Chapter 14

The Environment

The Environment Bureau and the Environmental Protection Department are committed to enhancing the quality of the environment. During 2009, priority areas included combating air pollution, implementing a solid waste management policy, improving harbour water quality, promoting energy efficiency and conservation, and tackling climate change.

Hong Kong, with only 1 104 square kilometres of land, is home to some 7 million people. But it is also one of the world's largest trading economies. Its steep mountains allow it only 225 square kilometres on which to put up buildings for people to live and work in. Strict control over urban development is, therefore, imperative. Over 400 square kilometres of the remaining land that is not built on are designated as 'protected areas'. These include country parks, special areas and conservation zones. Inevitably, the heavy concentration of people and activities in a small area strains the environment, particularly the air. Hong Kong is also increasingly affected by air pollution in the Pearl River Delta (PRD) region.

Environmental protection is a major policy area for the third term of the Hong Kong Special Administrative Region (HKSAR) Government. The policy initiative is important for the building of a quality city and a quality life for local citizens. Tackling air pollution, stepping up action to improve water quality in Victoria Harbour, better managing municipal solid waste, promoting energy efficiency and further strengthening regional co-operation continue to be Government priorities. Through 'I Love Hong Kong! I Love GREEN!' campaign activities, the public is encouraged to make a change in various aspects of daily living and to nurture a greener and more environment-friendly lifestyle.

Administrative Framework

The Environmental Protection Department (EPD), under the Environment Bureau, has overall responsibility for protecting the environment, including nature conservation. It executes environmental policies, vets environmental planning and assessment findings, enforces and reviews environmental laws, plans and develops facilities for liquid and solid waste disposal, and promotes environmental

management, auditing and reporting. It also promotes environmental awareness in the community.

The EPD receives professional support from several government departments and advice from the Advisory Council on the Environment, which comprises 18 members appointed by the Chief Executive, including members from non-governmental environmental organisations, business groups, academic institutions and professional bodies.

The Energy Division of the Environment Bureau oversees Hong Kong's energy policy to provide reliable supplies of energy at reasonable prices and promote its economical and safe use, while minimising the environmental impact from energy usage and production.

The Sustainable Development Division, now established under the Environment Bureau, promotes sustainable development in both the Government and the community and provides secretariat support to the Council for Sustainable Development.

Government spending on the environment in 2009-10 was budgeted at $8.62 billion, or about 2.7 per cent of total public expenditure.

Pollution Prevention

The Government has successfully applied an environmental assessment process to policy planning and project proposals. Development and policy proposals submitted to the Executive Council that involve environmental issues and all submissions to the Public Works Subcommittee of the Legislative Council's Finance Committee must contain an assessment of the environmental implications.

Environmental Impact Assessment Ordinance

The Environmental Impact Assessment Ordinance provides a transparent and systematic framework for assessing the environmental impact of designated projects and for identifying mitigating measures if needed. It is supplemented by a technical memorandum setting out clear and consistent technical guidelines and criteria. Since the implementation of the ordinance, 148 environmental impact assessment (EIA) reports have been approved (as at December 31) and more than 1.5 million people and many ecologically sensitive areas are being protected against the effects of unacceptable environmental problems. In addition, the EPD has been promoting continuous public participation in the EIA process.

Environmental Monitoring and Auditing

The environmental monitoring and auditing process seeks to validate the assumptions made in the planning stage of development projects and monitors the effectiveness of mitigation measures to ensure every project meets the environmental performance promised in the impact assessments. In 2009, the EPD handled 120 monitoring and auditing programmes for major projects.

For these projects, permit holders are required to set up dedicated websites to publish the results and data obtained from the environmental monitoring and

auditing process. Since 2002, proponents of major projects have been required to set up web camera systems to enable the public to see conditions at their sites.

Land Use Planning

For major land use planning studies, a Strategic Environmental Assessment is required to incorporate environmental considerations into the formulation of land use plans. Under the Environmental Impact Assessment Ordinance, an EIA must be carried out as part of the engineering feasibility study of urban development or redevelopment projects with a study area of more than 20 hectares or involving a population of more than 100 000 people. These environmental assessments are an integral part of the planning studies and help identify major environmental issues and possible mitigation measures for inclusion in the land use plans.

Environmental Management and Sustainability

The Government promotes environmental management in both the public and private sectors through the Green Manager Scheme, environmental auditing, environmental management systems and environmental performance reporting. All bureaux and departments have appointed Green Managers and, publish annual reports of their environmental performance. Starting from 2007, all annual environmental performance reports incorporate, where appropriate, the principles of the 'Clean Air Charter' which the Government supports to improve Hong Kong's air quality. To further promote environmental performance reporting in the private sector, the EPD has established a dedicated webpage encouraging listed companies in Hong Kong to share their environmental or sustainability information with their stakeholders.

Rural Developments

The Government is committed to improving the quality of life in rural areas and to ending or removing land uses that downgrade the rural environment. The facilities for sewage disposal in the rural areas of the New Territories are also better than before and are still being improved. In 2009, while continuing its effort on the construction of such sewerage facilities, the Government drew up plans to invest further in projects with village sewerage components to provide public sewers to enable domestic discharges from villages in rural and other unsewered areas to be conveyed to sewage treatment works.

Cross-boundary Co-operation

Because environmental pollution transcends administrative boundaries, Hong Kong and Guangdong have been working together on environmental matters for over 20 years.

The HKSAR Government and the Guangdong Provincial Government have drawn up and instituted a Regional Air Quality Management Plan that aims to reduce pollutant emissions in the region by 20 per cent to 55 per cent by 2010, taking 1997 as the base year. Since November 2005, a regional air quality monitoring network, comprising 16 monitoring stations, has been publishing the

Regional Air Quality Index and the reports on the monitoring results were released in April and October 2009.

In April 2008, the two sides launched a five-year Cleaner Production Partnership Programme to encourage and help more than 56 000 Hong Kong owned factories in the PRD region to adopt cleaner production technologies and practices. By improving energy efficiency and reducing emissions, Hong Kong owned factories can make a positive contribution to improving the region's air quality. Up to end of December 2009, over 400 funding applications have been approved for conducting technical support projects under the programme. To promote efforts on this front further, the governments of the HKSAR and Guangdong Province jointly launched the Hong Kong–Guangdong Cleaner Production Partners Recognition Scheme in August to recognise the achievements of Hong Kong-owned enterprises in pursuing cleaner production.

To strengthen this collaboration further, the two sides signed the Environmental Co-operation Agreement at the Hong Kong–Guangdong Co-operation Joint Conference on August 19. Both sides agreed, among other matters, to undertake a joint study on the post-2010 air emission reduction arrangements for the region. On the water quality front, the two sides will commission a study on regional water quality management for the Pearl River Estuary in 2010, making use of the mathematical model jointly developed by the two sides to assess the environmental capacity of the estuary for meeting various water quality objectives.

