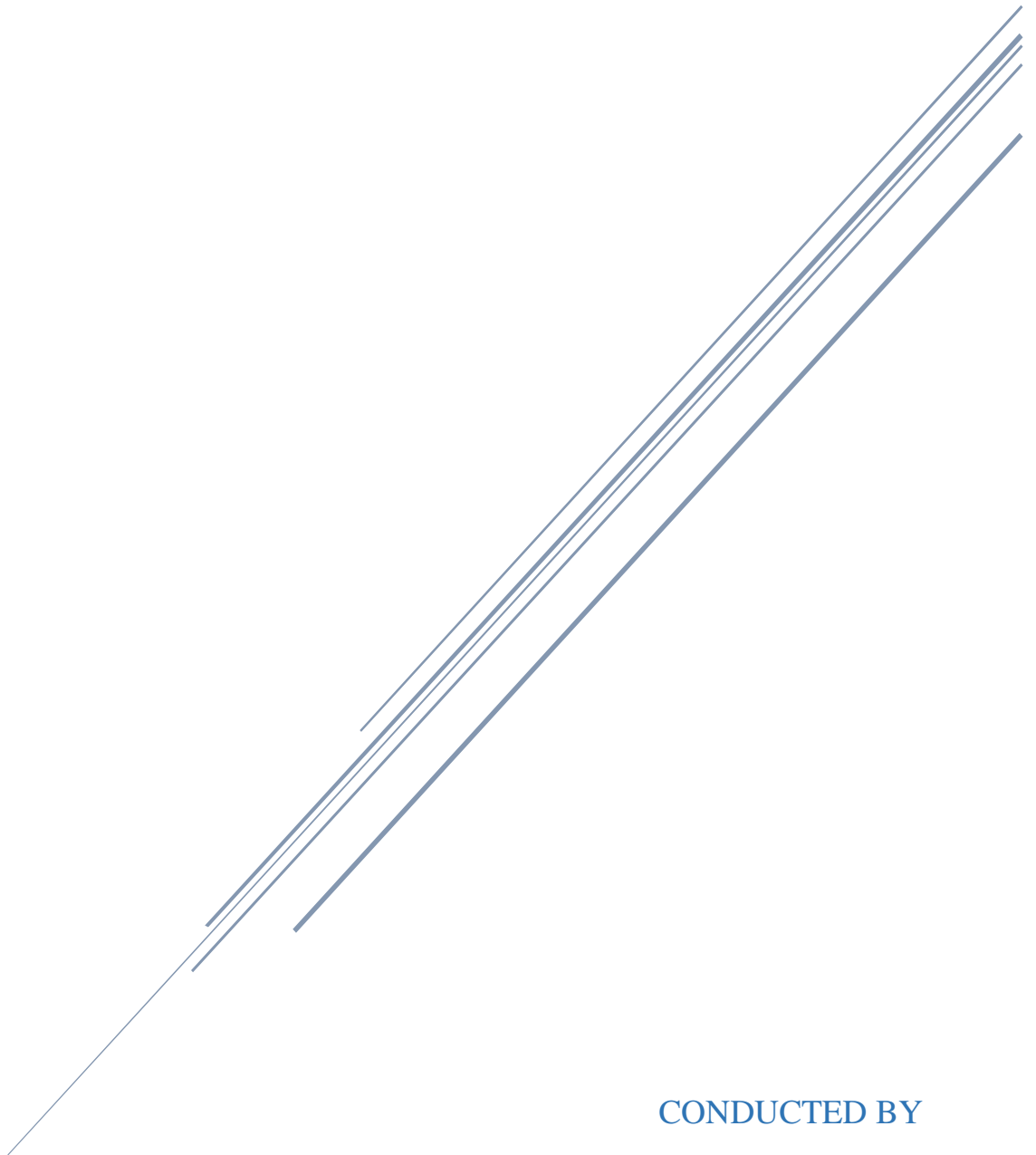


ENERGY AUDIT REPORT FOR FY2020-21

ASSAM POWER DISTRIBUTION COMPANY LTD



CONDUCTED BY

ENCURE ENERGY
KOLKATA

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1. ACKNOWLEDGEMENT

M/S ENCURE ENERGY expresses sincere gratitude to the management of Assam Power Distribution Company Limited for giving us the opportunity to to conduct 'Energy Audit' for financial year 2020-21.

We are thankful to the following officials of Assam Power Distribution Company Limited (APDCL) for their kind support extended during Annual Energy Audit:

Mr. Mir Rafiul Amin Dewan- CGM, COM&EE

Ms. Rijumoni Sarma- GM, REV


Mr. Lilambar Das- DGM, TRC

Mr. Pradip Baishya-AGM, TRC

Mr. Indrajit Tahbildar-AGM, COM&REV

Mr. Pratim Banerjee- Energy Manager

M/S ENCURE ENERGY also wishes to thank all other officers and staff of APDCL for their excellent cooperation and support for successful completion of Energy Audit.


PRODIP GOLDER
Accredited Energy Auditor
REGN. No. AEA – 282
Bureau of Energy Efficiency

Signature:

2. EXECUTIVE SUMMARY

- i. The study covers mainly verification process for monitoring of input energy and consumption pattern at various voltage levels, identification of area of energy leakage, wastage or inefficient use, identification of high loss-making areas and networks, identification of overloaded/underloaded segments of the network for necessary capacity additions, highlighting the strengths and weaknesses of the DISCOM in the management of energy and energy resources with a focus mainly on proposals and recommendations on Energy Conservation.
- ii. Assam Power Distribution Company Limited (APDCL) is a public limited company wholly owned by the Government of Assam. It was incorporated on the 23rd day of October 2009 and has been registered under Indian Companies Act 1956. APDCL is supplying power to the major industrial centres situated in Assam such as Coal India Limited (Ledo, Margherita), Brahmaputra Gas Cracker & Polymer Limited (Lepatkata, Dibrugarh), Cement Corporation of India Limited (Bokajan), Hindustan Paper Corporation Limited (Panchgram & Jagiroad), Assam Petrochemicals Limited (Namrup) etc. and serving the people of Assam with a consumer base of more than 64 lakhs and this is growing year by year.
- iii. In order to reach out to the consumers in a more inclusive manner, the Company has bifurcated its electricity distribution operation into three regions headed by CGM(D&S). These regions have been further divided into 8 (Eight) Zones with each zone being headed by a General Manager (GM). These 8 (Eight) zones have been further divided into 19 (Nineteen) numbers of Electrical Circles with each circle being headed by a Chief Executive Officer (CEO) in the rank of DGM (Deputy General Manager). Each Circle is further divided into Electrical Divisions. There are total of 45 (Forty Five) Electrical Divisions under APDCL. The Divisions are being headed by an Assistant General Manager (AGM). Each Division is further divided into Electrical Sub-Divisions. There are total 158 (One Hundred Fifty Eight) Electrical Sub-Divisions under APDCL. The Sub-Divisions are being headed by a Sub Divisional Engineer (SDE) in the rank of Deputy Manager (DM) / Assistant Manager (AM). Also, to cater the needs of the industrial consumers properly, 17 numbers of

IRCAs (Industrial Revenue Collection Areas) have been established throughout Assam with each IRCA being headed by an Area Manager. The Sub-Divisions and IRCAs are main revenue units of APDCL.

iv. Energy Accounting summary for the financial year 2020-21:

Sr. No.	parameters	Unit	Value
1	Energy from state Generation	MU	1329.75
2	Energy purchased	MU	9673.89
3	Total Energy Input (1+2)	MU	11003.64

4	Energy Exported & sale	MU	1230.89
5	Inter state transmission loss	%	4.39
		MU	482.75
6	Energy at DISCOM periphery (3-4-5)	MU	9290.00

7	Energy available for sale (6)	MU	9290.000
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8	Energy Billed	MU	7456.13
9	T&D Loss (7-8)	MU	1833.87
10	T&D Loss (9/7)	%	19.75

11	Billed Amount	Rs. Cr	5974.44
12	Collection Amount	Rs. Cr	5504.70
13	Collection Efficiency (12/11)	%	92.14
14	Collection against arrears	Rs. Cr	110.82

15	Aggregate Technical & Commercial Loss	%	26.06
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**The revenue collected shall exclude the arrears. However, in case figures of arrears not available separately, there is possibility to getting collection efficiency figures of more than 100%. In such cases, efficiency shall be restricted to 100% and shall be used for computation of AT&C losses. The amount attributing collection efficiency higher than 100% shall be treated collection against arrears.*

v. DICSOM performance for the financial year 2021-22:

Circle wise performance is presented in BEE format which is compilation of sub divisional level data obtained from respective divisions

Name of Circle	Input energy (MU)	Billed energy (MU)	T&D Loss (MU)	T&D Loss (%)	Billing Efficiency (%)	Billed Amount (Rs. Cr.)	Collected Amount (Rs. Cr.)	Collection against Arrears (Rs. Cr.)	Collection Efficiency (%)	AT & C Loss (%)
BADARPUR	408.02	276.62	131.400	32	68	219.65	168.69	0.00	76.80	47.93
BARPETA	413.82	324.90	88.920	21	79	246.97	234.43	0.00	94.92	25.47
BONGAIGAON	547.77	388.15	159.620	29	71	305.22	253.85	0.00	83.17	41.07
CACHAR	503.90	405.47	98.430	20	80	320.40	279.39	0.00	87.20	29.83
DIBRUGARH	399.46	325.32	74.140	19	81	272.22	260.34	0.00	95.64	22.11
Ghy EC-I	1166.95	1090.70	76.250	7	93	931.96	931.96	99.27	100.00	6.53
Ghy EC-II	881.58	766.41	115.167	13	87	609.04	609.04	11.56	100.00	13.06
Golaghat	298.73	230.57	68.157	23	77	185.44	167.55	0.00	90.35	30.26
JORHAT	448.92	361.43	87.490	19	81	292.28	275.57	0.00	94.28	24.09
KANCH	279.40	212.17	67.229	24	76	175.66	158.81	0.00	90.41	31.34
KOKRAJHAR	487.86	343.60	144.260	30	70	259.99	206.14	0.00	79.29	44.16
MANGALDOI	359.47	294.01	65.460	18	82	225.18	196.66	0.00	87.34	28.57
MORIGAON	197.57	153.30	44.270	22	78	122.42	98.72	0.00	80.64	37.43
NAGAON	702.07	520.56	181.510	26	74	408.22	356.86	0.00	87.42	35.18
NORTH LAKHIMPUR	315.77	244.29	71.480	23	77	190.24	169.65	0.00	89.18	31.01
RANGIA	387.62	305.36	82.260	21	79	236.03	224.55	0.00	95.14	25.05
SIVASAGAR	422.17	335.45	86.720	21	79	271.59	254.84	0.00	93.83	25.44
TEZPUR	568.17	471.91	96.260	17	83	373.19	359.79	0.00	96.41	19.93
Tinsukia	501.45	405.91	95.540	19	81	328.73	297.85	0.00	90.60	26.66
Overall	9290.69	7456.13	1834.563	20	80	5974.44	5504.70	110.82	92.14	26.06

vi. Focus matrix for performance improvement for DISCOM:

AT &C Loss	Circle: Badarpur, Kokrajhar, Bongaigaon
T&D Loss	Circle: Badarpur, Kokrajhar, Bongaigaon
Collection efficiency	Circle: Badarpur, Kokrajhar, Morigaon

The circles Badarpur, Kokrajhar, Bongaigaon be the target area on 1st priority, based on the appearance in the focus matrix, for improvement of DISCOM's performance

- vii. Load factor for DISCOM is very poor (10%) which indicates that the connected load has not been updated which leads to lesser billing for defective metered consumers (assessed energy). Commercial/Industrial consumers are found with least load factor. DISCOM has to be very proactive to re-assess connected load, replace defective meter with communicable prepaid meter to minimize the leakages.

