

# KERELA STATE ELECTRICITY REGULATORY COMMISSION

PRESENT: Shri.M.K.G.Pillai, Chairman  
Shri.C.Balakrishnan, Member

January 14, 2005

## IN THE MATTER OF INCENTIVES TO HT/EHT CONSUMERS ON POWER FACTOR IMPROVEMENT AND TOD PRICING

### ORDER

#### 1. Background

The share of HT& EHT industrial consumption to the total electricity sold is showing a declining trend in the State of Kerala as highlighted below.

Financial Year	Share of HT&EHT Industrial Consumption in Total Energy Sales of KSEB
1978-79	63.9 %
1994-95	36.96%
2001-02	31.3%
2002-03	32.93%
2003-04	25.06%
2004-05	25% (estimated)
2005-06	23% (estimated)

This indicates a negative or stagnant growth of industrial sector, which is one of the productive sectors. In addition to this, HT&EHT industrial consumers are the major subsidizing consumers in the State power sector; the cross subsidy contribution of HT&EHT Industrial Consumers is to the tune of 43% in the ruling tariff structure. Thus the declining share of HT&EHT Industrial consumption has a direct impact on the State's economy and power sector development.

Viewing this serious scenario, a proposal on incentives to HT&EHT Consumers had been submitted by KSEB to the Government of Kerala vide letter No. Plg.Com/4360/2001/860 dated 28.1.2003. However, no decision was taken on this proposal.

The HT and EHT Industrial Electricity Consumers' Association have been expressing their concern on non-implementation of the incentive scheme and this has been a matter of discussion in all the State Advisory Committee meetings of the Commission.

Higher load-end power factor results in the reduction of reactive power generation at the source and reactive power flow in the network. This, in turn reduces the ampere loading of power network components such as transformers, switchgears and transmission lines which effectively release system capacity, enabling better utilization of power generators and transmission network in a given power system.

The present system peak demand in the State has increased to almost twice the off-peak demand. This necessitates more investment in the power system to meet the peak demand and generation and purchase of expensive thermal energy. And the system remains unutilized during the off-peak periods. Therefore all possible measures are required to be resorted to reduce the peak load consumption and increase the consumption during the off-peak period. Increase in off-peak consumption minimizes the idling cost of generating plants and power system network. Increased consumption during off-peak period substantially saves the costly peak-power and excessive technical losses in the system.

Increase in the Load Factor of individual HT&EHT Consumers may not necessarily result in reduction of the grid peak power demand. Therefore, the Commission is of the view that incentive based on load factor improvement might not bring in the required results. The incentive scheme should be designed in such a way as to encourage the consumers to shift their consumption from peak period to off-peak. For this purpose, the existing provisions in the differential pricing method for providing incentives for Time of Day (TOD) consumption in the prevailing tariff structure shall be reviewed on the basis of suggestions filed by the HT&EHT Industrial Consumers' Association.

In the above context, the Commission is of the view that incentives shall be provided to HT/EHT Consumers, with due consideration to the resulting benefits to KSEB by way of improvement in technical performance of the power system and reduction of line losses and reduction in expensive peak-time power.

These incentives may also be viewed as one of the measures to promote industrial development and to increase industrial power consumption. The need for power sector development in the State in the context of developing infrastructure for attracting new industries and value added economic activities also assumes much significance.

It is under these necessitating and justifiable circumstances, reasons and grounds, the Commission has taken up a detail review of the present application filed by the HT&EHT Consumer's Association for review of incentives in electricity charges.

## **2. Power Factor Improvement**

On the basis of the discussion in the Advisory committee meeting held on 6.5.04, the Kerala High Tension and Extra High Tension Industrial Consumers' Association filed their suggestions on incentives for Power Factor and Load Factor improvements to Kerala State Electricity Board with a copy to the Commission vide their letter dated 21.5.2004.

The Commission sought the comments of KSEB on the above suggestions made by the Kerala High Tension and Extra High Tension Industrial Consumers' Association *vide* letter dated 24.5.2004

The Kerala State Electricity Board submitted their proposal *vide* letter dated 1.11.2004. The copy of this letter was handed over to the participants including the representative of The Kerala High Tension and Extra High Tension Industrial Consumers' Association, during the Advisory Committee meeting held on 3.11.3004.

Commission subsequently examined the proposal submitted by KSEB and the load flow study and the computation of expected reduction in loss due to p.f. improvement attached to the proposal. In the load flow study conducted by the KSEB in respect of EHT consumers, a constant EHT load of 101.7 MW was assumed and the loss reduction was estimated for various levels of power factor improvement from 0.85 to unity. While doing this, the reactive power for the complete system was considered at very low level by maintaining unrealistically high level of system power factor corresponding to initial conditions. This makes the load flow profile non representative of the actual power conditions. In the case of HT System, loss profile for one-kilometer line is theoretically calculated as a general example. Therefore, the inferences drawn from the load flow study computations are not leading to any realistic result.

