

Annual Energy Audit Report

FY2021-22

Laxmipati Balaji Supply Chain
Management Limited



Enertek Solutions India Pvt Ltd

June - 2022

FY2021-22

ANNUAL ENERGY AUDIT FOR
DISCOM UNDER BEE
NOTIFICATION



Laxmipati Balaji Supply Chain Management
Limited,

Village - Sai, Taluka -Pen, Raigad-410206

Prepared by
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FY 2021 -2022 – Prepared - June 2022

Acknowledgement

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Mr. Sarvothama Shetty - VP, Operations

Mr. Vikas Patil - Asst. Manager, Technical

and all other supporting staff who have given full co-operation and support. They took keen interest and gave valuable inputs during the course of study.

Sincerely,
Audit Team

Study Team

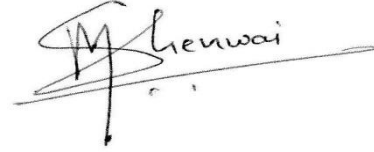
The annual energy audit involved engagement of following team members representing Enertek Solutions India Pvt Ltd. that was awarded the said work for LBSCML vide their PO No. LBSCML/22-23/001 dtd 16 April 2022

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Abbreviations –

AMR	Automated Meter Reading
AT & C	Aggregate Technical and Commercial
BEE	Bureau of Energy Efficiency
CKT	Circuit Kilometer
CT	Current Transformer
DC	Designated Consumer
DISCOM	Electricity Distribution Company
DT	Distribution Transformer
EA	Energy Auditor
EHT	Extra High Tension
EHV	Extra High Voltage
EM	Energy Manager
ESIPL	Enertek Solutions India Pvt Ltd
HT	High Tension
HVDS	High Voltage Distribution System
KVA	Kilo Volt Ampere
LBSCML	Laxmipati Balaji Supply Chain Management Limited
MoP	Ministry of Power
MU	Million Unit
MW	Mega Watt
NO	Nodal Officer
NLDC	National Load Dispatch Centre
OA	Open Access
POC	Point of Connection
PT	Potential Transformer
PX	Power Exchange
RE	Renewable Energy
RLDC	Regional Load Dispatch Centre
SDA	State Designated Agency
SLD	Single Line Diagram
SLDC	State Load Dispatch Centre
T & D	T & D Transmission and Distribution
XLPE	Cross Linked Polyethylene

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1. Executive Summary

Auditors have critically examined the various systems, schemes, devices employed as well as the associated documents at LBSCML for above 22 kV level, at 22kV level and Below 22kV Level so as to ascertain its adequacy and efficacy as per the directives of the BEE and guidelines as per regulation.

1.1 Objective of the study

- To develop and establish a framework and a set of comprehensive guidelines that all Distribution utilities across India can follow and adhere to.

- To identify areas of high loss and pilferage, and thereafter focus efforts to take corrective action

1.2 Brief Overview of DISCOM

The Ministry of commerce & industry (Department of commerce), Government of India vide its Notification dated 3rd March ,2010 under clause (b) of sub section (1) of **section 49 of the Special Economic Zones Act,2005** has specified that the Developer of the SEZ is deemed to be a Distribution licensee under the provision of the Electricity Act 2003.

Maharashtra Electricity Regulation Commission after following due regulatory process took on records the LBSCML's status as deemed distribution licensee for the notified area at Sai village, Tal-Panvel, Dist. Raigad.in its order in case 275 of 2018 dated 17/12/2018. Further Hon. Commission has notified in official gazette the Maharashtra Electricity Regulation Commission (Specified Condition of Distribution License applicable to Laxmipati Balaji supply Chain management LTD for FTWZ and IT/ITES SEZ at village Sai, Tal. Panvel, Dist. Raigad) regulation 2019 on 27/02/2019. In view of above, LBSCML is a deemed Distribution Licensee in its SEZ area at Sai village, Tal. Panvel, District Raigad in the state of Maharashtra.

1.3 Important Parameters

- LBSCML **purchases** power from **Manikaran Power limited**,

- Present Connectivity of the DISCOM is 1 MW which is fed through 2 x 1.5 MVA Distribution transformer installed at AIS substation.

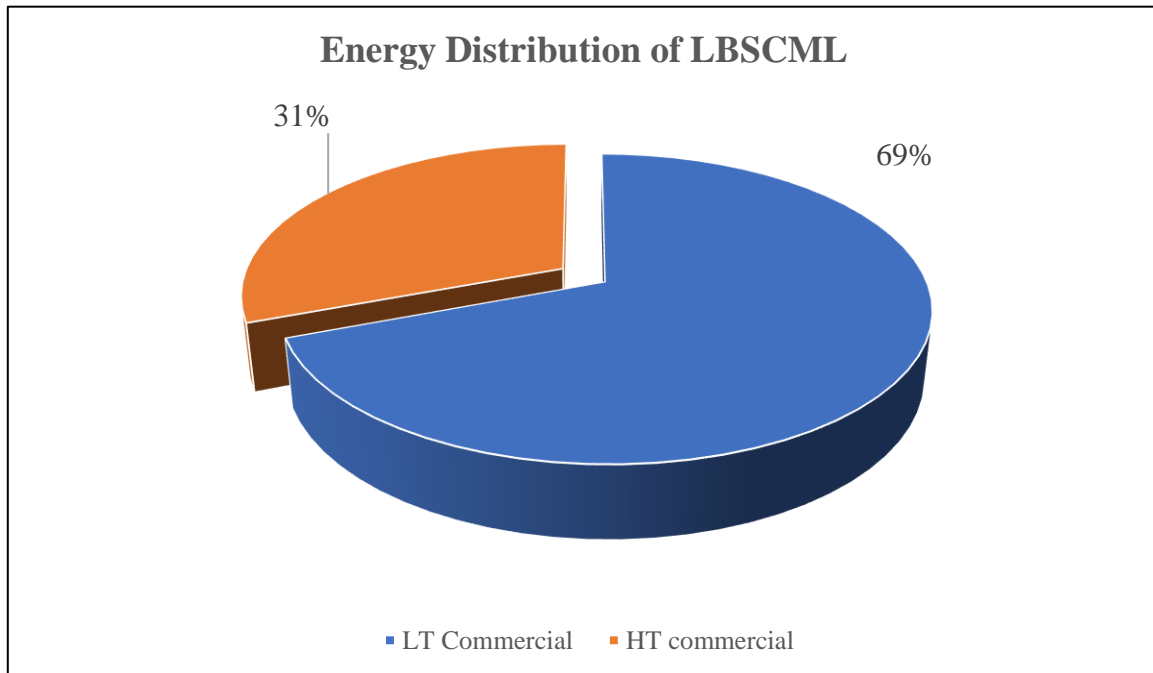
- LBSCML provides power supply to Consumers in two **tariff categories**:
 - 1) **LT Connections**
 - 2) **HT Connections**

- The DISCOM does **not include any residential, agriculture or water supply tariff-based consumer**.