Hong Kong and Shenzhen, meanwhile, are jointly implementing action programmes to reduce pollution of the adjoining water bodies, including Deep Bay and Mirs Bay. Both sides are conducting a joint review of the regional water quality management strategy for Mirs Bay. In addition, the EPD will commission a joint study with Guangdong in early 2010 to evaluate the carrying capacity of the water bodies in the Pearl River Estuary. This will provide the two governments with solid scientific bases for devising management plans and strategies for controlling water pollution in the Pearl River Estuary. The two sides are working closely together to encourage the adoption of cleaner production practices by Hong Kong-owned factories in Shenzhen. Both sides will also enhance co-operation in the areas of promoting wider use of clean energy and green transportation. In addition, Hong Kong and Macao agreed to further enhance environmental co-operation in areas like air quality monitoring, waste management and carrying out public awareness activities.

Climate Change

Climate change has become one of the most important challenges to the international community. The HKSAR Government is doing its best to reduce greenhouse gas emissions by taking vigorous measures, primarily aiming at adoption of cleaner fuels for power generation, enhancing energy efficiency, reducing reliance on fossil fuels, making fuller use of waste-to-energy technologies, developing an efficient public transportation system and promoting green lifestyle.

The carbon audit guidelines for buildings, jointly launched by the EPD and the Electrical and Mechanical Services Department (EMSD) in July 2008, aim to assist building managers and users to calculate the amount of greenhouse gas emitted from their building operations and to explore room for improvements. Over 140 organisations from different sectors have become 'Carbon Audit • Green Partners' and they are committed to carbon auditing and will initiate carbon reduction efforts.

The EPD has commissioned a comprehensive study on climate change to assess its impact on Hong Kong and to identify further adaptation and mitigation strategies for Hong Kong to combat climate change. The HKSAR has also joined the C40 Cities Climate Leadership Group to enhance co-operation with participating cities to combat climate change.

Energy Efficiency

Energy consumption is closely related to greenhouse gas emissions. Improving energy efficiency helps address the growing concerns of climate change and global warming. The total energy consumption at end-use level in Hong Kong in 2007 was 294 107 TJ, with residential, commercial, industrial and the transport sector consuming 18 per cent, 38 per cent, 9 per cent and 35 per cent of the energy respectively. To meet the challenges of climate change, the Energy Efficiency Office of the EMSD has implemented a range of programmes and initiatives to promote efficient use of energy, including implementing a number of voluntary energy efficiency labelling and registration schemes; promoting water-cooled air-conditioning systems and promoting effective energy management methods.

The initial phase of the Mandatory Energy Efficiency Labelling Scheme (MEELS) came into full implementation on November 9 in the year, following the expiry of an 18-month grace period. Under the MEELS, energy labels are required to be shown on prescribed products for supply in Hong Kong to inform consumers of their energy efficiency performance. Three types of prescribed products covered in the initial phase of MEELS are room air-conditioners, refrigerating appliances and compact fluorescent lamps. The second phase of the MEELS will cover washing machines and dehumidifiers and the relevant legislative amendments have been passed by the Legislative Council. The second phase will take effect in March 2010 with an 18-month grace period for the trades to make necessary preparations.

As buildings account for 89 per cent of electricity consumed, promoting their efficient use of energy is instrumental in reducing greenhouse gas emissions. To improve further energy efficiency in new and existing buildings, the Government introduced the Buildings Energy Efficiency Bill into the Legislative Council on December 9 to mandate compliance with the Building Energy Codes.

To promote adoption of energy-efficient air-conditioning systems, the Government plans to implement a district cooling system (DCS) at the Kai Tak Development (KTD). The DCS will provide chilled water to non-domestic developments there for air-conditioning purpose. It is an energy-efficient system which consumes 35 per cent less electricity compared with traditional air-cooled air-conditioning systems.

The DCS will be developed and commissioned for operation in three phases to suit the development schedule of the KTD. The first phase is expected to be completed by end 2012 for operation from 2013 onward to match the early developments at the KTD.

The Government recognises the importance of promoting the use of renewable energy in Hong Kong. In 'A First Sustainable Development Strategy for Hong Kong', the Government sets a target of generating 1 to 2 per cent of Hong Kong's total electricity supply from renewable sources by 2012. Meanwhile, Hong Kong's two power companies are making progress in their attempts to use clean energy to produce electricity. Hongkong Electric Company Limited (HEC) started operating its wind turbine on Lamma Island in 2006. Both companies are planning the development of off-shore commercial wind farms in Hong Kong waters. CLP Power Hong Kong Limited (CLP Power) has completed the Environmental Impact Assessment for its wind farm project while HEC has submitted the Environmental Impact Assessment report on its wind farm to the Environmental Protection Department for approval.

Legislation and Pollution Control

Hong Kong has eight ordinances on pollution control. These are the Waste Disposal Ordinance, the Water Pollution Control Ordinance, the Air Pollution Control Ordinance, the Noise Control Ordinance, the Ozone Layer Protection Ordinance, the Dumping at Sea Ordinance, the Environmental Impact Assessment Ordinance and the Hazardous Chemicals Control Ordinance. Most of them have subsidiary regulations and other statutory provisions such as technical memoranda.

The Government follows a set of environmental quality objectives to better protect public health and to preserve a natural ecosystem. The cost of imposing limits on polluting emissions is not higher than that needed to achieve conservation goals. These goals include making maximum use of the environment's natural capacity to absorb and recycle waste.

In 2009, EPD inspectors made about 57 000 visits to different locations around Hong Kong to enforce controls on air, noise, waste and water pollution and to deal with complaints about pollution. This resulted in some 365 prosecutions and nearly $2.4 million in fines.

The Stockholm Convention on Persistent Organic Pollutants (the Stockholm Convention), became effective in Hong Kong in November 2004 and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (the Rotterdam Convention) became effective in Hong Kong in August 2008. A local legislation, the Hazardous Chemicals Control Ordinance, came into operation in April 2008 to regulate the import, export, manufacture and use of non-pesticide hazardous chemicals, including those subject to the regulation of the Stockholm Convention and the Rotterdam Convention.

The EPD also works with the construction, catering, and vehicle repair industries, the property management sector and other trades to promote good practices and compliance with environmental regulations.

The EPD runs a Compliance Assistance Centre where businesses may obtain updated information and advice on environmental compliance, pollution prevention and environmental management.

Air Pollution

Like most modern cities, Hong Kong's air is affected by pollutants emitted from a multitude of sectors, including transport, power generating and construction. The Government has been implementing various measures to improve air quality. Between 1990 and 2008, emissions of sulphur dioxide (SO2), nitrogen oxides (NOx), respirable suspended particulates (RSP) and volatile organic compounds (VOC) have dropped by 44 per cent to 59 per cent.

The EPD operates a range of controls under the Air Pollution Control Ordinance (APCO) and its subsidiary regulations, including licensing of some large industrial facilities and specific controls on fuel quality, furnace and chimney installations, dark smoke emissions, open burning, dust emissions from construction works, emissions from petrol filling stations, perchloroethylene emissions from dry-cleaning facilities, as well as VOC emissions from printing machines and the levels of VOC in selected products. With effect from October 1, 2008, the law mandates that all industrial and commercial processes use ultra low sulphur diesel (ULSD) to further reduce emissions of SO2. In 2009, the regulation limiting the content of VOC in products was amended to extend its control in phases starting from January 1, 2010 to vehicle refinishing paints/coatings, vessel and pleasure craft paints/coatings, adhesives, and sealants.

