

ANNUAL ENERGY AUDIT REPORT



Designated Consumer



**Meghalaya Power Distribution Corporation Limited
(MePDCL)**

Lum Jingshai, Short Round Road, East Khasi Hills
Shillong– 793001

(Meghalaya)

FY 2022 -23

Conducted by



A-Z Energy Engineers Private Limited

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List of Abbreviations

AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AT&C	Aggregate Technical and Commercial
BEE	Bureau of Energy Efficiency
ckt	Circuit
CT	Current Transformer
DC	Designated Consumer
DEEP	Discovery of Efficient Electricity Price
DISCOM	Electricity Distribution Company
DT	Distribution Transformer
EA	Energy Auditor
EHT	Extra High Tension
EHV	Extra High Voltage
EM	Energy Manager
FY	Financial Year
HT	High Tension
HVDS	High Voltage Distribution System
KVA	Kilo Volt Ampere
LT	Low Tension
MoP	Ministry of Power
MU	Million Units
MW	Mega Watt
NO	Nodal Officer
OA	Open Access
PoC	Point of Connection
PT	Potential Transformer
PX	Power Exchange
RE	Renewable Energy
RLDC	Regional Load Dispatch Centre
SDA	State Designated Agency
SLD	Single Line Diagram
SLDC	State Load Dispatch Centre
T&D	Transmission and Distribution

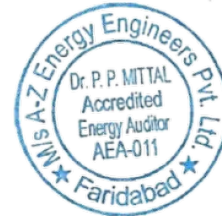
Acknowledgement

We would like to express our heartfelt gratitude to the Meghalaya Power Distribution Corporation Limited (MePDCL), Shillong for providing us with the opportunity to conduct the Energy Audit of their DISCOM for FY 2022-23, in accordance with the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit in electricity distribution companies) Regulations, 2021 and its Amendments.

We are immensely grateful to the management of Meghalaya Power Distribution Corporation Limited (MePDCL), Shillong, for their invaluable cooperation and providing us with all the relevant information necessary for the successful completion of the Annual Energy Audit.

We also extend our sincere thanks to the entire working group, especially to Sh. Sanjay Goyal- CMD, Sh. P. Sahkhar-Chief Engineer (PMC) and Sh. Santanu Mandal- Energy Manager (EM), for their immense support and assistance throughout the audit process.

We look forward to a continued partnership with Meghalaya Power Distribution Corporation Limited (MePDCL), Shillong, and we express our gratitude for their continued support in all our future endeavours.



Signature 

Name: Dr. P.P Mittal

Designation: Director

Registered No: AEA-011

Firm: A-Z Energy Engineers Pvt. Ltd.

1. Executive Summary

At present, the MePDCL is spread over an area of 22,000 sq. km that is divided into seven (7) power distribution circles, namely West Garo Hills, East Garo Hills, Khasi Hills, Jaintia Hills, Ri-Bhoi, Shillong, and Tura. These distribution circles have been strategically divided to cover eleven (11) districts present within the state. After preliminary stakeholder interaction with utility officials of the respective circles, data collection was carried out to collect the data required for further study. Using the data collected, AT&C loss level computation was carried out. It was observed from our field survey that lack of metering, longer line lengths, malfeasance practices, and lack of database management were the key and preliminary factors behind the high losses.

While the Input Energy purchase, Net Input energy at DISCOM Periphery and Energy billed for the customer is 2905.05 MU, 2127.18 MU and 1781.42 MU, the monthly consumption per customer stands at 217.66 KWH/Month. MePDCL caters to area spread in 7 circles, 17 Division.

1.1. Goals and Objectives

MePDCL is a designated consumer in Discom sector. Being a designated Consumer MePDCL need to have Annual energy audit (Accounting) of their facilities as per BEE notification No 18/1/BEE/Discom/2021 dated 6th October 2021.

The Annual Energy Audit (Accounting) at MePDCL is conducted with the following Objectives:

- Verification of existing pattern of energy distribution across periphery of electricity Distribution Company.
- Verification of accounted energy flow submitted by electricity Distribution Company at all applicable voltage levels of the distribution network.
- Verification of the accuracy of the data collected and analyses and processes the data with respect to consistency, improvement in accounting and reducing loss of DISCOM.
- Verification of the information submitted by DC to the SDA/BEE about status of energy input, Output and loss for the previous two year.
- Access the past performance of the establishment.
- Quantification of Energy Losses, and Energy Saving Potential.

1.2. About Energy Audit firm

A-Z Energy Engineers Pvt. Ltd. is an Accredited Energy Auditor from BEE and an ISO 9001:2015 certified company that aims to assist all stakeholders in implementing energy efficiency and creating awareness about the merits of energy efficiency and safety practices. They are empanelled by BEE for PAT M & V Audits and Mandatory Energy Audit

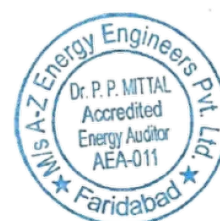
Projects and have completed more than 1500 projects, including 52 PAT projects. The founder Director, Shri. Dr PP Mittal, has received several awards and recognitions for his services in the field of energy. We have a pool of experienced BEE Accredited & Certified Energy Auditors, Electrical Engineers, Mechanical Engineers and Technicians having experience of more than 30 years. The Energy Audits is being carried out with sophisticated instruments namely Power-Analyzer, Flue Gas Analyzer, Ultra-sonic flow meter, Techo-meter, Anemometer, Hego-Meter, Digital Thermometer, Thermographic Camera's, Lux Meter, Leak detectors. Laser gun etc.

1.3. AT&C losses for FY 2022-23

Meghalaya Power Distribution Corporation Limited (MePDCL), is a state-owned electric utility company headquartered in Shillong, Meghalaya, India. Meghalaya Power Distribution Corporation Limited (MePDCL), distributes electricity from the end point of transmission to the end consumers. The AT&C losses for FY2022-2023 are 25.31% & the Distribution loss of the sector is 16.25%. The AT&C losses for the FY 2022-23 are shown in the table below:

Table 1: Energy Balance & Losses for FY 2022-23

Energy Input Details	Formula	UoM	Value
Input Energy Purchase (From Generation Source)	A	MU	2905.00
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	2127.18
Total Energy billed (is the Net energy billed, adjusted for energy traded))	C	MU	1781.42
Transmission and Distribution (T&D) loss Details	D	MU	345.77
	$E = D/B \times 100$	%	16.25%
Collection Efficiency	F	%	89.19%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1-E) \times \text{Min}(F, 100\%)\}$	%	25.31%



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2. Background

2.1. Extant Regulations and role of BEE

2.1.1. The Objectives of BEE

- To develop policies and programmes on efficient use of energy and its conservation with the involvement of stakeholders.
- To plan, manage and implement energy conservation programmes as envisaged in the EC Act.
- To assume leadership and provide policy framework and direction to national energy efficiency and conservation efforts and programmes.
- To demonstrate energy efficiency delivery mechanisms, as envisaged in the EC Act, through Public-Private Partnership (PPP).
- To establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at the national level.
- To leverage multi-lateral, bi-lateral and private sector support in implementation of programmes and projects on efficient use of energy and its conservation.
- To promote awareness of energy savings and energy conservation.

2.1.2. Role of BEE

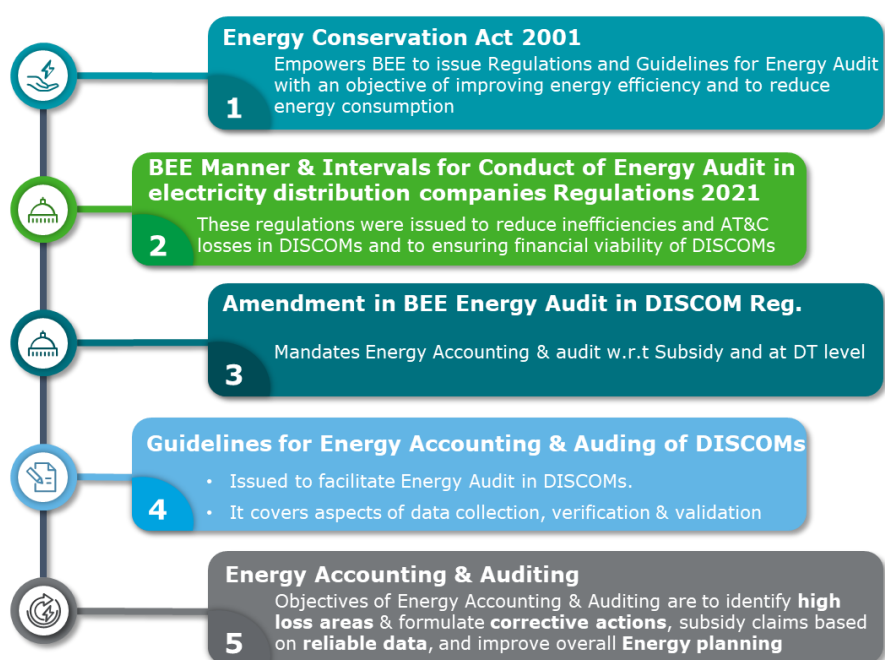
- BEE coordinates with designated agencies, designated consumers and other organization working in the field of energy conservation/efficiency to recognize and utilize the existing resources and infrastructure in performing the functions assigned to the Bureau under the Energy Conservation Act.
- The Act provides regulatory mandate for: standards & labeling of equipment and appliances; energy conservation building code for commercial buildings; and energy consumption norms for energy intensive industries.
- The EC Act was amended in 2010 to incorporate few additional provisions required to better equip BEE to manage ever evolving sphere of energy efficiency in the country.
- Create awareness and disseminate information on energy efficiency and conservation.
- Arrange and organize training of personnel and specialists in the techniques for efficient use of energy and its conservation.
- Strengthen consultancy services in the field of Energy Efficiency.
- Promote research and development.
- Develop testing and certification procedures and promote testing facilities.
- Formulate and facilitate implementation of pilot projects and demonstration projects.
- Promote use of energy efficient processes, equipment, devices and systems.

- Take steps to encourage preferential treatment for use of energy efficient equipment or appliances.
- Promote innovative financing of energy efficiency projects.
- Give financial assistance to institutions for promoting efficient use of energy and its conservation.
- Prepare educational curriculum on efficient use of energy and its conservation.
- Implement international co-operation programmes relating to efficient use of energy and its conservation.

2.1.3. Regulatory framework for Energy Accounting & Audit

The Energy Conservation Act 2001 (hereafter referred to as EC Act 2001) was enacted on 29th September 2001. The EC Act 2001 empowers BEE to notify regulations regarding energy conservation and efficiency improvement. In accordance with the EC Act 2001, BEE notified the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit) Regulations, 2021, on 6th October 2021. BEE subsequently amended these regulations with the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit) (Amendment) Regulations, 2022. The Ministry of Power (MoP) issued guidelines on 17th January 2023, for energy accounting and auditing of distribution companies, in line with the BEE regulations. Distribution companies and energy audit firms must comply with this regulatory framework when preparing energy accounts and audit reports. The regulatory framework for Energy accounting and Energy Auditing is shown in the below figure:

Figure 1: Regulatory framework for Energy Accounting & Audit



Key highlights of the Regulatory framework are listed below:

- Bureau of Energy Efficiency (BEE) through Ministry of Power, Government of India issued regulations for Conduct of Mandatory Annual Energy Audit and Periodic Energy Accounting in DISCOMs. As per the regulation, all Electricity Distribution Companies are mandated to conduct annual energy audit and periodic energy accounting on quarterly basis.
- Owing to the impact of energy auditing on the entire distribution and retail supply business and absence of an existing framework with dedicated focus on the same, it was imperative to develop a set of comprehensive guidelines that all Distribution utilities across India can follow and adhere to.
- Accordingly, Regulations on Manner and Intervals for Conduct of Energy Audit and Accounting in Electricity Distribution Companies has been framed. Energy Accounting means accounting of all energy inflows at various voltage levels in the distribution periphery of the network, including renewable energy generation and open access consumers, and energy consumption by the end consumers. Energy accounting and a consequent annual energy audit would help to identify areas of high loss and pilferage, and thereafter focus efforts to take corrective action.
- These Regulations for Energy audit in Electricity Distribution Companies provides broad framework for conduct of Annual Energy Audit though and Quarterly Periodic Energy Accounting with necessary Pre-requisites and reporting requirements to be met.
- The Central Government may issue the energy savings certificate to the designated consumer whose energy consumption is less than the prescribed norms and standards in accordance with the procedure as may be prescribed.
- The designated consumer whose energy consumption is more than the prescribed norms and standards shall be entitled to purchase the energy savings certificate to comply with the prescribed norms and standards
- The Central Government may, in consultation with the Bureau, prescribe the value of per metric ton of oil equivalent of energy consumed

2.2. Purpose of audit and accounting Report

MePDCL is a designated consumer in Discom sector. Being a designated Consumer MePDCL need to have Annual energy audit (Accounting) of their facilities as per BEE notification No 18/1/BEE/Discom/2021 dated 6th October 2021.

The energy intensity of India is higher with respect to GDP growth and there is an urgent need to address these issues on priority through integrated and comprehensive approach and by adopting latest techniques and technologies with active participation of all stakeholders.

Sensing the need of the hour Government of India initiated a mechanism for all energy intensive large industries and facilities (designated consumer) known as PAT Scheme

which is "A market-based mechanism to enhance cost effectiveness of improvements in energy efficiency in designated consumers, through certification of energy savings that could be traded."

Annual Energy audit (Accounting) will not only help in reducing losses in system, but it also helps DISCOM in sustainable growth. The objective of this energy audit is to reduce T&D loss and AT&C loss of the DISCOM through identification of commercially viable and implementable scheme for reduction of technical and commercial loss in the DISCOM thus leading to sustainable energy cost reductions.

The Annual Energy Audit (Accounting) at MePDCL is conducted with the following Objectives:

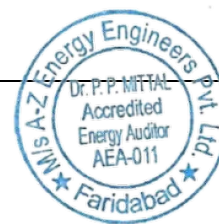
- Verification of existing pattern of energy distribution across periphery of electricity Distribution Company.
- Verification of accounted energy flow submitted by electricity Distribution Company at all applicable voltage levels of the distribution network.
- Verification of the accuracy of the data collected and analyses and processes the data with respect to consistency, improvement in accounting and reducing loss of DISCOM.
- Verification of the information submitted by DC to the SDA/BEE about status of energy input, Output and loss for the previous two year.
- Access the past performance of the establishment.
- Quantification of Energy Losses, and Energy Saving Potential.

2.3. Period of Energy Auditing and accounting

Energy audit activity was started with a meeting at Head Office of MePDCL in the month of Aug. 2023. Based on the requirement visit was made to Division, Subdivision, Grid & Substation etc. for data collection and technical discussion. The period of study was from April 2022 to March 2023. The quarter wise report has been updated as per the DF consumers.

Table 2: Period of Energy Auditing and accounting

Particulars	Energy Accounting				Energy Audit
	Q1	Q2	Q3	Q4	FY 2022-23
Applicable period	1-Apr-22 to 30-Jun-22	1-Jul-22 to 30-Sep-22	1-Oct-22 to 31-Dec-22	1-Jan-23 to 31-Mar-23	1-Apr-22 to 31-Mar-23
Date of Commencement	8-Feb-2023	22-Feb-2023	20-Mar-2023	3-July-2023	
Date of Publishing	8-Feb-2023	28-Feb-2023	23-Mar-2023	3-July-2023	
Officer In charge	Shri. P.Sahkhar (Chief Engineer PMC)				Dr. P P Mittal [AEA 0011] Registration No: EmAEA-0024



3. DISCOM Introduction and Overview

3.1. Name and address of DISCOM

MePDCL (Meghalaya Power Distribution Corporation Limited) is having its corporate office at Lum Jingshai, Short Round Road, Shillong- 793001 (Meghalaya)

Table 3: Name and Address of DISCOM

Particulars	Details
Name of DC	Meghalaya Power Distribution Corporation Limited
Address	Lum Jingshai, Short Round Road, Shillong- 793001 (Meghalaya)

3.2. Name and contact details of energy manager (BEE Certified, if any) and Authorized signatory of DISCOM (Nodal Officer)

The Energy Accounting/Audit wing is headed by Mr. P. Sahkhar (Chief Engineer PMC) and Mr. Santanu Mandal (EM) is a BEE certified Energy Manager is leading the energy accounting activities in MePDCL. The details of DISCOM's energy manager and authorized signatory for this report are shown below:

Table 4: Details of energy manager and Authorized signatory of DISCOM

Particulars	Details
Energy Manager	Shri. Santanu Mandal Energy Manager EA-23306 Mobile: 9851628686 Email: cem.meecl@gmail.com
Authorized Signatory	Shri. P. Sahkhar Chief Engineer (PMC) Mobile: 9863074990 Email: cemoneva.meecl@gmail.com

3.3. Summary profile of DISCOM

3.3.1. Jurisdiction of DISCOM

The Meghalaya Energy Corporation Ltd. (MeECL) is a Government Company within the meaning of section 45 of the Companies Act, 2013, wholly owned by the Government of Meghalaya, incorporated under the Companies Act, 2013 in the year 2009 and inherited its business from the erstwhile Meghalaya State Electricity Board (MeSEB) in the year 2010. It has wholly owned three subsidiary Companies namely, Meghalaya Power Generation Corporation Ltd. (MePGCL), Meghalaya Power Transmission Corporation Ltd. (MePTCL) and Meghalaya Power Distribution Corporation Ltd. (MePDCL) responsible for Generation, Transmission and Distribution of Electricity respectively throughout the State as State Utilities.

The erstwhile Meghalaya State Electricity Board (MeSEB) was formed in the year 1975 after the formation of new State of Meghalaya from undivided State of Assam. The first Hydro Electric project in Meghalaya had started its operation in the year 1921, thereafter different Hydro Electric projects are being constructed throughout the State of Meghalaya utilising the natural water resources, efficient and experienced engineering wing and beautiful working environment of the State. MePDCL caters to area spread in 7 circles, 17 Division.

3.3.2. Energy Accounting/Audit wing in the DISCOM:

The Energy Accounting/Audit cell in the DISCOM has been established on 16-06-22. The Organogram of the DISCOM is as shown below:

Figure 2: Organogram of Energy accounting cell in the DISCOM

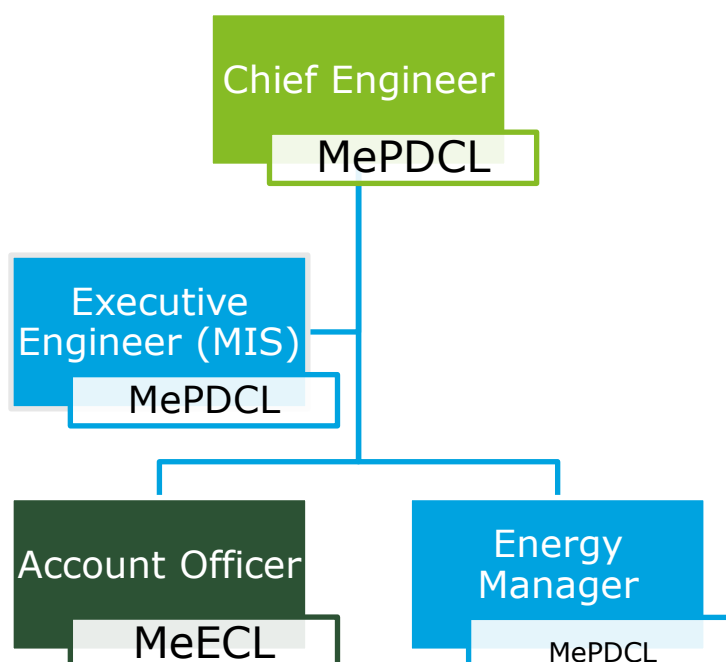


Table 5: Details of energy manager and Authorized signatory of DISCOM

Designation	Name of Officers
Chief Engineer (PMC), Commercial	Shri. P.Sahkhar
Executive Engineer (MIS)	Smti. S. Rymbai
Accounts Officer	Shri. A. Myllemngap
Energy Manager	Shri. S. Mandal

3.3.3. Administrative hierarchy

MePDCL is having its corporate office at Lum Jingshai, Short Round Road, Shillong, Meghalaya and has 7 Circles. These Circles are further divided into Divisions, Sub-Divisions and Sections as shown in the below tables.

Table 6: Administrative hierarchy structure in MePDCL

Parameters	Total
Number of circles	7
Number of divisions	17
Number of sub-divisions	54

The Circles are further divided into Divisions, Sub-Divisions and Sections as shown in the table below:

Table 7: Administrative hierarchy in MePDCL upto section level

Sub-Zone	Circle	Division	Sub-division	
Addl. Chief Engineer	Superintendent Engineer	Executive Engineer	Asst. Executive Engineer	
Central Zone	Shillong Distribution Circle	Shillong (East) Distribution Division	Nongthymmai DSD	
			Lapalang DSD	
			New Shillong DSD	
		Shillong (West) Distribution Division	Mawlai DSD	
			Upper Shillong DSD	
			Umlyngka DSD	
		Shillong Central Distribution Division	Umjarain DSD	
			Central DSD	
			Polo DSD	
	Mawprem DSD			
	Khasi Hills Distribution Circle		East Khasi Hills Distribution Division	Mawryngkneng DSD
				Pynursla DSD
		Cherra DSD		
		Sohiong DSD		
	West Khasi Hills Distribution Division	Mairang DSD		
		Nongstoin DSD		
		Riangdo DSD		
	South Khasi Hills Distribution Division	Mawkyrwat DSD		
Mawsynram DSD_DF				
Eastern Zone	Ri-Bhoi Distribution Circle	Umiyam Distribution Division	Umiyam DSD	
			Umsning DSD	
			Umiyam Rural DSD	

Sub-Zone	Circle	Division	Sub-division
		Nongpoh Distribution Division	Nongpoh DSD
			Nongpoh Rural DSD
			Patharkhmah DSD
		Byrnihat Distribution Division	Byrnihat DSD-I
			Killing DSD
			Byrnihat DSD-II
	Jaintia Hills Distribution Circle	Khliehriat Distribution Division	Sutnga DSD
			Khliehriat DSD
		Jowai Distribution Division	Jowai DSD
			Amlarem DSD
		Jowai Rural Distribution Division	Shangpung DSD
			Khliehtyrshi DSD
Western Zone	Tura Distribution Circle	Tura Distribution Division	Tura (West) DSD
			Tura (East) DSD
			Tura (North) DSD
	East Garo Hills Distribution Circle	South Garo Hills Distribution Division	Baghmara DSD
			Nangalbibra DSD_DF
			Chokpot DSD
		East Garo Hills Distribution Division	Williamnagar DSD
			Mendipathar DSD
			Bajengdoba DSD
			Songsak DSD (non-functional)
			Kharkutta DSD

Sub-Zone	Circle	Division	Sub-division
	West Garo Hills Circle	West Garo Hills Distribution Division	Dalu DSD_DF
			Dadengre DSD
			Tikrikilla DSD (non-functional)
			Phulbari DSD_DF
		South-West Garo Hills Distribution Division	Selsella DSD
			Garobadha DSD
			Ampati DSD
			Mahendraganj DSD

3.3.4. Consumer Details

Energy consumption with type of customer is given in the table:

Table 8: Customer Profile for FY 2022-23

Category	No. of Connections		Connected Load		Energy		Billed Amount in Rs. Crore	Collected Amount in Rs. Crore
	Nos	%	MW	%	MU	%		
Residential	639988	93.8%	740.185	61.3%	591.31	33.2%	302.08	267.39
Agricultural	22	0.0%	0.105	0.0%	0.19	0.0%	0.05	0.05
Commercial/Industrial-LT	38051	5.6%	107.509	8.9%	102.61	5.8%	73.29	71.77
Commercial/Industrial-HT	456	0.1%	273.217	22.6%	945.12	53.1%	591.91	522.04
Others	3516	0.5%	85.765	7.1%	142.18	8.0%	113.02	102.30
Total	682033	100%	1206.781	100%	1781.42	100%	1080.35	963.54

3.4. Electrical infrastructure and assets voltage wise

The following table provides the details of network infrastructure owned by MePDCL:

Table 9: Network Infrastructure details

Asset	Particulars	Unit	FY20-21	FY21-22	FY22-23
66 kV and above	66/ 11 kV Sub station	Nos			
	66 kV Feeders	Nos			
	66 kV Line	Ckt. km			
33 kV	33/ 11 kV Sub station	Nos			116
	33 kV Feeders	Nos	180		184
	33 kV Line	Ckt. km	2524.14		2685.155
11 kV	11 kV Feeders	Nos	365	367	374
	11 kV Overhead Line	Ckt. km	17815.04	19683.13	19715.32
	11 kV Underground Line	Ckt. km		1.86	1.86
LT	LT Line	Ckt. km	27120.92	31756.52	31603.472

Asset	Particulars	Unit	FY20-21	FY21-22	FY22-23
PTR	Power Transformer	Nos			
	Power Transformer Capacity	MVA			
DTR	Distribution Transformer	Nos	12405	12853	13137
	Distribution Transformer Capacity	KVA			922896.5

The Input energy, consumption, transmission losses and key infrastructure details of the MePDCL are summarized in table below:

Table 10: Input Energy & Infrastructure details

Parameters	FY 2022-23
Input Energy purchased (MU)	2905.00
Transmission loss (%)	3%
Transmission loss (MU)	81.966
Energy sold outside the periphery (MU)	653.358
Open access sale (MU)	42.495
EHT sale	0
Net input energy (received at DISCOM periphery or at distribution point)-(MU)	2127.18
Is 100% metering available at 66/33 kV (Select yes or no from list)	Yes
Is 100% metering available at 11 kV (Select yes or no from list)	No
% of metering available at DT	29%
% of metering available at consumer end	97%
No of feeders at 66kV voltage level	0
No of feeders at 33kV voltage level	198
No of feeders at 11kV voltage level	345
No of LT feeders level	0
Line length (ckt. km) at 66kV voltage level	0
Line length (ckt. km) at 33kV voltage level	2797.4
Line length (ckt. km) at 11kV voltage level	17697.98
Line length (km) at LT level	29384.128
Length of Aerial Bunched Cables	0
Length of Underground Cables	1.86
HT/LT ratio	0.697

3.4.1. Metering details

The status of meters installed in MePDCL as on 31-03-2023 are given in the below tables:

Table 11: Voltage wise Meter Consumers

Parameters	>66kV	33kV	11/22kV	LT
Number of conventional metered consumers	11	43	702	566450
Number of consumers with 'smart' meters	0	0	106	80226
Number of consumers with 'smart prepaid' meters	0	0	0	1204
Number of consumers with 'AMR' meters	0	0	0	
Number of consumers with 'non-smart prepaid' meters	0	0	0	14381
Number of unmetered consumers	0	0	0	18910
Number of total consumers	11	43	808	681171

3.4.2. Distribution Transformer (DT) details

The details of distribution transformers in MePDCL as on 31-03-2023 are given in the below tables:

Table 12: Numbers of Distribution Transformers

Parameters	>66kV	33kV	11/22kV	LT
Number of conventionally metered Distribution Transformers	36	198	3938	
Number of DTs with communicable meters				
Number of unmetered DTs			9430	
Number of total Transformers	36	198	13368	

3.4.3. Feeder details

The details of feeders in MePDCL as on 31-03-2023 are given in the below tables:

Table 13: Voltage wise numbers of Feeders

Parameters	>66kV	33kV	11/22kV	LT
Number of metered feeders		196	293	
Number of feeders with communicable meters		0	0	
Number of unmetered feeders		0	52	
Number of total feeders	0	196	345	

3.4.4. Distribution Line details

The details of distribution lines in MePDCL as on 31-03-2023 are given in the below tables:

Table 14: Length of Distribution Lines

Particulars	Value(km)
Line length(ctkm)	29384.128 (LT line)+17697.98 (11 kV line)+2797.40 (33kV line)
Length of Aerial Bunched Cables	
Length of Underground Cables	1.86

3.4.5. Energy Flow details

Energy flow details for FY 2022-23 are given in the below table:

Table 15: Energy Flow details

EnergyInput Details	Formula	UoM	Value
Input Energy Purchase (From Generation Source)	A	MU	2905.00
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	2127.18
Total Energy billed (is the Net energy billed, adjusted for energy traded)	C	MU	1781.42
Transmission and Distribution (T&D) loss Details	D	MU	345.77
	$E = D/B \times 100$	%	16.25%

3.4.6. Pattern of energy distribution

Power Purchase:

During the analyzed period, MePDCL purchased a maximum energy of 293.16 million units (MUs) in September 2022, while the least energy of 184.86 MUs was purchased in April 2022. This shows that the company's energy purchase varies considerably from month to month irrespective of the seasonal impact.

