

REPORT

ON

DETAILED ENERGY AUDIT

Conducted at

**M/s LAKIREDDY BALI REDDY
COLLEGE OF ENGINEERING**

**Krishna District, Mylavaram,
Andhra Pradesh 521230**

Conducted by

Energy Auditing Firm



EAST COAST SUSTAINABLE PRIVATE LIMITED

6-80/1, PRIYA GARDENS P.O SIMHACHALAM, VISAKHAPATNAM

ANDHRA PRADESH – 530028

CIN: U74999AP2018PTC108807

www.eastcoast.net.in

December-2018

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I. ACKNOWLEDGEMENT

THE ENERGY AUDIT TEAM appreciates the keen interest shown by the management of **LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAYARAM** in getting Energy Audit done for conservation of energy.

THE ENERGY AUDIT TEAM expresses its sincere thanks to the management of “**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAYARAM**” for their trust and entrusting the assignment of Energy Audit of **LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAYARAM, Andhra Pradesh**.

THE ENERGY AUDIT TEAM is grateful to **Dr. K. Apparao**, Principal of college, for his initiative and confidence in **THE ENERGY AUDIT TEAM** in awarding the mandatory energy audit study.

The audit team very thankful to all the executives of the campus and in specific to following,

- Head of Electrical and Electronics Department

The arrangements and support during the energy audit were excellent. We deeply appreciate the interest, enthusiasm, and commitment of **LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAYARAM** towards the energy conservation.

For

The Energy Audit Team

II. ENERGY AUDIT TEAM

Name of the Member	Role in the Project
Mr. G Srinivasa Rao	Team Leader - Accredited Energy Auditor
Mr. Azmal Basha	Team Member - Energy Auditor

The report is made as per the Bureau of Energy Efficiency (BEE), Ministry of Power, and Govt. of India format.

III. EXECUTIVE SUMMARY

East Coast sustainable (P). Ltd has been entrusted with carrying out “Detailed Energy Audit” in Head- Office of M/s Lakireddy Bali Reddy College of Engineering, Mylavaram optimize the energy consumption and to identify the energy saving opportunities in the facility. In this connection, East Coast has conducted field measurements at the facility during December 2018 for collection of data and measuring various energy consumption parameters to analyse and find energy saving opportunities.

The major energy inputs for the facility are Electricity, Diesel, and Water. Electricity is used for Package Air Conditioners, Severs, PCs, ACs, Fans, lighting appliances and other loads. Diesel oil is being used in the DG set to generate electricity during power failure. A detailed study was carried out with an objective to identify and prioritize the cost-effective energy conservation recommendations to decrease the energy consumption and energy costs in the facility.

Lakireddy Bali Reddy College of Engineering Installed 410 kW grid-connected small scale (rooftop) solar PV system available for the benefit of campus these systems installed at their campus building rooftops.

Grid-connected solar PV systems feed solar energy directly into the building loads without battery storage. Surplus energy, if any, is exported to the APSPDCL grid and shortfall, if any, is imported from the grid.

IV. LIST OF ENERGY CONSERVATION RECOMMENDATIONS

The following are the energy conservation recommendations identified in the facility.

List of Energy Saving Recommendations

S. No	Name of the recommendation	Savings (kWh/year)	Monetary Savings (Rs./year)	Investment (Rs.)	Payback period (Months)	Remarks
1	Retrofit MV Light's with energy efficient LED Lights to reduce the energy consumption.	16,524	129,713	90,000	8	
2	Recommended to check with the authorized service person to improve the performance of the AC'S	20000	156600	NA	NA	
3	Retrofit T12& T8tube lights with LED Tube Light	29,790	233,849	1023000	52	
4	Retrofit Ceiling Fan with BLDC Fans	49,952	392,123	6244000	140	

V. IMPORTANT INFORMATION

- a) Name and Address of the plant : M/s Lakireddy Bali Reddy College of Engineering
Krishna District, Mylavaram,
Andhra Pradesh 521230
India
- b) Line of Activity : Educational Institutional
- c) Contact Person and Details : Mr. Munigoti Giridhar
Phone: +91- 9492071771
E-mail: munigoti7@gmail.com
- d) Period of Audit : December-2018
- e) Contracted Maximum Demand (CMD) : 400 kVA
- f) Maximum Recorded Demand (M.D) : 436 kVA (June-2018)
- g) Minimum Recorded Demand (M.D) : 204 kVA (November-2018)
- h) Power factor (PF) : 1 (Avg.)
- i) Energy Consumption & their cost details :

