ENERGY ADVISORY COMMITTEE
Electricity Market Review:
Asset Ownership and Cost Recovery

The Issue

To review the range of practices in managing **asset ownership** and **cost recovery** in the electricity supply industry, and consider options for development of the electricity market in Hong Kong.

Background

2. The electricity supply business requires heavy investments to provide the infrastructure needed to ensure safe, secure and reliable supply to the consumers. Like many other businesses, power industry's investors would expect to make returns from their investments and recover their operating costs through electricity tariff. Traditionally, the electricity supply industry is dominated by vertically integrated utilities, where assets for the entire "supply chain" - generation, transmission and distribution, are owned by one business entity. In recent years, as some of the electricity markets begin to reform, different segments of the supply chain might come under different ownerships. Consequently, there begins to emerge different methods and mechanisms for companies in the supply chain to maximize returns on their investments and recover their operating costs under different regulatory frameworks, having regard to assessed business risks, expected market share and revenue.

Asset Ownership

3. **Asset Ownership** comes in three forms.

(i) Vertical Integration, i.e. where all assets in the supply chain come under the same company;

(ii) Vertical Segregation, i.e. where different segments of the supply chain are owned by different companies; and

(iii) Horizontal Segregation, i.e. multiple ownerships in different segments of the supply chain.

Vertically integrated asset ownership is commonly found in traditional electricity markets and in markets with limited generation competition. The

latter two forms of asset ownership are more common in markets with wholesale and/or retail competition.

4. For the different forms of asset ownership, there could also be derivatives, such as separate accounts and/or separate functional units with integrated ownership, separate subsidiaries under same holding company, etc. Further variations may include separating the management and/or operation functions from the asset owners.

(I) Overseas Practices

5. Vertically integrated asset ownership is currently employed in regulated markets such as in France and some Asian countries, and was employed in markets in the U.K., U.S.A. and Australia before their electricity supply industries were liberalised. Increasing separation of asset ownership took place in these latter markets when their electricity supply industries underwent reform. There were also instances of preserving vertical integration of asset ownership in some states of the U.S.A. when competitive markets were introduced, and only separation of accounts and/or operations was required. Experience in these countries is summarised in Annex I.

(II) Hong Kong Practice

6. In Hong Kong, CLP Power and HEC are vertically integrated utilities, which are subsidiaries of the respective holding companies listed in the Hong Kong Stock Exchange.

(i) CLP Power completely owns the transmission and distribution assets. Generation assets are owned by Castle Peak Power Company (CAPCO), which CLP Power and ExxonMobil have 40% and 60% stake respectively. CLP Power operates CAPCO's power stations and is the sole customer for CAPCO's electricity supply.

(ii) HEC owns all generation, transmission and distribution assets.

For future electricity markets, some different scenarios are described below for discussion.

(III) Different Scenarios

(A) Vertically Integrated Asset Ownership: Status Quo

7. Each vertically integrated power company will own and operate all assets required to supply electricity to its customers. This can also apply to a range of different market management modes such as coordinated or joint planning (as discussed in the "Planning Criteria and Reliability Standard" Paper).

8. Under this scenario, there would not be much additional costs that are otherwise required for establishing the necessary governance framework if the assets were put under different owners. The drawback is that it might be a disincentive to the entry of new market participants because, among other things, the costs of entry (as an integrated asset owner) – capital investments for generation, transmission and distribution facilities – are very substantial.

(B) Segregated Asset Ownership

(a) Vertical Segregation

9. Under this scenario -

(i) the generation segment is owned by an entity different from the transmission and distribution owner; or

(ii) every segment of the supply chain, i.e. generation, transmission and distribution, is owned by a different entity.

10. With the generation asset placed under a different ownership from that for the other assets in the supply chain, entry of new suppliers (usually in the form of independent power producer) would facilitate competition in the generation sector. Placing each segment of the supply chain under a different owner would enable competition to be extended to the purchasing sector at the wholesale and/or retail levels.

11. Segregating asset ownership would nevertheless introduce -

(i) costs to set up the new companies;

(ii) costs to set up the associated governance framework and processes for managing the generation companies' access to the grid, instead of leaving it to internal arrangements when all assets are under one ownership;

(iii) stranded costs for assets rendered inefficient or redundant when there are changes in the market environment (see paragraphs 13 to 19 below under Cost Recovery); and

(iv) potential adverse impacts on supply reliability due to improper demarcation of responsibility and insufficient coordination, since the responsibility to ensure reliable electricity supply will be shared among different entities.

