Annual EnergyAudit Accounting 2021-22



Designated Consumer



TATA POWER DELHI DISTRIBUTION LIMITED

NDPL House, Hudson Lines, Kingsway Camp, Delhi-110009 (India)

FY 2021-2022

Conducted by



A-Z Energy Engineers Private Limited

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We also express sincere thanks to the management of Tata Power DDL, Delhi, which is a Designated Consumers in the DISCOM sector for extending necessary co-operation and providing relevant information to us for the successful completion of the audit. Our sincere thanks to the entire working group comprising of:

- Mr. Ganesh Srinivasan CEO
- Mr. HC Sharma General Manager, Nodal Officer
- Md. Shadab Ahmad Sr. Manager, Energy Manager
- Ms. Sameeksha Raina- Head of Group, Energy Audit
- Mr. Neeraj Singh Manager, Energy Audit
- Ms.Gaganpreet Kaur –Sr.Executive, Energy Audit

A-Z Energy Engineers Pvt. Ltd. looks forward to their continued support in all future endeavours as well.

Dr.P.P.Mittal) Director

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List of Abbreviations

AMI Advanced Metering Infrastructure

AMR Automated Meter Reading

AMRUT AtalMission for Rejuvenation and Urban Transformation

AT & C Aggregate Technical and Commercial

BEE Bureau of Energy Efficiency

ckt Circuit Kilometer
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

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

Executive Summary

Bureau of Energy efficiency (BEE) notified the Bureau of Energy Efficiency (Manner and intervals for conduct the energy audit (Accounting) in Electricity Distribution Companies) Regulations, 2021 on 6th October 2021. As per regulation, all Electricity Distribution Companies are Mandate to conduct annual energy audit and periodic energy accounting on quarterly basis.

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. It distributes electricity in North & North West parts of Delhi. The company started operations on July 1, 2002 post the unbundling of erstwhile Delhi Vidyut Board Distribute electricity from the end point of transmission to the end consumers. While the energy Purchased, Net Input & billed Tata Power-DDL for the customer is 11737.11MU, 9424.75MU& 8752.21MU. The monthly consumption per customer stands at 386.76 KWH/Month. Tata Power-DDL caters to area spread in 5 circles, 12Division

Discom Energy Accounting FY-2021-2022

Net Energy Input to the Discom for FY 2021-2022 is estimated and presented in the table:

S. No	Particulars	Values
1	Input Energy Purchase (MU)	11737.105
2	Transmission Loss (%)	4%
3	Transmission Loss (MU)	471.211
4	Energy Sold Outside the periphery (MU)	1841.142
5	Open access sale (MU)	88.704
6	EHT Sale (MU)	156.878
7	Net Input Energy at Discom	9424.75

The T&D and AT&C losses for FY 2021-2022 are presented below:

	T & D Loss		AT & C Loss (%)
Total Losses	T & D Loss (MU)	T & D Loss (%)	6.80%
	672.55	7.14%	



Some key details regarding company's distribution for FY 21-22 are mentioned below:

- 1. Source of Input Energy
- 2. Consumer wise connections & energy consumptions for FY 2021-22
- 3. Technical Parameters For FY 2021-22

> Source of Input Energy

The source of input energy with generation station and generation capacity & contract period is given the table:

Table 1: Generation station, generation capacity & contract period

			•	
Name of Generation station	Generation Capacity (MW)	Type of station based on fuel	Type of contract in Year	Type of Grid
NTPCDadri GPS	28	Gas	25 Years	Inter State
NTPCAuriya GPS	22	Gas	35 Years	Inter State
NTPC ANTA GPS	14	Gas	30 Years	Inter State
Pragati- I	63.6	Gas	25 Years	Intra State
Pragati III	298	Gas	25 Years	Intra State
IPGCL GT	27	Gas	20 Years	Intra State
NHPCDulhasti	15	Hydro	35 Years	Inter State
NHPCParbati III	20	Hydro	40 Years	Inter State
NHPCBairasiul	6	Hydro	25 Years	Inter State
NHPCTanakpur	3.2	Hydro	35 Years	Inter State
NHPCChamera -I	13	Hydro	35 Years	Inter State
NHPCChamera-II	12	Hydro	35 Years	Inter State
NHPCChamera-III	9	Hydro	35 Years	Inter State
NHPC URI-I	16	Hydro	35 Years	Inter State
NHPC Uri-II	10	Hydro	40 Years	Inter State
NHPCDhauliganga	11	Hydro	35 Years	Inter State
NHPCSewa II	5	Hydro	35 Years	Inter State
Tala HEP	9	Hydro	35 Years	Inter State
NathpaJhakriHPS	44	Hydro	35 Years	Inter State
TehriHPP	19	Hydro	35 Years	Inter State
Koteshwar HEP	12	Hydro	35 Years	Inter State
Narora APS	14	Nuclear	43 Years	Inter State
RAPP 5&6	17	Nuclear	43 Years	Inter State
NTPCSingrauli Small Hydro	2	RE	35 Years	Inter State
SECI Solar (Renewable)	2	RE	35 Years	Inter State
Delhi Municipal Solid Waste Solutions Ltd. (Bawana) (Renewable)	7	RE	20 Years	Intra State
Nanti Hydro Power Pvt. Ltd. (Renewable)	13.5	RE	20 Years	Inter State

Name of Generation station	Generation Capacity (MW)	Type of station based on fuel	Type of contract in Year	Type of Grid
Suryakanta Hydro energies Pvt. Ltd. (Renewable)	14	RE	20 Years	Inter State
TimarpurOkhla Waste management co. Ltd. (Renewable)	6	RE	20 Years	Intra State
Sun Edison	180	RE	20 Years	Inter State
Taranda	12.7	RE	20 Years	Inter State
SECI WIND	50	RE	25 Years	Inter State
SECI 200 MW (SBSR)*	33	RE	25 Years	Inter State
Cosmos Hydro*	13	RE	20 Years	Inter State
NTPCAravaliJhajjar	613.8	Coal	25 Years	Inter State
NTPCDadriNCTPS(Th.) Stage II	10	Coal	25 Years	Inter State
NTPCDadriNCTPS(Th) Stage I	10	Coal	25 Years	Inter State
NTPCKahalgaon II	48.3	Coal	25 Years	Inter State
NTPCSingrauliSTPS	46	Coal	30 Years	Inter State
NTPCRihandSTPS-II	39	Coal	25 Years	Inter State
NTPCRihandSTPS-I	31	Coal	28 Years	Inter State
NTPCKahalgaon I	15.6	Coal	25 Years	Inter State
NTPCUnchahaar-II TPS	14	Coal	25 Years	Inter State
NTPCUnchahaar-III TPS	9	Coal	25 Years	Inter State
NTPCUnchahaar-I TPS	7	Coal	27 Years	Inter State
NTPCFarakka	7	Coal	25 Years	Inter State
CLPJhajjar	132	Coal	25 Years	Inter State
Maithon Power Limited	300	Coal	30 Years	Inter State
CTPS 7 & CTPS 8	92	Coal	25 Years	Inter State
MTPS 6	31	Coal	25 Years	Inter State
Sasan	27 MW to 136 MW	Coal	25 Years	Inter State

Power Generation Source	Generation Capacity (MW)
Gas	453
Renewable Energy	351
Hydro	204
Nuclear	31
Coal	1542

> Category wise Consumer count& energy consumption for FY 2021-22

Table 2: Energy consumption and type of consumers

Category of Consumers	Voltage Level	No of Consumers	Total Consumption (In MU)
Domestic	HT/LT	1603501	4478.55
Commercial	LT	239165	1069
Water Supply		1429	255.39
Public Lighting		4981	118.67
HT Industrial		360	257.06
Industrial (Small)		29842	2084
HT Commercial		470	322.3
Agricultural		4585	13.91
EV		877	23.32
Others-1 (if any, specify in remarks)		368	129
Total		1885578	8751.20

> Technical Parameters For FY 2021-22

Tata Power DDL supplies power to north & north-west part of Delhi. Distribution area of Tata Power DDL is divided into five circles, twelve divisions & the overall purchased Energy, consumption and AT &C losses for the FY-2021-2022 is shown in table below. The AT&C loss for FY 2021-2022 is 6.80% & the T&D losses of the discom is 7.14%.

Table 3: Technical Details (FY2021-22)

Technical Details (FY2021-22)				
Energy Input Details	UoM	Value		
Input Energy Purchase (From Generation Source)	Million kwh	11737.11		
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kwh	9424.75		
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kwh	8752.21		
Transmission and Distribution (T&D) loss	Million kwh	672.55		
Details	%	7.14%		
Collection Efficiency	%	100.36%		
Aggregate Technical & Commercial Loss	%	6.80%		

The total purchased power by Tata Power-DDL is 11737.11millionunits and the net energy after adjusting the transmission losses and energy sales is 9424.75million units. The total energy billed or net energy billed after all the adjustment is 8752.21millionunits. The total T&D losses for FY 2021-22was 672.55millionunits, the overall collection efficiency of the Tata Power-DDLwas100.36% & AT&C losses was 6.80%.

> Details of Input Energy & Infrastructure

The Input energy, consumption & transmission losses of the Tata Power-DDL are shown in table below:

Table 4: Input energy, consumption & transmission losses of the Tata Power DDL

Parameters	FY 2021-22
Input Energy purchased (MU)	11737.11
Transmission loss (%)	4%
Transmission loss (MU)	471.211
Energy sold outside the periphery (MU)	1841.142
Open access sale (MU)	88.704
EHT sale	156.878
Net input energy (received at DISCOM periphery or at distribution point)-(MU)	9507.35
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	93%
% of metering available at consumer end	100%
No of feeders at 66kV voltage level	132
No of feeders at 33kV voltage level	108
No of feeders at 11kV voltage level	1341
No of LT feeders' level	16095
Line length (ckt. km) at 66kV voltage level	538.7
Line length (ckt. km) at 33kV voltage level	477.3
Line length (ckt. km) at 11kV voltage level	5132
Line length (km) at LT level	7485
Length of Aerial Bunched Cables	5641
Length of Underground Cables	6055
HT/LT ratio	0.821376

Goals and Objectives

Tata Power-DDL is a designated consumer in Discom sector. Being a designated Consumer Tata Power-DDL needs to undergo Annual energy audit (Accounting) 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.

Energy Conservation measures already taken

Tata Power DDL has taken various energy conservation measures to reduce the energy consumptions in FY-2021-22. Some of them are mentioned below:

- Replacement of the old inefficient ACs with energy efficient AC's
- Replacement of inefficient old fan with energy efficient BLDC Fans
- Replacement of non-conventional light with energy efficient light (LED's)

Table 5: AC Replacement Program, BLDC Fan's & (LED's) Energy saving

DSM Program	FY	Quantity (Nos)	Load reduction (MW)	Energy saving (MU)	CO2 reduction (mTon)
AC Replacement Scheme	FY-21-22	2148	1	1.64	1.3
BLDC Ceiling Fan	FY-21-22	620	0.03	0.12	0.1
LED Lighting Scheme	FY-21-22	99006	1	2	2
Behavioural Demand Response (BDR)	FY-21-22	2044	7.69	-	-

Energy Conservation measures Proposed for Future

- 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.
- 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.
- 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 2x10sqmm Al XLPE to 2x25sqmm Al XLPE. The reduction in resistivity will result in reduction of technical losses.

Critical Analysis

- Tata Power Delhi Distribution Limited is an electricity distribution company which is spread over 510 sq. KM and providing power supply to North & North-West Delhi While the energy Purchased, Net Input & billed Tata Power-DDL for the customer is 11737.11MU, 9424.75MU& 8752.21MU. The monthly consumption per customer stands at 386.76 KWH/Month. Tata Power-DDL caters to area spread in 5 circles, 12 Division, 37 numbers of sub-division, 1341 number of feeders, 7548 number of DTs and 1885578 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'2021 to 31st March'2022was 4.01%, 7.14 %, 100.36 % & 6.80 % respectively.
- The electrical energy is supplied by various interstate and intrastategenerating stations at 400 KV, 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 DDLhas 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.

I. Background

1.1 Extant Regulation & Role of BEE

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.

Role of BEE

- BEE coordinates with designated agencies, designated consumers and other
 organizations 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 &labelling 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.

The main amendments made to the original Act are given below:

 The Central Government may issue the energy savings certificate to the designated consumer whose energy consumption is less than the prescribed norms and standards in accordance with the procedure as may be prescribed.

- The designated consumer whose energy consumption is more than the prescribed norms and standards shall be entitled to purchase the energy savings certificate to comply with the prescribed norms and standards
- The Central Government may, in consultation with the Bureau, prescribe the value of per metric ton of oil equivalent of energy consumed
- Commercial buildings which are having a connected load of 100 kW or contract demand of 120 kVA and above brought under the purview under the EC Act.

Promotional Role

The major Promotional Role of BEE includes:

- 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 programmers relating to efficient use of energy and its conservation.

1.2 Purpose of Audit & Accounting Report

The annual energy audit accounting has been conducted for FY 2021-22 based on the notification no. 18/1/BEE/Discom/2021 from Bureau of Energy Efficiency, New Delhi dated 6th October, 2021 which says:

(1) Every electricity distribution company shall conduct an annual energy audit for every financial year and submit 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:

Provided that on the commencement of these regulations, the first annual energy audit of every electricity distribution company shall be conducted within six months from the date of such commencement, by taking into account the energy accounting of electricity distribution company for the financial year immediately preceding the date of the commencement of these regulations.

(2) Where a new electricity distribution company is established after the commencement of these regulations, such electricity distribution company shall conduct its first annual energy audit on completion of the first financial year from the date of being notified as designated consumer.

The Annual Energy Audit (Accounting) 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 analyse and process 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

1.3 Period of Energy Audit& Accounting

Period of energy audit and accounting for Tata Power Delhi Distribution Limited, New Delhi is for FY21-22, 1st April, 2021- 31st March, 2022.

II. Introduction of Designated Consumer

2.1 Sector

Tata Power Delhi Distribution Limitedbelongs to the Electricity Distribution Sector.

