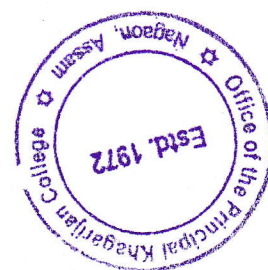


Policy Document on Environment and Energy Usage



Khagarijan College, Nagaon, Assam


The environment and the Energy usage policy of the Khagarijan College, Nagaon, Assam is mainly based on the usage of energy in a systematic way so as to minimize the environmental impact. The environment and energy policy of the college implies to explore the possibilities of renewable energy resources to reduce the financial burden of the institutions and to sustain the environment balance coping with energy crisis.

The growing demand for energy and its crisis at the same time has bound everyone to think alternatively about energy consumption and its usages. Hence, the energy and environmental policy document of the college in a binding for its stakeholders and to the various activities undertaken by the institution. By doing so, the institution will oblige to save the energy consumption and simultaneously contribute to the environment by reducing the level of impact as part of its commitment. For the awareness about energy consumption and savings, the college will organise demonstration/workshop/seminar etc. for its stakeholders. The Youth Club and Green Club, comprises by the students, aimed to create awareness about the environmental preservation.

Policy Guidelines

- To count Co2 emission level generated by the activities of the institution.
- To measure the energy usage level and its impact on the surrounding areas.
- To balance the air pollution by maintaining a Green campus initiatives.
- To install the solar plant as part of the energy saving policy.
- To install the LED bulb in the entire campus of the college to reduce the energy usage.
- To adopt a systematic waste management policy/mechanism
- To adopt plantation programme for reducing Co2 emission level.
- To install rain water harvesting unit

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- 
- To adopt a policy environment friendly vehicles for reducing emission level.
 - To ensure the availability of the resources to improve the energy savings policy.
 - To monitor the emerging environmental and energy issues by generating knowledge among its stakeholders.
 - To mobilise its stakeholders to engage in the institution initiatives.
 - The institution will strive to practice ecological responsibility focused on the preservation of its natural grasslands and landscape.
 - The college will conduct Energy and environmental audit to assess the usage of electricity by different assets of the institution.
 - To develop a policy for segregation of the electronic waste and dispose the same to the proper government agencies.
 - The institution will completely ban on single use plastics within the campus.



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ENERGY AUDIT

2021-2022



Prepared by

Internal Quality Assurance Cell

KHAGARIJAN COLLEGE, NAGAON: ASSAM

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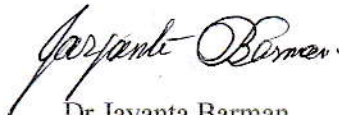
ENERGY AUDIT 2021-2022

Khagarijan College


Nagaon, Assam



Certified by:


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ACKNOWLEDGEMENTS



The Internal Energy Audit Evaluation Committee offers due gratitude to the Principal of Khagarijan College for assigning this important task of Energy Audit upon the selected group of individuals. The committee expresses due gratitude to:

- Khagarijan College Management Committee
- Principal of the Khagarijan College – Dr. Ramesh Nath
- Vice-Principal of the Khagarijan College – Dr. Jonaram Nath
- IQAC Co-Ordinator of Khagarijan College – Dr. Rameswar Kurmi
- External Energy Audit Evaluator
- Faculty members of Khagarijan College
- Office Staff members of Khagarijan College

We also offer due credit and heartfelt gratitude to all who helped us carry out this vital exercise and gave all necessary inputs. We are also thankful to all the members who were actively involved while collecting the data, conducting field measurements, tabulating the data and analyzing the same.

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INTRODUCTION



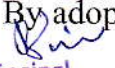
Energy is one of the very essential aspects and basic requirements that influence survival. In the contemporary scenario it has become such a resource that can dictate matters of development and growth in almost all sectors. At present it is a vital factor that balances the goal for sustainable lifestyle along with kickstarting the long road to further development. However, the unbalanced and uncertain use or more like over consumption of energy gravely impacts not only the sustainability of the resource but also affects the environment with detrimental consequences.

