

ANNUAL ENERGY AUDIT REPORT



Designated Consumer



TATAPOWER-DDL

TATA POWER DELHI DISTRIBUTION LIMITED

NDPL House, Hudson Lines,
Kingsway Camp, Delhi-110009

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 Tata Power Delhi Distribution Limited, Delhi 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, 2022 and its Amendments.

We are immensely grateful to the management of Tata Power Delhi Distribution Limited, Delhi, 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 comprising of:

Mr. Ganesh Srinivasan – CEO
Mr. HC Sharma– General Manager, Nodal Officer
Mr. Neeraj Singh– Senior Manager (Energy Audit),
Mr. Md. Shadab Ahmad – AGM, Energy Manager
Mr. Hari Om Sharma – Head of Group, Energy Audit
Ms. Gagandeep Kaur - Senior Manager, Energy Audit

for their immense support and assistance throughout the audit process.

We look forward to a continued partnership with Tata Power Delhi Distribution Limited, Delhi, and we express our gratitude for their continued support in all our future endeavours.



Signature

Name: Dr. P.P Mittal

Designation: Director

Registered No: EmAeA 0024

Firm: A-Z Energy Engineers Pvt Ltd

1. Executive Summary

Tata Power-DDL is a joint venture between Tata Power Company and the Government of NCT of Delhi with the majority stake being held by Tata Power (51%). It distributes electricity in North & Northwest parts of Delhi. The company started its operations on July 1, 2002, post the unbundling of erstwhile Delhi Vidyut Board to distribute electricity from the end point of transmission to the end consumers.

The Input energy purchased (from Generation source), Net Input energy (at Discom periphery after adjusting for transmission losses and traded energy) & Total Energy billed by Tata Power-DDL for their customers is 12741.47MU, 10622.62 MU & 9946.33MU respectively, for FY 2022-23, and the average monthly consumption stands at 423.08kWhr/per consumer/month.

Tata Power-DDL caters to network area spread in 5 circles, 12 Divisions across an area of 510sq.kms.

1.1. Goals and Objectives

Tata Power-DDL is a designated consumer in Discom sector. Being a designated Consumer Tata Power-DDL 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 Tata Power-DDL 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 1260 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

The AT&C loss for FY 2022-23 is 6.36%, which is the same as the T&D (Transmission and Distribution) losses as the collection efficiency has been restricted to 100%. 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	12741.467
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	10622.619
Total Energy billed (is the Net energy billed, adjusted for energy traded))	C	MU	9946.330
Transmission and Distribution (T&D) loss Details	D	MU	676.289
	$E = D/B \times 100$	%	6.37%
Collection Efficiency	F	%	100.01%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1-E) \times \text{Min}(F, 100\%)\}$	%	6.36%



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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 29thSeptember 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 6thOctober 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 17thJanuary 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.

2.2. Purpose of audit and accounting Report

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

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.

2.3. Period of Energy Auditing and accounting

Energy audit activity was started with a meeting at Head Office of Tata Power-DDL in the month of May & June. 2023. Based on the requirement visit was made to Division, Subdivision and Grid etc. for data collection and technical discussion. The period of study was from April 2022 to March 2023

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	01-July-22	04-Oct-22	04-Jan-23	05-Apr-23	03-Apr-23
Date of Publishing	22-Nov-22	02-Jan-23	01-Mar-23	02-June-23	09-June-23 (Draft)
Officer In charge	Ms. Sameeksha Raina			Mr Hari Om Sharma	Dr. P P Mittal [AEA 0011] Registration No: EmAEA- 0024



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3. DISCOM Introduction and Overview

3.1 Name and address of DISCOM

Tata Power-DDL is having its corporate office at NDPL House, Hudson Lines, Kingsway Camp, Delhi-09, Delhi – 110009 (Delhi)

Table 3: Name and Address of DISCOM

Particulars	Details
Name of DC	Tata Power Delhi Distribution Limited
Address	NDPL House, Hudson Lines, Kingsway Camp, Delhi-09, P.O GTB Nagar, Delhi

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. Ganesh Srinivasan (CEO) and the Mr. Md. Shadab Ahmad (AGM) is a BEE certified Energy Manager is leading the energy accounting activities in Tata Power-DDL. 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	Mr. Md Shadab Ahmad (AGM) EM-5062 Ph: 91-1166050613 Mobile: 9717991957 Email: mdshadab.ahmad@tatapower-ddl.com
Authorized Signatory	Sh. Mr. HC Sharma (General Manager) Ph: 91-1166050595

3.3 Summary profile of DISCOM

3.3.1 Jurisdiction of DISCOM

Tata Power Delhi Distribution Limited [Tata Power-DDL] is a joint venture between Tata Power and the Government of NCT of Delhi with the majority stake being held by Tata Power Company (51%). Tata Power-DDL is acknowledged for its consumer-friendly practices. Since privatization, the Aggregate Technical & Commercial (AT&C) losses in Tata Power-DDL areas have shown a record decline. Tata Power-DDL Strives to Serve Utilities across the globe to improve their standards of performance and create long term value with strategic partners. Its distribution network is spread over an area of 510 sq. km, catering to a customer base of 1.9 million, caters to area spread in 5 circles, 12 divisions.

3.3.2. Energy Accounting/Audit wing in the DISCOM:

The Energy Accounting/Audit wing in the DISCOM has been established on 11-Feb-22. The Organogram of the DISCOM is as shown below:

Figure 2: Organogram of Energy accounting wing in the DISCOM

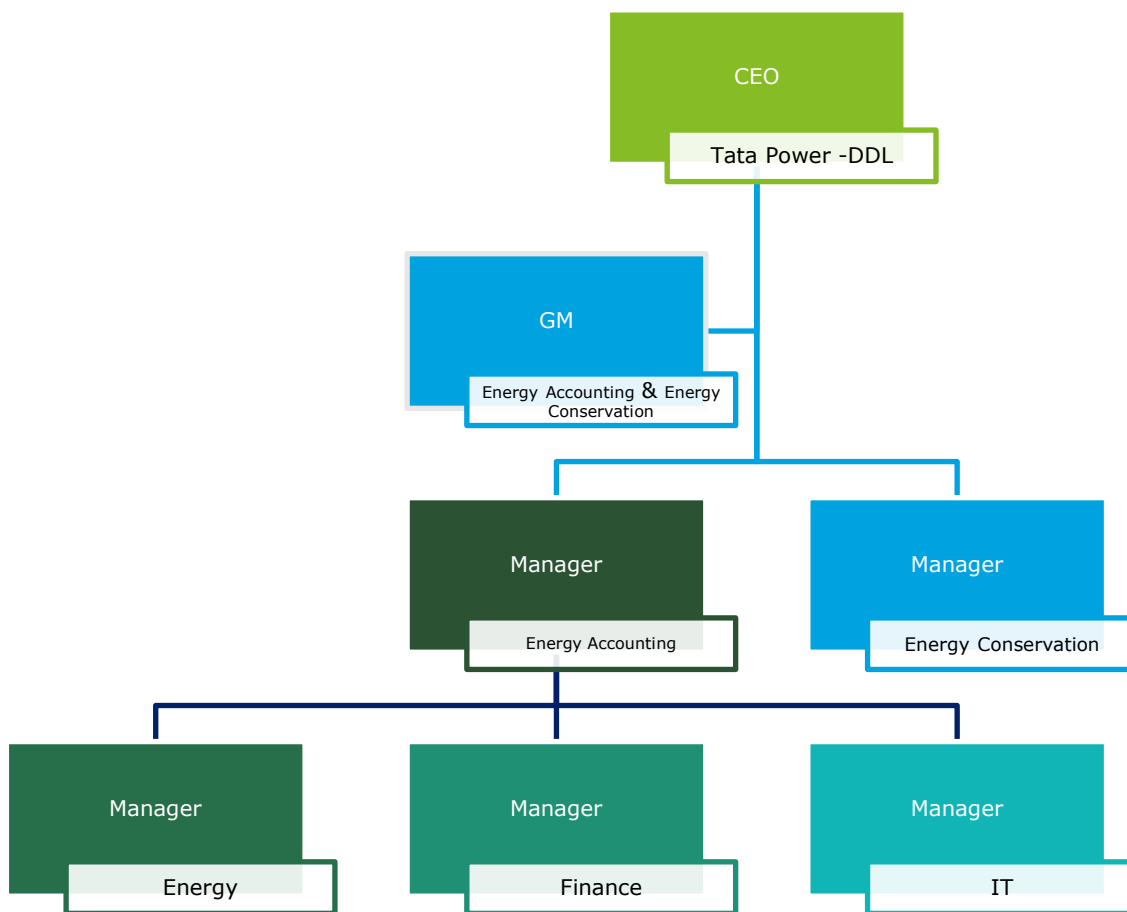


Table 5: Details of energy manager and Authorized signatory of DISCOM

Designation	No. of Officers
CEO	Mr. Ganesh Srinivasan
General Manager	Mr. HC Sharma
AGM (Energy Manager)	Mr. Md Shadab Ahmad
Head of Group, Energy Audit	Mr. Hari Om Sharma
Sr. Manager, Energy Audit	Mr. Neeraj Singh
Sr. Manager, Energy Audit	Ms. Gagandeep Kaur
Finance Manager	Mr. Sachin Gupta
IT Manager	Ms. Kamakshi Oberoi

3.3.3. Administrative hierarchy

Tata Power-DDL is having its corporate office at NDPL House, Hudson Lines, Kingsway Camp, Delhi-09 and has 5 Circles. These Circles are further divided into Divisions, Sub-Divisions and Sections as shown in the below tables.

Table 6: Administrative hierarchy structure in Tata Power-DDL

Parameters	Total
Number of circles	5
Number of divisions	12
Number of sub-divisions	37
Number of sections	-

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

Table 7: Administrative hierarchy in Tata Power-DDL up to section level

Circle	Division	Name of Sub-Divisions	Name of Sections
Urban	Badli	Zone 507, 516, 572	Not Applicable
	Shalimar Bagh	Zone 414, 503, 506, 531,532	
	Rohini	Zone 551, 561, 571, 581	
Sub-Urban	Bawana	Zone 512, 521, 533	
	Narela	Zone 511, 514, 517, 522	
Metro	Mangolpuri	Zone 515, 518, 519	
	Kirari	Zone 513, 523	
	Pitampura	Zone 504, 508, 510, 530	
Town	Civil Lines	Zone 411, 416, 417, 418, 421, 423, 424	
	Keshavpuram	Zone 422, 425, 501, 502, 509, 520	
	Model Town	Zone 402, 412, 413, 415, 505	
City	Motinagar	Zone 1301, 1302, 1303, 1304	

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		Billed Energy		Billed Amount in Rs. Crore	Collected Amount in Rs. Crore
	Nos	%	MW	%	MU	%		
Residential	1670344	85.26%	3530.34	54.6%	4988.73	50.2%	3198.91	3197.17
Agricultural	4505	0.23%	33.24	0.5%	16.89	0.2%	11.12	11.13
Commercial/ Industrial-LT	275478	14.06%	2305.06	35.6%	3658.61	36.8%	5232.4	5243.6
Commercial/ Industrial-HT	811	0.04%	344.53	5.3%	661.1	6.6%	901.96	902.88
Others	7960	0.41%	253.81	3.9%	621	6.2%	646.16	636.43
Total	1959098	100%	6467	100%	9946.33	100%	9990.55	9991.21

Figure 3: Category wise consumer share

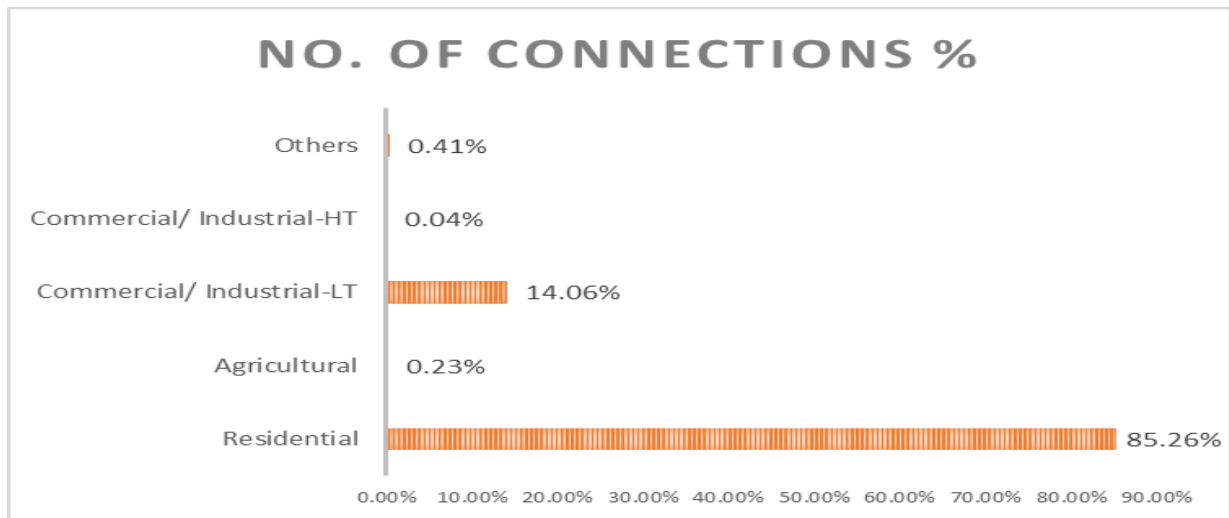


Figure 4: Category wise Load share

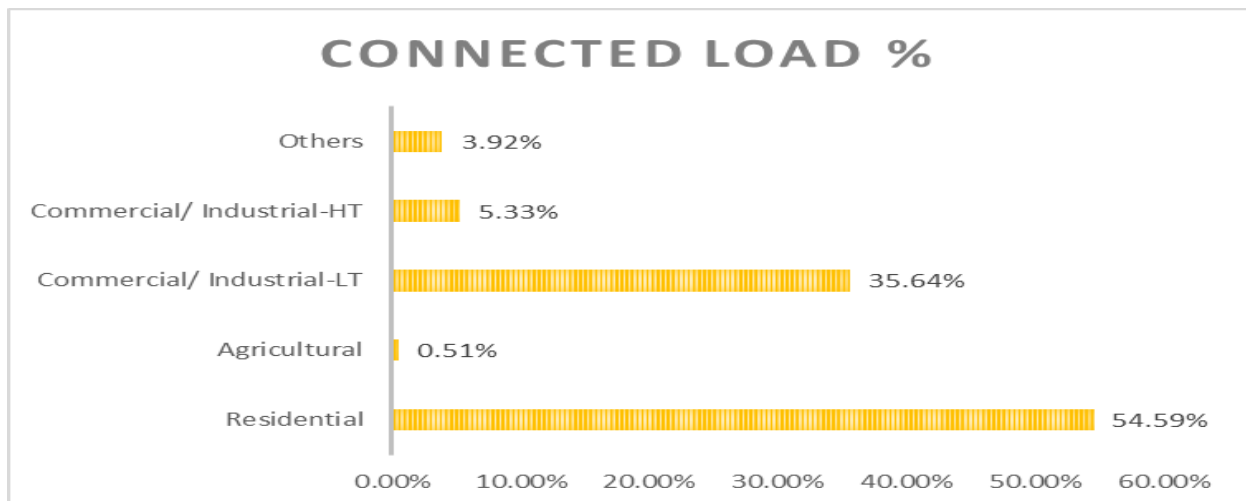
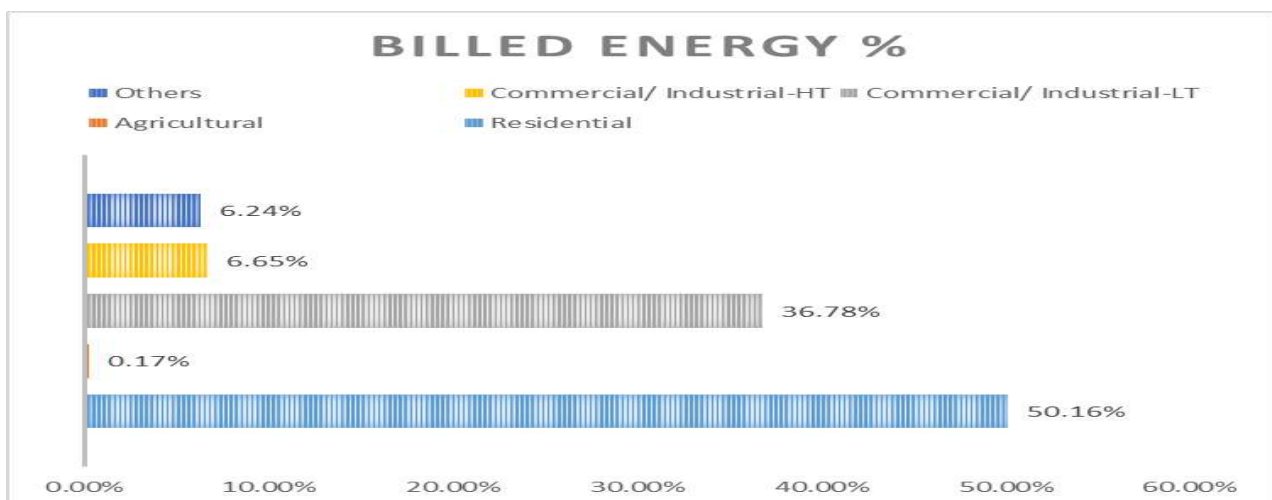


Figure 5: Category wise Billed Units



3.4. Electrical infrastructure and assets voltage wise

The following table provides the details of network infrastructure owned by Tata Power-DDL:

Table 9: Network Infrastructure details

Asset	Particulars	Unit	FY20-21	FY21-22	FY22-23
66 kV and above	66/ 11 kV Sub station	Nos			42
	66 kV Feeders	Nos	134	132	137
	66 kV Line	Ckt. km	536.92	538.7	554.01
33 kV	33/ 11 kV Sub station	Nos			42
	33 kV Feeders	Nos	108	108	111
	33 kV Line	Ckt. km	477.11	477.3	482.19
11 kV	11 kV Feeders	Nos	1280	1341	1286
	11 kV Overhead Line	Ckt. km	4999.2	5132	5236.9
	11 kV Underground Line	Ckt. km			3028
LT	LT Line	Ckt. km	7354.1	7485	7588
PT	Power Transformer	Nos			219
	Power Transformer Capacity	MVA	-	-	5143
DT	Distribution Transformer	Nos	Above 250kVA-4594 nos., equal to and less than 250kVA-2654 nos.	Above 250kVA-4744 nos, equal to and less than 250kVA-2804 nos.	Above 250kVA-4986 nos., equal to and less than 250kVA-3171 nos.
	Distribution Transformer Capacity	MVA			3421.1

The Input energy, consumption, transmission losses and key infrastructure details of the Tata Power-DDL are summarized in table below:

Table 10: Input Energy & Infrastructure details

Parameters	FY 2022-23
Input Energy purchased (MU)	12741.47
Transmission loss (%)	4%
Transmission loss (MU)	526.11
Energy sold outside the periphery (MU)	1593.98
Open access sale (MU)	77.64
EHT sale	224.64
Net input energy (received at DISCOM periphery or at distribution point)-(MU)	10696.05
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)	Yes
% of metering available at DT	91%
% of metering available at consumer end	100%

Parameters	FY 2022-23
No of feeders at 66kV voltage level	137
No of feeders at 33kV voltage level	111
No of feeders at 11kV voltage level	1286
No of LT feeders level	16929
Line length (ckt. km) at 66kV voltage level	554.01
Line length (ckt. km) at 33kV voltage level	482.19
Line length (ckt. km) at 11kV voltage level	5236.9
Line length (km) at LT level	7588
Length of Aerial Bunched Cables	5729.9
Length of Underground Cables	6238
HT/LT ratio	0.8267132

3.4.1. Metering details

The status of meters installed in Tata Power-DDL as on 31-03-23 are given in the below tables:

Table 11: Voltage wise Meter Consumers

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventional metered consumers	-	-	-	1607524
Number of consumers with 'smart' meters	-	-	-	315336
Number of consumers with 'smart prepaid' meters	-	-	-	3468
Number of consumers with 'AMR' meters	5	2	1005	27448
Number of consumers with 'non-smart prepaid' meters	-	-	-	4310
Number of unmetered consumers	-	-	-	-
Number of total consumers	5	2	1005	1958086

3.4.2. Distribution Transformer (DT) details

The details of distribution transformers in Tata Power-DDL as on 31-03-23 are given in the below tables:

Table 12: Numbers of Distribution Transformers and Metering

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventionally metered Distribution Transformers	-	-	-	203
Number of DTs with communicable meters	-	-	-	4342
Number of unmetered DTs	-	-	-	441
Number of total Transformers	-	-	-	4986

3.4.3. Feeder details

The details of feeders in Tata Power-DDL as on 31-03-23 are given in the below tables:

Table 13: Voltage wise numbers of Feeders and Metering

Parameters	66kV and above	33kV	11/22kV	LT
Number of metered feeders	137	111	1286	16929
Number of feeders with communicable meters	137	111	1286	16929
Number of unmetered feeders	0	0	0	0
Number of total feeders	137	111	1286	16929

3.4.4. Distribution Line details

The details of distribution lines in Tata Power-DDL as on 31-03-23 are given in the below tables:

Table 14: Length of Distribution Lines

Particulars	Value(km)
Line length(ct km)	1893.2
Length of Aerial Bunched Cables	5729.9

3.4.5. Energy Flow details

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

Table 15: Energy Flow details

Parameters	Values
Input Energy purchased (MU)	12741.47
Transmission loss (%)	4%
Transmission loss (MU)	526.11
Energy sold outside the periphery(MU)	1593.98
Open access sale (MU)	77.63
EHT sale	224.64
Net input energy (received at DISCOM periphery or at distribution point)-(MU)	10696.05
Total Energy billed (MU)	9946.33
Transmission and Distribution (T&D) Loss (MU)	676.29
Transmission Loss (%)	6.37%

3.4.6. Pattern of energy distribution

Power Purchase:

During the analyzed period, Tata Power-DDL purchased a energy of 12741.47 million units (MUs) in FY 2022-23. This shows that the company's energy purchase varies considerably from month to month irrespective of the seasonal impact. Month wise purchase energy breakup is not available.

