, domestic ferries are an important maritime source, accounting for 44% of the SO₂, 54% of the NO_x and 66% of the RSP emitted from local vessels. Moreover, they frequently ply along the harbour area. Their emissions are more visible to the people living or working near to the shore of the harbour area. Smoke emissions from domestic ferries have also drawn complaints from the public.

3. Since 2001, government vessels have switched to ("ULSD") (sulphur content not more than 50 ppm) without problem. To reduce the emissions of local ferries, the Government has decided to launch a trial of local ferries using ULSD. The purposes of the trial are to ascertain the technical feasibility of the fuel switch for local ferries and to collect essential operation data such as change in fuel consumption and engine power, fuel refilling requirement, maintenance requirement, etc.

Progress

4. New World First Ferry Services Limited, Hong Kong & Kowloon Ferry Limited and Hongkong & Yaumati Ferry Co. Ltd. will participate in the trial. We are discussing with these operators the detailed arrangement of the trial. We plan to launch the trial in the first half of 2009 and have the initial findings ready around early 2010. Subject to the findings, the Government will map out the way forward on how to encourage local ferry operators to switch from the currently used marine light diesel to ULSD, the maximum sulphur content of which being 1% of that of marine light diesel.

Environmental and Health Benefits

5. The fuel switch will reduce SO₂ and RSP emissions from each vessel by about 99% and 10% respectively. With proper maintenance of the engines, the use of ULSD could also help reduce dark smoke emission. It helps reduce the respiratory diseases arising from exposure to SO₂ and RSP.

Environmental Protection Department

April 2009

**Progress of Measures to
Control Emissions from Power Plants**

Purpose

This paper reports on the progress of measures to control emissions from power plants for improvement of the air quality of Hong Kong.

Background

2. The Hong Kong SAR Government has reached a consensus with the Guangdong Provincial Government in April 2002 to reduce the emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), respirable suspended particulates (RSP), and volatile organic compounds by 40%, 20%, 55% and 55% respectively by 2010 as compared to 1997.

3. The burning of fossil fuels for electricity generation is the main source of emissions in Hong Kong, accounting for 89% of SO₂, 46% of NO_x, and 28% of RSP emitted locally in 2007. For Hong Kong to achieve the 2010 emission reduction targets, it is essential for the power plants to substantially reduce their emissions of SO₂, NO_x, and RSP.

Policy on Control of Emissions from Electricity Generation

4. The Government's environmental policy towards power companies has been premised on the following important principles -

- (a) power companies should use the best practicable means to reduce emissions as required in the Air Pollution Control Ordinance (APCO), and at the same time enhance the operational efficiency of the power plants and the combustion and generation efficiencies;
- (b) power companies must use low-sulphur coal for the existing coal-fired

generating units;

- (c) power companies should maximize the use of the existing gas-fired generating units;
- (d) all new generating units to be developed from 1997 onwards should be powered by natural gas;
- (e) emission caps are imposed starting August 2005 on any specified licences issued or renewed to power companies under the APCO; and
- (f) power companies should actively consider adopting the most effective economic tools (including emissions trading) to achieve the emission reduction targets.

Progress of Control Measures

5. Since August 2005, we have imposed emission caps on power plants for the three pollutants, i.e. SO₂, NO_x and RSP, upon renewal of their respective specified licences. These emission caps have been progressively tightened to ensure that Hong Kong can meet the 2010 emission reduction targets.

6. To ensure a smooth, timely and transparent implementation of the emission caps for the power sector, legislative amendment was made in July 2008 to provide for the stipulation of emission caps for power plants by technical memorandum (TM) and use of emissions trading as an alternative means for achieving the emission caps.

7. The TM promulgated in December 2008 provides for the allocation of the total quantities of emission allowances for the three pollutants to the power plants for 2010 and beyond according to their respective shares of the electricity generated for local consumption so as to ensure a fair and equitable allocation of the same quantity of emission allowances per unit of electricity generated. **Annex A** presents the emission caps imposed or to be imposed on power plants for 2010.

8. To encourage the power companies to take more proactive steps to reduce emissions and sustain strict compliance with the environmental requirements, we have set out a number of incentives and penalty in the new Scheme of Control Agreements signed with them in January 2008. These arrangements include –

- (a) linking the permitted rate of return of the two power companies to their environmental performances. An incentive on rate of return will be provided for rewarding better than required performance in reducing emissions and improving air quality. Likewise, the new arrangements provide for penalty on rate of return for emitting more pollutants than permissible; and
- (b) providing a higher rate of return to the power companies for their investments in renewable energy facilities, offering them an increase in permitted return depending on the extent of renewable energy usage in their electricity generation.