The APCO also bans the import and sale of the more dangerous types of asbestos, amosite and crocidolite. Moreover, anyone intending to remove asbestos must engage registered professionals, and submit asbestos investigation reports and plans to the department.

Power plants are the largest sources of emission. To ensure smooth, timely and transparent compliance with the emission caps imposed on power plants, the APCO was amended in 2008 to give statutory effect to the emission caps for power plants in 2010 and beyond. The amendments also provide for the local power plants to engage in emissions trading as an alternative means for achieving the emission caps.

The Government completed a comprehensive consultancy study in July to review Hong Kong's Air Quality Objectives and develop a long-term air quality management strategy, taking into account the latest international developments, including the Air Quality Guidelines published by the World Health Organisation. A four-month public consultation on the findings and recommendations of the study ended on November 30. The Government is reviewing the views gathered from the consultation including among others 2 000-plus written submissions and returned questionnaires for

deciding on how best to update the Air Quality Objectives and take forward the necessary improvement measures to achieve the proposed new objectives.

Air pollution is a cause of public concern, especially when the emission sources are near homes. In 2009, the department handled some 11 100 complaints of air pollution, of which some 5 000 were about vehicle emissions, and issued about 1 300 legal notices instructing offenders to abate air pollution.

Transport

Vehicle emissions are the major source of air pollution and nuisance experienced at roadsides. The Government's policy is to apply the most stringent motor vehicle fuel and emission standards whenever they are practicable. Between 1999 and 2009, the concentrations of RSP, SO2 and NOx at roadsides, fell by 33 per cent, 48 per cent and 31 per cent respectively.

Hong Kong largely follows the European Union's standards on emission and fuel. All newly registered vehicles are required to comply with the Euro IV standards, except for newly registered diesel private cars, which must meet emission standards of stringency similar to those of petrol private cars. Diesel vehicles emit more NOx than petrol vehicles, which is a major contributor to smog.

Nearly all of Hong Kong's taxis are now running on liquefied petroleum gas (LPG) and over 60 per cent of public light buses are fuelled by LPG. To control emissions from older vehicles, the Government has made the installation of emission reduction devices a statutory requirement for all pre-Euro diesel vehicles. This regulation went into force on April 1, 2007. Two new schemes were also launched on the same day to provide financial incentives to encourage early replacement of pre-Euro and Euro I diesel commercial vehicles with new ones compliant with the prevailing emission standards (the Euro IV standards) and the use of environment-friendly private cars. Another incentive scheme was launched on April 1, 2008 to encourage the use of environment-friendly commercial vehicles.

The Government is also actively promoting the use of electric vehicles in Hong Kong. The exemption of the First Registration Tax for electric vehicles has been extended to May 2014. A steering committee has been set up under the leadership of the Financial Secretary to make recommendations on strategy and specific measures to promote the use of electric vehicles. The Government signed a Memorandum of Understanding with Mitsubishi and Nissan Motor in February and April respectively to promote the use of electric vehicles. The Government also conducted trials on Mitsubishi's electric vehicle, 'i-MiEV', and BYD's dual mode hybrid vehicle 'F3DM'. The first batch of 'i-MiEV' will be launched progressively on the global market before April 2010. The Government has procured 10 units in this batch for deployment in different bureaux and departments.

To encourage the supply and use of Euro V diesel, the Government waived the fuel tax for Euro V diesel on July 14, 2008. Euro V diesel is now available at all petrol filling stations in Hong Kong. The Government aims to tighten the standards of motor vehicle diesel and unleaded petrol to Euro V specifications in 2010.

Furthermore, it is making preparations for implementing statutory control on the quality of auto biodiesel from July 1, 2010.

Another motor vehicle emission control strategy is to tighten control over smoky vehicles. Under the Smoky Vehicle Control Programme, all vehicles reported must be tested for smoke levels to find out whether the owners have corrected the smoke defects. The number of smoky vehicles on roads has decreased by about 80 per cent since 1999. The Government is also taking forward the proposed statutory ban against idling vehicles with running engines.

Apart from cleaner vehicles and fuels, it is essential to promote mass transit systems that are pollution-free at street level. The Government has adopted a policy that gives priority to rail over road and encourages innovation wherever practical.

Indoor Air Quality

To promote good indoor air quality (IAQ) and public awareness of its importance, the Government has introduced an IAQ Management Programme, a core element of which is a voluntary IAQ Certification Scheme for offices and public places that are served by mechanical ventilation and air-conditioning systems. It aims to recognise good IAQ management practices and to provide incentives for owners of buildings/premises or property management companies to pursue the best level of indoor air quality.

Ozone Layer Protection

The Montreal Protocol, which aims to control substances that deplete the ozone layer, is applicable to Hong Kong. The Ozone Layer Protection Ordinance prohibits manufacture and import of chlorofluorocarbons (CFCs) and halons for local consumption. The EPD also sets a quota to control the import of hydrochlorofluorocarbons (HCFCs). To comply with the accelerated phase-out programme for HCFCs under the Montreal Protocol, the Government amended the Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation in 2009 to extend the banning of import of controlled products to those containing HCFCs such as air-conditioners, portable fire extinguishers and aerosols containing CFCs such as metered dose inhalers in phases starting from January 1, 2010.

Noise

Road Traffic Noise

Under the existing policy, project proponents are required to assess traffic noise impact when planning new roads and provide necessary direct mitigation measures to ensure traffic noise at the noise sensitive receivers stay within acceptable levels. Where direct measures are inadequate, indirect noise mitigation measures must be used.

To address traffic noise from existing roads, a programme to retrofit noise barriers on noisy road sections is being carried out in phases under the Public Works

Programme. All high-speed (70 kilometres per hour or above) roads have been resurfaced with low-noise material wherever practicable. In addition, a trial programme to surface local roads with low-noise material is being implemented.

To prevent individual vehicles from producing excessive noise, the Government tightened legislation in 2002 to require all newly registered vehicles to comply with the latest internationally recognised noise standards.

Railway Noise

Various noise reduction programmes have been implemented by the railway operators since the early 1990s to address noise problems along railways, bringing relief to some 110 000 affected residents thus far. New railway projects are required to undergo environmental impact assessments to ensure their noise impact is properly addressed.

Aircraft Noise

The impact of aircraft noise on almost all residents in the vicinity of Hong Kong International Airport flight paths is within the planning standard. However, there is still concern about the aircraft noise nuisance, especially during evenings and early mornings. The Government will continue exploring and implementing all practicable aircraft noise mitigating measures.

Noise from Industrial or Commercial Activities

Noise from industrial or commercial activities is controlled through the issuance of noise abatement notices. The EPD serves abatement notices requiring the owners or occupants of premises causing excessive noise to reduce it within a given period.