(b) Horizontal Segregation

12. This scenario is a more elaborated form of the vertical segregation scenario, in which the assets in each of the generation and retail sectors are owned by several different entities to create more market participants. Due to the prohibitive high cost and the physical constraints in replicating the transmission and distribution networks (i.e. the grid), it is not practical to expect multiple ownership in these segments. Because of the pivotal role of the grid and the virtual monopoly of its ownership, arrangement will have to be made to provide access to the grid on a non-discriminatory basis to ensure healthy market operation. Possible intrusion into private property right is a major issue for consideration if this scenario is to be pursued.

Cost Recovery

13. **Cost Recovery** in the electricity supply business generally refers to the mechanism with which a power company makes returns from its investments and recovers its operating costs. Cost recovery for a power company operating as an integrated business is relatively simple as its return on investments and recovery of operating costs are normally collected through tariff. As competition is introduced to an electricity market, some power companies may find themselves having to deal with inefficient or redundant

facilities, or **stranded asset**, and may seek a means to recover the **stranded costs** involved. The implications of these stranded costs that could not be recovered from electricity sales under different competitive market structures are summarized in Annex II.

(I) Overseas Practices

14. Different forms of market structure exist throughout the world. They range from fully regulated markets to partially or fully liberalised markets depending on the stage of reform. In regulated markets where vertically integrated power companies still serve as the sole electricity suppliers, return on investments and operating cost recovery are collected through regulated tariff. In liberalised markets, some sectors of the electricity supply business may still remain regulated while other sectors may be open to competition. Normally, the transmission and distribution networks would remain regulated and the relevant investments and operating costs would be recovered through regulated charges. The generation and retail sectors would be deregulated and open to competition, and cost recovery for these businesses would depend very much on market forces. Where market liberalisation results in stranded asset, mechanisms such as the examples shown in Annex III may be required to recover the stranded costs.

(II) Hong Kong Practice

15. In Hong Kong, both CLP Power and HEC are regulated power companies under the respective Scheme of Control Agreements (SCAs) signed with the government. The power companies' return on investments and recovery of operating costs are collected through tariffs pursuant to the arrangement under the SCAs.

(III) Possible Options on Stranded Cost Recovery

16. In the event that the two power companies should incur stranded asset under a different regulatory regime, the following might be considered for dealing with the stranded costs -

(A) Absorbed by the Power Companies

17. This scenario is more likely to be theoretical than real. Being commercial operators, any stranded costs would more likely be transferred to the consumers in the form of an implicit charge in the tariff. To safeguard the consumers' interest, the regulatory regime needs to address this concern.

(B) Explicit Surcharge

18. This option requires that an explicit charge for stranded cost recovery be shown as a separate item, apart from that for electricity usage. Common examples of explicit surcharges include customer exit fees, access fees paid for access to new providers, or a surcharge usually on a kWh basis called competitive transition charge (CTC), which has been used in some states in the U.S.A. CTC is a non-bypassable charge that is based on the amount of a customer's electricity consumption and applied to all customers regardless of whether they get bundled service from their power companies. Customers choosing to use electricity from alternative suppliers are still required to pay CTC charges to the incumbent power companies. The advantage of the explicit surcharge approach is that it appears as a separate charge on the electricity bill and is easy to monitor. However, this approach requires an appropriate surcharge mechanism for fair and reasonable stranded cost recovery be developed, which needs detailed analysis and evaluation of the competitive market and potential stranded investments.

(C) Reimbursement by Public Funds

19. Where the investments made in providing electricity supply have been initiated by the government and the redundant asset is the consequence of government actions, power companies may demand public funds to offset their stranded costs. The desirability and appropriateness of this option have to be carefully considered against the energy policy, fiscal policy, legal implications and economic philosophy of the government concerned. This does not appear as a real and viable alternative for the Hong Kong situation.

Observations

20. Implementing changes to asset ownership to facilitate proactive introduction of competition to the Hong Kong electricity market would be a

definite challenge and could expose the government to financial indemnity since the existing power companies in Hong Kong are investor-owned.

