

# **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](http://www.eastcoast.net.in)

**December-2020**

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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 2020 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 510 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.

Conventional lighting appliances like Florescent Tube Lights (FTLs) Compact Florescent Lights (CFLs) and LED were installed in the facility for lighting in office areas, corridors, Conference hall, washrooms, etc. Campus 48x98 W of LED lights are installed for street lighting and in some of the rooms.

#### 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
3	Retrofit T12& T8tube lights with LED Tube Light	14,560	149,356	114,296	8	
4	Retrofit Ceiling Fan with BLDC Fans	32,000	251,200	6,244,000	24	

## 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-2020
- e) Contracted Maximum Demand (CMD) : 400 kVA
- f) Maximum Recorded Demand (M.D) : 334 kVA (May-2020)
- g) Minimum Recorded Demand (M.D) : 38 kVA (September-2020)
- h) Power factor (PF) : 1 (Avg.)
- i) Energy Consumption & their cost details :

<b>Electricity Consumption details for January 2020- November 2020</b>			
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	62,773
2	Monthly Avg. Bill of Electricity	Rs./ Month	6,83,856
3	Yearly Consumption of Electricity	kWh/Year	186,652
4	Yearly Bill of Electricity	Rs./ Year	2,543,761
5	Maximum Electricity Consumption (Feb-2020)	kWh/Month	32,452
6	Minimum Electricity Consumption (Sep-2020)	kWh/Month	9,312



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

<b>Diesel Oil Consumption &amp; Units Generated for January 2020 - December 2020</b>						
<b>S. No</b>	<b>Name</b>	<b>Capacity (kVA)</b>	<b>Period</b>	<b>Operating Hours</b>	<b>Diesel Consumption (L)</b>	<b>Units Generated</b>
1	DG Set-I	250	January-2020 to December-2020	110	2100	17600
2	DG Set-II	250	January-2020 to December-2020	110		15400
3	DG Set-III	125	January-2020 to December-2020	10		2200

<b>Water Consumption Details for January 2020 – December 2020</b>			
<b>S. No</b>	<b>Particulars</b>	<b>Unit</b>	<b>Value</b>
			<b>Water</b>
1	Yearly Water. Consumption	KL/year	1,50,000
2	Monthly Water. Consumption	KL/Day	10,000
3	Daily Water Consumption	KL/Day	500
2	Monthly Avg. Cost	Rs./ Month	6,600
4	Yearly bill of Water	Rs./ Year	72,600

## **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 186,652 kWh (Units) from January-2020 to December-2020. The electricity consumption is varied from 9,312 kWh to 32,452 kWh and the average monthly electricity consumption is 62,773 kWh.
- The annual grid electricity bill during January-2020 to December-2020 is Rs.2,543,761 and monthly average grid electricity bill is Rs. 683,856/-
- The recorded maximum demand is varied from 38 kVA in September-2020 to 240 kVA in March-2020. The month-wise power consumption, actual demand, billed units (kWh) and electricity bill is presented in Table below:

Table 2.2.1:Month wise electricity consumption January 2020 – November 2020

**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-20	400	199	320	1	29,228	129,744	152,000	290,684
2	Feb-20	400	120	320	1	32,452	61,200	152,000	241,984
3	Mar-20	400	240	320	1	32,452	165,393	152,000	327,362
4	Apr-20	400	46	320	1	11,156	61,200	152,000	218,086
5	May-20	400	46	320	1	10,820	61,200	152,000	157,965
6	Jun-20	400	46	320	1	11,156	61,200	152,000	218,086
7	Jul-20	400	54	320	1	10,364	61,200	152,000	217,742
8	Aug-20	400	70	320	1	10,460	61,200	152,000	217,790
9	Sep-20	400	38	320	1	9,312	61,200	152,000	217,610
10	Oct-20	400	128	320	1	15,112	61,200	152,000	218,190
11	Nov-20	400	157	320	1	14,140	61,200	152,000	218,262
<b>Average</b>		400	255.34	337	1	62,773.69	433,801.43	258,829.22	683,856.33
<b>Total</b>						<b>186,652</b>	<b>845,937</b>	<b>1,672,000</b>	<b>2,543,761</b>
<b>Maximum</b>		<b>400</b>	<b>240</b>	<b>320</b>	<b>1</b>	<b>32,452</b>	<b>165,393</b>	<b>152,000</b>	<b>327,362</b>
<b>Minimum</b>		<b>400</b>	<b>38</b>	<b>320</b>	<b>1</b>	<b>9,312</b>	<b>61,200</b>	<b>152,000</b>	<b>157,965</b>