•LBSCML is in development stage and the number of consumers expected is increasing as the project progresses. LBSCML has started its **operations on 16th February 2021**.

•DISCOM has **2 Distribution transformers**. There are in total **25 registered consumers** of the licensee. **100%** of the Licensee consumers are **metered consumers**. Out of its total Energy Billing, around **31 %** of the Energy consumed is at **Commercial HT level**, and **69%** of the energy consumed is at **commercial LT 415V level**. DISCOM does not have any residential, agricultural or public utilities consumer.

Figure 1: Energy Distribution of LBSCML



Segregation of Consumers

•DISCOM has completed 100% metering at consumer end. DISCOM has also completed 100 % metering at DT level with communicable meters. DISCOM has plans to replace electronic meters to smart meter within stipulated time.

•The total **contracted demand of licensee is 1.432 MVA**,

•The **input energy** at DISCOM periphery for the FY2021-22 was **3.0148 MU** out of which **2.9189 MU were metered** and billed and -0.0069 MU (~ -0.24%) was Transmission and Distribution loss. The **AT & C losses are calculated as 0.2%** with a 99.56% Collection Efficiency

Summary of AT&C losses summary-

Table 1: Summary of Losses at LBSCML

Particulars		Value	Unit
Input Energy Purchased	(A)	3.0148	MU's
Transmission Loss @ 3.18%	(B)	3.18%	%
Input Energy at DISCOM Periphery	(C)	2.9189	MU's
LBSCML Sale	(D)	2.9258	MU's
T & D Loss	(E=C-D)	-0.0069	MU's
T& D Loss %	(F=E/C %)	-0.23%	%
Total Amount Billed	F	4.66	Cr
Total Amount Collected	G	4.64	Cr
Collection Efficiency	(H=G/F)	99.56%	%
Aggregate T&C Losses	$I = (1 - ((1-E) \times H))$	0.2%	%

1.4 Critical Comments

LBSCML is conducting the **audit for the first time** after the start of operations in February 2021. Based on physical inspection of datasheets and invoice history, no variation in the input energy billed vs reported in proforma and output energy sold vs reported in proforma was found.

Suggestions for improvement –

- It was observed that the energy loss in distribution was **-0.24%** based on DISCOM data, However, accurate loss for Cabling and transformer losses can be calculated when there is adequate metering available. Energy metering at HT level should be improved. In order to correctly identify distribution losses between supply point and the Periphery, Class 0.2s accuracy meters should be installed at the 22kV incomer and outgoing LV side at the periphery of the DISCOM.
- Plant has installed a 10kW rooftop solar PV system which is also injecting power into the main power grid. This Additional solar generation happening in the plant should be recorded and metered along with all other metering plan. Install a SCM/ABT energy meter to the Solar generation/ injection point

2 Background

2.1 About PAT under NMEEE

In 2008, Government of India announced 'National Action Plan on Climate Change (NAPCC), identifying eight missions to promote inclusive growth in the country. The National Mission for Enhanced Energy Efficiency (NMEEE) is one of the eight identified missions under.

NAPCC. One of the initiatives under NMEEE is Perform Achieve and Trade (PAT) scheme; which is a market-based mechanism having the objective to enhance energy efficiency (target based) in the country with an option to trade the additional energy savings, in the form of energy saving certificates. Bureau of Energy Efficiency (BEE) under Ministry of Power (MoP) is implementing this scheme in 13 energy intensive sectors namely- Thermal Power Plant, Aluminium, Pulp & Paper, Chlor- Alkali, Cement, Iron & Steel, Textile, Fertilizer, Refinery, Railways, DISCOM, Petro-chemical & Buildings.

In order to further widen the coverage of PAT scheme, in subsequent phases, it is required to bring in more DISCOM units/establishments under its ambit by increasing the number of designated consumers in already notified 13 energy intensive sectors.

The baseline SEC and potential of energy conservation would be considered to Arrive at the energy saving targets for newly added DCs by BEE during the subsequent phases of PAT.

2.2 Role of BEE

Role of BEE for formulation of Sector Specific Technical committee and finalization of Target setting methodology. Establishment of Energy Consumption Norms and Standards for DCs in consultation with Technical Committee. Conducting the Regional Workshops and guiding DCs regarding the PAT Scheme.

2.3 About DISCOM Sector

A healthy distribution sector is considered as the key to a financially viable power sector. One of the major challenges affecting the health of Indian distribution sector is the high aggregate technical and commercial (AT&C) losses. AT&C loss is the sum of technical loss and commercial loss. The technical loss occurs due to flow of energy into transmission and distribution network. Technological advancements could help in reduction of technical loss

to an optimum level. As per international norms, the technical loss in a distribution system should be in the range of 4-5%.

On the other hand, the commercial loss is mostly man-made and occurs due to inefficient billing and collection of the energy supplied, illegal connections, theft, meter tampering, and pilferage, etc. The commercial loss is occurring mostly due to managerial issues and could be brought down to zero with efficient administrative practices. National aggregate technical and commercial losses stood at 22%. As long as AT&C losses continues to be in such a high range, it is difficult for the DISCOMs to be commercially viable.

