

ENERGY AUDIT REPORT

UDALGURI COLLEGE,
UDALGURI, B.T.R, ASSAM
YEAR: 2022-23



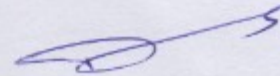
PREPARED BY:
DEPARTMENT OF PHYSICS,
UDALGURI COLLEGE

Certificate

Certified that *Energy Audit* involving Energy usage, has been conducted for Udalguri College, Udalguri; for the session 2022-23. The Audit explores the scenario as existing in Udalguri College Campus and the steps which can be taken to minimize any drawbacks existing in the existing energy structure. The audit involves applicable standards and procedures as prescribed by the Ministry of Power, Govt. of India.

Date: 06/06/2023

Place: Udalguri



Signature & Seal of the Auditor

Nipu Das

Sub-Divisional Engineer
Udalguri Electrical Sub-Divisional
A.P.D.C.i.(LAR), Udalguri

Acknowledgement

I would like to express my heartfelt gratitude to Udalguri College, Udalguri for giving me the opportunity to carry out Energy Audit pertaining to the College. I appreciate the wholehearted support and efforts of the Staff & students of the Department of Physics, Udalguri College who made the task easier for me.

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ABSTRACT

An energy audit is a survey and analysis of how energy is used to save energy in a building. An energy audit is the first step in finding ways to reduce energy costs and carbon footprint in commercial and industrial properties. It adopts a positive attitude, with the aim of continually enhancing energy efficiency, as opposed to financial audit, which emphasizes adherence to regularity. An Energy Efficiency Audit on Udalguri College Electrical Appliances has been conducted and compared the energy consumption of various electrical appliances of Udalguri College and provided recommendations to enhance the energy efficiency.

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1. Introduction:

An energy audit survey is a way of measuring and analyzing energy flows to reduce energy consumption in a building. For commercial and industrial properties, the first step is an energy audit to identify ways to reduce energy costs and carbon emissions. An energy audit has a positive focus on continuous improvement of energy utilization as opposed to a financial audit which focuses on maintaining a consistent level of performance. It provides the essential data base for an overall energy saving programme, covering essentially energy usage analysis and energy saving measures.

According to the Energy Conservation Act, 2001 Energy Audit is defined 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 and an action plan to reduce energy consumption". Udalguri College has placed a great emphasis on the promotion and education of energy-efficient practices among students, faculty, and other personnel of the institution in order to ensure the successful implementation of an energy-efficient campus.

Energy conservation is an essential action that should be implemented in all areas of the globe. Two decades ago, the conventional wisdom held that energy conservation would be beneficial in the long run. However, when considering the current state of affairs, it is clear that energy conservation has become the primary and most essential factor in achieving sustainable growth.

2. Energy Consumption Data

Udalguri College receives electricity from Assam Power Distribution Company Limited.

There are also 4 DG sets in the College facility with a total capacity of 47.4 kVA. These DG sets are mainly used for power outage from APDCL.

Sl. No.	Generators	Piece	Power Output (kVA)	Watt (kW)
1	Main Generator 1	1	15	12
2	Main Generator 2	1	15	12
3	Girls CR generator	1	2.4	2.1
4	Girls Hostel	1	15	12
TOTAL				38.1

The college campus is equipped with a total of five solar streetlights, which are installed in a variety of locations. Each of these streetlights has an output power of 30 watts.

The primary uses of energy are as follows:

- i. Lights
- ii. Fans
- iii. Water pumps
- iv. Computers
- v. Printers
- vi. ACs

Monthly Energy Consumption

The monthly energy consumption for the year 2022-23 is:

Bill Month	Consumption Unit (kWh)	Bill Amount (Rs.)
Apr-22	1793.76	16987
May-22	1307.91	12386
Jun-22	2436.11	23070
Jul & Aug-22	4346.04	41157
Sep & Oct-22	6154.38	58282
Nov-22	671.06	6355
Dec-22	3104.54	29400
Jan-23	438.33	4151
Feb-23	659.45	6245
Mar-23	3350.58	31730
Apr-23	1912.84	18118
Total	26175	247881
Average	2379.545455	22534.63636
Max	6154.38	58282
Min	438.33	4151