### 2.2.1 RECORDED MAXIMUM DEMAND PATTERN

The below is the recorded demand pattern of the facility from January-2020 to November-2020.

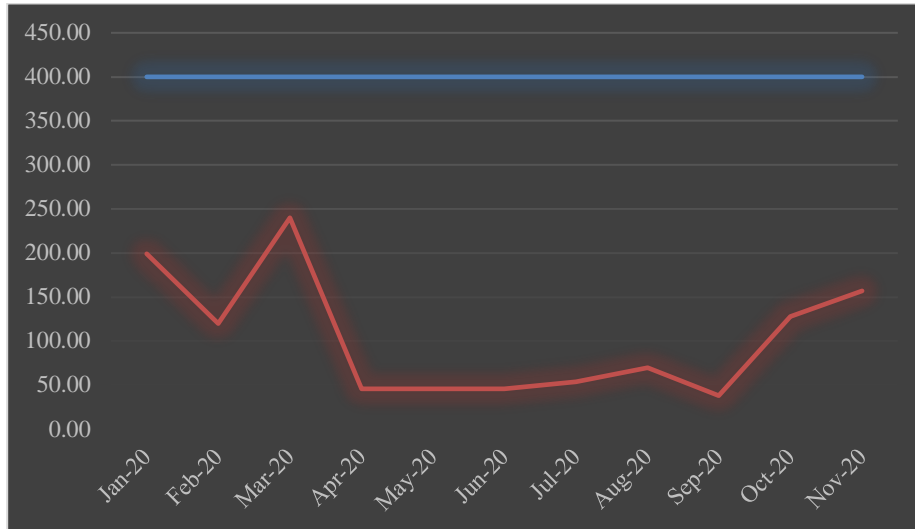


Figure 2.2:1:Recorded Maximum Demand Pattern

### 2.2.2 ELECTRICITY CONSUMPTION PATTERN

The following is the electricity consumption pattern for the facility from January-2020 to November-2020. The electricity consumption is high during the Feb-2020 and consumption is low in the month of September-2020.

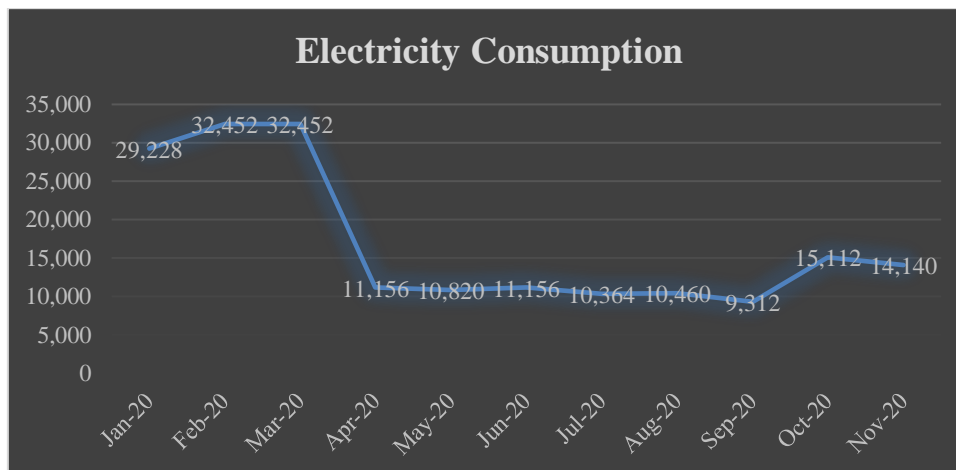


Figure 2.2:2: Month wise electrical consumption pattern

### 2.3 DIESEL CONSUMPTION ANALYSIS

The facility has two numbers of Diesel Generators of capacity 2x 250kVAeach 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.

