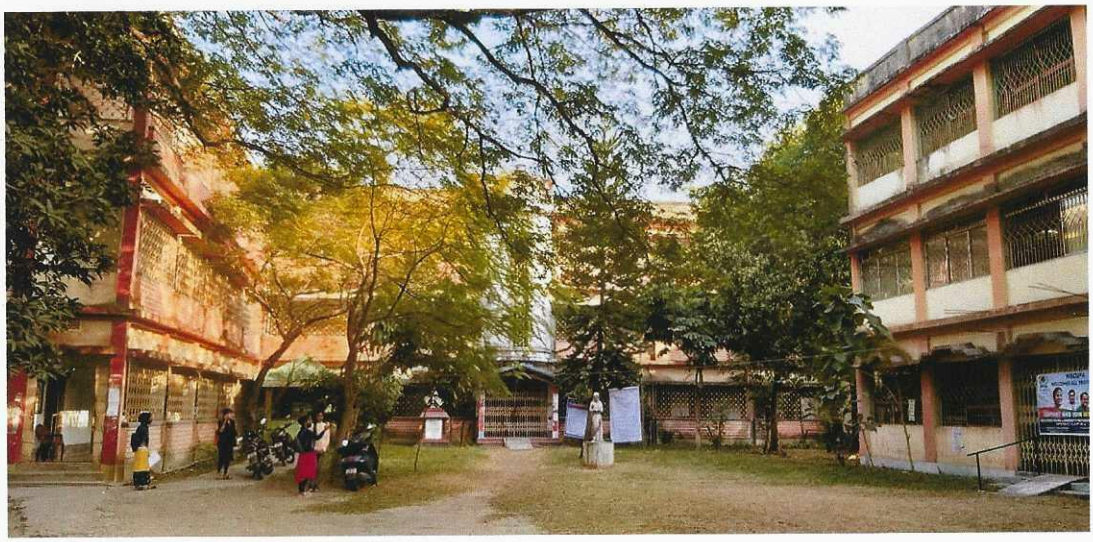
Energy Audit Report 2022-23

Of

Thakur Panchanan Mahila Mahavidyalaya



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Energy Audit of Thakur Panchanan Mahila Mahavidyalaya

(Audit Report 2022-2023)

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1. Preface

Thakur Panchanan Mahila Mahavidyalaya campus underwent an energy audit from July 1st, 2022 to June 30th, 2023. The goal was to find ways to save energy without sacrificing comfort, health, or safety. The audit team looked for energy-efficient appliances and everyday practices that could reduce overall energy use. They surveyed every classroom, lab, and other space on campus, taking note of all the electrical equipment – lights, fans, electronics, and so on. They even considered how much power each item are used to get a clear picture of the college's total electricity consumption.

2. Acknowledgement

We'd like to thank Principal Dr. Rupa Bhowmick for allowing us to conduct an energy audit on campus. We also appreciate the help of department heads, staff members, and their teams.

This report details our findings from the energy audit, including data, observations, analysis, and recommendations for different campus facilities. We identified several energy-saving opportunities (measures) that, if implemented, will lead to lasting benefits for both energy use and cost savings for the college.

We are happy to submit this detailed report and look forward to working with Dr. Bhowmick to implement the identified opportunities and recommendations.

3. Energy Audit: An Introduction

An energy audit is a great way to get a handle on your building's energy use. It's like a checkup that helps you understand where all the energy is going and how you can use it more efficiently. This can help you save money on your bills and reduce your environmental impact.

Here's what an energy audit typically involves:

- **Identifying all energy sources:** This means taking a close look at everything that uses energy in your building, from lighting and appliances to heating and cooling systems.
- **Measuring energy use:** The auditors will measure how much energy each piece of equipment is using.
  Analyzing the data: Once they have all the data, they'll analyze it to identify areas where you can save energy.
  Making recommendations: The auditors will then recommend specific steps you can take to improve your energy efficiency. These recommendations might include things like upgrading to more energy-efficient equipment, changing your operating procedures, or making changes to the building itself.

4. Why do it?

An energy audit is like a deep dive into your institution's energy use. It helps you see where you can save money by figuring out:

- How much energy you're using and where it's going.
- Areas where you're wasting energy.
- Ways to use less energy without impacting your day-to-day activities.

This audit is especially important for academic institutions because it helps them develop sustainable practices for saving energy. These practices can include:

- Keeping an eye on energy prices and supply.
- Finding the right mix of energy sources (like electricity and solar power).
- Investing in energy-saving technologies and equipment upgrades.

By doing an energy audit, campuses can become more energy-efficient, save money, and even help the environment!

