

ENERGY AUDIT

STUDY PERIOD (ONE YEAR) 2024 - 2025

Sustainability study

AUDIT REPORT

Studied for

Maulana Azad Education Society's

Marathwada College of Education

Dr. Rafiq Zakaria Campus, Dr. Rafiq Zakaria Marg,

Post Box No. 117, Harsul Road, Rauza Baugh,

Aurangabad – 431001 (MS), India

Studied in the capacity of

Accredited and Certified

Green Building Professional



Studied by

Email: greenviosolutions@gmail.com

Disclaimer

The study has been prepared for **Maulana Azad Education Society's Marathwada College of Education** located at Dr. Rafiq Zakaria Campus, Dr. Rafiq Zakaria Marg, Post Box No. 117, Harsul Road, Rauza Baugh, Aurangabad – 431001 (MS), India based on input data submitted by the Institute analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the internal team. The warranty or undertaking, expressed or implied is made and no responsibility is accepted in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

It is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This should not be copied or regenerated in any form.

Ar. Nahida Abdul
Greenvio Solutions



Acknowledgement

Appreciation extended to **Maulana Azad Education Society's Marathwada College of Education, Maharashtra** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are extended are due to everyone from the Management.

We are also thankful to Institute's Task force who have played a major role in data collection.

CONFIDENTIAL

Contents

Disclaimer	1
Acknowledgement.....	2
Contents	3
1. Introduction	4
2. Overview	4
3. Observation	5
4. Investigation	6
5. Documentation.....	7
6. Compliance.....	16
7. Suggestion	17
8. Compilation	19

1. Introduction

1.1 About the Institution

1.1.1 Vision

The Institute strives "To be the Centre of Excellence by providing world class 'Teacher Education' to students from all sections of the socitey."

1.1.2 Mission

The Institute's adheres:

- Envisages to impart quality training with commitment to excellence.
- Endorses to impart value added education with efficient and competent man power, excellent infrastructure and innovation in teacher training and research programmes in order to generate globally competitive and skilled teachers, researchers and torough prfessionals.

2. Overview

2.1 Summarised Populace analysis for 2024-25

2.1.1 Students data

The data (shared by Institute) shows there were 161 male; 333 female.
Thus 494 students.

2.1.2 Staff data

Sl. No.	Particulars	Male	Female	Total
1	Admin staff	5	0	5
2	Teaching staff	10	8	18
3	Non-Teaching staff	8	1	9
Total		23	09	32

Table 1: Staff data of the Institution

Above data documents 32 staff members.

Thus, total populace stands at 526 nos.

3. Observation

1 | Page

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO IA (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: ☒ Green audit ☐ Energy audit ☐ Environment audit

Institute: Marathwada College of Education Date: 17-05-2022
CSN

Document objective: Inferences of the Site visit

Observations (Positive aspects)	Suggestions (Improvement aspects)
Green Audit	
- Documentation of water facilities with maintenance information	- Dedicate following zones with documentation - Orange zone
Energy Audit	
- 20 Nos. of solar panels available on rooftop of building & maintained - Fire safety measures undertaken.	- Dedicate following zones with documentation - Green Energy zone - Danger zone
Environment Audit	
- Environmental study reflects good atmosphere - Flora is available in sufficient nos.	- Dedicate following zones with documentation - Green zone - Rooftop zone

Signature & round seal
Name:
Designation:

Signature & round seal
Name: Mrs. Shalini
Designation: Project Coordinator
For The Greenvio Solutions

Plate 1: Evidence files related to inferences

4. Investigation

The following results were carried out during visit on **17 May 2025.**

The micro-climate temperatures of the site depends upon various factor including through evapotranspiration, trees and other vegetation cool the air around them. (Reference and further edited with details from dnr.louisiana.gov)

The base temperature for thermal comfort is 24°C (75°F) – Reference study [https://www.researchgate.net/post/What is the base temperature for thermal comfort in India#:~:text=The%20base%20temperature%20for%20thermal%20comfort%20in%20India%20is,C%20\(75%C2%B0F\).](https://www.researchgate.net/post/What_is_the_base_temperature_for_thermal_comfort_in_India#:~:text=The%20base%20temperature%20for%20thermal%20comfort%20in%20India%20is,C%20(75%C2%B0F).)

