

ENERGY ADVISORY COMMITTEE

Electricity Market Review : Electricity Tariff

The Issue

To review the different **tariff structures** and **tariff setting processes** being adopted in the electricity supply industry, and to consider **possible options** for the post-2008 electricity market in Hong Kong.

Background

2. Tariff is the source of a power company's revenue, which generally include target return on its investment, and recovery of operating costs. In a regulated market, tariff setting is subject to regulatory oversight, and is normally an annual process attracting public attention. In a liberalised market, tariff will largely be determined by the market forces, although charges for some segments of the supply chain, e.g. network services, might be subject to regulation.

Tariff Components

3. Tariff, be it in the case of a regulated or liberalised market, includes the following elements:

- target return on investment
- operation & maintenance expenses
- depreciation
- operating interests
- taxes, plus
- fuel costs in the case of generation business

Tariff Structure and Setting

(I) Overseas Practices

(A) Tariff Structure

4. Electricity tariff structure could take various forms and in effect varies with countries, and in different markets in the same country. Nevertheless, they can generally be categorized by consumer type. For

instance, residential and non-residential groups of consumers may be offered different tariff schemes.

5. Residential consumers are either offered a basic tariff rate (per kWh consumption) regardless of time and volume of use (e.g. in Singapore), or varying tariff rates for different time and volume of use as a means to encourage energy efficiency and conservation. For example, in Los Angeles, San Francisco, Taipei, Seoul and Tokyo, power companies offer increasing block tariffs to encourage conservation. Additionally, power companies in London, San Francisco and Sydney offer a Time-of-Use (TOU) rate that charges less for consumption during off-peak hours and on Saturdays and Sundays to enhance efficiency thereby allowing the power companies to reduce installed generation capacity. To take advantage of the TOU rate, consumers are required to install a special type of meters to record consumption in different time slots.

6. For non-residential consumers, different tariff schemes may be offered to different consumer groups, i.e. commercial, industrial or agricultural, depending on specific characteristics of the country. In major cities in the U.S.A., U.K. and Australia, peak demand charges are applied on top of energy charges to large non-residential consumers as a means to encourage shifting peak hour use to other times. Additionally, high energy consumption user groups are usually offered lower tariff to recognize their contribution to high loading factor (high energy consumption/demand ratio). In New York and San Francisco where non-residential consumption accounts for the majority of annual electricity sales, power companies offer lower tariff to the non-residential consumers. The reverse is the case in Sydney, where there is a high percentage of residential consumers. Apart from recognizing consumption pattern and volume, some tariff schemes recognize the contributions of special customers. In Thailand, for example, lower tariff is offered to agricultural customers as agricultural products are a major income source for the country. In countries such as Singapore, consumers that are supplied at a higher voltage are offered lower tariff due to the reduced investment on electricity supply facilities required by the power companies involved.

(B) Tariff Setting Process

7. Tariff setting process varies in different markets in overseas countries, dictated to a great extent by the state of the market, liberalised or regulated, the degree of liberalisation, and the regulatory regimes and framework.

8. In regulated markets, the tariff setting process is overseen by the regulators according to established regulatory regimes and framework. For example, in Japan and in those states in the U.S.A. where the electricity markets are not yet liberalized, power companies are required to submit detailed information to the regulators to support their proposed tariff rates. The information would include cost breakdown so that the regulators could assess the proposed rate against established pre-set benchmarks (including the rate of return). Most of the information submitted to the regulators, other than those deemed confidential by the power companies, are made public. Public hearings, with representation by the power companies, may be held if such is provided in the relevant regime. The views expressed, however, may not necessarily be reflected in the eventual tariff.

9. In liberalised markets, the energy consumption component of the electricity tariff would in essence be subject to market force. The transmission and distribution network services would normally remain regulated and their charges would be set in a manner similar to the tariff setting process for regulated markets described above.

10. A brief account on the tariff structure and tariff setting process in the U.S.A., the U.K. and Australia is at Annex.

