Chapter-III

Operational Efficiency

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3.1 Introduction

The UDAY guidelines/MoU stipulated monitoring of operational efficiency parameters for time-bound improvement. The targeted activities under these parameters along with the envisaged benefits were as follows:

Table 3.1: Operational parameters under UDAY scheme and targeted benefits

Sl. No.	Parameters	Purpose/envisaged benefits
1.	Compulsory Feeder and Distribution Transformer (DT) metering.	Ability to track losses at the feeder and DT level for corrective action.
2.	Feeder segregation.	Segregation of feeders for agricultural and non-agricultural consumers ensures better management of subsidy to agriculture consumers. It also helps in peak load management[1].
3.	Feeder improvement for network strengthening and optimisation.	Reduce technical losses and minimise power outages.
4.	Smart metering of all consumers consuming above 200 units per month by December 2019.	Smart meters will be tamper proof and allow remote reading thus helping reduce theft, implementation of DSM activities and consumer engagement.
5.	Undertake measures for Demand Side Management (DSM)[2] which includes energy efficient LED bulbs and agricultural pumps.	Reduction in peak load and energy consumption as well as savings in consumer's energy bills.
6.	Undertaking energy audit upto 11 KV in rural areas by September 2016.	Identification of loss making areas for corrective action.

Source: MoU signed amongst MoP, GoP and the Company. Targeted benefits taken from UDAY scheme.

The position of achievement of operational parameters as on 31 March 2020 is given in **Table 3.2**:

[1] Peak Load management means management of peak/excess load/demand which is more than the supply. This is done by reducing the supply to non-essential category consumers at peak time.

[2] Demand-Side Management (DSM) is the selection, planning, and implementation of measures intended to have an influence on the demand or customer-side of the electric meter. DSM program can reduce energy costs for utilities, and in the long term, it can limit the requirement for further generation capacity augmentation and strengthening of transmission and distribution system.

Table 3.2: Achievements of the Company against operational parameters under UDAY scheme

Sl. No.	Operational performance indicators	Position as on 31 March 2016	Target as per UDAY scheme (up to 2018-19)	Position as on 31 March 2020
1.	Feeder metering-Urban (in nos.)	3,386	3,386	3,640
2.	Feeder metering- Rural (in nos.)	7,414	7,414	8,018
3.	Rural Feeder Audit (in nos.)	0	100 *per cent*	90.15 *per cent* (March 2021)
4.	DT Metering (Urban)	28,650	73,140	46,093
5.	DT Metering (Rural)	969	1,18,997	969
6.	Smart Metering of consumers with consumption above 200 Units per month (in nos.)	0	16,32,105	0
7.	Feeder Segregation (in nos.)	5,686	5,962	6,415
8.	Distribution of LED Bulbs under DELP/UJALA (in lakh nos.)	0	120	13.19
9.	Street Lighting LED (in nos.)	0	4,90,000	2,03,424
10.	Feeder improvement (in nos.)	0	10,800	10,968

Source: UDAY scheme, MoU for UDAY scheme and UDAY portal data provided by the Company.

The Company could not achieve the operational parameters of Distribution Transformer (DT) metering and smart metering and feeder segregation. Against the target of metering 192,137 distribution transformers upto the year 2018-19, only 47,062 were metered by 31 March 2020.

3.2 Network

3.2.1 *Implementation of Smart Meter Project*

As part of operational efficiency measures, MoU for UDAY scheme envisaged installation of Smart Meters for 100 *per cent* consumers (other than Agriculture Pumpset consumers) consuming more than 500 units per month by 31 December 2017 and for consumers consuming above 200 units but less than 500 units per month by 31 December 2019 based on cost benefit analysis. The National Tariff Policy (January 2016) of Ministry of Power, Government of India (MoP, GoI) had noted that Smart Meters[3] have the advantages of remote metering and billing, implementation of peak and off-peak tariff and demand side management through demand response.

The Company decided (September 2016) to invite tenders for providing smart meters (with integrated modem) for all consumers with sanctioned load of 20 KW and above along with requisite infrastructure to integrate with existing Meter Data Acquisition System. However, the purchase order for procurement

[3] Smart Meter is a new kind of electricity meters that can digitally send meter readings to energy supplier for more accurate energy bills. Smart meters come within-home displays so as to better understand consumers' energy usage. Prepayment mechanism is one of the features of smart meters.

of smart meters could be placed only in May 2020 *i.e.* after a gap of more than three and half years of first tender. The deliveries were to be completed by December 2020. It was noticed that even after placement of purchase order, the Company could not ensure execution of the project upto December 2020.

