

ENERGY AUDIT REPORT (2023-2024)



**GOVERNMENT GENERAL DEGREE COLLEGE LALGARH
JHARGRAM, WEST BENGAL**

**CONSULTRAIN MANAGEMENT SERVICES,
LAKE ROAD, KOLKATA**

**TROPICAL INSTITUTE OF EARTH AND
ENVIRONMENTAL RESEARCH (TIEER),
MEDINIPUR**

CONSULTRAIN MANAGEMENT SERVICE
Lake Road, Kolkata, West Bengal, India



TROPICAL INSTITUTE OF EARTH AND
ENVIRONMENTAL RESEARCH (TIEER)

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ENERGY AUDIT CERTIFICATE

Academic Year: 2023-2024

This is to certify that Government General Degree College Lalgah, Jhargram, West Bengal has good and healthy eco-friendly environment created for saving Earth and Nature. Tropical Institute of Earth and Environmental Research associated with Consultrain Management Service are satisfied after rapid Energy Audit with moral support of Honorable Principal, IQAC Team, Staff and Students for academic year 2023-2024. This efforts taken by Faculties and Students towards environment and sustainable are highly appreciable and commendable.

(Dr. Binoy Kr. Chanda)
President, TIEER

(Dr. Pranab Sahoo)
Asst. Professor &
Secretary, TIEER

(Mrs. Sanchita Bhattachariya)
ISO-Auditor & CEO, CMS

(Mr. Ananda Kr. Das)
Expert & Member,
TIEER

ACKNOWLEDGEMENT

We, The Energy Audit Team thank the management of Government General Degree College, Lalgarh, Jhargram West Bengal for assigning us such an important work on Energy Audit. We appreciate the cooperation to our team for the assigned study, giving us necessary inputs to carry out audit activities.

Our special thanks to:

- ❖ Principal of the College*
- ❖ IQAC Members*
- ❖ Teaching & supporting staff*

ENERGY AUDIT : 2023-24

This Audit has been conducted by a Committee constituted by the Experts & Scientists from different reputed Institutes. The Committee developed a questionnaire for audit based on the regulatory & statutory requirements of Central as well State. The basic data was gathered & compiled, which the committee analyzed. By and large, the audit reveals a healthy environment inside the Lalgarh Government General Degree College campus. The committee has suggested short term as well as long-term suggestions for improved environmental conditions about energy efficiency to a higher levels and authorities and all stakeholders of the College conforms that they will give due attention and utilize opportunities for identified improvements. The Committee members are listed below:

LIST OF EXPERTS AND SCIENTISTS

SL. No.	NAME	DESIGNATION	AREA IN INTEREST
1.	Dr. Binoy Kr. Chanda	President, TIEER & Former IC, VU	Environment Science & Climatology
2.	Dr. Pranab Sahoo	Secretary, TIEER & Assistant Professor and HOD, Dept of Geography, S.B. Mahavidyalaya, Kapgari	Climate Change and Environment Management and Biogeography
3.	Mrs. Sanchita Bhattachariya	Consultant, Consultrain Management services, Kolkata, & Member, TIEER, ISO-9001,14001&50001Cerfied Auditor.	Environment Management
4.	Dr. Sudipta Maiti	Faulty, Dept. of Botany, Raja N.L. Khan Womens' College, Midnapore	Plants Diversity & Carbon stocking, Green Management
5.	Dr. Chandan Karan	Faculty, Dept. of Geography, Seva Bharati Mahavidyalaya, Kapgari, W.B.	Land use Survey, Ecology and Map Designer
6.	Dr. Mrinmoy Ghorai	Assistant Professor in Zoology, Panskura Banomali college.	Fauna & Aqua animals and Biodiversity conservation
7.	Sri Ananda Das	Asst. Teacher & expert	Electro physics
8.	Sri Sarat Chatterjee	Surveyor	Water and Air Quality Measurement
9.	Sri Sanjib Mahata	Surveyor & Expert in RS &GIS	Map Designer
10.	Sri Soumitra Patra	M.Tech in Agriculture and surveyor	Micro irrigation technology and water management
11.	Mrs Sumita Swar	Surveyor and Expert ENVS	Waste and Environment Management

