

ENERGY AUDIT

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

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**



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

Email: greenviosolutions@gmail.com

Valid till **August 2024**

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 of Commerce Date: 15-07-2023

Document objective: Inferences of the Site visit

Observations (Positive aspects)	Suggestions (Improvement aspects)
Green Audit	
- Dedicated water supply by pit area is available	- Water management through storage, equipment - Waste management area should be redeveloped
Energy Audit	
- An 100% LED [Energy-efficient appliances] campus.	- Alternate sources of energy need to be explored.
Environment Audit	
- Good green cover by area available	- Ecological by campus beautification can be undertaken.



Signature & round seal

Name:

Designation:

For the said Institute



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



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 of Commerce **Date:** 15-07-2023

Document objective: Proof of the Site visit



Meeting with the core team



Investigation of the systems



Signature & round seal
Name:
Designation:
For the said Institute



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

Website: thegreenviosolutions.co.in Email: greenviosolutions@gmail.com



Disclaimer

The Audit Team has prepared this report for the **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.

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 **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 to everyone from the Management.

Our heartfelt thanks are extended to Chairperson of entire process **Dr. Ravindran Karathadi**, (Principal) for the valuable inputs.

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

- ⇒ **Faculty members** – **Dr. Jayasree V.**, Vice Principal (Administration); **Dr. Hinduja S. P.**, Vice Principal (Academics) and the Assistant Professors - **Mr. Mohd. Jabir, Ms. Naveena Suresh, Mr. Iyer.**
- ⇒ **Admin staff members (Accountants)** – **Ms. Nalini Shelke and Mr. Pravin**

We appreciate the cooperation of 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

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Overview	6
3. Investigation	7
4. Observations.....	7
5. Documentation	8
6. Suggestion	14
7. Compilation.....	16

1. Introduction

1.1 Statements of the Institution

1.1.1 Vision

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

1.1.2 Mission

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

1.1.3 Objective

It is the objective of the College:

- Maintain good academic standards through innovative and effective teaching, learning methods.
- Focus on learner-centric teaching to make learning a happy, joyful and fruitful experience.
- Sensitize students on vital social issues raging across the globe and guide them to emerge as socially responsible citizens of the nation.
- Motivate students to achieve discipline, self-mastery and professionalism.
- Enable students to meet the needs, demands and challenges ahead and excel in life.
- To aim at all round development of students and groom their talents through meaningful co-curricular, extracurricular activities with an emphasis on integrity and ethics.
- To have a positive approach towards development and progress of youth, highlight their inherent powers and inspire them to realize their full potential.

1.2 Assessment of the Institute

1.2.1 Affiliation

The Institute is affiliated to **University of Mumbai**, one of the premier universities in India, is positioned in the city of Mumbai city and the state of Maharashtra.

1.2.2 Certification

The College has received the code under **All India Survey of Higher Education (AISHE)** wherein the code is C-33899.

1.2.3 Accreditation

The following are details of the accreditation awarded by the National Assessment & Accreditation Council (NAAC) to the College.

Cycle	First	Second
CGPA	81.60	3.08
Grade	B++	A
Year	2004	2012

Table 1: NAAC Accreditation details of the Institute

The College is due to enter its Third cycle of NAAC.

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 **1,022 male and 937 female students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	07	03	10
2	Teaching staff	08	24	32
3	Non-Teaching staff	06	04	10
Total Staff Members		21	31	52

Table 2: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises had a total of **52 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 **991 male and 904 female students**.

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	07	03	10
2	Teaching staff	06	24	30
3	Non-Teaching staff	08	08	16
Total Staff Members		21	35	56

Table 3: Staff data of the Institution for 2021-2022

The staff data shows the Institute premises had a total of **56 Staff Members**.

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: See Narayana Guru College Commerce Date: 15-07-2023

Document objective: Exit Meeting attendance sheet

S. No.	Name	Committee	Designation	Signature
1.	Mrs. F. A. Shaikh	External	Project Coordinator	
2.	Ar. Nahida Abdulla	External	Project Head	
	Dr. Jayasree V	Internal	Vice-principal (Academics)	
	Dr. S.P. Hinduja	Internal	Vice-principal (Academics)	
	Mrs. Naveena Suresh	Internal	Criterion Head	
	Mr. Jabir M	Internal	Criterion Member	
	Mr. Iyer P.V	Internal	Criterion Member	



Signature & round seal

Name:

Designation:

For the said Institute



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



3. Investigation

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. Observations

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 soon.
- 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**' systems available in the premises.