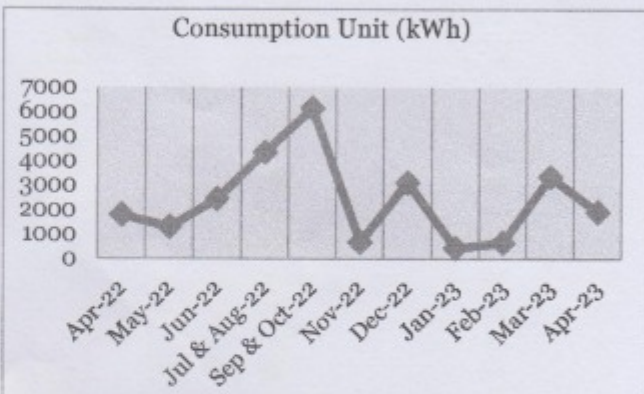
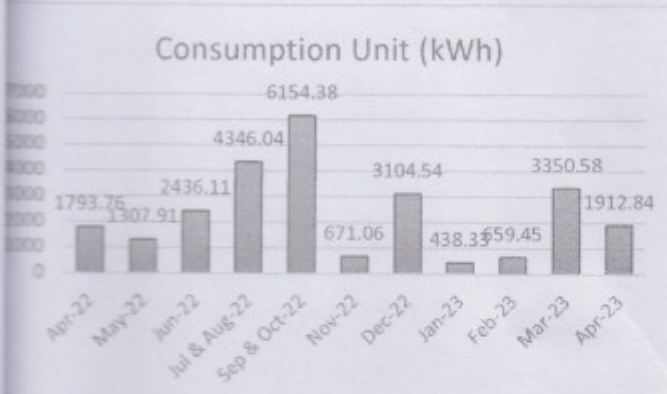


Fig: Graphical Representation of Consumption Unit (kWh)

3. Inventory Details

Department wise Computer and Printers distribution

Sl No.	Department	Science		
		Computers (Quantity)	Power (watts)	Total Load (watts)
1	Physics	1	200	200
2	Zoology	1	200	200
3	Botany	1	200	200
4	Maths	7	7*200	1400
5	Chemistry	1	200	200
6	Computer(lab) R12	23	23*200	4600
7	Computer(lab) R13	31	31*200	6200
8	Computer(lab) R14	21	21*200	4200
TOTAL				17200

Sl.No.	Department	Arts		
		Computers (Quantity)	Power (watts)	Total Load (watts)
1	Education	1	200	200
2	Economics	1	200	200
3	Political Sc.	1	200	200
4	History	1	200	200
5	Bodo	1	200	200
6	English	1	200	200
7	Philosophy	1	200	200
8	Assamese	1	200	200
TOTAL				1600

Others				
Sl. No.	Room	Computers (Quantity)	Power (watts)	Total Load (watts)
1	Teachers Common Room	2	2*200	400
2	Administrative Block	2	2*200	400
3	Junior Assistant	1	200	200
4	Senior Assistant	1	200	200
5	Accounts Room	1	200	200
6	Scholarship Branch	1	200	200
7	Principal Office	1	200	200
8	Distance Education Cell	1	200	200
9	Library	7	7*200	1400
10	Exam Centre Cell	1	200	200
11	RFID Self Service Kiosk	1	150	150
12	Wall TV & Wall mount Kiosk	1	45	45
13	Online Counter laptops	3	3*45	135
14	NAAC Cell	3	3*200	600
TOTAL				4530

Printers				
Sl. No.	Department	Quantity	Power(watts)	Total (watts)
1	Infront Principal office	1	650	650
2	Online Counter	2	2*11	22
3	Administrative	2	2*11	22
TOTAL				694

Distribution of Water pump, Fridge and Air Conditioner

Water Motors				
Sl. No.	Motors	Piece	Power kW/HP	
1	Parking side	1	0.37/0.5	
2	Infront Botany Dep.	1	0.75/1.0	
3	Infront Union Body	1	0.75/1.0	
4	Sc. compound	1	1.10/1.5	
5	Auditorium	1	0.75/1.0	
6	Girls hostel	1	0.75/1.0	
TOTAL				4.47 kW

Fridge				
Sl. No.	Location	Piece	Power (watts)	Total Load
1	Physics Dept.	1	110	110
2	Room 28	1	110	110
3	Zoology (185L)	1	110	110
4	Zoology (265L)	1	150	150
TOTAL				480

Sl. No.	AC	AC		Power (watts)	Total Load
		Piece			
1	Principals office	2		2*1200	2400
2	Teachers common room	1		1200	1200
TOTAL					3600