9. To achieve the emission caps of 2010 and beyond, both power companies are actively engaged in retrofitting their existing coal-fired units by flue gas desulphurization (FGD) for removal of SO₂ and low NO_x burner or selective catalytic reduction (SCR) for reduction of NO_x emission, as well as increasing the gas-firing power generation. **Annex B** presents the details and progress of their emission reduction programmes.

10. As shown in the emission trends of the **Annex C**, both power companies have made good progress towards the attainment of the 2010 emission. With full implementation of their respective emission reduction programmes, both power companies are confident that these emission caps could be fully met.

Further Reduction of Emissions

11. To help further improve our air quality, we have commissioned a consultancy study in June 2007 to review our Air Quality Objectives (AQOs) in light of the latest international developments and the recent Air Quality

Guidelines issued by the World Health Organization in 2006. Among others, the consultant responsible for conducting the study has identified the increase of natural gas for local electricity generation to 50% as one of the potential emission reduction measures for attaining the proposed new AQOs. The feasibility of this option depends on-

- (a) the adequate supply of natural gas;
- (b) the lead time required for building additional gas generation units, additional emission abatement measures and associated gas supply infrastructure; and
- (c) the readiness of consumers and businesses to bear the additional cost.

12. We would consult the public on the proposal in the context of the review of AQOs. In light of the views and comments of the public and the stakeholders, we would work out the proposal for tightening up the emission caps on the power companies as soon as reasonably practicable.

Environmental Protection Department

April 2009

Emission Caps for Power Plants From 2010 Onwards

Power Plant	Sulphur dioxide (SO₂)	Nitrogen oxides (NO_x)	Respirable suspended particulates (RSP)
Lamma Power Station	9,370	15,890	470
Black Point Power Station	8,617	14,612	433
Castle Peak Power Station	7,135	12,099	358
Penny's Bay Power Station	2	2	1

(Unit: tonnes)

Annex B

Implementation progress of the current emission reduction proposals of the two power companies

	Emission Reduction Measures	Commissioning Date
HEC	Reducing SO₂ Emission: (1) To retrofit two 350MW coal-fired units with FGD (2) To retrofit a 250MW coal-fired unit with FGD	July 2009 and April 2010 respectively April 2010
	Reducing NO_x Emission: To retrofit two 350MW coal-fired units with Low NO _x Burners	July 2009 and April 2010 respectively
	Wind Power : To install a 0.8MW Wind Turbine unit	Commissioned in February 2006
	Increasing Electricity Generation from Natural Gas : (1) To install a 335MW gas-fired Combined Cycle Gas Turbine unit (2) To convert an oil-fired unit to a 365MW gas-fired Combined Cycle Gas Turbine unit	Commissioned in October 2006 Commissioned in January 2008
CLP	Reducing SO₂ Emission: To retrofit four 677MW coal-fired units with FGD	4 th quarter of 2009, 1 st and 4 th quarters of 2010 and 1 st quarter of 2011 respectively

	Emission Reduction Measures	Commissioning Date
	Reducing NO_x Emission: To retrofit four 677MW coal-fired units with SCR	4 th quarter of 2009, 1 st and 4 th quarters of 2010 and 1 st quarter of 2011 respectively
	Increasing Electricity Generation from Natural Gas: To commission two 312MW gas-fired Combined Cycle Gas Turbine units	Commissioned in August 2005 and May 2006 respectively

