আনন্দৰাম ঢেকিয়াল ফুকন মহাবিদ্যালয়

ANANDARAM DHEKIAL PHOOKAN COLLEGE

NAAC accredited with B++ Grade with CGPA 2.94 (3rd Cycle)

ENERGY AUDIT REPORT (2023 – 2024)

Audited by

DEPARTMENT OF PHYSICS

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1. ENERGY AUDIT AND ITS OBJECTIVES

With the way the society is advancing with leaps and bounds, conservation of energy should be one of our top priorities as one of the sustainable developments. An energy audit is a survey, inspection, and analysis of the flow of energy in a structure, process, or system with the goal of conserving energy. The goal is to lower the energy input into the system without having an adverse effect on the output. It entails the verification, tracking, and analysis of energy use, as well as the filing of a technical report with suggestions for enhancing energy efficiency along with a cost-benefit analysis and a reduction action plan for energy usage.

One of the main goals of the energy audit is to find and assess opportunities to lower energy consumption per unit of product output as well as lowering operational expenses through energy planning and conservation. An energy audit creates a baseline for controlling the organization's energy use and serves as the foundation for organizing a more efficient use of energy across the board.

The goal of this audit is to figure out how much electricity is used in our college campus. The Energy auditing for the session 2023-24 is carried out by the Department of Physics, ADP College.

2. ABOUT THE COLLEGE

Established on 7th September 1959, Anandaram Dhekial Phookan College (ADP College) is located in Nagaon district of Assam. Anandaram Dhekial Phookan College is affiliated to Gauhati University. At present the college is offering various Undergraduate and Postgraduate programmes in Arts, Science and Commerce streams. The curricular aspects of the college is taken care by twenty-one departments viz. English, Assamese, Arabic, Sanskrit, Bengali, Hindi, Education, Economics, Geography, History, Philosophy, Political Science, Commerce, Computer Science, Physics, Chemistry, Mathematics, Botany, Zoology, Statistics, and Herbal Science& Technology. The college also offers PG courses in Herbal Science and Technology (MSc), Assamese (MA) and History (MA).

3. ENERGY AUDIT TEAM

Name	Designation	Department	College	Signatures
Dr. Jayanta Barman	Associate Professor	PHYSICS	ADP COLLEGE	
Dr. Bhaskar J. Saikia	Assistant Professor & HOD			
Dr. Lakshmi K. Singh	Assistant Professor			
Dr. Dharitree Dutta	Assistant Professor			
Dr. Hrishikesh Talukdaar	Assistant Professor			
Jocelyn Sangma	Assistant Professor			

4. ENERGY AUDIT AND METHODOLOGY

The energy audit was conducted from 01.07.2023 to 30.06.2024. The reviewed implementation of energy saving and conservation opportunity has been identified as well as quantified as follows:

1) Inventory of various electrical load.

2) APDCL bill study and working out average cost of power.

3) Identification of various energy conservation measures and saving opportunity.

In this present report, college electricity audit has been executed and verified. The faculties of Physics department collected data surveyed the college campus for the audit. In this survey, all the departments, including the laboratories; different sectors, classrooms and Common Areas were involved. In every building, each and every room was examined to note, the no. of fans, LED bulbs, refrigerators, heaters, computers,

instruments, AC, etc. We have calculated the contribution of energy consumption with respect to units consumed by each of the equipment in comparison with the total requirement of electricity. The Survey details are given elaborately in the following section.

Calculation of Energy Consumption in kWh

Electric energy or power consumption can be calculated using the following basic formula.

Energy Consumption in Watt-hours = Power Rating in Wattage x Time in Hours

$E = P \times t$ (Wh)

Wh is a small unit to measure the energy usage.

To convert it to the basic electricity unit i.e. 1000 Watts per hour = 1kWh = 1 Unit of electricity, we divide it by 1000 i.e. $E = P \times t \div 1000$ … (kWh)

Where:

- E = Electric Energy (Consumed power in kWh)
- P = Power in Watts
- t = Time in hours per day

Daily Energy Consumption

Power Consumption (Daily) = Power Usage (Watts) x Time (Hours)

Example: A 50 watts fan used for 4 hours daily. The daily watt hour and kilowatt hour consumption is as follows.