5.2 Secondary sources of energy consumption

The premise uses batteries, UPS as backup for administrative purposes. The details of the existing sources are documented below:

S. No.	Name	Purpose.
1	UPS	Admin
2	Gas cylinders	Canteen

Table 4: Details of secondary sources of energy consumption

5.3 Actual electrical consumption as per bills

The Institute 'DOES NOT' have any sources of renewable energy and thus spends a huge amount of expense every month as documented below:

Sr. No.	Month	Year	Units	Amount (Rs.)
1	June	2021	4,312	39,860
2	July	2021	4,354	40,290
3	August	2021	4,402	40,850
4	September	2021	5,140	47,140
5	October	2021	6,504	59,600
6	November	2021	6,718	61,530
7	December	2021	6,836	62,920
8	January	2022	4,259	39,820

9	February	2022	6,916	64,470
10	March	2022	12,902	1,19,200
11	April	2022	11,873	1,09,760
12	May	2022	8,316	77,340
13	June	2022	10,698	99,620
14	July	2022	12,938	1,33,670
15	August	2022	12,908	1,33,300
16	September	2022	12,529	1,29,490
17	October	2022	10,969	1,13,360
18	November	2022	12,095	1,26,020
19	December	2022	12,880	1,36,710
20	January	2023	10,543	1,11,830
21	February	2023	12,734	1,35,390
Total			1,90,826	18,82,170

Table 5: 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.

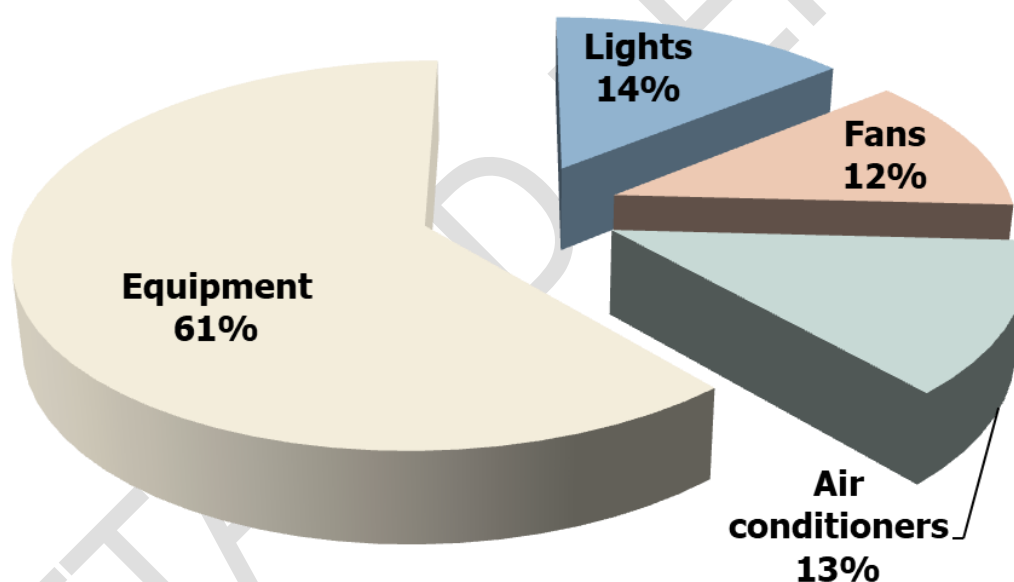


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consume 61% whereas the lights consume 14% while air conditioners fans consume 13% and the fans consume 12% of the total calculated electrical energy.

5.5 Fans

5.5.1 Types of fans based on the numbers

There are a total of **313 fans** on the premises as follows:

S. No.	Type	Nos.
1	Exhaust fans	12
2	Wall mounted fans	18
3	Ceiling fans	283

Table 6: Summary of the types of fans in the premises

5.5.2 Types of fans based on the power consumption

The energy consumption of fans is **15,571 kWh** of the energy.

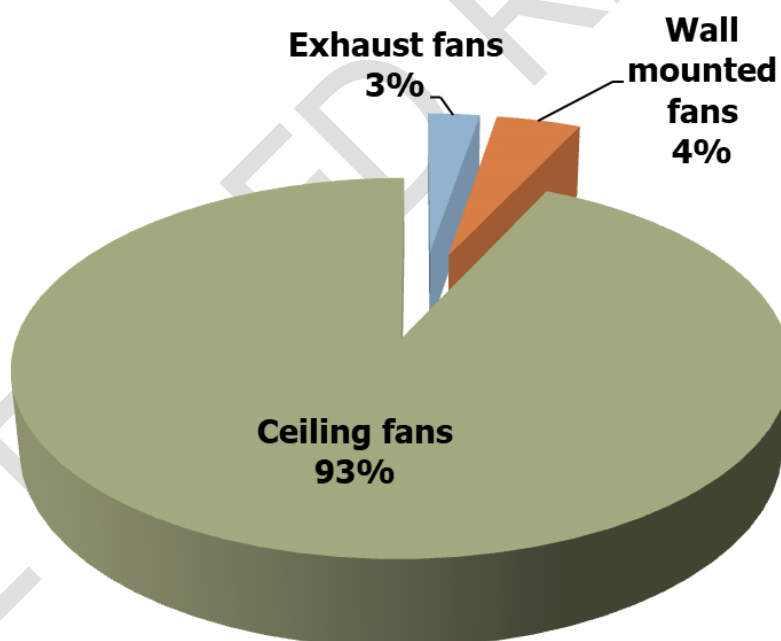


Figure 2: Types of fans based on power consumption

The above analysis shows the **Ceiling fans consume 93%** whereas the **wall mounted fans consume 4%** while **exhaust fans consume 3%** of total power consumed by fans.

