

ENERGY AUDITING REPORT



GOVT. LARANG SAI PG COLLEGE, RAMANUJGANJ (C.G.)



DISTT.- BALARAMPUR-RAMANUJGANJ(C.G)

SESSION- 2020-21

SUBMITTED TO

Internal Quality Assurance Cell

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Preface

Data collection for energy audit of govt. larang sai pg College ramanujganj, Campus was conceded by team for the period of 1 may 2020 to 30 June 2021. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. To drop of energy utilization whilst cultivate or humanizing comfort, health and safety were of prime anxiety. This audit required to recognize the mainly energy proficient appliances. Besides, several each day processes concerning common appliances have been provided which facilitate sinking the energy expenditure. . In the contemporary scenario energy has been identified as a crucial and balancing factor in the indices for sustainable development . the heavy and unbalanced energy consumption adversely affect energy price and economic growth.

The energy conservation act,2001, defines energy auditing as “the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis”. It facilitates a systematic approach to the energy management in a system, trying to balance the total energy input with its use. It identifies all the energy streams in a system and quantifies the use of energy according to its discrete functions. It is a study to determine how and where energy is used, and to identify methods for energy savings. The Energy Auditing for a day is the index of the consumption which normalizes the situation of Energy crisis by providing the schemes for conservation of energy. The opportunities lie in the use of existing renewable energy technologies, greater efforts at energy efficiency and the dissemination of latest technologies This report is our mite in contributing to the larger picture of effective energy management and conservation. As is known, energy auditing is an on-going process, a part of a larger procedure to ensure long- term sustainable development.

Any suggestions to further enhance the quality of this work are always welcome. Kindly email your comments and suggestions to email:

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ABBREVIATION

A	Amps
AC	Air Conditioner
AC	Alternating Current
AMET	Academy of Maritime Education and Training
CFL	Compact fluorescent lamp
CIP	Comprehensive Inspection Program
DC	Direct Current
HSD	High Speed Diesel
Hz	Hertz
Kg	Kilogram
kVA	kilo-volt-ampere
kW	kilo Watts
kWh	kilowatt hour
kWp	Kilowatt peak
LED	Light Emitting Diode
LPG	Liquefied Petroleum Gas
MMS	Module mounting structure
MPPT	Maximum Power Point Tracker
NAAC	The National Assessment and Accreditation Council
SECS	Specific Energy Consumption
SPV	Solar Photovoltaic
STC	Standard Test Condition
CSPDCL	Chhattisgarh state power distribution company limited
TV	Television
V	Volts
W	Watts
W/m ²	Watt per square meter

1.Introduction

A nation is tiring to advanced in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other field of intelligence activity had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. This audit was undertaken in order to verify how effective these steps were, and also to identify loop holes, if any, in the existing practices, along with outlining measures for enhancing energy utilization. An energy audit is a process to study of a building to know the energy consumption of the building and identify methods to reduce the energy consumption for energy savings.

2.Objectives

The Energy Audit Manual of the Energy Management Centre, Government of Chhattisgarh, defines the primary objective of any energy audit as determining “ways to reduce energy consumption per unit of product output or to lower operating costs” .The recommendations of the study will become a basis for future schemes of better energy consumption and preservation throughout the organization.

Specific objectives of the study are:

- √ Verify the steps adopted for energy management in the campus
- √ Spot the inefficient or inadequate practices, if any
- √ Improve the energy preserving measures and methods
- √ Identify potential energy saving opportunities
- √ Formulate Possible steps and measures to be adopted in the campus

3.Methodology

An energy audit is an inspection, survey and analysis of energy flows, for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output.

Method use for Energy audit is a Preliminary Audit. preliminary audit uses existing data to look extensively at the existing energy consumption patterns and identifies the areas for improvement.

4.Data collection

For the purpose of this audit, audit groups for specific areas were formed. Data was collected through

- √ Inspection and observation
- √ Identification of energy consumption
- √ Calculations, analysis
- √ Validation

5.Data analysis

The gathered data was then quantified and separated according to the following criteria:

- √ Energy consumption by end use
- √ Average energy use block-wise
- √ Consumption equipment-wise
- √ Rate of consumption month-wise
- √ Rate of consumption time-wise

Historical Data Analysis

5.1: Study of Variation of Monthly Units consumption & Power Factor:

In this Chapter, we study the details of the 12 month Electricity Bills.