Energy Billed:

The energy billed by Tata Power-DDL is provided FY 2022-23, category wise energy consumption is provided the maximum consumption is recorded to domestic consumer. This indicates that the company's energy consumption has increased gradually over the analyzed period. The Month wise breakup of billed energy data is not available.

The voltage wise consumption pattern is given below:

Table 16: Voltage wise consumption pattern

Voltage Level	Consumers		Energy Consumption	
	No.	% Share	MUs	% Share
440V			8751.98	88%
11KV			970.1	9.75%
33KV			224.64	2.25%
132KV	Not Applicable			
220KV				
Total	1959098		9946.72	100%

3.4.7. Salient features

Tata Power-DDL 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.

a) Vision

To be the most trusted and admired provider of reliable, competitive and sustainable power and services using technology and innovative solutions and be the utility of choice for all stakeholders.

b) Mission

Our mission is **to deliver world class services to the customer** and to create benchmarks to become a global utility leader with energy efficient services and energy solutions.

- Innovate to Deliver World Class Services to the Consumers.
- Create Benchmarks to become a Global Utility Leader with Energy efficient services and clean energy solutions.
- Achieve Excellence Through Safety, Technology Adoption, Collaborations and Teamwork.
- Reach out and Engage in Community Development Programs and Initiatives.

- Empower Employees, Enrich Creativity And Enhance Learning.

c) Core values

Tata Power-DDL is a value-driven organisation and our Six Core values are an integral part of our work culture.

Figure 6: Core Values of TATA Power-DDL



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.

1. 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:

Some critical initiatives adopted for technical loss reduction are mentioned below:

1. **Sub-Transmission Network Optimization:** Tata Power-DDL has a mesh network at the 33 & 66 kV level which is operated in a radial manner. The NOPs (Normal Open Points) are decided after conducting thorough loss studies and the most optimal configuration is adopted for minimum loss while meeting other operational & reliability requirements. The exercise is conducted annually to incorporate benefits from addition of new circuits. Also a separate configuration is adopted for the winter months (Nov to Mar) to take advantage of lower loading levels. The winter reconfiguration result is expected saving of approximately 0.6 GWh annually.
2. **11 kV Network Optimization:** The 11 kV network is also a mesh network operated in a radial manner. We have initiated an internal project this year (FY22-23) to reconfigure the

network for minimum loss while meeting other operational & reliability requirements. This is expected to contribute to reduction in technical loss by over 0.5 GWh annually.

3. **Change in Cable Specifications:** Due to operational requirements, the standard rating of service cable catering to single phase consumers with sanctioned load 6 to 10 kW has been revised from 2x10 sqmm Al XLPE to 2x25 sqmm Al XLPE. The reduction in resistivity will result in reduction of technical losses.
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 wind 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.

2. Proposed Energy Conservation Measures for the Future:

As a responsible organisation, Tata Power-DDL promotes and practices Sustainable initiatives. These are aligned with the Vision & Mission and Climate Change Policy of the organization. The organisation is sensitive to the aspect of climate change and committed to implementing energy-efficient and greener technologies.

A. At Consumer Level:

Energy conservation initiatives undertaken by TATA Power Delhi at consumer level are as mentioned below:

➤ Energy Efficient Lighting and Fans

Scheme: Tata Power-DDL is offering Energy Efficient Products (EEPs) such as LED Bulbs and LED Tube Lights which have low maintenance and usage costs. These are durable and use up to 75% less energy than any other incandescent bulbs resulting in the reduction of monthly energy bills. In addition to lighting, option for BLDC fans at discounted rates is available. BLDC motors do not have brushes so they are more reliable, high life expectancy and energy savings as compared to conventional ceiling fans. With the added convenience of remote control, BLDC fan is a financially and environmentally smart choice for customers as it consumes half electrical load as compared to ordinary fans.

➤ Discount based AC Scheme for Customers:

Tata Power-DDL in association with Voltas is providing a discount-based scheme with or without Replacement of Old AC for all the customers.

➤ Home Automation:

Tata Power-DDL is offering an IoT based solution which allows to operate, schedule, monitor appliances like lighting, fans, ACs, washing machines, geysers, TVs, refrigerators, etc. with phone or with voice control via Google assistant or Alexa.

➤ **Home Automation (Sensors & Sensor Lights):**

Tata Power-DDL is offering Motion Sensors: With Motion sensors, lights and appliances can be switched on during presence of a person in the area. In absence of motion, automatically turn off the lights. Sensor Lights: When motion is detected, sensor lights automatically illuminate at full brightness. In the absence of motion automatically dim the area lights to 20%.

➤ **Air Purifier Scheme:**

Tata Power-DDL in association with Voltas has initiated the Air Purifiers scheme at special discounted rates. The Air Purifiers are powered with 6-stage filtration process and removes up to 99.90% airborne pollutants, eliminates impurities with ease.

➤ **Washing Machine Scheme:**

Tata Power-DDL has launched a 5 star rated washing machine scheme at special discounted rates in collaboration with Voltas-Beko.

B. At TATA Power-DDL Network level:

Energy conservation initiatives undertaken by TATA Power Delhi at its network level are as mentioned below:

1. **Smart DT Meters with DIDO (Digital Input/Output):** Smart DT meters installed for Distribution transformers, are being installed in network with added feature of DI/DO (digital input and digital output) port. These digital ports in meters can be connected to float sensors installed inside conservation oil tank for monitoring of oil levels of DT. When oil level dips below required level, smart digital ports connected to breaker would trip off the power supply to DT and would prevent from any overheating/ damage to DT. This has been included by CEA "Guidelines and best practices for Operation and Maintenance of Distribution Transformers".
2. **Temperature based DT cooling system:** DT usually has the provision of ONAN (oil natural and air natural) cooling. Based on network and load requirements, few of the DTs have been provided with ONAF (oil natural air forced) cooling. This would be helpful in maintaining the temperature of DT at optimum level and would prevent any hamper on efficiency of DT. This has been included by CEA "Guidelines and best practices for Operation and Maintenance of Distribution Transformers".
3. **Li-ion battery with BMS (battery management system):** For providing DC supply in grid sub-stations, conventional batteries used were of lead acid type. Gradually these type of batteries are now replaced with Li-ion batteries. Benefits of Li-ion over conventional are 90% of depth of discharge than 60%, 95% efficiency, non-hazardous disposal, less charging time, high specific energy output etc.
4. **Energy efficient Distribution Transformers:** Loss levels and efficiency levels for distribution and power transformers have been already defined and set in our technical specifications for OEMs (original equipment manufacturers) to comply with.
5. **Mineral oil vs. Ester oil:** Conventionally, petroleum based mineral oil is being used as dielectric medium in transformers. Ester oil has been introduced now with features of High flash point of 330

deg C providing high level of fire safety, Chemical properties of ester oil enhances DT insulation performance and life expectancy, Insulation system of a distribution transformer can be run at 20°C warmer conditions, thus increasing the loading capability of transformer for the same life expectancy. Transformer with ester oil can operate better in areas with high ambient temperature.

6. **RF based street light management system:** Radio frequency based remote monitoring and operations of LED street light projects are being implemented. Main features include 'Dimming' of lights during non-peak hours and 'ON/OFF' feature based on Astro timer switch. Energy management through Street light controller would reduce energy consumption and CO₂ emission. Unnecessary over-lighting can be prevented by target dimming of sectors of the city, roads or individual luminaires. Thus, the SLC (street light controller) can be used to make effective and consistent energy savings –approximately up to 50% per year.

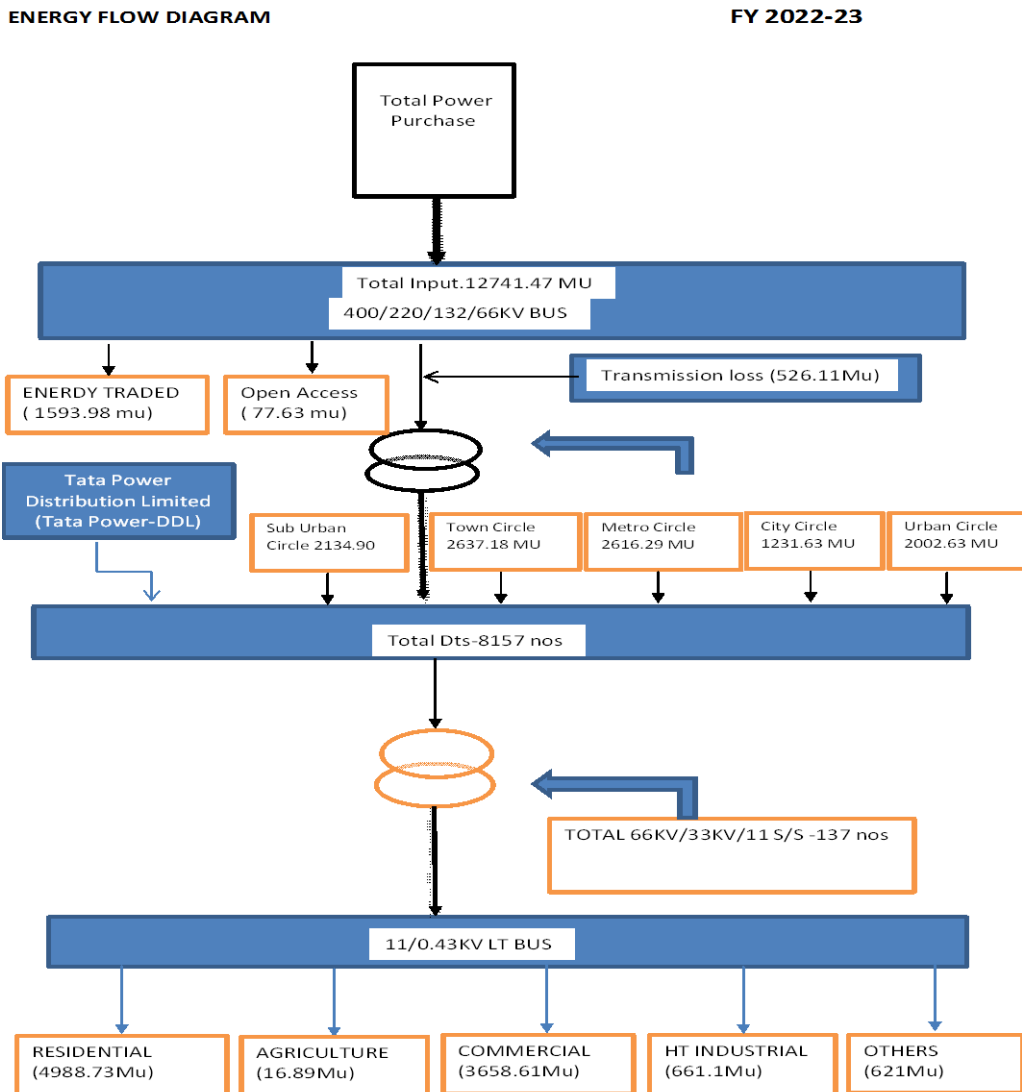
7. **Sub-station re-designing for space constrained areas:** To cater to ever increasing load requirements, few occurrences of space constraints are part of network designing. For such space constrained areas, new designs of sub-stations are proposed. Few new designs are Vertical double decker sub-station, wherein two DTs would be placed up and down in double tier arrangement; DT installation of single spun pole with LT and HT switches beneath the mounted DT; Drain top based sub-station where no space is available etc.

4. Energy flow analysis

4.1. Energy flow across 5 Service Levels

- a) Energy flow between DTL 220KV Grid Substations to Tata Power DDL 66kV/33kV Grid Substation
- b) Energy flow between DTL 220 KV Grid Substations and Tata Power DDL 11kV/6.6 kV Substations
- c) Energy flow between 11kV/6.6kV feeders and distribution transformers, or high voltage distribution system
- d) Energy flow between distribution transformer, or high voltage distribution system to end consumer
- e) Energy flow between Feeders to end-consumer

Figure 7: Energy Flow Diagram



4.2. Validation of metered data

- 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.

Data from 10% of 11 kV Feeder meters:

Table 17: Data of 10% 11kV feeder Meters

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
PP-3 66/11kV	RMU Outside PP-3 grid fdr-1 (SD-1 COLONY)	11300231	185	372709	436464	11794647
PP-3 66/11kV	RANI BAGH NO.1	11300214	100	280644	348205	6756042
PP-3 66/11kV	P AND T A8 NSP FDR-1	11301094	60	2136680	2357772	13265492
PP-3 66/11kV	RMU INSIDE PP-3 GRID	11301093	120	1350710	1481038	15639428
PP-3 66/11kV	NDM-2	11301096	60	101014	117602	995281
PP-3 66/11kV	216 HIG FLATS S/S -1	11300520	60	403677	477226	4412979
PP-3 66/11kV	NSP NO.2 FDR NO.1	11301092	60	343479	379690	2172694
Rani Bagh Grid 33/11kV	SANT NAGAR GURUDWARA	11300482	80	435430	555561	9610469
Rani Bagh Grid 33/11kV	COMERCIAL CMLPX S/S NO.4 FDR-2 + Ranibagh grid pass	11300586	80	272781	396489	9896591
Rani Bagh Grid 33/11kV	COMERCIAL CMLPX S/S NO.2 (Prestige Build well)	11300585	80	89343	152986	5091407
PP-1 66/11kV	Ashiana Apartment	11300608	60	113738	269194	9327394
PP-1 66/11kV	KU S/S	11300610	60	730019	934707	12281277
PP-1 66/11kV	Rukmini Devi no. 2	11300634	60	981126	1149613	10109238
PP-1 66/11kV	LAWYER CHAMBER	11300497	60	87408	107135	1183609
PP-2 66/11kV	UP SAMAJ FDR NO. 2	11300894	70	520890	634880	7979239
PP-2 66/11kV	UP SAMAJ FDR NO.1	11300885	70	632534	774423	9932225
PP-2 66/11kV	MOLANA AZAD	11300891	70	767590	858365	6354282
PP-2 66/11kV	TELEPHONE EXCHANGE NEW	11300639	70	914849	1080213	11575460
PP-2 66/11kV	Sharda apartment o/d s/s(VIDYA VIHAR APPT)	11300886	70	647670	730409	5791773
PP-2 66/11kV	WORK CENTER B	11300890	70	1047821	1239698	13431360
PP-2 66/11kV	N.D.D.B. FEEDER	11300888	70	333794	464273	9133515
PP-2 66/11kV	7/3 Ring road ROHINI SUBSTATION TO RHN	11300883	70	367758	481686	7975013
PP-2 66/11kV	3A/2 ROHINI	11300640	70	626346	770324	10078476
PP-2 66/11kV	BHAGWAN MAHAVIR HOSPITAL S/S (DT workshop)	11300892	70	318828	386136	4711568
PP-2 66/11kV	Tarun enclave	11300893	70	877586	1065905	13182304
PP-2 66/11kV	LSC Mkt. SainikVihar	11301088	70	560019	682757	8591645
PP-2 66/11kV	Phoolaram No 2	11301089	70	443330	591550	10375401
MGP-1 66/11kV	JALEBI CHOWK FDR NO.2	11300507	70	1751701	1910986	11149973
MGP-2 66/11kV	BA BLOCK MIA PH-2 S/S Panel No.8	11300982	60	1731955	1898865	10014588
Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
MGP-2 66/11kV	A-12 MIA PH-2 S/STN.	X1200666	1	11180340	22816400	11636060
MGP-2 66/11kV	Indian Gas agency s/s+ E block kiosk fdr-2	11301053	60	152242	169881	1058344

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
MGP-2 66/11kV	CNG PUMP NEAR ANUKAMPA	X1200675	1	935860	3536640	2600780
MGP-2 66/11kV	S/S NO. 32 FEEDER NO.2	X1200665	1	3890160	9461320	5571160
MGP-2 66/11kV	B C BLOCK MIA PH-2	11300983	60	1200620	1335275	8079356
Rampura Grid 33/11kV	OLD MOTHER DAIRY RAMPURA	11300155	100	180993	221049	4005579
Rampura Grid 33/11kV	ONKAR NAGAR B	11300135	100	74393	149994	7560117
Rampura Grid 33/11kV	B 42 PEARL DRINK(RMU NEAR B-31 S/S)	5297435	100	176472	190053	1358069
Rampura Grid 33/11kV	B-38	11300159	100	20753	130804	11005137
Rampura Grid 33/11kV	Rampura-1 Feeder No-2	11300130	100	680088	840073	15998558
Wazirpur I Grid 33/11kV	FIRE STATION	11300841	70	1660994	1823270	11359268
Wazirpur I Grid 33/11kV	B-BLK PH.I	11300837	70	12638	119445	7476457
Wazirpur I Grid 33/11kV	CET PLANT ASHOK VIHAR PH.II	11300844	70	1031170	1143565	7867664
Wazirpur I Grid 33/11kV	DSIDC SHED 21 WPIA PH.I	11300843	60	1359797	1501696	8513957
Wazirpur I Grid 33/11kV	7 A S/S	11300845	70	1120213	1227372	7501091
Wazirpur I Grid 33/11kV	B-32/2 WIA	11300842	70	1233755	1329067	6671867
Wazirpur II Grid 33/11kV	A-93 WPIA	11301035	60	545815	664282	7108001
Wazirpur II Grid 33/11kV	COMMUNITY CENTER	11301036	60	1267956	1443000	10502627
Wazirpur II Grid 33/11kV	TP	11300967	60	1321058	1424564	6210366
Wazirpur II Grid 33/11kV	KASTURBA POLYTECHNIC S/S	11300968	60	739714	817717	4680207
Wazirpur II Grid 33/11kV	TV TOWER TO PPR	11301037	60	149612	174656	1502612
Wazirpur II Grid 33/11kV	NDM – 1	11301137	60	95230	116155	1255483
Wazirpur II Grid 33/11kV	PRESS COMPLEX – II	11301038	60	520061	589632	4174247
Wazirpur II Grid 33/11kV	A-100/6 WPIA	11300901	60	298244	439831	8495184
Ashok Vihar Grid 33/11kV	B-3	11300801	60	349216	449670	6027215
Ashok Vihar Grid 33/11kV	F-BLOCK JJ COLONY	11300677	60	580980	715510	8071816
Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
Ashok Vihar Grid 33/11kV	SPORTS COMPLEX ASHOK VIHAR	11300675	60	495285	602711	6445571
Ashok Vihar Grid 33/11kV	New shanti nagar	11300669	60	421870	550151	7696804
Ashok Vihar Grid 33/11kV	GANDA NALA SHASTRI NAGAR S/S no. 1	11300676	60	731079	871800	8443213
Ashok Vihar Grid 33/11kV	Ramlila ground ashok vihar	11300799	60	319861	406202	5180459
Ashok Vihar Grid 33/11kV	JA BLK MURGA MARKET Feeder-2	MSP45247	60	662983	846662	11020740

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 66kV/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

1% of input energy points at <T-D> interface

Table 18: 1% Input Energy Points

Exchange point meters	Meter reading (Apr 22)	Meter reading (Apr 23)	MF
Narela T-1	342180	62326	1000
Narela T-2	743149	133347	500
Narela T-3	934283	753588	1000
BWN T-2	223156	1717	1000
BWN T-3	850282	314834	333.33

Data of at-least 1/3rd of Divisions:-

Min 10 of input energy points

Table 19: Rohini Division Data

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
PP-1 66/11kV	LAWYER CHAMBER	11300497	60	87408	107135	1183609
PP-2 66/11kV	7/3 Ring road ROHINI SUBSTATION TO RHN	11300883	70	367758	481686	7975013
PP-2 66/11kV	3A/2 ROHINI	11300640	70	626346	770324	10078476
Haiderpur Grid 33/11kV	QU- 2 S/S	11300105	100	314262	412131	9786871
Haiderpur Grid 33/11kV	WATER WORKS-III	11300110	100	548751	714736	16598552
Haiderpur Grid 33/11kV	WATER WORKS-IV	11300111	100	497070	622130	12505985
Haiderpur Grid 33/11kV	1/15 s/s no.2	11300112	100	139231	238881	9965013
ROHINI DC-1	D MALL	11301059	60	685878	793857	6478722
ROHINI DC-1	CROWN PLAZA-1	11301081	60	215286	216226	56388
ROHINI DC-1	CROWN PLAZA-2	11301058	60	980717	1120329	8376732

Table 20: Data of Mangolpuri Division

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
PP-2 66/11kV	WORK CENTER B	11300890	70	1047821	1239698	13431360
PP-2 66/11kV	N.D.D.B. FEEDER	11300888	70	333794	464273	9133515
MGP-1 66/11kV	JALEBI CHOWK FDR NO.2	11300507	70	1751701	1910986	11149973
MGP-2 66/11kV	S/S NO. 32 FEEDER NO.2	X1200665	1	3890160	9461320	5571160
RG-2 66/11kV	BUDH VIHAR PH.1 FRUIT MARKET S/S	11300764	60	1497924	1659780	9711365
RG-2 66/11kV	DSIDC SULTAN PURI WORK CENTER-2	11300873	60	852722	976318	7415734
RG-23 66/11kV	RMU NEAR RG-23 GRID	11301240	60	2532799	2749651	13011102
RG-23 66/11kV	PKT-11 SEC-21 RHN FDR NO-2	11300646	60	1307063	1459428	9141891
RG-23 66/11kV	JAIN NAGAR	11301239	60	1990807	2151281	9628430
RG-23 66/11kV	6/23 S/S NO.1 S/S +11-B SEC-23 S/S (RMU Zone 561 Fdr-1)	11300650	120	220713	285190	7737308

Table 21: Data of Pitampura Division

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
PP-3 66/11kV	RMU Outside PP-3 grid fdr-1 (SD-1 COLONY)	11300231	185	372709	436464	11794647
PP-3 66/11kV	RANI BAGH NO.1	11300214	100	280644	348205	6756042
PP-3 66/11kV	P AND T A8 NSP FDR-1	11301094	60	2136680	2357772	13265492
PP-3 66/11kV	RMU INSIDE PP-3 GRID	11301093	120	1350710	1481038	15639428
PP-3 66/11kV	NDM-2	11301096	60	101014	117602	995281
PP-3 66/11kV	216 HIG FLATS S/S -1	11300520	60	403677	477226	4412979
PP-3 66/11kV	NSP NO.2 FDR NO.1	11301092	60	343479	379690	2172694
Rani Bagh Grid 33/11kV	SANT NAGAR GURUDWARA	11300482	80	435430	555561	9610469
Rani Bagh Grid 33/11kV	COMERCIAL CMLX S/S NO.4 FDR-2 +Ranibagh grid pss	11300586	80	272781	396489	9896591
Rani Bagh Grid 33/11kV	COMERCIAL CMLX S/S NO.2 (Prestige Buildwell)	11300585	80	89343	152986	5091407

Table 22: Data of Keshav Puram Division

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
Rampura Grid 33/11kV	OLD MOTHER DAIRY RAMPURA	11300155	100	180993	221049	4005579
Rampura Grid 33/11kV	ONKAR NAGAR B	11300135	100	74393	149994	7560117

Grid	Feeder	METER NO	MF	Meter Reading (1/4/2022)	Meter Reading (1/4/2023)	Energy (kWh)
Rampura Grid 33/11kV	B 42 PEARL DRINK(RMU NEAR B-31 S/S)	5297435	100	176472	190053	1358069
Rampura Grid 33/11kV	B-38	11300159	100	20753	130804	11005137
Rampura Grid 33/11kV	Rampura-1 Feeder No-2	11300130	100	680088	840073	15998558
Wazirpur I Grid 33/11kV	FIRE STATION	11300841	70	1660994	1823270	11359268
Wazirpur I Grid 33/11kV	B-BLK PH.I	11300837	70	12638	119445	7476457
Wazirpur I Grid 33/11kV	CET PLANT ASHOK VIHAR PH.II	11300844	70	1031170	1143565	7867664
Wazirpur I Grid 33/11kV	DSIDC SHED 21 WPIA PH.I	11300843	60	1359797	1501696	8513957
Wazirpur I Grid 33/11kV	B-32/2 WIA	11300842	70	1233755	1329067	6671867

c) Field verification report of the activities undertaken in a) and b) above to be included as an annexure to the energy audit report.

