Annual Energy Audit Report of APSPDCL FY 23-24

DesignatedConsumer Registration No.: - **DIS0005AP**

Andhra Pradesh Southern Power Distribution Company Limited

APSPDCL, DoorR No 19-13,65/A, Tirchanoor Road,

Srinivasapuram,Tirupaiti,

Andhra Pradesh, India-517503

Conducted by

M/s Zenith Energy Services Private Limited

3rd Floor,C1, Space & moreBusiness Park1-89/A/8/C2,

VitalRaoNagar, Hyderabad- 500 081,

Telangana State,India.

July– 2024

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I. ACKNOWLEDGEMENT

Zenith Energy Services Private Limited (ZESPL), Hyderabad (an EmAEA by BEE) expresses its sincere gratitude to the management of "Andhra Pradesh Southern Power Distribution Company Limited (APSPDCL)"for giving theman opportunity for conducting the "Annual Energy Audit" 2023-24.Our special thanks go to the following APSPDCL officials for their whole-hearted support and the excellent cooperation extended to the Energy Audit team from ZESPL.

Shri K.Audiseshaiah	CGM(Energy Conservation & Quality Control)
Shri. R.Chandrasekhara Reddy	General Manager (Energy Audit)
Shri. S.Soma Sekhar	Executive Engineer (Energy Audit)
Shri. C. Balaji.	DEE (Energy Audit)
Smt D.Lakshmi	AEE (Energy Audit)

ZESPL also wishes to thank all other executives and staff of APSPDCL Tirupati for their active involvement, providing all the data connected to the audit, and sharing their experience on the implementation of energy conservation measures in APSPDCL.

ENERGY AUDIT TEAM

ZENITH ENERGY SERVICES (P) LIMITED

II. STUDY TEAM

Sl. No.	Organization	Team Members	Designation	Role
1	Zenith Energy Services (Private Limited)	Mr. R. Gopala Krishna	Sr. Consultant Accredited EnergyAuditor Regd. No. AEA-0123	Project Head, Review of Data and Report
2		Mr. D S R Krishna	Head (Energy Efficiency)	Inspection, Review of Data & Report
3		Mr. R. Veera Swamy	DISCOM Sector Expert	Verification of Data and Report
4		Mr. P. Mahesh Kumar	Energy Auditor - 11059	Verification of Data and Report
5		Mr. Guru Sri Charan Upparapalli - Engineer	Sr. Engineer	Field Visit, Compilation of Data and Report
6		Mr. B Satyanarayan	Energy Auditor	Verification of Data and Report

1 EXECUTIVE SUMMARY

1.1 Introduction

As per BEE Notification No 18/BEE/DISCOM/2021 dated 6th October 2021 every energy Distributing Company shall conduct an annual energy audit for every financial year and submit the annual energy report to the BEE and SDA and also made available on the web site of the electrical distribution company within a period of four months from the date of expiry of the financial year.

In order to evaluate various critical parameters like T&D losses, Collection Efficiency, ATC Losses etc. BEE has developed a Sector Specific Proforma on 02-02-2022 and distributed the same to the eligible DISCOMs.

1.2 Details of Energy Purchased, Net Input Energy % of Losses

As per the Energy Accounting proforma submitted by APSPDCL for the FY 2023-24 the details are as under.

a) The gross energy purchased by APSPDCL from all the generating sources put together is 32780.61 MU.
b) The net input energy at DISCOM (After adjusting the transmission losses and energy traded) is 31252.24 MU.
c) The transmission losses are 953.79 MU.
d) The total Energy Billed is 28731.78 MU.
e) The Transmission & Distribution (T&D) Loss for the AY 2023-24 is 2520.46 MU.
f) The % of T&D Losses is 8.06 %
g) The Collection efficiency is 85.99%
h) The billing efficiency is 91.93%
i) The AT&C Losses are 20.95%
j) % of Metered Sales is 67.51%

1.3 Distribution Losses for the past 3 years

The Percentage of Distribution Losses incurred by APSPDCL during the FY 21-22, 22-23 and 23-24 are shown as under.

Financial Year	2021-22	2022-23	2023-24
D Losses (%)	8.10	8.08	8.06

From the above figures it is evident that the Distribution Losses have shown decreasing tendency in each financial year and the ECMs implemented by APSPDCL during 2023-24 are enumerated in the latter chapters. All the documents were signed by the head of the department of the respective circles.

1.4 Critical comment

Each parameter in the Proforma is verified the from the certified documents provided by APSPDCL and also cross checked from the Data furnished by APPCC/Transco for FY 2023-24. From the data provided by APSPDCL it was observed that APSPDCL purchased a total 10229.0821 MU from renewable energy sources i.e solar and wind which was around 4422.3251 MU less than previous year's purchse from the same sources respectively due to non-availability of wind.

1.5 Comment on Metering of DTs

As intimidated by APSPDCL and as per the infrastructural details made available in the Energy Accounting Pro Forma, 6,44,612 DTRs are not provided with any meter. APSPDCL is planning to install communicable meters(smart metering) to all DTRs, feeder meters under RDSS Sccheme. APSPDCL intimated that tenders for this work are finalized and executin will take place shortly.

Due to no meter to DTRS, the losses in the LT Side could not assessed and taken as zero and total sales were added to 11 KV sales to evaluate the distribution losses.

1.6 Empaneled accredited energy auditing firm [EMAEA] – an overview

Name of the Firm : M/s Zenith Energy Services (P) Ltd, Hyderabad

Registration No of the Firm : EmAEA – 011

Registration No. of the Lead AEA : R Gopala Krishna (AEA –0123)

Other BEE empaneled AEA/ CEA/ DISCOM sector Expert

DSR Krishna- AEA

S.VeeraSwamy-Discom Expert

Y. Venkateswarlu- CEA EA 17704

R. Sasidhar- CEA EA 7970

Zenith Energy Services Private Limited (ZESPL) is a BEE empaneled energy auditing technical consultancy organization providing techno–commercial advisory services in the areas of Energy Efficiency, Renewable Energy, and Climate Change Management(CDM) for over three decades. The company also has rich experience in conducting baseline Audits, Energy Audits for DISCOMs, Cement sector and Power sector etc. The clients include DISCOMs like TSNPDCL, MSEDCL, DGVCL, cement majors like KCP, PENNA, and KESORAM group. besides Thermal Power Plants like NCTPS Stage II, KTPS (TS GENCO)

1.7 Designated consumer – an overview

Name and Address of Designated Consumer

Andhra Pradesh Southern Power Distribution Company Limited (**APSPDCL**)

Registration No.& Address DC No : **DIS0001AP**

APSPDCL, Door No 19-13,65/A,Tirchanoor Road,Srinivasapuram,Tirupati-517503

Name & details of Energy Auditor and Authorized signatory of DC

Details of Energy Manager	Details of Authorised Signatory
Shri. S. Soma Sekhar (Energy Manager) Reg. No: EA- 7172 Mobile : +91- 9440817405 Mail : eaapspdcl@gmail.com	**Smt** K.Audiseshaiah Chief General Manager/Energy Conservation and Quality Control

1.8 Brief Details of APSPDCL

The Southern Power Distribution Company of Andhra Pradesh Ltd (APSPDCL) was incorporated under the Companies Act, 1956 as a Public Limited Company on 01-04- 2000 with headquarters at Tirupati to carry out electricity distribution for the districts of Krishna, Guntur, Prakasam, Nellore, Chittoor and Kadapa.

