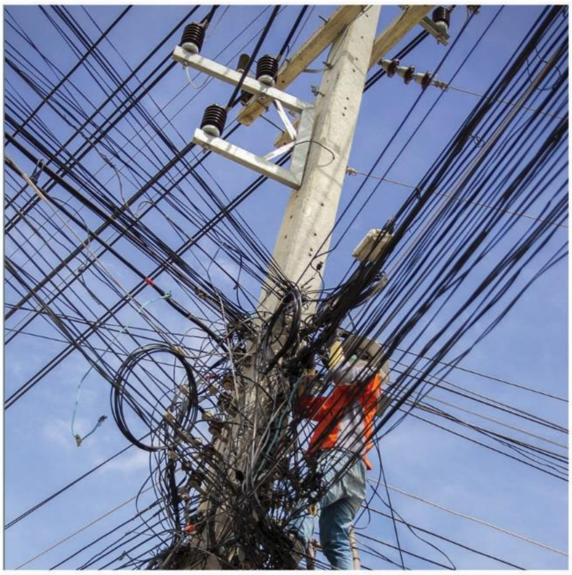
Feeder Survey In Karnataka

Key Observations



CSTEP®
CENTER FOR STUDY OF SCIENCE, TECHNOLOGY & POLICY

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1. Abstract

Given the significance of low aggregate technical and commercial (AT&C) loss in improved operational efficiency of a distribution company (DISCOM), this paper aims at identifying the ground-level challenges in calculation of AT&C loss. In this context, CSTEP conducted stakeholder discussions at the field level of DISCOMs, followed by detailed feeder surveys. Through these surveys, CSTEP observed a lack of awareness amongst employees about AT&C losses, a lack of accountability, inadequate manpower and resources, poor operation and maintenance of the infrastructure, etc. CSTEP hopes to contribute to resolve these issues in order to achieve the desired targets of AT&C loss reduction in DISCOMs.

2. Introduction

One of the challenges faced by the distribution sector in India is high aggregate technical and commercial (AT&C) losses. The AT&C losses have two components: technical losses and commercial losses. The technical losses occur due to resistance to the flow of energy into the distribution network, and depend on the length of distribution lines, number of distribution transformers (DTs), type of conductor used, and total length of the feeder. On the other hand, commercial losses occur due to inefficient managerial/administrative practices, defective meters and metering, inaccurate billing, illegal connections, theft, pilferage, etc.

In most of the distribution companies (DISCOMs) in India, the AT&C losses range from 15% to more than 40% of the input energy. The technical loss component could be reduced by upgrading the network with high-voltage distribution system (HVDS), appropriate use of conductors in high-tension (HT) and low-tension (LT) lines, and shifting transformers to locations near the load centres. The quantum of energy lost not attributable to technical losses is the commercial loss, which can be reduced by streamlining the energy-auditing and accounting processes and taking measures against theft and pilferage.

In order to take any remedial action, it is important to identify the exact points where losses occur and determine the reasons of their occurrence, that is, whether the losses are because of inefficiencies in the network and sub-standard maintenance (technical) or inaccurate billing and collection (commercial), or unauthorised consumption/theft of power.

In this context, the Center for Study of Science, Technology and Policy (CSTEP) undertook a detailed field survey of 11 kV feeders in two utilities of Karnataka (Chamundeshwari Electricity Supply Corporation Limited, or CESC, and Bangalore Electricity Supply Company Limited, or BESCOM) to identify the points of high AT&C losses and the reasons for the losses. We identified 20 feeders (10 feeders in each DISCOM) and covered 9 districts during the course of the study.

3. Methodology

We adopted the following methodology for stakeholder discussions, feeder selection, and field survey.

Stakeholder Discussions

- Examined the structure and functioning of subdivision and section offices
- Identified issues/discrepancies in the calculation process of AT&C losses

Feeder Selection

- Prepared a data-collection template for the utilities to share the data in the requisite format
- Based on the data received from utilities, selected around 20 feeders for surveys with the following considerations:
  - Feeders with AT&C loss greater than 20%
  - Feeders with 30–90 DTs
  - Feeders with high, medium, and low yearly energy input [low (<=3 MU), medium (3-10 MU), high (>10 MU)]
  - Feeders of 10–35 km in length
  - Feeders in all terrains except hilly regions[1]
  - Feeders in consumer categories: urban, Niranthara Jyoti Yojana (NJY), industrial, commercial, and agricultural
- Held discussions on the preliminary feeder sample set with utilities to solicit their inputs and feedback on the feeder-selection process.