In order to improve the energy efficiencies in the power system, State electricity Distribution Companies are included in PAT cycle II. DISCOMs having AT&C losses of 1000 Million Unit (MU) (Equivalent to 86000 MTOE) and above are notified as Designated Consumers (DCs) and targets were assigned to 44 DISCOMs for reducing the T&D losses under PAT Cycle-II. T&D losses is considered as performance matrix of electricity distribution companies under PAT.

As per the notification, which was formulated in consultation with the Bureau of Energy Efficiency (BEE), "All entities having issued distribution license by State/Joint Electricity Regulatory Commission under the Electricity Act, 2003..." are notified as DCs. After this notification, all DISCOMs will be governed under various provisions of the EC Act 2001, such as appointment of energy manager, energy accounting and auditing, identification of energy losses category-wise, and implementation of energy conservation and efficiency measures. With this, the number of DISCOM covered under the EC Act.2001 will increase from 44 to 103.

This decision will facilitate energy accounting and auditing as mandatory activity for all the DISCOM, leading to the actions towards reducing losses and increase their profitability. The amendment is expected to help DISCOMs to monitor their performance parameters and bring in transparency in the distribution sector through professional inputs, it added. It will also assist in developing projects for reducing the electricity losses by DISCOMs and implementing effective solutions.

The amendment is expected to improve the financial state of DISCOMs. The quarterly data of these DISCOMs will be collected and monitored by the government to suggest measures for increasing the efficiency and reduce the energy losses.

2.4 Period of Energy Auditing and accounting Methodology

Period of Energy accounting in this report is considered to by FY 21-22 i.e., from 1st April 2021 till 31st March 2022.

The detailed energy audit site inspection and data verification exercise initiated from 09 June 2022 and was completed on 12 June 2022. The Methodology followed by the team can be stated as follows –

1. Kick of meeting with LBSCML team to finalise the sample size
2. Survey of the Distribution network
3. Collection of the Primary Data and finalization of the sample size check
4. Site visit and Energy Meter data collection
5. Scrutiny of collected data and Data gaps of the submitted data
6. Loss calculation for the network segment then if required normalization
7. Compilation of the Draft report
8. Presentation on Draft report
9. Final report with incorporation of comments.

3 Introduction of DISCOM [LBSCML]

3.1 Name and Address of Designated Consumer

Laxmipati Balaji Supply chain Management limited.

Village Sai, Taluka -Pen, Raigad-410206

Nodal Officer:

Mr. Sarvothama Shetty, VP operations LBSCML.

Village Sai, Taluka -Panvel, Raigad-410206

3.2 About DISCOM

The Ministry of commerce & industry (Department of commerce), Government of India vide its Notification dated 3rd march ,2010 under clause (b) of sub section (1) of section 49 of the special Economic Zones Act,2005 has specified that the Developer of the SEZ is deemed to be a Distribution licensee under the provision of the Electricity Act 2003. The provision inserted in clause (b) of section 14 of the EA 2003 vides Notification No. S.0.528 (E) is as under:

“Provided that the Developer of a special Economic Zone notified under sub-section (1) of section 4 of the Special Economic Zones Act 2005, shall be deemed to be a licensee for the purpose of this clause, with effect from the date of notification of such Special Economic Zone”.

Maharashtra Electricity Regulation Commission after following due regulatory process took on records the LBSCML’s status as deemed distribution licensee for the notified area at sai village, Tal-Panvel, Dist. Raigad.in its order in case 275 of 2018 dated 17/12/2018. Further Hon. Commission has notified in official gazette the Maharashtra Electricity Regulation Commission (Specified Condition of Distribution License applicable to Laxmipati Balaji supply Chain management LTD for FTWZ and IT/ITES SEZ at village Sai, Tal. Panvel, Dist. Raigad) regulation 2019 on 27/02/2019.In view of above, LBSCML is a deemed Distribution Licensee in its SEZ area at Sai village, Tal. Panvel, District Raigad in the state of Maharashtra.

3.3 General Information

General Information				
1	Name of the DISCOM	Laxmipati Balaji Supply chain Management Limited		
2	i) Year of Establishment	2018		
	ii) Government/Public/Private	Private		
3	DISCOM's Contact details & Address			
i	City/Town/Village	Village Sai, Taluka -Pen,		
ii	District	Raigad		
iii	State	Maharashtra	Pin	410206
iv	Telephone	022 67814196	Fax	
4	Registered Office			
i	Company's Chief Executive Name	Navnit Choudhary		
ii	Designation	Vice President		
iii	Address	205 &206 (part),2nd floor, Ceejay house, F-Block, Shivsagar Estate, Dr. Annie Besant Road,		
iv	City/Town/Village	Mumbai		
v	District			
vi	State	Maharashtra	Pin	400018
vii	Telephone		Fax	
5	Nodal Officer Details*			
i	Nodal Officer Name (Designated at DISCOM's)	Sarvothama Shetty		
ii	Designation	VP-operation		
iii	Address	Sai village, Taluka-Panvel, Dist-Raigad		
iv	City/Town/Village			
v	District	Raigad		
vi	State	Maharashtra	Pin	410206
vii	Telephone	9892326914	Fax	
6	Energy Manager Details*			
i	Name	Harshad Batule		
ii	Designation	Energy Manager	Whether EA or EM	EM
iii	EA/EM Registration No.	EM-300042/21		
iv	Telephone		Fax	
v	Mobile	9421053996	E-mail ID	harshadbatule@gmail.com

4 Energy Accounting and Verification

4.1 Scope of work –

1 To carry out Energy Audit in line with the BEE EA Regulation 2021 to Conduct Energy Audit in LBSCML.

- Preparation of checklist/action plan for Energy Audit.
- Proforma of Energy Audit will be shared with selected agency after the issuance of Purchase Order.
- DISCOM visit should be carried out by all team members of the agency as per the team declaration in technical proposal. BEE EA Regulation 2021 formats will be used for this audit.
- Collection and Review of the energy related data of last Financial Year (FY 2021-22) in the Proforma by visiting the DISCOM physically.
- Verification of existing pattern of energy distribution across periphery of electricity distribution Company
- Collection and verification of energy flow data of electricity distribution company at all applicable voltage level of distribution network (please refer energy audit regulation) Collection of data on energy received and distributed by DISCOM and verify the accuracy of data

2 Collection & analysis the data and prepare the same with report;

I Input energy details:

- a. Collection of input energy from recorded system meter reading
- b. All the inputs points of transmission system
- c. Details provided by transmission unit
- d. System loading and Captures infrastructure details (i.e., no of circle, division, sub-division, feeders, DTs, & Consumers)

II Parameters for computation of distribution losses:

- a) Details of, HT sale, LT sale and transmission losses
- b) Number of consumer's category wise
- d) Details of billed and un-billed energy category wise of each circle
- e) Metered and un-metered details.