- Daily power usage in Wh = 50W x 4 Hours = 200 Wh / day
- Daily power usage in kWh = 200 Wh /1000 = 0.2 kWh / day

5. SURVEY DETAILS:

A. Data collected from Academic buildings:

Department	LED	Fan	Heater	Refrigerator	Computer	Printer	Laptop	AC	Lab.	Dig. Board	Water Purifier
Assamese	10	17	1	0	1	1	0	0	1	1	1
Arabic	8	4	0	0	1	0	0	0	0	0	0
Botany	26	12	1	1	1	1	0	0	2	1	1
Bengali	5	3	0	0	1	1	0	0	0	0	0
Commerce	4	2	1	0	1	1	0	0	0	0	0
Computer Science	10	10	0	0	33	2	1	0	1	1	0
Chemistry	22	17	1	1	1	1	1	0	2	1	1
English	12	6	1	0	11	1	0	0	1	1	0
Economics	3	3	1	0	1	1	1	0	0	0	0
Education	8	13	1	0	1	1	1	0	1	1	1
Geography	22	15	1	0	9	1	4	0	1	2	1
History	26	17	1	0	1	1	0	0	0	0	1
Herbal Science	48	26	1	1	1	2	4	2	3	1	1
Mathematics	5	5	1	0	4	1	1	0	0	1	1
Physics	27	18	1	0	4	1	0	0	1	1	1
Political Science	5	7	1	0	1	1	2	0	0	1	1
Philosophy	3	1	0	0	1	1	0	0	0	0	0
Sanskrit	4	2	0	0	1	1	0	0	0	0	0
Statistics	9	8	1	0	2	1	0	0	1	1	0
Zoology	18	11	2	1	7	1	2	0	2	2	1
Fashion Technology	3	2	0	0	0	0	0	0	0	0	1
Hindi	2	1	0	0	1	0	0	0	0	0	0
Biotech Hub	5	3	0	2	2	1	0	1	1	0	1
Total	**285**	**203**	**16**	**6**	**86**	**22**	**17**	**3**	**17**	**15**	**13**

B. Data collected from administrative buildings and Hostels:

Section	LED	Fan	Heater	Refrigerator	Computer	Printer	Laptop	mic	projector	AC	Xerox	TV	Water Purifier
Principal Chamber	47	8	2	1	1	1	1	1	1	2	1	3	1
Vice Principal (Admin)	5	2	1	0	0	0	0	0	0	1	0	0	0
Vice Principal (Academic)	4	2	0	0	0		0	0	0	0	0	0	0
Office	19	10	1	0	6	4	1	0	0	1	1	0	0
Xerox Room	2	1	0	0	0	0	0	0	0	0	2	0	0
IQAC	4	2	0	0	2	1	1	0	0	0	0	1	0
Library	8	43	0	0	8	3	0	0	0	1	1	1	1
Auditorium	42	10	0	0	0	0	0	1	0	10	0	0	0
Meeting Room	9	4	0	1	0	0	0	0	0	1	0	0	0
Computer Hub	16	10	0	0	28	0	0	1	1	3	0	0	0
TC Room	12	16	0	0	0	0	0	0	0	1	0	0	0
Canteen	12	7	0	0	0	0	0	0	0	0	0	0	0
NCC	5	3	0	0	0	0	0	0	0	0	0	0	0
Seminar Hall	19	11	0	0	0	0	0	1	1	2	0	0	0
IDOL	5	4	0	0	0	0	0	0	0	0	0	0	0
Hostel 1	50	28	0	0	1	0	6	0	0	0	0	0	0
Hostel 2	110	74	0	0	1	0	12	0	0	0	0	0	0
Indoor Stadium	44	10	0	0	0	0	0	0	0	0	0	0	0
Classrooms	127	171	0	0	0	0	0	6	1	0	0	0	0
Boy's Common Room	4	2	0	0	0	0	0	0	0		0		0
Girl's Common room	9	8	0	0	0	0	0	0	0	0	0	0	0
Total	**553**	**426**	**4**	**2**	**47**	**9**	**21**	**10**	**4**	**22**	**5**	**5**	**2**