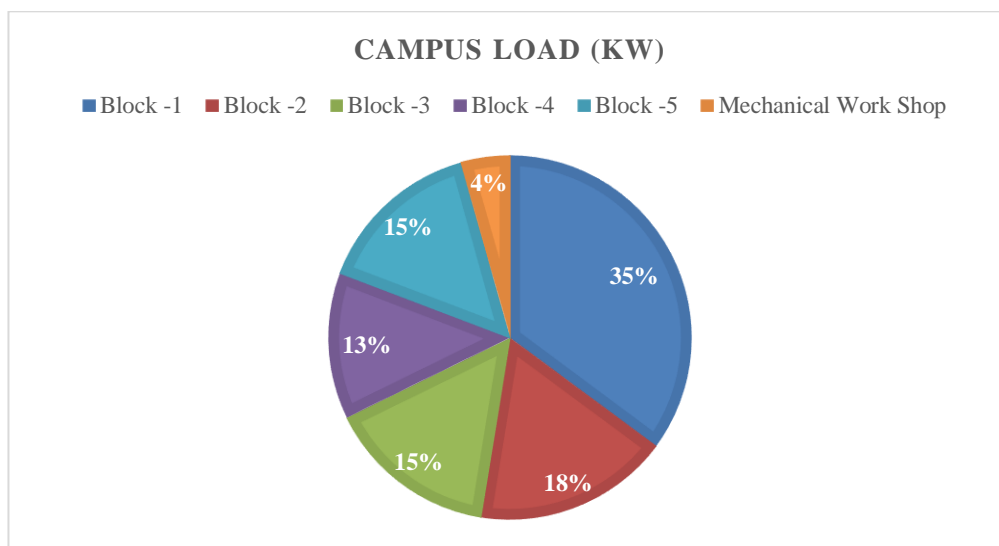
## 2.5 ENERGY DISTRIBUTION

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	173.19	35.17
2	Block -2	85.67	17.39
3	Block -3	74.89	15.21
4	Block -4	64.17	13.03
5	Block -5	73.35	14.89
6	Mechanical Workshop	21.24	4.31
	Total	492.52	100