2.2 Name and Address of Designated Consumer

Table 6: General Information

	General Information						
1	Name of the DISCOM	Ta	Tata Power Delhi Distribution Limited				
2	Year of Establishment			2002-03			
	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	011-661122	202	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 Naga					
V	District						
vi	State	Delhi		Pin	110009		
	Telephone	011-66112202 Fax 011-27468					
5	Nodal Officer Details*						
i	Nodal Officer Name (Designated at DISCOM's)			Mr. HC Sharma			
ii	Designation			General Manager			
iii	Address	NDPL Hous	se, Hu	dson Lines, Kingsway C	amp, Delhi-09		
iv	City/Town/Village	Delhi		P.O.	GTB Nagar		
V	District						
vi	State	Delhi		Pin	110009		
vii	Telephone	91-1166050	595	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	91-1166050		Fax			
v	Mobile	9717991957	E- mail ID	mdshadab.ahmad@ta	tapower-ddl.com		

2.3 Name and details of energy manager and Authorised signatory of DC

Table 7: Name and details of energy manager and Authorised signatory of DC

PARTICULARS	DETAILS			
Energy Manager	Md. Shadab Ahmad (Sr. Manager)			
	EM- 5062			
	Ph: 91-1166050613			
	Mobile: 9717991957			
	Email: mdshadab.ahmad@tatapower-ddl.com			
Authorized Signatory	Mr. HC Sharma (General Manager)			
	Ph: 91-1166050595			

2.4 Summary profile of DC's

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.

Table 8: Customer Database

Distribute Electricity	Service a Populace	Customer Base	Peak Load (MW)	Distribution Area
North & North West Delhi	7 million	1.88 million	2106	510 Sq. M

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.

Achieving excellence through safety, technology adoption, collaborations and teamwork is the mission of Tata Power-DDL.

Consumer convenience is the driving force behind all initiatives at Tata Power – DDL. The organization 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 is committed to the sustainability goals and continuing to reduce its carbon footprints through RPOs and various clean energy initiatives.

TATA Power-DDL has 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 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 skillsets 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.

Key parameters regarding Tata Power DDL are mentioned below:-

Source of Input Energy

The source of input energy with generation station and generation capacity & contract period is given the table:

Table 9: Input energy source and capacity

Source	Capacity (MW)
Gas	453
Renewable Energy	351
Hydro	204
Nuclear	31
Coal	1542

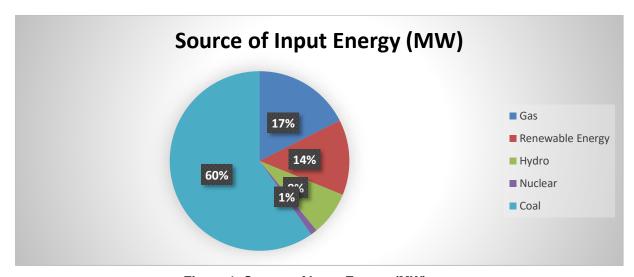


Figure 1: Source of Input Energy (MW)

• Consumer wise connections & energy consumptions for FY 2021-22

Table 10: Energy consumption with type of consumers

Type of Consumers	Category of Consumers (EHT/HT/LT/Others)	Voltage Level	No of Consumers	Total Consumption (In MU)
Domestic	HT/LT	11/.22/.4	1603501	4478.55
Commercial	LT		239165	1069
Water Supply			1429	255.39
Public Lighting			4981	118.67
HT Industrial			360	257.06
Industrial (Small)			29842	2084
HT Commercial			470	322.3
Agricultural			4585	13.91
EV			877	23.32
Others-1			368	129
	Total		1885578	8751.20

Technical Parameters for FY 2021-22

Tata Power DDL supplies power to north & north-west part of Delhi, It is divided into five circles, twelve divisions & the overall purchased Energy, consumptions & AT &C losses for the FY-2021-2022 is sown in table below the AT&C losses for FY2021-2022 is 6.80% & the T&D losses of the sector is 7.14%.

Table 11: Technical Details (FY 2021-22)

Technical Details (FY2021-22)					
Energy Input Details	UoM	Value			
Input Energy Purchase	Million Units	11737			
(From Generation Source)	Willion Offics	11737			
Net input energy (at DISCOM Periphery after					
adjusting the transmission losses and energy	Million Units	9425			
traded)					
Total Energy billed (is the Net energy billed,	Million Units	8752			
adjusted for energy traded))		0702			
Transmission and Distribution (T&D) loss	Million Units	672.55			
Details	%	7.14%			
Collection Efficiency	%	100.36%			
Aggregate Technical & Commercial Loss	%	6.80%			

The total purchased power by Tata Power-DDL is 11737.11million kWh and the net energy after adjusting the transmission losses and energy sales is 9424.75million kWh, The total energy billed or net energy billed after all the adjustment is 8751.21million kWh. The total T & D loss for FY 2021-22 is 672.55million kWh.

Category wise Consumers, Consumptions & Losses

Table 12: Category wise Consumers, Consumption & Losses

Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total energy	T&D loss (MU)
Residential	1603501	3325		4478.55	672.55
Agricultural	4585	33		13.91	
Commercial/Industrial-LT	269002	2267	9424.75	3153.49	
Commercial/Industrial-HT	834	360		579.36	
Others	7656	230		526.90	
	1885578	6215	9424.75	8752.21	672.55

Consumer category	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
Residential		2582.7	2584.5	100.07%	
Agricultural		9.8	9.7	99.59%	
Commercial/Industrial-LT	7.14%	4257.7	4275.8	100.43%	
Commercial/Industrial-HT		745.1	744.5	99.93%	
Others		527.5	537.5	101.90%	
	7.14%	8122.7	8152.0	100.36%	6.80%

Administrative structure

The Distribution network of Tata Power-DDLis divided into five numbers of circles, twelve number of divisions &thirty-seven numbers of sub divisions.

Table 13: Administrative structure

Parameters	Values
Number of circles	5
Number of divisions	12
Number of sub-divisions	37

• Voltage wise Metered& Unmetered Consumers

Table 14: Voltage wise metered& unmetered Consumers

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventional metered consumers	0	0	0	1589334
Number of consumers with 'smart' meters	0	0	0	254226
Number of consumers with 'smart prepaid' meters	0	0	0	0
Number of consumers with 'AMR' meters	5	2	1005	36273
Number of consumers with 'non-	0	0	0	4733

Parameters	66kV and above	33kV	11/22kV	7
smart prepaid' meters				
Number of unmetered consumers	0	0	0	0
Number of total consumers	5	2	1005	1884566

• Numbers of Distribution Transformers (above 250kVA)

Table 15: Number of Distribution Transformers

Parameters	66kV and above	33kV	11/22kV	LT
Number of conventionally metered Distribution Transformers	0	0	0	229
Number of DTs with communicable meters	0	0	0	4179
Number of unmetered DTs	0	0	0	336
Number of total Transformers	0	0	0	4744

Numbers of Feeders

Table 16: Numbers of Feeders

Parameters	66kV and above	33kV	11/22kV	LT
Number of metered feeders	132	108	1341	16095
Number of feeders with communicable meters	132	108	1341	16095
Number of unmetered feeders	0	0	0	0
Number of total feeders	132	108	1341	16095

• Length of Cables

Table 17: Length of Cables

Particulars	Value (km)
Line length (ct km)	1937

Particulars	Value (km)
Length of Aerial Bunched Cables	5641
Length of Underground Cables	6055

Energy Flow Diagram

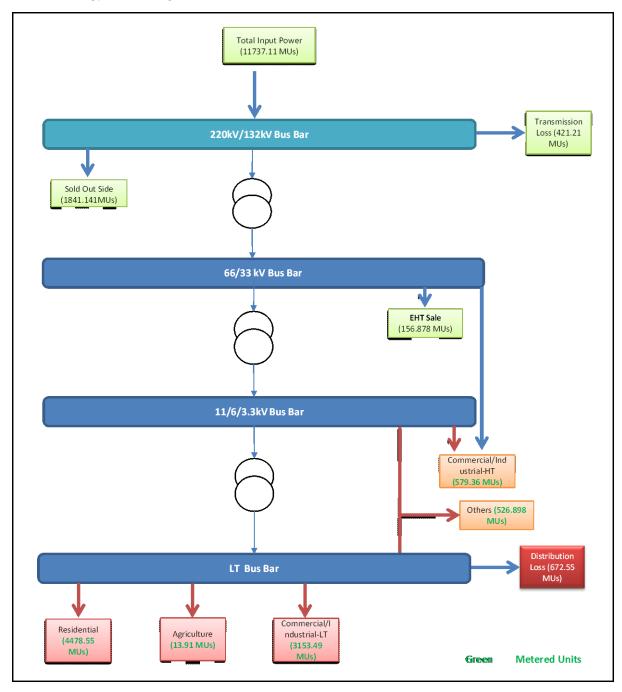


Figure 2: Energy Flow Diagram

III Discussions & Analysis-

3.1 Energy Accounts for Previous Year (FY 2020-2021)

Tata Power DDL has undertaken second year of energy accounting as per notification. No. 18/1/BEE/DISCOM/2021 from BUREAU OF ENERGY EFFICIENCY dated 6th October, 2021.

Circle wise Connections & Input Energy

Tata Power DDL has five circles and twelve numbers of division &thirty-seven numbers of sub division, the circle wise total numbers of connections, connected load (MW), Input energy(MU) & metered energy (MU) is given in the table:

Circle	Total No of Consumers	Connected Load (MW)	Input Energy (MU)	Metered Energy (MU)
Urban Circle	488797	1064	1670.72	1527.51
Sub Urban Circle	205017	1150	1813.98	1626.33
Town Circle	419677	1659	2212.07	2113.02
Metro circle	587100	1584	2238.01	2142.07
City Circle	123440	568	1015.34	901.514
Total	1824031	6026	8950.12	8310.43

Table 18: Input & Metered Energy Circle Wise

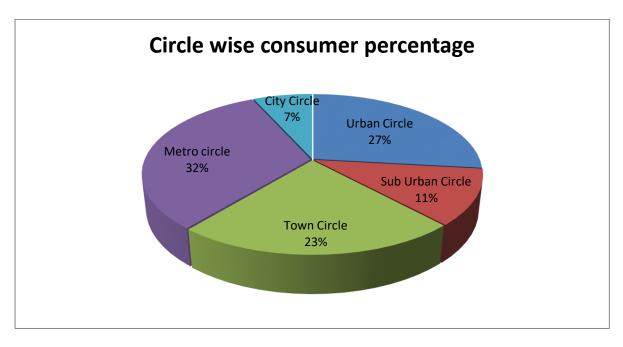


Figure 3: Circle wise consumers

Circle wise Energy Sharing

The circle wise connected load & input energy & metered energy with transmission & distribution losses is given in following table:

Circle	Connected Load (MW)	Input Energy (MU)	Metered Energy (MU)	T&D loss (MU)
Urban Circle	1064	1670.72	1527.51	143.21
Sub Urban Circle	1150	1813.98	1626.33	187.66
Town Circle	1659	2212.07	2113.02	99.05
Metro circle	1584	2238.01	2142.07	95.94
City Circle	568	1015.34	901.51	113.83
Total	6026	8950.12	8310.43	639.68

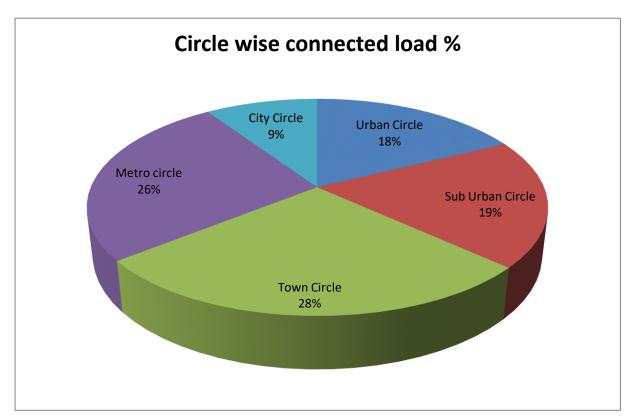


Figure 4: Circle wise connected Load

 Technical Parameters for FY 2020-21 Tata Power DDL supply to north & north-west part of Delhi, It is divided into five circles, twelve divisions & the overall purchased Energy, consumptions and AT &C losses for the FY-2020-2021 is shown in table below the AT&C losses for FY2020-2021 is 6.48% & the T&D losses of the sector is 7.15%.

Table 19: Technical Details (FY 2020-21)

Technical Details (FY2020-21)					
Energy Input Details	UoM	Value			
Input Energy Purchase (From Generation Source)	Million Units	10085.62			
Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million Units	8950.12			
Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million Units	8310.43			
Transmission and Distribution (T&D) loss	Million Units	639.68			
Details	%	7.15%			
Collection Efficiency	%	101%*			
Aggregate Technical & Commercial Loss	%	6.48%			

^{*} Collection efficiency is more than 100 % on account of arrears, prepayment etc.