Emission Trend for Power Generation Sector from 1990 to 2008

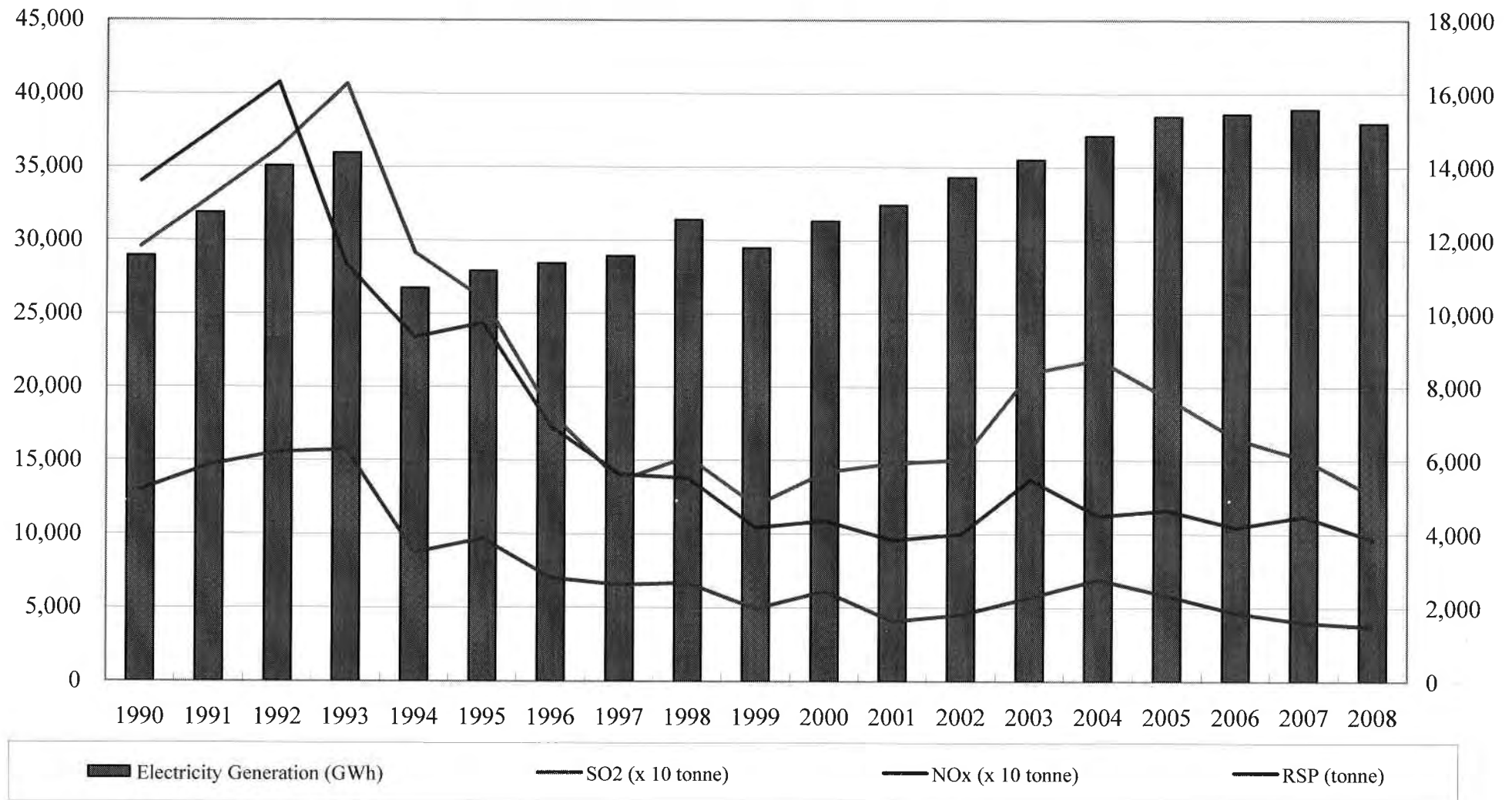
Year	Sulphur dioxide (SO ₂) (tonnes)	Nitrogen oxides (NO _x) (tonnes)	Respirable suspended particulates (RSP) (tonnes)
1990	118,000	136,000	5,190
1991	132,000	149,000	5,870
1992	145,000	163,000	6,220
1993	163,000	113,000	6,290
1994	117,000	93,600	3,490
1995	104,000	97,500	3,870
1996	72,800	69,200	2,800
1997	54,400	56,100	2,610
1998	61,000	55,200	2,670
1999	47,800	41,700	1,970
2000	56,800	43,600	2,450
2001	59,200	38,300	1,630
2002	60,100	40,000	1,810
2003	83,900	54,800	2,280
2004	87,500	44,900	2,760
2005	77,100	46,400	2,320
2006	66,000	41,800	1,860
2007	60,400	44,800	1,600
2008	50,600	38,500	1,480

Data are rounded to three significant figures.