Distribution of Light Bulbs

Sl. No.	Name of the Building/Room	LIGHT BULBS					No. Of Bulbs	No. Of Holders	Total Load (in Watt)
		TYPES OF BULBS							
		Tungsten Of 100W	Tube light Of 36W	LED Of 9W	CFL Of 20W	Dim Light Of 15W			
1	Principal office + Waiting Room		1	44			45	67	432
2	Vice Principal Office		1	1			2	3	45
3	Dept. of Physics & Lab				3		3	4	60
4	Dept. of Chemistry & Lab		6				6	16	216
5	Dept. of Zoology & Lab		6				6	28	216
6	Dept. of Botany & Lab				2		2	4	40
7	Dept. of Mathematics & Lab	1		1			2	2	109
8	Dept. of Political Science			2			2	2	18
9	Dept. of Education			2			2	3	18
10	Dept. of English			2			2	6	18
11	Dept. of Economics			2			2	6	18
12	Dept. of Bodo	1		2			3	3	118
13	Dept. of History			1			1	2	9
14	Dept. of Philosophy			2			2	3	18
15	Dept. of Assamese			2			2	5	18
16	Dept. of Nepali			1			1	3	9
17	Dept. of EVS			1			1	3	9
18	Examination Branch		3		1		4	7	128
19	Administrative Building	1	5	21		6	33	70	559
20	Academic Building	60	36	23	10		129	248	7703
21	Teacher's Common Room (Science)		2	2			4	9	90
22	Teacher's Common Room (Arts)	2	2	1	1		6	6	301
23	Boys Common Room						0	2	0
24	Girls Common Room		2	1			3	3	81
25	UC Women's Hostel	1	50	37	2	3	93	126	2318
26	UC Central Library		2	10	1		13	16	182
27	UC Online Corner	2		3			5	5	227
28	UC Canteen	1					1	4	100
29	UC Student Union Hall						0	1	0
30	UC Auditorium		10	84			94	94	1116
31	UC Unit ABSU Hall						0	1	0
32	NAAC Cell			2	2		4	10	58
33	IGNOU		1				1	2	36
34	Computer Lab (Total 3 Room)			13	16		29	36	437
TOTAL		69	127	260	38	9	503	800	14707

Distribution of Fans

Sl. No.	Name of the Building/Room	Ceiling Fan of 50W	Ceiling Fan of 60W	Exhaust Fan of 35W	Table Fan of 40W	Total
1	Principal Office		2		1	3
2	Vice Principal Office		2		1	3
3	UC College Canteen	4		4		8
4	UC Online Corner	1				1
5	UC Student Union Hall	1				1
6	UC Unit ABSU/BoStis Hall	1				1
7	UC Auditorium Hall	25				25
8	Dept. of Physics & Lab	4				4
9	Dept. of Chemistry & Lab	4				4
10	Dept. of Zoology & Lab	4				4
11	Dept of Botany & Lab	9	1			10
12	Dept. of Mathematics & Lab	2	2			4
13	Dept. of Political Science	4				4
14	Dept. of Bodo	3	2			5
15	Dept. of History	2				2
16	Dept. of Education	6				6
17	Dept. of Economics	3	1			4
18	Dept. of English	4	2			6
19	Dept. of Philosophy	4				4
20	Dept. of Assamese	3	1			4
21	Dept. of Nepali		1			1
22	UC Women's Hostel	55	30			85
23	Administrative Block (Total room 7)	11	10			18
24	Computer Lab (Total Room 3)		22			22
25	Academic Building (Total Room 38)	145	50			195
26	Teacher's common room (Science)		6			6
27	Teacher's common room (Arts)		6			6
28	Girls Common Room	4				4
29	Boys common room	2				2
30	NAAC Cell		8	2		10
31	IGNOU		2			2
32	UC Central Library	10	2			12
33	Dept. of EVS	2				2
Total		313	150	6	2	471

4. Observations

Table 1. Computers of 200W

Particulars		Units
Total Number of Computers	115	Number
Measured Watt	200	Watts
Total Watts	23000	Watts
Operating Hours in a day	8	Hours
Estimated Energy Consumption Per day in kWh	184	kWh
Monthly Estimated Energy Consuming (Approximately)	5520	kWh
Per Unit cost as per APDCL Bill	9.47	Rs
Total Monthly unit cost (Approximately)	52274.4	Rs
Cost of per Computer	22000	Rs
Total investment Cost	2640000	Rs

