ENERGY AUDIT

STUDY PERIOD (ONE YEAR) 2023 - 2024

Sustainability study

AUDIT REPORT

Studied for

Sree Narayana Guru College of Commerce

P. L. Lokhande Marg, Chembur (West),
Mumbai - 400089, Maharashtra, India

Studied in the capacity of

Accredited and Certified
Green Building Professional

Studied by

Website: https://thegreenviosolutions.co.in/
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Background reference image Janko Ferlic on pexels

Disclaimer

The Audit Team has prepared this report for **Sree Narayana Guru College of Commerce** located at *P. L. Lokhande Marg, Chembur (West), Mumbai - 400089, Maharashtra, 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 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.

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Acknowledgement

The Audit Assessment Team extends its appreciation to **Sree Narayana Guru College of Commerce, 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.

Sustainable Academe
Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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Contents

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1. Introduction

1.1 About the Institution

1.1.1 Vision

The Institute proposes *"Empowerment through Higher Education to all strata of Society"*

1.1.2 Mission

The Institute adheres and focuses *"Quality education to all irrespective of caste, creed, socio-economic status and uplift the poor and downtrodden".*

2. Overview

2.1 Summarised Populace analysis for 2023-24

2.1.1 Students data

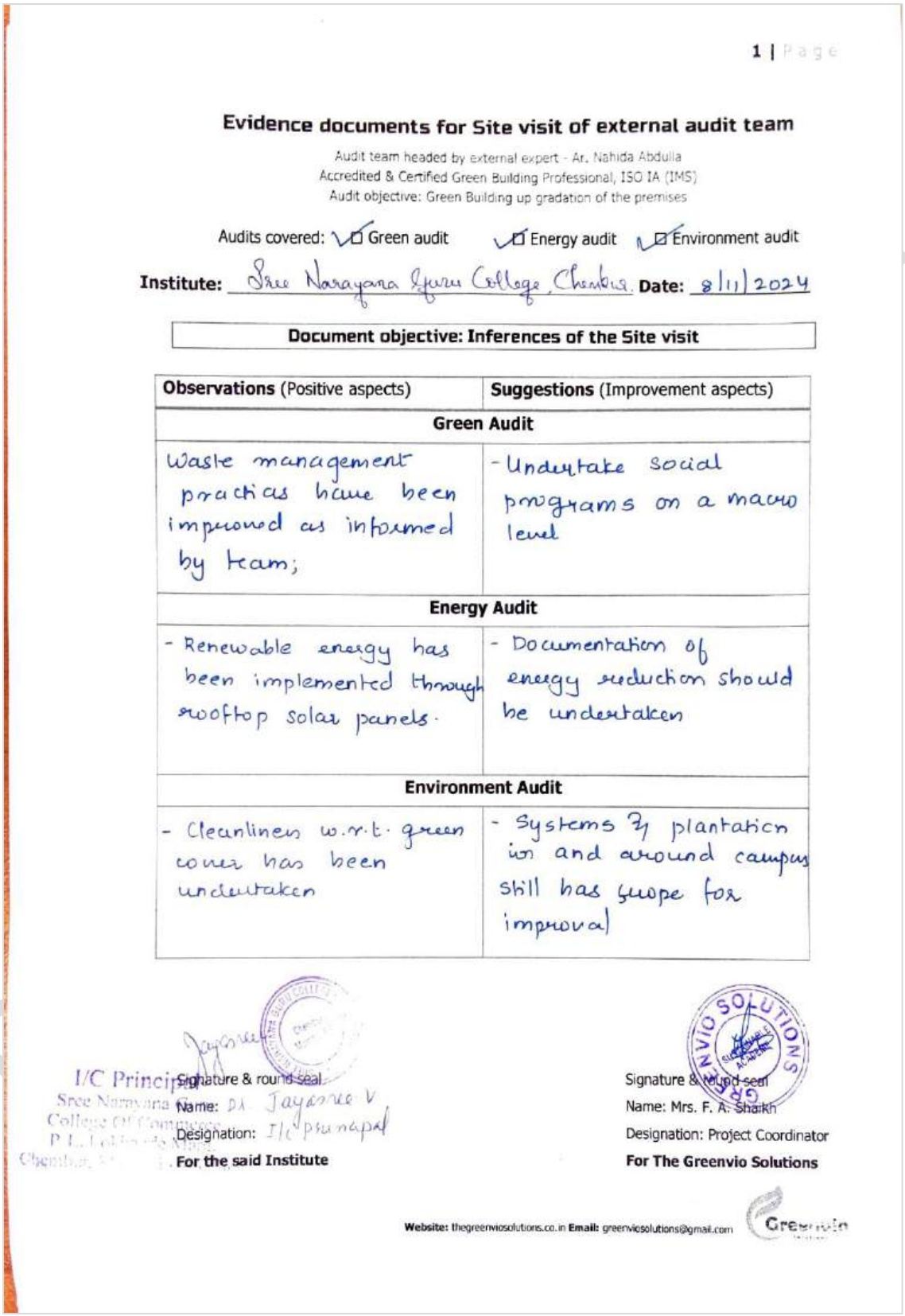
The data (shared by Institute) shows there were 1,814 students.