S. No.	Time	Location	Result (°C)	Should be (°C)	Requires improvement
1.	10:59	Building 1 – Terrace	30	24	No
2.	11:24	Building 2 – Ground floor	30	24	No

Table 2: Results for the micro-climate temperature study

5. Documentation

Section 1 - Life safety management

5.1 Facilities study

The facilities include fire extinguishers, sand buckets etc.



Plate 2: Fire and life safety measures

Section 2 - Energy generation & expense incurred

5.2 Load distribution study

5.2.1 Categorization

The campus has EDUCATIONAL and RESIDENTIAL (Boys Hostel in common campus);

As per the bill shared the type of load can be stated is 'COMMERCIAL'

5.2.2 Primary sources of energy consumption

- ➔ **Electrical (Metered)** – Light, Fans, Equipments, Pumps comprise these sources.
- ➔ **Alternate sources of energy consumption** – There are 20 solar panels on building one rooftop.

5.2.3 Secondary sources of energy consumption

The sources are noted below:

S. No.	Detail	Nos.
1	UPS	2
2	Batteries	16
3	Solar panels	24

Table 3: Secondary sources

5.3 Technical payload study

The data related to electricity bills is documented below.

Sr. No.	Month	Year	Amount	Total units consumed with solar
1	June	2024	21,035	745
2	July	2024	20,954	726
3	August	2024	20,503	707
4	September	2024	19,793	659
5	October	2024	21,917	809
6	November	2024	16,578	419
7	December	2024	17,929	514
8	January	2025	20,165	689
9	February	2025	21,027	765
10	March	2025	28,056	1,297
11	April	2025	30,960	1,561

Table 4: Details of the electrical consumption

The observation related to above information states:

- The **total amount** spent is **Rs. 2,38,915/-**
- **Total units** consumed was **8,891 kWh (Electrical + Solar)**
- **Alternate source of energy is available through 20 solar panels**
- **The solar is connected to:**
 1. Meeting hall
 2. Coordinator room
 3. Principal cabin
 4. Computer labs
 5. Admin office
 6. Three staff rooms



Plate 3: Rooftop solar panels



Plate 4: Batteries near the rooftop solar panels



Plate 5: Solar details

Section 3 - Building safety

Certain cracks and maintenance aspects need to be undertaken.

Section 4 – Energy consumption

5.4 Calculated electrical consumption study

(Energy consumption by the electrical appliances study)

The following documentation is based on the consumption practice on a regular working day.

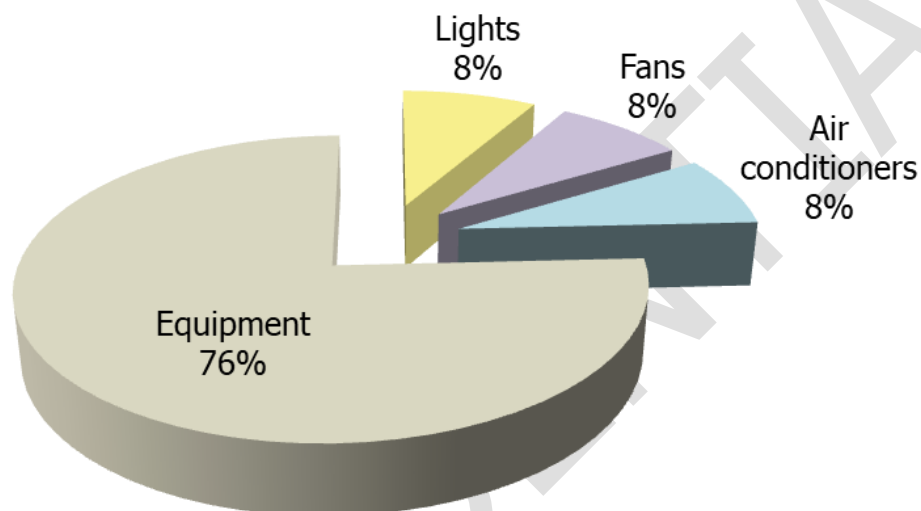


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consume 76% whereas fans, lights and air conditioners consume 8% each of total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are **144 lights on the premises**; the following table shows the various types of lights on the premises.