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.

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

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 & for FY 2021-22 are as shown below:

Table 23: AT&C losses of previous two years

Technical Details	UoM	FY 2020-21	FY 2021-22
Input Energy Purchase (From Generation Source)*	Million kWh	10085.62	11737.11
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kWh	8950.12	9424.75
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kWh	8310.43	8752.21
Transmission and Distribution (T&D) loss Details	Million kWh	639.68	672.55
	%	7.15%	7.14%
Collection Efficiency	%	100.72%	100.36%
Aggregate Technical & Commercial Loss	%	6.48%	6.80%

b) Division wise Losses Comparison

The division wise AT&C losses for the FY 2021-22 & for FY 2022-23 are as shown below:

Table 24: Division wise AT&C Losses FY 2021-2022

Name of District	Annual AT&C Loss (FY2021-2022)						
	Energy Input (MU)	Energy Billed (MU)	D&B Losses (%)	Amount Billed (Rs. Cr.)	Amount Realized (Rs. Cr.)	Coll. Eff. (%)	AT&C Losses (%)
Badli	621 .60	553.61	10.94%	562.80	570.16	101.31%	9.77%
Bawana	1302 .72	1171 .22	10.09 %	1394 .15	1397.45	100.24%	9.88%
Civil Lines	773.43	750.61	2.95%	677.48	675.47	99.70%	3.24%
Keshav Puram	803 .95	754.21	6.19%	737.58	730.59	99.05%	7.08%
Mangolpuri	618 .99	576 .76	6.82%	410.40	413.41	100.73%	6.14%
Model Town	667 .51	626.38	6.16%	515.16	515.57	100.08%	6.09%
Moti Nagar	752.93	711.74	5.47%	711.20	712.16	100.14%	5.34%
Narela	1088 .77	994 .04	8.70%	1065.43	1071.89	100.61%	8.15%
Pitam Pura	612 .37	573.77	6.30%	506.34	508.87	100.50%	5.83%
Rohini	1034 .25	984.75	4.79%	790.30	796.64	100.80%	4.02%
Kirari	394.40	342.65	13.12%	225.94	229.85	101.73%	11.62%
Shalimar Bagh	753.83	712.46	5.49%	525.92	529.97	100.77%	4.76%
TPDDL Total	9424.75	8752.21	7.14%	8122.69	8152.04	100.36%	6.80%

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

a) Division wise Losses Comparison

The division wise AT&C losses for FY 2022-23 are as shown below:

Table 25: Division wise AT&C losses FY 2022-23

Annual AT&C Loss (FY2022-2023)							
Name of District	Energy Input (MU)	Energy Billed (MU)	D&B Losses (%)	Amount Billed (Rs.cr)	Amount Realized (Rs. Cr.)	Coll. Eff. (%)	AT&C Losses (%)
Badli	697.77	640.65	8.19%	694.93	695.40	100.07%	8.12%
Bawana	1457.23	1322.54	9.24%	1688.90	1693.81	100.29%	8.98%
Civil Lines	903.66	889.99	1.51%	872.13	864.85	99.17%	2.34%
Keshav Puram	886.18	838.05	5.43%	885.76	885.22	99.94%	5.49%
Mangolpuri	698.77	645.82	7.58%	504.31	504.53	100.04%	7.54%
Model Town	755.87	718.17	4.99%	643.07	643.46	100.06%	4.93%
Moti Nagar	847.33	803.91	5.12%	866.72	869.34	100.30%	4.84%
Narela	1231.63	1128.44	8.38%	1294.90	1294.65	99.98%	8.40%
Pitam Pura	677.68	646.08	4.66%	626.99	629.08	100.33%	4.34%
Rohini	1161.64	1112.43	4.24%	978.70	978.73	100.00%	4.23%
Kirari	437.49	384.81	12.04%	279.29	277.70	99.43%	12.54%
Shalimar Bagh	867.37	815.83	5.94%	655.29	654.89	99.94%	6.00%
TPDDL Total	10622.62	9946.72	6.36%	9990.97	9991.67	100.01%	6.36%

b) Summary of AT&C losses for FY 2022-23

The AT&C losses over the Q1, Q2, Q3, Q4 of FY 2022-23 and annual AT&C losses for FY 2022-23 are as shown below:

Table 26: AT&C losses in FY 2022-23

Energy Input Details	Formula	Units	Quarterly				Annual FY 22-23
			Q1	Q2	Q3	Q4	
Input Energy Purchase(From Generation Source)	A	MU	3950.09	3838.29	2419.25	2549.74	12741.47
Net input energy(at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	3192.49	3255.47	2117.13	2057.53	10622.62
Total Energy billed (is the Net energy billed, adjusted for energy traded)	C	MU	2728.00	3065.18	2170.00	1981.36	9946.33
Transmission and Distribution (T&D) loss Details	D	MU	464.49	190.29	-52.87	76.17	676.29
	$E = D/B \times 100$	%	14.55%	5.85%	-2.50%	3.70%	6.37%
Collection Efficiency	F	%	92%	102%	104%	104%	100.01%
AT&C Losses	$G = 1 - \{(1-E) \times \text{Min}(F, 100\%)\}$	%	21%	4%	-6%	0%	6.36%

c) Circle wise T&D and AT&C Losses

The circle wise connected load & input energy, transmission & distributions losses and AT&C loss is given in following table:

Table 27: Circle wise T&D and AT&C losses in FY 2022-23

Circle	Total Number of connections		Total Connected Load		Input energy		Billed energy	
	Nos.	% Share	MW	% Share	MU	% Share	MU	% Share
URBAN CIRCLE	629236	32.10%	1742.04	26.90%	2726.78	25.70%	2568.65	25.80%
SUB-URBAN CIRCLE	232580	11.90%	1331.72	20.60%	2688.85	25.30%	2451.77	24.60%
TOWN CIRCLE	458778	23.40%	1596.78	24.70%	2545.72	24.00%	2445.91	24.60%
METRO CIRCLE	491601	25.10%	1203.57	18.60%	1813.94	17.10%	1676.19	16.90%
CITY CIRCLE	146903	7.50%	592.87	9.20%	847.33	8.00%	803.81	8.10%

d) Division wise Input energy and billed energy details

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

Table 28: Division wise input energy & billed energy for FY 2022-23

S. No	Name of Division	Input energy (MU)	% of Input energy consumption	Total Billed energy (MUs)	% of energy consumption
1	Badli	697.77	6.6%	640.87	6.4%
2	Bawana	1457.23	13.7%	1323.15	13.3%
3	Civil lines	903.66	8.5%	889.91	8.9%
4	Keshavpuram	886.18	8.3%	838.01	8.4%
5	Kirari	437.49	4.1%	384.56	3.9%
6	Mangolpuri	698.77	6.6%	645.64	6.5%
7	Model town	755.87	7.1%	717.99	7.2%
8	Moti nagar	847.33	8.0%	803.81	8.1%
9	Narela	1231.63	11.6%	1128.62	11.3%
10	Pitam pura	677.68	6.4%	645.99	6.5%
11	Rohini	1161.64	10.9%	1112.3	11.2%
12	Shalimar bagh	867.37	8.2%	815.48	8.2%
		10622.62	100%	9946.33	100%

Figure 8: Division wise Input Energy Share

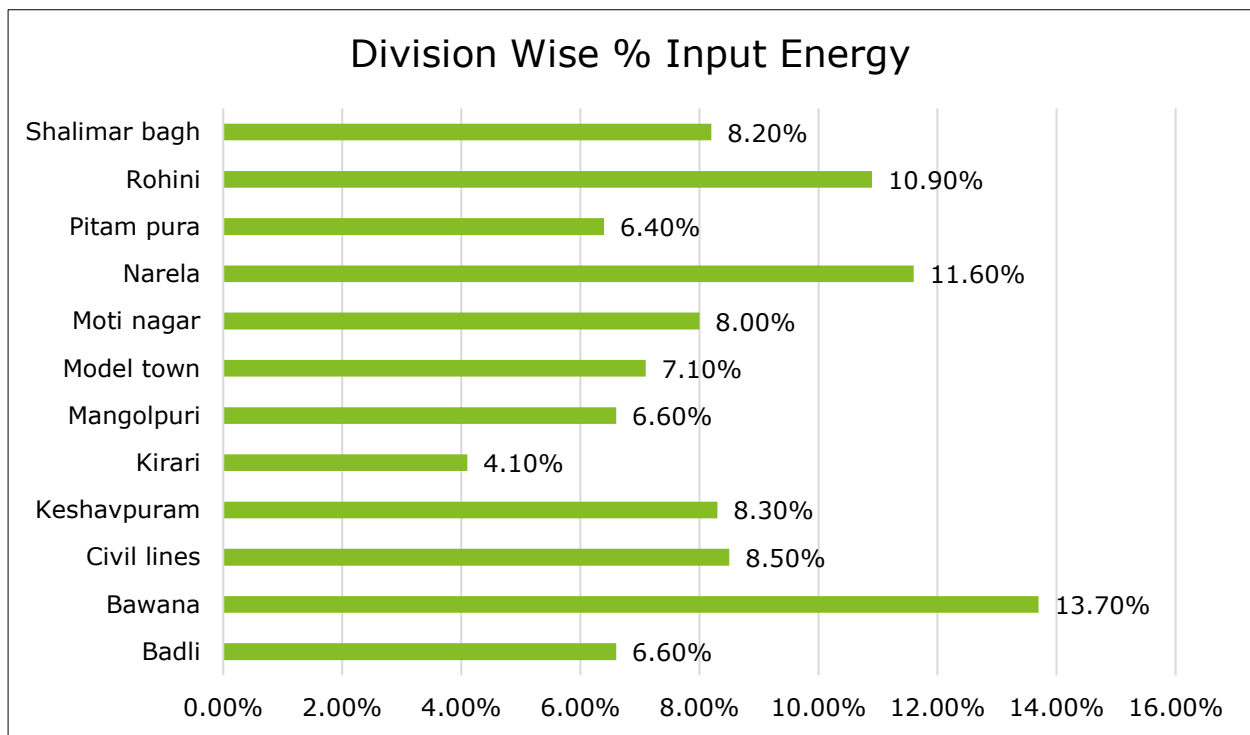
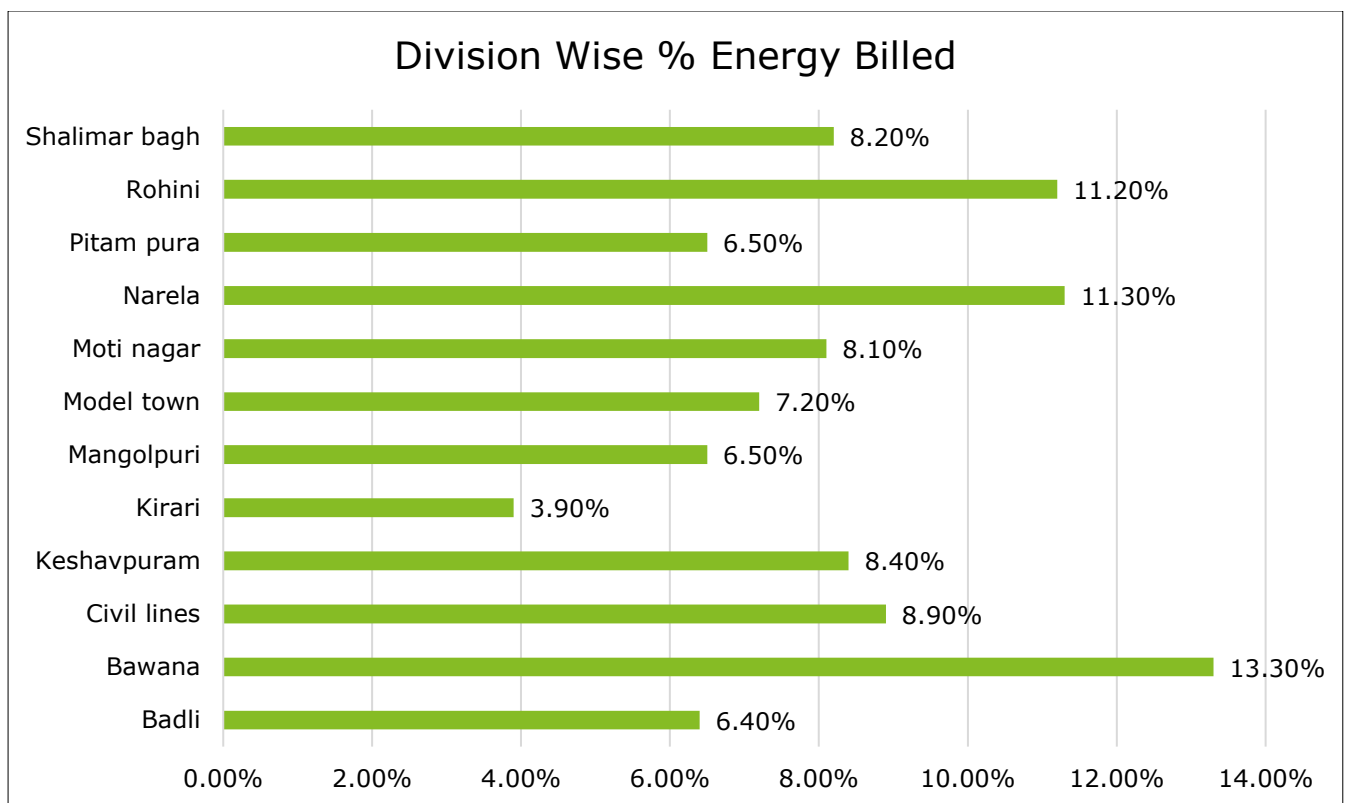


Figure 9: Division wise Billed Energy Share



e) Quarterly and annual AT&C losses

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

Table 29: Energy Input and AT&C Losses for FY 2022-23

Energy Input Details	Formula	UoM	Quarterly				Annual
			Q1	Q2	Q3	Q4	FY 22
Input Energy Purchase (From Generation Source)	A	MU	3950.09	3838.29	2419.25	2549.74	12741.47
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	3192.49	3255.47	2117.13	2057.53	10622.62
Total Energy billed (is the Net energy billed, adjusted for energy traded)	C	MU	2728.00	3065.18	2170.00	1981.36	9946.33
Transmission and Distribution (T&D) loss Details	D	MU	464.49	190.29	-52.87	76.17	676.29
	$E = D/B \times 100$	%	14.55%	5.85%	-2.50%	3.70%	6.37%
Collection Efficiency	F	%	92%	102%	104%	104%	100.01%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1 - E) \times \text{Min}(F, 100\%)\}$	%	21%	4%	-6%	0%	6.36%

f) 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 Tata Power-DDL for FY 2022-23 are not available as shown in the below table:

Table 30: Voltage-wise AT&C Losses for FY 2022-23

S. No.	Particulars	Units	Values
1	Losses in 132 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	

S. No.	Particulars	Units	Values
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	
5.b.	Total Output from the Distribution System	MUs	
5.c.	Distribution System Losses	%	
5.d.	% Distribution System Losses	%	

g) Circle wise AT&C losses analysis

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

Table 31: 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
URBAN CIRCLE	629236	32.10%	1742.04	26.90%	2726.78	25.70%	2568.65	25.80%
SUB-URBAN CIRCLE	232580	11.90%	1331.72	20.60%	2688.85	25.30%	2451.77	24.60%
TOWN CIRCLE	458778	23.40%	1596.78	24.70%	2545.72	24.00%	2445.91	24.60%
METRO CIRCLE	491601	25.10%	1203.57	18.60%	1813.94	17.10%	1676.19	16.90%
CITY CIRCLE	146903	7.50%	592.87	9.20%	847.33	8.00%	803.81	8.10%

2. Circle-wise AT&C losses

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

Table 32: Circle wise T&D losses, Collection Efficiency and AT&C losses for FY 2022-23

Circle	Input energy	Billed energy	T&D loss		Collection Efficiency %	AT&C loss %
	MU	MU	MU	%		
URBAN CIRCLE	2726.78	2568.65	158.13	5.80%	100.24%	5.58%
SUB-URBAN CIRCLE	2688.85	2451.77	237.08	8.82%	100.18%	8.64%
TOWN CIRCLE	2545.72	2445.91	99.81	3.92%	99.35%	4.60%
METRO CIRCLE	1813.94	1676.19	137.75	7.59%	100.31%	7.31%
CITY CIRCLE	847.33	803.81	43.52	5.14%	100.23%	4.91%
Total	10622.62	9946.33	676.29	6.37%	100.00%	6.36%

Division wise AT&C losses analysis

3. Division-wise AT&C losses

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

Table 33: Division wise T&D losses, Collection Efficiency and AT&C losses for FY 2022-23

Name of circle	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total energy	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
URBAN CIRCLE	Badli	Residential	108912	176.16	697.77	258.17	56.901	8.15%	152.63	151.99	99.58%	
		Agricultural	483	3.86		2.39			1.39	1.46	105.04%	
		Commercial/Industrial-LT	21248	209.95		333.84			485.68	486.29	100.13%	
		Commercial/Industrial-HT	49	14.11		23.59			33.32	33.5	100.54%	
		Others	590	19.31		22.88			21.88	24.35	111.29%	
			131282	423.39	697.77	640.87	56.901	8.15%	694.9	697.59	100.39%	7.80%
SUB-URBAN CIRCLE	Bawana	Residential	70362	111.82	1457.23	159.93	134.076	9.20%	92.2	91.86	99.63%	
		Agricultural	1709	10.22		3.98			3.15	3.1	98.41%	
		Commercial/Industrial-LT	22086	577.84		1111.92			1538.95	1544.65	100.37%	
		Commercial/Industrial-HT	35	8.8		17.16			23.12	23.24	100.52%	
		Others	381	9.26		30.16			31.39	31.48	100.29%	
			94573	717.94	1457.23	1323.15	134.076	9.20%	1688.81	1694.33	100.33%	8.90%
TOWN CIRCLE	Civil lines	Residential	112277	298.37	903.66	423.94	13.753	1.52%	303.57	303.45	99.96%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	24116	104.89		126.93			194.38	193.25	99.42%	
		Commercial/Industrial-HT	71	54.94		95.42			137.37	137.31	99.96%	
		Others	854	74.56		243.62			236.79	229.7	97.01%	
			137318	532.76	903.66	889.91	13.753	1.52%	872.11	863.71	99.04%	2.47%
TOWN CIRCLE	Keshavpuram	Residential	122116	282.26	886.18	393.96	48.173	5.44%	260.97	260.91	99.98%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	27357	238.36		356.82			515.04	515.27	100.04%	
		Commercial/Industrial-HT	107	34.64		72.38			93.38	93.51	100.14%	
		Others	556	6.76		14.85			16.33	7.47	45.74%	
			150136	562.02	886.18	838.01	48.173	5.44%	885.72	877.16	99.03%	6.35%