Energy Billed:

The energy billed by MePDCL showed a minor increasing trend from April 2022 to March 2023, with a slight bump in January 2023. This indicates that the company's energy consumption has increased gradually over the analyzed period.

The chart below shows MePDCL energy purchase pattern from April 2022 to March 2023:

Figure 3: Monthly Energy Input and Energy billed pattern

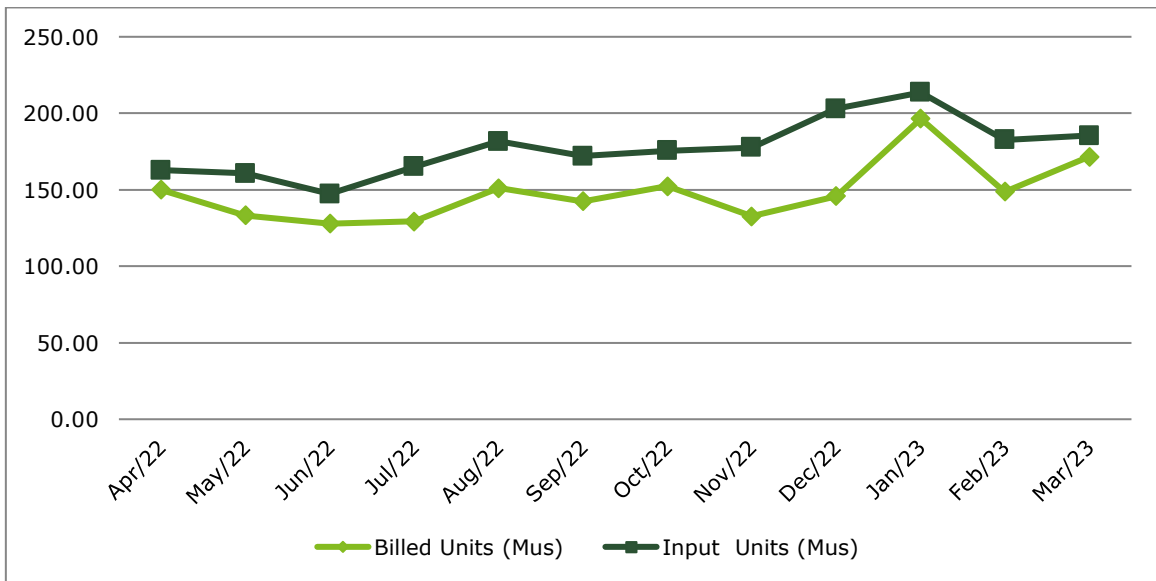
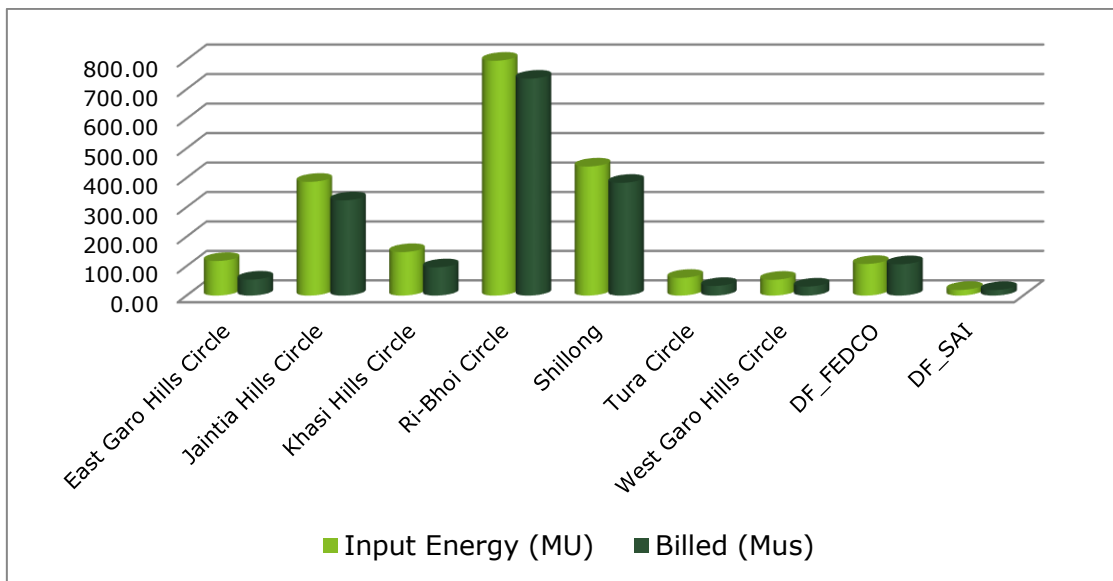


Figure 4: Circle wise Energy Input (MU) and Energy billed (MU) pattern



In conclusion, MePDCL energy purchase pattern shows considerable variation from month to month. While the maximum energy was purchased in September 2022, the least energy was purchased in April 2022. The energy billed shows a minor increasing trend from April 2022 to March 2023, indicating a gradual increase in energy consumption. The chart shows that the energy purchase pattern fluctuates considerably, which may pose challenges for the company in managing its energy supply and demand.

The Month wise break up of input energy (MUs) parameter for all the circle is given below:

Table 16: Month wise Input Energy for FY 2022-23

Particulars	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
East Garo Hills Circle	7.59	8.72	7.40	10.28	10.78	10.30	9.58	9.97	11.62	11.99	9.94	9.29
Jaintia Hills Circle	26.94	26.97	28.44	28.11	35.07	28.12	31.19	31.52	37.94	40.83	35.60	35.67
Khasi Hills Circle	9.50	10.63	10.18	11.34	11.21	10.83	11.67	13.89	16.09	16.03	13.43	12.95
Ri-Bhoi Circle	71.16	64.43	53.90	62.81	69.78	69.26	69.58	63.85	69.40	73.79	62.02	66.94
Shillong	31.16	32.21	31.67	31.38	32.24	31.86	34.10	38.92	45.41	47.91	41.24	40.32
Tura Circle	4.40	4.66	4.66	5.41	5.92	5.37	4.63	4.73	5.57	5.61	4.94	4.18
West Garo Hills Circle	3.67	4.02	3.58	4.89	5.16	5.13	4.53	4.16	4.94	5.10	4.27	4.25
DF_FEDCO	7.05	7.74	6.26	9.24	9.75	9.44	8.77	9.08	10.06	10.49	9.50	9.99
DF_SAI	1.21	1.25	1.27	1.69	1.74	1.65	1.52	1.59	1.84	1.85	1.60	1.85
Grand Total	162.69	160.63	147.36	165.15	181.65	171.96	175.57	177.70	202.88	213.60	182.55	185.45

The Month wise break up of billed energy (MUs) parameter for all the circle is given below:

Table 17: Month wise Billed Energy for FY 2022-23

Particulars	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
East Garo Hills Circle	3.68	3.48	4.07	2.88	3.52	3.54	6.21	4.36	4.83	5.07	5.73	6.85
Jaintia Hills Circle	26.18	23.69	23.15	25.69	27.28	21.10	25.20	20.99	26.58	43.01	24.47	36.23
Khasi Hills Circle	7.72	6.86	6.84	7.32	7.60	7.66	8.02	7.61	8.02	9.78	9.52	8.97
Ri Bhoi Circle	70.26	57.07	52.67	52.77	66.64	66.69	63.28	53.07	56.65	77.38	53.36	66.31
Shillong Circle	29.80	28.46	28.98	25.59	29.27	28.03	34.04	31.32	34.19	43.30	37.88	32.23
Tura Circle	2.46	2.64	2.64	2.57	2.82	1.94	3.38	2.54	2.20	3.39	3.06	3.07
West Garo Hills Circle	2.23	2.08	1.81	1.54	2.28	2.43	1.84	1.98	1.53	1.85	3.99	7.06
DF_FEDCO	6.43	7.77	6.41	9.20	9.84	9.48	8.89	9.20	10.00	10.79	9.20	9.24
DF_SAI	1.21	1.25	1.27	1.69	1.69	1.65	1.52	1.59	1.84	1.85	1.60	1.56
Grand Total	149.97	133.30	127.84	129.24	150.95	142.52	152.39	132.66	145.82	196.42	148.79	171.52

The voltage wise consumption pattern is given below:

Table 18: Voltage wise consumption pattern

Voltage Level	Consumers		Energy Consumption	
	No.	%Share	MUs	%Share
LT	35763	5.24%	92.71	5.20%
HT/EHT	520	0.08%	979.64	54.99%
LT/HT	645750	94.68%	709.06	39.80%
Total	682033	100.00%	1781.42	100.00%

3.4.7. Salient features

MePDCL main objectives are to achieve efficiency gains and make necessary changes to make the company commercially viable, progressively self-sustainable, and less dependent on the government while balancing the interests of consumers with regards to quality of service and economical tariffs.

- To undertake the activities of distribution to all consumers irrespective of the voltage, provision, supply, wheeling, purchase, sale, import, export and trading of electricity, introduce open access in distribution as per the Electricity Act 2003 and/or the directions of the regulator.
- To plan, develop, acquire, establish, construct, erect, lay, hire, lease, buy, sell, operate, run, manage, maintain, enlarge, alter, renovate, modernize, work and use power distribution system network in all its aspects including amongst others various voltage lines and associated sub -stations, including distribution centers, cables, wires, accumulators, plants, motors, meters, apparatus, computers and materials connected with sub -transmission, distribution, supply of electrical energy, ancillary services, telecommunication and telemetering equipments.
- To tender, finalise and execute Power Purchase Agreements and other agreements for sale or purchase of electricity with generating companies, trading companies, other distribution companies, Central and State generating authorities, departments or companies, societies, other States, utilities, Independent Power Producers and other Persons.
- To undertake Rural Electrification schemes in the licensed area.
- Any other work incidental to the objectives & functions of the company.

3.5. Energy Conservation measures

Energy conservation is a critical issue in today's world, as the demand for energy continues to increase while the resources available to produce it are finite. The energy conservation measures that have already been taken and propose some measures for the future are explained below.

Energy Conservation Measures taken by the DISCOM:

Several energy conservation measures have already been implemented to reduce energy consumption and promote sustainable energy use. Some of these measures are:

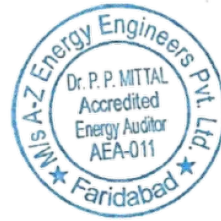
1. MePDCL has reduced their AT & C losses quite appreciably from the FY 2011-12 to FY 2021-22 by the adoption of Technical Loss Management by network up-gradation, installation of power factor controller, network management, regular health monitoring of the assets at all voltage levels, High Voltage Distribution System (HVDS) installation, LED bulb distribution, Commercial Loss Management and Theft Control, conducting in house Energy audit, replacement of old meters with high quality electronic meters, adoption of Automatic Meter Reading System, Smart Street Lighting Management System, LT Aerial Bunched Conductor (ABC) installation, use different types of seals to prevent unauthorized access to service parts etc.
2. Management response for action plan of MePDCL was found to be very positive and MePDCL was agreed upon to implement it with top priority within the target stipulated in pre-requisites of BEE's regulation.
3. Energy-Efficient Lighting: The Company has initiated Ujala scheme for replacement of traditional incandescent bulbs with energy-efficient LED bulbs, which has significantly reduced energy consumption and saved power purchase costs.
4. Energy Management Systems: The Company has implemented energy management systems to monitor and control energy consumption, identify areas of energy waste, and optimize energy usage.
5. Renewable Energy: The Company has increased the use of renewable energy sources, such as solar and mini hydro power, to reduce reliance on fossil fuels and reduce carbon emissions.
6. Energy Audits: Regular energy audits are conducted to identify energy waste and implement measures to reduce it.

Proposed Energy Conservation Measures for the Future:

- A. Installation of 100% metering at distribution transformers, replacement of old electro-mechanical meters with high quality electronic meters, meter Board Renovation, 100% metered supply, automatic Meter Reading System for high value consumers, In house meter testing facility (NABL accredited) to identify defective and faulty meters, starting of Pre-paid metering, implementation of

Smart Street Lighting Management System (SSLMS), installation of LT Aerial Bunched Conductor (ABC), installation of special tamper-evident paper seals in Service cut-out.

- B. 11 kV incomers shall be provided with capacitor bank with suitable capacity.
- C. Irrigation power consumers shall be provided with adequate capacity individual capacitors with their motors to manage the reactive load.
- D. Normal high loss distribution transformers should be replaced with star rating distribution transformer in phase manner.
- E. Normal conventional meter should be replaced with communicable prepaid smart meters.
- F. Augmentation of existing transformers at overloaded segments.
- G. Replacement or strengthening of conductor at overloaded segments is recommended.
- H. Recommended to provide aerial bunch conductor at theft prone area.
- I. Recommended to provide AMR meters for all HT installations.



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4. Energy flow analysis

4.1. Energy flow across 5 Service Levels

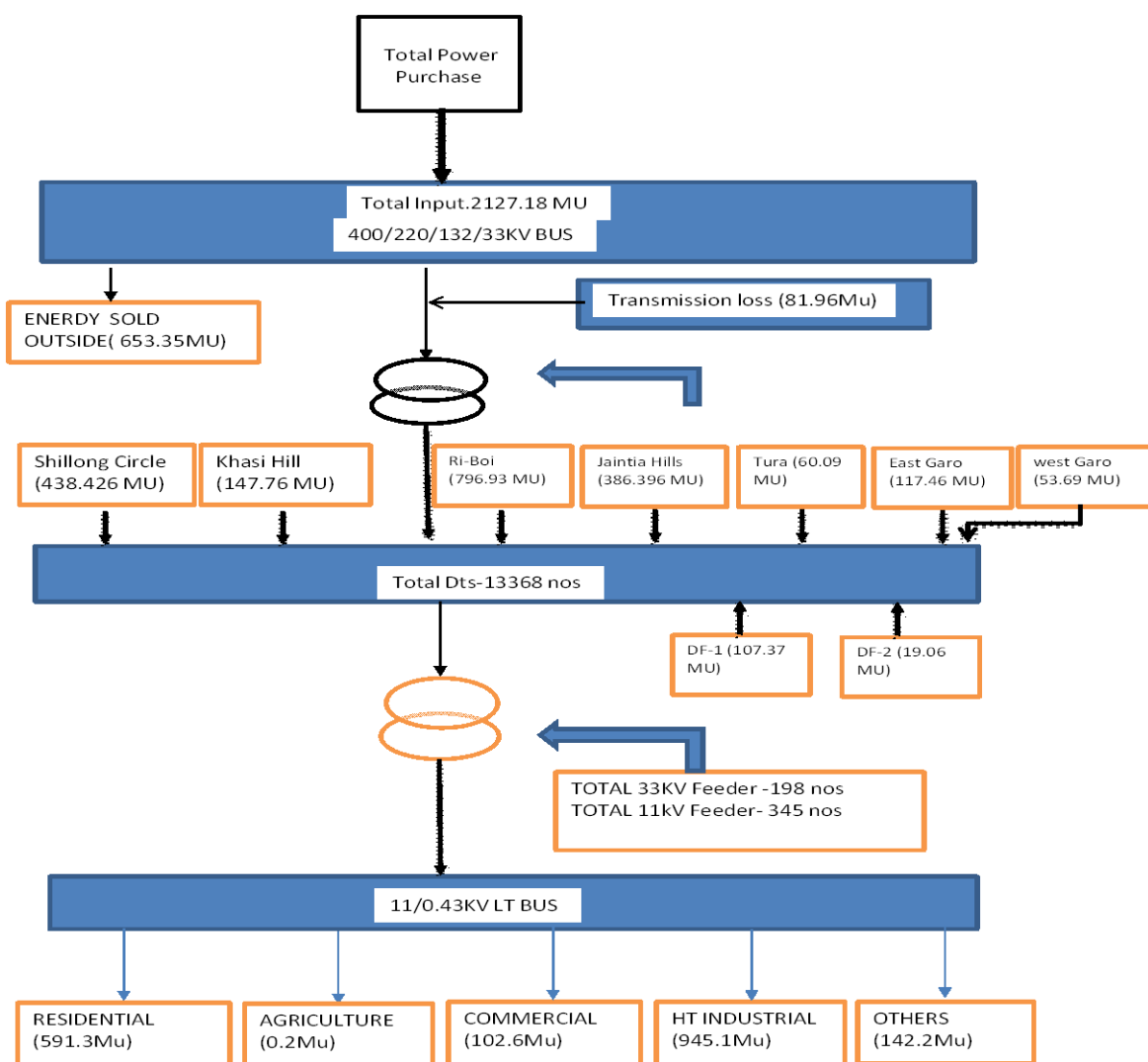
The Energy at different voltage levels and the losses at different levels are shown in below table long term energy, short term energy and renewable energy wise details are given below:

Table 19: Energy Flow at different Voltage level Losses for FY 2022-23

DISCOM		Input (in MU)	Sale (in MU)	Loss (in MU)	Loss %
I	LT	2127.18	1781.42	345.77	16.25%
Ii	11kV				
Iii	33kV				
Iv	>33kV				

ENERGY FLOW DIAGRAM

FY 2022-23



4.2. Validation of metered data

As per SoP validation of meter data must be as per the below criteria. Accordingly, the metered data validated needs to be elaborated.

- a) Validation of feeder data:** Based on data available in 11 kV Feeder meter at substation for a sample size of 10% for which documentary evidence to be captured in the audit report.
- b) Validation of energy flow data and losses:** Based on field survey as per the following sample size:
- Min. 10 or 1% (whichever is higher) of DISCOM's input energy metering points between Transmission and 66/33kV/11kV distribution feeders by checking functional and communication status of meters etc.
 - For all Divisions with AT&C losses greater than 25% or at-least 1/3 of the total Divisions of DISCOM, verify:
 - Total of min. 10 or 1% of metering points (whichever is higher) between 220-132- 110- 66 /33 kV outgoing and 22kV-11kV-6.6kV-3kV incoming feeders/ direct end consumer by checking functional and communication status of meters.
 - In an Urban High Loss Division, check 5 or 1% of Metering points (whichever is higher) at DTs where communicable meters were already installed under other schemes such as R-APDRP and IPDS.
 - Total of min. of 10 or 1% of metering points (whichever is higher) between 11kV/6.6kV feeders and DTs by checking functional and communication status of meters, foot survey of feeder to check for thefts/ hooking etc.
 - Verify metering and connection status of min. of 10 or 2% consumers of the Division (whichever is higher) of the following category of consumers – Agriculture (Metered and Un-metered), Govt. category connection (ULB, RLB etc.), and LT Industrial
- c) Field verification report** of the activities undertaken in a) and b) above to be included as an annexure to the energy audit report.

The Category wise metered consumers and unmetered consumers are shown in below table, As per the consumers details most of the consumers are residential which is 93.84% and the energy share is 33.19% of total consumers and energy, commercial/industrial LT is 5.58% of total consumers and energy share is 5.76% of total billed energy, commercial/industrial HT is 0.07% of total consumers and energy share is 53.05% of total billed energy.

Consumer category	Metered	Un-metered	Total Consumer	% share of Consumer	Metered Energy (MU)	Unmetered Energy	Total Billed Energy (MU)	% Share energy
Residential	621078	18910	639988	93.835%	573.08	18.23	591.31	33.19%
Agricultural	22	0	22	0.003%	0.19	0.00	0.19	0.01%
Commercial/Industrial-LT	38051	0	38051	5.579%	102.61	0.00	102.61	5.76%
Commercial/Industrial-HT	456	0	456	0.067%	945.12	0.00	945.12	53.05%
Others	3516	0	3516	0.516%	142.18	0.00	142.18	7.98%

Consumer category	Metered	Un-metered	Total Consumer	% share of Consumer	Metered Energy (MU)	Unmetered Energy	Total Billed Energy (MU)	% Share energy
Total	663123	18910	682033	100%	1763.19	18.23	1781.42	100%

Field visit of Substations, DTs and commercial building was done during the audit time.

It was found that there is low voltage problem in Phulbari area in Garo Hills. Few date wise voltage levels are shown below:

Sl No.	Time (Hrs)	33KV Voltage at Phulbari 33/11KV S/S (Date:01.07.23)	33KV Voltage at Phulbari 33/11KV S/S (Date:03.07.23)	33KV Voltage at Phulbari 33/11KV S/S (Date:04.07.23)
1	01:00			
2	02:00			
3	03:00			
4	04:00			
5	05:00			
6	06:00			
7	07:00			29.4
8	08:00			30.42
9	09:00	21.94		
10	10:00	23.62		
11	11:00	24.71		
12	12:00	24.89	25.05	
13	13:00	28.96	31.57	
14	14:00			
15	15:00			31.56
16	16:00			29.12
17	17:00			
18	18:00			22.44
19	19:00	26.07		
20	20:00			
21	21:00			
22	22:00			
23	23:00			
24	00:00			

It was also observed that most of the consumers are metered.

It was also observed that some of the meter and CT&PT is not in working condition.

At the time of field visit it was observed that capacitor banks are installed.

It was also observed that average power factor was found in the range of .90 to 0.99.

It was also observed that hourly load parameters are monitored in the logbook and energy consumption is monitored at every 24hr.

4.3. Validation of energy flow data and losses

Voltage wise power purchase details are not available, as the invoice of power purchase contains only units purchased and details of power plant voltage not available. Voltage wise energy flow data are not available, Input at different voltage level are not available. Majority of feeders are common to LT & HT. So input energy supplied is inseparable.

5. Loss and subsidy computation

5.1. Energy accounts analysis for previous year

Previous cycle of audit is energy accounting base on the notification No. 18/1/BEE/DISCOM/2021 from Bureau of Energy Efficiency dated 6th October 2021.

a) Summary of AT&C losses for previous years

The AT&C losses for the FY 2020-21 & 2021-22 are as shown below:

Table 20: AT&C losses of previous year

Technical Details	UoM	FY 2020-21	FY 2021-22
Input Energy Purchase (From Generation Source)*	Million kWh	2511.51	2460.84
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kWh	1818.14	2061.97
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kWh	1326.46	1549.63
Transmission and Distribution (T&D) loss Details	Million kWh	491.69	512.33
	%	27.04%	24.85%
Collection Efficiency	%	100.44%	99.84%
Aggregate Technical & Commercial Loss	%	26.72%	24.96%

b) Circle wise Energy & Losses consumptions for FY 2020-21

The circle wise input energy & Billed energy in different circle is given below the "Ri-Bhoi" circle having maximum energy billed and "East Garo Hills" circle having minimum energy billed. "Ri-Bhoi" have maximum input energy and "East Garo Hills" have minimum input energy as shown in table:

Table 21: Circle wise AT&C Losses in FY 2020-21

Particulars	East Garo Hills	Jaintia Hills	Khasi Hills	Ri-Bhoi	Shillong	West Garo Hills	FY-2020-2021
Billed Input (Mus)	44.07	155.94	106.27	610.22	332.05	77.90	1326.45
Input Energy (Mus)	146.59	240.90	155.03	696.75	382.54	196.35	1818.15
D Loss (Mus)	102.51	84.96	48.76	86.53	50.49	118.44	491.69
% D Loss	69.93%	35.27%	31.45%	12.42%	13.20%	60.32%	27.04%
Billed Amount (Rs Crore)	27.50	94.50	65.75	326.95	231.53	47.71	793.95
Collected Amount (Rs Crore)	22.55	110.51	70.08	273.30	240.39	47.48	797.44
% Collection Efficiency	82.01%	116.94%	106.59%	83.59%	103.82%	99.50%	100.44%
% AT&C	75.34%	24.30%	26.94%	26.79%	9.88%	60.52%	26.72%

c) Circle wise Energy & Losses consumptions for FY 2021-22

The circle wise input energy & Billed energy in different circle is given below the "Ri-Bhoi" circle having maximum energy billed and "East Garo Hills" circle having minimum energy billed. "Ri-Bhoi" have maximum input energy and "West Garo Hills" have minimum input energy as shown in table:

Table 22: Circle wise AT&C Losses in FY 2021-22

Particulars	East Garo	Jaintia Hills	Khasi Hills	Ri-Bhoi	Shillong	West Garo	Tura Circle	FY 2021-22
Billed Input (Mus)	60.25	212.12	108.11	711.67	354.17	69.93	33.40	1549.65
Input Energy (Mus)	153.91	327.42	159.11	796.48	420.05	143.03	61.96	2061.96
D Loss (Mus)	93.67	115.30	50.99	84.82	65.88	73.10	28.56	512.31
% D Loss	60.86%	35.21%	32.05%	10.65%	15.68%	51.11%	46.09%	24.85%
Billed Amount (Cr)	34.11	126.36	68.21	392.19	252.09	38.46	20.19	931.60
Collected Amount(Cr)	18.57	129.59	70.37	371.88	293.53	32.39	13.82	930.15
% Collection Efficiency	54.44%	102.55%	103.17%	94.82%	116.44%	84.23%	68.47%	99.84%
% AT&C	78.69%	33.56%	29.89%	15.28%	1.82%	58.82%	63.09%	24.96%

5.2. Energy accounts analysis and performance in current year (based on quarterly data)

5.2.1. Month wise Input energy and billed energy details

The Month wise input energy & billed energy for FY 2022-23 of the Discom periphery is shown in below table.