On 2nd June 2014, due to bifurcation of the erstwhile Andhra Pradesh Anantapur and Kurnool districts were added to the Southern Power Distribution Company of AP Ltd.

AP Power Sector Reforms envisage creation of Distribution Companies as Government Undertakings. The Andhra Pradesh Gazette No.37 published by the Government of Andhra Pradesh on Friday 31 March 2000 declared formally formation of Distribution Companies. In this process, Andhra Pradesh Southern Power Distribution Company was formed for the following six districts of Andhra Pradesh. The corporate office and headquarters of APSPDCL is at Tirupati City.

Quality power at economic rates acts a catalyst in transforming the state by fostering growth in agricultural, industrial and commercial areas while meeting the increasing domestic demand. On Feb 1, 1999, Government of Andhra Pradesh initiated the first phase of reforms and restructuring in AP's power sector by unbundling APSEB into APGENCO and APTRANSCO to cater to Generation and Transmission & Distribution respectively. APTRANSCO was further reorganized into four distribution companies to cater to the needs to the different districts of AP.

APSPDCL was formed on April 1, 2000 to serve Krishna, Guntur, Prakasam, Nellore, Chittoor and Kadapa districts.After the bifurcation of the erstwhile Andhra Pradesh into the two new states of Andhra Pradesh and Telangana on 2 June-2014, two more districts Anantapur and Kurnool were added to the Southern Power Distribution Company of AP Ltd.

a) To develop and maintain an efficient, co-ordinated and economical distribution system
b) To supply electricity on an application of the consumer in accordance with the provisions specified in the Electricity Act 2003.
c) provide non-discriminatory open access to the consumers.
d) To establish a forum for redressal of grievances of the consumers

Since the State Government of Andhra Pradesh has vested the function of distributing power in the designated area to APSPDCL,APEPDCL, APCPDCL, the Business Scope of the Company falls within the legal framework as specified in the Act and can include:

(i) To develop and maintain an efficient, co-ordinated and economical distribution system.

(ii) To Operate the existing distribution infrastructure efficiently &effectively;

(iii) Merchant Sale of Power in the event of availability of surplus power after meeting the requirement of own consumers with whom the capacity is contracted presently;

(iv) Other associated businesses such as Training, Research and Development activities, Technical consultancy services, and O&M related services;

(v) The Consumer base of APSPDCL consists of Domestic, Non-Domestic , Agricultural and Industrial Consumers as major categories.

2. SCOPE, APPROACH AND METHODOLOGY

2.1 Scope of energy audit

The Work order given by the DC to EmAEA is attached as an Annexure -1.

2.2 Approach adopted for annual energy audit

Based on the data collection and discussions as per BEE guidelines, EmAEA prepared the annual energy audit report for the FY 2023-24 and presented it to the DC.

2.2.1. Data Review, interpretation and analysis

All the documents submitted by APSPDCL is studied in detail and after detailed scrutiny APSPDCL is requested to make additional documents (Duly certified) ready to support the data entered in the Proforma and the final values like T&D Losses .AT&C Losses arrived at in the proforma. APSPDCL made all the documents available by the time Zenith team visited their office.

Activity	Period
Visit and Discussions with the DC	11-07-2024 to 12-07-2024
Post visit report preparation	24.07.2024 – 31-07-2024

2.3 Methodology adopted for Annual Energy Audit

- Discussion with the Audit team of APSPDCL regarding the plan of action for conducting Energy audit.
- Detailed study of various ENCON measures taken during 2023-24.
- Verification of energy input and sales data submitted by the DC.
- Examining mandatory Forms and source documents of the data presented during the audit.

Preparation of Annual Energy Audit report for the submission. The signed copy of Energy Accounting Pro Forma is enclosed separately with a link. (Annexure 3)

2.3.1. Team Composition

The following members from Zenith Energy and APSPDCL have participated in the Annual Energy study of the DC.

ZESPL Hyderabad	**APSPDCL-Tirupati**
Sri. R Gopala Krishna, AEA	Sri. S.Soma Sekhar Energy Manager(EA-7172)
Sri R VeeraSwamy DISCOM Expert	Shri N. Narendra Naidu, AO
Sri. P. Mahesh Kumar, CEA-11059	Kum J. Dhrani, AEE/IT
Sri Guru Sri Charan Upparapalli - Engineer	

2.3.2. Minutes of Meeting/Verification

The audit team verified the data filled in sector specific Proforma document by the DC with certified documents by the DC and other certified intra departmental documents and from the annual reports conducted by Independent Third-party Auditors.

2.4 Purpose of the Annual Energy Audit report

Energy Conservation Act 2001 (EC Act 2001) requires DCs to:

a) Furnish report of energy consumption to the BEE and SDA(By External Agency)
b) Designate or appoint an Energy Manager who will be in-charge for submission of annual energy consumption returns to BEE and SDA (Section 14 (l))
c) Comply with the energy conservation norms and standards prescribed under Section 14 (g) of the Act

As per BEE Notification No 18/BEE/DISCOM/2021 dt. 6th October 2021 every energy distribution Company shall conduct an annual energy audit for every financial year and submit the annual energy report to the BEE and SDA and also made available on the web site of the electrical distribution company within a period of four months from the date of expiry of the financial year. The general structure of the report shall be as under.

a) It shall be mandatory to record the energy supplied separately for each category of consumers which is being provided a separate 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.
b) Provide for monitoring of input energy and consumption pattern at various levels.

c) Identify the areas of energy leakage, wastage or inefficient use

d) Identify high loss making areas and networks for initiating target based corrective action and

e) Identify overloaded segments of the network for necessary capacity addition.

f) In addition, the report shall highlight the strength and weakness 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.

g) The audit report shall be signed by the AEA under the seal of its firm giving all the accreditation details along with details of manpower employed in conducting the annual energy audit.

