

Audit Report

- a. Green Audit
- b. Energy Audit
- c. Environment Audit



I/C PRINCIPAL
Chandrabhan Sharma College
of Arts, Science & Commerce
Powai-Vihar, Powai, Mumbai - 400 076
Tel. 25704526 / 25704530

GREEN AUDIT

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

Sustainability study
AUDIT REPORT

Studied for
Smt. Durgadevi Sharma Charitable Trust's
**Chandrabhan Sharma College of Arts,
Commerce & Science**

Adi Shankaracharya Marg, Powai Vihar Complex,
Powai, Mumbai – 400076, Maharashtra, India

Studied in the capacity of

Accredited and Certified
Green Building Professional



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

Email: greenviosolutions@gmail.com

Valid till **April 2024**

Background reference image Sasin Tipchai on unsplash

Disclaimer

The Audit Team has prepared this report for the **Smt. Durgadevi Sharma Charitable Trust's Chandrabhan Sharma College of Arts, Commerce & Science** located Adi Shankaracharya Marg, Powai Vihar Complex, Powai, Mumbai – 400076, Maharashtra, India based on input data submitted by the College 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 Hon'ble Management and College. 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 thanks the **Smt. Durgadevi Sharma Charitable Trust's Chandrabhan Sharma College of Arts, Commerce & Science, Maharashtra, India** for assigning this important work of Green Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Mr. Prashant G. Sharma**, President; **Mr. Himanshu P. Sharma**, Vice President; **Dr. Manju P. Sharma**, Treasurer; **Mr. Diksthan G. Sharma**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairpersons of the entire process **Dr. Pratima Singh**, Principal for the valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required - **Ms. Manali Naik**, Convenor - Placements & Career Guidance Cell & Cordinator - Department of Multimedia & Mass communication; **Mr. Vicky Kukreja**, Assistant Professor.

We highly appreciate the assistance of **Mr. Sainath Sawant, Technical staff** 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

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Overview	7
3. Research	9
4. Green Practices Audit	10
5. Waste Audit	13
6. Water Audit.....	15
7. Health and Hygiene Audit.....	17
8. Compilation.....	18

DETAILED REPORT

Evidence documents for Site visit of external audit team

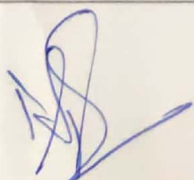
Audit team headed by external expert - Ar. Nahida Abdulla
 Accredited & Certified Green Building Professional, ISO IA (IMS)
 Audit objective: Green Building up gradation of the premises

Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College of Arts, Commerce & Science Date: 3rd May, 2023

Document objective: Inferences of the Site visit

Observations (Positive aspects)	Suggestions (Improvement aspects)
Green Audit	
<ul style="list-style-type: none"> - Rain water harvesting practiced - E-waste management practiced. 	<ul style="list-style-type: none"> - Undertake organic waste management
Energy Audit	
<ul style="list-style-type: none"> - Sensor based lights used 	<ul style="list-style-type: none"> - Undertake alternate source of energy.
Environment Audit	
<ul style="list-style-type: none"> - Tree undertaken on rooftop (under process) 	<ul style="list-style-type: none"> - Undertake measures to increase green cover on vertical front



Signature & round seal

Name:

Designation:

For the said Institute



Signature & round seal

Name: Mr. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



Evidence documents for Site visit of external audit team

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Document objective: Proof of the Site visit



Meeting with the core team



Investigation of the systems

Signature & round seal
Name: Dr Pratima Singh
Designation:
For the said Institute



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



1. Introduction

1.1 About the Trust

Charitable purpose including relief of poverty, distress, education, medical relief and advancement or other objects of general public utility and on conduct, maintain or assist schools, colleges, dispensaries, hospitals, orphanages, home for destitute and other institutions and activities of charitable nature are undertaken. The works revolve around the following:

- ⇒ *Setting up Schools and colleges or other educational institutions and donation to other charitable institution/trust or institution of similar objects/nature*
- ⇒ *Aid to deprived people*
- ⇒ *Scholarships to brilliant and deserving students of Mumbai*
- ⇒ *Medical aid*
- ⇒ *Donation and contributions to other charitable trust and institution of similar objects*

1.2 About the Institution

The Chandrabhan Sharma College of Arts, Science and Commerce was established to serve the ever-growing need for higher education in the vicinity of Powai. The degree College started in 2008 is affiliated to the University of Mumbai and offers various professional courses like B.M.S, B.M.M, BSc. IT, etc. The College got affiliation from YCMOU in 2015 and conducts courses like BCA, BIS etc.

The first successful batch of graduates passed out in the year 2011. The College had a very modest beginning with around 100 students, but with the vision of the Trustees, the Principal and a team of qualified and dedicated staff members it has grown to strength of 2,000+ students.

The College lays emphasis on building values, nurturing talent and developing the intellectual faculty of the students.

1.3 Statements of the Institution

1.3.1 Vision

The College proposes " *To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.*"

1.3.2 Mission

The College adheres and focuses

- ➔ *To provide quality education that aims at preparing students for the challenges of life.*
- ➔ *To bring about an all-round development in the personality of the students.*
- ➔ *To encourage students to participate in inter-collegiate events and help them acquire and hone up their skills through peer learning.*
- ➔ *To assist students in getting suitable placements.*
- ➔ *To promote sports and inculcate discipline amongst the students and help them to be physically and mentally fit.*
- ➔ *To encourage students to go beyond books and to make them globally competent.*

1.3.3 Aim

The College has formulated the following aim *To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.*"

1.3.4 Objective

It is the objective of the College

- ➔ *To impart value based education.*
- ➔ *To emphasis on subject to make them responsible of concept to facilitates logical thinking.*
- ➔ *To inculcate discipline among students to make them responsible citizen.*

- To promote sport, cultural & fine arts.
- To develop the personality, confidence & Communication skills of the students.
- To establish industry network.
- To promote welfare by providing relief to the needy and deserving students.
- To Provide a secular outlook to students which will help them adapt globally
- To upgrade infrastructure to compete with global standards

The commitment of the Institute is towards continuous improvement and democratic functioning, as is reflected in its vision and mission statements, which in turns become the guiding principles for the governance of the Institute.

1.4 Assessment of the Institute

1.4.1 Affiliations

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.

1.4.2 Certification

The College submits its academic records every year to the **All India Survey of Higher Education (AISHE)** Govt. of India through its registered allocated code which is C - 34088.

1.4.3 Accreditation

The College received a **B+ Grade with a CGPA 2.57 in the First cycle of accreditation** in the year 2017 awarded by the National Assessment & Accreditation Council (NAAC) to the College.

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 **950 male and 479 female students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	14	10	24
3	Non-Teaching staff	22	18	40
Total Staff Members		41	29	70

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

The staff data shows the College premises had a total of **70 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 **914 male and 496 female students.**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	11	12	23
3	Non-Teaching staff	14	08	22
Total Staff Members		30	21	51

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

The staff data shows the College premises had a total of **51 Staff Members.**

2.2 Total College Area & College Building Spread Area

The **total site area is 0.75 acres** and the **total Built-up area of the Institute is 1,29,166.93 sq. ft.** for an **approximately 1,499 footfalls.**

2.3 Institute Infrastructure

2.3.1 Establishment

The Institute was established in **2008.**

2.3.2 Spatial Organisation

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc. The Institute is located pretty close to nature and hence has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.4 Operation and Maintenance of the premises

The interview session was held with the staff regarding the operation and working hours. The Institution is open from Monday to Saturday from 10:00 hours to 17:00 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

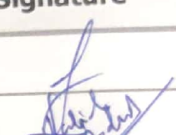
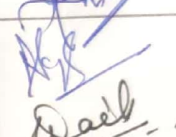
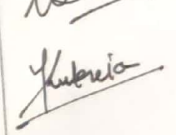

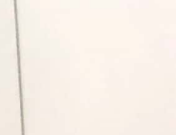
Evidence documents for Site visit of external audit team

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

Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College of Arts, Commerce & Science Date: 3rd May, 2023

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. Pratima Singh		Principal	
4.	Ms. Manali Naik		IGAC member	
5.	Mr. Vicky Kukreja		IGAC 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

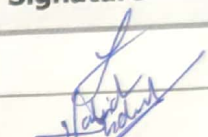
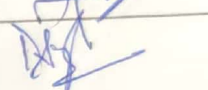
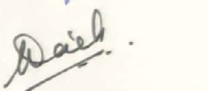
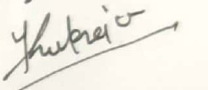




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Audit objective: Green Building up gradation of the premises

Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College Date: 3rd May, 2023
of Arts, Commerce & Science
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	
3.	Dr. Pratima Singh		Principal	
4.	Ms. Manali Naik		IQAC member	
5.	Mr. Vicky. Kukreja		IQAC member	

Signature & round seal

Name: Dr. Pratima Singh

Designation:

For the said Institute



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



4. Green Practices Audit

The increasing global warming and climate change have made us realise that apart from the enormous strategies the individual small efforts need to be taken by individuals and Educational Institutes as the younger generations are the future of the world and once they are taught about these practices only then can we assume a better future.

4.1 Green practices

We observed the following points during the Site investigation and data verification of the premises; these are common for all the Buildings on the premises.