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CHAPTER-1.0 INTRODUCTION

1.1 INTRODUCTION OF THE ENERGY AUDIT

Energy Audit is a process of systematic, documented, periodic and objective evaluation of components of Energy sources with the aim of safeguarding the environment and natural resources in its operations. The process starts with systematic identification, quantification, recording, reporting and analysis of components of Energy sources in the university. Energy auditing is a means of assessing environmental performance (Welford, 2002). It is as systematic, documented, periodic, and objective review by regulated entities of facility operations and practices related to meeting environmental requirements (EPA, 2003).



survey of Lalgarh Govt. College
Mahala Guri, Medinipur Division 721504
India
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Entrance of Lalgarh Government General Degree College premises

1.2 OBJECTIVES AND VIEWS OF ENERGY AUDITING:

The objectives of Energy Auditing are to assess a resource and fossil fuel utilization aids effective learning and provides a learning Resource management.

- To study of interrelationship between beneficiary and environment in the University campus
- To Establish to provide basis for improved sustainability
- To Recognize the cost saving methods through energy minimizing and managing
- To Financial savings through a reduction in resource use
- To Develop of ownership, personal and social responsibility for the University and its environment and resource

1.3 ADVANTAGES AND FAVOR OF ENERGY AUDIT:

- To develop to more efficient resource management
- To provide basis for improved sustainability
- To create a GHG free campus



Meeting with Hon'ble Principal & IQAC Team

About the College :

The project of setting up a Government General Degree College at Lalgarh was taken in 2012 and it was established in the year 2014 the Govt. of West Bengal's aim to spread higher education among the less oriented areas of Junglemahal. It is one of the four govt. colleges that saw its opening in these areas of Western parts of Paschim Medinipur. The college was inaugurated by Hon'ble Chief Minister Smt. Mamata Banerjee on 14th July, 2014.

Welcome to Lalgarh Government College! The college is built on the wonderfully scenic environment along the river Kansaboti and is surrounded by lush green paddy fields. The college is built covering almost six acres of lands comprising two buildings: one, the main building having the office of the college and class rooms and the other, the Student's Activity Centre having two separate common rooms for the boys and girls, the Students' Union room and the college canteen and one hall room for assembly purposes. Construction activities are still going on in some parts the college.

As an active and throbbing teaching-learning community the college is committed to the mission of unearthing the latent possibilities and intellectual potentialities of the pupil of the area to enable them to culminate all the virtues of worthy and responsible citizens, who must carry out their duties to their society, state and nation uninterruptedly in their respective future life.



survey of Lalgarh Govt. College
Medinipur, Medinipur Division 721516
India
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02:22pm

Introducing of The Principal, Government General Degree College at Lalgarh, Jhargram,
West Bengal

Vision & Mission of the College :

Mission Statement

Government General Degree College, Lalgarh, nestled in the heart of Junglemahal, is committed to transcending the conventional paradigms of education to irrigate the arid intellectual landscapes of this economically challenged region. Our mission is to serve as a beacon of enlightenment, extending the transformative power of higher education to the underserved and underprivileged sections of society. With a steadfast dedication to inclusivity and excellence, we aspire to cultivate an environment where learning is not merely a transmission of knowledge but a holistic journey towards personal and communal upliftment.

We are dedicated to:

1. **Empowering Minds:** Provide equitable access to quality education, enabling students to overcome socio-economic barriers and achieve academic excellence.
2. **Fostering Intellectual Curiosity:** Encourage a spirit of inquiry and critical thinking, guiding students to explore and innovate beyond the confines of traditional syllabi.
3. **Holistic Development:** Promote the all-round development of students by integrating academic rigor with co-curricular and extracurricular activities.
4. **Community Engagement:** Instill a sense of social responsibility and encourage students to contribute positively to the local community and beyond.
5. **Sustainable Educational Practices:** Implement sustainable educational methodologies that are adaptable and resilient, ensuring long-term benefits for students and society.