Emissions of Power Generation Sector from 1990 to 2008

Electricity Generation

Emissions



**Study on Low Emission Zone, Rationalization of Bus Routes and
Bus-Bus Interchange Scheme**

Purpose

This paper informs Members of the progress of our study on low emission zone pilot scheme, rationalization of bus routes and bus-bus interchange scheme.

Background

2. Franchised buses are a major and visible source of roadside air pollution at busy corridors, where they constitute a major share of the traffic. In particular, franchised buses account for a significant share of the traffic along busy corridors such as Yee Wo Street at Causeway Bay, Nathan Road and Des Voeux Road Central. For example, franchised buses contribute 40% of the traffic at Yee Wo Street, Causeway Bay, 35% at Nathan Road (Shantung Street to Dundas Street) and 40% at Des Voeux Road Central.

3. Reducing the number of bus trips and bus stopping activities at busy corridors and restricting older buses from entering busy corridors by setting up low emission zones will go a long way towards improving our roadside air quality. The latter measure is able to reduce the roadside emissions of respirable suspended particulates and nitrogen oxides, which are major pollutants emitted from motor vehicles, by about 20% and 10% respectively. This helps reduce the respiratory diseases arising from exposure to high levels of these air pollutants.

Pilot Low Emission Zones

4. To improve roadside air quality, some overseas countries have set up low emission zones to restrict vehicles with high emissions entering into the zone.

5. As franchised buses account for a major share of the traffic at busy corridors, we are studying the feasibility of setting up a pilot “low emission zone” at one or more busy corridors to restrict franchised buses with higher exhaust emissions from entering the zone, and to evaluate the effectiveness of the measure in improving roadside air quality. In considering the setting up of a pilot “low emission zone”, we will also study possible ways to ensure that the franchised bus companies will continue to provide effective services to passengers in various districts, and that the road traffic in different districts will not be affected. In addition, we will examine how to minimize or avoid any negative impact it may have on roadside air quality in other areas.

6. The study is expected to be completed in 2009/2010.

Rationalization of Bus Routes

7. Transport Department has been working with the District Councils and the franchised bus companies to pursue route cancellations, amalgamations, truncations and frequency reductions so as to reduce the number of bus trips and bus stopping activities particularly on busy corridors. Transport Department will seek to balance the public demand for bus services and the need to improve road traffic and the environment.

8. Through bus service rationalization efforts, over 3,000 bus trips passing through Central and about 2,000 bus trips passing through Yee Wo Street, Causeway Bay per day were removed from 1999 to 2008. In Kowloon, about 1,400 bus trips in Nathan Road were reduced over the same period. Transport

Department will continue to pursue further bus service rationalization where practicable in consultation with the District Councils.

Bus-Bus Interchange Schemes

9. Bus-bus interchange schemes are pursued as one of the measures to achieve more efficient use of bus resources, relieve congestion, minimize environmental impact on busy corridors, and reduce the need for long-haul point-to-point bus routes.

10. Up to end 2008, a total of 229 bus-bus interchange schemes offering fare concessions of \$0.1 to \$29.2 to passengers had been implemented. Through the provision of fare discount incentives and selection of convenient interchanging locations, these schemes are well received by the public. On average, some 120,000 passengers use these interchanges everyday. The schemes have also improved the bus network and facilitated inter-district travel whilst minimizing the need for introducing additional bus routes.

Environmental Protection Department

April 2009

Government efforts in addressing climate change

(1) Energy savings from energy-efficient installations

With the advancement in energy efficiency technologies, energy-efficient installations are more readily available in the market for consumers' selection. Examples on the use of energy-efficient installations in a building for energy savings and the cost involved are set out below –

- (a) the use of T5 fluorescent lighting with electronic ballasts can generally achieve about 30% energy savings as compared with conventional T8 fluorescent lighting with electromagnetic ballasts. Depending on the actual design of the installation, the payback period for the use of T5 fluorescent lighting with electronic ballast will be around two to five years, while the expected service life of the T5 fluorescent lamp is around 18,000 hours; and
- (b) the use of air-conditioning chiller with water cooling tower can generally achieve about 20% energy savings as compared with air-cooled chiller system. Depending on the actual design of the installation, the payback period for adopting water-cooled chiller will be around seven to 10 years, with an expected service life of around 20 to 25 years.

