

**Consultation Paper**  
**on**  
**Future Development of**  
**the Electricity Market in Hong Kong**

**Stage II Consultation**

**Economic Development and Labour Bureau**  
**Government of the Hong Kong Special Administrative Region**  
**December 2005**

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## FOREWORD

This Consultation Paper sets out the proposed framework for the future development of Hong Kong's electricity market after the existing Scheme of Control Agreements between the Government and the two power companies expire in 2008. We invite your views on the proposals pertaining to the future regulatory arrangements of the electricity market and other related matters presented in this Consultation Paper.

This is Stage II of the two-stage public consultation process. Views of the public on various issues and possible options for the development of the post-2008 electricity market were sought under Stage I of the public consultation exercise held between 31 January 2005 and 30 April 2005. The proposed framework set out in this Consultation Paper has been drawn up with regard to, *inter alia*, views received during the Stage I Consultation. With views received during this Stage II Consultation, we will finalise the regulatory arrangements, and work with the power companies on the post-2008 arrangements.

This Consultation Paper consists of three chapters. Chapter 1 summarises views received during the Stage I Consultation, which form the basis of the proposed arrangement for post-2008. Chapter 2 presents our detailed proposals for the future regulatory arrangements for the electricity market and other related matters. Chapter 3 summarises the key features of the proposed arrangements.

Please send us your views and comments *on or before 31 March 2006*:

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All responses will be treated as public information unless otherwise specified.

# CHAPTER 1

## INTRODUCTION

### A. STAGE I CONSULTATION

1.1 The existing Scheme of Control Agreements (SCAs) between the Government and the two power companies<sup>1</sup> will expire in 2008. The Government has conducted a review, and launched Stage I of a two-stage public consultation exercise between 31 January 2005 and 30 April 2005 to seek the views of the public on various issues and possible options on the future development of the electricity market.

1.2 We have received a total of 766 written submissions from different sectors of the community and, in addition, 175 messages through the dedicated discussion forum on the website of the Economic Development and Labour Bureau (EDLB) and the Public Affairs Forum of the Home Affairs Bureau. All written submissions have been uploaded onto the EDLB's website, and views received during the Stage I Consultation have been reported to the Legislative Council Panel on Economic Services in June 2005.

1.3 Stage I Consultation indicates that –

- (a) Views received were overwhelmingly in support of the existing policy objective of ensuring that reliable, safe and efficient electricity supply is available to the public at reasonable prices, whilst the impact on the environment is minimised in the production and use of electricity. In particular, most of the views received considered reliability and safety of electricity supply to be of paramount importance and should continue to be the primary objective for the future development of the electricity market.
- (b) Most of the views received were supportive of the current SCA-type of arrangement or similar bilateral agreements.

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<sup>1</sup> Separate SCAs were signed with –

- a) the Hongkong Electric Company Limited (HEC) and Hongkong Electric Holdings Limited. Where pertinent in this document, HEC would represent both companies; and
- b) the CLP Power Hong Kong Limited (CLP Power), Exxon Mobil Energy Limited (Exxon Mobil) and Castle Peak Power Company Limited (CAPCO). CAPCO is a joint venture generating company established between CLP Power and Exxon Mobil. Where pertinent in this document, CLP Power would represent the companies.

Views were, however, divided on the future institutional arrangement, i.e. whether the existing arrangement should continue or a new regulatory authority should be set up.

- (c) Relatively more respondents preferred an asset base approach for calculating return, and opined that the current rate of return should be lowered. On the rate of return, some suggested that it be linked to cost of capital, others opined reference be made to economic indicators. Some also suggested incentives be given for improvements in performance.
- (d) Some suggested that tariffs should be linked to economic indicators and transparency be enhanced in the tariff review process.
- (e) Most respondents did not support increased interconnection, out of concern that it might affect reliability and increase tariffs. Views were divided on providing third-party access to the power grids of the two power companies.
- (f) Most respondents expressed reservation on introducing competition into the electricity market. Many expressed reservation on importing electricity from the Mainland, out of concerns about supply reliability and availability of surplus electricity in the Mainland.
- (g) While relatively few views were received on environment-related issues, respondents generally supported the introduction of renewable energy (RE), but some were worried that higher costs of RE might lead to higher tariffs.

## **B. STAGE II CONSULTATION**

1.4 Electricity is a daily necessity for the general public and crucial to Hong Kong's economic and social development. In considering arrangement for the future development of the electricity market, we have considered the views received during the Stage I Consultation, and endeavoured to strike a balance between the interests of different stakeholders while bearing in mind the overall long-term interests of Hong Kong as a whole.

1.5 Our proposals for the future regulatory arrangements of the market and other related matters are set out in Chapter 2.

## CHAPTER 2

### THE FUTURE ELECTRICITY MARKET

#### A. POLICY OBJECTIVE

2.1 The objective of the Government's energy policy is to ensure that the public can enjoy reliable, safe and efficient energy supplies at reasonable prices, and to minimise the environmental impact caused by the production and use of energy.

2.2 The Stage I Consultation revealed a clear consensus in the community that reliability and safety of electricity supply are of paramount importance and should continue to be the primary objective in the future development of the electricity market. We are enjoying a high standard of supply reliability exceeding 99.99%, which is amongst the highest in the world. We **propose** that regulatory arrangement for the future electricity market should aim to achieve the Government's energy policy objective.

#### B. NEW SUPPLY SOURCES

2.3 Hong Kong's electricity market is an open one. Interested investors who meet the relevant reliability, safety and environmental requirements can enter the market. With supply reliability as a top priority, feedbacks from the Stage I Consultation however indicated general reservation about introducing competition into the future electricity market, particularly with regard to the import of electricity from the Mainland. Nevertheless, there have been suggestions that supply of electricity from the Mainland be considered to take advantage of the apparently lower tariffs across the border, and that more new supply sources be introduced into the market.