Vision Statement

Our vision is to emerge as a distinguished center of learning, where education transcends the boundaries of classrooms and textbooks, fostering an enlightened and equitable society. We envision Government General Degree College, Lalgarh as a crucible of knowledge and wisdom, where students are nurtured to realize their fullest potential and equipped to contribute meaningfully to the world.

1. **Academic Excellence:** Strive to achieve the highest standards of academic excellence, providing a robust curriculum that is responsive to the evolving needs of society and the global landscape.
2. **Innovative Pedagogy:** Embrace innovative teaching methodologies that cater to diverse learning styles and foster a culture of continuous improvement and lifelong learning.
3. **Cultural and Intellectual Diversity:** Celebrate and promote cultural and intellectual diversity, creating an inclusive environment where every student feels valued and respected.
4. **Leadership and Professionalism:** Develop future leaders and professionals who are not only academically proficient but also possess strong ethical values, integrity, and a commitment to social justice.
5. **Research and Development:** Encourage a strong emphasis on research and development, fostering a spirit of innovation and discovery that contributes to the advancement of knowledge and societal progress.
6. **Global Perspective:** Equip students with a global perspective, preparing them to navigate and excel in an interconnected and dynamic world.

Core Values

1. **Inclusivity:** Ensuring that every student, regardless of their socio-economic background, has access to quality education and the opportunity to succeed.
2. **Integrity:** Upholding the highest standards of honesty, ethics, and transparency in all our endeavors.
3. **Excellence:** Striving for excellence in teaching, learning, and research, and continuously seeking to improve and innovate.
4. **Community:** Fostering a strong sense of community and social responsibility, encouraging students to engage with and contribute to their local and global communities.
5. **Sustainability:** Promoting sustainable practices in education and beyond, ensuring that our impact is positive and enduring.

Strategic Goals

1. **Enhanced Learning Environment:** Develop state-of-the-art facilities and resources that provide a conducive environment for learning and personal growth.
2. **Faculty Development:** Invest in the continuous professional development of our faculty, ensuring they are equipped with the latest pedagogical skills and knowledge.
3. **Student Support Services:** Strengthen student support services, including counseling, mentoring, and career guidance, to ensure the holistic well-being and success of our students.
4. **Collaborations and Partnerships:** Forge strategic partnerships with academic institutions, industry, and community organizations to enhance educational and career opportunities for our students.
5. **Research Initiatives:** Promote and support research initiatives that address local, national, and global challenges, fostering a culture of inquiry and innovation.
6. **Alumni Engagement:** Build a robust alumni network that contributes to the growth and development of the college and its students.

In conclusion, Government General Degree College, Lalgarh is more than an educational institution; it is a catalyst for change, an incubator of dreams, and a harbinger of hope. We invite all stakeholders—students, faculty, parents, and the community—to join us in our mission to irrigate the deserts of deprivation with the waters of knowledge and wisdom. Together, we shall forge a path towards a brighter, more equitable future, where education serves as the cornerstone of societal transformation and national strength.

Come, let us step into this noble militia of sustainable educational development, hand in hand, heart to heart, and stride towards a horizon of endless possibilities and shared prosperity.

General Information :

Total area of the college campus – 6.4 acres,
Building area: 0.62 acres,
Green & Vegetated area: 3.47 acres.
Play Ground & Vacant land area: 2.31 acre
Water Bodies area: 0.02acre
Departments: 11 (Under Graduate)
Laboratories: 3
Students: 952
Teaching & Non-teaching staff: 33
Others stakeholder: 2
Total Stake holders: 987



Table 1 Area Coverage of the College Campus

Area Coverage of College Premises	Area in Percentage
Building and Construction	9.66
Vegetation Cover	54.04
Playground and Fallow land	36.00
Water Bodies	0.30

