

ENERGY AUDIT

STUDY PERIOD (TWO YEARS) 2021 - 2022 & 2022 - 2023

Sustainability study

AUDIT REPORT

Studied for

Jogeshwari Education Society's

College of Commerce, Science & Information Technology

JES Education Complex, Caves Road, Arvind Gandbhir Campus,
Jogeshwari(East), Mumbai - 400060, Maharashtra

Studied in the capacity of

Accredited and Certified

Green Building Professional



Website: <https://thegreenviosolutions.co.in/>

Email: greenviosolutions@gmail.com

Valid till **June 2024**

Disclaimer

The Audit Team has prepared this report for the **Jogeshwari Education Society's College of Commerce, Science & Information Technology** located at JES Education Complex, Caves Road, Arvind Gandbhir Campus, Jogeshwari(East), Mumbai - 400060, Maharashtra 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 by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit 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 is the property of Greenvio Solutions and should not be copied or regenerated in any form.

The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh who is as an Accredited and Certified Green Building Professional-Architect. Green Building consultancy is her forte and she is one of the most sought after names when it comes to providing excellent quality services within the stipulated time frame.

The Study is conducted in capacity of Accredited & Certified Green Building Professional with extensive experience.

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

sustainableacademe@gmail.com

Acknowledgement

The Audit Assessment Team extends its appreciation to the **Jogeshwari Education Society's College of Commerce, Science & Information Technology, 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 **Mr. Kiran Kamat (Jt. Secretary)** and everyone from the Management.

Our heartfelt thanks are extended to the Chairperson of the entire process **Dr. Prashant Shelar**, Principal for the valuable inputs.

We are also thankful to Institute's Task force the faculty members who have played a major role in data collection *Mrs. Vaishali Trivedi, Faculty and Mrs. Sunita Sharma, IQAC Coordinator.*

We highly appreciate the assistance of *Mr. Rishi Shinde & Mr. Laxman Shetty, Mrs. Jasmin Jadhav* and the **entire Teaching, Non-teaching, and Admin staff** for their support while collecting the data.

Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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DETAILED REPORT

Evidence documents for Site visit of external audit team

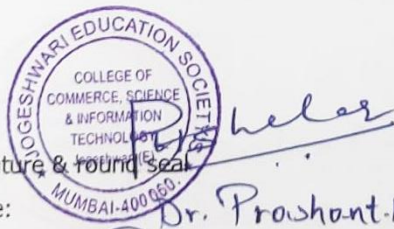
Audit team headed by external expert - Ar. Nahida Abdulla
 Accredited & Certified Green Building Professional, ISO IA (IMS)
 Audit objective: Green Building up gradation of the premises

Audits covered: Green audit Energy audit Environment audit

Institute: Jogeshwari Education Society's College of Commerce & IT Date: 15/07/2023

Document objective: Inferences of the Site visit

Observations (Positive aspects)	Suggestions (Improvement aspects)
Green Audit	
- Fire, life safety measures are undertaken	- Water & waste management could be improved
Energy Audit	
- An 100% LED [Energy efficient appliance] premises	- Alternate sources of energy can be explored
Environment Audit	
- Sufficient green cover in premises	- Documentation & reflectance should be done


 Signature & round seal
 Name: Dr. Prashant H. Shelar
 Designation: Principal
For the said Institute


 Signature & round seal
 Name: Mrs. F. A. Shaikh
 Designation: Project Coordinator
For The Greenvio Solutions

1. Introduction

1.1 Statements of the Institution

1.1.1 Vision

The Institute proposes "To channelize young minds not only towards academic goals but also towards their social responsibilities, to provide ample opportunities to nurture and sustain creative talents and multiple intelligences for the service to humanity at large."

1.1.2 Mission

The Institute adheres and focuses "To promote academic excellence & create humane, self-reliant citizens to meet the local and global challenges of the society."