S. No.	Type	Nos.
1	LED lights <i>(Energy efficient appliance)</i>	79
2	Non-LED <i>(Non-Energy efficient appliance)</i>	65

Table 5: Summary of the types of lights on-premise

5.5.2 Types of lights based on the power consumption

The energy consumption of lights is **7,286 kWh** of energy.

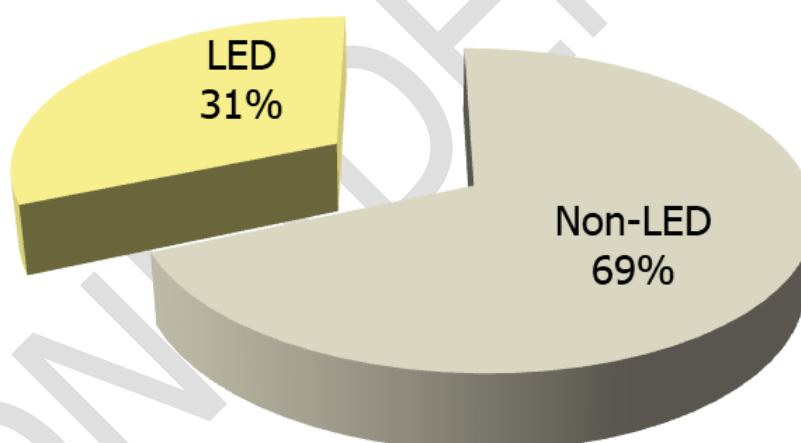


Figure 2: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on-premises shows **LED lights consume 31%** whereas the **Non-LED lights consume 69%** of the total power consumed by lights.

5.5.3 Energy efficient lighting

The premise has LED Lights to contribute to 55% in terms of number and **31% of the power requirement** is met through the same.

5.6 Fans

5.6.1 Types of fans based on the numbers

There are **107 Ceiling fans** on the premises.

5.6.2 Types of fans based on the power consumption

The energy consumption of fans is **7,042 kWh** of the energy with the Ceiling fans (Regular) consuming 100% of total power consumed by fans.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

There are **4 air conditioners** on the entire premises.

5.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **6,794 kWh** of energy.

5.8 Equipment

Only the major appliances information has been documented.

5.8.1 Types of Equipment

There are **88 nos. of equipment** in the premises.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **66,030 kWh** of energy.