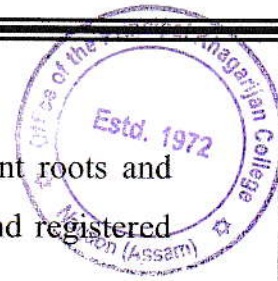
As defined by Energy Conservation Act, 2001, Energy auditing refers to “the verification, monitoring and analysis of the use of energy including submission of technical reports containing recommendations for improving energy efficiency with cost benefit analysis”. Energy Auditing aims to understand the usage and calculate the same with reference to necessary guidelines. It becomes an important process to gauge the range of energy consumption by an organization with respect to its discrete functions. This is done by reading the energy input with its use.

The aim of this report is to contribute to the larger picture of energy consumption by analyzing the usage of the institution and throwing light on the scopes of conservation by carefully calibrating the consumption to a stable level. This report is our mite in contributing to the larger picture of effective energy management and conservation. Thereby energy auditing is a continuous process so as to contribute to the betterment of the future in a sustainable manner.

OVERVIEW OF KHAGARIJAN COLLEGE

Khagarijan College is one of the premier institutions of higher education in Nagaon district, Assam; a splendid temple of learning in sylvan surroundings. The college was established in September 1972. The word “Khagarijan” prestigiously displays the original name of Nagaon. The ‘Putakollongjan’ flows behind the college, branching off from the river Kollong. ‘Jan’ is a type of rivulet. ‘Khagari’ refers to a type of long reed that grows along the banks of rivers. The two words ‘Jan’ and ‘Khagari’ joined together give the ancient name of Nagaon, ‘Khagarijan’, which has been kept alive by this institution. By adopting


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the name, Khagarijan, the college has succeeded in rejuvenating the ancient roots and heritage of Nagaon town. The college is affiliated to Gauhati University and registered under 2(F) and 12(B) of University Grants Commission Act, 1956.

Since its inception, the college has been a beacon by guarding the cause of education and moral upliftment of the students. Pursuit of knowledge, has all along been the avowed objective of the institution and it has justified its existence despite a lot of obstacles standing in its way. Apart from dissemination of knowledge, the college aims to generate new values; relevant for the new generation of society.


The College, with a dedicated teaching and administrative staff makes an assiduous effort to prepare the students for a good career; to face the stark realities of life and help them build up character and personality to become responsible citizens of the country. It is a matter of pride that innumerable students have come to the college and left the campus after receiving their desired degrees, and they have made their marks in different levels of social, political and academic life.

OBJECTIVES

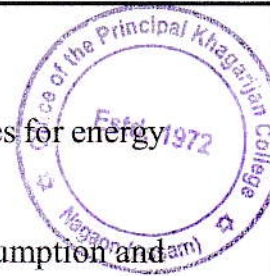
Energy Audit aims at analyzing the consumption of energy and its usage. As per the Energy Audit Manual of the Energy Management Centre, Government of Assam, the primary objective of energy audit is to determine “ways to reduce energy consumption per unit of product output or to lower operation costs”.

The specific objectives are:

- To identify the inefficient or inadequate management of energy usage in the campus.
- To improve upon the identified areas so as to better manage energy conservation


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- To identify other scopes in the campus to bring forth innovative measures for energy conservation.
- To assess the overall performance of the college regarding energy consumption and usage.



METHODOLOGY

The task of this audit undertaken by Khagarijan College is to identify the energy usage pattern and figure out areas with scope for improvement so as to recommend an action plan for proper management of the same.

The energy audit was conducted during summer and winter season, so as to review the data of energy usage and identify conservation opportunity. The methodology keeps track of the following:

- 1) Inventory of various electrical load
- 2) Study of the APDCL bills to work out the average cost of power.
- 3) Identification of various energy conservation measures and opportunities.
- 4) Review of Awareness programmes if any for optimum use of electricity as well as its saving.
- 5) Review of implemented non-conventional energy installation and applications in college campus as well as its quantification.

The Method used for Energy Audit is a Preliminary Audit. A Preliminary audit uses existing data to scrutinize the existing energy consumption patterns extensively and identify the areas for improvement.

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SYSTEMS STUDIED DURING ENERGY AUDIT




- Lighting fixtures in the campus have been physically verified and recorded.
- The implemented usage of non-conventional energy installation and applications in college have been reviewed.
- Electricity bills from APDCL are verified and analyzed to work out the cost of power.
- Awareness programmes regarding proper usage of electricity and energy conservation if any are reviewed as an important initiative of the college towards the goal of sustainable energy use.
- Any innovative strategy or method used for catering to energy conservation have been reviewed and analyzed to understand the efforts of the college.