Table No 5.1 Variation in Units Consumption & Power Factor (PF)

Sr.no.	Month	No. Units kWh	Power Factor
1	April 21	150	0.85
2	March 21	753	0.85
3	February 21	477	0.85
4	January 21	795	0.85
5	December 20	100	0.85
6	November 20	200	0.85
7	October 20	189	0.85
8	September 20	605	0.85
9	August 20	351	0.85
10	July 20	332	0.85
11	June 20	336	0.85
12	May 20	967	0.85
Total		=5255 AVERAGE=437	Average =0.85

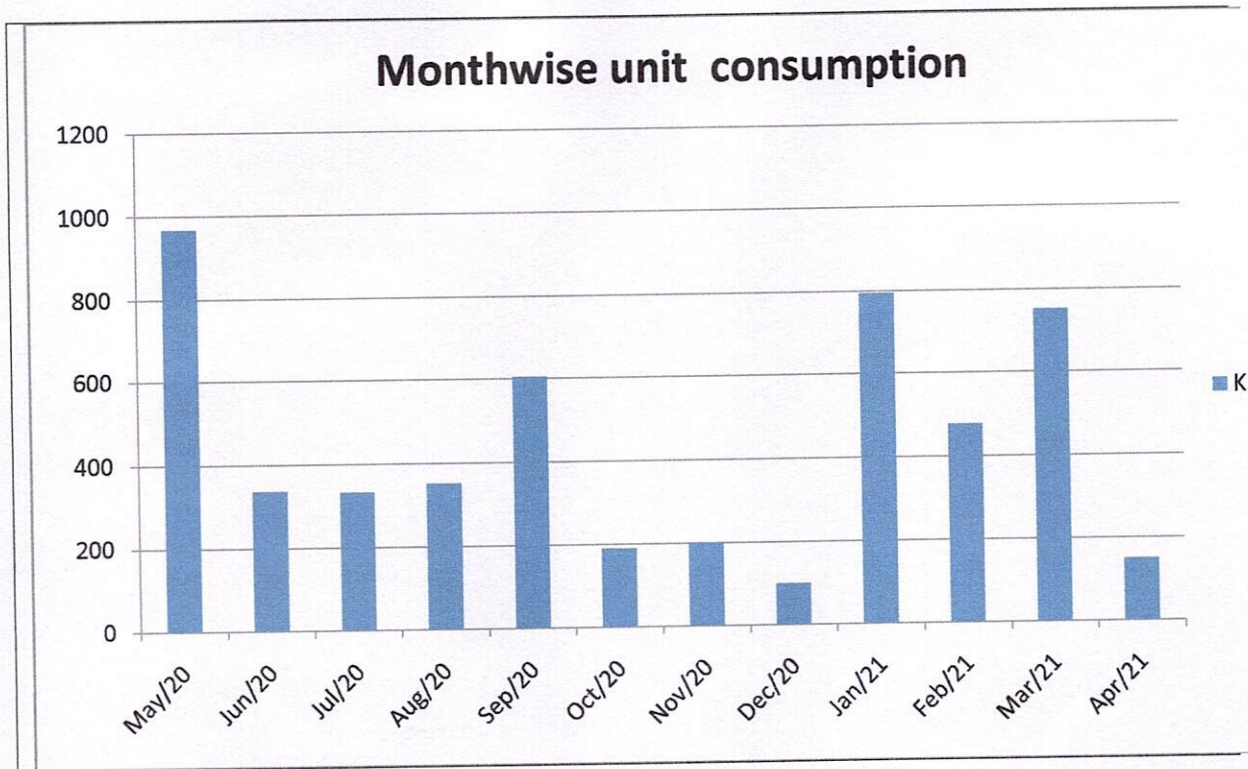