- **Social awareness** - *The College has taken up awareness drives on various social issues for rural upliftment and regeneration in the College and surrounding villages.*
- **Fresh environment** – *The College provides an eco-friendly ambience with fresh air and soothing environment which helps to maintain a physical and mental balance. This kind of a space it a must for an educational specially technical institute which is inviting and gives the stakeholders an opportunity to explore indoor and outdoor learning to a great extent.*
- **Team work** – *The best quality of the College which sets it apart is its coordinating, cooperative staff members; for a building the foundation plays the most important role for its future similarly for an educational institute its staff members do.*

4.2 Community development

The College conducts environmental initiatives documented as follows:

S. No.	Name of the event	Why and how was it celebrated?	Date and year
1	Shifting of Climatic Preparedness	Various measures that can be undertaken for saving our planet.	16-Sep-21

2	Swachh Bharat Abhiyan at Powai Lake Garden	Students cleaning the garden as a part of swachh Bharat Abhiyan so that the garbage does not reach the lake polluting it further. The collected garbage was disposed of properly.	02-Oct-21
3	Visit to Marine and Coastal Biodiversity Centre	To watch different species of migrating birds like flamingos, peahens and different species of mangroves. To understand how mangroves are important for the ecosystem, pollution-causing factors and how pollution is affecting the Thane Creek.	27-Nov-21
4	Webinar "Miracle Enzyme"	Organic chemical free enzyme not only cleans your house efficiently but also purifies the water bodies when it goes down the drain. It helps in waste management, reduces global warming, helps in soil recovery, purifies air and water. That is why it is called Miracle Enzyme.	12-Feb-22
5	Celebration of World Aquatic Animals Day	Nature trail and understanding life of aquatic animals	08-Apr-22
6	Working towards carbon neutral planet	Students get to know about various organisations working to protect the environment. Students get to know the importance of going green. Awareness spread among students about the dangers faced by the planet earth and the measures that need to be taken to preserve the ailing planet.	10-Sep-22
7	Dhangar Waterfall Trek - Badlapur	Students get to know about various organizations working to protect the environment. Students get to know the importance of green environment. Awareness spread among students about the dangers faced by the planet earth and the measures that need to be taken to preserve the ailing planet.	19-Sep-22
8	E-Waste Week	1. Students understood the harmful effect of E-Waste. 2. Student understood how to dispose E-waste Safely.	17 - 21 October 2022
9	World Wetlands Day	To Understand the importance of Wetland for Ecosystem. To Understand the importance of Wetland for green environment.	02-Feb-23
10	Seminar on Awareness about "E-waste"	The event aimed to spread awareness about the harmful effects of electronic waste on the environment and to promote sustainable practices in disposing of electronic devices.	29 th March 2023

Table 3 Details of the environment events in the premises

4.2 Section-wise recommendations related to 'Green practices'

The following suggestions are to be considered as a **first priority** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission**. The Institute can execute a plan after discussion with Project Head.

- ➔ **Increase the plantations on the premise** - There can be provision for more plantations on the premise maybe even a Kitchen garden facility.
- ➔ **Plant as a gift** - As a kind gesture, the guests visiting the premise can be asked to plant a small plant on the premise itself and they can be even given plants/bouquets from the flowers of the plants on the premise as a gift.
- ➔ **Tree adoption scheme in the premises** - The Institute can adopt the One Faculty – One tree adoption scheme; this can be practiced on occasions such as toppers meet, guest sapling plantations, specific zoning of the tree adoption area. this can be very beneficial, especially during the summer season.
- ➔ **No vehicle day** - Once in a while, a No vehicle day can be adopted by students and staff to promote the use of eco-friendly vehicles on the premise.
- ➔ **Signages on the plants mentioning scientific names** - The practice of having the names of each plant and tree will provide awareness among the staff and students.
- ➔ **Documentation** – Improve and increase the documentation and visibility/ reflectance of the environment related events on the website, social media handles

5. Waste Audit

Waste is an inevitable part of our lives. Over the years the awareness about waste management techniques has given a rise to rethink how the waste can be avoided being sent to the landfills. The audit provides an approximation of the types of waste generated, location of waste collections, disposal techniques used, waste segregation methodologies adopted, and waste management strategies that are implemented in addition to the newer ways that can be adopted aiming to make the premise clean and sustainable.

5.1 Waste produced

- **Solid waste** – The solid waste from the toilets is let into the storm water drains. *We suggest undertaking a biogas plant in the premises as there is availability of land and resources.*
- **Liquid waste** – The black and grey water from the wash basin and kitchens, toilets is let into the storm water drains. *The practice is as per the local municipal corporation rules and no suggestions are required for this section.*
- **E-waste management** – *An E-waste bin is available in the premises and thus no suggestions are required for this section.*
- **Plastic waste** – The current practices involve sensitization programs and awareness drives, however *we suggest practicing a dedicated Plastic collection drive and utilising the same for a best out of waste installation.*
- **Bio-waste** – *The sanitary vending machine are in working conditions and these are used as substitutes for bio-waste management.*

5.2 Bins summary

There are 56 dustbins inside the premises; these are available in the form of plastic bins.

5.3 Section-wise recommendation related to 'waste audit'

The following suggestions are to be considered as a **first priority** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

- ➔ **Signages** - Messages about avoiding wastage should be placed at appropriate locations.
- ➔ **Material of the dustbin** - The current plastic dustbins should be replaced with eco-friendly material.

DETAILED REPORT

6. Water Audit

Water is one of the basic needs. Pure drinking water is a resource that needs to be preserved efficiently. A water audit helps to identify the sources of water consumption, and the water requirement by the premises is met by these sources. The points and effective usage without any wastage. Understanding the techniques which are best suited to the site to increase water conservation in terms of awareness and practice.

6.1 Water availability and consumption

6.1.1 Source of Primary water supply

The College requires water from the Local Municipality for drinking water purposes, the details of the same are documented below:

S. No.	Type	Capacity (litres)	Nos.
1	Overhead	5,000	1
2	Overhead	10,000	1
3	Overhead	10,000	1
4	Fire tank	10,000	1

Table 4: Details of the water tanks in the premises

6.1.2 Source of Secondary water supply

The College uses the secondary sources of water supply for general usages such as watering plants, kitchen, toilets, and wash basins connected to the labs and other spaces.

6.1.3 Source of Tertiary water supply

The tertiary source of water is the additional source of water harvesting. *There is a rain water harvesting tank available in the premises.*

6.1.4 Source of Reusing waste water

The initiative is not under practice at present completely only the chemicals are neutralized before letting it down in the drains. *We have suggested to under practices of green chemistry as per discussion to treat the waste water from the laboratories and reused the same after filtering for watering the plants and the trees in the premises.*

6.2 Areas of water usage

Based on the inventory done and data shared by the staff it was found that the premise has the following facilities:

- ➔ Urinals - 06 nos.
- ➔ Toilets - 14 nos.
- ➔ Washbasins - 21 nos.
- ➔ Taps (Indoors) - 38 nos.
- ➔ Taps (Outdoors) - 01 nos.

As per the data shared by the College and on-site observation, it was noted that there is no water wastage of water in the form of Cleanliness of toilets.

6.3 Recommendations for a Sustainable Habitat

The following suggestions are to be considered as a **first priority** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

- ➔ **Rain water bunds** – There should be landscape beautification project undertaken to appropriate channelize the rain water through bunds and similar facilities.
- ➔ **Waterless urinals** - There can be the provision of waterless urinals as a Green Building initiative in the premise, either the existing ones can be replaced with such a facility or new toilets can be constructed in this manner.
- ➔ **Signages** - Messages about avoiding water wastage should be placed at appropriate locations.

7. Health and Hygiene Audit

The hygiene is a part and parcel of our daily life. It is extremely essential to keep the surroundings clean in the same manner as we would want our houses to be. Educational Institutes have a bigger role to play in order to affect the young minds in the positive manner through better hygienic practices.

7.1 Facilities available

The Institution has washroom facility, hand wash, drinking water and dustbin facilities.

7.2 Smoke Exposure

The Institution is a smoke free premise which helps in adapting to a Healthy Institution

7.3 Hygiene

- There was certain odour issue faced during the investigation.
- The areas of water tanks in site on ground floor are clean

7.4 Section-wise recommendation related to 'Health and hygiene audit'

The following suggestions are to be considered as a **first priority** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission**. The Institute can execute a plan after discussion with Project Head.

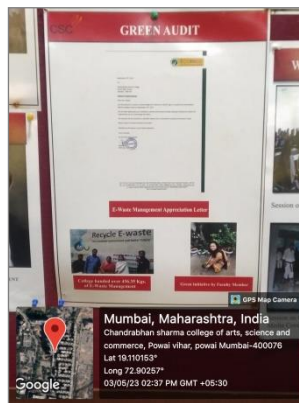
- **Courtyards and duct areas** – These are located in the internal and setback should have vertical gardens for beautification.
- **Signboards** – The Institute should have multiple signboards about 'No smoking' and 'Healthy premises' at every nook and corner of the Institute.
- **Compound wall** – The compound wall should have awareness messages about 'No Smoking' and 'No Tobacco'



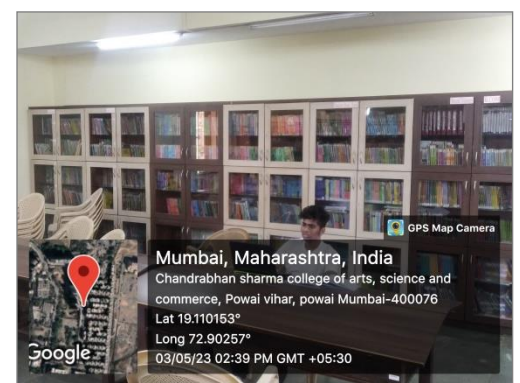
Discussion with the core team



Investigative parameters – Energy Management – Appliances, awareness posters



Investigative parameters – Water Management – E-waste certificate, Dustbins in the premises



Investigative parameters – Fire & Life safety; General areas in the premises

8. Compilation

The study is based on the data collected, analysed, 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 analyse and study the data collected.