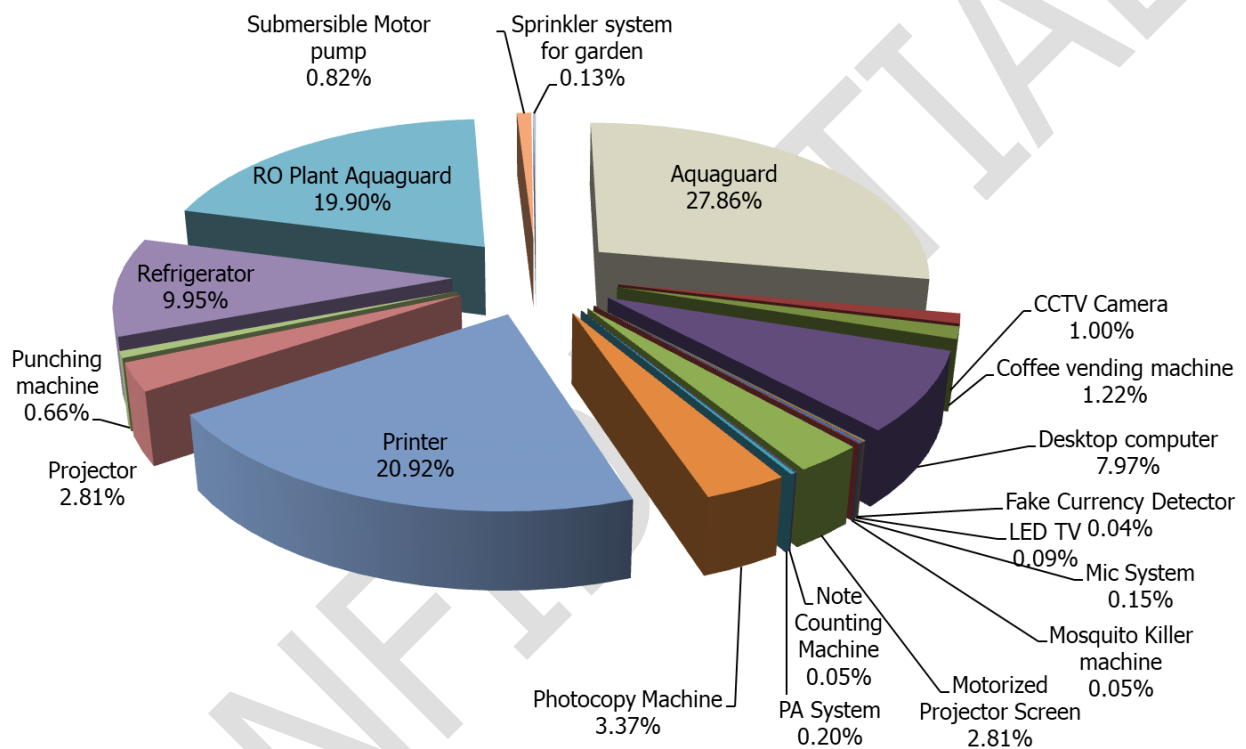


Figure 3: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that **Aquaguard consumes more energy at 27.86%** while **printer consumes 20.92%** whereas **RO Plant Aquaguard consumes 19.90%** and **Refrigerator consumes 9.95%** these are major consumers as compared to other equipment.

6. Compliance

The compliance study was carried out through investigative ways. This was done to understand extent of implementations based on previous reports.

- ➔ Original report study was for 2021-22 and 2022-23
- ➔ Renewal study currently done is one academic year starting June 2024

6.1 Compliance status in form of Action taken report

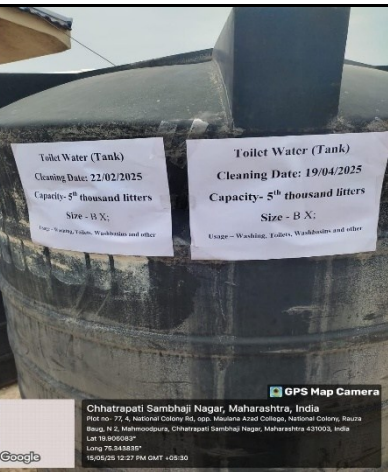
The inputs are noted next page onwards.

ACTION TAKEN REPORT

(Green/ Energy/ Environment) AUDIT

S. No.	Recommendation	Page nos. of Report	Action taken (Implemented/ Under process/ Steps to be taken)	Evidence (Geo tag photo or other)
1.	Use of LED Lights	Energy Audit-Pg.no .08	WE have installed LED lights in all the classrooms, staff rooms, office, Library etc. The photos are attached	
2.	Electronic waste	Environment-al audit	We have installed the electronic waste box in the Internship school	
3.	Water Conservation		Students daily upload saving of water on YEWS APP	
4.	Use of Separate Dustbins	Environment Audit Pg no.09	We have put dustbins of plastic and dry garbage separately in corridors	

5.	No vehicle Zone	Environment Audit pg.no 15	The notices are released from time to time to notify the students not to park the vehicles in 'No Vehicle zone'	
6	Bird feeder Installation	Green audit	The campus is made ecofriendly for different birds found in the campus	
7.	Fire Zone	pg.no. 14	Fire zone banners related with fire safety and precaution was hanged at building entrance area	
8.	Composting	pg.no. 09	The students were taught to use dried leaves of campus trees and use it for composting purpose	
9.	Workshop on Sustainable Shopping Habit	Environmental Audit	The students were asked to prepare cloth bags for shopping of vegetables, avoiding the use of plastic bags	
10.	Trash to treasure	Environmental audit pg.no 09	The waste materials were used for making the useful products, and students were involved in it.	