##### (I) SUPPLY FROM THE MAINLAND

2.4 Feedbacks from the Stage I Consultation indicated reservations about the availability of surplus and reliable supply in the Mainland for supply to Hong Kong. We have since commissioned further studies and held discussions with relevant Mainland authorities to assess the prospect of importing electricity from Guangdong for supply to Hong Kong. The latest assessment showed that –

- (a) generally speaking, the supply and demand situation in Guangdong would improve in the next few years;
- (b) nevertheless, electricity supply would remain tight in the near term, especially in certain regions and during certain times of the year.

2.5 The assessment at paragraph 2.4(a) above is, however, not without uncertainties which include, for instance, the commissioning of new power plants; the phasing-out of small, less efficient generating units; the availability of additional supply from the western provinces; the supply and price of primary fuel (e.g. coal and oil); economic growth and improved living standards in the Mainland, etc.

2.6 The assessment also flags up various other issues that need to be addressed, with regard to importing electricity from Guangdong. Among others,

- (a) the Mainland authorities plan and develop their power system according to forecast demand in the Mainland: Hong Kong's needs are not included in their plan;
- (b) additional transmission lines and relevant infrastructure might be required: there could be technical constraints in having them constructed on the Mainland side of the border; and
- (c) the responsibility and accountability for supply planning would have to be redefined.

2.7 Earlier this year, some interests have been expressed about importing electricity from the Mainland for supply to Hong Kong. Nevertheless, details of any such proposals have yet to emerge, and consideration of any such proposals will have to take into account the issues identified in paragraph 2.6 above. Moreover, even if it does not require access to the existing grids, construction of relevant supply infrastructure in Hong Kong will also be required to fulfill the safety, environmental, land and planning stipulations governing such works.

2.8 All indications, therefore, suggest that it would be prudent at this stage not to predicate the future development of the electricity market in Hong Kong on supply from the Mainland. This notwithstanding, we **propose** to prepare the ground for possible new supply sources from the Mainland vide paragraphs 2.19 to 2.26 below.

2.9 Separately, the latest forecast of Hong Kong's electricity demand indicates an annual growth rate of 2% to 3% over the next 10 years. Current projections are that the installed and committed generation capacities of the two power companies are expected to be able to meet local demand up to around the end of this decade, and that there is potential at the existing power plant sites for the two power companies to develop generation facilities to meet forecast demand well into the next decade. That said, in view of the aspiration of our community for introducing RE and given the topographical constraints in the development of RE in Hong Kong, we should provide for the possibility of local power companies importing RE from the Mainland in future.

2.10 We therefore **propose** that we should –

- (a) continue to monitor closely developments in the electricity market in Guangdong so as to identify possible sourcing opportunities including RE in a more timely manner;
- (b) assess the economic benefits that could be realised for Hong Kong consumers with electricity import from the Mainland, having regard to reliability, safety and tariff;
- (c) enhance liaison with the relevant Mainland authorities and explore how technical constraints to the development of relevant infrastructure, such as transmission lines, on the Mainland side of the border might be addressed; and
- (d) make preparations, including developing regulatory arrangements, with regard to grid access to new electricity suppliers and enhanced interconnection between Hong Kong and Guangdong for possible supply from the Mainland.

## **(II) RENEWABLE ENERGY**

2.11 To better protect the environment, we support the development of renewable energy. In the First Sustainable Development Strategy for Hong Kong promulgated by the Government in May 2005, we have set the target of having 1% – 2% of our local power needs met by RE by 2012. The 2005 Policy Address announced our intention to ask the power companies to use RE in electricity generation in the future regulatory regime. Views received during the Stage I Consultation generally supported the introduction of RE in the future electricity market,

but were wary that the higher costs of RE might lead to higher electricity tariffs.

2.12 We appreciate that there are topographical constraints and limitations in Hong Kong to the application of RE, consideration should nevertheless be given to tapping wind energy, solar energy and energy-from-waste.

### Wind energy

2.13 As a first step, both power companies have, during the Interim Review of the existing SCAs in 2003, agreed to set up a production-scale wind turbine as pilot public education and demonstration projects so that the public can gain a first-hand understanding of the benefits and limitations of wind power generation in Hong Kong. The 800kW wind turbine put up by HEC on Lamma Island will be commissioned in 2006. CLP Power has identified two potential sites for construction of a wind turbine and is now carrying out wind measurement at these sites.

2.14 Wind power generation needs relatively more space. Sites with good wind power potential, which may be suitable for building wind farms, are mostly located on the hillsides or in country parks, or offshore areas. Hong Kong might need to give up some green belts or carry out large-scale marine works for extensive development of wind power generation, which might give rise to issues relating to planning interface, visual impact, cost effectiveness, and the need for broad consensus in the community.

### Solar energy

2.15 Currently, solar energy application is mostly confined to incorporating small-scale solar panels into building designs as a “green” building feature. Solar energy is not competitive in terms of per unit cost of generation, hence application on a mass scale in the near future might be constrained by economic considerations.

### Energy-from-waste

2.16 Employing thermal processes to treat municipal solid wastes are capable of providing stable power supply, and energy-from-waste should be given further consideration to its future development.

2.17 To encourage and facilitate the introduction of RE, with the view to meeting the 1% – 2% RE target by 2012 in the First Sustainable

Development Strategy promulgated by Government in May 2005, we **propose** that, in addition to public education, arrangements be made in the future regulatory regime to provide financial incentives to the power companies (vide paragraphs 2.46 and 2.58 below) and grid access for RE systems (vide paragraphs 2.21 to 2.22 below) to promote the use of RE.

### **(III) ARRANGEMENTS TO CATER FOR NEW SUPPLY SOURCES**

2.18 The arrangements between the Government and the power companies are not franchises and do not provide exclusive rights to the companies in electricity supply. Interested parties are at liberty to enter the Hong Kong electricity market. To prepare the ground for electricity supply from new sources, we **propose** that arrangements be made with regard to grid access and increased interconnection, as set out in paragraphs 2.19 to 2.26 below.

#### **(i) Grid Access**

2.19 Third party connection/access to the power grids (i.e. transmission & distribution networks) of the existing two power companies can facilitate development of alternative supply sources including RE and from the Mainland.

