

## Electricity bill crisis - a way out

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### Estimated hydro power and thermal power composition in 2008

Power is currently generated from hydro and oil fired thermal power plants in Sri Lanka. Hydro power has no fuel cost involved and hence it is very much cheaper than oil fired electricity. The cost of oil fired electricity will continue to rise due to the depletion of oil resources. However the number of units generated annually from hydro power is determined by the climatic conditions. The CEB has predicted the year 2008 as a dry year.

Hydro capacity		
Condition	Probability	GWh
Very wet	10%	5472
Wet	20%	5031
Medium	40%	4487
Dry	20%	3866
Very dry	10%	3430
<b>Average</b>		<b>4457</b>

Hence about 60% of electrical energy is due to be generated from oil fired thermal power plants in 2008.

**Table No. 01: Units of Hydro & Thermal electricity expected to be generated**

Generation	Units of electricity expected to be generated in 2008 (GWh)	%
CEB - Hydro	3,600	35%
Mini - Hydro	315	03%
CEB - thermal	2,228	22%
Private - thermal	4,171	40%
<b>Anticipated total generation</b>	<b>10,314</b>	<b>100%</b>
Losses	(1,650)	16%
Total number of electricity units to be sold	8,664	84%

### CEB expenditure breakup for 2008

According to the CEB estimates it has to spend 75% of its total expenditure on oil fired power in 2008.

**Table No. 02: CEB estimated expenditure breakup at the beginning of the year**

<b>Expenditure</b>	<b>2008 (Rs Billion)</b>	<b>2008 (%)</b>
Purchase from private power producers	68	50%
Expenditure for fuel of CEB Thermal power	33	25%
Generation Operation & Maintenance (O&M)	6	04%
Transmission O&M	1	01%
Distribution regions O&M	10	07%
Corporate O&M	2	01%
Short term loans & interest	2	01%
Depreciation	14	11%
<b>Total Expenditure</b>	<b>136</b>	<b>100%</b>

**The CEB is currently running at a loss**

In the years 2006 and 2007 the CEB was running at a loss. Further it is anticipated that with the current tariff structure of the CEB, the Electricity Board will make a loss of Rs. 45 billion this year. If the CEB were to implement the 2007 tariff structure it would make a loss of Rs. 100 billion by the end of the year 2008.

**Table No. 03 Expenditure & Income status of the Ceylon Electricity Board**

<b>Year</b>	<b>2006</b>	<b>2007</b>	<b>Expenditure estimated in Jan 2008</b>		<b>Expenditure estimated in Oct 2008</b>
			<b>2007 rate</b>	<b>Current rate</b>	<b>Current rate</b>
<b>Expenditure (Rs. billion)</b>	85.24	109.73	135.12	135.12	160.66
<b>Expenditure without depreciation (Rs. billion)</b>	n.a	n.a	122.12	122.12	147.66
<b>Income (Rs. billion)</b>	69.94	86.07	92.65	129.02	129.02
<b>Loss (Rs. billion)</b>	(15.30)	(23.66)	(42.47)	(6.10)	(31.64)

If the CEB is to cover its full costs then the average unit price should be increased to 18.54 Rs/kWh.