- ➔ Uniform Plumbing Code – India, 2008
- ➔ IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
- ➔ IGBC Green Landscape Rating system, March 2013
- ➔ BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
- ➔ Used only for understanding Universal design - Universal Accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National center for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation and www.umassd.edu
- ➔ The city of Cheyenne, Streetscape/ Urban Design elements - Wyoming Planning Association, Gillette, Wyoming, United States
- ➔ Images on site by Coordinators of the both teams
- ➔ Icon images used by <https://www.vecteezy.com/free-vector/security-camera-icon> and <https://www.vecteezy.com/free-vector/electric-car-icon>



ENVIRONMENT AUDIT

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

Sustainability study
AUDIT REPORT

Studied for
Smt. Durgadevi Sharma Charitable Trust's
**Chandrabhan Sharma College of Arts,
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Adi Shankaracharya Marg, Powai Vihar Complex,
Powai, Mumbai – 400076, Maharashtra, India

Studied in the capacity of
Accredited and Certified
Green Building Professional



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

Email: greenviosolutions@gmail.com

Valid till **April 2024**

Disclaimer

The Audit Team has prepared this report for the **Smt. Durgadevi Sharma Charitable Trust's Chandrabhan Sharma College of Arts, Commerce & Science** located Adi Shankaracharya Marg, Powai Vihar Complex, Powai, Mumbai – 400076, Maharashtra, India based on input data submitted by the College 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.

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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.

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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 thanks the **Smt. Durgadevi Sharma Charitable Trust's Chandrabhan Sharma College of Arts, Commerce & Science, Maharashtra, India** for assigning this important work of Environment Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Mr. Prashant G. Sharma**, President; **Mr. Himanshu P. Sharma**, Vice President; **Dr. Manju P. Sharma**, Treasurer; **Mr. Diksthan G. Sharma**, Secretary and everyone from the Management.

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Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Overview	7
3. Research	9
4. Investigation	10
5. Inferences.....	13
6. References	15

DETAILED REPORT

Evidence documents for Site visit of external audit team

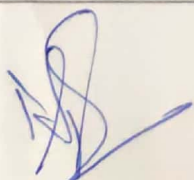
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Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College of Arts, Commerce & Science Date: 3rd May, 2023

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Designation:

For the said Institute



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Name: Mr. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



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Meeting with the core team



Investigation of the systems

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Name: Dr Pratima Singh
Designation:
For the said Institute



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1. Introduction

1.1 About the Trust

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1.2 About the Institution

The Chandrabhan Sharma College of Arts, Science and Commerce was established to serve the ever-growing need for higher education in the vicinity of Powai. The degree College started in 2008 is affiliated to the University of Mumbai and offers various professional courses like B.M.S, B.M.M, BSc. IT, etc. The College got affiliation from YCMOU in 2015 and conducts courses like BCA, BIS etc.

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The College lays emphasis on building values, nurturing talent and developing the intellectual faculty of the students.

1.3 Statements of the Institution

1.3.1 Vision

The College proposes " *To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.*"

1.3.2 Mission

The College adheres and focuses

- ➔ *To provide quality education that aims at preparing students for the challenges of life.*
- ➔ *To bring about an all-round development in the personality of the students.*
- ➔ *To encourage students to participate in inter-collegiate events and help them acquire and hone up their skills through peer learning.*
- ➔ *To assist students in getting suitable placements.*
- ➔ *To promote sports and inculcate discipline amongst the students and help them to be physically and mentally fit.*
- ➔ *To encourage students to go beyond books and to make them globally competent.*

1.3.3 Aim

The College has formulated the following aim *To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.*"

1.3.4 Objective

It is the objective of the College

- ➔ *To impart value based education.*
- ➔ *To emphasis on subject to make them responsible of concept to facilitates logical thinking.*
- ➔ *To inculcate discipline among students to make them responsible citizen.*

- To promote sport, cultural & fine arts.
- To develop the personality, confidence & Communication skills of the students.
- To establish industry network.
- To promote welfare by providing relief to the needy and deserving students.
- To Provide a secular outlook to students which will help them adapt globally
- To upgrade infrastructure to compete with global standards

The commitment of the Institute is towards continuous improvement and democratic functioning, as is reflected in its vision and mission statements, which in turns become the guiding principles for the governance of the Institute.

1.4 Assessment of the Institute

1.4.1 Affiliations

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.

1.4.2 Certification

The College submits its academic records every year to the **All India Survey of Higher Education (AISHE)** Govt. of India through its registered allocated code which is C - 34088.

1.4.3 Accreditation

The College received a **B+ Grade with a CGPA 2.57 in the First cycle of accreditation** in the year 2017 awarded by the National Assessment & Accreditation Council (NAAC) to the College.

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 **950 male and 479 female students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	14	10	24
3	Non-Teaching staff	22	18	40
Total Staff Members		41	29	70

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

The staff data shows the College premises had a total of **70 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 **914 male and 496 female students.**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	11	12	23
3	Non-Teaching staff	14	08	22
Total Staff Members		30	21	51

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

The staff data shows the College premises had a total of **51 Staff Members.**

2.2 Total College Area & College Building Spread Area

The **total site area is 0.75 acres** and the **total Built-up area of the Institute is 1,29,166.93 sq. ft.** for an approximately 1,499 footfalls.

2.3 Institute Infrastructure

2.3.1 Establishment

The Institute was established in **2008**.

2.3.2 Spatial Organisation

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc. The Institute is located pretty close to nature and hence has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.4 Operation and Maintenance of the premises

The interview session was held with the staff regarding the operation and working hours. The Institution is open from Monday to Saturday from 10:00 hours to 17:00 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

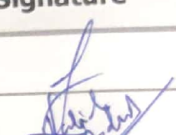
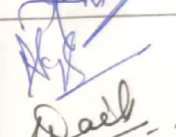
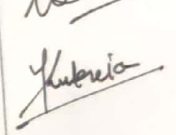

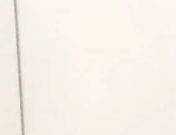
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Audit team headed by external expert - Ar. Nahida Abdulla
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Audit objective: Green Building up gradation of the premises

Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College of Arts, Commerce & Science Date: 3rd May, 2023

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. Pratima Singh		Principal	
4.	Ms. Manali Nait		IGAC member	
5.	Mr. Vicky Kukreja		IGAC 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

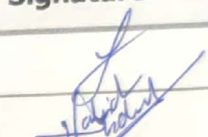
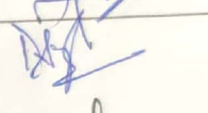
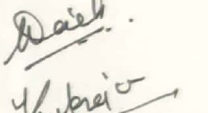
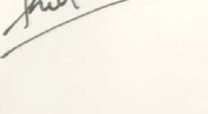




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of Arts, Commerce & Science
Document objective: Exit Meeting attendance sheet

S. No.	Name	Committee	Designation	Signature
1.	Mrs. F. A. Shaikh	External	Project Coordinator	
2.	Ar. Nahida Abdulla	External	Project Head	
3.	Dr. Pratima Singh		Principal	
4.	Ms. Manali Naik		IQAC member	
5.	Mr. Vicky. Kukreja		IQAC member	

Signature & round seal

Name: Dr. Pratima Singh

Designation:

For the said Institute



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



4. Investigation

Environment is an essential part for human survival. We co-exist with the environment and it cannot be termed as a separate entity. The Ecological audit helps to understand the flora, fauna that exists and steps that can be taken to improve the same.

To denote if there are problems related to sound in and around the surrounding. In terms of the carbon footprint it helps in keeping a tab on the eco-friendly habits incorporated by the inhabitants of the premises. Health today is the topmost priority, a general understanding of the initiatives undertaken along with sufficient hygiene practices adopted. Universal design is applicable to all built and unbuilt spaces.

4.1 Open Spaces

There is an open space opposite to the premises used by students at present for sports and cultural gatherings. **There are provisions for natural plantations which have enhanced the beauty of the space.**

4.2 Flora audit

4.2.1 Flora audit

The College campus is located in a shared campus with multiple Institutes; however the building for the College is a standalone building. The plants in the premises are documented through a survey by the internal team and refined further as follows:

S. No.	Plant name	Type	Nos.	Planted by
1	Tulsi	Plant	3	Mr. Umesh Kabadi
2	Areca Palm	Plant	26	Management
3	Bamboo	Plant	6	Mr. Tushar. Shah
4	Periwinkle	Shrub	3	Manali Naik
5	Aloe Vera	Plant	1	Ravi Vishwakarma

Table 3: Details of the Flora in the premises

At present, there are 39 nos. plantations on the premises. The overall ambience of premises has lots of plants.

4.3 Noise Audit

On a macro level the College is surrounded by huge farms and minimal residential blocks **thus there is a peaceful and noise free arena observed inside the premises.**

4.4 Carbon Footprint Audit

4.4.1 Eco-friendly Commuting Practices

- The site is located in an urban locality.
- Overall, the carbon footprint is well under control.
- Students and staff members commute using public transport.
- There are no major fossil fuels used inside the premises.
- No kind of garbage burning activity is undertaken.

4.4.2 Heat Island Reduction

The external temperature is well under control owing to shaded walkways and huge nos. of plantations all over the premises.

4.4.3 Outdoor Light Pollution Study

The College compound lights are not upward looking thus, these do not cause light pollution.

4.5 Universally accessible premises

As per World Report on Disability, 2011 there are 180 million approx. Persons with Disabilities that makes it 15% of total population of India.

The following facilities are available on the premises for the specially-abled as part of universally accessible premises initiatives.

- Low height risers in the staircases
- Non-slippery floor surfaces
- Lifts for user friendly accessibility

The design of the premises is highly appropriate for access with passages and corridors being wide enough in size and naturally ventilated.

4.6 Fire Safety

Fire and life safety are an important consideration of the National Building Code 2016. This aspect is touched upon as part of this study in the capacity of an Architect registered with the Council of Architecture. As part of the research, fire safety audit was considered from the 'Building systems' perspective.

All provisions such as extinguishers, sand buckets, dedicated fire zone safety and exit signages have been undertaken.