Table 2. Water Pumps

Particulars		Units
Total Number of Water Pumps	6	Number
Total Watts	4470	Watts
Operating Hours in a day	1	Hours
Estimated Energy Consumption Per day in kWh	4.47	kWh
Monthly Estimated Energy Consuming (Approximately)	134.1	kWh
Per Unit cost as per APDCL Bill	9.47	Rs
Total Monthly unit cost (Approximately)	1269.9	Rs
Cost of per Water Motor (avg.)	4000	Rs
Total investment Cost	24000	Rs

Table 3. Fridge

Particulars		Units
Total Number of Fridge	4	Number
Total Watts	480	Watts
Operating Hours in a day	5	Hours
Estimated Energy Consumption Per day in kWh	2.40	kWh
Monthly Estimated Energy Consuming (Approximately)	72	kWh
Per Unit cost as per APDCL Bill	9.47	Rs
Total Monthly unit cost (Approximately)	681.84	Rs
Cost of per Fridge (avg.)	18000	Rs
Total investment Cost	72000	Rs

Table 4. AC

Particulars		Units
Total Number of AC	3	Number
Total Watts	3600	Watts
Operating Hours in a day	8	Hours
Estimated Energy Consumption Per day in kWh	28.8	kWh
Monthly Estimated Energy Consuming (Approximately)	864	kWh
Per Unit cost as per APDCL Bill	9.47	Rs
Total Monthly unit cost (Approximately)	8182.08	Rs
Cost of per AC	34000	Rs
Total investment Cost	102000	Rs

Table 6. Normal Ceiling Fan of 60W

Particulars		Units
Total Number of 60 Watt Ceiling Fan	150	Number
Measured Watt	60	Watts
Total Watts	9000	Watts
Operating Hours in a day	8	Hours
Estimated Energy Consumption Per day in kWh	72	kWh
Monthly Estimated Energy Consuming (Approximately)	2160	kWh
Per Unit cost as per APDCL Bill	9.47	Rs
Total Monthly unit cost (Approximately)	20455.2	Rs
Cost of per Fan	1500	Rs
Total investment Cost	225000	Rs

Table 7. Exhaust Fan & Table Fan

Particulars		Units
Total no. of 35W Exhaust fan	6	Number
Total no. of 40W Table fan	2	Number
Exhaust fan & Ceiling fan monthly estimated energy consuming	69.6	kWh
Total monthly cost (Exhaust + Table)	659.112	Rs.

Table 8. TOTAL POWER CONSUMPTION OF DIFFERENT TYPES OF BULBS

Sl. No.	Types of Bulbs	Quantity	Watt Per Bulb	Total Load (In watt)	Total Power Consumption per day (kWh)
1	LED	260	9	2340	28.08
2	CFL	38	20	760	9.12
3	Tube Light	127	36	4572	54.864
4	Tungsten	69	100	6900	82.8
5	Dim Light	9	15	135	1.62
TOTAL		503	180	14707	176.484

5. Data Analysis and Conclusion

Daily average energy consumption by various electrical appliances is given below:

Sl. No.	Name of the electrical appliance	Energy Consumption/Day in kWh
1	Computers	184
2	Different types of light bulb	176.484
3	Ceiling Fan	72
4	Air Conditioner	28.8
5	Water pump	4.47
6	Fridge	2.40
7	Exhaust Fan and Table Fans	2.32

The results of this energy audit study indicate that Computers account for the most energy consumption, followed by different types of light bulbs and ceiling fans. The energy consumption may be minimized by using non-conventional energy sources like solar energy.

It was also observed that the lights and fans are left on excessively when there are no classes or vacant rooms. In total, there are 69 series of 100 watts tungsten bulbs, which can be substituted by 6 to 10 watts LED light bulbs.

The analysis of the various utilities of Udalguri College's campus has revealed a significant amount of electricity consumption and waste. Therefore, it would be advantageous to implement energy efficiency measures to reduce the energy consumption.

It should be mentioned here that the college authority has installed five numbers of solar powered street lights in the college campus which will help to minimize the daily energy consumption.

6. Appendix



Fig(a): Solar Powered Street-Light



Fig(b): Ceiling Fan



Fig(c): Computers



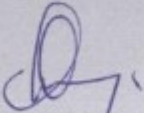
Fig(d): Diesel Generator

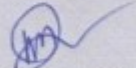


Fig(e): AC



Fig(f): CFL Light bulb


Dr Luke Daimary,
Principal, Udalguri College
PRINCIPAL
UDALGURI COLLEGE.
UDALGURI


Mr Naba Kumar Baishya
Convenor, Energy Audit