- g) Boundary meter details
- h) Energy Cost and Tariff data
- i) Source of energy Supply (e.g., electricity from grid or self-generation), including generation from renewables;
- j) Energy supplied to Open Access Consumers which is directly purchased by Open Access Consumers from any supplier other than electricity distribution company

III Monitoring and verifications of input energy and consumption pattern at various voltage levels

IV Identify the areas of energy leakage, wastage or inefficient use;

V Identify high loss-making areas/networks, for initiating target based corrective action.

VI Identify overloaded segments of the network for necessary capacity additions.

VII Methodology for loss computation various losses.

VIII Collection Efficiency (Category wise) and computation of AT&C loss.

3 Observe and compile various Energy Conservation (ENCON) options implemented by the DISCOM and prepared report containing details of expenditure made by DC along with saving and payback period.

Recommendations to facilitate energy audit, energy accounting and improve energy efficiency.

4 Prepare final report of LBSCML as per the scope of work and as per the BEE Energy Audit Regulation, 2021, in a standard format duly indexed, covering profile of the unit and its details of energy related data analytical & Statistical details and any other relevant information. The indicative report structure is provided in second schedule of BEE EA Regulation 2021.

Deliverables

- Preparation of report as per BEE EA Regulation 2021
- Verify & submit the duly signed annual energy audit report

4.2 Energy accounts for previous years

DISCOM is carrying out energy audit for the first time, the energy accounting for each year will be built in subsequent years.

4.2 Input Energy Detail

4.2.1 Source of Power Purchase/Generation Station

Below table describes source of power supply and their technical details

Table 2 Source of Power Purchase

Name of Generation Station	Generation Capacity (In MW)	Type of Station Generation	Type of Contract (in years/months/days)	Type of Grid	Point of Connection (POC) Loss MU	Voltage Level (At input)
BirlaCarbon Pvt Ltd	15	Gas	One Year	Intra state	NA	100kV

LBSCML purchases power from **Manikaran Power Limited**, Manikaran power limited is a Trader for energy purchase in this scenario. **Sanctioned load in the agreement is 1MW as per the contract made between MPL and LBSCML**. Bills attached in the Report are from Manikaran Power Limited in annexure V.

4.2.2 Input Energy Feeder Wise

Below table describes quantum of energy injected by each power supplier in grid.

Table 3 Input Energy Feeder Wise

Voltage Level (KVA)	Feeder Name	Feeder Metering Status	Status of Meter	Feeder Type (Agri/ Industrial/Mixed)	Consumption Details		
					Meter Sr. No	Import (MU)	Export (MU)
22kV	100/22 KV Jite s/s	AMR	Functional	Input to DL	ABT Q0323851	3.014	0.0

4.3 Infrastructure Details

4.3.1 Transformers and Feeders (Voltage level wise)

Below table describes installed capacity and infrastructure of power distribution available with DISCOM

Table 3 Power and Distribution Transformer Capacity

Parameter	Voltage Level	Transformers		Aggregate Capacity
	kV/k V	Capacity (kVA)	Quantity (Nos)	(kVA)
Distribution Transformer	22/0.433	1500	2	3000
Total				3000

4.3.2 Single Line Diagram

SLD of the network is attached in annexure I

4.3.3 Infrastructure Details –

Sr. No.	Parameters	Total	Covered during in audit	Verified by Auditor in Sample Check	Remarks (Source of data)
i	Number of circles	NA		0	0
ii	Number of divisions	NA	0	0	0
iii	Number of sub-divisions	NA	0	0	0
iv	Number of feeders	1	0	0	0
v	Number of DTs	2	0	0	0
vi	Number of consumers	25	0	0	0
2	Parameters	66kV and above	33kV	11/22kV	LT
a. i.	Number of conventional metered consumers	0	0	0	0
ii	Number of consumers with 'smart' meters	0	0	1	24
iii	Number of consumers with 'smart prepaid' meters	0	0	0	0
iv	Number of consumers with 'AMR' meters	0	0	0	0
v	Number of consumers with 'non-smart prepaid' meters	0	0	0	0

vi	Number of unmetered consumers	0	0	0	0
vii	Number of total consumers	0	0	1	24
b.i.	Number of conventionally metered Distribution Transformers				2
ii	Number of DTs with communicable meters				
iii	Number of unmetered DTs			0	0
iv	Number of total Transformers				2
c.i.	Number of metered feeders		0	1	
ii	Number of feeders with communicable meters				
iii	Number of unmetered feeders				
iv	Number of total feeders		0	1	0
d.	Line length (ct km)	10 KM			

e.	Length of Aerial Bunched Cables	0			
f.	Length of Underground Cables	2 KM			
3	Voltage level	Particulars	MU	Reference	Remarks (Source of data)
i	66kV and above	Long-Term Conventional	0	Includes input energy for franchisees	
		Medium Conventional	0		
		Short Term Conventional	0		
		Banking	0		
		Long-Term Renewable energy	0		
		Medium and Short-Term RE	0	Includes power from bilateral/ PX/ DEEP	
		Captive, open access input	0	Any power wheeled for any purchase other than sale to DISCOM. Does not include input for franchisee.	
		Sale of surplus power	0.00%		