Name of circle	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total energy	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
METRO CIRCLE	Kirari	Residential	138424	202	437.49	307.1	52.932	12.10%	162.73	161.87	99.47%	
		Agricultural	66	0.36		0.18			0.11	0.11	100.00%	
		Commercial/Industrial-LT	16216	51		61.34			92.8	93.22	100.45%	
		Commercial/Industrial-HT	7	2.94		2.21			3.82	3.89	101.83%	
		Others	406	6.68		13.73			19.81	21.03	106.16%	
			155119	262.98	437.49	384.56	52.932	12.10%	279.27	280.12	100.30%	11.83%
METRO CIRCLE	Mangolpuri	Residential	191167	314.07	698.77	475.22	53.134	7.60%	264.54	264.12	99.84%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	22786	100.34		131.8			192.64	194.09	100.75%	
		Commercial/Industrial-HT	23	9.28		22.29			27.74	27.76	100.07%	
		Others	598	6.72		16.33			19.38	20.47	105.62%	
			214574	430.41	698.77	645.64	53.134	7.60%	504.3	506.44	100.42%	7.21%
METRO CIRCLE	Model town	Residential	148828	338.84	755.87	483.97	37.880	5.01%	325.39	324.87	99.84%	
		Agricultural	1	0.01		0			0	0.00%		
		Commercial/Industrial-LT	21684	106		129.35			196.88	197.25	100.19%	
		Commercial/Industrial-HT	46	13.3		26.12			37.62	37.42	99.47%	
		Others	765	43.85		78.55			83.15	83.36	100.25%	
			171324	502	755.87	717.99	37.880	5.01%	643.04	642.9	99.98%	5.03%
TOWN CIRCLE	Moti Nagar	Residential	118383	309.47	847.33	417.96	43.519	5.14%	288.4	290.1	100.59%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	27689	218.35		280.28			429.45	430.56	100.26%	
		Commercial/Industrial-HT	121	56.12		91.24			131.36	130.79	99.57%	
		Others	710	8.93		14.33			17.47	17.25	98.74%	
			146903	592.87	847.33	803.81	43.519	5.14%	866.68	868.7	100.23%	4.91%
CITY CIRCLE	Narela	Residential	115983	185.43	1231.63	283.27	103.006	8.36%	163.89	163	99.46%	
		Agricultural	2169	18.29		9.88			6.27	6.26	99.84%	
		Commercial/Industrial-LT	18820	357.64		710.46			963.98	964.79	100.08%	
		Commercial/Industrial-HT	138	36.71		97.37			126.32	125.85	99.63%	
		Others	897	15.71		27.64			34.38	35.31	102.71%	
			138007	613.78	1231.63	1128.62	103.006	8.36%	1294.84	1295.21	100.03%	8.34%

Name of circle	Name of Division	Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total energy	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
SUB-URBAN CIRCLE	Pitam pura	Residential	104349	358.77	677.68	440.59	31.686	4.68%	328.92	329.78	100.26%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	16964	108.66		132.95			201.27	201.71	100.22%	
		Commercial/Industrial-HT	76	36.77		60.46			84.13	84.36	100.27%	
		Others	519	5.98		11.99			12.64	12.46	98.58%	
			121908	510.18	677.68	645.99	31.686	4.68%	626.96	628.31	100.22%	4.47%
METRO CIRCLE	Rohini	Residential	205877	546.73	1161.64	744.78	49.343	4.25%	502.37	502.42	100.01%	
		Agricultural	0	0		0			0	0.00%		
		Commercial/Industrial-LT	30203	128.54		149.92			224.17	225	100.37%	
		Commercial/Industrial-HT	67	45.13		90.55			122.99	123.86	100.71%	
		Others	936	46.24		127.05			129.13	129.14	100.01%	
			237083	766.64	1161.64	1112.3	49.343	4.25%	978.66	980.42	100.18%	4.08%
URBAN CIRCLE	Shalimar bagh	Residential	233666	406.42	867.37	599.84	51.888	5.98%	353.3	352.8	99.86%	
		Agricultural	77	0.5		0.46			0.2	0.2	100.00%	
		Commercial/Industrial-LT	26309	103.49		133			197.16	197.52	100.18%	
		Commercial/Industrial-HT	71	31.79		62.31			80.79	81.39	100.74%	
		Others	748	9.81		19.87			23.81	24.41	102.52%	
			260871	552.01	867.37	815.48	51.888	5.98%	655.26	656.32	100.16%	5.83%
Total		Residential	1670344	3530.34	10622.62	4988.73	676.289	6.37%	3198.91	3197.17	99.95%	
		Agricultural	4505	33.24		16.89			11.12	11.13	100.09%	
		Commercial/Industrial-LT	275478	2305.06		3658.61			5232.4	5243.6	100.21%	
		Commercial/Industrial-HT	811	344.53		661.1			901.96	902.88	100.10%	
		Others	7960	253.81		621			646.16	636.43	98.49%	
Total			1959098	6466.98	10622.62	9946.33	676.289	6.37%	9990.55	9991.21	100.01%	6.36%

Division wise connections & energy consumptions for FY 2022-23

The Division wise connections, load, input energy & Billed energy with percentage share in different division is given below the "Shalimar Bagh" Division having maximum numbers of consumers and "Bawana" Division having minimum numbers of consumers. "Bawana" has maximum input energy as well as billed units and "kirari" have minimum input energy as well as billed units as shown in table:

Table 34: Division wise connections & energy consumption

Name of Division	Total Number of connections		Total Connected Load		Input energy		Total Billed energy	
	Number	%	Load (MW)	%	MU	%	MU	%
Badli	131282	6.7%	423.39	6.5%	697.77	6.6%	640.87	6.4%
Bawana	94573	4.8%	717.94	11.1%	1457.23	13.7%	1323.15	13.3%
Civil lines	137318	7.0%	532.76	8.2%	903.66	8.5%	889.91	8.9%
Keshavpuram	150136	7.7%	562.02	8.7%	886.18	8.3%	838.01	8.4%
Kirari	155119	7.9%	262.98	4.1%	437.49	4.1%	384.56	3.9%
Mangolpuri	214574	11.0%	430.41	6.7%	698.77	6.6%	645.64	6.5%
Model town	171324	8.7%	502	7.8%	755.87	7.1%	717.99	7.2%
Moti nagar	146903	7.5%	592.87	9.2%	847.33	8.0%	803.81	8.1%
Narela	138007	7.0%	613.78	9.5%	1231.63	11.6%	1128.62	11.3%
Pitam pura	121908	6.2%	510.18	7.9%	677.68	6.4%	645.99	6.5%
Rohini	237083	12.1%	766.64	11.9%	1161.64	10.9%	1112.3	11.2%
Shalimar bagh	260871	13.3%	552.01	8.5%	867.37	8.2%	815.48	8.2%
	1959098	100%	6466.98	100%	10622.62	100%	9946.33	100%

Table 35: Divisions wise AT&C losses (%) & T&D losses (%)

S. No.	Division	T&D loss (%)	AT&C loss (%)
1	Badli	8.15%	7.80%
2	Bawana	9.20%	8.90%
3	Civil lines	1.52%	2.47%
4	Keshavpuram	5.44%	6.35%
5	Kirari	12.10%	11.83%
6	Mangolpuri	7.60%	7.21%
7	Model town	5.01%	5.03%
8	Moti nagar	5.14%	4.91%
9	Narela	8.36%	8.34%
10	Pitam pura	4.68%	4.47%
11	Rohini	4.25%	4.08%
12	Shalimar bagh	5.98%	5.83%

h) Feeder wise AT&C losses analysis

1. Feeder wise AT&C losses

Tata Power-DDL has ring main power distribution network. To provide uninterrupted power, back feeding points/normal operating points (NOP) are usually changed. Due to this dynamic nature of the network, connected consumers to a feeder at a particular point of time will change as the NOP changes. Tata Power-DDL is working on to implement technological solutions to capture these dynamic changes.

2. High loss feeders

If we compare input energy of feeder and related consumption, in many cases, input is low as compared to consumption. Vis-a- Vis, in some feeders, gap is high in positive side.

Though critical parameters are monitored on monthly basis, substantial difference in the data will not be reflected on quarterly basis. Due to spread over of meter reading and billing in multiple cycle, rollover of consumers takes place from preceding quarter to current quarter and vice-versa. Hence, in some of the feeders, the gap between input and consumption may be high on positive side and in some of the feeders it is negative. As the period of consideration widens or on rolling basis, variation gets normalized.

Considering the following feeders individually, it gives an impression that these feeders are having high MU loss. But considering them with the feeders with which these feeders share input energy and consumption, the MU losses are reduced drastically.

Table 36: High Loss Feeders

Name of the Station	Feeder Code/ID	Feeder Name	Type of Feeder	Type of feeder meter	Received at Feeder (Final in MU)	Feeder Consumption (In MU)	T&D losses
BAWANA-6 GRID	230463344	BWN-6 TO RG-34 INTERCONNECTOR S/S 3&4	Sub-Urban	AMR	28.45	0.00	28.45
BAWANA-6 GRID	22012174	BWN-6 TO RG-34 INTERCONNECTOR S/S - 1&2	Sub-Urban	AMR	20.98	0.00	20.98
BURARI GRID	58592839	DJB BURARI GRID TO BURARI PRADHAN ENCLAVE S/S	Urban	AMR	27.18	9.16	18.02
HAIDER PUR GRID	21996893	HAIDER PUR GRID TO HAIDER PUR W.W NO-3	Urban	AMR	16.60	0.00	16.60
HAIDER PUR GRID	21996813	HAIDER PUR GRID TO HAIDER PUR W.W NO-2	Urban	AMR	16.04	0.00	16.04

3. Identification of overloaded segments/ infrastructure

Count of Overload feeders in Tata Power DDL is Zero.

In TPDDL network planning of feeders/ sections is being done 2-3 years prior to implementation at site, for overcoming any chance of overloading crisis occurrence in future.

5.3 Subsidy computation and analysis (based on quarterly data)

The subsidy details during FY 2022-23 are shown in the table below:

Table 37: Category wise subsidy Division wise subsidy details

FY-2022-23																
Consumer Category (Separate for each subsidized consumer)		Billed Energy			Subsidized Billed Energy			Applicable rate of Subsidy as notified by State govt.		Subsidy Due from State Govt.			Subsidy Actually Billed / claimed from State Govt. (As against col.12)	Subsidy Received from State Govt. (As against col.13)	Balance Subsidy yet to be Received from State Govt.	No.of Benefited Consumers
		Metered	Un-metered*	Total	Metered (out of col.2)	Un-metered* (out of col.3)	Total	Metered Energy**	Un-metered Energy**	Metered Energy	Un-metered Energy	Total				
		(in kWh)			(in kWh)			(in Rs/kWh)		(in Rs. Cr.)			(in Rs. Cr.)	(in Rs. Cr.)	(in Rs. Cr.)	Count
1		2	3	4=2+3	5	6	7=5+6	8	9	10=5X8	11=6x9	12=10+11	13	14	15=13-14	16****
Residential Domestic	0-200 units pm	1018512423		1018512423	1018512423		1018512423	Entire current demand								9769985
	201-400 units pm	1543087274		1543087274	*			Rs. 800 per month								5153432
Agriculture		16104374		16104374	**			Rs. 105 per unit/month								48237
Commercial/Industrial - LT																
Commercial/Industrial - HT																
Other (specify)					***											
Total																

5.4 Trend analysis and identification of key exceptions

Details maybe specified such as performance of DISCOM in FY 2020-21, 2021-22 Vs FY 2022-23, Annually comparison, circle wise analysis, where the DISCOM has improved and where needs improvement, etc.

a) Summary Comparison of AT&C and T&D losses

Division Wise Comparison of T&D and AT&C losses For FY 2020-21, FY 2021-22 & FY 2022-23 are shown in below Table:

Table 38: Comparison of AT&C and T&D losses for last three Years

Name of Division	AT&C Loss			T&D Loss		
	FY 2020-21	FY 2021-22	FY 2022-23	FY 2020-21	FY 2021-22	FY 2022-23
Badli	10.35%	9.77%	8.12%	11.59%	10.90%	8.19%
Bawana	11.88%	9.88%	8.98%	13.33%	10.10%	9.24%
Civil Lines	2.92%	3.24%	2.34%	2.73%	3.00%	1.51%
Keshav Puram	5.31%	7.08%	5.49%	5.61%	6.20%	5.43%
Mangolpuri	4.32%	6.14%	7.54%	5.42%	6.80%	7.58%
Model Town	5.36%	6.09%	4.93%	4.99%	6.20%	4.99%
Moti Nagar	4.77%	5.34%	4.84%	5.00%	5.50%	5.12%
Narela	10.05%	8.15%	8.40%	11.21%	8.70%	8.38%
Pitam Pura	4.18%	5.83%	4.34%	4.34%	6.30%	4.66%
Rohini	2.66%	4.02%	4.23%	3.18%	4.80%	4.24%
Kirari	10.38%	11.62%	12.54%	10.43%	13.10%	12.04%
Shalimar Bagh	4.55%	4.76%	6.00%	5.22%	5.50%	5.94%

Figure 10: Last three-year AT&C loss Trend

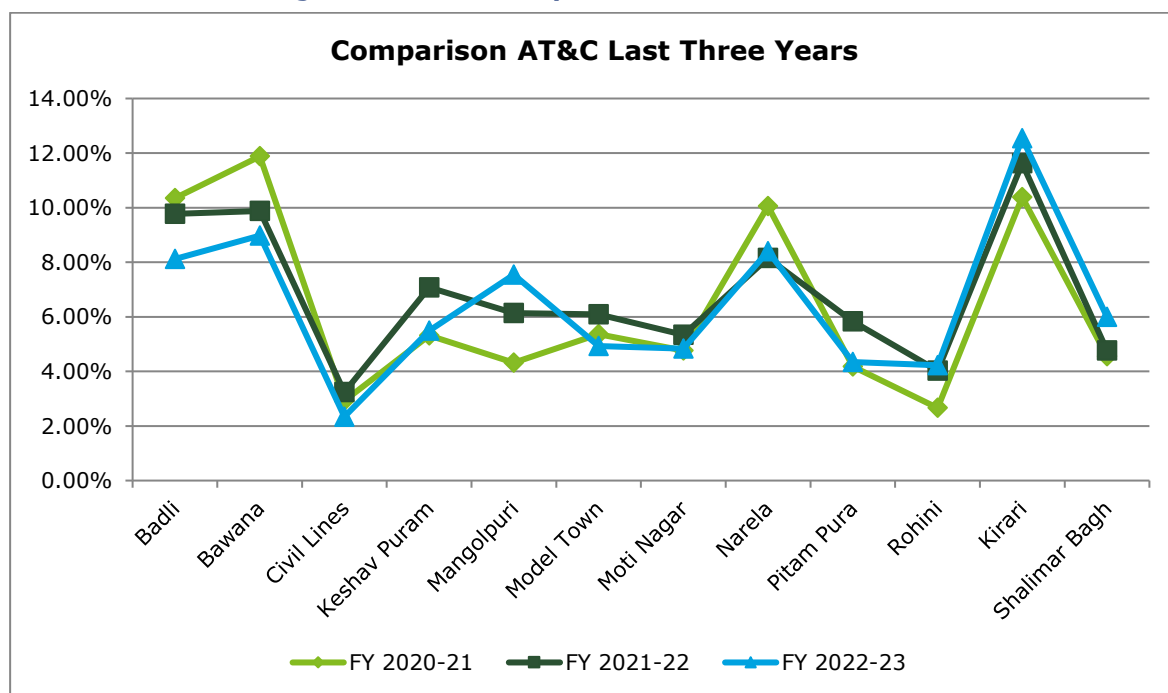
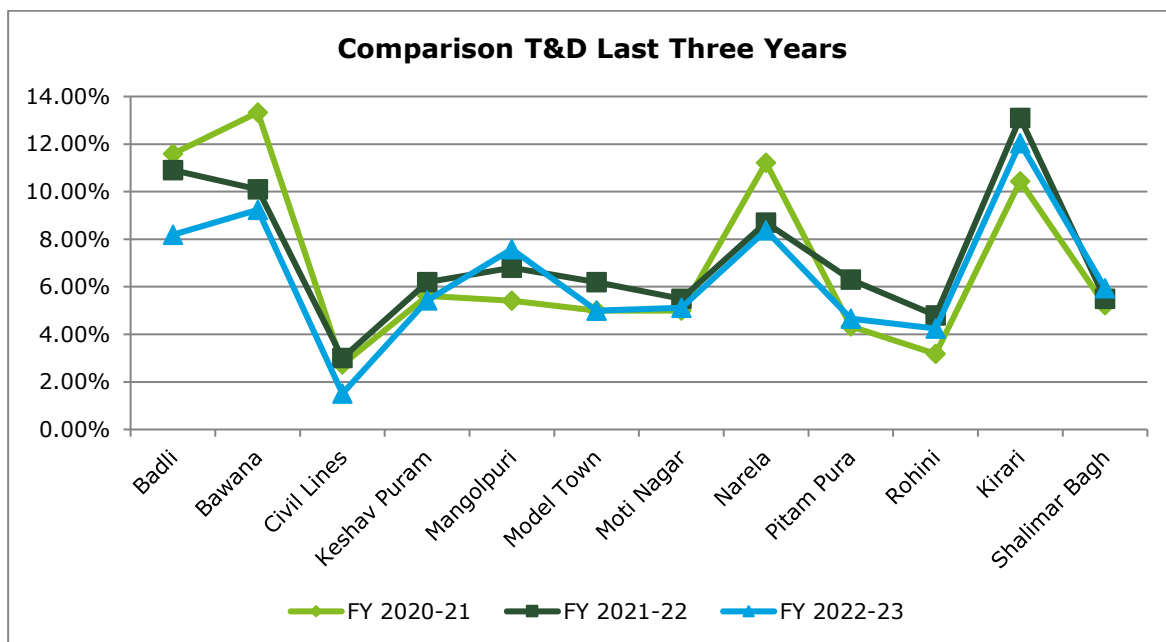


Figure 11: Last three-year T&D trend



b) Summary of AT&C losses for last three Years

The AT&C losses for the FY 2020-21, FY 2021-22 & FY 2022-23 are as shown below:

Table 39: AT&C losses Trend for last three Years

Technical Details	UoM	FY 2020-21	FY 2021-22	FY 2022-23
Input Energy Purchase (From Generation Source)*	Million kWh	10085.62	11737.11	12741.47
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kWh	8950.12	9424.75	10622.62
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kWh	8310.43	8752.21	9946.33
Transmission and Distribution (T&D) loss	Million kWh	639.68	672.55	676.29
Details	%	7.15%	7.14%	6.37%
Collection Efficiency	%	100.72%	100.36%	100%
Aggregate Technical & Commercial Loss	%	6.48%	6.80%	6%

6 Energy Audit findings

6.1 Review of capacity of DISCOM’s energy accounting and audit wing

The Energy Accounting/Audit wing in the DISCOM has been established on 11-Feb-22.

