

Before the
MAHARASHTRA ELECTRICITY REGULATORY COMMISSION
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Case No. 17 of 2006

**In the matter of
Suo Motu Review of Progress of Pilot DSM projects / Programmes undertaken by
M/s. Reliance Energy Limited**

**Dr Pramod Deo, Chairman
Shri. A. Velayutham, Member**

ORDER

Dated: August 16, 2006

At the meeting held in the office of the Commission on 29th September 2005, M/s. Reliance Energy Limited (“REL”) presented a proposal to implement pilot Demand Side Management (DSM) for promoting use of Compact Fluorescent Lamps (CFLs) among the residential consumers. The scheme proposed by REL involved sale of CFLs to eligible residential consumers on monthly instalments. REL commenced implementation of the project around October 2005. The Commission, at the said meeting (held on 29th September 2005), had requested all the distribution licensees to keep the Commission informed of the progress made in implementing the scheme periodically (quarterly). The Commission has not received any progress report from REL on the project.

2. The Commission arranged a *suo motu* hearing on 12th March 2006 under Regulation 32 of the MERC (Conduct of Business) Regulations, 2004 to review the projects and schemes undertaken by REL under the Demand Side Management (“DSM”) Scheme to:

- a) Review the progress made in the evaluation of CFL pilot project.
- b) Review other DSM programmes, projects or initiatives that REL is in the process of planning, designing or implementing.
- c) Ascertain whether or not impact assessment mechanisms form an integral part of existing and future planned DSM programmes and projects, and if not, to find out how REL will integrate impact assessment mechanisms in the DSM projects and programmes it is implementing at present or is planning for the future.

3. At the hearing held on 12th July 2006, REL team comprising Shri. P.S. Pandya, Senior Consultant, Shri. R.G. Marathe, Chief Engineer, Shri. Kapil Sharma (Manager, REL) and Shri. Rajiv Lade, Deputy Manager made a presentation (“Presentation”) and made oral submissions. REL, apprised the Commission of two initiatives undertaken viz., sale of Compact Fluorescent Lamps (“CFLs”) on monthly instalments and installation of Automatic Power Factor Correction Capacitors (“APFC”) in its select (11/0.4KV) sub-stations.



Pilot CFL Scheme:

REL's submissions-

4. REL has been working on CFL Scheme through sale on instalments since December 2005. REL commenced distributing coupons along with monthly electricity bills in the South Division (Bandra to Vile Parle) of its area of supply for the purchase of three 15W CFLs from 10th January 2006. REL was able to negotiate cost price of CFL at Rs. 82 per piece from M/s Bajaj Electricals (Whereas the market price was Rs. 160). REL selected only one model (of 15W) for sale under the programme (as a replacement for most widely used incandescent bulbs of 60W). Under the Pilot CFL scheme, each consumer was required to visit a designated REL outlet, where the said coupon could be exchanged with a maximum of three CFLs. South Division pilot project was targeted towards residential consumers whose energy consumption is up to 300 units per month, as these consumers, according to REL's analysis were most likely to install CFLs.

5. The cost of CFL was recovered from consumers in 11 instalments of Rs. 7 each through consecutive monthly bills and last instalment of Rs. 5 in the 12th monthly bill. Further, last three months instalments amounting Rs. 19 (Rs 7 x 2 + Rs 5 for last month) were to be waived, provided the consumers pay the first nine instalments without any default. CFLs were provided with a warranty period of one year.

6. There were 14 Distribution Centres under the Pilot Scheme. Under the South Division CFL Distribution Scheme, 1,64,983 coupons were distributed and 26,600 consumers (amounting to 16% of the total number of consumers to whom coupons were distributed) had availed of CFLs under the scheme resulting in a sale of 79,800 CFLs. The calculations (theoretical) made by REL indicated that the resultant load relief could be of the order of 0.4 MU per month under the normal circumstances and reduction of operating load during peak hours could be of the order of 2.8 MVA.