(II) Hong Kong Situation

(A) Tariff Structure

11. The two power companies in Hong Kong apply an increasing block tariff structure for the residential consumers to promote energy efficiency and conservation. For general non-residential consumers, CLP Power applies a decreasing two-block tariff structure, while HEC applies an increasing two-block tariff structure. For non-residential consumers with high energy consumption and high power demand, both power companies offer a tariff comprising an energy charge and a demand charge, both of which are decreasing two-block tariff structure. CLP Power also offers off-peak and on-peak charges to these categories of consumers whereby the former rates are lower to encourage off-peak consumption.

(B) Tariff Setting Process

12. The Scheme of Control Agreement stipulates a two-step procedure for setting the applicable tariff for each year. Firstly, the Government conducts Financial Reviews on a 4 to 5 year basis with the two power companies to agree

on the Financial Plan prepared by the companies. The Financial Plan includes the projected basic tariff rates for each year during the Financial Plan period.

13. Then, the Government conducts a Tariff Review with the CLP Power in October and with the HEC in November of each year to determine the basic tariff rate for the following year in the light of the latest financial data. For this purpose, the power companies will provide all the necessary financial information and projections (including sales forecast, capital and operating expenditure) to the Government. The power companies are not required to disclose to the public detailed financial data and projections for tariff setting purposes. Nevertheless, it has been the practices for the power companies to brief the Energy Advisory Committee and the Panel on Economic Services of the Legislative Council on their tariff adjustments.

14. If the tariff rate eventually determined is no higher than 7% of the projected basic tariff rate approved during the Financial Review, the power companies could proceed with the new rates without further approval from the Government.

Options for Hong Kong

(A) Tariff Structures

(i) Existing Tariff Structure – Status Quo

15. The existing structure is relatively simple. Applying different tariffs to different groups of consumers is the business decision of the power companies, which is not subject to the Government's review.

(ii) Flat Rate

16. Applying a flat tariff rate to all consumers in each of the consumer groups (i.e. residential and non-residential) is a simple and straight-forward approach in tariff setting. This approach is suitable in markets where, within each consumer group, the electricity consumption pattern during each day and throughout the year is subject to minimal fluctuation, hence flat tariff rates could be applied in relatively fair manner to all consumers within the group. The drawback is that in places where the load factor varies greatly during each day and throughout the year (such as in Hong Kong), cross-subsidization would be unavoidable as non-peak users would pay the same rate as peak users who contribute greatly to the need for higher generation capacity. Moreover, this approach is not conducive to energy conservation.

(iii) Time of Use Rate

17. Rates differentiated by the Time of Use (TOU) may be introduced to encourage consumers to use electricity during off-peak periods. This might help to defer investment in new generating plants thereby reducing the cost of electricity in the long run. To implement the TOU rate, a TOU meter, which is relatively expensive (in the range of US\$ 100 to 280 as compared to US\$ 25 to 30 for traditional electro-mechanical meter), would have to be installed at the consumers' premises to record electricity consumption at different time intervals. For this scheme to be effective, off-peak charges would have to be considerably lower than the on-peak charges.

(iv) Consumption (Volume) Discount

18. Per unit generation cost usually decreases when a generator is operated at or near its optimum level (full-load). Similarly, purchases of large block of energy to supply the consumers would usually be charged at a lower price. Savings realized by generation at the optimum level and large purchase discount rate could be passed onto consumers with huge consumption in terms of volume. This option providing the incentive for consumers to use more electricity may run counter to the promotion of energy efficiency and conservation with the view to reducing installed capacity requirement.

(B) Tariff Setting Process (in regulated electricity supply sector only)

(i) Annual Tariff Review with the Government: Status Quo

19. This process is simple, easy to administer, entails minimal administrative costs and takes about one to two months. Nonetheless, this process is not transparent and consumers' views are not reflected in the process.