C. Data collected for Miscellaneous Items:

Item	Cooler	Refg. (Canteen)	Coffee Machine (Canteen)	Halogen	Water Motor	Generator
Quantity	1	1	1	7	10	2

D. Total Power consumed:

Items	Quantity	Power Consumed (in Watt)	Total power Consumed (in Watt)	Total energy Consumed in 1hr (in kWh)	Total energy Consumed per day (in kWh)	Total energy Consumed in 1 month (in kWh)	Total energy Consumed in 1 year (in kWh)
LED	838	20	16760	16.76	83.8	1676	16760
Fan	629	40	25160	25.16	125.8	2516	25160
Heater	20	1000	20000	20	100	2000	20000
Refreg.	8	500	4000	4	20	400	4000
Computer	133	360	47880	47.88	239.4	4788	47880
Printer	31	750	23250	23.25	116.25	2325	23250
Laptop	38	65	2470	2.47	12.35	247	2470
AC	25	2000	50000	50	250	5000	50000
CCCam	75	100	7500	7.5	37.5	750	7500
Lab	17	1000	17000	17	85	1700	17000
Dig. Board	15	100	1500	1.5	7.5	150	1500
Aquagaurd	15	50	750	0.75	3.75	75	750
Mic	10	40	400	0.4	2	40	400
Projector	4	400	1600	1.6	8	160	1600
Xerox	5	1400	7000	7	35	700	7000
TV	5	100	500	0.5	2.5	50	500
Cooler	1	250	250	0.25	1.25	25	250

Refg. (Canteen)	1	2000	2000	2	10	200	2000
Coffee Machine (Canteen)	1	100	100	0.1	0.5	10	100
Halogen	7	500	3500	3.5	17.5	350	3500
Water Motor	10	1000	10000	10	50	1000	10000
Generator	2	50	0	0	0	0	0
Total			**241620**	**241.62**	**1208.1**	**24162**	**241620**

6. ANALYSIS AND RESULTS:

A. Report on Electricity bill paid (2023-2024)

Months	Units Billed (kWh)	Start date of Billing	End date of Billing	Bill Amount	Amount paid
May-23	2931.36	1st April 23	30th April 23	34287	Paid
Jun-23	5263.26	1st May 23	31st May 23	58229	Paid
Jul-23	6270.35	1st June 23	30th June 23	66572	Paid
Aug-23	3117.19	1st July 23	31st July 23	40997	Paid
Sep-23	9504.44	1st August 23	31st August 23	93666	Paid
Oct-23	9849.13	1st September 23	30th September 23	95752	Paid
Nov-23	6222.4	1st October 23	31st October 23	74346	Paid
Dec-23	3456.78	1st November 23	30th November 23	44564	Paid
Jan-24	2547.7	1st December 23	31st December 23	37776	Paid
Feb-24	1265.79	1st January 24	31st January 24	25630	Paid
Mar-24	2437.7	1st February 24	29th February 24	35755	Paid
Apr-24	3944.45	1st March 24	31st March 24	50160	Paid

- The average power usage of ADP College per month is 5036.44 kWh but the total power of all the electrical equipment is 24162 kWh. The difference in energy usage is because all the appliances are not used 24X7 at the same time.

7. INFERENCE and SUGGESTIONS

- Energy saving monitors should replace the current normal monitors.
- LED bulbs should be used to save on electricity bill.
- Outdated and old Ceiling, Stand, and Wall fans should be replaced by brushless Fans.
- Outdated electrical devices *viz.* refrigerator, heater, water purifier, motor etc. should be replaced by devices of the same kind with higher energy saving option.
- Outdoor Halogen lights should be replaced by Led lights.
- Lights and Fans should be shut down when not in use to save maximise saving.
- The solar panel (right now not in working condition) which is used as an alternate energy source in our college should be made functional to save the APDCL energy bill amount as well as to promote green environment and solar energy.
- Air conditioners should be used moderately to save on electricity bill as well as reduce the emission of CFC.

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