Construction Noise

Noise from general construction works between 7pm and 7am and on public holidays is controlled through construction noise permits. These restrict the use of equipment in accordance with strict criteria and ban noisy manual activities in built-up areas. Percussive piling is prohibited at night and on public holidays and requires a permit during the daytime on any day that is not a public holiday.

The Government has phased out the use of noisy diesel, steam and pneumatic piling hammers. The law also requires hand-held percussive breakers and air compressors for construction to meet strict noise standards and to have 'green' noise emission labels.

To deter repeated industrial, commercial and construction noise offences, the Noise Control Ordinance stipulates that the senior management of a body corporate will be held liable for repeated offences committed by that body corporate.

The EPD has introduced a Quality Powered Mechanical Equipment system to promote the use of more environmentally friendly construction equipment and to facilitate the construction noise permit application process.

Intruder Alarm and Neighbourhood Noise

The Police handles complaints about intruder alarms and neighbourhood noise from domestic premises and public places.

Water Quality and Sewerage

Water pollution has increased with urban development and population growth. The lack of proper treatment for most of the sewage from older urban areas around Victoria Harbour resulted in poor water quality there but since the Harbour Area Treatment Scheme (HATS) Stage 1 went into operation at the end of 2001, there has been a marked improvement. The Government is now implementing HATS Stage 2A which will collect and properly treat the remaining 25 per cent of sewage around the harbour.

In addition, pollution control at source has yielded positive results, and river quality has also improved. The percentage of rivers in the 'good' and 'excellent' categories increased from 34 per cent in 1986 to 84 per cent in 2009, and the percentage in the 'bad' and 'very bad' categories fell from 45 per cent in 1986 to 6 per cent in 2009.

The Government commissioned a study to review and develop Hong Kong's marine water quality objectives in October 2008. The marine water quality objectives were introduced under the Water Pollution Control Ordinance and gradually applied to the 10 water control zones from 1982 to 1996. The study aims to review the existing water quality objectives in light of the local conditions, overseas best practices and scientific advances; and to examine the technical attainability and potential socio-economic implications of any proposed changes to the water quality objectives.

Views from the public and stakeholders on the study findings will be collected through a two-stage public engagement exercise. The first stage public engagement, which lasted for three months, commenced in September to seek views from the public on the issues to be addressed and the review approaches. The second stage public engagement will be held after any proposed changes to the water quality objectives are formulated.

Sewage Treatment and Disposal

At present, the public sewerage system serves 93 per cent of the population and collects about 2.7 million cubic metres of waste water every day. About 70 per cent of the collected sewage receives chemical or higher levels of treatment before being discharged.

HATS Stage 1 collects sewage from the urban areas of Kowloon, Tsuen Wan, Kwai Tsing, Tseung Kwan O and the north-eastern part of Hong Kong Island and transports it through a network of deep tunnels to Stonecutters Island for treatment.

The Government is implementing the second stage in two phases, HATS Stages 2A and 2B. HATS Stage 2A involves extending the deep tunnel system to take the untreated sewage from the remaining parts of Hong Kong Island to the Stonecutters

Island Sewage Treatment Works. The treatment plant will be expanded to provide centralised chemical treatment to sewage from the entire HATS catchment with fast track provision of part of the disinfection facilities which were commissioned in December 2009. The critical works of the HATS Stage 2A have commenced construction in 2009 and the whole project is targeted for completion in 2014. Under the second phase (HATS Stage 2B), biological treatment facilities will be provided on an adjacent site, the implementation programme being based on the results of a review in 2010-11 of water quality trends and population and sewage flow build-up.

Details of HATS are available on the 'A Clean Harbour for Hong Kong' website, www.cleanharbour.gov.hk.

Apart from HATS, the Government has spent a further $18 billion on other sewerage schemes since 1991 and will spend another $12 billion on schemes over the next five years. These include sewerage for rural villages. Under the Water Pollution Control (Sewerage) Regulation, the EPD is empowered to direct house owners to connect their waste water pipes to new public sewers. Since the regulation came into force at the end of 1995, about 6 000 village houses have already made connections to the public sewers.

Sewage Charges

All water users who discharge their sewage into public sewers have to pay a basic sewage charge in accordance with the polluter-pays principle. Also, 30 trades and industries whose effluent strength exceeds that of domestic sewage, have to pay a trade effluent surcharge reflecting the additional cost of treating their stronger effluent. These charges are used to recover the operation and maintenance costs of sewage collection, treatment, and disposal facilities, while the Government provides funds for construction.

In May 2007, the Government's proposals to gradually increase the sewage charge for handling domestic waste water over a 10-year time frame was approved by the legislature. This reflects the community's continued support of the polluter-pays principle and joint commitment to further enhancing the water environment. The average bill for domestic accounts will rise from the 2007 level of $11 per month to $27 per month over a period of 10 years.

Livestock Waste Pollution

The Waste Disposal Ordinance bans the keeping of livestock in new towns and environmentally sensitive areas. Where they are allowed, livestock farms must have proper waste treatment systems. The Government provides a free livestock waste collection service which collected about 19 000 tonnes of waste during the year.

From a public health and environmental protection standpoint, livestock farming in urbanised Hong Kong is not sustainable in the long term. To address the problem, the Government has introduced licence-surrender schemes to encourage poultry and pig farmers to cease permanently the keeping of poultry and pigs. Livestock farmers are given ex gratia payments and the schemes are entirely voluntary.

The poultry and pig schemes were introduced in 2005 and 2006 respectively and farmers had up to one year to decide whether or not to join them. The two schemes have effectively decreased the number of pig and poultry farms and reduced the pollution load on the environment. Through the buyout scheme launched in 2008 for the live poultry trade, the number of poultry farms has been further reduced.

Bathing Beaches

The Government has adopted strict standards for water quality control to protect the health of swimmers at bathing beaches. These standards indicate the pollution level measured in terms of E. coli (the bacterium that can indicate the presence of sewage). The following table shows how beaches were classified in 2009. Beaches in the 'good' and 'fair' categories meet the Government's water quality objective for bathing. In 2009, over 90 per cent of the bathing beaches met the water quality objective.

Beach water quality ranking	Bathing season geometric mean of *E. coli* count per 100ml of beach water	Minor health risk cases per 1 000 swimmers	Number of beaches in 2009
Good	Up to 24	Undetectable	23
Fair	25 to 180	10 or less	15
Poor	181 to 610	11 to 15	3
Very Poor	More than 610	More than 15	0

Beach water quality gradings for open beaches are available on the EPD's home page, hotline and weekly press releases.

Waste Management

Waste Reduction

The Policy Framework for the Management of Municipal Solid Waste (2005-2014), published in 2005, sets out the strategy and measures to address the municipal solid waste problem in Hong Kong over the next decade and proposes simple yet effective economic tools that will create incentives for the community to recycle more and discard less.

Waste reduction and recovery have always played an important role in waste management, resulting in the export of substantial quantities of recovered recyclable materials for re-manufacturing outside Hong Kong. In all, about 3.15 million tonnes of recyclable materials were exported in 2009, generating export earnings of about $5.8 billion.

