

FY 2021-22

**ANNUAL ENERGY AUDIT REPORT
OF
BSES YAMUNA POWER LTD.
SHAKTI KIRAN BUILDING, KARKARDOOMA, DELHI-110032**

*Audit Conducted and Report prepared by
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Last but not the least; The management of the company deserves special appreciation for undertaking energy audit of its system, this initiative by the company is a major step towards mitigating the biggest risk the mankind is facing in this 21st century- global warming.

PESPL looks forward to their continued support in all future endeavors as well.

PESPL Team

LIST OF ABBREVIATIONS

AEA	Accredited Energy Auditor
AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AT&C	Aggregate Technical and Commercial
APFC	Automatic Power Factor Control
BEE	Bureau of Energy Efficiency
BYPL	BSES Rajdhani Power Limited
CEA	Certified Energy Auditor
CERC	Central Electricity Regulatory Commission (India)
CO2	Carbon dioxide
CKT	Circuit
CT	Current Transformer
DC	Designated Consumer
DEEP	Discovery of Efficient Electricity Price
DERC	Delhi Electric Regulatory Company
DISCOM	Electricity Distribution Company
DT	Distribution Transformer
EAR	Energy Audit Report
EC	Energy Conservation
EE	Energy Efficiency
ECM	Energy Performance Improvement Action
EHT	Extra High Tension
EHV	Extra High Voltage
EM	Energy Manager
FY	Financial Year
GHG	Greenhouse Gas
HT	High Tension
HVDS	High Voltage Distribution System
IPMVP	International Performance Measurement and Verification Protocol
LT	Low Tension
MNRES	Indian Ministry of Non-Conventional and renewable Energy Sources
MoP	Ministry of Power
M&V	Measurement and Verification
NCV	Net Calorific Value
NO	Nodal Officer
OA	Open Access
O&M	Operation and Maintenance
PF	Power Factor
PLC	Programmable Logic Control
POC	Point of Connection
PT	Potential Transformer
PX	Power Exchange

PMV	Performance Measurement and Verification
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

UNITS AND MEASURES

GWh (or MU)	Giga Watt Hour or Million Units
KVA	Kilo Volt Ampere
KW	Kilo Watt
KWh	Kilo Watt Hour (Unit)
MWe / GWe	Megawatt / Gigawatt of electricity capacity
V	Voltage

Conversion Factors

1kgoe	10000 Kcal
1 kWh	860 Kcal

Emission Factor

Electricity	0.82 Kg Co ₂ /KWh
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Executive summary

SAVE ENERGY- SAVE FUTURE

Brief Overview of the BSES- Yamuna Power Ltd. (BYPL)

BYPL is responsible for Central and East Delhi Power Distribution, spread over an area of 200 sq. km catering to a customer base of 1.77 million, with the apparent customer density for it being 8850 Cons./sq. km. While the energy billed by BYPL for the customer is 5865 MU, the peak demand of 1662 MW, the monthly consumption per customer stands at 276.2Kwh/Month. BYPL cater to areas spread over 14 division across Central and East areas including Chandni Chowk, Darya Ganj, GT Road, Karkardooma, Karawal Nagar, Krishna Nagar, Laxmi Nagar, Mayur Vihar Phase I & II, Mayur Vihar – Phase III, Nandnagri, Pahar Ganj, Patel Nagar, Shankar Road and Yamuna Vihar. The Consumer profile of BYPL is shown in following table.

Goals and Objective

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

The Annual Energy Audit (Accounting) at BYPL 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.

Period of audit

Energy audit activity was started with a meeting at Head Office of BYPL in the month of June 2022. Based on the requirement, visits were made to Division, Subdivision, Grid etc. for data collection and technical discussion. The period of study was from April 2021 to March 2022.

Major challenges and goals for the upcoming year

- For sustainable growth of company major challenge and goal is to reduce T&D and AT&C loss in divisions which are having losses higher than Discom average value.
- To meet the T&D reduction target given by DERC and PAT target given by BEE.

Major activities to meet challenge and goal

To achieve Loss reduction target BYPL has started various activities for strengthening and monitoring of entire network so that corrective action can be taken to reduce losses.

Summary and classification of Energy

- Being a Discom, BYPL procures Electrical Energy from long term and short-term sources and distributed it to the end users.
- To fulfill the requirement of RPO compliance BYPL is procuring power from long term purchases, net metering consumers and REC certificates etc.

Energy Conservation measures and initiative for technical loss reduction

- BYPL has done various energy conservation measures to reduce the energy consumption in FY 2021-22. Some of them are mentioned below:
 - ❖ Replacement of the old inefficient ACs with energy efficient AC's
 - ❖ Replacement of non-conventional light with energy efficient light (LED's)
 - ❖ Installation of India's first Smartly managed EV Charging station in Mayur Vihar.
- Thermo-scanning of assets for hotspot detection to perform conditional-based monitoring for sustainable energy conservation to ensure efficiency and effectiveness of equipment and systems.
- Replacement of bare conductor with armoured cable in Rural area in MGJG scheme.
- Replacement of 2 core X 6 sq. mm service cable with 2 core X 10/25 sq. mm cables.
- Replacement of bare conductor with Aerial Bunched Cables (ABC).
- Replacement of static electronic meters with digital smart meters at the consumers.
- New Grids, HT and LT feeders
- DT Addition/ Augmentation for overloaded DT, HVDS
- Balancing of Load at all voltage levels; Shunt Capacitors at LV
- LT Less system for Agriculture Pump connections
- Pole Metering; Group Metering,
- HVDS Bushing mounted DB
- New armoured street light ckts in HVDS area
- Heat Shrink Coatings on theft prone points in network
- Chemical Joints; Application of Conductive paste on LT bushings to reduce contact resistance

Proposed Energy Conservation Measures and Initiative

- Proposed energy conservation measures to reduce the energy consumption in FY 2022-23. Some of them are mentioned below:
 - ❖ Replacement of the old inefficient ACs with energy efficient AC's
 - ❖ Managed EV charging

1 Critical Analysis and Comments

1.1 Critical Analysis

- BYPL provides services to approx. 18,29,109 consumers of various categories of consumers. The consumer base of DISCOM consists of Domestic, Non-Domestic, Industrial consumers etc.
- While the energy billed by BYPL for the customer is 6171.47 MU, the monthly consumption per customer stands at 333.7 KWh/Month. BYPL caters to area spread in 180 Sq. Km.
- Verified Distribution (T&D) losses, collection efficiency & aggregate technical & commercial losses of BYPL for FY21-22, i.e., 1st April'2021 to 31st March'2022 is 7.65%, 100.43% & 7.26 % respectively.
- BYPL has 100 % metering available at all level.
- BYPL 's distribution network consists of 3 numbers of circles, 14 numbers of divisions, 42 numbers of sub-division, 18611 number of feeders, 3958 number of DTs and 1829109 numbers of consumers.
- The electrical energy which is supplied by Delhi Transco & Power Grid Corporation Ltd. at 400 KV, 220 KV, 66 KV, and 33 KV and same is supplied to consumers at 66 KV, 33 KV, 11 KV, 400 V and 230 V single phase.
- Being a Discom BYPL have RPO obligation which will be a certain percentage of energy sale. For the FY 2021-22 it is about 10.25%.
- It can be fulfilled by either purchasing of power from renewable energy producer or purchasing of REC certificate.
- The objective of this is to promote generation of electricity from renewable source of energy hence for non-compliance; there is a provision for penal action.
- Quantum of electricity generated under Delhi Electricity Regulatory commission (net metering for renewable energy) Regulation 2014 shall qualify towards compliance of renewable purchase obligation (RPO) for the Discom if renewable energy generator is not an obligated entity
- At present source for solar power is from SECI, Thyagraj, Delhi MSW, Roof Top Net Metering etc. The balance is by purchasing of REC certificate.
- The source for non-solar renewable energy is Delhi MSW, SECI-Alfanar (Wind) and Renewable Hydro station from Himachal Pradesh.
- In the FY 2021-22 BYPL has purchased about 453 MU of Renewable energy from above sources. Apart from this BYPL also procured 26.27 MU from Roof Top net metering.
- Discom has initiated various activities for Technical Loss reduction as well as AT & C Loss reduction. Some of major activities are mentioned as under.
 - ❖ Technical Loss Reduction Activities
 - New Grids, HT and LT feeders
 - DT Addition/ Augmentation for overloaded DT, HVDS
 - Balancing of Load at all voltage levels; Shunt Capacitors at LV
 - LT less system for Agriculture Pump connections
 - Pole Metering; Group Metering,
 - HVDS Bushing mounted DB
 - New armoured street light Ckts in HVDS area
 - Heat Shrink Coatings on theft prone points in network
 - Chemical Joints; Application of Conductive paste on LT bushings to reduce contact resistance

❖ Commercial Loss Reduction Activity

- Meter Relocation, Old Meter Replacement; MS box with shearing nut arrangement
- Bare conductor with armour cable; Armour cable in place of heavily punctured AB cable span, armoured cast tape to secure joints.
- Enforcement activities - Curbing E-Rickshaw theft, Odd Hour/ Surprise raids, Lady Guards
- Facilitator engagement to support team on the ground
- Surveillance of actions taken and generation of LR leads

1.2 Status and progress in compliance to prerequisites to energy accounting

The status and progress of compliance to prerequisites to energy accounting is discussed in following table.

Table 1 Pre-Requisites for Annual Energy Audit and periodic Energy Accounting

S No	Activity	Status
1	Identification and mapping of all of the electrical network assets.	Identified
2	Identification and mapping of high tension and low-tension consumers.	Identified & already shared
3	Development and/or implementation of information technology enabled energy accounting and audit system including associated software;	GEMS, MDAS, SAP Software are used
4	Electricity distribution company shall ensure installation of functional meters for all consumers, and feeders. It is clarified that meter installation shall be done in a phased manner within a period of 3 financial years from the date of coming into effect of these regulations in accordance with the trajectory as set-out in Annexure 2.	Already installed & shared
5	All Distribution Transformers (other than those connected with dedicated / segregated agricultural feeders, HVDS DTs below 25KVA and DTs below 25KVA) shall be metered with communicable meters. Existing non-communicable Distribution Transformer meters shall also be replaced with communicable meters and integrated with AMI.	Communication meters are being installed. Activities are going on for remaining Distribution Transformers. Already shared
Sr No	Activity	Status

6	To establish an IT system to create energy accounting reports without any manual interference. Such system shall be established within a period of 3 years from the date of coming into effect of these regulations for urban and priority area consumers; and within 5 years from the date of coming into effect of these regulations for rural consumers excluding agricultural consumers.	Ongoing
7	Create a centralized energy accounting and audit cell comprising of nodal officer, energy manager, IT manager (not below 5 years' service experience) and a financial manager (not below 5 years' service experience).	Already implemented
7.1	Nodal Officer, who shall be a full-time employee of the Electricity Distribution Company in the rank of the Chief Engineer or above and also having professional experience of not less than five years.	List have already shared
7.2	1 Energy Manager, 1 Financial Manager and 1 IT Manager, having professional experience of not less than five years.	List have already shared

1.3 Management Analysis

BYPL is having well-defined Energy Management System in place and they are following as per list given below.

- Continually improve energy performance, including energy efficiency, energy use and consumption
- Review energy use, consumption and efficiency at defined intervals
- Document the methodology and criteria used to develop the Energy Review considering facilities, equipment, systems or processes
- Establish an energy baseline and identify EnPIs (Energy Performance Indicators) appropriate for monitoring and measuring it's energy performance
- Establish, implement and maintain documented Energy Objectives and Targets
- The benefits include:
 - Identifying opportunities for improvement
 - Ensuring greater level of control
 - Enhance image
 - Satisfy the expectations of most stakeholders
 - Reduced costs and improved business performance
 - Improved compliance with energy legislation
 - Reduce carbon emissions
 - Demonstrating transparency and commitment

1.3.1 Energy management monitoring system

BYPL has established, documented, implemented and maintained an energy management system in accordance with the in house developed energy management system (EMS).

The organization has determined and documented the requirements of EMS in order to achieve continual improvement of its energy efficiency through:

- (i) Identification of sources and evaluation of past and present energy use and consumption.
- (ii) identification of applicable legal obligations and other requirements to which the organization subscribes,
- (iii) identification of priorities and setting of appropriate energy objectives and targets,
- (iv) establishing a relevant structure and programme(s) to implement the policy and achieve objectives and meet the targets,
- (v) Facilitation of planning, control, monitoring, preventive and corrective actions, and auditing and review activities to ensure both that the energy policy is complied with and the energy management system remains appropriate.