DETAILED REPORT

5. Inferences

5.1 Section-wise suggestions related to premises

The following suggestions are to be considered as a **first priority** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

5.1.1 Site beautification

- ➔ **Bird house/ Feeders** - At appropriate locations there can be provisions for drinking water and some grains for birds as they visit the site much frequently.
- ➔ **Child area** - There can be one provision where if student's or staff relative who are toddlers or senior citizens can rest and this area could have facilities accordingly.

5.1.2 Universally accessible premises

- ➔ **Provisions for visually impaired - Signages** – In addition to the signages being in regular language there should be additional signages in braille language for the specially-abled students.
- ➔ **Provisions for visually impaired - Tactile flooring** – The indoor and outdoor of the premises should have dedicated tactile flooring for the visually impaired.

5.1.3 Life safety

NO recommendations suggested for this section.

5.1.4 Pollution Control

- ➔ **Internal circulation** – (applicable only to large campuses) – There could be an e-vehicle for public transportation that can be used by the stakeholders for internal circulation.

- ➔ **Battery charging points for Eco-friendly vehicles** - There can be provision for battery charge points, this would inspire students to change their mode of transportation and adopt sustainable practices.
- ➔ **Bicycles as a gift** - As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.
- ➔ **Paperless technologies for offices** - The Institute can go technology-friendly and go paperless in the functioning of the Premise to a certain extent maybe not fully.
- ➔ **Avoid paper wastage through books** - The Institute can collect all old semester notebooks; these can either be converted to reusable paper on the premises through a workshop or using a shredder machine or handed over to a vendor for making fresh paper. Additionally, the Students can be motivated to undertake similar practices on an individual note.

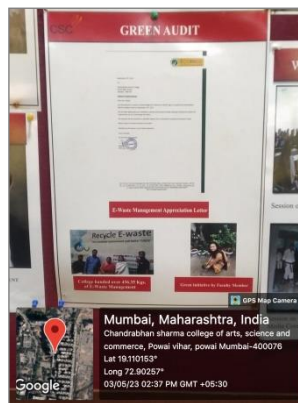
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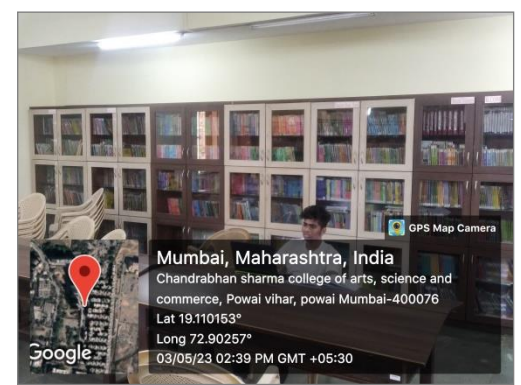
Discussion with the core team



Investigative parameters – Energy Management – Appliances, awareness posters



Investigative parameters – Water Management – E-waste certificate, Dustbins in the premises



Investigative parameters – Fire & Life safety; General areas in the premises

6. References

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.

- ➔ Uniform Plumbing Code – India, 2008
- ➔ IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
- ➔ IGBC Green Landscape Rating system, March 2013
- ➔ BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
- ➔ Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.



ENERGY AUDIT

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

Sustainability study
AUDIT REPORT

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

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Valid till **April 2024**

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Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Overview	7
3. Research	9
4. Investigation	10
5. Documentation	11
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7. References	20

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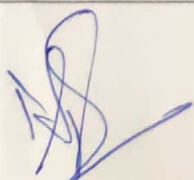
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1.3.2 Mission

The College adheres and focuses

- ➔ *To provide quality education that aims at preparing students for the challenges of life.*
- ➔ *To bring about an all-round development in the personality of the students.*
- ➔ *To encourage students to participate in inter-collegiate events and help them acquire and hone up their skills through peer learning.*
- ➔ *To assist students in getting suitable placements.*
- ➔ *To promote sports and inculcate discipline amongst the students and help them to be physically and mentally fit.*
- ➔ *To encourage students to go beyond books and to make them globally competent.*

1.3.3 Aim

The College has formulated the following aim *To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.*"

1.3.4 Objective

It is the objective of the College

- ➔ *To impart value based education.*
- ➔ *To emphasis on subject to make them responsible of concept to facilitates logical thinking.*
- ➔ *To inculcate discipline among students to make them responsible citizen.*

- To promote sport, cultural & fine arts.
- To develop the personality, confidence & Communication skills of the students.
- To establish industry network.
- To promote welfare by providing relief to the needy and deserving students.
- To Provide a secular outlook to students which will help them adapt globally
- To upgrade infrastructure to compete with global standards

The commitment of the Institute is towards continuous improvement and democratic functioning, as is reflected in its vision and mission statements, which in turns become the guiding principles for the governance of the Institute.

1.4 Assessment of the Institute

1.4.1 Affiliations

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.

1.4.2 Certification

The College submits its academic records every year to the **All India Survey of Higher Education (AISHE)** Govt. of India through its registered allocated code which is C - 34088.

1.4.3 Accreditation

The College received a **B+ Grade with a CGPA 2.57 in the First cycle of accreditation** in the year 2017 awarded by the National Assessment & Accreditation Council (NAAC) to the College.

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 **950 male and 479 female students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	14	10	24
3	Non-Teaching staff	22	18	40
Total Staff Members		41	29	70

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

The staff data shows the College premises had a total of **70 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 **914 male and 496 female students.**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	11	12	23
3	Non-Teaching staff	14	08	22
Total Staff Members		30	21	51

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

The staff data shows the College premises had a total of **51 Staff Members.**

2.2 Total College Area & College Building Spread Area

The **total site area is 0.75 acres** and the **total Built-up area of the Institute is 1,29,166.93 sq. ft.** for an approximately 1,499 footfalls.

2.3 Institute Infrastructure

2.3.1 Establishment

The Institute was established in **2008**.

2.3.2 Spatial Organisation

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc. The Institute is located pretty close to nature and hence has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.4 Operation and Maintenance of the premises

The interview session was held with the staff regarding the operation and working hours. The Institution is open from Monday to Saturday from 10:00 hours to 17:00 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

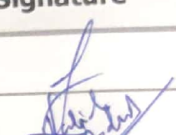
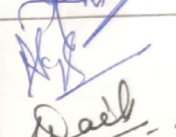
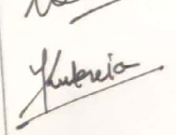

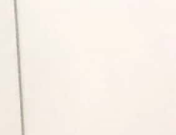
Evidence documents for Site visit of external audit team

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

Audits covered: Green audit Energy audit Environment audit

Institute: Chandrabhan Sharma College of Arts, Commerce & Science Date: 3rd May, 2023

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. Pratima Singh		Principal	
4.	Ms. Manali Nait		IGAC member	
5.	Mr. Vicky Kukreja		IGAC 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

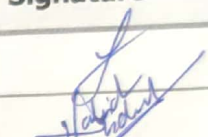
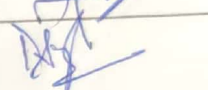
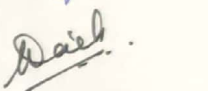
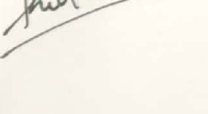




Evidence documents for Site visit of external audit team

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: Chandrabhan Sharma College Date: 3rd May, 2023
of Arts, Commerce & Science
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	
3.	Dr. Pratima Singh		Principal	
4.	Ms. Manali Naik		IQAC member	
5.	Mr. Vicky. Kukreja		IQAC member	

Signature & round seal

Name: Dr. Pratima Singh

Designation:

For the said Institute



Signature & round seal

Name: Mrs. F. A. Shaikh

Designation: Project Coordinator

For The Greenvio Solutions



4. Investigation

4.1 Sources analysis

The primary and secondary sources of energy consumption are based on the electrical supply through the local government.

4.2 Energy efficiency analysis

4.2.1 Energy efficient practices for alternative sources

- Additional provisions such as solar hot water heaters, solar parking etc., should be introduced in the near future.
- The premise has LED Lights contribute to 46% in terms of number and **62% of the power requirement** is met through the same. As per our study we could conclude that both of these numbers should improve.
- There are sensor based smart lights in the premises.

4.2.2 Energy efficient equipment

- The premise has LED Lights in multiple spaces.
- The air conditioners are BEE star labelled appliances and new.
- 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 sources to harness solar energy in the premises are under process and will be implemented soon.

5.2 Secondary sources of energy consumption

The premise uses batteries, inverters & UPS as backup for administrative purposes.

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 2021 - 2022				
1	June	2021	45,690	4,269
2	July	2021	68,470	6,414
3	August	2021	31,500	4,086
4	September	2021	34,240	3,489
5	October	2021	61,210	6,242
6	November	2021	58,370	5,953
7	December	2021	68790	7,014
8	January	2022	36100	3,681
9	February	2022	41540	4,236
10	March	2022	80,900	8,227
11	April	2022	74,060	7,453
12	May	2022	60,310	5,953

Academic year 2022 - 2023				
13	June	2022	74,840	7,596
14	July	2022	95,020	8,727
15	August	2022	1,01,640	9,286
16	September	2022	1,07,360	9,775
17	October	2022	93,930	8,236
18	November	2022		8,795
19	December	2022	1,10,480	9,647
20	January	2023	77,053	6,550
21	February	2023	81,250	6,997
22	March	2023	1,04,740	9,195
23	April	2023	1,09,820	9,588

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 in summarised in the following sections.