Electricity Consumption details for January 2018- November 2018			
Cost of Electricity		: Rs. 7.40/Unit	
Demand Charges		: Rs. 385/kVA	
S. No	Particulars	Unit	Value
1	Monthly Avg. Consumption of Electricity	kWh/Month	42,863
2	Monthly Avg. Bill of Electricity	Rs./ Month	484,429
3	Yearly Consumption of Electricity	kWh/Year	557,219
4	Yearly Bill of Electricity	Rs./ Year	6,297,586
5	Maximum Electricity Consumption (June-2018)	kWh/Month	66,720
6	Minimum Electricity Consumption (November-2018)	kWh/Month	18,004

Diesel Oil Consumption & Units Generated for January 2018 - December 2018						
S. No	Name	Capacity (kVA)	Period	Operating Hours	Diesel Consumption (L)	Units Generated
1	DG Set-I	250	January-2018 to December-2018	150	4620	33375
2	DG Set-II	250	January-2018 to December-2018	140		31150
3	DG Set-III	125	January-2018 to December-2018	8		890

Water Consumption Details for January 2018 – December 2018			
S. No	Particulars	Unit	Value
			Water
1	Yearly Water. Consumption	KL/year	152,500
2	Monthly Water. Consumption	KL/Day	15,250
3	Daily Water Consumption	KL/Day	610
2	Monthly Avg. Cost	Rs./ Month	7,800
4	Yearly bill of Water	Rs./ Year	78,000

1 INTRODUCTION

1.1 GENERAL DETAILS

The Lakkireddy Bali Reddy College, Mylavaram is consists of five Blocks. Each Blocks is spread over four flours and various departments. The ground floor consists of Staff room and lab room, electrical room with outdoor transformer, a bank, an Emergency control room, Government Audit room and few offices. There is also another four storied building which house central admin.

1.2 SCOPE OF THE STUDY:

The major energy consuming loads of the facility are

- HVAC (Package AC units, Split AC units, Window AC units)
- Lights and Fans
- Water Pumps and Fire Water pumps
- PCs, Servers (UPS load)

2 DESCRIPTION OF ENERGY SYSTEMS

2.1 ENERGY SYSTEMS DESCRIPTION

The major inputs for the facility are

- i. Electricity from APSPDCL,
 - ii. Diesel oil for DG sets as a backup for power and
 - iii. Water for domestic use and fire fighting
-
- Electricity is the major input energy and used for HVAC, Lighting, Pumping and running the office equipment like Servers, Computers, Printers, etc.
 - Diesel oil is used in DG sets to generate power in case of power failure.
 - Water is being used for drinking, cooking, washrooms, and firefighting.

2.2 ELECTRICAL ENERGY ANALYSIS

The electricity is sourced from APSPDCL. The following are the details of the electrical supply.

- The facility has a Maximum Contract Demand (CMD) of 400 kVA.
- The facility has installed 3 No of Transformer of capacity 2x 400 kVA & 1x 500 kVA.
- The plant has 3 DG sets of 2x 250 kVA & 1x 125 kVA each capacity and is used in the event of power failure.
- Grid supply is available at 11 kV and is stepped down to 415 Volts. The average power factor is maintained at 1 (avg.)
- The annual electricity consumption of plant is 557,219 kWh (Units) from January-2018 to November-2018. The electricity consumption is varied from 18,004 kWh to 66,720 kWh and the average monthly electricity consumption is 42,863 kWh.
- The annual grid electricity bill during January-2018 to November-2018 is Rs.6,297,586 and monthly average grid electricity bill is Rs. 484,429/-
- The recorded maximum demand is varied from 204 kVA in November-2018 to 436 kVA in July-2018. The month-wise power consumption, actual demand, billed units (kWh) and electricity bill is presented in Table below:

M/s Lakireddy Bali Reddy College of Eng., Mylavaram.

