

INFORMATION NOTE

Electricity Market in Hong Kong

1. Background

1.1 At a special meeting held on 30 March 2006, the Panel on Economic Services requested the Research and Library Services Division to provide information on the levels of investment and rates of return of the CLP Power Hong Kong Limited (CLP) and the Hongkong Electric Company Limited (HEC) as well as those of electricity companies in comparable overseas markets.

1.2 The purpose of this information note is to provide Members of the Panel with background information on Hong Kong's electricity market with respect to its structure, regulatory framework, as well as levels of investment and rates of return of CLP and HEC. The permitted rates of return for overseas regulated electricity companies are also provided for reference.¹

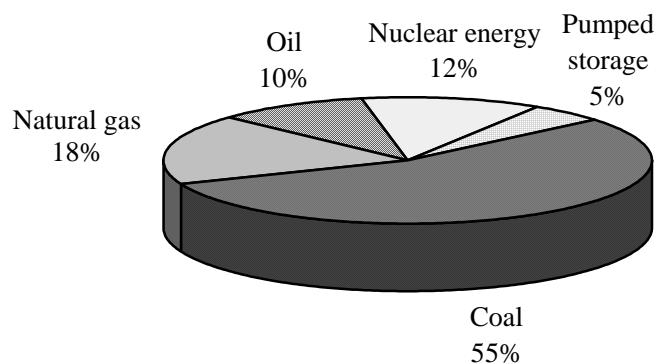
2. Market structure of Hong Kong's electricity industry

2.1 Electricity supply in Hong Kong is provided by CLP and HEC. The two power companies are investor-owned and listed in the stock market. Both of them are also vertically integrated, i.e. they own and operate the entire electricity supply chain, including generation plants, transmission and distribution networks, and supply electricity directly to customers within their respective service areas.

2.2 At present, local electricity demand is largely met by generation plants built in Hong Kong (except nuclear and pumped storage generation²) by CLP and HEC. Figure 1 shows the generation fuel mix of the installed capacities of these two power companies.

¹ This information note only provides the permitted rates of return in selected overseas electricity markets due to scanty information available on the levels of investment of the power companies in these markets. In addition, it is difficult to compare the levels of investment made by electricity companies in different markets as they are usually operating under distinct market structures and/or regulatory regimes. For example, the regulator of a particular market may encourage power companies to invest more on the power system infrastructure for the objective of achieving a higher reliability in electricity supply.

² CLP has contracted to purchase the power generated at the two 984 MW pressurized water reactors at the Guangdong Daya Bay Nuclear Power Station. It also has the right to use 50% of the 1 200 MW capacity of the Guangzhou Pumped Storage Power Station.

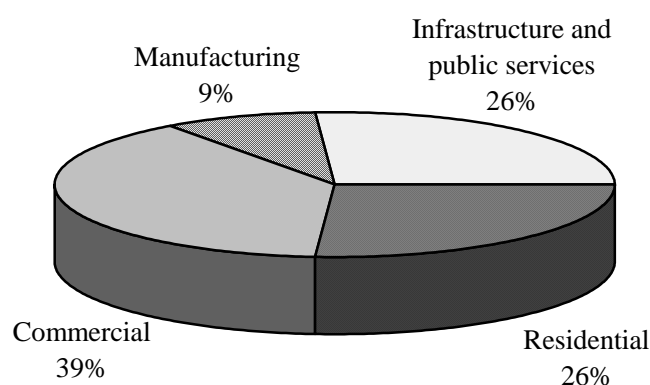
Figure 1 — Fuel mix for power generation in Hong Kong

Source: Economic Development and Labour Bureau.

CLP Power Hong Kong Limited

2.3 Founded in 1901, CLP supplies electricity to about 2.2 million customers in Kowloon and the New Territories, including Lantau, Cheung Chau and most of the outlying islands. CLP operates three generating facilities, namely the Castle Peak Power Station (4 108 MW³), the Black Point Power Station (2 187.5 MW) and the Penny's Bay Power Station (300 MW). All these power stations are owned by the Castle Peak Power Company Limited, of which 60% is owned by the Exxon Energy Limited and 40% by CLP.

2.4 In 2005, CLP sold 29 382 GWh⁴ of electricity in Hong Kong⁵, of which 39% and 26% were supplied to the commercial and residential sectors respectively.

Figure 2 — Consumption of CLP's electricity by customer type in 2005

Source: CLP Holdings Limited.