Consumer Category	Number of Consumers	Connected Load (MW)	Energy Billed (MU)	Load Factor (%)
Residential	5920892	5509.26	4195.73	9
Agricultural	37013	132.01	81.35	7
Commercial/Industrial-LT	317914	1462.16	1086.70	8
Commercial/Industrial-HT	3699	1179.74	1445.15	14
Others	70299	572.79	647.21	13
Total	6349817	8855.96	7456.13	10

viii. Infrastructure summary for the financial year 2020-21:

Number of circles	19
Number of divisions	45
Number of sub-divisions	158
Number of feeders at 66kV level	0
Number of feeders at 33kV level	506
Number of feeders at 11kV level	1656
Number of LT feeders level	89646
Number of total feeders	91808
Number of total consumers	6349817
Metering available at consumer end	100%
Number of conventionally metered Distribution Transformers	13930
Number of DTs with communicable meters	0
Number of unmetered DTs	78037
Number of DTs	91967
DT metering available	15%
No of 11/0.4 KVA DTR (Nos)	91967
No of 11/0.4 KVA DTRs Metered	13930
No of 11/0.4 KVA dedicated DTR (Nos)	13102
No of Power Transformer capacity in MVA	4337.28
No of 11 KV feeders	1656
No of 33 KV feeders	506
33 KV feeder Metering	575
11 KV feeder Metering	626
Feeder metering available	56%
Line length (ckt. km) at 66kV voltage level	0
Line length (ckt. km) at 33kV voltage level	8670.18
Line length (ckt. km) at 11kV voltage level	82125.77
Line length (km) at LT level	268938.52
Length of Aerial Bunched Cables	32218.86
Total Line length (ct km)	391274.11
HT/LT ratio	0.34
33 KV Line (Ckt Km) (using MVCC)	0
11 KV Line (Ckt Km) (using MVCC)	6.5
11 KV Line (Ckt Km) (using AB Cable)	672.72
LT Line-1 Phase (Ckt Km) (Using Bare Conductor)	147711.3
LT Line -3 Phase (Ckt Km) (Using Bare Conductor)	89681.08
LT Line-1 Phase (Ckt Km) (Using AB Cable)	18784.55
LT Line-3 Phase (Ckt Km) (Using AB Cable)	12761.59
No. of ESDs	158
33/11 KV Sub-Stations (Nos)	427
33/11 KV Dedicated Substation (Nos)	78

ix. Consumer category wise energy billing summary for the financial year 2020-21:

Type of Consumers	Category of Consumers	No. of Consumers		Energy Billed (MU)	
		No of Metered Consumers	No of unmetered Consumers	Metered Energy (MU)	Estimated Energy (MU)
Residential	LT	5920892	0	4195.726728	0
Agricultural	LT	37013	0	81.35250691	0
Commercial/Industrial-LT	LT	317914	0	1086.698695	0
Commercial/Industrial-HT	HT	3699	0	1445.147308	0
Others	LT	70299	0	647.2085361	0
Total		6349817	0	7456.13	0.00

x. Benchmarking on Performance Parameters:

Performance parameter	APDCL	Pan-India	Top performer	National Target
AT&C loss (%)	20	18	2.81	12-15%
ACS-ARR gap (Rs./kWh)	1.9	0.43	-0.87	Zero

Source: <https://www.uday.gov.in/>: As per 08th December, 2022

- xi. HT/LT ratio is 0.34 which indicates that HT circuit lengths are predominantly low in respect to LT circuit length. LT circuit incurs more distribution losses than HT circuit due to higher current flow for same amount of energy flow through the conductor. It is encouraged to provide HT connection closer to the load centre to minimize the distribution loss.

3. SUMMARY OF CRITICAL ANALYSIS BY ENERGY AUDITOR AND MANAGEMENT ANALYSIS

3.1 status and progress in compliance to prerequisites to energy accounting

Sr. No.	Pre-requisites	Status & Progress
a	Identification and mapping of all of the electrical network assets	Identification of electrical network assets are already in place. Mapping of the assets are yet to be done. Mapping of consumers at each voltage level with their metering communication status is in progress. Energy injection at each voltage level and feeder level is in progress
b	Identification and mapping of high tension and low- tension consumers	Mapping of consumers as per HT & LT status are already in place
c	Development and implementation of information technology enabled energy accounting and audit system, including associated software	DC has developed their own software named "ARMS", which is used for bill generation and payment monitoring. Modification is going on to integrate the system to capture energy input at each voltage level and loss calculation
d	Electricity distribution company ensures the installation of functional meters for all consumers, transformers and feeders. Meter installation is done in a phased manner within a period of three financial years from the date of the commencement of these regulations in accordance with the trajectory set out in the First Schedule	All the consumers are claimed metered but the DC do not have the detail accounting of consumers with defective meter. 15% DTs are metered and process of 100% DT metering has been taken by the DC. 56% feeders up to 11kV & 33kV level are metered whereas details about defective meters and their replacement tracking has to be established.
e	all distribution transformers (other than high voltage distribution system up to 25kVA and other distribution system below 25 kVA) shall be metered with communicable meters. And existing noncommunicable distribution transformer meters shall be replaced with communicable meters and integrated with advanced metering infrastructure	Process started under RDSS scheme
f	Electricity distribution company has established an information technology enabled system to create energy accounting reports without any manual interference	DC has their own software-based revenue management system for Energy Accounting
g	Electricity distribution company has a centralized energy accounting and audit cell comprising of— (i) a nodal officer, an energy manager and an information technology manager, having professional experience of not less than five years; and (ii) a financial manager having professional experience of not less than five years	The DC has created a Centralized Energy Accounting and Audit Cell with the following officer 1. One Nodal Officer 2. One Certified Energy Manager 3. One IT Manager 4. One Financial Manager

3.2 Management Analysis

Sr. No.	Comments by Auditor	Responses of DISCOM Management
a	Metering not available at 33kV/11kV level or defective meter or meter CT/PT defective	Due to lack of manpower and funds, replacement of defective meters are taking longer time
b	11kV feeders are not communicable meters	Management are taking initiatives under RDSS to install communicable metering for 100% feeders
c	Energy input, export and sale details not available at each voltage level	no such accounting system followed. DISCOM agreed to make such arrangement as per BEE guideline
d	in energy accounting sheet, circle wise data is accounted instead of division wise	Due to lack of manpower and absence of proper accounting mechanism (preferably IT based) DISCOM are facing difficulties for such accounting
e	Assessed energy (in MU) has not been reported in accounting sheet for consumers having defective meters. Even no such data of defective consumers are presented in the accounting sheet	Consumers with defective meter are billed based on the assessment at sub-division level and re-assessment of load also conducted at sub-division level. Due to lack of standardised procedure these data is not accounted centrally
f	Division wise energy input data is partially metered and rest estimated as boundary metering is available partly at sub divisional level	DISCOM understood the importance of 100% boundary meter for pin pointing the grey area in the network to formulate proper strategy for network efficiency improvement
g	No standard energy accounting format is maintained at division level for input (feeder wise metered data) and billing data (with assessment unit for defective meters)	DISCOM will look into it and take necessary steps
h	Absence of communicable DT meters preventing DISCOM to identify the network where leakages, wastage is happening	DT metering project initiated under RDSS scheme
i	Overall collection efficiency is 94% whereas the billing efficiency is only 80%. This indicates undetected number of defective consumer meters leads to lesser billing	Loss reduction programme is initiated
j	Load factor for DISCOM is very poor indicates that connected load has not been updated leading to lesser billing for defective metered consumers (assessed energy)	Connected load to be re-assessed and defective meters to be replaced
k	Data regarding availability of different energy meters (conventional, smart, prepaid) for consumers are not available	DISCOM will look into it and take necessary steps
l	Distribution network diagram is not available for all division and overall state level	DISCOM will take necessary initiative

3.3 DISCOM performance analysis

T&D Loss analysis:

Sr. No.	Circle	T&D Loss (%)
1	BADARPUR	32
2	KOKRAJHAR	30
3	BONGAIGAON	29
4	NAGAON	26
5	KANCH	24
6	Golaghat	23
7	NORTH LAKHIMPUR	23
8	MORIGAON	22
9	BARPETA	21
10	RANGIA	21
11	SIVASAGAR	21
12	CACHAR	20
13	JORHAT	19
14	Tinsukia	19
15	DIBRUGARH	19
16	MANGALDOI	18
17	TEZPUR	17
18	Ghy EC-II	13
19	Ghy EC-I	7
Overall		20

Over all T&D loss for the DISCOM is 20% whereas 11 circles out of 19 circles are assessed with higher T&D loss than the overall value of 20%.

All these 11 circles are the target areas for reducing T&D losses by installing prepaid meters, replacing the defective meters

Collection Efficiency analysis:

Sr. No.	Circle	Collection Efficiency (%)
1	BADARPUR	77
2	KOKRAJHAR	79
3	MORIGAON	81
4	BONGAIGAON	83
5	CACHAR	87
6	MANGALDOI	87
7	NAGAON	87
8	NORTH LAKHIMPUR	89
9	Golaghat	90
10	KANCH	90
11	Tinsukia	91

Over all collection efficiency for the DISCOM is 92% whereas 11 circles out of 19 circles is assessed with lower collection efficiency than the overall value of 92%.

Collection efficiency has to be improved by continuous monitoring, vigil and follow up

Sr. No.	Circle	Collection Efficiency (%)
12	SIVASAGAR	94
13	JORHAT	94
14	BARPETA	95
15	RANGIA	95
16	DIBRUGARH	96
17	TEZPUR	96
18	Ghy EC-I	100
19	Ghy EC-II	100
Overall		100

AT&C loss analysis:

Sr. No.	Circle	AT & C Loss (%)
1	BADARPUR	48
2	KOKRAJHAR	44
3	BONGAIGAON	41
4	MORIGAON	37
5	NAGAON	35
6	KANCH	31
7	NORTH LAKHIMPUR	31
8	Golaghat	30
9	CACHAR	30
10	MANGALDOI	29
11	Tinsukia	27
12	BARPETA	25
13	SIVASAGAR	25
14	RANGIA	25
15	JORHAT	24
16	DIBRUGARH	22
17	TEZPUR	20
18	Ghy EC-II	13
19	Ghy EC-I	7
Overall		26

Over all AT&C loss for the DISCOM is 26% whereas 11 circles out of 19 circles are assessed with higher AT&C loss than the overall value of 26%. All these 11 circles are the target areas for improving collection efficiency

Load factor analysis:

Sr. No.	Circle	Connected Load (MW)	Energy Billed (MU)	Load Factor (%)
1	NORTH LAKHIMPUR	352.05	244.29	8
2	Ghy EC-I	1496.28	1090.70	8
3	BARPETA	435.85	324.90	9
4	DIBRUGARH	424.55	325.32	9
5	SIVASAGAR	428.15	335.45	9
6	JORHAT	459.02	361.43	9
7	MANGALDOI	372.51	294.01	9
8	RANGIA	385.28	305.36	9
9	NAGAON	644.12	520.56	9
10	Tinsukia	486.28	405.91	10
11	BONGAIGAON	456.77	388.15	10
12	Golaghat	264.88	230.57	10
13	KANCH	242.75	212.17	10
14	MORIGAON	175.10	153.30	10
15	KOKRAJHAR	386.43	343.60	10
16	TEZPUR	512.37	471.91	11
17	BADARPUR	282.35	276.62	11
18	Ghy EC-II	688.36	766.41	13
19	CACHAR	362.84	405.47	13
	Overall	8855.96	7456.13	10

Load factor is very poor. 9 out of 19 circles have lower load factor than the overall load factor of the DISCOM. Reassessment of connected Load and replacement of defective meters is required

3.4 Recommendations to improve performance of DISCOM

- i. Stress given to identify the gaps on accounting of the AT&C loss including T&D loss & billing efficiency. For improving billing efficiency an AI-based app that can autofill units consumed in discom bills. Bills are generated based on images captured by meter readers, so no manual overriding is possible. Though APDCL started the same.
- ii. Launching performance-based incentive schemes to reward employees for actions taken to maintain or reduce AT&C losses and ACS-ARR gap. Accountability for loss monitoring resides with dedicated substation and feeder-level managers. They have to regularly monitor MIS reports and have to institutionalized the following actions to ensure that there are no revenue leakages:
 - Investigating frequent zero and average billed connections through onsite visits, phone calls and notices