21. Liberalisation of the electricity market may expose consumers to stranded costs, be it in the form of an implicit charge embedded in the tariff or an explicit surcharge. Thus, while introducing more competition is commonly expected to reduce tariff in general, the reduction may be offset by the recovery of stranded costs, especially in the early years when competition is first introduced. On the other hand, to gain competitive advantage, generation companies may not pass on the full amount of the stranded costs to consumers, in which event consumers stand to benefit from any lowering tariff that comes with more suppliers.

Advice Sought

22. Members are invited to offer views on the issues and possible approaches having regard to the situation in Hong Kong, bearing in mind that the two power companies in Hong Kong are investor-owned.

Economic Development and Labour Bureau
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Annex I

Overseas Experience on Asset Ownership

Australia

Before restructuring of the electricity market, the electricity supply sector in Australia was dominated by vertically integrated state-owned utilities and these utilities owned and operated their generation, transmission and distribution assets to supply electricity to the captive customers in their supply areas. This mode of asset ownership began to change in the evolution from the traditionally regulated to the fully competitive electricity market. Separate generation, transmission, distribution and retail companies were formed. The state-owned generation assets in New South Wales, Victoria, Queensland and South Australia were also horizontally segregated into a number of generation companies to create more players for competition in the National Electricity Market, and some of them became privatised. State regulations also require the distribution and retail businesses to be ring-fenced[1].

U.K.

2. In the U.K., prior to restructuring of the electricity supply sector, generation and transmission assets in England and Wales were owned and controlled by the government-owned utility, the Central Electricity Generating Board (CEGB), while the distribution and retail assets were owned and administered by twelve regional Area Boards. The restructuring of the electricity supply sector started in late 1980s along with the privatisation process for the government-owned enterprises and the ownership of generation and transmission assets was separated. A transmission company: National Grid Company was formed to own and operate the transmission network. While detaching from the CEGB, conventional generation assets were further segregated horizontally into two companies, namely PowerGen and National Power, while the nuclear generation assets were grouped under the company called Nuclear Electric. As for the distribution and retail businesses, twelve regional electricity supply companies were formed to replace the twelve Area Boards. These companies were then privatised and their generation assets were further divested to other companies.

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[1] Many distribution companies also operate retail business. As distribution business is a natural monopoly and retail business is competitive, the distribution companies are required to ring-fence the two businesses (i.e. to unbundled them financially and functionally) to allow open and fair access to the distribution networks, when the retail market is liberalised.

U.S.A.

3. In the U.S.A., most of the electricity utilities are investor-owned and many of them are listed in the stock market. Before liberalisation of the electricity market, the electricity supply sector was dominated by vertically integrated utilities that owned and operated generation, transmission and distribution facilities for providing electricity supply. In mid 1990s, the Federal Energy Regulatory Commission mandated the utilities to allow third party access to their transmission grid. Although ownership of the assets remained with the utilities, they were required to provide separate accounts for their generation and network businesses to ensure non-discriminatory grid access. In some individual states, the electricity market has evolved to allow wholesale competition in the generation and purchaser sectors, and many of these utilities were required to divest their generation assets so as to facilitate fair competition in the market.

Impact on Financial Markets

4. On the possible impact arising from the unbundling of assets on stock prices and financial positions of the publicly listed power companies, this was not a key issue in the cases of Australia and the U.K. at the time of reform. It was because the power companies in these two countries at that time were under government ownership and not yet privatised.

5. In the case of the U.S.A., some individual cases of functional unbundling had shown little effect on the stock performance and valuation of the power companies concerned. However, from credit rating point of view, the generation companies formed by unbundling from the parent power companies might have a slightly lower rating than the parent companies, as generation business in a competitive market is generally perceived to be riskier than the transmission and distribution businesses. This would also depend on other factors such as the financial situation of individual generation companies.

