

REPORT OF ENERGY AUDIT

Submitted to

CENTRE OF EXCELLENCE, GOVT.

COLLEGE SANJAULI,

SHIMLA-6 (H.P)

SESSION : 2024-25

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Introduction

Energy is the fundamental driving force behind the academic, administrative, and infrastructural functioning of a college campus. From classrooms, laboratories, libraries, and hostels to administrative offices and support services, efficient and reliable energy utilization is essential for ensuring uninterrupted academic activities and a conducive learning environment. In the present era, characterized by escalating energy costs, rapid technological advancement, and increasing environmental challenges such as climate change and resource depletion, institutions of higher education carry a collective responsibility to adopt sustainable, efficient, and environmentally conscious energy practices.

An Energy Audit is a systematic, scientific, and comprehensive assessment of energy consumption patterns within an institution. Its primary objective is to identify opportunities for energy conservation and efficiency enhancement without adversely affecting academic output, operational efficiency, or comfort levels. The audit examines how energy is generated, distributed, and utilized across different facilities of the campus, thereby enabling informed decision-making regarding energy management and optimization.

The process of energy auditing involves a detailed study of energy flows in various buildings and departments to detect areas of excessive consumption, energy losses, and operational inefficiencies. It evaluates the performance of electrical systems, lighting, heating, ventilation, air conditioning, and other energy-consuming equipment. Based on these observations, the audit provides practical, technically feasible, and cost-effective recommendations for optimizing energy use through improved technologies, efficient operational practices, regular maintenance, and adoption of renewable energy sources. By reducing avoidable energy wastage, the audit not only results in significant financial savings but also contributes meaningfully to lowering the institution's carbon footprint.

For an academic institution, an energy audit serves as a strategic tool for long-term energy management planning. It supports preventive maintenance, quality control of electrical and utility systems, and promotes optimal utilization of available resources. Moreover, the audit plays a vital role in fostering awareness and responsible energy-use behavior among students, faculty, and non-teaching staff. Such awareness-building initiatives encourage active participation of stakeholders in energy conservation efforts, thereby strengthening the institution's sustainability culture.

The outcomes of an energy audit extend beyond cost reduction. They assist in improving indoor environmental quality, enhancing safety standards, increasing equipment lifespan, and creating a comfortable and eco-friendly campus atmosphere. Importantly, the audit aligns institutional practices with national and global sustainability goals, including energy efficiency, renewable energy adoption, and environmental stewardship.

Overall, the energy audit provides a forward-looking and action-oriented framework for achieving energy efficiency, cost optimization, and sustainable campus development. It reinforces the institution's commitment to responsible governance, environmental consciousness, and long-term sustainability, thereby positioning the college as a proactive contributor to sustainable development in the higher education sector.

Observations of the Energy Audit (Session 2024–25)

During the academic session 2024–25, the Energy Audit Team conducted a detailed review of electricity consumption across various departments, academic blocks, and the boys' hostel, with special reference to monthly electricity bills. The analysis of billing data reflects clear seasonal variations as well as the impact of energy-use patterns on campus.

The **college electricity bills** show a moderate level of consumption during the summer months of April and June 2024, amounting to ₹22,876 and ₹21,295 respectively. A noticeable rise in electricity expenditure is observed from September 2024 onwards, with a significant increase during October (₹69,759), November (₹59,367), December (₹61,600), and January 2025 (₹71,980). This upward trend corresponds with increased academic activity, extended working hours, greater use of lighting, heating, and office equipment during the winter months.

Similarly, the **hostel electricity bills** indicate higher consumption during months of increased residential occupancy and seasonal demand. While July and August 2024 recorded comparatively lower bills (₹29,796 and ₹13,000), a steady rise is evident from September 2024, culminating in the highest expenditure in January 2025 (₹68,027). This reflects increased use of room heaters, geysers, and lighting during colder months, along with higher student presence in the hostel.

The audit team observed that the continued use of **LED lighting systems**, energy-efficient electrical appliances, and awareness among staff and students has helped in controlling excessive energy wastage despite increased demand. The previously installed **solar power system** continues to supplement grid electricity and plays a supportive role in reducing overall dependency on conventional power sources, especially during daylight hours.

Overall, the energy audit observations for 2024–25 indicate that while electricity consumption naturally increases during peak academic and winter periods, the institution's sustained focus on energy-efficient practices has contributed to responsible energy management. The audit recommends further strengthening of renewable energy utilization, periodic monitoring of hostel energy use, and continued sensitization of students and staff to promote a culture of energy conservation on campus.