2.1.2 Staff data

Sl. No.	Particulars	Male	Female	Total
1	Teaching Staff	16	26	42
2	Non-teaching Staff	12	10	22
Total		**28**	**36**	**64**

Table 1: Staff data of the Institution for 2023-2024

3. Observation



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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: Sree Narayana Guru College, Chembur **Date:** 8/11/2024

Document objective: Inferences of the Site visit

Observations (Positive aspects)	**Suggestions** (Improvement aspects)
Green Audit	
Waste management practices have been improved as informed by team;	- Undertake social programs on a macro level
Energy Audit	
- Renewable energy has been implemented through rooftop solar panels.	- Documentation of energy reduction should be undertaken
Environment Audit	
- Cleanliness w.r.t. green cover has been undertaken	- Systems of plantation in and around campus still has scope for improval

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Name: Mrs. F. A. Shaikh
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For The Greenvio Solutions

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Plate 1: Evidence files related to inferences

Evidence documents for Site visit of external audit team

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Institute: Sree Narayana Guru College **Date:** 8/11/2024

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.	Dr. Jayasree V	Internal	In Charge Principal	
4.	Dr. S.P. Hinduja	Internal	Vice Principal	
5.	Ms. Naveena Suresh	Internal	Faculty	

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Plate 2: Evidence files related to proof

4. Investigation

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 in India 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).

The following results about 'Micro-climate temperature' are based on the investigation carried out during the site visit.

S. No.	Space	Result (^{0}C)	Required (^{0}C)	Improvement required
1.	Stilt area @ 08:31	25	24	YES - To be improved
2.	Office - Internal area (Air conditioned space) @ 10:06	29	24	YES - To be improved
3.	Terrace (Open area) @ 10:17	29	24	YES - To be improved

Table 2: Results for the micro-climate temperature study

The above study shows the spaces require an improvement in microclimate.
The institution agreed to work on the same.