Fig-1 Month wise Energy consumption for the year 2020-21

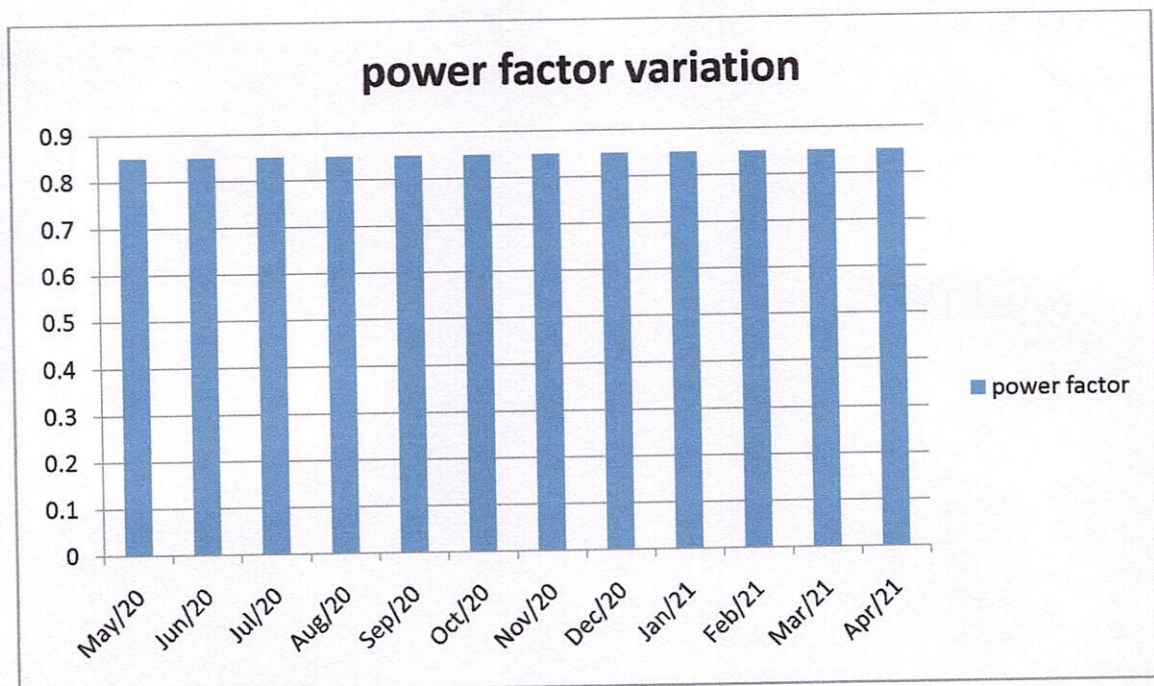


FIG-2 Month wise Power Factor variation

5.2. Time-wise split up of energy consumption on a normal working day.

TIME	UNIT PER HOUR
9:30AM to 10:30AM	0.7
10:30AM to 11:30AM	1.2
11:30AM to 12:30PM	1.6
12:30 PM to 1:30 PM	1.8
1:30 PM to 2:30 PM	2.3
2:30 PM to 3:30 PM	2.5
3:30 PM to 4:30 PM	3.0
4:30 PM to 5:30 PM	0.9