Table 2.2.1:Month wise electricity consumption January 2018 – November 2018

Electricity Bill: Lakireddy Bali Reddy College of Engineering

HT Consumer No: VJA634

Sl. No.	Month	CMD (kVA)	Recorded Demand (kVA)	Billed Demand (kVA)	Power Factor	Electricity Consumption (kWh)	Energy Charges (INR.)	Demand Charges Normal (Rs.)	Net Electricity Bill (Rs.)
1	Jan-18	400	228.00	320.00	1.00	38,748	296,809.00	152,000	456,094
2	Feb-18	400	222.00	320.00	1.00	35,156	269,295.00	152,000	428,515
3	Mar-18	400	324.00	324.00	1.00	45,716	350,184.00	153,900	512,329
4	Apr-18	400	360.00	360.00	0.99	61,072	471,886.00	171,000	652,176
5	May-18	400	426.00	426.00	1.00	62,652	485,000.00	204,700	644,029
6	Jun-18	400	436.00	436.00	1.00	55,752	514,415.00	224,580	588,612
7	Jul-18	400	436.00	436.00	1.00	66,720	514,415.00	224,580	749,604
8	Aug-18	400	337.00	337.00	1.00	39,816	304,990.00	160,170	472,568
9	Sep-18	400	316.00	320.00	1.00	37,540	287,556.00	152,000	447,096
10	Oct-18	400	362.00	362.00	1.00	31,916	244,476.00	172,330	424,408
11	Nov-18	400	204.00	320.00	1.00	21,264	162,669.60	152,000	219,005
Average		400	318.67	356.75	1.00	42863.00	330247.97	330247.97	484429.75
Total						557219.00	4293223.57	4293223.57	6297586.75
Maximum		400	436.00	436.00	1.00	66720.00	514415.00	514415.00	749604.00
Minimum		400	173.00	320.00	0.99	18004.00	61280.00	61280.00	218721.00

2.2.1 RECORDED MAXIMUM DEMAND PATTERN

The below is the recorded demand pattern of the facility from January-2018 to November-2018.

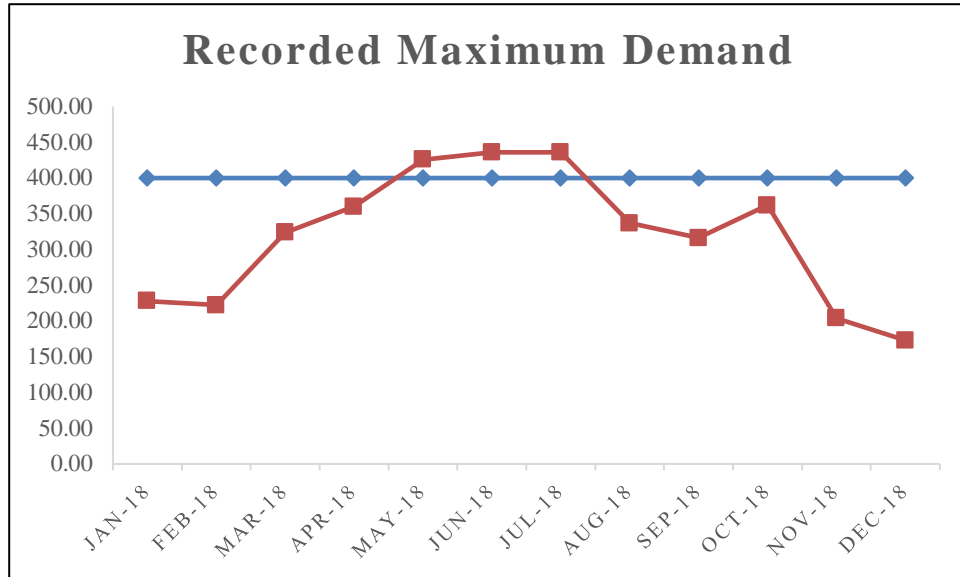


Figure 2.2:1:Recorded Maximum Demand Pattern

2.2.2 ELECTRICITY CONSUMPTION PATTERN

The following is the electricity consumption pattern for the facility from January-2018 to November-2018. The electricity consumption is high during the July-2018 and consumption is low in the month of November-2018.