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

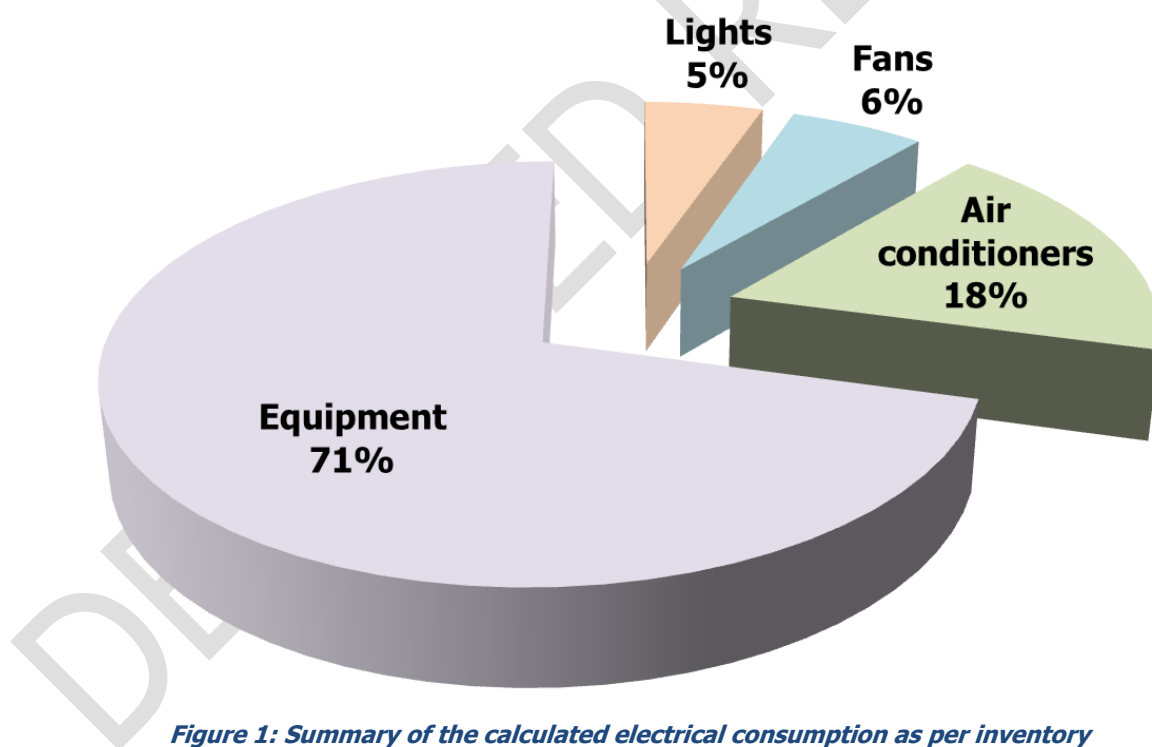


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consumes 71% whereas the air conditioners consume 18% while the fans consume 6% and the lights consume 5% of the total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are a total of **555 nos. of lights on the premises**; the following table shows the various types of lights on the premises.

S. No.	Type	Nos.
1	LED (Energy-efficient lights)	343
2	Non-LED (Non Energy-efficient lights)	100
3	CFL (Non Energy-efficient lights)	94
4	Halogen (Non Energy-efficient lights)	18

Table 4: 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 **25,556 kWh** of energy.

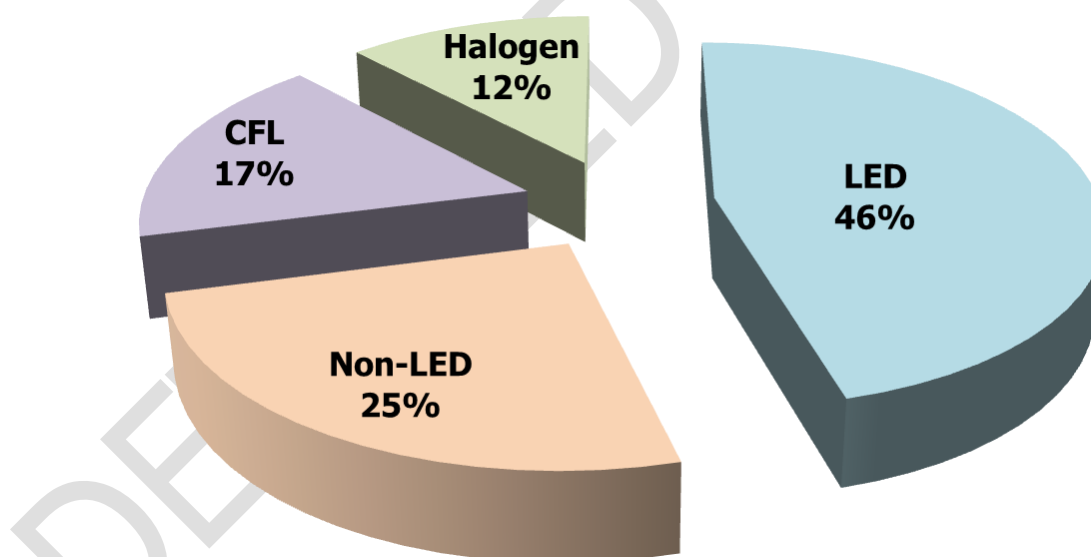


Figure 2: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on the premises shows that the **LED lights consume 46%** while the **Non-LED lights consume 25%** whereas the **CFL lights consume 17%** and the **Halogen lights consume 12%** of the total power consumed by lights.

5.6 Fans

5.6.1 Types of fans based on the numbers

There are a total of **381 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	340
2	Small motor exhaust fans	14
3	Wall mounted fans	27

Table 5: Summary of the types of fans in the premises

5.6.2 Types of fans based on the power consumption

The energy consumption of fans is **28,981 kWh** of the energy.

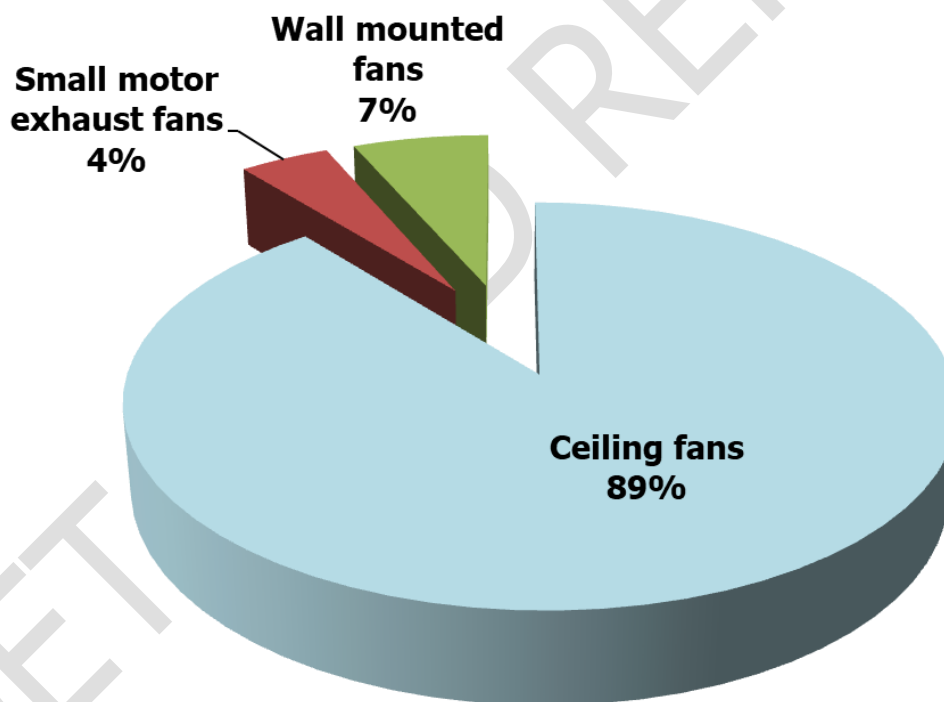


Figure 3: Types of fans based on power consumption

The above analysis shows the **Ceiling fans consume 89%** whereas the **wall mounted fans consume 7%** while the **small motor exhaust fans consume 4%** of the total power.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

There are **40 air conditioners** on the entire premises.

5.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **87,000 kWh** of energy.

5.7.3 Site investigation observations

- The major consumption is in the Conference room, Library and IT laboratory as the usage is maximum in these spaces.
- Nearly equal consumption takes place in the rest of the areas wherever there are air conditioners.
- While the least energy is consumed by the air conditioners in the Cabins and the Exam room.

5.7.4 About the replacement of current air conditioners

The current air conditioners are well maintained, though there is not an immediate requirement for replacement however, whenever the College 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 **319 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **3,42,802 kWh** of energy.