ENERGY AUDIT TEAM

Internal Energy Audit Committee

1. Chairman: Dr Ramesh Nath, Principal, Khagarijan College, Nagaon, Assam
2. Convenor: Ms. Rupali Talukdar, Assistant Professor, Dept of Economics
3. Members: Ms. Bichitra Pegu, Assistant Professor, Dept of Education
Ms. Jharna Morang, Assistant Professor, Dept of Political Science
Ms. Maitreyee Dutta, Assistant Professor, Dept of English


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External Audit Evaluators

1. Debabrata Debnath,
HOD and Associate Professor,
Dept of Physics, Dhing College
Dhing, Nagaon

2. Mridul Kumar Bora,
Junior Engineer,
PWD, Nagaon Electrical Subdivision
Nagaon

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 and analysis
- Validation

Data analysis

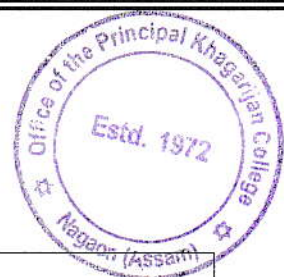
The gathered data was then quantified and separated according to the following criteria:

- Energy consumption by end use
- Estimated energy use block-wise
- Consumption equipment-wis


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Energy Audit Process and Schedule

Date: 18/06/2022



TIME	PROGRAMME
10:00 AM	Welcome and briefing by Principal and others
10:30 AM	Visit to the departments by the members
11:00 AM	Visit to academic building, administrative building, and physical verification of other infrastructure
12:30 PM	Interaction with Management and other staff of the college
2:00 PM	Tabulation of Data

Energy Audit Process and Schedule

Date: 25/06/2022


TIME	PROGRAMME
10:00 AM	Welcome and briefing by Principal and others
10:30 AM	Visit to the departments by the members
11:00 AM	Visit to academic building, administrative building, and physical verification of other infrastructure
12:30 PM	Interaction with Management and other staff of the college
2:00 PM	Tabulation of Data

After the two-day verification, the Energy Audit Report was submitted to the College Authority

DATA ANALYSIS

Table 1: Estimated energy consumption in KWH during summer

Items	Number	Power in W/item	TIME consumed (In hours)	Days	TOTAL Power consumption in KWH
Tube light	97+10 used	20	4	24	19.2
LED	194+131 used	12	2	24	75.45
Ceiling Fan	150+71 used	60	3	24	306
Exhaust Fan	8	35	0.5	24	3.36


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AC	4	1000	4	24	384
Freeze	4	250	0.5	24	12
Computer	30+38 used	200	2	24	364.80
Printer	9	30	0.5	24	3.24
Xerox machine	3	2000	0.5	24	72
TV	2	40	1	24	1.92
Aqua guard	8	100	0.5	24	9.6
Inverter	8	1500	1	24	288
Water Motor	4	746	0.5	24	35.808
CCTV	40	50	24	30	1440
100 W LED	7	100	10	30	210
Total					3225.378