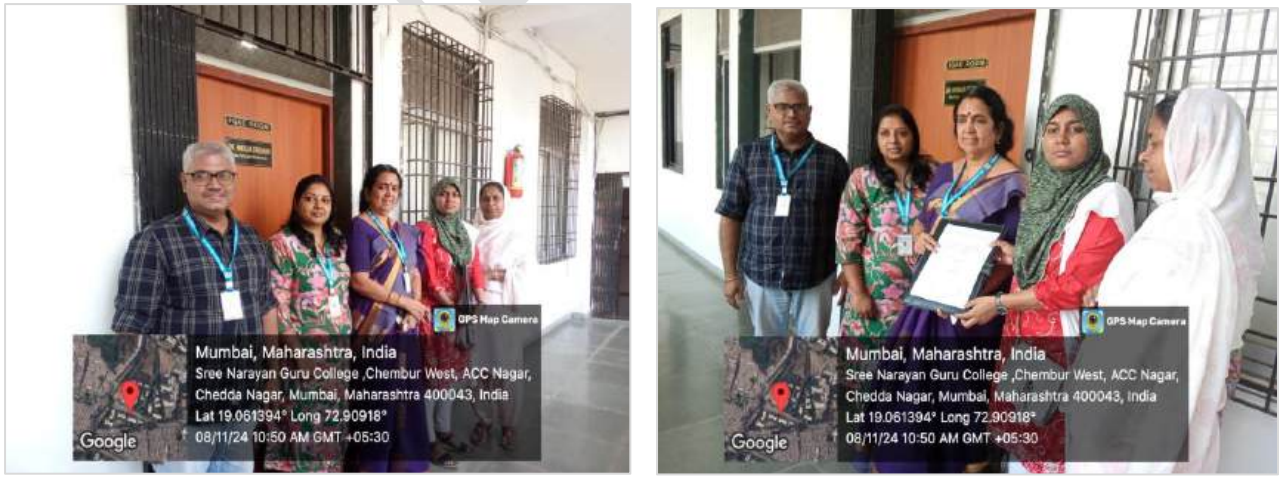

Plate 3: Evidence of the team interaction with key stakeholders

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5. Documentation

Section 1 – Life safety management

5.1 Facilities study

All new provisions that have been included are – Information boards, awareness messages, sand buckets, and fire safety measures such as 65 nos. of fire extinguishers.



Plate 4: Fire and life safety measures undertaken

There are fire safety alarms, fire ducts available in the premises.

Section 2 – Energy generation & expense incurred

5.2 Load distribution study

5.2.1 Categorization

Since the campus is an Educational Institute without any residential facility within site the type of load can be stated as 'Commercial'

5.2.2 Primary sources of energy consumption

- **Electrical (Metered) –** Light, Fans, Equipments, Pumps comprise these sources.
- **Alternate sources of energy consumption –** The study period considered did not have any renewable sources however recently solar panels have been installed.

5.2.3 Secondary sources of energy consumption

Diesel Generator is used in the campus.No other secondary sources are required in this campus.

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5.3 Technical payload study

The data related to electricity bills is documented below.

Sr. No.	Month	Year	Amount	(A) Total units consumed	(B) Solar units generated	(C = A-B) Gross units consumed after deduction
Academic year between 2023-2024						
1	June	2023	Not informed	10,367	0	10,367
2	July	2023	Not informed	12,510	0	12,510
3	August	2023	Not informed	14,508	0	14,508
4	September	2023	Not informed	12,529	0	12,529
5	October	2023	1,67,687.72	15,443	0	15,443
6	November	2023	1,01,597.20	9,285	0	9,285
7	December	2023	1,25,906.86	11,498	0	11,498
8	January	2024	1,29,791.74	11,916	0	11,916
9	February	2024	1,45,498.20	13,241	0	13,241
10	March	2024	1,43,112.57	12,287	0	12,287
11	April	2024	1,44,142.95	11,907	0	11,907
12	May	2024	1,14,068.74	8,778	0	8,778

Table 3: Details of the electrical consumption

The observation related to above information states:

- The **total amount** spent is **Rs. 10,71,806/-**
- **Total units** consumed was **1,44,269 kWh (Only Electrical)**
- The **total units** consumed in past one year is **zero units (Only solar)**
- **Alternate source of energy is available in the form of 'Renewable mode' through rooftop solar panels installed in April 2024 but functional after monsoon; thus no energy consumption through solar during study period (June 2023 to May 2024) considered.**

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Section 3 – 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. (Note: The data for equipment was not shared hence the study excludes the same.)

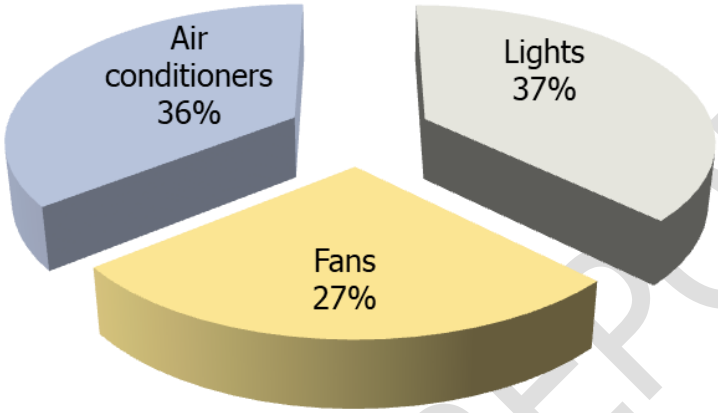

Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that lights consume 37% whereas air conditioners consume 36% while fans consume 27% of total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are **630 LED lights***(Energy efficient appliance)* **on the premises.**

5.5.2 Types of lights based on the power consumption

The energy consumption of lights is **17,690 kWh** of energy with 100% of energy consumed by lights being LED.