- Removing service lines from permanently disconnected consumers to prevent misuse
 - Bringing all newly energized connections under the billing cycles
 - Identifying and investigating high loss and low consumption connections
- iii. All consumers are not shifted to smart meters yet. AMR System should be implemented for each incoming & outgoing feeder of every Sub-station with particular emphasis to Bulk Load Consumers. Technical loss at consumer end meters can be avoided if the following points are checked at regular interval for bulk load consumer
- Poor accuracy of meters,
 - Large error in capital CTs / PTs,
 - Voltage drops in PT cables,
 - Loose connection in PT wire terminations,
 - Overburdened CT,
 - Incorrect multiplying factor,
 - Software bugs
- iv. For DTR Metering AMR System should be implemented for detection of overload, unbalance load by DTR level smart meter.
- v. Increase in HT/LT ratio – It is well known that for high HT/ LT ratio, the losses will be lesser. The losses for a given quantum of power supplied by a line are inversely proportional to the square of its operating voltage. Higher the operating voltage, lower will be the line losses. Therefore, by increasing the HT lines the losses will be reduced.
- vi. Connected load vs billing energy assessment need to be done and accordingly the load may be reassessed to increase fixed charges amount in billing
- vii. Loss Figures should be ascertained with actual Load Flow Study.
- viii. Calibration of all types of Meters should be done periodically.
- ix. For ascertaining Sub-Division level losses proper accounting to be done.
- x. To reduce technical loss, each & every Sub-Station should be in the Load Centre.
- xi. DISCOM should encourage industrial loads to shift to HT connection to reduce technical loss for distribution

- xii. DISCOM may adapt special tamper proof paper seal for low and medium voltage service installation to detect pilferage at consumer service box
- xiii. It is suggested to replace rewirable fuse cut-outs at the service termination with MCB/MCCB inside an enclosure with special type of seals to prevent unauthorised access to service parts
- xiv. It is suggested to install specially designed anti-theft pillar box in pilfer prone pockets. Anti-theft pillar box comprises of door locking arrangement with insulated bus bar inside.
- xv. Consumer awareness is required to reduce commercial loss by Media, Camp & Leaflets etc. Partnering with post offices and gram panchayats and deploying dedicated agents to improve rural collections may help discom with large rural territories to improve their collection efficiency. To educate consumers about electricity usage can shifts in consumer behaviour.
- xvi. Simplification and integration of payment method like use of digital channels (web, mobile apps, etc.) for billing and payments to improve collection efficiency.
- xvii. DISCOM need to create a centralized energy accounting and audit cell with adequately qualified personnel. Special Team comprising finance, technical & HR officials from Head Quarter to be deployed for surprise visit to the consumer's premises to reduce commercial loss. The team constantly should change its action plan with regard to mode, manner and timing of anti-pilferage activities. High end commercial & industrial consumer should be monitored by IT based system. IT based system should comprise of loss reduction cell information management, criminal case information management, inspection cum disconnection reporting, consumer information system database.
- xviii. To reduce commercial loss HVDS (High Voltage Distribution System), AB Cable (Aerial Bunched Cable), should be used for power distribution purposes. Besides, in order to combat high loss/pilferage prone areas, co-axial cable may be used because of its inherent construction which will result in cable fault alarm if such attempts are made the pilferers.
- xix. To reduce technical loss & also to enhance reliability of power supply, UG Cables should be used in Urban Areas. Network Re-configuration, bifurcating feeders based on loading, re-routing feeders and replacing conductors to reduce technical losses.

- xx. Segregation of loads at DTR level for different consumer categories like residential, agriculture etc will ease of monitoring and planning for loss minimization
- xxi. Encourage more and more collection-based distribution franchise in rural area for improving efficiency.
- xxii. All temporary connections have to be connected through energy meter though presence of political interference.

4. ENERGY AUDIT TEAM

Sl. No.	Name	Qualification	CEM/CEA/AEA	Experience
1	Prodip Golder	AMIE (Electrical) Chartered Engineer, B.O.E AEA, CEA	CEA – 11726 AEA- 282	24 Years
2	Dr. Sumimal Roy Barman	Ph.D in Electrical Engineering	Sector Expert	35 years
3	Shubhrangsu Gongopadhyay	B.E. (Mechanical), B.O.E, CEA	CEA – 11727	26 years
4	Arup Narayan Singha	AMIE (Mechanical) B.O.E, CEA	CEA – 29699	24 years
5	Somnath Sarkar	MEA (Energy), CEM, CMVP	CEM-5313	13 years

5. BACKGROUND

5.1 Extant Regulations and role of BEE

The Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies) Regulations, 2021, were published vide notification No.18/1/BEE/DISCOM/2021, dated the 15th April, 2021 in the Gazette of India, Extraordinary, Part III, Section 4, as required under sub-section (1) of section 58 of the Energy Conservation Act, 2001 (52 of 2001) inviting objections and suggestions from all persons likely to be affected thereby within forty five days from the date of publication of the Notification in the Official Gazette;

AND WHEREAS objections and suggestions received with respect to the said draft regulations within the specified period aforesaid have been duly considered;

NOW, THEREFORE, 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: -

1. **Short title, application and commencement.** — (1) These regulations may be called the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit in electricity distribution companies) Regulations, 2021.
 - (2) These regulations shall apply to all electricity distribution companies specified as designated consumer.
 - (3) They shall come into force on the date of their publication in the Official Gazette.
2. **Definitions.-** (1) In these regulations, unless the context otherwise requires, —
 - (a) “Act” means the Energy Conservation Act, 2001 (52 of 2001);
 - (b) “annual energy audit” means the energy audit conducted by an accredited energy auditor on annual basis in accordance with these regulations;
 - (c) “annual energy audit report” means the report on annual energy audit;
 - (d) “circle” means the demarked area of the electricity distribution company in which electricity distribution company is divided.
 - (e) “consumer” shall have the meaning assigned to it under clause (15) of section 2 of the Electricity Act, 2003 (36 of 2003);
 - (f) “division” means an administrative unit in which an electricity distribution company is divided for the purpose of ease of operation;
 - (g) “electricity distribution company” means a distribution licensee as defined in clause (17) of section 2 of the Electricity Act, 2003 (36 of 2003);
 - (h) “energy accounting” means accounting of all energy inflows at various voltage levels in the distribution periphery of the network, including renewable energy generation and open access consumers, and energy consumption by the end consumers;

- (i) “periodic energy accounting” means the energy accounting conducted on quarterly basis as mentioned in regulation 4;
 - (j) “periodic energy accounting report” means the report on periodic energy accounting submitted and signed by the energy manager;
- (2) Words and expressions used herein and not defined but defined in the Act shall have the meanings respectively assigned to them in the Act.

3. Intervals of time for conduct of annual energy audit- (1) Every electricity distribution company shall conduct an annual energy audit for every financial year and submit the annual energy audit report to the Bureau and respective State Designated Agency and also made available on the website of the electricity distribution company within a period of four months from the expiry of the relevant financial year:

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

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

Explanation. — If any entity created as a result of merger, demerger, slump sale, acquisition, change of control or any other corporate restructuring of, or involving, any existing electricity distribution company, such entity shall not be considered as a new electricity distribution company for the purposes of this sub-regulation.

4. Intervals of time for conduct of periodic energy accounting- (1) Every electricity distribution company shall —

- (a) ensure that all feeder wise, circle wise and division wise periodic energy accounting shall be conducted by the energy manager of the electricity distribution company for each quarter of the financial year; and

(b) submit the periodic energy accounting report to the Bureau and respective State Designated Agency and also made available on the website of electricity distribution company within forty-five days from the date of the periodic energy accounting.

(2) After the commencement of these regulations, every electricity distribution company shall, notwithstanding anything in sub-regulation (1), —

(a) conduct its first periodic energy accounting, for the last quarter of the financial year immediately preceding the date of such commencement; and

(b) conduct its subsequent periodic energy accounting for each quarter of the financial year for a period of two financial years from the date of such commencement, and submit the periodic energy accounting report within sixty days from the date of periodic energy accounting.

5. Pre-requisites for annual energy audit and periodic energy accounting — Save as otherwise provided, every electricity distribution company shall undertake all actions as may be required for the annual energy audit and periodic energy accounting before the start of the relevant financial year, including the following actions, namely: —

- (a) the identification and mapping of all of the electrical network assets;
- (b) the identification and mapping of high tension and low-tension consumers;
- (c) the development and implementation of information technology enabled energy accounting and audit system, including associated software;
- (d) the electricity distribution company shall ensure the installation of functional meters for all consumers, transformers and feeders:

Provided that meter installation may be done in a phased manner within a period of three financial years from the date of the commencement of these regulations in accordance with the trajectory set out in the First Schedule;

- (e) all distribution transformers (other than high voltage distribution system up to 25kVA and other distribution system below 25 kVA) shall be metered with communicable meters. And existing noncommunicable distribution transformer meters shall be replaced with communicable meters and integrated with advanced metering infrastructure;

- (f) the electricity distribution company shall establish an information technology enabled system to create energy accounting reports without any manual interference:

Provided that such system may be established—

- (i) within a period of three years from the date of the commencement of these regulations in case of urban and priority area consumers; and
 - (ii) within five years from the date of the commencement of these regulations in case of rural consumers;
- (g) the electricity distribution company shall create a centralized energy accounting and audit cell comprising of—
- (i) a nodal officer, an energy manager and an information technology manager, having professional experience of not less than five years; and
 - (ii) a financial manager having professional experience of not less than five years;
- (h) any other requisite that Bureau may direct for energy audit and accounting purpose.

6. Reporting requirements for annual energy audit and periodic energy accounting –

(1) Every electricity distribution company shall designate a nodal officer, who shall be a fulltime employee of the electricity distribution company in the rank of the Chief Engineer or above, for the purpose of reporting of the annual energy audit and periodic energy accounting and communicate the same to the Bureau.

(2) Every electricity distribution company shall ensure that the energy accounting data is generated from a metering system or till such time the metering system is not in place, by an agreed method of assumption as may be prescribed by the State Commission.

(3) Metering of distribution transformers at High Voltage Distribution System up to 25KVA can be done on cluster meter installed by each electricity distribution company.

(4) The energy accounting and audit system and software shall be developed to create monthly, quarterly and yearly energy accounting reports.

(5) Every electricity distribution company shall provide the details of the information technology system in place as specified in clause (f) of regulation 5 that ensures minimal manual intervention in creating the energy accounting reports and any manual intervention of any nature, in respect of the period specified therein, shall be clearly indicated in the periodic energy accounting report.

7. Manner of annual energy audit and periodic energy accounting- (1) Every annual energy audit and periodic energy accounting under these regulations shall be conducted in the following manner, namely:—

- (a) verification of existing pattern of energy distribution across periphery of electricity distribution company; and
- (b) verification of accounted energy flow submitted by electricity distribution company at all applicable voltage levels of the distribution network—
 - (i) energy flow between transmission and 66kV/33kV/11kV incoming distribution feeders;
 - (ii) energy flow between 66kV/33kV outgoing and 11kV/6.6kV incoming feeders;
 - (iii) energy flow between 11 kV/6.6kV feeders and distribution transformers, or high voltage distribution system;
 - (iv) energy flow between distribution transformer, or high voltage distribution system to end consumer, including ring main system;
 - (v) energy flow between Feeder to end-consumer; and
 - (vi) energy flow between 66/33/11 kV directly to consumer.

(2) The accredited energy auditor, in consultation with the nodal officer of the electricity distribution company shall—

- (a) develop a scope of work for the conduct of energy audit required under these regulations;

- (b) agree on best practice procedures on accounting of energy distributed across the network; and (c) collect data on energy received, and distributed, covered within the scope of energy audit.
- (3) The accredited energy auditor shall—
 - (a) verify the accuracy of the data collected in consultation with the nodal officer of the electricity distribution companies as per standard practice to assess the validity of the data collected; and (b) analyse and process the data with respect to—
 - (i) consistency of data monitoring compared to the collected data;
 - (ii) recommendations to facilitate energy accounting and improve energy efficiency; and
 - (iii) with respect to the purpose of energy accounting in reducing losses for the electricity distribution company.

8. Prioritization and preparation of action plan- (1) The annual energy audit report submitted by accredited energy auditor in consultation with the nodal officer and periodic energy accounting report submitted by energy manager of the electricity distribution company shall include following activities, namely: —

- (I) data collection and verification of energy distribution—
 - (a) monthly energy consumption data of consumers and system metering from electricity distribution company at following voltage levels —
 - (i) 33/66/132 kV levels, including 33/66/132kV feeder and Sub-station;
 - (ii) 11/22 kV levels, including 11/22 kV feeder and Distribution Sub-station;
 - (iii) 440 V level, including Distribution Transformer and low-tension consumer;
 - (b) input energy details for all metered input points;
 - (c) boundary meter details;
 - (d) source of energy supply (e.g electricity from grid or self-generation), including generation from renewables.