Annex II

Stranded Cost Implications under different Competitive Market Structures

The implications of stranded cost may vary under different competitive market structures, ranging from -

(a) Competition in the Generation Sector

Under this competition mode, the transmission and distribution businesses would remain regulated. Investment and operating costs for these businesses can be recovered via regulated charges. The generation assets, however, would be treated separately from the incumbent power companies usually via separate accounting or by forming separate generation companies. Other new generation companies (usually in the form of independent power producers) may enter the market to compete with the generation business of the incumbent companies who still hold the obligation to serve and act as the power purchasers for their captive customers. All the generation companies (new and incumbent) would now compete for entering into long-term power purchase contracts as well as short-term energy balancing contracts with the power purchasers. Under this environment, some of the original generation assets may become uneconomical and the generation businesses concerned may not be able to earn sufficient revenues (now determined by competitive tariff) to recover the costs of investment. Whilst this mode of competition may promote multiple generation investors and induce lowering of tariff, the stranded costs would be passed onto the consumers and a stranded cost recovery mechanism would have to be developed. This would require increased regulatory monitoring, added administrative burden and complexity to the market.

(b) Competition at the Wholesale Level

Under this mode of competition, there would be multiple wholesale purchasers to arrange for electricity supply from all generation companies participating in the market. More new generation companies are envisaged to enter the market in response to market signals and there would be no limit on the number of new generation companies that may choose to participate. Hence, those generation businesses of the incumbent power companies

would face keener competition and be exposed to more stranded cost problems than that arising from mode (a) above. Like mode (a), a stranded cost recovery mechanism is required, and all the corresponding advantages and disadvantages would also apply.

(c) Competition at the Wholesale and Retail Levels

Under this mode, consumers are free to purchase electricity from any generators or entities that offer to make such arrangements on their behalf. The retail businesses would be further segregated from the incumbent power companies and would face competition from other new retailers entering the market. This would further expose the power companies to stranded costs because some of their investments related to the retail business, such as customer services centers, may become uneconomic and the revenues collected may not be sufficient to recover such costs incurred before retail competition. A more complicated stranded cost recovery mechanism would need to be developed, which adds more costs to the consumers, increased administrative burdens and further complexity to the market.

Annex III

Stranded Costs Estimation and Recovery in the U.S.A.

Only legitimate, prudent and verifiable costs incurred by the investor-owned power companies for providing electricity supply to their customers could be considered for stranded cost recovery when the electricity market is open up for competition. In many states of the U.S.A., stranded cost recovery would only be allowed after the power companies have taken suitable mitigation measures (e.g. reducing capital spending, sale of generation assets and acceleration of depreciation) to reduce the stranded cost impact during the transition to competition. Power companies are required to implement active plans to reduce their potential exposure to stranded costs before the responsibility for stranded cost recovery is passed on to consumers when competition is introduced. Delay in the onset of retail competition is another option to reduce stranded costs.

2. There are two general approaches for the estimation of stranded costs, namely administrative approach and market valuation approach:

(a) The administrative approach

This approach is aimed at measuring stranded costs by analytical techniques, which involve forecasting and modeling of future revenue requirements under current regulatory principles, and comparing the results with projected revenues in a competitive market.

(b) Market valuation approach

The market valuation approach is used to measure stranded costs by determining the market value of assets through sale, auction, or divestiture of the assets involved, and comparing the resulting market price to the embedded cost[2] of these assets. If the market value is less than the embedded cost, then the difference would represent the stranded costs and vice versa, stranded benefits.

[2] Costs used as basis for rates in which consumers currently and historically charged by utilities for providing fully bundled services.

3. The amount of stranded cost is dependent upon what will happen in a competitive market such as future market prices, and hence this is contributing to the variability and riskiness of estimating stranded costs. Since there are considerable amount of uncertainties in attempting to quantify stranded costs, the calculations of which may be subject to a wide range of outcomes. Because of such uncertainties, periodic revisiting of these calculations may be necessary to ensure a fair and accurate recovery of stranded costs. However, this will impose additional administrative burdens and provide no incentives for the utilities to reduce stranded costs.

4. Stranded cost recovery mechanisms vary in different states of the U.S.A. Some states have included implicit stranded cost recovery charges as part of the bundled tariffs, while others collect explicit charges like customer exit fee, access fee or a surcharge called competitive transition charge. Securitisation of stranded costs is also commonly used for managing the financial effects of stranded cost recovery. It is used to refinance the stranded costs through issuing bonds. Legislation is normally enforced to allow a stream of future revenues of the utilities to be considered as their properties for the purpose of securing the bonds. Fixed recovery charges are collected from their customers to generate sufficient revenues for covering the payments to retire the bonds.