5.6 Equipment

There are more than 100 different equipments.

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5.7 Fans

5.7.1 Types of fans based on the numbers

There are **131 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	101
2	Wall mounted fans	18
3	Exhaust fans	12

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 **12,778 kWh** of the energy.

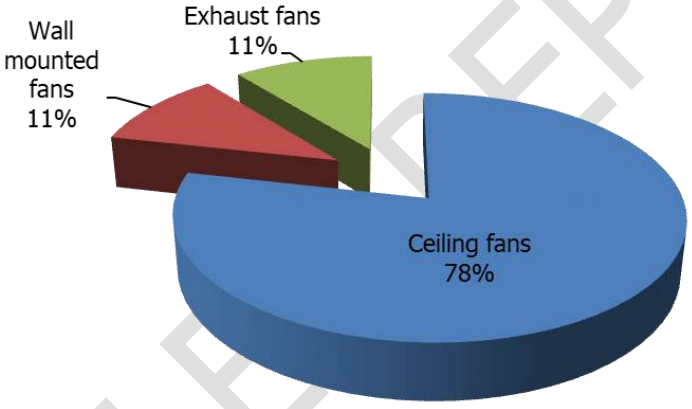


Figure 2: Types of fans based on power consumption

The above analysis shows Ceiling fans consume 78% whereas the wall-mounted and exhaust fans consume 11% each of the total power consumed by fans.

5.8 Air conditioners

5.8.1 Types of air conditioners based on the numbers

There are **23 air conditioners** on the entire premises**.**

5.8.2 Building-wise consumption analysis

The energy consumption of air conditioners is **16,935 kWh** of energy.

5.9 Comparison study

Section 2 - Energy requirement

A. Calculated Electrical requirement (in kWh) as per inventory

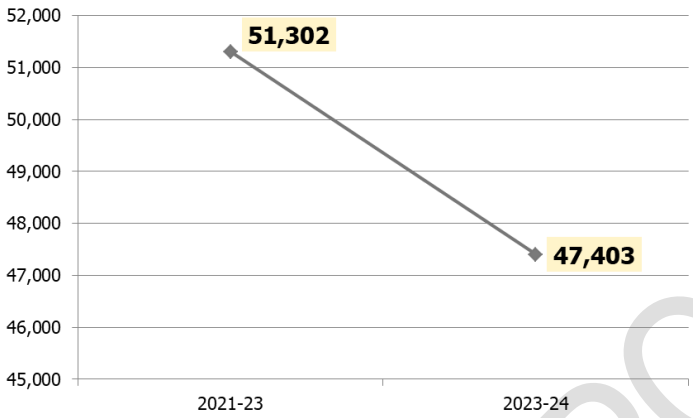


Figure 3: Comparative study of electrical requirement in kWh

There has been a decrease of 3,899 kWh in the energy requirement. (Note: This comparison excludes equipment as the same was not shared for this year). This highlights a positive update.

B. Energy generation – Only solar units generated study

The solar panels were installed in April 2024; however the meters were in function post monsoon thus after the period of study considered (June 2023-May 2024). Thus the solar units consumed in previous academic years (2021-22, 2022-23) and current period (2023-24) stands to be zero.

C. Energy management – Percentage of energy consumed by LED lights study

The previous study stated 100% LED lights, similarly this study too stated LED lights thus energy consumed by lights remains same.

D. Energy management – Nos. lights study

The previous study stated 630 nos. of lights and the current study too stated the same nos. hence the nos. of lights remains the same.