3. INFRASTRUCTURAL DETAILS OF APSPDCL

3.1 Introduction

APSPDCL, Tirupati is responsible for Power Distribution for about 71.3 Lakh consumers in 5circles belonging to different categories as shown in the following table:

Table 1: Consumer Details

No.	Parameters	Total	Covered during in audit
i	Number of circles	5	5
ii	Number of divisions	33	33
iii	Number of sub-divisions	108	108
iv	Number of 33/11 Kv Sub Stations	1540	1540
v	Number of feeders	7076	7076
vi	Number of DTs	644612	644612
vii	Number of consumers	7217815	7217815

3.2 Statistical details of Metered Consumers

APSPDCL, Tirupati is purchasing its entire energy requirement from various sources at11 kV, 33KV , 132KV and above voltage levels.

Table 2: Distribution Grid Details

No.	Parameters	66kV & above	33 kV	11 / 22kV	LT
i	Number of conventional metered consumers	129	745	3329	6039416
ii	Number of consumers with 'smart' meters	0	0	0	0
iii	Number of consumers with 'smart prepaid' meters	0	0	0	0
iv	Number of consumers with 'AMR' meters	0	0	0	0
V	Number of consumers with 'non-smart prepaid' meters	0	0	0	0
vi	Number of unmetered consumers	0	0	0	1174196
vii	Number of total consumers	129	745	3329	7213612

3.3 Statistical data of Meters on Power Transformers and DTs

Power Transformers installed at 33/11kV substations are maintained by APSPDCL. Below is the detail of the meters provided on Power transformers.

Table 3: Details of meters on power transformers and DTs

No.	Parameters	66kV and above	33kV	11/22kV	LT
i	Number of conventionally metered Distribution Transformers	0	0	0	0
ii	Number of DTs with communicable meters	0	0	0	0
iii	Number of unmetered DTs	0	0	644612	0
iv	Number of total Transformers	0	0	0	0

3.4 Statistical data of feeders and meters provided on the feeders

APSPDCL,Tirupati maintains the network at 33kV and below. APSPDCL has 775 no of 33kV feeders and 6301 no feeders at 11kV level. Details of consumers with different type of meters are tabulated as under.

3.5 The details of Feeders

The details of Feeders at Different Voltage levels and type of meters provided on the feeders are tabulated as under.

Table 4: Details of Feeders and meters provided on the feeders

S.no	Parameters	66kV and above	33kV	11/22kV	LT
i	Number of metered feeders	0	775	6301	0
ii	Number of feeders with communicable meters	0	775	6301	0
iii	Number of unmetered feeders	0	0	0	0
iv	Number of total feeders	0	775	6301	0
d.	Line length (ct km)	314199			
e.	Length of Aerial Bunched Cables in KM	88075.84			
f.	Length of Underground Cables in KM	1095.02			

4. ENERGY SCENARIO OF APSPDCL FOR THE YEAR 2023-24

4.1 The Energy Scenario

The Energy Scenario of APSPDCL during the FY 23-24 is tabulated as below.

Table 5: Performance Summary

S. No	Description	Units	2023-24
1	Input Energy Purchase	MU	32780.61
2	Transmission Losses	MU	953.79
3	Energy Sold ouside the DISCOM periphery	MU	574.58
4	Open Access Sales	MU	899.12
5	EHT Sale	MU	6530.31
6	Net input energy (received at DISCOM periphery or at distribution point)	MU	31252.24
7	Billed Energy	MU	28731.78
8	T&D Loss	MU	2520.46
9	T&D Loss	%	8.06
10	Billed Amount	INR Cr	22904.60
11	Collected Amount	INR Cr	19695.66
12	Collection Efficiency	%	85.99
13	AT&C Loss	%	20.95

4.2 The details of Power purchased from different sources

The details of Power purchased from different sources during the Financial 2023-24 is available in the Energy Accounting Proforma.

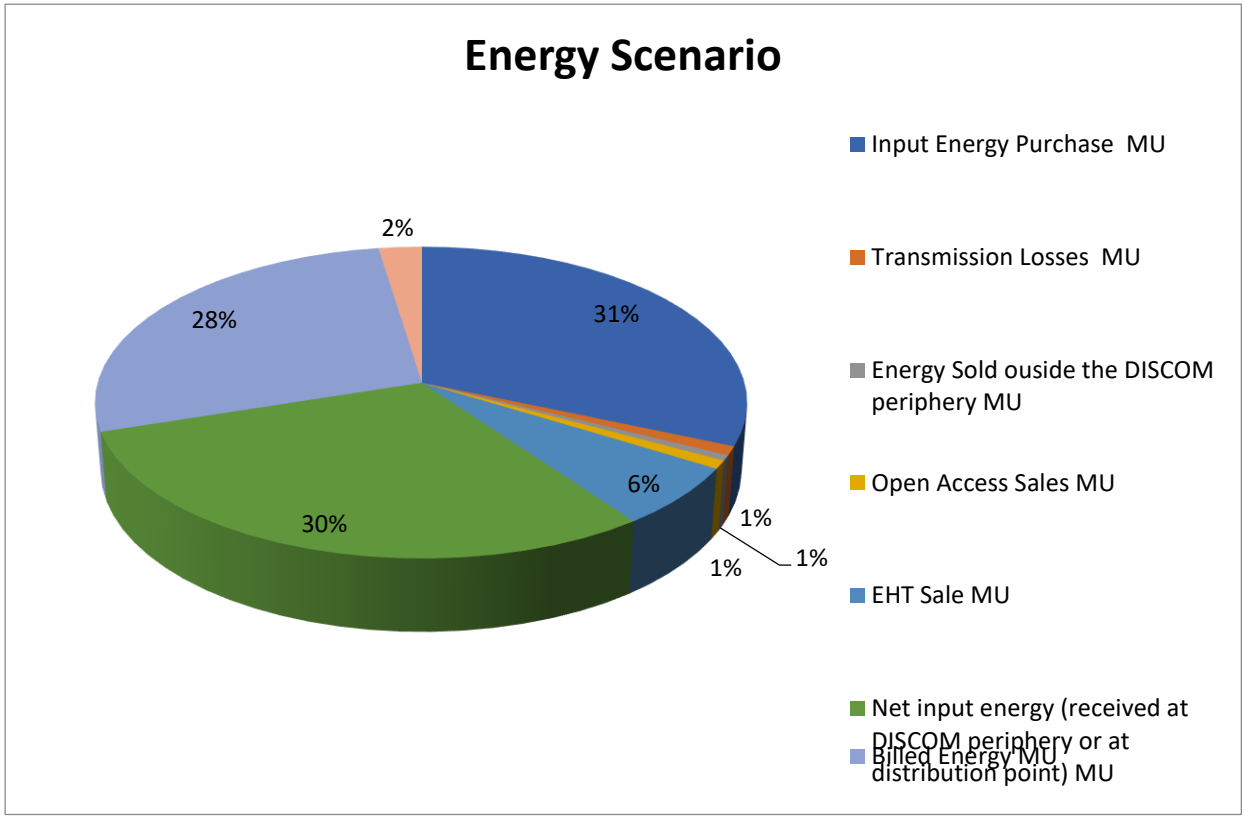
The following table shows the energy input, sales and losses at various voltage levels.