³ MW, or megawatt, is a unit of electric power. The productive capacity of electrical generators operated by electricity companies is often measured in MW. See Wikipedia (2006).

⁴ GWh is a unit of energy and equals to one million kWh.

⁵ In 2005, CLP also sold 4 497 GWh of electricity to the Mainland.

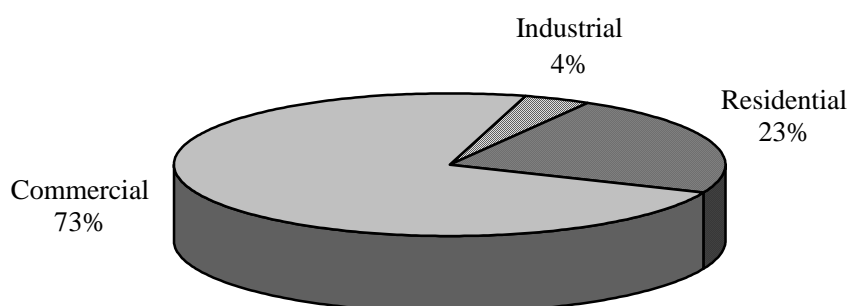
Hongkong Electric Company Limited

2.5 Found in 1889, HEC supplies electricity to about 550 000 customers on the Hong Kong Island and the neighbouring islands of Ap Lei Chau and Lamma Island. Electricity for HEC's service areas is supplied from the Lamma Power Station, which has a total installed capacity of 3 420 MW.

2.6 HEC's power transmission system is interconnected with that of CLP by a cross-harbour link, which enables the provision of emergency support to each other during generator failure and hence reduces potential loss of electricity supply to customers.

2.7 In 2005, HEC sold 10 755 million kWh of electricity, of which 73% and 23% were supplied to the commercial and residential sectors respectively.

Figure 3 — Consumption of HEC's electricity by customer type in 2005



Source: Hongkong Electric Holdings Limited.

3. Regulatory framework

3.1 The Government regulates the safety, and the environmental and economic aspects of electricity supply in Hong Kong through the following regulatory framework:

Safety regulation

3.2 The Economic Development and Labour Bureau (EDLB) oversees all policy issues relating to the reliability, safety and efficiency of power generation, electricity supply and utilization. In addition, the Electrical and Mechanical Services Department enforces the compliance of CLP and HEC with the provisions stipulated in the Electricity Ordinance.

Environmental regulation

3.3 The Environment, Transport and Works Bureau oversees all environmental polices relating to power generation and electricity supply in Hong Kong. In particular, the Environmental Protection Department enforces the compliance of CLP and HEC with the provisions stipulated in the relevant environmental ordinances.⁶

Economic regulation

3.4 EDLB also oversees policy issues relating to the economic regulation of CLP and HEC through the Scheme of Control Agreements (SCAs) signed between the Government and the two power companies.

Scheme of Control Agreements

3.5 In principle, the operations of CLP and HEC are primarily regulated by the Government through the 15-year SCAs. The current agreements run from 1993 until 2008, with interim reviews conducted in 1998 and 2003. The objectives of SCAs are to allow the regulated power companies and their shareholders to

*"earn a return which is reasonable in relation to the risks involved and the capital invested in and retained in the businesses; in return the Government has to be assured that service to all consumers shall at all times be adequate to meet demand, will be efficient and of high quality, and is provided at the lowest possible cost which is reasonable in the light of financial and other considerations and is consistent with Government policy objectives on energy efficiency and conservation in the light of the need to protect the local and global environment and to meet international obligations."*⁷

3.6 Key provisions contained within SCAs for achieving the policy objective of providing reliable, safe and efficient electricity supply at reasonable prices include:

- (a) an obligation for the power companies to provide sufficient facilities to meet present and future electricity demand. For this obligation, the power companies are entitled to receive a 13.5% permitted rate of return on their average net fixed assets with an additional 1.5% for assets financed by shareholders' funds;
- (b) an obligation for the power companies to supply electricity at the lowest possible cost;

⁶ The relevant environmental ordinances include the Air Pollution Control Ordinance, the Environmental Impact Assessment Ordinance, the Noise Control Ordinance, the Waste Disposal Ordinance and the Water Pollution Control Ordinance.

⁷ See Economic Development and Labour Bureau (1993a) and (1993b).