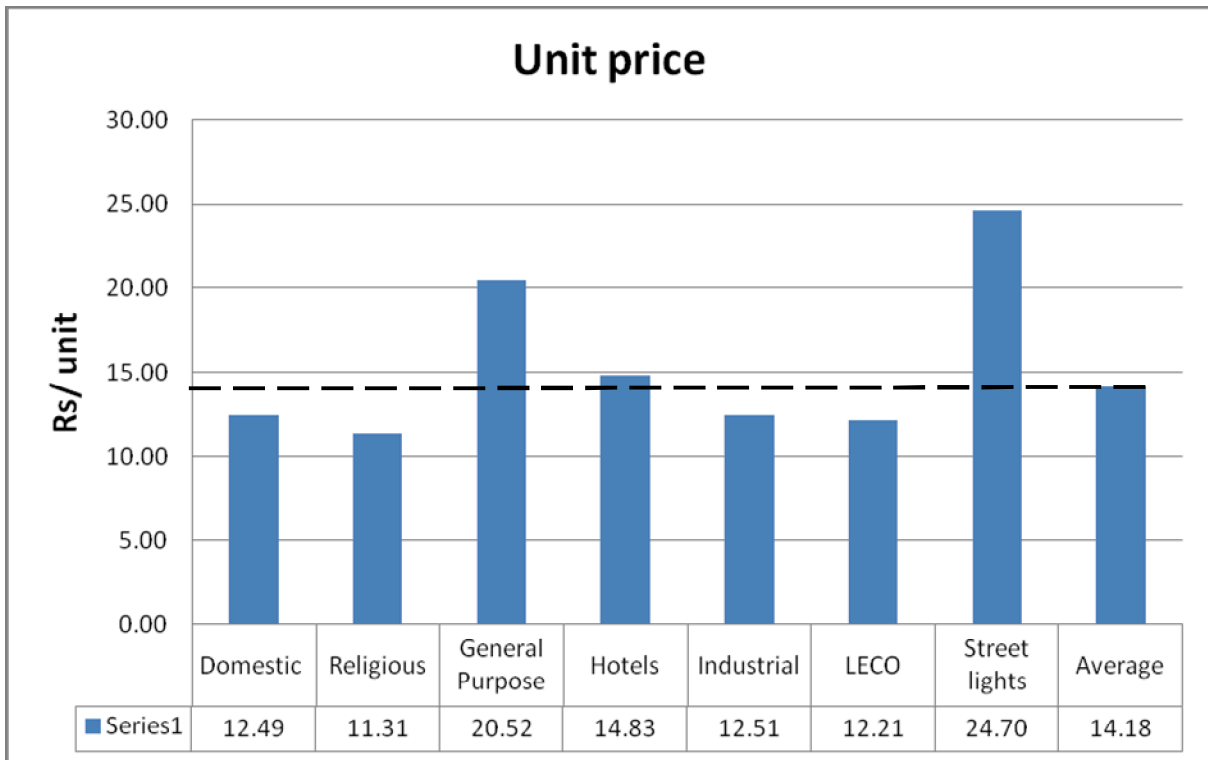
**The Government should not subsidize the CEB**

It would not be wise for the government to grant subsidies to bridge the gap and overcome CEB financial crisis. That is because the poor sections of the population that do not get electricity would thereby be made to subsidize the privileged people who have electricity through the taxes that they pay to the government.

**The average unit prices of the different sectors are not the same**

The tariff structure of the CEB consists of 7 main sectors: Domestic, Religious, General Purpose, hotels, industrial, LECO and Street Lights. The General Purpose, Street Lights and hotel purpose sectors subsidize the domestic, Religious & industrial sectors and LECO.