**Figure 2.5:1: % of Energy share pattern**

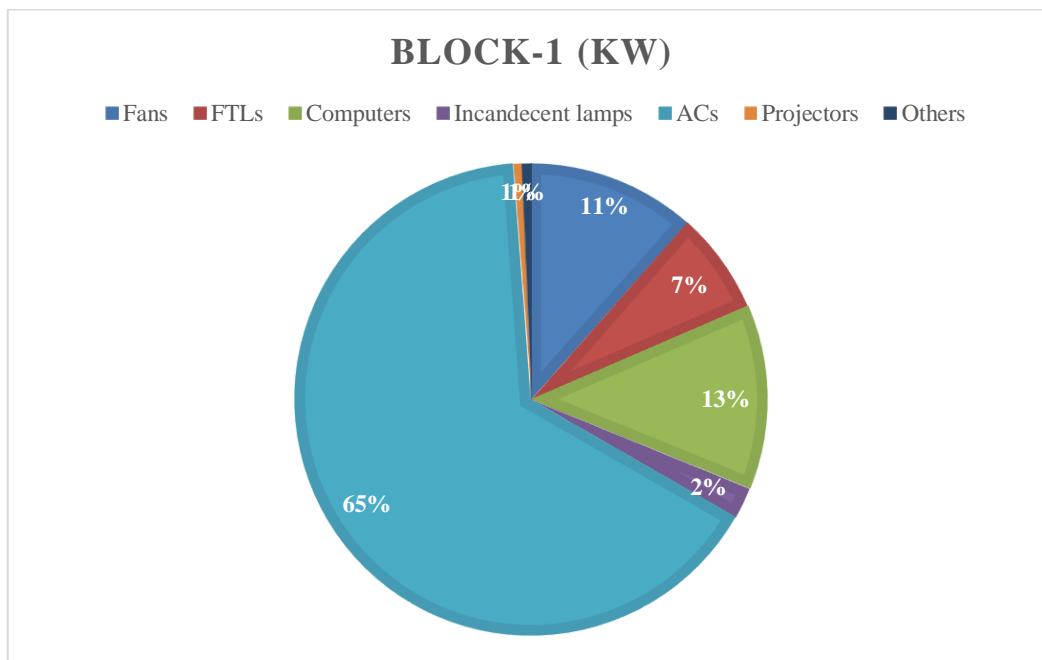
## 2.6 ENERGY DISTRIBUTION OF DIFFERENT BLOCKS

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**

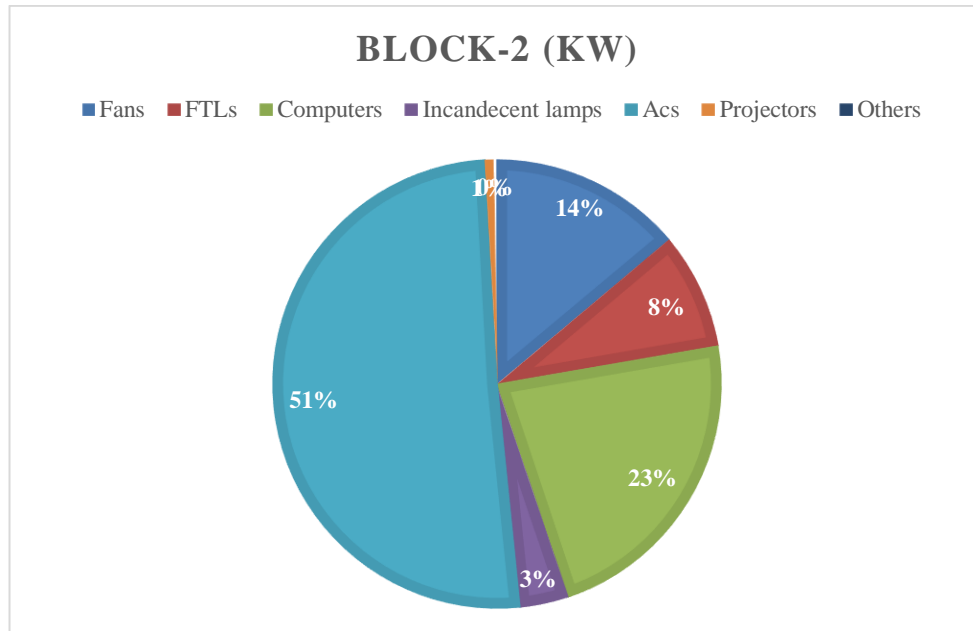
SI. NO	Appliance	Power (KW)	% Sharing of Power (kW)
1	Fans	22.88	11.5
2	FTLs	13.824	7.0
3	Computers	25	12.6
4	Incandescent lamps	4.26	2.1
5	ACs	129.87	65.5
6	Projectors	1.14	0.6
7	Others	1.22	0.6
	Total	198.194	100



**Figure 2.6.1: Block-1 % of Energy share pattern**

**Table 2.6.2: Block-2 Energy share pattern**

Sl. NO	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	15.36	13.88
2	FTLs	9.288	8.39
3	Computers	25	22.59
4	Incandescent lamps	3.9	3.52
5	ACs	56.16	50.75
6	Projectors	0.66	0.60
7	Others	0.3	0.27
	Total	110.668	100