1.3.2 Bench marking

BYPL has carried out an initial review to identify the areas of energy use and opportunities for improvement. The resulting information provided the basis for setting the energy management work programme(s), objectives and targets.

1.3.2.1 Energy Base Line

Collecting and analyzing energy billing data yields important information about our energy use. Accordingly current energy uses pattern becomes baseline for future course of action plan.

Energy Base line will

- Helps define potential energy savings
- Helps to focus efforts on the most important areas
- Determines accurate avoided energy costs for calculating cost savings
- Helps identify energy saving opportunities
- Provides a baseline from which to measure the effectiveness of energy management activities.

1.3.2.2 Energy Performance Indicators:

Energy Performance indicators (EnPI) is a parameter which indicates the performance of a particular system, equipment, machineries etc. EnPI shall be reviewed and changed, if required.

1.3.3 Development and establishment of procedures include energy efficiency possibilities

Energy objectives are identified and documented at all relevant functional levels. The objectives and targets established are measurable & consistent with the energy policy, including

improvements in energy efficiency and to comply with applicable legal obligations & other requirements to which the organization subscribes. It also consider the significant energy aspects identified in the review as well as its technological options, its financial, operational and business conditions, legal requirements and the views of interested parties. The objectives contain the specific targets for those controllable parameters that have a significant impact on energy efficiency. The objectives and targets related to energy policy statement requirements are available with MR, who regularly keeps the status up to date.

These objectives and their achievement status are regularly reviewed and documented through programmes referred to as energy management program (EnMS). The responsibility, time frame & detailed action plan for achievement of these objectives is also documented in these programmes. These Programmes are reviewed at regular & planned intervals. For projects relating to new developments & new / modified activities, programmes are made / amended to ensure that the energy policy and procedures apply to such projects. If necessary, operational controls are suitably applied to ensure energy conservation and efficient use of energy. Controls are also exercised through incorporating the energy issues in the OCPs and / or providing training on the issues of concern to the relevant personnel involved in work

1.3.4 Training

BYPL has established and maintained a procedure to identify competence requirements and periodically assess the training needs to ensure the capacity of personnel, especially those carrying out energy management functions which have potential to cause significant energy use/consumption. It is envisaged to impart the training as per the established procedure of awareness, training and competence.

Departmental Heads and Location In-charges shall ensure competence of personnel working for on its behalf, related to significant energy use, on the basis of appropriate education, training, skills or experience.

Energy training needs of personnel, associated with the control of its significant energy use and the operation of its EnMS, shall be identified by the Management Representative, in consultation with Departmental Heads and Location In-charges. Energy Management System Training Calendar shall be prepared by the MR, every year, on the basis of identified training needs in consultation with Departmental Heads and Location In-charges.

BSES Yamuna Power Limited shall ensure that all personnel working for or its behalf are aware of:

- Energy Policy
- The importance of conformity with the energy policy, procedures and the requirements of EnMS
- Their Roles, responsibilities and authorities in achieving the requirements of Energy Management System
- The benefits of improved energy performance
- The impact, actual or potential, with respect to energy use and consumption, of their activities and how their activities and behaviour contribute to the achievement of energy

objectives and targets, and the potential consequences of departure from specified procedures.

Training shall be conducted on the job and / or formally in the classroom. Training methodology shall take into account differing levels of responsibility, ability, language skills, literacy and the significant energy use and consumption associated with the work activity of individual. Training attendance records shall be maintained by the Location In-charge.

Effectiveness of training provided in achieving necessary competence shall be evaluated. The training attendance and training effectiveness evaluation records shall be maintained in the form of Training Attendance Record by the Location In-charges.

Newly joined employees shall undergo Energy induction. Energy Induction shall be provided at the time of joining. Energy induction program shall cover different aspects of Energy management system in BSES Yamuna Power Limited in addition to the Energy Management System awareness requirement as defined above.

1.3.5 General audit review

A core team has been established to conduct an initial review of the organization's energy uses. The energy data are updated every year. During the review of activities related to energy use following issues are considered

- a. Past and present energy data and energy factors based on measurement and other data,
- b. Identification of areas of significant energy loss, in particular of significant changes in energy use during the last period,
- c. An estimate of the expected energy consumption or loss reduction during the period of FY 2021-22,
- d. Identification of all relevant variables and responsible persons working for and on behalf of the organization whose actions may lead to significant changes in energy loss,
- e. Identification and prioritisation of opportunities for reduction of losses.

1.3.6 Conform to Act, rules and regulation framed their number

BSES Yamuna has been established to identify, to have access and understand all applicable legal obligations & other energy related requirement directly attributable to the energy use and consumption.

Register of EnMS Regulatory / Legislative Requirements is maintained & periodically kept up to date. Relevant information on legal & other EnMS requirements will be communicated, if required to employees/ persons under the direct control and other relevant interested parties through suitable means like meetings / display on notice boards etc. Responsibilities for ensuring compliance to statutory requirements are allocated & these concerned personnel take regular action & maintain relevant documents.

These applicable legal and other requirements are taken into account in establishing, implementing and maintaining EnMS.

1.3.7 Strength and weaknesses of the BSES Yamuna

BSES Yamuna is having an established energy management plan. The highlights of energy management plan are as under.

- Proactive approach of Top management toward energy conservation.
- Energy conservation cell is well represented by all concerned department.
- Energy monitoring and tracking on daily basis by an expert team.
- Measures for identified energy loss reduction opportunity taken on priority basis.
- Synergy between all concerned departments.
- Regular awareness programme at each level.
- Established training procedure keeping in view of capacity building for energy conservation.

BYPL is also having some of weak point in implementing energy management system, which are as under:

For implementing DSM & Energy Efficiency measures, instant connect with all customers is desired in the digital era. As of now, BYPL is in process of connecting with all customers through online modes.

2 Background

2.1 Extent Regulation and Role of BEE

Recognizing the fact that efficient use of energy and its conservation is an essential part of India's goals to mitigate the gap between demand and supply and to promote economic competitiveness, the Government of India enacted the Energy Conservation Act – 2001. The Act provides for institutionalizing and strengthening delivery mechanisms for energy efficiency services in the country and provides the much-needed coordination between the various organizations and stakeholders, within the Government and in the private sector.

The Government of India has set up Bureau of Energy Efficiency (BEE) (Website: www.beeindia.gov.in) on 1st March, 2002 under the provisions of the Energy Conservation Act, 2001. The mission of Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with primary objective of reducing energy intensity of the Indian economy. Overcoming barriers for financing of energy efficiency is a key policy goal. This will be achieved with active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors.

The setting up of Bureau of Energy Efficiency (BEE) provides a legal framework for energy efficiency initiatives in the country. The Act empowers the Central Government and in some instances the State Governments to:

- Notify energy intensive industries, other establishments, and commercial buildings as designated consumers.
- Establish and prescribe energy consumption norms and standards for designated consumers.
- Direct designated consumers to designate or appoint certified energy manager in charge of activities for efficient use of energy and its conservation.
- Get an energy audit conducted by an accredited energy auditor in the specified manner and intervals of time.
- Furnish information with regard to energy consumed and action taken on the recommendation of the accredited energy auditor to the designated agency.
- Comply with energy consumption norms and standards, and if not so, to prepare and implement schemes for efficient use of energy and its conservation.
- Prescribe energy conservation building codes for efficient use of energy and its conservation in commercial buildings State Governments to amend the energy conservation building codes to suit regional and local climatic conditions.
- Direct owners or occupiers of commercial buildings to comply with the provisions of energy conservation building codes.
- Direct mandatory display of label on notified equipment's and appliances.
- Specify energy consumption standard for notified equipment's and appliances.
- Prohibit manufacture, sale, purchase and import of notified equipment and appliances not conforming to standards.

Schedule to EC Act provides list of 15 energy intensive industries and other establishments to be notified as designated consumers (DC).

Section 14 (e) of the EC Act provides that the Central Government may, by notification, in consultation with the Bureau of Energy Efficiency specify any user or class of user of energy as designated consumers which satisfies the following conditions:

- i. Energy Quantity or Energy Intensity
- ii. Amount of investment required for switching over to energy efficient equipment;
- iii. Capacity of the industry to make investment for switching over to energy efficient equipment; and
- iv. Availability of the energy efficient machinery and equipment required by the industry.

Since the objective of the Act is to promote energy efficiency and its conservation and consequently to reduce the energy cost, selection of industry for the purpose of declaring it, the Designated Consumer under Section 14(e) of the EC Act should primarily take into account-

- (i) total annual energy consumption in Metric Ton of Oil Equivalent;
- (ii) Energy intensity; and
- (iii) Percentage of Energy cost on total cost, as every designated consumer is always keen to reduce energy consumption as well as energy cost to make its product competitive. in

exercise of the powers conferred by clause (g) of sub-section (2) of section 58, read with clause (q) of sub-section (2) of section 13 of the Energy Conservation Act, 2001 (52 of 2001), the Bureau of Energy Efficiency, with the previous approval of the Central Government, hereby makes the following regulations, namely: --Manner and Intervals for Conduct of Energy Audit in electricity distribution companies Regulations, 2021.

These regulations shall apply to all electricity distribution companies specified as designated consumer.

They shall come into force on the date of their publication in the Official Gazette which is 6th October 2021

2.2 Purpose of Audit and Accounting Report

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

Sensing the need of the hour Government of India initiated a mechanism for all energy intensive large industries and facilities (designated consumer) known as PAT Scheme which is "A market-based mechanism to enhance cost effectiveness of improvements in energy efficiency in designated consumers, through certification of energy savings that could be traded."

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

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

The Annual Energy Audit (Accounting) at BYPL 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.

2.3 Period of Energy Auditing and Accounting

Energy audit activity was started with a meeting at Head Office of BYPL in the month of June 2022. Based on the requirement visits were made to Division, Subdivision, Grid etc. for data collection and technical discussion. The period of study was from April 2020 to March 2021.

3 Introduction of Discom

3.1 Details of BSES- Yamuna Power Ltd. (BYPL)

The details of BYPL are shown in following table.

Table 2 Details of BYPL

Details of DISCOM – BSES- Yamuna Power Ltd. (BYPL)			
General Details			
Name of the Unit	BSES Yamuna Power Ltd.		
Year of Establishment	2002		
Government/Public/Private	Private		
Contact details & Address			
City/Town/Village	Karkardooma		
District	Delhi		
State	Delhi	Pin	110092
Telephone	011-41247111	Fax	011-41249765
Registered Office			
Name of Chief Executive	Sh. Amarjeet Singh		
Designation	CEO		
Address	Shakti Kiran Building, Karkardooma		
City/Town/Village	New Delhi	PO	
District			
State	Delhi	Pin	110092
Telephone	011-41249382	Fax	011-41249765
Nodal Officer Details			
Name of Nodal Officer	Sh. Devanshu Sharma		
Designation	General Manager		
Address	Corporate Annexe, CBD-III building, Karkardooma		
City/Town/Village	New Delhi	PO	
District			
State	Delhi	Pin	110032
Telephone	011-41249135	Fax	011-41249765
Energy Manager Details			
Name of Energy Manager	Sh Rajesh Srivastava		
Designation	Vice-President	Whether EA/EM	Energy Manager

EA/EM Registration No.	EA-24509		
Telephone	011-41249842	Fax	011-41249765
Mobile	9350261189	Email Id	rajesh.r.srivastava@relianceada.com

3.2 Profile of BYPL

BSES with its tagline ‘A Journey of Operational Excellence’ commenced its operations in Delhi in the year 2002 after the privatization of the Delhi Power Distribution System. While whole Delhi accounts for 4% of total India, BSES mainly operates in West, South, East and Central Delhi while the TPDDL (Formerly known as NDPL) operates in the North Delhi.

Prior to privatization the Delhi power situation was very poor and in dire need of improvements where AT&C Loss Level was more than 63% while the operation reliability only stood at 70%. Even with a govt. support of Rs. 1200 Cr. p.a. the Technology used was of Obsolete Legacy System with the customer service being generalist.

Post-privatization Delhi saw a turnaround in the Delhi Power Distribution System with reduction in AT&C loss, improvement in operational reliability, adoption of an Integrated System Technology and having a customer centric approach.

It has also been certified with ISO - 9001:2015 for Quality Management System, ISO – 14001:2015 for Environment Management System, ISO – 45001-2018 for Occupational Health and Safety Management, ISO/IEC – 27001:2013 for IT Security Management and ISO/IEC 17025:2005 for Testing and calibration Laboratory.