3.2 Energy Accounts & Performance in current year (FY 2021-2022)

> Summary of Energy Consumption

The category wise details of consumers is given in the table:

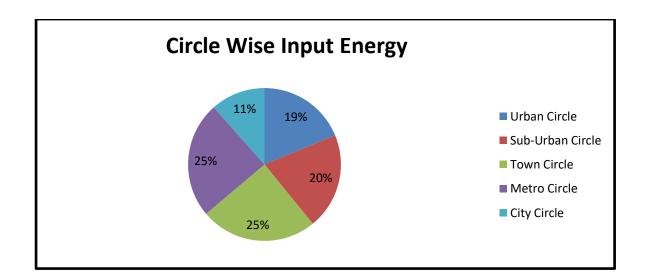
S.No	Type of Consumers	Category of Consumers	Voltage Level	No of Consumers	Total Consumption (In MU)	% Share
1	Domestic	HT/LT	11/.22/.4	1603501	4478.55	51.2%
2	Commercial	LT		239165	1069	12.2%
3	Water Supply			1429	255.39	2.9%
4	Public Lighting			4981	118.67	1.4%
5	HT Industrial			360	257.06	2.9%
6	Industrial (Small)			29842	2084	23.8%
7	HT Commercial			470	322.3	3.7%
8	Agricultural			4585	13.91	0.2%
9	EV			877	23.32	0.3%
10	Others-1 (if any , specify in remarks)			368	129	1.5%
	Total			1885578	8751.20	100.0%

Circle wise Consumers& Input Energy

Tata Power DDL has five circles and twelve numbers of division &thirty-seven numbers of sub division. Circle wise, Input energy (MU) & metered energy (MU) is given in the table:

Circle	Input Energy (MU)	Metered Energy (MU)		
Urban Circle	1769.83	1608.718		
Sub Urban Circle	1915.095	1744.993		
Town Circle	2330.31	2216.553		
Metro circle	2320.747	2187.902		
City Circle	1088.77	994.04		
Total	9424.753	8752.208		

Table 20: Circle Wise Input & Metered Energy



Circle wise Billed Energy

Urban Circle
Sub-Urban Circle
Town Circle
Metro Circle
City Circle

Figure 5: Circle wise Input &Billed Energy

> Circle wise T&D and AT&C Losses

The circle wise connected load & input energy & metered energy with transmission & distribution losses is given in following table:

Name of Circle	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
Urban Circle	161.11	9.10%	1314.65	1329.98	101.17%	8.04%
Sub-Urban Circle	170.10	8.88%	1900.49	1906.32	100.31%	8.60%
Town Circle	113.76	4.88%	2126.25	2118.22	99.62%	5.24%
Metro Circle	132.85	5.72%	1715.86	1725.62	100.57%	5.19%
City Circle	94.73	8.70%	1065.43	1071.90	100.61%	8.15%
	672.55		8122.69	8152.042		

Table 21: T & D and AT&C Circle Wise

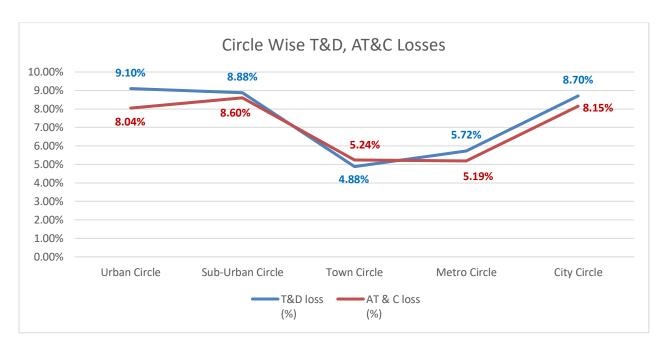


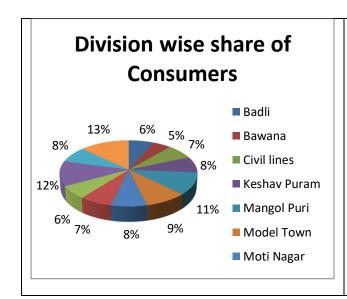
Figure 6: Circle wise T&D, AT&C losses

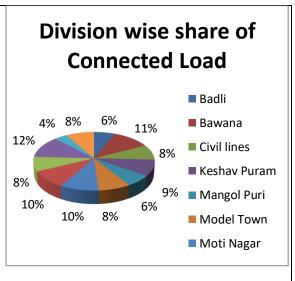
Division wise energy parameters

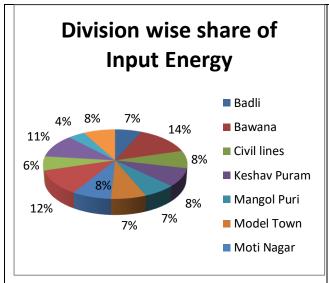
The total twelve numbers of divisions, the energy parameter input energy, metered energy& T & D Losses of division wise is shown in below table:

Table 22: Division Wise Input, Metered Energy

Name of Division	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MUs)	Billed energy (MUs)
Badli	124298	385	621.60	553.61
Bawana	90357	691	1302.72	1171.22
Civil lines	135226	519	773.43	750.61
KeshavPuram	147094	556	803.95	754.21
MangolPuri	204301	400	618.99	576.76
Model Town	167581	486	667.51	626.38
Moti Nagar	143788	586	752.93	711.74
Narela	130156	595	1088.77	994.04
PitamPura	119866	500	612.37	573.77
Rohini	231890	749	1034.25	984.75
Kirari	146450	233	394.40	342.65
Shalimar Bagh	244571	516	753.83	712.46
Total	1885578	6215	9424.75	8752.21







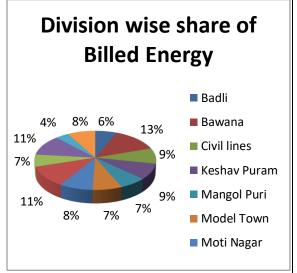


Figure 7: Division wise Input, Billed Energy, Consumers and Connected Load

Division wise energy parameters& Losses

The Division wise T&D Losses, Billed Amount & Collected Amount with transmission & distribution losses is given in following table

Table 23: Division Wise T&D Losses & AT&C losses

Name of Division	T&D loss (MU)	T&D loss (%)	Billed Amount Rs. Crore	Collected Amount Rs. Crore	Collection Efficiency	AT & C loss (%)
Badli	67.99	10.94%	562.8	570.2	101.31%	9.77%
Bawana	131.50	10.09%	1394.2	1397.5	100.24%	9.88%
Civil lines	22.82	2.95%	677.5	675.5	99.70%	3.24%
KeshavPuram	49.75	6.19%	737.6	730.6	99.05%	7.08%
MangolPuri	42.22	6.82%	410.4	413.4	100.73%	6.14%
Model Town	41.12	6.16%	515.2	515.6	100.08%	6.09%
Moti Nagar	41.19	5.47%	711.2	712.2	100.14%	5.34%
Narela	94.73	8.70%	1065.4	1071.9	100.61%	8.15%
PitamPura	38.60	6.30%	506.3	508.9	100.50%	5.83%
Rohini	49.50	4.79%	790.3	796.6	100.80%	4.02%
Kirari	51.75	13.12%	225.9	229.9	101.73%	11.62%
Shalimar Bagh	41.37	5.49%	525.9	530.0	100.77%	4.76%
Total	672.55	7.14%	8122.69	8152.04	100.36%*	6.80%

^{*} Collection efficiency is more than 100 % on account of arrears, prepayment etc.

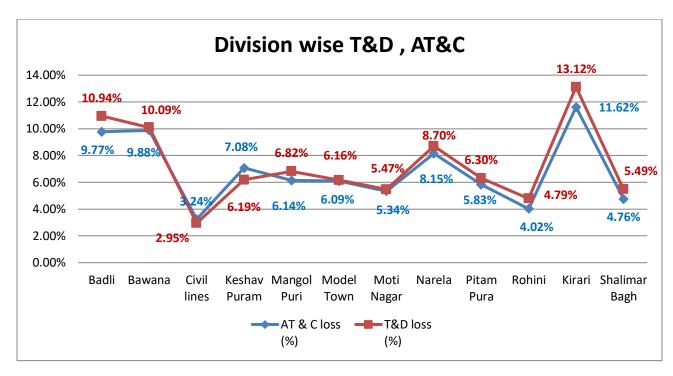


Figure 8: Division wise T&D & AT&C

Consumer Category wise energy parameters & Losses

The consumer wise all the parameters like input energy, metered energy, no of consumers, billed amount, collection efficiency & AT&C losses are given in below table:

Table 24: Consumer Category &AT&C Losses

Consumer category	Total Number of connections (Nos)	Total Connected Load (MW)	Input energy (MU)	Total energy	T&D loss (MU)	
Residential	1603501	3324		4478.55		
Agricultural	4585	33		13.91	672.55	
Commercial/Industrial-LT	269002	2267	9424.75	3153.49		
Commercial/Industrial-HT	834	360	579.36			
Others	7656	230		526.90		
	1885578	6215	9424.75	8752.21	672.55	

Consumer category	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT & C loss (%)
Residential		2582.7	2584.5	100.07%	
Agricultural		9.8	9.7	99.59%	
Commercial/Industrial-LT	7.14%	4257.7	4275.8	100.43%	
Commercial/Industrial-HT		745.1	744.5	99.93%	
Others		527.5	537.5	101.90%	
	7.14%	8122.7	8152.0	100.36%	6.80%

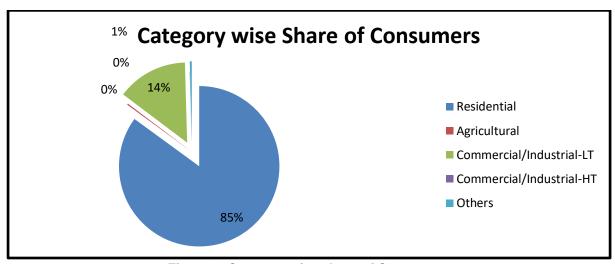


Figure 9: Category wise share of Consumers

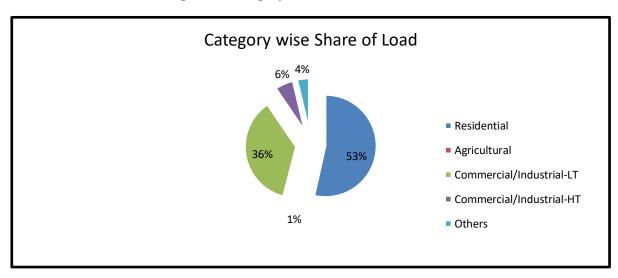


Figure 10: Category wise Share of Load

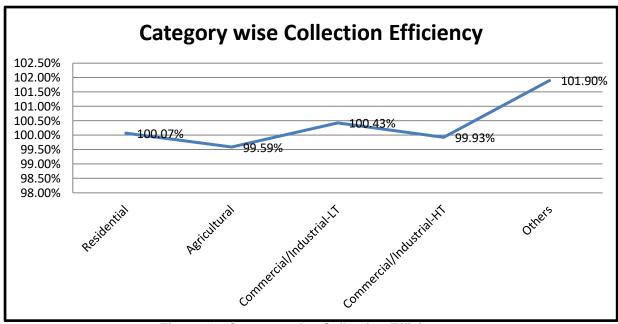


Figure 11: Category wise Collection Efficiency

Range of Losses

The Range of T&D Losses, collection efficiency and AT &C losses among the divisions is tabulated below:

Table 25: % Losses- Division Wise

Description	Data		
T & D Losses	7.14%		
T & D Losses Range	2.95% to 13.12%		
Division with highest losses	Kirari		
Division with lowest losses	Civil Lines		
Collection efficiency	100.36%		
Collection efficiency range	99.05% to 101.73%		
AT & C Loss (%)	6.80%		
AT & C Range	3.24% to 11.62%		
Division with highest AT&C Losses	Kirari		
Division with lowest AT&C Losses	Civil Lines		

> Voltage wise Energy Parameter

Tata Power-DDL having EHV, HV & LV voltage levels, voltage wise feeder name, energy parameter, input energy, export energy, metered, unmetered connections as per the data provided is given in the following table:

220kV Voltage feeder name & Energy Parameters

Table 26: Metering Details at 220 KV

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
1	Urban	DMRC Jahangirpuri	Metered	Functional	Mixed	4902494	1000	15.34
2	Urban	DMRC SMB RSS	Metered	Functional	Mixed	4902484	500	18.98
3	Town	Kashmeri Gate 220 KV DMRC 2	Metered	Functional	Mixed	4902482	500	58.17
4	Town	Kashmeri Gate 220 KV DMRC 1	Metered	Functional	Mixed	5128473	1000	55.44

➤ 66 kV Voltage feeder name & Energy Parameters

Table 27: Metering Details at 66 KV

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
1	SubUrban	Narela T X 1	Metered	Functional	Mixed	4864963	1000	253.51
2	SubUrban	Narela T X 2	Metered	Functional	Mixed	5128462	500	279.27
3	SubUrban	Narela T X 3	Metered	Functional	Mixed	4865052	1000	163.52
4	SubUrban	Railway Ckt-1	Metered	Functional	Mixed	4864952	-625	-28.29
5	SubUrban	Railway Ckt-2	Metered	Functional	Mixed	4865039	-500	-14.2
6	Town	GopalPur T X 2	Metered	Functional	Mixed	4864976	2000	34.02
7	Town	GopalPur T X 4 (160 MVA)	Metered	Functional	Mixed	5295184	1000	448.76
8	Urban	T X 2 Shalimar Bagh	Metered	Functional	Mixed	5128411	1000	157.2
9	Urban	T X 4 Shalimar Bagh	Metered	Functional	Mixed	40001535	1000	111.19
10	Urban	T X 1 Rohini 220 KV	Metered	Functional	Mixed	4864964	1000	193.18
11	Urban	T X 2 Rohini 220 KV	Metered	Functional	Mixed	4865022	1000	185.33
12	Urban	T X 3 Rohini 220 KV	Metered	Functional	Mixed	4864997	1000	344.66
13	Urban	T X 4 Rohini 220 KV	Metered	Functional	Mixed	5295166	500	310.47

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
14	Sub Urban	T X 1 Kanjawala	Metered	Functional	Mixed	4865041	1000	176.68
15	Sub Urban	T X 2 Kanjawala	Metered	Functional	Mixed	5295182	500	291.92
16	Metro	66 KV DMRC MUNDKA	Metered	Functional	Mixed	5128439	-800	-3.88
17	Sub Urban	T X 3 Kanjawala	Metered	Functional	Mixed	4864788	2000	493.73
18	Sub Urban	I/C 100 MVA TR. No.1 Bawana 400 KV	Metered	Functional	Mixed	4864911	1000	308.78
19	Metro	66kV I/C No 1 Rohini-II 220 KV	Metered	Functional	Mixed	4902505	2000	344.98
20	Metro	66kV I/C No 2 Rohini-II 220 KV	Metered	Functional	Mixed	5128468	1000	345.09
21	Metro	NangloiCkt 2	Metered	Functional	Mixed	4864787	-800	0.15
22	Metro	Mundka to MGP-1	Metered	Functional	Mixed	4864983	800	143.98
23	IV/IQtrO	MGP T-off to NangloiCkt (-ve)	Metered	Functional	Mixed	4864971	-800	0
24	Metro	Mundka to SawdaGhevra	Metered	Functional	Mixed	4864950	2000	22.29
25	City	sagarpurRewari Line	Metered	Functional	Mixed	5128441	750	28.5
26	City	PappanKalanRewari Line	Metered	Functional	Mixed	4864960	1000	82.99
27		66/11 Tr 3 Rewari Line	Metered	Functional	Mixed	4865005	-250	-9.31
28	Sub Urban	T X 2 Bawana	Metered	Functional	Mixed	4864992	1000	185.51
29	Sub Urban	T X 3 Bawana	Metered	Functional	Mixed	4864827	333.3 3	200.07
30	Sub Urban	T X 1 Bawana	Metered	Functional	Mixed	4864892	4000	250.25
31	Sub Urban	DELHI MSW Bawana	Metered	Functional	Mixed	4864958	500	138.44
32	Sub Urban	TRANSFORMER 4 (160MVA) Bawana	Metered	Functional	Mixed	5128449	2000	232.69
33	Urban	66kV Incomer 1- 220kV SGTN	Metered	Functional	Mixed	XF46524 6	1	336.12
34	Urban 66kV Incomer 2- 220kV SGTN		Metered	Functional	Mixed	XF46524 8	1	227.53