Feeder Survey

A Junior Engineer (JE) / lineman[2] was allocated by the DISCOMs to support us during the field audit for each of the selected feeders. The period of survey was from July 2018 to February 2019 for CESC feeders, and September 2018 to February 2019 for BESCOM feeders.

- Conducted a field survey for 20 selected feeders and their associated DTs
- Collected geographic information system (GIS) locations of selected feeders and associated DTs
- Collected and studied the single-line diagrams (SLDs) of the selected feeders
- Examined whether feeders and connected DTs were metered
- Examined the maintenance issues associated with feeders, DTs, and consumers' service lines
- Observed and documented tagging issues for feeder-DT and DT-consumer

4. Organisation Assessment: Structure and Functioning

DISCOMs' organisational structure consists of various hierarchical levels (Figure 1). Because AT&C loss calculation and feeder management are carried out at subdivision and section office levels, we examined the structure and functioning of these two levels for the purpose of our study.

[1]Feeders in hilly regions would not give an accurate representation of the feeders in the entire state

[2]The 'lineman' would now be called the 'powerman' as per the government order dated June 12, 2018

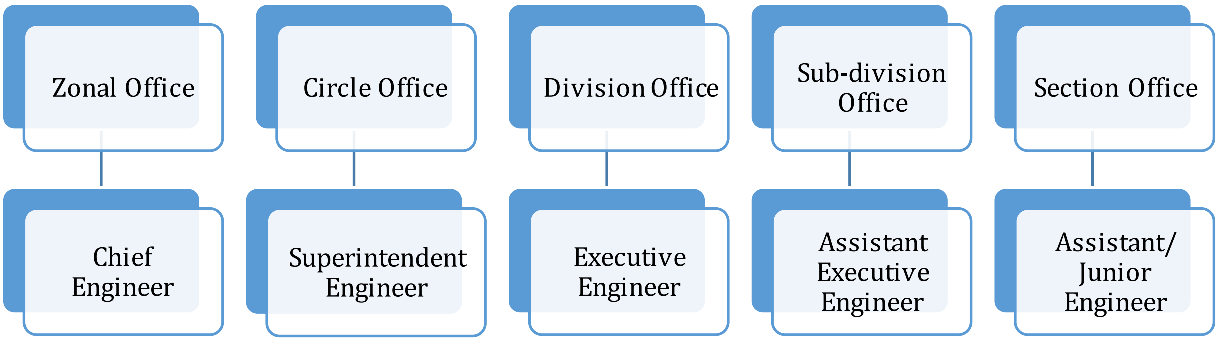

Figure 1: DISCOMs' organisation structure

Subdivision Office

A subdivision office is an intermediate office between a division office and a section office. It combines the technical (section office) and the accounting (division office) branches of the DISCOMs' operation. The subdivision office reports all statistical information, such as AT&C losses, energy-audit reports, and consumer data, to the division office after consolidating the data received from section offices.

Typically, each subdivision office supervises 3–5 section offices to ensure reliable distribution of power in its jurisdictional area. A subdivision office is responsible for performing various functions, as detailed in Annexure 1.

The subdivision offices have two departments: a technical wing, headed by an Assistant Engineer (Technical) (AET), and an accounts wing, headed by an Assistant Accounts Officer (AAO). Figure 2 illustrates the organisational structure of a subdivision office.