E. Actual energy consumed – Load distribution (in kWh) as per bills

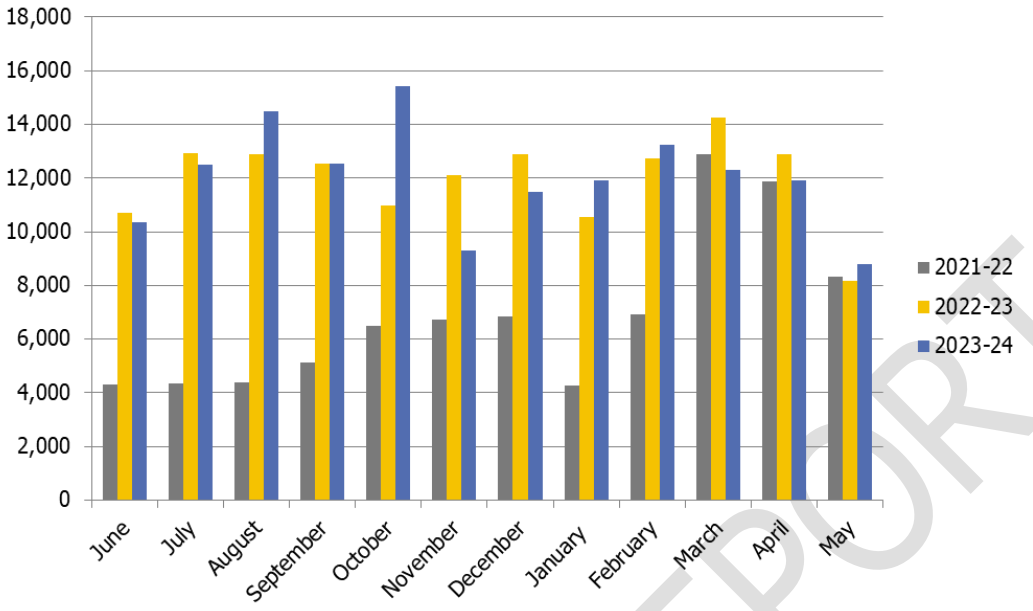


Figure 4: Comparative study of E. Actual energy consumed – Load distribution (in kWh)

The Original study was conducted last year for 2021-22 & 2022-23 being first year of study; while the renewal has been conducted for 2023-24 as the current academic year has not been completed. The above study is a representation of energy consumption patter for each year. Observation of the study has been documented in the graph below.

F. Summary of total energy consumed as per bills (in kWh) comparative study

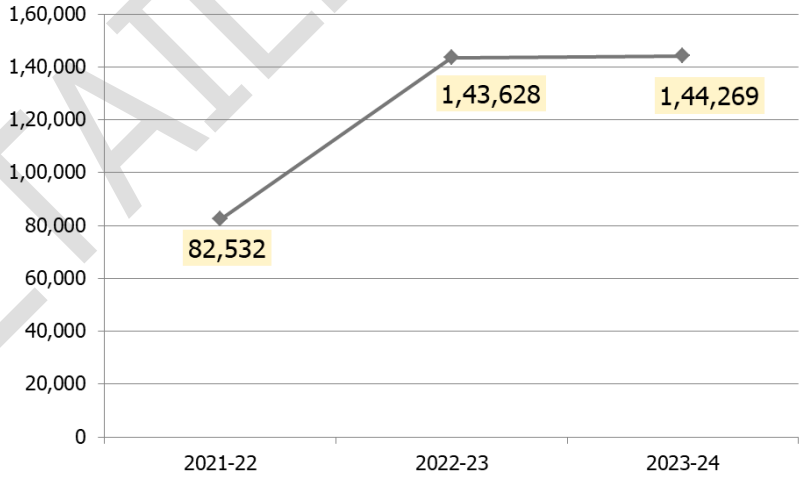


Figure 5: Comparative study of total energy consumed as per bills (in kWh)

As compared to past two years (2021-22 & 2022-23) there has been an increase in the energy consumption as per above study. While compared to 2022-23 and 2023-24 there has been a marginal increase of only 641 kWh units. Since the solar panels have been installed and functional very recently the impact of the same shall take a while to reflect.