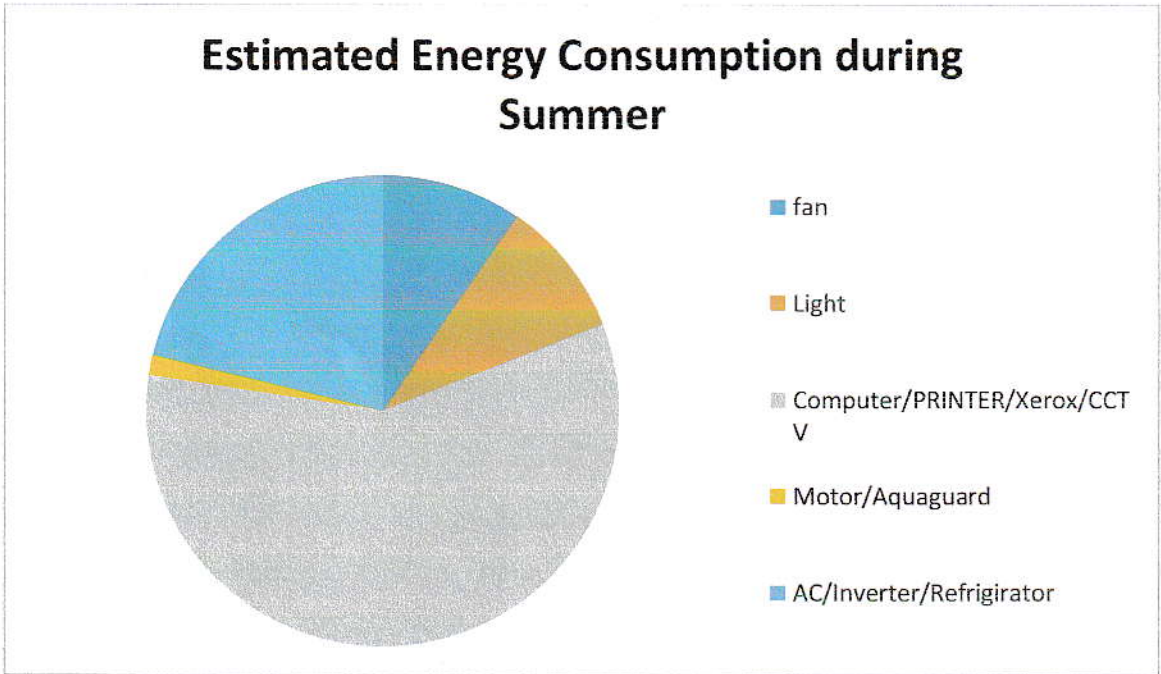



Fig 1: Energy consumption use (summer)


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Table 2: Estimated energy consumption in KWH during winter



Items	Number	Power in W/item	TIME consumed (In hours)	Days	TOTAL Power consumption in KWH
Tube light	97+10 used	20	4	24	19.2
LED	194+131 used	12	2	24	75.45
Ceiling Fan	150+71 used	60		24	0
Exhaust Fan	8	35	0.5	24	3.36
AC	4	1000		24	0
Freeze	4	250	0.5	24	12
Computer	30+38 used	200	2	24	364.80
Printer	9	30	0.5	24	3.24
Xerox machine	3	2000	0.5	24	72
TV	2	40	1	24	1.92
Aquaguard	8	100	0.5	24	9.6
Inverter	8	1500	1	24	288
Water Motor	4	746	0.5	24	35.808
CCTV	40	50	24	30	1440
100 W LED	7	100	10	30	210
Total					2535.378


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Estimated energy consumption during winter

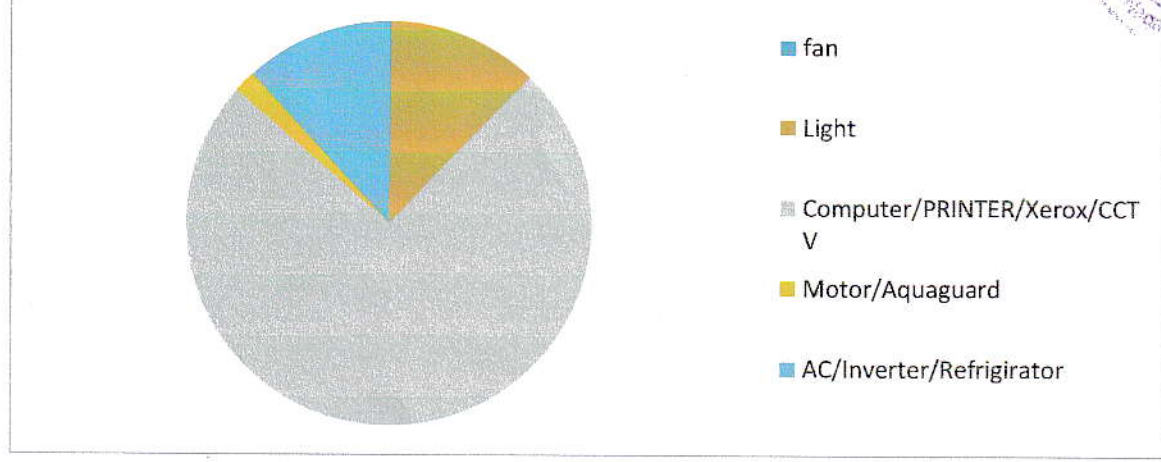


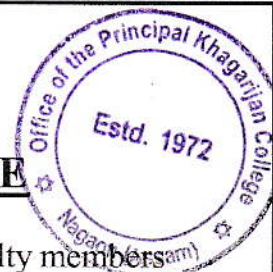
Fig 2: Energy consumption by and use (winter)