Assistant Engineer (Technical) (AET)	Approving new service connections	Processing & monitoring of maintenance works	Preparing and submitting different types of statistical information to higher offices	Processing and approving estimates of material and work required at section office	Conducting maintenance works as required by section office
Assistant Accounts Officer (AAO)	Ensuring 100% billing and collection in the subdivision	Monitoring of disconnections/ reconnections	Inspecting anytime-bill-payment (ATP) machine counters/kiosks	Monitoring test reports of newly serviced installations	Attending to consumers in disputed cases
Cashier	Managing the imprest account in subdivision office	Opening and closing the daily cash balance	Monitoring and verifying bill payments		
Senior Assistant	Approving new service connections and changes in tariff		Calculating payments to be made for the surrender of old service connections		
Junior Assistants	Managing the billing and collection information of all consumers [water supply and streetlight, HT installations, and installations with rooftop photovoltaic (RTPV)]		Handling information on unbilled cases		

Figure 2: Organisational structure of a subdivision office

Section Office

A section office is the most important interface between the consumer and the DISCOM. It is here that consumer relations are established and thus, is very critical to the company as a whole. An assistant engineer (AE) or a junior engineer (JE) is in charge of the section office, and they are known as section officers. Figure 3 shows the organisational structure of a section office. The meter-reader wing consists of meter readers (MRs) and gram vidyut pratinidhis (GVPs), who carry out the billing and collection processes. The MRs cater to urban areas, while GVPs[3] handle rural areas. The administration wing consists of an overseer who assists the section officer in all administration-related activities of the section office. The technical wing constitutes 10-15 officials, including a supervisor, linemen[4] (LM), assistant linemen (ALM), and junior linemen (JLM).

Assistant Engineer (AE)	Changing the ownership of the existing connections	Revising connected loads on consumers' request	Approving temporary extension of supply	Implementing change in tariffs			
Meter Reader/ GVPs	Recording meter readings of consumer installation and delivering the bills on the spot	Maintaining meter-reading observation books	Recording defects and deficiencies in installations' meter readings	Observing abnormal/subnormal consumptions, unauthorised connections and reconnections	Verifying accuracy of meters, misuse of energy, and general condition of the installation during routine meter reading	Collecting payments based on reading of installations	Reporting any abnormalities in readings, change in the nature of installation, meters not recording, suspected pilferage of energy, etc. to the section officer
Lineman	Identifying and reporting theft cases to the section officer	Recording the DT readings for DT-wise energy audit	Maintaining high-tension (HT) and low-tension (LT) lines and transformers	Removing touching and over-hangings in HT/LT lines	Replacing faulty meters and constructing overhead lines for service connections	Renewing HT and LT damaged poles	
Overseer	Preparing estimates for maintenance work	Preparing monthly vital statistics, including DT replacement and augmentation, and maintenance on HT/LT lines	Maintaining registers (such as assets register), disconnections and reconnections, tools and plants material accounts	Receiving and recording consumer complaints and arranging for compliance	Collecting cash from consumers and issuing authorised receipts	Assisting AE and office staff in technical matters	

Figure 3: Organisational structure of a section office

Observations on the functioning of section offices

- Although the section office is responsible for replacing faulty meters, constructing overhead lines for service connections, and replacing HT/LT damaged poles, it does

[3]The concept of GVP was introduced in Karnataka in 2003, with the aim of increasing revenue collection from villages and improving the quality of consumer service in rural areas.
[4]Two types of activities are carried out by linemen; one is maintenance-related activities (maintenance of HT and LT lines, distribution transformers, cables, and equipment, etc.) and another is attending to the breakdown of HT/LT lines and transformers, service connections, and consumer complaints.

not usually have an inventory or store. In case of faulty meters and DTs, or for the procurement of any such material, the section officer prepares an estimate of the quantity and cost in a standard format. The form is submitted to the subdivision office for the AEE's approval, after which the material is procured and dispatched to the section office. The required item is usually received within a day if it is available in the stores at the division office. If unavailable at the store, it is procured within two weeks[5].