2.20 The existing power grids are private properties of the two power companies which have been planned, developed and operated by the companies to match their own supply sources, mode of operation, and the demand of their consumers. The power grids may therefore not be immediately compatible with the operating condition of a third party, and may have to be reinforced or reconfigured. To ensure the integrity of the power grids, and therefore reliability and safety of supply to consumers, it will be necessary to develop codes of practice and standards relating to supply reliability and safety, and liability (in case of fault). Costs will be entailed in reinforcing or reconfiguring power grids, providing back-up electricity supply and maintenance of the system. Arrangements will have to be in place to ensure that consumers will not be made to bear such costs unduly.

2.21 There were only a few comments on this issue during the Stage I Consultation, and views were divided. Having due regard to the rights and ownership of the power companies in their power grids and to prepare the ground for future market development, we **propose** to seek the agreement of the two power companies to provide connection/access to their grids –

(a) Grid Connection for RE Users

Currently, consumers with electricity generating systems using RE for meeting part of their in-house electricity demand can request the power companies to provide, with the payment of a nominal administrative fee, back-up electricity supply by connecting their generating equipment to the power companies' power grids. And a set of technical guidelines on connection of small-scale RE power systems (200 kW or below) to the power grids has been developed by the Electrical and Mechanical Services Department (EMSD) in consultation with the power companies, professional institutions, consultants and contractors, property developers and renewable energy interest groups.

To facilitate grid connection by RE users, we **propose** to –

- (i) institute a standard arrangement for RE users to connect to the grid for backup supply and to extend the arrangement to cover RE systems with capacities above 200 kW, provided that –
- the RE systems in question are not designed to feed electricity into the power grids of the power companies; and
  - reliability and safety of electricity supply to other consumers will not be compromised.

In this connection, we will work with the power companies to modify the technical guidelines to cater for RE systems with capacities above 200 kW; and

- (ii) seek the agreement of the power companies to waive the nominal administrative fees for grid connection by RE users.

(b) Grid Access for All Generating Facilities using RE

In addition to (a), we **propose** to further promote the use of RE in Hong Kong by facilitating generating facilities

employing RE to connect and feed electricity to the power companies' power grids.

To prepare for this development, we will work with the power companies, relevant experts and stakeholders to improve the technical codes developed for grid connection for RE users under (a) to cater for the operation mode where electricity will be fed from the RE sources into the power grids to ensure the reliability and safety of electricity supply of the grids, and will work with the power companies to develop a set of fair and transparent guidelines for accounting and settlement of power transactions, demarcation of responsibility, accountability and liability, etc.

(c) Grid Access for Other New Supply Sources

In the long run, grid access will be made available to other power suppliers, including possible new supply sources, say, from the Mainland vide paragraph 2.10 above. To ensure that the high standard of supply reliability enjoyed by consumers will not be compromised, this development would depend on many factors, including the availability of reliable and safe new supply sources.

Interfaces between the different parties will necessitate development of regulatory arrangements, one of the options being legislation, to ensure that –

- (i) there will be a level playing field for the existing and the new market participants;
- (ii) the new market participants will have in place viable development and supply plans which meet relevant safety, reliability and environmental requirements; and
- (iii) the responsibility and accountability for supply planning is clearly defined.

2.22 We **propose** that grid connection/access for RE users/generating facilities using RE should be negotiated between the prospective grid user and the respective power company. The Government will assist where necessary and when requested by either party, including assisting in arriving at mutually agreed access charges. And the Government will

initiate and draw up the regulatory framework regarding provision of grid access for other new supply sources in the long run, which might involve setting up a separate regulatory authority.

**(ii) Increased Interconnection**

2.23 Interconnection cannot displace the need for new generation facilities to meet growth in electricity demand. And enhanced interconnection to enable all consumers in one supply area to choose supplier(s) in another supply area without constraints is not an economically viable proposition. Nevertheless, increased interconnection can enhance efficiency in the use and planning of generation facilities, and provide more flexibility for the power companies in taking forward the emission reduction projects (which necessitates temporary outage of certain generation facilities).

Interconnection between CLP Power and HEC

2.24 The existing interconnector between CLP Power and HEC would reach the end of its expected useful life by 2011. The actual life span of the existing interconnector could, however, only be ascertained after detailed engineering assessments, and the possibility to extend the technical life of the existing interconnector cannot be ruled out.

2.25 We support increased interconnection at an “optimum” level between the two power companies to reap the benefits of reserve capacity sharing and coordinated generation planning and to provide more flexibility for the power companies in taking forward the emission reduction projects. We reckon it important that the two power companies will be involved and fully committed to making good use of interconnection to optimise their aggregate generation resources and system efficiency, with the ultimate goal of lowering costs for consumers. We therefore **propose** that –

- (a) increased interconnection, in whatever mode, be taken forward jointly by the two power companies.

Involving a third party, as the developer and/or planning agent for developing and directing the use of increased interconnection, will –

- raise complex issues relating to technical interface and liability, leading to uncertainties in optimising system efficiency which will not be in the interest of the

consumers; and

- give rise to a more complicated regulatory system with higher administrative costs;
- (b) the two power companies be requested to plan for increased interconnection, taking into account the results of the detailed engineering assessments of the existing interconnector;
- (c) we work with the two power companies to review and harmonise the planning criteria and reliability standards for the interconnected power system; and
- (d) we prepare the ground work for the future setting up of a separate regulatory authority to oversee technical and economic issues related to enhancing interconnection between the two power companies, and to providing grid access to any new supply sources in future.

### Interconnection with Guangdong

2.26 The existing interconnection capability is adequate for the current transfer of contracted power purchase from the Guangdong Nuclear Power Station at Daya Bay and the Guangzhou Pumped Storage Power Station at Conghua to Hong Kong. To prepare for substantive power transfers to Hong Kong when new supply sources are available from the Mainland, we **propose** to –

- (a) keep close track of developments in the Mainland, and maintain close contact with the relevant Mainland authorities with regard to infrastructure and related issues; and
- (b) make preparations for enhanced interconnection, covering both technical and regulatory aspects such as conducting power system planning & utilisation studies and power flow assessments, and preparing for the relevant legislative framework.