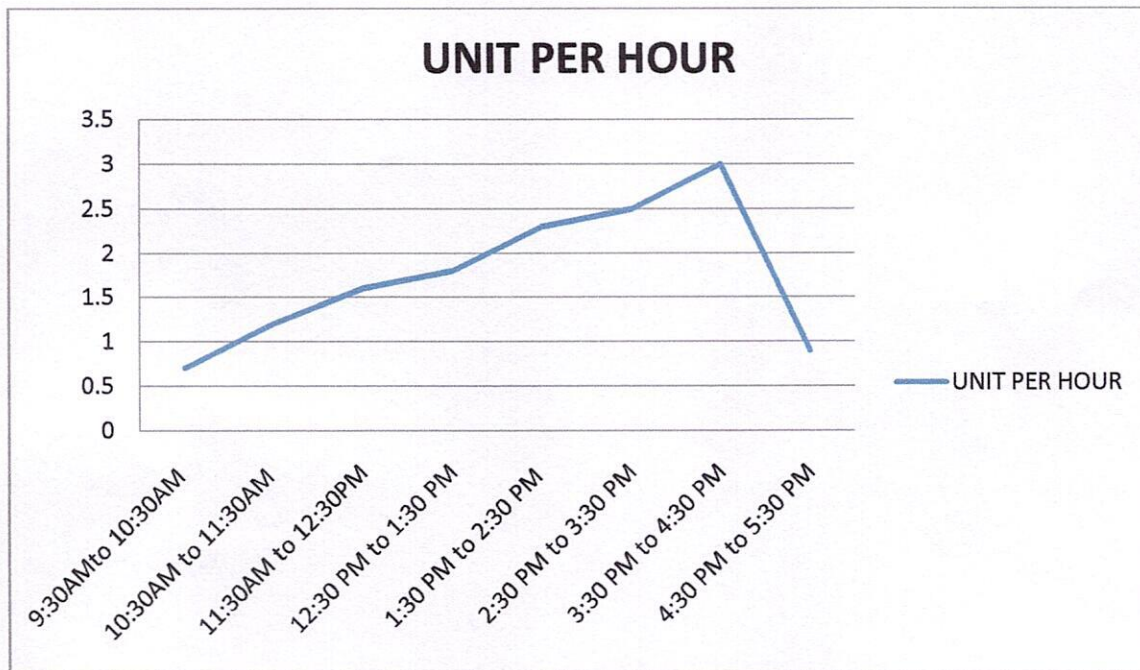


FIG-3 Time-wise Energy consumption for the year 2020-21

5.2 Study of Month wise Electricity Bill Variation

Table No 5.2 Variation in Electricity Bill

Sr.	No. Month Electricity	Bill Amount
1	April 21	1406
2	March 21	5929.12
3	February 21	3710.08
4	January 21	6266.80
5	December 20	1062
6	November 20	1729
7	October 20	1665.08
8	September 20	4727.10
9	August 20	2617.03
10	July 20	2659.24
11	June 20	2703.32
12	May 20	7775.39
Total	Total Annual Bill =	42250.16
	Average Monthly Bill =	3520.84667

