



## Water, Power and Gas Supplies

### WATER SUPPLIES

Providing an adequate water supply for Hong Kong has always been difficult because there are no natural lakes, rivers or substantial underground water sources. The annual rainfall averages 2 398.5 millimetres but this is insufficient to meet current demands — the average daily consumption of potable water during 2014/15 being 2.63 million cubic metres.

The Water Supplies Department is a government department providing potable water to the people living within the Hong Kong Special Administrative Region. The department also supplies sea water for flushing.

**Sources of Water:** Hong Kong's two main sources of water are rainfall from natural catchments and Dongjiang water from Guangdong Province. Shortage of natural storage reservoir sites led to the construction of Hong Kong's first 'reservoir in the sea' at Plover Cove. The initial scheme, completed in 1967, was created by damming, and draining an inlet of Tolo Harbour and had a storage of 170 million cubic metres. The storage was increased in 1973 to 230 million cubic metres by raising the dam. A similar but larger scheme at High Island, completed in 1978, has a capacity of 281 million cubic metres. The total storage capacity of Hong Kong's reservoirs is 586 million cubic metres.

**Supply from Guangdong:** Dongjiang is Hong Kong's major source of water. Dongjiang water first started to be supplied to Hong Kong in 1965. Today, about 70-80 per cent of water comes from Dongjiang by arrangement with the Guangdong authorities. 729 million cubic metres of Dongjiang water was imported in 2014/15. The Dongshen-Hong Kong water supply system is designed to be capable of providing Hong Kong with 1.1 billion cubic metres per annum.

**Sea Water for Flushing:** An interesting facet of the waterworks is the sea water supply systems with their separate networks of distribution mains, pumping stations and service reservoirs. In 2014/15, an average of about 748 000 cubic metres of sea water was supplied each day.

### Consumption (in million cubic metres):

|                    | 2013/14 | 2014/15 |
|--------------------|---------|---------|
| <i>Fresh Water</i> |         |         |
| Annual             | 937.34  | 961.46  |
| Daily Average      | 2.57    | 2.63    |
| Highest Daily      | 2.81    | 2.85    |
| <i>Sea Water</i>   |         |         |
| Annual             | 276.35  | 273.17  |
| Daily Average      | 0.76    | 0.75    |

**Rainfall and Yield:** About one-third of Hong Kong's 1 098 square kilometres has been developed as water catchments.

|  | 2013/14       | 2014/15       |
|--|---------------|---------------|
| <i>Rainfall (in mm)</i>                        |               |               |
| Rainfall recorded by the Hong Kong Observatory | 2 959.0       | 2 493.3       |
| Average rainfall recorded in water catchments  | 2 453.5       | 1 596.0       |
| <i>Yield (in million cubic metres)</i>         |               |               |
| Yield from catchment areas                     |               |               |
| Old Reservoirs                                 | 138.97        | 96.02         |
| Plover Cove and High Island Systems            | 207.87        | 122.01        |
| Water Received from Guangdong by pipeline      | 598.43        | 728.60        |
| <i>Total</i>                                   | <i>945.27</i> | <i>946.63</i> |

**Reservoir Storage:** Hong Kong is dependent on adequate storage for the maintenance of a regular supply. The reservoirs and their storage capacities are tabulated below:

| <i>Reservoir</i>     | <i>Year on Supply</i> | <i>Storage Capacity<sup>3</sup></i> |
|----------------------|-----------------------|-------------------------------------|
| Pok Fu Lam           | 1877                  | 233 000                             |
| Tai Tam Upper        | 1889                  | 1 490 000                           |
| Tai Tam Byewash      | 1904                  | 80 000                              |
| Tai Tam Intermediate | 1907                  | 686 000                             |
| Kowloon              | 1910                  | 1 578 000                           |
| Tai Tam Tuk          | 1917                  | 6 047 000                           |
| Shek Lei Pui         | 1925                  | 374 000                             |
| Reception            | 1926                  | 121 000                             |
| Aberdeen (2 Res.)    | 1931                  | 1 259 000                           |
| Kowloon Byewash      | 1931                  | 800 000                             |
| Shing Mun (Jubilee)  | 1936                  | 13 279 000                          |
| Tai Lam Chung        | 1957                  | 20 490 000                          |
| Shek Pik             | 1963                  | 24 461 000                          |
| Lower Shing Mun      | 1965                  | 4 299 000                           |
| Plover Cove          | 1968                  | 229 729 000                         |
| High Island          | 1978                  | 281 124 000                         |

### Consumer Services:

|                                   | 2013/14   | 2014/15   |
|-----------------------------------|-----------|-----------|
| Additional no. of accounts (nett) | 38 400    | 21 500    |
| No. of accounts as at April 1     | 2 860 300 | 2 881 800 |

**Water Treatment:** The supply is fully treated by chemical coagulation, sedimentation (at most treatment works), filtration, disinfection by chlorination, pH value adjustment, chlorination and fluoridation. The drinking water is soft in character and conforms fully to the Guidelines for Drinking-water Quality recommended by the World Health Organization.