**Graph 01: The unit rate comparison among different components**

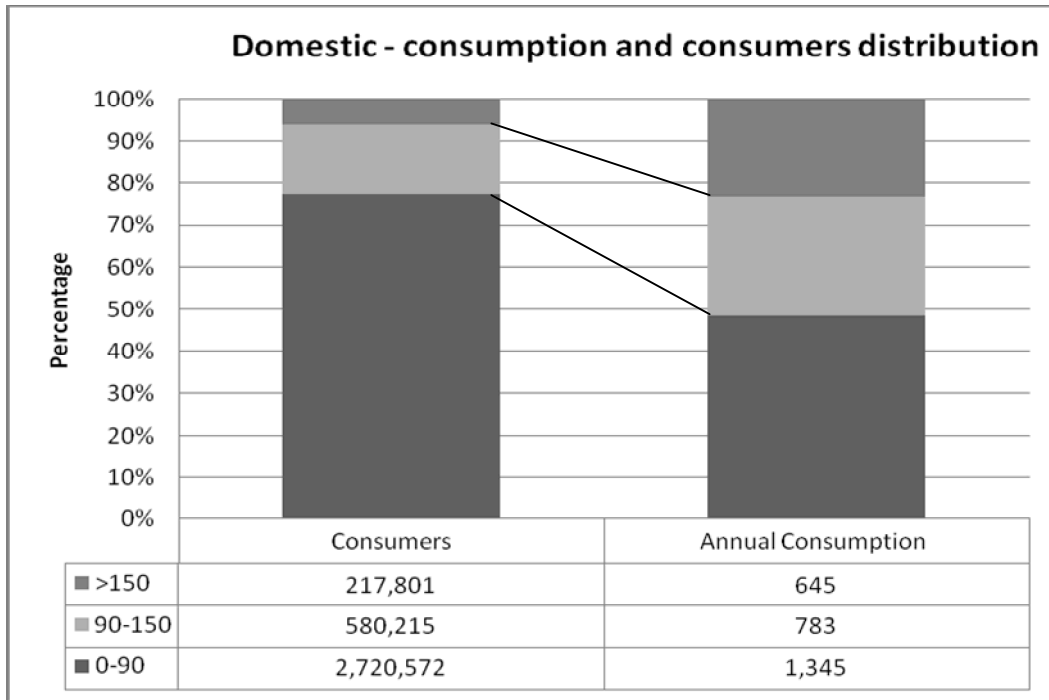


Without analyzing the consumption pattern in detail it is difficult to come to a conclusion whether a particular sector should be subsidized by another sector or not. However there is no rationale given by the CEB for this sector wise difference in the average fees. If the government institutions are coming under the General Purpose (GP) sector then by charging a high tariff from GP, CEB is indirectly charging the communities who do not have access to electricity as well. Hence it is the responsibility of the CEB to give a justification for this difference as it has all the data on power consumption. If the CEB fails to give a reasonable explanation for this difference then it is better to have a flat average tariff for all sectors. Accordingly average tariff in all sectors should be 14.18 Rs./kWh for the year 2008 to collect the estimated revenue for the CEB.

#### **Domestic sector consumption distribution**

Domestic sector consumption is not equally distributed. Just 6% of the consumers consume 23% of the domestic sector consumption. On the other hand about 75% of the consumers consume less than 50% of the domestic sector consumption. If we assume that the generated hydro power units are proportionately distributed among all sectors then 40-50 % of the demand in each category is supplied by hydro power. It implies that consumption of the domestic sector consumers consuming less than 90 units/month, can be met by the domestic sector hydro power quota. Hence the monthly bill of the block consuming less than 90 units/ month need not be increased with the increase in oil prices.

**Graph 02: Domestic sector consumption distribution**



**Who in the domestic sector should be protected?**

The domestic sector electricity usage can be classified as basic (primary), moderate and luxury (secondary) depending on the electrical items used. Having electrical lighting during 6-9 in the evening and viewing a TV can be considered as a primary need of the modern day human being.

The following table enumerates the usage of electrical appliances and the number of units consumed in a low electricity consuming household.

	Rated Wattage	No. of items	Hour/day	Units/month (kWh)
Incandescent lamps	40	3	1.00	3.60
CFL	11	3	4.00	3.96
Radio	5	1	4.00	0.60
TV (color)	100	1	4.00	12.00
Table fan	40	1	8.00	9.60
Refrigerator	90	1	16.00	43.20
Electric Iron	1,000	1	0.25	7.50
Rice cooker	600	1	0.50	9.00
<b>Monthly Total (kWh)</b>				<b>89.46</b>

Primary need of a household can be considered as 90 units per month as 75% of the domestic sector consumers come under this category.