7. REL further extended the Pilot CFL Scheme to other divisions of its area of supply, on consumer demand, which resulted into "Compact Fluorescent Lamps-Main Scheme". Under the Scheme, during the months of April 2006 and May 2006, 15,93,115 coupons were distributed and 1,38,643 consumers (amounting to 9% of the total number of consumers to whom coupons were distributed) had availed of CFLs under the scheme resulting into a sale of 4,15,930 CFLs. The calculations (theoretical) made by REL indicated that the resultant load relief could be of the order of 2.2 MU per month under the normal circumstances and reduction of operating load during peak hours could be of the order of 14.55 MVA.

8. REL attempted to measure the impact of the said Schemes by undertaking a sample study of billing pattern of about 17,567 consumers. The study was conducted by comparing the quantum of consumption of the consumers in the month of December 2005 (i.e. assuming use of GLS / incandescent bulbs) vis-à-vis that of January 2006 (i.e. with use of CFLs). However it did not indicate any significant load relief. Among the 17,567 consumers, the use of the CFLs in the case of 8,282 consumers indicated a decrease in consumption by 13.1%; in the case of 8,842 consumers indicated an increase in consumption by 18.6%; and in the case of remaining 443 consumers indicated no change in consumption.

9. REL attempted to measure the impact from its distribution transformers. REL has 565 sub-stations under its South Division. Average installed capacity of the transformer is 630 kVA with average load factor of 0.5 and the impact of reduction in load due to CFLs was too small for measurement. On the other hand, the total impact due to use of CFLs spread over 565 sub-stations was hardly measurable. REL contended that inconsistency in consumption owing to seasonal variation also led to ineffectiveness in the assessment study.



Commission's Queries and Responses of REL:

10. The Commission noted that REL secured the cost price of the CFLs at Rs. 82 – a price more favourable than the one secured by Maharashtra State Electricity Distribution Company Limited (“MSEDCL”). The Commission enquired whether REL had invited tenders for the supply of the CFLs, (which process MSEDCL has to adopt). It was submitted that REL, being a private-sector body, unlike MSEDCL, had the liberty to choose M/s Bajaj Electricals as the supplier since the negotiations with them fructified into desired results.

11. The Commission asked whether REL, while embarking on an ‘area specific’ programme, undertook communication programme to inform its consumers on features of CFLs and specifically to inform on the minimum number of hours of usage per day per lamp for the substitution to be economically viable. REL conceded that no such guidelines were issued to the consumers of South Division as regards which of the GLS / incandescent lamp in the house was to be substituted with CFLs.

12. The Commission asked REL to probe further the total load reduction in terms of MVA, in the pockets / areas where the CFLs were installed, considering both the Pilot Distribution Scheme and the Main Distribution Scheme. REL undertook to furnish the said information separately.

13. REL assured the Commission that it would conduct Consumer Survey with regard to the impact of CFLs, as well as undertake Load Research. Since REL has installed electronic meters at various sub-stations, it would be possible for REL to conduct the load research.

14. Consultants to the Commission, made the following comments:—

- i) The prime objective of the DSM programme being the reduction in demand, and especially in view of the peak demand during the evening, REL needs to devise appropriate mechanism for measurement of the impact achieved through the use of CFLs. Apart from the technical method of measuring impact through recording and comparing data from the transformers / feeders, REL could further undertake a Consumer Survey to evaluate overall impact (including estimation of the load reduction) as a result of use of the CFLs, in terms of load reduction as well as energy saved. The Commission has already informed the utility of the process /methodology of Consumer Survey in writing to REL, in this regards.
- ii) A proper Consumer Survey would disclose (a) whether the consumers have installed the CFLs in places where the use (in hours per day) is higher (say 5 or more hours per day), and not simply installed in corridors or bathrooms; (b) whether the consumers have used CFLs in place of GLS lamps or the FTLs. The survey could correctly assess the impact of the projects run by REL. The Consumer Survey study may be shared with other utilities for their implementation of DSM programmes.
- iii) The Brihan Mumbai Electric Supply and Transport Undertaking (BEST) had undertaken consumer survey and it was discovered that the expected impact of CFLs would not be possible owing to the consumers installing the GLSs in bathrooms, toilets, passages, etc., where the usage is less than 4 hours per day.