1.1.3 Objectives

The objective of the Institute is:

- ⇒ To ensure a high standard of education.
- ⇒ To enrich the students "personality by encouraging their participation in curricular and extracurricular activities.
- ⇒ To promote sports culture.
- ⇒ To promote learning opportunities that are flexible and support alternative learning styles.
- ⇒ To promote positive ways of social interaction, self-confidence enabling to exchange ideas and opinions with others.
- ⇒ To cultivate organisational skills in dealing with academic and emotional problems of students.
- ⇒ To nurture the thirst for knowledge and skill in the latest innovations and technologies in education.
- ⇒ To sensitize the students towards the threatening environmental issues.
- ⇒ To inspire student to meet the challenges of dynamic society and to fulfil their role as nation builders.

1.2 Assessment of the Institute

1.2.1 Affiliation

The Institute is affiliated to **Mumbai University**, a collegiate state-owned public university in Mumbai and one of the largest university systems in the world.

1.2.2 Certification

The College has received the code under **All India Survey of Higher Education (AISHE)** wherein the code is C-33763.

1.3 Facilities

Some of the key facilities are listed below.

- Well stocked library
- Computer laboratory with latest softwares
- Conference hall
- Hygienic canteen

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were a total of **1,033 students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	01	01	02
2	Teaching staff	08	11	19
3	Non-Teaching staff	02	01	03
Total Staff Members		11	13	24

Table 1: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises had a total of **24 Staff Members**.

2.2 Summarised Populace analysis for 2021-2022

2.2.1 Students data

The data (shared by the Institute) shows there were a total of **1,014 students**.

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	01	02	03
2	Teaching staff	08	13	21
3	Non-Teaching staff	02	01	03
Total Staff Members		11	16	27

Table 2: Staff data of the Institution for 2021-2022

The staff data shows the Institute premises had a total of **27 Staff Members**.

2.3 Site Area & Institute Building Spread Area

The **site area is 1.60 acres and the built-up area is 35,000 sq. ft.**

2.4 Institute Infrastructure

2.4.1 Establishment

The Institute was established in **2009**.

2.4.2 Spatial Organisation

The Institute is located in a pollution free and healthy environment.

The Building is a Reinforced Cement Concrete (RCC) framework building.

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc.

2.5 Operation and Maintenance of the premises

The interview session and data collection session was held with the staff regarding the operation and working hours. The schedule shared by the team shows that the College is working for Monday to Saturday beginning at 07:30 hours up to 13:00 hours.

3. Research

3.1 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution sustainable and healthy premises for its inhabitants.

3.2 Analysis of the Green Building Study Audit

The procedure included detailed verification as follows:

- Investigation
- Technical discussion with team
- Observations
- Inferences

3.3 Strategy adopted for Green Building Study Audit

The strategies included data collection from the admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collection, and preparation of the Report.

3.4 Activities undertaken for the Green Building Study Audit

- Discussion with the Institute
- Allotment and Initiation by the Institute
- Data collection
- Submission of the files

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO 1A (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: Green audit Energy audit Environment audit

Institute: Jogeshwari Education Society's Date: 15/07/23
College of Commerce and IT

Document objective: Induction Meeting attendance sheet

S. No.	Name	Committee	Designation	Signature
1.	Mrs. F. A. Shaikh	External	Project Coordinator	
2.	Ar. Nahida Abdulla	External	Project Head	
3.	Prof. Sunita Sharma	Internal	IQAC Head	
4.	Ass. Prof. Vaishali Trivedi	Internal	Nature Club Head.	

Signature & round seal

Name:

Designation:

For the said Institute



Prashant H Shelar

Prashant H Shelar

Principal



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions

4. Investigation

4.1 Observations

The following points were observed during the investigation.

- **Lights** - All lights are in working conditions. There was **no fuse defect observed**.
- **Fans** - All fans are in working conditions. Windows **do not** have cracks and are caulked appropriately.
- **Air conditioners** - The Outdoor units were cleaned maintained and had **no dust collection problems**.
- **Equipment** - All equipments are in working conditions and **daily monitoring is done by the maintenance staff** and admin staff in an excellent manner.
- **General** - **No defect** was found in any appliance of electrical consumption.

4.2 Energy efficiency analysis

4.2.1 Energy efficient practices for alternative sources

Additional provisions that can be introduced in the near future are noted below:

- Solar tree
- Solar parking

4.2.2 Energy efficient equipment

- The premise has LED Lights in multiple spaces.
- The air conditioners are BEE star labelled appliances, the old ones are supposed to be replaced as and when required.
- There are no energy efficient fans in the premises.