6. Compliance

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

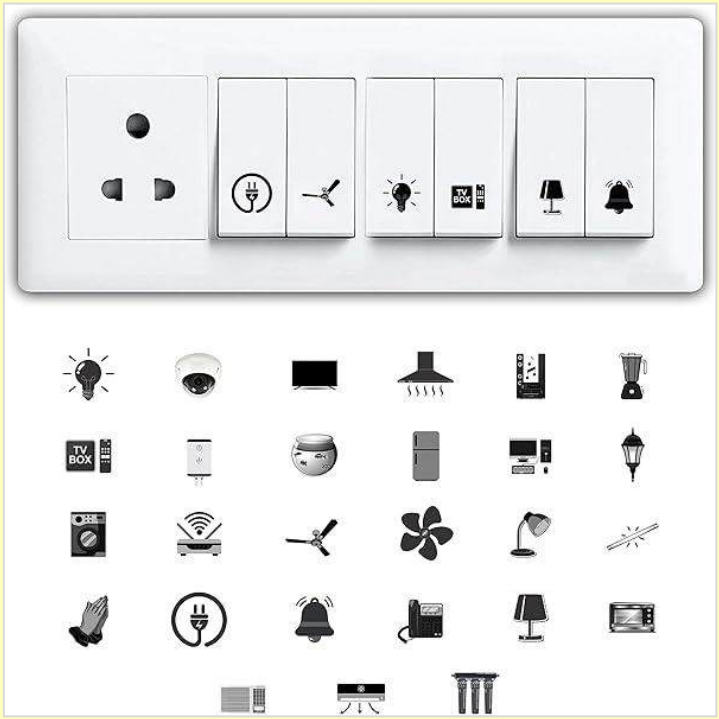
- Original report study was for June 2021 to May 2022 and June 2022 to May 2023
- Renewal study currently done is for June 2023 to May 2024

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.	Location/ Aspect	Evidence	Suggestion
1.	**Document** **Fire escape route plan and life safety**		➲ Highlight the corridors in light green highlighter ➲ Signify the outline of staircase block ➲ Include a ✘ symbol on lift and note on plan 'Do not use lift' ➲ Highlight the locations of fire extinguisher in a blue or brown box and mention same in legend ➲ Include 'You are here' indication on the route plan

2.	**Document Switches**	N.A.	The switches should be indicated as follows:  Image source: Amazon
3.	**Document solar facility**	N.A.	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.	**Display Manual**	N.A.	Display an instruction manual at public spaces about **First aid in electric shock**
5.	**PASS Board**	N.A.	Wherever there is a fire extinguisher display the PASS board in English and local language

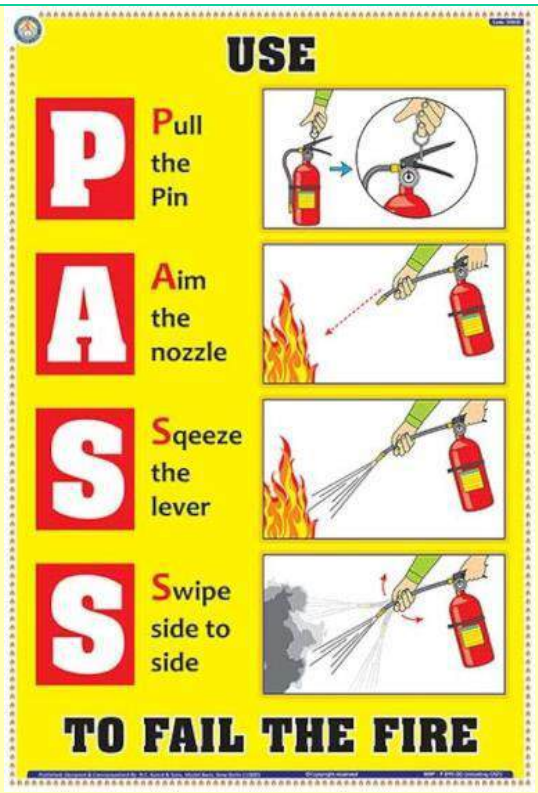
			 Source: Amazon
6.	**Store areas**		Introduce sand buckets inside the store area.
7.	**Unwanted electrical facilities**		Remove the unwanted electrical connections and wiring
8.	**Additional safety for electrical control areas**		The areas where heavy electrical appliances/ loads/ panels/ generators are kept should be demarcated 'Danger zone' as a signage display. A board about 'Prevent electrical accident' should be displayed in English and local language Rubber mats should be kept for about a distance of 2m

Table 5: Observation based suggestion study of the campus

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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.energuide.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

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