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- (c) a requirement for the power companies to seek the approval of the Executive Council for certain aspects of their financial plans, including projected tariff levels, and the approval of the Government to each annual tariff adjustment;
 - (d) provisions for annual audits jointly conducted by the Government and the power companies on their technical and financial performances; and
 - (e) the establishment of a "Development Fund" which, among other purposes, provides a depository for net revenue in excess of the permitted return and, when necessary, provides funds up to the balance of the Development Fund to ameliorate the impact of tariff increase.

3.7 According to the Government⁸, the SCA arrangement has served Hong Kong well in making available reliable and safe supply of electricity to consumers in the past years. However, there have been concerns and criticisms about such arrangement, which include the following:

- (a) the permitted rate of return of 13.5% on fixed assets and the additional 1.5% on assets financed by shareholders' funds being considered high in the present-day economic climate;
- (b) the permitted return, based on fixed assets, being perceived to have encouraged over-investment by the two power companies;
- (c) inflexible arrangement of fixing the permitted rate of return over a 15-year period, as amendments to SCAs cannot be made without consent of the parties involved; and
- (d) low transparency in the annual tariff and auditing reviews.

4. Reviews of the electricity market in Hong Kong

4.1 The current SCAs between the Government and the two power companies will expire in 2008. As such, the Government has conducted a two-stage consultation to set out its preliminary views on various issues relating to the post-2008 arrangements for Hong Kong's electricity market, and invite interested parties to comment on these issues.

⁸ See Economic Development and Labour Bureau (2005a).

Stage I Consultation

4.2 On 31 January 2005, the Government launched Stage I of the two-stage consultation exercise with the issue of a consultation paper entitled *Future Development of the Electricity Market in Hong Kong: Stage I Consultation*. In the consultation paper, the Government seeks public views on the possible options for a number of issues relating to the development of Hong Kong's electricity market after 2008. These issues include the rate and basis for determining the permitted return, the tariff setting mechanism, increased interconnection, grid access and alternate electricity sources, and the post-2008 regulatory and institutional arrangements.

Stage II Consultation

4.3 On 30 December 2005, the Government launched the Stage II public consultation exercise to set out its proposed framework for the development of Hong Kong's electricity market after 2008, based on the comments collected during the Stage I consultation.

4.4 The proposed regulatory framework puts forward the following policy initiatives:

- (a) continuing the existing practice of exercising economic regulation by means of bilateral agreement signed between the Government and the individual power companies. The term of the new agreement will be shortened from 15 years to 10 years, with an option for a five-year extension after a review conducted before expiry;
- (b) lowering the permitted rate of return to 7-11% for different types of assets;
- (c) introducing financial disincentives to ensure the compliance of the power companies with emission reduction requirements;
- (d) encouraging the use of renewable energy. The proposed rate of return for renewable energy infrastructure is higher than all other assets; and
- (e) requiring all tariff adjustments to be approved by the Government, as opposed to the existing arrangement whereby the Government's approval is not required if the projected basic tariff rate of a year is not higher than the most recently approved basic tariff rate by 7% or more.

5. Levels of investment and rates of return of the CLP Power Hong Kong Limited and the Hongkong Electric Company Limited

5.1 SCAs provide an agreed basis for determining a reasonable level of profit that the companies can earn from generating and supplying electricity. Reasonable profit is measured by the net return to the shareholders of the electricity companies. According to the Government, the net return is calculated by first determining the amount of permitted return based on the following formula:

$$\text{Amount of permitted return} = 13.5\% \times \text{average net fixed assets financed by borrowed capital} + 15\% \times \text{average net fixed assets financed by shareholders' funds}$$

Deductions are then made from the permitted return to give the net return. These deductions include interest on borrowed capital of up to 8% p.a., a charge at 8% p.a. on the average balance of the Development Fund; interest up to a rate of 8% p.a. on the funds from growth in consumers' deposits after 30 September 1998 for CLP and after 31 December 1998 for HEC and excess capacity adjustment (if any).

5.2 As shown in Table 1, the levels of investment of CLP and HEC are measured by the amount of capital expenditure incurred by these power companies. In 2005, the amount of capital expenditure incurred by CLP and HEC totalled HK\$6,005 million and HK\$3,006 million respectively.

5.3 In 2005, the rates of permitted return on average net fixed assets for CLP and HEC were both at 14.4%. Over the same period, the net return on average net fixed assets for CLP and HEC were 12.9% and 13.3% respectively.