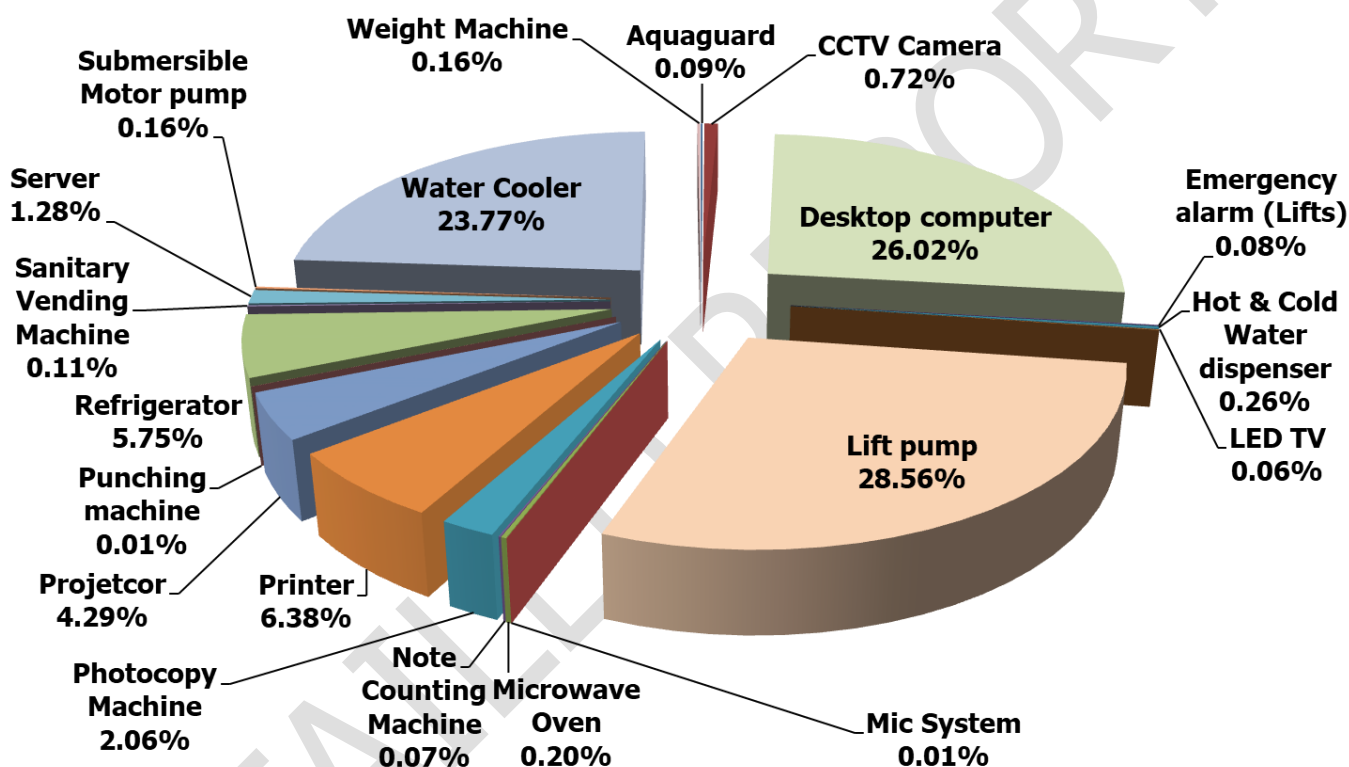


Figure 4: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **lift pump consumes more energy at 28.56%** while the **desktop computer consumes 26.02%** the **water cooler consumes 23.77%** and the **printer consumes 6.38%** 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 1.5 to 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 analysis shows that there would be a reduction of an average of **67% reduction** in energy consumption through lights specifically as a part of the electro -mechanical system if all **Non-LED lights on all floors** are replaced with an energy efficient appliance whenever the College undergoes renovation.

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 detailed study states that is all the **ceiling fans on all floors** if replaced with star rated appliance results in a reduction of average of **69% reduction** in energy consumption if replaced with energy efficient appliance. It will be suggested to either replace these now if College 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 related to 'entire Institute' and should be considered as **second priority** and should be **implemented within 2.5 to 3.5 years from the date of the Report submission.**

6.2.1 Alternatives to increase renewable energy – Solar parking

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



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 Alternatives towards Smart premises – Smart gardening

The College 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/>

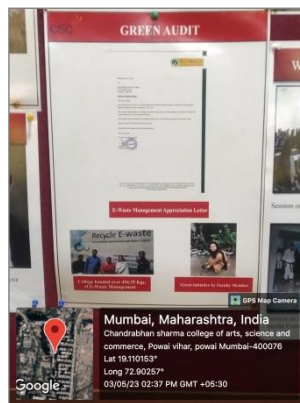
Data source: <https://www.happysprout.com/inspiration/what-is-smart-gardening/>



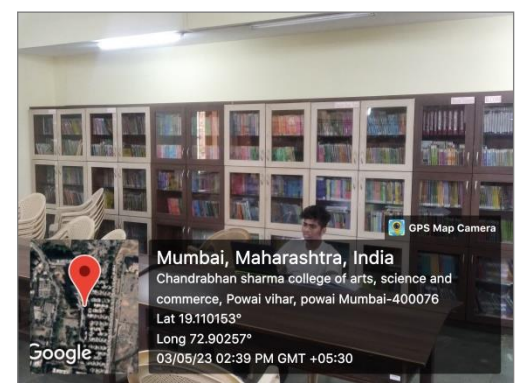
Discussion with the core team



Investigative parameters – Energy Management – Appliances, awareness posters



Investigative parameters – Water Management – E-waste certificate, Dustbins in the premises



Investigative parameters – Fire & Life safety; General areas in the premises

7. References

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 - Zsuzsa Bóka from Pixabay
- ➔ Inference study reference image - <https://solarpowerproject.in/solar-panels-for-parking-lots.php>







Vision

“To be an academy of excellence, which will provide transformative and empowering educational experiences to create globally competitive youth.”

Mission

1. To provide quality education which aims at preparing students for the challenges of life
2. To bring about an all-round development in the personality of the students
3. To encourage students to participate in intercollegiate events and help them acquire and hone up their skills through peer learning
4. To assist students in getting suitable placements
5. To promote sports and inculcate discipline amongst students to keep them physically and mentally fit
6. To encourage students to go beyond books and to make them globally competent independently

Objective

- The purpose of this audit was to ensure that the Green Policy is followed and implemented in the campus, across all departments, administrative bodies and students.
- To provide opportunities to learners in protecting and improving the natural environment.
- To promote 7 RReduce, Replace, Reuse, Recycle, Recover, Refuse and Reject, Rethink method
- To create awareness on Pollution control measures



Green Audit Committee

Convener: Dr.RajashekharO.Patil

H.O.D. : Environmental studies

Sant Gadgae Maharaj College

Member:

Elsie Gabriel

Founder Young Environmentalists Programme Trust

Ambassador for India Global Quest International

National Coordinator Oceans Climate Reality Project

To,

Dr. Pratima Singh
Principal
Chandrabhan Sharma College

Subject: Green Audit for the Academic year 2020 - 21

Dear Madam,

We are thankful for giving us an opportunity to give Suggestions and Recommendations on green campus initiative in the academic year 2020 - 21 for green audit of initiatives in Chandrabhan Sharma College campus.

- Create awareness among learners about shifts in climate and depletion of Ozone layer.
- E-waste Bin to be installed in the college premises
- Creating awareness programmes in the vicinity and college campus by running a E waste management drive. Same can be handed over for recycling.
- College can conduct activities beyond the college campus.

Thank you & regards



Converner

Green Audit

Dr. Rajashekhar O. Patil

H.O.D., Environmental studies

Sant Gadge Maharaj College



Smt. Durgadevi Sharma Charitable Trust's
Chandrabhan Sharma College
of Arts, Science & Commerce
(Affiliated to the University of Mumbai)
NAAC ACCREDITED 'B+' GRADE (FIRST CYCLE)

17th January, 2021

To

Dr. Rajashekhar O.Patil

H.O.D., Environmental studies

Sant Gadge Maharaj College

Subject: Letter of Invitation

Dear Sir

Our college intends to conduct a Green Audit for the current academic year 2020-21. We take great pleasure in inviting you to be the Honorable member of this Audit Committee.

We request you to visit our college on 19th January, 2021 and conduct a detailed green audit. We welcome your valuable comments and suggestions on the ways in which our performance can be improved further.

We look forward to your valuable presence and guidance



With Regards



Smt. Durgadevi Sharma Charitable Trust's
Chandrabhan Sharma College
of Arts, Science & Commerce
(Affiliated to the University of Mumbai)
NAAC ACCREDITED 'B+' GRADE (FIRST CYCLE)

19th January, 2021

To

Dr. Rajashekhar O. Patil

Sant Gadge Maharaj College,

Girgaum, Mumbai, Maharashtra 400004

Subject: Letter of Thanks

Dear Sir

We thank you for your visit to our college today, as the Honorable Member of the Audit Committee and conducting the Green Audit to help us understand the areas of improvement required to make our performance even better.

We have made a note of the valuable suggestions put forth by the Audit Team and will make sincere efforts to implement them in the near future

We look forward to more such interactions with you

With Regards



12th January, 2021

To
Mrs.Prashant Sharma,
Managing Trustee

Subject: Compliance Report of Green Audit for the Academic year 2020-21

We are very thankful to Dr.Rajashekhar O. Patil and team for conducting a green audit in our academic year 2020-21. On the basis of recommendation given by the committee members of the Green Audit 2020-21. The following measures were undertaken by the college:

- The college continued the practice of giving plants to every guest coming to the college instead of giving bouquets.
- Resources conservation boards were placed on the college campus.
- E- waste management bins are kept in college campus



Principal
Dr. Mrs. Pratima Singh

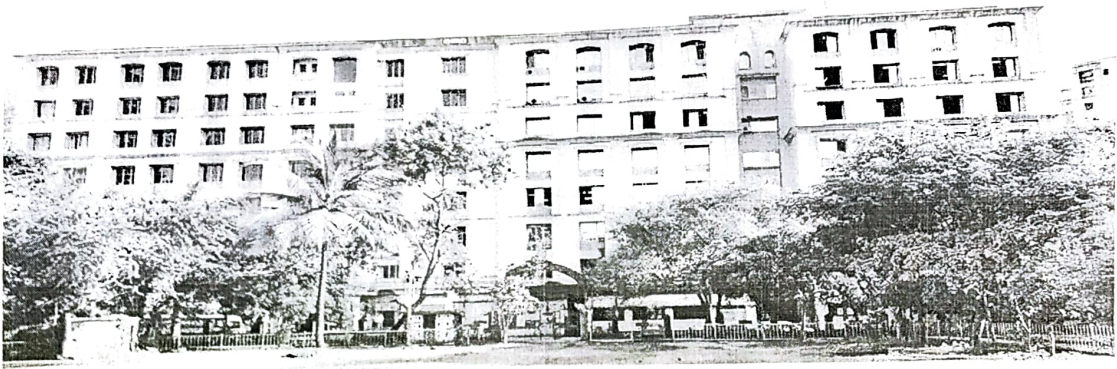
Energy Audit Report

April 2019- March 2020

of

Smt. Durgadevi Sharma Charitable Trust's
CSC Chandrabhan Sharma College
of Arts, Science & Commerce
(Affiliated to the University of Mumbai)
NAAC ACCREDITED 'B+' GRADE (FIRST CYCLE)