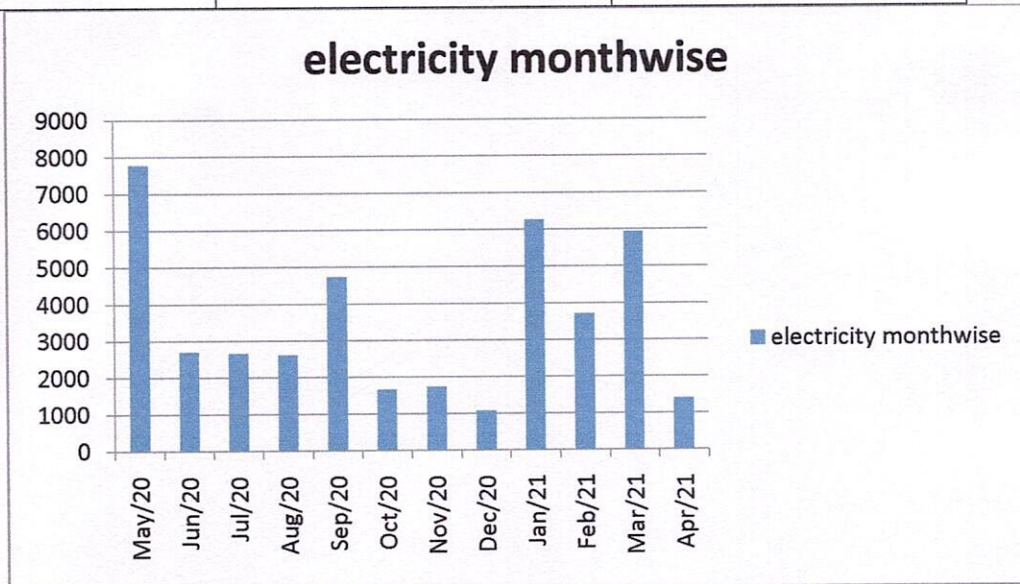


FIG-4 Month wise Electricity Bill Variation

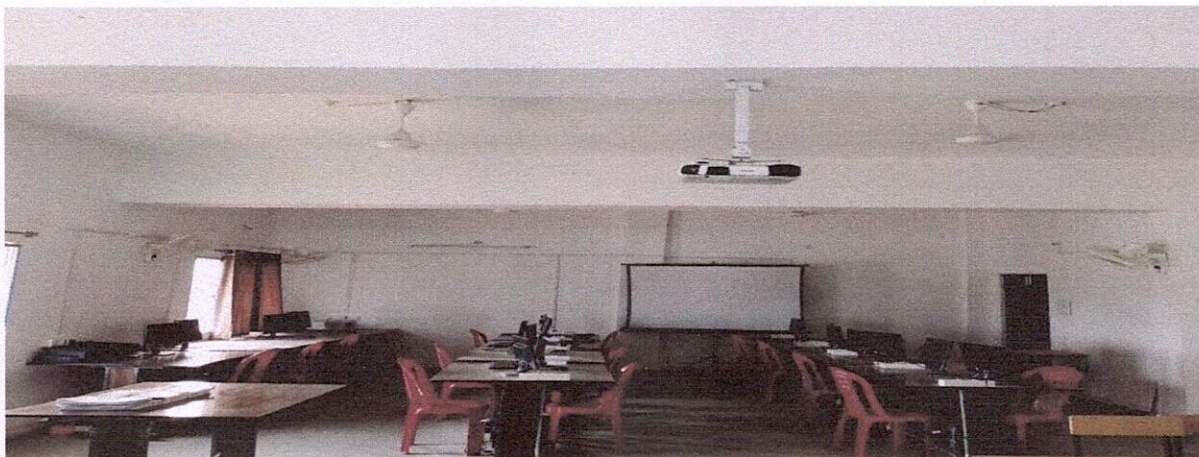
5.3.The consumption of energy block-wise.

S. N	Block	Energy Consume Per Year Block Wise (kwh)
1	Physics	1289
2	Chemistry	3178
3	Zoology	4550
4	Botany	4017
5	Mathematics	449
6	Political science	778
7	Hindi	640
8	English	229
9	Sociology	269
10	Commerce	1660
11	History	959
12	Library	548
13	Computer Department	1498
14	Principal chamber	1399
15	Office	129
16	Professor room	710
17	Canteen	409
18	Common Room	11393
19	Class Room	280
20	Sports	3450
21	Nss Room	1068
22	Seminar Room	7609
23	Smart Room	618
24	Corridor(New building)	827
25	Corridor(old building)	98
26	Outside campus	18
27	Exam control room	469
28	Cultural room	600
	TOTAL	280