Table 23: Month wise input energy & billed energy for FY 2022-23

Months	Purchase Units (MU)	Net Input Energy (MU)	Billed Energy (MU)
Apr-22	184.86	162.69	149.97
May-22	216.89	160.63	133.30
Jun-22	245.20	147.36	127.84
Jul-22	291.95	165.15	129.24
Aug-22	285.90	181.65	150.95
Sep-22	293.16	171.96	142.52
Oct-22	289.69	175.57	152.39
Nov-22	199.24	177.70	132.66
Dec-22	248.68	202.88	145.82
Jan-23	235.30	213.60	196.42
Feb-23	214.68	182.55	148.79
Mar-23	199.45	185.45	171.52
Total	2905.00	2127.18	1781.42

Note: Details Sheet Attached in Annexure

5.2.2. Quarterly and annual AT&C losses

The Quarter wise and annual AT&C losses for FY 2022-23 are shown in below table.

Table 24: Energy Input and AT&C Losses for FY 2022-23

Energy Input Details	Formula	UoM	Quarterly				Annual
			Q1	Q2	Q3	Q4	FY 22-23
Input Energy Purchase (From Generation Source)	A	MU	646.95	871.01	737.61	649.43	2905.00
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	470.67	518.76	556.15	581.60	2127.18
Total Energy billed (is the Net energy billed, adjusted for energy traded)	C	MU	411.11	422.71	430.86	516.73	1781.42
Transmission and Distribution (T&D) loss	D	MU	59.56	96.04	125.29	64.87	345.77

Energy Input Details	Formula	UoM	Quarterly				Annual
Details	$E = \frac{D/B}{100} \times$	%	12.66%	18.51%	22.53%	11.15%	16.25%
Collection Efficiency	F	%	93%	89%	89%	86%	89.19%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1 - E) \times \text{Min}(F, 100\%)\}$	%	18%	28%	31%	24%	25.31%

5.2.3. Voltage wise AT&C losses

Voltage wise power purchase details are not available, as the invoice of power purchase contains only units purchased and details of power plant voltage not available.

Majority of feeders are common to LT & HT. So input energy supplied is inseparable.

Cumulated EHT sales MUs for 33kV and above are maintained and therefore bifurcations of same are not available.

The voltage wise AT&C losses of MePDCL for FY 2022-23 are as shown in the below table:

Table 25: Voltage-wise AT&C Losses for FY 2022-23

S. No.	Particulars	Units	Values
1	Losses in >33 KV System and Connected Equipment		
1.a.	Total Energy delivered into 132 KV Distribution System from EHT SSs	MUs	
1.b.	Energy consumed by HT consumers at 132KV (Sales + Third Party)	MUs	
1.c.	Energy Delivered to lower voltage	MUs	
1.d.	Losses (132 kV System)	MUs	
1.e.	% Losses (132 kV System)	%	
2	Losses in 33 KV System and Connected Equipment		
2.a.	Total Energy delivered into 33 KV Distribution System from EHT SSs	MUs	
2.b.	Energy consumed by HT consumers at 33KV (Sales + Third Party)	MUs	
2.c.	Energy Delivered into 11 KV and LT System from 33/11 KV SSs	MUs	
2.d.	Losses (33 kV System)	MUs	
2.e.	% Losses (33 kV System)	%	
3	Losses in 11 KV System and Connected Equipment		
3.a.	Total Energy delivered into 11 KV and LT Distribution System	MUs	
3.b.	Energy consumed by HT consumers at 11KV (Sales + Third Party)	MUs	
3.c.	Total Output from 11kV to LT	MUs	
3.d.	Losses (11kV System)	MUs	
3.e.	% Losses (11kV System)	%	
4	Losses in LT system and connected equipment		
4.a.	Energy delivered to LT system from 11/400 V DTRs	MUs	
4.b.	Energy sold at LT level	MUs	
4.c.	Losses (LT System)	MUs	
4.d.	% Losses (LT System)	%	
5	Total losses in the Distribution System		
5.a.	Total Input to the distribution system	MUs	2127.18
5.b.	Total Output from the Distribution System	MUs	1781.42
5.c.	Distribution System Losses	MUs	345.77
5.d.	% Distribution System Losses	%	16.25%

5.2.4. Circle wise AT&C losses analysis

1. Circle wise connections & energy consumptions for FY 2022-23

The circle wise connections, load, input energy & Billed energy with percentage share in different circle is given below the "Khasi Hills" circle having maximum numbers of consumers and "Tura" circle having minimum numbers of consumers. "Ri Bhoi" have maximum input energy as well as billed units and "Tura" have minimum input energy as well as billed units as shown in table:

Table 26: Circle wise No. of consumers, Input energy and Sales in FY 2022-23

Circle	Total Number of connections		Total Connected Load		Input energy		Billed energy	
	Nos.	% Share	MW	% Share	MU	% Share	MU	% Share
Shillong Distribution Circle	134319	19.7%	354.850	29.4%	438.43	20.6%	383.08	21.5%
Khasi Hills Distribution Circle	143938	21.1%	177.563	14.7%	147.76	6.9%	95.92	5.4%
Ri-Bhoi Distribution Circle	64986	9.5%	275.824	22.9%	796.93	37.5%	736.16	41.3%
Jaintia Hills Distribution Circle	91584	13.4%	161.748	13.4%	386.40	18.2%	323.58	18.2%
Tura Distribution Circle	29355	4.3%	51.490	4.3%	60.09	2.8%	32.69	1.8%
East Garo Hills Distribution Circle	77996	11.4%	89.385	7.4%	117.46	5.5%	54.21	3.0%
West Garo Hills Distribution Circle	40568	5.9%	43.238	3.6%	53.69	2.5%	30.61	1.7%
Distribution Franchisee-1	71975	10.6%	42.014	3.5%	107.37	5.0%	106.45	6.0%
Distribution Franchisee-2	27312	4.0%	10.670	0.9%	19.06	0.9%	18.72	1.1%
Total	682033	100%	1206.78	100%	2127.18	100%	1718.84	100%

2. Circle-wise AT&C losses

The circle wise AT&C losses are shown in the table below:

Table 27: Circle wise T&D losses, Collection Efficiency and AT&C losses for FY 2022-23

Name of Circle	Input energy (MU)	Billed energy (MU)	T&D loss		Collection Efficiency	AT& C loss (%)
			(MU)	(%)		
Shillong Distribution Circle	438.43	383.08	55.35	12.6%	99.42%	13.1%
Khasi Hills Distribution Circle	147.76	95.92	51.83	35.1%	89.22%	42.1%
Ri-Bhoi Distribution Circle	796.93	736.16	60.78	7.6%	91.70%	15.3%
Jaintia Hills Distribution Circle	386.40	323.58	62.82	16.3%	80.03%	33.0%
Tura Distribution Circle	60.09	32.69	27.40	45.6%	88.34%	51.9%
East Garo Hills Distribution Circle	117.46	54.21	63.25	53.8%	55.08%	74.6%
West Garo Hills Distribution Circle	53.69	30.61	23.08	43.0%	48.94%	72.1%
Distribution Franchisee-1	107.37	106.45	0.92	0.9%	91.08%	9.7%
Distribution Franchisee-2	19.06	18.72	0.34	1.8%	109.51%	-7.6%
Total	2127.18	1718.84	345.77	16.3%	89.19%	25.3%

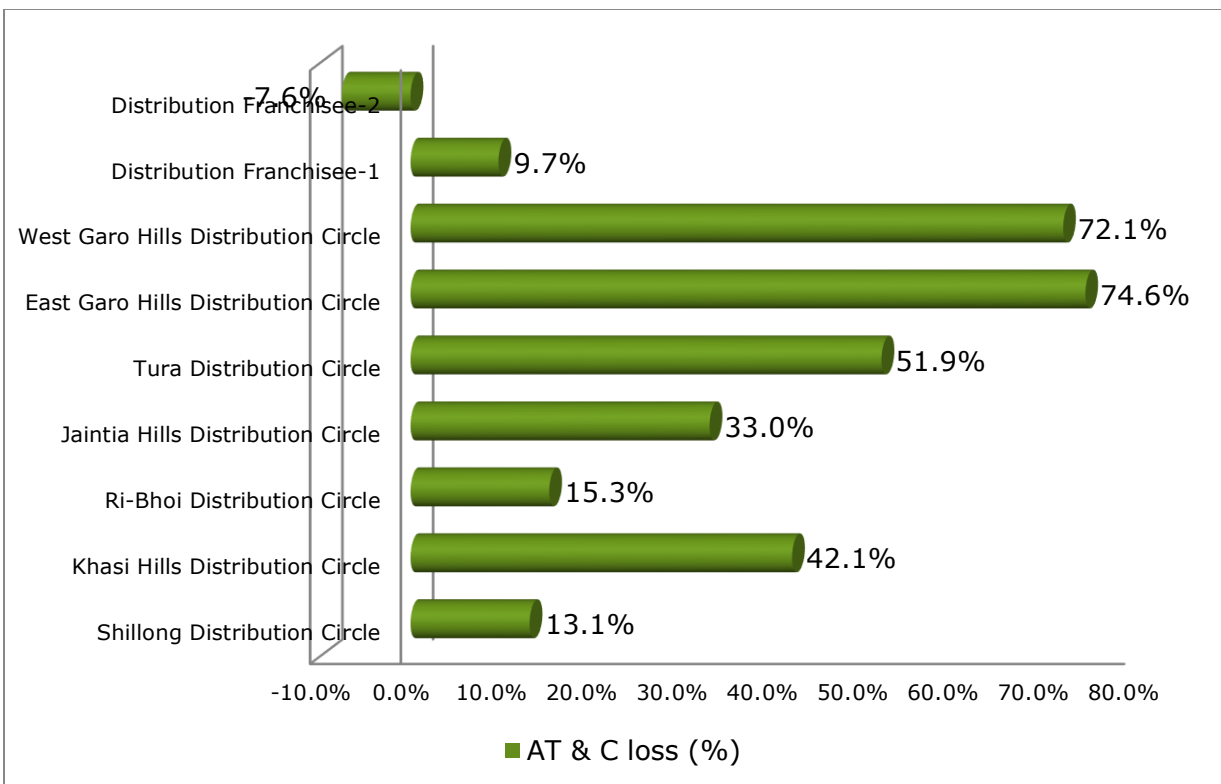
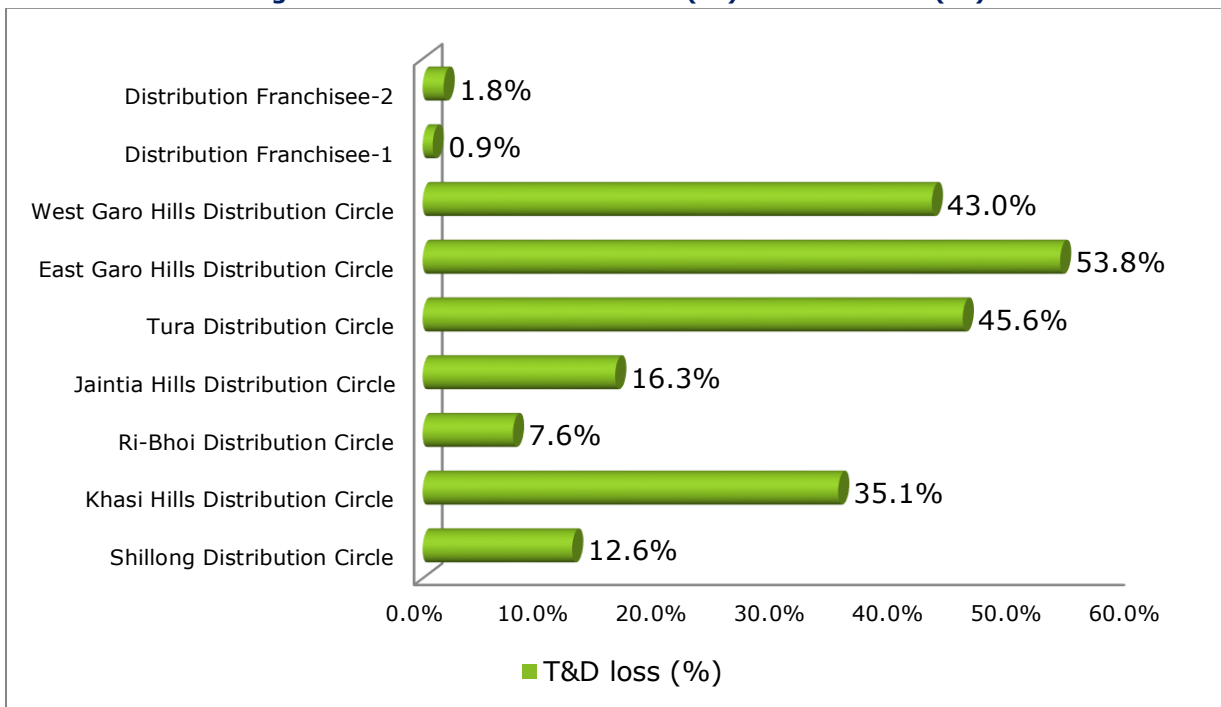
Note: AT&C Losses calculation as per BEE proforma the calculation is as per actual Collection efficiency. MePDCL AT&C calculation is based on more than 100% collection efficiency.

3. High loss Circles

"East Garo Hills" Circle had the highest T&D loss both in quantum 63.25 MUs and T&D loss percentage of 53.8%. Therefore, "East Garo Hills" Circle must be prioritized to reduce the

T&D loss in order to have overall reduction in AT&C losses of the DISCOM. Further, the circles with high loss that needs to be prioritized can be identified from the below chart:

Figure 5: Circle wise AT&C Losses (%) Vs T&D losses (%)



Division wise AT&C losses analysis

4. Division-wise AT&C losses

The Division wise AT&C losses are shown in the table below:

Table 28: Division wise T&D losses, Collection Efficiency and AT&C losses for FY 2022-23

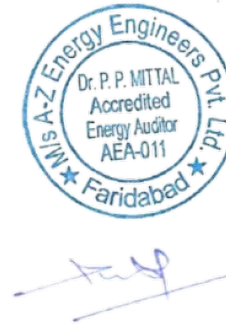
S. No	Name of circle	Circle code	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency (%)	AT & C loss (%)
1	Shillong Distribution Circle		Shillong Distribution Circle	Residential	117369	244.555	438.43	218.51	55.35	13%	127.51	126.87	99.49%	
				Agricultural	1	0.008		0.04			0.02	0.03	162.41%	
				Commercial/Industrial-LT	15813	42.921		37.84			33.74	33.79	100.14%	
				Commercial/Industrial-HT	127	20.159		27.02			24.61	24.39	99.08%	
				Others	1009	47.207		99.67			80.72	80.00	99.10%	
Sub-total				134319	354.850	438.43	383.08	55.35	13%	266.61	265.07	99.42%	13%	
2	Khasi Hills Distribution Circle		East Khasi Hills Distribution Division	Residential	64301	69.519	67.82	35.06	19.47	29%	19.89	17.97	90.35%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	2195	7.748		5.95			5.26	5.47	103.83%	
				Commercial/Industrial-HT	10	2.521		4.31			3.53	2.53	71.56%	
				Others	257	3.172		3.02			2.77	1.65	59.53%	
Sub-total				66763	82.959	67.82	48.35	19.47	29%	31.45	27.61	87.78%	37%	
3	Khasi Hills Distribution Circle		West Khasi Hills Distribution Division	Residential	57473	58.050	57.25	28.27	19.90	35%	16.30	14.88	91.25%	
				Agricultural	0	0.000		0.00			0.00	100.00%		
				Commercial/Industrial-LT	2710	9.718		5.53			4.99	5.53	110.93%	
				Commercial/Industrial-HT	23	3.638		1.06			1.23	1.21	98.22%	
				Others	231	2.102		2.49			2.26	1.50	66.69%	
Sub-total				60437	73.508	57.25	37.35	19.90	35%	24.78	23.12	93.32%	39%	
4	Khasi Hills Distribution Circle		South Khasi Hills Distribution Division	Residential	16068	18.547	22.69	8.39	12.47	55%	4.82	3.12	64.72%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	594	1.399		0.66			0.65	0.82	126.01%	
				Commercial/Industrial-HT	0	0.000		0.00			0.00	0.00%		
				Others	76	1.150		1.16			1.11	1.36	123.07%	

S. No	Name of circle	Circle code	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency (%)	AT & C loss (%)
Sub-total					16738	21.096	22.69	10.21	12.47	55%	6.58	5.31	80.65%	64%
5	Ri-Bhoi Distribution Circle		Umiam Distribution Division	Residential	32541	33.464	141.54	24.79	26.65	19%	12.67	8.50	67.07%	
				Agricultural	1	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	1231	3.649		3.71			3.16	2.90	91.73%	
				Commercial/Industrial-HT	59	25.476		77.29			48.80	43.81	89.78%	
				Others	132	5.276		9.10			7.62	6.46	84.76%	
Sub-total					33964	67.865	141.54	114.89	26.65	19%	72.24	61.66	85.36%	31%
6	Ri-Bhoi Distribution Circle		Nongpoh Distribution Division	Residential	22776	24.304	24.51	15.68	4.38	18%	7.93	5.58	70.32%	
				Agricultural	2	0.017		0.03			0.01	0.01	70.31%	
				Commercial/Industrial-LT	1216	3.336		2.91			2.41	2.57	106.54%	
				Commercial/Industrial-HT	7	0.771		0.63			0.65	0.61	93.74%	
				Others	161	2.117		0.89			1.10	0.80	73.11%	
Sub-total					24162	30.546	24.51	20.13	4.38	18%	12.10	9.57	79.04%	35%
7	Ri-Bhoi Distribution Circle		Byrnihat Distribution Division	Residential	5924	7.148	630.88	5.71	29.75	5%	3.08	2.39	77.64%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	786	3.620		3.59			3.03	2.94	96.87%	
				Commercial/Industrial-HT	122	166.350		591.67			333.67	312.46	93.64%	
				Others	28	0.295		0.16			0.18	0.09	50.23%	
Sub-total					6860	177.413	630.88	601.13	29.75	5%	339.97	317.88	93.50%	11%
8	Jaintia Hills Distribution Circle		Khliehriat Distribution Division	Residential	24296	22.577	301.62	19.53	34.63	11%	9.49	8.64	91.03%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	1907	4.335		4.94			4.23	4.37	103.28%	
				Commercial/Industrial-HT	69	47.761		241.35			177.65	135.75	76.41%	
				Others	134	1.740		1.17			1.18	0.91	76.71%	
Sub-total					26406	76.413	301.62	266.99	34.63	11%	192.55	149.66	77.73%	31%
9	Jaintia Hills Distribution Circle		Jowai Distribution Division	Residential	24791	32.048	50.12	24.97	16.06	32%	13.64	14.20	104.11%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	1985	6.609		3.93			3.36	3.32	98.92%	

S. No	Name of circle	Circle code	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency (%)	AT & C loss (%)
				Commercial/Industrial-HT	7	0.652		0.36			0.35	0.33	96.77%	
				Others	174	4.743		4.81			4.30	2.05	47.57%	
Sub-total					26957	44.051	50.12	34.06	16.06	32%	21.64	19.90	91.95%	38%
10	Jaintia Hills Distribution Circle		Jowai Rural Distribution Division	Residential	37172	35.480	34.66	17.84	12.13	35%	9.48	8.96	94.48%	
				Agricultural	0	0.000		0.00			0.00	0.00%		
				Commercial/Industrial-LT	930	3.661		3.17			2.80	2.97	106.04%	
				Commercial/Industrial-HT	3	0.285		0.13			0.16	0.14	89.98%	
				Others	116	1.858		1.38			1.40	0.87	61.87%	
Sub-total					38221	41.284	34.66	22.52	12.13	35%	13.84	12.94	93.48%	39%
11	Tura Distribution Circle		Tura Distribution Division	Residential	27006	39.178	60.09	24.54	27.40	46%	13.78	13.00	94.38%	
				Agricultural	3	0.045		0.02			0.01	0.01	63.22%	
				Commercial/Industrial-LT	2036	3.566		2.57			2.31	2.08	90.27%	
				Commercial/Industrial-HT	15	1.724		0.83			1.02	0.70	69.11%	
				Others	295	6.977		4.74			4.94	3.69	74.62%	
Sub-total					29355	51.490	60.09	32.69	27.40	46%	22.06	19.49	88.34%	52%
12	East Garo Hills Distribution Circle		South Garo Hills Distribution Division	Residential	14624	15.054	22.72	7.36	13.03	57%	3.69	1.65	44.67%	
				Agricultural	2	0.002		0.00			0.00	0.00%		
				Commercial/Industrial-LT	481	1.374		1.10			0.94	0.74	78.58%	
				Commercial/Industrial-HT	0	0.000		0.00			0.00	0.00%		
				Others	112	1.648		1.23			1.11	0.64	58.00%	
Sub-total					15219	18.078	22.72	9.69	13.03	57%	5.74	3.03	52.82%	77%
13	East Garo Hills Distribution Circle		East Garo Hills Distribution Division	Residential	60221	60.411	94.75	39.00	50.22	53%	21.55	10.82	50.22%	
				Agricultural	3	0.017		0.00			0.00	0.00%		
				Commercial/Industrial-LT	2287	5.684		4.70			4.29	2.90	67.55%	
				Commercial/Industrial-HT	5	3.484		0.07			0.21	0.08	40.39%	
				Others	261	1.712		0.75			0.86	1.14	133.75%	
Sub-total					62777	71.307	94.75	44.52	50.22	53%	26.91	14.95	55.56%	74%
14	West Garo		West Garo	Residential	487	1.008	0.46	0.24	0.09	20%	0.15	0.15	98.47%	

S. No	Name of circle	Circle code	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency (%)	AT & C loss (%)
	Hills Distribution Circle		Hills Distribution Division	Agricultural	0	0.000		0.00			0.00	0.00	0.00%	
				Commercial/Industrial-LT	6	0.104		0.09			0.08	0.06	78.14%	
				Commercial/Industrial-HT	0	0.000		0.00			0.00	0.00%		
				Others	3	0.118		0.03			0.01	33.83%		
Sub-total					496	1.230	0.46	0.37	0.09	20%	0.26	0.22	84.03%	33%
15	West Garo Hills Distribution Circle		South-West Garo Hills Distribution Division	Residential	38789	36.281	53.23	23.93	22.99	43%	12.25	6.15	50.17%	
				Agricultural	9	0.001		0.00			0.00	0.00%		
				Commercial/Industrial-LT	1032	2.340		2.26			2.03	1.31	64.25%	
				Commercial/Industrial-HT	5	0.329		0.04			0.05	0.03	67.03%	
				Others	237	3.057		4.01			3.46	1.13	32.70%	
Sub-total					40072	42.008	53.23	30.24	22.99	43%	17.79	8.62	48.43%	72%
16	Distribution Franchisee-1		Mawsynram DSD, Nonglabibra DSD, & Phulbari DSD (FEDCO)	Residential	69539	33.606	107.37	80.57	0.92	1%	20.48	18.65	91.08%	
				Agricultural	1	0.015		0.09			0.00	0.00	0.00%	
				Commercial/Industrial-LT	2255	6.257		18.63			0.00	0.00	0.00%	
				Commercial/Industrial-HT	4	0.067		0.36			0.00	0.00	0.00%	
				Others	176	2.069		6.80			0.00	0.00	0.00%	
Sub-total					71975	42.014	107.37	106.45	0.92	1%	20.48	18.65	91.08%	10%
17	Distribution Franchisee-2		Dalu DSD (SAI)	Residential	26611	8.956	19.06	16.93	0.34	2%	5.36	5.87	109.51%	
				Agricultural	0	0.000		0.00			0.00	0.00	0.00%	
				Commercial/Industrial-LT	587	1.188		1.01			0.00	0.00	0.00%	
				Commercial/Industrial-HT	0	0.000		0.00			0.00	0.00	0.00%	
				Others	114	0.526		0.78			0.00	0.00	0.00%	
Sub-total					27312	10.670	19.06	18.72	0.34	2%	5.36	5.87	109.51%	-8%
76	Total			Residential	639988	740.185	2127.18	591.31	345.77	16%	302.08	267.39	88.52%	
				Agricultural	22	0.105		0.19			0.05	0.05	98.71%	
				Commercial/Industrial-LT	38051	107.509		102.61			73.29	71.77	97.92%	
				Commercial/Industrial-HT	456	273.217		945.12			591.91	522.04	88.20%	