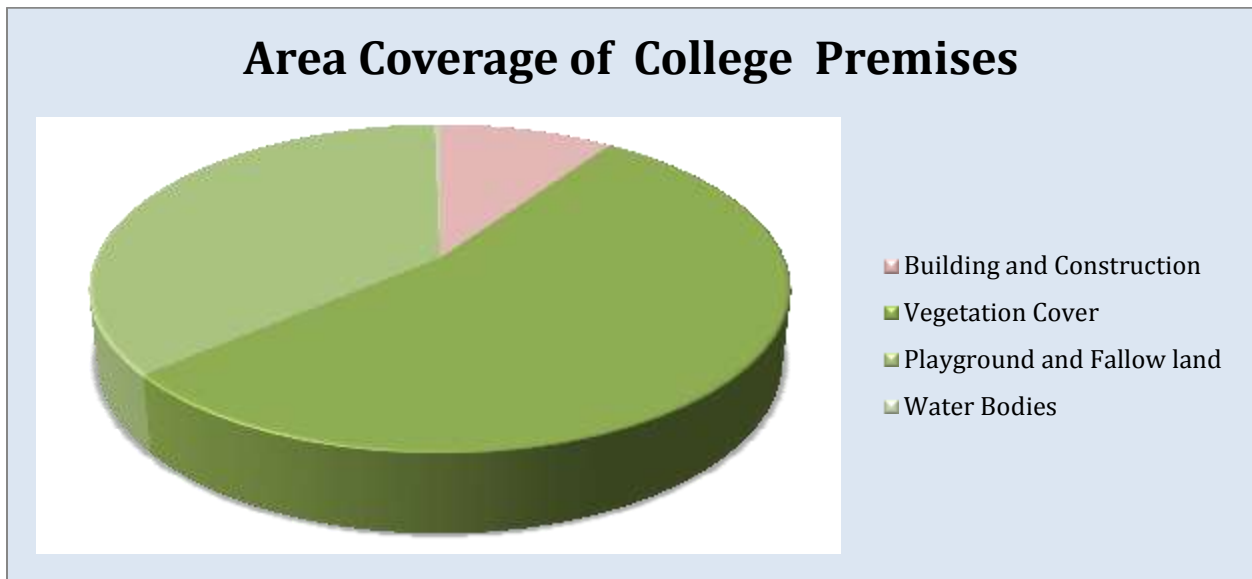
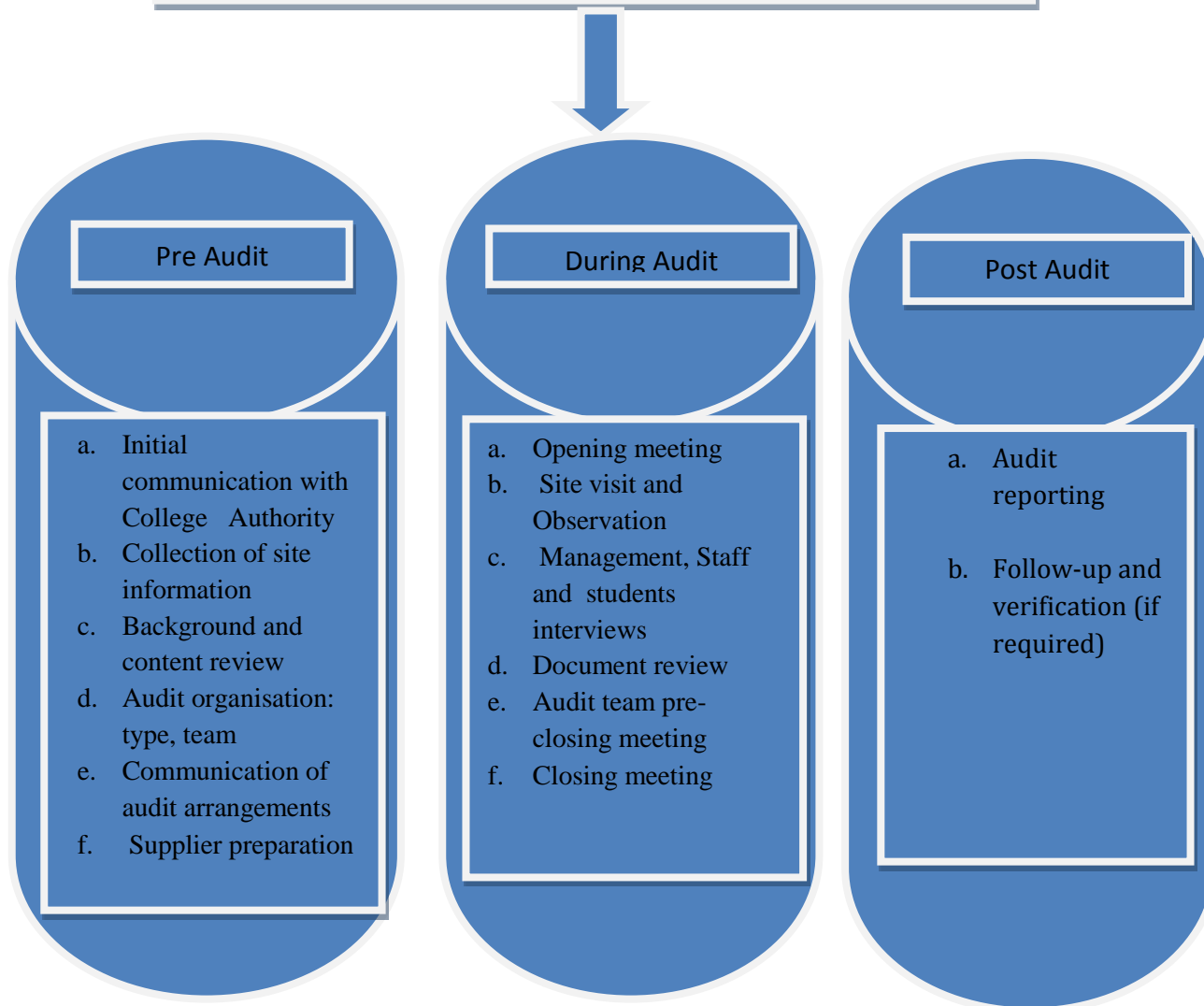


