

Energy Audit Report

Of

Shri Sarda Education Society's

(A Linguistic Minority Educational Institute)

**Smt Radhabai Sarda Arts, Commerce & Science
College, Anjangaon Surji, Dist Amravati (MS)**



By

Department of Physics

For session

2023-2024

Introduction:

An energy audit is an inspection, survey and analysis of energy consumed in a system in order to identify opportunities for reducing energy expense and carbon footprints.

Energy Audit Objectives:

- To study the present pattern of energy consumption
- To identify energy saving measures for energy optimization
- To implement the acceptable and feasible measures for energy conservation.

Methodology:

➤ **Historical data Analysis:**

This step involves collection and study of electricity bills of college in order to establish base line data on energy consumption and its variation with change in production volume. Energy audit team collected energy bills of college for session 2022-2023 and analysed them.

➤ **Actual measurement and data analysis:**

This step involves actual site measurement. Energy audit team visited to all units of college campus and collected the data for analysis like number of electrical appliances, their wattage and operating time.

➤ **Identification of energy conservation opportunities:**

This step involves the identification of acceptable and feasible opportunities for minimizing energy consumption and their evaluation for implementation. After the complete data analysis, energy audit team finds out the opportunities towards energy conservation and made some recommendations.

Electrical energy system

Source of electricity : MSEDCL (BU/1627/ANJANGAON SUB –DN)				
Details of Electricity Meters				
Installation area	Installation Date	Meter Number	Connection Type	Sanctioned Load
Arts Building (Block A)	17/11/1989	359710030322	LT II	1.00 KW
Library Building (Block B)	30/5/2014	359710158418	LT II	0.54 KW
Commerce Building (Block C)	15/5/2015	359718101369	LT II	3.70 KW
Science Building (Block D)	15/5/2015	359718101377	LT II	5.93 KW
Total Sanctioned Load : 11.17 KW				

Electricity Bill Analysis

Month	Consumption Unit (kWh)				
	Block A	Block B	Block C	Block D	Total Consumption (Monthly)
Jun-2023	1339	300	465	332	2436
Jul-2023	1385	283	619	433	2720
Aug-2023	1031	275	489	593	2388
Sep-2023	1081	246	452	444	2223
Oct-2023	991	217	470	480	2158
Nov-2023	1043	239	526	518	2326
Dec-2023	703	158	298	215	1374
Jan-2024	668	185	327	227	1407
Feb-2024	722	223	377	223	1545
Mar-2024	724	239	396	304	1663
Apr-2024	807	308	456	386	1957
May-2024	1117	326	501	406	2350
Total Consumption (Yearly)	11611	2999	5376	4561	24547
Average Monthly Consumption	986	250	448	380	2046

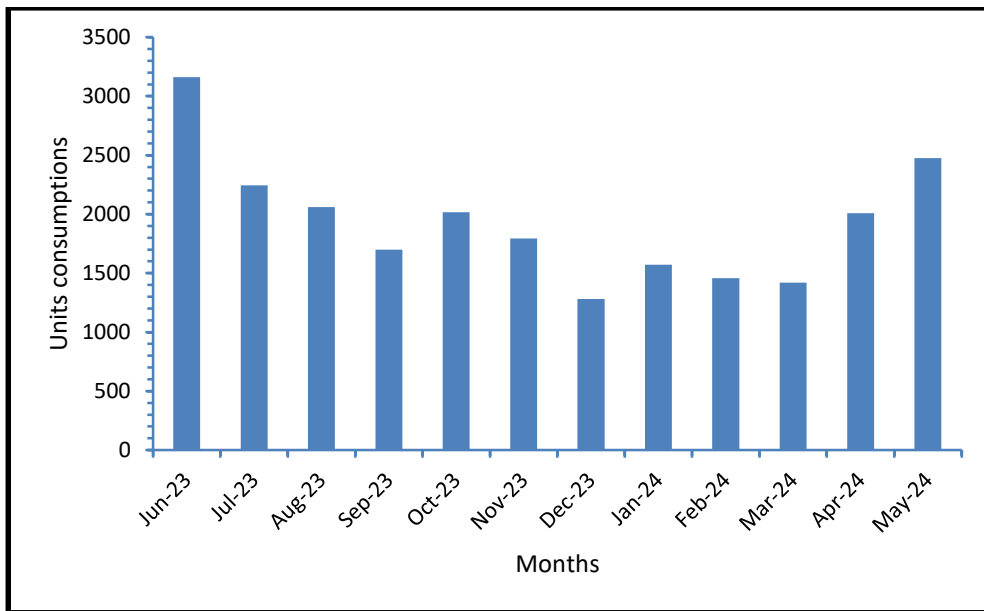


Fig. 1: Month wise total units consumption in college.