## **C. PROPOSED REGULATORY ARRANGEMENTS**

### **(I) SAFETY REGULATION**

2.27 At present, safety of electricity supply is regulated under the Electricity Ordinance (Chapter 406), with EMSD as the enforcement agency. The scope of regulation covers all aspects, from registration of generating facilities, transmission, distribution to use of electricity. Maintaining the current high safety standards is crucial to ensuring supply safety. We **propose** that safety in the supply and use of electricity be continued to be mandated by legislation, with provisions updated as required in tandem with technological developments and international practices.

### **(II) ENVIRONMENTAL REGULATION**

2.28 We recognise the important role played by the electricity industry in environmental protection. Regulation of the environmental performance of power stations is covered by the Air Pollution Control Ordinance and other environment-related legislation<sup>2</sup> enforced by the Environmental Protection Department (EPD).

2.29 The United Nations Framework Convention on Climate Change and its Kyoto Protocol were extended to Hong Kong in May 2003. We are committed to reducing greenhouse gas emissions as far as practicable. No new coal-fired generation units have been allowed since 1997, because gas-fired generation emits about 50% less carbon dioxide than coal-fired generation. We have also asked the power companies to use natural gas for power generation as much as possible.

2.30 In April 2002, the Hong Kong and Guangdong Provincial Governments reached an agreement to reduce, on a best endeavour basis, emissions of four major pollutants, namely, sulphur dioxide, nitrogen oxide, respirable suspended particulates and volatile organic compounds by 40%, 20%, 55% and 55% respectively by 2010, as compared to the 1997 levels.

2.31 Reduction of emissions in power generation is an important issue for improving the regional air quality in the Pearl River Delta. The 2005 Policy Address announced that, to fully achieve the emission reduction targets by 2010, the Government will impose and progressively

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<sup>2</sup> Including the Environmental Impact Assessment Ordinance, Noise Control Ordinance, Waste Disposal Ordinance, Water Pollution Control Ordinance, etc.

tighten the emission caps on major pollutants when renewing the licences of individual power plants.

2.32 Experience has shown that the mandatory licensing arrangements have been effective for improving the environmental performance of power companies in Hong Kong. We **propose** that environmental regulation continue to be applied in the future electricity market. To provide added impetus, we further **propose** to adopt additional measures, under the economic regulatory arrangements –

- (a) to minimise the costs to consumers in meeting the emission reduction targets; and
- (b) to promote energy efficiency and conservation, environmental improvements, and use of renewable energy in electricity generation, vide paragraphs 2.45 to 2.49, and 2.58 below.

### **(III) ECONOMIC REGULATION**

2.33 At present, the Government exercises economic regulation over the two power companies through legally-binding bilateral Scheme of Control Agreements (SCAs). Experience in the past forty years has indicated that the bilateral agreements have been effective in ensuring reliable and safe electricity supply in Hong Kong, while providing flexibility for both the Government and the business operators to respond to market demands.

2.34 The alternative approach, by means of legislation, is generally reckoned as inflexible, more bureaucratic, more costly and Government intrusion into private business. Under the prevailing situation, we **propose** to continue economic regulation of the power companies by means of a bilateral agreement arrangement. Nevertheless, we consider that as the market continues to develop, it will be necessary to put in place additional regulatory arrangements, including legislation, to ensure reliable and adequate supply. We will commence our preparation work in this regard.

2.35 We recognise that the current SCAs are not without shortcomings. Indeed, criticisms of the current SCAs reiterated in the feedbacks during the Stage I Consultation include the following –

- (a) permitted rates of return (13.5% on fixed assets; and additional 1.5% on assets financed by shareholders' funds)

are high;

- (b) return based on fixed assets encourages over-investment;
- (c) fixing the permitted rate of return over a 15-year period is inflexible; and
- (d) annual tariff and auditing reviews lack transparency.

## **The Future Regulatory Regime**

2.36 The proposed future regulatory regime aims –

- (a) to achieve the policy objective as regards reliable, safe and efficient supply at reasonable prices;
- (b) to further the environmental objectives promulgated in the 2005 Policy Address, with regard to emissions reduction, use of renewable energy, and implementation of demand side management; and
- (c) to address the shortcomings of the current arrangement vide paragraph 2.35 above.

### **(i) Regulatory Instrument**

#### Bilateral Agreements

2.37 The electricity supply industry is capital intensive requiring long lead time for planning and long pay-back period. Feedbacks from the Stage I Consultation were supportive of having a bilateral agreement arrangement between the Government and each of the power companies to exercise economic regulation, but views were divided on the period of the agreement, with some supporting the current 15-year period, while others favouring a shorter duration.

#### Duration of the Agreements

2.38 In considering the period of the future agreements, we have to strike a balance between allowing flexibility for changes and providing a relatively stable and certain environment for long-term investment by power companies. We **propose** that the future agreement be on a 10-year term with an option to extend by another five years, unless a review to be conducted towards the end of the term indicates that the

prevailing market conditions are such that continuing economic regulation by a bilateral agreement approach is no longer appropriate.

2.39 Irrespective of the duration of the term, future bilateral agreements would include provisions for –

- (a) a tariff review on an annual basis;
- (b) an auditing review on the financial and technical performance of the power companies on an annual basis;
- (c) review of the companies' development plans on a periodic basis, similar to the joint financial review under the current SCAs; and
- (d) a joint interim review with the power companies every five years within the period of the agreement.

#### New Features in the Bilateral Agreements

2.40 To enable the Government to implement the agreements in a manner which best serves the interests of the public at the time, we **propose** that the future bilateral agreements should include specific provisions that will require –

- (a) all development plans relating to electricity supply of the power companies to be approved by the Government;
- (b) the key components for determining the permitted rate of return to be reviewed, and the permitted rate of return to be adjusted where appropriate, every five years to reflect the prevailing economic conditions, having regard to the need to provide a stable regulatory environment to facilitate long-term investments and the potential implications on tariffs. This will be different from the existing arrangement whereby the permitted rate of return is fixed for the period of the agreement (see paragraph 2.56); and
- (c) all tariff adjustments to be approved by the Government, as opposed to the existing arrangement whereby Government's approval is not required if projected basic tariff rate of a year is not higher than the most recently approved basic tariff rate by more than 7% (see paragraphs 2.59 and 2.60).