Also, due to its excellence in the field of Power Distribution System, BSES has also been graced with multiple Rewards as well as recognition both National like D L Shah - Quality Council of India, PHDCCI (*PHD Chamber of Commerce*) ICC (*Indian Chambers of Commerce*) etc. as well as international like Stevie Award and British Safety Council Award.

BSES Yamuna Power Limited (BYPL)

BYPL is the second largest utility in National Capital of Delhi in terms of Area has been served and numbers of consumers have been served. Since the privatization, BYPL has traversed a long and successful journey to become one of the most respected utilities in the country. Among various other achievements, BYPL has been successful in drastically bringing down the AT&C Losses from 63 % in FY 2002-03 to 7.65 % in FY 2021-22 which by any standard is a significant reduction. BYPL has achieved operational excellence by providing 24X7 reliable and quality power to its consumers for more than a decade. BYPL has transformed itself into a world class utility with integrated state of the art systems, automated processes, and customer friendly value-added services. BYPL ‘s ever improving customer centering service initiatives at Delhi. In the challenging environment of electricity distribution BYPL is redesigning its business process towards B2C business model. BYPL is Committed towards utilities led Demand Side Management (DSM) program for its consumers and view Energy efficiency as well as DSM as the cheapest resource to be dispatched in Integral Resource planning (IRP).. Roof Top solar system has been promoted aggressively by BYPL as a result more than 12 MWp roof top solar has been installed in last 3 years.

BYPL responsible for Central and East Delhi Power Distribution is spread over an area of 180 sq. km catering to a customer base of 1.8 Million, with the apparent customer density for it being 9145 Cons./sq. km. While the energy billed by BYPL for the customer is 6171 MU, the peak demand of 1662 MW, the monthly consumption per customer stands at 281 Kwh/Month. BYPL cater to areas spread over 14 divisions across Central and East areas including Chandni Chowk, Darya Ganj, GT Road, Karkardooma, Karawal Nagar, Krishna Nagar, Laxmi Nagar, Mayur Vihar Phase I & II, Mayur Vihar –Phase III, Nandnagri, Pahar Ganj, Patel Nagar, Shankar Road and Yamuna Vihar.

The energy available at the peripheral of Delhi which is procured from generating station and transmitted by Transmission system are used by BYPL, BYPL, TPDDL, NDMC and MES.

The energy received by BYPL in the year 2020-21 and its consumption in different segment is shown in following table and figure.

Table 3 Customer Profile BYPL (FY 2021-22)

Period 21-22					
S.No.	Type of Consumers	No of Consumers	% Share	Total Consumption (In MU)	% Share
1	Domestic	1,422,265	78%	3,943	64%
7	Water Supply	1,540	0.08%	13	24.96%
8	Public Lighting	3,152	0.17%	59	0.96%
9	HT Water Supply	70	0.00%	134	2.17%
10	HT Industrial	35	0.00%	65	1.05%
11	Industrial (Small)	7,609	0.42%	261	4.23%
12	Industrial (Medium)				
13	LT Commercial	392,751	21%	1,141	18%
14	HT Commercial	299	0.02%	242	3.92%
15	Applicable to Government Hospitals & Hospitals	32	0.00%	56	0.91%
16	Lift Irrigation Schemes/Lift Irrigation Societies	42	0.00%	0.25	0.00%
17	HT Res. Apartments Applicable to all areas	17	0.00%	18	0.30%
18	Mixed Load		0.00%		0.00%
19	Government offices and department		0.00%		0.00%
20	Others-1 (Delhi Metro)	3	0.00%	108	1.75%
21	Others-2 (Delhi Airport)		0.00%		0.00%

22	Others-3 (if any , specify in remarks)	1,294	0.07%	-	#VALUE!
	TOTAL	1,829,109		6,171	

4 Discussion and Analysis

4.1 Critical Analysis: Discom Parameter for evaluation of performance

- Ideally, reduction of technical losses should be the parameter for evaluation of performance of Discom sector. However, the technical losses of the Discom are not available and also it involves a cumbersome process to calculate the technical losses, which varies based on various factors like loading pattern etc.
- Now, only the T&D losses and AT&C losses are available as the performance parameter for achieving energy efficiency by DISCOMs.
- It was decided that out of the two parameters, T&D loss parameter seems to be appropriate parameter which reflects energy savings to a greater extent as compared to AT&C losses.

Transmission & Distribution losses (T&D losses)

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

Aggregate technical and commercial losses (AT&C losses)

$$\text{AT\&C Losses} = \{1 - (\text{Billing Efficiency} \times \text{Collection Efficiency})\} \times 100$$

Where,

Billing efficiency = Total unit Billed / Total unit Inputs

Collection efficiency = Revenue collected / Amount Billed

The energy Input, billing and T&D loss for BSES Yamuna is shown in following

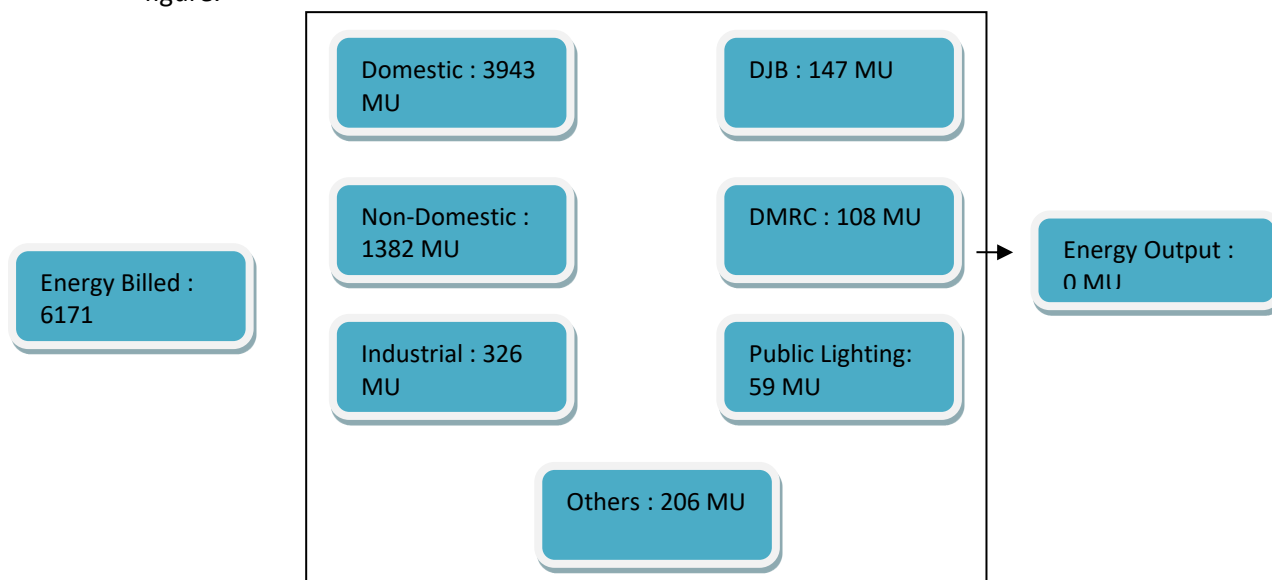
Table 4 Loss Calculation

Trend of BYPL			
Sl no	Year		2021-22
1	Purchase Energy	MU	8278
2	Net Energy Input to Discom	MU	6683
3	Energy billed	MU	6171
4	Amount collected	Rs. Crores	8940
5	T&D Loss	%	7.65%
6		MU	511
9	Collection efficiency	%	100.43%
10	AT&C Loss	%	7.46%

The overall averaged T & D Losses & AT & C Losses of the BYPL is 7.65 % & 7.46 %.

4.1.1 Gate to Gate Diagram

The gate-to-gate energy flow diagram at BSES Yamuna for the year 2021-22 is shown in following figure.



4.2 Energy Conservation measures already taken

Form 3 of FY 2020-21 is attached in Annexure

4.3 Proposal for Energy Conservation Measures.

During Energy Audit of establishment all energy consuming equipment and processes studied. The analysis of all major energy consuming equipment and appliances carried out and the same is discussed in earlier section of this report. Based on the analysis Energy conservation measures (ECM) have been identified; each of which are described below:

4.3.1 ECM 1: Improvement in metering system

Project

- Installation of Smart meters

Study & investigation

- Advanced technology meter / Smart Meter is very accurate
- Better understanding of energy usages
- Meter box found tampered
- There are some defective meters/aged meters

Recommendation Action

SAVE ENERGY- SAVE FUTURE

To improve metering system, it is recommended to install smart meters for better result.

Saving Assessment

The cost-benefit analysis of the energy conservation measure is as shown in the table below:

Table 5 Cost Benefit of Recommendation 1

Energy Efficiency Measures	Estimated Annual Energy Savings	Estimated Investment	Monetary Savings	Simple Payback Period
	Electricity (M KWh)	(Rs. In Crores)	(Rs. In Crores)	(Months)
ECM 1- Smart Meter Installation	22	39	16	30

Action Plan

Item	Action
Operation & Maintenance	
Retrofit	Smart Energy Meters
Replacement	Old Meter
Procurement	Smart Meter
Construction	The installation and commissioning can be done by in-house staff/ on contract
Costing	Rs 39 Crores
Project Specific Baseline Parameters	<ul style="list-style-type: none"> • Present Billing Efficiency • Present Collection Efficiency • Energy Purchase power and power billed
Baseline	As shown in this section
M&V	It is proposed to use IPMVP protocol 'C', the 'Whole Facility Method'. Conduct energy monitoring before and after installation of energy meters
Implication, If any & precaution	None
Social Benefits	Reduction in Co2 emission and Confidence building

4.3.2 ECM 2b: System Improvement and Automation

Project

- System Improvement and Automation

Study & investigation

- Overloaded distribution transformer
- Unbalanced and overloaded LT feeder.
- Network components are old and inefficient
- Old technology for distribution system management
- Hot spot on termination due to poor termination

Recommendation Action

For the improvement of system, it is recommended to:

- Replace overloaded distribution transformer
- Load Balance DT & LT feeders by shifting of load from overloaded phase to under loaded feeder
- Replace old equipment's, cables with efficient equipment's
- Upgrade Distribution system management
- Do real time health monitoring of DT.
- Replacement of old obsolete network element.
- Addition of new substations to reduce LT length
- Do thermal scanning of electrical joints
- Install pole meters, pole distribution box, lock and revamp feeder pillar.
- Lay new LT feeder to relieve overloaded LT feeders

Action Plan ECM 2B

Item	Action
Operation & Maintenance	Load balancing on DT and LT feeder Replacement of old inefficient equipment's Revamping of pole distribution box, feeder pillar Health monitoring of DT and feeders Thermal scanning of Electrical joints
Retrofit	
Replacement	Defective and overloaded DT, Pole distribution
Procurement	Pole Meter, DT, Distribution management system, electrical hardware etc.
Construction	Installation of new 66/33 KV grid substation, Laying of new LT feeders
Costing	Rs 62 Crores
Project Specific Baseline Parameters	<ul style="list-style-type: none"> • Present T&D Loss • Energy Purchase power and power billed
Baseline	As shown in this section
M&V	It is proposed to use IPMVP protocol 'C', the 'Whole Facility Method'. Conduct T & D loss calculation before and after implementation in particular segment.
Implication, If any & precaution	None
Social Benefits	Reduction in Co ₂ emission and Improvement in Reliability of power supply

Notes

- As ECM 2a and 2b both are having impact on reduction on T& D loss and activities are inter related hence it will be very difficult to quantify the losses due to any isolated activities.
- T&D loss of the year is 7.65 % which is already very near to best achievable value hence the scope of further reduction is very difficult whereas investment is required for maintain the system as well as T&D loss percentage. This is the reason for high payback period.
- Due to Covid 19 and subsequent lock down consumption is very low for industrial as well as commercial sector. Consumption of certain other sector also got affected due to non-operation of Delhi Metro and Railway.
- It is observed that consumption is low in the area where T&D loss as well as AT&C loss was minimum which means area having high T&D loss and AT&C loss are now major contributor in overall T&D Loss and AT&C loss causing which overall T&D loss as well as AT&C loss may increase

4.4 Inclusion and Exclusion

4.4.1 Input Energy Details & Infrastructure

- Net Input energy at DISCOM periphery is calculated based on Import/Export interface ABT meters installed at Transco level.
- The Transco ABT meters are installed on incoming feeders (66kV/33kV) feeding to DISCOM Grid.
- Outgoing 11kV feeders connected to Distribution Transformer located in different Divisions / Subdivisions.
- 11kV feeders can be segregated in division but 66/33kV Feeders can't be segregated into Division / Subdivision level.
- DTL is the custodian of the input energy meters and responsibility for installing and maintaining AMR is with DTL. Please note that AMR are not installed as on date on interface meters and neither real time meter data will be shared with us for generating this report.
- Similar format (Form 1, Part B) is also being submitted during PAT Cycle-VII submissions, under which Division and Sub-division was not included.