(ii) Annual Tariff Review with the Government and Making Public Available Information

20. Making public the information provided to the Government in the tariff review process will enhance transparency. While the public may offer their views on the information submitted, they may nevertheless not be satisfied unless the final tariff truly reflects their views. Moreover, they may feel that they are unable to fully participate in the whole review exercise and influence the final tariff setting. Since public views are invited and considered in setting the final tariff, this process takes a longer time than the Status Quo option. Moreover, there may be difficulties to meet public demands for what may be

commercially sensitive information, as the two power companies in Hong Kong are listed and investor-owned.

(iii) Annual Review of Tariff with Public Hearing

21. A review group may be appointed with representations from the power companies, the regulatory authorities and the general public. This process will provide an opportunity to all concerned parties to express their views and debate on pertinent issues, the cost data and information submitted by the power companies. A resolution process will have to be instituted to cater for situations when the groups cannot reach a consensus. The process could be tortuous, and must be very carefully administered to ensure a balance between the obtaining of public participation and the power companies' claim to business confidentiality.

(iv) More Frequent Tariff Setting Process

22. To cater for changes in the economic climate and fluctuation of the fuel market prices, a more frequent tariff review process may be considered, e.g. twice a year or even quarterly as in the case of Singapore. The drawback of this process is that it would lead to significant administrative burden to both the power companies and the regulatory authorities. A modified version is to introduce a component in the tariff that is sensitive to economic performance and fuel price. This component would nevertheless need to be reviewed periodically to ensure its continuing appropriateness.

Observations

23. Tariff may be so structured to influence the consumption pattern and utilization of electricity supply facilities, which in some cases may lead to deferred investment and hence lower tariff in the long run. While lowering tariff is an objective, reliability in supply should not be compromised in the process.

24. Information disclosure by the power companies could improve transparency in tariff setting. Nevertheless, certain information may be market sensitive and may not be suitable for disclosure, particularly when competition is introduced.

Advice Sought

25. Members are invited to offer views on tariff structures and tariff

setting processes, having regard to the situation in Hong Kong.

Economic Development and Labour Bureau
October 2002

Electricity Tariffs in the U.S.A., U.K. and Australia

USA

The wholesale electricity markets have been largely liberalised in many states of the USA, with some of the markets covering several states, such as the PJM¹ market in the northeastern region. In competitive wholesale markets, the prices of generation are determined by the market force and therefore not subject to any regulatory control. Transmission services are, however, regulated and hence power companies have to file their transmission network charges with the Federal Energy Regulatory Commission (FERC), which regulates interstate electricity transaction. Under the rules of the FERC, power companies owning both generation and transmission facilities have to provide separate accounts for these businesses.

2. The retail electricity markets are under the jurisdiction of the state governments. The states' public utility/service commissions are responsible for regulating network charges and electricity tariff of the distribution and retail sectors. The retail electricity markets in some states have been liberalised, and general customers are free to choose their electricity suppliers. Power companies are required by legislation to segregate their retail business from distribution network business. The electricity tariffs generally consist of a regulated portion (for network services) and a non-regulated portion (for generation and retail supply).

3. In general, electricity supply companies structure their tariffs to cater for different types of customers or consumptions. For residential consumers, apart from the general charges based on kWh consumed, time-of-use (TOU) rates are also available. Some utilities, e.g. Pacific Gas & Electric Company (PG&E) of California, offer seasonal rates such that charge per kWh is higher in summer (peak time) than in winter. There are also special tariff schemes for the lower income group such as the "CARE" scheme of PG&E. Non-residential tariff schemes are made available to the commercial, industrial and agricultural consumers. To qualify for the non-residential schemes, the demand and consumption would need to exceed the general threshold level consumed by residential customers. Lower off-peak demand rates are also available to provide incentives for non-residential consumers in off-peak power

¹ PJM is a wholesale pool with membership covering several states in the northeastern part of the USA, including Pennsylvania, New Jersey and Maryland, etc. (from which the name PJM was derived).

consumption.