**(ii) Return**

2.41 To ensure that power companies will have in place adequate, quality infrastructure and management to enable Hong Kong to continue to enjoy reliable and safe supply, we have to ensure that the regime for regulating return would yield, on the one hand, affordable electricity tariffs for consumers and, fair and reasonable return for the power companies and their shareholders to continue to invest in necessary electricity supply infrastructure for meeting forecast demand on the other. The rate base and the rate of return are two essential elements to the economic regulatory regime.

**(a) Rate Base**

2.42 We **propose** to adopt a two-pronged approach, using fixed assets and performance as the base for determining return.

Average Net Fixed Assets (ANFA)

2.43 Given the capital intensive nature of the electricity supply industry, we **propose** to continue to adopt a fixed asset approach using ANFA as the base to provide the necessary incentives for the power companies to continue to invest in essential electricity supply infrastructure to ensure reliable and adequate power supply. This approach is consistent with worldwide practice and supported by feedback from the Stage I Consultation.

2.44 The alternative, equity base, recognises that portion of assets funded by shareholders as the rate base, which may not be confined to only fixed assets. This approach lacks incentive for efficient financing and shareholders may not be inclined to use debt financing even when it is available and cheaper. As a result, equity base is not commonly used as the rate base for determining return in other regulatory regime.

Performance Improvement

2.45 Views received during the Stage I Consultation suggest that incentives should be provided to motivate the power companies to improve their performance. We **propose** that incentives be provided to the power companies if they increase the use of RE or achieve improvements in performance in energy conservation, demand side management, operational efficiency, service quality or emissions reduction. As a corollary, power companies will be “penalised” for

failing to keep up to the agreed standards of operational efficiency and service quality or failing to meet the emission caps stipulated in the Specified Process Licences (SPLs) issued under the Air Pollution Control Ordinance (APCO).

### *Energy Conservation, Demand Side Management and Use of RE*

2.46 In the 2005 Policy Address, the Chief Executive has called on the power companies to implement demand side management and to complement Government's efforts in energy conservation, and to use RE for power generation. In the First Sustainable Development Strategy promulgated in May 2005, the Government has also set a target of having 1% – 2% of our local power needs to be met by RE by 2012. We **propose** to –

- (a) provide financial incentives to the power companies for improving their performance in energy efficiency and conservation with a set of indicators, involving demand side management activities such as energy audits, promotion of energy conservation, savings in energy usage ;
- (b) provide financial incentives to the power companies to encourage them to use RE in electricity generation, with a view to achieving the target of having 1% – 2% of our local power needs met by RE by 2012; and
- (c) determine the amount of incentives in accordance with the power companies' actual performance against the relevant agreed performance targets.

We **propose** that “gains” thus achieved by the power companies should be shared with the consumers.

### *Operational Efficiency and Service Quality*

2.47 The power companies' performance, in terms of operational efficiency and service quality, will also be gauged. We **propose** to develop a set of indicators with the power companies on operational efficiency, supply reliability and customer service performance, etc, and provide financial incentives to the power companies for improvements to their performance in these areas. Disincentives would be included to discourage under-performance.

2.48 Overseas experiences indicate that “gains” of the sort are small when taken against return on ANFA. In line with overseas experiences, we **propose** that such gains, or deductions, be made in the form of lump-sum.

#### *Emissions Reduction*

2.49 Emissions from power plants are regulated by the SPLs issued by EPD under the APCO. Since the APCO regulates not only power plants but also small industrial operations, financial penalty under the APCO which might be imposed on the power companies for failing to meet the emission caps in the SPLs is relatively moderate. Furthermore, cancelling the SPLs is not a practical alternative. To ensure that the statutory emission caps are met, we **propose** to link the permitted rate of return on all fixed assets of the power companies to their achievement of the emission caps stipulated in the SPLs and reduce such permitted rate of return if the companies do not achieve the caps. As a corollary, financial incentives in the form of “bonus” return will be provided to encourage the power companies to reduce their emissions to levels below those required in the SPLs.

#### Excess Capacity

2.50 To ensure that the power companies will monitor closely demand in their respective service areas and be vigilant in considering the timing for the installation of additional generation facilities, there is a mechanism under the current SCAs for determining excess generation capacity. With this mechanism, a portion (40% for CLP Power and 50% for HEC) of the capital expenditure on machinery and equipment relating to any facility found to be “excessive” would be excluded from the company’s ANFA for calculating the return.

2.51 To guard against over-investments by the power companies, we **propose** to continue, and tighten, the existing excess capacity mechanism, whereby all capital expenditure on machinery and equipment of the generation facility found to be excessive will be deducted from the rate base (i.e., ANFA) in calculating the company’s return. This approach may, however, result in the power companies deferring investment in generation assets, thus affecting supply reliability.

## Emission Reduction Facilities

2.52 To improve air quality, the two power companies have proposed to install emission reduction facilities in their respective Financial Plans in order to reduce sulphur dioxide and nitrogen oxide emissions from their power plants by 2011/2012.

2.53 To fully achieve the emission reduction targets in 2010 agreed between the Hong Kong and Guangdong Provincial Government, the Chief Executive has announced in his 2005 Policy Address that we, amongst other things, will require the power companies to install emission reduction facilities and have asked them to accelerate these projects. We will also explore options to avoid the costs of installing the facilities being passed onto consumers as far as possible.

2.54 To avoid the costs of emission reduction facilities being passed onto consumers as far as possible, we have considered excluding all capital expenditure for such facilities from the rate base, including those already included as assets under the current SCAs. In other words, the power companies will stop earning returns on any such investments after 2008. This approach, however, will not be conducive to achieving the emission reduction targets, since the power companies will not have any incentives to invest, or to continue to invest, in such facilities. And worse, to comply with the emission caps stipulated in the SPLs of individual power plants, the power companies may reduce the operation of the “polluting” coal-fired generating units, leading to possible issues with supply sufficiency and reliability. Or alternatively, the power companies may embark on other measures, such as emissions trading or replacing the “polluting” coal-fired generating units by gas-fired ones, either measure will entail costs which will invariably be passed onto consumers.