Fig. 1 Area Coverage of College Premises

CHAPTER – 2.0 METHODOLOGY AND SURVEY SCHEDULES

Flow Chart of Methodology for Auditing



2.1 ADVANTAGES OF ENERGY AUDIT:

- To develop to more efficient resource management
- To provide basis for improved sustainability
- To create a GHG free campus
- Recognize the cost saving methods through Energy minimizing and Managing
- Energy auditing should become a valuable tool in the management and monitoring of environmental and sustainable development Programs of the College.

2.2 SITE VISIT :

College and its premises were visited and analyzed by the audit-teams several times to gather information. Campus trees were counted and identified. Medicinal garden, play grounds, All Department, office rooms and parking grounds were also visited to collect data. Number and type of vehicles used by the stakeholders were counted and fuel consumption for each vehicle was verified with the user. Leakage of a few water taps and over flow tanks were noticed during the site inspection.

2.3 QUESTIONNAIRE FOR ENERGY AUDIT:

Survey Form for data collection

1. List ways that you use energy in your College. (Electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others).
2. Electricity bill amount for the last three year
3. Amount paid for LPG cylinders for last one year
4. Also mention the amount spent for petrol/diesel/ others for generators?
5. Are there any energy saving methods employed in your College? If yes, please specify. If no, suggest some.
6. How much money does your College spend on energy such as electricity, gas, etc. in a month.
7. How many CFL bulbs has your College installed? Mention use (Hours used/day for how many days in a month)
8. Energy used by each bulb per month? (for example- 60 watt bulb x 4 hours x number of bulbs = kwh).
9. How many LED bulbs are used in your College ? Mention the use (Hours used/day for how many days in a month)
10. Energy used by each bulb per month? (kwh).
11. How many incandescent (tungsten) bulbs have your College installed?
12. Mentions use (Hours used/day for how many days in a month)
13. Energy used by each bulb per month? (kwh).
14. How many fans are installed in your College? Mention use (Hours used/day for how many days in a month)
15. Energy used by each fan per month? (kwh)
16. How many air conditioners are installed in your College? Mention use (Hours used/day, for how many day in a month)
17. Energy used by each air conditioner per month? (kwh).
18. How much electrical equipment including weighing balance are installed your College?
19. Mention the use (Hours used/day for how many days in a month)
20. Energy used by each electrical equipment per month? (kwh).
21. How many computers are there in your College ? Mention the use (Hours used/day for how many days in a month)
22. Energy used by each computer per month? (kwh)
23. How many photocopiers are installed by your College? Mention use (Hours used/day for how many days in a month).
24. How many cooling apparatuses are in installed in your College? Mention use(Hours used day for how many days in a month)