The Organogram of the DISCOM is as shown below:

Figure 12: Organogram of Energy accounting in the DISCOM

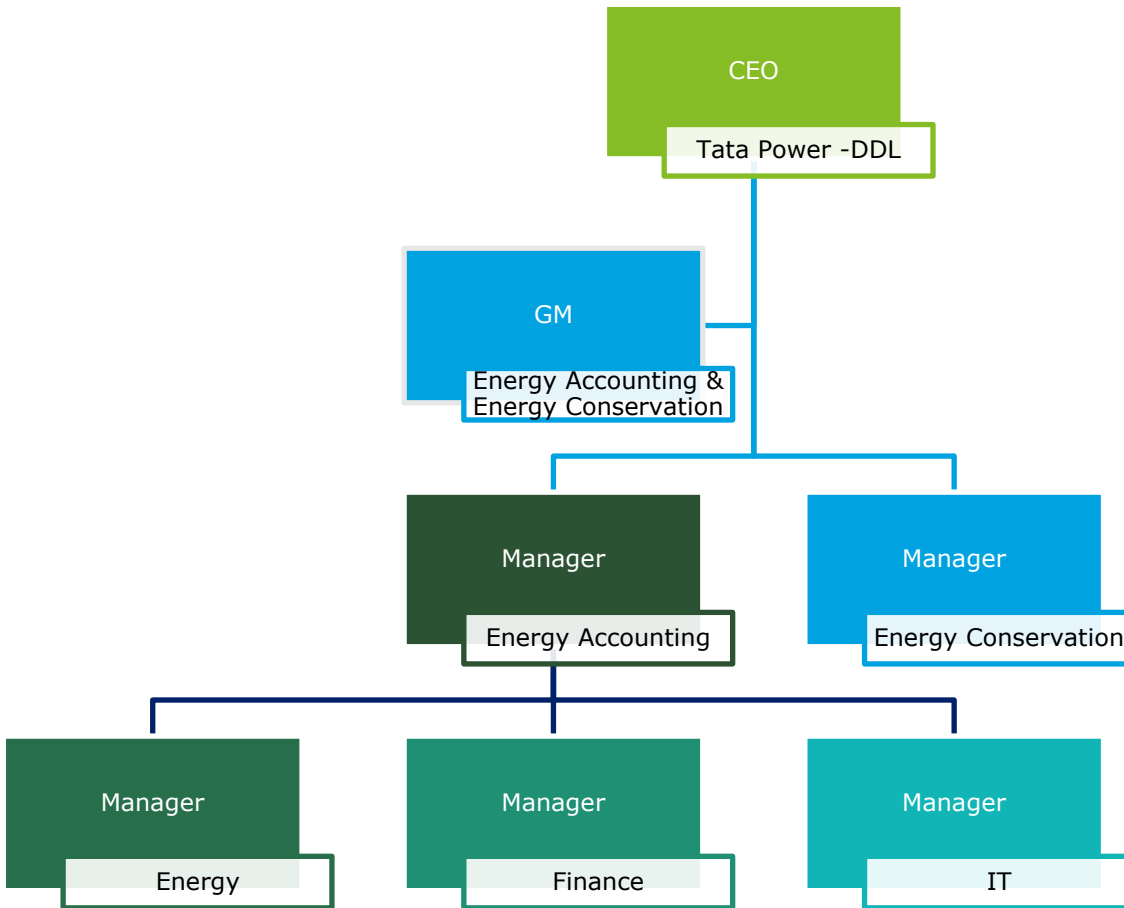


Table 40: Details of energy manager and Authorized signatory of DISCOM

Designation	No. of Officers
CEO	Mr. Ganesh Srinivasan
General Manager	Mr. HC Sharma
AGM (Energy Manager)	Mr. Md Shadab Ahmad
Head of Group, Energy Audit	Mr. Hari Om Sharma
Sr. Manager, Energy Audit	Mr. Neeraj Singh
Sr. Manager, Energy Audit	Ms. Gagandeep Kaur
Finance Manager	Mr. Sachin Gupta
IT Manager	Ms. Kamakshi Oberoi

6.2. Critical Analysis

- The monthly consumption per customer stands at 423.08 KWH/Month. Tata Power-DDL caters to area spread in 5 circles, 12 Division, 37 numbers of sub-division, 1287 number of feeders, 8157 number of DTs and 1959098 numbers of consumers.
- Verified transmission losses, distribution (T&D) losses, collection efficiency & aggregate technical & commercial losses of Tata Power Delhi Distribution Limited for FY21-22, i.e., 1st April'2022 to 31st March'2023 was 4.13%, 6.36 %, 100.01 % & 6.36 % respectively.
- The electrical energy is supplied by various interstate and intrastate generating stations at 220 KV, 66 KV, 33 KV and same is supplied to customers at 66 KV, 33 KV, 11 KV, 6.6KV, 400V and 230 V single phase.
- Tata Power-DDL has implemented several world-class technologies such as Advance Distribution Management system or ADMS which is designed to replace the conventional SCADA-DMS-OMS system with features like real-time integration of Smart Meter Data / Distributed Generation integration and single data model from GIS , Integrated Geographical Information System (GIS) for instant services, Advanced Metering Infrastructure (AMI), Automated Demand Response (ADR), Smart Street Light Management system, Field Force Automation, Upgraded Network etc.
- Tata Power DDL has implemented various energy conservation measures under DSM programme i.e., AC Replacement Scheme, BLDC Ceiling Fan, LED Lighting Scheme, Behavioural Demand Response (BDR) etc.
- 12 % of its total generation requirement has been met via renewable energy towards compliance of renewable purchase obligation (RPO) for the Discom.
- Tata Power DDL calculation methodology of AT&C Losses calculated on not more than 100% collection efficiency.
- Tata Power-DDL has 100 % metering available at 11/33/66 KV system. However, there is 100% metering at consumer end and 93% metering available at DT.

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 first two Quarters (i.e., Q1 and Q2 of FY 2022-23) however, the delay has been reduced in Quarter 3 and Quarter 4 of FY 2021-22. DISCOM needs to submit 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 41: 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	Yes

Clause	Details	Sub-Clause	Criteria	Compliance Status
		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 Schedule	Yes
		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:	NA
		d.2.1.	All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15%	NA
		d.2.2.	All Union Territories (for areas with technical difficulty, non-communicable meters may be installed)	NA
		d.2.3.	All Industrial and Commercial consumers	Yes
		d.2.4.	All Government offices at Block level and above	Yes
		d.2.5.	Other high loss areas i.e., rural areas with losses more than 25% and urban areas with losses more than 15%	Yes
		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:	NA
		d.3.1.	All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15%;	

Clause	Details	Sub-Clause	Criteria	Compliance Status
			d.3.2. All Union Territories (for areas with technical difficulty, prepaid meters to be installed);	NA
			d.3.3. All Industrial and Commercial consumers;	NA
			d.3.4. All Government offices at Block level and above;	NA
			d.3.5. Other high loss areas i.e., rural areas with losses more than 25% and urban areas with losses more than 15%.	NA
			d.4. Consumer Metering: 98% by FY 2022-23 99% by FY 2023-24	Yes
			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	Yes
		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	Yes

Clause	Details	Sub-Clause	Criteria	Compliance Status
			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
		c	Metering of distribution transformers at High Voltage Distribution System up to 25KVA is done on cluster meter installed by the electricity distribution company	NA
		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,	Yes

Clause	Details	Sub-Clause	Criteria	Compliance Status
			shall be clearly indicated in the periodic energy accounting report	

6.2.2. Data gaps

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

Table 42: Summary of Data gaps

S. No.	Data gaps raised by Energy Auditor	Response shared by DISCOM	Status of data submission by DISCOM
	Voltage wise power purchase is not available as per BEE format as mentioned in Infrastructure sheet.	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 input billed energy not available	Majority of feeders are common to LT & HT. So input energy supplied is inseparable. This comprises of input at 33 & 66 kV as the two can't be mentioned separately. Cumulated EHT sales Mus for 33kV and above are maintained and therefore bifurcation of same is not available. Same also provided in A.6 of Form-input energy sheet	
	Feeder wise AT&C losses not available.	Tata Power-DDL has ring main power distribution network. To provide uninterrupted power, back feeding points/normal operating points (NOP) are usually changed. Due to this dynamic nature of the network, connected consumers to a feeder at a particular point of time will change as the NOP changes. Tata Power-DDL is working on to implement technological solutions to capture these dynamic changes. Hence, if we compare input energy of feeder and related consumption, in many cases, input is low as compared to consumption. Vis-a- Vis, in some feeders, gap is high in positive side. Though critical parameters are	

S. No.	Data gaps raised by Energy Auditor	Response shared by DISCOM	Status of data submission by DISCOM
		monitored on monthly basis, substantial difference in the data will not be reflected on quarterly basis. Due to spread over of meter reading and billing in multiple cycle, rollover of consumers takes place from preceding quarter to current quarter and vice-a-versa. Hence, in some of the feeders the gap between input and consumption may be high on positive side and in some of the feeders it is negative. As the period of consideration widens or on rolling basis, variation gets normalized.	
	POC losses are not available	Generation at Transmission periphery-Point of connection loss (POC) and input voltage level are not available. As the power drawn is supplied through Central Transmission Utility (Power Grid) and State Transmission Utility (Delhi Transco).	

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 43: Comments by Energy Auditor and responses of DISCOM management

S. No.	Comments by Energy Auditor	Response of DISCOM's management
	Kindly provide the filled in format as per BEE.	Provided by Tata Power
	Quarterly format as per BEE	Provided by Tata Power
	Kindly provide the identification and mapping of all of the electrical network assets	GIS Mapping
	Kindly provide the identification and mapping of high tension and low-tension consumers	GIS Mapping
	Kindly provide the details of the energy accounting data - 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	Metering is provided and home-grown software is used as per tariff category.

Whether the Metering of distribution transformers at High Voltage Distribution System up to 25KVA is done on cluster metering? If not what is the action plan	No exclusive clusters exist having HVDS installation consisting of transformers less than 25 KVA
Energy (Electrical) Purchase report for the year 2022-23	Provided by Tata Power
Open access consumer and their details	Provided by Tata Power
Peak Demand of the system	Provided by Tata Power
High loss Network segments	The segment identification is not possible due to ring main.
Energy Conservational Schemes implemented	Provided by Tata Power
Energy conservational Schemes to be implemented	Provided by Tata Power
Power Distribution Transformer	Provided by Tata Power
Maintenance practices - Power Substation , HT lines LT lines ,DTR	Provided by Tata Power
Average Billing Rate	Category wise consumer and total billed energy of those consumer is provided by Tata Power

6.3 Revised findings based on data validation and field verification

The site visits were carried out to ascertain the meter number and the input serial number of the meter. Physical verification along with system data was verified.

At the time of field visit feeder meters are in working conditions, Logbook is maintained on daily basis including hourly loading pattern, running runs of feeder & energy consumption.

Departmental Team and Vigilance also catch Theft through Raids and lodge FIR to reduce the loss.

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

It was also observed that all the consumers are metered.

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 and the office buildings. The distribution network accounts for the majority of energy consumption, followed by office buildings.

7.1.1 Recommendations:

1. Installation of Smart Meters.
2. Installation of Automatic Power factor controller (Capacitor Bank) at newly constructed PSS.
3. System improvement & automation.
4. Load balancing of distribution transformers

7.1.2 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.

7.2 Summary of key findings – energy balance and losses

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

Table 44: Energy balance and losses

Energy Input Details	Formula	UoM	Value
Input Energy Purchase (From Generation Source)	A	MU	12741.47
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	B	MU	10622.62
Total Energy billed (is the Net energy billed, adjusted for energy traded))	C	MU	9946.33
Transmission and Distribution (T&D) loss Details	D	MU	676.2894
	$E = D/B \times 100$	%	6.37%
Collection Efficiency	F	%	100.01%
Aggregate Technical & Commercial Loss	$G = 1 - \{(1-E) \times \text{Min}(F, 100\%)\}$	%	6.36%

7.3 Recommendations and best practices

a) Energy accounting

In Accordance to clause 5(g) of Bureau of energy efficiency (Manner and intervals for conduct of Energy audit in Electrical distribution companies) Regulation issued by BEE Ministry of Power ,GOI dated 6th Oct 2021 for conduct Mandatory Annual Energy Audit & periodic Energy Accounting in Electrical Distribution Companies and as per guidelines issued by BEE vide L. No 18/BEE/DISCOM/2021/1348-94, an Energy Audit Cell (EAC) in Tata Power DDL has been formed on 11th Feb 2022. The Energy Audit Cell conducts quarterly and annual energy audit through internal energy manager, and also gets the annual audit done by accredited energy auditor and send the report to BEE.

Energy Accounting is the first step towards identifying areas that need improvement. This will involve reviewing the current processes, systems, and data management practices.

Tata Power-DDL is laying special emphasis on Energy Accounting at all levels. Steps are being taken to account for every unit of energy supplied to consumers. The following measures are being implemented.

- i. 100% Feeder Metering at 33/11kV Substations.
- ii. 100% DT Metering by end of FY2023-24 under RDSS
- iii. 100% Consumer metering for all categories of consumers.

b) Loss reduction

TPDDL is a joint venture between Tata Power and Delhi Govt., that distributes power to over seven million population having over 1.9 million customers in North and North-West Delhi. The Discom was formed in 2002.

Today, AT&C losses stand at 6.36% (as of FY 2023) which is an unprecedented reduction from an opening loss level of 53% in July 2002.

TPDDL leveraged technology to improve its operational efficiency and reduce its losses.

Tata Power- DDL has undertaken various initiatives for loss reduction. Some of the initiatives are as follows:

Renovation in Metering Infrastructure: Replacement of electromechanical meters, defective meters by electronic meters/ smart meters. Installation of AMR (Automatic Meter Reading) meters and tamper-proof static meters and remote disconnection / reconnection as and when required.

Theft Control: Conducting raids in high loss areas for identifying pilferage of electricity.

Substation automation and distribution automation: Implementation of SCADA (Supervisory Control and Data Acquisition System) Control System for load management, including GIS mapping of assets.

Network reconfiguration: Electrical network designing wrt Standards and Guidelines, also considering network redundancy to increase system reliability.

Power factor improvement by automatic power factor controller.

Microgrid solutions to promote energy access to the areas where grid supply has not reached or is not feasible.

HVDS: Introduction of high voltage distribution system.

AB Cable: Replacement of bare conductor by AB (aerial bunched) Cable for shielding of possibilities of power theft.

Process re-engineering for improvement of existing customer complaint, improvement in all sorts of delay in billing, arrangement for spot billing etc. Improved process with IT application development.

Customer care services: Customer oriented management approach, like implementation of call center for 24 hours, improving customer care.

c) Energy conservation

➤ Energy Efficient Lighting and Fans

Scheme: Tata Power-DDL is offering Energy Efficient Products (EEPs) such as LED Bulbs and LED Tube Lights which have low maintenance and usage costs. These are durable and use up to 75% less energy than any other incandescent bulbs resulting in the reduction of monthly energy bills. In addition to lighting, option for BLDC fans at discounted rates is available. BLDC motors do not have brushes so they are more reliable, high life expectancy and energy savings as compared to conventional ceiling fans. With the added convenience of remote control, BLDC fan is a financially and environmentally smart choice for customers as it consumes half electrical load as compared to ordinary fans.

➤ Discount based AC Scheme for Customers:

Tata Power-DDL in association with Voltas is providing a discount-based scheme with or without Replacement of Old AC for all the customers.

➤ Home Automation:

Tata Power-DDL is offering an IoT based solution which allows to operate, schedule, monitor appliances like lighting, fans, ACs, washing machines, geysers, TVs, refrigerators, etc. with phone or with voice control via Google assistant or Alexa.

➤ Home Automation (Sensors & Sensor Lights):

Tata Power-DDL is offering Motion Sensors: With Motion sensors, lights and appliances can be switched on during presence of a person in the area. In absence of motion, automatically turn off the lights.

Sensor Lights: When motion is detected, sensor lights automatically illuminate at full brightness. In the absence of motion automatically dim the area lights to 20%.

➤ **Air Purifier Scheme:**

Tata Power-DDL in association with Voltas has initiated the Air Purifiers scheme at special discounted rates. The Air Purifiers are powered with 6-stage filtration process and removes up to 99.90% airborne pollutants, eliminates impurities with ease.

➤ **Washing Machine Scheme:**

Tata Power-DDL has launched a 5 star rated washing machine scheme at special discounted rates in collaboration with Voltas-Beko.

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 losses 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. Energy Audit Cell as per BEE Regulation.
2. GIS Based mapping for all feeder monitoring.
3. Substation wise dashboard for all substation monitoring
4. Division dashboard for monitoring all division data.
5. Critical Parameters dashboard for KPI.
6. Customer cares help line number.

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 a Tata Power DDL 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. 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 empaneled 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 (In Years)/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		6 Years
5	Mr. Pankaj Chauhan	Team Member		8 Years

c) Registration No.

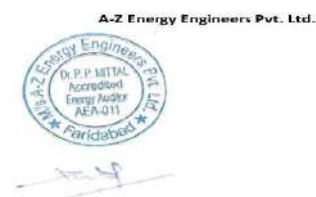
EmAEA 0024

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 Tata Power-DDL, Delhi (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 TATA Power Delhi Distribution Ltd., New Delhi & A-Z Energy Engineers Pvt. Ltd., New Delhi

TATA Power Delhi Distribution Ltd

AZ Energy Engineers Pvt. Ltd.

The Audit team of A-Z Energy Engineers Pvt. Ltd., New Delhi visited the Head office of Tata Power-DDL in month of May, June & July 2023. The necessary works related to annual energy audit was also carried out at Head / site offices of Tata Power –DDL, in reference to PO.NO 4500018016 dated 26.03.2023 of Tata Power-DDL. The Annual Energy Audit was conducted as per the provisions stipulated under BEE (Manner and Intervals for conduct of Energy Audit in electricity distribution Companies) Regulation 2021 and its amendment.

Following are the key observations during audit.

- Filled in Proforma for FY 2022-23 was filled with Tata Power Delhi, & Audit team.
- Tata Power has provided the following documents for Purchase Energy, input/Billed energy. i.e. GIS software, Fact sheet, DERC True up & Petition Filled.
- Tata Power-DDL has provided details for action plan to reduce losses.
- Verified T&D losses, AT&C losses & Collection Efficiency is 6.36%, 6.37% & 100% respectively based on the filled in proforma and verified source documents.

S.No	Data Required for Annual Energy Audit	Status
1	Complete filled in Proforma for the year 2022-2023 (Annually)	Provided
2	Feeder wise input ,Billed Energy,T&D losses	Provided
3	Action plan to reduce the T&D and AT&C losses	Provided The various schemes
4	Assets details matched with the proforma infrastructure sheets	Provided

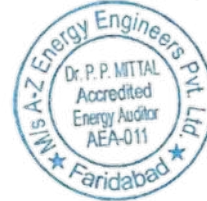
S.No	Data Required for Annual Energy Audit	Status
5	Verified T&D and AT&C losses of previous year	provided
6	Subsidy category Wise (BEE Guideline proforma)	Provided
7	DT Wise Losses	Provided
8	Feeder wise Losses	Provided



Tata Power Delhi

HARIOM SHARMA
E. Code : 90231
AGM- Energy Audit Group
Tata Power Delhi Distribution Limited

A-Z Energy Engineers Pvt. Ltd.



Annexure III - Check List prepared by auditing Firm

An annual energy audit checklist is used to assess the energy efficiency of Tata Power DDL 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 45: Infrastructure details

Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
Number of circles	5	5		
Number of divisions	12	12		
Number of sub-divisions	37	37		
Number of feeders	1287	1287		
Number of DTs	8157	8157		
Number of consumers	1959098	1959098		

Table 46: Metering details

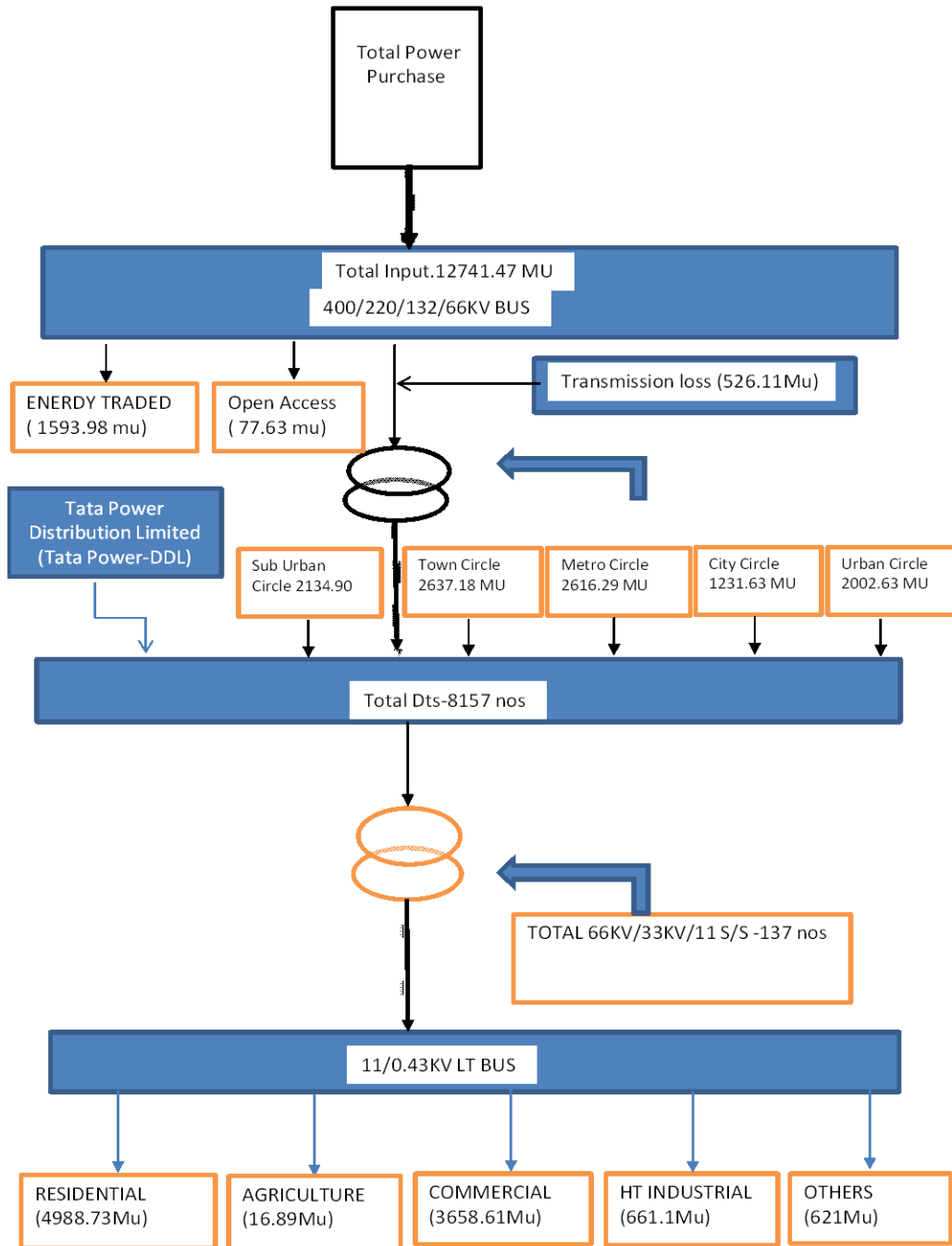
Table 44: Metering details

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventional metered consumers	0	0	0	1607524
Number of consumers with 'smart' meters	0	0	0	315336
Number of consumers with 'smart prepaid' meters	0	0	0	3468
Number of consumers with 'AMR' meters	5	2	1005	27448
Number of consumers with 'non-smart prepaid' Meters	0	0	0	4310
Number of unmetered consumers	0	0	0	0
Number of total consumers	5	2	1005	1958086
Number of conventionally metered Distribution Transformers	0	0	0	203
Number of DTs with communicable meters	0	0	0	4342
Number of unmetered DTs	0	0	0	441
Number of total Transformers	0	0	0	4986
Number of metered feeders	137	111	1286	16929
Number of feeders with communicable meters	137	111	1286	16929
Number of unmetered feeders	0	0	0	0
Number of total feeders	137	111	1286	16929
Line length(ctkm)	1893.2			
Length of Aerial Bunched Cables	5729.9			
Length of Underground Cables	6238			

Annexure VI - Electrical Distribution System

ENERGY FLOW DIAGRAM

FY 2022-23



Annexure VII - Power Purchase Details**a) Input Purchase Power generating station for FY 2022-23**

Source wise/generating station wise power purchase, contracted capacity, RPO obligation met by the DISCOM, etc.