**Table 04: A typical case of a moderate consumer**

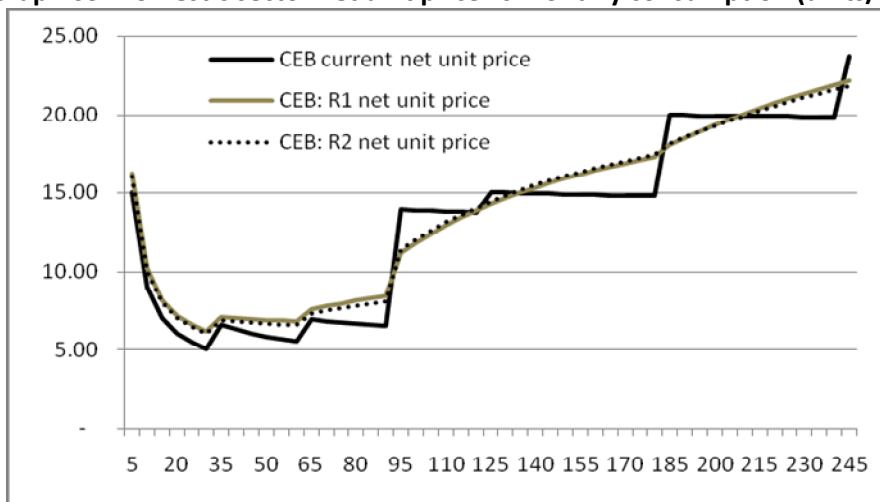
	<b>Rated Wattage</b>	<b>No. of items</b>	<b>Hour/day</b>	<b>Units/month (kWh)</b>
Florescent lamp	40	1	4.00	4.80
CFL	11	6	4.00	7.92
Radio	10	1	4.00	1.20
TV (color)	100	1	4.00	12.00
Table fan	40	1	8.00	9.60
Ceiling fan	75	1	8.00	18.00
Refrigerator	100	1	16.00	48.00
Electric Iron	1,000	1	0.25	7.50
Rice cooker	600	1	0.75	13.50
Washing machine	1,500	1	0.50	22.50
<b>Monthly Total (kWh)</b>				<b>145.02</b>

It is clear that a moderate lifestyle can be achieved, by consuming less than 150 units/month. Hence all efforts should be made to protect the consumers who are consuming less than 150 units/ month. About 94% consumers come under this category. An alternative to current tariffs should address these concerns. The answer to the ever increasing global fossil fuel prices is energy conservation. The energy conservation efforts should start from higher consuming groups. Hence an effective electricity tariff structure should be applied to the higher consuming groups for encouraging them to conserve energy.

**Issues of the current domestic sector tariff structure**

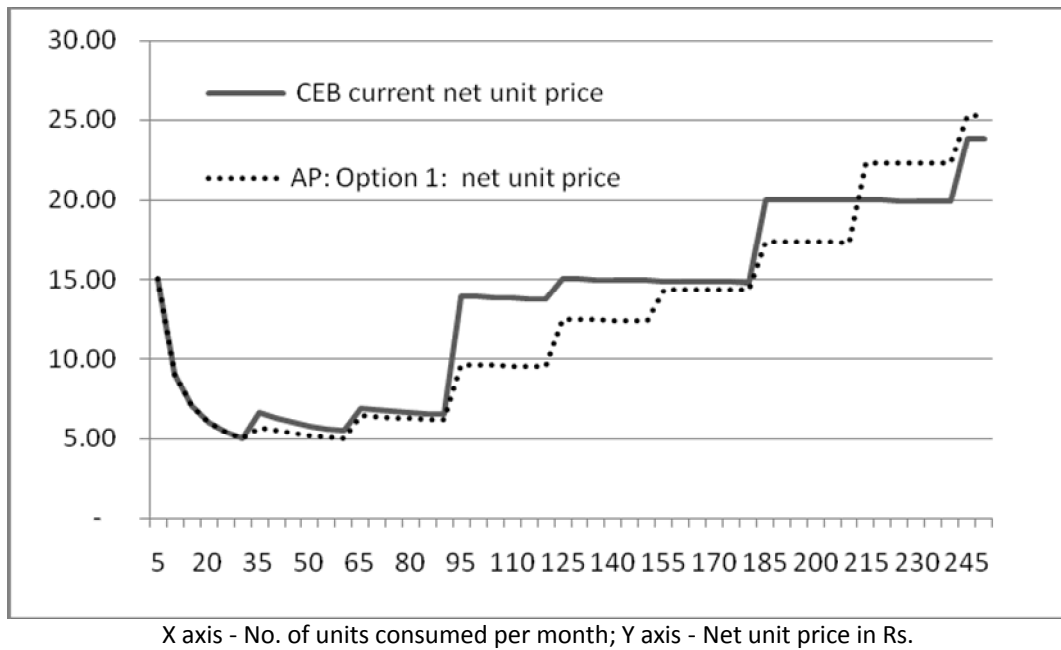
The current tariff structure has given a comparatively better price for blocks consuming less than 90 units per month. However the main weakness in the current domestic sector tariff is the sudden jump when moving from one block to next higher block. The second weakness is that there is no protection for the consumer block of 91-150 which mainly consists of the middle income group in society.