25. Energy used by each cooling apparatus per month? (kwh)Mention use (Hours used/day for how many days in a month)
26. Energy used by each photocopier per month? (kwh) Mention the use(Hours used/day for how many days in a month)how many inverters your College installed? Mentions use (Hours used/day for how many days in a month)
27. Energy used by each inverter per month? (kwh)
28. How many electrical equipment are used in different labs of your College? Mention the use (Hours used/day for how many days in a month)
29. Energy used by each equipment per month? (kwh)
30. How many heaters are used in the canteen of your College? Mention the use (hours used per day for how many days in a month)
31. Energy used by each TV per month? (kwh)
32. Any other item that uses energy (Please write the energy used per month) Mention the use (Hours used per day for how many days in a month)
33. Are any alternative energy sources/nonconventional energy sources employed / installed in your College? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.
34. Do you run switch off drills at College?
35. Are your computers and other equipment put on power-saving mode?
36. Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby mode most of the time? If yes, how many hours?
37. What are the energy conservation methods adapted by your College?
38. How many boards displayed for saving energy awareness?



Source of conventional Energy

CHAPTER 3.0 : AUDIT STAGE

3.1 CAMPUS OBSERVATION AND ENQUIRY

Energy audit forms part of a resource management process. Although they are individual events, the real value of energy audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy, pollution and also economic efficiency. All these indicators are assessed in process of Energy Auditing of educational institute". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and integrate environmental considerations into all contracts and services considered to have significant environmental impacts.

The Audit covered the following major areas:

1. Sources of Energy
2. Consumption of Energy
3. Cost of Energy
4. Measurement of Emission of GHGs
5. Energy Efficiency and Energy Management

3.2 GROUPING AND STRATEGY

The following groups were formed with specific target areas and end users assigned.

Group 1: Lighting and fans in Administrative building

Group 2: Lighting and fans in Departments (All departments, offices, class rooms and labs)

Group 3: Lighting common area – Covering Street lights, corridors, grounds

Group 4: Room air conditioners in Principal Chamber, departments and labs

Group 5: Enquiry of total energy cost from Power Office

Group 6: Water Pumps in the entire campus

The groups are allowed the use of various measuring instruments to assist in the auditing activity. Also, cooperation of the Electrical Maintenance Section was sought to collect past data and for taking measurements.



Uses of Conventional energy in Smart class room



Uses of Conventional energy in Lab

3.3 Energy Efficiency and Energy Management:

a Energy sources	Sources of Energy: Conventional Electricity & Diesel	
b.	Energy consumption	The useable energy is Conventional. The used Electricity energy is 30661 units which costing is Rs.2.44Lakh/-, The Maximum energy is consumed for Light & Fan and Computer Section amounting to 64% of total consumption.