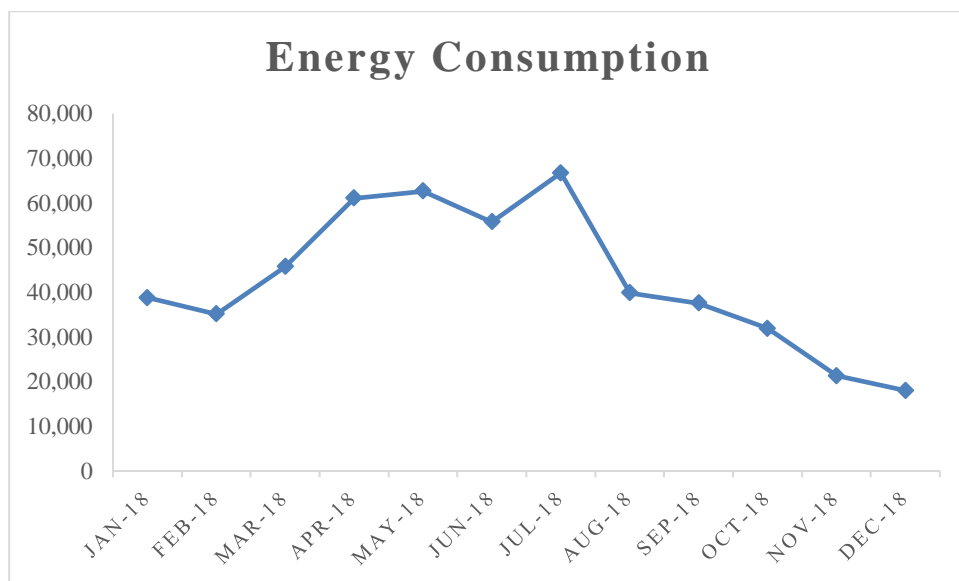


Figure 2.2:2: Month wise electrical consumption pattern

2.3 DIESEL CONSUMPTION ANALYSIS

The facility has two numbers of Diesel Generators of capacity 2x 250kVA each and 1x 125 kVA. Owing to favourable power supply situation, the DG sets are used very sparingly and accordingly the diesel consumption is insignificant. Most of the diesel consumption is towards idle running of the sets daily for few minutes to upkeep the sets.

2.4 WATER SYSTEM

Municipal Water is sourced from Bore Wells and Mylavaram Municipal Corporations. The consumptive use of water is towards drinking, cooking and for washrooms. The Campus has a sump/tank at ground level where the municipal water is collected after meter. The water from sump is pumped to 6 numbers of over-head tanks located on the main buildings. The water pump also pumps the water to fire water sump to which the fire water pump is connected.

2.5 ENERGY DISTRIBUTION

The distribution of electricity is presented in the following pie-chart.

The % of energy share pattern is as given below:

Table 2.5.1:Energy share pattern

SI. No	Block Name	Power (kW)	% of Energy Share
1	Block -1	204.44	33.99
2	Block -2	104.02	17.30
3	Block -3	97.82	16.26
4	Block -4	82.96	13.79
5	Block -5	87.20	14.50
6	Mechanical Workshop	25.00	4.16
	Total	601.44	100

