Methodology for Tariffs for Persons Exempted from the Requirement to Obtain a License to Distribute and Supply Electricity

Public Utilities Commission of Sri Lanka

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1. BACKGROUND

1.1 Legal Background

In terms of Section 10 of the Sri Lanka Electricity Act, No. 20 of 2009 as amended, a Certificate of Exemption (CoE) is issued by the Public Utilities Commission of Sri Lanka (PUCSL) to persons exempted from the requirement to obtain a license to distribute and supply electricity for a 5-year period subject to certain Conditions.

In terms of Condition 19 of the CoE, as soon as practicable after obtaining the CoE, the exempted person is required to prepare a tariff schedule for sale of electricity to customers and submit such schedule for approval by the PUCSL prior to charging electricity customers. At the same time, at every revision of end-use tariffs, the exempted person is expected to submit his tariff schedule to the PUCSL.

The tariff schedule should be prepared in accordance with the methodology approved by the PUCSL, reflecting the costs of the exempted person in providing electricity, allowing the exempted person to recover all reasonable costs incurred in carrying out the activities authorized by the CoE on an efficient basis under the following areas:

a. Electricity purchase cost of the exempted person;
b. Standby or emergency generator operation and maintenance cost; and
c. Distribution system operation, management and maintenance cost.

1.2 Current Practice

Presently, exempted persons submit their costs and the PUCSL reviews the same in accordance with the "Tariff Setting Guidelines for Electricity Distribution and Supply Licensees/Exempted Other than Ceylon Electricity Board (CEB) and Lanka Electricity Company (Pvt) Ltd (LECO)" (Guidelines) and approves a flat tariff to be charged from the tenants of the exempted person.

In accordance with the Guidelines, the exempted person is required to submit the following cost items for the previous 6 months: average purchase cost of electricity, average direct maintenance cost of standby generation, average direct operating cost of standby generation, average direct maintenance costs of the electricity distribution system, adjustment for losses and regulatory levy.

In addition, capital cost or depreciation of the distribution system and standby generator are not allowed to be included in the tariff. Further, average direct fixed costs of electricity distribution/standby generation are estimated considering fixed costs within at least one-year period. Furthermore, distribution losses are estimated based on the electricity purchased and metered consumption within the authorized area.

The above details are prepared by the exempted person in a spreadsheet template provided by the PUCSL and the respective electricity bills, fuel bills, proof for other costs incurred are submitted to the PUCSL along with the completed spreadsheet requesting a tariff revision. Thereafter, considering the costs submitted by the exempted person and the requested tariff revision, the PUCSL calculates the reasonable costs of the exempted person following the

Guidelines, and makes necessary changes and approves a tariff for the exempted person to charge from his tenants.

2. THE TARIFF METHODOLOGY

2.1 General Principles

A cardinal rule followed in electricity tariffs formulation is that the methodology adopted to develop tariffs must be in accordance with the fundamental principles of electricity tariff making. Explained below is how PUCSL recommends complying with this basic requirement in proposing a methodology for the development of a tariff for customers in a premise, where electricity distribution is taking place under an Exemption Order issued by PUCSL.

2.1.1 Price of electricity to reasonably reflect the true cost of supply

It was assumed that the tariff applicable for purchasing electricity by an exempted person from a Distribution Licensee reflects the true cost of supply. In the methodology developed, the said purchase cost is used as the starting point for the determination of the cost of supply. Hence, the tariff will fulfill this basic requirement.

2.1.2 Tariff to ensure efficient allocation of resources

Electricity has to be priced to ensure that it will be used by those who value it most. If the price is high, it will be bought only by customers who get the greatest benefit from them. It is presumed that the exempted person's electricity purchase prices have been decided honoring this basic principle.

Further, resource allocation largely applies to the generation/transmission/distribution sectors. Hence as outlined in the Section 1, if the purchase price is chosen as the starting point for computation of electricity prices for the customers purchasing electricity from the exempted person, then the second principle will also be complied with.