The Government is also promoting local recycling, with the development of a 20-hectare EcoPark in Tuen Mun Area 38 for exclusive use by the recycling and environmental industry. The EcoPark is being developed in two phases on 8 and 12 hectares of land respectively. All lots in Phase I have been let to waste recyclers. The infrastructure works of Phase II will be completed in early 2010.

To encourage waste reduction, recovery and recycling, the Government launched a territory-wide Source Separation of Domestic Waste Programme in January 2005. Over the five years to 2009, domestic waste requiring disposal dropped by 14.5 per cent. On the other hand, waste requiring disposal from the commercial and industrial sector continued to increase in the same period. The Government therefore rolled out a similar programme for the commercial and industrial sectors in October 2007. In 2009, commercial and industrial waste requiring disposal remained at the preceding year's level.

In line with the polluter-pays principle, the Government aims to create economic incentives for waste reduction, recovery and recycling by introducing producer responsibility schemes (PRS) and a charging scheme for municipal solid waste. An environmental levy scheme on plastic shopping bags was implemented in July 2009 as the first mandatory PRS under the Product Eco-responsibility Ordinance. Subject to the outcome of public consultation, the second scheme will target waste electrical and electronic equipment.

Meanwhile, the EPD continues to promote and support trade-funded voluntary recycling programmes. In addition, it will examine possible charging options for Hong Kong in respect of municipal solid waste.

Landfills

All municipal solid waste is disposed of at three large modern landfills in the New Territories, which are operated to high environmental standards.

The community disposed of 3.27 million tonnes of municipal solid waste in 2009. Of this, about 67 per cent was domestic waste and the remainder was commercial and industrial waste. On average, each person in Hong Kong disposed of about 1.28 kilogrammes of municipal solid waste daily.

In 2009, it was estimated that the three landfills would be filled to capacity during mid- to late-2010. Planning work for the extension of all three landfills is under way.

Hong Kong has 13 old landfills, which have been restored for safety and environmental reasons. Recreational facilities have been or will be built on most of the restored sites.

Refuse Transfer Stations

Municipal solid waste is collected and delivered to refuse transfer stations by refuse collection vehicles, containerised and then taken to landfills by sea or land transport. A network of six transfer stations and seven outlying islands transfer

facilities handled 1.65 million tonnes of waste in 2009. About 75 per cent of Hong Kong's domestic waste is delivered via this network to landfills.

Chemical and Special Wastes

All chemical waste producers are required to pack, label and store their chemical wastes correctly before disposal at licensed treatment facilities. A trip ticket system tracks the movement of chemical waste from its origin to the final disposal point.

In 2009, a daily average of 107 tonnes of chemical waste, including MARPOL Annex I & II waste from ocean-going vessels, were treated at the Chemical Waste Treatment Centre on Tsing Yi Island. A Government contractor operates the treatment centre. Waste producers using its services are required to pay part of the treatment cost.

Following the commissioning of the Low-level Radioactive Waste Storage Facility at Siu A Chau, most of the low-level radioactive waste generated in Hong Kong has been transferred to the facility for long-term storage. The facility is purpose-built to meet stringent international standards for the safe storage of low-level radioactive waste.

Clinical Waste

To safeguard public health, the Government proposes to implement the Clinical Waste Control Scheme to ensure that clinical waste is handled and disposed of in an environmentally sound and safe manner. Under the control scheme, clinical waste will be sent to the Chemical Waste Treatment Centre for disposal by high-temperature incineration. The Government is installing additional facilities at the Chemical Waste Treatment Centre to receive and treat clinical waste and to upgrade the air pollution control system to meet the latest European Union emission standards.

Construction Waste

The construction industry generated 15.4 million tonnes of construction waste in 2009. Of that, about 93 per cent was inert and suitable for re-use. The policy has been to maximise the recovery and re-use of inert materials and minimise their disposal at landfills. The construction waste charging scheme introduced in December 2005 provides an economic incentive for reducing construction waste. The Government continues to deliver inert materials to the Mainland for re-use in reclamation projects there.

Large-scale Waste Treatment Facilities

Hong Kong has to deal with a large volume of non-recyclable waste and needs new state-of-the-art, cost-effective facilities to treat such waste and reduce its volume. A multi-technology approach is needed so that wastes of different nature can be dealt with by the most suitable technology. The Government aims to commission the first phase of large-scale Integrated Waste Management Facilities (IWMF) that will adopt advanced incineration as its core technology in mid-2010. It will also develop Organic Waste Treatment Facilities (OWTF) to treat source-separated

organic waste such as food waste and turn it into useful resources. It plans to commission the first phase of OWTF before mid-2010. However, even with such facilities, residual waste will still need to be disposed of at landfills.

In order to deal with the ever-increasing sewage sludge generated from the sewage treatment works, a dedicated Sludge Treatment Facility (STF) that will adopt advanced incineration technology and with a capacity of 2 000 tonnes per day will be built at Tsang Tsui near Nim Wan, Tuen Mun. Tenders for the STF were invited in October 2009.

Import and Export of Waste

Import and export of waste are regulated by a permit system under the Waste Disposal Ordinance (WDO). The control is in line with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which adopts a prior informed consent procedure for shipments of controlled waste. To support the Basel Ban, an initiative of the Basel Convention to curb the export of hazardous waste from developed countries to developing countries, the EPD ceased issuing import permits for controlled waste from the developed countries with effect from 1998. This ban arrangement was also incorporated in the WDO in April 2006.

In 2000, a memorandum of understanding (MoU) was signed between the HKSAR and the Mainland to strengthen the control of hazardous waste movements between the two places. The MoU was subsequently renamed 'Co-operation Arrangement on Control of Waste Movements between the Mainland and HKSAR' in November 2007.

In 2009, 54 prosecutions related to illegal waste import and export activities were completed, with the imposition of fines totalling about $0.9 million. Most of the offences involved trans-shipment of hazardous electronic waste through Hong Kong to other places.

Floating Refuse in the Harbour

The Marine Department deploys a fleet of about 70 contractors' vessels to collect floating refuse and refuse from vessels. In 2009, 16 195 tonnes were collected. Besides law enforcement, the Government also uses publicity and education to tackle the floating refuse problem.

Marine Dumping

The EPD maintains strict control over marine dumping operations via a permit system under the Dumping at Sea Ordinance. These operations follow the requirements of the London Convention to which Hong Kong is a Contracting Party.

Since August 2008, all marine dumping vessels operating under permits issued by EPD have to be equipped with an automatic self-monitoring device that transmits real-time data to the EPD Control Centre to allow the authorities to trace any illegal dumping in a cost-effective manner. The department's inspectors conduct frequent patrols of Hong Kong waters to prevent illegal dumping.

Monitoring and Investigation

Assessing the progress made in achieving policy goals is one of the EPD's key activities. The results gained from routine monitoring and special investigations form the basis for much of the department's strategic planning, provision of facilities and statutory controls. The department has 94 sampling stations in marine waters including enclosed bays and typhoon shelters, and another 82 stations for inland waters. It also monitors 41 bathing beaches.