B. Meter reading of Input energy injection points											Remarks (Source of data)	
S.No.	Zone	Circle	Voltage level	Division	Sub-Division	Feeder ID	Feeder Name	Period from...to...				
								Meter S.No	CT/PT ratio	Import (MU)	Export (MU)	
B.1										0.00	0.00	
B.2										0.00	0.00	
B.3										0.00	0.00	
B.4										0.00	0.00	
B.5										0.00	0.00	
B.....												
[भाग III—खण्ड 4] भारत का राजपत्र : प्रसाधारण											25	
B.....												
B.....												
B.1001	Total (MU)									0.00	0.00	
B.1002	Net input energy at DISCOM periphery (MU)										0.00	
Color code	Parameter											
	Please enter voltage level or leave blank											
	Please enter feeder id and name or leave blank											
	Enter meter no or leave blank											
	Enter CT/PT ratio or leave blank											
0	Please enter numeric value or 0											
	Please select yes or no from list											
	Formula protected											

4.4.2 Generating Station wise POC Loss Calculation

BYPL is purchasing power from different generating station situated at different states and connected through national, regional and state level grid hence generating station wise POC loss is not feasible. Generating station voltage level is also not feasible as BYPL is receiving power mostly at 66 KV level and 33 KV level. In view of above fact POC loss and voltage level to be excluded from Input Energy Source form.

4.4.3 Division and Subdivision wise distribution of embedded generation

Circle, Division and subdivision wise distribution of embedded generation is not feasible as grid is connected to other divisions also and input energy is also not from single source.

4.4.4 Period for T&D Loss and AT&C loss calculation

T&D Loss & AT&C Loss should be computed on YTM Basis instead of Quarterly Basis.

5 Notes on EA/EM Along with Queries and Reply to the Data Gaps

Comments of BEE data sheet is discussed as under.

Table 6 Comments on BEE format

Sr. No	Reference Data Sheet	Comments & Queries	Remarks
1	General information sheet	Nil	Nil
2	Input Infrastructure	T&D Loss and D Loss	Since T&D Loss and D loss is same for DISCOMs so D loss to be removed from modified format.

3	Input energy injection point	Zone, Circle, Division & Sub-division column, Status of communication	<p>Net Input energy at DISCOM periphery is calculated based on Import/Export interface ABT meters installed at Transco level.</p> <p>The Transco ABT meters are installed on incoming feeders (66kV/33kV) feeding to DISCOM Grid.</p> <p>Outgoing 11kV feeders connected to Distribution Transformer located in different Divisions / Subdivisions.</p> <p>11kV feeders can be segregated in division but 66/33kV Feeders can't be segregated into Division / Subdivision level.</p> <p>Based on Above fact modification of Part B Table is required and Zone, Circle, Division & Sub-division column to be excluded from the Form.</p> <p>DTL is the custodian of the input energy meters and responsibility for installing and maintaining AMR is with DTL. Please note that AMR are not installed as on date on interface meters and neither real time meter data will be shared with us for generating this report.</p>
4	Input energy source	POC Loss Calculation and voltage level	<p>BYPL is purchasing power from different generating station situated at different states and connected through national, regional and state level grid hence generating station wise POC loss is not feasible. Generating station voltage level is also not feasible as BYPL is receiving power mostly at 66 KV level and 33 KV level. In view of above fact POC loss and voltage level to be excluded from Input Energy Source form.</p>
Sr. No	Reference Data Sheet	Comments & Queries	Remarks
5	Embedded generation	Circle, Division and subdivision wise embedded generation	Circle, Division and subdivision wise distribution of embedded generation is not feasible as grid is connected to other divisions also and input energy is also not from single source.
6	Details of consumer	Nil	Nil
7	Feeder wise loss	Individual Feeder wise loss calculation is not feasible	<p>Individual Feeder Level T&D Loss Computation:</p> <ul style="list-style-type: none"> • Every 11KV Feeder is having ring main system through which DTs or HT Consumers are back-fed other than normal feeder based on the system and network requirements. • Since the downstream network from feeder to DT is so dynamic in nature that it is very cumbersome

			<p>to maintain the feeder network connectivity to DT accurately.</p> <ul style="list-style-type: none"> • Such switchovers will trigger the change in normal network configuration leading to downstream network connectivity and shift the network cut-off points and ultimately the change in grouping of DTs. • Hence, there could be instances where the Feeder consumption figure would be higher than the figure of energy received at that Feeder. This poses an acute problem in maintaining energy flow at feeder level. • As per above mentioned constrains, computation of feeder consumption, net export and T&D loss at feeder level is not feasible. <p><u>T&D Loss computation of Group of feeders:</u></p> <ul style="list-style-type: none"> • BYPL has identified the group of feeders whose are utilized for back-feeding purpose as per system and network requirement. Hence consumption, net export and T&D loss is calculated at Group of feeders. Format is modified and enclosed for 1st Energy Accounting Report and same will be followed for subsequent periodic Energy Accounting Report. <p><u>Feeder Level AT&C Loss Computation:</u></p> <ul style="list-style-type: none"> • For computation of AT&C loss, computation of collection efficiency is required. • Collection efficiency is computed based on collected amount from HT & LT consumers against billed amount of HT & LT consumers at division level as per billing cycle where as T&D loss of Group of feeders are calculated based on received energy at group of feeders level, consumption of HT consumers and net energy exports to group of feeders based on calendar months in which consumption of LT consumers, which is significant, are not taken in account. There is no direct correlation between T&D loss at group of feeders and collection efficiency at division level hence computation of AT&C loss at group of feeders' level is not feasible. • It is pertinent to note that Hon'ble commission also mandated the T&D and collection efficiency at division level.
8	Division Wise loss	Loss calculation on quarterly basis	<p>T&D Loss & AT&C Loss should be computed on YTM Basis instead of Quarterly Basis. T&D loss and collection efficiency is submitted to DERC as per DERC guidelines.</p>

			The guidelines for computation of AT&C losses given by CEA have yet not been adopted by DERC.
9	Subsidy Reconciliation	NIL	<p>Residential Consumers: Subsidized residential consumers are based on monthly consumption as per tariff structure and identified groups like SIKH rights consumers. Applicable subsidies are as follows: Domestic consumers: Up to 200 Units - No charges 201 to 400 units - up to INR 800/- flat discount SIKH RIOTS: 100% Subsidy up to 400-unit consumption.</p> <p>Agricultural consumers: Subsidy given to agricultural consumers is based on fixed charges INR 105/- Per KW per Month hence billed and subsidized energy is not in KWh it is in KW (Load).</p> <p>Non-Domestic Consumers: Lawyer Chambers are considered under subsidized consumers and Subsidy based on Domestic Tariff.</p> <p>As norms for subsidy for different category of consumers are different and there might be chance to get different categories of consumers falls under similar group for example residential category. Hence it is recommended to calculate average Subsidy rate to be calculated for residential</p> <p>Total subsidy received from Govt. against total claimed amount. Category wise subsidy received cannot be available with DISCOMs hence it is recommended to calculate subsidy received based on weightage of amount claimed in respective consumer categories with adjustments of opening balance of subsidy.</p>

6 Annexure

6.1 Introduction of Verification Firm.

Padmashtdal Energy Services Private Limited (PESPL) is a service consultancy company providing techno commercial solution to customers in the areas of Power System, Industrial Electronics and Utility system management since 1996. In last few years of its operation, the company has been able to generate positive reputation and goodwill among its clientele.

The experience of PESPL in various industries around the country made it realize that there is huge potential of saving energy in almost all industries. In some of the industrial units and office set up the possibility of saving energy is as high as 20%. In some of the industries and companies the energy conservation seemed possible by simply adhering to better operating practices and in some by technical up-gradation in instrumentation & control system and modification in plants.

With this experience, PESPL entered into the arena of ENERGY CONSERVATION in 2005. It focused on ensuring that our client industries adopt efficient energy management systems that help them to optimize their resource utilization thereby reducing the operational cost. We have conducted several energy audits and provided consultancy to industrial units and office facilities to achieve substantial reduction in their Energy-Cost. Our client base includes Sugar industries, Paper Industries, Power Plants, steel plant, MSME units, commercial buildings etc.

PESPL has been accredited as an ESCO (Energy Service Company) by BEE (A statutory body under Ministry of Power, Govt. Of India) in the year 2008. Our CEO of company Mr. Kamalesh Kumar Jha is also an Accredited Energy Auditor by BEE The detail of the Study team including Designation, Professional qualification & experience are furnished as under:

6.2 Brief Approach, Scope & Methodology for audit

The following flow chart illustrates the methodology followed for carrying out different tasks leading to preparation of the EAR.

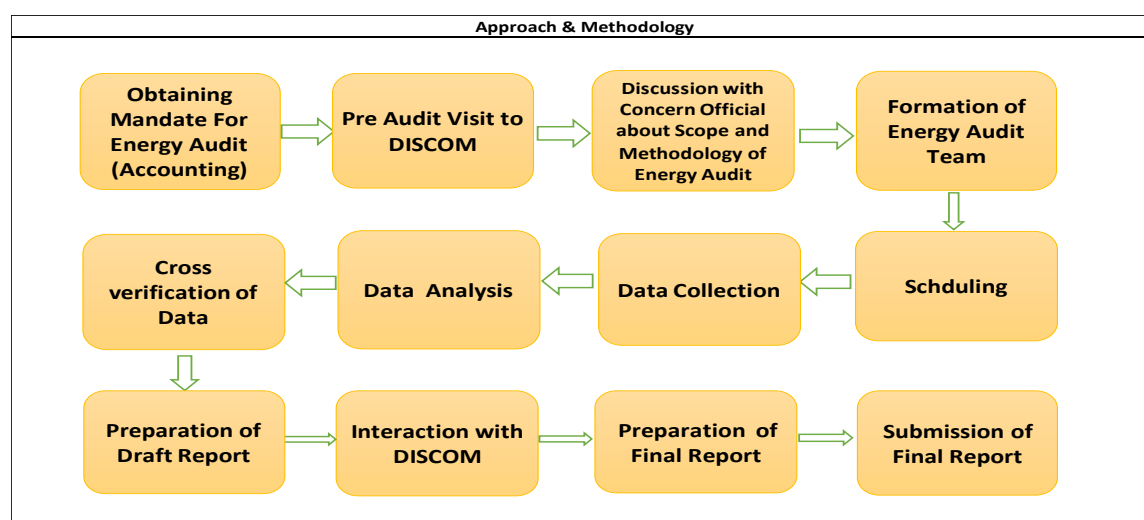


Figure 1 Methodology

6.3 Infrastructure Details

The major components of BYPL are listed as under:

- Grid substation 66KV/33KV/11KV
- Distribution Substation 11KV/415 V
- Power/Distribution Transformer
- Protection system
- Metering system
- Cables
- Power Capacitor
- Earthing

Table 7 Inventory List as on March 2022

Sl No	Description	UOM	2020-21
-------	-------------	-----	---------

1	Grid	Number	54
2	EHV Feeders	Number	171
3	EHV Lines/Cable	KM	1071.7
4	Power Transformer	Number	168
5	EHV capacity	MVA	3844
6	Metering at 66/33 KV	%	100
7	Shunt Capacitors	MVAr	990.45
8	11 KV Feeder	Number	945
9	11 KV lines/Cable laid (UG)/OH	KM	
10	Metering at 11 KV level	%	100
11		Number	
12	Distribution Transformer	MVA	3958
13	Metering at DT Level	%	100
14	LT feeders	Number	18611
15	LT Line/Cable Laid (UG)/OH	KM	5712
16	HT/LT ratio	Number	0.53
17	Metering at consumer end	%	100 %

6.3.1 Grid Source

The BYPL is getting supply from Transco and Power grid at 66 KV and 33 KV. Total number of grid substation in BYPL is 54 in the year 2021-22.

6.3.2 Power Transformer

Power transformers installed at various grid substation and it is used to step down voltage level from 66/33 which is received Transco, to 11 KV for different feeders. Total number of power transformer of different rating installed at BYPL is 168 having a cumulative capacity of 3844 MVA.

6.3.3 EHV Feeder

BYPL is having 171 number of EHV feeders at 66/33 KV. It is used to receive power from Transco and also for feeding of Bulk consumer like DIAL, DJB, Railway, DMRC etc.