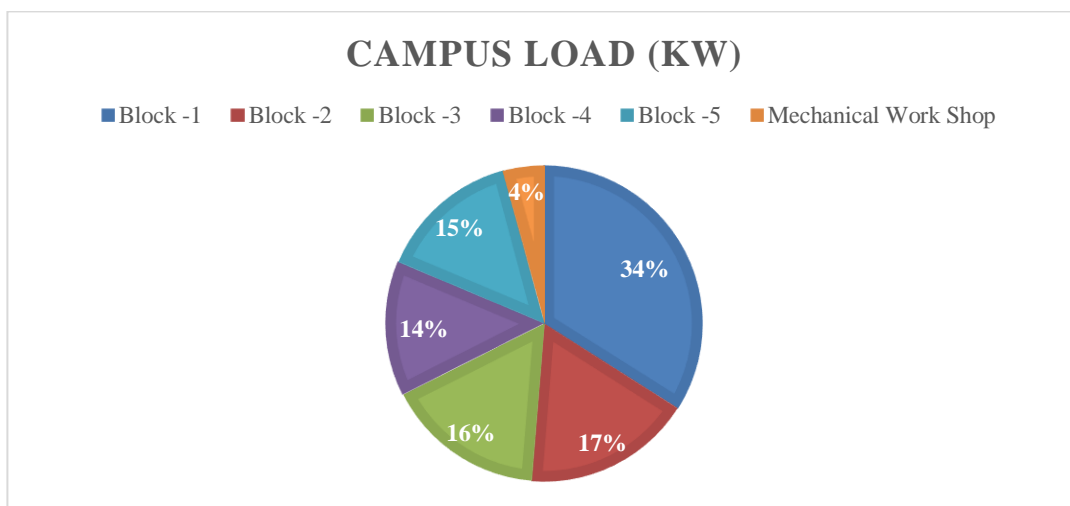


Figure 2.5:1: % of Energy share pattern

2.6 ENERGY DISTRIBUTION OF DIFFERENT BLOCKS

The distribution of electricity is presented in the following pie-chart.

The % of energy share pattern is as given below:

Table 2.6.1:Block-1 Energy share pattern

SI. No	Appliance	Power (KW)	% Sharing of Power (kW)
1	Fans	25	12.2
2	FTLs	12.824	6.3
3	Computers	20	9.8
4	Incandescent lamps	4.26	2.1
5	ACs	140	68.5
6	Projectors	1.14	0.6
7	Others	1.22	0.6
	Total	204.444	100

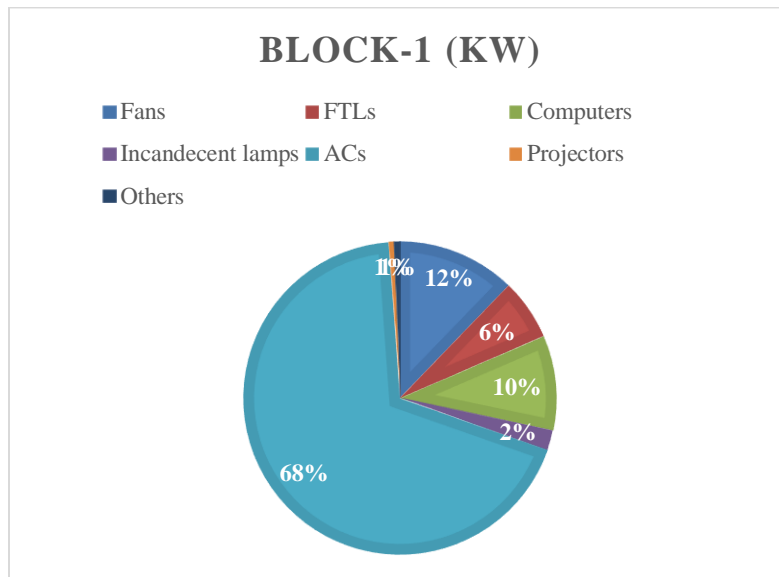


Figure 2.6:1: Block-1 % of Energy share pattern

Table 2.6.2: Block-2 Energy share pattern

SI. No	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	13	12.50
2	FTLs	10	9.61
3	Computers	20	19.23
4	Incandescent lamps	3.9	3.75
5	ACs	56.16	53.99
6	Projectors	0.66	0.63
7	Others	0.3	0.29
	Total	104.02	100