2.1.3 Price to be in accordance with the burden a customer imposes on the system

Burdens customers impose on the power system depend on their usage patterns and load characteristics. Best way of capturing such features of a customer installation is to use a smart meter. However, when such equipment are not available, tariff designer generally reverts back to the age old practice of categorizing the customer installations according to the purposes for which electricity is used, and extracting relevant information through load research.

It was found that customer installations in exempted entities also can be broadly divided as residential, commercial, and industrial. It is an accepted fact that usage patterns and load characteristics of customers in any one category do not differ much from one another and are similar. Load research was carried out in a number of installations to acquire this information and was used in the determination of cost of supply.

2.1.4 Allocation of cost of losses to be assigned according to their responsibilities for losses

Losses are two-fold, namely technical losses and non-technical losses. Certificate of Exemption (CoE) issued by the PUCSL requires all exempted persons to maintain records

on technical and non-technical losses in their distribution systems and to submit such information to the regulator. However, none of the exempted parties have provided such information so far.

However, at this stage, it appears that calculation of technical losses and non-technical losses and allocating such losses to responsible parties is an unproductive sophistication. Hence, the cost of losses will be distributed among the customers proportionate to their energy consumption.

PUCSL intends fixing a maximum level for losses for installations (cap), and if any exempted person claims that the losses are higher than that, then that party shall be called upon to substantiate the loss levels declared with calculations.

2.1.5 Maintain some degree of stability in the electricity prices

Customers expect a fair degree of stability in electricity prices. The PUCSL Tariff Methodology stipulates that the generation prices would change every six months. As the starting point for the tariffs is the purchase cost, all changes effected to the purchase tariffs will get reflected in the customer retail tariff. It is proposed that the tariffs for customers in exempted premises be revised every six months based on the previous 12 months data.

2.1.6 Tariffs to be fair for the customer as well as for the provider of electricity (exempted person) and should allow provider to recover all reasonable costs

Methodology for electricity tariff calculation is aimed at a “no profit – no loss” situation to the provider in the activity of the distribution of electricity. It has to be noted that the services offered by exempted entities include value addition and hence will differ from the services accorded by Distribution Licensees (CEB and LECO).

It has been observed that the value-added services and the levels of such services vary from location to location. It was analyzed the possibility of introducing any standardization at least among the exempted persons in the same purchase tariff category. It was observed through field surveys, that the levels of value added services provided by the exempted persons also differs according to the type of customers served.

2.1.7 The tariff has to be simple, easy to understand/implement

The tariff, no matter how accurately reflects the purchase cost, if not feasible or economical to administer, complicated or not simple enough to implement with the metering facilities presently available, will not serve much purpose.

It was found that almost all revenue meters installed at customer premises are simple flat rate analog energy meters and hence a flat rate tariff will be recommended. If the exempted person decides to install electronic energy meters which have the ability to separately measure the electricity consumed from the grid and standby generators, a two part tariff is recommended.

2.2 Methodology to Determine the Cost of Supply

A spreadsheet was developed for the calculation of cost of supply to the customer installations in exempted entities. Data used, their sources/derivations and the formulae employed in the calculations are explained in the Table 1 below.

The Tariff Model (Calculation spreadsheet) can be downloaded via the Commission's website http://www.pucsl.gov.lk/english/uncategorized/methodology-for-tariffs-for-persons-exempted-from-the-requirement-to-obtain-a-license-to-distribute-and-supply-electricity/