FINDINGS AND RECOMMENDATION OF THE AUDIT

Findings	Recommendation
The electrical wirings of many buildings were found to be old and inefficient	Need to replace old electrical cables with newer alternatives.
There seems 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 in vacant rooms.	Students and staffs should be encouraged constantly to use energy judiciously. Posters and pamphlets should be distributed and notices about saving energy should be posted in notice boards throughout the campus.
Many departments still use bulbs causing heavy power loss.	Filament bulbs and CFLs should be replaced with LEDs.
AC, Refrigerators and freezers used in many departments use obsolete technology and hence cause power loss.	Gadgets and equipment should be repaired and/or replaced with latest ones to save energy (with five-star rating).
It is noticed that resistive regulators are used in many rooms of the college.	Resistive regulators should be replaced by electronic regulators.
It is noticed that desktops are mostly used in the college.	Desktops must be replaced by laptops to save energy.

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POSITIVE INITIATIVES OF THE COLLEGE



1. It is commendable that the college organizes initiatives to aware faculty members and the students regarding energy conservation. Awareness Programme on Rising Energy Demand: Deforestation and Climate Change was conducted by IQAC, Khagarijan College on 03/01/22 to spread awareness about the dangers of rising energy demands. Hands on Training session regarding "Energy Saving" has been conducted by IQAC, Khagarijan College, Nagaon, Assam on 28/05/2022 in collaboration with Nagaon Solar House where proper management of energy usage and measures to reduce energy wastage were demonstrated by the Resource Person initiating a wave of discussion and awareness regarding the same.
2. The college has taken a step towards going green by using two solar lights to illuminate the grounds.

AREAS OF IMPROVEMENT


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 large numbers of indicators on boards.
3. Proper lighting facilities in classrooms.
4. Increase awareness among students and bearers.

Scopes for Saving Energy

This study could identify the following scopes for saving energy in the campus:


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- Updating of technologies in laboratory equipment.
- Replacing old electrical cables.
- Replacing tube lights with LEDs.
- Ensuring even lighting facilities in all class rooms.
- Turning off electrical equipment when not in use.
- False ceilings in classroom for maintaining optimum room temperature
- Using computers and electronic equipment in power saving mode.
- Establishment of solar panels.

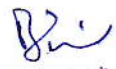
Immediate areas of improvement

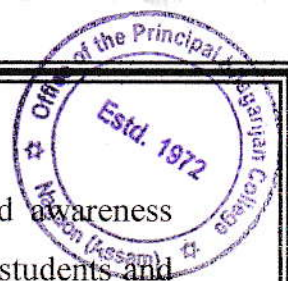
Based on the study, the following areas were identified as those requiring immediate improvement:

1. Replacing tubes with LEDs
2. Repairing and updating laboratory equipment
3. Encouraging students and staff to switch off electrical instrument.

CONCLUSION

The Energy Audit of Khagarijan College has been successfully concluded after thorough examination of all the aspects specified in the Objective of this Audit. Various scope for improvement like replacing old wirings, filament bulbs and tubes have been proposed as recommendation by the committee. Furthermore, a master switch can be installed at a prominent place which can be directly supervised by the HOD/supervising staff so as to help avoid power wastage in closed rooms. Also, a well-prepared electrical wiring plan for the campus, would help to identify unused points and conduct re-wiring.


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points and conduct re-wiring. Beyond the sessions organized to spread awareness regarding energy conservation, further training /lecture sessions for both students and staff should be included for better comprehension. If everyone ensures switching off lights, fans and electrical instrument that are not in use, roughly 10% of energy saving is possible. An Instruction cum Request Sign board can be displayed near each switch-board, to influence and guide the user thus arresting misuse and wastage of power. While the college has begun to use solar energy, there is much scope for improvement and increase in solar energy usage.

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