- (e) review of the current consumption practices in order to identify the energy loss in the system;
- (II) data verification, validation and correction—
 - (a) 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;
 - (b) verification and correction of input energy, taking into account the following —
 - (i) recorded system meter reading by metering agency;
 - (ii) all the input points of transmission system;
 - (iii) details provided by the transmission unit;
 - (iv) relevant records at each electricity test division for each month;
 - (v) recorded meter reading at all export points (where energy sent outside the State is from the distribution system); and
 - (vi) system loading and corresponding infrastructure;
 - (c) energy supplied to Open Access Consumers which is directly purchased by Open Access Consumers from any supplier other than electricity distribution company; and
 - (d) verify and validate the system metering data provided by metering agency through random field visit (particularly for data irregularity).

9. Structure of the annual energy audit report- (1) The structure of annual energy audit report shall be prepared in the format as set-out in the Second Schedule.

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

(3) The annual energy audit report shall—

- (a) provide for monitoring of input energy and consumption pattern at various voltage levels;
 - (b) identify the areas of energy leakage, wastage or inefficient use;
 - (c) identify high loss-making areas and networks, for initiating target based corrective action; and (d) identify overloaded segments of the network for necessary capacity additions.
- (4) The accredited energy auditor shall highlight the strengths and weaknesses of the electricity distribution company in the management of energy and energy resources in the annual energy audit report and recommend necessary action to improve upon method of reporting data, energy management system in detail along with their underlying rationale.
- (5) The accredited energy auditor shall sign the energy audit report under the seal of its firm giving all the accreditation details along with details of manpower employed in conducting the annual energy audit.

10. Report of Bureau- On receipt of the annual energy audit report, the Bureau may—

- (a) direct the electricity distribution company to take such actions as it may consider appropriate; and (b) make such recommendations to the Central Government as it may consider necessary.

THE FIRST SCHEDULE [See regulation 5(d)] TRAJECTORY FOR METER INSTALLATION

(A) Timeline for metering—

- (i) 100% Communicable Feeder Metering integrated with AMI, by 31st December 2022 along-with replacement of existing non-communicable feeder meters.
- (ii) All Distribution Transformers (other than HVDS DT up to 25kVA and other DTs below 25 kVA) shall be metered with communicable meters. Communicable DT Metering for the following areas / consumers to be completed by December 2023 and in balance areas by December 2025:

- o All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15% ; o All Union Territories (for areas with technical difficulty, non-communicable meters may be installed);
- o All Industrial and Commercial consumers; o All Government offices at Block level and above; o Other high loss areas i.e rural areas with losses more than 25% and urban areas with losses more than 15%.

Further, existing non-communicable Distribution Transformer meters to be replaced with communicable meters integrated with AMI, within the timelines applicable to the respective areas.

- (iii) Prepaid Smart Consumer Metering to be completed for all directly connected meters and AMR in case of other meters, by December 2023 in the following areas:

- o All Electricity Divisions of 500 AMRUT cities, with AT&C Losses > 15%;
- o All Union Territories (for areas with technical difficulty, prepaid meters to be installed);
- o All Industrial and Commercial consumers;
- o All Government offices at Block level and above;
- o Other high loss areas i.e. rural areas with losses more than 25% and urban areas with losses more than 15%.

The balance areas and consumers may be taken up in a phased manner subsequently. However, Distribution Companies can additionally cover any other areas as well as agricultural consumers, at their option by December 2023. Further, in rural / hilly areas with connectivity or communication issues, wherein installation of smart meters may not be feasible, prepaid meters may be opted for.

- (iv) Consumer Metering: o 98% by FY 2022-23 o 99% by FY 2023-24

(B) Targets for functional meters—

Meter	FY 22-23	FY 23-24	FY24-25
Feeder metering	98.5%	99.5%	99.5%
DT metering	90%	95%	98%
Consumer metering	93%	96%	98%

5.2 Purpose of audit & accounting report

Basic objective or purpose of the audit and accounting report is described below:

- i. development of a comprehensive energy accounting system to quantify and determine actual losses in the power distribution system, segregated across technical and commercial losses.
- ii. Identification of areas of leakage, theft, wastage or inefficient use, thereby paving the way for tackling the present challenges of high Transmission and Distribution (T&D) losses.
- iii. to enable and ensure an independent 3rd party energy audit of the distribution system to arrive at a true and fair picture of T&D losses.
- iv. to enable the Distribution utilities to undertake targeted efficiency improvement activities to reduce Distribution losses in priority areas / customer segments.

5.3 Period of Energy Auditing & accounting

- i. Every electricity distribution company shall conduct an annual energy audit for every financial year and submit the annual energy audit report to the Bureau and respective State Designated Agency and also made available on the website of the electricity distribution company within a period of four months from the expiry of the relevant financial year:

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

- ii. Where a new electricity distribution company is established after the commencement of these regulations, such electricity distribution

company shall conduct its first annual energy audit on completion of the first financial year from the date of being notified as designated consumer.

6. INTRODUCTION OF DISCOM (DC)

6.1 Name & Address of Designated Consumers

Name of the DISCOM	Assam Power Distribution Company Limited		
DISCOM's Address			
City/Town/Village	Guwahati-1, Asaam, Bijulee Bhawan, 4th Floor, Paltan Bazar		
District	Kamrup		
State	Assam	Pin	781001

6.2 Name & Contact details of Energy Manager and authorised signatory of DC (Nodal Officer)

Nodal Officer Details*	
Nodal Officer Name (Designated at DISCOM's)	Lilambar Das
Designation	DGM (TRC)
Address	Bijulee Bhawan, Paltan Bazar
Energy Manager Details*	
Name	Pratim Banerjee
Designation	Energy Manager
EM Registration No.	EA-33274
Address	Bijulee Bhawan, Paltan Bazar, pin 781001

6.3 Summary profile of DCs (Assets, Energy Flow, Consumer Base, salient features etc.)

6.4 Assets

Number of circles	19
Number of divisions	45
Number of sub-divisions	158
Number of feeders at 66kV level	0
Number of feeders at 33kV level	506
Number of feeders at 11kV level	1656
Number of LT feeders level	89646
Number of total feeders	91808
Number of total consumers	6349817
Metering available at consumer end	100%
Number of conventionally metered Distribution Transformers	13930
Number of DTs with communicable meters	0
Number of unmetered DTs	78037
Number of DTs	91967
DT metering available	15%
No of 11/0.4 KVA DTR (Nos)	91967
No of 11/0.4 KVA DTRs Metered	13930
No of 11/0.4 KVA dedicated DTR (Nos)	13102
No of Power Transformer capacity in MVA	4337.28
No of 11 KV feeders	1656
No of 33 KV feeders	506
33 KV feeder Metering	575
11 KV feeder Metering	626
Feeder metering available	56%
Line length (ckt. km) at 66kV voltage level	0
Line length (ckt. km) at 33kV voltage level	8670.18
Line length (ckt. km) at 11kV voltage level	82125.77
Line length (km) at LT level	268938.52
Length of Aerial Bunched Cables	32218.86
Total Line length (ct km)	391274.11
HT/LT ratio	0.34
33 KV Line (Ckt Km) (using MVCC)	0
11 KV Line (Ckt Km) (using MVCC)	6.5
11 KV Line (Ckt Km) (using AB Cable)	672.72
LT Line-1 Phase (Ckt Km) (Using Bare Conductor)	147711.3
LT Line -3 Phase (Ckt Km) (Using Bare Conductor)	89681.08
LT Line-1 Phase (Ckt Km) (Using AB Cable)	18784.55
LT Line-3 Phase (Ckt Km) (Using AB Cable)	12761.59
No. of ESDs	158

33/11 KV Sub-Stations (Nos)	427
33/11 KV Dedicated Substation (Nos)	78

6.5 Energy Flow

6.6 Consumer Base

Consumer Type	Number of consumers	% share
Residential	5920892	93.2%
Agricultural	37013	0.6%
Commercial/Industrial-LT	317914	5.0%
Commercial/Industrial-HT	3699	0.1%
Others	70299	1.1%
Total	6349817	100%

7. DISCUSSION & ANALYSIS

7.1 Energy accounts in previous years (FY2019-20)

7.2 Energy accounts and performance in the current year (FY2020-21)

Sr. No.	parameters	Unit	Value
1	Energy from state Generation	MU	1329.75
2	Energy purchased	MU	9673.89
3	Total Energy Input (1+2)	MU	11003.64
4	Energy Exported & sale	MU	1230.89
5	Inter state transmission loss	%	4.39
		MU	482.75
6	Energy at DISCOM periphery (3-4-5)	MU	9290.00
7	Energy available for sale (6)	MU	9290.000
8	Energy Billed	MU	7456.13
9	T&D Loss (7-8)	MU	1833.87
10	T&D Loss (9/7)	%	19.75
11	Billed Amount	Rs. Cr	5974.44
12	Collection Amount	Rs. Cr	5504.70
13	Collection Efficiency (12/11)	%	92.14
14	Collection against arrears	Rs. Cr	110.82
15	Aggregate Technical & Commercial Loss	%	26.06

**The revenue collected shall exclude the arrears. However, in case figures of arrears not available separately, there is possibility to getting collection efficiency figures of more than 100%. In such cases, efficiency shall be restricted to 100% and shall be used for computation of AT&C losses. The amount attributing collection efficiency higher than 100% shall be treated collection against arrears.*

7.3 Unit wise performance

Name of Circle	Input energy (MU)	Billed energy (MU)	T&D Loss (MU)	T&D Loss (%)	Billing Efficiency (%)	Billed Amount (Rs. Cr.)	Collected Amount (Rs. Cr.)	Collection against Arrears (Rs. Cr.)	Collection Efficiency (%)	AT & C Loss (%)
BADARPUR	408.02	276.62	131.400	32	68	219.65	168.69	0.00	76.80	47.93
BARPETA	413.82	324.90	88.920	21	79	246.97	234.43	0.00	94.92	25.47
BONGAIGAON	547.77	388.15	159.620	29	71	305.22	253.85	0.00	83.17	41.07
CACHAR	503.90	405.47	98.430	20	80	320.40	279.39	0.00	87.20	29.83
DIBRUGARH	399.46	325.32	74.140	19	81	272.22	260.34	0.00	95.64	22.11
Ghy EC-I	1166.95	1090.70	76.250	7	93	931.96	931.96	99.27	100.00	6.53
Ghy EC-II	881.58	766.41	115.167	13	87	609.04	609.04	11.56	100.00	13.06
Golaghat	298.73	230.57	68.157	23	77	185.44	167.55	0.00	90.35	30.26
JORHAT	448.92	361.43	87.490	19	81	292.28	275.57	0.00	94.28	24.09
KANCH	279.40	212.17	67.229	24	76	175.66	158.81	0.00	90.41	31.34
KOKRAJHAR	487.86	343.60	144.260	30	70	259.99	206.14	0.00	79.29	44.16
MANGALDOI	359.47	294.01	65.460	18	82	225.18	196.66	0.00	87.34	28.57
MORIGAON	197.57	153.30	44.270	22	78	122.42	98.72	0.00	80.64	37.43
NAGAON	702.07	520.56	181.510	26	74	408.22	356.86	0.00	87.42	35.18
NORTH LAKHIMPUR	315.77	244.29	71.480	23	77	190.24	169.65	0.00	89.18	31.01
RANGIA	387.62	305.36	82.260	21	79	236.03	224.55	0.00	95.14	25.05
SIVASAGAR	422.17	335.45	86.720	21	79	271.59	254.84	0.00	93.83	25.44
TEZPUR	568.17	471.91	96.260	17	83	373.19	359.79	0.00	96.41	19.93
Tinsukia	501.45	405.91	95.540	19	81	328.73	297.85	0.00	90.60	26.66
Overall	9290.69	7456.13	1834.563	20	80	5974.44	5504.70	110.82	92.14	26.06

7.4 Energy performance measures already taken and proposed for future

Integrated Power Development Scheme (IPDS) (Status: Completed)

Brief:

The Government of India had launched “Integrated Power Development Scheme” (IPDS) to extend financial assistance against capital expenditure to supplement the efforts of DISCOM in strengthening and augmenting distribution infrastructure in urban areas including provisioning of solar panels and installation of Meters. Power Finance Corporation Ltd (PFC) is the nodal agency for operationalization and implementation of the scheme under the overall guidance of MoP, GOI with the following objectives.