Figure - Snapshot of the Electricity Pricing and Tariff Determination Model

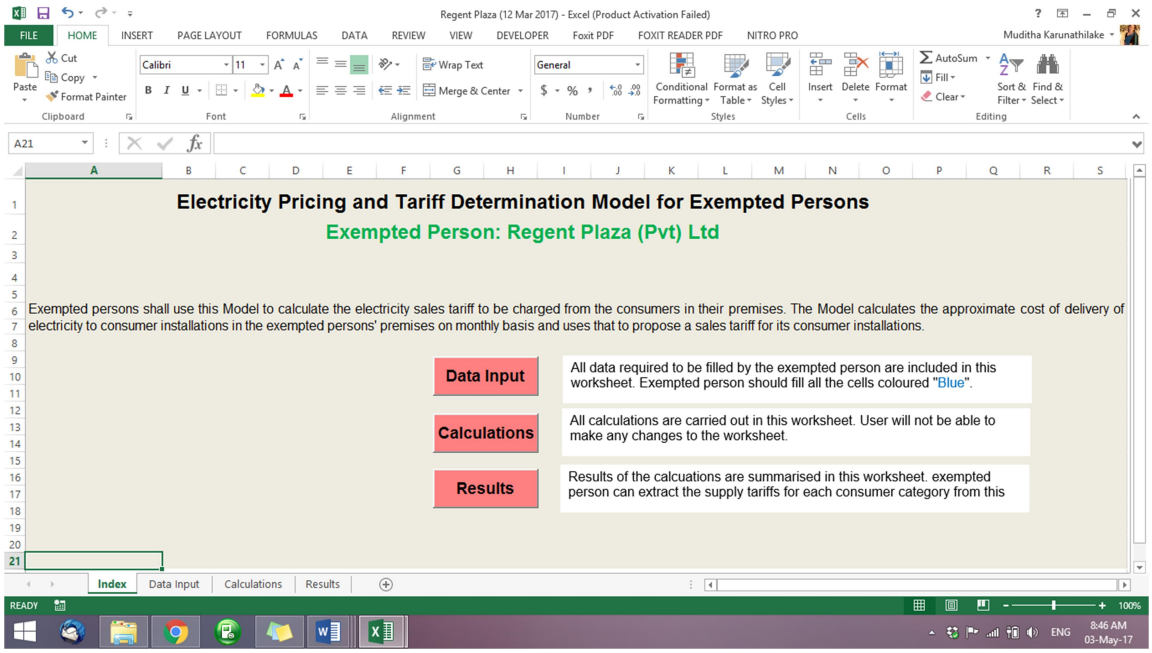

Table 1 – Calculation of Cost of Supply to the Customer Installations

Information	Source	Formulae employed	Output
Historical data			
Exempted persons' (EP) purchase tariff (GP_1, GP_2, GP_3, I_1, I_2, I_3)	CEB/LECO		Applicable tariff
Customer information, Total energy purchased, Maximum demand	CEB/LECO		Number of customers in each category (N_{Res} , N_{Com}, N_{Ind}), their energy usage (E_{Res} , E_{Com}, E_{Ind}), Exempted entities' Maximum demand, total energy purchased by EP ($Energy_{EP}$)
Data gathered through investigations/studies			
Loss level	Study results	$Losses = \frac{(Energy_{EP} - All\ metered\ energy)}{(Energy_{EP})}\%$ Or $Losses = (Transformer\ loss + technical\ loss + non\ technical\ loss)\%$	A maximum value for "Losses" to be assumed. If EP objects to this value, the onus of proposing/substantiating will lie with the EP. Cap for transformer loss = 2% Cap for technical loss = 2% Cap for non-technical loss = 0.5%
Energy EP is required to meet the demand of the customers	Study results	$Energy_{Res} = \frac{E_{Res}}{(1 - \%losses)}$ $Energy_{Com} = \frac{E_{Com}}{(1 - \%losses)}$ $Energy_{Ind} = \frac{E_{Ind}}{(1 - \%losses)}$	Total energy Exempted Person should purchase/generate to meet the customer demand for each category. ($Energy_{Res}$, $Energy_{Com}$, $Energy_{Ind}$)
Energy supplied by the grid to meet the consumer usage	Study results	$Energy_{Grid\ Res} = Energy_{Res} - SBG_{Res}$ $Energy_{Grid\ Com} = Energy_{Com} - SBG_{Com}$ $Energy_{Grid\ Ind} = Energy_{Ind} - SBG_{Ind}$ SBG_{Res} , SBG_{Com}, SBG_{Ind} are the units generated by standby generator for each customer category. This is explained in detail below.	Total energy Exempted Person should purchase from the grid to meet the customer demand for each category. ($Energy_{Grid\ Res}$, $Energy_{Grid\ Com}$, $Energy_{Grid\ Ind}$)