2.55 Instead, we **propose** to include all capital expenditure for emission reduction facilities in the rate base, but subject it to a lower rate of return. This approach retains some incentive for the power companies to invest, or continue to invest, in such facilities to help achieving the emission reduction targets, while lessening at the same time the financial burden on consumers.

### **(b) Permitted Rate of Return**

2.56 Fair and attractive return is pivotal to encouraging continuous investment and quality service by the power companies in maintaining

stable and reliable electricity supply to the consumers. Feedbacks from the Stage I Consultation opined the current rate as high and should be lowered. Some also suggested that the rate should be linked to the cost of raising capital or suitable economic indicators. We agree that the rate of return should provide an incentive to the investors and, at the same time, reflect the opportunity cost and the associated risk borne by the power companies in making investments in electricity supply infrastructure. We therefore **propose** –

- (a) to adopt an integrated approach in determining the rate to reflect the cost of raising capital and risks, which will include –
  - equity and debt as the cost elements;
  - risk free rates and risk premiums for each of these cost elements;
  - capital structure and tax rate; and
  - unique challenges and risks in the current and future electricity market of Hong Kong; and
- (b) to review the key components, and adjust the rate where appropriate, every five years to reflect the prevailing economic conditions, having regard to the need to provide a stable regulatory environment to facilitate long-term investments and the potential implications on tariffs.

With the approach at (a) above, current indications are that the permitted rate of return would be in the range of 7% to 11%. The actual permitted rate of return may have to take into account the prevailing market conditions.

2.57 We **do not propose** to directly “benchmark” the return rates to those of other local utilities or performance of other types of business because this approach will be crude and arbitrary, and fails to take into account the opportunity costs and risks of the particular industry. Similarly, “benchmarking” against rates adopted in overseas electricity markets is inappropriate because of the difference in market structure, regulatory regime and business risks involved. Nevertheless, the average return rates of other types of business may serve as reference for the rate of return determined by the integrated approach proposed in paragraph 2.56 above.

(c) **Varying Return for Different Types of Assets**

2.58 Under the current SCAs, one single rate is applied to the aggregated value of ANFA in the entire supply chain, covering generation, transmission & distribution. We **propose** to apply different rates of return to different types of assets in the new economic regulatory regime as follows –

(a) RE Infrastructure

Pursuant to our policy objective of minimising impact on the environment caused in the generation of electricity, we **propose** to give a higher rate of return for RE infrastructure than all other assets, to encourage the development and application of RE in Hong Kong.

(b) Generation, Transmission & Distribution Assets

To reflect the different investment risks associated with the different operations in the supply chain, i.e., generation versus transmission & distribution, we **propose** to give a lower rate of return for generation assets and a further lower rate for transmission & distribution assets.

(c) Emission Reduction Facilities

To avoid the costs of emission reduction facilities being passed onto consumers as far as possible, we **propose** to subject this type of assets to the lowest rate of return.

This approach is not without problems, amongst which, difficulty in asset classification and the potential increase in administrative costs should not be underestimated.

(iii) **Tariff**

2.59 At present, tariffs charged by the power companies include the costs for making available the supply (operating costs and fuel charges), plus the agreed return to the companies for providing the service. We **propose** that electricity tariffs should continue to include these elements and be subject to annual reviews to ensure that tariffs reflect the cost of providing electricity services, and that reliable and safe electricity supply will be available to consumers at reasonable and affordable prices.

2.60 Under the existing SCAs, Government's approval is not required for tariff increases where the projected basic tariff rate of a particular year is no higher than the most recently approved basic tariff rate by more than 7%. We **propose** that under the new regime, Government's approval will be required for all tariff adjustments to ensure that they are cost-justified, reasonable and affordable to consumers.

**(a) Linking Pertinent Operating Expenses to Economic Indicators**

2.61 There were some suggestions during the Stage I Consultation for electricity tariffs to be linked to economic indicators, e.g., the local Consumer Price Index (CPI). Of note is that most of the costs of the power companies are not directly related to or affected by local inflation/deflation. Fixed assets or fuel are, for instance, imported from overseas, the costs of which are neither reflected nor affected by the local CPI. Linking electricity tariffs to the CPI also runs the risk of substantial increases in tariffs in times of high inflation, and the increases may not be truly in line with the actual operating costs.

2.62 If tariffs were to be set with reference to the prevailing CPI, a possible option would be to identify and confine linkage to only those costs that are local, e.g. labour costs. We **do not propose** to link tariffs to local economic indicators such as the CPI because –

- (a) only a small percentage of operating costs is directly related to local inflation/deflation. As such, linking tariffs to CPI cannot truly reflect the changes in the underlying costs for providing electricity services; and
- (b) if local consumer prices are on a rising trend, automatic tariff increases arising from linking tariffs to CPI will bring windfall gains to power companies, on top of the agreed rate of return.

**(b) Fuel Costs**

2.63 Hong Kong has no indigenous fuel resources and all fuels, e.g., coal and natural gas, for power generation are imported. Fuel costs of the electricity supply industry in Hong Kong are exposed to price volatility in the global fuel markets.

2.64 Under the current SCAs, fuel cost is borne by consumers, and the basic tariff rates of the two power companies include a standard fuel cost. Differences between the standard fuel cost and actual fuel prices incurred would be captured in a Fuel Clause Account, through which the difference will be returned to or recovered from consumers by means of a rebate or a surcharge each year. The Fuel Clause Account mechanism has helped to stabilise tariffs, e.g. by deferring the recovery of fuel cost deficits. To maintain stable tariffs for consumers, we see merits and **propose** to retain the Fuel Clause Account mechanism.

2.65 While fuel cost fluctuations are largely beyond the control of the power companies, fuel sourcing and procurement are decisions of the power companies. We have explored whether the power companies should be made to bear part of the fuel cost fluctuations, say within an agreed “margin”. We note that –

- (a) while consumers might “gain” when actual fuel prices turn out to be higher, they might not be able to enjoy the benefits when the actual fuel prices are lower;
- (b) in the absence of a market index, the determination of the forecast fuel cost and the “margin” could be difficult, highly contentious and arbitrary; and
- (c) the fuel market has continued to be very volatile, the increase in risk associated with bearing part of the fuel cost variations may result in the power companies asking for a higher rate of return.