> 33 kV Voltage feeder name & Energy Parameters

Table 28: Metering Details at 33 KV

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type			Import (MU)
1	Town	GopalPur T X 1	Metered	Functional	Mixed	5128429	1000	227.91

C. No.	Cirolo	Feeder News	Feeder	Status of	Feeder	Meter	CT/PT	Import	
5. NO	Circle	Feeder Name	Metering Status	Meter	Type	S.No	ratio	(MU)	
2	Town	GopalPur T X 3	Metered	Functional	Mixed	4864924	1000	265.54	
	T	Kasmeri Gate 33 KV	Matauad	F atia al	Missaal	4004704	266.6	20.54	
3	Town	Civil Line-1	Metered	Functional	Mixed	4864791	6	30.54	
4	Town	Kasmeri Gate 33 KV	Metered	Functional	Mixed	4864867	500	17.06	
	TOWIT	Civil Line-2	Metered	Turictional	IVIIAGU	4004007	300	17.00	
5	Town	Kasmeri Gate 20 MVA TR	Metered	Functional	Mixed	4864797	100	21.44	
6	City	O/G PayalCktNaraina	Metered	Functional	Mixed	4864836	1000	69.6	
7	City	O/G REWARI LINE	Metered	Functional	Mixed	4865182	4000	57.41	
	,	Naraina INDERPURICkt-1	Wictorda			1000102			
8	City	Naraina	Metered	Functional	Mixed	4864865	1000	73.75	
9	City	33 kV 16 MVATR-1 Naraina	Metered	Functional	Mixed	4864880	500	21.16	
10	City	33 kV 16 MVATR-2 Naraina	Metered	Functional	Mixed	5295128	50	44.67	
11	City	INDERPURICkt-2 Naraina	Metered	Functional	Mixed	4864873	1000	77.48	
10	City	33KVNarainaPandav	Metered	Functional	Mixed	5295124	100	20.08	
12	City	Nagar feeder Naraina	Meterea	Functional	IVIIXEG	5295124	100	20.00	
13	Town	O/G 33 KV Rama Road Rohtak Road	Metered	Functional	Mixed	4865179	3750	66.16	
14	Town	O/G 33 KV ShahzadaBagh-2	Metered	Functional	Mixed	4865152	1000	7.33	
		Rohtak Road							
15	Town	O/G 33 KV Rampura-1 Rohtak	Metered	Functional	Mixed	4902497	140.6	76.7	
		Road					3		
16	Town	O/G 33 KV Rampura-2 Rohtak	Metered	Functional	Mixed	4864790	166.6	73.37	
		Road					7		
17	Town	T X 3 Rohtak Road	Metered	Functional	Mixed	5128406	625	7.31	
18	Town	O/G 33 kV DLFKirti	Metered	Functional	Mixed	4864821	150	69.71	
		Nagar Rohtak Road							
19	Urban	T X 1 Shalimar Bagh	Metered	Functional	Mixed	4864930	1000	304.35	
20	Urban	T X 3 Shalimar Bagh	Metered	Functional	Mixed	4864922	1000	288.41	
21	Town	T X 2 Subzimandi	Metered	Functional	Mixed	5295137	1000	250.72	
22	Town	O/G BG Rd-1 (To BSES)	Metered	Functional	Mixed	4864831	-1000	-48.36	
23	Town	O/G BG Rd-2 (To BSES)	Metered	Functional	Mixed	4864825	- 133.3 3	-46.85	

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
24	Town	T X 1 Subzimandi	Metered	Functional	Mixed	4864916	1000	240.49
25	Urban	33kV I/C No 1 Wazirpur	Metered	Functional	Mixed	4864903	1000	337.89
26	Urban	33kV I/C No 2 Wazirpur	Metered	Functional	Mixed	4864946	1000	339.03
27	Metro	33 KV PeeragarhiCKT to CC ranibagh	Metered	Functional	Mixed	4864901	250	45.04
28	City	Sudarshan Park 33KV Line-1	Metered	Functional	Mixed	4864810	200	115.01
29	City	PUSACkt-I	Metered	Functional	Mixed	4864843	1000	33.44
30	City	33 kV Pandav Nagar DMS	Metered	Functional	Mixed	5295200	100	-0.01
31	City	33 kV Vishal -1 Rewari Line	Metered	Functional	Mixed	4865158	-200	-23.33
32	City	33 kV Vishal -2 Rewari Line	Metered	Functional	Mixed	4864816	-187.5	-0.41
33	City	33 kV MayapuriRewari Line	Metered	Functional	Mixed	4864808	-187.5	-17.38
34	City	33/11 Tr 1 Rewari Line	Metered	Functional	Mixed	4864822	-100	-3.34
35	Town	I/C from Rohtak road Sudersan Park	Metered	Functional	Mixed	4864866	1250	28.64
36	City	Vishal (Imp/Exp) Sudersan Park	Metered	Functional	Mixed	4865149	-187.5	-0.33

> 11 kV Voltage feeder name & Energy Parameters

Table 29 : Metering Details at 11 KV

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
1	Sub- Urban	LOCAL TR Narela	Metered	Functional	Mixed	4902583	-10	-0.22
2	Town	LOCAL TRGopalpur	Metered	Functional	Mixed	4865091	-7.5	-0.19
3	Town	ISBTK.Gate (F/o No.IIMahavir Ice factory)	Metered	Functional	Mixed	4865074	133.3 3	5.8

S. No	Circle	Feeder Name	Feeder Metering	Status of Meter	Feeder Type	Meter S.No	CT/PT ratio	Import (MU)
			Status					
4	Town	LOCAL TR K Gate	Metered	Functional	Mixed	4902530	-7.5	-0.12
5	Town	Kasmeri Gate BUS COUPLER	Metered	Functional	Mixed	4902585	-400	-0.01
6	City	GopiNath Bazaar (- ve) Naraian	Metered	Functional	Mixed	4902566	-100	-13.06
7	City	LOCAL TRnaraina	Metered	Functional	Mixed	4902602	-100	-0.32
8	Town	BUS COUPLER Rohtak Road	Metered	Functional	Mixed	4902559	300	0.06
9	Urban	LOCAL TR SMB	Metered	Functional	Mixed	4902561	-7.5	-0.59
10	Urban	LOCAL TR Rohini	Metered	Functional	Mixed	4902597	-100	-0.45
11	Sub Urban	LOCAL TRKanjawala	Metered	Functional	Mixed	4865071	- 266.6 6	-0.26
12	Town	LOCAL TRSubzimandi	Metered	Functional	Mixed	4902604	-100	-0.15
13	BSES	DCMNuruddin Park BG Road	Metered	Functional	Mixed	4902579	500	4.97
14	BSES	DCMchowk BG Road	Metered	Functional	Mixed	4902526	500	6.1
15	BSES	Sadar-S/S BG Road	Metered	Functional	Mixed	4865090	500	6.55
16	BSES	CSA colony BG Road	Metered	Functional	Mixed	4865088	166.6 6	0
17	BSES	Philips DMS	Metered	Functional	Mixed	4902568	100	4.39
18	Town	Tibia College Faiz Road	Metered	Functional	Mixed	4902540	100	9.83
19	Town	EAST PARK ROAD Faiz Road	Metered	Functional	Mixed	4902520	100	9.34
20	Town	ManakPuraFaiz Road	Metered	Functional	Mixed	4902536	100	6.16
21	City	ESI Hospital and Rameshnagar-2 Vishal	Metered	Functional	Mixed	4902539	100	5.63
22	City	Moti Nagar Tanga stand S. B. Mill	Metered	Functional	Mixed	4902548	100	0
23	City	41 Rama Road (70 Rama Road) S. B. Mill	Metered	Functional	Mixed	4865089	100	0
24	City	51 Rama Road S. B. Mill	Metered	Functional	Mixed	4902528	100	0.08
25	City	Nazafgarh Road S. B. Milss	Metered	Functional	Mixed	4902564	100	6.23
26	City	Moti Nagar Kiosk S B Mill	Metered	Functional	Mixed	4902591	1333. 33	4.49
27	City	BSES NDPL (EX) ON BUS 1&2 Rewari Line	Metered	Functional	Mixed	4902577	400	0.09
28	City	NDPL BSES (EX) ON BUS 2&3 Rewari Line	Metered	Functional	Mixed	4902525	400	-0.08

S. No	Circle	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type			Import (MU)
29	Sub Urban	Local TrBawana	Metered	Functional	Mixed	4902543	-100	-0.23

Voltage wise exchange point details

The voltage wise total no of exchange points & energy consumptions at all the voltage level are presented below:

Table 30: Energy exchange points at Various Voltage Level

Voltage Level (kV)	Exchange Points	Input Energy (MU)
220kV	4	147.93
66kV	34	6235.13
33kV	36	3070.23
11kV	29	54.04

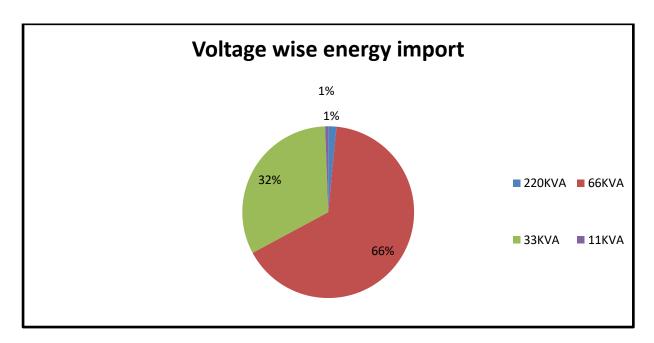


Figure 12: Voltage wise Energy Import (%)

3.3 Unit wise Performance

Tata Power DDL has total five circles, twelve divisions and there are following category in which the energy consumption is divided Residential, agriculture, Commercial & others. The performance of all the division are shown in below table:

Table 31: Unit Wise Performance

				C	ivision Wise	Losses							
					Period From	1st April,	2021 To 3	1st March,	2022				
			Consumer	profile		Energy		Losses		Commercial Parameter			
S.No	Name of	Name of		Total	Total	paran	ameters		T0.D	Billed	Collected		AT &
50	circle	Division	Consumer category	Number of connections (Nos)	Connected Load (MW)	Input energy (MU)	Billed energy (MU)	T&D loss (MU)	T&D loss (%)	Amount in Rs. Crore	Amount in Rs. Crore	Collection Efficiency	C loss (%)
			Residential	102729	156		220			115	115	100%	
	URBAN		Agricultural	500	4		2			1	1	100%	
1	1 CIRCLE	I RADII	Commercial/Industrial-LT	20458	203	622	294	68	11%	401	403	100%	
			Commercial/Industrial-HT	54	15		24			31	30	99%	
			Others	557	7		13			15	21	141%	
Suk	o-total			124298	385	622	554	68	11%	563	570	101%	10%
			Residential	66739	98		143			74	74	100%	
	SUB-		Agricultural	1673	10		3			3	3	101%	
2	URBAN	BAWANA	Commercial/Industrial-LT	21551	566	1303	977	132	10%	1265	1267	100%	
	CIRCLE		Commercial/Industrial-HT	32	8		18			22	22	100%	
			Others	362	9		31			30	32	105%	
Suk	o-total			90357	691	1303	1171	132	10%	1394	1397	100%	10%
3	TOWN	CIVIL	Residential	110501	288	773	376	23	3%	242	242	100%	
3	CIRCLE	LINES	Agricultural	0	0	//3	0	23	3/0	0	0	0%	

				C	Division Wise	Losses											
S.No	Name	Name of			Period From	1st April,	2021 To 3	1st March,	, 2022								
			Commercial/Industrial-LT	23841	103		94			142	143	101%					
			Commercial/Industrial-HT	68	54		88			116	116	100%					
			Others	816	74		192			178	174	98%					
Sub	o-total			135226	519	773	751	23	3%	677	675	100%	3%				
			Residential	119262	272		361			216	216	100%					
		1/501141/	Agricultural	0	0		0			0	0	0%					
4	TOWN CIRCLE	KESHAV PURAM	Commercial/Industrial-LT	27184	240	804	311	50	6%	423	425	101%					
	CINCLL	TORAW	Commercial/Industrial-HT	116	38		69			85	84	99%					
			Others	532	6		13			14	6	43%					
Sub	o-total			147094	556	804	754	50	6%	738	731	99%	7%				
			Residential	181356	286		428			213	212	100%					
	METDO	MANICOL	Agricultural	0	0		0			0	0	0%					
5	METRO CIRCLE	MANGOL PURI	Commercial/Industrial-LT	22335	98	619	113	42	7%	157	157	100%					
	CINCLL	1 OIKI	Commercial/Industrial-HT	23	9		21			24	24	100%					
			Others	587	7		15			17	20	118%					
Suk	o-total			204301	400	619	577	42	7%	410	413	101%	6%				
			Residential	145437	327		435			264	265	100%					
	NACTOO	MODEL	Agricultural	1	0		0			0	0	0%					
6	METRO CIRCLE	MODEL TOWN	Commercial/Industrial-LT	21370	105	668	107	41	6%	158	158	100%					
	CINCLE	10001	Commercial/Industrial-HT	44	14		22			30	30	99%					
			Others	729	40		62			63	62	98%					
Suk	o-total			167581	486	668	626	41	6%	515	516	100%	6%				
			Residential	115755	296		378			234	235	100%					
	CITY	MOTI	Agricultural	0	0		0			0	0	0%					
7	CITY CIRCLE	MOTI NAGAR	Commercial/Industrial-LT	27257	219	753	237	41 5%		37 41 5%	37 41 5%	7 41 !	41 5%	348	350	100%	
	CINCLE	NAGAR —	Commercial/Industrial-HT	124	63		83				113	112	99%				
			Others	652	8		14			16	15	97%					