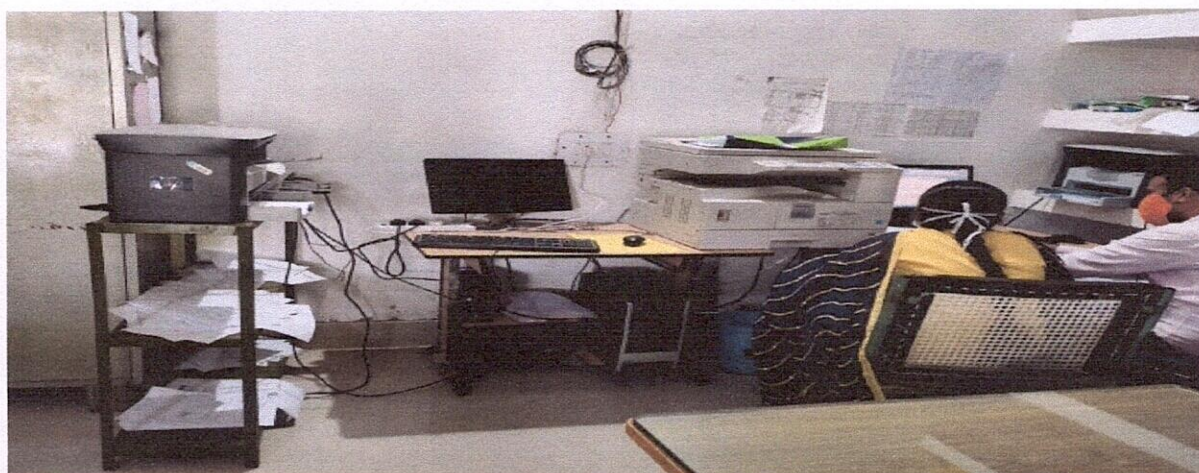
5.4.Equipment-data

s.n.	block	Tube LIGHT	CFL	Led tube	fan	ac	freeze	computer	lcd	Printer/p hotocopy	cooler	Lab equipment
01	Physics	4	0	1	4	0	0	0	0	0	0	10
02	Chemistry	3	0	2	4	0	1	0	0	0	0	10
03	Zoology	4	0	0	4	0	1	1	0	0	0	24
04	Botany	4	0	3	4	0	1	1	0	0	0	17
05	Mathematics	3	0	1	4	0	0	0	0	0	0	0
06	Political science	0	0	2	2	0	0	2	0	1	0	0
07	Hindi	1	0	1	2	0	0	1	0	2	0	0
08	English	2	1	0	2	0	0	1	0	1	0	0
09	Sociology	1	0	1	1	0	0	0	0	0	0	0
10	Commerce	2	1	1	4	0	0	0	0	0	0	0
11	History	3	0	0	4	0	0	0	0	0	0	0
12	Library	0	0	10	14	0	0	1	0	1	0	0
13	Computer Department	3	0	0	6	0	0	19	0	0	0	0
14	Principal chamber	1	1	2	2	0	0	1	2	0	0	0
15	Office	3	0	2	2	0	0	2	0	3	0	0
16	Professor room	2	1	1	4	0	0	2	0	1	0	0
17	Canteen	2	0	1	2	0	0	1	0	0	0	0
18	Common Room	2	0	1	4	0	0	0	0	0	0	0
19	Class Room	86	3	16	90	0	0	0	0	0	0	0
20	Sports	4	0	0	6	0	0	0	0	0	0	0
21	Nss Room	3	0	2	6	0	0	1	0	1	0	0
22	Seminar Room	3	0	1	6	2	0	0	0	0	0	0
23	Smart Room	3	0	2	6	0	0	0	0	0	0	0
24	Corridor(New building)	12	0	3	4	0	0	0	0	0	0	0
25	Corridor(old building)	2	0	2	0	0	0	0	0	0	0	0
26	Outside campus	0	0	2	0	0	0	0	0	0	0	0

27	Exam control room	3	1	1	4	0	0	0	0	0	0	0
28	Cultural room	3	0	0	6	0	0	0	0	0	0	0
	TOTAL	162	04	58	195	02	03	33	02	10	00	61



Computer department



office



AC



INVERTER

5.5. Actual Measurements and its Analysis

Sr. No .	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr. (avg.)	Power Consumption/day (Watt)
A	B	C	D	$E=C*D$	F	$G=E*F$
1	FTL	40	162	6480	4	25920
2	Fan	80	195	15600	4	62400
3	PC	60	33	1980	4	7920
4	Printer	Standby mode: 30-50w/ printing mode:300 - 500w	9	2700	1	2700
5	LED 9W	9	58	522	2	1044
6	CFL	20	4	80	2	160
7	Xerox Machine	650	1	650	1/2HOUR	325
8	AC	3500	2	7000	0	0
9	CCTV	10	64	640	24	15360
10	UPS	2-5KVA, 51 batteries of 80 Amp-hr	33	82500	2	165000
11	Water cooler	2.8kwh/day	6	16800	2	33600
12	Internet Box with wifi router W/Hr	850	5	2900	8	23200
13	Exhaust fan	60	3	180	2	360

14	Electric bell	10	1	10	1	10
15	Freeze	2kwhr/day	3	6000	8	48000
16	Lab Equipment	80	61	4880	1	4880
17	Pumping Motor	1.0 HP	1	746	1	746
18	LCD Projector	282				

It is expected to generate 14 units/day, 420 units per month.