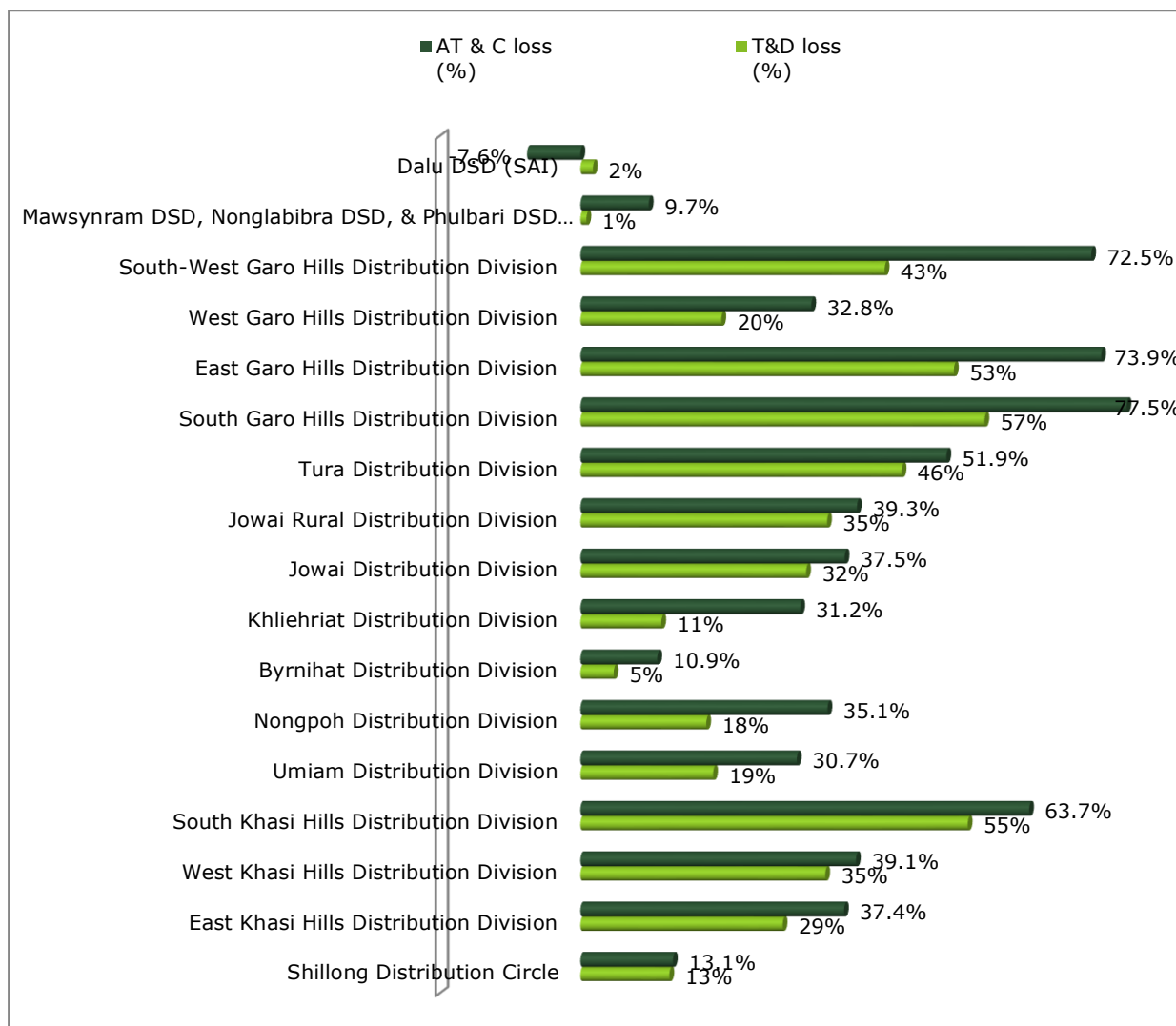
S. No	Name of circle	Circle code	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency (%)	AT & C loss (%)
				Others	3516	85.765		142.18			113.02	102.30	90.51%	
77	At company level				682033	1206.781	2127.18	1781.42	345.77	16%	1080.35	963.54	89.19%	25%



5. High loss divisions

“Shillong Distribution” Division had the highest T&D loss quantum of 55.346 MU and South Garo Hills Distribution Division had the highest AT&C loss percentage of 77.50%. Further, the divisions with high loss that needs to be prioritized can be identified from the below chart:

Figure 6: Division wise T&D losses (%) Vs AT&C losses (%)



The list of top Divisions with higher AT&C losses (%) & T&D losses (MU) identified from the above chart are tabulated below:

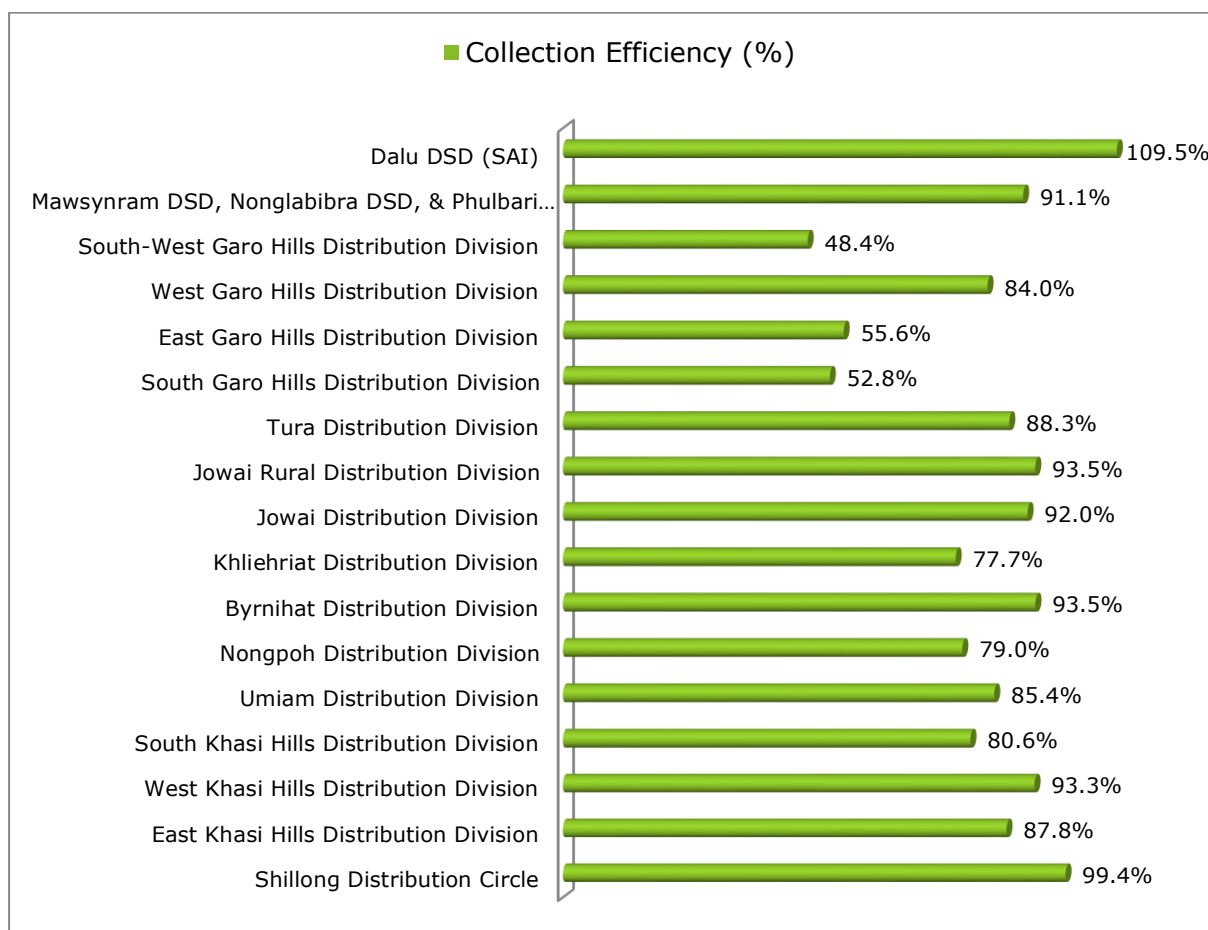
Table 29: Top Divisions with higher AT&C losses (%) & T&D losses (MU)

S. No	Name of Division	T&D loss (MU)	T&D loss (%)	AT & C loss (%)
1	East Khasi Hills Distribution Division	19.47	28.7%	37.4%
2	West Khasi Hills Distribution Division	19.90	34.8%	39.1%
3	South Khasi Hills Distribution Division	12.47	55.0%	63.7%
4	Jowai Distribution Division	16.06	32.0%	37.5%
5	Jowai Rural Distribution Division	12.13	35.0%	39.3%
6	Tura Distribution Division	27.40	45.6%	51.9%
7	South Garo Hills Distribution Division	13.03	57.4%	77.5%
8	East Garo Hills Distribution Division	50.22	53.0%	73.9%

S. No	Name of Division	T&D loss (MU)	T&D loss (%)	AT & C loss (%)
9	West Garo Hills Distribution Division	0.09	20.0%	32.8%
10	South-West Garo Hills Distribution Division	22.99	43.2%	72.5%

Further, it was observed that the collection efficiency is not more than 100% across all the Divisions as shown below:

Figure 7: Division wise Collection efficiency (%)



5.2.5. Feeder wise AT&C losses analysis

1. Feeder wise ATC losses

Feeder-wise/unit-wise losses are not available due to:

- 33KV feeders are in Ring Main in shilling circle.
- 44% of total feeders are unmetered.
- 86 nos Feeders meter are Non DLMS (Device Language Message Specification) & 30 nos is not working.

100% consumer indexing is not in place; thus, feeder wise /DTR wise energy accounting or loss calculation is not possible.

MePDCL operates in small area comprising of single unit. Thus, loss of entire unit is given. However, from FY 2021-2022 onwards, unit wise loss can be provided by dividing the licensed area in units/divisions by proper arrangement at our end.

AT&C Losses of Some of the Feeders are monitored and the AT&C losses shown in below table:

Table 30: Feeder wise AT&C Loss FY 2022-23

Circle	Substation	Feeder Code	FEEDER_NAME	Feeder Type	FEEDER_METER_NUMBER	ATC (%)
Shillong Circle	33/11 KV DYMPEP SUBSTATION	4122B01900G02	11 KV AIR 11	URBAN	MEB00963	2.81%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900101	11 KV AIRFORCE I	URBAN	MEB96470_1	9.86%
Shillong Circle	33/11 KV KEATING ROAD SUBSTATION	4122A01500W01	11 KV KEATING ROAD MES	URBAN	18130674	9.12%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900103	11 KV AIRFORCE III	URBAN	MEB00247	18.78%
Shillong Circle	33/11 KV KEATING ROAD SUBSTATION	4122A01500W02	11 KV BARABAZAR	URBAN	18130684	7.85%
Shillong Circle	33/11 KV KEATING ROAD SUBSTATION	4122A01500W03	11 KV MALKI	URBAN	18164168	14.33%
Shillong Circle	33/11 KV KEATING ROAD SUBSTATION	4122A01500W04	11 KV KEATING ROAD OAKLAND	URBAN	18164166	11.63%
Shillong Circle	33/11 KV KEATING ROAD SUBSTATION	4122A01500W05	11 KV LABAN	URBAN	18164157	6.95%
Shillong Circle	33/11 KV LADNONGKREM SUBSTATION	4122B01A01302	11 KV ARPS	URBAN	MEB00360	59.39%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02001	11 KV ASANANG	MIXED	MEB01511	29.22%
Shillong Circle	33/11 KV HAPPY VALLEY SUBSTATION	4122B01A00M01	11 KV ASSAM RIFLES	URBAN	MEB00334	9.98%
Shillong Circle	33/11 KV MAWLAI SUBSTATION	4122A01601C01	11 KV IEWRYNGHEP	URBAN	18164178	8.91%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V01	11 KV LAITUMKHTAH	URBAN	MECL0410	13.40%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V04	11 KV BANDSTAND	URBAN	MECL0269	11.42%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V02	11 KV DHANKHETI	URBAN	MECL0268	18.41%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G01	11 KV BAZAR	URBAN	KSB35588	39.25%
Shillong Circle	33/11 KV KENCHE'S TRACE SUBSTATION	4122A01800X02	11 KV KENCHE'S TRACE & MES	URBAN	18164160	14.77%
Shillong Circle	33/11 KV KENCHE'S TRACE SUBSTATION	4122A01800X03	11 KV MADAN LABAN	URBAN	18164165	9.42%
Shillong Circle	33/11 KV MAWPREM SUBSTATION	4122A01801E03	11 KV BEADON-II	URBAN	MECL0454	10.83%
Shillong Circle	33/11 KV MAWPREM SUBSTATION	4122A01801E01	11 KV IEWDUH	URBAN	MECL0451	13.63%
Shillong Circle	33/11 KV FOURTH FURLONG SUBSTATION	4122A01502J03	11 KV BIVAR ROAD	URBAN	XF468508	9.84%
Shillong Circle	33/11 KV FOURTH FURLONG SUBSTATION	4122A01502J02	11 KV CAMEL ROAD	URBAN	XF468507	23.62%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G03	11 KV CHIADING	MIXED	KSB35587	69.59%
Shillong Circle	33/11 KV LAITLYNGKOT SUBSTATION	4122B01901401	11 KV MADANLYNGKHI	URBAN	MEB00330	9.70%
Shillong Circle	33/11 KV LAITLYNGKOT SUBSTATION	4122B01901402	11 KV LAITLYNGKOT	URBAN	MEB00337	24.60%
Tura Circle	33/11 KV DAKOPGRE SUBSTATION	42JJA05L00C01	11 KV DAKOPGRE 1	MIXED	MEB01520	17.61%
Tura Circle	33/11 KV DAKOPGRE	42JJA05L00C02	11 KV	URBAN	MEB01521	14.79%

Circle	Substation	Feeder Code	FEEDER_NAME	Feeder Type	FEEDER_METER_NUMBER	ATC (%)
	SUBSTATION		DAKOPGRE 2			
Shillong Circle	33/11 KV HAPPY VALLEY SUBSTATION	4122B01A00M02	11 KV LAITKOR	URBAN	MEB00361	18.06%
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H03	11 KV DAMAS	MIXED	MECL0319	78.96%
Shillong Circle	33/11 KV SE FALLS SUBSTATION	4122B01A02206	11 KV DEMSEINIONG	URBAN	MECL0168	8.74%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P01	11 KV LAPALANG NONGRAH	URBAN	XA496740	16.20%
Tura Circle	33/11 KV DOBASIPARA SUBSTATION	42JJA05L00F01	11 KV DOBASIPARA I	URBAN		19.84%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P02	11 KV LAPALANG POHKSEH	URBAN	XA496741	11.73%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P03	11 KV LAPALANG MADANRITING	URBAN	XA496739	9.88%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P04	11 KV LAPALANG MAWLYNREI	URBAN	XA496742	16.52%
Shillong Circle	33/11 KV FOURTH FURLONG SUBSTATION	4122A01502J01	11 KV DON BOSCO	URBAN		12.22%
Shillong Circle	33/11 KV METER FACTORY SUBSTATION	4122B01B01J06	11 KV JAI AW	URBAN	18164185	14.32%
Khasi Hills Circle	33/11 KV SOHRA SUBSTATION	4133A02902702	11 KV LOWER CHERRA	URBAN	MECL0097	18.25%
Khasi Hills Circle	33/11 KV MAWSAWA SUBSTATION	4133B02E01901	11 KV KYNSHI	MIXED	18164188	11.68%
Khasi Hills Circle	33/11 KV MAWSAWA SUBSTATION	4133B02E01902	11 KV MAIRANG TOWN	URBAN	MECL0258	13.53%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N01	11 KV HAWAKHANA 1	URBAN	X0994334	44.97%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N02	11 KV HAWAKHANA 2	URBAN	X0994336	32.24%
Khasi Hills Circle	33/11 KV MAWSAWA SUBSTATION	4133B02E01904	11 KV MAIRANG CIVIL	URBAN	MECL0260	12.94%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N03	11 KV HAWAKHANA 3	URBAN	X0994341	26.71%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N04	11 KV HAWAKHANA 4	URBAN	X0994332	11.45%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G04	11 KV JAIL BUILDING	MIXED	KSB35586	67.99%
Shillong Circle	33/11 KV KENCHE'S TRACE SUBSTATION	4122A01800X04	11 KV LAWSOHTUN	URBAN	18164189	12.42%
Shillong Circle	33/11 KV DYMPEP SUBSTATION	4122B01900G03	11 KV MAWBEH	URBAN		29.27%
Shillong Circle	33/11 KV MAWIONG SUBSTATION	4122A01601A02	11 KV MAWIONG RIM	URBAN	XF468488	10.72%
Shillong Circle	33/11 KV DYMPEP SUBSTATION	4122B01900G01	11 KV MAWJRONG	URBAN	MEB03560	4.85%
Shillong Circle	33/11 KV MAWPHLANG SUBSTATION	4122B01901D03	11 KV MAWNGAP	URBAN	MEB04013	9.66%
Shillong Circle	33/11 KV MAWPHLANG SUBSTATION	4122B01901D02	11 KV MAWPHLANG	URBAN	MEB04005	11.33%
Shillong Circle	33/11 KV MAWPREM SUBSTATION	4122A01801E02	11 KV MAWPREM	URBAN	MECL0409	10.35%
Shillong Circle	33/11 KV METER FACTORY SUBSTATION	4122B01B01J02	11 KV MAWROH	URBAN	18164158	15.41%
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H01	11 KV MENDIPATHAR	URBAN	MECL0297	71.20%
Khasi Hills Circle	33/11 KV NONGSTOIN SUBSTATION	4133B02G01U03	11 KV MICRO TYLLANG	MIXED	MECL0378	18.94%
Jaintia Hills	33/11 KV JOWAI	4111A00100V05	11 KV	URBAN	X0821248	17.28%

Circle	Substation	Feeder Code	FEEDER_NAME	Feeder Type	FEEDER_METER_NUMBER	ATC (%)
Circle	SUBSTATION		MIHMYNTDU			
Shillong Circle	33/11 KV MAWIONG SUBSTATION	4122A01601A01	11 KV MLP-BN	URBAN	XF468513	66.37%
Shillong Circle	33/11 KV MNREDA SUBSTATION	4122B01B02R02	11 KV MNREDA LANGKYRDING	URBAN	XC407097	11.23%
Shillong Circle	33/11 KV MNREDA SUBSTATION	4122B01B02R03	11 KV MNREDA MAWPAT	URBAN	XC407094	16.25%
Shillong Circle	33/11 KV MNREDA SUBSTATION	4122B01B02R01	11 KV MNREDA NONGMYNSONG	URBAN	XC407093	14.19%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900105	11 KV MYLLIEM	URBAN	MECL0183	15.92%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V03	11 KV NONGRIM HILLS	URBAN	MECL0275	15.97%
Shillong Circle	33/11 KV METER FACTORY SUBSTATION	4122B01B01J03	11 KV OAKLAND	URBAN	18164164	12.48%
Ri Bhoi Circle	33/11 KV NONGPOH SUBSTATION	4144A03D01S02	11 KV PATHARKHMAH FEEDER	MIXED	XD452448	15.98%
Shillong Circle	33/11 KV SE FALLS SUBSTATION	4122B01A02202	11 KV POHKESH	URBAN	MECL0199	13.51%
Shillong Circle	33/11 KV METER FACTORY SUBSTATION	4122B01B01J07	11 KV POLO	URBAN	MECL0357_1	21.32%
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H02	11 KV RESUBELPARA	MIXED	MECL0296	61.24%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02002	11 KV RONGKHON EDENBARI	MIXED	MEB00311	41.40%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02003	11 KV RONGKHON TURA II	URBAN	MECL0344	23.05%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900104	11 KV RURAL	URBAN	MECL0184	17.58%
Khasi Hills Circle	33/11 KV NONGSTOIN SUBSTATION	4133B02G01U01	11 KV SEINDULI	MIXED	MECL0257	22.77%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G02	11 KV TOWN	URBAN	WBE07338	49.51%
Jaintia Hills Circle	33/11 KV JOWAI SUBSTATION	4111A00100V01	11 KV TOWN 2	URBAN	X0821257	58.63%
Ri Bhoi Circle	33/11 KV NONGPOH SUBSTATION	4144A03D01S01	11 KV TOWN FEEDER URBAN	URBAN	XD452447	10.72%
Khasi Hills Circle	33/11 KV SOHRA SUBSTATION	4133A02902701	11 KV TYRNA	MIXED	MECL0098	16.88%
Shillong Circle	33/11KV WEILOI SUBSTATION	4122B01902L01	11 KV TYRSAD	MIXED		20.98%
Shillong Circle	33/11 KV MAWIONG SUBSTATION	4122A01601A03	11 KV UMJAPUNG	URBAN	XF568497	14.51%
Shillong Circle	33/11 KV SE FALLS SUBSTATION	4122B01A02205	11 KV UMPLING	URBAN	MECL0170	11.03%
Khasi Hills Circle	33/11 KV SOHRA SUBSTATION	4133A02902703	11 KV UPPER CHERRA	URBAN	MECL0425	10.07%
Shillong Circle	33/11KV UMJARAIN SUBSTATION	4122C01F01A01	11KV KYNTON MASSAR	URBAN		16.19%
Shillong Circle	33/11KV UMJARAIN SUBSTATION	4122C01F01A02	11KV MAWTAWAR	URBAN		12.89%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900107	33 KV AIR FORCE TO ASSAM RIFLES	URBAN		11.32%
Shillong Circle	33/11 KV LADNONGKREM SUBSTATION	4122B01B02M03	33 KV NEHU TO LADNONGKREM	URBAN	MEB03557	10.03%

2. Identify high loss feeders

These are some Identified high loss feeders:

Table 31: High Losses Feeders FY 2022-23

Circle	Substation	Feeder Code	FEEDER_NAME	Feeder Type	FEEDER_METER_NUMBER	ATC (%)
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H03	11 KV DAMAS	MIXED	MECL0319	78.96%
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H01	11 KV MENDIPATHAR	URBAN	MECL0297	71.20%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G03	11 KV CHIADING	MIXED	KSB35587	69.59%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G04	11 KV JAIL BUILDING	MIXED	KSB35586	67.99%
Shillong Circle	33/11 KV MAWIONG SUBSTATION	4122A01601A01	11 KV MLP-BN	URBAN	XF468513	66.37%
East Garo Hills Circle	33/11 KV MENDIPATHAR SUBSTATION	42HHA04L01H02	11 KV RESUBELPARA	MIXED	MECL0296	61.24%
Shillong Circle	33/11 KV LADNONGKREM SUBSTATION	4122B01A01302	11 KV ARPS	URBAN	MEB00360	59.39%
Jaintia Hills Circle	33/11 KV JOWAI SUBSTATION	4111A00100V01	11 KV TOWN 2	URBAN	X0821257	58.63%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G02	11 KV TOWN	URBAN	WBE07338	49.51%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N01	11 KV HAWAKHANA 1	URBAN	X0994334	44.97%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02002	11 KV RONGKHON EDENBARI	MIXED	MEB00311	41.40%
East Garo Hills Circle	33/11 KV WILLIAMNAGAR SUBSTATION	42HHA04M02G01	11 KV BAZAR	URBAN	KSB35588	39.25%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N02	11 KV HAWAKHANA 2	URBAN	X0994336	32.24%
Shillong Circle	33/11 KV DYMPEP SUBSTATION	4122B01900G03	11 KV MAWBEH	URBAN		29.27%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02001	11 KV ASANANG	MIXED	MEB01511	29.22%
Tura Circle	33/11 KV HAWAKHANA SUBSTATION	42JJA05L00N03	11 KV HAWAKHANA 3	URBAN	X0994341	26.71%
Shillong Circle	33/11 KV LAITLYNGKOT SUBSTATION	4122B01901402	11 KV LAITLYNGKOT	URBAN	MEB00337	24.60%
Shillong Circle	33/11 KV FOURTH FURLONG SUBSTATION	4122A01502J02	11 KV CAMEL ROAD	URBAN	XF468507	23.62%
Tura Circle	33/11 KV RONGKHON SUBSTATION	42JJA05L02003	11 KV RONGKHON TURA II	URBAN	MECL0344	23.05%
Khasi Hills Circle	33/11 KV NONGSTOIN SUBSTATION	4133B02G01U01	11 KV SEINDULI	MIXED	MECL0257	22.77%
Shillong Circle	33/11 KV METER FACTORY SUBSTATION	4122B01B01J07	11 KV POLO	URBAN	MECL0357_1	21.32%
Shillong Circle	33/11KV WEILOI SUBSTATION	4122B01902L01	11 KV TYRSAD	MIXED		20.98%
Tura Circle	33/11 KV DOBASIPARA SUBSTATION	42JJA05L00F01	11 KV DOBASIPARA I	URBAN		19.84%
Khasi Hills Circle	33/11 KV NONGSTOIN SUBSTATION	4133B02G01U03	11 KV MICRO TYLLANG	MIXED	MECL0378	18.94%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900103	11 KV AIRFORCE III	URBAN	MEB00247	18.78%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V02	11 KV DHANKHETI	URBAN	MECL0268	18.41%
Khasi Hills Circle	33/11 KV SOHRA SUBSTATION	4133A02902702	11 KV LOWER CHERRA	URBAN	MECL0097	18.25%

Circle	Substation	Feeder Code	FEEDER_NAME	Feeder Type	FEEDER_METER_NUMBER	ATC (%)
Shillong Circle	33/11 KV HAPPY VALLEY SUBSTATION	4122B01A00M02	11 KV LAITKOR	URBAN	MEB00361	18.06%
Tura Circle	33/11 KV DAKOPGRE SUBSTATION	42JJA05L00C01	11 KV DAKOPGRE 1	MIXED	MEB01520	17.61%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900104	11 KV RURAL	URBAN	MECL0184	17.58%
Jaintia Hills Circle	33/11 KV JOWAI SUBSTATION	4111A00100V05	11 KV MIHMYNTDU	URBAN	X0821248	17.28%
Khasi Hills Circle	33/11 KV SOHRA SUBSTATION	4133A02902701	11 KV TYRNA	MIXED	MECL0098	16.88%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P04	11 KV LAPALANG MAWLYNREI	URBAN	XA496742	16.52%
Shillong Circle	33/11 KV MNREDA SUBSTATION	4122B01B02R03	11 KV MNREDA MAWPAT	URBAN	XC407094	16.25%
Shillong Circle	33/11 KV LAPALANG SUBSTATION	4122B01A02P01	11 KV LAPALANG NONGRAH	URBAN	XA496740	16.20%
Shillong Circle	33/11KV UMJARAIN SUBSTATION	4122C01F01A01	11KV KYNTON MASSAR	URBAN		16.19%
Ri Bhoi Circle	33/11 KV NONGPOH SUBSTATION	4144A03D01S02	11 KV PATHARKHMAH FEEDER	MIXED	XD452448	15.98%
Shillong Circle	33/11 KV NONGTHYMMAI SUBSTATION	4122A01701V03	11 KV NONGRIM HILLS	URBAN	MECL0275	15.97%
Shillong Circle	33/11 KV AIRFORCE SUBSTATION	4122B01900105	11 KV MYLLIEM	URBAN	MECL0183	15.92%

5.2.6. Identify overloaded segments/ infrastructure

UL (Under loaded): 20% of kVA rating for more than 90% of time where peak kVA < 40% of kVA rating

OL (Overloaded): 95% of kVA rating for at least half an hour

UB (Unbalanced): Relative phase wise unbalance is > 150% or < 50% and peak kVA of the transformer is at least 50% of kVA rating.