Table 6: Energy accounting Summary (voltagewise)

Energy Accounting Summary					
S.no	**Voltage**	**Input (in MU)**	**Sale (in MU)**	**Loss (in MU)**	**Loss %**
i	LT	0	17,975.35	0	0
ii	11 Kv	21,696.83	2,090.06	1,631.43	7.52
iii	33 kV	3,924.22	3,035.19	889.03	3.47
iv	> 33 kV	6,530.31	6,530.31	0	
S.no	**OA, Captive**	**Input (in MU)**	**Sale (in MU)**	**Loss (in MU)**	**Loss %**
i	LT	0	0	0	0
ii	11 KV	17.54	17.54	0	0
iii	33 kV	309.27	309.27	0	0
iv	> 33 kV	572.31	572.31	0	0

The Pie diagram showing the above data is shown as under

Figure 1:Energy Accounting Pie Diagram



4.3 The Energy sales particulars and loss calculations at different voltage levels

The Loss calculations for different voltage levels is shown as under

Table 7: Voltage-wise sales, open access demand and loss

S.no	Voltage	Energy Sales Particulars	MU
I	LT Level	DISCOM' consumers	17,975.347
		Demand from open access, captive	0
		Embedded generation used at LT level	0
		Sale at LT level	17975.347
		Quantum of LT level losses(Notional)	0
		Energy Input at LT level	-
Ii	11 kV Level	DISCOM' consumers	2072.520
		Demand from open access, captive	17.541

S.no	Voltage	Energy Sales Particulars	MU
		Embedded generation at 11 kV level used	0
		Sales at 11 kV level	2090.061
		Quantum of Losses at 11 Kv(Including LT Losses)	1631.426
		Energy input at 11 kV+LT level	21696.834
Iii	33 kV Level	DISCOM' consumers	2725.920
		Demand from open access, captive	309.2706
		Embedded generation at 33 kV or below level	
		Sales at 33 kV level	3,035.191
		Quantum of Losses at 33 kV	889.03
		Energy input at 33kV Level	25621.06
Iv	>66 kV	DISCOM' consumers	5957.992
		Demand from open access, captive	572.313
		Cross border sale of energy	0
		Sale to other DISCOMs	0
		Banking	0
		Input at 66kV and above (EHV)	6530.306
Total Energy Requirement(Excluding OA Sales+3rd party sales)			**32151.36**
Total Energy Sales(Discom sales+ Open access sales)			**29630.91**

4.4 Procedures for Loss Calculations

The following table provides the loss calculations

Table 8: **Calculation Procedures for Loss Calculations**

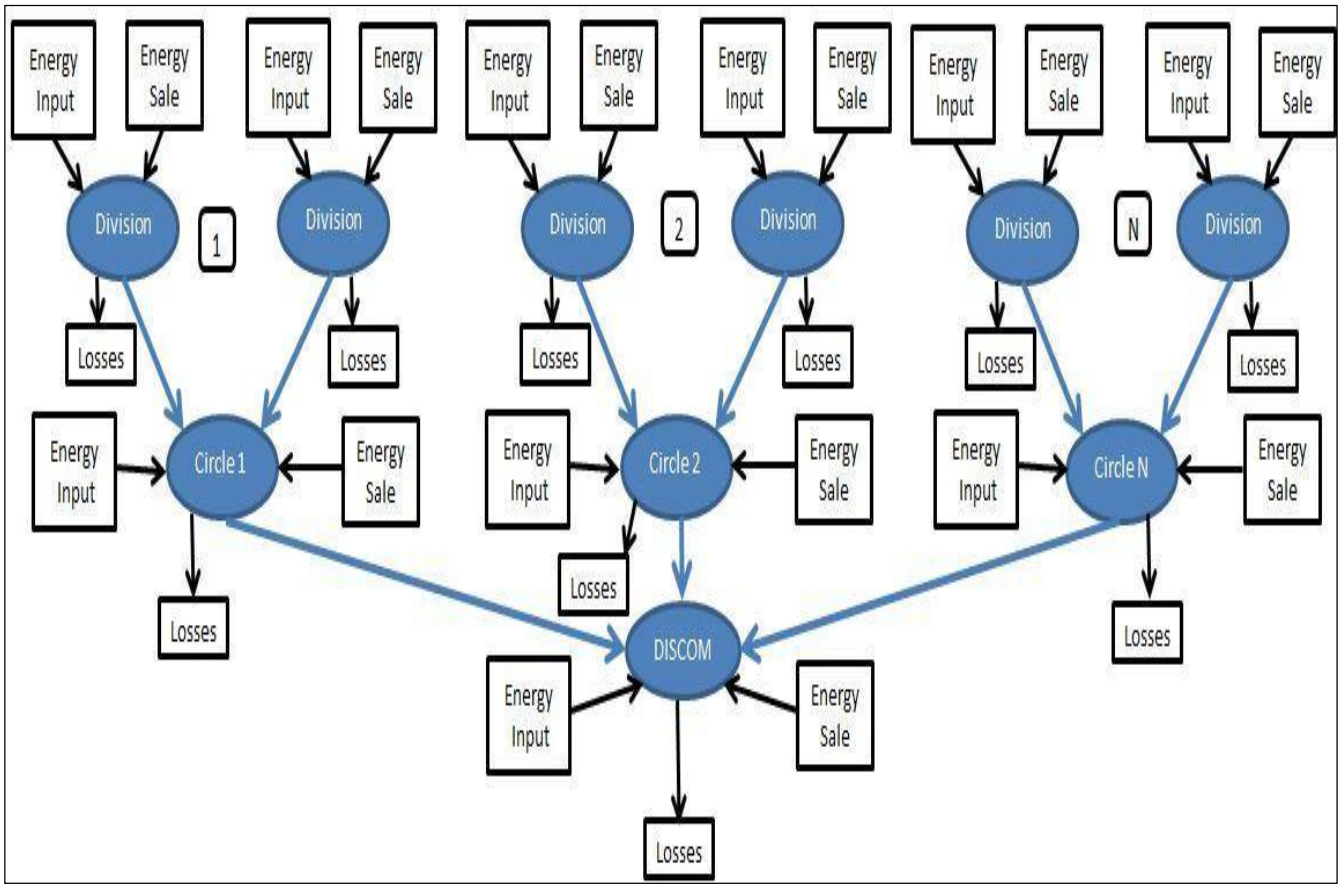
1	EHT Distribution network Input (Transco-Discom Boundary)		7102.62
2	EHT 3rd Party sales		76.13
3	EHT Open access sales which is being adjusted to respective HT consumer recorded energy		496.19
4	Net EHT Input Energy =1-2-3		6530.31
5	EHT Discom sales		6530.31
6	EHT Distribution N/w loss =4-5		0.00