5. Objectives and scope of the audit

An energy audit has two main goals:

1. **Save money:** By finding ways to use less energy, you can lower your operating costs. Think of it like finding ways to tighten your belt on energy spending.
2. **Use energy wisely:** The audit helps identify areas where you might be wasting energy and suggests ways to use it more effectively. Imagine getting the most out of every drop of energy!

The audit takes a close look at several areas to achieve these goals, including:

- **The flow of energy:** This means examining how electricity, water, lighting (including LEDs and CFLs), appliances (like copiers, computers, projectors, and cameras), pumps, and refrigerators are used throughout the building.
- **How efficiently everything is running:** The audit checks to see if equipment and buildings are using energy as effectively as possible.
- **Smart practices:** It also looks for ways to improve energy use through better planning, operation, maintenance, and keeping things clean (housekeeping).

6. Energy audit team of TPM Mahavidyalaya

Name	Designation
Dr. Rupa Bhawmick, Principal, TPMM	Chairperson
Sri Arup Guha, Environmental Activist	External member
Sri Kaushik Deb, Executive Engineer, PWD, Govt, of WB	External member
Dr. Upendra Nath Barman, Associate Professor, and Coordinator, IQAC, TPMM	Vice chairperson

7. Methodology

Step 1: Physical verification of Lighting, Ceiling/ Table and Exhaust Fans, Heaters, Generators, Uninterrupted Power Supply (UPS) machines and ventilators; load fixtures and verification of installed energy efficient system's capacities are carried out.

Step 2: Inspection of when the cost or prospective cost savings in each of the above components are considered, energy always wins, and the energy management task becomes a key cost reduction area. The energy audit assisted in better understanding how energy is used in the institution as well as identifying waste factors and development potential towards energy savings opportunities.

Step 3: Finally, after the audit process, the energy audit included suggestions for energy cost reduction, preventive maintenance and quality control activities, all of which are critical for the utility operations in the institution.

8. Experiment and data collection

The energy audit was conducted from and reviewed implementation of energy saving and conservation opportunity already identified as well as quantified it.

1) Inventory of various electrical loads.
2) Studying of bills of TPMM 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 entire campus was surveyed by the Energy Audit Team headed by Sri Arup Guha, Member of NAS Group and eminent environmental activist along with Sri Kaushik Deb, Executive Engineer, Public Works Department, Government of West Bengal. In this survey, two constituent buildings comprising of Classrooms, Library, Administrative Section and Common Areas were surveyed. In all buildings, each and every room was examined to note, the number of fans, tube lights, computer, instruments, etc. The electrical equipments that were put forth for the energy audit include practical laboratory, instruments, fans, computers and etc., for this study.

We've calculated the exact amount of connected load with respect to units consumed by each of the equipment such as, lights, fans, computers, instruments and etc., in comparison with the total requirement of electricity. We've studied all these above mentioned electrical equipment by collecting exact data from our survey. The Survey details are given elaborately, as below:

Table of data collected

	Fan (70W)	Tube light (20W)	Camera	Refrigerator	Computer	Printer	Xerox machine	Projector	Bore Well Motor	Led Bulbs	Camera Monitor	Water Purifier
Principal's Office	2	6	1	1	1	1	0	0	0	2	1	0
Office	10	12	4	0	6	2	3	0	0	2	0	0
Library	23	31	4	0	9	4	0	0	0	0	0	1
Washroom	0	0	0	0	0	0	0	0	0	7	0	0
Staff Room	2	2	0	1	2	0	0	0	0	0	0	0
Indoor Auditorium	10	12	0	0	0	0	0	1	0	2	0	0
Class Rooms	82	52	0	0	2	1	0	3	0	35	0	0
Canteen	1	1	0	0	0	0	0	0	0	0	0	0
Computer Room	3	1	0	0	0	0	0	0	0	1	0	0
Guard Room	2	1	0	0	0	0	0	0	0	0	0	0
NCC Room	1	2	0	0	1	1	0	0	0	1	0	0
IQAC Room	3	3	0	0	2	3	0	0	0	0	0	0
Passageways	4	8	10	0	0	0	0	0	2	3	0	4
Gymnasium	6	8	0	0	0	0	0	0	0	0	0	0
Common Room	4	10	0	0	0	0	0	0	0	0	0	0
Alumni Room	1	1	0	0	0	0	0	0	0	0	0	0
Total number	154	150	19	2	23	12	3	4	2	53	1	5
Connected Load	**10780**	**2820**	**396.5**	**500**	**195.5**	**300**	**4200**	**325**	**3000**	**795**	**85**	**175**

9. Current energy consumption scenario

Thakur Panchanan Mahila Mahavidyalaya, Cooch Behar uses energy in the form of electricity purchased from West Bengal State Electricity Distribution Company Limited (WBSEDCL) under Tariff Category Commercial Urban A (CM_U). The college has sanctioned load 12.4 KVA. Total billing amount has been found to be about INR 1,09,798 for 4 quarter analysis period of 2022-23. The overall average energy charges stand at INR 8.72 per unit.