We **propose** that the existing arrangement for fuel costs to be fully borne by consumers be continued, as we do not see certain and substantial benefits that might be accrued to consumers by making the power companies bear partially fuel cost fluctuations.

**(c) Tariff Setting**

2.66 Under the existing SCAs, in determining the tariffs for the coming year, we conduct annual tariff reviews with each of the power companies. An alternative is to set tariffs for a fixed period of time, modified automatically on an annual basis with reference to economic indicators such as CPI and pre-agreed efficiency improvement factors, i.e. CPI-X approach.

2.67 The existing annual tariff reviews ensure that, while relevant costs are taken into account, the tariffs are maintained at levels reasonable and affordable to the consumers, and also reflect the prevailing economic conditions. Moreover, since linking tariffs to the local CPI is not appropriate (paragraphs 2.61 to 2.62 above), we **propose** to continue to conduct annual tariff reviews with the power companies, having regard to, *inter alia*, projected sales, operating expenses and permitted return of the respective power companies, and the result of the annual tariff review be subject to the approval of the Government. To enhance transparency, we further **propose** to request power companies to make available more information to the public, such as details of new development projects, electricity sales and growth rates, provided that no commercially sensitive information will be disclosed.

**(d) Tariff Stabilisation Fund**

2.68 Under the current SCAs, a Development Fund (DF) is established to assist in financing the acquisition of new fixed assets and, where necessary, to ameliorate any tariff increase. Since the Interim Review in 2003, the balance in the fund is capped at a level equivalent to 12.5% of annual local sales (i.e. about 1.5 months' average local sales). The role of the DF in financing asset acquisition has diminished in recent years, though the role as a tariff stabiliser remains. We **propose** to maintain an account, the Tariff Stabilisation Fund, for the retention of net revenue in excess of the agreed return for the power company, which when necessary, will provide funds to ameliorate the impact of tariff increase for consumers.

2.69 Having regard to the purpose of this account and hitherto the public's concern over potential excessive accumulation in the DF, we further **propose** that a lower "cap" be established for balance in the Tariff Stabilisation Fund and monies in excess of the "cap" will be returned to consumers in the immediate following year in the form of either a one-off rebate or tariff reduction, as is the case with the DF mechanism. The "cap" should provide a reasonable cushion against tariff fluctuation.

**(iv) Implementation Schedule**

2.70 After this Stage of consultation and upon receipt of the views from the public, we will finalise the arrangement and work with the power companies on the post-2008 arrangement.

#### **(IV) INSTITUTIONAL SETUP**

2.71 There were few comments, and views were divided, during the Stage I Consultation on the future institutional setup. Until the market operation changes and more players come into the market, we **propose** to maintain the current institutional setup, which has been effective in regulating the electricity supply industry and ensuring a proper balance of economic, safety, reliability and environmental considerations pertaining to electricity supply issues.

2.72 That is to say EDLB will continue to be responsible for economic regulation, EMSD for safety regulation and EPD for environmental regulation, while the Energy Advisory Committee, chaired by a non-official member and with members drawn from different sectors of the community, will continue to provide advice to the Government on all energy policy related matters.

2.73 We will keep under review the need to set up a separate regulatory authority, with representation from various stakeholder groups including consumers, investors, academics and experts, trade unions, etc, and prepare the ground work for such a new setup in the future.

#### **D. SUSTAINABILITY IMPLICATIONS**

2.74 The First Sustainable Development Strategy promulgated by Government in May 2005 set out the target of having 1% – 2% of our total electricity supply to be met by power generated from RE by 2012. To achieve this target, the Government will work with the power companies on arrangements for simplifying procedures for RE suppliers to gain access to the existing power grids, with the objective of having appropriate procedures in place in the post-2008 electricity market, and encourage the power companies to use RE for power generation. The Government also aims to increase and sustain conservation of energy in order to reduce the growing trend of energy use.

2.75 A preliminary sustainability assessment of the proposed regulatory arrangements for the electricity market after 2008 shows that the proposed arrangements would contribute positively to the sustainable development of Hong Kong by ensuring that the public can continue to enjoy reliable, safe and efficient electricity supply at reasonable prices, whilst the impact on the environment in the production and use of electricity will be minimised. Specifically, arrangements are proposed under the future regulatory regime to encourage the power companies to

use RE for power generation through giving a higher rate of return on RE infrastructure; providing financial incentives to the power companies to encourage the use of RE; and facilitating connection/access by RE facilities to the power grids of the two power companies. We also propose that financial incentives be given to the power companies if they can improve their performance in energy efficiency and conservation.

2.76 In line with the sustainability principle of providing a healthy living and working environment for the people of Hong Kong, the proposal of linking the permitted rate of return on all fixed assets of the power companies to the achievement of the emission caps stipulated in the SPLs issued under the APCO will further encourage the power companies to make greater efforts in reducing emissions and improving air quality in Hong Kong. A detailed sustainability assessment will be conducted upon finalisation of the post-2008 electricity market arrangements after the Stage II Consultation.

## CHAPTER 3

### SUMMARY OF RECOMMENDATIONS

3.1 In summary, our recommendations with regard to the arrangements for Hong Kong's electricity market after 2008 are as follows –

#### **A. Policy Objective**

[Paragraphs 2.1 to 2.2]

To ensure that the public can continue to enjoy reliable, safe and efficient energy supplies at reasonable prices, and to minimise the environmental impact caused by the production and use of energy.

#### **B. New Supply Sources**

##### **(I) Supply from the Mainland**

[paragraphs 2.4 to 2.10]

- To continue to monitor closely developments in the electricity market in Guangdong so as to identify possible sourcing opportunities including RE in a more timely manner;
- to assess the economic benefits that could be realised for Hong Kong consumers with electricity import from the Mainland, having regard to reliability, safety and tariff;
- to enhance liaison with the relevant Mainland authorities and explore how technical constraints to the development of relevant infrastructure on the Mainland side of the border might be addressed; and
- to make preparations, including developing regulatory arrangements to enable grid access for new electricity suppliers and for enhanced interconnection between Hong Kong and Guangdong, for possible supply from the Mainland.