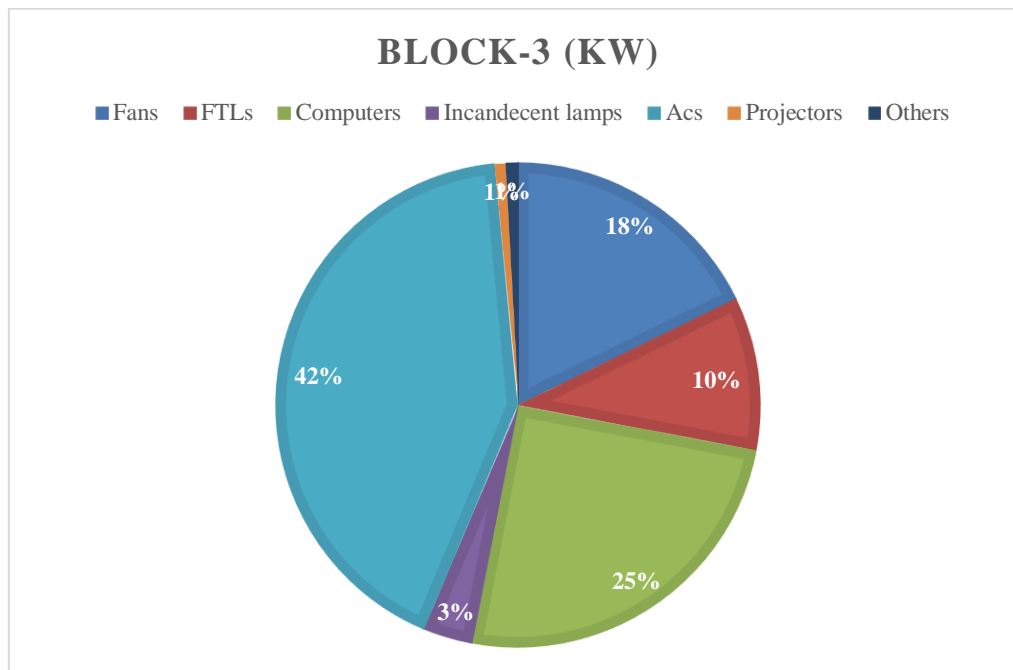


**Figure 2.6.2: Block-2 % of Energy share pattern**

**Table 2.6.2: Block-3 Energy share pattern**



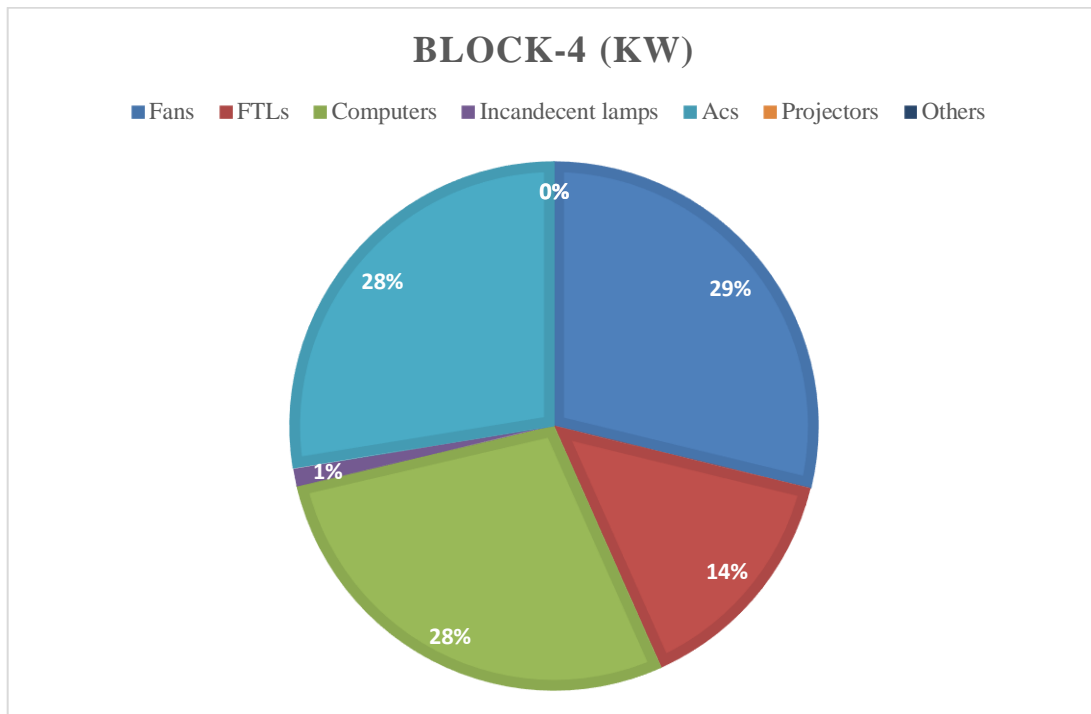
SI. N)	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	17.8	17.8
2	FTLs	10.2	10.2
3	Computers	25.0	25.0
4	Incandescent lamps	3.3	3.3
5	ACs	42.1	42.2
6	Projectors	0.7	0.7
7	Others	0.8	0.8
	Total	99.888	100