5. Documentation

5.1 Primary sources of energy consumption

- **Electrical (Metered)** – Light, Fans, Equipments, Pumps comprise these sources.
- **Renewable energy** – There are 'NO' sources of renewable energy available in premises.

5.2 Secondary sources of energy consumption

The premise uses induction stove as source of secondary source.

5.3 Actual Electrical Consumption as per Bills

The College spends a substantial amount on electricity bills every month. However, we would like to recommend the use of alternate sources of energy to harness the electrical loads and reduce the monetary expenses.

S. No.	Month	Year	Amount	Units consumed
Academic year 1				
1	June	2021	7,703	804
2	July	2021	8,130	835
3	August	2021	8,610	888
4	September	2021	8,363	864
5	October	2021	9,199	940
6	November	2021	9,195	943
7	December	2021	11,227	1,121
8	January	2022	7,263	764
9	February	2022	11,578	1,171
10	March	2022	13,572	1,329
11	April	2022	16,650	1,616

12	May	2022	11,220	1,105
Academic year 2				
13	June	2022	10,700	1,058
14	July	2022	15,330	1,331
15	August	2022	13,540	1,183
16	September	2022	13,780	1,217
17	October	2022	13,170	1,173
18	November	2022	13,250	1,170
19	December	2022	16,909	1,425
20	January	2023	15,115	1,285
21	February	2023	18,690	1,586
22	March	2023	22,170	1,843
23	April	2023	20,540	1,696
24	May	2023	16,240	1,371

Table 3: Details of the electrical consumption

5.4 Calculated Electrical Consumption as per inventory

The electricity bills provide actual consumption data. The following is the calculated consumption. It is done to understand the percentage of energy usage in the premises by various applications. It is based on the inventory collected and interviews with the staff.

The additional data such as wattage is taken from market research. In terms of electrical consumption, the main sources are lights, fans, air conditioner, and equipment. The inventory and data collection for sources of energy consumed in the premise is summarised in the following sections.

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

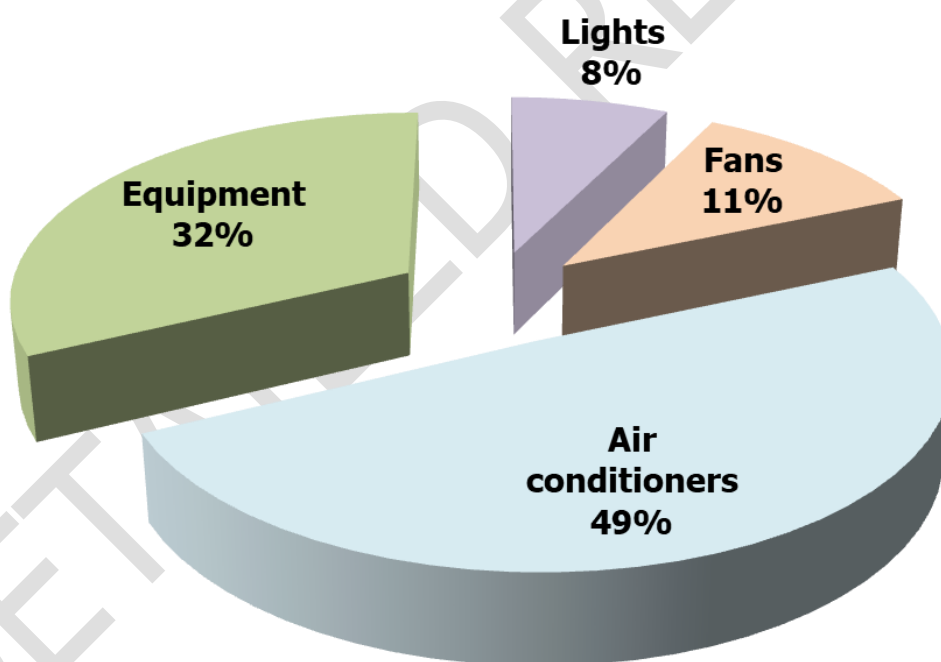


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that air conditioners consume 49% whereas the equipment consumes 32% while the fans consume 11% and the lights consume 8% of the total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are a total of **277 LED lights on the premises**; the following table shows the various types of lights on the premises.