6.3.4 Distribution Transformer

BYPL is having 3958 number of distribution transformer with a cumulative capacity of 6612MVA. It is used to convert voltage from 11 KV to 415 V. it is located near to consumer base.

6.3.5 11 KV Feeder

11 KV Feeders are used to transport power from grid substation to HT consumers and different distribution transformers. BYPL is having about 945 number of 11 KV feeders.

6.3.6 LT Feeders

LT feeders are used to transfer power from distribution transformer to end consumers. It may be at 415 V for three phase connection and at 220 V for small domestic consumers. BYPL is having about 18611number of LT feeders.

6.3.7 Protection/Switching System

Complete distribution network is protected with proper protection relays like overload, earth fault, distance protection relay, Feeder Protection relay installed at different feeder panels.

Power Transformers are protected with Overload, Earth fault, Differential relays.

Switching of different feeders are with VCB/SF6 for HT switching and ACB/MCCB/ SFU for LT switching

6.3.8 Metering System

Energy meters are installed for all individual as well as bulk consumers. Apart from this energy meters are also installed at all EHV, HT feeders and distribution transformers for monitoring of energy flow in the Discom. BYPL is having very good metering system for real time monitoring of power flow in the distribution network.

6.3.9 Cables

Cables are used to for interconnecting of different feeders to power transformers, Distribution transformers, end consumers etc. Based on the site condition and requirement overhead as well as underground cables are used. The cable length in BYPL is shown as under:

- 66 KV cables/Lines : 235 KM
- 33 KV cable/Lines : 422 KM
- 11 KV cables/Lines : 3035 KM
- LT Cable /Lines : 5712 KM

6.3.10 Power Capacitors

Copper Loss in electrical system is very much dependent on current flowing through the system. Hence to reduce copper loss current should be as low as possible. To reduce current we have to increase voltage and maintain power factor as high as possible near to unity. Voltage level is already optimized as per requirement of network.

To reduce distribution loss and to maintain power factor near to unity BYPL has installed sufficient shunt capacitors at different EHT/HT feeders and distribution transformers. The power factor is also monitored in real time.

6.3.11 Earthing System

To avoid electrical hazard all electrical system, need to be earthed properly. Keeping this in mind BYPL is following all the guidelines of CERC and IS codes of practice for earthing. The main objective of earthing should be:

- The impedance to ground should be as low as possible and it should be as per standards.
- The electrode or earth conductor and earthing strips should be capable enough to carry fault current so that electrical hazard can be avoided.

6.4 Electrical Distribution System

DISCOM is an organization whose sole responsibility is to procure the electrical power from power generating company through Transmission Company at EHV level and distribute it to end user at appropriate voltage level.

Power received by DISCOM from Transmission Company at 220KV/132KV/66KV/33KV/11 KV level and same is supplied to different customer as per their required voltage level. Type of consumer and their voltage level are shown as under:

- Individual Residential Consumer: 230 V Single Phase / 400 V Three Phase
- Group Housing Society : 11 KV Three Phase
- Commercial Consumer : 230 V Single Phase/ 400 V Three Phase/ 11 KV Three Phase/ 33 KV Three Phase/ 66 KV Three Phase
- Industrial LT Consumer : 230 V Single Phase and 400 V Three Phase
- Industrial HT Consumer : 11 KV/33 KV/66 KV/132 KV Three Phase
- Agriculture Consumer : 230 V Single Phase and 400 V Three Phase
- Street Light/Pump House : 400 V Three Phase/ 11 KV Three Phase

Note: Voltage Specified is as per DERC Supply code and performance Standards Regulations 2017, with +/- 6% variation is admissible in case of Low-Tension voltage level.

As per EC Act 2001 DISCOM is an energy intensive organization, due to its nature of operation. A large amount of energy is being distributed by DISCOM and during the process a significant amount of energy is lost known as T&D loss. The T&D loss percentage is having a wide variation among various DISCOM.

During financial year 2013-14, T&D loss was as low as 12.08% in Himachal Pradesh DISCOM and it was as high as 46.36% in J& K DISCOM with an India level average of 20.68 % which is equivalent to 193750 MU causing revenue loss of 96875 Crores (@Rs 5/unit). The equivalent Co2 emission is about 1589 Lakh MT. The gap between world average and India average is more than 10%. Based on above fact it was observed that a substantial reduction in T&D loss can be achieved accordingly Prime Minister's Council on Climate Change directed to include DISCOM in to PAT scheme. The threshold for inclusion in PAT scheme is T&D loss of 1000 MU in a financial year (equivalent to 86000 Mtoe) accordingly 44 DISCOM was notified BYPL is also one of them.

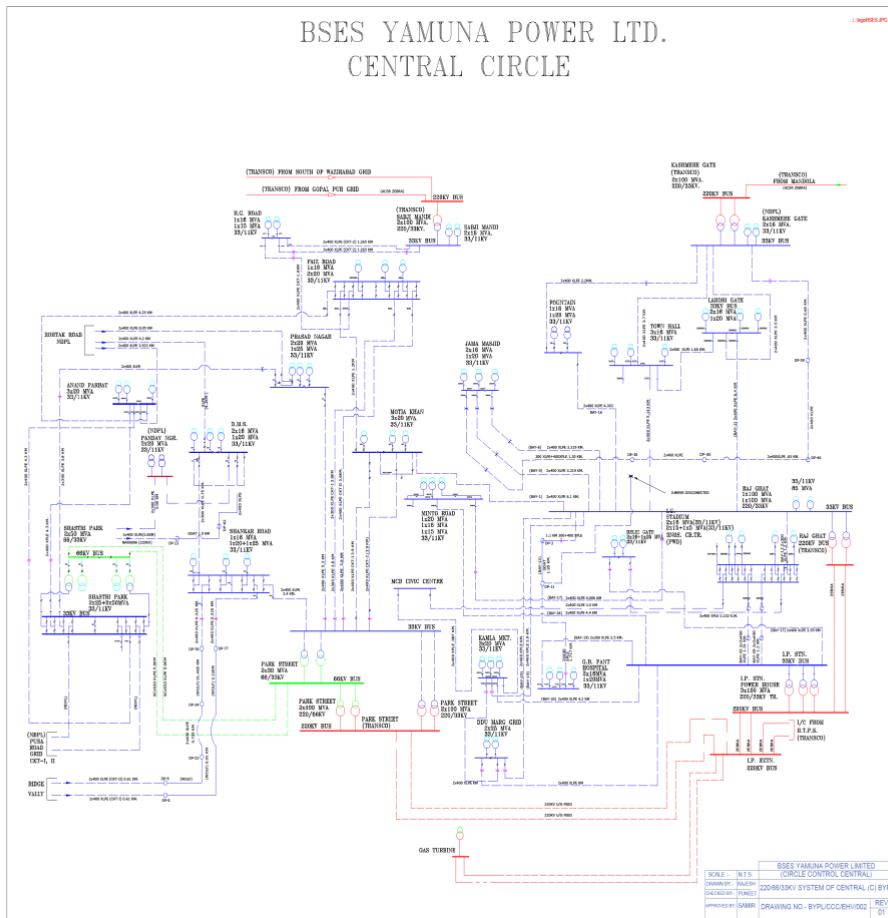
System Element Power Losses (%)

Table 8 System Element Power Loss

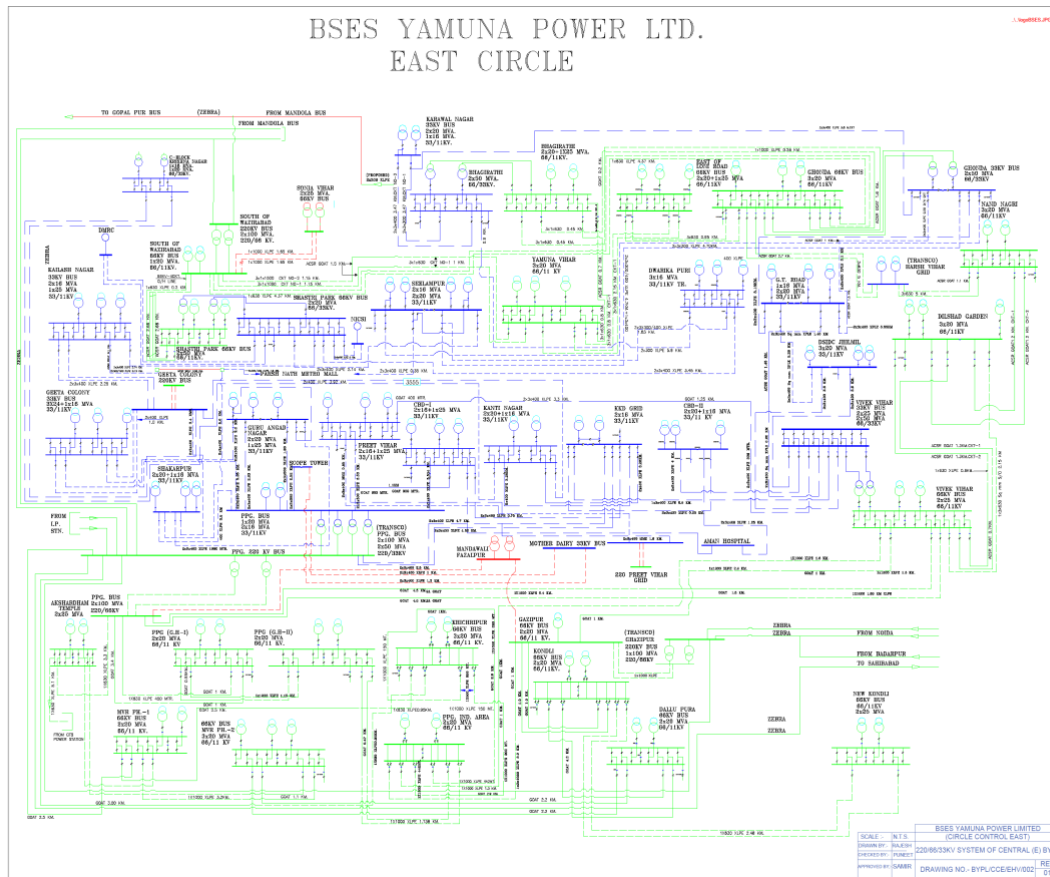
Sr no	Description	Minimum	Maximum
1	Step UP Transformer & EHV Transmission	0.5	1.0
2	Transformation to Intermediate Voltage Level	1.5	3.0
3	Transmission System and step down to sub transmission voltage level	2.0	4.5
4	Distribution Line & Service Connection	3.0	7.0
Total		7.0	15.5

6.5 Line Diagram (SLD)

6.5.1 SLD of Central Circle



6.5.2 Annexure 2 SLD of East Circle



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

Energy balance of BSES Yamuna is shown in following table

Table 9 Energy Balance BSES Yamuna

S.No.	Type of Consumers	Category of Consumers (HT/LT/Others)	Voltage Level	No of Consumers	Total Consumption (In MU)
1	Domestic	LT	LT	1,422,265	3,943
7	Water Supply	LT	LT	1,540	13
8	Public Lighting	LT	LT	3,152	59
9	HT Water Supply	HT	11 KV	70	134
10	HT Industrial	HT/ EHT	11 KV & 33 KV	35	65
11	Industrial (Small)	LT	LT	7,609	261
12	Industrial (Medium)				
13	LT Commercial	LT	LT	392,751	1,141

14	HT Commercial	HT	11 KV, 33 KV	299	242
15	Applicable to Government Hospitals & Hospitals	HT	11 KV	32	56
16	Lift Irrigation Schemes/Lift Irrigation Societies	LT	LT	42	0.25
17	HT Res. Apartments Applicable to all areas	HT	11 KV	17	18
18	Mixed Load				
19	Government offices and department				
20	Others-1 (Delhi Metro)	EHT	66KV	3	108
21	Others-2 (Delhi Airport)				
22	Others-3 (if any , specify in remarks)	LT & HT	LT & 11 KV	1,294	
TOTAL				1,829,109	

6.7 List of documents verified with each parameter

- Third Party audited Power Purchase Certificate
- Input energy at Discom Periphery verified by DTL Bill.
- Third Party audited Billing Certificate
- Third Party audited Subsidy Certificate

6.8 List of Parameters arrived through calculation or formulae with list of documents as source of Data

- T&D Loss
- AT&C Loss

6.9 Form 3 2021-22

FORM 3

[Refer Regulation 5(3)]

DETAILS OF ENERGY CONSERVATION MEASURES IMPLEMENTED, INVESTMENT MADE AND SAVINGS IN ENERGY ACHIEVED AND PROGRESS MADE IN THE IMPLEMENTATION OF OTHER RECOMMENDATIONS - 2021-22

A : Implemented

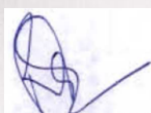
S.No.	Description of Energy Efficiency improvement measures	Category	Investment rupees (Rs in Cr)	Verified savings (Rupees Cr)	Verified energy savings (MU)	Units	Fuel	Remarks
1	Improvement in metering system	Power Reliability	39	16.1	22.2	MU	Electricity	
2	System improvement & automation	Power Reliability	62	25.7	35.4	MU	Electricity	
3	DSM activity	Performance Obligation	0.29	52.0	77.0	MU	Electricity	

* Includes cost of Renewable Energy also

Signature

Name of Energy Manager - Sh Rajesh Srivastava (EA24509)
Name of Company - BSES Yamuna Power Ltd
Full address - Shakti Kiran Building, Karkardooma

Contact Person - Sh Devanshu Sharma
E-mail address - devanshu.sharma@relianceada.com
Telephone / Fax numbers - 011-39999135 / 011-39999765
Plant address - Shakti Kiran Building, Karkardooma



Signature

Name of accredited energy auditor - Sh Kamallesh Kr Jha
Accreditaion details - AEA0007
Seal



6.10 Detailed Formats to be annexed

BEE Format comprising following sheets.