S. No.	Name of Generation Station	Generation Capacity (In MW)	Type of Station Generation	Type of Contract	Type of Grid
1	NTPC Aravali Jhajjar	613	Coal	25 Years	Inter State
2	NTPC Dadri NCTPS(Th.) Stage II	9	Coal	25 Years	Inter State
3	NTPC Kahalgaon II	48	Coal	25 Years	Inter State
4	NTPC Singrauli STPS	46	Coal	30 Years	Inter State
5	NTPC Rihand STPS-II	39	Coal	25 Years	Inter State
6	NTPC Rihand STPS-I	31	Coal	28 Years	Inter State
7	NTPC Dadri GPS	28	Gas	25 Years	Inter State
8	NTPC Auriya GPS	22	Gas	35 Years	Inter State
9	NTPC Kahalgaon I	16	Coal	Till change of allocation by MoP in lieu of Tala	Inter State
10	NTPC ANTA GPS	14	Gas	25 Years	Inter State
11	NTPC Unchahaar-II TPS	14	Coal	25 Years	Inter State
12	NTPC Unchahaar-III TPS	9	Coal	25 Years	Inter State
13	NTPC Unchahaar-I TPS	7	Coal	27 Years	Inter State
14	NTPC Farakka	7	Coal	Till change of allocation by MoP in lieu of Tala	Inter State
15	NTPC Singrauli Small Hydro	2	RE	35 Years	Inter State
16	NHPC Dulhasti	15	Hydro	35 Years	Inter State
17	NHPC Parbati III	20	Hydro	40 Years	Inter State
18	NHPC Bairasiul	6	Hydro	25 Years	Inter State
19	NHPC Tanakpur	3	Hydro	35 Years	Inter State
20	NHPC Chamera -I	13	Hydro	35 Years	Inter State
21	NHPC Chamera-II	12	Hydro	35 Years	Inter State
22	NHPC Chamera-III	9	Hydro	35 Years	Inter State
23	NHPC URI-I	16	Hydro	35 Years	Inter State
24	NHPC Uri-II	10	Hydro	40 Years	Inter State
25	NHPC Dhauliganga	11	Hydro	35 Years	Inter State
26	NHPC Sewa II	5	Hydro	35 Years	Inter State
27	Narora APS	14	Nuclear	15 Years	Inter State
28	RAPP 5&6	17	Nuclear	15 Years	Inter State
29	CLP Jhajjar	132	Coal	25 Years	Inter State
30	Maithon Power Limited	300	Coal	30 Years	Inter State
31	SECI Solar (Renewable)	20	RE	25 Years	Inter State
32	Tala HEP	9	Hydro	As per MoP/NRPC order	Inter State
33	CTPS 7	92	Coal	25 Years	Inter State
34	CTPS 8		Coal	25 Years	Inter State
35	MTPS 6	31	Coal	25 Years	Inter State

S. No.	Name of Generation Station	Generation Capacity (In MW)	Type of Station Generation	Type of Contract	Type of Grid
36	Sasan	27 MW to 136 MW	Coal	25 Years	Inter State
37	Nathpa Jhakri HPS	44	Hydro	35 Years	Inter State
38	Tehri HPP	19	Hydro	35 Years	Inter State
39	Koteshwar HEP	12	Hydro	35 Years	Inter State
40	Pragati- I	64	Gas	25 Years	Intra State
41	Pragati III	298	Gas	25 Years	Intra State
42	IPGCL GT	27	Gas	10 Years	Intra State
43	Delhi Municipal Solid Waste Solutions Ltd. (Bawana) (Renewable)	7	RE	20 Years	Intra State
44	Nanti Hydro Power Pvt. Ltd. (Renewable)	14	RE	20 Years	Inter State
45	Suryakanta Hydro energies Pvt. Ltd. (Renewable)	14	RE	20 Years	Inter State
46	Timarpur Okhla Waste management co. Ltd. (Renewable)	6	RE	20 Years	Intra State
47	Sun Edison	180	RE	20 Years	Inter State
48	Taranda	13	RE	20 Years	Inter State
49	SECI WIND	50	RE	25 Years	Inter State
50	SECI 200 MW (SBSR)*	100	RE	25 Years	Inter State
51	Tekhhand Waste to Electricity Project Ltd	9	RE	25 Years	Intra State
52	Cosmos Hydro	20	RE	20 Years	Inter State

Remarks:-

1. *SBSR 200 MW: - Out of total allocation of 200 MW only 100 MW has been commissioned till Dec 2022
2. ** Contract period beyond useful life may depend upon agreement/Regulatory orders.
3. NTPC >25 years few stations under litigation before various forums.

b) Input Purchase Power Embedded generating station for FY 2022-23

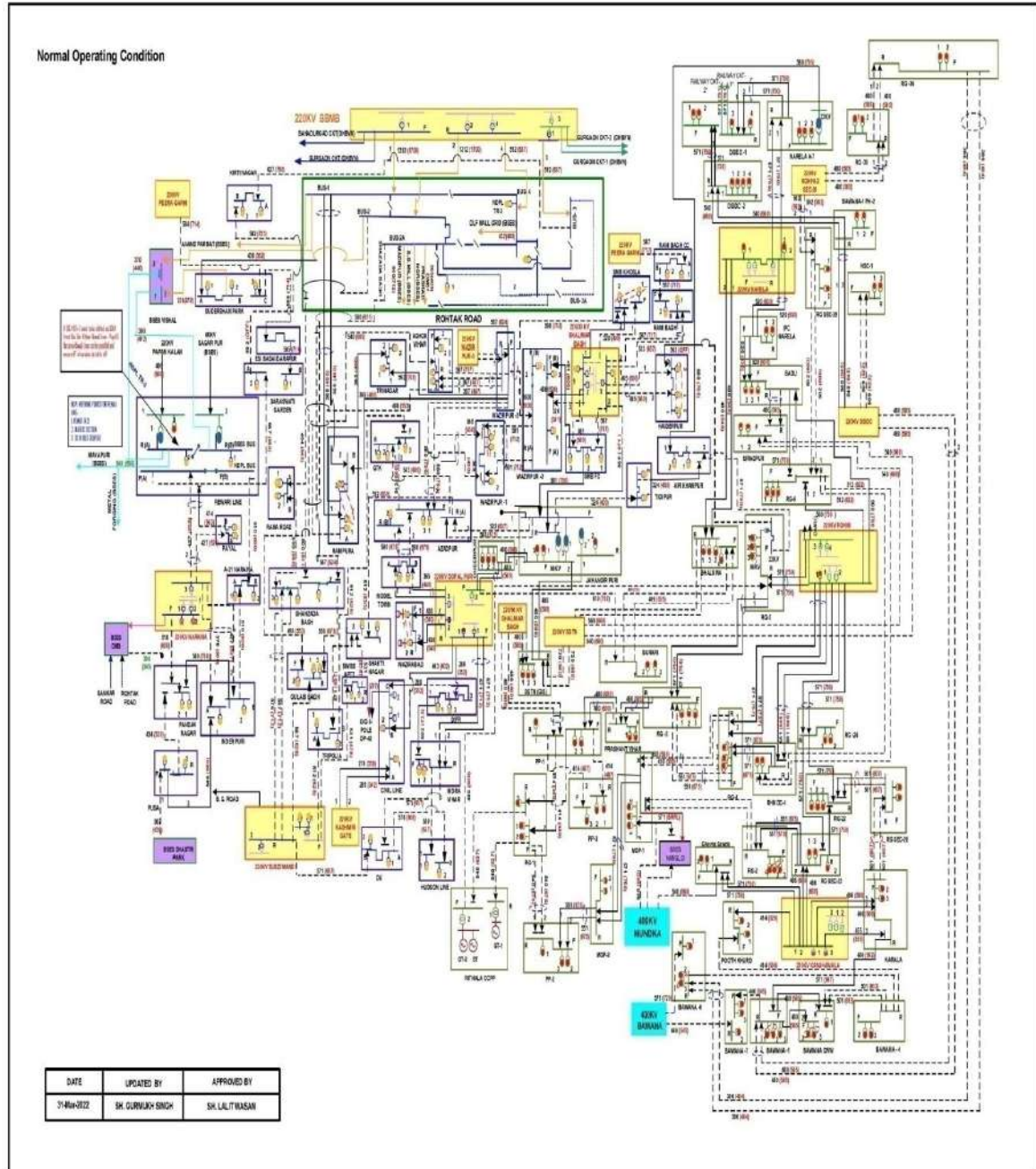
S. No	Name of Generation Station	Generation Capacity (In MW)	Type of Station	Type of Contract	Type of Grid	Voltage Level (KVA)	Received at Circle (In MU)	Received at Division Level (In MU)	Remarks (If any)
1	1MW KPM	1	Renewable	Captive Generation	On-Grid System	11 kV	1.031749	1.031749	Town
2	RG-5 Grid	0.225	Renewable	Captive Generation	On-Grid System	415 V	0.225895	0.225895	Urban
3	Narela DSIIDC-2 Grid	0.06	Renewable	Captive Generation	On-Grid System	415 V	0.025038	0.025038	Sub-urban

S. No	Name of Generation Station	Generation Capacity (In MW)	Type of Station	Type of Contract	Type of Grid	Voltage Level (KVA)	Received at Circle (In MU)	Received at Division Level (In MU)	Remarks (If any)
4	RG-23 Grid	0.055	Renewable	Captive Generation	On-Grid System	415 V	0.047521	0.047521	Urban
5	Pooth-khurd Grid	0.054	Renewable	Captive Generation	On-Grid System	415 V	0.052105	0.052105	Sub-urban
6	RG-22 Grid	0.05	Renewable	Captive Generation	On-Grid System	415 V	0.044663	0.044663	Urban
7	BCWW Grid	0.045	Renewable	Captive Generation	On-Grid System	415 V	0	0	Sub-urban
8	NRL A-7 Grid	0.043	Renewable	Captive Generation	On-Grid System	415 V	0.034833	0.034833	Sub-urban
9	Cennet	0.025	Renewable	Captive Generation	On-Grid System	415 V	0.020945	0.020945	Metro
10	GTK Grid	0.025	Renewable	Captive Generation	On-Grid System	415 V	0.032489	0.032489	Town
11	RG-2 Grid	0.0245	Renewable	Captive Generation	On-Grid System	415 V	0.026201	0.026201	Urban
12	RG-24 Grid	0.024	Renewable	Captive Generation	On-Grid System	415 V	0.027376	0.027376	Urban
13	CENPEID	0.01485	Renewable	Captive Generation	On-Grid System	415 V	0.006867	0.006867	Urban
14	Corporate Office	0.00396	Renewable	Captive Generation	On-Grid System	415 V	0.003841	0.003841	Town

Annexure VIII - Single Line Diagram (SLD)

The SLD of the DISCOM is as shown below:

Figure 13: Single Line Diagram (SLD) of Tata Power DDL



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 47: Category of service details

Table 45: Category of service details

Type of Consumers	Category of Consumers (EHT/HT/LT/Others)	Voltage Level	No of Consumers	Total Consumption (InMU)
Domestic			1670344	4988.73
Commercial			261279	1751.39
Water Supply			1462	268.44
Public Lighting			4995	123.77
HT Industrial			313	270.27
Industrial (Small)			14196	1906.92
HT Commercial			501	390.98
Agricultural			4505	16.89
EV			1145	44.39
Others-3 (if any , specify in remarks)			358	184.54
TOTAL			1959098	9946.33

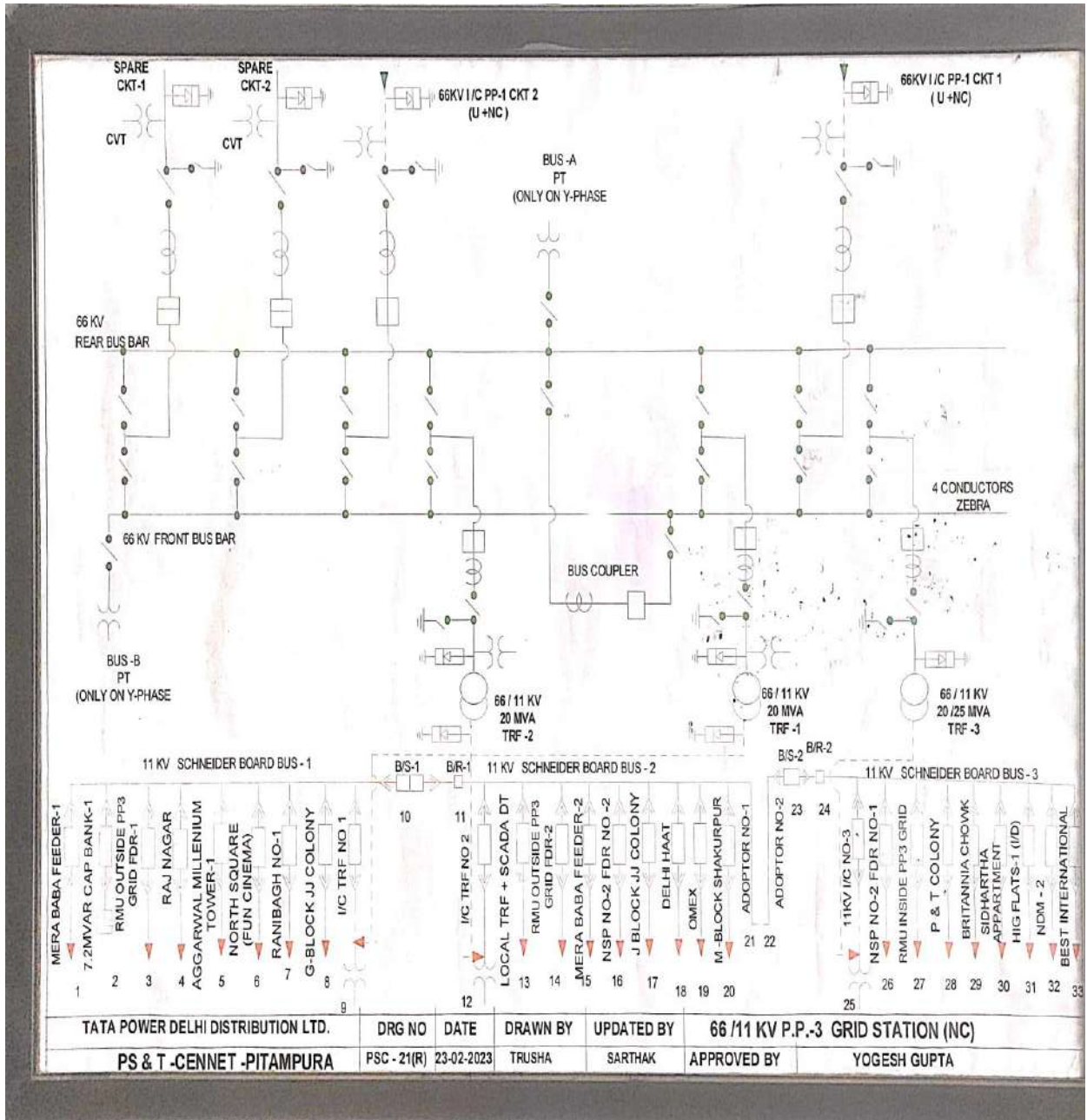
Annexure X - Field Verification data and reports

The field inspection details are shown in the below table:

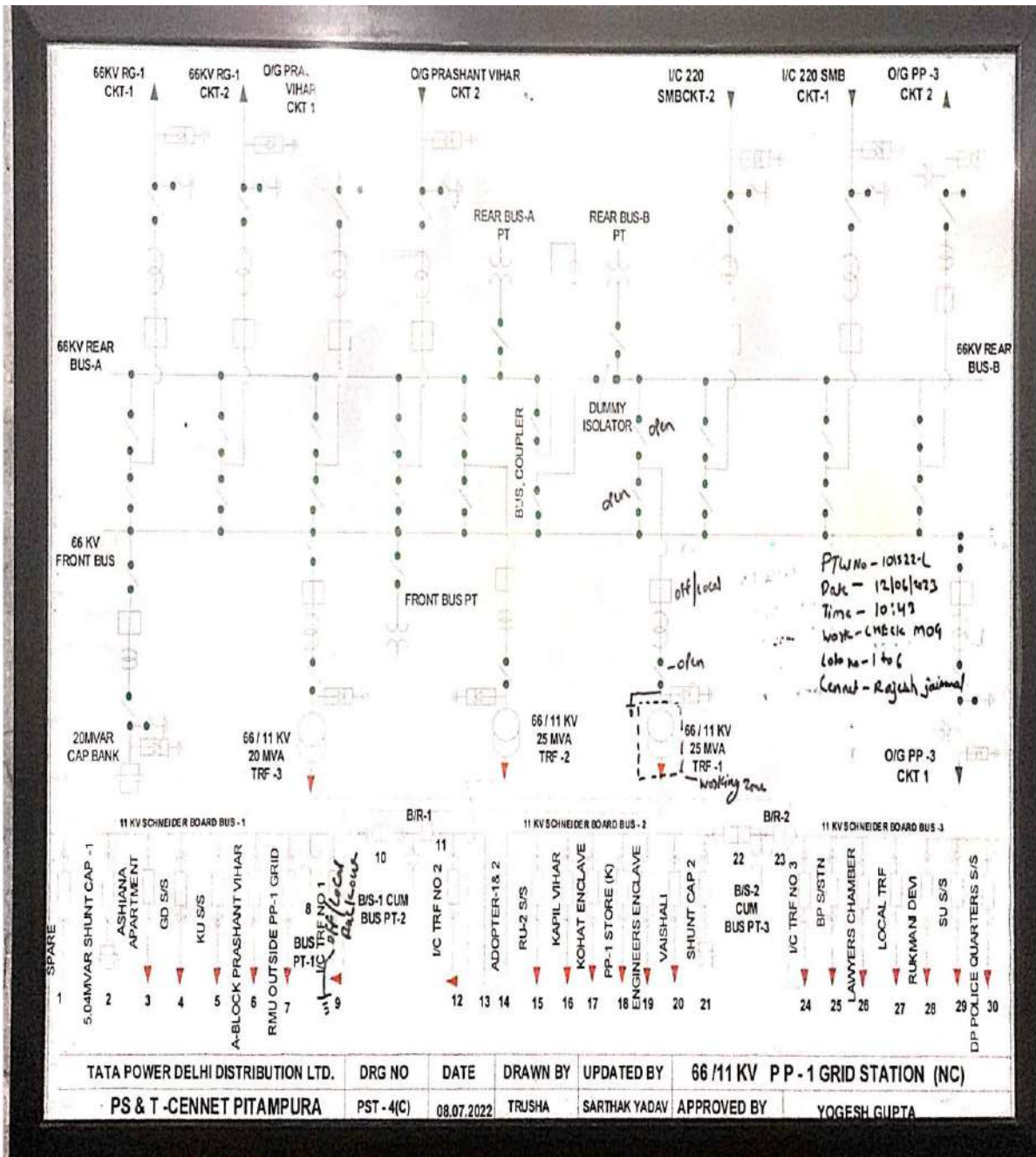
Table 48: Field Inspection details ..







TATA POWER DELHI DISTRIBUTION LTD.	DRG NO	DATE	DRAWN BY	UPDATED BY	66 /11 KV P.P.-3 GRID STATION (NC)	
PS & T -CENNET -PITAMPURA	PSC - 21(R)	23-02-2023	TRUSHA	SARTHAK	APPROVED BY	YOGESH GUPTA



TATA POWER DELHI DISTRIBUTION LTD.	DRG NO	DATE	DRAWN BY	UPDATED BY	66/11 KV PP-1 GRID STATION (NC)
PS & T-CENNET PITAMPURA	PST-4(C)	08.07.2022	TRISHA	SARTHAK YADAV	APPROVED BY YOGESH GUPTA



Annexure XI - List of documents verified with each parameter

The documents verified are listed in the below table:

Table 49: 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	NA	NA
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	Data Attached in BEE Guideline proforma
9	High Loss area T&D & AT&C action plan to reduce losses	Provided	Data Attached
10	Power Map	Provided	Data Attached
11	Current status of Metering status at Various Voltage level of Discom	Functional & Non Functional meter details provided	100 % metered (operational)
12	Status of default meter (non-functional meters)	Provided	Data Attached

Annexure XII - Brief Description of Unit

Tata Power Delhi Distribution Limited [Tata Power-DDL] is a joint venture between Tata Power and the Government of NCT of Delhi with the majority stake being held by Tata Power Company (51%).

Tata Power-DDL is acknowledged for its consumer-friendly practices. Since privatization, the Aggregate Technical & Commercial (AT&C) losses in Tata Power-DDL areas have shown a record decline.