4. As part of the tariff setting process, regulated power companies are required to report detailed costs and charges to the regulators in support of their tariff applications. The information filed with the regulators will normally be available to the public barring any information deemed confidential² by the power companies. Rate applications are generally approved after a regulatory disclosure process to ensure transparency. Frequency of tariff setting varies depending on the timing of rate applications. Regardless of the regulatory requirements for disclosure of information, power companies in the USA generally have the tradition of voluntary disclosure of information to increase the confidence of both investors and public.

U.K.

5. Under the electricity reform in the late 1980s, vertical segregation of asset ownership took place in the electricity supply industry, followed by the privatisation of the segregated entities. A compulsory wholesale electricity pool was set up, with competition introduced to the generation sector while the transmission network remained to be regulated. The wholesale pool arrangement was reviewed in the late 1990s and later replaced by the New Electricity Trading Arrangement in 2001.

6. At the retail level, twelve Regional Electricity Companies were formed. These companies were required to segregate their distribution network business from the retail supply business. The retail electricity market was liberalized in phase, and all retail customers are now able to choose their electricity suppliers.

7. For residential consumers, two main types of tariff schemes are provided, namely the Standard Domestic Tariff and the Domestic Economy 7 Tariff. The former tariff provides for normal daily charge of electricity at a uniform rate, while the latter is effectively a time of use (TOU) scheme which provides a lower tariff rate in the off peak hours. Consumers are required to install special meters (known as the Economy 7 Meters) to enjoy the TOU rates. The non-residential tariffs are more competitive which are tailored for business and industrial consumers, according to their loading characteristics, consumption, etc. TOU and seasonal schemes are also available for the non-residential consumers to encourage off-peak consumptions. Some utilities, which are in both the electricity and gas supply businesses, provide discounts to

² There is no clear definition regarding what information is deemed confidential. Generally, customer data, fuel costs, value of assets etc. are deemed confidential by the utilities.

customers who choose the same supplier for both gas and electricity. For example, a Premier Dual Fuel Tariff is offered by London Electricity.

8. Price setting in the liberalised wholesale electricity market is determined by open competition and hence there is no price control in the generation segment. The tariff setting cycles of the regulated transmission and distribution network businesses are in the order of 3 to 5 years and the tariff reset will take into account the performance of the utility companies during the review cycle.

9. Power companies are required to provide specific information to the regulator as stipulated in their operating licenses. Transmission and distribution companies prepare statements on the basis of charges for connection, use of network, etc. in a format provided by the regulator. There are, however, no requirements for the power companies to disclose publicly a breakdown of their electricity costs and prices.

Australia

10. Wholesale competition was first introduced in the state of Victoria in 1994. The wholesale market was gradually extended to other states to form the National Electricity Market (NEM), which commenced operation in 1998. The NEM manages electricity trading in a compulsory pool through competitive bidding from generation companies in the interconnected member states. Power companies in these states are vertically segregated, with some of which privatised. While the generation sector is subject to competition, the network charges are generally regulated. The Australian Competition and Consumer Commission regulates the inter-state transmission network charges.

11. Retail competition has been introduced at the state level in phases, such that all retail consumers will eventually be able to choose their suppliers. State regulators enforce the functional separation (or ring-fencing) between the retail segment and distribution network business to ensure impartiality. The distribution network charges are subject to regulation of the state regulators.

12. The electricity retailers in different states offer various tariff schemes for their customers. Many of the suppliers offer TOU tariffs, e.g. the Controlled Load Tariff of EnergyAustralia in Sydney and the WINNER Tariff of CitiPower in Melbourne. To enjoy the TOU tariffs, special meters are required and meter conversion charges will apply. Some suppliers also offer their customers the choice of paying a premium in the tariff to select some percentage of their electricity supply from renewable energy sources, e.g. under the EcoPower Tariff of CitiPower and Pure Energy Tariff of EnergyAustralia.

13. Pricing for generation is subject to competitive market force. Transmission and distribution network charges are regulated with a review conducted every 5 years. Regulated utilities are required to submit detailed financial information to the regulator for the approval of their network charges. The state regulators enforce strict consumer information laws that require the power companies to clearly differentiate transmission and distribution charges from electricity supply charges on the electricity bills.