		Quantum of inter-state transmission loss	0	As confirmed by SLDC, RLDC etc	
		Power procured from inter-state sources	0	Based on data from Form 5	
		Power at state transmission boundary	0		
ii	22kV	Long-Term Conventional	0		
		Medium Conventional	0		
		Short Term Conventional	3.014774	DSM	MSLDC
		Banking	0		
		Long-Term Renewable energy	0		
		Medium and Short-Term RE	0		
		Captive, open access input	0		
		Sale of surplus power	0.00%		
		Quantum of intra-state transmission loss	0		
		Power procured from intra-state sources	3.014774		
iii		Input in DISCOM wires network	3.014774		
iv	33 kV	Renewable Energy Procurement	0		
		Small capacity conventional/ biomass/ hydro plants Procurement	0		
		Captive, open access input	0		

v	11 kV	Renewable Energy Procurement	0		
		Small capacity conventional/ biomass/ hydro plants Procurement	0		
		Sales Migration Input	0		
vi	LT	Renewable Energy Procurement	0		
		Sales Migration Input	0		
vii		Energy Embedded within DISCOM wires network	0		
viii		Total Energy Available/ Input	3.014774		
4	Voltage level	Energy Sales Particulars	MU	Reference	
i	LT Level	DISCOM' consumers	2.027298	Include sales to consumers in franchisee areas, unmetered consumers	
		Demand from open access, captive	0	Non DISCOM's sales	
		Embedded generation used at LT level	0	Demand from embedded generation at LT level	
		Sale at LT level	2.0272980		
		Quantum of LT level losses	0		

		Energy Input at LT level	2.027298		input energy kept as sale as DT site reading not available
ii	11 kV Level	DISCOM' consumers	0	Include sales to consumers in franchisee areas, unmetered consumers	
		Demand from open access, captive	0	Non DISCOM's sales	
		Embedded generation at 11 kV level used	0	Demand from embedded generation at 11kV level	
		Sales at 11 kV level	0		
		Quantum of Losses at 11 kV	0		
		Energy input at 11 kV level	0		input energy kept as sale as DT site reading not available
iii	22 kV Level	DISCOM' consumers	0.898597	Include sales to consumers in franchisee areas, unmetered consumers	
		Demand from open access, captive	0	Non DISCOM's sales	

		Embedded generation at 22kV or below level	0	This is DISCOM and OA demand met via energy generated at same voltage level	
		Sales at 22 kV level	0.89859680		
		Quantum of Losses at 22 kV	0.0000000		
		Energy input at 22kV Level	0.8985968		input energy kept as sale as DT site reading not available
iv	> 33 kV	DISCOM' consumers	0	Include sales to consumers in franchisee areas, unmetered consumers	
		Demand from open access, captive	0	Non DISCOM's sales	
		Cross border sale of energy	0		
		Sale to other DISCOMs	0		
		Banking	0		
		Energy input at > 33kV Level	0		
		Sales at 66kV and above (EHV)	0		
Total Energy Requirement			2.925895		
Total Energy Sales			2.9258948		

Table 4: Infrastructure Details

4.4 Energy accounts and performance in the current year

4.4.1 Voltage Wise Losses

The below tables describe losses incurring at each voltage level

Table 5 Voltage Wise Losses

Parameter	22 kV	11 kV	LT level	Total
	A	B	C	
Input Energy (MU)	2.918904	NA	NA	2.918904
Sales (MU)	2.925895	NA	NA	2.925895
Losses (MU)	-0.00699	NA	NA	-0.00699
% Losses	-0.24%	NA	NA	-0.24%

Losses seen as zero due to the following reasons –

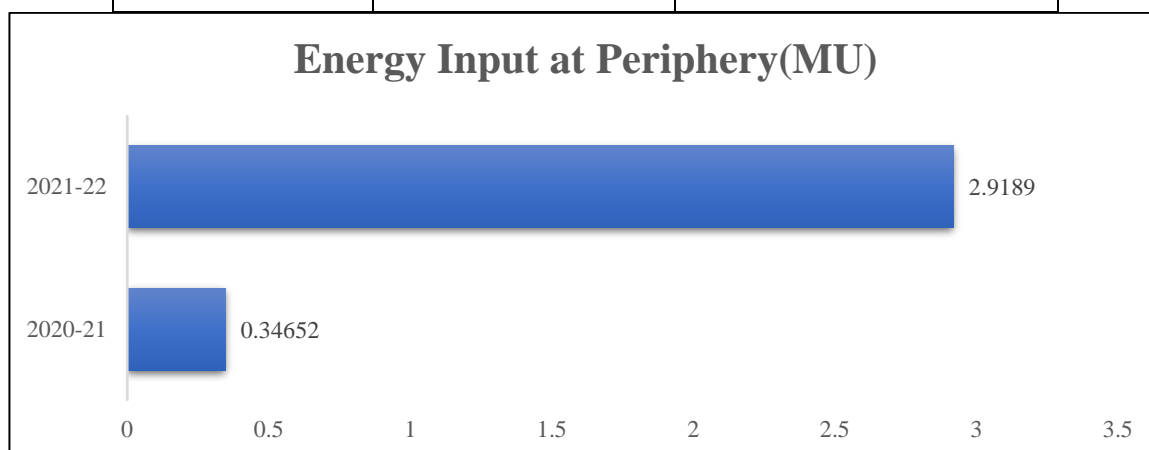
- Transformer losses at 22 kV level are billed in the consumer scope
- Cabling losses are billed in the consumer side meters.
- LT metering losses are not calculated as presently there is not meter available at transformer LV side.