To ensure reliable power supply and to provide best in class service to its consumers, Tata Power-DDL has implemented several world-class technologies such as Advance Distribution Management system or ADMS which is designed to replace the conventional SCADA-DMS-OMS system with features like real-time integration of Smart Meter Data / Distributed Generation integration and single data model from GIS , Integrated Geographical Information System (GIS) for instant services, Advanced Metering Infrastructure (AMI), Automated Demand Response (ADR), Smart Street Light Management system, Field Force Automation, Upgraded Network, Integrated Toll Free Helpline No. 19124, etc.

Tata Power-DDL is the first Indian utility to be a member of Global Intelligent Utility Network Coalition (GIUNC) which is a coalition of 14 power utilities worldwide and is working towards accelerating the development of common standards, technology solutions and processes for intelligent networks.

Tata Power-DDL provides various facilities and services to its consumers for their ease and convenience such as 24X7 Integrated Helpline, Mobile Application for both iOS and Android users, bilingual website, Multiple Payment Avenue, End to End online services for New Connection, etc.

Tata Power-DDL's contribution towards improving the ease of getting electricity connection through process simplification improving India's ranking twice, from 138 in 2015 to 22 in 2019.

TATA Power-DDL has also added solar generation as a part of its sustainable initiatives since 2008, and has installed fifteen (15) Solar Plants in its Licensed Area with a total generation capacity is 1.8 MW. It has a total of 1420 Rooftop solar plants under net metering with a cumulative capacity of 43MWp. The company is now working on setting up a Smart Grid with the integration of Roof Top Solar, Energy Storage, E-charging of Electric Vehicles, Home Automation etc. in its network.

Tata Power-DDL's change management experience, distributed leadership system, adoption of latest technology; robust competence development process and innovative & open work culture are the key strategic boosters which helped in building and sustaining competitive advantage in the changing business scenario. A journey which began a decade ago for empowering the consumers in Delhi now holds the potential to transform the distribution sector in India and similarly help utilities across the globe. Tata Power-DDL has a presence in India in nearly 20+ States and working with 30+ Discoms including Goa, Haryana, Uttar Pradesh, Chhattisgarh etc. as well as in International cities such as Benin, Eko, Kaduna, Kano etc.

Tata Power-DDL is focused and committed to the road ahead and is exploring new opportunities to replicate its experience of distribution reforms both in India and abroad. It is leveraging its unique learning and skill sets solely and in collaboration with leading utilities and

technology providers like GE, IBM, Enel, Omron, 3M, Panasonic, AES, Mitsubishi etc. in the areas of communications & smart grid technology, change management, consumer service delivery and business process re-engineering. Tata Power-DDL has also collaborated with leading international and national Institutions like Harvard, MIT, Ryerson University, IIT Delhi, Punjab Engineering College, Delhi University, Netaji Subhas Institute of Technology etc. to carry out research activities in energy space.

World Class Technologies , Tata Power DDL	
Advance Distribution Management System (ADMS)	Advance Distribution Management System (ADMS) is a single integrated system which will facilitate advanced monitoring, analysis, as well as control and planning, thereby enabling Tata Power-DDL to enhance the reliability, safety and efficiency of the power for the consumers. This system has advanced features of reporting outages and intimating to customers upfront. This system facilitates system controller as well as maintenance team for faster restoration of supply.
Geographical information System (GIS)	Geographical Information System (GIS) is a foundational technology and single source to have repository of network, asset and consumer indexing for Tata Power-DDL. The data of this system gets integrated with ADMS, FFA, ERP, AMI, etc. for successful functioning of respective systems. This system enables delivering of results in terms of reliable & quality power along with advanced services and timely information to the consumers.
Smart Meter	Smart Meters are basic building blocks of Smart Grid. This technology encompasses Communication System (RF in Tata Power-DDL's case) and Data Handling Technologies (Meter Data Management System). Tata Power-DDL is implementing Smart Metering Technology (Advanced Metering Infrastructure-AMI) to bring operation efficiency in different IT and OT domains. This technology will bring transparency to consumers in terms of their consumption per month and monitoring of other critical parameters like MDI and PF on an instant basis. For Tata Power-DDL, it enables easy detection of pilferage and loss reduction. This last mile link will complete Smart Grid implementation by Tata Power-DDL.

World Class Technologies , Tata Power DDL	
Smart Street Light Management system	<p>Tata Power-DDL jointly is working on a project for achieving a reduction in the demand of street lighting which coincides with peak load, thereby reducing the overall peak demand, improving the lux levels, improving the power factor and checking the carbon foot print as a responsibility to the society. This will translate into considerable saving to the exchequers. This system is entirely managed through a Smart Centralized Control & Monitoring System which can identify partially or completely affected streetlight circuits on a real-time basis and the type/nature of fault, thereby alerting the maintenance team without any requirement of consumer complaints for such purpose. This will enhance safety & security of general public. It can also detect pilferage from street light circuits and generate alerts.</p>
Field Force Automation	<p>Customer service through mobile workforce is the key to exceed the expectations of the consumer. Field Force Automation (FFA) is a system which optimizes the various tasks in hand and schedules & dispatches the nearest Crew to provide faster service to the consumers. This system not only enhances the service level but also completely tracks the allocation of workforce.</p>

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 50: 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

General Information			
1	Name of the DISCOM	TATA POWER DELHI DISTRIBUTION LIMITED	
2	i) Year of Establishment	2002-03	
	ii) Government/Public/Private	Joint venture	
3	DISCOM's Contact details & Address		
i	City/Town/Village	New Delhi	
ii	District	Delhi	
iii	State	Delhi	Pin 110009
iv	Telephone	011-66112202	Fax 011-27468042
4	Registered Office		
i	Company's Chief Executive Name	Ganesh Srinivasan	
ii	Designation	CEO	
iii	Address	NDPL House, Hudson Lines, Kingsway Camp, Delhi-09	
iv	City/Town/Village	Delhi	P.O. GTB Nagar
v	District		
vi	State	Delhi	Pin 110009
vii	Telephone	011-66112202	Fax 011-27468042
5	Nodal Officer Details*		
i	Nodal Officer Name (Designated at DISCOM's)	Mr. HC Sharma	
ii	Designation	General Manager	
iii	Address	NDPL House, Hudson Lines, Kingsway Camp, Delhi-09	
iv	City/Town/Village	Delhi	P.O. GTB Nagar
v	District		
vi	State	Delhi	Pin 110009
vii	Telephone	91-1166050595	Fax
6	Energy Manager Details*		
i	Name	Md. Shadab Ahmad	
ii	Designation	Sr. Manager	Whether EA or EM EM
iii	EA/EM Registration No.	EM-5062	
iv	Telephone	91-1166050613	Fax
v	Mobile	9717991957	E-mail ID mdshadab.ahmad@tatapower-cdl.com
7	Period of Information		
	Year of (FY) information including Date and Month (Start & End)	1st Apr 2022 - 31st Mar 2023	

Performance Summary of Electricity Distribution Companies

1	Period of Information Year of (FY) information including Date and Month (Start & End)	1st Apr 2022 - 31st Mar 2023	
2	Technical Details		
(a)	Energy Input Details		
(i)	Input Energy Purchase (From Generation Source)	Million kwh	12741.47
(ii)	Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kwh	10622.62
(iii)	Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kwh	9946.33
(b)	Transmission and Distribution (T&D) loss Details	Million kwh	676.29
		%	6.37%
	Collection Efficiency	%	100%
(c)	Aggregate Technical & Commercial Loss	%	6%

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

H.S. SHARMA

Name of Authorised Signatory

Name of the DISCOM:

Full Address:-

Signature:-

Name of Energy Manager*:

Md. Shadab Ahmad
Md Shadab Ahmad

Registration Number:

EM 5062

Seal

Hariom Sharma

HARIOM SHARMA
E. Code : 90231
AGM- Energy Audit Group
Tata Power Delhi Distribution Limited

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	5	FY 22-23		Organizational
ii	Number of divisions	12	FY 22-23		Organizational Structure
iii	Number of sub-divisions	37	FY 22-23		Organizational Structure
iv	Number of feeders	1287	FY 22-23		GIS database
v	Number of DTs	8157	FY 22-23		GIS database
vi	Number of consumers	1959098	FY 22-23		SAP System
2	Parameters	66kV and above	33kV	11/22kV	LT
a. i.	Number of conventional metered consumers	0	0	0	1607524
ii	Number of consumers with 'smart' meters	0	0	0	315336
iii	Number of consumers with 'smart prepaid' meters	0	0	0	3468
iv	Number of consumers with 'AMR' meters	5	2	1005	27448
v	Number of consumers with 'non-smart prepaid' meters	0	0	0	4310
vi	Number of unmetered consumers	0	0	0	0
vii	Number of total consumers	5	2	1005	1958086
b.i.	Number of conventionally metered Distribution Transformers	0	0	0	203
ii	Number of DTs with communicable meters	0	0	0	4342
iii	Number of unmetered DTs	0	0	0	441
iv	Number of total Transformers	0	0	0	4986
c.i.	Number of metered feeders	137	111	1286	16929
ii	Number of feeders with communicable meters	137	111	1286	16929
iii	Number of unmetered feeders	0	0	0	0
iv	Number of total feeders	137	111	1286	16929
d.	Line length (ct km)		1893.2		
e.	Length of Aerial Bunched Cables		5729.9		
f.	Length of Underground Cables		6238		

Details of Division Wise Losses (See note below)**

Division Wise Losses																												
S.No	Name of circle	Circle code	Name of Division	Consumer profile															Energy parameters									
				Period From 1st Apr 2022 - 31st Mar 2023															Billed energy (MU)				Losses		Commercial Parameter			AT & C loss (%)
				Consumer category	No of connection metered (Nos)	No of connection Un-metered (Nos)	Total number of connections (Nos)	% of number of connections	Connected Load metered (MW)	Connected Load Un-metered (MW)	Total Connected Load (MW)	% of connected load	Input energy (MU)	Metered energy	Unmetered/assessment energy	Total energy	% of energy consumption	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency						
																							T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	
1	Badli			Residential	108912	0	108912	83%	176.16	0	176.16	42%	258.17	0	258.17	40%	697.7706	56.9006	8%	152.63	151.99	99.58%						
				Agricultural	483	0	483	0%	3.86	0	3.86	1%	2.39	0	2.39	0%				1.39	1.46	105.04%						
				Commercial/Industrial-LT	21248	0	21248	16%	209.95	0	209.95	50%	333.84	0	333.84	52%				485.68	486.29	100.13%						
				Commercial/Industrial-HT	49	0	49	0%	14.11	0	14.11	3%	23.59	0	23.59	4%				33.32	33.5	100.54%						
				Others	590	0	590	0%	19.31	0	19.31	5%	22.88	0	22.88	4%				21.88	24.35	111.29%						
				Sub-total	131282	0	131282	100%	423.39	0	423.39	100%	697.7706	640.87	0	640.87				100%	56.9006	8%	694.9	697.59	100.39%	8%		
2	Bawana			Residential	70362	0	70362	74%	111.82	0	111.82	16%	159.93	0	159.93	12%	1457.226	134.0763	9%	92.2	91.86	99.63%						
				Agricultural	1709	0	1709	2%	10.22	0	10.22	1%	3.98	0	3.98	0%				3.15	3.1	98.41%						
				Commercial/Industrial-LT	22086	0	22086	23%	577.84	0	577.84	80%	1111.92	0	1111.92	84%				1538.95	1544.65	100.37%						
				Commercial/Industrial-HT	35	0	35	0%	8.8	0	8.8	1%	17.16	0	17.16	1%				23.12	23.24	100.52%						
				Others	381	0	381	0%	9.26	0	9.26	1%	30.16	0	30.16	2%				31.39	31.48	100.29%						
				Sub-total	94573	0	94573	100%	717.94	0	717.94	100%	1457.226	1323.15	0	1323.15				100%	134.0763	9%	1688.81	1694.33	100.33%	9%		
3	Civil lines			Residential	112277	0	112277	82%	298.37	0	298.37	56%	423.94	0	423.94	48%	903.6627	13.75272	2%	303.57	303.45	99.96%						
				Agricultural	0	0	0	0%	0	0	0	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	24116	0	24116	18%	104.89	0	104.89	20%	126.93	0	126.93	14%				194.38	193.25	99.42%						
				Commercial/Industrial-HT	71	0	71	0%	54.94	0	54.94	10%	95.42	0	95.42	11%				137.37	137.31	99.96%						
				Others	854	0	854	1%	74.56	0	74.56	14%	243.62	0	243.62	27%				236.79	229.7	97.01%						
				Sub-total	137318	0	137318	100%	532.76	0	532.76	100%	903.6627	889.91	0	889.91				100%	13.75272	2%	872.11	863.71	99.04%	2%		
4	eshavpuran			Residential	122116	0	122116	81%	282.26	0	282.26	50%	393.96	0	393.96	47%	886.1833	48.17328	5%	260.97	260.91	99.98%						
				Agricultural	0	0	0	0%	0	0	0	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	27357	0	27357	18%	238.36	0	238.36	42%	356.82	0	356.82	43%				515.04	515.27	100.04%						
				Commercial/Industrial-HT	107	0	107	0%	34.64	0	34.64	6%	72.38	0	72.38	9%				93.38	93.51	100.14%						
				Others	556	0	556	0%	6.76	0	6.76	1%	14.85	0	14.85	2%				16.33	7.47	45.74%						
				Sub-total	150136	0	150136	100%	562.02	0	562.02	100%	886.1833	838.01	0	838.01				100%	48.17328	5%	885.72	877.16	99.03%	6%		
5	Kirari			Residential	138424	0	138424	89%	202	0	202	77%	307.1	0	307.1	80%	437.492	52.932	12%	162.73	161.87	99.47%						
				Agricultural	66	0	66	0%	0.36	0	0.36	0%	0.18	0	0.18	0%				0.11	0.11	100.00%						
				Commercial/Industrial-LT	16216	0	16216	10%	51	0	51	19%	61.34	0	61.34	16%				92.8	93.22	100.45%						
				Commercial/Industrial-HT	7	0	7	0%	2.94	0	2.94	1%	2.21	0	2.21	1%				3.82	3.89	101.83%						
				Others	406	0	406	0%	6.68	0	6.68	3%	13.73	0	13.73	4%				19.81	21.03	106.16%						
				Sub-total	155119	0	155119	100%	262.98	0	262.98	100%	437.492	384.56	0	384.56				100%	52.932	12%	479.27	280.12	100.30%	12%		
6	Mangolpur			Residential	191167	0	191167	89%	314.07	0	314.07	73%	475.22	0	475.22	74%	698.7736	53.13358	8%	264.54	264.12	99.84%						
				Agricultural	0	0	0	0%	0	0	0	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	22786	0	22786	11%	100.34	0	100.34	23%	131.8	0	131.8	20%				192.64	194.09	100.75%						
				Commercial/Industrial-HT	23	0	23	0%	9.28	0	9.28	2%	22.29	0	22.29	3%				27.74	27.76	100.07%						
				Others	598	0	598	0%	6.72	0	6.72	2%	16.33	0	16.33	3%				19.38	20.47	105.62%						
				Sub-total	214574	0	214574	100%	430.41	0	430.41	100%	698.7736	645.64	0	645.64				100%	53.13358	8%	504.3	506.44	100.42%	7%		
7	Model town			Residential	148828	0	148828	87%	338.84	0	338.84	67%	483.97	0	483.97	67%	755.8697	37.87966	5%	325.39	324.87	99.84%						
				Agricultural	1	0	1	0%	0.01	0	0.01	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	21684	0	21684	13%	106	0	106	21%	129.35	0	129.35	18%				196.88	197.25	100.19%						
				Commercial/Industrial-HT	46	0	46	0%	13.3	0	13.3	3%	26.12	0	26.12	4%				37.62	37.42	99.47%						
				Others	765	0	765	0%	43.85	0	43.85	9%	78.55	0	78.55	11%				83.15	83.36	100.25%						
				Sub-total	171324	0	171324	100%	502	0	502	100%	755.8697	717.99	0	717.99				100%	37.87966	5%	643.04	642.9	99.98%	5%		
8	Moti nagar			Residential	118383	0	118383	81%	309.47	0	309.47	52%	417.96	0	417.96	52%	847.3294	43.51936	5%	288.4	290.1	100.59%						
				Agricultural	0	0	0	0%	0	0	0	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	27689	0	27689	19%	218.35	0	218.35	37%	280.28	0	280.28	35%				429.45	430.56	100.26%						
				Commercial/Industrial-HT	121	0	121	0%	56.12	0	56.12	9%	91.24	0	91.24	11%				131.36	130.79	99.57%						
				Others	710	0	710	0%	8.93	0	8.93	2%	14.33	0	14.33	2%				17.47	17.25	98.74%						
				Sub-total	146903	0	146903	100%	592.87	0	592.87	100%	847.3294	803.81	0	803.81				100%	43.51936	5%	866.68	868.7	100.23%	5%		
9	Narela			Residential	115983	0	115983	84%	185.43	0	185.43	30%	283.27	0	283.27	25%	1231.626	103.0058	8%	163.89	163	99.46%						
				Agricultural	2169	0	2169	2%	18.29	0	18.29	3%	9.88	0	9.88	1%				6.27	6.26	99.84%						
				Commercial/Industrial-LT	18820	0	18820	14%	357.64	0	357.64	58%	710.46	0	710.46	63%				963.98	964.79	100.08%						
				Commercial/Industrial-HT	138	0	138	0%	36.71	0	36.71	6%	97.37	0	97.37	9%				126.32	125.85	99.63%						
				Others	897	0	897	1%	15.71	0	15.71	3%	27.64	0	27.64	2%				34.38	35.31	102.71%						
				Sub-total	138007	0	138007	100%	613.78	0	613.78	100%	1231.626	1128.62	0	1128.62				100%	103.0058	8%	1294.84	1295.21	100.03%	8%		
10	Pitam pura			Residential	104349	0	104349	86%	358.77	0	358.77	70%	440.59	0	440.59	68%	677.6759	31.68586	5%	328.92	329.78	100.26%						
				Agricultural	0	0	0	0%	0	0	0	0%	0	0	0	0%				0	0	0.00%						
				Commercial/Industrial-LT	16964	0	16964	14%	108.66	0	108.66	21%	132.95	0	132.95	21%				201.27	201.71	100.22%						
				Commercial/Industrial-HT	76	0	76	0%	36.77	0	36.77	7%	60.46	0	60.46	9%				84.13	84.36	100.27%						
				Others	519	0	519	0%	5.98	0	5.98	1%	11.99	0	11.99	2%				12.64	12.46	98.58%						
				Sub-total	121908	0	121908	100%	510.18	0	510.18	100%	677.6759	645.99	0	645.99				100%	31.68586	5%	626.96	628.31	100.22%	4%		
11	Rohini			Residential	205877	0	205877	87%	546.73	0	546.73	71%	744.78	0	744.78	67%	1161.643	49.3426	4%	502.37	502.42	100.01%						
				Agricultural	0	0	0	0%	0																			

109			Residential	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Agricultural	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Commercial/Industrial-LT	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Commercial/Industrial-HT	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Others	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
Sub-total			0	0	0	100%	0	0	0	100%	0	0	0	100%	0	0%	0	0	0.00%	100%
110			Residential	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Agricultural	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Commercial/Industrial-LT	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Commercial/Industrial-HT	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
			Others	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0.00%		
Sub-total			0	0	0	100%	0	0	0	100%	0	0	0	100%	0	0%	0	0	0.00%	100%
76	Total	Residential	1670344	0	1670344	85%	3530.34	0	3530.34	55%	4988.73	0	4988.73	50%	3198.91	3197.17	99.95%			
		Agricultural	4505	0	4505	0%	33.24	0	33.24	1%	16.89	0	16.89	0%	11.12	11.13	100.09%			
		Commercial/Industrial-LT	275478	0	275478	14%	2305.06	0	2305.06	36%	3658.61	0	3658.61	37%	5232.4	5243.6	100.21%			
		Commercial/Industrial-HT	811	0	811	0%	344.53	0	344.53	5%	661.1	0	661.1	7%	901.96	902.88	100.10%			
		Others	7960	0	7960	0%	253.81	0	253.81	4%	621	0	621	6%	646.16	636.43	98.49%			
77	At company level	1959098	0	1959098	100%	6466.98	0	6466.98	100%	10622.62	9946.33	9946.33	100%	676.2894	6%	9990.55	9991.21	100.01%	6%	

** Note - It shall be mandatory to record the energy supplied separately for each category of consumers which is being provided a separate rate of subsidy in the tariff, by the state government, so that the subsidy due for the electricity distribution company is quarterly calculated by multiplying the energy supplied to each of such category of consumers by the applicable rate of subsidy notified by the state government.

Color code	Parameter
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	Please enter circle code
0	Please enter numeric value or 0
	Formula protected

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Authorised Signatory and Seal

Signature:-
Name of Energy Manager: Md Shadab Ahmad
Registration Number: EM 5062

Name of Authorised Signatory:

Name of the DISCOM:
Full Address:-

Seal


HARIOM SHARMA
E. Code : 90231
AGM- Energy Audit Group
Tata Power Delhi Distribution Limited

Details of Input Energy Sources

Period From.....To.....