	Division Wise Losses												
S.No	Name	Name of			Period From	1st April,	2021 To 3	1st March,	2022				
Suk	-total			143788	586	753	712	41	5%	711	712	100%	5%
			Residential	108737	172		246			126	126	100%	
	SUB-		Agricultural	2270	19		8			6	5	99%	
8	URBAN	NARELA	Commercial/Industrial-LT	18130	350	1089	622	95	9%	792	796	101%	
	CIRCLE		Commercial/Industrial-HT	145	40		91			111	110	99%	
			Others	874	14		27			31	34	110%	
Suk	o-total			130156	595	1089	994	95	9%	1065	1072	101%	8%
			Residential	102456	350		409			276	278	100%	
	NASTRO	DITALA	Agricultural	0	0	612	0			0	0	0%	
9	METRO CIRCLE		Commercial/Industrial-LT	16828	107		108	39	6%	157	159	101%	
	CINCLE		Commercial/Industrial-HT	77	37		46		61	61	100%		
			Others	505	6		11			11	11	102%	
Suk	-total			119866	500	612	574	39	6%	506	509	101%	6%
			Residential	201287	530	1034	681			413	413	100%	
	MAETRO		Agricultural	0	0		0			0	0	0%	
10	METRO CIRCLE	ROHINI	Commercial/Industrial-LT	29619	127		123	49 5%	178	179	101%		
	CINCLE		Commercial/Industrial-HT	68	47		66			86	87	101%	
			Others	916	45		116			113	118	104%	
Suk	o-total			231890	749	1034	985	49	5%	790	797	101%	4%
			Residential	130399	176		276			130	131	100%	
	URBAN		Agricultural	62	0		0			0	0	100%	
11	CIRCLE	KIRARI	Commercial/Industrial-LT	15581	49	394	52	52	13%	75	76	102%	
	CINCLE		Commercial/Industrial-HT	5	2		2			2	2	99%	
			Others	403	6		13			18	21	114%	
Suk	-total			146450	233	394	343	52	13%	226	230	102%	12%
12	URBAN	SHALIMAR	Residential	218843	373	754	527	41	5%	280	280	100%	
12	CIRCLE	BAGH	Agricultural	79	0	734	0	41	3/0	0	0	105%	

	Division Wise Losses												
S.No	Name	Name of		Period From 1st April, 2021 To 31st March, 2022									
			Commercial/Industrial-LT	24848	101		116			162	163	101%	
			Commercial/Industrial-HT	78	33		51			63	65	103%	
			Others	723	8		19			21	23	108%	
Sub-total 244571 515 754 712 41 5%				526	530	101%	5%						
			Residential	1603501	3324		4479			2583	2584	100%	
	_		Agricultural	4585	33	9425	14		673 7%	10	10	100%	
76	I	otal	Commercial/Industrial-LT	269002	2268		3153	673		4258	4276	100%	
			Commercial/Industrial-HT	834	360		579			745	745	100%	
			Others	7656	230		527			527	537	102%	
77	At comp	any level		1885578	6215	9425	8752	673	7%	8123	8152	100%	7%



3.4 Energy Conservation measures already taken & proposed for Future

> Energy Conservation measures already taken

Tata Power DDL has done various energy conservation measures to reduce the energy consumptions in FY-2021-22. Some of them are mentioned below:

- Replacement of the old inefficient ACs with energy efficient AC's
- Replacement of inefficient old fan with energy efficient BLDC Fans
- Replacement of non-conventional light with energy efficient light (LED's)

Table 32: AC Replacement Program, BLDC Fan's & (LED's) Energy saving

DSM Program	FY	Quantity (Nos)	Load reductio n (MW)	Energy Saving (MU)	CO2 reduction (mTon)
AC Replacement Scheme	FY-21-22	2148	1	1.64	1.3
BLDC Ceiling Fan	FY-21-22	620	0.03	0.12	0.1
LED Lighting Scheme	FY-21-22	99006	1	2	2
Behavioural Demand Response (BDR)	FY-21-22	2044	7.69	-	-

Energy Conservation measures Proposed for Future

- 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.
- 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.
- 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 2x10sqmm Al XLPE to 2x25sqmm Al XLPE. The reduction in resistivity will result in reduction of technical losses

3.5 Loss Reduction Measures

Tata Power- DDL has undertaken various initiative for loss reduction in its high loss districts. Some of those initiatives are as follows:

- Replacement of electromechanical meters with electronic meters
- Conducting raids in high loss areas for identifying pilferage of electricity
- Installation of meters on outer wall of premise in high loss areas
- Tata Power DDL is actively pursuing measured to reduce losses in its high loss area.

3.6 Critical Comments

Transmission & Distribution losses (T&D losses)

T& D Losses = {1- (Total energy Billed/ Total energy Input in the system)} x 100

Aggregate technical and commercial losses (AT&C losses)

AT&C Losses = {1- (Billing Efficiency x Collection Efficiency)} x 100

where, Billing efficiency= Total unit Billed/ Total unit Inputs

Collection efficiency = Revenue collected / Amount Billed

The overall average T & D Losses & AT & C Losses of the Tata Power DDL, are 7.14% & 6.80% which are significantly less than the average of all India figure which stands at close to 20%.

DISCOM T & D Losses computation approach

Transmission losses = Total Energy Purchased - Total Energy Sale - Total Input

Transmission losses (MU)	Value
Total Energy Purchased	11737.11
Total Energy Sale	1841.14
Transmission losses	471.21
Total Input	9424.75
Transmission losses (%)	4.01

3.7 Inclusion & Exclusions Not applicable

3.8 Detailed Formats to be annexed

An annual energy audit checklist is used to assess the energy efficiency of Tata based on equipment, appliances, design, and usage. Accredited Energy Audi tor 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).

IV Note of the EA/EM along with queries & replies to data gaps

Designated Consumer has T&D losses 7.14% & AT&C losses 6.80%. Various schemes have been implemented by DC to reduce losses which are shown in annual report and attached in the annexure of report.

DC is having the GIS software and SAP report which is provided for verification. Also supporting documents for the same has been provided which is attached in annexure of report.

(1) The Net Input Energy at Discom periphery as mentioned in the summary sheet is 9424.75 MUs, which is fetched from the Division wise losses sheet (This value is inclusive of energy from renewable generation (mentioned in sheet- "details of received sources") and exclusive of open access energy); whereas net input energy in "Form Input Energy" sheet is fetched from summation of meter reading of Input energy at injection points, and is inclusive of Open access MUs & exclusive of energy from renewable generation.

Particulars Particulars Particulars Particulars	Formula	Value
Division wise input energy	Α	9424.75
Open Access Data	В	88.70
Net Input including open access	C=A+B	9513.46
Solar Units Received at Discom	D	6.11
Meter reading of Input energy at injection points	E=C-D	9507.35

- (2) The entire EHT/HT/LT system is in Ring Main. For ring-main connectivity, the electrical connection keeps changing in fault conditions, maintenance purpose and optimization of asset. Thus, feeder-wise energy accounting will not be correct; it is calculated as a whole.100% consumer indexing is not in place; thus, feeder wise /DTR wise energy accounting or loss calculation is not possible. TATA Power- DDL operates in small area comprising of single unit. Thus, loss of entire unit is given. However, from FY 21-22 onwards, unit wise loss can be provided by dividing the licensed area in units/divisions by proper arrangement at our end.
- (3) There is 100% metering available at feeder and consumer level but limited metering available at distribution transformers of 250 kVA and below. Expanding metering infrastructure for all DTs would require intensive capital expenditure and with insignificant improvement margins, therefore, the Discom has requested for exemption for metering at DTs rated 250 kVA & below.

V. Annexures

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

Dr. P.P. Mittal the Founder Director of A-Z Energy Engineers Pvt. Ltd. was awarded by Govt. of India in National Energy Conservation Award 2013, 2015 & 2016. MSME Ministry Govt. of India awarded "Best Services Providing Company" it was awarded by Hon'ble Prime Minister of India. Dr. P.P. Mittal, also received the "Energy Engineer" of South-East Asia Subcontinent award 2016 & 2018 at Washington DC & Charlotte USA respectively. Haryana Govt. also recognized the services of Dr. P.P. Mittal, Ph.D, MBA, Post Graduate Diploma in Power Distribution, Chartered Engineer, Leed Auditor - Indian Green Building Council Hyderabad, Accredited Energy Auditor (AEA-011).

Accolades

- Stand first in MSME Micro Services Award 2013 and award received from Hon'ble Prime
 Minister of India on 18/10/2016 at Ludhaiana. This award consist <u>Trophy</u>, <u>Certifiate & cash prize of Rs. 3 lacs</u>.
- Reveived prestigious "Legend in Energy" Award for Asian Sub-contitnet from AEE, Atlanta at Wahington, DC on 20/09/2016.
- Received Award from AEE Atlanta at Washington citing as "Energy Engineer-2016 & 2018" of South-East Aisa sub-continent
- Received Letter of appreciateion from Chief Minister of Haryana
- Winner Haryana State Energy Conservation Award 2012 with Certificate & Rs. 50,000/-
- National Energy Conservation Award 2013
- National Energy Conservation Award 2015
- National Energy Conservation Award 2016
- Appreciation from Sh. Kalraj Misra, Hon'ble Minister of State for MSME.
- Recevied Appreciation from Sh. Haribahi Parathibhai Chaudhary, Minister of State for MSME, Govt. of India
- Recevied Appreciation from Sh. K.K. Jalan, IAS Seecretary, MSME
- Received appcreciation from Sh. Devender Singh, IAS, Secretary Power, Haryana
- Recevied Appreciation from Institute of Engineers on Energy Day

- Received Appreciation from HAREDA, Chandigarh
- Received feedback & appreciation from 400 units including CERC, UNDP & CAG
 - I. Name of the Firm

Name of Accredited Firm	Accredited Energy Auditor
A-Z Energy Engineers Pvt. Ltd. Darya Ganj New Delhi-110002	Dr. P P Mittal :- AEA 0011 Registration Number:- EmAEA-0024

II. Composition of Team

Sr. No.	Name	Qualification	EM/EA/AEA/EmAEA Registration No	Experience (In Years)/ Sector	
		Team Leade	er		
1	Dr. P.P Mittal	Ph.D, MBA	AEA-011	+45 Years	
		Sector Expe	ert		
2	Mr. Vipon Chanda	DISCOM Sector	-	30 Years	
		Team Membe	ers		
3	Mr. V.P Sharma	B. Tech	EA- 10061	32 Years	
4	Mr.Alok Kumar Tiwari	B.Tech	EM-300137	6 Years	
5	Mr. Pankaj Chauhan	Team Member	-	8 Years	

III. Registration No.

EmAEA - 0024

IV. Undertaking from EmAEA

We A-Z Energy Engineers Pvt. Ltd. hereby confirms that our AEA and all other audit team members mentioned in this report has conduct mandatory annual energy audit (Accounting) for Tata Power Delhi Distribution Limited (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.

Authorised Signatory

(Dr. P.P. MITTAL)

Director

Prepared by: A-Z Energy Engineers Pvt. Ltd.

5.2 Minutes of Meeting with the Discom.

TATA Power Delhi Distribution Ltd

A-Z Energy Engineers Pvt. Ltd.

AZ Energy Engineers audit team visited the site during August and September 2022 and conduct the energy audit accounting with reference to the TATA Power work order dated 23th March 2022 and notification from the Bureau of Energy Efficiency dated 6th October 2021 for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies.

Following are the key observations during audit.

Filled in proforma for FY 2021-22 was available with TATA Power-DDL, New Delhi.
 Audit team verified the filled in proforma.

 Client has provided the following documents for purchase power, Input/Billed energy, No. of consumers, Nos. of DT's Nos. of Circle i.e. GIS software, Fact sheet, DERC True up & Petition Filled

- Client has provided details for action plan to reduce losses.

Verified T&D losses, AT&C losses & Collection Efficiency is 7.14 %, 6.80 % & 100.36 % respectively based on the filled in proforma and verified source documents.

Signed on behalf of

Tata Power - DDL

A-Z Energy Engineers Pvt.Ltd.

(Dr.P.P.Mittal)

5.3 Check List prepared by EM/AEA

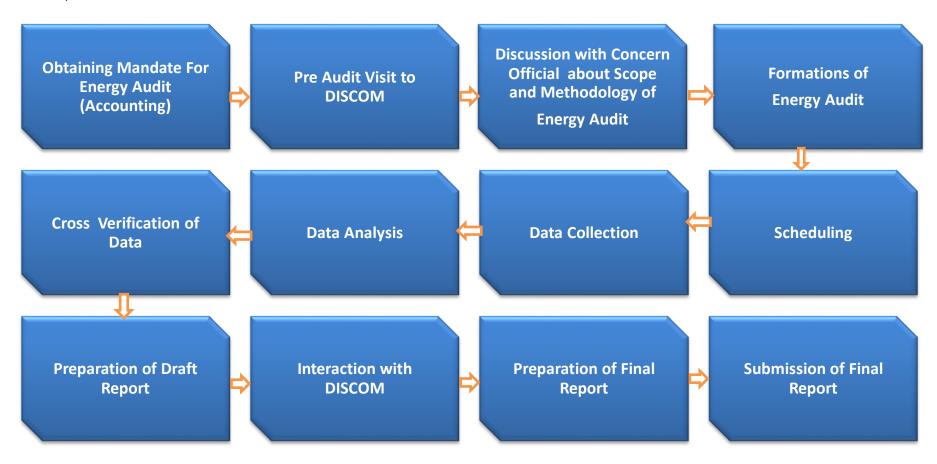
An annual energy audit checklist is used to assess the energy efficiency of Tata based on equipment, appliances, design, and usage. Accredited Energy Audi tor develops this checklist to identify opportunities for energy cost reduction and recommend solutions.

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).