Assuming 60 MU @5% and 185 MU @10% as transmission loss due to the consumption by EHT Consumers and HT Consumers respectively, on a conservative basis, the Commission has computed the expected reduction of transmission loss by improving the p.f. from an average existing p.f of 0.90 to unity. This works out to 47 MU. The maximum allowable incentive for improving the power factor from 0.9 to unity in the case of all the HT and EHT consumers should be equivalent to the value of this saving which works out to 1.5% of their total consumption. The incentive for p.f improvement has to be worked out on this basis. The logic followed is that the reduction in loss in energy as a

percentage of total energy sales to EHT and HT Consumers is the incentive that can be allowed to EHT and HT consumers, so that the incentive is made equal to the saving due to reduction in transmission loss.

### **3. Improvements on TOD pricing**

The Kerala High Tension and Extra High Tension Industrial Consumers' Association made the following suggestions *vide* their letter dated 14.6.2004 on the existing provisions of differential pricing for maximum demand and energy charges in the prevailing tariff structure of KSEB

- a) the maximum permissible demand during off-peak hours should be raised from existing 105% to 120% of the contract demand,
- b) the cut off limit for off-peak consumption should be fixed at 25% of the total energy consumed in place of 30% at present and the rate of rebate enhanced from the existing level of 25% to 40%.

The Commission sought the comments of KSEB on the above suggestion *vide* letter dated 5.6.2004. On receipt of comments from KSEB the Commission directed KSEB to quantify the financial benefits as a consequence of implementation of the proposed TOD pricing scheme.

KSEB submitted its response *vide* its letters dated 22.7.2004, 11.10.2004 and 2.11.2004.

KSEB stated that the shortfall in revenue would be about Rs.1.31 Crores per month, which is about Rs.15.7 Cr. per year, if the suggestions indicated by HT&EHT Association were implemented. KSEB indicated that the reduction in peak load and monthly energy consumption due to introduction of TOD metering is 69MW (8.28MU) for EHT Consumers and 18MW (2.16MU) in the case of HT Consumers. This means, shifting 10.44MU per month, which is about 125MU of peak consumption to off-peak period in a year. And the corresponding annual financial savings projected by KSEB is Rs.4.31 Crores. As per the details provided by KSEB there would be no considerable reduction in revenue by increasing the allowable percentage of contract demand during off-peak period.

KSEB has indicated that the ex-bus peak and off-peak power cost is Rs.3.00 per Unit and Rs.1.75 per Unit respectively. If this difference, which is Rs. 1.25 per Unit is considered, the savings due to shifting of 125 MU from peak period consumption to off-peak period would bring in a revenue of Rs.15.7 Cr, which points to the fact that the reduction in revenue is equal to the financial gain due to lower off-peak power cost.

The Commission, however, found that the above calculation was too simplistic in the sense that it did not take into account the sensitivity of the changes in the incentive for demand charges. If the impact of change in the incentive for demand charge is also taken into account, the Commission has found that it may not be possible to accept the incentive scheme suggested by the HT&EHT consumers' Association without modification, if the revenue loss to the Board is to be fully compensated by the cost savings due to shift in load from peak period to off-peak period. The Commission has found that in order to balance the gain and loss, it is necessary that the cut off for off-peak consumption should be fixed at 27.5% of the total consumption instead of 25% suggested by the Association and 30% in vogue in the existing difference pricing method of the Board. In addition, the percentage of energy changes should be fixed at 35% instead of 40% suggested by the Association and 25% in vogue in the present differential pricing method.

In the above exercise, it has been assumed that the demand subject to a maximum of 20% would get shifted from peak period to off-peak period and the difference in energy cost between peak period and off peak period would not be less than Rs.1.25 p.u. on an average.

#### **4. Commission's Order**

Having considered all the facts and merits, exercising the powers under Section 61 (c) 61 (d) and Subsection (3) of Section 62 of the Electricity Act 2003, the Commission issues the following directions for compliance by the licensees.

##### **4.1 Power Factor Improvement**

The normal power factor to be maintained by the HT & EHT consumers shall be 0.90.

The following Incentives and Penalty shall be applicable to HT & EHT consumers for power factor improvement.

Power Factor Range	Incentives
0.90 to 1.00	0.15 % of energy charges for each 0.01 unit increase in power factor from 0.9 p.f

Power Factor Range	Penalty
For power factor below 0.90	1% energy charge for every 0.01 fall from 0.90 p.f

Average monthly Power factor shall be taken as the basis for the payment of incentives/penalties.

#### **4.2 Modification in differential pricing method**

Following modifications are ordered in respect of differential pricing method:

1. The maximum permissible demand during off-peak hours shall be allowed up to 120% of the contract demand in place of the prevailing limit of 105% of contract demand and incentives for demand charges shall be worked out on that basis.
2. a) For working out the incentives for energy charge, the off-peak consumption in excess of 27.5% of the total consumption shall be taken, instead of the present level of 30%.  
  
b) The rate of incentive for energy charges shall be 35% instead of the present level of 25%.

The recorded Maximum Demand during off peak hours in excess of 120% of the Contract Demand will be changed at the ruling demand charge/kVA.

The licensees shall work out the savings as well as revenue shortfall prior to the implementation and after the implementation of the above incentive schemes and submit a report thereof to the Commission on quarterly basis.

**This order will be effective from 1<sup>st</sup> April 2005.**

**C.BALAKRISHNAN  
MEMBER**

**M.K.G.PILLAI  
CHAIRMAN**