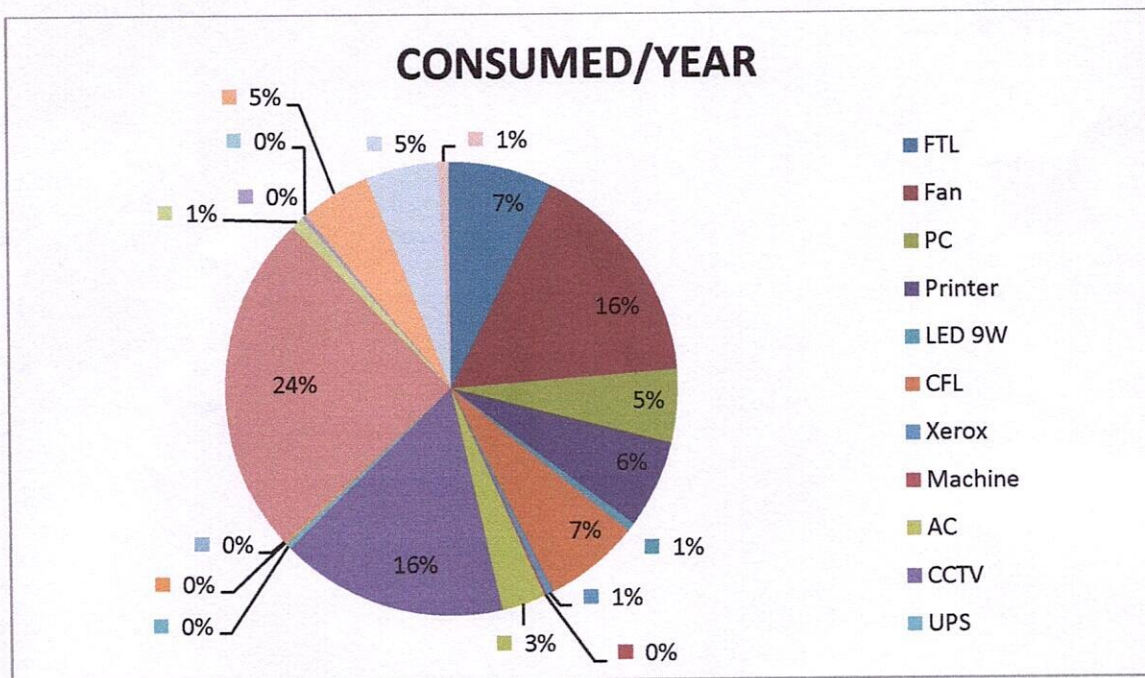


FIG-5 Energy Consumption by and use

6. MAJOR FINDINGS

Since this was a Preliminary Audit, the findings are formulated as per the norms for this stipulated by the Energy Audit Manual.

1 establish energy consumption in the organization

From the quantitative analysis of the gathered data, the following findings have been reached.

1. The computers record the highest consumption based on end use
2. The Computer Science Block records the highest rate of consumption
3. The month of may shows the peak in consumption.
4. The time slots in the Afternoon record the highest consumption on a normal working day.

Identify easiest areas of attention

Based on the physical observation and the analysis of data collected, certain areas have been identified as areas of attention.

1. Old wiring cables in many parts of the campus leading to loss of energy.
2. Use of CFL and tubes in certain rooms.
3. There is NO USE OF ANY RENEWABLE ENERGY.
4. Use of old equipment in laboratories.

Estimate the Scope for Saving

The study could identify a large scope for saving energy in the campus, including

- ✓ updating of technologies in laboratory equipment.
- ✓ replacing old electrical cables and pipelines.
- ✓ Turn off electrical equipments when not in use
- ✓ Use energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs
- ✓ Use computers and electronic equipments in power saving mode.

Identify immediate areas of improvement

Based on the study, certain areas were identified as requiring immediate improvement. These are

1. Replacing incandescent bulbs and tubes with LEDs
2. Repairing and updating laboratory equipment
3. Encouraging students and staff to switch off electrical instrument.
4. . Ensuring even lighting facilities in rooms THROUGH WINDOS.
5. Use of Solar panels as a main source of lighting, especially common areas

7. Finding and recommendation of the Audit

Findings	Recommendations
The electrical wiring of OLD buildings was found to be old and inefficient	Replace old electrical cables with new ones
There seem to be a lack of judicious use of power among students and staff. During the study, it was found that lights, fans and computers were kept on working mode in many rooms, without a single person present.	Students and staff should be exhorted constantly to use energy judiciously. Posters and pamphlets should be distributed and notices about saving energy should be posted at major points of use.
Many Departments still use incandescent bulbs causing heavy power loss	Incandescent bulbs should be replaced with LEDs

OTHER Recommendations

- ✓ Use electricity effectively.
- ✓ Use the „OFF“ switch, rather than the „STAND BY“ mode.
- ✓ Switch off fans & lights when not in use.
- ✓ Use LEDs instead of conventional light sources.
- ✓ Check for Green Tags before purchasing goods.
- ✓ Keep equipments in power save mode.
- ✓ Make use of wind energy.

8. CONCLUSION

1. A training /lecture for both students and staff to awareness for the need of energy conservation. If everyone ensures switching off lights, fans and electrical instrument that are not in use, roughly 10% of energy saving is possible.
2. The scope for non-conventional energy should be utilized.
3. A well-prepared electrical wiring plan for the campus, which would help to identify unused points and re-wiring.

YK
Audit In charge



[Signature]
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