6.10.1 General information sheet

Sr No.	General Details	Description		
1	Name of the Unit	BSES Yamuna Power Ltd		
2	(i) Year of Establishment	2002		
	(ii) Government/Public/Private	Private		
3	Contact details & Address			
i	City/Town/Village	Delhi		
ii	District	Shahdara		
iii	State	Delhi	Pin	110032
iv	Telephone	011-41247111	Fax	011-41249765

4	Registered Office	Shakti Kiran Building, Karkardooma		
i	Company's Chief Executive Name	Sh Amarjeet Singh		
ii	Designation	CEO		
iii	Address	Shakti Kiran Building, Karkardooma		
iv	City/Town/Village	Delhi	PO	Delhi
v	District	Shahdara		
vi	State	Delhi	Pin	110019
vii	Telephone	011-41249382	Fax	011-41249765
5	Nodal Officer Details			
i	Nodal Officer Name (Designated at DISCOM's)	Sh Devanshu Sharma		
ii	Designation	General Manager		
iii	Address	Corporate Annexe, CBD-III Building, CBD Shahdara, Karkardooma		
iv	City/Town/Village	Delhi	PO	Delhi
v	District	Shahdara		
vi	State	Delhi	Pin	110019
vii	Telephone	9350110218 / 011-41249135	Fax	011-41249765
6	Energy Manager Details			
i	Name	Sh Rajesh Srivastava		
ii	Designation	Vice - President	Whether EA or EM	EM
iii	EA/EM Registration No.	EA-24509		
iv	Telephone	011-41249842	Fax	011-41249765
v	Mobile	9350261189	Email Id	rajesh.r.srivastava@relianceada.com

6.10.2 Input Infrastructure

Form-Details of Input Infrastructure					
1	Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
i	Number of circles	3	21-22	Verified	
ii	Number of divisions	14		Verified	
iii	Number of subdivisions	46		Verified	
iv	Number of feeders	19,674		Verified	Including LT & HT Feeders
v	Number of DTs	3,958		Verified	
vi	Number of consumers	1,829,093		Verified	

2	Parameters	66kV & above	33kV	11/22kV	LT
vii	Number of total consumers	3	454	1,828,652	
b. i.	Number of conventionally metered Distribution Transformers	-	-	3958	-
	Number of DTs with communicable meters	-	-	Approx 50% [1982]	-
	Number of unmetered DTs	-	-	0	-
	Number of total Transformers	-	-	3958	-
c. i.	Number of metered feeders	61	110	988	-
ii	Number of feeders with communicable meters	1	110	988	-
iii	Number of unmetered feeders	0	0		-
iv	Number of total feeders	61	110	988	18,611
d.	Line length (ct km)	235	422	3,035	5,712
e.	Length of Aerial Bunched Cables	-	-	379	2,278
f.	Length of Underground Cables	1077	2671		3,434

3	Voltage level	Input Energy Particulars	MU	Reference	Remarks (Source of data)
i	At All Voltage level (66/33/11KV)	Long-Term Conventional	7,848		
		Medium Conventional	-		
		Short Term Conventional	175		
		Banking	-360		
		Long-Term Renewable energy	430		
		Medium and Short-Term RE	-	Includes power from bilateral/PX/ DEEP	
		Captive, open access input	-	Any power wheeled for any purchase other than sale to DISCOM. Does not include input for franchisee.	
		Sale of surplus power	1,043		
		Quantum of inter-state transmission loss	354	As confirmed by SLDC, RLDC etc	
		Power procured from inter-state sources	7,401	Based on data from Form 5	
		Power at state transmission boundary	7,148		
vi	LT	Renewable Energy Procurement	-		
		Sales Migration Input	-		
vii		Energy Embedded within DISCOM wires network	-		
viii		Total Energy Available/ Input	6,696		

Energy Accounting Summary					
5	DISCOM	Input(in MU)	Sale(in MU)	Loss(in MU)	Loss %
i	LT	6,019	5,521	498	8.28%
ii	11 Kv	471	461	10	2.12%
iii	>33 kv	191	190	1	0.53%

6.10.3 Input energy injection point

S.No	Parameters	21-22
A.1	Input Energy purchased (MU)	8065
A.2	Transmission loss (%)	2.64%

A.3	Transmission loss (MU)	213
A.4	Energy sold outside the periphery(MU)	827
A.5	Open access sale (MU)	113.11
A.6	EHV sale	
A.7	Net input energy (received at DISCOM periphery or at distribution point,after adjustment)-(MU)	6680.99
A.8	Is 100% metering available at 66/33 kV (Select yes or no from list)	yes
A.9	Is 100% metering available at 11 kV (Select yes or no from list)	yes
A.10	% of metering available at DT	100%
A.11	% of metering available at consumer end	100%
A.12	No of feeders at 66kV voltage level	61
A.13	No of feeders at 33 KV voltage level	110
A.14	No of feeders at 11kV voltage level	976
A.15	No of LT feeders level	18611
A.16	Line length (ckt. km) at 66KV voltage level	235
A.17	Line length (ckt. km) at 33 KV voltage level	422
A.18	Line length (ckt. km) at 11kV voltage level	3035
A.19	Line length (km) at LT level	5712
A.20	Length of Aerial Bunched Cables	2278
A.21	Length of Underground Cables	6638
A.22	HT/LT ratio	0.34

B. Meter reading of Input energy injection points

S. No.	Zone	Circle	Voltage level	Division	Sub-Division	Feeder ID	Feeder Name	Feeder Metering Status (Metered/ unmetered/ AMI/AMR)	Status of Meter (Functional/ Non-functional)	Metering Date	Feeder Type (Agricultural/ Industrial/ Mixed)	Status of Communication			Sales	Remarks (Source of data)
										Date of last actual meter reading/communication		% data received automatically if feeder AMR/AMI	Number of hours when meter was unable to communicate in period	Total Number of hours in the period		
1	NA	CENTRAL	33			CANPB322	I/C -3 ROHTAK ROAD	AMR	Functional		Mixed	100%	NA	NA	NA	
2	NA	CENTRAL	11			CBGRD102	CHANDRA SHEKHER AZAD COLONY (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA	
3	NA	CENTRAL	11			CBGRD105	NURUDDIN PARK (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA	
4	NA	CENTRAL	11			CBGRD106	DCM CHOWK (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA	
5	NA	CENTRAL	11			CBGRD107	SADAR S/STN(NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA	
6	NA	CENTRAL	33			CBGRD312	SABJI MANDI CKT-2	AMR	Functional		Mixed	100%	NA	NA	NA	
7	NA	CENTRAL	33			CBGRD314	Subzi Mandi CKT -1	AMR	Functional		Mixed	100%	NA	NA	NA	

8	NA	CENTRAL	11	PNR		CBLKH101	OPEN ACCESS SUPPLY TO B L KAPOOR HOSPITAL	AMR	Functional		Mixed	100%	NA	NA	NA
9	NA	CENTRAL	33			CDDUM301	33 KV I/C IP BAY NO 18	AMR	Functional		Mixed	100%	NA	NA	NA
10	NA	CENTRAL	33			CDDUM302	33 KV I/C RPH BAY NO 20	AMR	Functional		Mixed	100%	NA	NA	NA
11	NA	CENTRAL	33			CDLGT313	BAY NO 17 IP STN.	AMR	Functional		Mixed	100%	NA	NA	NA
12	NA	CENTRAL	11			CDMSG119	PANDAV NAGAR (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
13	NA	CENTRAL	11			CDMSG122	PHILIPS (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
14	NA	CENTRAL	33			CDMSG314	33 KV I/C & O/G PANDAV NAGAR (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
15	NA	CENTRAL	33			CDMSG315	ROHTAK ROAD	AMR	Functional		Mixed	100%	NA	NA	NA
16	NA	CENTRAL	33			CDMSG316	I/C NARIYANA	AMR	Functional		Mixed	100%	NA	NA	NA
17	NA	CENTRAL	33			CFNTN301	I/C FROM 220 KASHMIRI GATE	AMR	Functional		Mixed	100%	NA	NA	NA
18	NA	CENTRAL	33			CFNTN302	I/C FROM RAJGHAT BAY - 16	AMR	Functional		Mixed	100%	NA	NA	NA
19	NA	CENTRAL	11			CFZRD103	TIBIA COLLEGE NO.2 (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
20	NA	CENTRAL	11			CFZRD106	MANAK PURA (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
21	NA	CENTRAL	11			CFZRD112	TIBIA COLLEGE NO.1 (NDPL)	AMR	Functional		Mixed	100%	NA	NA	NA
22	NA	CENTRAL	33			CFZRD315	PARK STREET-1	AMR	Functional		Mixed	100%	NA	NA	NA
23	NA	CENTRAL	33			CFZRD316	PARK STREET-2	AMR	Functional		Mixed	100%	NA	NA	NA
24	NA	CENTRAL	66	DRG		CGAST601	DMRC CKT 1 & 2	AMR	Functional		Mixed	100%	NA	NA	NA
25	NA	CENTRAL	66	DRG		CGAST602	OPEN ACCESS SUPPLY TO DMRC CKT 1 & 2	AMR	Functional		Mixed	100%	NA	NA	NA
26	NA	CENTRAL	33			CGBPT304	BAY NO. 19 FROM IP STATION	AMR	Functional		Mixed	100%	NA	NA	NA
27	NA	CENTRAL	33			CGBPT305	BAY NO. 13 FROM RAJGHAT POWERHOUSE	AMR	Functional		Mixed	100%	NA	NA	NA
28	NA	CENTRAL	11	SRD		CGRTS101	OPEN ACCESS SUPPLY TO GANGA RAM TRUST SOCIETY	AMR	Functional		Mixed	100%	NA	NA	NA
29	NA	CENTRAL	33			CIGSD311	I P STATION BAY-33	AMR	Functional		Mixed	100%	NA	NA	NA
30	NA	CENTRAL	33			CIGSD312	I P STATION BAY-29	AMR	Functional		Mixed	100%	NA	NA	NA
31	NA	CENTRAL	33			CIGSD313	RAJGHAT P H BAY-12	AMR	Functional		Mixed	100%	NA	NA	NA
32	NA	CENTRAL	33			CJMJD301	RAJGHAT POWER HOUSE BAY NO 6	AMR	Functional		Mixed	100%	NA	NA	NA
33	NA	CENTRAL	33			CJMJD313	220 KV KASHMIRI GATE	AMR	Functional		Mixed	100%	NA	NA	NA
34	NA	CENTRAL	33			CJMJD314	RAJGHAT POWER HOUSE BAY NO 5	AMR	Functional		Mixed	100%	NA	NA	NA
35	NA	CENTRAL	33			CKMKT316	I P STATION BAY-30	AMR	Functional		Mixed	100%	NA	NA	NA
36	NA	CENTRAL	33			CKMKT322	RPH Bay no 19	AMR	Functional		Mixed	100%	NA	NA	NA
37	NA	CENTRAL	33			CLHGT313	33 KV I/C FROM RAJGHAT CKT-2 BAY-2	AMR	Functional		Mixed	100%	NA	NA	NA
38	NA	CENTRAL	33			CLHGT314	33 KV INCOMER FROM 220 KV	AMR	Functional		Mixed	100%	NA	NA	NA