5.4 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



5.5 Infrastructure Details

Table 33: Infrastructure details

1	Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
I	Number of circles	5	5		Organizational Structure
li	Number of divisions	12	12		Organizational Structure
lii	Number of sub- divisions	37	37		Organizational Structure
lv	Number of feeders	1341	1341		GIS database
V	Number of DTs	7548	7548		GIS database
Vi	Number of consumers	1885578	1885578		SAP System
2	Parameters	66kV and above	33kV	11/22kV	LT
a. i.	Number of conventional metered consumers	0	0	0	1589334
li	Number of consumers with 'smart' meters	0	0	0	254226
lii	Number of consumers with 'smart prepaid' meters	0	0	0	0
lv	Number of consumers with 'AMR' meters	5	2	1005	36273
V	Number of consumers with 'non-smart prepaid' meters	0	0	0	4733
Vi	Number of unmetered consumers	0	0	0	0
Vii	Number of total consumers	5	2	1005	1884566
b.i.	Number of conventionally metered Distribution Transformers	0	0	0	229
li	Number of DTs with communicable meters	0	0	0	4179
lii	Number of unmetered DTs	0	0	0	336
lv	Number of total Transformers	0	0	0	4744
c.i.	Number of metered feeders	132	108	1341	16095
li	Number of feeders with communicable meters	132	108	1341	16095

lii	Number of unmetered feeders	0	0	0	0			
lv	Number of total feeders	132	108	1341	16095			
d.	Line length (ct km)			1937				
e.	Length of Aerial Bunched Cables	5641						
f.	Length of Underground Cables			6055				

5.6 Power Purchase details

Table 34: Power Purchase Details

Name of Generation station	Generation Capacity (MW)	Type of station based on fuel	Type of contract in Year	Type of Grid
NTPCDadri GPS	28	Gas	25 Years	Inter State
NTPCAuriya GPS	22	Gas	35 Years	Inter State
NTPC ANTA GPS	14	Gas	30 Years	Inter State
Pragati- I	63.6	Gas	25 Years	Intra State
Pragati III	298	Gas	25 Years	Intra State
IPGCL GT	27	Gas	20 Years	Intra State
NHPCDulhasti	15	Hydro	35 Years	Inter State
NHPCParbati III	20	Hydro	40 Years	Inter State
NHPCBairasiul	6	Hydro	25 Years	Inter State
NHPCTanakpur	3.2	Hydro	35 Years	Inter State
NHPCChamera -I	13	Hydro	35 Years	Inter State
NHPCChamera-II	12	Hydro	35 Years	Inter State
NHPCChamera-III	9	Hydro	35 Years	Inter State
NHPC URI-I	16	Hydro	35 Years	Inter State
NHPC Uri-II	10	Hydro	40 Years	Inter State
NHPCDhauliganga	11	Hydro	35 Years	Inter State
NHPCSewa II	5	Hydro	35 Years	Inter State
Tala HEP	9	Hydro	35 Years	Inter State
NathpaJhakriHPS	44	Hydro	35 Years	Inter State
TehriHPP	19	Hydro	35 Years	Inter State
Koteshwar HEP	12	Hydro	35 Years	Inter State
Narora APS	14	Nuclear	43 Years	Inter State
RAPP 5&6	17	Nuclear	43 Years	Inter State
NTPCSingrauli Small				
Hydro	2	RE	35 Years	Inter State
SECI Solar				
(Renewable)	20	RE	35 Years	Inter State
Delhi Municipal Solid				
Waste Solutions Ltd.				
(Bawana) (Renewable)	7	RE	20 Years	Intra State
Nanti Hydro Power Pvt.	13.5	RE	20 Years	Inter State

Name of Generation station	Generation Capacity (MW)	Type of station based on fuel	Type of contract in Year	Type of Grid
Ltd. (Renewable)				
Suryakanta Hydro				
energies Pvt. Ltd.				
(Renewable)	14	RE	20 Years	Inter State
TimarpurOkhla Waste				
management co. Ltd.				
(Renewable)	6	RE	20 Years	Intra State
Sun Edison	180	RE	20 Years	Inter State
Taranda	12.7	RE	20 Years	Inter State
SECI WIND	50	RE	25 Years	Inter State
SECI 200 MW (SBSR)*	33	RE	25 Years	Inter State
Cosmos Hydro*	13	RE	20 Years	Inter State
NTPCAravaliJhajjar	613.8	Coal	25 Years	Inter State
NTPCDadriNCTPS(Th.) Stage II	10	Coal	25 Years	Inter State
NTPCDadriNCTPS(Th) Stage I	10	Coal	25 Years	Inter State
NTPCKahalgaon II	48.3	Coal	25 Years	Inter State
NTPCSingrauliSTPS	46	Coal	30 Years	Inter State
NTPCRihandSTPS-II	39	Coal	25 Years	Inter State
NTPCRihandSTPS-I	31	Coal	28 Years	Inter State
NTPCKahalgaon I	15.6	Coal	25 Years	Inter State
NTPCUnchahaar-II TPS	14	Coal	25 Years	Inter State
NTPCUnchahaar-III	0	Cool	OF Voore	Inter State
TPS NTPCUnchahaar-I TPS	9 7	Coal Coal	25 Years 27 Years	Inter State
NTPCFarakka	7	Coal	25 Years	Inter State
CLPJhajjar	132	Coal	25 Years	Inter State
Maithon Power Limited	300	Coal	30 Years	Inter State
CTPS 7 & CTPS 8	92	Coal	25 Years	Inter State
MTPS 6	31	Coal	25 Years	Inter State
Sasan	27 MW to 136 MW	Coal	25 Years	Inter State

5.7 Details of Consumers

Table 35: Details of Consumers

S.No	Type of Consumers	Category of Consumers (EHT/HT/LT/Othe rs)	Voltage Level (In Voltage)	No of Consumers	Total Consumption (In MU)
1	Domestic	HT/LT	11/.22/.4	1603501	4478.55
2	Commercial	LT		239165	1069
3	Water Supply			1429	255.39
4	Public Lighting			4981	118.67
5	HT Industrial			360	257.06
6	Industrial (Small)			29842	2084
7	HT Commercial			470	322.3
8	Agricultural			4585	13.91
9	EV			877	23.32
10	Others-1 (if any , specify in remarks)			368	129
		Total		1885578	8751.20

5.8 Detailed Format to be annexed

	Gen	neral Information		
1	Name of the DISCOM	TATA POWER DEL	.HI DISTRIBUTION LIN	MITED
2	i) Year of Establishment		2002-03	
	ii) Government/Public/Private	Jo	oint venture	
3	DISCOM's Contact details & Address			
i	City/Town/Village	J	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	Gan	esh 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	Mr	. HC Sharma	
-	DISCOM's)	1411	. TTC Sharma	
ii	Designation		neral Manager	
iii	Address	NDPL House, Hudson	Lines, Kingsway Camp	
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		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@ta	tapower-ddl.com
7	Period of Information			
	Year of (FY) information including Date	FY21-22, 1st Ap	ril, 2021- 31st March, 20)22
	and Month (Start & End)			-

	Performance Summary of Electricity Distri	bution Companies	
1	Period of Information Year of (FY) information including Date and Month (Start & End)	FY21-22, 1st April	, 2021- 31st March, 2022
2	Technical Details	- L	
(a)	Energy Input Details		
(i)	Input Energy Purchase (From Generation Source)	Million kwh	11737.11
(ii)	Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kwh	9424.75
(iii)	Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kwh	8752.21
(b)	Transmission and Distribution (T&D) loss Details	Million kwh	672.55
(D)	Transmission and Distribution (T&D) loss Details	%	7.14%
	Collection Efficiency	%	100%
(c)	Aggregate Technical & Commercial Loss	%	7%
or Stat loss.	of the information supplied is found to be incorrect and such informa e Government or any of the authority under them or any other perso ised Signatory and Seal		
		Signature:-	
		Name of Energy Mana	ger*: 1.b
Name o	f Authorised Signatory	Registration Number:	(Jakan)
Name o	of the DISCOM:	_^	1.0 7
Full Ad	dress:- (camella Rama)	Md Sh EM500	adab Ahmad
Seal	HOG(EAG)		