7	% EHT N/w loss =6/4		**0.00**
(i)	Total Energy delivered into 33 KV Distribution System from EHT SSs	A	23863.82
(ii)	Energy delivered by all other Generating Stations at 33kV	B	1757.20
(iii)	Energy consumed by HT consumers at 33KV (Sales)	X	2725.92
(iv)	Energy Delivered into 11 KV and LT System from 33/11 KV SS	C	21696.80
(v)	33KV 3rd party+ OA sales	K	309.27
(vI)	EHT SS Auxiliary consumption	Z	12.05
	Losses (33 kV System)	L=(A + B-K) - (C + X)	889.03
	% Losses (33 kV System)	**100 x (L / (A+B)**	3.47
II. Losses in 11 KV System and Connected Equipment		**II. Losses in 11 KV System and Connected Equipment**	
(i)	Energy delivered into 11 KV system from 33/11kV SSs	C	21696.80
(ii)	Energy delivered into 11 KV Distribution System from EHT SSs	D	0.00
(iii)	Energy delivered at 11kV from all other Generating Stations	E	0.03
(iv)	Total Energy delivered into 11 KV and LT Distribution System	C+D+E	21696.83
(v)	Energy consumed by HT consumers at 11KV Sales	Y	2072.52
(vi)	LT sales	F	17975.35
(vii)	11KV 3rd party+OA sales	M	17.54
	Losses (11kV+LT System)	N=(C + D + E-M) - (Y + F)	1631.43
	% Losses (11kV System)	N/(C+D+E-M) x 100	7.52

4.5 The voltage level-based hierarchy of the APSPDCL

The following figure shows the voltage level-based hierarchy of the APSPDCL

Figure 2: Hierarchy of Distribution loss by DISCOM



4.6. The methodology adopted by the DISCOM is as under

i. Input energy is arrived with the joint Meter readings of Transco, DISCOM and other concerned officials at inter face points of Transco-Discom, Genco-Discom, Private developers –Discom, Discom- Discom.

ii. The Input energy will be reconciled at Transco level every month with MRI dumps of all inter face points and will be considered as total input energy for APSPDCL.

iii. The metered sales arrived through energy billing software using which bills are being issued.

iv. The agricultural salesare being assessed as per the methodology proposed by Indian Statistical Institute.

v. By knowing the input energy, metered sales and consumption, the Distribution losses and AT&C losses are computed at company level.

vi. APSPDCL is also calculating the circle wise losses based on the inputs from boundary meters installed at circle level. Net energy input is finalised after

Import/export of energy on the basis of boundary meters at circle level.

vii. Energy billed is considered as per the Energy Billing System (EBS) reports of the DISCOM.

viii. T&D losses are calculated at circle level. Revenue billed and realized is taken from the financial records of APSPDCL finance department and accordingly AT&C losses are finalized.

ix. The energy input is taken from the sub- station meters of 11 kV/22kV, 33kV and 66 kVfeeders and 66 kV, 132 kV and 220 kV feeders. Sale of energy is taken as per Energy Billing System (EBS) software. Agricultural consumption will be arrived as per ISI methodology.

x. Since the DTs do not have meters the sale of Energy at LT Level is added to 11 kV level sales and then the losses at 11 kV level are evaluated.

4.7. Input Energy

4.7.1. The energy purchase and net energy input details are as under.

Table 9: Energy Input Details

S. No	Particular	FY (2023-24) MU
1	Net Input Energy Purchase (From Generation Source)	32780.61
2	Net Input Energy against Sale of Energy to Discom consumers	31252.24

The source of Data AP Transco EBC Wing. The input energy purchased from Generation sources for the FY 2022-23 is 32780.61 MU. The above Net Input energy value is verified from the provisional audit report submitted by third party for the financial year 2023-24 and from MIS data of APSPDCL for the year 2022-23. Since the report is provisional there may be slight changes in the energy figures after the final report is published. The details of energy exchanges between APTRANSCO and APSPDCL is enclosed in Annexure 4

4.8 Summary of Losses: APSPDCL supplies Power to about 72.17 lakhs consumers belonging to different categories through a network consisting of 7076 feeders at different voltage levels and 644612 no's distribution transformers of different

capacities. The procedure for verification of calculations by Zenith team to compute % of T&D Losses and % of Distribution Losses is as under.

1 Set the boundary of the operation as per gate-to-gate concept

2. Identify the sources of energy

3. Data collection from DISCOM

4. Account for Billed Energy, Net input Energy consumption and Meter reading of input energy injection points in different scenarios

5. Calculate Circle wise losses

6. Calculate DISCOM % T&D Loss

The % T&D Loss of the DISCOM is calculated excluding Open Access Energy on a monthly basis using the Transmission and Distribution losses in MU, the % T&D Loss of the DISCOM as per the following formula:

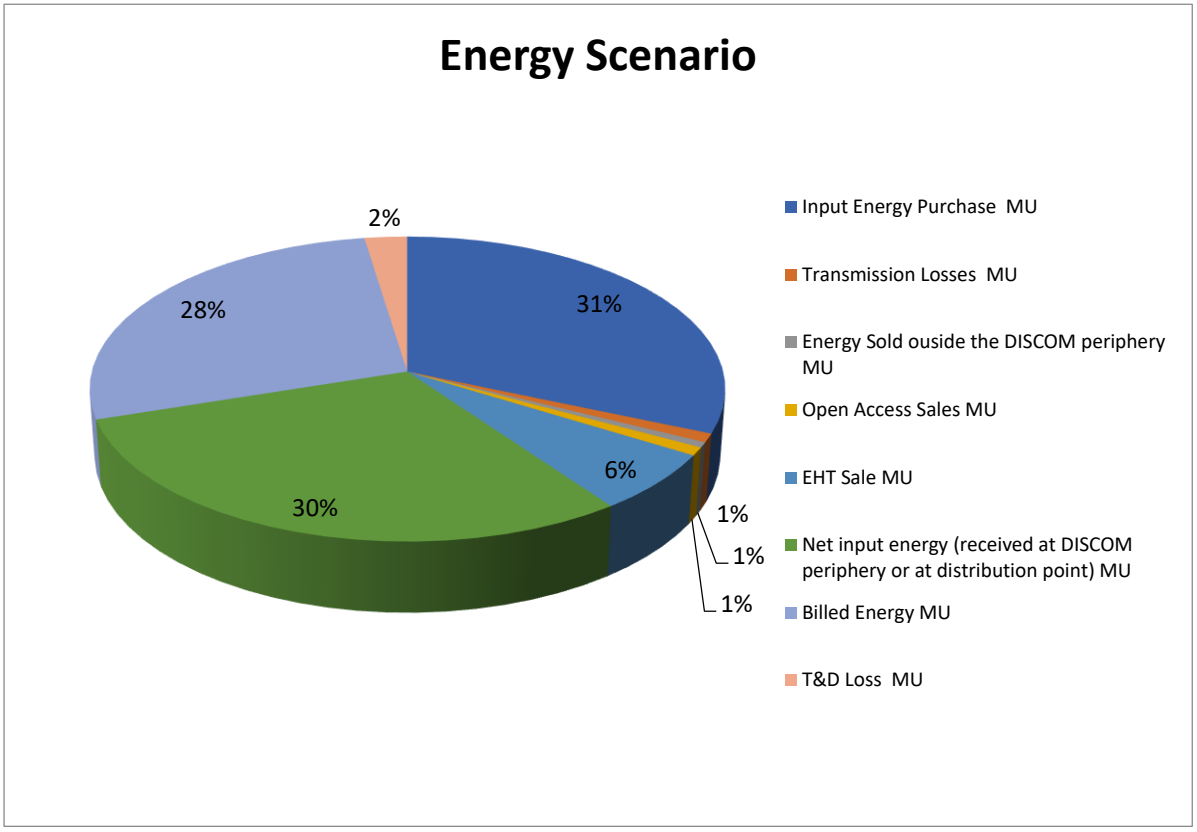
% T&D Loss = (Input Energy Purchase (MU) – Billed Energy (MU)) / Input Energy (MU)*100

% Distribution Losses = (Net Input Energy Purchase (MU) – Billed Energy (MU)) / Input Energy (MU)*100

Table 10: Losses summary

No.	Particulars	Units	Quantity
1	Gross Input Energy Purchase	MU	32780.61
2	Net Input Energy(At DISCOM Periphery after adjusting the transmission losses and energy traded)	MU	31252.24
3	Total Energy Billed (Is the net energy billed, adjusted for energy traded)	MU	28731.78
4	T&D Losses	MU	3474.25
5	% of T&D Losses	%	10.79
6	Distribution Losses	MU	2520.46
7	% of Distribution Losses	%	8.06

Pie Chart for the above details is shown as under



5. DETAILS OF VARIOUS CATEGORIES OF CONSUMERS AND THEIR CONSUMPTION

5.1 Consumer profile

APSPDCL, Tirupati supplies power to about 71.3 lakh numbers of consumers as per data up to FY-2022-23, detail of consumer for the FY-2022-23 is given in the table below.

Table 11: Consumer profile

Period From April ' 23 to March ' 24					
S. No	**Type of Consumers**	**Category of Consumers (EHT/HT/LT/Others)**	**Voltage Level (In Voltage)**	**No of Consumers**	**Total Consumption (In MU)**
1	Domestic	LT		5242039	5650.00
2	Commercial	LT		593145	1230.05
3	IP Sets	LT		1190184	9801.00
4	Industrial (Small)	LT		41348	531.24
5	LT others	LT		146896	763.06
6	Others-1 (if any , specify in remarks)	Cat:1	11KV	36	14.34
7	Others-2 (if any , specify in remarks)	Cat:2	11KV	1165	405.4176
8	Others-3 (if any , specify in remarks)	Cat:3	11KV	1713	938.93
9	Others-4 (if any , specify in remarks)	Cat:4	11KV	278	162.95
10	Others-5 (if any , specify in remarks)	Cat:5	11KV	136	33.86
11	Others-5 (if any , specify in remarks)	RESCO	11KV	1	517.03
12	Others-5 (if any , specify in remarks)	Cat:1	33KV	5	2.19
13	Others-5 (if any , specify in remarks)	Cat:2	33KV	380	74.99
14	Others-5 (if any , specify in remarks)	Cat:3	33KV	300	2482.28
15	Others-5 (if any , specify in remarks)	Cat:4	33KV	16	111.02
16	Others-5 (if any , specify in remarks)	Cat:5	33KV	44	55.44
18	Others-5 (if any , specify in remarks)	Cat:1	132KV	0	0.00
19	Others-5 (if any , specify in remarks)	Cat:2	132KV	18	38.75
20	Others-5 (if any , specify in remarks)	Cat:3	132KV	45	3574.00
21	Others-5 (if any , specify in remarks)	Cat:4	132KV	24	793.30
23	Others-5 (if any , specify in remarks)	Cat:5	132KV	15	114.23
24	Others-5 (if any , specify in remarks)	Cat:1	220KV	0	0.00
25	Others-5 (if any , specify in remarks)	Cat:2	220KV	3	0.77
26	Others-5 (if any , specify in remarks)	Cat:3	220KV	4	483.06
	Others-5 (if any , specify in remarks)	Cat:4	220KV	6	148.32
	Others-5 (if any , specify in remarks)	Cat:5	220KV	14	805.55
Tota				**7217815**	**28731.78**

5.2 APSPDCL Energy Flow Block Diagram

The Block diagram indicating Energy flow from various sources and energy distribution to various category consumers is shown in Annexure 11 .

5.3 The details of Input metering points in various Divisions

The details of Input metering points in various Divisions are verified from the previous data and import and export at sample locations are ENCLOSES IN Annexure 4

5.4 The Energy Scenario of APSPDCL

The Energy Scenario of APSPDCL during the FY 2021-22, 22-23 and 23-24 is tabulated as under.