## ELECTRICITY

Electricity is supplied by CLP Power Hong Kong Limited and The Hongkong Electric Company Limited which are investor-owned and do not operate on a franchise basis. The companies have entered voluntarily with the Government into mutual agreements (Scheme of Control Agreements) concerning their financial affairs.

**CLP Power Hong Kong Limited (CLP Power)**, founded in 1901, supplies electricity to Kowloon and the New Territories, including Lantau, Cheung Chau and most of the outlying islands.

CLP Power's local maximum demand in 2014 was 7 030 MW, while local sales amounted to 32.9 billion kWh. At the year end, the company had about 2.46 million customers.

At present, electricity is generated by three power stations, namely, Castle Peak (4 108 MW), Black Point (2 500 MW) and Penny's Bay (300 MW), with the total installed capacity being 6 908 MW. All these power stations are owned by Castle Peak Power Company Limited (CAPCO), 70 per cent of which is owned by CLP Power and 30 per cent by China Southern Power Grid International (HK) Company, Limited (CSG HK). CLP Power has contracted to purchase about 70 per cent (on a temporary basis from October 2014 to 2018, CLP Power purchases some additional 10 per cent) of the power generated at the two 984 MW pressurised water reactors at the Guangdong Daya Bay Nuclear Power Station, some 50 kilometres from Hong Kong, to help meet the long term demand for electricity in its supply area. It also has the right to use 50 per cent of the 1 200 MW capacity of Phase 1 of the Guangzhou Pumped Storage Power Station, at Conghua.

Wholly owned by CLP Power, the transmission system operates at 400kV and 132kV while distribution is mainly at 33kV, 11kV and 380V. The supply is 50Hz alternating current, at 220V single-phase or 380V three-phase. For bulk customers, supply is available at 132kV, 33kV and 11kV.

An extra high voltage transmission system, at 400kV, transmits power from the Castle Peak and Black Point Power Stations to the various load centres. It comprises 503 kilometres of double-circuit overhead line encircling the New Territories, 52 kilometres of cables and 11 extra high voltage substations.

By the end of 2013, CLP Power had 218 primary and 13 692 secondary substations in its transmission and distribution network.

By the end of 2014, CLP Power had 224 primary and 13 845 secondary substations in its transmission and distribution network.

The company's power system has been interconnected with the Guangdong power system since April 1979 and electricity is exported to Guangdong Province. 80 per cent of the profit is given back to CLP Power's local customers.

**The Hongkong Electric Company Limited (HKE)**, founded in 1889, supplies electricity to Hong Kong Island, Ap Lei Chau and Lamma Island. Electricity is supplied from the Lamma Power Station. At the end of 2014, the total installed capacity of the station was 3 757 MW.

The maximum demand in 2014 was 2 460 MW, and sales of electricity for the year amounted to 11 billion kWh. At the year end, the company had 0.57 million customers.

The transmission system of HKE operates at 275kV and 132kV, whereas distribution is effected mainly at 22kV, 11kV and 380V. The supply is 50Hz alternating current, at 220V single-phase or 380V three-phase. With the exception of a few short lengths of 132kV overhead transmission lines, the entire transmission and distribution system is composed of underground cables.

By the end of 2014, HKE had 51 switching/zone substations and 3 793 consumer substations.

The interconnection of the company's transmission system with that of the CLP Power by a cross-harbour link has an installed capacity of 720 MVA enabling the provision of emergency support to each other during generator failure and hence reduces potential loss of supply to customers.

## 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 nearly all taxis and over 65 per cent of public light buses while natural gas is used for electricity generation and production of town gas.

Hong Kong has about 2.25 million gas customers in the domestic, commercial and industrial sectors of which town gas and LPG respectively accounted for 87.2 per cent and 12.8 per cent of total fuel gas sold in these sectors in terms of heating values.

**Town gas** is manufactured at plants in Tai Po and Ma Tau Kok, which have daily throughput capacities of about 9.7 and 2.6 million cubic metres respectively. A pipe network of some 3 500 kilometres supplies town gas to about 182 million customers.

**LPG** is imported into Hong Kong by sea and stored at five terminals on Tsing Yi Island before being distributed to approximately 430 000 customers and 67 LPG filling stations for LPG vehicles.

**Natural Gas** is imported from the Mainland China 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 Hong Kong SAR Government and the National Energy Administration signed the Memorandum of Understanding (MoU) on the enhanced supply of natural gas to Hong Kong, among other things, in the coming two decades. With the concerted efforts of all parties, the MOU has been implemented gradually, including the extension of nuclear electricity supply from Daya Bay Nuclear Power Station for another 20 years up to 2034 and the completion of the Hong Kong Branch Line of the Second West-East Natural Gas Pipeline in 2012. At present, new natural gas is being supplied to Hong Kong for power generation. Hong Kong can benefit from improved air quality by increasing the use of clean energy and reducing the emission of power plants.