Energy meters are installed at each voltage level for energy consumption. The readings are taken manually.

The energy reading of commercial and Industrial consumers, Distribution transformer readings are downloaded by the appropriate software for billing and analysis.

There is 97% metering available at consumers. Also MePDCL has claimed that there is approx 29% metering at DTs transformers.

The energy consumed by MePDCL offices, receiving stations is also metered and accounted.

5.3. Subsidy computation and analysis (based on quarterly data)

NA

5.4. Trend analysis and identification of key exceptions

Details maybe specified such as performance of DISCOM in FY 2020-21 Vs FY2021-22 and FY 2022-23 annually comparison, circle wise analysis, where the DISCOM has improved and where needs improvement, etc.

a) Summary of AT&C losses comparison for previous years

Table 32: AT&C loss Comparison for last three Years

Technical Details	UoM	FY 2020-21	FY 2021-22	FY 2022-23
Input Energy Purchase (From Generation Source)*	Million kWh	2511.51	2460.84	2905.00
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kWh	1818.14	2061.97	2127.18
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kWh	1326.46	1549.63	1781.42
Transmission and Distribution (T&D) loss Details	Million kWh	491.69	512.33	345.77
	%	27.04%	24.85%	16.25%
Collection Efficiency	%	100.44%	99.84%	89.19%
Aggregate Technical & Commercial Loss	%	26.72%	24.96%	25.31%

The trend of reduction in distribution loss has reached a trough during the past few years. Marginal rate of reduction of distribution loss becomes extremely low. Further reduction will involve significant capital and operational expenditure and may prove to be counter-productive for the consumers

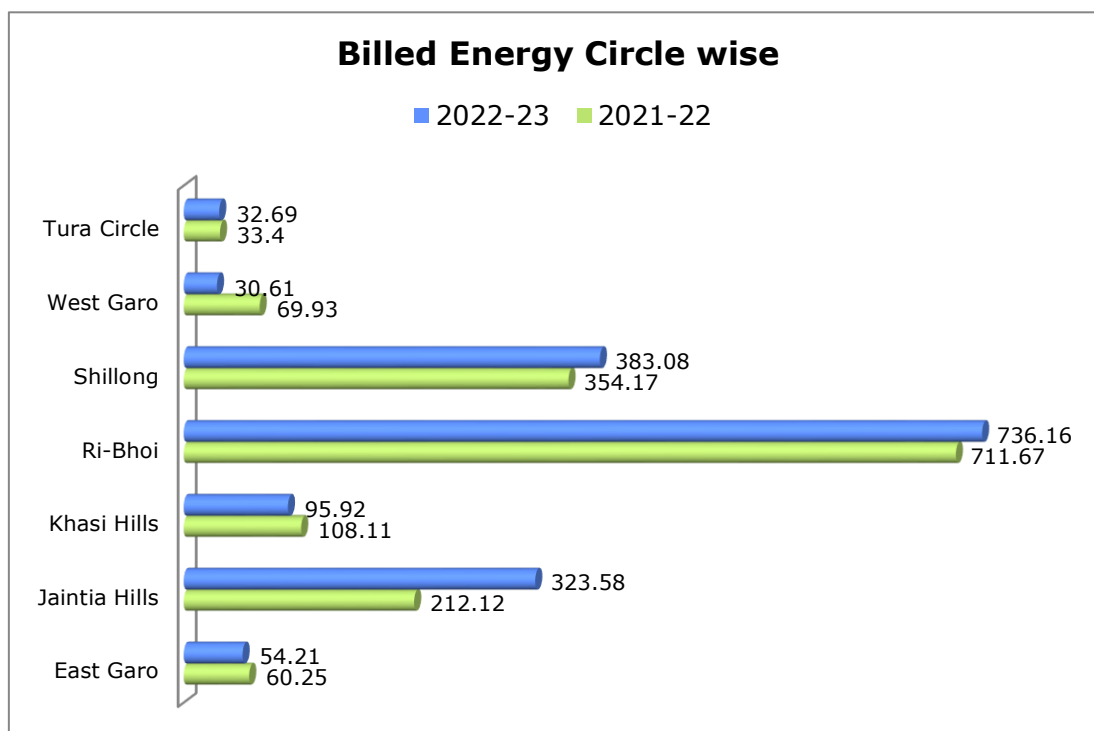
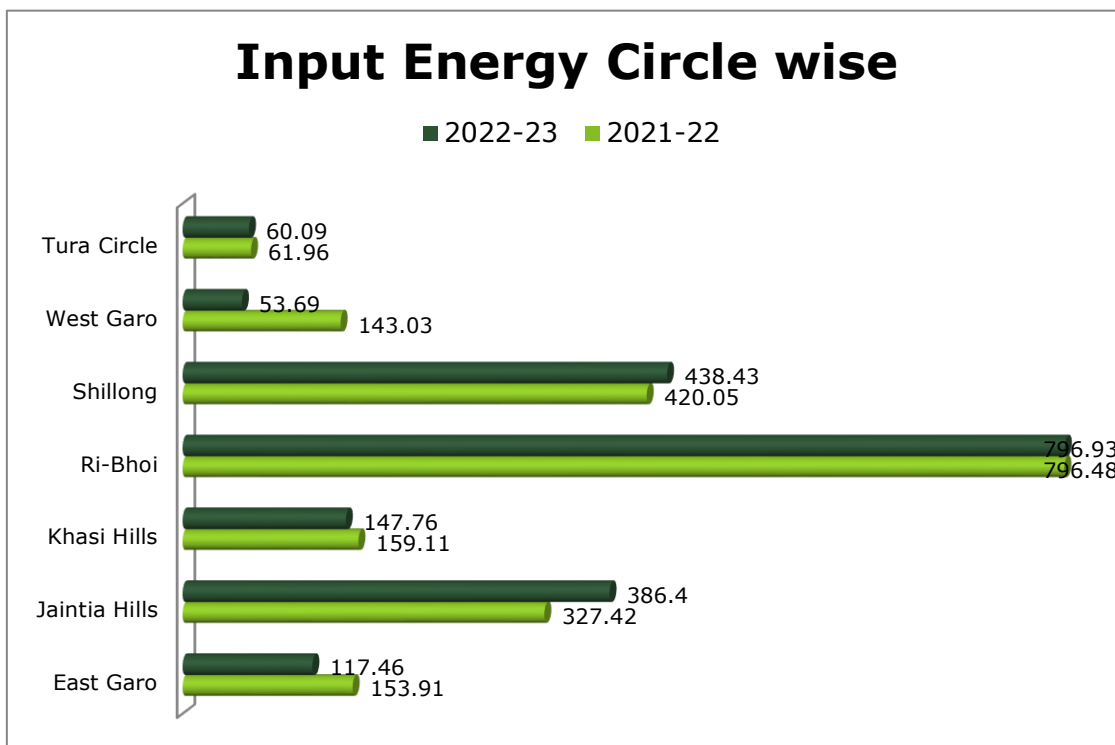
As we compare the losses for last three years it was found that T&D losses is decreasing trend as compare to first two years and collection efficiency is also decreasing trends, hence AT&C losses is increasing.

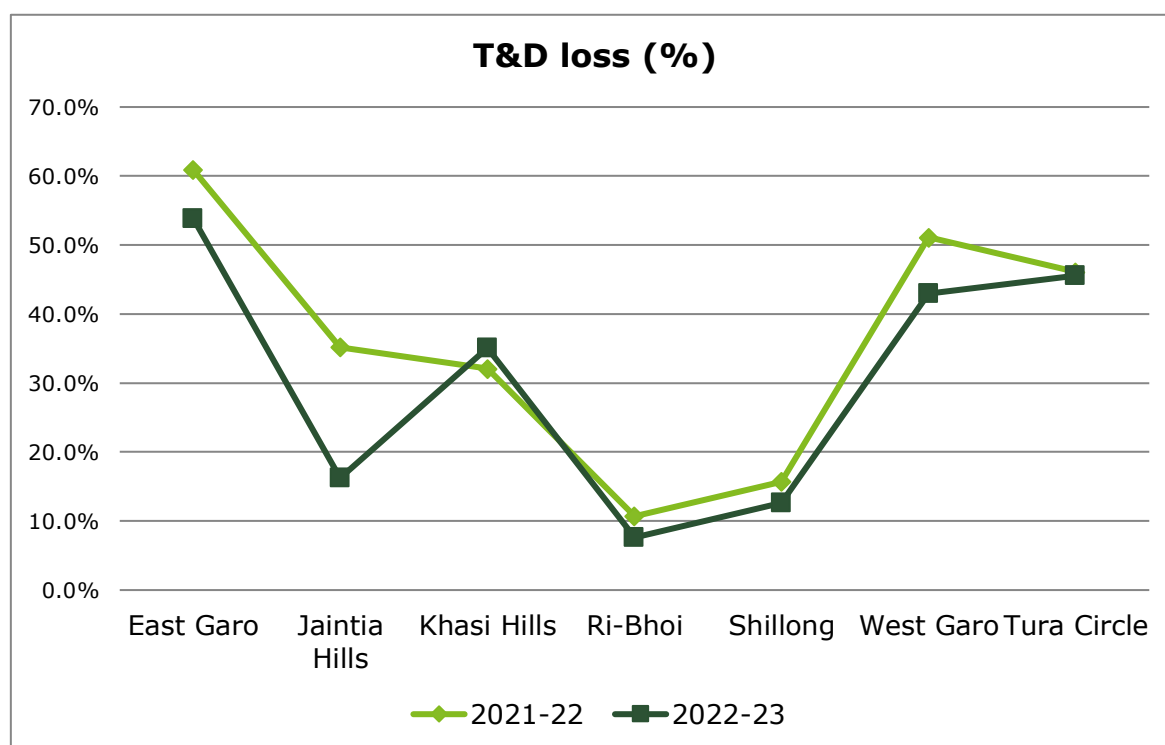
b) Circle wise Energy & Losses Comparison

The circle wise input energy, Billed energy & losses comparison is shown in below table:

Table 33: Circle wise Energy & Losses Comparison

Particulars	Input Energy (MU)		Billed Energy (MU)		Loss (MU)		Loss (%)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
East Garo	153.91	117.46	60.25	54.21	93.67	63.25	60.90%	53.85%
Jaintia Hills	327.42	386.4	212.12	323.58	115.3	62.82	35.20%	16.26%
Khasi Hills	159.11	147.76	108.11	95.92	50.99	51.84	32.10%	35.08%
Ri-Bhoi	796.48	796.93	711.67	736.16	84.82	60.77	10.70%	7.63%
Shillong	420.05	438.43	354.17	383.08	65.88	55.35	15.70%	12.62%
West Garo	143.03	53.69	69.93	30.61	73.1	23.08	51.10%	42.99%
Tura Circle	61.96	60.09	33.4	32.69	28.56	27.4	46.10%	45.60%
Total	2061.96	2000.76	1549.65	1656.25	512.31	344.51	24.90%	17.22%



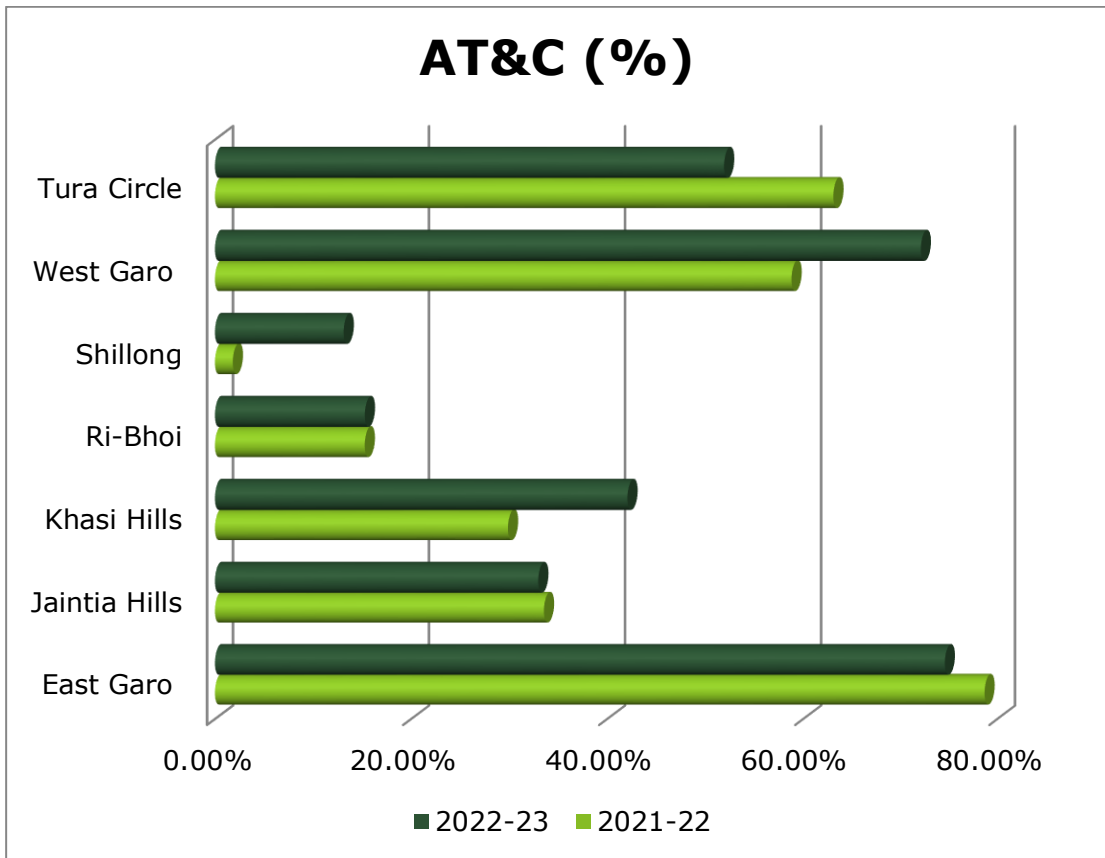
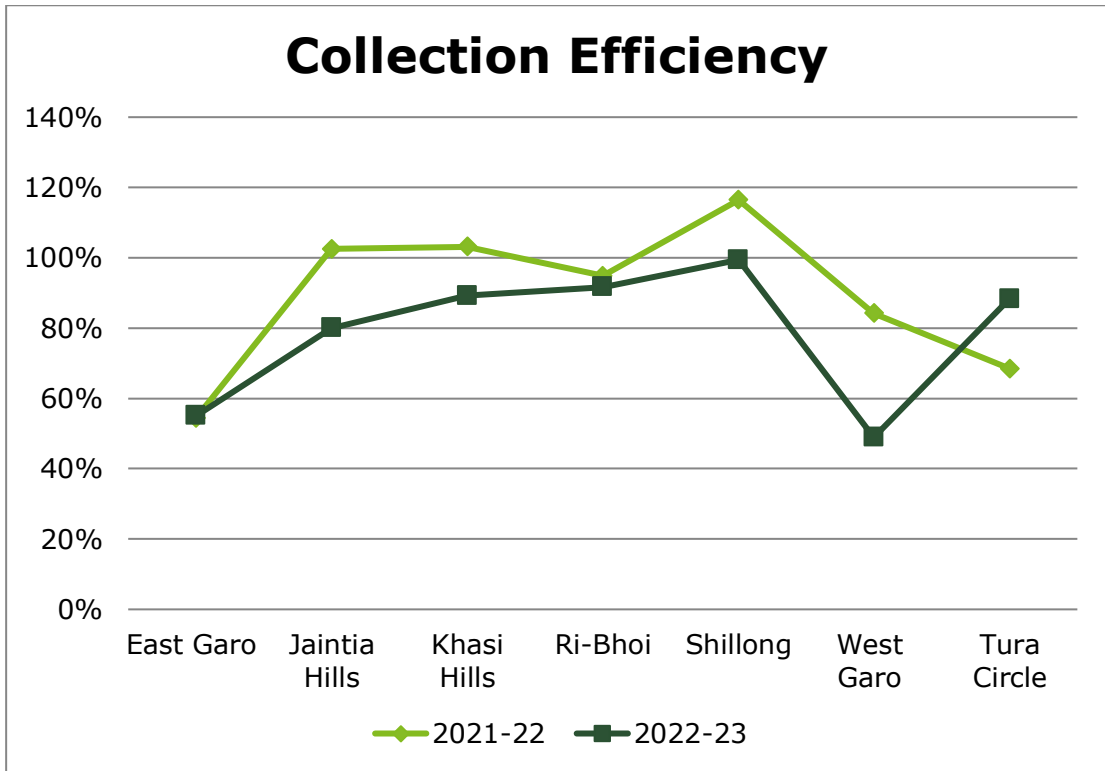


c) Circle wise Collection & AT&C Losses comparison

The circle wise Billed, Collection Amount & AT&C losses comparison is shown in below table:

Table 34: Circle wise Collection Efficiency & AT&C Losses Comparison

Particulars	Billed Amount (Cr)		Collection Amount (Cr)		Collection Efficiency (%)		AT&C (%)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
East Garo	34.11	32.65	18.57	17.98	54.44%	55.07%	78.69%	74.58%
Jaintia Hills	126.36	228.03	129.59	182.498	102.55%	80.03%	33.56%	32.98%
Khasi Hills	68.21	62.81	70.37	56.04	103.17%	89.22%	29.89%	42.08%
Ri-Bhoi	392.19	424.31	371.88	389.114	94.82%	91.71%	15.28%	15.29%
Shillong	252.09	266.61	293.53	265.07	116.44%	99.42%	1.82%	13.13%
West Garo	38.46	18.05	32.39	8.83	84.23%	48.92%	58.82%	72.10%
Tura Circle	20.19	22.06	13.82	19.485	68.47%	88.33%	63.09%	51.94%
Total	931.6	1054.52	930.15	939.017	99.84%	89.05%	24.96%	



6. Energy Audit findings

6.1. Review of capacity of DISCOM's energy accounting and audit wing

The Energy Accounting/Audit cell in the DISCOM has been established on 16-05-22. The Organogram of the DISCOM is as shown below:

Figure 8: Organogram of Energy accounting cell in the DISCOM

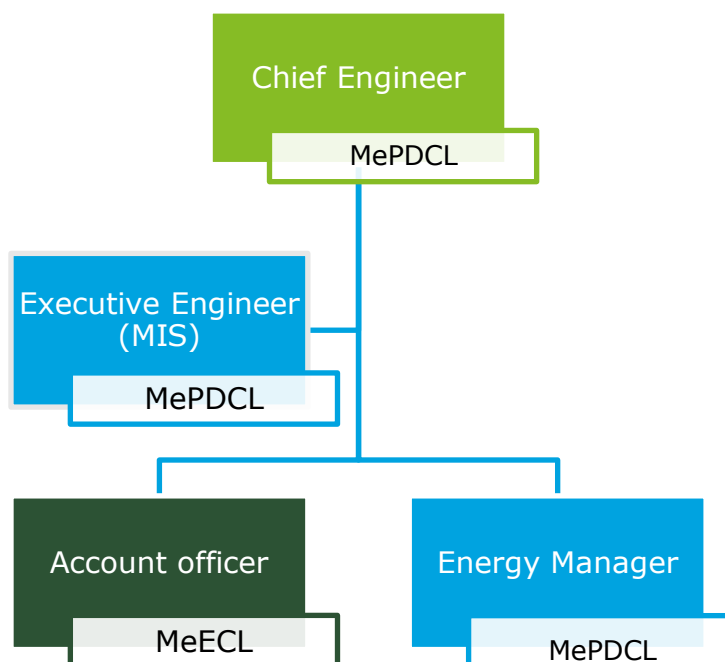


Table 35: Details of energy manager and Authorized signatory of DISCOM

Designation	Name of Officers
Chief Engineer (Comm.)	Shri. P.Sahkhar
Executive Engineer (MIS)	Smti. S. Rymbai
Accounts Officer	Shri. A. Myllemngap
Energy Manager	Shri. S. Mandal

6.2. Critical Analysis

- Verified transmission losses, distribution (T&D) losses, collection efficiency & aggregate technical & commercial losses of MePDCL for FY22-23, i.e., 1st April 2022 to 31st March 2023 is 2.82%, 16.25%, 89.19% & 25.31% respectively.
- MePDCL calculation methodology of AT&C Losses calculated on more than 100% collection efficiency.
- Detail of received source data is provide because power purchase for DISCOM is done by MePDCL. They have only provided monthly Purchased bills.

- The electrical energy which is supplied by various interstate Purchase power agreement at 220 KV, 132KV, 33 KV and same is supplied to customers at 132 KV, 33 KV, 11 KV, 400V and 230 V single phase.
- MePDCL has 100 % metering available at 11/33/66 KV system. However, there is 97% metering at consumer end and 29% metering available at DT.
- MePDCL is a very vast distribution network having 7 numbers of circles, 17 numbers of divisions, 54 numbers of sub-division, 345 numbers of feeders, 13368 number of DTs and 682033 numbers of consumers.
- MePDCL will be able to provide the Feeder wise Input Energy, Feeder wise billed energy after completion of installation of feeder meters and DT meters and mapping in each feeder.
- At the time of field visit it was found that at maximum substation the average power factor is above 0.95, which is satisfactory.
- Voltage wise power purchase details are not available, as the invoice of power purchase contains only units purchased and details of power plant voltage not available.
- Majority of feeders are common to LT & HT. So input energy supplied is inseparable.
- Cumulated EHT sales MUs for 33kV and above are maintained and therefore bifurcations of same are not available.
- Some of the meters were found faulty and CT & PT ratio is not working condition.
- Capacitor bank is already installed at some of the substation.
- There is low voltage problem in phulbari area in Garo Hills
- At present HT/LT ratio of DISCOM is 0.697.
- Need to improve HT/LT ratio by providing (High Voltage Distribution System) HVDS system.

6.2.1. Status and progress in compliance to pre-requisites to energy accounting

This Energy Audit report is being issued within the timeline stipulated in Regulations and hence no further comments from Energy Auditor with regards to this aspect.