				er Pr			W 52	Detai	ls of Divis	ion Wise L				2002							2000		
5F40	Name of	Grein code	Name of	9	No ol connection	No ol connection	Consumer profile	No rumber	Connected	Connected	[Colai	%ol			Emergy parent Silled energy ()			2.00	3140	Oon Billed	mercial Parar Odlected		Ar & Clop
7140	où da	Grein main	Division	Consumer on legarly	metered (fécs)	Un-metered (Year)	olcomections (Na)	ol comections	Load matered (hms)	Load Un-matered (finkl)	Connected Load (Intel)	load	inpul smrgy (hru)	amergy amergy	Urmelwedfa szazmeni www.yy	fold energy	%olenergy consumption	r&clos (hnu)	r&plop (%)	Amount in Fa. Grore	Amount in Fo. Grave	Obliction Eliciency	(%)
	JA SAMI CI IC		6301	Residents all Agricultural Commencial/Industrial-LE	102 729 300 204 38	0	1027.29 300 20433	3.5% 0% 1 %	135 942 5 794 205 055	0	1 30 942 5 724 205 055	41 % 1% 25%	521 5005	220 A 1 25 294 55	0	220 4 1 23 294 55	40% 0% 3.%	57 22 34	17%	11436	11435	99 97% 100 00% 100 35%	
	Sub-1	otel		Commercia() of a trus-HF Others	34 33 ? 124293	0	34 337 129298	0% 0%	7 (57 334,326	0	7 (57 334,326	2% 100%	62L6006	25 58 15 548 15 26 3 60 32	0	25 38 15 548 13 58 359, 698 (538	2% 100%	62,9924	US	50 62 15 1 552 452 562, 758 549		99 13% 140 37% 10 1.31%	
	-uasan o			Asside deal Agricultural	667.00 1675		99 750 1675	74% 2%	23 2 23	0	23 12 23 1	14%		14266 513	0	142 M 3 13	1,2%	151 3044	10%	75 64 2 62	75 52 2 71	99 97% 100 74%	
_			NO PROBO	Commercial/Industrial-RF Commercial/Industrial-RF Others	21331 52 352	0	21551 52 562	24% 0%	366 EE 3.57 3.32	0	357 332	32% 1% 1%		970.59 17.54 51.27915	0	976 39 17 34 51 2791 2796	3.5% 1% 5%			1363 47 21 93 30 5 7 53 93 6		100 15% 22 30% 103 42%	
	Sub-1	olel		Residential Agricultural	90357 110301	0	90357 1 (050)	100% 3.2% 0%	69L28 287 867 0	0	69L28 287367 0	72.4: 100%	1902.724	117L219 576.46	0	570-40 0	20% 20%	131.5044	UN.	241 71	292.45147 242.44	100.24% 100.30%	10%
5	га жин са кс		GALFRANZ	Commercial/India tual-tf Commercial/India tual-Hf Others	2.5341 63 316	0	25341 63 316	13% 0%	105 245 35 701 75 947	0	105 245 55 701 75 947	20% 10% 14%	775 4500	25 39 38 21 192 0462	0	25 3 2 33 2 1 1 22 046 17 35	1.5%	22 82456	5%	141 62 116 56 177 792 256	142 77 113 94 174 51 620 6	22 64% 23 64%	
4	Sub-1	o tel		Nasida etal	119262	0	192262	100%	5 (2/252 27) 55	0	5 (2.252 271 %5	100% 49%	773.43 (b	760 60 62 561 01	0	750,696 (723 25 (0)	100%	22.82496	3%	617.482236 215.85	675.466206 213.5	99.70% 99.39%	3%
4	га жин а ка			Agricultural Commercial/India trail-tr Commercial/India trail-HT	27134 115	0	27134 116	13% 0%	0 259 77 57 95	0	2 22 77 57 95	ASY.	303 2045	0 510 33 49 03	0	0 510 20 %0 03	4 1% 2%	40 74067	916	425 03 34 3	423.53 85.7	0 00% 100 54% 23 70%	
	Sub-1	o tel		Others Reside stud	352 147094 131.255	0	3.52 1.470.94 1.81.536	100%	5 4 550.73 235 42	0	5.4 555,73 235,42	196 100% 72%	303.9543	75 4 2037 427 81	0	15 2 595 55 44 754 203 65 34 42 7 31	2% 100% 7.4%	49.74567	6%	15 8672545 797,577294 212 58	3 94 54 711 6 79 0 50 947 L 21 2 13	42 35% 92 05% 99 30%	*
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	Sub-1	otel		Others	2017 20130 L	0	387 204301	0% 100%	9.52 392.96	0	6.52 322.56	2% 100%	6123361	15 20439 576 7646	0	13.2040.3040 3.76.7645320	3% 100%	42.22(32	7%	16 3362644	12 237 231 5 413 48 725 2	113 12%	
	e F F R CO CO R C		40 PFL FOW	Residents al Agricultural Commencial/Industrial-LF	140.457 1 215.70	0	1 454.57 1 215.70	8 7% 0% 1.5%	527 M2 001 100 29	0	527 M2 0 0 1 1 00 20	67% 0% 22%	667 30 77	454 76 0 01 1 07 58	0	454 76 001 107.53	0 20% 0% 1 7%	41 12452	916	265 79 0 137 38	20 4 02 0 13 8 22	0 00 54% 0 00% 100 43%	
	Sub-1	otel		Commercial/indiction-HF Others	729 15759 L	0	7.23 167531	0% 0%	15 72 32 62 436.23	0	15 72 29 69 436 29	3% 3% 100%	662.5077	22 53 51 335 54 62 6 39 39	0	22.55 51.88554276 526.8893428	4% 10% 100%	4L 1269	6%	50.50 65.4117182 515.161.718		22.51% 23.52% 100.02%	6%
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	Sub-1			Commercial/Industrial-HF Others	124 102	0	124	0% 0%	6231 733	0	6231 733	11% 1%		35 14 15 3 731	0	25 14 25 15 20 20 25 25	12%			11515 157052025	11 2 52 15 201 1591	99 29% 96 79%	
				Paraside alcul Agricusti, anal	109 75 7 2 2 70	0	100757 2270	100% 34% 2%	171 74 13 32	0	536.39 171.74 18.52	100% 29% 3%	752.9251	71 L 7931 240 35 3 16	0	711.7390938 243.35 3.16	23% 23%	41.13702	5%	120.53	71.2 16 1139 126 03 3 43	100 14% 99 76% 98 75%	
3	anaku		HARMA	Commercial/Inductival-LF Commercial/Inductival-HF Others	131:50 143 374	0	131 33 145 334	1.4% 0%	540 30 20 31	0	340 300 20 31 14 5	30% 76 2%	1033 771	522 14 90 73 27 451 94	0	622 14 90 75 27 4619 4062	9.5% 5% 5%	94 72971	2%	791 97 1 10 73 20 3423467	20 40 110 16 23 7 7 220 6	99 47% 109 30%	
	Sub-1	o in l		Reside dual Agricultural	102-05 102-05	0	102436	100% 33% 0%	59.463 FE DE 2	0	594 63 530 24	100% 20%	1088,771	994 04 19 409 33	0	994.0419406 403.33	100% 7.1% 0%	94.72971	9%	275.43 275.43	107L39529 277 52	100.61% 100.42% 0.00%	3%
2	-uasan o			Commercial/India tual-tf Commercial/India tual-Hf	192.23	0	163.23	14%	100 S0 57 02	0	10h 9h 57 02	21%	612.5715	100 17 40 71	0	103 17 40 71	19%	58 39 79	0%	137.53	158 52 51 25	100 31 % 99 77%	
	Sub-1	otel		Others Reside stud	10366 201207	0	303 L1996 201287	100%	338 4998 330527	0	3 38 400.8 3 00 5 27	196 100% 21%	6123715	573.7736 520.52	0	11012543 573.7735644 52032	2% 100% 9.2%	33.50.79	6%	905.397052 415.05	11 401 8458 508 87 1344 41 2 52	102 10% 100 50% 22 32%	
10	e F F R CO CO R C		RONH	Agricultural Commercial/Industrial-LF Commercial/Industrial-RF	295 12 52	0	250 19 63	0% 1.5% 0%	120 M2 47 45	0	126 62 47 45	0% 17% 8%	1054 235	122 5 7 50 33	0	0 122 67 50 88	1.2%	42 42 22	3%	0 17733 3627	173 31 37 43	0 00% 100 52% 101 57%	
	Sub-1	otel		Others Reside stud	291 80 291 390 130 392	0	216 23(39) 1.00520	0% 100% 35%	40 12 749,497 173 90	0	40.12 749.897 170.90	100% 73%	1094.259	113 WAU 284 7548 2733	0	1 12 584.5487 934.7543487 273 3	12%	42.4030	5%	115 025363 790,303563 1,50.47	117 760033 796 640093 130 7	104 15% 100 30%	4%
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	Sub-1	otel		Commercial/Induction-HF Others	3 403 (4640)	0	405 146490	0% 0% 100%	9.59 233.03	0	191 539 239.09	2% 100%	3943977	15 300 36 342 6456	0	15.5000.0017 342.640.002	0% 4% 100%	5L 752L5	LSNs.	2 47 18 1971029 225.937 003	2 45 20 7 20 552 22 9 30 050 2	99 19% 11.5 87% 10 L 73%	12%
12	JA SAMI CI RC		RUMAL M	Residents al Agricultural Commercial/Industrial-LE	21884.5 73 24849	0	218045 72 24049	35% 0%	572 95 0 491 1 00 59	0	572 95 0 491 100 53	72% 0% 20%	7353517	3.25 73 0.44 113.35	0	0.44 113.36	7.8% 0% 16%	41 50720	3%	230 29 0 19 1 51 55	279 95 0 2 162 63	99 87% 103 26% 100 65%	
	Sub-1	o in l		Commercial/Indicatival-HF Others	78 725 29157 L	0	73 725 24671	0% 0%	60.2 704.0 704.01	0	2022 9226 192416	2% 100%	759.39 17	30 85 18 83444 71 2 4644	0	30 8 5 1 8 8 3 44 4 2 50 7 1 2 4 6 9 4 9 2 7	7% 2% 100%	4L36726	5%	52 35 20 3495 133 525 31662	94.26 22.200.247 22.200.200 20.200.200	102 75% 107 89% 100 77%	5%
Ī.,				Asside deal Agricultural	0	0	0	ON: ON:	0	0	0	ON: ON:		0	0	0	ON: ON:	0	0%	0	0	0.00%	
Ĺ				Commercial/India trail-If Commercial/India trail-Iff Others	0	0	0	ON:	0	0	0	ON:	Ľ	0	0	0	0% 0%			0	0	0 00%	
	Sub-1	o Mail		Residents at Agricultural	0	0	0	100% 0% 0%	0	0	0	100% 0%	0	0	0	0	100% 0% 0%	0	0%	0	0	0.00% 0.00%	
14				Commercial/Induction-LF Commercial/Induction-HF Others	0	0	0	0% 0%	0	0	0	0% 0%		0	0	0	ONS ONS	0	0%	0	0	0 00% 0 00%	
	Sub-1	otel		Reside dual Agricultural	0	0	0	100% 0%	0	0	0	100% 0%	0	0	0	0	100% 0% 0%	0	0%	0	0	0.00% 0.00%	100%
13				Commercial/Industrial-LF Commercial/Industrial-RF Others	0	0	0	ON: ON:	0	0	0	0% 0%		0	0	0	0% 0%	0	0%	0	0	0 00% 0 00% 0 00%	
	Sub-1	otel		Reside stud	0	0	0	100% DK	0	0	0	100% 0%	0	0	0	0	100% 0%	0	0%	0	0	0.00%	100%
10				Agricultural Commercial/Industrial-LF Commercial/Industrial-RF	0	0	0	ON: ON:	0	0	0	ON: ON:		0	0	0	0% 0%	0	0%	0	0	0 00% 0 00% 0 00%	
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17				Agricultural Commercial/Industrial-LF Commercial/Industrial-RF	0	0	0	0% 0%	0	0	0	0% 0%		0	0	0	ONS ONS	0	0%	0	0	000%	
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21				Commercial/Induction-Uf Commercial/Induction-Hf Others	0	0	0 0	a coc/ol a coc/ol a coc/ol	0	0	0	ACTY/OF ACTY/OF ACTY/OF		0	0	0	Acrycol Idyrox Idyrox	0	0%	0	0	0 00% 0 00% 0 00%	
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22				Agricultural Commercial/Indiatod-LF Commercial/Indiatod-RF	0	0	0	A ON/OI A ON/OI A ON/OI	0	0	0	ANY/OI ANY/OI ANY/OI		0	0	0	ADYDI ADYDI IDYDA	0	0%	0	0	0 00% 0 00% 0 00%	
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25				Agricultural Commercial/Indiction-LF Commercial/Indiction-RF	0	0	0	A ON/OI A ON/OI A ON/OI	0	0	0	ACTY/OI ACTY/OI ACTY/OI		0	0	0	ARIQUIA ARIQUIA ARIQUIA	0	0%	0	0	0 00% 0 00%	
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Ir	np ut Energy	y purc hased k	(0)														20.0000000			200000000000000000000000000000000000000		Provisional values
A.1																	11737.105		Power purc	hase Invoice		will be revised at
A2 T	Fransmission	n loss (%)															4%		Power purc	hase Invoice		year end.
A3 TI	Fransmission																471.21062					PGCIL & DTLIOSSE
	nergy sold	outside1he pe	riphery MU)																Power purc	hara Impira		Provisional values,
A4																	1841.1416		rower purc	nase invoice		will be revised at year end.
0) pen access	sale (MU)																				Energy supplies to consumers on
ده																	88.703969					open access mode
																						in the licensee area of Tata Powe
A6 EI	EHT sale																156.87787		From Regu	latory data		DOL.
		ergy (received eringavailable															9507.35 Kes					
A9 B	ls 100% mete	eri ngavaila Ne ng availa Nea1	ea1 11 IV Se														93%	Energy.	Audi1 andG IS	Data jabove 2	2501VA)	
A.11 %	a of meterin	ng availa Neat ns at 6610 volt	consumerer	vd													100% 132		From Billing GIS Dat	data base		
A.13 N	No of feeder	rs at 33 EV vol1	ige level														108		G IS Dat	a base		
A.15 N	No of LT fee	rsaf 111V volt derslevel															1341 16095		G IS Dat	a base		
		c tr. tm) a166 c tr. tm) a133															538.7 477.3		G IS Dat	a base		
A.18 Li A.19 Li	inelength Linelength	k H. Im) at 11 Im) at IT leve	tV voltage ler I	vel													5132 7485		G IS Dat			
A.20 Le	Length of Ae	erial Bunched C nderground Ca	ables														5641 6055		GIS Dat	a base		
	HT/LT milo	go and Ca															0.8213761		35.00			
-						1						ection points										Remarks (Many)
								Feeder Melenag	State of Meter	ng Date	Feeder Troe (April	States % data	of Commen	Total		Period f	romto		Sales			
700		0,000	Volte	Division	Sub-Division	Pender	Pender	States (Victored)	(Faschossi/ Nos-	Do te of	Ted actination (boot	% data recore	rof	Total Number						Rem	er la	
SNo	enol	Grele	(SVA)	(KVA)	(KVA)	10	Name	AMIYAMR)	(metro ml)	acted neter reading		Ame	nies mies	horn in the	on2 wien	Cr/Presio	Import (hru)	Export (MU)		(Source:		
										/ reading		artona tralle	rester rest	owned			3000 A	2000				
-		_				-				aura ke		of the second	-									
																						Period From 1st
																						April, 2021 To 31s March, 2022.
B.1		Sub-Urban	66				Na rela TX 1	Metered	Functional		Mixed				4864963	1000	253.51					Circle denotes the
																						geograp hical locations of
																						respective feeders at injection points
8.2		Sub-Urban	66				Na rela TX 2				Mixed				5128462	500	279.27			- 8		
8.4 8.4		Sub-Urban Sub-Urban	66 11			10	Na rela TX 3 DCALTR Nare	Metered	Functional Functional		Mixed Mixed				4865052 4902583	1000	163.52 -0.22					
8.5		Sub-Urban Sub-Urban	66 66				Railway CH- Railway CH-J	Metered	Functional Functional		Mixed Mixed				48649.52 48650.39	-625 -500	-28.29 -14.20					
B.7		Town	66				Sopal Pur TX	Metered	Functional	0	Mixed				4964976	2000	34.02					
8.8		Town Town	33				iopal PurTX iopal PurTX	Metered	Functional Functional		Mixed Mixed				5128429 4864924	1000	227.91 265.54					-
8.10 8.11		Town	11 66				CALTR Gopal Purt X 4 160	Metered Metered	Functional Functional		Mixed Mixed			1	4865091 5295184	-7.5 1000	-0.19 448.76					1
8.12 8.13		Town	220				Gate 220 KV	Metered	Functional Functional		Mixed Mixed				4902482 5128473	500 1000	58.17					
B.14		Town	33			Kasmeri	Gate33 KV C	Metered	Functional		Mixed				4864791	266.66	55.44 30.54					
8.15 8.16		Town	11 33			SBT K.Gate F Kasmeri	/o No.II Mah Ga1e33 KV C	Metered	Functional Functional		Mixed Mixed				4865074 4864867	133.33 500	5.90 17.06					
8.17 8.18		Town	33 11				eri Gate 20 M DCALTR K.Ga		Functional Functional	0	Mixed Mixed				4864797 4902530	100 -7.5	21.44 -0.12					
8.19		Town	11			Kasmer	i Gale BUSC	Metered	Functional		Mixed				4902585	-400	-0.01					
8.20 8.21		Gity Gity	33			O/G R	Payal Ct1 Na PWARI LINE N	Metered	Functional Functional		Mixed Mixed				4864836 4865182	4000	57.41					
8.23 8.23		Gity Gity	33				PURICEF1 F 6 MVATR-1	Metered Metered	Functional Functional	10	Mixed Mixed				4864865 4864880	1000 300	73.75 21.16					
8.24 8.25		Gity Gity	33 11			33 tV 1	6 MVATR-2 h Bazaar ve	Metered	Functional		Mixed Mixed				5295128 4902566	50 -100	44.67 -13.06					
8.26		G1y	11			10	CALTR na rai	Metered	Functional		Mixed				4902602	-100	-0.32					7
8.27 8.28		City City	33		3.	3KV Naraina P		Metered			Mixed Mixed				4864873 5295124	1000	77.48 20.08					
8.29 8.30		Town	33				Rama Road R	Metered	Functional		Mixed Mixed				4865179 4865152	3750 1000	66.16 7.33					
8.31 8.32		Town	33			O/G33KV	Ramp ura-1 R Ramp ura-2 R	Metered	Functional		Mixed Mixed				4902497 4864790	140.63 166.67	76.70 73.37			- 1		
8.33		Town	11			BUSCO	DUPLER ROMA	Metered	Functional		Mixed				4902559	300	0.06					
8.34 8.35		Town	33			O/G 33 EV D	C3 Romat Ro LF Kirli Nagar	Metered	Functional Functional		Mixed Mixed				5128406 4864821	625 150	7.31 69.71					
8.36 8.37		Urban Urban	33 66			TX	1 Shai mar B 2 Shai mar B	Metered	Functional Functional		Mixed Mixed				4864930 5128411	1000	304.35 157.20					
8.38		Urban	220			DM	IRC Jahangirp	Metered	Functional		Mixed		9		4902494	1000	15.34					ė,
8.39 8.40		Urban Urban	11 33			TX	IOCALTRSM 3 Shalimar B	Metered	Functional		Mixed Mixed				4902561 4864922	-7.5 1000	-0.59 288.41					
8.41 8.42		Urban Urban	220 66				MRC SMB RS 4 Shalimar B	Metered Metered			Mixed Mixed		8		4902484 40001535	500 1000	1898 11119					
8.43 8.44		Urban Urban	66			T>	1 Rohini 220	Metered			Mixed				4964964	1000	193.18					
B.4.5		Urban	66 66			TX	2 Rohini 220 3 Rohini 220	Metered	Functional		Mixed Mixed				4865022 4864997	1000	185.33 344.66					
8.46 8.47		Urban Urban	66 11				4 Rohini 220 OCALTR Rohi		Functional Functional	0	Mixed Mixed				5295166 4902597	-100	310.47 -0.45					
8.48 8.49		Sub Urban Sub Urban	66 66			Т	X 1 Kanjawa		Functional Functional		Mixed Mixed				4865041 5295182	1000	176.68					Š.
8.50		Sub Urban	11			100	X2 Kanjawa GLTR Kanjay	Metered	Functional		Mixed				4865071	-266.66	291.92 -0.26					
8.51 8.52		Metro Sub Urban	66 66				V DMRC MUI 'X 3 Kanjawa		Functional Functional		Mixed Mixed			2	5128439 4864788	-800 2000	-3.88 493.73			-		
8.53 8.54		Town	33			т	X 2 Subzimer BG Rd-1 To	Metered			Mixed Mixed				5295137 4864831	1000	250.72					ķ.
8.55		Town	33			O/G	BG Rd-2 To	Metered	Functional		Mixed				4864825	-133.33	-46.85			- 7		
8.56 8.57		Town Town	33 11				X 1 Subzimar A L TR Subzim	Metered Metered	Functional Functional		Mixed Mixed				49649 16 49026 04	1000 -100	240.49 -0.15			- 1		
8.58		Sub Urban Metro	66			(€ 100 MV)	TR. No.1 Bay	Metered	Functional Functional		Mixed Mixed				48649 11 4902505	1000	308.78			- 1		
		Metro	66			eetv (/c	No 2 Rohini-	Metered	Functional		Mixed				5128468	1000	344.98 345.09					
8.60		Urban	33				I/C No 1 Was I/C No 2 Was		Functional Functional		Mixed Mixed				4864903 4864946	1000	337.89 339.03					
8.60 8.61 8.62		Urban	33							_						250						-
8.61		Urban Metro City	33			33 KV Peers	igami CKT to a n Park 33 K	Metered	Functional Functional		Mixed Mixed			- 1	4864901 4864810	200	45.04 115.01			-		2