- **POWER SUPPLY SYSTEM**

The power supply for the college is from WBSEDCL with the help of 430 Volts feeders under Commercial Urban A (CM_U) with sanctioned load 12.4 KVA.

- **DG Sets**

There is 1 DG set in power house. Detailed of the DG Set is given in Table below:

Sl. No.	Specifications	Tech. specs
1	Make	Kirloskar Oil Engine Ltd.
2	Rated voltage	430 V
3	Frequency	50 Hz
4	Power factor	0.95
5	Phase	3 phase

- **Electricity Bill Analysis**

Energy audit team analyzed last 4 quarter electricity bill of college. Detailed of unit Consumption, annual payable amount and annual charges are given below.

- **Quarterly electrical energy consumption (Year – 2022-23):**

1	Month and year	Total consumed units	Amount
2	Q1 (July to September)	2962	30796
3	Q2 (October to December)	3229	33636
4	Q3 (January to March)	2381	24531
5	Q4 (April to June)	2003	20835
6	Total	10575	109798

10. Results and Discussion

- **Energy Consumption Analysis**

An analysis of the energy consumption data indicated the following:

- Electricity constitutes the only energy usage, accounting for the total energy consumption.
- Fan and Lighting systems accounted for 28% of the total energy consumption, indicating potential for efficiency improvements.

- **Building Envelope**

The audit identified several areas where the building envelope can be enhanced to improve energy efficiency:

- Inadequate insulation in certain buildings leads to significant heat loss during colder months; and increased cooling demands during warmer months.
- Air leaks and drafts around windows, doors, and other openings result in energy wastage and decrease comfort levels.

- **Lighting**

Lighting systems were found to be a significant contributor to overall energy consumption. The audit highlighted the following areas for improvement:

- Outdated lighting fixtures and inefficient lamps in various buildings have been found. Also, over-illumination was found in certain areas where lighting levels exceeded recommended standards.
- A good number of CFL lamps are still found in use, which should be replaced by LED lamps.

- **Fan**

There is ample scope of improvement in this area as well, like:

- A large number of fans are old and consume more power with aging. We recommend replacing it with new energy efficient fans.
- The old regulators should be replaced by electronic regulator for managing unnecessary loss of power.

11. Suggestions and recommendations

Based on the findings of the energy audit, the following recommendations are proposed to enhance energy efficiency and reduce operational costs:

- **Building Envelope**

- Improve insulation in buildings with inadequate thermal barriers to minimize heat loss/gain.
- Seal air leaks and drafts around windows, doors, and other openings to reduce energy wastage and improve occupant comfort.

- **Behavioural Practices**

- Develop an energy awareness and conservation program to educate students, faculty, and staff about energy-saving practices.

- Encourage the college community to adopt energy-efficient behaviours, such as turning off lights and equipment when not in use.

- **Renewable Energy**

- Explore the feasibility of installing renewable energy systems, such as solar panels to generate clean energy on campus and reduce reliance on the grid.

- **Installation of LED light**

- Replace all the CFL bulbs with LED light in a phased manner to reduce energy consumption and efficient use of electricity.

12. Conclusion

In conclusion, this energy audit report highlights various opportunities for Thakur Panchanan Mahila Mahavidyalaya to enhance energy efficiency, reduce energy consumption, and achieve cost savings. Implementation of the recommended measures will not only contribute to environmental sustainability but also lead to financial benefits for the college in the long run. We encourage Thakur Panchanan Mahila Mahavidyalaya to prioritize energy efficiency initiatives and consider developing an action plan to address the recommendations outlined in this report. If you require any further information or assistance in implementing the proposed recommendations, please do not hesitate to contact us. We would be happy to provide any support necessary to help Thakur Panchanan Mahila Mahavidyalaya achieve its energy efficiency goals.

Signature of the auditors:

1. Rupa Bhawmick

Principal, TPM Mahavidyalaya and Chairperson

Principal
T.P.M. Mahavidyalaya
Cooch Behar

2. Arup Guha

Environmentalist and External Member

Hony. Secretary
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3. Kaushik Del

Executive Engineer, PWD, Cooch Behar Electrical Division and External Member

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4. Nipendra Nath Barman

Associate Professor, TPMM and Vice Chairperson/ IQAC Coordinator

IQAC
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