Audit observed that the selected firm was to supply 96,000 smart meters by 28 December 2020 after acceptance of sample from in-house laboratory or a reputed outside laboratory by 27 June 2020. They were to supply 16,000 smart meters every month. Audit observed that up to April 2021, only 335 smart meters were installed. The delay in implementation was attributed to delay in approval (November 2020) of sample smart meters by the Company which were submitted to it by the firm on 31 July 2020.

Thus, the important milestone, of installation of smart meters, to achieve operational efficiency was eluding the Company even after lapse of almost five years from signing of MoU.

The Company/State Government stated (May 2021/August 2021) that out of 96,000 smart meters ordered, 20,100 meters have been supplied. A roadmap for replacement of all the existing single phase and three phase meters with smart meters has been prepared and submitted for the approval. As per the plan, eight lakh meters will be replaced each year for which grant of ₹ 900 per meter will be admissible from GoI.

3.2.2 *Distribution Transformer metering*

The MoU required the Company to achieve 100 *per cent* metering of its Distribution Transformers (DTs) by June 2017. The aim of the project was to track losses at the feeder and DT level for corrective action for reduction of losses to achieve efficiency targets given in the MoU. As of March 2016, out of total 1,92,137 DTs of the Company, only 29,619 DTs (15.4 *per cent*) were metered and balance 1,62,518 DTs (except AP DTs) were unmetered.

The total cost of DT metering was estimated at ₹ 275.77 crore. UDAY scheme Monitoring Committee[4] of the Company, considering the prevailing infrastructure and cost involved decided (July 2016) to implement the project in phased manner. In the first phase only 20 *per cent* of DT metering (cost: ₹ 55.15 crore) was proposed to be carried out to analyse the usefulness of the system. The Company decided (April 2017) to seek approval of GoP and GoI for necessary amendment in the MoU regarding achieving 20 *per cent* work of DT metering (except AP DTs) in the first phase under UDAY scheme and submitted (December 2018) the metering implementation schedule to the State Government for 32,500 DTs for complete DT metering in South Zone (26,045 DTs) and partial DT metering in Central zone (6,455 DTs). After obtaining (January 2019) concurrence of the State Government, the proposal for the amendment in the MoU was submitted

[4] Committee constituted (May 2016) under the chairmanship of CMD, Company for monitoring the progress of UDAY scheme. It comprises of Director (Finance), Director (Commercial), Director (Distribution) and Director (Generation) of Company.

(January 2019) to GoI regarding executing the project of DT metering in phased manner with 20 *per cent* of work in first phase to analyse the usefulness of the project and 100 *per cent* achievement by September 2020. The decision of the GoI was awaited (December 2020).

Audit observed:

- Partial progress was made in DT metering in urban areas. DT metering in rural areas was slow due to fund constraints. The Company also did not provide for funds for metering of existing DTs in any of the ongoing rural electrification schemes.
- The selection of South zone and Central zone of the Company for implementation of DT metering in the first phase lacked justification as these zones reported comparatively lesser loss as compared to the high loss making Border zone (21.05 *per cent* losses) and West zone (19.52 *per cent* losses). PSERC had also recommended DT metering in high loss making areas of Border Zone.

The Company/State Government replied (April/May 2021) that the reliable zones were selected to avoid teething problems and that the proposal sent for amendment to the MOU for reducing the DT metering target was pending with GoI.

The delay in implementation of DT metering resulted in non-fulfilment of the commitment as per MoU and non-achievement of the objective to narrow down the loss making areas for reducing the overall distribution losses.

3.2.3 *Overloaded sub-transmission lines*

Overloading of an electrical network is one of the biggest contributors to technical losses. As per the instructions (June/November 2016) of the Company, the High Tension/Extra High Tension feeders/Main distribution lines (lines) were to be loaded upto 80 *per cent* of maximum current carrying capacity of the conductor. If the existing lines reached beyond 80 *per cent* of their maximum current carrying capacity, bifurcation/augmentation of existing lines or construction of new lines was required to be planned immediately for keeping the loading of the system within limits.