4.4.2 Net Input Energy

It is the net energy at DISCOM periphery after adjusting the transmission losses and energy traded

Table 6 Net Input Energy

Unit	Year 2020-21	Year 2021-22
Million kWh	0.34652	2.918904



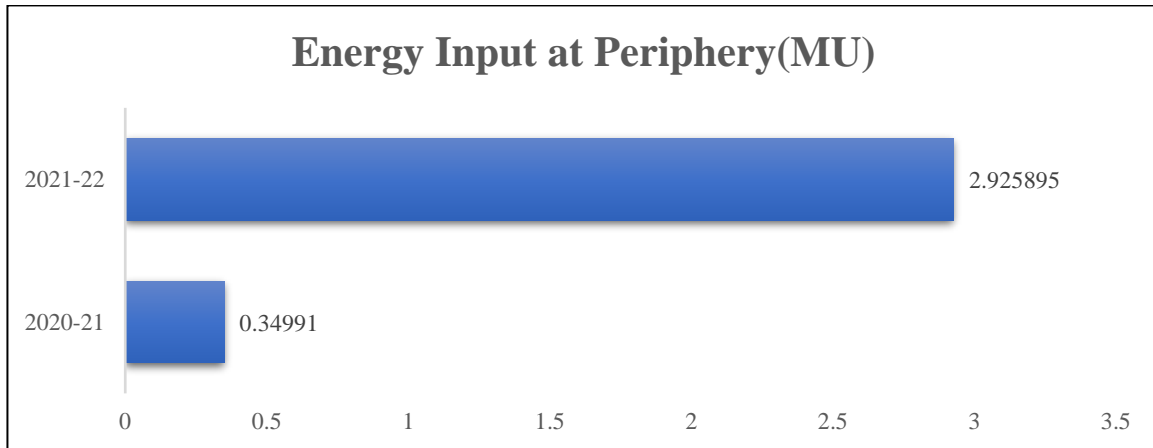
Graphical Representation of Energy input

4.4.3 Total Billed Energy

It is the Net energy billed.

Table 7 Billed Energy

Unit	Year 2020-21	Year 2021-22
Million kWh	0.34991	2.925895



Graphical Representation of Energy input

4.4.4 critical Analysis

- LBSCML is a New DISCOM and has started its operation on **16th February 2021**
- LBSCML has **2 x 1500 kVA distribution transformers** installed in the premise for **22kV to 415V voltage levels. One transformer is operational while the other transformer remains in standby**
- Power is purchased from a trader known as Manikaran Power limited which has a 1MW contract with LBSCML. The power consumption data used in this report is as per the SLDC data.
- LBSCML DISCOM has **24 LT consumers and 1 HT** consumer in the premise. The Number of live consumers changes during the operational year as per the occupancy of the premise.
- It is observed that **T & D loss of DISCOM is -0.24% and there is no space for** improvement in the network that further reduce the loss of high quantum. However, energy accounting can be further improved by quantifying DT wise losses, replacement with smart meters at judicious locations and nullifying or offsetting meter errors.
- All distribution and Transmission losses inside the DISCOM periphery are being metered in the scope of the consumer as metering is done at main substation for all consumers.
- **It was observed that the energy loss in distribution was -0.24% based on DISCOM data, However, accurate loss for Cabling and transformer losses can be calculated when there is adequate metering available. Energy metering at HT level should be improved. In order to correctly identify distribution losses between supply point and the Periphery, Class 0.2s accuracy meters should be installed at the 22kV incomer and outgoing LV side at the periphery of the DISCOM.**
- **Plant has installed a 10kW rooftop solar PV system which is also injecting power into the main power grid. This Additional solar generation happening in the plant should be recorded and metered along with all other metering plan. Install a SCM/ABT energy meter to the Solar generation/ injection point**

4.4.5 Transmission & Distribution loss

It is the total T & D losses incurred for specific financial year.

Table 8 T & D Loss Summary

Unit	Year 2020-21	Year 2021-22
Million kWh	-0.00339	-0.00699
%	-0.97%	-0.24%

Note –

T&D Loss in MUs = Net Input Energy at DISCOM periphery in MUs – Total Billed Energy in Mus

4.4.6 Category wise energy consumption

Table 9: Category Wise Consumption

Consumer category	Total Number of connections (Nos)	% Of number of connections	Total Connected Load (MW)	Billed energy (MU) Metered energy	% Of energy consumption
Residential	0	0%	0	0	0%
Agricultural	0	0%	0	0	0%
Commercial/Industrial-LT	24	96%	1.232	2.027298	69.3%
Commercial/Industrial-HT	1	4%	0.2	0.898597	31%
Others	0	0%	0	0	0%
	25	100%	1.432	2.925895	100%

4.4.7 Calculation of AT& C Losses

Table 10: Calculation of AT&C Losses

Consumer category	No of connection metered (Nos)	Total Connected Load (MW)	% Of connected load	Input energy (MU)	Total energy (MU)	% Of energy consumption	T&D loss (MU)	T&D loss (%)	Billed Amount in Rs. Crore	Collected Amount in Rs. Crore	Collection Efficiency	AT&C losses
Residential	0	0	0%	2.918904	0	0%	-0.00699	-0.24%	0	0	0.00%	0.21%
Agricultural	0	0	0%		0	0%			0	0.00%		
Commercial/Industrial-LT	24	4.616	86%		2.0272	69.3%			3.7530	3.653	97.35%	
Commercial/Industrial-HT	1	0.8	14%		0.8985	31%			0.9087	0.9876	108.67%	
Others	0	0	0%		0	0%			0	0	0.00%	
	25	5.416	100%	2.9189	2.9258	100%	-0.00699	-0.24%	4.6618	4.6411	99.56%	0.21%

4.4.8 Energy Consumption and reduction of losses details

- The DISCOM has been hovering around -0.24% T&D loss.
- It can be seen that major consumption of units in licensee area consists of LT connections accounting to nearly 69% of total units billed. It is understood that since supply of this consumers is through 415V, distribution and metering losses are considerably low.
- Also, as seen in the losses, the Distribution losses for each consumer is in the consumer scope as the energy meter is installed at the substation from where the power is distributed.
- DISCOM has an overall collection efficiency of 99.56% in FY21, which means the T & D loss and AT & C losses are equal at 0.21%
- The overall A T & C loss of the DISCOM are considerably lower than that of the average A T & C loss benchmark of 20.66% (CEA Report, Oct 2020)
- It can be seen that installed power transformer capacity of DISCOM the distribution transformer capacity is 1.5 X 2MVA.

4.4.9 Energy Conservation Measures already taken

In the present situation, the utility is a newly commissioned DISCOM and has started Operations in February 2021.