Commission's Directives:

15. The Commission directed the REL to:
- (a) Submit the methodology adopted for the survey to the Commission;
 - (b) Address issues concerning off-take being limited to 20%, consumer opinion on the affordability of the CFLs in the proposed survey; and
 - (c) Share its findings on consumer survey with the Commission.
16. The Commission further instructed REL to:
- (a) Adjust the operational expenditure that REL has incurred (amounting to Rs.1,02,00,000/-) and necessary costs towards publicity through the Load Management Charge (LMC) fund available with REL. (However, it is the impact of the DSM programme which must justify the incurring of the said costs.);
 - (b) Submit a statement of accounts comprising total LMC fund available with REL (as on April 1 2005), amount used so far on energy conservation campaign (provide details), amount to be deducted in respect of CFL project and APFCC pilot project. (The statement should also indicate the balance left after adjusting the above two expense heads.);
 - (c) Ensure that CFL project gets sufficient publicity, considering the scale on which the project has been undertaken; and
 - (d) Undertake year-to-year comparison of load and energy consumption to avoid effect of any seasonal variation (i.e. Readings in a month in Year 2005 be compared with those in the corresponding month in the Year 2006) and not on a month-to-month basis.

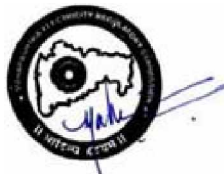
Automatic Power Factor Correction Capacitor ("APFCC"):

REL's submissions-

17. REL informed that Automatic Power Factor Correction Capacitor ("APFCC") scheme had been undertaken for reactive power management at 11/0.4 kV sub-stations. REL had already installed appropriate size of capacitors to improve power factor in HT system. Installation of the power factor correction system resulted in higher kVA (active power). REL has planned to provide the APFCC scheme at all its 11/0.4 kV sub-stations.

18. REL has already placed orders on M/s. ABB, M/s. Baron Power, M/s. Neptune and M/s. Shreem for the installation of 960 APFC Panels at all 11/0.4 kV sub-stations in the Central, East, North, South and South Central zones of REL's area of supply.

19. REL submitted that the modular construction of the APFCC panels consists of Fixed Units and Switchable Units. For 300 kVAR of APFCC rating, 100 kVAR is fixed and balance 200 kVAR is variable, consisting of 8 units of 25 kVAR each. Similarly, for 450 kVAR of APFCC rating, 150 kVAR is fixed and balance 300 kVAR is variable consisting of 12 units of 25 kVAR each. These units automatically switch-in and cut-off which maintains the power factor between 0.98 and 0.99. REL has, till date, provided for 267 capacitor systems in various areas. As per the survey conducted by REL, the transformers have a minimum loading of about 40%. REL submitted that for 630 kVA distribution transformer kVAR requirement for improving power factor from 0.85 to unity is about 133 kVAR (assuming loading of 40%).



20. REL submitted that it had initially identified more than 3,000 locations for the installation of APFC Panels. Thereafter, in the first phase, 960 APFC Panels were ordered – 480 numbers of 300 kVAR Capacitors and 480 numbers of 450 kVAR Capacitors. It was submitted that out of the 960 APFC Panels those have been ordered by REL, 256 has been commissioned and the project would soon reach completion.

21. REL submitted that at the Chandan Park sub-station, being situated in an industrial area, the power factor before installation of the APFC Panel was 0.6 (as there is considerable inductive load) and after installation became 0.9 registering increase in availability of 50 kVA equivalent demand in the system.