It was observed that there has been significant delay in submission of Quarterly Accounts during three Quarters (i.e., Q1, Q2, and Q3 FY 2022-23), quarterly report Q4 is also submitted to BEE. The Quarterly accounts within the timeframe stipulated in the Regulations. Further, the compliance with regards to Regulations and Pre-requisites are tabulated in the table below:

Table 36: Compliance status w.r.t Timelines and Pre-requisites

Clause	Details	Sub-Clause	Criteria	Compliance Status
3	Intervals of time for conduct of annual energy audit	A	Conducted an annual energy audit for every financial year and submitted the annual energy audit report to the Bureau and respective State. Designated Agency and also made available on the website of the electricity distribution company within a period of four months from the expiry of the relevant financial year	Yes
4	Intervals of time for conduct of periodic energy accounting.	A	All feeder wise, circle wise and division wise periodic energy accounting is conducted by the energy manager of the electricity distribution company for each quarter of the financial year.	Yes
		B	All feeder wise, circle wise and division wise periodic energy accounting is conducted by the energy manager of the electricity distribution company for each quarter of the financial year.	Yes
		C	Electricity distribution company conducted its first periodic energy accounting, for the last quarter of the financial year immediately preceding the date of such commencement (i.e., 6th October 2021)	Yes
		D	Electricity distribution company conducted its subsequent periodic energy accounting for each quarter of the financial year for a period of two financial years from the date of such commencement and submits the periodic energy accounting report within sixty days from the date of periodic energy accounting.	Yes
5	Pre-requisites for annual energy audit and periodic energy accounting	A	Pre-requisites for annual energy audit and periodic energy accounting	Yes
		B	Identification and mapping of high tension and low-tension consumers	Yes
		C	Development and implementation of information technology enabled energy accounting and audit system, including associated software	Under Progress
		d	Electricity distribution company ensures the installation of functional meters for all consumers, transformers and feeders. Meter installation is done in a phased manner within a period of three financial years from the date of the commencement of these regulations in accordance with the trajectory set out in the First	Under Progress

Clause	Details	Sub-Clause	Criteria	Compliance Status
			Schedule	
			d.1. 100% Communicable Feeder Metering integrated with AMI, by 31st December 2022 along with replacement of existing non-communicable feeder meters.	
			d.2. All Distribution Transformers (other than HVDS DT up to 25kVA and other DTs below 25 kVA) shall be metered with communicable meters. Communicable DT Metering for the following areas/ consumers to be completed by December 2023 and in balance areas by December 2025:	Under Progress
			d.2.1. All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15%	
			d.2.2. All Union Territories (for areas with technical difficulty, non-communicable meters may be installed)	
			d.2.3. All Industrial and Commercial consumers	
			d.2.4. All Government offices at Block level and above	
			d.2.5. Other high loss areas i.e., rural areas with losses more than 25% and urban areas with losses more than 15%	
			d.3. Prepaid Smart Consumer Metering to be completed for all directly connected meters and AMR in case of other meters, by December 2023 in the following areas:	
			d.3.1. All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15%;	
			d.3.2. All Union Territories (for areas with technical difficulty, prepaid meters to be installed);	
			d.3.3. All Industrial and Commercial consumers;	
			d.3.4. All Government offices at Block level and above;	
			d.3.5. Other high loss areas i.e., rural areas with losses more than 25% and urban areas with losses more than 15%.	
			d.4. Consumer Metering: 98% by FY 2022-23 99% by FY 2023-24	
			d.5. Targets for functional meters - Meter FY 22-23 FY 23-24 FY24-25 Feeder metering 98.5% 99.5% 99.5% DT metering 90% 95% 98% Consumer metering 93% 96% 98	

Clause	Details	Sub-Clause	Criteria	Compliance Status
		e	e.1. All distribution transformers (other than high voltage distribution system up to 25kVA and other distribution system below 25 kVA) is metered with communicable meters.	
			e.2. And existing non communicable distribution transformer meters is replaced with communicable meters and integrated with advanced metering infrastructure.	
		f	Electricity distribution company has established an information technology enabled system to create energy accounting reports without any manual interference and such systems may be within a period of three years from the date of the commencement of these regulations in case of urban and priority area consumers; and within five years from the date of the commencement of these regulations in case of rural consumers	
		g	Electricity distribution company has a centralized energy accounting and audit cell comprising of (i) a nodal officer, an energy manager and an information technology manager, having professional experience of not less than five years; and (ii) a financial manager having professional experience of not less than five years	
6	Reporting requirements for annual energy audit and periodic energy accounting	a	Electricity distribution company has a nodal officer, who is a full time employee of the electricity distribution company in the rank of the Chief Engineer or above, for the purpose of reporting of the annual energy audit and periodic energy accounting and communicate the same to the Bureau	Yes
		b	Electricity distribution company ensures that the energy accounting data is generated from a metering system or till such time the metering system is not in place, by an agreed method of assumption as may be prescribed by the State Commission.	Yes, Under Process
		c	Metering of distribution transformers at High Voltage Distribution System up to 25KVA is done on cluster meter installed by the electricity distribution company	Under Process

Clause	Details	Sub-Clause	Criteria	Compliance Status
		d	The energy accounting and audit system and software is developed to create monthly, quarterly and yearly energy accounting reports.	
		c	Electricity distribution company has provided the details of the information technology system in place as specified in clause (f) of regulation 5 that ensures minimal manual intervention in creating the energy accounting reports and any manual intervention of any nature, in respect of the period specified therein, shall be clearly indicated in the periodic energy accounting report	Under Process

6.2.2. Data gaps

The Audit firm has raised the data gaps to the DISCOM. The summary of data gaps raised and response from DISCOM is summarized in the table below:

Table 37: Summary of Data gaps

S. No.	Data gaps raised by Energy Auditor	Response shared by DISCOM	Status of data submission by DISCOM
1	DT Wise losses are not in account.	DT wise mapping is under process.	
2	Feeder wise AT&C losses is not in account	Under Progress	
3	Voltage wise consumer & Sold unit is not available	Voltage wise bifurcation is not available	

6.2.3. Summary of key responses of DISCOM management on Comments by Energy Auditor

The Auditor has identified the key issues with regards to Energy Accounting/Audit and DISCOM's management has responded to the same as summarized in the table below:

Table 38: Comments by Energy Auditor and responses of DISCOM management

S. No.	Comments by Energy Auditor	Response of DISCOM's management
1	Kindly provide the identification and mapping of all of the electrical network assets.	Division Wise schematic were shown
2	Kindly provide the identification and mapping of high tension and low-tension consumers	Schematic maps for 11kV feeder were Shown.
3	DT wise losses is not in account	DT wise metering is under process.

S. No.	Comments by Energy Auditor	Response of DISCOM's management
4	Energy (Electrical) Purchase report for the year 2022-23	Provided by MePDCL
5	Energy sold outside the discom	Energy sold outside Provided
6	Energy Conservational Schemes implemented	Provided
7	Energy conservational Schemes to be implemented	Provided
8	Quarter wise report	Provided
9	Voltage wise losses are not available	Under process

6.3. Revised findings based on data validation and field verification

MePDCL officials responded to the data gaps and the plan for the site visit with Accredited Energy Auditor was prepared. The field visits were conducted in the month of August 2023. The schedule of the visits is as follows. Details along with Photo are enclosed in annexure

1. During field interaction & on-site visit auditor wanted to know the status of identification and mapping status of all of the electrical network assets, status of identification and mapping of high tension and low-tension consumers, status of the development and implementation of information technology status enabled energy accounting and audit system, including associated software, installation status of functional meters for consumers, transformers and feeders, status of adoption of an information technology enabled system to create energy accounting report reports without any manual interference and status of formation of cell for centralized energy accounting etc.
2. During field interaction & on-site visit auditor observed that MePDCL possessed communicable meters connected with feeders of MePDCL for capturing loss data, having system for identification and mapping of all high-tension consumers, but not having for low tension consumers. Still, during verification processes in their conference hall, MePDCL was unable to show the loss figures in details for feeders (Sample feeder wise mapping and losses are shown)/DTRs in their records.
3. Management response for action plan of MePDCL was found to be very positive and MePDCL was agreed upon to implement it with top priority within the target stipulated in pre-requisites of BEE's regulation.
4. Network diagram of the few feeders with high loss checked
5. The condition of the conductor and the reason for the loss were discussed.
6. The input point meter serial number validation is carried out.
7. The sending end voltage level. It is injection point of the MePDCL
8. The energy accounting process validated for each circle.

9. Input energy data cross verification.
10. Metering points and their energy break up.
11. Check list submitted to the MePDCL and data gaps of the submitted data explained.
12. At the time of field visit it was found that at maximum substation the average power factor is above 0.95, which is satisfactory.
13. Some of the meters were found faulty and CT & PT ratio is not working condition.
14. Need to survey and replace conductor of proper capacity.
15. Need to cut tree branches touching to conductors.
16. Need to tighten the jumpers.

6.4. Inclusions and Exclusions

NA

7. Conclusion and Action Plan

7.1. Summary of critical analysis and way forward proposed by Energy Auditor

The primary energy-consuming areas are the distribution network, the office buildings, and the fleet of vehicles used for maintenance and repairs. The distribution network accounts for the majority of energy consumption, followed by office buildings and vehicles.

7.1.1. Areas of Inefficiencies:

- **Distribution Network:** The energy consumption of the distribution network is higher than industry standards. The primary reasons for this are the aging infrastructure and lack of modern technology.
- **AT&C Loss:** it is still high (25.31%) as compared to national average of 15.5%. The main reason of high AT&C losses is billing efficiency, which is around 83.74%.
- **LT/HT Ratio:** Increasing HT lines can help in reducing both line losses and voltage drops. Efforts should be made to achieve a low LT/HT ratio, which would be very beneficial for improving efficiency of power distribution in the MePDCL.

7.1.2. Recommendations:

- The division wise excel sheet shall be automated via some software and the respective changes in the field in order to maintain the supply and meter faults, etc. shall be updated in the software on timely basis.
- 33/11kV Substation monitoring system shall be implemented. It shall monitor the loading of Transformer, Substations Battery and Feeders. It shall have the capability to show online data.
- Normal high loss distribution transformers should be replaced with star rating distribution transformer in phase manner.
- Normal conventional meter should be replaced with communicable prepaid smart meters.
- Augmentation of existing transformers at overloaded segments.
- Replacement or strengthening of conductor at overloaded segments is recommended.
- Recommended to provide aerial bunch conductor at theft prone area.
- Recommended to provide AMR meters for all HT installations.
- The DTR meter reading shall be AMR based and shall be increased. Proper Monitoring of the DTR meters shall be done.
- During off-peak periods, MePDCL is expected to minimize the no load losses by maintaining optimal loading of transformers by configuring its network in such a manner that reliability of supply is also not compromised.

Action Plan under Revamped Distribution Sector Scheme

A. Details of Infrastructure works under Loss Reduction (MePDCL)

Sr. No.	Activity	Unit	Quantity
1	HVDS/ Extension of HT Line and Reduction of LT Line		
A	New HT Line (21 no STP Poles, weasel conductor)	Ckm	1091.12
B	LT to HT conversion (17 nos STP Poles, weasel conductor) (Proposed in relatively flat Garo Hills)	Ckm	1926.03
C	LT AB Cable (3CX 50 Sqmm (168A)+1CX 35 Sqmm (insulated Messenger) + 1CX 16 Sqmm (Street light), 28 nos of Galvanized STP poles)	Ckm	1249.81
D	63 KVA substation (Supply cost of only Xmer 2.43 Lakhs)	Nos.	1234
E	100 KVA substation (Supply cost of only Xmer 3 Lakhs)	Nos.	1354
F	250 KVA substation (Supply cost of only Xmer 3.81 Lakhs)	Nos.	7
2	RECONDUCTORING/ AB CABLE		
A	33 kV reconductoring (6 nos of GI STP, 148 Sqmm MVCC Cable)	Ckm	244.85
B	11 kV reconductoring (5 nos of GI STP, 241 Sqmm MVCC Cable)	Ckm	1137.19
C	Replacement of LT bare conductor with LT AB Cable (3CX 50 Sqmm (168A)+ ICX 35 Sqmm (Insulated Messenger) - ICX 16 Sqmm (Street light)), 12 nos GI STP Poes	Ckm	2373.03
3	IT/OT works		
A	Implementation of Billing system/ other related software	Lumpsum	-
B	Other operating licenses (Perpetual license with 7 years of product warranty)	Lumpsum	-

B. Details of Smart Metering Works under RDSS

S. No	Type of Smart meter	Phase-I (By Dec'23)		Phase-II (By March'25)		Total Meters
		Nos	in %	Nos	in %	
1	Consumer Metering					
I.a	1 Ph smart Consumer meter	1,92,570	50%	1,92,568	50%	3,85,138
1.b	3 phase whole current smart	37,432	50%	37,430	50%	74,862
2	Smart DT Metering	5,705	50%	5,714	50%	11,419
3	Smart Feeder Metering	904	100%	0	0%	904
4	Smart Boundary Metering	420	100%		0%	420
Total		2,37,031	50%	2,35,712	50%	4,72,743

7.1.3. Cost-Benefit Analysis:

To determine the cost-effectiveness of the recommended measures, a cost-benefit analysis should be conducted. The cost of implementing the measures should be compared to the potential energy savings to determine the return on investment. This analysis will help the company prioritize the implementation of the recommended measures.

In conclusion, the energy audit of the electricity distribution company revealed several areas of inefficiencies in energy consumption. The recommended measures, including upgrading the infrastructure, modernizing the HVAC systems, promoting employee awareness, and improving the fleet of vehicles, will help to improve energy efficiency and reduce energy consumption. Conducting a cost-benefit analysis will help the company to prioritize the implementation of these measures. Overall, the implementation of these measures will improve the company's energy efficiency, reduce energy consumption, and lower energy costs.

7.2. Summary of key findings – energy balance and losses

The Energy balance and losses of MePDCL for FY 2022-23 are as shown in the table below:

Table 39: Energy balance and losses

Energy Input Details	Formula	UoM	Value
Input Energy Purchase (From Generation Source)	A	MU	2905.00
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	2127.18
Total Energy billed (is the Net energy billed, adjusted for energy traded))	C	MU	1781.42
Transmission and Distribution (T&D) loss	D	MU	345.77
Details	$E = D/B \times 100$	%	16.25%
Collection Efficiency	F	%	89.19%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1-E) \times \text{Min}(F, 100\%)\}$	%	25.31%

7.3. Recommendations and best practices

a) Energy accounting

The Bureau of Energy Efficiency (BEE), through Ministry of Power, Government of India, notified the regulations viz. 'Bureau of Energy Efficiency(Manner and Intervals for Conduct of Energy Audit in Electricity Distribution Companies) Regulations, 2021' vide Notification No.18/1/BEE/DISCOM/2021 dated 6th October 2021, and amendment issued thereof on 28th Oct. 2022. The extant regulations specify the following key aspects related to energy accounting and audit for electricity distribution companies.

- a) Intervals of time for conduct of periodic energy accounting and annual energy audit and report submission thereof.
- b) Pre-requisites for annual energy audit and periodic energy accounting

- c) Reporting requirements for annual energy audit and periodic energy accounting,
- d) Manner of annual energy audit and periodic energy accounting
- e) Prioritization and preparation of action plan and
- f) Structure of annual energy audit report

These regulations have been issued under the ambit of Energy Conservation Act, 2001, with an overall objective to reduce inefficiencies and losses in distribution sector thereby ensuring financial and economic viability of DISCOMs.

The regulation stipulates quarterly energy accounting by DISCOMs, through a certified Energy Manager and annual energy audit by an Independent Accredited Energy Auditor. The periodic energy accounting (quarterly) report needs to be submitted within 60 days of completion of the respective Quarter while the annual energy audit report should be submitted within four months of the completion of the financial year.

As per this regulation, An Energy Audit Cell (EAC) has been constituted headed by the Chef Engineer (PMC) vide notification no. MeECL/CA/GA/13/YR-22/16 dated 28th April 2022. The committee took necessary action to adhere with the regulation. In following table, status of the activities with timelines has been given

Activity		Date of Engagement	Reference	
1	Engagement of the Certified Energy Auditor- Shri. Santanu Mandal (BEE Reg. No. EA-23306)	28 th November 2022	Office Order No. MeECL/CA/GA/13/YR-22/45	
2	1 st Engagement of Independent Accredited Energy Auditor through Competitive Bidding	07 th December 2022	LOA No. MePDCL/CE(PMC)/Tech-065/2022-23/135	
Energy Accounting Report (Quarterly)		Date of Submission	Reference	Acknowledgement received from BEE
	Q2 of FY2021-22	08 th February 2023	Email	08 th February 2023
	Q3 of FY2021-22	08 th February 2023	Email	08 th February 2023
	Q4 of FY2021-22	08 th February 2023	Email	08 th February 2023
	Q1 of FY2022-23	08 th February 2023	Email	08 th February 2023
	Q2 of FY2022-23	22 nd February 2023	MePDCL/CE(PMC)/Tech-065(Pt-II)/2023-24/48	28 th February 2023
	Q3 of FY2022-23	20 th March 2023	MePDCL/CE(PMC)/Tech-065(Pt-II)/2023-24/63	23 rd March 2023
	Q4 of FY2022-23	03 rd July 2023	MePDCL/CE(PMC)/Tech-065(Pt-III)/2023-24/40	03 rd July 2023
	Q1 of FY2023-24	29 th September 2023	MePDCL/CE(Comm.)/Tech-078/2023-24/ 8	
Energy Audit Report (Annual)		Date of Submission	Reference	Acknowledgement received from BEE
	FY-2020-21	27 th January 2023	Through Email	31 st January 2023
	FY-2021-22	02 nd February 2023	Through email	03 rd February 2023

b) Loss reduction

- Replacement of Electronic Meter to Smart Meters in Urban areas having loss more than 40%. In RDSS scheme.
- DT metering of Urban areas having loss more than 40%.
- Augmentation of DTR and PTRs
- Augmentation of Conductor of 33 & 11 KV lines.
- Construction of New Substations.
- Installation of New Capacitor Bank on 11 KV feeders.
- LT underground cabling etc.
- Replacement of Bare LT Conductor with AB cable.
- Improving HT: LT ratio.

c) Energy conservation

- i. Awareness camps organised at Sub-Divisional level to advice consumers to use 5-star rated energy efficient appliances.
- ii. Encouraging Consumers to opt roof top solar energy panels.

7.4. Action plan for line loss reduction

Following energy conservation Measures (ECMs) is adopted for line loss reduction

1. Installation of Smart Meters.
2. Installation of Automatic Power factor controller (Capacitor Bank).
3. System improvement & automation.
4. Improvement in metering system.
5. Replacing of conventional/ non star rated transformer into energy efficient transformers.
6. Replacement of all conventional mechanical energy meters with static digital energy meters having less power consumption and more accuracy.
7. Laying of AB cable in theft prone area where loss are in higher side.
8. HVD system to reduce low tension line losses.
9. Replacing worm out /Under sized conductors.
10. Increase in HT/LT Ratio.
11. Preventive & Periodic maintenance of line & transformer.
12. Load balancing of distribution transformers.
13. MIS Based periodic reporting of unit wise business parameters.
14. Installation of solar generation plant & solar pumps.
15. Strengthening of energy accounting infrastructure- 100% consumer metering.
16. GIS based asset mapping of all 33/11KV Substations, 11KV Lines and distribution transformers has been completed.

17. 11KV Feeder wise base line technical data i.e., length, Peak load, VR and technical loss calculated by algorithm & published in power BI.
18. Feeder wise baseline commercial loss is being collected by subtracting technical loss for total T&D loss.
19. Selection/priority of area must be made under:
 - I. Feeder having VR more than 15%.
 - II. Feeder having VR more than 9 to 15%.
 - III. Feeder having peak load more than 100 Amp. & length more than 30KM.
 - IV. High T&D loss feeder.
 - V. High commercial loss feeder.

7.5. Action plan for monitoring and reporting

1. Online monitoring of month wise energy data of various Division of MePDCL.
2. The division wise excel sheet shall be automated via some software and the respective changes in the field in order to maintain the supply and meter faults, etc. shall be updated in the software on timely basis.
3. 33/11kV Substation monitoring system shall be implemented. It shall monitor the loading of Transformer, Substations Battery and Feeders. It shall have the capability to show online data.
4. Most of the Feeder Meters are having communication facility through AMR and MRI Data (generally, more than feeder meter data is received through AMR or MRI.). The DTR meter reading shall be AMR based and shall be increased. Proper Monitoring of the DTR meters shall be done.
5. During off-peak periods, MePDCL is expected to minimize the no load losses by maintaining optimal loading of transformers by configuring its network in such a manner that reliability of supply is also not compromised.

7.6. Action plan for automated energy accounting

Automated energy accounting is a critical component of modern electricity distribution systems. It allows for accurate and efficient tracking of energy usage, which helps identify energy waste, reduce energy consumption, and improve billing accuracy. In this report, we will outline an action plan for implementing automated energy accounting in an electricity distribution company.

Step 1: Evaluate Current Energy Accounting System

The first step is to evaluate the current energy accounting system to identify areas that need improvement. This will involve reviewing the current processes, systems, and data management practices. The evaluation should consider the following factors:

- Accuracy of billing and metering
- Timeliness of bill generation
- Data management practices
- Energy usage tracking capabilities
- Customer feedback and complaints

Step 2: Identify Automated Energy Accounting System Requirements

After evaluating the current energy accounting system, the next step is to identify the requirements for an automated energy accounting system. This will involve considering the following factors:

- Energy usage tracking capabilities
- Billing accuracy and timeliness
- Integration with existing systems
- Data management capabilities
- Scalability and flexibility

Step 3: Research and Select an Automated Energy Accounting System

Once the requirements are identified, the next step is to research and select an automated energy accounting system. This will involve reviewing available options and selecting a system that meets the identified requirements. The selected system should have the following features:

- Real-time energy usage tracking
- Automated billing and metering
- Data management and analysis capabilities
- Integration with existing systems
- User-friendly interface

Step 4: Develop Implementation Plan

After selecting an automated energy accounting system, the next step is to develop an implementation plan. This will involve determining the following:

- Timeline for implementation
- Resource requirements
- Roles and responsibilities
- Training requirements
- Data migration plan

Step 5: Implementation and Testing

Once the implementation plan is developed, the next step is to implement and test the automated energy accounting system. This will involve the following:

- Installation and configuration of the system
- Data migration from the old system to the new system
- User training
- System testing

Step 6: Rollout and Monitoring

After successful testing, the next step is to rollout the automated energy accounting system to all customers. This will involve communicating the changes to customers and

ensuring a smooth transition. Once rolled out, the system should be continuously monitored to identify any issues and improve the system's performance.

In conclusion, implementing an automated energy accounting system can help an MePDCL improve billing accuracy, reduce energy waste, and enhance data management capabilities. The action plan outlined above provides a framework for implementing an automated energy accounting system in an electricity distribution company. By following this plan, the company can successfully implement the system and achieve its energy accounting goals.

Annexures

Annexure I - Introduction of Verification Firm

We A-Z Energy Engineers Pvt. Ltd. provides consultancy services in the areas of energy management while conducting Energy Audits in all segments of energy input. For conducting Detailed Energy Audits, Energy Audits under PAT (Mandatory and M&V), we have a pool of experienced BEE Accredited & Certified Energy Auditors, Electrical Engineers, Mechanical Engineers and Technicians having experience of more than 30 years. The Energy Audits is being carried out with sophisticated instruments namely Power-Analyzer, Flue Gas Analyzer, Ultra-sonic flow meter, Techo-meter, Anemometer, Hego-Meter, Digital Thermometer, Thermographic Camera's, Lux Meter, Leak detectors. Laser gun etc.

Objective

- To carry out and take ahead the business of Energy Efficiency and climate change including promotion and dissemination of energy efficient product and services.
- To disseminate the culture of safe manufacturing and Services through safety audits and trainings.
- To facilitate implementation of energy efficiency projects for Demand Side Measures including optimization of energy mix for industries, railways, building sector, lighting, HVAC etc.
- To facilitate implementation of schemes, programs and policies of central and state governments or its agencies applicable for enhancing energy efficiency.
- To provide consultancy services in the field of Clean Development Mechanism and Renewable Energy Certificate projects, Carbon Markets, Demand Side Management, Energy Efficiency, Climate change and other related areas.
- To identify and impart training to build the capacity of stakeholders in the field of Energy Efficiency and safe practices in Industry.
- To act as a resource center in the field of Energy Efficiency and take up the activities of Capacity Building Training and other related activities.

Vision

- To make use of energy sustainable.
- To create and sustain markets for energy efficiency in India
- To facilitate energy efficiency improvement through private sector investments in energy efficiency.

Mission

- To assist all stakeholders in implementing energy efficiency and realizing savings.
- To create awareness regarding merits of improvement of energy efficiency and safety practices in private and public sector.

We are Accredited Energy Auditor from BEE, also empanelled by BEE for PAT M & V Audits and Mandatory Energy Audit Projects. A-Z Energy Engineers Pvt. Ltd. has been short listed by Bureau of Energy Efficiency as an Energy Service Company (ESCO), it is an ISO 9001:2015 certified company. We have completed more than 1260 nos. projects, including 52 PAT projects

Dr. P.P. Mittal the Founder Director of A-Z Energy Engineers Pvt. Ltd. was awarded by Govt. of India in National Energy Conservation Award 2013, 2015 & 2016. MSME Ministry Govt. of India awarded "Best Services Providing Company" it was awarded by Hon'ble Prime Minister of India.

a) Name of the Firm

Name of Accredited Firm	Accredited Energy Auditor
A-Z energy Engineers Private Limited	Dr P.P Mittal (AEA 011)

b) Composition of Team

Sr.No.	Name	Qualification	Registration No	Experience (InYears)/Sector
1	Dr. P.P Mittal	Ph.D, MBA		+45 Years
2	Mr. Vipon Chanda	DISCOM Sector		30
3	Mr. V.P Sharma	B. Tech		32 Years
4	Mr. Alok Kumar Tiwari	B. Tech		7 Years
5	Mr. Pankaj Chauhan	Team Member		8 Years

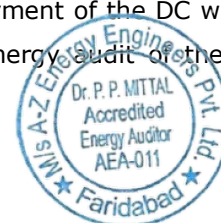
c) Registration No.

EmAEA 0024

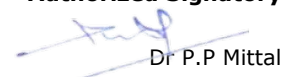
d) Undertaking

We A-Z Energy Engineers Pvt. Ltd. hereby confirm that our AEA and any of the audit team member mentioned in this report has conduct mandatory annual energy audit (Accounting) for MePDCL, Shillong (hereafter called as DC).

We also confirm that none of our team member was in the employment of the DC within the previous four years, and was not involved in undertaking energy audit of the DC within the previous four years.



Authorized Signatory


Dr P.P Mittal

Annexure II - Minutes of Meeting with the DISCOM team**Minutes of Meeting with Meghalaya Power Distribution Corporation Limited (MePDCL), Shillong & A-Z Energy Engineers Pvt. Ltd., New Delhi****MePDCL****AZ Energy Engineers Pvt. Ltd.**

AZ Energy Engineers audit team visited the site on 16th to 19th Aug' 23 and conduct the energy audit accounting with reference to the BEE and notification from the Bureau of Energy Efficiency dated 28th October 2022 for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies).

Following are the key observations during audit.

- Filled in Proforma for FY 2022-23 was filled with Meghalaya Power Distribution Corporation Limited, & Audit team.
- MePDCL has provided the following documents for Purchase Energy, input/Billed energy. i.e. Internal Department sheet & UGO.
- MePDCL has provided details for action plan to reduce losses
- Verified T&D losses, AT&C losses & Collection Efficiency is 16.25%, 25.31% & 89.19% respectively based on the filled in proforma and verified source documents.
- During the audit field visit of substation was done and data attached in report. During the visit it was found that most of meters with modem were installed also daily basis logbook.

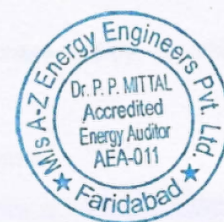
S. No	Data Required for Annual Energy Audit	Status
1	Complete filled in Proforma for the year 2022-2023 (Annually)	Provided
2	Supporting Data with Month wise breakup	Provided Month wise breakup
A	Purchase Energy	


S. No	Data Required for Annual Energy Audit	Status
B	Net Input in Discom	(Consumer, Units)
C	Billed Energy	
D	Revenue Demand	
E	Revenue Collected	
F	Energy Export to other	
G	Transmission loss calculation Methodology	
H	Quarter report	Provided
3	Feeder wise input ,Billed Energy, T&D & AT&C losses	Provided
4	Action plan to reduce the T&D and AT&C losses	RDSS Plan Provided
5	Assets details matched with the proforma infrastructure sheets	Provided
6	Subsidy category Wise (BEE Guideline proforma)	NA
7	High Loss area T&D & AT&C action plan to reduce losses	Provided
8	DT Wise Losses	Under Progress
9	Feeder wise Losses	Provided

Meghalaya Power Distribution Corporation Limited

AZ Energy Engineers Pvt. Ltd.