Table 12: Energy and commercial losses

S. No	Description	Units	2021-22	2022-23	2023-24
1	Input Energy	MU	25215.49	26778.42	31252.24
2	Total Sales	MU	23173.12	24614.23	28731.28
3	Distribution Losses	MU	2042.38	2164.20	2520.46
4	Distribution Losses	%	8.10	8.08	8.06
5	Collection Efficiency	%	92.01	93.9	85.99
6	Billing Efficiency	%	91.9	91.92	91.94
7	AT&C Losses	%	15.45	13.69	20.95
8	Demand	INR Cr	14058.78	16863.60	22904.60
9	Collection	INR Cr	12935.08	15834.16	19695.66
10	% of metered Sales	%	66.15	68.09	67.5
11	No of Consumers	No	7879953	7130061	7217815
12	Profit after Tax	INR Cr	(152.35)	(1.26)	

APSPDCL prepared demand collection division wise and category wise for all the quartes and quarter wise. The consumption of HT Consumers in the enrgy accounting proforma and demand collection charts and verified and almost tallied. (Minor difference in the data is likelt to occur because of manipulation of decimal digits upto zero/one/two etc decimals by various quarters. The data consists of quarterwise subsidy billed to the respective State Govt and Subsidy receive from the State Govt. APSPDCL also prepared voltage wise loss statement on monthly basis which provides all the details about gross energy input,losses,net energy input and sales on monthly basis. Copy of the details are enclosed in the Annexure 5.

Detailed syudy of previous energy accounting proformas indicates that the Collection Efficiency is reduced from 93.9% during 2022-23 to 85.99 during 2023-24. The AT&C losses increased from 13.69% during 2022-23 to 20.95 % during 2023-24.

a) APSPDCL has prepared detailed analysis of Power Purchased from various sources,Fixed Cost and Variable cost of the particular source.The same data was verified from the audit report conducted bt third party and the average cost of unit purchase works out to be INR 6.24 per Unit (Only Provisional).
b) In order to bring down Distribution losses to a sustainable level, APSPDCL is conducting intensive inspections by operation wing and DPE wing to minimize the theft/Direct tapping/Unauthorized usage of power supply to reduce the losses and Continuous monitoring of top ten high loss Towns and Mandal headquarters and preparing action plan to get down T&D and AT&C losses to permissible limits. Further APSPDCL is carrying out the following works under RDSS.
    1. Bifurcation of 117Nos 33KV feeders(>250A) by erecting 947Kms of 33KV lines
    2. Feeder Segregation (i.e. the feeders with more than 30% agl loads): The feeders' segregation work on 3015 Nos of Agl feeders are going to be taken up.
    3. To improve AT&C Loss and for accurate loss measures, 24,14,631 nos of smart meters are going to fixed for Government, Industrial, Commercial & Domestic (>200 units consumption per month) services, DTR & Feeder meters.

    In addition to the above the following works are to be carried-out (under proposal) under Loss reduction process:

    1. Proposed for erection of 923Nos Capacitor banks
    2. Replacement of 2334Kms of LT Conductor with AB Cable in theft prone areas.
    3. Bifurcation of over loaded 11KV feeders
    4. Replacement of Old/Frayed conductors in 33KV, 11KV & LT level
    5. Replacement of Old/Frayed LT Cables
    6. Renovation of DTR earthing & conversion of LT- three wire system into LT-five wire system to minimize the neutral currents
    7. Loss reduction by reliability improvement – Proposal for providing of 33KV & 11KV covered conductor/UG Cables in tree dense areas is urban area

The Billed Energy of the DISCOM is calculated Circle wise on a monthly basis using the Metered Energy and Unmetered Energy.The Billed Energy of the DISCOM measured in MU as per the following formula

5.5. Billed Energy (Total Energy) = Metered Energy (MU) + Un-Metered energy (MU)

Category wise sale for Assessment Year-2023-24 verified and matching to the total audited sale for Assessment Year-2023-24. The details are enclosed in Annexure 7.

Year wise T&D Losses

The Distribution losses for FY 2021-22, 22-23 and 23-24 are shown below. tabulated below.

Table 13: Year wise T&D losses

S. No	Particulars	Unit	2021-22	2022-23	2023-24
1	% of Distribution Losses	%	**8.10**	**8.08**	**8.06**

From the above data it is evident that APSPDCL has initiated technical steps to reduce losses and legal steps to control the theft of electricity during 2022-23.

5.6. The Divisionwise losses for the FY 2022-23 and 23-24 are shown as under.

a) Various measures taken by all the circles of APSPDCL during the FY 2022-23 are enclosed in the Annexure 5
b) The ENCON measured taken resulted in reduction of Distribution losses by 0.02% from the previous year.
c) The year wise loss reduction statement with effect from 2022-23 to 2023-24 and technical measures taken to reduce the loss are elaborated and attached.

5.7. Analysis of High Loss areas

The division wise losses for FY 2022-23 are presented below.

Table 14: Divisions wise Losses

Sl. No	Name of circle	Name of the Division	T&D loss (%)	AT & C loss (%)
1	Nellore	Nellore Town	3.52	4.87
2	Nellore	Nellore Rurals	8.60	11.54
3	Nellore	Naidupeta	8.51	10.30
4	Nellore	Kavali	8.73	10.87
5	Nellore	Gudur	8.65	11.84
6	Nellore	Atmakuru	9.00	16.61
7	Nellore	Kovvur	7.57	24.19
8	Tirupati	Tirupati Town	3.50	9.75
9	Tirupati	Tirupati Rurals	8.69	14.48
10	Tirupati	Puttur	8.70	13.04
11	Tirupati	Pileru	8.66	18.16
12	Tirupati	Madanapale	8.65	20.78
13	Tirupati	Chittoor Town	8.68	15.01
14	Tirupati	Chittoor Rurals	8.69	16.98
15	Tirupati	Punganoor	8.92	40.00
16	Kadapa	Rayachoty	8.51	15.48
17	Kadapa	Rajampet	8.43	15.19
18	Kadapa	Pulivendula	8.00	23.09
19	Kadapa	Proddatur	8.31	25.22
20	Kadapa	Mydukur	8.60	15.18
21	Kadapa	Kadapa	6.76	11.21
22	Ananthapur	Kalyandurg	9.40	17.54
23	Ananthapur	Kadiri	9.45	25.45
24	Ananthapur	Hindupur	7.67	17.62
25	Ananthapur	Gooty	8.16	25.95
26	Ananthapur	Ananthapur Rural	9.44	25.16
27	Ananthapur	Ananthapur Town	7.33	10.02
28	Kurnool	Nandyal	7.78	12.70
29	Kurnool	Kurnool Town	7.69	18.89
30	Kurnool	Dhone	7.94	71.82
31	Kurnool	Adoni	7.93	7.93
32	Kurnool	Kurnool Rurals	8.23	76.33
33	Kurnool	Yemminagur	7.19	153.26
Sub-total		**APSPDCL Circle Total**	**8.06**	**20.95**