Powai, Mumbai - 400076



Report Prepared by



KNOWLEDGE INCLUSION
EDUCATION AND CONSULTING COMPANY

Connect: 9820678215 # Email: KnowledgeInclusion@gmail.com

Kurla, Mumbai - 400070



I/C PRINCIPAL

Chandrabhan Sharma College
Arts, Commerce & Science
Powai-Vihar, Powai, Mumbai - 400 076
Tel. 25704526/65234526

Preface

The team conceded Chandrabhan Sharma College of Arts, Science and Commerce data collection for an energy audit from April 2019 to March 2020. The audit was over sighted to inquire about convenience to progress the energy competence of the College. Health and safety were primely anxious to drop energy utilization whilst cultivating or humanizing comfort. This audit is required to recognize the mainly energy proficient appliances. Besides, several each-day processes concerning common appliances have been provided, facilitating the energy expenditure. Knowledge Inclusion Education and Consulting Company completed the energy audit survey. All data was collected from the classroom, laboratory, and other college properties. The work is completed by considering how many tubes, fans, A.C, electronic instruments, etc. in each room are installed and their uses



Acknowledgement

Knowledge Inclusion Education and Consulting Company convey their gratitude and thanks to the Management of Chandrabhan Sharma College of Arts, Science and Commerce, Mumbai, for allowing us to conduct an Energy Audit which was conducted for the period June 2019 up to May 2020

Our sincere thanks to the Management of the College, Principal Dr. Pratima Singh, Faculty Mrs. Anjana Verma and other staff members for their keen interest and support in conducting the Energy Audit



Introduction

About the College

Chandrabhan Sharma College of Arts Science and Commerce, established in 2008, is part of the GHP education Wing and is managed by Smt. Durgadevi Sharma Charitable Trust.

The Managing Trustee, Shri Prashant Sharma, founded the College in memory of his late Grandfather, Pandit Chandrabhan Sharma. The College is nestled in a picturesque campus on the hillside of Powai.

Chandrabhan Sharma College grooms the new youth generation to excel morally and academically. Emphasize value-based learning and focus on understanding and not mere accumulation of knowledge.

Programs Offered by the College

The College offers seven undergraduate programs such as Bachelor of Commerce, Bachelor of Management Studies, Bachelor of Information Technology, Bachelor of Commerce in Financial Market, Bachelor of Commerce in Accounting and Finance, Bachelor of Commerce in Banking and Insurance as well as Bachelor of Mass Media

The vision of the College

“To be an academy of excellence, which will provide transformative and empowering educational experiences to generate globally competitive youth.”



The Mission of the College

To provide quality education, bring all-around development, encourage students to participate in the inter-collegiate event, and cope up their skills through peer learning. Promote sports, inculcate discipline and help them be physically and mentally fit. Assist students for placement and make them globally competent.

The Philosophy of the College

“Imagination is the beginning of creation. First, imagine what you desire, how you will create what you desire, and finally, create what you desire.”



A nation is trying to advance in quantity and quality to spread education among common India and develop their intelligence. In India, the entire field of education and other intelligent activities had been monopolized by a handful of men before independence. But today, we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development, energy management is essential. Regarding the electricity crisis, we are facing a lack of electricity during office work. So, institutional Management is taking design regarding electricity production and saving electricity for eco-social aspects.

The energy requirement of India is growing, and incomplete domestic fossil fuel treasury. The country has a motivated strategy to enlarge its renewable energy resources and a policy to establish nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facilities from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means a reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to the adequate rating of the equipment, using high-efficiency equipment, and change of habits that causes enormous wastages of energy. By observing all these studies lack electricity and huge electricity demands. It is necessary to plan to be self-sufficient in electricity requirements.

Experimental and Data Collection

The team collects all required data. How many fans, tubes, fans, computers, instruments, Air-condition etc., are measured in the building. According to the survey following data is collected.

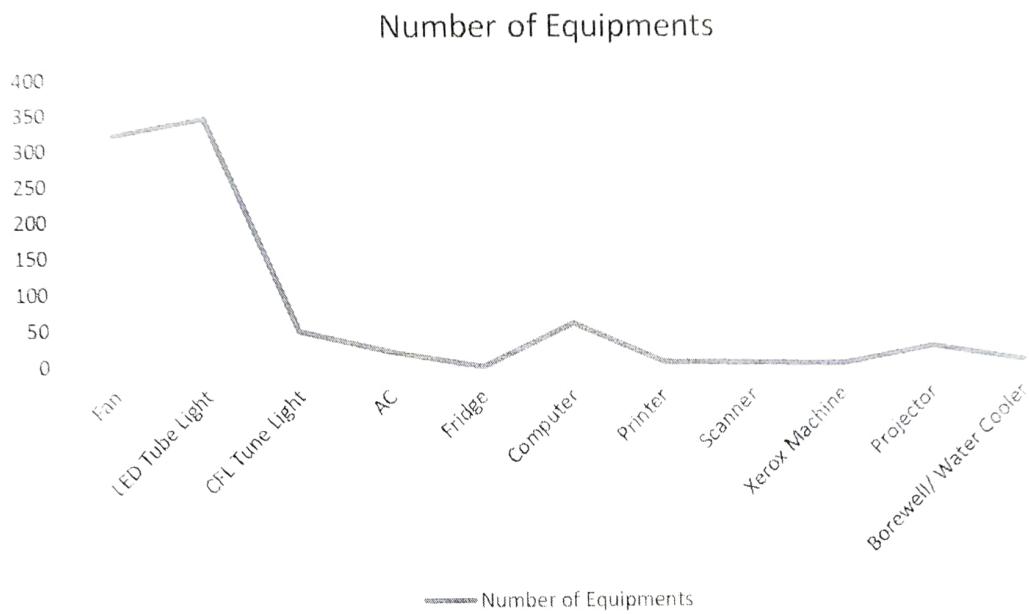


Number of Appliances working on Electricity in Numbers

Department/ Instrument	Fan	LED Tubelight	CFL Tube light	A.C.	Fridge	Comp- uter	Print er	Scanner	Xerox Machine	Projector	Borewell Motor
Principal Office	3	5	1	1	1	1	1	1	--	--	--
Office	5	6	--	1	--	6	2	1	1	--	--
Computer Lab.	4	7	--	2	--	30	--	--	--	1	
Examination Department.	6	9	--	1	--	3	1	--	--	--	--
Staff Room	5	6	--	1	--	5	--	--	--	--	--
Library	14	23	--	2	--	9	1	1	--	--	--
Classroom	204	190	22	9	--	3	--	--	--	22	--
Boy's Room	8	10	3		--	--	--	--	--	--	--
Girl's Room	2	3			--	--	--	--	--	--	--
NSS Room	2	--	2		--	--	--	--	--	--	--
Storeroom	3	--	3		--	--	--	--	--	--	--
YCMOU/NAAC	3	4	--	1	--	1	1	1	--	--	--
Sport	22	24	--		--	1			--	--	--
Placement	2	2	--	1	--	--	--	--	--	--	--
Pantry	4	6	--		--	--	--	--	--	--	--
Seminar Hall	6	9	--	2	--	1	--	--	--	1	
Passage	26	38	18		--	--	--	--	--	--	3
Washroom	3	3	--		--	--	--	--	--	--	WATERCOOLER
Total Quantity	322	345	49	21	1	60	6	4	1	24	3



Number of Appliances working on Electricity in Graphical Presentation



Power Consumption of Electricity Board

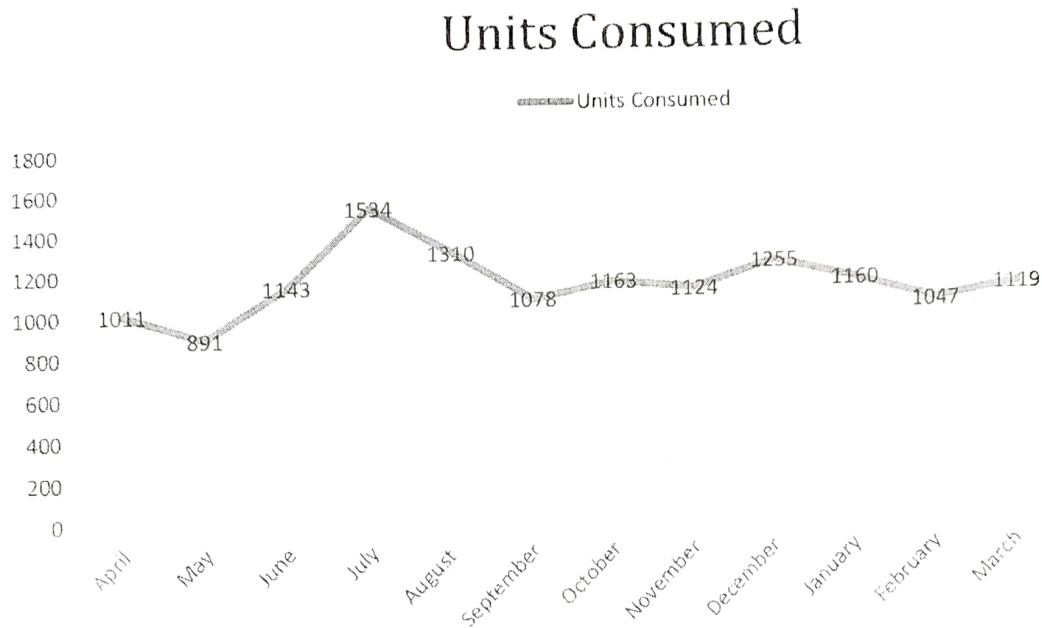
The College receives electricity supply from Adani Electricity, Mumbai. The tariff is generated on LT IX (B). The type of supply is LT bearing account number 150126056. The bill is generated under the name Smt. Durgadevi Sharma Charitable Trust, Mumbai – 400076. In the entire audit period, the load factor was assumed to be 0.0000% and the average power factor was 87.50 % lag