68	NA	EAST	33			ECBSA317	I/C 220 KV PREET VIHAR	AMR	Functional		Mixed	100%				NA	
69	NA	EAST	33			ECBSA319	33KV I/C PATPARGANJ	AMR	Functional		Mixed	100%				NA	
70	NA	EAST	11	MV R		ECRWP101	OPEN ACCESS SUPPLY TO CROWN PLAZA	AMR	Functional		Mixed	100%				NA	
71	NA	EAST	33			EDRKP316	220 KV PREET VIHAR CKT 1	AMR	Functional		Mixed	100%				NA	
72	NA	EAST	33			EDRKP317	220 KV PREET VIHAR CKT 2	AMR	Functional		Mixed	100%				NA	
73	NA	EAST	66	MV R		EEWMP601	I/C 220 KV GHAZIPUR	AMR	Functional		Mixed	100%				NA	
74	NA	EAST	66			EGHON620	66 KV I/C HARSH VIHAR CKT 1	AMR	Functional		Mixed	100%				NA	
75	NA	EAST	66			EGHON621	66 KV I/C HARSH VIHAR CKT 2	AMR	Functional		Mixed	100%				NA	
76	NA	EAST	66			EGHON629	WAZIRABAD CKT-II	AMR	Functional		Mixed	100%				NA	
77	NA	EAST	66			EGHO N630	WAZIRABAD CKT-I	AMR	Functional		Mixed	100%				NA	
78	NA	EAST	66			EGHS1615	220 KV PPG CKT - 1	AMR	Functional		Mixed	100%				NA	
79	NA	EAST	66			EGHS1618	220 KV PPG CKT-2	AMR	Functional		Mixed	100%				NA	
80	NA	EAST	33			EGTCL318	220 KV PATPARGANJ GRID	AMR	Functional		Mixed	100%				NA	
81	NA	EAST	33			EGTCL320	I/C FROM 220 KV GEETA COLONY CKT -1	AMR	Functional		Mixed	100%				NA	
82	NA	EAST	33			EGTCL322	I/C FROM 220 KV GEETA COLONY CKT - 2	AMR	Functional		Mixed	100%				NA	
83	NA	EAST	33			EGTRD323	I/C FROM 220 KV PREET VIHAR GRID	AMR	Functional		Mixed	100%				NA	
84	NA	EAST	33			EGUAN319	I/C 220KV PREET VIHAR	AMR	Functional		Mixed	100%				NA	
85	NA	EAST	33			EGUAN321	PATPARGANJ NO. II	AMR	Functional		Mixed	100%				NA	
86	NA	EAST	33			EGUAN322	PATPARGANJ - I	AMR	Functional		Mixed	100%				NA	
87	NA	EAST	11	MV R		EHLDY101	OPEN ACCESS SUPPLY TO HOLIDAY INN	AMR	Functional		Mixed	100%				NA	
88	NA	EAST	33			EJLML320	I/C FROM 220 KV PREET VIHAR GRID	AMR	Functional		Mixed	100%				NA	
89	NA	EAST	33			EKARD301	PATPARGANJ CKT - II	AMR	Functional		Mixed	100%				NA	
90	NA	EAST	33			EKARD317	PATPARGANJ CKT - I	AMR	Functional		Mixed	100%				NA	
91	NA	EAST	33			EKARD319	220KV PREET VIHAR CKT-1	AMR	Functional		Mixed	100%				NA	
92	NA	EAST	66			EKDLI601	GHAZIPUR CKT NO. II	AMR	Functional		Mixed	100%				NA	
93	NA	EAST	66			EKDLI602	GHAZIPUR CKT NO. I	AMR	Functional		Mixed	100%				NA	
94	NA	EAST	66			EKHPR617	220 KV PPG CKT 2 BAY 6	AMR	Functional		Mixed	100%				NA	
95	NA	EAST	66			EKHPR618	220 KV PPG CKT 1 BAY 11	AMR	Functional		Mixed	100%				NA	
96	NA	EAST	33			EKLNR317	FROM 220 KV GEETA COLONY CKT-2	AMR	Functional		Mixed	100%				NA	
97	NA	EAST	33			EKLNR318	FROM 220 KV GEETA COLONY CKT-1	AMR	Functional		Mixed	100%				NA	
98	NA	EAST	33			EKNTR316	220 KV GEETA COLONY BAY-8	AMR	Functional		Mixed	100%				NA	
99	NA	EAST	33			EKNTR317	220 KV GEETA COLONY BAY-6	AMR	Functional		Mixed	100%				NA	

100	NA	EAST	33		EKNTR318	220KV PREET VIHAR CKT-1	AMR	Functional		Mixed	100%			NA
101	NA	EAST	33		EKRNG301	I/C 220KV GEETA COLONY BAY NO 2	AMR	Functional		Mixed	100%			NA
102	NA	EAST	33		EKRNG302	I/C 220KV GEETA COLONY BAY NO 3	AMR	Functional		Mixed	100%			NA
103	NA	EAST	11	LN R	EMAXH101	OPEN ACCESS SUPPLY TO MAX HOSPITAL	AMR	Functional		Mixed	100%			NA
104	NA	EAST	66		EMAYI611	220 KV PPG CKT 2 BAY 9	AMR	Functional		Mixed	100%			NA
105	NA	EAST	66		EMAYI612	220 KV PPG CKT 1 BAY 10	AMR	Functional		Mixed	100%			NA
106	NA	EAST	33		EMDRY304	I/C 220 KV PPG	AMR	Functional		Mixed	100%			NA
107	NA	EAST	66		ENAND610	66 KV I/C HARSH VIHAR CKT 1	AMR	Functional		Mixed	100%			NA
108	NA	EAST	66		ENAND611	66 KV I/C HARSH VIHAR CKT 2	AMR	Functional		Mixed	100%			NA
109	NA	EAST	66		EPATP610	66 KV I/C GHAZIPUR	AMR	Functional		Mixed	100%			NA
110	NA	EAST	33		EPRVR301	33 KV PATPARGANJ	AMR	Functional		Mixed	100%			NA
111	NA	EAST	33		EPRVR316	I/C 220 KV PREET VIHAR	AMR	Functional		Mixed	100%			NA
112	NA	EAST	33		ESCPT303	I/C FROM 220 KV PPG	AMR	Functional		Mixed	100%			NA
113	NA	EAST	66		ESHAS601	66 KV I/C FROM WAZIRABAD-CKT-1	AMR	Functional		Mixed	100%			NA
114	NA	EAST	66		ESHAS602	66 KV I/C FROM WAZIRABAD-CKT-2	AMR	Functional		Mixed	100%			NA
115	NA	EAST	66		ESHAS603	66 KV I/C FROM WAZIRABAD-CKT-3	AMR	Functional		Mixed	100%			NA
116	NA	EAST	66		ESHAS604	66 KV I/C FROM WAZIRABAD-CKT-4	AMR	Functional		Mixed	100%			NA
117	NA	EAST	33		ESHKP313	I/C FROM P.P.GANG	AMR	Functional		Mixed	100%			NA
118	NA	EAST	33		ESHKP318	I/C FROM 220 KV GEETA COLONY	AMR	Functional		Mixed	100%			NA
119	NA	EAST	33		ESHKP319	I/C 220KV PREET VIHAR	AMR	Functional		Mixed	100%			NA
120	NA	EAST	66		ESNVH607	WAZIRABAD CKT - 1	AMR	Functional		Mixed	100%			NA
121	NA	EAST	66		ESNVH608	WAZIRABAD CKT - 2	AMR	Functional		Mixed	100%			NA
122	NA	EAST	66		EVIVK619	PATPARGANJ CKT-1	AMR	Functional		Mixed	100%			NA
123	NA	EAST	66		EVIVK620	PATPARGANJ CKT-2	AMR	Functional		Mixed	100%			NA
124	NA	EAST	66		EVIVK622	GHAZIPUR CKT-2	AMR	Functional		Mixed	100%			NA
125	NA	EAST	66		EYMVR616	I/C WAZIRABAD-1	AMR	Functional		Mixed	100%			NA
126	NA	EAST	66		EYMVR618	I/C WAZIRABAD-2	AMR	Functional		Mixed	100%			NA
127	NA	EAST	11	LN R	TDTGG101	S/STN NO 2 DDA FLAT 101 SFS	AMR	Functional		Mixed	100%			NA
128	NA	EAST	11	LN R	TDTGG102	S/STN NO 1 NEAR TAJ APP	AMR	Functional		Mixed	100%			NA
129	NA	EAST	11	LN R	TDTGG103	S/STN NO 3 TELCO	AMR	Functional		Mixed	100%			NA
130	NA	EAST	11	MV R	TDTGG104	BPS GHAZIPUR	AMR	Functional		Mixed	100%			NA
131	NA	EAST	11	MV R	TDTGG105	FISH MARKET-2	AMR	Functional		Mixed	100%			NA

132	NA	EAST	11	MV R		TDTGG106	GHAZIPUR DDA FLAT	AMR	Functional		Mixe d	100%			NA
133	NA	EAST	11	MV R		TDTGG107	FISH MARKET-1	AMR	Functional		Mixe d	100%			NA
134	NA	EAST	11	MV R		TDTGG108	KHICHARIPUR S/STN-3	AMR	Functional		Mixe d	100%			NA
135	NA	EAST	11	LN R		TDTGG109	S/STN-2 TELCO	AMR	Functional		Mixe d	100%			NA
136	NA	EAST	11	LN R		TDTGG110	S/STN-1 NEAR TELCO	AMR	Functional		Mixe d	100%			NA
137	NA	EAST	66	MV R		TDTGG601	DMRC RSS VINOD NAGAR 1 & 2	AMR	Functional		Mixe d	100%			NA
138	NA	EAST	66	MV R		TDTGG602	OPEN ACCESS SUPPLY TO DMRC RSS VINOD NAGAR 1 & 2	AMR	Functional		Mixe d	100%			NA
139	NA	EAST	66	NN G		TDTHV605	66 KV DMRC RSS YAMUNA VIHAR CKT 1	AMR	Functional		Mixe d	100%			NA
140	NA	EAST	66	NN G		TDTHV606	66 KV DMRC RSS YAMUNA VIHAR CKT 2	AMR	Functional		Mixe d	100%			NA
141	NA	EAST	66	NN G		TDTHV607	OPEN ACCESS SUPPLY TO DMRC RSS YAMUNA VIHAR 1 & 2	AMR	Functional		Mixe d	100%			NA
142	NA	CENTRA L	11	CC K		TDTKG101	ELECTRIC CREMOTORIU M	AMR	Functional		Mixe d	100%			NA
143	NA	CENTRA L	11	CC K		TDTKG102	BELA ROAD	AMR	Functional		Mixe d	100%			NA
144	NA	CENTRA L	11	CC K		TDTKG103	HAMITON ROAD	AMR	Functional		Mixe d	100%			NA
145	NA	CENTRA L	11	CC K		TDTKG104	NEW KASHMIRI GATE	AMR	Functional		Mixe d	100%			NA
146	NA	CENTRA L	11	CC K		TDTKG105	G.P.O.	AMR	Functional		Mixe d	100%			NA
147	NA	EAST	11	LN R		TDTPP101	NATIONAL DAIRY NO-1	AMR	Functional		Mixe d	100%			NA
148	NA	EAST	11	LN R		TDTPP102	NATIONAL DAIRY NO-2	AMR	Functional		Mixe d	100%			NA
149	NA	EAST	11	LN R		TDTPP103	Veer Sawarkar Block, Main Vikas Marg	AMR	Functional		Mixe d	100%			NA
150	NA	EAST	11	LN R		TDTPP104	GANESH NAGAR COMPLEX	AMR	Functional		Mixe d	100%			NA
151	NA	EAST	11	LN R		TDTPP105	COMERCIAL PRAITICE	AMR	Functional		Mixe d	100%			NA
152	NA	EAST	11	LN R		TDTPP106	NIRMAN VIHAR DDA FLAT	AMR	Functional		Mixe d	100%			NA
153	NA	EAST	11	LN R		TDTPP107	IDC MOTHER DAIRY	AMR	Functional		Mixe d	100%			NA
154	NA	EAST	11	LN R		TDTPP108	PREET VIHAR	AMR	Functional		Mixe d	100%			NA
155	NA	EAST	11	LN R		TDTPP109	DVB STAFF QTRS NO-1	AMR	Functional		Mixe d	100%			NA
156	NA	EAST	11	LN R		TDTPP110	RENNY WELL	AMR	Functional		Mixe d	100%			NA
157	NA	EAST	11	LN R		TDTPP111	DVB STAFF QUATER NO-II	AMR	Functional		Mixe d	100%			NA
158	NA	EAST	11	KW R		TDTWG10 1	SONIA VIHAR BPS NO 1	AMR	Functional		Mixe d	100%			NA
159	NA	EAST	11	KW R		TDTWG10 2	SONIA VIHAR BPS NO 2	AMR	Functional		Mixe d	100%			NA
160	NA	EAST	11	YV R		TDTWG10 3	SHADRA BANDH	AMR	Functional		Mixe d	100%			NA
161	NA	EAST	11	YV R		TDTWG10 4	MONI BABA MANDIR	AMR	Functional		Mixe d	100%			NA
162	NA	EAST	11	KW R		TDTWG10 5	W/BAD SWITCHING STN NO - 2	AMR	Functional		Mixe d	100%			NA
163	NA	EAST	11	YV R		TDTWG10 6	PUSTAVIJAY COLONY	AMR	Functional		Mixe d	100%			NA