 Chief Engineer (Commercial)
 Meghalaya Power Distribution Corporation Limited
 Lumjingshai, Shillong - 793001




 Energy Manager,
 MeECL, Meghalaya
 BEE Reg. No: EA-23306



Annexure III - Check List prepared by auditing Firm

An annual energy audit checklist is used to assess the energy efficiency of MePDCL based on equipment, appliances, design, and usage. Accredited Energy Auditor develops this checklist to identify opportunities for energy cost reduction and recommend solutions.

Documentary evidence for T & D system related data voltage-wise energy input data, sale data, feeder-wise loss data, collection efficiency etc.

► List of Measures adopted for energy conservation and quantity of energy saved with proper document support.

► Checking & verification of over loading of feeders at Substation level either by the study of SCADA system or by the log book

- Month wise input and billed energy.
 - T&D losses computation approach.
 - Un-metered energy consumption approach.
 - Internal field audit report of input and billed energy.
 - Performance of discom on distribution losses.
 - Outcome of internal filed audit.
 - Measures taken to reduce losses and improve losses.
 - Zone/circle/Division/Sub-division wise loss computation.
 - Reduction achieved, measures adopted for energy conservation and quantity of energy saved.
 - Report on distribution losses.
 - Write up on energy scenario.
 - Net Input Energy Computation Details.
 - Category wise consumer's details.
 - Category wise consumers connected load and % load
 - Bifurcation of Billed Energy (metered billed energy and unmetered billed energy).
- Write up on procedure followed Technical loss analysis.

Annexure IV - Brief Approach, Scope & Methodology for audit

Scope of annual energy accounting is as per guidelines and notification from Bureau of Energy Efficiency, New Delhi dated 6th October, 2021



Annexure V - Infrastructure Details

The infrastructure details of the DISCOM are as shown in the table below:

Table 40: Infrastructure details

Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
Number of circles	7	7	Sample Checked	
Number of divisions	17	17	Sample Checked	
Number of sub-divisions	54 (4 DF & 2 are not functional)	54 (4 DF & 2 are not functional)	Sample Checked	
Number of feeders	345	345	Sample Checked	
Number of DTs	13368	13368	Sample Checked	
Number of consumers	682033	682033	Sample Checked	

Table 41: Metering details

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventional metered consumers	11	43	702	566450
Number of consumers with 'smart' meters	0	0	106	80226
Number of consumers with 'smart prepaid' meters	0	0	0	1204
Number of consumers with 'AMR' meters	0	0	0	
Number of consumers with 'non-smart prepaid Meters	0	0	0	14381
Number of unmetered consumers	0	0	0	18910
Number of total consumers	11	43	808	681171
Number of conventionally metered Distribution Transformers	36	198	3938	
Number of DTs with communicable meters				
Number of unmetered DTs			9430	
Number of total Transformers	36	198	13368	
Number of metered feeders		196	293	
Number of feeders with communicable meters		0	0	
Number of unmetered feeders		0	52	
Number of total feeders	0	196	345	
Line length(ctkm)	29384.128 (LT line)+ 17697.98 (11 kV line)+ 2797.40 (33kV line)			
Length of Aerial Bunched Cables	0			
Length of Underground Cables	1.86			

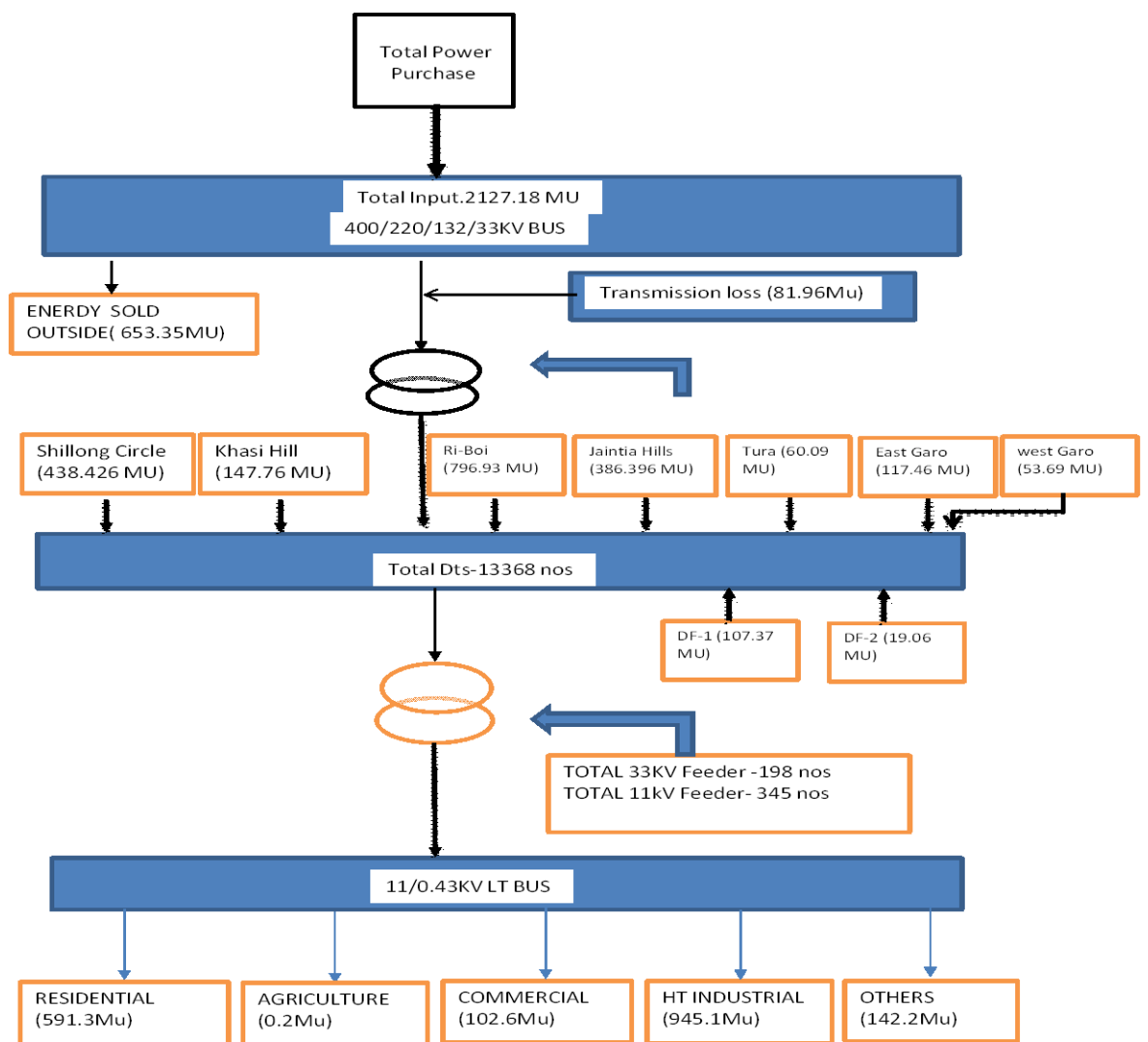
Annexure VI - Electrical Distribution System

- ▶ Energy flow between transmission and 220kV/132kV/33kV/20 kV/11kV/6.0 kV/3.3 kV incoming distribution feeders
- ▶ Energy flow between 132kV/33kV outgoing and 20 kV/11kV/6.6 kV/6.0 kV incoming feeders
- ▶ Energy flow between 11kV/6.0 kV/3.3 kV feeders and distribution transformers, or high voltage distribution system

Energy flow between distribution transformer, or high voltage distribution system to end-consumer, including ring main system. Energy flow between Feeder to end-consumer & Energy flow between 132kV/33kV/20 kV/11kV/6.0 kV/3.3 kV directly to consumer

ENERGY FLOW DIAGRAM

FY 2022-23



Annexure VII - Power Purchase Details

a) Input Purchase Power for FY 2022-23

MePDCL, Shillong purchase the power from the MePDCL the month wise purchase units are shown in below table:

Table 42: Month wise power purchase

Sr. No.	Months	Energy (in Mus)
1	Apr-22	184.86
2	May-22	216.89
3	Jun-22	245.20
4	Jul-22	291.95
5	Aug-22	285.90
6	Sep-22	293.16
7	Oct-22	289.69
8	Nov-22	199.24
9	Dec-22	248.68
10	Jan-23	235.30
11	Feb-23	214.68
12	Mar-23	199.45
	Total	2905.00

b) Circle wise monthly Input Energy for FY 2022-23

The Month wise break up of input energy (MUs) parameter for all the circle is given below:

Table 43: Circle wise monthly input & Billed energy (MU)

Month	East Garo Hills					West Garo Hills				Grand Total
	Circle	Jaintia Hills Circle	Khasi Hills Circle	Ri-Bhoi Circle	Shillong	Tura Circle	Circle	DF_FEDCO	DF_SAI	
Apr-22	7.59	26.94	9.50	71.16	31.16	4.40	3.67	7.05	1.21	162.69
May-22	8.72	26.97	10.63	64.43	32.21	4.66	4.02	7.74	1.25	160.63
Jun-22	7.40	28.44	10.18	53.90	31.67	4.66	3.58	6.26	1.27	147.36
Jul-22	10.28	28.11	11.34	62.81	31.38	5.41	4.89	9.24	1.69	165.15
Aug-22	10.78	35.07	11.21	69.78	32.24	5.92	5.16	9.75	1.74	181.65
Sep-22	10.30	28.12	10.83	69.26	31.86	5.37	5.13	9.44	1.65	171.96
Oct-22	9.58	31.19	11.67	69.58	34.10	4.63	4.53	8.77	1.52	175.57
Nov-22	9.97	31.52	13.89	63.85	38.92	4.73	4.16	9.08	1.59	177.70
Dec-22	11.62	37.94	16.09	69.40	45.41	5.57	4.94	10.06	1.84	202.88
Jan-23	11.99	40.83	16.03	73.79	47.91	5.61	5.10	10.49	1.85	213.60
Feb-23	9.94	35.60	13.43	62.02	41.24	4.94	4.27	9.50	1.60	182.55
Mar-23	9.29	35.67	12.95	66.94	40.32	4.18	4.25	9.99	1.85	185.45

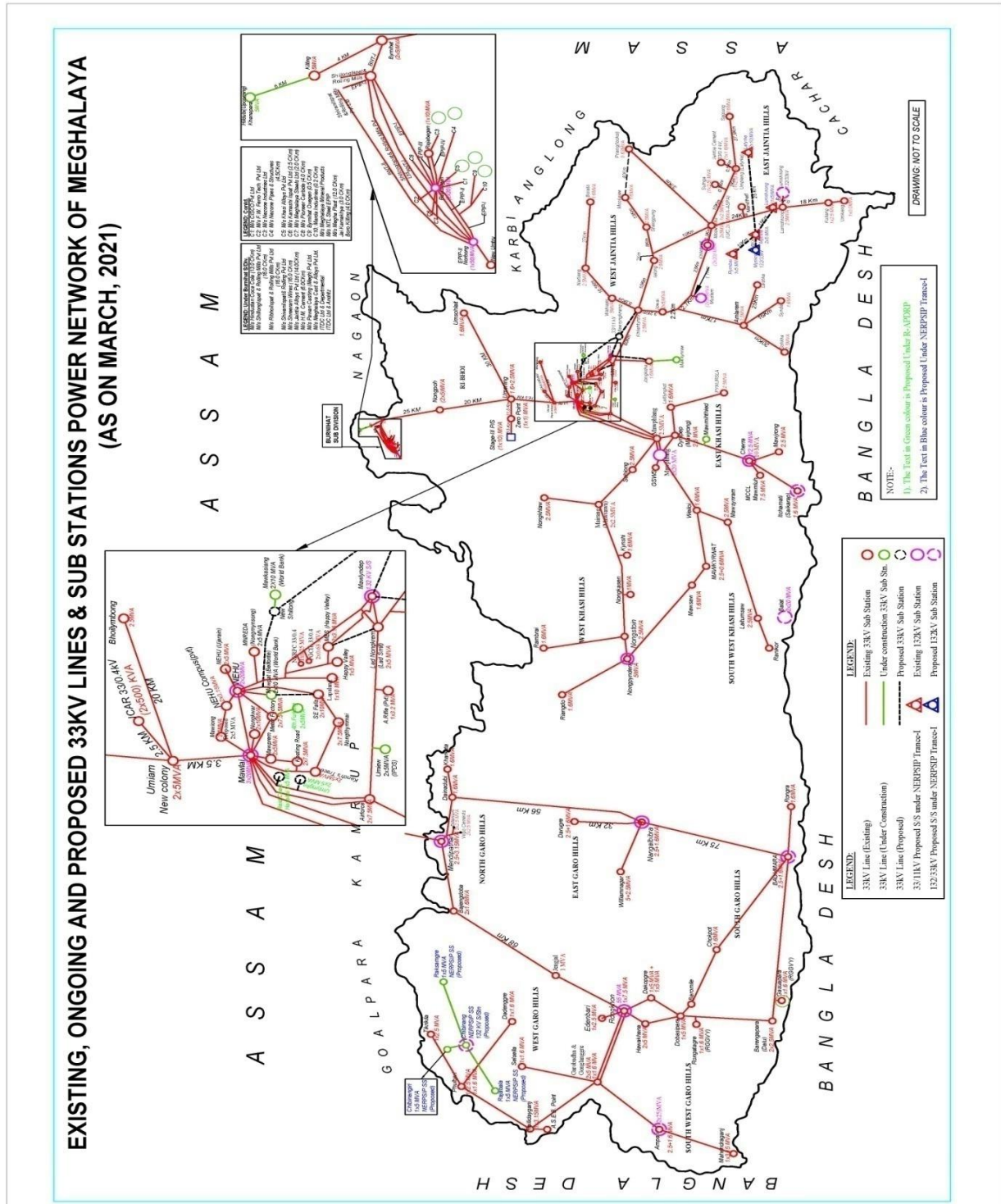
Month	East Garo Hills					West Garo Hills		DF_FEDCO	DF_SAI	Grand Total
	Circle	Jaintia Hills Circle	Khasi Hills Circle	Ri Bhoi Circle	Shillong Circle	Tura Circle	Circle			
Apr-22	3.68	26.18	7.72	70.26	29.80	2.46	2.23	6.43	1.21	149.97
May-22	3.48	23.69	6.86	57.07	28.46	2.64	2.08	7.77	1.25	133.30
Jun-22	4.07	23.15	6.84	52.67	28.98	2.64	1.81	6.41	1.27	127.84
Jul-22	2.88	25.69	7.32	52.77	25.59	2.57	1.54	9.20	1.69	129.24

Month	East Garo Hills Circle	Jaintia Hills Circle	Khasi Hills Circle	Ri Bhoi Circle	Shillong Circle	Tura Circle	West Garo Hills Circle	DF_FEDCO	DF_SAI	Grand Total
Aug-22	3.52	27.28	7.60	66.64	29.27	2.82	2.28	9.84	1.69	150.95
Sep-22	3.54	21.10	7.66	66.69	28.03	1.94	2.43	9.48	1.65	142.52
Oct-22	6.21	25.20	8.02	63.28	34.04	3.38	1.84	8.89	1.52	152.39
Nov-22	4.36	20.99	7.61	53.07	31.32	2.54	1.98	9.20	1.59	132.66
Dec-22	4.83	26.58	8.02	56.65	34.19	2.20	1.53	10.00	1.84	145.82
Jan-23	5.07	43.01	9.78	77.38	43.30	3.39	1.85	10.79	1.85	196.42
Feb-23	5.73	24.47	9.52	53.36	37.88	3.06	3.99	9.20	1.60	148.79
Mar-23	6.85	36.23	8.97	66.31	32.23	3.07	7.06	9.24	1.56	171.52

Annexure VIII - Single Line Diagram (SLD)

The SLD of the DISCOM is as shown below:

Figure 9: Single Line Diagram (SLD) of MePDCL



Annexure IX - Category of service details (With Consumer and voltage-wise)

Type of consumers with different type of voltage & number of consumers are shown in below table:

Table 44: Category of service details

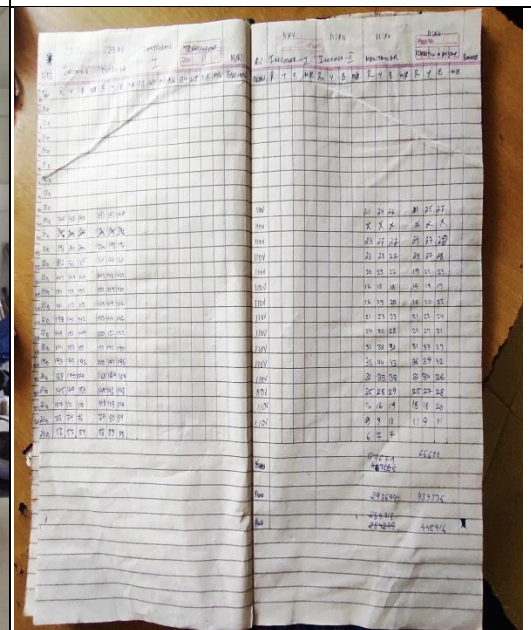
S.No	Type of Consumers	Category of Consumers	No of Consumers	Total Consumption (In MU)
1	Domestic	LT/HT	543838	493.81
2	Commercial	LT	34520	78.03
7	Water Supply	LT	452	8.43
8	Public Lighting	LT	78	1.03
9	HT Water Supply	HT	68	34.88
10	HT Industrial	EHT/HT	223	914.05
11	Industrial (Small)	LT	689	4.95
13	HT Commercial	HT	229	30.72
17	Mixed Load	HT/LT	2416	13.03
18	Government offices and department	HT/LT	209	77.04
19	Crematorium	LT	21	0.18
20	Agriculture	LT	1	0.09
21	EV	LT	2	0.00
22	Distribution Franchisee-1_FEDCO	HT/LT	71975	106.45
23	Distribution Franchisee-2_SAI	HT/LT	27312	18.72
	Total		682033	1781.42

Annexure X - Field Verification data and reports

The field inspection details are shown in the below table:

Table 45: Field inspection details

		
		
<p>33/11 kV Umjarain Substation</p>		



132/33 KV NEHU SUBSTATION

Annexure XI - List of documents verified with each parameter

The documents verified are listed in the below table:

Table 46: List of documents verified with each parameter

S. No	Data Required for Annual Energy Audit as per BEE regulation	Status	Remark
1	Complete filled in Proforma for the year 2022-2023 (Annually)	Provided	Data Attached
2	Supporting Data with Month wise breakup	Provided Month wise breakup	Data Attached
A	Purchase Energy		
B	Net Input in Discom		
C	Billed Energy		
D	Billed Revenue		
E	Revenue Collected		
F	Energy Export to other		
G	Transmission loss calculation Methodology	Calculated	Provided
3	Feeder wise input ,Billed Energy, T&D & AT&C losses	Provided	Data Attached
4	Action plan to reduce the T&D and AT&C losses	Provided The various schemes	Action plan to reduce AT&C losses & payback of RDSS Schemes
5	Assets details matched with the proforma infrastructure sheets	Provided	Data Attached
6	Verified T&D and AT&C losses (Approved With Petition)	Petition provided	Data Attached
7	Energy Flow Diagram	Data Attached	Data Attached
8	Subsidy category Wise (BEE Guideline proforma)	Format Provided	NA
9	High Loss area T&D & AT&C action plan to reduce losses	Provided	Data Attached
10	Power Map	Provided	Data Attached

Annexure XII - Brief Description of Unit

The Meghalaya Energy Corporation Ltd. (MeECL) is a Government Company within the meaning of section 45 of the Companies Act, 2013, wholly owned by the Government of Meghalaya, incorporated under the Companies Act, 2013 in the year 2009 and inherited its business from the erstwhile Meghalaya State Electricity Board (MeSEB) in the year 2010. It has wholly owned three subsidiary Companies namely, Meghalaya Power Generation Corporation Ltd. (MePGCL), Meghalaya Power Transmission Corporation Ltd. (MePTCL) and Meghalaya Power Distribution Corporation Ltd. (MePDCL) responsible for Generation, Transmission and Distribution of Electricity respectively throughout the State as State Utilities.

The erstwhile Meghalaya State Electricity Board (MeSEB) was formed in the year 1975 after the formation of new State of Meghalaya from undivided State of Assam. The first Hydro Electric project in Meghalaya had started its operation in the year 1921, thereafter different Hydro Electric projects are being constructed throughout the State of Meghalaya utilising the natural water resources, efficient and experienced engineering wing and beautiful working environment of the State.

The following are the projects operated and maintained by the MePGCL:

Name of the Project	Type of Development	Capacity (MW)	Date of Commissioning	Design Energy (mu)
Sonapani mhp	Run-of the river	1 X 1.5	1921/2009	5
Umtru, dehal, byrnihat	Run-of the river	4 X 2.8	1957	39
Umiam stage-i, sumer	Storage	4 X 9	1965	116
Umiam stage-ii, um-sumer	Power channel (pondage)	2 X 10	1970	46
Umiam-umtru stage-iii, kyrdemkulai	Pondage	2 X 30	1979	139
Umiam-umtru stage-iv, nongkhylllem	Pondage	2 X 30	1992	207
Myntdu leshka h.e. Project	Run-of the river	3 X 42	2011-13	486
New umtru he project	Pondage	2X20	2017-18	235
Lakroh mini hydel project	Run-of the river	1.5	2019	11.01
Total		356.20		1273

The MeECL and its three subsidiaries have availed loans mainly from the Power Financial Corporation Ltd. (PFC) and REL Ltd. (REC) for funding the execution of Power Generation Projects by MePGCL and for meeting Power Purchase dues incurred by MePDCL. The Power Finance Corporation Ltd. (the Lender) has assigned an internal rating of 'A' to the MePGCL and 'A+' to the MePTCL on 15th November, 2018 and both ratings are still effective.

With effect from 1st April, 2012, the respective assets & liabilities including all rights, obligations and contingencies of the three subsidiary companies of MeECL has been transferred to and vest with the respective Subsidiary companies from MeECL.

GOVERNMENT NOTIFICATION

Pursuant to the Government of Meghalaya notification on 'The Meghalaya Power Sector Reforms Transfer Scheme, 2010', the Meghalaya Energy Corporation Ltd. (MeECL) was incorporated on 14th September, 2009 as holding company of Meghalaya Power Distribution Corporation Ltd. (MePDCL), Meghalaya Power Transmission Corporation Ltd. (MePTCL) and Meghalaya Power generation Corporation Ltd. (MePGCL).

STATE OF AFFAIRS OF MEECL

Pursuant to the Amendment notification on 'The Meghalaya Power Sector Reforms Transfer Scheme, 2010' dated 31st March, 2012, the MeECL had carried all the business activities of its own and of its three subsidiary companies during the financial years 2010-11 and 2011-12.

With effect from 1st April, 2012, the respective assets & liabilities including all rights, obligations and contingencies of the three subsidiary companies of MeECL has been transferred to and vest with the respective subsidiary companies from MeECL.

FUNCTIONS OF MEECL

The MeECL is a Government Company within the meaning of section 45 of the Companies Act, 2013. Your Company is 100% owned by the Government of Meghalaya.

The MeECL is comprising of all the assets, liabilities including all rights, obligations, contingences and proceedings belonging/related to the common activities or not specifically associated with the generation, transmission and distribution activities.

Inter-alia, the MeECL is performing the following major activities:

- i) HR & Administration of the MeECL and its three subsidiaries.
- ii) Maintaining the provident Fund, Pension Fund, Gratuity Fund etc. for employees of MeECL and its three subsidiaries.
- iii) Corporate Social Responsibility
- iv) Preparation of Accounts and Fund Management
- v) Commercial, Material Management and Planning & Design for MeECL and of subsidiary companies.

STATE OF AFFAIRS OF MEGHALAYA POWER DISTRIBUTION CORPORATION LTD. (MEPDCL)

The MePDCL is a Government Company within the meaning of Section 45 of the Companies Act, 2013. The present share-holding is 100% owned by the Meghalaya Energy Corporation Ltd. (MeECL), a Government of Meghalaya Enterprise.

Your company is licensee mandated with distribution of power to consumers within the State of Meghalaya. Your Company has started carrying its business operations with effect from 1st April, 2012.

The MePDCL has commenced filing its separate tariff petition before the Meghalaya State Electricity Regulatory Commission (MSERC) with effect from 1st April, 2013.

REGULATORY FRAMEWORK: TARIFF FIXATION/DETERMINATION

The Meghalaya State Electricity Regulatory Commission is a statutory body established in accordance with the provisions of the Electricity Act, 2003 and is responsible for licensing transmission, distribution and trade of electricity in the State. The other important responsibilities of the MSERC include; fixation of tariff, regulation of procurement and creation of a consumer friendly grievance settlement framework.

CONSUMER ADVOCACY

The Electricity Act, 2003 provides for active participation of consumers in all areas of generation, transmission and distribution of electricity. The regulatory mechanism created by this legislation has been deliberately designed to receive inputs from consumers and citizens.

From the framing of regulations to the stage of licensing utilities and fixing tariff, the Act requires that the people be provided an opportunity to participate in decision making. In fact the Act even requires the Commission disseminate knowledge among consumers about the means by which they can involve themselves and make the regulatory function sensitive to the needs of the community at large.

Given the importance of electricity in our daily lives the Commission expects that consumers and citizens will participate more actively in determining the contours of the service they expect from their service providers.