LBSCML has not specifically implemented energy saving as the % losses are very low. But the DISCOM has made an effort in trying to implement energy efficient technologies in the commissioning stage itself. Some of the technologies implemented in the system are

- Energy Efficient Pumping systems in the premise,
- LED lighting has also been installed at majority of the places
- Harmonic control panel installed in the main substation for reduction of harmonics

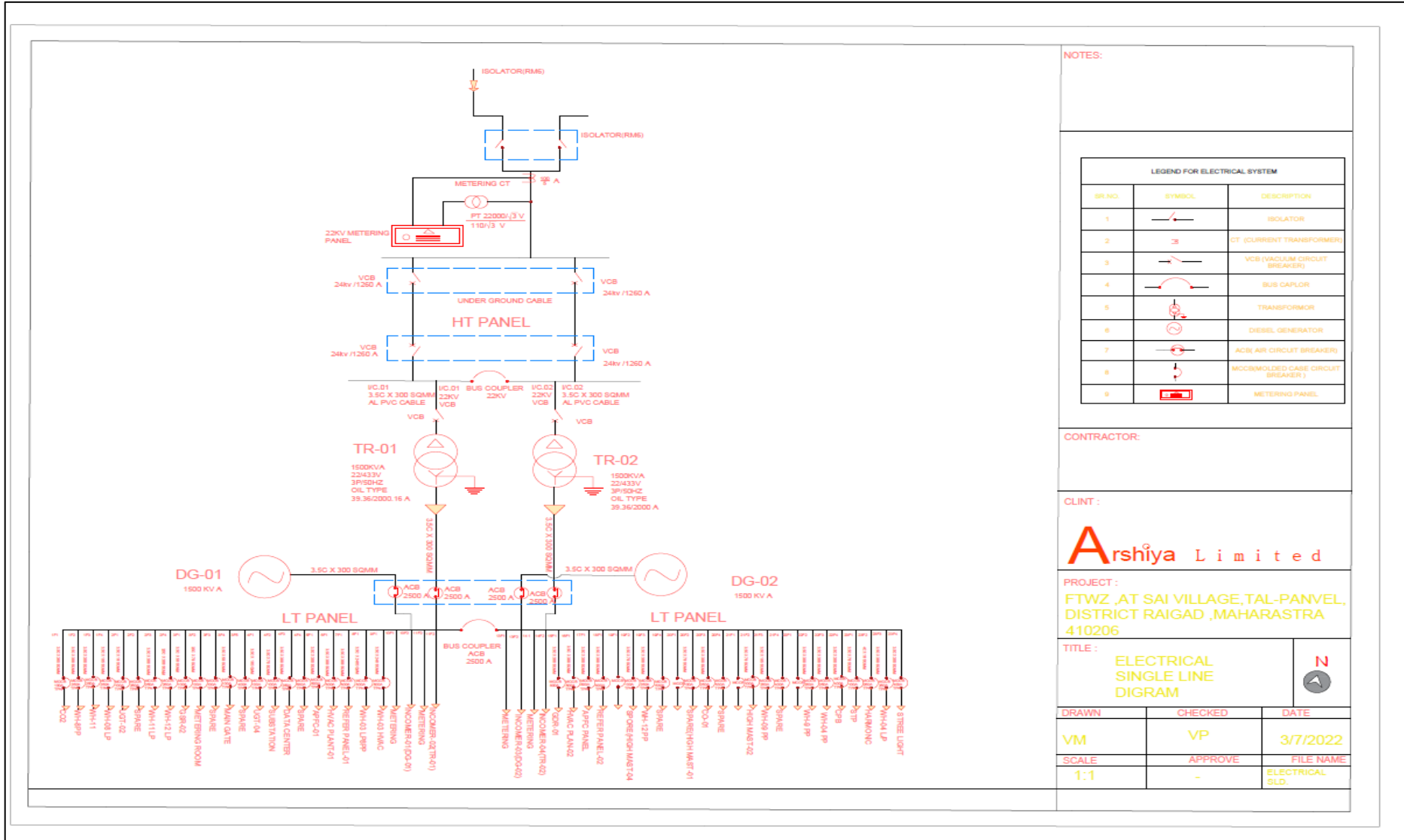
However, the DISCOM shows in interest in reducing the Distribution losses by approaching in the following areas of improvement: -

- **Installation of LED lighting**
- **Reactive power compensation, Correction of power factor** at all LT level distribution.

Similar Smaller energy conservation efforts by the DISCOM Shall help reduce the overall T&D losses incurred as a supply company.

Annexures

Annexure I – Single Line Diagram



NOTES:

LEGEND FOR ELECTRICAL SYSTEM		
SR.NO.	SYMBOL	DESCRIPTION
1	[Symbol]	ISOLATOR
2	[Symbol]	CT (CURRENT TRANSFORMER)
3	[Symbol]	VCB (VACUUM CIRCUIT BREAKER)
4	[Symbol]	BUS COUPLER
5	[Symbol]	TRANSFORMOR
6	[Symbol]	DIESEL GENERATOR
7	[Symbol]	ACB (AIR CIRCUIT BREAKER)
8	[Symbol]	MCCB (MOLDED CASE CIRCUIT BREAKER)
9	[Symbol]	METERING PANEL

CONTRACTOR:

CLINT :
Arshiya Limited


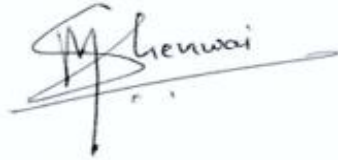
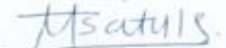
PROJECT :
FTWZ ,AT SAI VILLAGE ,TAL-PANVEL,
DISTRICT RAIGAD ,MAHARASTRA
410206

TITLE :
**ELECTRICAL
SINGLE LINE
DIGRAM**



DRAWN	CHECKED	DATE
VM	VP	3/7/2022
SCALE	APPROVE	FILE NAME
1:1	-	ELECTRICAL SLD.