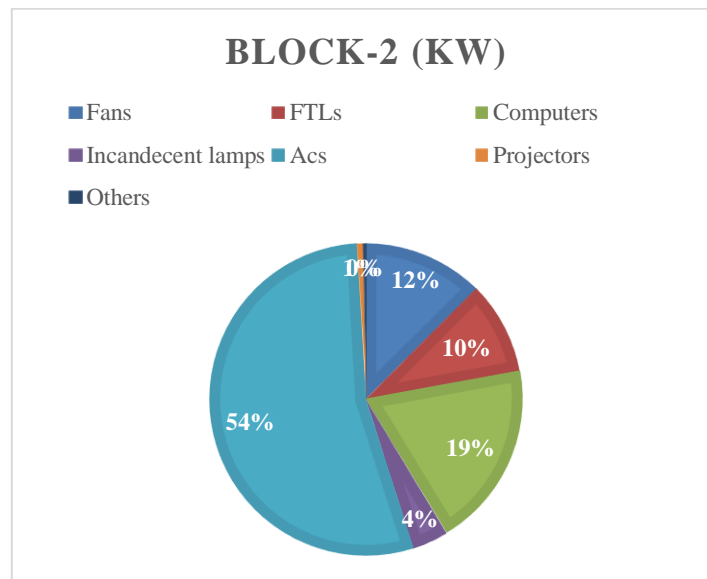


Figure 2.6:2: Block-2 % of Energy share pattern

Table 2.6.2: Block-3 Energy share pattern

SI. No	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	15.0	15.3
2	FTLs	10.0	10.2
3	Computers	20.0	20.4
4	Incandescent lamps	3.3	3.4
5	ACs	48.0	49.1
6	Projectors	0.7	0.7
7	Others	0.8	0.8
	Total	97.8	100

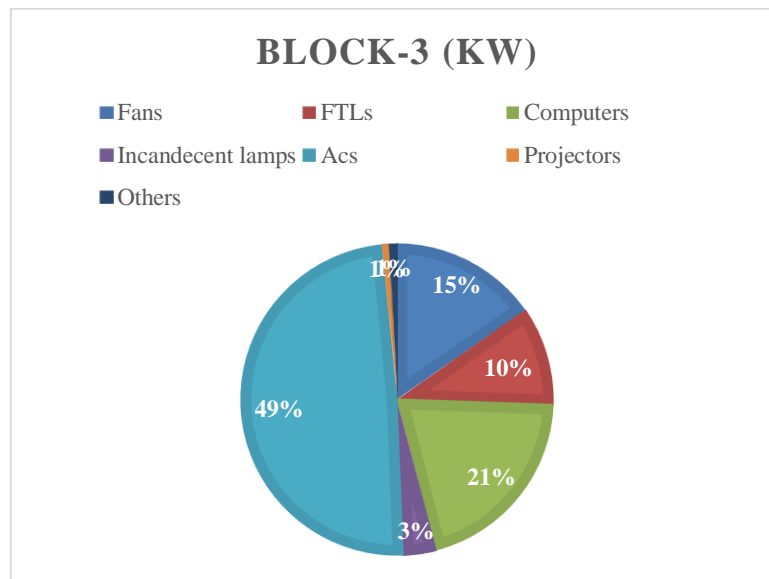


Figure 2.6:3: Block-3 % of Energy share pattern

Table 2.6.4: Block-4 Energy share pattern

SI. No	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	23	27.72
2	FTLs	12	14.46
3	Computers	19	22.90
4	Incandescent lamps	0.96	1.16
5	ACs	28	33.75
6	Projectors	0	0.00
7	Others	0	0.00
	Total	82.96	100

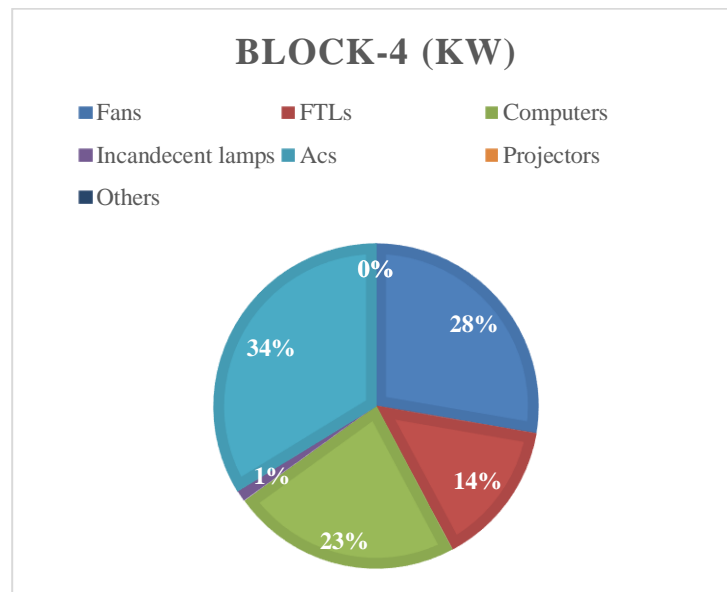


Figure 2.6:4: Block-4 % of Energy share pattern

Table 2.6.5: Block-5 Energy share pattern

SI. No	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	25	28.7
2	FTLs	12	13.8
3	Computers	19	21.8
4	Incandescent lamps	3.12	3.6
5	ACs	28.08	32.2
6	Projectors	0	0.0
7	Others	0	0.0
	Total	87.2	100