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	NTPC Aravali Jhajjar	613	Coal	25 Years	Inter State			Transmission
2	Stage II	9	Coal	25 Years	Inter State			
3	NTPC Kahalgaon II	48.27498	Coal	25 Years	Inter State			
4	NTPC Singrauli STPS	46	Coal	30 Years	Inter State			
5	NTPC Rihand STPS-II	39	Coal	25 Years	Inter State			
6	NTPC Rihand STPS-I	31	Coal	28 Years	Inter State			
7	NTPC Dadri GPS	28	Gas	25 Years	Inter State			
8	NTPC Auriya GPS	22	Gas	35 Years	Inter State			
9	NTPC Kahalgaon I	15.6431184	Coal	MoP in lieu of Tala	Inter State			
10	NTPC ANTA GPS	14	Gas	25 Years	Inter State			
11	NTPC Unchahaar-II TPS	14	Coal	25 Years	Inter State			
12	NTPC Unchahaar-III TPS	9	Coal	25 Years	Inter State			
13	NTPC Unchahaar-I TPS	7	Coal	27 Years	Inter State			
14	NTPC Farakka	7	Coal	MoP in lieu of Tala	Inter State			
15	Hydro	2	RE	35 Years	Inter State			
16	NHPC Dulhasti	15	Hydro	35 Years	Inter State			
17	NHPC Parbati III	20	Hydro	40 Years	Inter State			
18	NHPC Bairasiul	6	Hydro	25 Years	Inter State			
19	NHPC Tanakpur	3.152	Hydro	35 Years	Inter State			
20	NHPC Chamera -I	13	Hydro	35 Years	Inter State			
21	NHPC Chamera-II	12	Hydro	35 Years	Inter State			
22	NHPC Chamera-III	9	Hydro	35 Years	Inter State			
23	NHPC URI-I	16	Hydro	35 Years	Inter State			
24	NHPC Uri-II	10	Hydro	40 Years	Inter State			
25	NHPC Dhauliganga	11	Hydro	35 Years	Inter State			
26	NHPC Sewa II	5	Hydro	35 Years	Inter State			

27	Narora APS	14	Nuclear	15 Years	Inter State			
28	RAPP 5&6	17	Nuclear	15 Years	Inter State			
29	CLP Jhajjar	132	Coal	25 Years	Inter State			
30	Maithon Power Limited	299.985	Coal	30 Years	Inter State			
31	SECI Solar (Renewable)	20	RE	25 Years	Inter State			
32	Tala HEP	9	Hydro	As per MoP/NRPC order	Inter State			
33	CTPS 7	92	Coal	25 Years	Inter State			
34	CTPS 8		Coal	25 Years	Inter State			
35	MTPS 6	31	Coal	25 Years	Inter State			
36	Sasan	MW	Coal	25 Years	Inter State			
37	Nathpa Jhakri HPS	44	Hydro	35 Years	Inter State			
38	Tehri HPP	19	Hydro	35 Years	Inter State			
39	Koteshwar HEP	12	Hydro	35 Years	Inter State			
40	Pragati- I	63.61	Gas	25 Years	Intra State			
41	Pragati III	298	Gas	25 Years	Intra State			
42	IPGCL GT	27	Gas	10 Years	Intra State			
43	Waste Solutions Ltd.	7	RE	20 Years	Intra State			
44	Ltd. (Renewable)	13.5	RE	20 Years	Inter State			
45	energies Pvt. Ltd.	14	RE	20 Years	Inter State			
46	management co. Ltd.	6	RE	20 Years	Intra State			
47	Sun Edison	180	RE	20 Years	Inter State			
48	Taranda	12.65	RE	20 Years	Inter State			
49	SECI WIND	50	RE	25 Years	Inter State			
50	SECI 200 MW (SBSR)*	100	RE	25 Years	Inter State			
51	Electricity Project Ltd	8.5	RE	25 Years	Intra State			
52	Cosmos Hydro	19.8	RE	20 Years	Inter State			

268	1304			INDERPURI GRID	21984489	INDERPURI GRID TO KV	City	AMR	2.1856833	2.078325		0.1073583
269	1304			INDERPURI GRID	21984499	INDERPURI GRID TO C	City	AMR	10.5339276	9.343144435		1.190783165
270	1302			INDERPURI GRID	21984509	INDERPURI GRID TO DP	City	AMR	2.96968545	2.55277902		0.41690643
271	1302			INDERPURI GRID	21984519	INDERPURI GRID TO N	City	AMR	10.12115295	9.77769783		0.34345512
272	1302			INDERPURI GRID	21984529	INDERPURI GRID TO M	City	AMR	6.845766986	4.5076		2.338166986
273	1304			INDERPURI GRID	21984549	INDERPURI GRID TO DS	City	AMR	5.877420978	5.975991248		-0.09857027
274	1304			INDERPURI GRID	21984559	INDERPURI GRID TO GE	City	AMR	7.501840828	7.069504		0.432336828
275	1304			INDERPURI GRID	21984569	INDERPURI GRID TO D	City	AMR	12.2710671	11.37623923		0.894827872
276	1302			INDERPURI GRID	21984679	INDERPURI GRID TO NE	City	AMR	15.1434018	14.59704444		0.546357365
277	1304			PUSA GRID	21984699	NASC FDR NO-1	City	AMR	0	0		0
278	1304			PUSA GRID	21984709	PUSA GRID TO PID	City	AMR	5.3333772	8.10212		-2.7687428
279	1304			PUSA GRID	21984729	PUSA GRID TO 72 QTRS	City	AMR	3.985387306	3.463442187		0.521945119
280	1304			PUSA GRID	21984739	PUSA GRID TO KVB MA	City	AMR	1.516390075	1.48205		0.034340075
281	1304			PUSA GRID	21984769	PUSA GRID TO NASC FC	City	AMR	4.745719114	4.396637		0.349082114
282	1304			PUSA GRID	21984779	PUSA GRID TO NCAP	City	AMR	6.002918125	5.764715582		0.238202543
283	1304			PUSA GRID	21984789	PUSA GRID TO TODAPU	City	AMR	5.109759	5.679992749		-0.570233749
284	1304			PUSA GRID	21984799	PUSA GRID TO IARI PUS	City	AMR	11.173731	10.86186296		0.311868043
285	1304			PUSA GRID	21984866	A.L.R.KHADEWALA	City	AMR	0	0		0
286	1304			PUSA GRID	21984876	PUSA GRID TO PHYTOT	City	AMR	4.1289324	4.051086		0.0778464
287	1304			PANDAV NAGAR GRID	21984926	PANDAV NAGAR GRID	City	AMR	6.993166093	6.88245179		0.110714303
288	1302			PANDAV NAGAR GRID	21984946	PANDAV NAGAR GRID	City	AMR	2.414822771	2.116987458		0.297835313
289	1304			PANDAV NAGAR GRID	21984956	PANDAV NAGAR GRID	City	AMR	5.701518049	5.385501435		0.316016614
290	1302			PANDAV NAGAR GRID	21984966	PANDAV NAGAR GRID	City	AMR	5.744951283	5.153297478		0.591653805
291	1302			PANDAV NAGAR GRID	21984976	PANDAV NAGAR GRID	City	AMR	5.177545916	4.071831324		1.105712792
292	1304			PANDAV NAGAR GRID	21984986	PANDAV NAGAR GRID	City	AMR	5.610334279	5.901067164		-0.290732885
293	1304			PANDAV NAGAR GRID	21984996	PANDAV NAGAR GRID	City	AMR	9.585042823	9.625005539		-0.039963716
294	1301			SB MILL GRID	21985026	51 RAMA ROAD	City	AMR	6.0179016	0		6.0179016
295	1301			SB MILL GRID	21985046	S.B. MILL GRID TO DELI	City	AMR	6.7244118	6.521441562		0.202970238
296	1301			SB MILL GRID	21985056	41 RAMA ROAD HVDS	City	AMR	3E-07	0		3E-07
297	1301			SB MILL GRID	21985106	S.B. MILL GRID TO TAMU	City	AMR	3.3810024	3.271666562		0.109325838
298	402			G.T.K. GRID	21985173	G.T.K. GRID TO A-26 GT	Town	AMR	12.9147041	12.72829002		0.18641408
299	402			G.T.K. GRID	21985183	G.T.K. GRID TO F.C.I.	Town	AMR	3.93610365	3.426631		0.50947265
300	416			G.T.K. GRID	21985203	G.T.K. GRID TO OLD SA	Town	AMR	7.95204045	7.307016937		0.645023513
301	402			G.T.K. GRID	21985213	G.T.K. GRID TO CHATTA	Town	AMR	6.35719275	6.534124		-0.17693125
302	402			G.T.K. GRID	21985223	G.T.K. GRID TO A-BLK G	Town	AMR	4.9838994	5.063115104		-0.079215704
303	402			G.T.K. GRID	21985233	G.T.K. GRID TO A-BLOC	Town	AMR	10.04806098	10.30459994		-0.256538962
304	509			G.T.K. GRID	21985283	G.T.K. GRID TO ESS-1A	Town	AMR	0	0		0
305	509			G.T.K. GRID	21985293	G.T.K. ROAD GRID TO B	Town	AMR	11.13574011	11.347731		-0.211990889
306	412			G.T.K. GRID	21985303	G.T.K. GRID TO POLICE	Town	AMR	7.02857475	7.215686686		-0.187111936
307	402			G.T.K. GRID	21985323	G.T.K. ROAD GRID TO M	Town	AMR	5.339436016	9.001453686		-3.66201767
308	509			G.T.K. GRID	21985333	G.T.K. GRID TO OLD BR	Town	AMR	8.48826045	8.376624144		0.111636306
309	402			G.T.K. GRID	21985343	G.T.K. GRID TO ARYA BH	Town	AMR	10.76510848	9.879804291		0.885304187
310	416			G.T.K. GRID	21985353	G.T.K. GRID TO C.C. CO	Town	AMR	9.638127922	10.1600326		-0.52190468
311	417			TRIPOLIA GRID	21985403	TRIPOLIA GRID TO SATN	Town	AMR	7.704173873	8.530026208		-0.825852334
312	416			TRIPOLIA GRID	21985413	TRIPOLIA GRID TO DVB	Town	AMR	10.71798185	7.588238643		3.129743207
313	417			TRIPOLIA GRID	21985463	RUB S/ST FDR-1	Town	AMR	1.0255302	0		1.0255302
314	417			TRIPOLIA GRID	21985473	TRIPOLIA GRID TO TRIP	Town	AMR	2.422270116	2.430120833		-0.007850717
315	416			TRIPOLIA GRID	21985483	TRIPOLIA GRID TO M.C.	Town	AMR	11.06313836	9.182121061		1.881017294
316	417			TRIPOLIA GRID	21985493	TRIPOLIA GRID TO ROO	Town	AMR	5.71607418	7.703788499		-1.987714318
317	402			TRIPOLIA GRID	21985513	TRIPOLIA GRID TO TELE	Town	AMR	1.146833567	1.42178		-0.274946433
318	417			TRIPOLIA GRID	21985523	TRIPOLIA GRID TO 26-H	Town	AMR	6.805578361	6.810702415		-0.005124054
319	416			TRIPOLIA GRID	21985533	TRIPOLIA GRID TO C.C.S	Town	AMR	10.27888666	9.572056997		0.706829662
320	418			HUDSON LINE GRID	21985600	SSPL	Town	AMR	0	0		0
321	416			HUDSON LINE GRID	21985620	HUDSON LINE GRID TO	Town	AMR	10.23571006	7.704647853		2.531062205
322	418			HUDSON LINE GRID	21985630	HUDSON LINE GRID TO	Town	AMR	10.559889	8.427797187		2.132109817
323	418			HUDSON LINE GRID	21985640	AIR MALL RD	Town	AMR	0.048792475	0		0.048782475
324	418			HUDSON LINE GRID	21985680	HUDSON LINE GRID TO	Town	AMR	2.027284203	2.448121		-0.420836797
325	402			HUDSON LINE GRID	21985690	HUDSON LINE GRID TO	Town	AMR	8.670148229	8.786770686		-0.116627457
326	416			HUDSON LINE GRID	21985700	HUDSON LINE GRID TO	Town	AMR	4.98106675	5.006093291		-0.025024541
327	416			HUDSON LINE GRID	21985710	HUDSON LINE GRID TO	Town	AMR	6.24892485	11.23751146		-4.988586608
328	418			HUDSON LINE GRID	21985720	HUDSON LINE GRID TO	Town	AMR	3.365279945	3.854697749		-0.489417804
329	413			INDRA VIHAR GRID	21985840	INDRA VIHAR GRID TO	Town	AMR	11.63417076	10.37317173		1.260999038
330	413			INDRA VIHAR GRID	21985850	INDRA VIHAR GRID TO	Town	AMR	13.3224861	10.3345246		2.987961498
331	413			INDRA VIHAR GRID	21985860	INDRA VIHAR GRID TO	Town	AMR	9.83324321	9.99554502		-0.16230181
332	418			INDRA VIHAR GRID	21985870	INDRA VIHAR GRID TO	Town	AMR	12.98602297	6.600908478		6.385114488
333	413			INDRA VIHAR GRID	21985880	INDRA VIHAR GRID TO	Town	AMR	13.23235043	12.01943896		1.212911468
334	413			INDRA VIHAR GRID	21985940	INDRA VIHAR GRID TO	Town	AMR	9.682020468	11.23060487		-1.548584405
335	413			INDRA VIHAR GRID	21985950	INDRA VIHAR GRID TO	Town	AMR	11.92574206	10.69995639		1.225785666
336	413			INDRA VIHAR GRID	21985960	INDRA VIHAR GRID TO	Town	AMR	0.52920735	0.5514		-0.02219265
337	413			INDRA VIHAR GRID	21985970	INDRA VIHAR GRID TO	Town	AMR	2.74233855	2.716503		0.02583555
338	418			INDRA VIHAR GRID	21985980	INDRA VIHAR GRID TO	Town	AMR	3.418961298	4.114030291		-0.695068993
339	411			CIVIL LINE GRID	21986110	CIVIL LINE GRID TO PRE	Town	AMR	8.616886433	7.132879291		1.484007142
340	411			CIVIL LINE GRID	21986150	CIVIL LINE GRID TO FLA	Town	AMR	13.28109007	11.5984581		1.682631968
341	411			CIVIL LINE GRID	21986160	CIVIL LINE GRID TO ME	Town	AMR	4.483037848	4.47354		0.009497848
342	418			CIVIL LINE GRID	21986170	CIVIL LINE GRID TO PRE	Town	AMR	2.073130319	1.66868		0.404450319
343	418			CIVIL LINE GRID	21986180	CIVIL LINE GRID TO AIR	Town	AMR	0.267736783	0.237612		0.030124783
344	411			CIVIL LINE GRID	21986190	CIVIL LINE GRID TO OLC	Town	AMR	0.432577813	1.050265		-0.617687188
345	418			CIVIL LINE GRID	21986200	CIVIL LINE GRID TO PRE	Town	AMR	10.68915219	12.12648		-1.43732781
346	418			CIVIL LINE GRID	21986210	CIVIL LINE GRID TO JUB	Town	AMR	7.033658573	6.285052		0.748606573
347	411			CIVIL LINE GRID	21986250	CIVIL LINE GRID TO CIV	Town	AMR	11.28439523	10.25566073		1.028734499
348	411			CIVIL LINE GRID	21986260	CIVIL LINE GRID TO 11K	Town	AMR	4.387105549	18.020624		-13.63351845
349	411			CIVIL LINE GRID	21986270	CIVIL LINE GRID TO KHJ	Town	AMR	8.534176636	8.323080994		0.211095642
350	418			CIVIL LINE GRID	21986280	CIVIL LINE GRID TO LUK	Town	AMR	17.45704485	16.22543539		1.231609455
351	411			CIVIL LINE GRID	21986297	CIVIL LINE GRID TO 6.6J	Town	AMR	5.14218078	0		5.14218078
352	418			CIVIL LINE GRID	21986307	6.6KV OUTDOOR S/S	Town	AMR	0	0		0
353	411			CIVIL LINE GRID	21986317	6.6KV CHANDRAWAL W	Town	AMR	11.50170651	0		11.50170651
354	418			CIVIL LINE GRID	21986337	CIVIL LINE GRID TO MA	Town	AMR	3.603142905	4.433969729		-0.830826824
355	418			CIVIL LINE GRID	21986347	CIVIL LINE GRID TO NPT	Town	AMR	7.24876245	6.552029144		0.696733306
356	418			CIVIL LINE GRID	21986357	CIVIL LINE GRID TO AIR	Town	AMR	0.057574815	0.123853		0.066278185
357	418			CIVIL LINE GRID	21986367	WAZIRABAD WATER W	Town	AMR	4.25134665	0		4.25134665
358	418			CIVIL LINE GRID	21986377	CIVIL LINE GRID TO DES	Town	AMR	7.4219607	7.84898977		-0.42702907

1269	523			ROHINI - 22 GRID	263445838	ROHINI - 22 GRID TO K	Metro	AMR	3.038873344	15.5512731			-12.51239976		
1270	523			ROHINI - 22 GRID	263445856	ROHINI - 22 GRID TO R	Metro	AMR	0	9.703379			-9.703379		
1271	532			BURARI GRID	270444797	DJB BURARI GRID TO B	Urban	AMR	9.5260949	10.67144694			-1.145352036		
1272	414			BURARI GRID	270444820	DJB BURARI GRID TO B	Urban	AMR	13.15616	12.88925967			0.266900334		
1273	414			BURARI GRID	270444843	DJB BURARI GRID TO H	Urban	AMR	0.32768	17.897136			-17.569456		
1274	414			BURARI GRID	270444877	TRANSPORT DEPT. BUR	Urban	AMR	0	0			0		
1275	505			JAHANGIR PURI GRID	271239171	JAHANGIRPURI GRID TO	Town	AMR	10.70023849	9.435549309			1.264689183		
1276	505			JAHANGIR PURI GRID	271239194	JAHANGIRPURI GRID TO	Town	AMR	8.587807078	4.485673185			4.102133893		
1277	519			ROHINI - 2 GRID	271522571	ROHINI - 2 GRID TO B	Metro	AMR	8.216053444	7.26892977			0.947123674		
1278	414			BURARI GRID	272183955	DJB BURARI GRID TO D	Urban	AMR	5.114588225	5.44734			-0.332751775		
1279	413			INDRA VIHAR GRID	278547694	INDRA VIHAR GRID TO	Town	AMR	0.00032	0			0.00032		
1280	561			ROHINI - 6 GRID	280570016	ROHINI - 6 GRID TO DT	Urban	AMR	0	0			0		
1281	561			ROHINI - 6 GRID	280570040	ROHINI - 6 GRID TO 8/1	Urban	AMR	8.224205604	9.476642			-1.252436396		
1282	551			ROHINI - 2 GRID	285254797	ROHINI - 2 GRID TO B	Urban	AMR	9.30583763	9.081722208			0.224115423		
1283	519			ROHINI - 2 GRID	285254821	ROHINI - 2 GRID TO K	Metro	AMR	4.3344421	4.161447104			0.172994996		
1284	518			ROHINI - 2 GRID	285254885	ROHINI - 2 GRID TO P1	Metro	AMR	8.45853105	7.454935726			1.003595324		
1285	515			ROHINI - 2 GRID	285254908	ROHINI - 2 GRID TO J-B	Metro	AMR	0.18615	7.106055			-6.919905		
1286	519			ROHINI - 2 GRID	285254931	ROHINI - 2 GRID TO B	Metro	AMR	0.00005	7.702063			-7.702013		
1287	515			ROHINI - 2 GRID	285254977	ROHINI - 2 GRID TO F1	Metro	AMR	1.893194819	7.148358937			-5.255164118		
1288	414			BHALSWA-2 (GIS) GRID	286694464	BHALSWA 2 GRID TO B	Urban	AMR	0	4.04802			-4.04802		
1289	532			BHALSWA-2 (GIS) GRID	286694508	BHALSWA 2 GRID TO S	Urban	AMR	0	4.601425			-4.601425		
1290	414			BHALSWA-2 (GIS) GRID	286694486	BHALSWA-2 (GIS) GRID	Urban	AMR	0	8.125353			-8.125353		
1291	503			BURARI GRID	272184021	BURARI GRID TO C&D	Urban	AMR	0	8.137199			-8.137199		

Consumer Category (Separate for each subsidized consumer category)	Billed Energy			Subsidized Billed Energy			Applicable rate of Subsidy as notified by State govt.		Subsidy Due from State Govt.			Subsidy Actually Billed / claimed from State Govt. (As against col.12)	Subsidy Received from State Govt. (As against col.13)	Balance Subsidy yet to be Received from State Govt.	No. of Benefited Consumers	
	Metered	Un- metered*	Total	Metered (out of col.2)	Un-metered* (out of col.3)	Total	Metered Energy**	Un- metered Energy**	Metered Energy	Un- metered Energy	Total					
	(in kWh)			(in kWh)			(in Rs/ kWh)		(in Rs. Cr.)							(in Rs. Cr.)
1	2	3	4=2+3	5	6	7=5+6	8	9	10=5X8	11=6x9	12=10+11	13	14	15=13-14	16****	
Residential Domestic	0-200 units pm	1018512423		1018512423	1018512423		1018512423	Entire current demand								9769985
	201-400 units pm	1543087274		1543087274	*			Rs. 800 per month								5153432
Agriculture		16104374		16104374	**			Rs. 105 per kw/month								48237
Commercial/Industrial - LT																
Commercial/Industrial - HT																
Other (specify)					***											
Total																

* Subsidy in 201-400 block is being given at flat rate of Rs. 800 per month, thus Subsidized Billed Energy cannot be ascertained.

** Subsidy in Agriculture category is being given at the flat of Rs. 105 per kw/month on Fixed charges

*** Though Subsidy is also being given to Lawyer's chamber connections at court complexes but extraction of actual units consumer and subsidized billed energy cannot be extracted

****No. of bills generated considered instead of No. of Benefited consumers

HARIOM SHARMA
E. Code : 90231
AGM- Energy Audit Group
Tata Power Delhi Distribution Limited

Md Shadab Ahmad
EM 5062