Annexure- II Minutes of Meeting with the DISCOM team

Minutes of Meeting			
Party 1	Laxmipati balaji Supply chain management Limited	Date	12 th June 2022
Party 2	Enertek solutions India Pvt Ltd		
Agenda – Annual Energy Audit For DISCOM Notification			
Date	12-06-2022	Time	15:00
		Venue	Conference Room, LBSCML admin Office
Members			
LBSCML	Sarvothama Shetty Vikas Patil	ESIPL	Makarand Shenwai Anand Dande Harshad Batule
Discussion Points -			
<p>Meeting has been called to discuss the details of Annual energy audit as notified by BEE for LBSCML, Raigad. This meeting involved a detailed discussion on the Scope of work for the said annual energy audit with the following points discussed-</p> <ul style="list-style-type: none"> - Data Provided by DISCOM for Annual energy Audit - The consultant verified the Electricity Bills, Billed energy, AT&C losses, Billed amount and collected amount of LBSCML. - Field visit was conducted to verify the meters installed in the DISCOM periphery. - Infrastructure details have been verified by ESIPL. - DISCOM is not monitoring actual Distribution losses between Source point (Jite) and the Injection Point at the periphery. This loss should be correctly monitored - Solar injection should be accounted for in the energy distribution system. - Calibration of meters should be started on regular basis - All data as per Energy audit requirement has been collected and checked on sample basis, 			
For Laxmipati Balaji Supply Chain Management Limited(LBSCML)		For Enertek Solutions India Pvt Ltd	
 (Sarvothama Shetty) VP-Operations		  Harshad Batule	

Annexure- III Check List prepared by auditing Firm

Parameter	Primary Documents	Data Provided by LBSCML
Details of purchased energy	Power purchase bills, SLDC documents, energy accounts, Audit statement, petition	SLDC Data
Transmission loss %	Calculation of transmission loss viz difference in total energy purchased and total energy drawl at distribution periphery.	SLDC Data
Energy input details meter wise, with other mentioned details	SLDC document, meter log	SLDC data
Summary of Circle wise Loss Number of metered consumers and connected load, category wise of each circle. Number of un-metered consumers and connected load, category wise of each circle	Statements, Database	Database – software
Circle wise input Energy for billed meter energy and billed un-metered energy	Meter logs through which input energy of circle was computed. Un-metered energy with reference of calculation should be maintained	Database - Software
Aggregate Technical and Commercial Losses	Consumer Bills and its summary Sheet	Consumer bills and Summary sheet
Calculations for All Losses and Accounting	Excel sheet as per BEE format	BEE Proforma shared

Annexure- IV Brief Approach, Scope & Methodology for audit

Annual Energy Audit shall have verification of:

- a) Existing pattern of energy distribution across periphery of the company;
- b) Accounted energy flow submitted by the company at all applicable voltage levels of the distribution network, —
 - (i) Energy flow between transmission and 22kV/11kV incoming distribution feeders
 - (ii) Energy flow between Feeder to end-consumer
 - (iii) Energy flow between 22/11 kV/0.433 kV directly to consumer

Auditor, in consultation with the nodal officer of the company shall:

- (i) The energy audit shall be conducted strictly as per BEE guidelines for DISCOM audit.
- (ii) Agree on best practice procedures on accounting of energy distributed across the network
- (iii) Collect data on energy received, and distributed, covered within the scope of energy audit.

Auditor shall:

- (i) Verify the accuracy of the data collected in consultation with the nodal officer of the company as per standard practice to assess the validity of the data collected;
- (ii) Analyse and process the data with respect to—
 - Consistency of data monitoring compared to the collected data;
 - Recommendations to facilitate energy accounting and improve energy efficiency;
 - With respect to the purpose of energy accounting in reducing losses for the company.

Prioritization and preparation of action plan:

- Report shall include following activities, namely: —
- Data collection and verification of energy distribution:
- Monthly energy consumption data of consumers and system metering from the company at following voltage levels —
- 22 kV level feeders of Distribution Sub-stations;
- 440 V level, including Distribution Transformer and low-tension consumer;

- Input energy details for all metered input points;
- Boundary meter details;
- Source of energy supply (e.g., electricity from grid or self-generation), including generation from renewables.
- Review of the current consumption practices in order to identify the energy loss in the system;
- Data verification, validation and correction:
- A monitoring and verification protocol to quantify on annual basis the impact of each measure with respect to energy conservation and cost reduction for reporting to Bureau and the concerned State designated agency;
- Verification and correction of input energy, taking into account the following —
- Recorded system meter reading by metering agency;
- All the input points of transmission system;
- Details provided by the transmission unit;
- Relevant records at each electricity test division for each month;
- Recorded meter reading at all export points (where energy sent outside the State is from the Distribution system); and
- System loading and corresponding infrastructure;
- Energy supplied to Open Access Consumers which is directly purchased by Open Access consumers from any supplier other than electricity distribution company; and
- Verify and validate the system metering data provided by metering agency through random field visit (particularly for data irregularity).

METHODOLOGY

- Auditor shall depute a team of experts for conducting the evaluation / audit and shall work in close association with DISCOM.
- Auditor shall submit an execution work plan for the assignment for which relevant data support will be provided by DISCOM.
- Auditor will Arrange meeting and provide presentation on overview, roadmap, scenario and results of the assignment to various plant heads / operational staff / engineering staff.

**Annexure V –
Power Purchase Details**

Month	Schedule Units	Actual Billed units	Bill Units	Bill Amount
Apr-21	354560	250929	343285	1534484
May-21	278440	242400	265277	1185789
Jun-21	276072	235410	261886	1170633
Jul-21	266507	250133	258180	1154065
Aug-21	280040	246163	270000	1206900
Sep-21	263310	236157	253860	1134754
Oct-21	278960	237523	250700	1120629
Nov-21	302480	238818	203490	121507
Dec-21	302415	242544	296058	1365179
Jan-22	302440	223525	292750	1308593
Feb-22	271520	217803	262640	1221276
Mar-22	289050	296747	279360	1299024
Energy in kWh	3465794	2918152	3237487	-
Energy in MU	3.4657	2.9181	3.2374	-
Amount in INR	-	-	-	13822832
Amount in INR CR	-	-	-	1.3822