5.5.2 Types of lights based on the power consumption

The energy consumption of lights is **11,002 kWh** of energy and the **LED lights consume 100%** of the same.

5.6 Air conditioners

5.6.1 Types of air conditioners based on the numbers

There are **12 air conditioners** on the entire premises.

5.6.2 Building-wise consumption analysis

The energy consumption of air conditioners is **73,556 kWh** of energy.

5.6.3 About the replacement of current air conditioners

The current air conditioners are well maintained. Though there is not an immediate requirement for replacement. Whenever the Institute undergoes redevelopment there can be provisions for replacement with energy-efficient appliances or new air conditioners that require less power consumption.

5.7 Fans

5.7.1 Types of fans based on the numbers

There are a total of **146 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	126
2	Large Motor exhaust fan	1
3	Wall mounted fans	19

Table 4: Summary of the types of fans in the premises

5.7.2 Types of fans based on the power consumption

The energy consumption of fans is **16,797 kWh** of the energy.

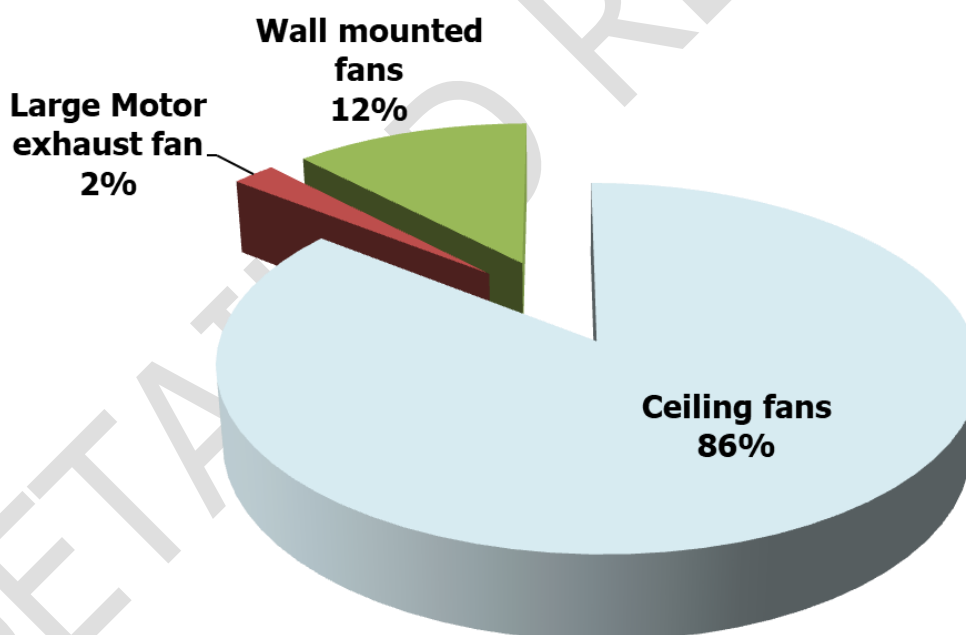


Figure 2: Types of fans based on power consumption

The above analysis shows the **ceiling fans consume 86%** whereas the **wall mounted fans consume 12%** while the **large motor exhaust fans consume 2%** of the total power.

5.8 Equipment

5.8.1 Types of Equipment

There are **127 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **48,061 kWh** of energy.