Table showing the consumption of power for the period April 2019 – May 2020

Month	Consumption
April	1011
May	891
June	1143
July	1543
August	1310
September	1078
October	1163
November	1124
December	1255
January	1160
February	1047
March	1119
Total	13,844



Graphical representation of electricity consumption between April 2019 to March 2020



Distribution of Network

There is a main electrical panel installed in the electric room. All the distribution cables go from the main panel to buildings and other open areas. Subpanels are installed in the buildings. There is a taping on each floor from the rising mains. During the study, it was observed that the conductor size is good according to ampere load. No conductor was found overheated or its insulation burnt. An adequate size conductor is going to feed the utility area. So, distribution losses are within the limit. Almost every piece of equipment used is of a good brand which not only helps to save energy but is also safe during any uneven incident



Use of Electricity during Peak Hours and off-Peak Hours

The applicable electricity tariff is not also based on the timing of the day, but it may not be applicable in the case of a domestic LT/ HT type connection. This will also help maintain the demand graph. It is recommended to avoid using electrical gadgets for cleaning, watering, etc., during peak hours. This type of work should be operational during the off-peak hour.

Advantages of Net Metering

1. Financial benefit for the system owner

Since the system owner is charged for the net energy consumed from the utility grid, the owner gets financial benefits. E.g., If energy generation < energy consumed: the owner pays just for the net amount. If energy generation > energy consumed: the owner gets credit for excess generation

2. Avoid the use of batteries

In a grid-connected solar PV system, any excess energy generated can be fed back to the local utility grid and can be taken back at a later stage when required. Thus, there is no need to store the surplus energy in batteries for later use, thus, avoiding the heavy costs of batteries. Also, since batteries are eliminated, the system's maintenance costs are reduced greatly. Batteries may be required only when there are frequent power fluctuations/outages.

3. Produce more today; use that tomorrow

If there is a surplus of power generation than the consumption, the surplus can be fed into the grid system, and if consumption increases, it can be taken from the grid.



Recommendation

Electricity

- Schedule your operations to maintain a high load factor
- Minimize maximum demand by tripping loads through a demand controller
- Use standby electric generation equipment for on-peak high load periods.
- Correct power factor to at least 0.99 underrated load conditions.
- Set transformer taps to optimum settings.
- Shut off unnecessary computers, printers, and copiers at night.

Motors

- Properly size to the load for optimum efficiency.
- (High-efficiency motors offer 4 - 5% higher efficiency than standard motors)
- Check alignment.
- Provide proper ventilation
- (For every 10°C increase in motor operating temperature over the recommended peak, the motor life is estimated to be halved)
- Check for under-voltage and over-voltage conditions.
- Balance the three-phase power supply.
- (An Imbalanced voltage can reduce 3 - 5% in motor input power)
- Demand efficiency restoration after motor rewinding.

Fans



- Use smooth, well-rounded air inlet cones for fan air intakes.
- Avoid poor flow distribution at the fan inlet.
- Minimize fan inlet and outlet obstructions.
- Clean screens, filters, and fan blades regularly.
- Use aerofoiled-shaped fan blades.
- Minimize fan speed.
- Turn off fans when not in use
- Use low-slip or flat belts.

Chillers

- Increase the chilled water temperature setpoint if possible.
- Use the lowest temperature condenser water available that the chiller can handle
- (Reducing the condensing temperature by 5.5°C, results in a 20 - 25% decrease in compressor power consumption)
- Increase the evaporator temperature

Lighting

- Reduce excessive illumination levels to standard levels using switching, de-lamping, etc.
- Aggressively control lighting with clock timers, delay timers, photocells, and occupancy sensors.
- Install efficient alternatives to incandescent lighting, mercury vapour lighting, etc. The efficiency (lumens/watt) of various technologies ranges from best to worst approximately as follows: low-pressure sodium, high-pressure sodium, metal halide, fluorescent, mercury vapour, and incandescent.



- Select ballasts and lamps carefully with high power factors and long-term efficiency in mind.
- Upgrade obsolete fluorescent systems to Compact fluorescents and electronic ballasts
- Consider lowering the fixtures to enable using less of them.
- Consider daylighting, skylights, etc.

Miscellaneous

- Meter any unmetered utilities to know what normal efficient use is. Track down causes of deviations.
- Shut down spare, idling, or unneeded equipment.
- Make sure that all of the utilities to redundant areas are turned off -- including utilities like compressed air and cooling water.
- Install automatic control to efficiently coordinate multiple air compressors, chillers, cooling tower cells, boilers, etc.
- Renegotiate utility contracts to reflect current loads and variations.
- Consider buying utilities from neighbours, particularly to handle peaks.
- Leased space often has low-bid inefficient equipment. Consider upgrades if your lease will continue for several more years.
- Adjust fluid temperatures within acceptable limits to minimize undesirable heat transfer in long pipelines.
- Minimize the use of flow bypasses and minimize bypass flow rates.
- Provide restriction orifices in purges (nitrogen, steam, etc.).

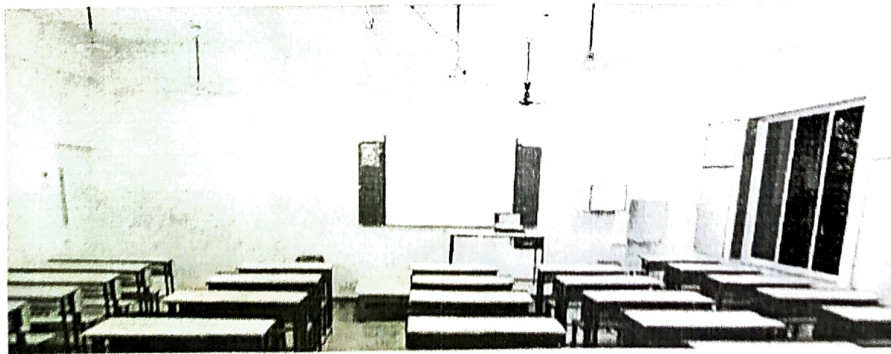
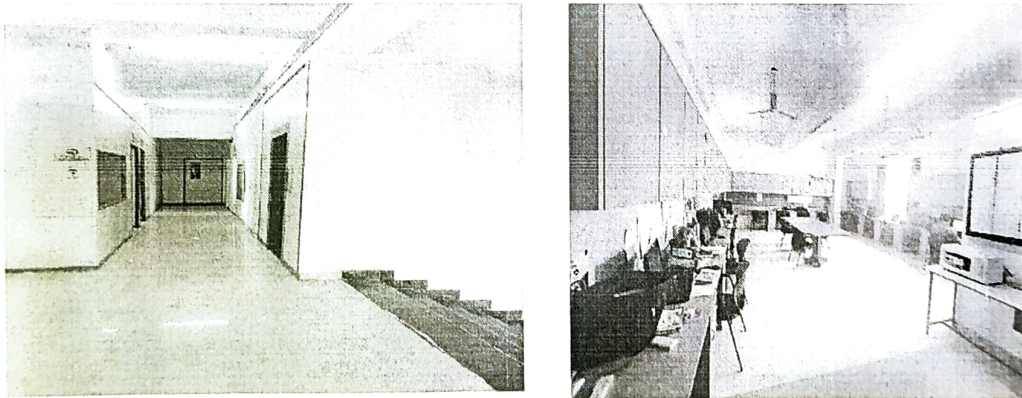
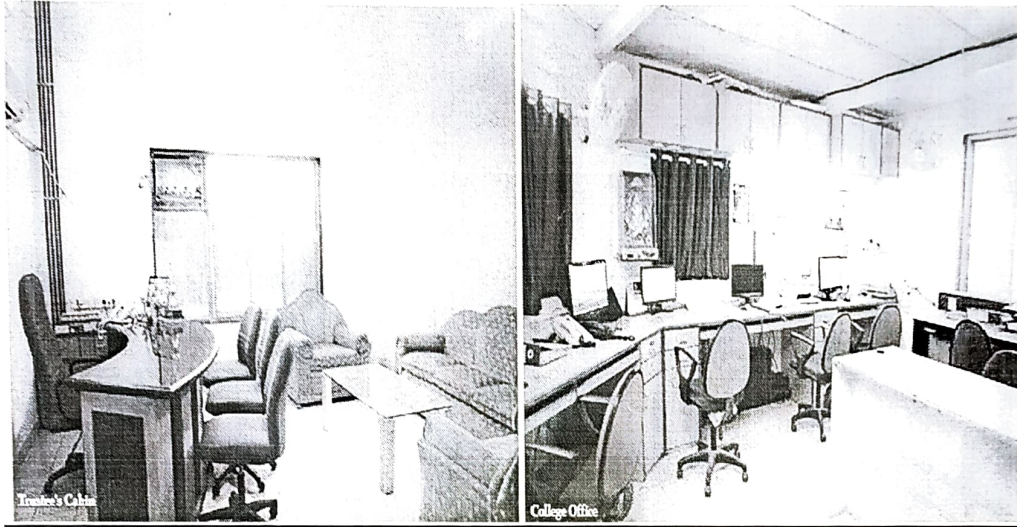


- Eliminate unnecessary flow measurement orifices.

Conclusion:

In conclusion, data generated in energy audits are useful for understanding the energy distribution and utilization of College. The College needs a maximum of 14,264 (annually) KW of electricity. and a hybrid energy generation device generates only 480 units/moths

Glimpses of Photos



I/C PRINCIPAL

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Arts, Commerce & Science

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