It was observed that during 2015-20, the maximum load on some of the distribution lines of the Company ranged between 154 *per cent* and 158 *per cent* indicating thereby that the lines were being overloaded beyond permissible limits, as shown below:

Table 3.3: Overloaded lines of the Company

Sl. No.	Particulars	2015-16	2016-17	2017-18	2018-19	2019-20
1.	Total lines under operation during the year	885	923	963	987	1,018
2.	Overloaded lines:					
	80 to less than 100 *per cent*	33	51	70	84	66
	100 *per cent* and above	10	34	35	32	64
Total Overloaded Lines		**43**	**85**	**105**	**116**	**130**
Percentage of Total Lines		**4.86**	**9.21**	**10.90**	**11.75**	**12.77**

Source: Data provided by the Company.

It was noticed that the number of overloaded lines showed an increasing trend. Further, the number of lines overloaded more than 100 *per cent* of their capacity increased from 10 in 2015-16 to 64 in 2019-20.

The Company/State Government replied (April/May 2021) that the load greater than 80 *per cent* was a benchmark to plan the deloading and that the lines could be used up to 100 *per cent*. To de-load the system, the Company had carried out various activities like commissioning of new grids and new lines. The reply is not acceptable as the instructions of the Company categorically provided that 11/66 KV lines/grid substations were to loaded upto 80 *per cent* and bifurcation/augmentation/new feeders should be planned immediately thereafter.

3.2.4 *Delay in implementation of rural feeder energy audit project*

As per MoU, Energy audit in rural areas up to 11KV feeder level was to be completed by September 2016. To conduct Energy Audit, an accurate estimation of transmission and distribution losses on periodical basis was essential. Keeping in view the large quantum of feeder meter data which required analysis, a system was needed that delivered data with minimal human interface to avoid unintentional errors.

In order to capture real time supply parameters of rural India and monitor the availability/quality of power supply in rural areas of the country by capturing actual distribution parameters (power supply, outages and conduct feeder wise Energy audit and AT&C losses), MoP introduced a 11 KV Rural Feeder Monitoring Scheme (RFMS) and appointed (October 2016) REC Transmission Projects Company Limited (RECTPCL) as its Implementing Agency for engaging with the States/Distribution companies. Entire cost of the Scheme was to be borne by the MoP. Under the Scheme, rural feeders meter data shall be acquired through modem and sent to data centers of the Company and Central Meter Data Acquisition System (MDAS) for further analysis and the same would be integrated with National Power Portal (NPP) to make it available for use of all stake holders. For the feeders that were already communicable, RECTPCL was to coordinate with Distribution Companies for porting the feeder information to the National Power Portal. For non-communicating Rural/Mixed feeders, RECTPCL evolved a project for making the 66/33KV incoming and 11 KV outgoing feeders communicable.

The Company signed (August 2018) a tripartite agreement with RECTPCL and the zonal implementing agency (ZIA) for execution of project in the State. As per agreement, 6,630 feeders were to be covered and the quantity could be increased to 25 *per cent.* The term of the agreement was for five years after Go-Live status *i.e.* integration of at least 90 *per cent* feeders with Central MDAS for at least 15 days continuously. The implementation period of project was six months from date of issue of work order wherein all the hardware, software, resources, etc. were to be installed.

However, as of March 2021, total feeders to be metered increased to 8,246 of which 7,434 (90.15 *per cent*) feeders were metered under the RFMS and

modems on remaining 812 feeders were yet to be installed. Further, out of 7,434 feeders, only 6,277 feeders (84.44 *per cent*) were communicating with the data centre of the Company against the benchmark of integration of 90 *per cent*. Thus, even after lapse of more than two years, the work could not be completed and the overall objective of rural feeder energy audit was yet to be achieved.

The Company/State Government stated (April/May 2021) that delay in installation of modems was due to delay in providing compatible meters by meter suppliers. The reply is not acceptable as the Company failed to ensure timely availability of compatible meters which led to delay in installation of modems.

3.3 Project delays

3.3.1 *Non-segregation of mixed load feeders and non-metering of AP consumers on mixed feeders*

The MoU for UDAY scheme provided for 100 *per cent* physical segregation of the mixed feeders[5] by March 2017. As on December 2016, there were 285 mixed rural area feeders in the *Kandi* area. All the consumers including unmetered agriculture connections were provided 24 hours supply from these feeders. This not only led to wasteful use of ground water but also hindered the efforts of PSERC to assess AP consumption accurately for *Kandi* area.

PSERC in its tariff orders for the year 2013-17 issued directions to the Company to segregate the *Kandi* area feeders and in case of any difficulty in segregating, install meters on all AP motors of such feeders. Company decided (June 2017) to physically segregate 78 mixed load feeders and meter all AP motors on 193 feeders by November 2019.