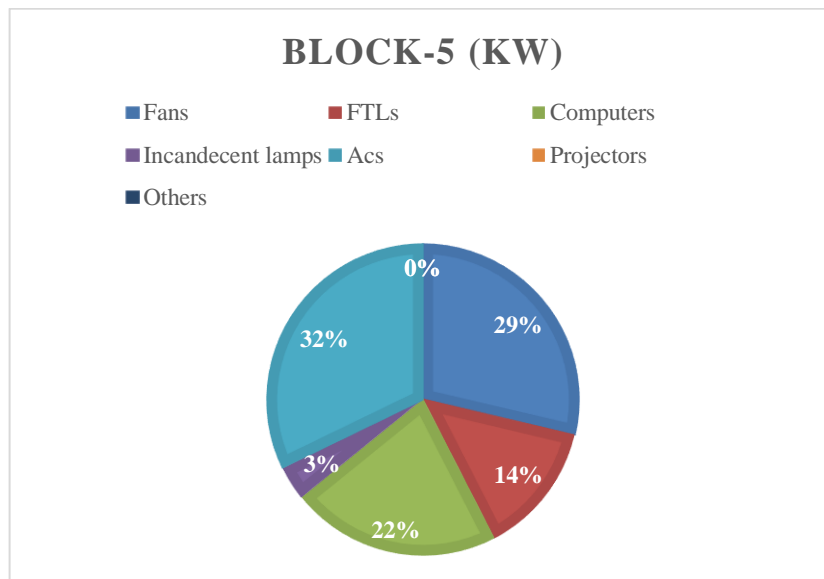


Figure 2.6:5: Block-5 % of Energy share pattern

Table 2.6.6: Mech Workshop Energy share pattern

SI. No	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	16	64
2	FTLs	9	36
3	Computers	0	0
4	Incandescent lamps	0	0
5	Projectors	0	0
6	Others	0	0
	Total	25	100

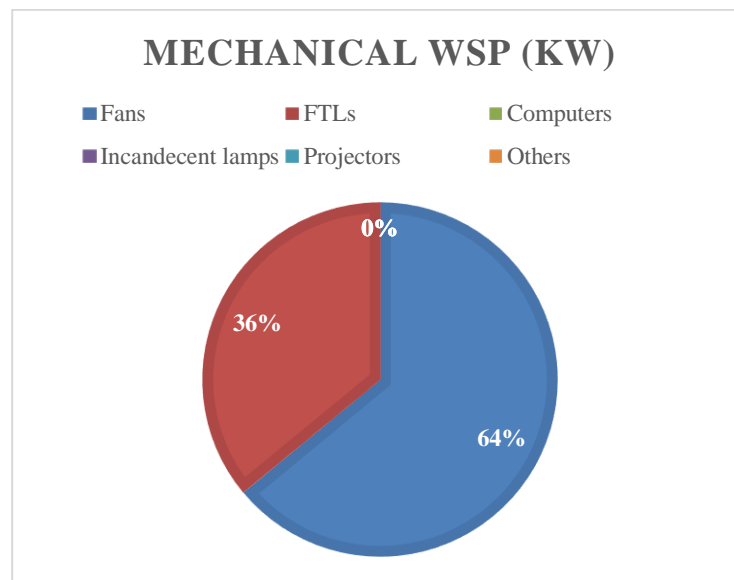


Figure 2.6:6: Mech Workshop % of Energy share pattern

2.7 PUMPS

During the audit it was observed that, 11 pumps are installed in the Campus. 7 pumps are centrifugal, and 4 pumps are Submersible is in operation. The details of the pumps are presented below:

Table 2: Pump systems analysis

Sl. No	Name of the Pump	Capacity of the Pump (HP)	Qty
1	Centrifugal Pumps	3	7
2	Submersible Pumps	5	4

All pumps are running 5 hours per day depending on the usage.