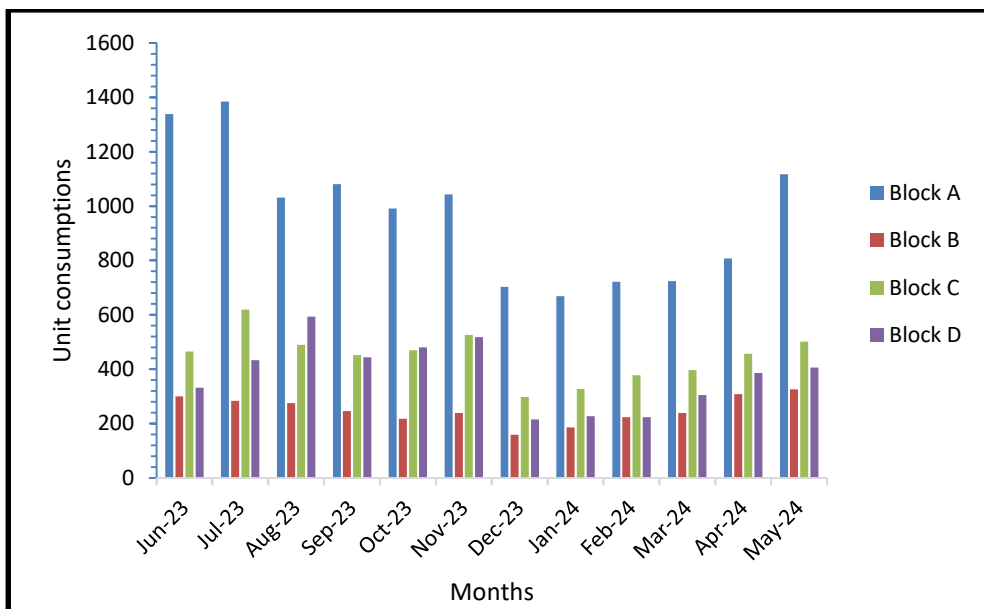


Fig. 2: Month wise and building wise units consumption.

Calculation of expected power consumption per month

Electrical Appliance	Power Rating (Watt)	Quantity	Total Power rating (kW)	Operating Hours (Hours)	Operating days per month	Power consumption per month (kWh)
AC (1.5 ton)	1500	1	1.5	3	21	94
AC (2 ton)	2000	3	6	2	5	60
Fan	70	150	10.5	3	21	661.5
Exhaust Fan	15	10	0.15	0.5	21	1.575
Water Cooler	240	7	1.68	1	21	35.28
LED tube bulb	23	15	0.345	2	21	14.49
LED tube light	22	29	0.638	2	21	26.796
LED tube light	20	40	0.8	2	21	33.6
LED POP bulb	15	40	0.6	1	21	12.6
LED POP bulb	10	7	0.07	1	21	1.47
LED POP bulb	6	3	0.018	0.5	21	0.189
LED POP bulb	3	3	0.009	0.5	21	0.0945
LED Street Light	45	4	0.18	5	30	27
LED Street Light	30	4	0.12	5	30	18
LED Focus (150 W)	150	1	0.15	5	30	22.5
LED Focus (50 W)	50	2	0.1	5	30	15
Computer	100	50	5	4	21	420
Printer	200	8	1.6	0.5	21	16.8
Scanner	45	1	0.045	0.5	21	0.4725
Xerox Machine	650	3	1.95	0.5	21	20.475
Lamination Machine	600	1	0.6	0.5	21	6.3
TV	85	2	0.17	5	21	17.85
UPS	1500	3	4.5	1	21	94.5
CCTV	10	38	0.38	24	30	273.6
LCD Projector	270	4	1.08	1	15	16.2
Refrigerator	50	3	0.15	24	30	108
Coffee Machine	1300	1	1.3	0.5	21	13.65
Wifi Router	10	5	0.05	6	21	6.3
Hot air oven	1500	2	3	1	5	15
Furnace	2000	2	4	1	5	20
Pumping motor 1HP	750	3	2.25	1	15	33.75
Electric Bell	5	2	0.01	6	21	1.26
Water Purifier	750	1	0.75	1	21	15.75
Total						3004