8.66	ESES	11			DC M N	Jurud clin Par t	Metered	Functional		Mixed				4902579	500	4.97			_		
8.67 8.68	ES ES	11	-	_		Michows BG adars/SBG R		Functional		Mixed Mixed				4902526 4865090	500	6.10	_			-	-
8.69	ESES	11				Acolony BG F			- 8	Mixed			8	4865088	166.66	0.00	0.00				8
8.70	City City	33				Panday Naga			- 0	Mixed		- 8		5295200	100	-0.01	ķ - 8				§
8.71 8.72	ES ES Metro	11	-				Metered			Mixed				4902568 4864787	100	4.39			-	_	
8.72	Metro	66	_	_		Mangor Cara Mundle to MG	Metered Metered	Functional	- 0	Mixed				4964983	900	0.15 143.98					
8.74	Metro	66			MGPT-	off to Mangloi	Metered	Functional		Mixed	2 3	- 5	8	4864971	-800	0.00	2 2				100
8.75	Metro	66			Mund	dia to Sawda	Metered	Functional	- 8	Mixed			9	48649.50	2000	22.29	1		ě .		3
B.76	Town	11				a College faix				Mixed				4902540	100	9.83					
8.77 8.78	Town Town	11	-	-		PARK ROAD F nat Pura Faiz		Functional Functional	- 2	Mixed Mixed				4902520 4902536	100	9.34		_			- 3
8.79	Gity	11	_			and Rameshi		Functional	- 8	Mixed				4902539	100	6.16 5.63	_		_		
8.80	Giy	11				gar Tanga stan			- 3	Mixed				4902548	100	0.00					1 1
B.81	City	11			41 Rama Ros	ad 70 Rama i	Metered	Functional		Mixed				4865089	100	0.00					
8.82	City	11			51 R	ama Road S.	Metered	Functional	- 8	Mixed				4902528	100	0.08					9
8.83 8.84	61y 61y	11	-		Nazat	igarh Road S. I Nagar Kiost S	Metered	Functional		Mixed Mixed				4902564 4902591	100 1333.33	6.23		_		_	
8.85	Gity	66	-			nagar kiloska garpur Rewan				Mixed				5128441	750	4.49 28.50					
8.86	Gity	66			Papp	an Kalan Rew	Metered	Functional		Mixed				4964960	1000	82.99					
8.87	Gity	11			ES ES NOPL	EX) ON BUS 18	Metered	Functional	- 0	Mixed	3			4902577	400	0.09	1				- 6
8.88	Gity	11			NOPL ESES	EX) ON BUS 28	Metered	Functional	1	Mixed			0	4902525	400	-0.08	S 0			-	
8.89	Gity	33	-	_	33 W	Vishal -1 Rev	Metered			Mixed			0	4865158	-200	-23.33					- 0
8.90 8.91	G1y	33	-	-		Vishal -2 Rev		Functional		Mixed Mixed		10.		4964816 4964808	-187.5 -187.5	-0.41	2				
8.92	City City	66	 		66/	Mayapuri Rev 11 Tr 3 Revva	Metered	Functional		Mixed				4865005	-250	-17.38 -9.31	2 8				
8.93	Giy	33				11 Tr 1 Rewa			- 8	Mixed	9			4864822	-100	-3.34	1				- 5
8.94	Town	33				ohlat road Su				Mixed	\$		0	4964866	1250	28.64	9				1
8.95	City	33		_	Vishal	Imp/Exp) Sude			- 8	Mixed				4865149	-187.5	-0.33	1 1				- 0
8.96 8.97	Sub Urban Sub Urban		-	_		TX18awan	Metered Metered	Functional		Mixed				4964992 4964827	1000 333.33	185.51				-	-
8.98	Sub Urban						Metered		- 2	Mixed			9	48648.92	4000	200.07 250.25					
8.99	Sub Urban	11				Local Tr Bawa	Metered	Functional	1	Mixed	8 8		8	4902543	-100	-0.23	1 1				2.
8.100	Sub Urban	66			DE	LHIMSWBay	Metered	Functional		Mixed				49649.58	500	138.44	1 1				
8.101	Sub Urban					MER 4 160 M				Mixed				5128449 YE468146	2000	232.69		_			
8.102 8.103	Urban Urban	66			661V II	ncomer 1-220 ncomer 2-220	Metered	Functional Functional	- 0	Mixed Mixed				XF465246 XF465248	1	336.12 227.53				_	
8.104	u i v d					1							8	,		-27.33	5 8				
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8.145 8.146																					
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B.148					0			-	- 3		9	7		3			1				- 0
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8.164																					
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8.13394 8.13395 8.13396 8.13397 8.13398 8.13490 8.13400							li di		(MU)	na han							950735	0.00	oco Tac			
8.13394 8.13395 8.13396 8.13397 8.13398 8.13399 8.13400							Netinau	Tota tenergyat D		rery (MU)				U S			950735	0.00	9507.38			
8.13394 8.13395 8.13396 8.13397 8.13398 8.13490 8.13400							Netinou			тегу (М.И.)							9507.35	0.00	9507.38			
8.13394 8.13395 8.13396 8.13397 8.13399 8.13400 8.13401 8.13402							Netinou	tenergyat D	SCOM se fs	тегу (М.И.)							950735	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13398 8.13490 8.13400			Hara anta	unida para la mana	Lorieque his		Netinau	tenergyat D		nery (MU)							9507.35	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13399 8.13400 8.13401 8.13402			Please enter	voltage leve Rederid an	d orleave bland diameories	at the blant	Netinou	tenergyat D	SCOM se fs	nery (MU)							9507.35	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13399 8.13400 8.13401 8.13402			Please enter	feederid an	d name or lea	at we blant	Netinou	tenergyat D	SCOM se fs	nery (MU)							9507.35	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13399 8.13400 8.13401 8.13402			Please enter Entermeter	voltage leve feeder id an no orleave tratio orleave	dnameorlea Nant	at we blant	Metinou	tenergyat D	SCOM se fs	nery (MU)							9507.35	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13399 8.13400 8.13401 8.13402			Please enter Enter meter Enter CT/PT Please enter	feeder id an no orleave t ratio orleav numeric val	d name or lea plant e blant ue or O	at se blant	Metinou	tenergyat D	SCOM se fs	nery (MU)							9507.38	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13398 8.13400 8.13401 8.12402 Color code			Please enter Enter meter Enter CT/PT Please enter Please selec	Rederid an no orleave t ratio orleave numeric val tyes or no fr	d name or lea plant e blant ue or O	at the blant	Netinou	tenergyat D	SCOM se fs	nery (MU)							9507.28	0.00	9507.35			
8.13394 8.13395 8.13396 8.13397 8.13398 8.13400 8.13401 8.12402 Color code			Please enter Enter meter Enter CT/PT Please enter	Rederid an no orleave t ratio orleave numeric val tyes or no fr	d name or lea plant e blant ue or O	at we blant	Netinau	tenergyat D	SCOM se fs	nery (MU)							9507.35	0.00	9507.35			
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slance Subsidy yet be Received from	State Govt.		(in Rs. Cr.)	15=13-14	3.4			•				-30.26
Subsidy Received Balance Subsidy yet from State Govt. to be Received from	(As against col.13)		(in Rs. Cr.)	14				921.93				921.93
Subsidy Actually Billed / dalmed	from State Govt. (As against col.12)		(in Rs. Cr.)	13		984 47	001.17	4.35			2.75	888,27
Govt.	Total	100		11+01=11								
Subsidy Due from State Govt.	Un-metered	Energy	(In Rs. Cr.)	11=6x9								
Subsidy	Metered	Energy		10=5X8								
f Subsidy as ate govt.	Un-metered	Energy**	Wh)	6								
Applicable rate of Subsidy as notified by State govt.	Motored Energy##	determined and de	(in Rs/kWh)	8		Entire current demand	Rs. 800 per month	Rs. 105 per kw/month				
	Total	100		7=5+6		1008436654 Entire current						
Subsidized Billed Energy	Un-metered*	(out of col.3)	(in kWh)	9								
Subsidiz	Motored (cut of col 2)	Hetered (out of col.s.))	2		1008436654						
	Total	100		4=2+3		1008436654	1476093789 i	13118680 ii				
Billed Energy	Ilemotomedi	- Colonial C	(In kWh)	3								
	Meterod	na mara		2		1008436654	1476093789	13118680				
						0-200 units pm	201-400 units pm					
Consumer Category (Separate for each subsidized consumer category)				1	B/F	lime desired		Agriculture	Commercial/Industria - T	Commercial/Industria I - HT	Other (specify)	Total

*Basis of assessment of energy to be provided in the notes along with relevant Government Orders **Provide copy of relevant Government Orders

Residential includes 0-200 units & 201-400 units subsidy, CGHS & Sikh Riots

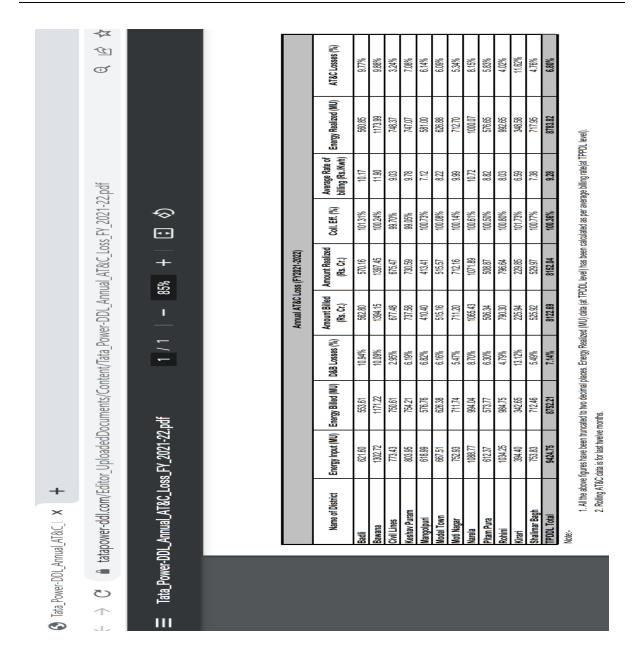
Other includes Lawyer Chamber subsidy

i. Subsidy in 201-400 block is being given at flat rate of Rs. 800 per month, thus Subsidized Billed Energy cannot be ascertained. It Subsidy in Agriculture category is being given at the flat of Rs. 105 per kw/month on Fixed charges

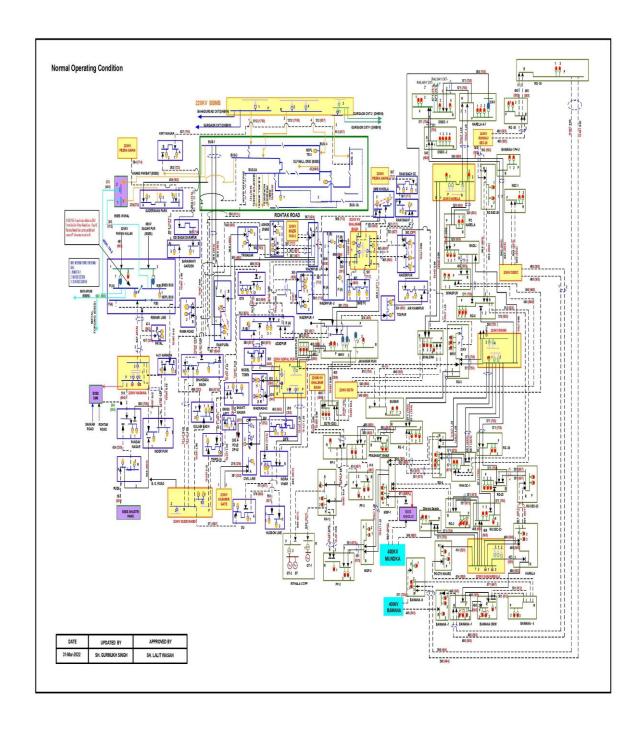
iii. Though Subsidy is also being given to Lawyer's chamber connections at court complexes but extraction of actual units consumer and subsidized billed energy cannot b







5.9 Single Line Diagram (SLD)



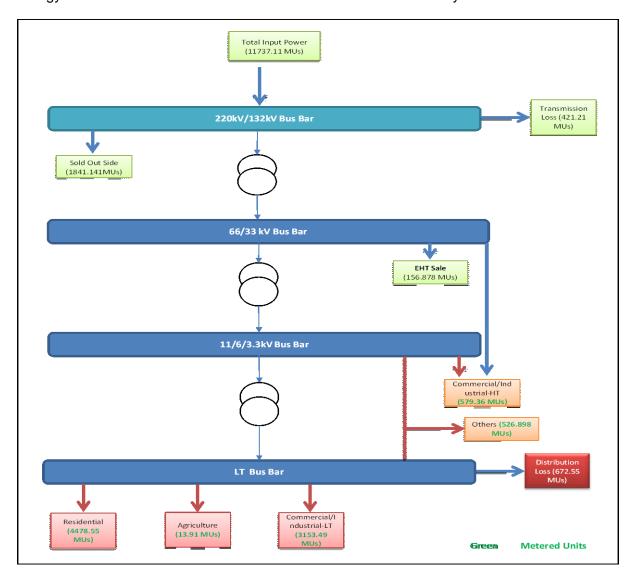
5.10 Electrical Distribution System

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

Energy flow between distribution transformer, or high voltage distribution system to endconsumer, including ring main system

Energy flow between Feeder to end-consumer &

Energy flow between 132kV/33kV/20 kV/11 kV/6.0 kV/3.3 kV directly to consumer



5.11 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 skillsets 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, NetajiSubhas Institute of Technology etc. to carry out research activities in energy space.

Table 36: About TATA POWER-DDL

World Class Technol	ogies , 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.

World Class Technol	ogies , Tata Power DDL
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.
Smart Street Light Management system	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.
Field Force Automation	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.

5.12 List of parameters arrived through calculation or Formulae with list of source of data

Transmission and Distribution Losses (T&D Losses)

- Energy losses occur in the process of supplying electricity to consumers due to technical and commercial reasons.
- The technical losses are due to energy dissipated in the conductors, transformers and other equipment used for transmission, transformation, sub-transmission and distribution of power.
- These technical losses are inherent in a system and can be reduced to a certain level.
- Pilferage by hooking, bypassing meters, defective meters, errors in meter reading and in estimating un-metered supply of energy are the main sources of the commercial losses.
- There is another component of commercial losses, which is attributable to non-recovery of the billed amount, which is reflected in collection efficiency.
- T&D losses together with loss in collection give us Aggregate Technical & Commercial (AT&C) losses.

Calculation of transmission losses:

Transmission losses = Total Energy Purchased - Total Energy Sale - Total Input

Table 37: Calculation of transmission losses

Transmission losses (MU)	Value
Total Energy Purchased	11737.11
Total Energy Sale	1841.14
Transmission losses	471.21
Total Input	9424.75
Transmission losses (%)	4.01