**Graph 03: Domestic sector net unit price vs monthly consumption (units/month)**





**Graph 04: Comparison between the current CEB tariff and the AP: Option 1**



**A Formula to replace blocks structure**

If we are to stop a sudden increase in bills while moving from a one block to another block, then we have to drop the block tariff system and use a formula to ensure a gradual growth in unit price with the increase in consumption.

$$\text{Monthly Bill} = an^2 - b$$

n- no. of units consumed per month

a & b - constants which can be varied to collect the expected CEB revenue.

With this formula the unit rate will increase gradually with the increasing monthly consumption. The first term of the formula is a variable, which changes with number of units consumed.

**Alternative proposal: Option 2 (AP: Option 2)- Drop the blocks structure and introduce a formula to have a gradual growth in the unit rate for the consumers consuming more than 90 units per month**

For this Alternative proposal the formula is applied only for consumers who are consuming more than 90 units per month. The existing CEB tariff will be applied to consumers who are using less than or equal 90 units per month.

$$\text{Monthly Bill} = an^2 - b \text{ (for the consumers consuming more than 90 per month)}$$

Proposed values for 2008:

$$a= 0.106; b= 300$$

Therefore for 2008 the monthly bill for domestic sector consumers consuming more than 90 per month can be calculated as follows;

$$\text{Monthly Bill} = 0.106 \times (\text{Units})^2 - 300$$

The maximum unit rate charged from any consumer is fixed at Rs. 50 /unit

The CEB can collect approximately the same annual revenue as it current collects from domestic sector consumers by using the above mentioned figures for a & b of the proposed formula. This alternative will benefit the consumers consuming less than 150 units per month (i.e. about 94% of the domestic consumers).

**Alternative proposal: Option 3 (AP: Option 3)- Drop the blocks structure and fixed cost and introduce a formula to have a gradual growth in the unit rate**