- To generate various reports relating to consumers (such as energy consumption, billing and collection, processing of new and temporary service connections, and surrendering of old service connections), a computer is available at the section office for the AE/JE. However, we observed that the section officers were not aware of the different reports that could be generated from the software tools[6] available on the computer. These tools are also equipped with geographical information system (GIS), wherein geo-location of all the DTs and consumers could be noted. Quite often, because of problems with the GIS module in the software, the section officer bypasses the updation of this information.
- At each section office, one vehicle is allocated to take care of both breakdown and maintenance activities. However, we observed that employees frequently have to wait for the availability of the vehicle to carry the tools/equipment required for maintenance work.
- While MRs are regular employees of DISCOMs and are appointed as per the DISCOMs' recruitment process, the GVPs are selected by the gram panchayats as community representatives and appointed on the basis of local recommendations. The GVPs are usually not under disciplinary control of the DISCOM. The MRs/GVPs are provided with a meter-reading observation book to record any issues/discrepancies relating to billing, collection, and consumption details of consumers/installations. The section officer is expected to review the book at the end of every month to take necessary actions. Despite this process, we observed that the book is not updated regularly by MRs/GVPs.
- There seems to be an inconsistent pattern of assigning linemen in a section office. For instance, in some section offices, linemen are allocated feeder-wise (i.e., one lineman is assigned for one feeder), while in other section offices, gram panchayat–wise allocation is done for linemen (i.e., one gram panchayat, comprising 3–4 villages, is assigned 2–3 linemen), which covers only parts of a feeder and not the entire feeder.
- In addition to identifying and reporting theft cases, the linemen are responsible for recording the DT readings for the purpose of the DT-wise energy audit. We observed that a record of DT readings is rarely maintained.

[5]The division and subdivision offices are usually located within a distance of 5 km from each other in town areas and 10–12 km in rural areas. In a few cases, subdivision offices are located in the same premises as the division office.

[6]Computers are uploaded with two kinds of software: Restructured Accelerated Development Reform Programme (RAPDRP) in town section offices and Total Revenue Management (TRM) software (such as BCSITS or NSOFT) in rural section offices.

5. Process for Calculating AT&C Loss

The AT&C loss in a DISCOM is calculated at the section and subdivision offices, and then shared with the division office for consolidation. Figure 4 illustrates the process of AT&C loss calculation.

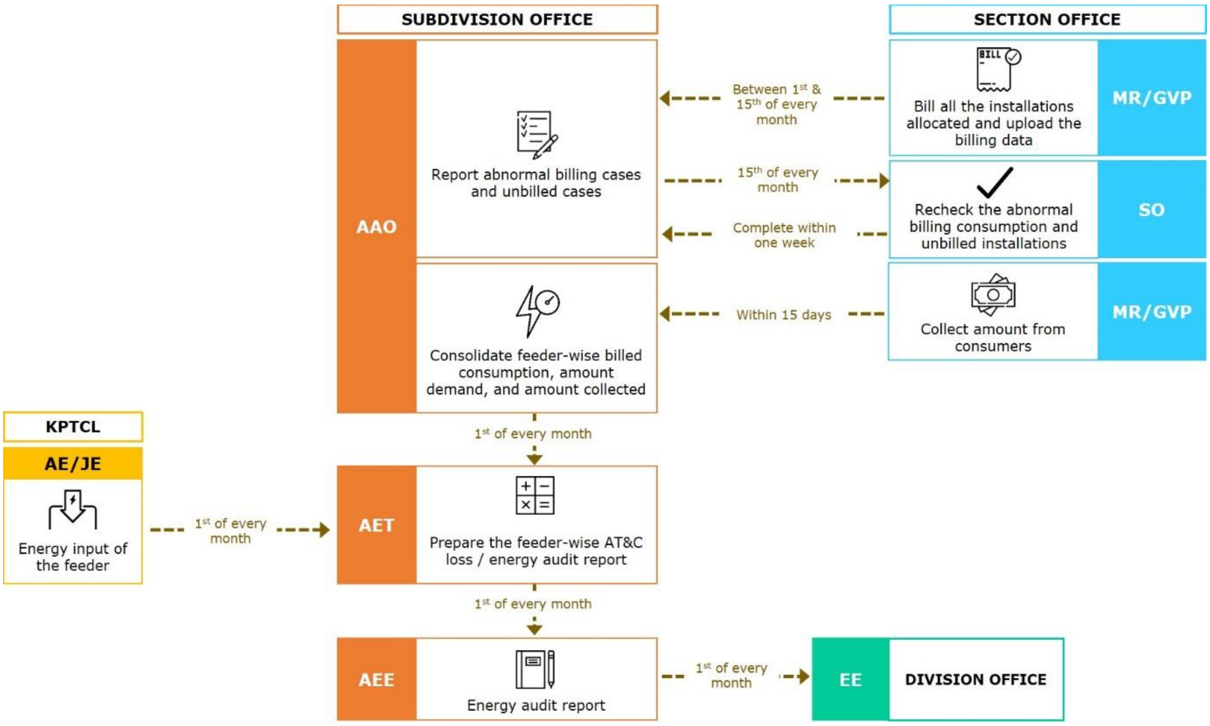

Figure 4: AT&C loss process

The formula used for calculating AT&C loss at the 11kV feeder level is

AT&C loss = 1–(billing efficiency*collection efficiency)