However, it was noticed that upto August 2020 only seven out of 78 mix load feeders were segregated and not even a single meter was installed on AP connections running on 193 mix load feeders. The delay in works was attributed to resistance of the consumers to installation of meters on AP motors and segregation of feeders. As on March 2021, only 37 feeders were segregated. Failure to complete mixed feeder segregation project resulted in burden of ₹ 1,222.13 crore in the form of disallowance of subsidy against AP consumption claimed by the Company in the *Kandi* area for the years 2015-16 to 2019-20.

The Company/State Government replied (May 2021/August 2021) that work of 47 feeders has been completed; there were Right of Way (RoW) and forest issues on some feeders; and MoP/GoI has granted time extension up to 30 September 2021 and the Company planned to complete the work of feeder segregation and AP consumer metering within this extended time.

[5] Mixed feeder provides supply of electricity to agricultural and non-agricultural (domestic and non-domestic) consumers simultaneously.

3.3.2 *Domestic Efficiency Lighting Programme/Unnat Jyoti by Affordable LEDs for All (UJALA)*

As per MoU, the Company was to undertake measures for demand side management to provide LED lights to the consumer under domestic efficiency lighting programme (DELP) through EESL[6]. The target for LED lights to be distributed[7] during the year and actual achievement there against was as follows:

Table 3.4: Distribution of LEDs under DELP/UJALA

(Figures in lakhs)

Year	Target for distribution of LED Lights	Actual LED Lights distributed	Percentage achievement
2015-16	Not prescribed	0	-
2016-17	20	0	0
2017-18	45	9.92	22.00
2018-19	55	2.40	4.36
2019-20	Not prescribed	0.87	-
Total	**120**	**13.19**	**10.99**

Source: MoU for UDAY scheme and UDAY portal data provided by the Company.

The Company could distribute only 10.99 *per cent* of the targeted LED lights. Audit observed that the Company did not establish and communicate the area wise targets of distribution of LED bulbs to EESL in regard to minimum sale points per town and targeted sales.

The Company/State Government replied (May 2021/August 2021) that as on 31 March 2021, 14.26 lakh LED bulbs have been distributed. The fact remains that due to non-fixation of targets for contractor for distribution of LEDs, the performance of the Company remained dismal even after lapse of five years.

3.3.3 *Non-implementation of Smart Grid pilot project*

MoU provided that the Company will undertake feeder improvement programme for network strengthening, optimisation and loss reduction.

MoP, GoI planned (2010) to develop Smart Grids in India by taking up pilot Smart Grid projects in stages for increasing power availability, reducing AT&C losses and optimal utilisation of resources for sustainable growth. As a part of the pilot project, initially 14 State Utilities in the country including Company were selected (2012). MoP approved (August 2013) a pilot project in Punjab for eight feeders at a cost of ₹ 10.11 crore, of which 50 *per cent* was to be contributed by GoI and 50 *per cent* was required to be borne by Company.

The Company placed (April 2015) a work order (WO) of ₹ 8.17 crore for implementation of Smart Grid Pilot Project which was scheduled to be completed by October 2016. The work order mentioned that any of the three

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6 Stands for Energy Efficiency Services Limited, Noida - a Government of India enterprise promoted by Ministry of Power as a Joint Venture of four Public Sector Undertakings - NTPC Limited, Power Finance Corporation Limited, REC Limited and POWERGRID Corporation of India Limited.

7 At concession rates.

brands of the meters specified in the work order may be supplied by the contractor. It was noticed that the first brand of meter offered by the contractor failed (October 2016) in the lab test. The contactor offered (May 2017) to supply the meters of other brands listed in the work order. However, the Company without considering the other brands of meters, terminated (August 2017) the work order. The contractor filed (August 2017) a court case and then, upon order (September 2017) of the court, served (October 2017) notice for arbitration against the decision of the Company. The Arbitration Tribunal gave award (December 2018) in favour of the contractor citing the fact that manufacturing and supply of smart energy meters of first brand of meter offered was not mandatory. The award of the Tribunal was challenged by the Company in District Court, Patiala which was pending for hearing (May 2021).

The Company had also submitted (October 2017) proposal to MoP to complete the Smart Grid pilot project on its own by March 2018. But failure of Company to finalise project plan and submit timelines led to cancellation of the project by MoP (December 2018). GoI directed the Company (December 2018) to refund the grant of ₹ 89.50 lakh received for the project.