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

**Table 2.6.4: Block-4 Energy share pattern**

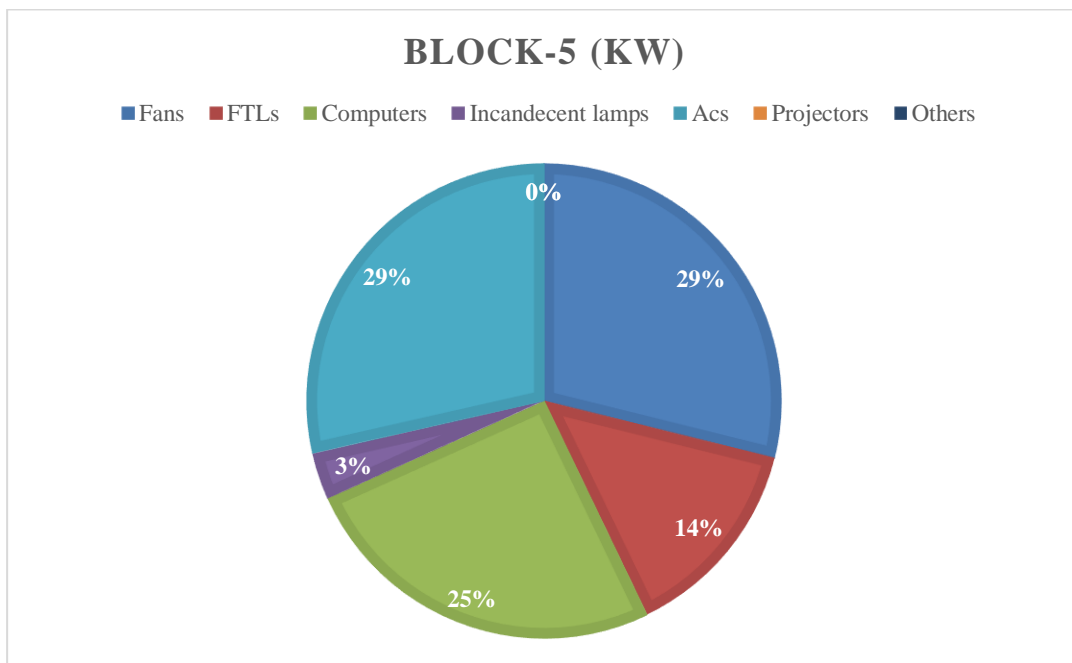
SI.NO	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	25.68	28.80
2	FTLs	12.96	14.53
3	Computers	25	28.04
4	Incandescent lamps	0.96	1.08
5	ACs	24.57	27.55
6	Projectors	0	0.00
7	Others	0	0.00
	Total	89.17	100