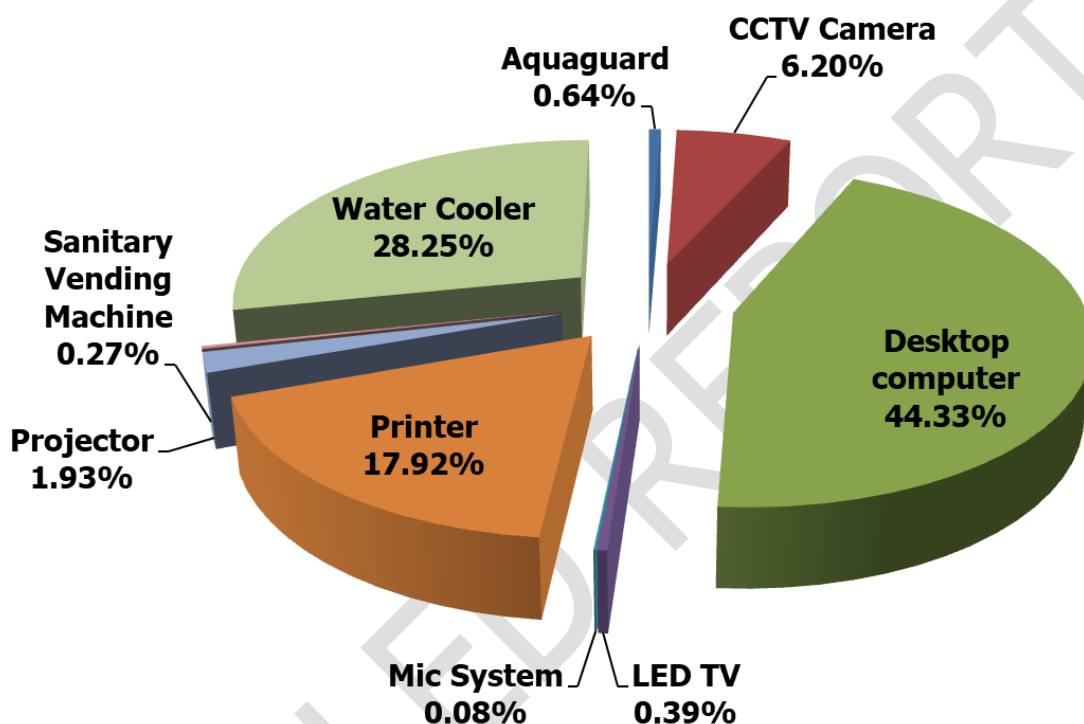


Figure 3: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows **desktop computer consumes 44.33%** while **water cooler consumes 28.25%** whereas **printer consumes 17.92%** and **CCTV camera consumes 6.20%** these are the maximum energy consumers as compared to other equipment.

6. Suggestion

6.1 Section-wise suggestions

The following suggestions **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.**

6.1.1 Electromechanical systems – Ceiling fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 45W when in use. These should be replaced with energy efficient fans consuming 14W when in use. Our technical research shows that there would be a reduction of an average of **69% reduction** in energy consumption It will be suggested to either replace these now if the Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

6.2 General suggestions

The following details are consolidated study recommendations should be **implemented within 2.5 to 3.5 years from the date of the Report submission.**

6.2.1 Alternatives towards Smart premises mechanisms

6.2.1.1 Smart gardening

The Institute can undertake a Smart Gardening system using IoT Technology. This will result in saving time by scheduling time for watering; saving money through automated water schedules tracking dampness of soil to know when, how much water garden needs.



Plate 1: Solar farm concept for the Institute (For reference purpose only)

Image source: <https://housing.com/news/smart-gardening/>

Data source: <https://www.happysprout.com/inspiration/what-is-smart-gardening/>

6.2.1.2 Facility management systems, controls

(Includes electromechanical systems – Electrical, Water)