% Share of energy use in each TOU interval for each category of customers (% Day, % Peak, % Off Peak)	Study results	$Energy_{Day,Res} = Energy_{Grid\ Res} \times \%Day$ $Energy_{Peak,Res} = Energy_{Grid\ Res} \times \%Peak$ $Energy_{OP,Res} = Energy_{Grid\ Res} \times \%Offpeak$ (similarly for other categories)	Energy EP should purchase to meet the demand of each customer category during the each TOU time interval. $Energy_{Day,Res}$, $Energy_{Peak,Res}$, $Energy_{OP,Res}$ $Energy_{Day,Com}$, $Energy_{Peak,Com}$, $Energy_{OP,Com}$ $Energy_{Day,Ind}$, $Energy_{Peak,Ind}$, $Energy_{OP,Ind}$
Load factor (LF), Power factor (PF)	Study results	$Peak\ demand\ _{Res} = \frac{Energy_{Grid\ Res}}{LF_{Res} \times PF_{Res} \times 24 \times 30}$ $Peak\ demand\ _{Com} = \frac{Energy_{Grid\ Com}}{LF_{Com} \times PF_{Com} \times 24 \times 30}$ $Peak\ demand\ _{Ind} = \frac{Energy_{Grid\ Ind}}{LF_{Ind} \times PF_{Ind} \times 24 \times 30}$	Individual peak demand of each category of customers. $Peak\ demand\ _{Res}$, $Peak\ demand\ _{Com}$, $Peak\ demand\ _{Ind}$ PF capped at 0.95
Contribution to peak factor (CPF)	Study results	Customer's demand at the EP peak = EP peak (kVA) x CPF $Coincident\ peak_{Res} = Peak\ demand\ _{Res} \times CPF_{Res}$ $Coincident\ peak_{Com} = Peak\ demand\ _{Com} \times CPF_{Com}$ $Coincident\ peak_{Ind} = Peak\ demand\ _{Ind} \times CPF_{Ind}$	Customer's peak coincident with EP peak $Coincident\ peak_{Res}$ $Coincident\ peak_{Com}$ $Coincident\ peak_{Ind}$
Units generated by Standby generator (SBG) for each category	Study results	$SBG_{Res} = \frac{Total\ SBG\ units \times\ Energy_{Res}}{Total\ EP\ purchases + Total\ SBG\ units}$ $SBG_{Com} = \frac{Total\ SBG\ units \times\ Energy_{Com}}{Total\ EP\ purchases + Total\ SBG\ units}$ $SBG_{Ind} = \frac{Total\ SBG\ units \times\ Energy_{Ind}}{Total\ EP\ purchases + Total\ SBG\ units}$	SBG units generated for each customer category SBG_{Res} SBG_{Com} SBG_{Ind}
Cost of SBG operation form Published information / O&M manuals	Study results	Cost per unit of SBG $SBG_{cost} = \frac{(Fuel\ costs + O\&M\ costs)}{Total\ units\ generated}$	Cost per unit (kWh) of SBG SBG_{cost} Fuel consumption rate capped at 0.32 litres/kWh Generator maintenance cost is capped at 750 LKR/kVA/year