Where,

Billing efficiency = Energy billed at the consumer end / Energy input at the feeder

Collection efficiency = Revenue collected from consumers / Revenue demand from consumers

Issues Identified

- *Billing:*
  - Each MR/GVP is provided with a meter-reading instrument (MRI) or mobile device with a printer to record consumption details and subsequently generate bills. On the day of the billing, the MR/GVP will visit each of the installations (allocated to them), note down the readings, and generate bills. Sometimes MRs encounter door lock (DL) cases (where consumer premises are locked), and they are unable to record the readings. In such cases, the practice is to generate the bills on the basis of fixed charges and the average of the previous 6 months' readings. We observed that in some cases, the bills were generated only on a fixed charge basis.

Further, the section officer should review the uploaded billing data on a daily basis, but we observed that the billing and collection data is not checked/verified at the section office. This would result in inaccurate billing data.

- The MRs/GVPs bill all installations between the 1st and the 15th of every month and upload the billing data to the portal in the section office on a daily basis. After the 15th of every month, the billing data is analysed by the AAO at the subdivision office; the AAO then checks the abnormal billing cases and unbilled cases due to 'meter not recording' and DL. The AAO reports such cases to the section officer and asks for the details to be provided within one week. The section officer asks the MRs/GVPs to recheck the abnormal billing and provide estimates on the consumption for unbilled cases.

- *Collection:*
  - Customers generally pay their bills within 15 days of issuance, through kiosks/counters or online. After the last day fixed for payment, the disconnection procedure is initiated. The MRs/GVPs visit consumers to either collect the payment or disconnect the service where payment is not made. While the disconnections are regularly carried out in urban areas, the MRs/GVPs have experienced difficulties in disconnecting electricity services in rural areas.
- *Energy input at the feeder:*
  - After receiving individual details of billed consumption, and amount collected, the AAO would generate the demand collection balance (DCB) report. The AAO will submit the report on feeder-wise billed consumption, amount demanded, and amount collected to the AET at the subdivision office on the 1st of every month. The AET will then calculate the losses by comparing the energy input and the billed consumption. In this calculation, the AET has to ensure that the feeder-energy input is accurate. The following three cases should be taken into consideration:
    - **Case 1 (exclusive feeder):** The feeder is exclusively feeding into a particular area, and the energy input to the feeder provided by the substation is taken on an 'as is' basis.
    - **Case 2 (sharing feeder):** If a feeder is exporting or importing energy to/from feeders in other subdivisions, then the AET of the subdivision should contact the other subdivision's AET to know the amount of energy exported or imported by the feeder. In some cases, because of the lack of boundary meters, the details on the energy exported and imported are not available and an estimation is made on the basis of the connected load of the feeder. This would compromise the accuracy of the AT&C loss calculation.
    - **Case 3 (changeover feeder):** In some cases, because of interruptions or faults in a feeder network, the DTs connected to the feeder are shifted to another feeder in the same subdivision. In such cases, the section office should inform the AET about the changeover and get the billing details of the shifted load/consumers. However, our discussions with officials revealed that such cases sometimes go unnoticed during the calculations, resulting in inaccurate AT&C loss calculations.

6. Issues Identified During Field Survey

In addition to our discussions with officers at section and subdivision offices, we identified a few issues in the field which are highlighted as follows:

1) Inaccurate and irregular update of data

The survey revealed inconsistency in the data, with respect to the number of transformers (connected to a feeder) from the section office and data collected during field survey. 65% (13/20) of the surveyed feeders have inconsistency in the number of DTs. As per DISCOMs' data, the total number of DTs associated with 20 feeders was 727, while the survey indicated it to be 748. Table 1 compares the number of DTs as per the data provided by DISCOMs and as per CSTEP's field survey. It was observed that while the initial configuration of the feeder in terms of the number of DTs and consumers connected are recorded in the form of SLDs, there was no continuous update based on the replacement of faulty DTs and augmentation of DT capacity. Moreover, the section/subdivision offices did not have a consolidated feeder profile with basic parameters—such as feeder name, feeder length, feeder type, number of DTs, type of conductors used, number of consumers, and connected load—for any of the 20 selected feeders.