- Strengthening of sub-transmission and distribution network in the urban areas.
- Metering of distribution transformers /feeders / consumers in the urban areas.

The scheme will help in:

- reduction in AT&C losses,
- 24x7 power supplies for consumers
- providing access to all urban households

Funding pattern: 85% Grant by Govt. of India and 15 % by Govt. of Assam.

IPDS System strengthening project:

Brief Scope of Work:		Unit	Executed quantity
1	33/11 KV Sub-station	New Sub-station	No. 13
2		Capacity enhancement & Additional Transformers	No. 39
3	11/0.4 KV DTR Sub-station	New DT	No. 686
4		Capacity Enhancement of DT	No. 342
5	Aerial Bunched Cable		Km 2454
6	Overhead Lines	33 KV New Feeders (Wolf)	Km 226
7		11 KV New Feeders (Raccoon)	Km 403
8		New LT Lines (Rabbit)	Km 180
9		33 KV Feeder Reconductoring	Km 281.51
10		11KV Feeder Reconductoring	Km 225.61
11		LT Feeder Reconductoring	Km 90
12	Meter	Pre Paid Meter	No. 2553
13		Boundary Meter	No. 123
14		Feeder Meter	No. 1274
15		DT Meter	No. 1005
16		Consumer Meter	No. 66782
17	Solar Panels		KWp 604
18	Town		No. 88

IPDS GISS Project:

Construction of 2 no. of 2x10 MVA GISS at Golaghat project Area of Golaghat EC & Dhemaji project area of North Lakhimpur EC have been undertaken under this project.

- Sanctioned Cost: 4.75 Cr
- Total Project completion cost: 4.75 Cr.
- Date of Physical Completion of work: 31.12.2021 (Completed within allotted time)

RT- DAS Project:

Installation and commissioning of Hardware and software for implementing real time data acquisition system (RT-DAS) covering 33/11kV substations of (87+5) R-APDRP & IPDS NonSCADA towns in Assam with five years FMS Support.

- Sanctioned Cost: 4.75 Cr.
- Total Project completion cost: 4.75 Cr.
- Date of Physical Completion of work: 31.12.2021 (Completed within allotted time)

Revamped Distribution Sector Scheme _____ (status: On-going)

Brief:

The Revamped Distribution Sector Scheme (RDSS) has been formulated by Ministry of Power, Government of India to support and revive the ailing DISCOMs. The Scheme

envisages to improve the operational efficiencies and financial sustainability of all DISCOMs/Power Departments.

Scheme objectives –

- The Revamped Distribution Sector Scheme (RDSS) aims to improve the operational and financial efficiency of the DISCOMs through the following objectives: -
 - a) Reduction of AT&C Losses to pan-India levels of 12-15% by FY 2024-25
 - b) Reduction of ACS-ARR gap to zero by FY 2024-25
 - c) Development of institutional capacities of the modern DISCOMs and
 - d) Improvement in the quality, reliability and affordability of power supply to consumers through various reform measures.

Ministry of Power has designed the captioned scheme subsuming all the central assisted scheme pertaining to Distribution Sector viz. DDUGJY, IPDS, SAUBHAGYA.

RDSS IMPLEMENTATION STATUS IN ASSAM:

- Approval accorded for the Action Plan and DPRs for Smart Prepaid metering & Distribution Infrastructure works on 24th December, 2021
- Monitoring Committee for RDSS constituted under Chairmanship of Secretary (Power), Govt. of India approved action plan and DPR for smart metering and Infrastructure works-Loss reduction on 10th January 2022
- Acceptance of the terms of sanction letter and execution of Scheme implementation Agreement on 28 th February 2022
- Acceptance of the terms of sanction letter and execution of Scheme implementation Agreement on 28 th February 2022

SUMMARY OF SANCTION:

- The Monitoring Committee has approved the Action Plan and Loss Reduction DPR of APDCL under RDSS as outlined below:
 - The Monitoring Committee has approved the Action Plan and Loss Reduction DPR of APDCL under RDSS as outlined below:
 - DPR for Prepaid Smart Metering works with total Project Cost of Rs. 3657.02 crore and GBS of Rs. 907.67 crore including incentive for Phase-I
 - DPR for Prepaid Smart Metering works with total Project Cost of Rs. 3657.02 crore and GBS of Rs. 907.67 crore including incentive for Phase-I
 - PMA charges of Rs. 20.46 crore for prepaid Smart Metering works and Rs. 38.56 crore for Infrastructure-Loss reduction works with total GBS of Rs. 18.41 crore and Rs. 34.70 crore respectively.

Present Status/ Progress Report:

Part A: Details of Smart meter projects									
1	2	3	4	5	6	7	8		9
S No.	State	Utility	Project Area(s)	Project Scope (Covers Smart Meters/ HES/ MDM)	Project Status (Completed/Ongoing/Tender/Proposed)	Nos. of Smart Meters Sanctioned			
						@Consumer level	@DT Level	@Feeder Level	
						Smart type	Smart Prepaid type		
1	Assam	APDCL	Guwahati (PaltanBazar, Ulubari, Narengi)	Establishment of smart grid control center along with supply, installation, testing and commissioning of smart meters (with/without net-metering), communication infrastructure along with applications for Head End System (HES), Meter Data Management (MDM) System and control center hardware & software, integration with existing billing and collection system and other IT systems of APDCL	Completed (Under FMS)	14519			

2	Assam	APDCL	Selected areas of Guwahati and Dibrugarh town	Establishment of smart grid control centre along with supply, installation, testing and commissioning of smart meters (with/without net-metering), communication infrastructure along with applications for Head End System (HES), Meter Data Management (MDM) System and control centre hardware & software, integration with existing billing and collection system and other IT systems of APDCL	Completed (Under FMS)	70000			
	Assam	APDCL	Selected areas of Jorhat, Silchar and Guwahati Town	Supply, installation, testing and commissioning of smart energy meters along with communication infrastructure, cloud based HES (Head End System) as well as integration of the same with APDCL's Existing MDMS system, billing system and other legacy applications.	Completed	134000			
4	Assam	APDCL	Selected areas of Kokrajhar, Goalpara, Nalbari and Guwahati Town	Supply, installation, testing and commissioning of smart energy meters along with communication infrastructure, cloud based HES (Head End System) as well as integration of the same with APDCL's Existing MDMS system, billing system and other legacy applications.	Completed	134000			
5	Assam	APDCL	Selected urban areas of APDCL (Circles: Nagaon, Morigaon, KANCH, Cachar, Badarpur, Jorhat, Golaghat, Sivsagar, Dibrugarh, Tinsukia, GEC-I)	Appointment of Advanced Metering Infrastructure (AMI) service provider including deployment of Smart Meters in Prepaid Mode, communications systems, Head End System (HES) and integration with existing MDMS system, billing system and other legacy applications of APDCL on DBFOOT basis(DBFOOT-I / PKG-I)	Ongoing	363500	3,63,500		

6	Assam	APDCL	Selected urban areas of APDCL (Circles: Kokrajhar, Bongaigaon, Barpeta, Rangia, Mangaldoi, Tezpur, North Lakhimpur, GEC-II)	Appointment of Advanced Metering Infrastructure (AMI) service provider including deployment of Smart Meters in Prepaid Mode, communications systems, Head End System (HES) and integration with existing MDMS system, billing system and other legacy applications of APDCL on DBFOOT basis. (DBFOOT-I / PKG-I I)	Ongoing	256600	2,56,600		
7	Assam	APDCL	Guwahati Electrical Circle-I (Complete) Guwahati Electrical Circle-II (Complete) Urban areas of all remaining 17 Electrical Circles	Implementation of Smart Metering with AMI in Selected Distribution Transformers across APDCL	LOA Awarded			17,000	
Total						9,72,619	6,20,100	17,000	

DEEN DAYAL UPADHAYA GRAM JYOTI YOJANA-NEW (DDUGJY-NEW) SCHEME

(Status:

Completed)

Objective: Electrification of balance left out un-electrified Rural BPL households free of cost.

Scheme implemented from 2021-22

Total households electrified: 3.68 Lakh

DDUGJY-NEW									
Year of Sanction	Targeted date of completion	Date/Year of completion	No. of Household		Sanctioned Cost (Rs. in Cr.)	Closure Sanctioned Cost (Rs. in Cr.)	Fund Received (Rs. in cr.)	Fund Utilised (Rs. in cr.)	Remarks
			Target	Achievement					
2021-2022	15-03-2022	07-03-2022 (2021-22)	368610	368610	1718.18	1379.57	164.48	164.48	All works completed within targeted timeline

The infrastructure details are given below:-

Scheme Name	11 KV Line(KM)		LT Line(KM)		DTR (Nos.)		HH(nos.)		Targeted date of completion	Date of completion
	Scope	Achievement	Scope	Achievement	Scope	Achievement	Scope	Achievement		
DDUGJY-New Addl. HHs	3540	3540	11677	11677	5653	5653	481507	368610	03/15/2022	03/07/2022

STATE OWNED PRIORITY DEVELOPMENT

ELECTRIFICATION OF ANGANWADI CENTERS AND PRIMARY SCHOOLS (UNDER SOPD) (Status: On-going)

Objective: In the budget for FY 2021-22, Govt. of Assam has announced the flagship scheme **Sonali Xaishab Bikkashit Axom** under ambitious **Ashtadash Mukhotor Unnoyonee Maala** Scheme for electrification of 48557 no. of Anganwadi Centers (AWC) and

13321 no. of Primary Schools (PS) in the initial stage with a financial involvement 161.33 Cr. But with new requirement of electrification from Social Welfare Department and SSA, the target of Anganwadi Center and Primary School is reassessed as 54967 nos. and 14332 nos. respectively.

Scheme implemented from 2021-2023

Total target of AWC & PS for electrification : 69299 nos.(AWC- 54967 nos + PS- 14332 nos.)

Total Achievement of AWC & PS for electrification : 64574 nos.(AWC- 51259 nos + PS- 13315 nos.) as on 01-11-2022

Fund Received/Utilised : : Rs. 144.00 Cr./Rs. 13.11 Cr.

Anganwadi Centres & Primary Schools									
Year of Sanction	Targeted date of completion	Date/ Year of completion	No. of Anganwadi Centres		No. of Primary Schools		Sanctioned Cost (Rs. in Cr.)	Fund Received (Rs. in cr.)	Fund Utilised (Rs. in cr.)
			Target	Achievement	Target	Achievement			
2021-2022	31-12-2022	Ongoing	54967	51259	14332	13315	161.33	144.00	13.11

Feeder Separation (under SOPD)

(Status: Completed)

**Details of projects undertaken in SOPD 2019-20 towards "Feeder Separation",
Sanctioned Amount : Rs. 0.4700 Cr
Received Amount: Rs. 0.2850 Cr.**

Name of the Circle	Name of work	LOA Ammount (in Rs.)	Contractor Name	LOA No. & date	Physical progress	Status/Ph Progr
Jorhat	Construction of new 11 KV (composite) line for power supply to Cinnamora and Murmuria Industries through the new industry feeder under Jorhat ESD-I and construction of 11 KV under ground Railway Track crossing at Murmuria for new Industry Feeder of Cinnamora under Jorhat ESD-I. (Line Length : 5.0 KM)	43,08,936.00	Suraj Kumar Sharma, Jorhat	CGM (PP&D)/APDCL/SOPD 20-21/FDR Separation/Jorhat/10 dtd. 22/02/2021	100%	All works completed and 11 KV LUG Cable at Railway Track Crossing charged.
		43,08,936.00			100%	

SYSTEM STRENGTHENING (UNDER SOPD)

(Status : COMPLETED)

Details of Projects implemented under "SOPD 2021-22"
Sanctioned Amount : Rs. 4.00 Cr.
Received Amount: Rs. 2.40 Cr.