Table 1 — Levels of investment and rates of return of CLP and HEC

	2001	2002	2003	2004	2005
CLP					
Capital expenditure (HK\$ million)	5,172	5,861	7,273	6,961	6,005
Rates of return					
<i>Permitted return/average net fixed assets (%)</i>	14.4	14.4	14.4	14.4	14.4
<i>Net return/average net fixed assets (%)</i>	12.2	12.5	12.9	13.1	12.9
HEC					
Capital expenditure (HK\$ million)	4,133	3,145	2,106	2,248	3,006
Rates of return					
<i>Permitted return/average net fixed assets (%)</i>	14.3	14.2	14.2	14.5	14.4
<i>Net return/average net fixed assets (%)</i>	13.1	13.5	13.2	12.3	13.3

Source: Economic Development and Labour Bureau.

6. Permitted rates of return in selected overseas electricity markets

6.1 In *Future Development of the Electricity Market in Hong Kong: Stage I Consultation*, the Government quoted the ranges of typical permitted rates of return for regulated power companies in Australia, the United Kingdom (UK) and the United States (US) for reference. The Regulatory Focus and the Public Utilities Fortnightly⁹ have also published the permitted rates of return for the electricity market in the US. These figures are listed in the table below.

Table 2 — Permitted rates of return in selected overseas electricity markets

Place	Range of permitted rates of return
Australia	6-9%. ⁽¹⁾
United Kingdom	6-7%. ⁽¹⁾
United States	6-13% (Source: Hong Kong Special Administrative Region Government) ⁽¹⁾ 7.0-9.4% (Source: Regulatory Focus) ⁽²⁾ 9.6-12.3% (Source: Public Utilities Fortnightly) ⁽²⁾

Notes: (1) In *Future Development of the Electricity Market in Hong Kong: Stage I Consultation*, the Government did not publish any breakdown of the range of typical permitted rates of return for electricity markets in Australia, the UK and the US.

(2) Please refer to Appendices I and II for the breakdown of the range of permitted rates of return in the US published by the Regulatory Focus and the Public Utilities Fortnightly respectively.

Sources: Economic Development and Labour Bureau, Regulatory Focus and Public Utilities Fortnightly.

6.2 According to some academics, it is very difficult to draw a direct comparison between the above figures and the permitted rates of return for CLP and HEC on a comparable basis.¹⁰ Power companies in overseas markets could be operating under market environments and regulatory regimes quite different from those of CLP and HEC, which may in turn affect their permitted rates of return.

⁹ The Regulatory Force is a publication series dealing with regulatory issues, whereas the Public Utilities Fortnightly is a monthly publication providing coverage and analysis of the energy and utilities industries.

¹⁰ The Government has expressed similar view on direct comparison of permitted rates of return for power companies in different electricity markets. See Economic Development and Labour Bureau (2003).

6.3 The market environment and regulatory regime variables which may affect the determination of the permitted rate of return include:

- (a) business ownership, which affects the targeted rate of return as well as the equity and debt makeup in financing;
- (b) market structure, which affects the business mix of the utility and earnings of individual business segments of the utility;
- (c) generation fuel mix¹¹, which affects the generation cost and thus the return from the electricity supply business;
- (d) degree of vertical integration;
- (e) business diversification, as other businesses such as gas supply and telecommunications services may also be operated by or associated with the same company; and
- (f) approaches adopted by the regulators for determining the permitted rates of return of regulated utilities. For example, some regulators choose to regulate tariff instead of rates of return.

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¹¹ Generation fuel may be conventional thermal, hydro and pumped storage, and/or nuclear.

Appendix I**Permitted rates of return for selected power companies in the United States**

Company	Permitted rate of return (%)
Altantic City Electric	8.1
Avista	9.1
Consolidated Edison of New York	8.1
Empire District Electric	9.2
Energy Louisiana	8.8
Kentucky Utilities	7.0
Nevada Power	9.0
OGE Electric Service	8.7
South Carolina Electric and Gas	8.4
Wisconsin Power and Light	9.4

Source: Major US Rate Case Decisions – January 2004 to December 2005, Supplemental Study. Regulatory Focus. 12 January 2006.

Appendix II
Permitted rates of return in the United States

State	Permitted rate of return on equity (%)
Arizona	10.3
California	11.4
Idaho	10.4
Indiana	10.5
Iowa	10.7
Kansas	10.5
Kentucky	11.0
Louisiana	10.3-12.3
Michigan	11.0
Missouri	11.0
New Hampshire	9.6
New York	10.3
Oregon	10.0
Pennsylvania	10.7
South Carolina	10.7
Texas	10.1
Utah	10.5
Vermont	10.0-10.5
Washington	10.3
Wisconsin	11.5

Source: Public Utilities Fortnightly.

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