The water quality monitoring programme provides a comprehensive record of the physiochemical and microbiological condition of Hong Kong waters. Annual reports of monitoring data are available on the EPD's website. Water quality of the major marine and river stations is published monthly on the website and gradings of water quality of bathing beaches are published weekly in the media and updated daily on the department's website.

Sustainable Development

The Council for Sustainable Development was appointed by the Chief Executive in March 2003 to promote sustainable development in Hong Kong. The council has so far addressed five key sustainability issues — solid waste management, renewable energy, urban living space, population policy and better air quality — since launching its first public engagement exercise to consult stakeholders in 2004.

The council conducted a new round of public engagement, entitled 'Building Design to Foster a Quality and Sustainable Built Environment', in June 2009. Various sectors of the community were engaged in dialogues on enhancement of sustainable building design; provision of essential, green and amenity features in buildings and gross floor area concessions; and building design on energy efficiency. The council is now consolidating the public views and will provide its recommendations to the Government.

Since 2003 the council had invited seven rounds of applications from organisations and individuals for grants from the Sustainable Development Fund to carry out work related to sustainable development. Thirty-three projects were approved in the first six rounds, involving grants of $29.7 million, and 19 of them have been completed so far.

To facilitate the integration of sustainability considerations in the decision-making process, since 2002 the Government has adopted a sustainability assessment system, the implementation of which is overseen by the Sustainable Development Division. All bureaux and departments are required to conduct sustainability assessments of their major initiatives and programmes and to explain the implications in their submissions to the Policy Committee and Executive Council.

Government Laboratory

The Government Laboratory supports the enforcement of environmental protection legislation and the implementation of various environmental programmes through the provision of comprehensive analytical and advisory services. In 2009, it

conducted numerous tests on environmental samples of air, water, sediment, soil, biota and waste samples and other substances, providing a large volume of useful data for various environmental programmes. In 2010, it will provide new analytical service for biodiesel testing. It will also develop new test methods targeting the additional groups of chemicals that have recently come under the control of the Stockholm Convention on Persistent Organic Pollutants.

Flora

Hong Kong is situated near the northern boundary of the distribution of tropical Southeast Asian flora, sharing similar species and structure with the flora of Guangdong Province. Despite its small size, Hong Kong has a rich flora with about 3 100 species of vascular plants, of which 2 100 are native to Hong Kong. Continual efforts in afforestation coupled with various conservation measures have transformed formerly bare hillsides and slopes into impressive woodlands. Besides greening and beautifying the countryside, woodlands are important habitats for wildlife and are essential to protecting water catchments from soil erosion. They also provide recreational opportunities for the public.

Remnants of the original forest cover, either scrub forest or well-developed woodlands, are still found in steep ravines or behind traditional villages in rural areas. They have survived as a result of their location in precipitous topography and the moist winter micro-climate, or because they are protected for cultural reasons.

Terrestrial Fauna

Hong Kong's climate and physical environment provide a wide range of habitats and support for a rich and varied fauna which include about 490 species of birds, 56 species of mammals, over 100 species of amphibians and reptiles, 238 species of butterflies and 115 species of dragonflies.

The Mai Po Marshes form one of the most important wildlife conservation sites in Hong Kong. Together with the Inner Deep Bay area, the Mai Po Marshes area has been listed as a 'Wetland of International Importance' under the Ramsar Convention. About 1 500 hectares of mudflats, fish ponds, marshes, reedbeds and dwarf mangroves provide a rich habitat for migratory and resident birds, particularly ducks and waders.

Some 370 species of birds have been observed in this area. Many of these are considered globally threatened and endangered, such as the black-faced spoonbill, oriental stork, Nordmann's greenshank and Saunders's gull. The Agriculture, Fisheries and Conservation Department (AFCD) implements a wetland conservation and management plan to conserve the ecological value of the area.

The traditional fung shui woods near old villages and temples and the secondary forests provide important habitats for many woodland birds. Birds sighted in the wooded areas include warblers, flycatchers, robins, bulbuls and tits.

Areas around the Kowloon reservoirs are inhabited by monkeys which were released or which have escaped from captivity, and their offspring. There are

breeding groups of rhesus macaques and a few long-tailed macaques, and their hybrids there. Some rhesus macaques have migrated to the forested areas of Shing Mun Reservoir and Tai Po Kau. Feeding of monkeys has been prohibited since July 1999 to prevent their growth in numbers.

Other mammals such as red muntjacs, leopard cats, East Asian porcupines, Chinese ferret badgers, masked palm civets, small Indian civets and Eurasian wild pigs are quite common in the countryside. Bats including the Himalayan leaf-nosed bats, Pomona leaf-nosed bats and Chinese horseshoe bats are found in caves and water tunnels. Sightings of less common species such as Eurasian otters, small Asian mongooses and Chinese pangolins are reported occasionally.

Hong Kong has over 100 species of amphibians and reptiles. There are 24 species of amphibians, and three of them — the Hong Kong cascade frog, the Hong Kong newt and the Romer's tree frog — are protected under the Wild Animals Protection Ordinance. Most of the 52 species of snakes are harmless, and reports of people being bitten by highly venomous snakes are very rare. Among the 10 native species of chelonians, the green turtle is of particular interest as it is the only known species of sea turtle breeding in Hong Kong.

Marine Fauna

Hong Kong's subtropical marine environment supports species of both tropical and temperate climates. Local waters contain a wide diversity of fish, crustaceans, molluscs and other marine life, of which at least 150 species are of fisheries significance.

Situated on the eastern bank of the Pearl River Estuary, Hong Kong receives fresh water from the river, especially in its western waters. The waters on the eastern side, on the other hand, are little influenced by the Pearl River outflow and are predominantly oceanic in nature. This unusual hydrography helps to contribute to the diversity of marine life.

Despite being close to the northern geographic limit for the growth of hard corals, Hong Kong supports 84 hard coral species. This diversity of corals is quite rich by international standards. A variety of marine fish also breeds in Hong Kong waters. Typical of the eastern waters is the red pargo, one of several sea bream varieties whose fry are abundant along the shore of Mirs Bay in early spring.

Two marine mammal species can be found throughout the year. The Indo-Pacific humpback dolphin, also known as the Chinese white dolphin, is the best known. The other is the finless porpoise. The humpback dolphin prefers the estuarine environment and inhabits the western waters of Hong Kong while the finless porpoise lives in the eastern and southern part, where the waters are predominantly oceanic.

To enhance inshore marine resources, the AFCD has installed artificial reefs to improve fisheries resources and biodiversity. The Marine Parks programme continues to be important in protecting and conserving sites of special ecological and conservation value.

Legislation and Nature Conservation

The Director of Agriculture, Fisheries and Conservation, who is also the Country and Marine Parks Authority, is responsible for the conservation of terrestrial and marine ecological resources and for the enforcement of legislation on nature conservation issues.