Commission's Queries and Responses of REL:

22. The Commission queried REL how the capacitor system behaves in the event of over voltage. REL submitted that each capacitor is controlled by a micro-processor based unit which ensures that under the circumstances of over-voltage or power factor reaching unity, the capacitor is automatically switched off.

23. The Commission observed that REL should also ensure the maintenance and warranty of the capacitors. It was submitted that REL was in the process of outsourcing contracts for maintenance and downloading data. The Commission observed that such being the case, REL needs to set out appropriate terms and conditions for the same.

24. The Commission observed that REL should select a specific/particular area where the said APFC Scheme has been introduced and undertake a Load Research study, to examine changes in voltage and frequency, influence of load variation with respect to changes in composition of load (resistive, inductive and capacitive). REL contended that with the help of the APFC Panels, it would be possible for REL to monitor power parameters phase-wise and total kVAR, kW and also monitor phase angles. REL apprised the Commission that the APFC Panels have inbuilt data loggers to download readings on, phase-wise voltage / current, kW, kVAR (reactive power). REL submitted that the said data is stored for up to 45 days and can be downloaded in the form of spread sheets. The said data could ultimately be useful to explore alternative methods to reduce system losses and improve power quality. The feeder level data could be used in developing total distribution system level models.

25. Other DSM Initiatives

Consultants to the Commission raised the following issues:

- i) Whether REL has formulated any DSM programme to cover the issue of pumping load of high rise apartment? Each housing society, having its individual water pump, uses the same almost arbitrarily and there is a need for REL to formulate certain load management programmes so as to stagger the timings for usage of pumps. REL undertook that the said issue will be studied by REL.
- ii) REL may further evaluate possibilities of formulating other DSM programmes to cover the issue of space cooling undertaken by various malls in its area of supply.
- iii) REL needs to work on issues concerning contribution to peak demand requirement by malls and commercial buildings.

26. The Commission, under its *suo-motu* initiative, has asked its consultants to evaluate the prospect of developing two demonstration projects in the BEST area of supply. Two single-owner buildings having higher lighting load are being identified for the said project. One of the methods proposed to be adopted to decrease the lighting load is the replacement of magnetic ballasts with



electronic ballasts in combination with high efficiency tubelights. The other areas would be to address space cooling as well as water pumping areas. These would be model projects for utilities to conduct DSM programmes.

27. The Commission has appointed I.I.E.C. (International Institute for Energy Conservation) to prepare DSM Bidding Document. The findings of load research by REL may be analysed in association with those under I.I.E.C. exercise for evolving alternative DSM schemes.

Commission's Directives:

The Commission directed the REL as follows:

28. Load Research study should not be limited to the impact assessment of the CFLs. REL needs to extend this research to the micro level inasmuch as to arrive at the type of load (i.e., the combination of R, L and C). Data collected from electronic meters under load research would be useful for designing the DSM programmes as well as for improving power quality. The research should include data collection, load configuration, type of load and consumer categories as components. The findings from the studies to evaluate impact should be documented properly, so as to share it on an international platform.

29. The Commission further directed REL to:

- (a) Conduct requisite Consumer Survey and Load Research to review achievements / impacts of the said programmes as detailed in the above paragraphs;
- (b) Submit the methodology to be adopted for conducting consumer survey to the Commission;
- (c) Submit the findings of the Consumer Survey to the Commission within a month from the date of the order;
- (d) Present alternative DSM programmes within a period of 5 months from the date of this order; and
- (e) Co-operate, participate and assist in making the DSM bidding programme effective.

30. The DSM programmes are being undertaken by the Licensees on the directions issued by the Commission and the Licensees are permitted to charge the expenses incurred on these programmes to ARR. Hence the Commission shall continuously review the programmes by holding hearings and issue suitable directions.

Sd/-
(A. Velayutham)
Member

Sd/-
(Dr Pramod Deo)
Chairman



(Ms. Malini Shankar)
Secretary, MERC