More information on various energy efficiency technologies would be available at the following EMSD websites –

http://www.emsd.gov.hk/emsd/eng/pee/aest_pub.shtml; and

<http://ee.emsd.gov.hk/eindex.html>

(2) Greenhouse gases in Hong Kong

Hong Kong's greenhouse gas (GHG) emissions, which totaled about 47 million tonnes CO₂ equivalent per annum, accounted for around 0.1% of global emissions¹. The GHG emissions per capita in recent years are maintained at around 6.7 tonnes, which are much lower than the levels of other developed economies such as Australia (about 28 tonnes), the USA (about 24 tonnes), UK (about 11 tonnes), Japan (about 10 tonnes) and Singapore (about 9 tonnes). Hong Kong's carbon intensity, as measured in terms of GHG emissions per unit of GDP, reduced by about 42% from 1990 to 2007. According to the Human Development Report 2007/2008 published by the United Nations Development Programme, Hong Kong's carbon intensity of growth, in terms of the amount of CO₂ emitted for every dollar in wealth created, is 44% to 67% lower than the above countries.

The trend of GHG emissions in Hong Kong from 2003 to 2007 is set out at **Table 1**. The carbon intensities of growth for selected territories are at **Table 2**.

Table 1: Hong Kong Greenhouse Gas Inventories – 2003 to 2007*

Year	Total Emission (in million tonnes CO ₂ -e)	Per capita emission (in tonnes CO ₂ -e / person**)	Emission Intensity (in kg CO ₂ -e per HK\$1000 GDP**)
2003	43.8	6.5	36.9
2004	44.1	6.5	34.3
2005	44.5	6.5	32.3
2006	45.9	6.7	31.1
2007	46.7	6.7	29.8

* Figures are subject to revision in the light of the review and updating of the inventories of Hong Kong's greenhouse gas emissions being carried out in the Consultancy Study on Climate Change (Agreement No. CE45/2007(EP)).

** Population and GDP data are provided by the Census and Statistics Department. GDP are calculated in chained (2006) dollars.

¹ Intergovernmental Panel on Climate Change estimated that the global GHG emission was 49 billion tonnes CO₂ equivalent in 2004.

Table 2: Carbon Intensity of Growth for Selected Territories[#]

Territory	Carbon intensity of growth (kt CO₂ per million 2000 PPP US\$) (2004)
Switzerland	0.17
<i>Hong Kong, China</i>	<i>0.19</i>
Sweden	0.21
France	0.23
Iceland	0.24
Austria	0.29
Netherlands	0.30
Italy	0.30
Ireland	0.31
Spain	0.33
Denmark	0.33
United Kingdom	0.34
Belgium	0.34
New Zealand	0.35
Japan	0.36
Germany	0.38
Greece	0.43
Finland	0.45
Israel	0.47
Luxembourg	0.48
Singapore	0.48

Territory	Carbon intensity of growth (kt CO₂ per million 2000 PPP US\$) (2004)
Norway	0.53
United States	0.56
Australia	0.58
Canada	0.69

Data are extracted from Human Development Report 2007/2008 published by the United Nations Development Programme for the 25 territories with the highest human development index ranking.

(3) Energy intensity targets

As an Asia-Pacific Economic Co-operation (APEC) member, Hong Kong is committed to playing its part in delivering the APEC-wide regional aspirational goal of achieving a reduction in energy intensity of at least 25% by 2030 (with 2005 as a base year). To this end, Hong Kong will seek to achieve a reduction in energy intensity by implementing a host of actions to enhance energy efficiency. For instance, measures announced in the 2008/09 Policy Address for this cause include:

- to reserve \$450 million under the Environment and Conservation Fund to subsidize building owners to conduct energy-cum-carbon audits and energy efficiency projects;
- to implement a district cooling system at the Kai Tak Development to supply chilled water to buildings in the new development area for centralised air-conditioning;
- to propose the second phase of the Mandatory Energy Efficiency Labelling Scheme in 2009;
- to legislate for the mandatory compliance of Building Energy Codes to improve energy efficiency in new and existing buildings;
- to promote environmental protection and energy conservation in government buildings through setting targets in various environmental

aspects for new government buildings and identifying demonstration projects; and

- to study the need to restrict the sale of incandescent light bulbs, assess the energy wastage of external lighting and study the feasibility of tackling the problems through legislation.

As announced in last year's Policy Address, we will make early preparations to meet the challenge of climate change and promote a low carbon economy. With the implementation of various energy efficiency measures, we will continue to closely monitor the trend of energy intensity movements.

Environment Bureau

April 2009