2) Incomplete DT metering and defective meters

The survey showed that 28% (206) of the total DTs are not metered (Figure 5 and Figure 6). Of the 542 metered DTs, 104 meters were found defective, with defects such as meter not recording (MNR) due to loose connections, meter burnt out (MBO), and meters with partial display (Figure 7 and Figure 8).

3) Inaccessible location of DTs and DT meters

During the field survey, it was found that 21% (112) of the DT meters are inaccessible due to huge bushes and shrubs growing close to the transformer, meters being placed too high and thus unreachable (Figure 9 and Figure 10), etc., making it difficult to record the readings.

Figure 5: DT without meter (1)

Figure 6: DT without meter (2)

Table 1: Brief profile of the selected feeders

#	District/Zone	Feeder Name	Feeder Category	No. of DTs (DISCOMs' data)	No. of DTs (CSTEP survey)	No. of Consumers	Yearly Energy Input (MU)	AT&C Loss (%) FY16-17
Feeder-1	Hassan	Halli Mysuru	Urban	35	32	1,373	0.9	23%
Feeder-2	Hassan	Malali NJY	NJY	35	41	1,331	0.8	21%
Feeder-3	Chamarajanagara	Gundegala	NJY	27	35	2,185	1.9	20%
Feeder-4	Mandya	Balaji Malt	Industrial	1	1	1	14.8	12%
Feeder-5	Mandya	Kleane Pack	Industrial	3	3	3	21.7	6%
Feeder-6	Hassan	Vidyuth Nagar	Urban	66	56	1,197	1.6	23%
Feeder-7	Hassan	Thatanahalli NJY	NJY	25	28	1,340	0.7	34%
Feeder-8	Mandya	K M Doddi	Urban	62	62	5,898	8	37%
Feeder-9	Mysuru	Mavathur	NJY	76	80	5,462	2.8	33%
Feeder-10	Mysuru	Balaji	Industrial	29	29	33	4.7	17%
Feeder-11	BMAZ	F05 Hanumanthappa	Urban	43	52	6876	10.8	72%
Feeder-12	BMAZ	F11 Kanteerava	Mixed	11	23	279	5.5	51%
Feeder-13	BMAZ	K B Park	Industrial	8	8	4	9	142%
Feeder-14	BRAZ	Kalvamanjali NJY	NJY	39	44	1,568	3.5	74%
Feeder-15	BRAZ	Bagyadavanahalli IP	Agricultural	67	61	224	7.5	30%
Feeder-16	CTAZ	Kithaganahalli	NJY	48	40	2,495	-	-
Feeder-17	BRAZ	F-18 Beedikeri	NJY	32	32	791	1.8	49%
Feeder-18	CTAZ	AB Hatti	NJY	55	51	1,926	3.4	80%
Feeder-19	CTAZ	Haralipura	NJY	36	42	1,718	2.2	20%
Feeder-20	CTAZ	F-08 KIADB	Industrial	29	29	30	2.4	24%

Source: Data collected from DISCOMs

Figure 7: DT Meter burnt out (MBO)

Figure 8: Meter not connected

Figure 9: DT meter placed high

Figure 10: DT location inaccessible

4) Operation and maintenance (O&M) issues

The survey indicated that many feeders are facing severe O&M issues. The section offices did not maintain records on the regular inspection of any of the 20 feeders surveyed. There was no periodic inspection to record the status of transformers. The feeder service lines and DTs were attended to, only when a fault occurred, through complaint-based maintenance. Some of these issues are explained below:

a) *Trees and bushes on transformers, poles, and overhead lines:* Figure 11, Figure 12, and Figure 13 show plants and bushes growing near a transformer, poles, and overhead electrical lines. Overhead lines are usually not protected by insulation, so anything coming in contact with or even close to an overhead line would become a direct pathway for an electric current, which could result in electrocution, injuries, and power outages. The survey revealed that 65% (13/20) of the feeders had issues relating to poor maintenance, which could lead to safety and reliability problems. Such issues were not observed in the remaining 35% feeders.