5.6 Lights

5.6.1 Types of lights based on the numbers

There are **630 nos. of LED lights** on the premises.

5.6.2 Types of lights based on the power consumption

The energy consumption of lights is **18,796 kWh** of energy with the LED lights consuming 100% of the total power consumed by lights.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

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

5.7.2 Building-wise consumption analysis

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

5.7.3 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.

5.8 Equipment

5.8.1 Types of Equipment

There are **302 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **81,721 kWh** of energy.

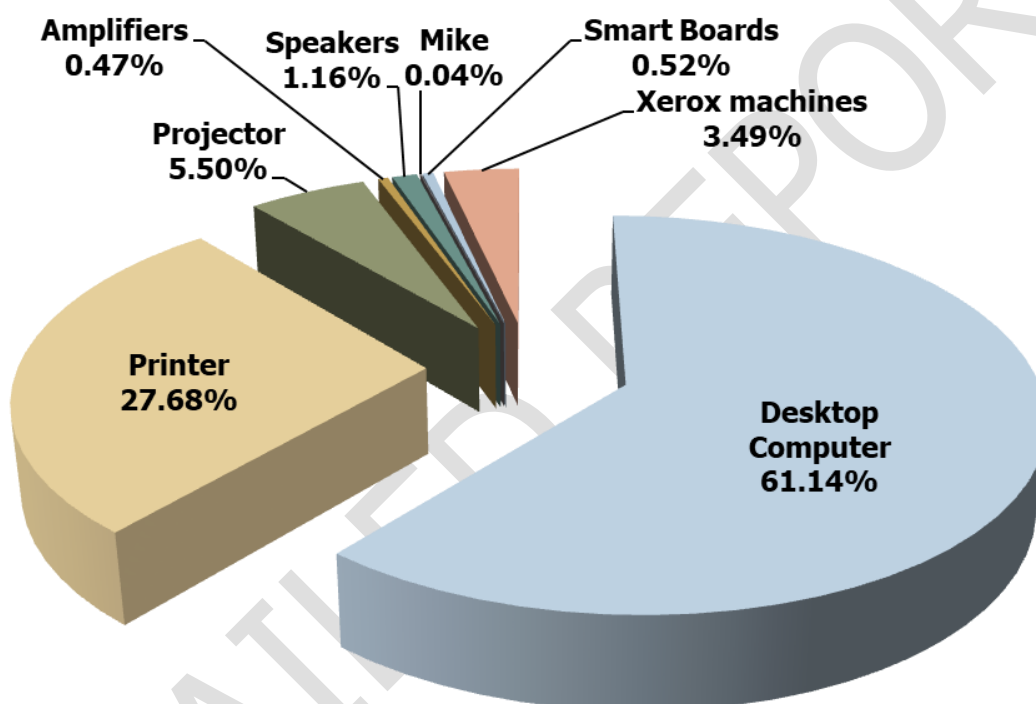


Figure 3: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **desktop computer consumes more energy at 61.14%** while the **printer consumes 27.68%** whereas the **projector consumes 5.50%** and the **Xerox machine consumes 3.49%** these are the maximum consumers as compared to other equipment.

6. Suggestion

6.1 Section-wise suggestions

The following suggestions are to be considered as a ***first priority*** for implementation. These **should be executed within the next 2.5 years from the date of the Report submission**. The Institute can execute a plan after discussion with Project Head.

6.1.1 Electromechanical systems - Electrical and Lighting

Section 1 - Non-LED lights

The current light analysis shows that Non-LED lights consume anywhere between 50W to 54W and even more when in use; these should be replaced with LED lights which consume on an average 12-16W when in use.

Our technical research shows that there would be a reduction of an average of **67% reduction** in energy consumption if replaced with energy efficient appliance.

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.

Section 2 - 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 if replaced with energy efficient appliance.

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 are consolidated study related to 'entire Institute' should be considered as **second priority** once section wise recommendations are implemented.

6.2.1 Alternatives to increase renewable energy

6.2.1.2 Solar parking

The University can turn its existing parking areas into solar panel powered parking areas. This will provide shade and renewable energy benefit to the University.



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

Source: Image by <https://solarpowerproject.in/solar-panels-for-parking-lots.php>

6.2.2.2 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 2: 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/>

On-site investigation and physical verification
Audit Team during the visit and other photos collected during data documentation



Evidence of the visit - Investigation of the compost and waste management areas



Evidence of the visit – Water sampling testing and outdoor study



Investigative parameters – Site Aspects – Campus extent and facilities available in the premises



Investigative parameters – Site Aspects – Terrace study to understand waterproofing and cooling study

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