Installation O&M cost and other fixed charges (fixed charge of grid purchases and exemption processing fee of PUCSL)	Study results	$IM_{Res} = (\frac{Total\ O\&M\ cost \times E_{Res}}{12 \times Total\ sales}) + \frac{(Fixed\ charge_{Grid} + \frac{PUCSL\ Charge}{12}) \times N_{Res}}{N_{Total}}$ $IM_{Com} = (\frac{Total\ O\&M\ cost \times E_{Com}}{12 \times Total\ sales} + \frac{(Fixed\ charge_{Grid} + \frac{PUCSL\ charge}{12}) \times N_{Com}}{N_{Total}}$ $IM_{Ind} = (\frac{Total\ O\&M\ cost \times E_{Ind}}{12 \times Total\ sales}) + \frac{(Fixed\ charge_{Grid} + \frac{PUCSL\ charge}{12}) \times N_{Ind}}{N_{Total}}$	Maintenance cost and other fixed charge component for each category of customers IM_{Res} , IM_{Com} , IM_{Ind} Other fixed costs of EP including fixed charge of grid purchases and exemption processing fee of PUCSL
Calculation of total costs			
Cost of meeting the energy requirement		$A_{Res} = Energy_{Day,Res} \times Day\ tarif + Energy_{Peak,Res} \times Peak\ tariff + Energy_{OP,Res} \times OP\ tariff$ $A_{Com} = Energy_{Day,Com} \times Day\ tarif + Energy_{Peak,Com} \times Peak\ tariff + Energy_{OP,Com} \times OP\ tariff$ $A_{Ind} = Energy_{Day,Ind} \times Day\ tarif + Energy_{Peak,Ind} \times Peak\ tariff + Energy_{OP,Ind} \times OP\ tariff$	Total cost of meeting the demand for energy of each category $(A_{Res}, A_{Com}, A_{Ind})$
Cost of meeting the peak demand		$B_{Res} = Coincident\ peak_{Res} \times Demand\ Charge$ $B_{Com} = Coincident\ peak_{Com} \times Demand\ Charge$ $B_{Ind} = Coincident\ peak_{Ind} \times Demand\ Charge$	Peak demand costs of each category of customers. $(B_{Res}, B_{Com}, B_{Ind})$
Cost of meeting the Installation O&M and other fixed charges	Study results	$C_{Res} = IM_{Res}$ $C_{Com} = IM_{Com}$ $C_{Ind} = IM_{Ind}$	Installation O&M cost responsibility for each category of customers. $(C_{Res}, C_{Com}, C_{Ind})$
Cost of meeting the Standby generator operation	Study results	$D_{Res} = SBG_{Res} \times SBG_{cost}$ $D_{Com} = SBG_{Com} \times SBG_{cost}$ $D_{Ind} = SBG_{Ind} \times SBG_{cost}$	Total cost of SBG units for each category $(D_{Res}, D_{Com}, D_{Ind})$
Total cost of supply to each category of customers (LKR)	Total cost of supply to Residential customers $= A_{Res} + B_{Res} + C_{Res} + D_{Res}$ Total cost of supply to Commercial customers $= A_{Com} + B_{Com} + C_{Com} + D_{Com}$ Total cost of supply to Industrial customers $= A_{Ind} + B_{Ind} + C_{Ind} + D_{Ind}$		
The tariff			

Cost of supply per kWh (LKR/kWh)	$Cost\ of\ a\ kWh\ for\ Residential\ consumers = \frac{A_{Res} + B_{Res} + D_{Res}}{E_{Res}}$ $Cost\ of\ a\ kWh\ for\ Commercial\ consumers = \frac{A_{Com} + B_{Com} + D_{Com}}{E_{Com}}$ $Cost\ of\ a\ kWh\ for\ Industrial\ consumers = \frac{A_{Ind} + B_{Ind} + D_{Ind}}{E_{Ind}}$ These calculations are done for every month in the preceding year. Average value shall be used as the flat tariff for the ensuing year.
Fixed charge (LKR/Month)	A fixed charge is always recommended and this should cover the installation maintenance costs and other fixed costs of the EP. $Fixed\ Charge\ for\ Residential\ consumers = \frac{C_{Res}}{N_{Res}}$ $Fixed\ Charge\ for\ Commercial\ consumers = \frac{C_{Com}}{N_{Com}}$ $Fixed\ Charge\ for\ Industrial\ consumers = \frac{C_{Ind}}{N_{Ind}}$