Sl. No.	Name of the Circle	Name of work	LOA Ammount (Rs.)	Contractor Name	LOA No. & date	Scheduled date of completion	Physical progress	Status/Physical Progress
1	Morigaon	“Renovation and strengthening of 10 KM, 33 KV Feeder from 33/11 KV Jagiroad Sub Station to 33/11 KV Nellie Sub Station for increasing load demand of 1.4 MW against JRN Pharma and Laboratories LLP under Jagiroad Electrical Sub-division within the jurisdiction of Morigaon Electrical Circle, APDCL.”	2,16,32,047.21	M/s Assam Electric Stores	CGM (PP&D)/APDCL/ SOPD 2021-22 (SDN)/33 KV Jagiroad-Nellie Feeder/27 Dtd: 23-11-2021	23-03-2022	100%	All works completed and line charged.

Ujjwal DISCOM Assurance Yojana (UDAY)

Implementation and performance of APDCL under Ujjwal DISCOM Assurance Yojana (UDAY)						
SL No.	Targeted Activity as per MoU	Amount (Rs. in Crore)				Present Status
		Earmarked fund	Amount Received	Amount Utilised	Balance amount in hand	
1	Feeder Metering	26.08	510.38	25.85	0.23	Physical Progress: 100 %
2	Distribution Transformer Metering	5.50		5.50	0.00	Earmarked amount is utilised towards DTR metering works in three electrical circls of APDCL. (GEC-II,Cachar & Jorhat). Physical Progress: 100 %
3	Feeder improvement programme and network strengthening and upgradation (FINS)	100		99.10	0.90	The amount has been utilised towards implementation of projects like construction and R&M of Distribution Sib Stations and 11kV & 33kV lines. Overall Progress: 99 % completed

4	Installation of smart prepaid meters for modernization of distribution system including accurate energy audit of 11 KV Feeders and reducing AT&C losses of APDCL (Amount earmarked for Energy Audit in rural areas was diverted to Smart Metering Works)	(149.23 + 116.32) = 265.55		265.55	0.00	<p>The Ear-marked amount is being utilised towards procurement of smart meters as follows: -</p> <p>i) In 1st phase, 70,000 nos. of smart meters under Jalukbari & Dibrugarh Town. Overall Progress: 100 % Completed.</p> <p>ii) In 2nd phase, 2,68,000 Nos. of smart meters under the following projects:</p> <p>A. Smart Metering with AMI at Silchar town, Jorhat town and selected areas of Guwahati town - 1,34,000 Nos. (Progress: 100%) (134,000 Nos)</p> <p>B. Smart Metering with AMI at Goalpara town, Nalbari town, Kokrajhar town and selected areas of Guwahati town - 1,34,000 Nos. (Progress: 100 %) (134000) Nos.)</p>
5	Physical Feeder Segregation (based on identified feeders for rural, agriculture etc.) (No amount was earmarked against this Targeted Activity; as such fund has been diverted from DTR Metering works to undertake feeder segregation works)	64.19		61.07	3.12	<p>The project is undertaken to segregate the existing feeders to provide dedicated power supply to the Tea Gardens and Industrial Estates. Overall Progress: 99 %</p>

6	Implementation of Smart Metering with AMI in Selected HT Consumers across APDCL	14.23		11.36	2.87	The amount was originally earmarked for installation of AMR modems at all HT feeders and urban HT consumers of APDCL. However, the project got vitiated owing to non-performance of the implementing agency. Hence, to maintain uninterrupted automatic meter readings, energy accounting & auditing of HT consumers of APDCL, the fund has been diverted for installation of HT Smart Meters in selected HT Consumers under APDCL for automatic meter reading and energy audit of feeders. NIT has been floated on 19.04.2022. Techno commercial evaluation is in progress.
7	Free distribution of energy efficient LED bulbs, Tube lights, efficient fans and organisation of consumer awareness programme (Demand Side Management)	80.00		80.00	0.00	The amount has been utilised towards implementation of MMADY scheme.
TOTAL		555.55		548.43	7.12	

DSM PROGRAMMES OF DISCOM:

1. **UJALA** - The Ujala Scheme is a joint initiative of Public Sector Undertaking of the Government of India, Energy Efficiency Services Limited (EESL) under the Union Ministry of Power and the Electricity Distribution Company.

<u>2020-21</u>			<u>2021-22</u>		
9w led	50w fan	20w tube light	9w led	50w fan	20w tube light
13239	442	327	7775	351	1013

2. **MUKHYA MANTRI AKASHDEEP YOJNA** – Under MMADY scheme of Government of Assam, LED bulbs will be distributed among applicable consumer base of APDCL

<u>2020-21</u>	<u>2021-22</u>
No.of LED set	No.of LED set
127423	573108

Assam Distribution System Enhancement and Loss Reduction

NAME OF PROJECT: Assam Distribution System Enhancement and Loss Reduction

PROJECT COST : INR 3284.04 Crore

[EAP Part- INR 2627.23 Crore (386 m USD) + GOA Counter Part -656.81 Crore (96.0 m USD)]

FUNDING AGENCY : Asian Infra Structure Investment Bank (AIIB)

SCOPE OF PROJECT: 1) New 33/11 KV Sub-stations: 196 Nos.

2) New 33 KV Line: 2605 C Km

3) New 11 KV Line: 5699 Km

4) High Voltage Distribution System (HVDS): 2674 Nos.

5) Smart Metering at Consumer level: 1, 86,255 Nos.

- PROJECT BENEFIT:
- 1) Sustainable Development of the State.
 - 2) Reduction of losses by approximately 5% from 20.13% in FY 20-21 to 15.34% in FY 26-27 in distribution network,
 - 3) Enhancement of transformation capacity to cater the future load growth by 1765 MVA,
 - 4) Resolution to the low voltage problem with installation of HVDS,
 - 5) Reduction in DTR failure rate and reduction of commercial losses with implementation of smart metering system.

Project Start Date: 25th April 2022

Overall Project Closing Date: 29th June 2027

7.5 Critical analysis by Energy Auditor

- i. Stress given to identify the gaps on accounting of the AT&C loss including T&D loss & billing efficiency. For improving billing efficiency an AI-based app that can autofill units consumed in discom bills. Bills are generated based on images captured by meter readers, so no manual overriding is possible. Though APDCL started the same.
- ii. Launching performance-based incentive schemes to reward employees for actions taken to maintain or reduce AT&C losses and ACS-ARR gap. Accountability for loss monitoring resides with dedicated substation and feeder-level managers. They have to regularly monitor MIS reports and have to institutionalized the following actions to ensure that there are no revenue leakages:
 - Investigating frequent zero and average billed connections through onsite visits, phone calls and notices
 - Removing service lines from permanently disconnected consumers to prevent misuse
 - Bringing all newly energized connections under the billing cycles
 - Identifying and investigating high loss and low consumption connections
- iii. All consumers are not shifted to smart meters yet. AMR System should be implemented for each incoming & outgoing feeder of every Sub-station with particular emphasis to Bulk Load Consumers. Technical loss at consumer end meters can be avoided if the following points are checked at regular interval for bulk load consumer
 - Poor accuracy of meters,
 - Large error in capital CTs / PTs,
 - Voltage drops in PT cables,
 - Loose connection in PT wire terminations,
 - Overburdened CT,
 - Incorrect multiplying factor,
 - Software bugs
- iv. For DTR Metering AMR System should be implemented for detection of overload, unbalance load by DTR level smart meter.
- v. Increase in HT/LT ratio – It is well known that for high HT/ LT ratio, the losses will be lesser. The losses for a given quantum of power supplied by a line are

inversely proportional to the square of its operating voltage. Higher the operating voltage, lower will be the line losses. Therefore, by increasing the HT lines the losses will be reduced.

- vi. Connected load vs billing energy assessment need to be done and accordingly the load may be reassessed to increase fixed charges amount in billing
- vii. Loss Figures should be ascertained with actual Load Flow Study.
- viii. Calibration of all types of Meters should be done periodically.
- ix. For ascertaining Sub-Division level losses proper accounting to be done.
 - x. To reduce technical loss, each & every Sub-Station should be in the Load Centre.
- xi. DISCOM should encourage industrial loads to shift to HT connection to reduce technical loss for distribution
- xii. DISCOM may adapt special tamper proof paper seal for low and medium voltage service installation to detect pilferage at consumer service box
- xiii. It is suggested to replace rewirable fuse cut-outs at the service termination with MCB/MCCB inside an enclosure with special type of seals to prevent unauthorised access to service parts
- xiv. It is suggested to install specially designed anti-theft pillar box in pilfer prone pockets. Anti-theft pillar box comprises of door locking arrangement with insulated bus bar inside.
- xv. Consumer awareness is required to reduce commercial loss by Media, Camp & Leaflets etc. Partnering with post offices and gram panchayats and deploying dedicated agents to improve rural collections may help discom with large rural territories to improve their collection efficiency. To educate consumers about electricity usage can shifts in consumer behaviour.
- xvi. Simplification and integration of payment method like use of digital channels (web, mobile apps, etc.) for billing and payments to improve collection efficiency.
- xvii. DISCOM need to create a centralized energy accounting and audit cell with adequately qualified personnel. Special Team comprising finance, technical & HR officials from Head Quarter to be deployed for surprise visit to the consumer's premises to reduce commercial loss. The team constantly should change its action plan with regard to mode, manner and timing of anti-pilferage activities. High end commercial & industrial consumer should be monitored by IT based system. IT based system should comprise of loss reduction cell information management,

criminal case information management, inspection cum disconnection reporting, consumer information system database.

- xviii. To reduce commercial loss HVDS (High Voltage Distribution System), AB Cable (Aerial Bunched Cable), should be used for power distribution purposes. Besides, in order to combat high loss/pilferage prone areas, co-axial cable may be used because of its inherent construction which will result in cable fault alarm if such attempts are made the pilferers.
- xix. To reduce technical loss & also to enhance reliability of power supply, UG Cables should be used in Urban Areas. Network Re-configuration, bifurcating feeders based on loading, re-routing feeders and replacing conductors to reduce technical losses.
- xx. Segregation of loads at DTR level for different consumer categories like residential, agriculture etc will ease of monitoring and planning for loss minimization
- xxi. Encourage more and more collection-based distribution franchise in rural area for improving efficiency.
- xxii. All temporary connections have to be connected through energy meter though presence of political interference.

7.6 Inclusions & Exclusions

No inclusions & exclusions are made in this report

7.7 Detailed format to be annexed

General Information			
1	Name of the DISCOM	ASSAM POWER DISTRIBUTION COMPANY LIMITED	
2	i) Year of Establishment	2009	
	ii) Government/Public/Private	Public Limited Company wholly owned by the Government of Assam.	
3	DISCOM's Contact details & Address		
i	City/Town/Village	GUWAHATI-1, ASAAM	
ii	District	KAMRUP	
iii	State	ASSAM	Pin 781001
iv	Telephone	0361 2739515	Fax 0361 2739501
4	Registered Office		
i	Company's Chief Executive Name	Mr RAKESH KUMAR	
ii	Designation	MANAGING DIRECTOR	
iii	Address	O/O MD, BIJULEE BHAWAN, 4TH FLOOR,PALTAN BAZAR	
iv	City/Town/Village	GUWAHATI	P.O.
v	District	KAMRUP (M)	
vi	State	ASSAM	Pin 781001
vii	Telephone		Fax
5	Nodal Officer Details*		
i	Nodal Officer Name (Designated at DISCOM's)	LILAMBAR DAS	
ii	Designation	DGM (TRC)	
iii	Address	BIJULEE BHAWAN, PALTAN BAZAR	
iv	City/Town/Village	GUWAHATI-1, ASSAM	P.O. 781001
v	District	KAMRUP (M)	
vi	State	ASSAM	Pin 781001
vii	Telephone	9954413454	Fax
6	Energy Manager Details*		
i	Name	PRATIM BANERJEE	
ii	Designation	ENERGY MANAGER	Whether EA or EM EA
iii	EA/EM Registration No.	EA-33274/21	
iv	Telephone		Fax
v	Mobile	9435543261	E-mail ID pratim.banerjee24@gmail.com
7	Period of Information		
	Year of (FY) information including Date and Month (Start & End)		