Table 1: Hostel Electricity Bills (Session 2024–25)

S. No.	Month & Year	Electricity Bill Amount (₹)
1	April 2024	52,222 ✓
2	June 2024	43,769 ✓
3	July 2024	29,796 ^p
4	August 2024	13,000 ✓
5	September 2024	21,446 ✓
6	October 2024	25,458 ✓
7	November 2024	44,543 ✓
8	January 2025	68,027 _x

Table 2: College Electricity Bills (Session 2024–25)

S. No.	Month & Year	Electricity Bill Amount (₹)
1	April 2024	22,876 ✓
2	June 2024	21,295 ✓
3	August 2024	20,140 ✓
4	September 2024	42,020 ✓
5	October 2024	69,759 ✓
6	November 2024	59,367 ✓
7	December 2024	61,600 ✓
8	January 2025	71,980 ✓
9	February 2025	32,080 ✓

Table 1: Hostel Electricity Bills (Session 2024-2025)

Sr.No	Consumer ID	Month & Year	Electricity Bill Amount
1	100008001555	April-2024	11315
2	100008001555	May-2024	0
3	100008001555	June-2024	21331
4	100008001555	July-2024	20627
5	100008001555	Aug-2024	20140
6	100008001555	Sep-2024	42019
7	100008001555	Oct-2024	63699
8	100008001555	Nov-2024	57341
9	100008001555	Dec-2024	67037
10	100008001555	Jan-2025	71980
11	100008001555	Feb-2025	32080
12	100008001555	Mar-2025	71060
		Total	478629

Table 1: Hostel Electricity Bills (Session 2024-2025)

Sr.No	Consumer ID	Month & Year	Electricity Bill Amount
1	100003018549	April-2024	59126
2	100003018549	May-2024	43858
3	100003018549	June-2024	32038
4	100003018549	July-2024	9292
5	100003018549	Aug-2024	9846
6	100003018549	Sep-2024	21299
7	100003018549	Oct-2024	22432
8	100003018549	Nov-2024	44165
9	100003018549	Dec-2024	59793
10	100003018549	Jan-2025	61892
11	100003018549	Feb-2025	10574
12	100003018549	Mar-2025	46314
		Total	420629

Different committees in the departments of Physics, Mathematics, Chemistry, Zoology, Geography, BCA, B.Voc, have been formed to check that judicious use of electricity is being done in each departments and these committees do visit various departments for frequent checkups. The details of such committees are as following.

Energy Club Cum Internal Audit Team (Department of Chemistry):

S.No	Name	Class	Contact number
1	AAYUSHI	Bsc 2nd year	8894904241
2	SWAPNIL SURYAN	Bsc 2nd year	8894489717

Internal Committee Members:

S.No	Name	Contact No.
1	Prof. Shalu Chauhan	9418560226
2	Prof. Reeta Chandel	9418149705
3	Dr. Yogesh Kumar	9418452005

Energy Club Cum Internal Audit Team (Department of Mathematics):

S.No	Name	Class	Contact number
1	POONAM	BA 2nd year	8091203253
2	LAKSHAY SHARMA	B.sc 2nd year	9015201750
3	Nikhil Bundel	B.sc 2nd year	6230246589

Internal Committee Members:

S.No	Name	Contact No.
1	Dr Girish Kapoor	9817116343
2	Dr Anjana Sharma	9817115030
3	Dr Poonam Sharma	7018219469

Energy Club Cum Internal Audit Team (Department of Physics):

S.No	Name	Class	Contact number
1	Prerana Thakur	B.sc 2nd year	7807637679
2	LAKSHAY SHARMA	B.sc 2nd year	9015201750
3	Pranshul Thakur	B.sc 2nd year	6230934077

Internal Committee Members:

S.No	Name	Contact No.
1	Dr Kirti Singha	7018358537
2	Prof. Anuj Sharma	9816037344

Energy Club Cum Internal Audit Team (Department of B.Voc):

S.No	Name	Class	Contact number
1	ARYAN	B.Voc 2 ND YEAR	8580430954
2	Ankita Thakur	B.Voc 2 ND YEAR	9805461783
3	SAKSHI	B.Voc 2 ND YEAR	8091792130

Internal Committee Members:

S.No	Name	Contact No.
1	Mrs. Uma Kanwar	8091200080
2	Mr. Pankaj Verma	9805059222

Energy Club Cum Internal Audit Team (Department of Commerce):

S.No	Name	Class	Contact number
1	PRIYANKA	B.com 2nd year	8091215450
2	Chetan Sharma	B.com 2nd year	8628044356
3	GAURI	B.com 2nd year	7876224519

Internal Committee Members:

S.No	Name	Contact No.
1	Dr Rajinder Singh	973629816
2	Prof. Anupam Verma	7018922301
3	Dr Reena Thakur	9816952972

Energy Club Cum Internal Audit Team (Department of B.C.A):

S.No	Name	Class	Contact number
1	Sachit Verma	B.C.A 2 ND YEAR	9015221513
2	Nivriti Sharma	B.C.A 2 ND YEAR	7876439128
3	Karan Kuthiala	B.C.A 2 ND YEAR	7807957940

Internal Committee Members:

S.No	Name	Contact No.
1	Mrs Pratiksha Chauhan	9418506580
2	Mrs Priyanka Chauhan	79418686327
3	Mrs Sheetal Chauhan	8988202538

Energy Club Cum Internal Audit Team (Department of Zoology & Botany) :

S.No	Name	Class	Contact number
1	PRAJJWAL SHARMA		8580815841
2	KARAN SHANDIL		8219265952
3	Diksha Sharma		8219771086

Internal Committee Members:

S.No	Name	Contact No.
1	Dr Minakshi	9418460610
2	Dr Shweta	7832087529
3	Porf. Deepti Gupta	9418963037
4	Dr. Sushil Sharma	9893128635

Facilities visited during the Energy Audit :

1. Administrative Block
2. Faculty Rooms
3. Class Rooms
4. Auditorium
5. Seminar Hall
6. Conference Room
7. Laboratories
8. Computer Centre
9. Hostel
10. Library
11. Campus

System studied during the Energy Audit.

- Lighting fixtures were verified physically.
- Installations of Energy efficient lighting systems were verified.
- Installations of safety systems were verified.
- Installations of power backup systems were verified.
- Electricity consumption system through bills was verified.
- The energy conservation awareness among the stakeholders for the optimum use of electricity and its saving was reviewed.

Major equipment related to electrical energy utilization

S.No.	Equipment/Utility	Quantity
1.	Tube lights	Tubes 188, Tubes (2x2) 103, Tubes (2x1) 12, Tubes (1x1) 22, Tubes (4x1) 3
2.	LED bulbs	NIL
3.	Sodium Vapor Lights	3
4.	UPS	40
5.	LCD Projectors	10
6.	Refrigerators	3
7.	R.O water facility	NIL

Dates of Installation of LED 06/11/2020 .

Dates of Installation of Solar Panels 02/03/2021 .

Quantitative and Qualitative Measurement (Energy Audit) :

S. No.	Requirement and Checklist of the Audit	Conformity (Yes/No)
1	Have internal Energy Audit procedures been developed and implemented in the organization?	Yes
2	Have programmes for the achievement of energy efficiency and conservation objectives been established and implemented as on date in the campus?	Yes
3	Has a Management Representative / Electrical Engineer / Staff-in-charge been assigned for saving on power consumption?	Yes
4	Implementation of alternative energy efficiency measures sufficient to satisfy the financial criteria of sophisticated inverters	Yes
5	Identification of the most efficient and cost-effective Energy Conservation Opportunities (ECOs) or Energy Conservation Measures (ECMs) taken by the Management	Yes
6	Are the following energy efficiency and conservation aspects considered in sufficient detail?	
6(a)	Replacement of fluorescent (tube) lights, incandescent lamps, and sodium vapor lights with CFL/LED	Yes (328)
6(b)	Availability of Uninterruptible Power Supply (UPS) and power generators for power backup in each building	Yes – UPS (38)
6(c)	Installation of solar panels, solar lights, solar water heaters, and electric water heaters	Yes – Solar Panels (2), Solar Lights (328)
6(d)	Renewable energy utilization (solar panel, wind mill) and carbon footprint considerations	Yes
6(e)	Natural / mechanical air ventilation at indoor and outdoor auditorium, stadium, seminar halls, etc.	Yes
6(f)	Display of signboards indicating Switch OFF/ON, danger signs at electrical equipment and power transformers on campus	Yes
7	Signing of MoU with Government agencies and NGOs to ensure energy conservation and efficiency in the campus	Yes
8	Conduction of awareness and outreach programs on energy conservation and energy efficiency	Yes
9	Steps taken to manage daylight utilization, AC machine heat emission, and use of eco-friendly refrigerators, etc.	Yes
10	Are all monitoring electrical equipment appropriately maintained and calibrated?	Yes