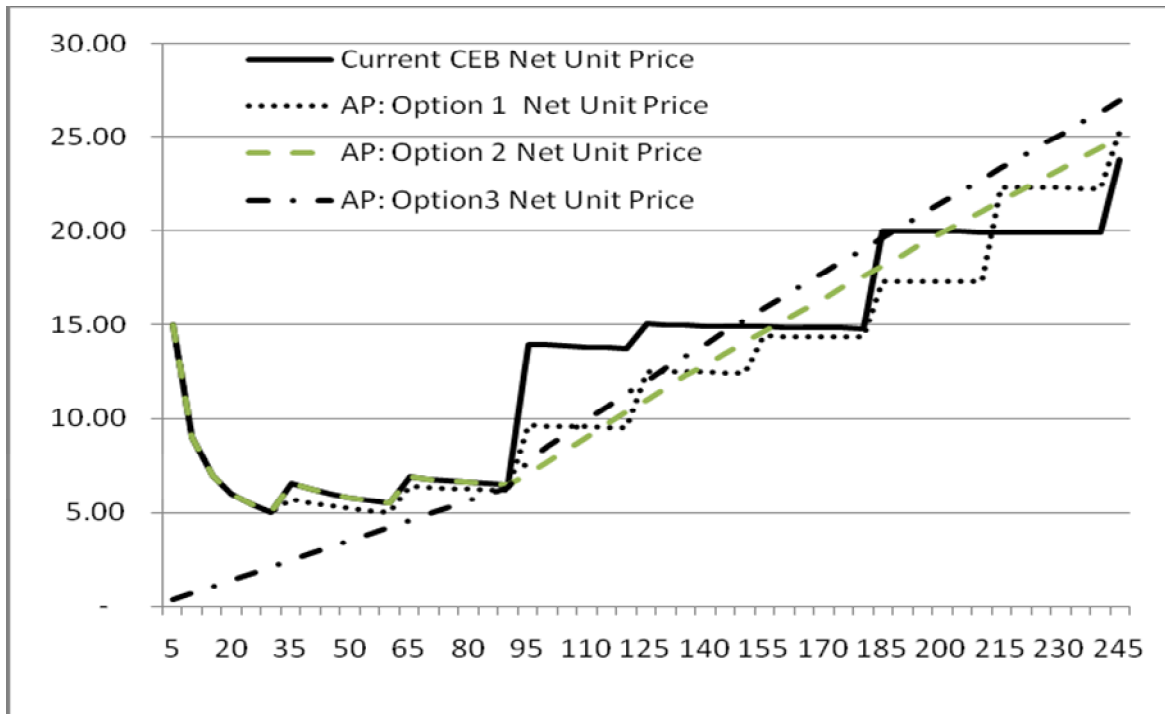
The formula is applied in two parts. The first part is for consumers consuming less than or equal 90 units per month. The second part is applied for consumers consuming over 90 units per month.