Audit observed that due to unjustified decision of termination of the contract, the Company had to forego the GoI grant besides bearing an avoidable loss of ₹ 1.72 crore on account of amount due under the terminated contract and legal expenses. Further, cancelation of the project resulted in loss of opportunity to add a new dimension of Smart Grid to the distribution network of the Company.

The Company/State Government replied (April/May 2021) that changing the meter make was a contradiction of the terms and conditions of the work order, therefore, same could not be allowed. The reply is not acceptable as the Company itself had made provision for alternate makes of meters in the work order.

3.4 Monitoring and control

3.4.1 *Monitoring at State Level and at DISCOM level*

As per MoU, the GoP was required to review the performance of the Company on monthly basis at State Government level in the presence of State finance representatives. Further, the CMD of the Company was also to monitor the performance of the Company on monthly basis. It was noticed that:

(i) GoP constituted (June 2016) a State Level Monitoring Committee (SLMC) to review the performance of Company under UDAY scheme under the chairmanship of Principal Secretary, Power including one representative from Department of Finance, Government of Punjab not below the rank of Under Secretary. Audit observed that while constituting the SLMC, no terms of reference of SLMC were framed with regard to periodicity and mechanism of monitoring the performance of the Company under UDAY Scheme. No provision regarding meetings to be held by the SLMC during a year/execution

phase of the Scheme was made for appraisals of the achievement of milestones/targets. SLMC held four meetings during 2016-17, three during 2017-18, two during 2018-19 and no meeting was held during 2019-20. The minutes of meetings of SLMC did not include the review of entire activities/targets envisaged under UDAY scheme and remedial measures to be taken to bridge the shortcomings. Audit further observed that no Action Taken Notes on the agenda of previous meetings of SLMC were prepared and submitted by the Company.

(ii) The Company constituted (May 2016) a Company Level Monitoring Committee (CLMC) under the chairmanship of CMD to review its performance under the UDAY scheme. Audit observed that while constituting the CLMC, a monthly review was mandated, however, no terms of reference of CLMC with regard to periodicity and mechanism of review/monitoring of performance were framed. No provision regarding the number of meetings to be held by the CLMC during a year/execution phase of the Scheme was made for appraisals of the achievement of milestones/targets. CLMC held two meetings during 2016-17, no meeting during 2017-18; and 2018-19 and one during 2019- 20. The number of meetings of CLMC indicated that CLMC did not monitor the entire activities/targets of UDAY scheme. The minutes of the meetings of CLMC did not include remedial measures to the shortcomings discussed. Audit further observed that no Action Taken Notes on the agenda of previous meetings of SLMC were prepared and submitted by the Company.

The Company/State Government stated (April/May 2021) that the meetings were held at management level to discuss the quarterly as well as monthly performance of the Company under UDAY scheme but the minutes of these meetings were not recorded. The reply is not acceptable as in absence of documentary evidence, the monitoring mechanism for implementation of UDAY could not be ensured.

3.4.2 *Incorrect uploading of data on UDAY Dashboard*

The Company uploads the data in quarterly monitoring formats on the UDAY Dashboard (a web portal) on monthly basis, to enable the GoI to monitor the current status of obligations being met under UDAY scheme. A scrutiny of the data uploaded on the UDAY Dashboard and MoU/record of the Company revealed that the data uploaded by the Company was incorrect to the following extent:

(i) The data in respect of the target and achievement of segregation of feeders uploaded on the dashboard was incorrect. The dashboard was depicting (March 2020) that out of 276 feeders, 246 feeders had been segregated. As observed in paragraph 3.3.1, the target segregation was 78 mixed load feeders and installation of meters on 193 mixed feeders. Of these, Company had completed the segregation of seven *Kandi* area feeders (upto August 2020). Hence both the target (276) and achievement (246) figures were incorrectly uploaded on the Dashboard since March 2018. Further, as on March 2021, the UDAY Dashboard

showed progress of segregation as 248 feeders whereas the actual progress made was 37 feeders.

(ii) As observed in paragraph 3.3.2, for distribution of LED bulbs under Domestic Efficient Lighting Program, the targeted distribution as per MoU was 120 lakh bulbs spread over 2016-17 (20 lakh), 2017-18 (45 lakh) and 2018-19 (55 lakh). The target indicated in UDAY dashboard was shown as 'nil' during 2016-17 to 2018-19.

The Company/State Government assured (April/May 2021) that figures of the feeder segregation will be set right on the UDAY Dash Board and matter regarding updation of targets of LED Bulbs has been taken up with the UDAY Cell. Audit noticed that updation of data was still pending (June 2021).