RECOMMENDATION: 1

A: Title of Recommendation	:	Retrofit MV with LED Tube Light Lamps
B: Description of Existing System and its operation	:	Existing luminaries for Office lighting are MV Lamps which consumes 150 W
C: Description of Proposed system and its operation	:	Retrofit MV Light's with energy efficient LED Lights to reduce the energy consumption. The LED Lights will consume 48 W without compromising on the illumination levels.
D: Energy Saving Calculations		
Present No. of MVs		90
Present Fixture Consumption of MV(W)	:	150
Proposed Consumption of LED Tube Light(W)	:	48
Achievable power savings(W)	:	102
Operating Hours (@ 6 hrs./day & 300 D/Y)	:	1800
Total Energy Savings kWh/year	:	16,524
E: Cost Benefits		
Energy Saving Potential / year	=	16,524
Cost Savings / year@ unit cost Rs. 7.85/ unit	=	129,713
Investment (@ Rs. 1000/LED)	=	90,000
Payback Period in months	=	8

RECOMMENDATION: 2

Description of Existing System and its operation	:	Present power consumption of the AC'S is 300 kW in different Blocks
Description of Proposed system and its operation	:	It is recommended to check with the authorized service person to improve the performance of the AC'S
Energy Saving Calculations		
Present power consumption (kW)	:	300
Proposed energy consumption (kW) by servicing	:	50
Achievable Energy savings (kWh/Year)	:	20000
Cost Benefits		
Energy Saving Potential (kWh/Year)	=	20000
Cost Savings (INR)@ INR. 7.83 per kWh	=	156,600
Investment	=	Not considered (Since it is maintenance activity)
Payback Period	=	Immediate

RECOMMENDATION: 2

A: Title of Recommendation	:	Retrofit T12 with LED Tube Light Lamps
B: Description of Existing System and its operation	:	Existing luminaries for Office lighting are T12 Lamps which consumes 36 W
C: Description of Proposed system and its operation	:	Retrofit T12 Tube Light's with energy efficient LED Tube Lights to reduce the energy consumption. The LED Tube Lights will consume 22 W without compromising on the illumination levels.
D: Energy Saving Calculations		
Present No. of FTLs		2046
Present Fixture Consumption of T12(W)	:	36
Proposed Consumption of LED Tube Light(W)	:	22
Achievable power savings(W)	:	14
Operating Hours (@ 4 hrs./day & 260 D/Y)	:	1040
Total Energy Savings kWh/year	:	29,790
E: Cost Benefits		
Energy Saving Potential / year	=	29,790
Cost Savings / year@ unit cost Rs. 7.85/ unit	=	233,849
Investment (@ Rs. 500/LED)	=	1,023,000
Payback Period in months	=	52

RECOMMENDATION: 3

A: Title of Recommendation	:	Retrofit Ceiling Fan with BLDC Fans
B: Description of Existing System and its operation	:	Existing luminaries for Office are Ceiling Fans which consumes 80 W
C: Description of Proposed system and its operation	:	Retrofit Ceiling Fan with energy efficient BLDC fan to reduce the energy consumption. The BLDC Fan will consume 40 W.
D: Energy Saving Calculations		
Present No. of Ceiling Fans		1561
Present Ceiling Fan Consumption W	:	80
Proposed Consumption of BLDC Fan	:	40
Achievable power savings(W)	:	40
Operating Hours (@ 4 hrs./day & 200 D/Y)	:	800
Total Energy Savings kWh/year	:	49,952
E: Cost Benefits		
Energy Saving Potential / year	=	49,952
Cost Savings / year@ unit cost Rs. 7.85/ unit	=	392,123
Investment (@ Rs. 3000/Fan)	=	6244000
Payback Period in months	=	140

VENDOR INFORMATION

1. Lighting

BIGAPPLE LIFE

Big Apple Arcade, 1-8-167 to 179,
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