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

**Table 2.6.5: Block-5 Energy share pattern**

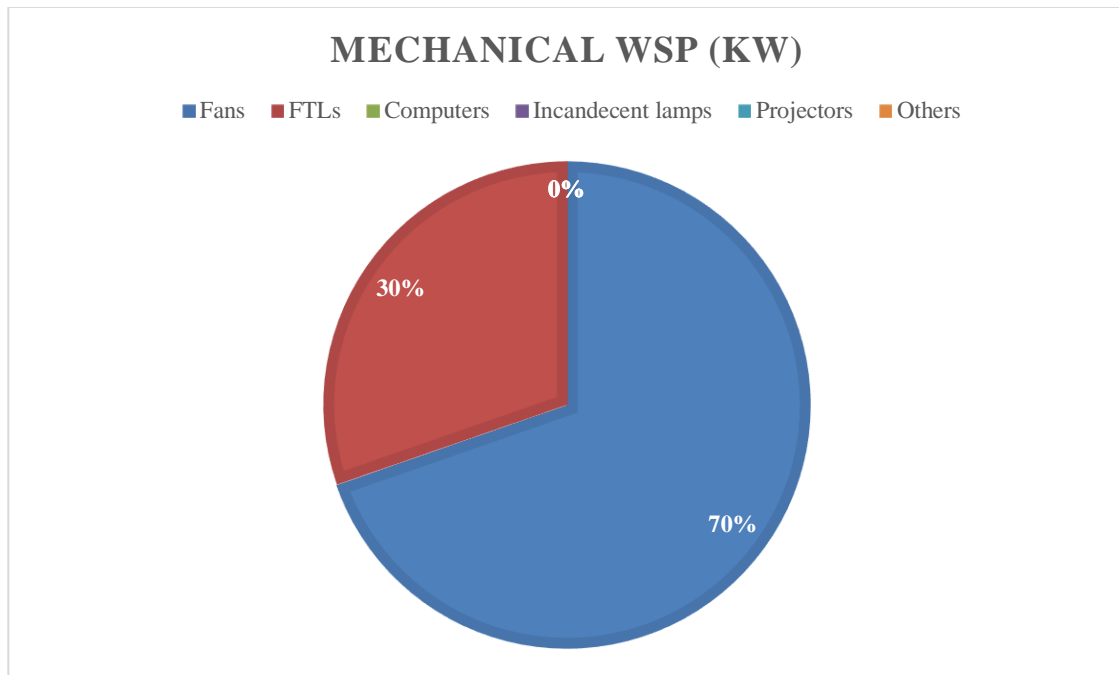
SI.NO	Appliance	Power (kW)	% Sharing of Power (kW)
1	Fans	28.4	28.9
2	FTLs	13.752	14.0
3	Computers	25	25.4
4	Incandescent lamps	3.12	3.2
5	ACs	28.08	28.6
6	Projectors	0	0.0
7	Others	0	0.0
	Total	98.352	100



**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	14.8	70
2	FTLs	6.444	30
3	Computers	0	0
4	Incandescent lamps	0	0
5	Projectors	0	0
6	Others	0	0
	Total	21.244	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**

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

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

**RECOMMENDATION: 1**

<b>A: Title of Recommendation</b>	:	<b>Retrofit T12 with LED Tube Light Lamps</b>
<b>B: Description of Existing System and its operation</b>	:	Existing luminaries for Office lighting are T12 Lamps which consumes 36 W
<b>C: Description of Proposed system and its operation</b>	:	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.
<b>D: Energy Saving Calculations</b>		
Present No. of FTLs		1846
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	:	14560
<b>E: Cost Benefits</b>		
Energy Saving Potential / year	=	14560
Cost Savings / year@ unit cost Rs. 7.85/ unit	=	149356.72
Investment (@ Rs. 500/LED)	=	114296
Payback Period in months	=	8

**RECOMMENDATION: 2**

<b>A: Title of Recommendation</b>	:	<b>Retrofit Ceiling Fan with BLDC Fans</b>
<b>B: Description of Existing System and its operation</b>	:	Existing luminaries for Office are Ceiling Fans which consumes 80 W
<b>C: Description of Proposed system and its operation</b>	:	Retrofit Ceiling Fan with energy efficient BLDC fan to reduce the energy consumption. The BLDC Fan will consume 40 W.
<b>D: Energy Saving Calculations</b>		
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	:	32000
<b>E: Cost Benefits</b>		
Energy Saving Potential / year	=	32000
Cost Savings / year@ unit cost Rs. 7.85/ unit	=	251200
Investment (@ Rs. 4000/Fan)	=	6244000
Payback Period in months	=	24

**VENDOR INFORMATION**

**1. Lighting**

**BIGAPPLE LIFE**

Big Apple Arcade, 1-8-167 to 179,  
Behind HDFC Bank, Near Paradise Circle,  
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Mobile: 9642232220