164	NA	EAST	11	KW R		TDTWG10 7	SADATPUR	AMR	Functional		Mixe d	100%			NA	
165	NA	EAST	11	KW R		TDTWG10 8	RAW WATER SONIA VIHAR	AMR	Functional		Mixe d	100%			NA	
166	NA	EAST	11	KW R		TDTWG10 9	SONIA VIHAR WTP NO - 1	AMR	Functional		Mixe d	100%			NA	
167	NA	EAST	11	YV R		TDTWG11 0	B-BLOCK BHAJANPURA	AMR	Functional		Mixe d	100%			NA	
168	NA	EAST	11	KW R		TDTWG11 1	TUKHMIR PUR	AMR	Functional		Mixe d	100%			NA	
169	NA	EAST	11	YV R		TDTWG11 2	D-BLOCK GAMRI EXTN	AMR	Functional		Mixe d	100%			NA	

16.1.1 Details of Input Energy Source

Period From 2021-22									
A. Generation at Transmission Periphery (Details)									
S.No.	Name of Generation Station	Installed Capacity (In MW)	Units purchased Apr'21 to March'22 (MU)	Type of Station Generation (Based-Solid (Coal, Lignite)/Liquid/Gas/Renewable (biomass-bagasse)/Others)	Type of Contract (in years/months/days)	Type of Grid (Intra-state/Inter-state)	Point of Connection(POC) Loss in MU(i.e Drawal Loss)*	Voltage Level (At input)	Remarks (Source of data)
1	UNCHAHAR-I	420	26.60	Coal	Till the end of useful life	CTU	0.91	N/A	
2	UNCHAHAR-II	420	58.36	Coal	Till the end of useful life	CTU	2.00	N/A	
3	UNCHAHAR-III	210	38.61	Coal	Till the end of useful life	CTU	1.32	N/A	
4	FARAKKA	1600	23.92	Coal	Till the end of useful life	CTU	0.82	N/A	
5	KAHALGAON-I	840	70.50	Coal	Till the end of useful life	CTU	2.41	N/A	
6	NCPD(Dadri-1)	840	0.00	Coal	APTEL judgement dt 08.02.2022 allow Delhi Discom for exit of PPA w.e.f 01.12.2020.	CTU	0.00	N/A	
7	RIHAND-II	1000	196.09	Coal	Till the end of useful life	CTU	6.71	N/A	

8	SINGRAULI	2000	480.33	Coal	Till the end of useful life	CTU	16.43	N/A	
9	KAHALGAON-II	1500	248.67	Coal	Till the end of useful life	CTU	8.50	N/A	
10	NCPP-II	980	701.98	Coal	Till the end of useful life	CTU	24.01	N/A	
11	RIHAND-III	1000	393.43	Coal	Till the end of useful life	CTU	13.46	N/A	
12	Mejia Units 6	250	137.53	Coal	Till the end of useful life	CTU	4.70	N/A	
13	CTPS 7 & 8	500	503.95	Coal	Till the end of useful life	CTU	17.24	N/A	
14	MTPS #7	500	645.22	Coal	Till the end of useful life	CTU	22.07	N/A	
15	APCPL(Jhajjar)	1500	204.59	Coal	Till the end of useful life	CTU	7.00	N/A	
16	SASAN	3960	2,464.51	Coal	long term-31.03.2037	CTU	84.29	N/A	
17	ANTA GAS	419	0.65	Gas	Till the end of useful life	CTU	0.02	N/A	
18	AURAIYA GAS	663	6.24	Gas	Till the end of useful life	CTU	0.21	N/A	
19	DADRI GAS	830	9.59	Gas	Till the end of useful life	CTU	0.33	N/A	
20	GAS TURBINE	90	43.40	Gas	Long term by March'2031	STU	0.39	N/A	
21	Pragati-I	330	236.83	Gas	Dec'2027	STU	2.13	N/A	
22	Bawana	1371	563.06	Gas	26.03.2039	CTU	5.07	N/A	
23	BAIRA SIUL	180	16.05	Hydro	25 yrs from the revised commissioning date	CTU	0.55	N/A	
24	SALAL	690	96.54	Hydro	40 yrs from the date of COD of last unit	CTU	3.30	N/A	
25	CHAMERA-I	540	37.50	Hydro	40 yrs from the date of COD of last unit	CTU	1.28	N/A	
26	TANAKPUR	94	13.64	Hydro	40 yrs from the date of COD of last unit	CTU	0.47	N/A	
27	URI	480	80.13	Hydro	40 yrs from the date of COD of last unit	CTU	2.74	N/A	
28	DHAULIGANGA	280	39.88	Hydro	40 yrs from the date of COD of last unit	CTU	1.36	N/A	
29	CHAMERA-II	300	45.10	Hydro	40 yrs from the date of COD of last unit	CTU	1.54	N/A	
30	DULHASTI	390	68.10	Hydro	40 yrs from the date of COD of last unit	CTU	2.33	N/A	
31	SEWA-II	120	2.09	Hydro	40 yrs from the date of COD of last unit	CTU	0.07	N/A	
32	CHAMERA-III	231	31.87	Hydro	40 yrs from the date of COD of last unit	CTU	1.09	N/A	
33	URI- II	240	53.42	Hydro	40 yrs from the date of COD of last unit	CTU	1.83	N/A	

34	Parbati-III	520	19.31	Hydro	40 yrs from the date of COD of last unit	CTU	0.66	N/A
35	SJVNL	1500	166.71	Hydro	40 yrs from the date of COD of last unit	CTU	5.70	N/A
36	Tala HEP	1020	20.67	Hydro	40 yrs from the date of COD of last unit	CTU	0.71	N/A
37	RAPP 5&6	440	103.10	Nuclear	15 Yrs i.e end of useful life	CTU	3.53	N/A
38	SECI-Solar+Wind		396.56	Renewable	25 year from COD of last unit	CTU	13.56	N/A
39	Delhi MSW Solutions Ltd	24	33.09	Renewable	25 year from COD of last unit	STU	0.30	N/A
	GRAND TOTAL		8,277.79				261.02	

* provisional nos subject to reconciliation by NLDC

16.1.2 Details of Consumer

Period 21-22						
S.No.	Type of Consumers	Category of Consumers (HT/LT/Others)	Voltage Level	No of Consumers	Total Consumption (In MU)	Remarks (Source of data)
1	Domestic	LT	LT	1,422,265	3,943	
7	Water Supply	LT	LT	1,540	13	
8	Public Lighting	LT	LT	3,152	59	
9	HT Water Supply	HT	11 KV	70	134	
10	HT Industrial	HT/ EHT	11 KV & 33 KV	35	65	
11	Industrial (Small)			7,609	261	
12	Industrial (Medium)	LT	LT			
13	LT Commercial	LT	LT	392,751	1,141	
14	HT Commercial	HT	11 KV, 33 KV	299	242	
15	Applicable to Government Hospitals & Hospitals	HT	11 KV	32	56	Includes 11 KV worship Hospital being billed on domestic tariff
16	Lift Irrigation Schemes/Lift Irrigation Societies	LT	LT	42	0.25	

17	HT Res. Apartments Applicable to all areas	HT	11 KV	17	18	Includes cooperative Group Housing Societies connection being billed on SPD
18	Mixed Load					
19	Government offices and department					
20	Others-1 (Delhi Metro)	EHT	66KV	3	108	
21	Others-2 (Delhi Airport)					
22	Others-3 (if any , specify in remarks)	LT & HT	LT & 11 KV	1,294	#REF!	Includes Advertisement & Hoardings, Temporary Supply, EV, Self consumption and Enforcement
TOTAL				1,829,109	#REF!	

16.1.3 Division Wise loss

Sl. No.	Circle	Name of Division	Period 21-22																			
			Consumer profile								Energy parameters				Commercial Parameter				AT & C loss			
			Co	No. of connections	No. of connections	Total connections	% of connections	Connected Load (MW)	Connected Load (V)	Total Load (V)	% of load	Billed (MU)	% of energy consumption			T	T&D loss	Billed	C	Coll		
													energy	ed/assess	rgy							
1	Cen	Chandni	Res	358		35805	1	71	100%	19.05		1	100%									
			Ag			0		0				0										
			Co	614		61428	1	167	100%	26.01		2	100%									
			Co	16		16	100	7.54		81		2	100									
			Oth	278		278	100	4	100%			2	97									
			total	975	0	975	100	4.01	-	66	0	49.04	0.06	0	100	0.06	0.12%	62	116%	-	-	
2	Cen	Darya	Res	506		506	100	124	100%	35		38	100									
			Ag			0		0				0										
			Co	207		207	100	81	100%	57		16	100									
			Co	76		76	100	71	100%	16		17	100									
			Oth	385		385	100	59	100%	72		25	100									
			total	719	0	719	100	58.78	-	93	93	95.79	0.05	4	100	5.14	5.10%	103	113%	-	-	
3	Cen	Pahar	Res	598		598	100	117	100%	63		34	100									

total				202	0	202	100	413	0	413	100%	73	20	0.13	32	100	5.53	3.90%		109	118%	-	
1	Sou st	Karkardo ma	Res	808		808	100	34		264	100%	83	85			61	100						
			Agr			0			0					0									
			Co ial/ al-LT	139		139	100		58	100%	54				14	100							
			Co ial/ al-HT	32		32	100	57.90		27	100%		73			10	100						
			Oth	288		288	100	26.81		5	100%		5	0.08		3	97						
total				950	0	950	100	354	0	354	100%	31	86.57	0.08	5	100	-3.76	4%		80	117%	-	
1	Sou st	Krishna agar	Res	137		137	100	98		309	100%	124	09			84	100						
			Agr			1	100		0	100%	00				0	100							
			Co ial/ al-LT	522		522	100	01		181	100%		63			43	100						
			Co ial/ al-HT	2		2	100	80		0	100%		84			0	100						
			Oth	346		346	100	0.34		4	100%		88	0.09		2	96						
total				189	0	189	100	494	0	494	100%	36	04	0.09	3	100	-4.69	7%		125	122%	-	
1	Sou st	Laxmi agar	Res	166		166	100	70		438	100%	150	66			103	100						
			Agr			0			0					0									
			Co ial/ al-LT	292		292	100		138	100%	24				31	100							
			Co ial/ al-HT	57		57	100	74		41	100%		05			16	100						
			Oth	420		420	100	41.43		11	100%		40	0.09		4	98						
total				195	0	195	100	628	0	628	100%	45	35	0.09	3	100	-3.90	9%		143	118%	-	
1	Sou st	Mayur ar Ph 1	Res	972		972	100	25		210	100%	81	67			56	100						
			Agr			1	100		0	100%	01				0	100							
			Co ial/ al-LT	111		111	100		40	100%	77				10	100							
			Co ial/ al-HT	24		24	100	40.41		18	100%		57			6	100						
			Oth	361		361	100	18.11		16	100%		99	0.06		9	99						
total				108	0	108	100	285	0	285	100%	2	80.12	0.06	8	100	1.01	1.24%		67	121%	-	
1	Sou st	Mayur ar Ph 3	Res	709		709	100	37		152	100%	50	51			39	100						
			Agr			0			0					0									
			Co ial/ al-LT	813		813	100		24	100%	72				6	100							
			Co ial/ al-HT	9		9	100	24.27		3	100%		86			2	100						
			Oth	263		263	100	3.18		11	100%		02	0.04		4	99						
total				793	0	793	100	191	0	191	100%	33	50.11	0.04	5	100	-0.48	6%		40	125%	-	