Table-2 Source of Energy in Percentage

Source of Energy	In Percentage
Conventional	100
Non -Conventional	0

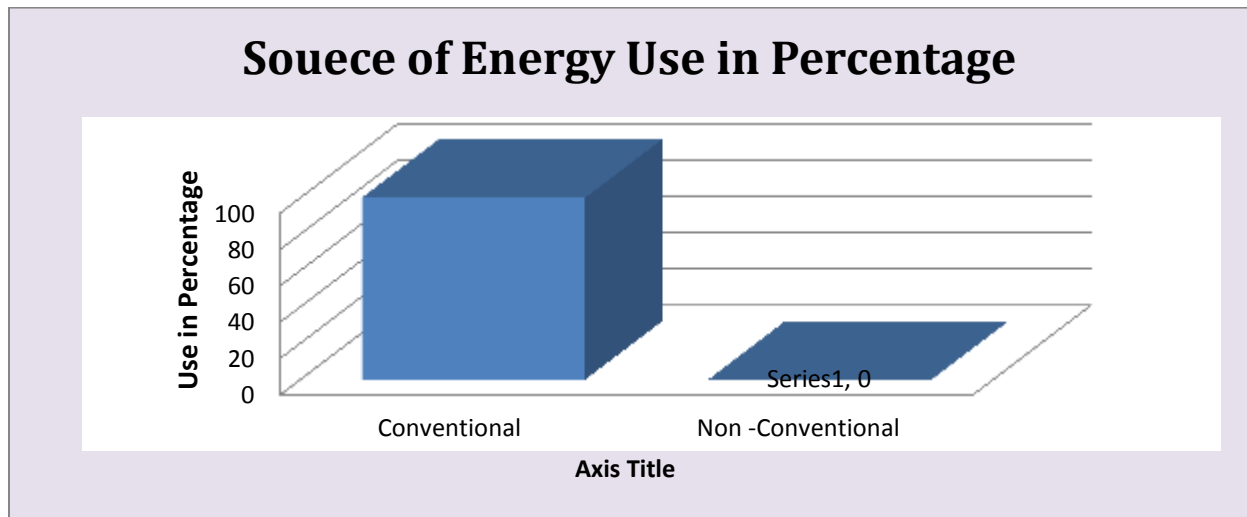


Fig. 2 Use of Energy in Percentage

Table-3 Energy Consumption in different Purpose in Percentage

Energy Consumption in different Purpose	In Percentage
Light and Fans	38
AC	16
Computer, Laptop and Printer	15
Pump	12
Refrigerator	8
Xerox Machine	7
Others	4

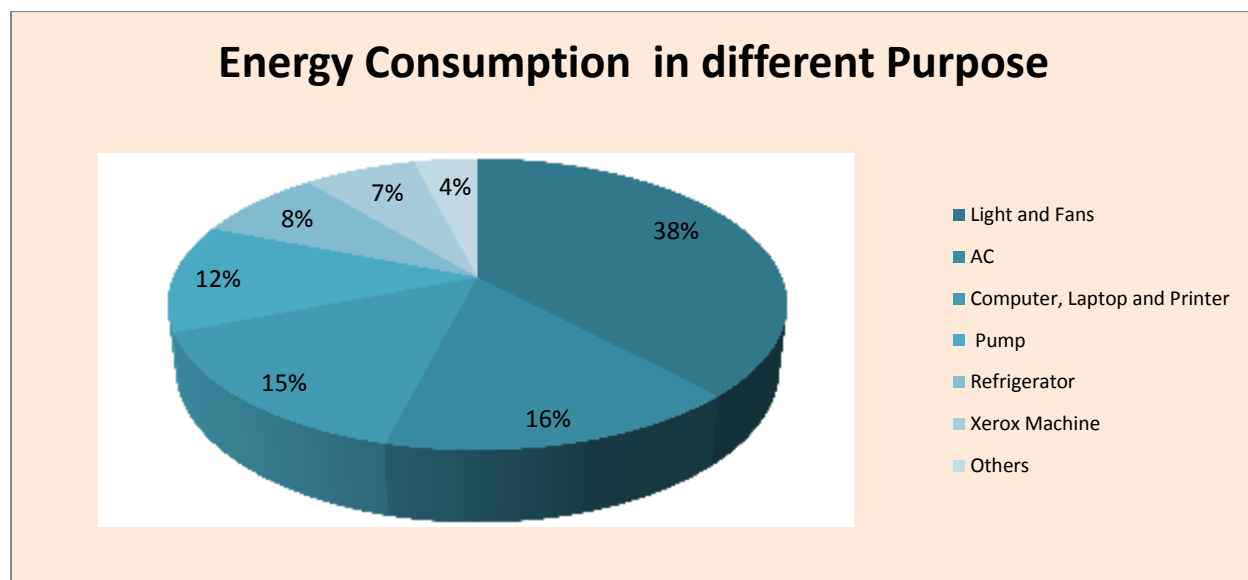


Fig. 3 Percentage of Energy Consumption in different Purpose

3.3 ENQUIRY OF DIFFERENT SOURCES OF ENERGY :

Recommendations:

- I. a) Installation of automatic lights with sensors can be considered.
- II. b) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing wherein equipment's with star rating; those using eco-friendly materials; those with safe disposal policy or return to supplier after unused, can be considered.