(II) Renewable Energy (RE)  
[Paragraphs 2.11 to 2.17]

To make arrangements in the future regulatory regime to provide financial incentives to power companies for grid connection/access for RE systems to promote the use of RE with the view to meeting the 1% – 2% RE target by 2012 in the First Sustainable Development Strategy promulgated by Government in May 2005.

(III) Arrangements to Cater for New Supply Sources  
[Paragraphs 2.18 to 2.26]

(i) Grid Access

- To seek the agreement of the two power companies to provide connection/access to their grids –
  - (a) to institute a standard arrangement for RE users to connect to the grid for back-up supply and to extend the arrangement to cover RE systems with capacities above 200kW; to seek the agreement of the power companies to waive the nominal administrative fees for grid connection by RE users;
  - (b) to further promote the use of RE by facilitating generating facilities employing RE to connect and feed electricity to the power companies' power grids; and
  - (c) in the long run, to provide grid access to other power suppliers, including possible new supply sources from the Mainland;
- to have grid connection/access for RE users/generating facilities using RE negotiated between the prospective grid user and the respective power company, and the Government will assist where necessary and when requested by either party, including assisting in arriving at mutually agreed access charges; and

- the Government to initiate and draw up the regulatory framework regarding provision of grid access for other new supply sources in the long run, which might involve setting up a separate regulatory authority.

(ii) Increased Interconnection

*Interconnection between CLP Power and HEC*

- To request the two power companies to take forward jointly increased interconnection at an “optimum” level to reap the benefits of reserve capacity sharing and coordinated generation planning and to provide more flexibility for the power companies in taking forward the emission reduction projects;
- to request the two power companies to plan for increased interconnection, taking into account the results of detailed engineering assessments of the existing interconnector;
- to work with the two power companies to review and harmonise the planning criteria and reliability standards for the interconnected power system; and
- to prepare the ground work for the future setting up of a separate regulatory authority to oversee technical and economic issues related to enhancing interconnection between the two power companies, and to providing grid access to any new supply sources in future.

*Interconnection with Guangdong*

- To keep close track of developments in the Mainland, and maintain close contact with the relevant Mainland authorities with regard to infrastructure and related issues; and
- to make preparations for enhanced interconnection, covering both technical and regulatory aspects such as conducting power system planning & utilisation studies and power flow assessment, and drawing up relevant legislative framework.

**C. Proposed Regulatory Arrangements**  
[Paragraphs 2.27 to 2.73]

(I) Safety Regulation

To continue to regulate by legislation safety in the supply and use of electricity, and update relevant requirements in tandem with technological developments and international practices.

(II) Environmental Regulation

- To continue to regulate by legislation environmental emissions in the production of electricity; and
- to adopt additional measures, under the economic regulatory arrangements, to minimise the costs to consumers in meeting the emission reduction targets and, to promote energy efficiency and conservation, environmental improvements, and use of renewable energy in electricity generation.

(III) Economic Regulation

- To continue economic regulation by means of bilateral agreement.

(i) Regulatory Instrument

- To be for 10 years, with an option to extend for another five years subject to a review to be conducted towards the end of the term;
- to include provisions for annual tariff review, annual auditing review, periodic review of the power companies' development plans, and interim review every five years; and
- to include specific provisions to require all development plans relating to electricity supply and tariff adjustments to be approved by the Government, and key components for determining the permitted rate of return to be reviewed, and the permitted rate of return to be

adjusted where appropriate, every five years.

(ii) Return

- To adopt a two-pronged approach, using fixed assets and performance as the base for determining return;
- to continue to use ANFA for calculating return to the power companies and to tighten the existing excessive capacity mechanism;
- to provide financial incentives to the power companies for increasing the use of RE and improving their performance in energy conservation and demand side management. “Gains” thus achieved by the power companies should be shared with the consumers;
- to provide financial incentives to the power companies for improvement on operational efficiency, supply reliability and customer service. Disincentives will be included to discourage under-performance;
- to link the permitted rate of return of the power companies on all their fixed assets to their achievement of the emission caps stipulated in the SPLs issued under the APCO, and reduce such permitted rate of return if they do not achieve the caps. And to provide financial incentives in the form of “bonus” return to encourage the power companies to reduce their emissions to levels below those required in the SPLs;
- to adopt an integrated approach in determining the permitted rate of return which will reflect the cost of raising capital and risks. To review the key components, and adjust the rate where appropriate, every five years to reflect the prevailing economic conditions; and

- to apply different rates of return between 7% – 11% to different types of assets to reflect the different investment risks associated with different operations in the supply chain and to further certain policy objectives, such as minimising impact on the environment and encouraging development of RE.

(iii) Tariff

- To continue to include the costs for making available supply (operating costs and fuel charges) and the agreed return to the company for providing the service in determining the tariff;
- to subject all tariff adjustments to Government’s approval to ensure that they are cost-justified, reasonable and affordable to consumers;
- to conduct tariff review on an annual basis and to request the power companies to make available more information to the public;
- to maintain the Fuel Clause Account for tariff stabilisation purpose, and fuel costs will continue to be borne by consumers;
- to maintain a Tariff Stabilisation Fund for the retention of net revenue in excess of the agreed return for the power company, which when necessary will provide funds to ameliorate the impact of tariff increase for consumers; and
- to lower the “cap” on the balance in the Tariff Stabilisation Fund, and return monies in excess of the “cap” to consumers in the immediate following year in the form of a one-off rebate or tariff reduction.

(IV) Institutional Setup

- To maintain the current setup with responsibilities for economic, safety and environmental regulation undertaken by various Government bureaux and departments.
- To keep under review the need to set up a separate regulatory authority, with representation from various stakeholder groups including consumers, investors, academics and experts, trade unions, etc, and prepare the ground work for such a new setup in the future.

– ENDS –