Figure 11: Transformer covered with trees and creepers

Figure 12: Overhead lines covered with bushes

Figure 13: Poles covered with bushes

b) *Poor maintenance of DT meters:* Figure 14, Figure 15, Figure 16, and Figure 17 illustrate the poor conditions of both meters and current transformer (CT) boxes of DTs. It was observed that 40% (216/542) of DT meters were not well-maintained, with issues such as meter not connected and current transformer (CTs) burnt out. In a few cases, even the newly installed meters were infested with rats and birds' nests.

Figure 14: Poor condition of DT meter

Figure 15: Burnt out connection in CT box

Figure 16: Rat inside the meter

Figure 17: Poor condition of meter box and faulty meter

c) *Poor maintenance of distribution network infrastructure:* Inadequate network maintenance leads to additional cost for DISCOMs, due to the frequent replacement of assets; it is also one of the reasons for high technical losses in the system. As per Central Electricity Authority (CEA) technical standards for construction of electrical plants and electric lines (CEA, 2018), a single-phase DT with a capacity of 25 KVA should be installed on a single-pole / 2-pole structure and 3 Phase DTs up to a capacity of 500 KVA on 2-pole (H-pole) or 4-pole structures or on a plinth. The two-pole structure (H-type pole configuration) helps locate DTs at a certain minimum height from the ground level to meet the ground clearance (around 3 meters by 2 meters (on ground) around the H-pole structure). This area should be provided with suitable fencing and lockable doors to prevent unauthorised access to the distribution box. The structures should also be provided with anti-climbing devices and a warning sign. However, we observed several discrepancies during our study. In an urban feeder, the distribution box (Figure 18) was placed on the ground, and the ground clearance was not met in this case. Additionally, we observed that 247 of the total 748 DTs do not conform to the CEA technical standards.

Figure 18: DT control box placed on ground

Figure 19: Broken pole

Figure 19 shows a broken pole that could lead to long hours of supply interruption and also acts as a safety hazard.

d) *Absence of street-light meters:* As per a Forum of Regulators (FOR) report (Forum of Regulators (FOR), 2009), all street lights were to be installed with meters to accurately assess their consumption. Further, in 2012, Karnataka Electricity Regulatory Commission (KERC) issued directions to all Karnataka DISCOMs to install electronic timer switches for street-lights so as to switch them 'on or off' at the required timings. However, of the 90 villages visited during the field survey, we saw that 36 villages were not yet installed with street-light meters and timer switches. In a few villages, street lights were hooked up in the middle of the line and switched on during the day as well (Figure 20). In the absence of control switches, it leads to unaccounted energy consumption and loss of revenue for DISCOMs.

Figure 20: Unmetered street lights

5. Lack of boundary meters

As per the FOR report (Forum of Regulators (FOR), 2009), boundary meters should be installed at every transition point for 11 kV feeders. The field survey revealed that Feeder-17 was supplying energy to more than one subdivision (Figure 21). In the absence of boundary meters, the amount of energy exported to each subdivision by the same feeder cannot be determined. This would lead to double accounting of energy exported by the feeder and inaccurate apportionment of energy between subdivisions having the same feeder.

Figure 21: SLD of a feeder supplying energy to two subdivisions

6. Feeder changeover process

The survey revealed that due to issues such as overloading and cable faults, DTs are shifted from one feeder to another. After the changeover process, there is no mechanism currently in place to update the number of DTs shifted on the feeder. This results in inaccurate energy auditing due to mismatch in the tagging of the shifted DTs.