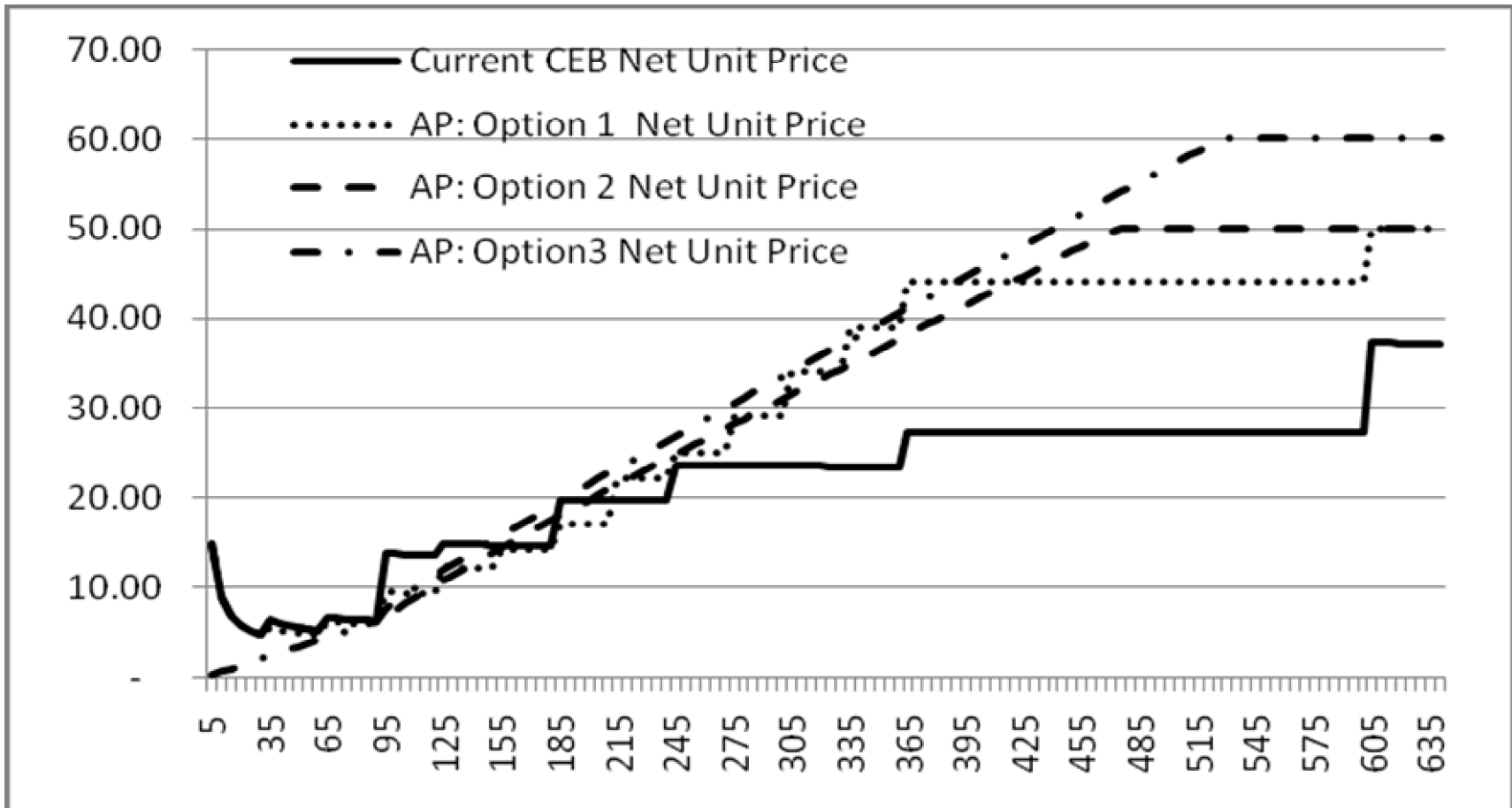
Part 1- Monthly bill =  $0.07 \times n^2 - 0$  (for the consumers consuming less than or equal 90 units per month)

Part 2 - Monthly bill =  $0.115 \times n^2 - 300$

The maximum unit rate charged from any consumer is fixed at Rs. 60 /unit. This alternative will benefit the consumers consuming less than 150 units per month (i.e. about 94% of the domestic consumers).

The results:





## General Purpose, hotels and industries sectors

Current CEB tariff rates for General purpose, hotels and industries sectors charge a higher rate from small consumers and a lower rate from large consumers. The CEB has not given a justification for this tariff structure. If CEB fails to give a reasonable justification for this disparity, it is recommended to charge an equal unit rate from all consumers in each sector. This will reduce the electricity price of 97% of General Purpose sector consumers; 78% of the hotel sector consumers and 85% of industrial sector consumers without reducing the total revenue of the CEB.

**Table No. 08: Existing and proposed tariff for the general purpose, hotel and industries**

	<b>CEB fixed charge (Rs/ connection)</b>	<b>CEB kVA charge (Rs/ connection)</b>	<b>CEB unit cost with FAC (Rs/ unit)</b>	<b>Proposed unit cost, No FAC (Rs/Unit)</b>
<b>General Purpose</b>				
GP1: Small	240.00		19.50	18.70
GP2: Medium	3000.00	750.00	17.94	18.70
GP3: Large	3000.00	675.00	17.68	18.70
<b>Hotels</b>				
H1: Small	240.00		19.50	13.75
H2: Medium GP	3000.00	750.00	17.94	13.75
H2: Medium 1	3000.00	675.00	10.68	13.75
H3: Large 1	3000.00	650.00	10.53	13.75
<b>Industries</b>				
I1: Small	240.00	675.00	13.00	10.70
I2: Medium	3000.00	650.00	10.53	10.70
I3: Large	3000.00	650.00	10.40	10.70