Performance Summary of Electricity Distribution Companies			
1	Period of Information Year of (FY) information including Date and Month (Start & End)	1ST APR 2020 - 31ST MAR 2021	
2	Technical Details		
(a)	Energy Input Details		
(i)	Input Energy Purchase (From Generation Source)	Million kwh	11003.64
(ii)	Net input energy (at DISCOM Periphery after adjusting the transmission losses and energy traded)	Million kwh	9290.00
(iii)	Total Energy billed (is the Net energy billed, adjusted for energy traded))	Million kwh	7456.13
(b)	Transmission and Distribution (T&D) loss Details	Million kwh	1833.87
	Collection Efficiency	%	0.20
	Aggregate Technical & Commercial Loss	%	92%
(c)		%	26%

A. Summary of energy input & Infrastructure		
S.No	Parameters	Current Year (2020-21)
A.1	Input Energy purchased (MU)	11003.64
A.2	Transmission loss (%)	4.7%
A.3	Transmission loss (MU)	518.2714
A.4	Energy sold outside the periphery(MU)	1194
A.5	Open access sale (MU)	0
A.6	EHT sale	36.89
A.7	Net input energy (received at DISCOM periphery or at distribution)	9290.00
A.8	Is 100% metering available at 66/33 kV (Select yes or no from list)	no
A.9	Is 100% metering available at 11 kV (Select yes or no from list)	no
A.10	% of metering available at DT	41%
A.11	% of metering available at consumer end	100%
A.12	No of feeders at 66kV voltage level	0
A.13	No of feeders at 33kV voltage level	506
A.14	No of feeders at 11kV voltage level	1656
A.15	No of LT feeders level	89646
A.16	Line length (ckt. km) at 66kV voltage level	0
A.17	Line length (ckt. km) at 33kV voltage level	8670.18
A.18	Line length (ckt. km) at 11kV voltage level	82125.77
A.19	Line length (km) at LT level	268938.5
A.20	HT/LT ratio	0.34

8. NOTES OF THE EA/EM ALONG WITH QUERIES AND REPLIES TO DATA GAPS

Sr. No.	Notes/queries by Energy Auditor	Replies from DISCOM
a	energy meter reading at input energy injection point not available	Only 56% feeders are metered, therefore all injection point metered data is not available
b	Energy data for feeder level at different voltage level not available	no such mechanism practiced yet. Although, DISCOM will start taking initiative to resolve that
c	Division wise energy accounting not available	Due to lack of resources and time, circle wise energy accounting has been recorded
d	input energy at sub-division level is estimated rather metered	Absence of boundary meter at sub-division level
e	DT metering available	only 15% of DTs are metered.
f	Energy Accounting Data including SLDC ABT Meter Data available	Yes
g	Any private franchisee	Yes
h	Billing/ invoice available for purchased energy	Yes
i	Availability of computation data of agriculture consumption (approved by SERC)?	No
j	Availability of distribution electrical SLD division/sub-division wise	No
k	Availability of quarterly energy accounting report	no
l	Availability of any status report of defective metering CT & PT	No

9. ANNEXURES

9.1 Introduction of Verification Firm

M/s **EnCure Energy**, Kolkata – 700030 is an “Energy Management Service & Solution” provider under the domain of a single umbrella. M/s EnCure Energy is a MSME organization. Udyam Regd. No. UDYAM-WB-14-0018632 and consisting of highly qualified and experienced technocrats, with deep understanding of energy efficiency & management to combat of climate change. Expertise with versatile domain knowledge is our DNA which helps us to deliver customized solutions on guarantee basis to our customers to optimize energy cost.

Our Domain

Audits

- ❖ Energy Audit, Water Balance Audit, Fire Safety Audit, Electrical Safety Audit, Hazop study, Earthing system audit, Compressed Air Audit, Power Quality & Harmonics Audit

Consultancy

- ❖ Energy Management advisory services, Carbon Footprint, Fuel switching, net zero, Renewable energy, Green Building [new & existing], Plant performance & reliability improvement, Solar PV Installation & Engineering

Project Engineering/Technical Solutions

- ❖ Implementation of energy saving measures on guarantee basis, IOT based energy monitoring system, Process Automation, Online leak sealing for high pressure steam & water line, Shutdown Overhauling, critical troubleshooting

Industry served:

- | | |
|-----------------------------------|-------------------------|
| • Thermal Power Plant (coal, Gas) | • Edible oil processing |
| • DISCOM | • Rice Mill |
| • Chemical/petrochemical | • Coke Oven Plant |
| • Commercial Buildings | • Ceramic |
| • Pulp & Paper | • Cement |
| • Iron & Steel | • Leather processing |
| • Fertilizer | • Dairy |
| • Pharmaceuticals | • Carbon Plant |

9.2 Minutes of meeting with DISCOM team

Minutes of meeting between Assam Power Distribution Company Limited (APDCL) and EnCure Energy

Name of job: Energy Audit (Accounting) for DISCOM for FY 2020-21 and 2021-22

Date of MOM: 05.11.2022

Member's Involved in the job:

APDCL

Mr. Mir Rafiul Amin Dewan (CGM, COM & EE)

Mr. Lilambar Das (DGM, TRC)

Mr. Pratim Banerjee (EM)

EnCure Energy

Mr. Prodip Golder-AEA (BEE)

Mr. Somnath Sarkar-CEM, CMVP

Dr. Subimal Roy Barman (Sector Expert)

Following have been discussed and agreed upon:

1. Onsite verification of data for aforementioned job at DISCOM of APDCL has been conducted from 3rd November to 05th November, 2022 at Bijulee Bhawan, Guwahati-781001, Assam where data verification and discussion happened with concerned officials of APDCL
2. Most of the HT (33 kV) consumer billing with AMR
3. Stress given to identify the gaps on accounting of the AT&C loss including T&D loss & billing efficiency
4. Audit team visited Sub-division, Division, sub-station, SLDC, APGCL and talked to concerned officials to understand the process & approach followed by the DISCOM for energy accounting and record keeping. Sub division level energy accounting not satisfactorily
5. Most vulnerable component CT & PT for metering system defective status checked. Defective CT & PT status feedback not accounting in billing section.
6. Status report of defective meters is depicted in ARMS software month wise, category wise.
7. Connected load data acquisition process have to be completed asap for good amount fixed charge can be collected
8. Audit team collected data from the APDCL and verification is in progress. Due diligence is given for the correctness as far as possible. After initial verification, some queries are raised which is discussed with the APDCL and further data is asked for. APDCL agreed to submit any further data as required during the report preparation phase.
9. Primary findings are as below:

- a. Distribution network diagram is available at the sub divisional office of respective sub division. However, network diagrams need to be placed in locations with proper visibility
 - b. Boundary level meter is available but not at all sub divisional level
 - c. Metering is done about 50% at DTR level
10. After verification of all the data, EnCure Energy will submit the final audit report to APDCL with recommendation to improve the AT&C loss

APDCL

Tran...
05/11/2022
Dy. General Manager (TRC)
O/o the CGM (Com & EE), APDCL
Bijulee Bhawan, Paltanbazar, Ghy-01

Pradip...
05/11/2022
Energy Manager
APDCL, ASSAM

EnCure Energy

Pradip Golder.
PRODIP GOLDER
Accredited Energy Auditor
REGN. No. AEA - 282
Bureau of Energy Efficiency



9.3 Check List prepared by auditing Firm

parameters	List of documents
Energy Purchased	Energy Bills
State Generation	SLDC, REA
Energy exported/sale	Sale invoice, export meter reading
Infrastructure details	audit report, asset registrar, monthly planning & status report
Consumer details	MIS, software report
Energy Billed	MIS, software report
Collection	MIS, software report
Energy accounting	quarterly accounting sheet

9.4 Brief Approach, Scope & Methodology for audit

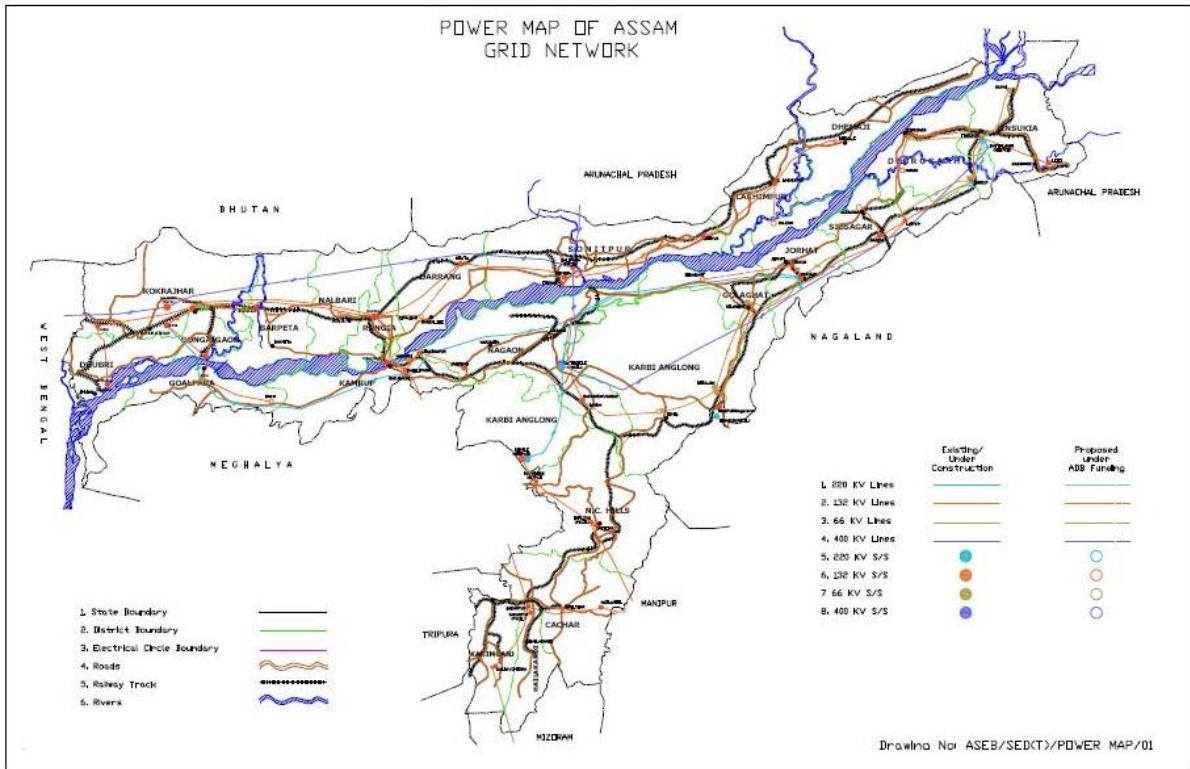
Followings are approach & methodology for the annual energy audit.

- i. Organized a kick off meeting at DISCOM office premises with energy accounting cell to understand Transmission & Distribution system from EHT network to LT network.
- ii. Visited 220kV/132kV substation, 33kV/11kV distribution station, outdoor DTR, Pole Mounted DTR, LT feeder Pillar Box randomly.
- iii. Understanding of all energy input points at different voltage level & energy metering or energy accounting & monitoring facilities with conventional metering, smart metering & prepaid metering system within the DISCOM boundary areas.
- iv. Understanding of energy flow between transmission and 33kV/11kV incoming distribution feeders, energy flow between 33kV outgoing and 11kV incoming feeders, energy flow between distribution transformer or high voltage distribution system to end-consumer including radial or ring main system, energy flow between Feeder to end-consumer & energy flow between 132kV/33kV/11kV directly to consumer.
- v. Collection of data on energy received, sold, billed, Distribution losses, AT & C losses & collection efficiency for FY 2020-21 and verified these data with appropriate sources
- vi. Verification of the accuracy of the data collected in consultation with the energy as per standard practices.
- vii. Understanding of AT & C loss reduction measures taken by the DISCOM during last few years & potential scope for further loss reduction.