The Forests and Countryside Ordinance provides for the general protection of trees and vegetation. Its subsidiary legislation, Forestry Regulations, controls the selling and possession of certain attractive plants to deter illegal collection. These include native camellias, magnolias, orchids, azaleas and the Chinese New Year flower.

The Wild Animals Protection Ordinance prohibits the hunting and sale or export of protected wild animals found in Hong Kong. It also restricts entry into three important wildlife habitats that are designated as 'restricted areas'. These are the Mai Po Marshes, the Yim Tso Ha Egretry and the green turtle nesting beach at Sham Wan.

The Protection of Endangered Species of Animals and Plants Ordinance imposes controls on the import, export, re-export, introduction from the sea or possession of endangered species to prevent their over-exploitation.

The Country Parks Ordinance provides for the designation, control and management of country parks and special areas for nature conservation, education and scientific research purposes. Country parks may be used for compatible recreation and tourism purposes.

The Marine Parks Ordinance provides for the designation, protection and management of marine parks and marine reserves for nature conservation, education and scientific research purposes. Recreational activities such as swimming and diving are allowed in marine parks.

The Fisheries Protection Ordinance provides for the regulation of fishing practices and the prevention of destructive fishing activities such as those involving the use of explosives or toxic substances to catch fish.

Protected Areas

About 40 per cent of Hong Kong's total land area has been designated as country parks and special areas for conservation and recreation. There are 24 country parks and 17 special areas covering 44 000 hectares of scenic hills, woodlands, reservoirs, islands, indented coastlines, marshes and uplands. All are carefully protected for nature conservation, education and scientific studies. Management responsibilities include the protection of woodland and vegetation against fire, control of development, tree planting, litter collection, the provision of educational and recreational facilities, and the promotion of a better understanding of the countryside.

There are four marine parks and one marine reserve covering 2 430 hectares of scenic coastal areas, seascapes and important biological habitats. Marine reserves are

dedicated to conservation, education and scientific studies. Fishing in marine parks is controlled through a permit system while such activity is totally banned in marine reserves. Publicity and educational activities are organised for students and members of the public.

Besides designating protected areas, the Government has been identifying and conserving sites of special scientific interest (SSSI), such as areas with special geological features and natural habitats of rare plants or animals, by exercising strict land use planning and development controls. There are 67 sites listed in the SSSI register.

Topography and Geology

Hong Kong's natural terrain is characterised by rugged uplands flanked by steep slopes. The highest point is Tai Mo Shan (957 metres above Principal Datum) in the central New Territories, and the lowest point (66 metres below Principal Datum) is in Lo Chau Mun (the Beaufort Channel) to the north of Po Toi Island. The mountains are predominantly formed of volcanic rocks, whereas the lower hills consist mainly of granite. Low-lying areas are generally underlain by granite or sedimentary rocks. A layer of soft, weathered rock covers the bedrock in most places, slope debris mantles the natural hillsides, and alluvium fills many of the valleys. Offshore, the seabed is covered with marine mud, with sand sheets occurring near the coast and in channels.

The oldest exposed rocks in Hong Kong are composed of Devonian river sediments that were deposited approximately 400 million years ago. The region was subsequently inundated by a shallow sea, which deposited Carboniferous limestones, the parent material of the Yuen Long and Ma On Shan marble. Between 170 to 140 million years ago, during the Jurassic and Cretaceous periods, violent volcanic eruptions were associated with deposition of thick ash and lava layers and the development of several calderas (giant craters). At deeper levels, molten magma was intruded and slowly crystallised to form granite. Layered rocks now seen on the island of Ping Chau are younger sediments, laid down in a lake on the edge of a desert, about 55 million years ago.

During the last 2.6 million years, the Quaternary Period, major glaciations caused successive lowering of world sea level of up to 120 metres, which resulted in the coastline being about 120 kilometres to the south. During interglacial periods, such as the present time, global sea level rose and marine sediments were deposited.

A series of fifteen 1:20 000-scale geological maps and six accompanying geological memoirs have been produced by the Hong Kong Geological Survey, a part of the Geotechnical Engineering Office. The Hong Kong Geological Survey has also published two summary memoirs and a set of 1:100 000-scale geological and thematic maps that synthesise the geology of Hong Kong. A popular account of the geology of Hong Kong, in Chinese and English, has also recently been published. Detailed geological information is available at the website of the Civil Engineering and Development Department.

Energy

Gas

Town gas and liquefied petroleum gas (LPG) are the main types of fuel gas used in Hong Kong for domestic, commercial and industrial purposes. LPG is also used as a fuel by some taxis and light buses while natural gas is used for electricity generation and production of town gas.

Hong Kong has about 2.3 million gas customers in the domestic, commercial and industrial sectors, of which town gas and LPG respectively accounted for 84.3 and 15.7 per cent of the total fuel gas sold in these sectors.

Town gas is manufactured at plants in Tai Po and Ma Tau Kok, which have daily throughput capacities of 9.66 and 2.6 million cubic metres respectively. There is a piping network of some 3 400 kilometres supplying town gas to about 1.7 million customers.

LPG is imported into Hong Kong by sea and stored at five terminals on Tsing Yi Island before being distributed to approximately 641 000 customers and 59 LPG filling stations.

Natural gas is imported from the Mainland via submarine pipelines to the Black Point, Castle Peak and Lamma Power Stations for electricity generation and to Tai Po plant for production of town gas.

On August 28, 2008, the HKSAR Government and the National Energy Administration signed a Memorandum of Understanding (MoU) on the enhanced supply of natural gas to Hong Kong, among other things, in the coming two decades. Since signing the MoU, the Government and the energy enterprises on both sides have followed up on its implementation. The Shenzhen-Hong Kong spur line of the Second West-East Natural Gas Pipeline and the liquefied natural gas terminal in Shenzhen to be jointly constructed by energy enterprises of both sides are anticipated to be completed in 2013. Hong Kong can benefit from improved air quality by increasing the use of clean energy and reducing the emission of power plants.

The Gas Safety Ordinance regulates the importation, manufacture, storage, transport, supply and use of fuel gas. All gas supply companies, gas installers and contractors must be registered with the Gas Authority (the Director of Electrical and Mechanical Services).

Electricity

The Hongkong Electric Company Limited (HEC) supplies electricity to Hong Kong Island and the neighbouring islands of Ap Lei Chau and Lamma, while CLP Power Hong Kong Limited (CLP Power) supplies Kowloon and the New Territories, including Lantau and several other outlying islands. The electricity supply to consumers is 50 hertz alternating current while the voltage is 220 volts single-phase and 380 volts three-phase.

Both power companies are investor-owned. The Government monitors them through mutually agreed Scheme of Control Agreements (SCAs). These require the companies to seek the Government's approval for certain aspects of their development plans, including their projected basic tariff levels. The SCAs do not give the companies any exclusive rights. They are not franchises, nor do they define a supply area for either company, or exclude newcomers to the market.

The Government signed the post-2008 SCAs with each of the two power companies in January 2008. The new agreements took effect upon the expiry of the previous ones on September 30, 2008 and December 31, 2008 for CLP Power and HEC respectively. The new SCAs are of 10-year term, with an option exercisable by the Government to extend for five more years, i.e. until 2023, after review of the prevailing market conditions.