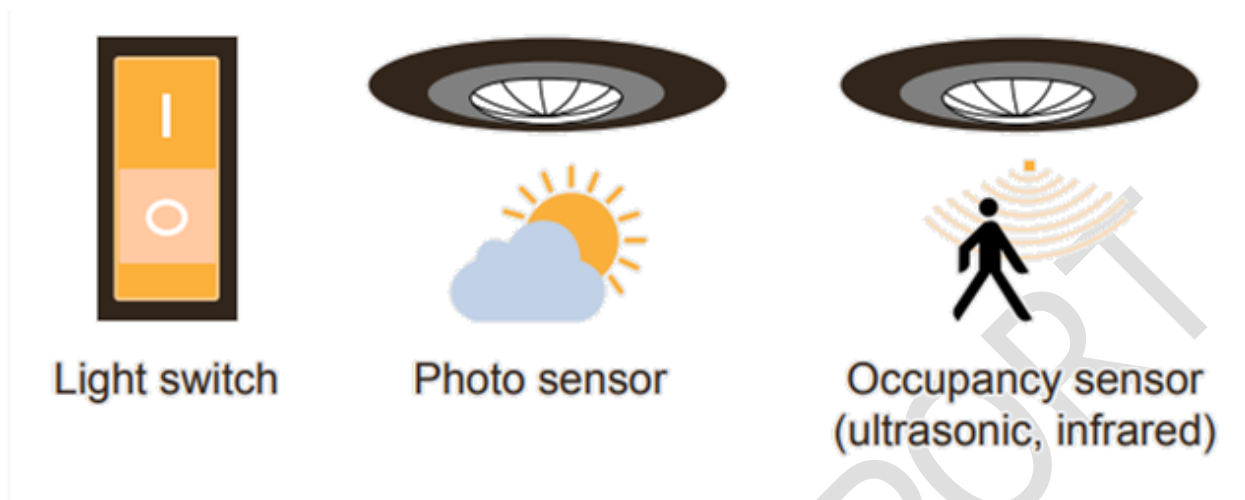


Plate 2: Understanding the lighting concepts

Source: https://seors.unfccc.int/applications/seors/attachments/get_attachment?code=NG125PFE4WHMWSYAK8TCAKIHMWX0F4QD

The above diagram provides a detailed study of how the system controls should be incorporated in the premises as far as lighting systems are considered. The suggestions for this sub-section are listed below.

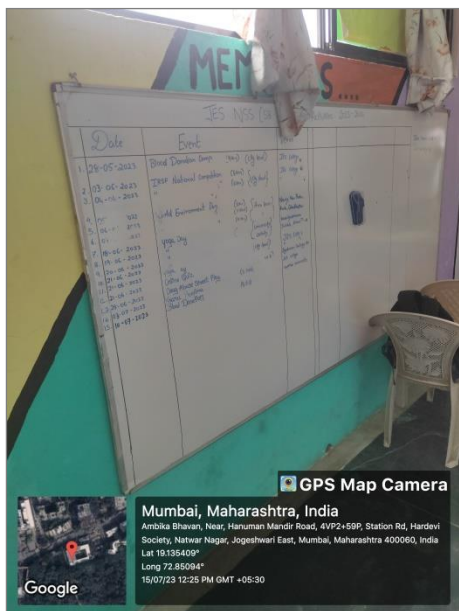
- Install PIR control of the lighting in the toilet areas.
- Install low flow taps with automatic shut off in the toilets.
- Install push button timer control in all rooms lighting and ceiling fans.
- Install Power Electronics control of the Foyer notice board lighting.
- Installation of intelligent lighting controller will help in controlling the lighting energy.
- Use of photo sensor switch for street light controlling helps in conserving the lighting energy.

On-site investigation and physical verification

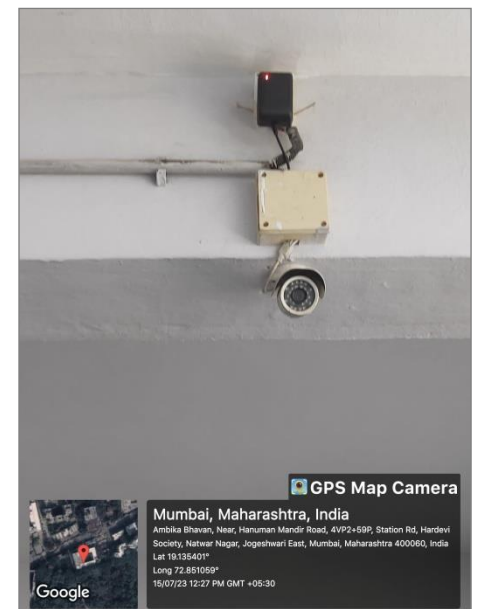
Audit Team during the visit and other photos collected during data documentation



Induction, exit meeting and group photo with the team



On site investigation with the team in NSS area and entrance space



On site investigation with the team about the water cooler, fire extinguisher and CCTV camera areas

7. 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://housing.com/news/smart-gardening/>
- ➔ Inference study reference image

https://seors.unfcc.int/applications/seors/attachments/get_attachment?code=NG125PFE4WHMWSYAK8TCAKIHMWX0F4QD