Recommendations for Improving Energy Efficiency and Energy Conservation

Based on the findings of the energy audit, the following recommendations are proposed to further strengthen energy efficiency, reduce operational costs, and promote sustainable energy practices across the college campus:

- 1. Adoption of Energy-Efficient Equipment**
During replacement or new procurement, preference should be given to **4–5 star rated energy-efficient appliances** such as LED lights, energy-efficient fans, air conditioners, laboratory equipment, and office devices to minimize electricity consumption.
- 2. Installation of Sub-Metering System**
Installation of **energy sub-meters in all academic blocks, laboratories, hostels, and administrative buildings** is recommended. This will enable building-wise energy monitoring, help identify high-consumption zones, and support data-driven energy management decisions.
- 3. Continuous Energy Monitoring and Review**
A **dedicated Energy Management Committee or Green Audit Team** may be constituted to regularly monitor, analyze, and review energy consumption patterns and recommend corrective measures.
- 4. Preventive Maintenance and Timely Replacement**
Regular preventive maintenance of electrical installations, laboratory equipment, and appliances should be ensured. Faulty or outdated equipment must be replaced promptly to prevent energy loss and safety hazards.
- 5. Promotion of Energy-Conscious Behaviour**
Faculty, staff, and students should be sensitized to **switch off lights, fans, computers, projectors, and laboratory equipment when not in use**. Display boards and reminders promoting energy conservation may be installed at strategic locations.
- 6. Use of Power-Saving Modes**
All computers and electronic devices should be operated in **power-saving or sleep mode** wherever feasible, especially in offices, libraries, and computer laboratories.
- 7. Automation and Smart Controls**
Installation of **automatic switches, occupancy sensors, and timers** in classrooms, corridors, washrooms, and common areas is recommended to avoid unnecessary power consumption.
- 8. Renewable and Alternative Energy Initiatives**
 - Installation of a **biogas plant** for hostel kitchens and canteen waste management may be explored to reduce dependence on conventional fuels.
 - Expansion and optimum utilization of **solar energy systems** for lighting, water heating, and other suitable applications may be considered.
- 9. Laboratory Energy Optimization**
Regular inspection of electrical and laboratory equipment should be conducted, and any leakage, malfunction, or inefficiency should be **immediately rectified** to ensure optimal performance.
- 10. Energy Audit and Documentation**
Periodic internal energy audits should be conducted, and detailed records of electricity consumption, savings achieved, and corrective actions taken should be maintained for continuous improvement and accreditation purposes.

11. Capacity Building and Academic Integration

The institution may introduce **value-added / non-formal / certificate / diploma courses on “Energy and Environment Management Audits”** to equip students and research scholars with practical knowledge and skills, enabling them to become **certified Lead Energy Auditors** and environmentally responsible professionals.

12. Student and Community Engagement

Students may be actively involved through **Eco Club activities, awareness campaigns, energy conservation drives, and project-based learning**, thereby fostering a culture of sustainability within the campus and the surrounding community.

Concluding Remarks by the Expert :

Considering the fact that the institution is a well-established, long-standing organization with a strong academic reputation, there exists significant scope for further energy conservation and for developing the campus into a more self-sustained and energy-efficient system. The energy conservation initiatives undertaken by the institution are appreciable and reflect a proactive approach towards sustainable practices.

The adoption of energy-efficient lighting systems, installation of LED fixtures, and utilization of solar power units across various departments have contributed substantially to reducing overall energy consumption and operational costs. The institution has also taken effective measures to ensure uninterrupted power supply through well-maintained generators and UPS systems, which are adequately secured with fencing and clearly displayed safety signboards such as “Danger” and “Warning.”

A notable strength observed during the audit is the awareness created among stakeholders regarding energy conservation. The strategic placement of instructional signboards like “Switch Off When Not in Use” across campus promotes responsible energy usage and reinforces a culture of sustainability among students, faculty, and staff.

Overall, the institution demonstrates commendable commitment towards energy management and conservation. With continued emphasis on awareness, regular monitoring, and gradual expansion of renewable energy resources, the campus has strong potential to emerge as a model green and energy-efficient institution in the region.


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