Comments on high loss area

a) As per the above table, the T&D loss of Ananthapur rural is high i.e., 9.44%

b) The AT&C losses increased from 13.69% during 2022-23 to 20.95 % during 2023-24. Variations in AT&C can be attributed to declined collection efficiency. The major contribution for decrease in collection efficiency is large accumulation

of arrears from the Govt. services particularly from Panchayat Raj and Lift Irrigation schemes

c) In order to reduce the Losses meetings (On virtual basis) are regularly conducted between top officials of APSPDCL and Field Officers and staff.

5.8. Agriculture Methodology

Computation of energy of Agriculture consumers is done as per below methodology, as given by the DISCOM.

APSPDCL is following the Indian Statistical Institute (ISI) methodology for assessing the free agricultural consumption. Per HP consumption is being arrived from the meters fixed on the LV side of the sampled Agriculture DTRs in different areas and the total agricultural consumption is extrapolated from the per HP consumption.A sample calculation for Kadapa Circle for the month of April 2022 is enclosed at Annexure 9 for reference.

The estimated agricultural consumption per KVA per DTR depends on the total connected load, type of crop raised, seasonal variation, geographical conditions and water table. Therefore, per KVA consumption of sample DTR varies from capacity to capacity and area to area.

APSPDCL has taken initiative as per the Government of Andhra Pradesh directives to provide meters to every unmetered agriculture consumer to implement DBT in the state.

5.9. Agriculture Billing

The schedule approved by the Commission for "CatgoryV for FY 2022-23 : Agriculture &Related" is as given below.

Table 15: *Agriculture & related Billing*

Sl No	Consumer Category	Low Tension		High
		Fixed/Demand Charges per Month in INR	Energy Charges in INR per Unit	Fixed/Demand Charges per Month per Kva in INR
I	Agriculture			
a	Corporate Farmers		3.5	
b	Non-Corporate Farmers			

c	Salt Farming Units up to 15 HP		2.5	
d	Sugar Cane Crushing		-	
e	Rural Horticultural Nurseries		-	
f	Floriculture in Green House	75/kW	4.5	
II	Aquaculture and Animal Husbandry	30/kW	3.85	30/PER KVA & 3.85 per unit
III	Agro Based Cottage Industries up to 10HP	20/kW	3.75	-
V	Government/Private Lift Irrigation Schemes		6.40 per KVAH	-

5.10. Energy Scenario of APSPDCLfor the Last 3 Years

The Energy scenario of APSPDCL for the last 3 years (Including the AY) are shown as under.

Table 16: Consumer details - Year wise

Consumer Category	FY (2021-22)	FY(2022-23)	FY(2023-24)
Residential	5826259	5101162	5242039
Agricultural	1194633	1273000	1190184
Commercial/Industrial-LT	695839	602713	634493
Commercial/Industrial-HT	3247	3429	3628
Others	159975	144807	147471
Total	**7879953**	**7130061**	**7217815**

5.11. Billed Energy (MU)

The Billed Energy of each category of the consumer for the last 3 years is shown as under

Table 17: Billed energy details - Year wise

Consumer Category	FY (2021-22)	FY(2022-23)	FY(2023-24)
Residential	5181.95	5228.36	5649.99
Agricultural	7166.64	6944.43	9801.00
Commercial/Industrial-LT	1441.37	1694.33	1761.29
Commercial/Industrial-HT	6010.45	7489.84	7998.17
Others	3372.70	3257.27	3521.32
Total	**23173.12**	**24614.42**	**28731.78**

Table 18: Performance Summary tables for the Last 3 Years

Summary Table: Feeder wise Energy Input

Description	FY (2021-22)	FY(2022-23)	FY(2023-24)
At 66 kV level and above	14,111	13551.51	6530.31
At 33 kV level	3,554.7	3438.34	3924.22
At 11/22 kV +LT level	17,784.8	18001.565	21696.22

The total Power purchased from various sources, their fixed cost, variable cost for the FY 2023-24 is shown in Annexure 9.

5.12 DISCOM wisePOC Loss statementissued by APSLDCfor the FY2023-24

DISCOM wise POC Loss statement issued by APSLDC for the Financial year 2023-24 all the DISCOMS in the State of Andhra Pradesh) is shown in the following table.

Table 19: APSLDC Discom wise POC loss data for FY 2023-24

Month	CGS actual drawl at APTRANSCO periphery in MU	APTRANSCO Ex-Bus CGS drawl with maps & kaps wh.benefit in MU	Diff	CPDCL	SPDCL
Apr-23	2765.451	2876.514	111.063	**25.922**	**44.914**
May-23	2304.276	2389.014	84.739	**19.778**	**34.268**
Jun-23	2034.880	2104.269	69.389	**16.195**	**28.061**
Jul-23	1254.168	1300.362	46.194	**10.782**	**18.681**
Aug-23	2740.999	2836.658	95.659	**22.327**	**38.684**
Sep-23	2480.681	2571.271	90.590	**21.144**	**36.635**
Oct-23	3314.666	3428.623	113.956	**26.597**	**46.084**
Nov-23	2684.606	2783.173	98.568	**23.006**	**39.861**
Dec-23	2106.756	2194.068	87.312	**20.379**	**35.309**
Jan-24	2362.417	2459.393	96.976	**22.634**	**39.217**
Feb-24	2460.850	2556.993	96.144	**22.440**	**38.881**
Mar-24	2632.917	2731.960	99.043	**23.117**	**40.053**
Total	**29142.666**	**30232.298**	**1089.630**	**254.320**	**440.647**

5.13. A Note on Data Gaps

After verification of the complete documents except for a minor variation there are no data gaps found in the total data submitted by APSPDCL.Since at the time of making the report all the relevant data is not finalised (All the data was provisional) there may be some minor changes in the report once the final annual report gets published.

(Note Please note that the certified copy of Energy Accounting Proforma occupies huge space and hence was not shown in the Annexure but will be uploaded separately.)

LIST OF ANNEXURES