- III. c) Notices/ signage can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all Departments & Sectors when not in use.
- IV. d) Use of large percentage renewable energy should be considered.

b. Energy-

- a) ❖ Electricity Consumption – 30661 Unit (Conventional). Rs. 2.44 Lakh Per Year
- b) Conventional energy- 30661 Unit
- c) Payable cost of electricity – 2.44 Lakh Per Year
- ❖ Fossil fuel consumption per Year: 50 Liter
- ❖ Number of Green Generators - 1Unit
- ❖ Cost of fuel for Generator – Rs. 4500/- Year

Energy Audit and Assessment

Sl. No.	Object and Parameter	Observation and Finding
1	Source of energy (conventional)	100%
2	Total consumption of Electric Power	97016 Units
3	The maximum use of Electric Power	Conventional - 100%
4	Maximum energy consumption in the purpose	Light & Fan- 47768 unit
5	Energy Consumption in Computer & Lab.	14113.96 unit
6	Amount of diesel used for green generator	100 liter
7	No. of Computers and use of energy	21(11 Unit/Day)
8	No. of AC and use of energy	6 (9 Unit/Day)

Energy consumption in different purpose, 2022-23		
1.	Lights & Fans	14113.96unit
2.	Air Condition	5942.72 unit
3.	Computer & Dept. Lab	5571.30unit
4.	Lifting of water(HP pump)	4457.04 unit
5.	Refrigerator	2971.36 unit
6.	Xerox Machine	2599.94 unit
7.	Others(CCTV,TV, water cooler & others)	1485.68 unit

CHAPTER 4.0 POST AUDIT STAGE

4.1 ENERGY COST SUMMARY

- a) Electricity Consumption – 37142 Unit (Conventional). Rs. 195000/- Per Year
- b) Conventional energy- 37142 Unit
- c) Payable cost of electricity – 195000/- Per Year
- d) Fossil fuel consumption per Year: Diesel used for green Generator- 100 liter
- e) Number of Green Generators - 1Unit
- f) Cost of fuel for Generator – Rs. 3000/-Month

4.2 CONCLUSION AND RECOMMENDATIONS

- Most of the time, all the tube lights in a class room are kept **ON**, even though, there is sufficient light level near the window opening.
- In such cases, the light row near the window may be kept **OFF**.
- All projectors to be kept OFF or in idle mode if there will be no presentation slides.
- All computers to have power saving settings to turn **off** monitors and hard discs, say after 10 minutes/30 minutes.
- All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like lights, fans, computers and projectors.
- Installation of more solar panels and other renewable energy sources.
- Conduct more save energy awareness programs for students and staff.
- Replace old computers and LED monitors.
- More energy efficient fans, tubes and bulb should be replaced.
- Observe a power saving day every year.
- Automatic power switch off systems may be introduced.

4.3 ENERGY CONSERVATION PROPOSALS

Providing Energy Saver Circuit to the Air Conditioners. The energy saver circuits for the air conditioners, intelligently reduces the operating hours of the compressors either by timing or temperature difference logic without affecting the human comfort. This can save around 15% to 30% of the electricity depending on the weather conditions and temperature settings. It is Recommended that the old air conditioners are being replaced with new energy efficient BEE STAR labeled (3 Star and above) air conditioners in a phased manner. Considering the average compressor ON Time, 5h/day

Proposal for Air Conditioner-

- Electricity Consumption – 37142 Unit (Conventional). Rs. 195000/- Per Year
- Yearly electricity consumption = 37142 Unit (Conventional). Rs. 195000/- Per Year
- Air Condition= 5942.72 unit / year
- Considering a saving of 15%, total annual savings = 15% X 5942.72 unit/ year
= 891.41 kWh/year/ air conditioner Cost of electricity = Rs. 6700/-/year
- Yearly savings = Rs. 6700/-/year air conditioner