The permitted rate of return of the power companies has been reduced from 13.5 to 15 per cent on their average net fixed assets to 9.99 per cent, to bring a material reduction in basic tariffs and ease consumers' spending on their electricity bills. The permitted rate of return is also linked to the emission performance of the power companies in the interest of better environmental protection. The new SCAs ensure the continued supply of reliable, safe and efficient electricity at reasonable prices. The Government will proceed with the preparation for the opening up of the electricity market, including the formulation of a new market mechanism and the associated regulatory framework, in the current regulatory period (i.e. from 2008 to 2018).

Currently, HEC has a total installed capacity of 3 756 megawatts (MW) at its Lamma Power Station. The Castle Peak Power Company Limited (CAPCO) supplies electricity to CLP Power from its power stations at Black Point (2 500MW), Castle Peak (4 108MW) and Penny's Bay (300MW).

CLP Power and HEC own their respective transmission and distribution systems. The two transmission systems are interconnected by a cross-harbour link, which provides emergency back-up and some sharing of generating capacity reserve between the two systems. The link has a current total capacity of 720 megavoltamperes (MVA).

CLP Power's transmission system is also connected to the electricity network in Guangdong Province which facilitates the export and import of electricity to and from the province. The electricity sold to Guangdong is from CLP Power's existing reserve generating capacity. Its sale is governed by an agreement with the HKSAR Government under which CLP Power's consumers are given priority of supply and 80 per cent of the profit from the sales. At the same time, CLP Power buys about 70 per cent of the power generated by the Guangdong Nuclear Power Station at Daya Bay, which has two 984MW pressurised water reactors, to meet part of the longer-term demand for electricity in its supply area.

According to the MoU signed between the HKSAR Government and the National Energy Administration on August 28, 2008, the Central People's Government supported the China Guangdong Nuclear Power Holding Company

Limited in the renewal of its supply agreement with Hong Kong for a further term of 20 years. In September 2009, the Government gave approval for CLP Power to extend the contract for the supply of nuclear electricity from Daya Bay Nuclear Power Station for another term of 20 years from May 7, 2014 onwards. The quantity of electricity supply will be no less than the current level.

CLP Power also has the right to use up to 50 per cent of the 1 200MW capacity of Phase 1 of the Guangzhou Pumped Storage Power Station at Conghua. Off-peak period electricity from the CAPCO system and the Guangdong Nuclear Power Station is stored in the pumped storage power station, which generates hydro-electricity to meet Hong Kong's demand during peak periods.

There are regulations under the Electricity Ordinance governing the registration of electrical contractors and workers and competent persons, safety of electrical wiring, supply of safe household electrical products and protection of electricity supply lines from third party damage.

Climate

Hong Kong has a sub-tropical climate. About 80 per cent of the annual rainfall occurs between May and September. August is the wettest month while January is the driest.

November and December are generally regarded as the best months of the year with pleasant breeze, plenty of sunshine and comfortable temperatures. January and February are cloudier, with occasional surges of the winter monsoon bringing cold weather.

March and April may be mild but humid with occasional fog. From May to August, it is hot and humid with occasional heavy rain and thunderstorms.

Tropical cyclones usually affect Hong Kong between June and October. The close approach of tropical cyclones could bring high winds and widespread heavy rain. Landslips and flooding sometimes cause considerably more damage than the winds.

The Year's Weather

The weather was exceptionally warm in 2009. The decade 2000-2009 is also the hottest on record. Eight tropical cyclones necessitated the issuance of tropical cyclone warning signals in 2009, more than the average of six to seven a year.

Meteorological Services

Hong Kong Observatory

Established in 1883, the Hong Kong Observatory provides a wide range of meteorological, geophysical, oceanographic, astronomical and climatological services. It also monitors environmental radiation, and administers the official time standard for Hong Kong.

Weather forecast and information service

The observatory issues forecasts and warnings of hazardous weather to the public, as well as to the shipping, aviation, transport and logistic communities. It also provides ultra-violet information and location-specific lightning alert services. In 2009, the observatory provided special weather service for the 2009 East Asian Games.

The observatory's Airport Meteorological Office provides weather services for the Hong Kong International Airport (HKIA) and for the Hong Kong Flight Information Region. The world-first Light Detection And Ranging (LIDAR) windshear alerting system, developed in-house by the observatory, was enhanced with one LIDAR now serving each of the two runways.

Weather information is disseminated to the public through the media, the observatory's website and the automatic Dial-a-Weather System. As one of the most popular government websites, the observatory website registered about 1 600 million page hits in 2009, an increase of about 14 per cent over 2008. The observatory's meteorologists also host regular TV and radio weather programmes and conduct media briefings during adverse weather conditions.

To heighten public alertness towards typhoons and their damaging effects, the observatory introduced in 2009 refined categories of typhoons. They are classified as 'Typhoon', 'Severe Typhoon' or 'Super Typhoon' according to their strength.

Radiation measurement and assessment

The observatory monitors the ambient radiation levels in Hong Kong and radioactivity in air, soil, water and food. In case of a nuclear alert, it will immediately step up radiation monitoring, assess the radiological consequences and provide technical advice to policy bureaux on action to take. The observatory's Radiation Laboratory received the ISO 9001:2008 accreditation for its radiation measurement services in 2009.

Climatological Service

The observatory provides climatological information to special users. It also studies climate change and the impact of weather and climate on health. It issues an annual outlook on rainfall and tropical cyclones, as well as seasonal predictions of temperature and rainfall.

Oceanographic Service

The observatory produces an annual tide table for Hong Kong and provides forecasts of wave and swell for mariners as well as warnings for the public of possible storm surges and tsunamis. It gives advice on oceanographic matters to other government departments and the engineering community.

Geophysical Service

The observatory monitors earthquakes, if any, in the vicinity of Hong Kong and around the world. Relevant information is issued through the media and the observatory's website.

Official time standard

As the official time keeper of Hong Kong, the observatory maintains a Time Standard accurate to within fractions of a microsecond per day and contributes to the determination of Co-ordinated Universal Time. Time checks are available to the public through its Dial-a-Weather System, local radio stations, web clock and the internet network time service, the latter handling more than 710 million checks in 2009, an increase of about 18 per cent over 2008.

Public Education

To promote public awareness of hazardous weather and climate change, the observatory runs an educational and outreach programme consisting of training courses for members of the public and government personnel, exhibitions, scientific lectures, open days and guided tours of the observatory. The Director of the Hong Kong Observatory also shares his views on various issues with the public through the Director's Blog.

Websites

Environment Bureau: www.enb.gov.hk
Agriculture, Fisheries and Conservation Department: www.afcd.gov.hk
Civil Engineering and Development Department: www.cedd.gov.hk
Environmental Protection Department: www.epd.gov.hk
Electrical and Mechanical Services Department: www.emsd.gov.hk
Council for Sustainable Development: www.susdev.org.hk
Hong Kong Observatory: www.hko.gov.hk and www.weather.gov.hk