Beyond the framework already in place, the Commission being a quasi-judicial body with powers of a civil court, functions transparently. This implies that its regulatory activities are carried out in a transparent manner and all deliberations and decisions are open to the public. To ensure that consumers and their interests are not lost sight of; the Act authorises the Commission to even appoint, if necessary, suitable individuals or institutions to effectively represent the consumers.

Annexure XIII - List of Parameters arrived through calculation or formulae with list of documents as source of data

Ideally, reduction of technical losses should be the parameter for evaluation of performance of Discoms sector. However, the technical losses of the Discoms are not available and it involves a cumbersome process to calculate the technical losses, which varies based on various factors like loading pattern etc.

Now, only the T&D losses and AT&C losses are available as the performance parameter for achieving energy efficiency by DISCOMs.

It was decided that out of the two parameters, T&D loss parameter seems to be appropriate parameter which reflects energy savings to a greater extent as compared to AT&C losses

Table 47: Formulas used to derive the parameters

Parameter	Formula	Data Source
AT&C Losses	$\{1 - (\text{Billing Efficiency} \times \text{Collection Efficiency})\} \times 100$	
T& D Losses	$\{1 - (\text{Total energy Billed} / \text{Total energy Input in the system})\} \times 100$	
Billing efficiency	Total unit Billed / Total unit Inputs	Collection efficiency
Collection efficiency	Revenue collected / Amount Billed	

Annexure XIV - Detailed Formats

General Information				
1	Name of the DISCOM	Meghalaya Power Distribution Corporation Limited (MePDCL)		
2	i) Year of Establishment	18.12.2009		
	ii) Government/Public/Private	Government Enterprise		
3	DISCOM's Contact details & Address			
i	City/Town/Village	Lum Jingshai, Short Round Road		
ii	District	East Khasi Hills		
iii	State	Meghalaya	Pin	793001
iv	Telephone		Fax	
4	Registered Office			
i	Company's Chief Executive Name	Shri Sanjay Goyal, IAS		
ii	Designation	Chairman Cum Managing Director		
iii	Address	Lum Jingshai, Short Round Road		
iv	City/Town/Village	Shillong	P.O.	GPO Shillong
v	District	East Khasi Hills		
vi	State	Meghalaya	Pin	793001
vii	Telephone		Fax	
5	Nodal Officer Details*			
i	Nodal Officer Name (Designated at DISCOM's)	Shri. P.Sahkhar		
ii	Designation	Chief Engineer (PMC)		
iii	Address	Lum Jingshai, Short Round Road		
iv	City/Town/Village	Lum Jingshai, Short	P.O.	Shillong
v	District	East Khasi Hills		
vi	State	Meghalaya	Pin	793001
vii	Telephone	9863074990	Fax	
6	Energy Manager Details*			
i	Name	Santanu Mandal		
ii	Designation	Energy Manager	Whether EA or EM	EM
iii	EA/EM Registration No.	23306		
iv	Telephone	9851628686	Fax	
v	Mobile	9851628686	E-mail ID	cem.meecl@gmail.com
7	Period of Information			
	Year of (FY) information including Date and Month (Start & End)	1st Apr, 2022 - 31st March, 2023		

26/10/23
 Chief Engineer (Commercial)
 Meghalaya Power Distribution Corporation Limited
 Lumjingshai, Shillong - 793001

Energy Manager,
 MeECL, Meghalaya
 BEE Reg. No: EA-23306

Performance Summary of Electricity Distribution Companies

1st Apr, 2022 - 31st March, 2023

Period of Information
Year of (FY) information including Date and Month (Start & End)

2		Technical Details
(a)	Energy Input Details	
(i)	Input Energy Purchase (From Generation Source)	Million kwh 2905.00
(ii)	Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kwh 2127.18
(iii)	Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kwh 1781.42
(b)	Transmission and Distribution (T&D) loss Details	Million kwh 345.77
		% 16.25%
	Collection Efficiency	% 89.19%
(c)	Aggregate Technical & Commercial Loss	% 25.31%


I/We undertake that the information supplied in this Document and Pro-forma is accurate to the best of my knowledge and if any of the information supplied is found to be incorrect and such information result into loss to the Central Government or State Government or any of the authority under them or any other person affected, I/we undertake to indemnify such loss.

Authorised Signatory and Seal

Signature:-

Name of AEA*:


Registration Number:


Energy Manager,
MeECL, Meghalaya
BEE Reg. No: EA-23306

Name of Authorised Signatory


Name of the DISCOM:

Full Address:-


Chief Engineer (Commercial)
Meghalaya Power Distribution Corporation Limited
Lumjingshai, Shillong - 793001

Form-Details of Input Infrastructure

1	Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
i	Number of circles	7			
ii	Number of divisions	17			
iii	Number of sub-divisions	54 (4 DF & 2 are not functional)			
iv	Number of feeders	345			
v	Number of DTs	13368			
vi	Number of consumers	682033			
2	Parameters	66kV and above	33kV	11/22kV	LT
a. i.	Number of conventional metered consumers	11	43	702	566450
ii	Number of consumers with 'smart' meters	0	0	106	80226
iii	Number of consumers with 'smart prepaid' meters	0	0	0	1204
iv	Number of consumers with 'AMR' meters	0	0	0	
v	Number of consumers with 'non-smart prepaid' meters	0	0	0	14381
vi	Number of unmetered consumers	0	0	0	18910
vii	Number of total consumers	11	43	808	681171
b. i.	Number of conventionally metered Distribution Transformers	36	198	3938	
ii	Number of DTs with communicable meters			9430	
iii	Number of unmetered DTs			13368	
iv	Number of total Transformers	36	198	293	
c. i.	Number of metered feeders		196	0	
ii	Number of feeders with communicable meters		0	0	
iii	Number of unmetered feeders		0	52	
iv	Number of total feeders	0	196	345	
d.	Line length (ct km)		29384.128 (LT line)+ 17697.98 (11 kV line)+ 2797.40 (33kV line)		
e.	Length of Aerial Bunched Cables		0		
f.	Length of Underground Cables		1.86		


Energy Manager,
MeECL, Meghalaya
BEE Reg. No: EA-23306

Division Wise Losses																					
S.No	Name of circle	Circle code	Name of Division	Consumer profile				Energy parameters				Losses		Commercial Parameter			AT & C loss (%)				
				No of connection metered	No of connection Un-metered	Total number of connections	% of number of connections	Connection metered (MW)	Connection Un-metered (MW)	Total Connection (MW)	% of connection d load	Input energy (MU)	Metered energy	Unmetered/assess ment energy	Total energy (MU)	% of energy consumption		T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore
1	Shillong Distribution Circle		Shillong Distribution Circle	117358	11	117369	87%	244.5484	0.007	244.5554	69%	218.5083	0.001512	218.5098	57%	55.34615	13%	127.5147	126.866	99.49%	
				15813	0	15813	12%	42.92093	0	42.92093	12%	438.476	0.035692	0.035692	0.035692	10%	55.34615	13%	0.015485	0.02515	162.41%
				1009	0	1009	1%	47.20659	0	47.20659	13%	99.67139	27.02132	0	27.02132	7%	55.34615	13%	33.74326	33.79161	100.14%
	Sub-total			134308	11	134319	100%	354.8427	0.007	354.8497	100%	383.0784	0.001512	383.0799	100%	55.34615	13%	266.6097	265.0678	99.42%	
2	Khasi Hills Distribution Circle		East Khasi Hills Distribution Division	64301	0	64301	96%	67.90075	1.618	69.51875	84%	34.27271	0.789584	35.06229	73%	19.46789	29%	19.88742	17.9675	90.35%	
				2195	0	2195	3%	7.74799	0	7.74799	9%	67.81947	5.954176	0	5.954176	12%	19.46789	29%	5.263661	5.465161	103.83%
				257	0	257	0%	3.172021	0	3.172021	3%	3.021569	4.313542	0	4.313542	9%	19.46789	29%	3.530115	3.526297	71.56%
	Sub-total			64422	241	64663	100%	81.34147	1.618	82.95947	100%	67.81947	0.789584	48.35158	100%	19.46789	29%	31.44775	27.60633	87.78%	
3	Khasi Hills Distribution Circle		West Khasi Hills Distribution Division	56731	0	56731	95%	57.65376	0.396	58.04976	79%	28.03523	0.230519	28.26575	76%	19.46789	29%	16.30445	14.8722	91.25%	
				2710	0	2710	4%	9.71824	0	9.71824	13%	57.25047	0.02674	0	0.02674	0%	19.46789	29%	0.004987	0.004987	100.00%
				231	0	231	0%	2.10202	0	2.10202	3%	2.493198	1.062819	0	1.062819	3%	19.46789	29%	4.985767	5.530744	110.93%
	Sub-total			59695	742	60437	100%	73.11159	0.396	73.50759	100%	57.25047	0.230519	37.35433	100%	19.46789	29%	24.77881	23.12439	93.32%	
4	Khasi Hills Distribution Circle		South Khasi Hills Distribution Division	15927	141	16068	96%	18.522	0.025	18.547	88%	8.380058	0.014804	8.394861	82%	12.47021	55%	4.817134	3.117724	64.72%	
				594	0	594	4%	1.399	0	1.399	7%	22.68509	0.664926	0	0.664926	7%	12.47021	55%	0.654399	0.824614	126.01%
				76	0	76	0%	1.1498	0	1.1498	5%	1.155095	0	0	0	0%	12.47021	55%	0	0	0.00%
	Sub-total			16597	141	16738	100%	21.0708	0.025	21.0958	100%	22.68509	0.014804	10.21488	100%	12.47021	55%	6.580648	5.307286	80.65%	
5	Ri-Bhoi Distribution Circle		Umiam Distribution Division	32207	334	32541	96%	33.1938	0.27	33.4638	49%	24.68707	0.100335	24.7874	22%	26.64846	19%	12.66801	8.496663	67.07%	
				1231	0	1231	4%	3.6494	0	3.6494	5%	3.709406	0	3.709406	3%	26.64846	19%	3.160667	2.899411	91.73%	
				59	0	59	0%	25.47639	0	25.47639	38%	77.29241	0	77.29241	67%	26.64846	19%	48.79688	43.81223	89.78%	
	Sub-total			33630	334	33964	100%	67.59509	0.27	67.86509	100%	141.5416	0.100335	114.8931	100%	26.64846	19%	72.24282	61.66481	85.36%	
6	Ri-Bhoi Distribution Circle		Nongpoh Distribution Division	22471	305	22776	94%	24.047	0.257	24.304	80%	15.54802	0.132114	15.68013	78%	4.377543	18%	0.11041	0.007763	70.31%	
				1216	0	1216	5%	3.36201	0	3.36201	11%	24.51179	2.913509	0	2.913509	14%	4.377543	18%	2.409819	2.567395	106.54%
				7	0	7	0%	0.7713	0	0.7713	3%	0.626192	0	0.626192	3%	4.377543	18%	0.647206	0.606683	93.74%	
	Sub-total			23857	305	24162	100%	30.2885	0.257	30.5455	100%	24.51179	0.132114	20.13425	100%	4.377543	18%	12.10133	9.565012	79.04%	
7	Ri-Bhoi Distribution Circle		Byrnihat Distribution Division	5923	1	5924	86%	7.148	0	7.148	4%	5.707751	0	5.707751	1%	29.74903	5%	3.082492	2.393288	77.64%	
				786	0	786	11%	3.62	0	3.62	2%	630.8772	3.585012	0	3.585012	1%	29.74903	5%	3.034736	2.939821	96.87%
				122	0	122	2%	166.3499	0	166.3499	94%	591.6739	0.161437	0	0.161437	0%	29.74903	5%	333.6747	312.4619	93.64%
	Sub-total			6859	1	6860	100%	177.413	0.11	177.524	100%	630.8772	0.161437	601.1281	100%	29.74903	5%	339.9688	317.8839	93.50%	
8	Jaintia Hills Distribution Circle		Khilchriat Distribution Division	24159	137	24296	92%	22.4673	0.11	22.5773	30%	19.46465	0.062123	19.52678	7%	34.63026	11%	9.493627	8.642013	91.03%	
				1907	0	1907	7%	4.335	0	4.335	6%	301.622	4.94468	0	4.94468	2%	34.63026	11%	4.230776	4.369514	103.28%
				69	0	69	0%	47.76107	0	47.76107	63%	241.3547	0	241.3547	90%	34.63026	11%	177.6461	135.7467	76.41%	
	Sub-total			26269	137	26406	100%	76.30347	0.11	76.41347	100%	301.622	0.062123	266.9918	100%	34.63026	11%	192.5507	149.6634	77.73%	
9	Jaintia Hills Distribution Circle		Jowai Distribution Division	24790	1	24791	92%	32.0475	0	32.0475	73%	24.96605	0	24.96605	73%	16.05634	32%	13.63882	14.19928	104.11%	
				1985	0	1985	7%	6.609	0	6.609	15%	50.11768	3.932848	0	3.932848	12%	16.05634	32%	3.356572	3.320254	98.92%
				7	0	7	0%	0.6516	0	0.6516	1%	0.355809	0	0.355809	1%	16.05634	32%	0.345738	0.33458	96.77%	
	Sub-total			174	0	174	1%	4.7432	0	4.7432	11%	4.806627	0	4.806627	14%	4.299341	2.045237	47.57%			


Sl. No.	Sub-total	Residential	Agricultural	Commercial/Industrial-LT	Commercial/Industrial-HT	Others	26956	1	26957	100%	44.0513	0	44.0513	0	50.11768	34.06134	0	34.06134	100%	16.05634	32%	21.64047	19.89936	91.95%	38%		
10	Jaintia Hills Distribution Circle	Residential	37172	0	37172	0	0	0	0	0%	35.4798	0	35.4798	0	17.84278	0.00024	0	17.84281	79%	0	0%	0	0	91.95%	94.48%		
		Agricultural	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0%	0	0	0	0	0.00%	0	
		Commercial/Industrial-LT	930	0	930	0	0	0	0	2%	3.661	0	3.661	0	3.65656	3.168236	0	3.168236	14%	12.13429	35%	2.80105	2.970256	106.04%	106.04%		
		Commercial/Industrial-HT	3	0	3	0	0	0	0	3%	0.2853	0	0.2853	0	0.132011	0.132011	0	0.132011	1%	0	0	0.155761	0.140149	89.98%	89.98%		
		Others	116	0	116	0	0	0	0	0%	1.8575	0	1.8575	0	1.379218	1.379218	0	1.379218	6%	12.13429	35%	1.399135	0.865696	61.87%	61.87%		
Sub-total	38221	0	38221	0	0	0	0	100%	41.2836	0	41.2836	0	34.65656	22.52225	0.00024	0	22.52227	100%	12.13429	35%	13.83819	12.93539	93.48%	93.48%			
11	Tura Distribution Circle	Residential	26571	435	27006	0	0	0	0	92%	38.84283	0.335	39.17783	0	24.39243	0.146034	0	24.53847	75%	0	0	0	0	94.38%	94.38%		
		Agricultural	3	0	3	0	0	0	0	0%	0.045	0	0.045	0	0.021029	0	0	0.021029	0%	0	0	0.012766	0.008071	63.22%	63.22%		
		Commercial/Industrial-LT	2036	0	2036	0	0	0	0	7%	3.565799	0	3.565799	0	60.09441	2.568891	0	2.568891	8%	27.4024	46%	2.309108	2.084391	90.27%	90.27%		
		Commercial/Industrial-HT	15	0	15	0	0	0	0	0%	1.724055	0	1.724055	0	0.825532	0	0	0.825532	3%	0	0	1.017457	0.703195	69.11%	69.11%		
		Others	295	0	295	0	0	0	0	1%	6.977385	0	6.977385	0	4.738092	4.738092	0	4.738092	14%	27.4024	46%	4.941231	3.687055	74.67%	74.67%		
Sub-total	28920	435	29355	0	0	0	0	100%	51.15507	0.335	51.49007	0	60.09441	32.54598	0.146034	0	32.69201	100%	27.4024	46%	22.05715	19.48504	88.34%	88.34%			
12	East Garo Hills Distribution Circle	Residential	13484	1140	14624	0	0	0	0	96%	13.94429	1.11	15.05429	0	6.676576	0.68819	0	7.364765	76%	0	0	0	0	44.67%	44.67%		
		Agricultural	2	0	2	0	0	0	0	0%	0.002	0	0.002	0	0.000694	0	0	0.000694	0%	0	0	0.000699	0	0.00%	0		
		Commercial/Industrial-LT	481	0	481	0	0	0	0	3%	1.3738	0	1.3738	0	22.71538	1.095082	0	1.095082	11%	13.02863	57%	0.942924	0.740909	78.58%	78.58%		
		Commercial/Industrial-HT	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0%	0	0	0	0	0.00%	0	
		Others	112	0	112	0	0	0	0	0%	1.6482	0	1.6482	0	1.276208	1.276208	0	1.276208	13%	13.02863	57%	1.109196	0.643351	58.00%	58.00%		
Sub-total	14079	1140	15219	0	0	0	0	100%	16.96829	1.11	18.07829	0	22.71538	8.99856	0.68819	0	9.686749	100%	13.02863	57%	5.73877	3.030947	52.82%	52.82%			
13	East Garo Hills Distribution Circle	Residential	58465	1756	60221	0	0	0	0	98%	58.8875	1.523	60.4105	0	37.89303	1.101459	0	38.99649	88%	0	0	0	0	50.22%	50.22%		
		Agricultural	3	0	3	0	0	0	0	0%	0.017	0	0.017	0	0.004428	0	0	0.004428	0%	0	0	0.003626	0.002461	67.88%	67.88%		
		Commercial/Industrial-LT	2287	0	2287	0	0	0	0	4%	5.684	0	5.684	0	4.704962	4.704962	0	4.704962	11%	50.2236	53%	4.286483	2.89552	67.55%	67.55%		
		Commercial/Industrial-HT	5	0	5	0	0	0	0	0%	3.4839	0	3.4839	0	0.069409	0	0	0.069409	0%	0	0	0.210165	0.084889	40.39%	40.39%		
		Others	261	0	261	0	0	0	0	0%	1.7115	0	1.7115	0	0.749647	0.749647	0	0.749647	2%	50.2236	53%	0.855191	1.143854	133.75%	133.75%		
Sub-total	61021	1756	62777	0	0	0	0	100%	69.7839	1.523	71.3069	0	94.74854	43.42348	1.101459	0	44.52494	100%	50.2236	53%	26.90734	14.94911	55.56%	55.56%			
14	West Garo Hills Distribution Circle	Residential	480	7	487	0	0	0	0	0%	1.008	0	1.008	0	0	0	0	0	0%	0	0	0	0	0.00%	0.00%		
		Agricultural	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0%	0	0	0	0	0	0.00%	0.00%	
		Commercial/Industrial-LT	6	0	6	0	0	0	0	0%	0.104	0	0.104	0	0.092555	0	0	0.092555	25%	0.091641	20%	0.07626	0.095959	78.14%	78.14%		
		Commercial/Industrial-HT	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0%	0	0	0	0	0.00%	0.00%	
		Others	3	0	3	0	0	0	0	0%	0.118	0	0.118	0	0.033809	0	0	0.033809	9%	0	0	0	0	0	0.00%	0.00%	
Sub-total	489	7	496	0	0	0	0	100%	1.22	0.01	1.23	0	0.458204	0.362338	0.004226	0	0.366563	100%	0.091641	20%	0.25879	0.217468	84.03%	84.03%			
15	West Garo Hills Distribution Circle	Residential	37915	874	38789	0	0	0	0	97%	35.9981	0.283	36.2811	0	23.65739	0.271928	0	23.92932	79%	0	0	0	0	12.25304	6.147608	50.17%	50.17%
		Agricultural	9	0	9	0	0	0	0	0%	0.001	0	0.001	0	0.0003	0	0	0.0003	0%	0	0	0	0	0.000493	0	0.00%	0.00%
		Commercial/Industrial-LT	1032	0	1032	0	0	0	0	3%	2.34016	0	2.34016	0	2.264811	2.264811	0	2.264811	7%	22.9892	43%	2.032655	1.305921	64.25%	64.25%		
		Commercial/Industrial-HT	5	0	5	0	0	0	0	0%	0.328869	0	0.328869	0	0.035324	0	0	0.035324	0%	0	0	0.050224	0.033666	67.03%	67.03%		
		Others	237	0	237	0	0	0	0	1%	3.0567	0	3.0567	0	4.014257	4.014257	0	4.014257	13%	22.9892	43%	3.455246	1.129926	32.70%	32.70%		
Sub-total	39198	874	40072	0	0	0	0	100%	41.72483	0.283	42.00783	0	53.23321	29.97209	0.271928	0	30.24401	100%	22.9892	43%	17.79166	8.61712	48.43%	48.43%			
16	Mawsynram DSO, Nonglabra DSD, & Phulbari DSD (FEDCO)	Residential	58854	10685	69539	0	0	0	0	97%	30.47122	3.13481	33.60603	0	65.88559	14.6886	0	80.57419	76%	0	0	0	0	20.48031	18.65312	91.08%	91.08%
		Agricultural	1	0	1	0	0	0	0	0%	0.015	0	0.015	0	0.094425	0	0	0.094425	0%	0	0	0	0	0	0.00%	0.00%	
		Commercial/Industrial-LT	2255	0	2255	0	0	0	0	3%	6.256714	0	6.256714	0	18.62625	0	0	18.62625	17%	0.915679	1%	0	0	0.00%	0.00%		
		Commercial/Industrial-HT	4	0	4	0	0	0	0	0%	0.067	0	0.067	0	0.360325	0	0	0.360325	0%	0	0	0	0	0.00%	0.00%		
		Others	176	0	176	0	0	0	0	0%	2.06878	0	2.06878	0	6.798034	6.798034	0	6.798034	6%	22.9892	43%	20.48031	18.65312	91.08%	91.08%		
Sub-total	61290	10685	71975	0	0	0	0	100%	38.87871	3.13481	42.01352	0	107.3689	91.76462	14.6886	0	106.4532	100%	0.915679	1%	20.48031	18.65312	91.08%	91.08%			
17	Dalu DSD (SAI)	Residential	26611	0	26611	0	0	0	0	0%	1.187667	0	1.187667	0	16.92643	0	0	16.92643	90%	0	0	0	0	5.360771	5.870807	109.51%	109.51%
		Agricultural	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0%	0	0	0	0	0.00%	0.00%	
		Commercial/Industrial-LT	587	0	587	0	0	0	0	2%	1.187667	0	1.187667	0	1.011506	1.011506	0	1.011506	5%	0.338056	2%	0	0	0.00%	0.00%		
		Commercial/Industrial-HT	0	0	0	0	0	0	0	0%	0	0	0	0	0	0	0	0	0	0%	0	0	0	0	0.00%	0.00%	
		Others	114	0	114	0	0	0	0	0%	0.526005	0	0.526005	0	0.779763	0.779763	0	0.779763	4%	0	0	0	0	0	0.00%	0.00%	
Sub-total	27312	0	27312	0	0	0	0	100%	10.6695	0	10.6695	0	19.05575	18.71769	0	18.71											

Details of Input Energy Sources

Period From 1st April 2022 To 31st March 2023

A. Generation at Transmission Periphery (Details)

S.No.	Name of Generation Station	Generation Capacity (In MW)	Type of Station Generation (Based- Solid (Coal ,Lignite)/Liquid/Gas/Renewable (biomass-bagasse)/Others)	Type of Contract (in years/months/days)	Type of Grid (Intra-state/Inter-state)	Point of Connection (POC) Loss MU	Voltage Level (At input)	Remarks (Source of data)
1	Umiam I	4X9	Hydro	PPA (25)	Intra-state		132	Energy Management
2	Umiam II	2X10	Hydro	PPA (25)	Intra-state		132	Energy Management
3	Umiam III	2X30	Hydro	PPA (25)	Intra-state		132	Energy Management
4	Umiam IV	2X30	Hydro	PPA (25)	Intra-state		132	Energy Management
5	MLHEP	3X42	Hydro	PPA (25)	Intra-state		132	Energy Management
6	Umtru	4X2.8	Hydro	PPA (25)	Intra-state		132	Energy Management
7	Sunapani	1X1.5	Hydro	PPA (25)	Intra-state		132	Energy Management
8	New Umtru	2X20	Hydro	PPA	Intra-state		132	Energy Management
9	Lakroh	1X1.5	Hydro	PPA	Intra-state		132	Energy Management
10	Ganol	3X7.5	Hydro	PPA	Intra-state		132	Energy Management
11	KOPILI	4X50	Hydro	PPA (5)	Inter-state		132	Energy Management
12	KOPILI-Ext	1X25	Hydro	PPA (5)	Inter-state		132	Energy Management
13	KHANDONG	2X25	Hydro	PPA (5)	Inter-state		132	Energy Management
14	RANGANA DI	3X135	Hydro	PPA (5)	Inter-state		132	Energy Management
15	DOYANG	3X25	Hydro	PPA (5)	Inter-state		132	Energy Management
16	AGBPP	6X33.5 +3X30	Gas-Steam	PPA (5)	Inter-state		132	Energy Management
17	AGTPP	4X21+2x25.5	Gas	PPA (5)	Inter-state		132	Energy Management
18	OTPC	2X363.3	Gas-Steam	PPA (25)	Inter-state		132	Energy Management
19	Loktak	3X35	Hydro	PPA (15)	Inter-state		132	Energy Management
20	AGTPP-CS	41	Gas-Steam	PPA	Inter-state		132	Energy Management
21	Tipaimukh	1500	Hydro	PPA (5)	Inter-state		132	Energy Management
22	BTPS	3X250	Coal	PPA (25)	Inter-state		132	Energy Management
23	Loktak-DS	3X30	Hydro	PPA (5)	Inter-state		132	Energy Management
24	Subansiri	8X250	Hydro	PPA (5)	Inter-state		132	Energy Management
25	Pare	2X55	Hydro	PPA (5)	Inter-state		132	Energy Management
26	Kameng	4X150	Hydro	PPA (5)	Inter-state		132	Energy Management
27	Pallatana		Hydro	PPA	Inter-state		132	Energy Management
28	BGTPP		Hydro	PPA	Inter-state		132	Energy Management


 Energy Manager,
 MeECL, Meghalaya
 BEE Reg. No: EA-23306