11	Water Conservation	pg.no.08	The students were asked to download YEWS APP of Maharashtra Govt. and upload daily the savings of water on it.	 Chhatrapati Sambhaji Nagar, Maharashtra, India N12-8-27-43, Raurs Baug, N 2, Cidco, Chhatrapati Sambhaji Nagar, Maharashtra 431003, India Lat 19.906678° Long 75.344133° 17/01/2025 01:21 PM GMT +05:30
12	Plant 4 Mother	Green Audit	The student were asked to plant one Tree and save the Mother Land	 Chhatrapati Sambhajnagar (Aurangabad), Maharashtra, India N12-8-27-43, Raurs Baug, N 2, Cidco, Chhatrapati Sambhajnagar (Aurangabad), Maharashtra 431003, India Lat 19.906678° Long 75.344133° 16/01/24 12:28 PM GMT +05:30
13	Medicinal Plantation	Environmental audit , pg.no 08	The plantation of trees was done For sustaining and maintaining Eco Friendly environment	 Aurangabad, Maharashtra, India V8Q9+8MM, Navkhanda, Aurangabad, Maharashtra 431001, India Lat 19.888189° Long 75.319801° 10/09/24 12:18 PM GMT +05:30
14	Cleaning of Water tank	Pg.no.08	The details of Water capacity, The Water tank was cleaning date was mentioned on water tank	 Chhatrapati Sambhaji Nagar, Maharashtra, India Plot No- 75.4, National Colony Rd, opp. Maulana Azad College, National Colony, Raurs Baug, N 2, Maharashtra, Chhatrapati Sambhaji Nagar, Maharashtra 431003, India Lat 19.906678° Long 75.344133° 16/01/24 12:28 PM GMT +05:30
				 Chhatrapati Sambhaji Nagar, Maharashtra, India Plot No- 75.4, National Colony Rd, opp. Maulana Azad College, National Colony, Raurs Baug, N 2, Maharashtra, Chhatrapati Sambhaji Nagar, Maharashtra 431003, India Lat 19.906678° Long 75.344133° 16/01/24 12:28 PM GMT +05:30

7. Suggestion

The suggestion (inference) would act as a 'PLAN OF ACTION' to implement all the suggestions in a detailed manner.

- ➔ Conduct the 'Before' and 'After' study with photos
- ➔ Document the same in 'Action taken report'

S. No.	Aspect with evidence if any	Suggestion
1.	Fire and Life safety aspect <u>Aspect area:</u> Signages and display for awareness	Wherever there is a fire extinguisher awareness board on 'HOW TO USE THE FIRE EXTINGUISHER?' in english and local language
2.	Fire and Life safety aspect <u>Aspect area:</u> Exposed electrical facilities	1. Many areas had lights, light points, in both blocks, if these are not working they can be removed / repaired; 2. Lights wherever extra replace with Non-LEDs 3. Cover the electrical meter areas as 'Danger zone'
3.	Energy generation <u>Aspect area:</u> Document solar facilities	There should be a display board about renewable energy with following information displayed ➔ Plant name ➔ Capacity ➔ Location ➔ Type of renewable energy system ➔ Nos. of units ➔ Installation date, month and year ➔ Energy generated per day and annually ➔ Energy consumption actual requirement per day and annually ➔ Energy saved per day and annually ➔ Last maintenance date and vendor ➔ Institute name and logo

4.	Energy consumption <u>Aspect area:</u> Capping of the wirings	Appropriate concealing and fabrication should be undertaken for these areas using cable concealers  <i>Image reference: Amazon</i>
5.	Structural safety aspect <u>Aspect area:</u> Safety signages	Include 'Restricted area ZONE' board for access near terrace area 

Table 6: Observation based suggestion study of the campus

8. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

Specific references for study related to energy

- ➞ <https://www.energy.gov/eere/buildings/zero-energy-buildings>
- ➞ <https://www.dsaarch.com/zero-net-positive-energy>
- ➞ U.S. Energy Information Administration
- ➞ <https://www.happysprout.com/inspiration/what-is-smart-gardening/>
- ➞ <https://ieeexplore.ieee.org/document/6779316>
- ➞ <https://www.murata.com/en-global/apps/industry/security/entranceandexitsystem>
- ➞ <https://www.energiguide.be/en/questions-answers/what-are-the-alternatives-to-air-conditioning/2121/>
- ➞ IGBC Green Campus rating system Abridged Reference Guide
- ➞ GEM Sustainability Certification Rating Program
- ➞ Inference study reference images
 - https://seors.unfccc.int/applications/seors/attachments/get_attachment?code=NG125PFE4WHMWSYAK8TCAKIHMWX0F4QD
 - <https://housing.com/news/smart-gardening/>
 - <https://solarpowerproject.in/solar-panels-for-parking-lots.php>