7. Inaccurate master-database management (MDM)

DISCOM officials informed that some of the DTs were installed with thread-through meters[7], which had in-built current-measuring elements. The meters could be accessed remotely, through a central server (MDM) located in the corporate office. In order to avoid tampering, some of these DT meters were placed at an inaccessible location. 146 DTs (of 366 DTs) were found to be installed with the thread-through meters and were placed high. So, we took readings from the central server located in the corporate office. The following issues were revealed on analysing the server data:

a. We observed a few cases of inaccurate tagging of DTs to feeders even in the online-portal data. For instance, Feeder-2 (Malali) has 41 DTs with thread-through meters. However, the online-portal data showed only 25 DTs tagged to this feeder. The remaining 16 DTs were tagged to a different feeder.
b. In one of the surveyed feeders (Feeder-3, Gundegala feeder), we found that only a few DTs associated with a feeder were installed with thread-through meters. The feeder had 35 DTs associated with it. Of these DTs, 26 DT meters were recording online and 9 were manual meters. The purpose of installing thread-through meters was to conduct efficient energy audit through the availability of real-time online data. The manual recording of 9 DTs could result in mismatch in the time synchronisation of readings.

[7] "A thread-through meter is an integrated meter with built-in current measuring elements, thus eliminating the need for external CTs, enclosures, and other accessories. It has advanced revenue protection features and supports interoperable distribution lifecycle management system (DLMS) communication protocol". ('Secure Prodigy Meter, 415 V', 2019)

c. The central server was expected to provide real-time consumption of the DTs at any given time. The analysis revealed that the real-time data acquisition was not accurate because the readings were for the previous day but the time displayed was of the current instant.
d. Similar tagging issues were observed in Feeder-15, Feeder-18, and Feeder-19, wherein the DT codes for the online data and the field data were inconsistent. The DT pole was provided with Distribution Transformer Lifecycle Management System (DTLMS) code, while the online data had Transformer information and Management System (TIMS) code, which made it difficult to tally the two readings (field and online). The officials informed us that the meter serial number on the DT meters could be used for tallying the readings. However, we found that the same meter serial number was displayed for two different DTs. For instance, meter serial number 3005620 for a DT in Feeder-19 was displayed for a DT with TIMS code 161010602145 (DT capacity 25 KVA) in October 2018, while the same meter serial number was being displayed for a DT with TIMS code 161010602027 (DT capacity 100 KVA) in November 2018.

8. Lack of availability of single-line diagram (SLD)

During the survey, we found that 40% (8/20) of the surveyed feeders did not have SLDs. Even when available (for the remaining feeders), the SLDs were not updated. So, some of the DTs could not be located. Moreover, SLDs were not updated to reflect the replacement or augmentation of failed or old DTs. For instance, in the SLD of Feeder-1, a DT with a capacity of 25 KVA was displayed, while our survey revealed the DT capacity to be 63 KVA.

9. Metering issues

During the survey, we found that a few consumer installations were unmetered while drawing energy from the network through direct connections (Figure 22). This would lead to unaccounted energy consumption for DISCOMs, adding to their AT&C losses. Further, we observed that a large number of electromechanical meters are still in use in rural areas, which should be replaced by electronic meters.

Figure 22: Installation with direct connection (without meter)

10. Theft

In a few cases, we found that consumers engage in theft and illegal connection/tapping of the LT lines. Most theft cases were observed in NJY feeders as compared to the urban feeders (Figure 23). Of the total surveyed feeders, one NJY feeder was found to be supplying energy to IP feeders. We also noticed that a few other NJY feeders were feeding the partial load of IP sets to avoid the overloading of the IP feeder. Figure 24 shows an IP set connected illegally to an NJY feeder.

Figure 23: Theft cases observed in various feeders

Figure 24: Illegal connection of IP set to NJY feeder

References

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Annexure 1

Functions of the subdivision office

- Sanctioning service connections
- Approving maintenance works
- Monitoring consumer complaints pertaining to power supply in terms of its quality, interruption, and other technical matters, as well as bill-related issues
- Proposing augmentation works
- Billing the consumers in its jurisdictional areas
- Collecting bills from consumers as per the terms and conditions of supply
- Maintaining consumers' accounts in a prescribed manner
- Integrating men, material, and special labour to execute maintenance works
- Initiating disciplinary actions to prevent the theft of power.

Functions of the section office

- Changing the ownership of existing connections
- Shifting meters for consumers
- Revising connected loads on the request of consumers
- Approving temporary extensions of supply
- Disconnecting and reconnecting supply
- Implementing changes in tariff
- Maintaining high-tension (HT) and low-tension (LT) lines, transformer maintenance, removal of touching and over hangings in HT/LT lines, etc.
- Replacing faulty meters, HT/LT damaged poles and constructing overhead lines for service connections