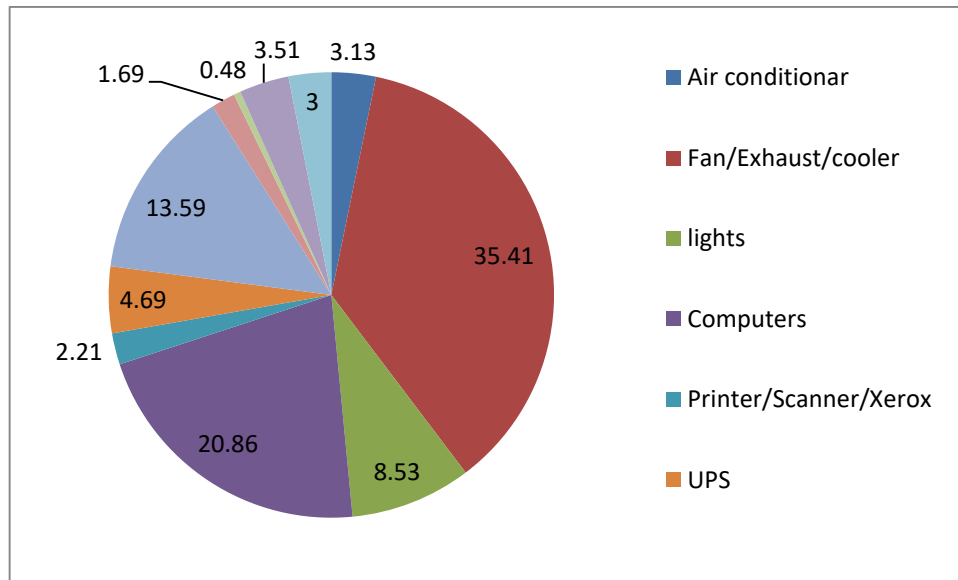


Figure 3 % consumption by different electrical appliances

Assessment of lightening system

Light Type	Quantity	Total power rating (KW)	Power consumption in 1 month (KWh)	Annual lightning power consumption (KWh)	% of total Annual lightning power consumption
LED bulbs/tube lights	148	3.03	171.74	2060.88	100 %
Conventional lights	0	0	0	0	0

Percentage of lighting power requirement met through LED bulbs:

Annual total lighting power requirement of college = **2066.88 KW**

Annual lighting power requirement met through LED = **2066.88 KW**

Therefore, Annual Percentage of lighting power requirement met through LED bulbs

$$= \frac{\text{Annual lighting power requirement met through LED bulb}}{\text{Annual total lighting power requirement}} \times 100$$

$$= \frac{2066.88}{2066.88} \times 100$$

$$= \mathbf{100 \%}$$

Use of renewable energy sources

Renewable energy source	Power rating (watt)	Quantity	Total Power rating (KW)
Solar street lamp	18	10	0.18



Carbon Di-oxide emission

Here we computed the CO₂ emission due to electricity consumption. In India, 0.8 Kg of CO₂ is emitted for consumption of 1 unit of electricity.

Sr No.	Month	Unit consumption (KWh)	CO ₂ Emitted in MT
1	Jun-2023	2436	1.94
2	Jul-2023	2720	2.17
3	Aug-2023	2388	1.91
4	Sep-2023	2223	1.77
5	Oct-2023	2158	1.72
6	Nov-2023	2326	1.86
7	Dec-2023	1374	1.09
8	Jan-2024	1407	1.12
9	Feb-2024	1545	1.23
10	Mar-2024	1663	1.33
11	Apr-2024	1957	1.56
12	May-2024	2350	1.88
Total		24547	19.64
Average CO ₂ emission per month =1.63 MT			

Identification of energy conservation opportunities

After complete data analysis, energy audit team finds scope for energy conservation in some area.


Accordingly following recommendations are suggested.

Executive Recommendations:

- It has been observed that majority of electrical power consumption is through Ceiling fans having wattage 70 Watt. Therefore it is recommended to replace these ceiling Fans with 40 Watt Energy Efficient Fans.
- PV solar system is suggested to install in a campus to minimize electricity bill. 15 KW solar panel may generate about 60 units per day which saves Rs 1,25000 per year

General Recommendations:

- Use renewable energy sources like solar , wind , biogas energy
- Use power saver circuit for AC
- Connect computer and printers in LAN
- Avoid the unnecessary use of electrical appliances
- Provide cross ventilation to laboratory and class rooms in order to reduce number of fans
- Established college level student community to monitor college campus for energy consumption parameters.


HEAD
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