9.5 Infrastructure Details

Number of circles	19
Number of divisions	45
Number of sub-divisions	158
Number of feeders at 66kV level	0
Number of feeders at 33kV level	506
Number of feeders at 11kV level	1656
Number of LT feeders level	89646
Number of total feeders	91808
Number of total consumers	6349817
Metering available at consumer end	100%
Number of conventionally metered Distribution Transformers	13930
Number of DTs with communicable meters	0
Number of unmetered DTs	78037
Number of DTs	91967
DT metering available	15%
No of 11/0.4 KVA DTR (Nos)	91967
No of 11/0.4 KVA DTRs Metered	13930
No of 11/0.4 KVA dedicated DTR (Nos)	13102
No of Power Transformer capacity in MVA	4337.28
No of 11 KV feeders	1656
No of 33 KV feeders	506
33 KV feeder Metering	575
11 KV feeder Metering	626
Feeder metering available	56%
Line length (ckt. km) at 66kV voltage level	0
Line length (ckt. km) at 33kV voltage level	8670.18
Line length (ckt. km) at 11kV voltage level	82125.77
Line length (km) at LT level	268938.52
Length of Aerial Bunched Cables	32218.86
Total Line length (ct km)	391274.11
HT/LT ratio	0.34
33 KV Line (Ckt Km) (using MVCC)	0
11 KV Line (Ckt Km) (using MVCC)	6.5
11 KV Line (Ckt Km) (using AB Cable)	672.72
LT Line-1 Phase (Ckt Km) (Using Bare Conductor)	147711.3
LT Line -3 Phase (Ckt Km) (Using Bare Conductor)	89681.08
LT Line-1 Phase (Ckt Km) (Using AB Cable)	18784.55
LT Line-3 Phase (Ckt Km) (Using AB Cable)	12761.59
No. of ESDs	158
33/11 KV Sub-Stations (Nos)	427
33/11 KV Dedicated Substation (Nos)	78

9.6 Electrical Distribution System



9.7 Power Purchase Details

9.8 Line Diagram (SLD)

SLD is not available with the DISCOM

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

Type of Consumers	Category of Consumers	No. of Cosumers		Energy Billed (MU)	
		No of Metered Consumers	No of unmetered Consumers	Metered Energy (MU)	Estimated Energy (MU)
Residential	LT	5920892	0	4195.726728	0
Agricultural	LT	37013	0	81.35250691	0
Commercial/Industrial-LT	LT	317914	0	1086.698695	0
Commercial/Industrial-HT	HT	3699	0	1445.147308	0
Others	LT	70299	0	647.2085361	0
Total		6349817	0	7456.13	0.00

9.10 Detailed Formats to be annexed

Refer to Chapter No. 7.7

9.11 List of documents verified with each parameter

parameters	documents verified
Energy Purchased	Energy Bills
State Generation	ABT meter reading, REA data, generator report
Energy exported/sale	Sale invoice, export meter reading
Infrastrure details	asset registrar
Consumer details	ARMS software
Energy Billed	ARMS software
Collection	ARMS software
Energy accounting	quarterly accounting sheet
Energy injection in different voltage level	Meter reading recorded at sub-stations

9.12 Brief Description of Unit

APDCL is a world class company serving the people of Assam for all round development of the State. We supply 24x7 uninterrupted, reliable, affordable, safe and quality power to our customers. We delight our customers by exceeding their expectations in providing 100% satisfaction in all aspects of our service.

We run our operations sustainably in an environment friendly manner. We keep our infrastructure in good health by undertaking timely preventive and predictive maintenance. We ensure that all our operations are safe for our employees as well as for the people whom we serve. We are extremely frugal in everything we do so that the cost of our operations is low. We undertake new projects to continuously upgrade our systems to provide quality power to our customers. We ensure that all our projects are completed in time with the least cost and best quality. Our vendors and contractors are our partners in enabling accelerated growth of Assam. In all our operations, we earn a reasonable profit to generate adequate surplus for taking up new projects to serve our customers.

We are very humane in our approach to all our employees who work as a disciplined team 24x7 in the most difficult conditions while being fully accountable to the community they serve.

This is who we are and this is what we will continue to be.

COMPANY PROFILE

Assam Power Distribution Company Limited (APDCL) is a public limited company wholly owned by the Government of Assam. It was incorporated on the 23rd day of October 2009 and has been registered under Indian Companies Act 1956.

The main purpose of forming the Company was to take over, manage and operate the electricity distribution system, assets, liabilities, undertaking of the erstwhile Assam State Electricity Board (ASEB) pursuant to a notified transfer scheme in terms of Part XIII of the Electricity Act, 2003.

The primary purpose of the Company is to undertake distribution, trading and supply of electricity in the state of Assam or outside in accordance with provisions of Applicable Law

and all activities ancillary or appurtenant thereto. It has also the mandate to develop, maintain and operate the power distribution system in the state of Assam. In carrying out the work of supplying power, APDCL reaches every part of the state. From Sadiya to Mancachar and from Jonai to Lowairpowa. From the hilly areas of North Cachar Hills to the low plains of Morigaon, APDCL is expanding its distribution network in spite of many physical hindrances. APDCL is also implementing off-grid solar projects in such areas where the distribution network could not reach such as Amarpur area under Chapakhowa Sub-division and the 'Char' areas of Brahmaputra river.

APDCL is supplying power to the major industrial centers situated in Assam such as Coal India Limited (Ledo, Margherita), Brahmaputra Gas Cracker & Polymer Limited (Lepetkata, Dibrugarh), Cement Corporation of India Limited (Bokajan), Hindustan Paper Corporation Limited (Panchgram & Jagiroad), Assam Petrochemicals Limited (Namrup) etc. and serving the people of Assam with a consumer base of more than 64 lakhs and this is growing year by year.

MANDATE OF THE COMPANY

The Company, Assam Power Distribution Company Limited was incorporated on the 23rd day of October, 2009 as a public limited company wholly owned by the Government of Assam. The ultimate object of the Company is to undertake the electricity distribution, trading, supply in the state of Assam or outside in accordance with provisions of Applicable Law and all activities ancillary or appurtenant thereto.

The main purpose of forming the Company was to take over, manage and operate the electricity distribution system, assets, liabilities, undertaking of the Assam State Electricity Board (ASEB), as may be transferred to it pursuant to a notified transfer scheme in terms of Part XIII of the Electricity Act, 2003. Subsequently, the Government of Assam notified the provisional transfer scheme vide Gazette notification bearing no. PEL. 151/2003/Pt./165 dated 10th December, 2004 as well as the final transfer scheme vide Gazette Notification PEL. 151/2003/Pt./349 dated Dispur, the 16th August, 2005 under the Electricity Act, 2003 transferring the various assets, liabilities etc. of the ASEB to the Company.

The main object of the company is to develop, maintain and operate power distribution system in the state of Assam.

VISION

" To be the catalyst for Holistic Growth of the State of Assam by powering Agriculture and Industry; lighting homes - rural and urban & generating internal resources for continually improving Technology & Delivery System to induce Customer Delight. "

MISSION

Our Commitment is to make Assam Power Distribution Company (APDCL) the pride of ASSAM. According to the employees of APDCL, the following 15 KEY TASK AREAS should be undertaken to achieve Our Mission:

- Advanced planning for procurement of electricity to cater to the consumers according to demand

- Enhancing the capacity of the electrical sub-divisions and distribution networks by investing in infrastructure
- Expanding the distribution network to supply power to all the villages
- Increasing awareness among the consumers about economic use of electricity
- Replacement of Electro-Mechanical Meters with Electronic Meters
- To give emphasis on 100% Revenue collection, energy audit and error-free billing
- Engagement of Franchisee to improve the services to the consumers
- To set up Vigilance Cell to detect unauthorized use of electricity
- Training the employees for consumer-friendly behaviour
- To set up state-of-the-art customer care centre and carry out consumer indexing
- Strong resolve for financial discipline
- Take proper steps to increase faith among consumers
- Proper planning for an effective HT/LT Ratio
- To reduce AT & C Losses by augmenting 1-Ph lines wherever required
- Installation of underground cable in lieu of overhead lines

ADMINISTRATION HIERARCHY

At the headquarter of the company there are the following wings who in turn functions under the administrative control and supervision of the Chairman and the Managing Director.

1. Technical wing is headed by CGM(D&S), LAR, CAR, UAR
2. Materials Management, Projects Planning & Design wing is headed by CGM(PP&D)
3. Rural Electrification wing is headed by CGM(RE)
4. Commercial Revenue, Commercial Tariff and Energy Efficiency wing is headed by CGM (Com. & EE)
5. Customer Relations, Marketing & Safety wing is headed by CGM (CR, Marketing & Safety)
6. Human Resource Development wing is headed by CGM(HRA)
7. Finance & Accounts wing is headed by CGM(F&A)
8. Project Management wing is headed by Director (PMU)
9. Vigilance & Security wing is headed by CGM (Anti-Theft and Security)
10. Medical wing is headed by Chief Medical Officer (CMO)

In order to reach out to the consumers in a more inclusive manner, the Company has bifurcated its electricity distribution operation into three regions headed by CGM(D&S)

1. Lower Assam Region (LAR)
2. Central Assam Region (CAR)
3. Upper Assam Region (UAR)

These regions have been further divided into 8 (Eight) Zones with each zone being headed by a General Manager (GM)

1. Guwahati Zone under LAR
2. Rangia Zone under LAR
3. Bongaigaon Zone under LAR
4. Nagaon Zone under CAR
5. Tezpur Zone under CAR
6. Silchar Zone under CAR

7. Jorhat Zone under UAR
8. Dibrugarh Zone under UAR

These 8 (Eight) zones have been further divided into 19 (Nineteen) numbers of Electrical Circles with each circle being headed by a Chief Executive Officer (CEO) in the rank of DGM (Deputy General Manager)

1. Guwahati Electrical Circle - I under Guwahati Zone
2. Guwahati Electrical Circle - II under Guwahati Zone
3. Rangia Electrical Circle under Rangia Zone
4. Mangaldoi Electrical Circle under Rangia Zone
5. Bongaigaon Electrical Circle under Bongaigaon Zone
6. Kokrajhar Electrical Circle under Bongaigaon Zone
7. Barpeta Electrical Circle under Bongaigaon Zone
8. Nagaon Electrical Circle under Nagaon Zone
9. Morigaon Electrical Circle under Nagaon Zone
10. KANCH Electrical Circle under Nagaon Zone
11. Tezpur Electrical Circle under Tezpur Zone
12. North Lakhimpur Electrical Circle under Tezpur Zone
13. Cachar Electrical Circle under Silchar Zone
14. Badarpur Electrical Circle under Silchar Zone
15. Jorhat Electrical Circle under Jorhat Zone
16. Golaghat Electrical Circle under Jorhat Zone
17. Sivasagar Electrical Circle under Jorhat Zone
18. Dibrugarh Electrical Circle under Dibrugarh Zone
19. Tinsukia Electrical Circle under Dibrugarh Zone

Each Circle is further divided into Electrical Divisions. There are total of 45 (Forty Five) Electrical Divisions under APDCL. The Divisions are being headed by an Assistant General Manager (AGM).

Each Division is further divided into Electrical Sub-Divisions. There are total 158 (One Hundred Fifty Eight) Electrical Sub-Divisions under APDCL. The Sub-Divisions are being headed by a Sub Divisional Engineer (SDE) in the rank of Deputy Manager (DM) / Assistant Manager (AM).

Also to cater the needs of the industrial consumers properly, 17 numbers of IRCAs (Industrial Revenue Collection Areas) have been established throughout Assam with each IRCA being headed by an Area Manager.

The Sub-Divisions and IRCAs are main revenue units of APDCL.

9.13 *List of Parameters arrived through calculation or formulae with list of documents as source of data*

parameters calculated	Source documents verified
Transmission Loss	ABT meter reading (import & export), SLDC report
T&D Loss	ABT meter reading, energy bills, MIS (ARMS software) data
Collection efficiency	MIS (ARMS software) data
Load factor	Monthly power report from sub-station, MIS (ARMS software) data
ACS-ARR gap	uday website

10. CERTIFICATION

This part shall indicate certification by ACCREDITED ENERGY AUDITOR (AEA) stating that:

- i. The data collection has been carried out diligently and truthfully
- ii. All reasonable professional skill and due diligence had been taken in preparing the energy audit report and content thereof are a true representation of the facts
- iii. Adequate training provided to personnel involved in daily operations after implementation of recommendations and
- i. The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals for Conduct of Energy Audit (Accounting) in Electricity Distribution Companies) Regulations, 2021, published vide notification No.18/1/BEE/DISCOM/2021, dated the 15th April, 2021 in the Gazette of India, Extraordinary, Part III, Section 4, as required under sub-section (1) of section 58 of the Energy Conservation Act, 2001 (52 of 2001)

Prodip Golder
PRODIP GOLDER
Accredited Energy Auditor
REGN. No. AEA – 282
Bureau of Energy Efficiency

Signature:

Seals:

