

GREEN AUDIT

STUDY PERIOD (TWO YEARS) 2020 – 2021 & 2021 - 2022

Sustainability study

AUDIT REPORT

Studied for

Rayat Shikshan Sanstha's

Savitribai Phule

Mahila Mahavidyalaya, Satara

Karmveer Samadhi Parisar, Raviwar Peth,
Powai Naka, Satara – 415001, Maharashtra

Studied in the capacity of

Accredited and Certified

Green Building Professional



Studied by

Greenenvia
Green Building Professional

Valid till **July 2024**

Disclaimer

The Audit Team has prepared this report for the **Rayat Shikshan Sanstha's Savitribai Phule Mahila Mahavidyalaya, Satara** located at Karmveer Samadhi Parisar, Raviwar Peth, Powai Naka, Satara – 415001, Maharashtra based on input data submitted by the Institute analysed by the team to the best of their abilities.

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

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and Institute. 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

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Acknowledgement

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Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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DETAILED REPORT

1. Introduction

1.1 About the statements of the Institute

1.1.1 Vision

The Institute intends "Education for the upliftment, social justice, gender equality and strengthening womanhood for the nation building."

1.1.2 Mission

The Institute adheres and focuses "To impart quality higher education to the women from rural area, to awake them educationally, socially, culturally and make them economically self-reliant."

1.1.4 Motto

The College works towards "Education through self-help."

1.1.5 Objective

It is the objective of the College:

- To improve the employability of future generations as per NEP 2020.
- To provide qualitative higher education to the students with hard work and dedication.
- To provide education to inculcate moral and cultural values to make the students civilized and responsible citizens.
- To inculcate democratic values of social equality, dignity of labour, secularism and patriotism.
- To inculcate scientific approach and rational attitude towards life into the students.
- To equip the students with the knowledge and skills of value-based education.
- To achieve overall personality development through extracurricular activities. To attain community and social development and train the students to face various competitive examinations

1.2 Assessment of the Institute

1.2.1 Affiliations

The Institute is affiliated to **Shivaji University**, a state University in the city of Kolhapur, State of Maharashtra in India.

1.2.2 Certification

The Institute has received the following Certifications

- **AISHE** – The All India Survey of Higher Education code is **C-11187**.
- **ISO 9001** – Quality Management Systems

1.2.3 Recognitions

The Institute is recognised in **section 2(f) and section 12 (B) of the University Grants Council Act, 1956** Govt. of India, New Delhi.

2. Overview

2.1 Summarised Populace analysis for 2021-2022

2.1.1 Students data

The data (shared by the College) shows there were a total of **967 students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	19	17	36
3	Non-Teaching staff	03	00	03
Total Staff Members		27	18	45

Table 1: Staff data of the Institution for 2021-2022

The staff data shows the College premises had a total of **45 Staff Members**.

3. Data

3.1 Site Area & College Building Spread Area

The **site area is 1,08,340 sq. ft.** with a built-up area of 18,203 sq. ft.

3.2 College Infrastructure

3.2.1 Establishment

The College was established in **1989**.

3.2.2 Spatial Organisation

The College is located in a pollution free and healthy environment. The Building is a Reinforced Cement Concrete (RCC) framework building. There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, etc.

4. Documentation

4.1 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.

4.1.1 Green practices

We observed the following points during the process.

- **Waste management** – *Compost pit and biogas plant is undertaken.*
- **Social awareness** - *The College has taken up awareness drives on various social issues for rural upliftment and regeneration in the college and surrounding villages.*
- **Cleanliness Campaign** - *The Swachha Bharat Abhiyan is carried out on college premises as well as off-premises.*
- **Silent and peaceful atmosphere** – *The College is located amidst residential areas which are well designed thus these help to maintain the pollution under control and provide a healthy ambience.*
- **Universal design** – *The College premises has special provisions such as ramps, lifts for the specially abled.*
- **Hygiene committee** - *The College has a hygiene committee which undertakes multiple programs and necessary actions towards the maintenance of cleanliness in the premises.*
- **Documentation of all the events** – *The best part about the College is the prompt and professional response, this was observed not only in the way the Team responded throughout the project but also through the documented data submitted be it the cleanliness report or the eco club activities report; each of these were documented and presented in a sophisticated manner which is highly appreciating.*

4.1.2 Community development

The College conducts environmental initiatives documented as follows:

S. No.	Event	Particulars	Date
1	Gas safety	To aware students about hazardous events	25-09-2021
2	Fire extinguisher handling training		15-09-2021
3	No vehicle day	To aware students about pollution	24-09-2021
4	Cleaning of campus	To increase awareness about hygienic	04-10-2022
5	Tree plantation	To create awareness about trees	08-12-2022
6	Tree plantation		06-12-2022
7	Environmental poster exhibition	To aware students about flora and fauna	28-02-2023
8	Guest lecture on Global Warming	To create awareness about nature.	16-09-2022
9	Guest lecture on Biodiversity	To aware students about nature	06-10-2022

Table 2: Details of the environmental initiatives undertaken

4.2 Waste Audit

Waste is an inevitable part of our lives. The audit provides an approximation of the types of waste generated, location of waste collections, disposal techniques used, waste segregation methodologies adopted. The waste management strategies are studied and ways that can be adopted aiming to make the premise clean and sustainable are proposed.

4.2.1 Waste produced

S. No.	Type of waste	Source	Current Disposal method	Can be retreated/ recycled?	Methodology
1	Solid waste	Toilets–Biodegradable waste	TREATED – Biogas plant	Not applicable as measures are already undertaken	
2	Liquid waste	Toilets, washbasins	Led into the storm water drains	Yes	TREATED - Sewage treatment plant can be initiated
3	Paper waste	Newspaper and other paper	Given to vendor	Yes	TREATED – A recycling plant can be initiated
4	E-waste	Computers - Non-biodegradable waste	Given to the Sanstha which is recycles further		
5	Dry waste in form of leaves	Open space & plantations, papers - Non biodegradable waste	TREATED – Composting has been undertaken		Not applicable as measures are already undertaken
6	Organic regular waste	Dust, dirt dust waste from indoor spaces			

Table 3: Details of the waste management practices adopted by the team

4.3 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 effective usage of water without any wastage should be a mandatory practice. Understanding the techniques as per site context to increase water conservation in terms of awareness and practice can be identified and executed as part of this exercise.

4.3.1 Water availability and consumption

4.3.1.1 Source of Primary water supply

The College uses drinking water for daily consumption. There are facilities at various locations in the premises as documented below:

S. No.	Type	Size	Capacity (litres)	Nos.	Location
1	Underground	15*7*10	17,000	1	Near Mess
2	Overhead	7*5*6	2,000	2	Top on Hostel
3	Fire tank	N/A	N/A	N/A	N/A
4	RO Plant	5*4*5	1,000	1	Third floor

Table 4: Details about the water facilities in the premises

4.3.1.2 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. **At present, there are no facilities available as the secondary source.**

4.3.1.3 Source of Tertiary water supply

The tertiary source of water is the additional source of water harvesting. *The project is under practice with dedicated pits admeasuring 15' x 7' x 1' having a capacity of 17,000 litres available in 1 nos. in the premises.*

4.3.1.4 Source of Reusing waste water

Green Chemistry is not applicable to the Institute.

4.3.2 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:

Particulars
General toilet for students
General toilet for staff
Special Toilet for handicaps 1.5m x 2.5m
Urinals
Taps in laboratories
Taps in wash basins in toilets
Taps in kitchen sinks
Taps in Hostel mess
Taps in Canteen
Taps in the garden

Table 5: Details of the water usages in the premises

4.4 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.

4.4.1 Facilities available

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

4.4.2 Hygiene aspects

There was no major hygiene issue observed anywhere in the premises.

5. Suggestions

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 Green practices Audit

- **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.
- **Environmental awareness** - There can be various artworks on the compound wall giving the message of saving the environment through the joint efforts of the students and staff thereby making the student socially and environmentally responsible citizens.

5.2 Waste Audit

- Tie up with **Bisleri International regarding their 'Bottles for change program'** also with **'Thereco'** for their waste management.
- Invite companies such as **'Thaely'** and **'Recharkha'** to undertake skill development workshops.

5.3 Water Audit

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.

5.4 Health and Hygiene Audit

- **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'



Investigative parameters – Energy Management – Solar hot water heater systems in the premises



Investigative parameters – Infrastructure facilities in the premises

Roof Rain water Harvesting System

For irrigating the plantation in campus

Rainwater harvesting is a technique used for collecting, storing, and using rainwater for landscape irrigation and other uses. The rainwater is collected from various hard surfaces such as rooftops and/or other manmade aboveground hard surfaces. We have much potential of roof rain water harvesting from which we can collect this water and store it for different purposes. In first phase we have collected the roof water 3000 sqft.

On that basis we can estimate the annual water collection which as follows

Roof Type	Co-efficient
Slab	0.8 to 0.9

Satara City annual rainfall in mm = 1200-1500, Consider rainfall - 1300 mm. Rainfall in meter = 1.3
 Rainwater Harvesting Potential (In Cum) = Area (in Sq. Meter) X Annual Rainfall (in) X Co-efficient X Constant Co. eff. (0.80)

Rainwater Harvesting (3000 Sq.ft) = Area in Meter X Annual Rainfall (in) X Co-efficient X Constant Co. eff.
 278.7091 1.3 0.8 0.80

Rainwater Harvesting (3000 Sq.ft) = 278.7091 X 1.3 X 0.8 X 0.80
 = 231.8859712 Cum
 = 231885.9712

We are using this water for irrigation plantations in campus by using drip irrigation system



Investigative parameters – Water Management – Rain water harvesting system



Investigative parameters – Waste Management through compost pit, biogas plant, dustbins and vending machine

6. 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>




Principal
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ENVIRONMENT AUDIT

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4. Documentation

4.1 Open Spaces

There is an moderately sized space used by students at present for sports and cultural gatherings. **There are provisions for plantations enhancing the beauty of the space.**

4.2 Flora audit

A flora survey was carried out to identify the total numbers of plants and trees. The flora survey is common for the entire campus as documented below.

S. No.	Plant name	Type	Nos.	Planted by
1	<i>Santalum Album</i>	Tree	Innumerable	Grown naturally
2	<i>Diospyros Oocarpa</i>	Tree	Innumerable	Grown naturally
3	<i>Delonix</i>	Tree	Innumerable	Grown naturally
4	<i>Senna Siamea</i>	Tree	Innumerable	Grown naturally
5	<i>Cassia Siamea</i>	Tree	Innumerable	Grown naturally
6	<i>Caesalpiniamimosoides</i>	Tree	Innumerable	Grown naturally
7	<i>Bombax Sp.</i>	Tree	Innumerable	Grown naturally
8	<i>Crotalaria Hebecarpa</i>	Herb	Innumerable	Grown naturally
9	<i>Clerodendrum serratum</i>	Shrub	Innumerable	Grown naturally
10	<i>Cassia Tora</i>	Shrub	Innumerable	Grown naturally
11	<i>Euphorbia Geniculata</i>	Shrub	Innumerable	Grown naturally
12	<i>Indigogera Sp</i>	Shrub	Innumerable	Grown naturally
13	<i>Jatropha curus</i>	Shrub	Innumerable	Grown naturally
14	<i>Embica officinalis</i>	Herb	Innumerable	Grown naturally
15	<i>Tecomastans</i>	Herb	Innumerable	Grown naturally
16	<i>Tectonagrandis</i>	Tree	Innumerable	Grown naturally
17	<i>Cassia Fistula</i>	Plant	6	Planted by staff
18	<i>Spanish Cherry</i>	Plant	6	Planted by staff
19	<i>Palm</i>	Plant	8	Planted by staff
20	<i>Lagerstroemia Speciosa</i>	Plant	5	Planted by staff
21	<i>Platyclusus</i>	Shrub	7	Planted by staff

22	<i>Spanish Chestnut</i>	Plant	1	Planted by staff
23	<i>Saraca Asoca</i>	Plant	8	Planted by staff
24	<i>Mango</i>	Plant	1	Planted by staff
25	<i>Duranta</i>	Shrub	250	Planted by staff
26	<i>Christina Plant</i>	Plant	1	Planted by staff
27	<i>Ixora</i>	Pant	4	Planted by staff
28	<i>Jatropha</i>	Plant	2	Planted by staff
29	<i>Magnolia Champaca</i>	Plant	2	Planted by staff
30	<i>Jasminum Sambac</i>	Plant	1	Planted by staff
31	<i>Plumeria Rubra</i>	Plant	2	Planted by staff
32	<i>Plumeria</i>	Plant	16	Planted by staff
33	<i>Rose</i>	Plant	6	Planted by staff
34	<i>Terminalia Catappa</i>	Tree	4	Planted by staff
35	<i>Coconut</i>	Tree	4	Planted by staff
36	<i>Eucalyptus</i>	Tree	4	Planted by staff
37	<i>Albizia Saman</i>	Tree	2	Planted by staff
38	<i>Delonxi Regia</i>	Tree	3	Planted by staff
39	<i>Banyan</i>	Tree	4	Planted by staff
40	<i>Ficus Elastica</i>	Tree	1	Planted by staff

Table 2: Details of the Flora in the premises

At present there are 348 numbers of plantations comprising of plants, trees, shrubs. Timely maintenance and care has resulted in positive benefits for the surroundings.

4.3 Fauna audit

There are varieties of biodiversity available as fauna in the premises as documented below:

- *Birds* - *Spindasisvulcanus, Moth, Elanuscaeruleus, Monticolasolitarius,*
- *Insects* - *Teratodesmonticollies, Spider*
- *Invertebrates* - *Snail*
- *Reptiles* - *Millipede And Beetle, Gecko,*
- *Amphibians* - *Frog, Snakes*
- *Mammals* - *Monkey, Rat*

4.4 Noise Audit

On a macro level the Institute is surrounded by public buildings and minimal residential blocks **thus there is a peaceful and noise free arena observed inside the premises.**

4.5 Carbon Footprint Audit

4.5.1 Eco-friendly Commuting Practices

- The site is located in a rural 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.

4.5.2 Heat Island Reduction

Certain measures have to be taken to keep outdoor temperatures under control.

4.5.3 Outdoor Light Pollution Study

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

4.6 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 facilities are available on the premises for the specially-abled as part of universally accessible premises initiatives include Low height risers in the staircases, Handrails for support, Ramps at the entrance

4.7 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. *At present, the following are available in the premises.*

- Fire extinguisher with sand buckets.
- Open staircase without any barriers and free of storage or combustible material.

5. Suggestion

The following suggestions **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 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.
- **Garden development** - The existing open space should be designed as an Architectural landscape. Scientific name plates and QR codes – The team should undertake a project to have name plates with QR codes on every plant of the premises.

5.2 Heat island reduction

- **Cool rooftops** - The Terrace rooftops should be painted with Cooltop – reflective materials to reflect the harsh sun rays and reduce the heat absorption in the top most floor and surrounding areas of the building.

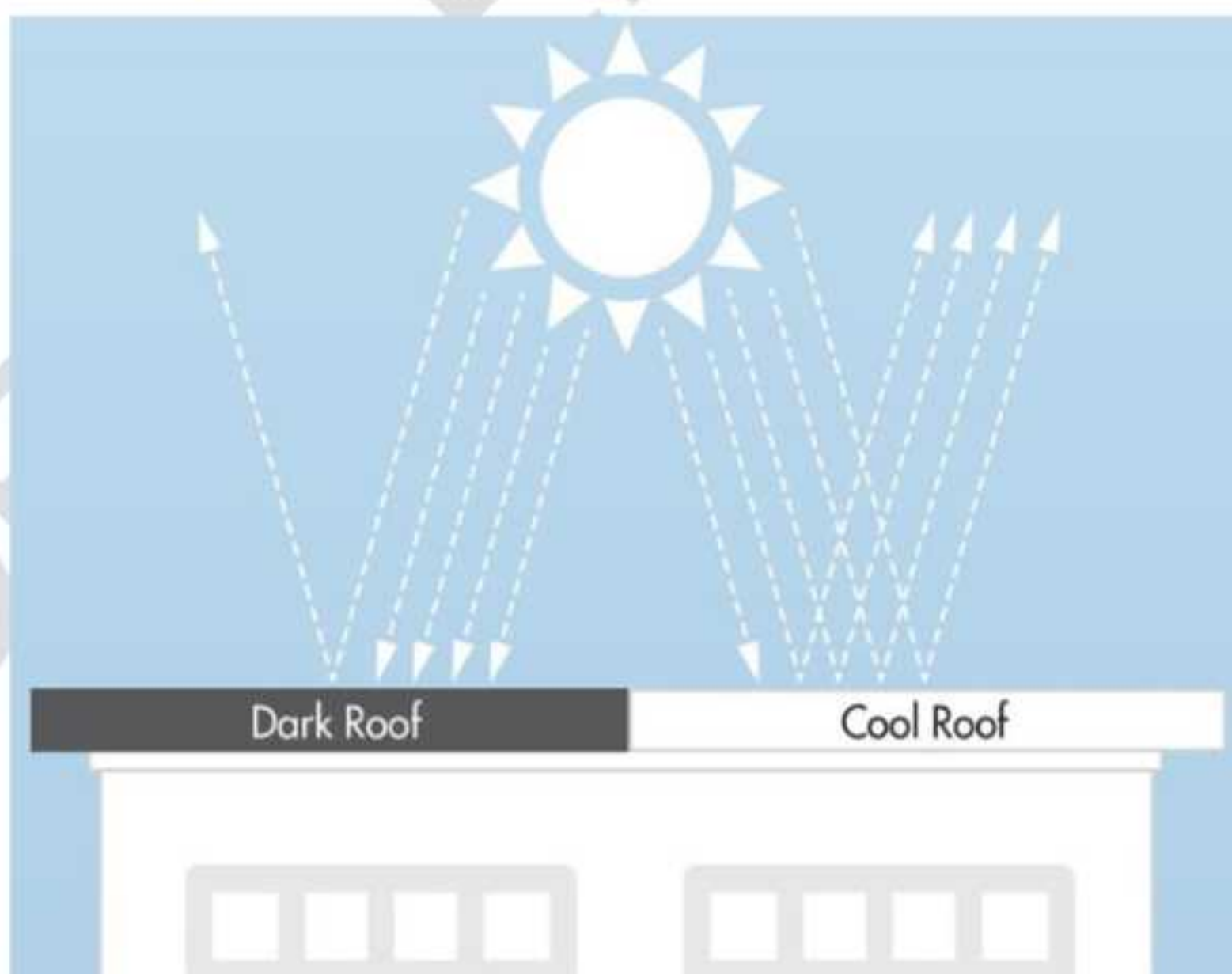


Plate 1: Cool roof comparative analysis (For reference purpose only)

Source: Image by <https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387>

5.3 Universally accessible premises

Provisions for visually impaired - Audio Visual Section – There should be dedicated section for the visually impaired students to listen to the audio books; An audio book reader should be available.

5.4 Life safety

- **Mandate fire extinguisher in spaces** - One fire extinguisher should mandatorily be there in every space which has an air conditioner/ gas cylinder.
- **Combustible equipment** - Every space which has a gas cylinder or combustible equipment should have a provision for the barricade around the gas cylinders, appropriate safety board's mentioning 'danger sign' and 'Do not touch' with an additional small fire extinguisher close by.

5.5 Pollution Control

Bicycles as a gift - As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.



Investigative parameters – Energy Management – Solar hot water heater systems in the premises



Investigative parameters – Infrastructure facilities in the premises

Roof Rain water Harvesting System

For irrigating the plantation in campus

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On that basis we can estimate the annual water collection which as follows

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278.7091 1.3 0.8 0.80

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We are using this water for irrigation plantations in campus by using drip irrigation system



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6. 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.

6.1 National references

- 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

6.2 International references

- Form, Space and Order by Francis D. K. Ching
- 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
- Streetscape elements – Chapter 6 on San Francisco
- American lung association <https://www.lung.org/>
- Study related to air pollution <https://www.airgle.com/>
- Exploring the light pollution <https://education.nationalgeographic.org/>
- Accessibility study <https://www.washington.edu/>
- Urban heat island effect <https://www.epa.gov/heatislands/what-you-can-do-reduce-heat-islands>

6.3 Reference images for suggestions:

- <https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387>
- <https://coolroofs.org/resources/what-is-a-solar-reflective-wall>
- <https://earthbound.report/2021/07/14/5-ways-to-reduce-the-urban-heat-island-effect/>
- <https://www.dutchiesstonewor>

DETAILED REPORT




Principal
Savitribai Phule Mahila Mahavidyalaya
SATARA.



ENERGY AUDIT

STUDY PERIOD (TWO YEARS) 2020 – 2021 & 2021 - 2022

Sustainability study

AUDIT REPORT

Studied for

Rayat Shikshan Sanstha's

Savitribai Phule

Mahila Mahavidyalaya, Satara

Karmveer Samadhi Parisar, Raviwar Peth,
Powai Naka, Satara – 415001, Maharashtra

Studied in the capacity of

Accredited and Certified

Green Building Professional



Valid till **July 2024**

Disclaimer

The Audit Team has prepared this report for the **Rayat Shikshan Sanstha's Savitribai Phule Mahila Mahavidyalaya, Satara** located at Karmveer Samadhi Parisar, Raviwar Peth, Powai Naka, Satara – 415001, Maharashtra based on input data submitted by the Institute analysed by the team to the best of their abilities.

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

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and Institute. 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 **Rayat Shikshan Sanstha's Savitribai Phule Mahila Mahavidyalaya, Satara, Maharashtra** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are extended are due to **Hon. Sharadchandra Pawar**, President and **everyone from the Management**.

Our heartfelt thanks are extended to the Chairperson of the entire process **Dr. Menkudale** (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. Abhijit Phate.**
- Admin staff members – **Mr. Baban Bhosale.**
- Non-teaching staff members – **Mr. Avinash Bhosale.**

We highly appreciate the assistance 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

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DETAILED REPORT

1. Introduction

1.1 About the statements of the Institute

1.1.1 Vision

The Institute intends "Education for the upliftment, social justice, gender equality and strengthening womanhood for the nation building."

1.1.2 Mission

The Institute adheres and focuses "To impart quality higher education to the women from rural area, to awake them educationally, socially, culturally and make them economically self-reliant."

1.1.4 Motto

The College works towards "Education through self-help."

1.1.5 Objective

It is the objective of the College:

- To improve the employability of future generations as per NEP 2020.
- To provide qualitative higher education to the students with hard work and dedication.
- To provide education to inculcate moral and cultural values to make the students civilized and responsible citizens.
- To inculcate democratic values of social equality, dignity of labour, secularism and patriotism.
- To inculcate scientific approach and rational attitude towards life into the students.
- To equip the students with the knowledge and skills of value-based education.
- To achieve overall personality development through extracurricular activities. To attain community and social development and train the students to face various competitive examinations

1.2 Assessment of the Institute

1.2.1 Affiliations

The Institute is affiliated to **Shivaji University**, a state University in the city of Kolhapur, State of Maharashtra in India.

1.2.2 Certification

The Institute has received the following Certifications

- **AISHE** – The All India Survey of Higher Education code is **C-11187**.
- **ISO 9001** – Quality Management Systems

1.2.3 Recognitions

The Institute is recognised in **section 2(f) and section 12 (B) of the University Grants Council Act, 1956** Govt. of India, New Delhi.

2. Overview

2.1 Summarised Populace analysis for 2021-2022

2.1.1 Students data

The data (shared by the College) shows there were a total of **967 students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	01	06
2	Teaching staff	19	17	36
3	Non-Teaching staff	03	00	03
Total Staff Members		27	18	45

Table 1: Staff data of the Institution for 2021-2022

The staff data shows the College premises had a total of **45 Staff Members**.

3. Data

3.1 Site Area & College Building Spread Area

The **site area is 1,08,340 sq. ft.** with a built-up area of 18,203 sq. ft.

3.2 College Infrastructure

3.2.1 Establishment

The College was established in **1989**.

3.2.2 Spatial Organisation

The College is located in a pollution free and healthy environment. The Building is a Reinforced Cement Concrete (RCC) framework building. There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, etc.

4. Documentation

The premise uses following sources of energy consumption.

4.1 Primary sources of energy consumption

- **Electrical (Metered)** – Light, Fans, Equipments, Pumps comprise these sources.
- **Alternate sources of energy** – There are sources available in the premises as documented below:

S. No.	Name	Nos.
1	Solar hot water heater system	14

Table 2: Details of the alternate sources of energy

4.2 Secondary sources of energy consumption

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

S. No.	Name	Nos.
1	UPS	8
2	Inverters	1
3	Batteries	6
4	Gas cylinders	2

Table 3: Details of secondary sources of energy consumption

4.3 Actual electrical consumption as per bills

The Institute has solar hot water heater system, however we have been informed that the purchase of solar panels is under process and will be initiated soon.

4.4 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.

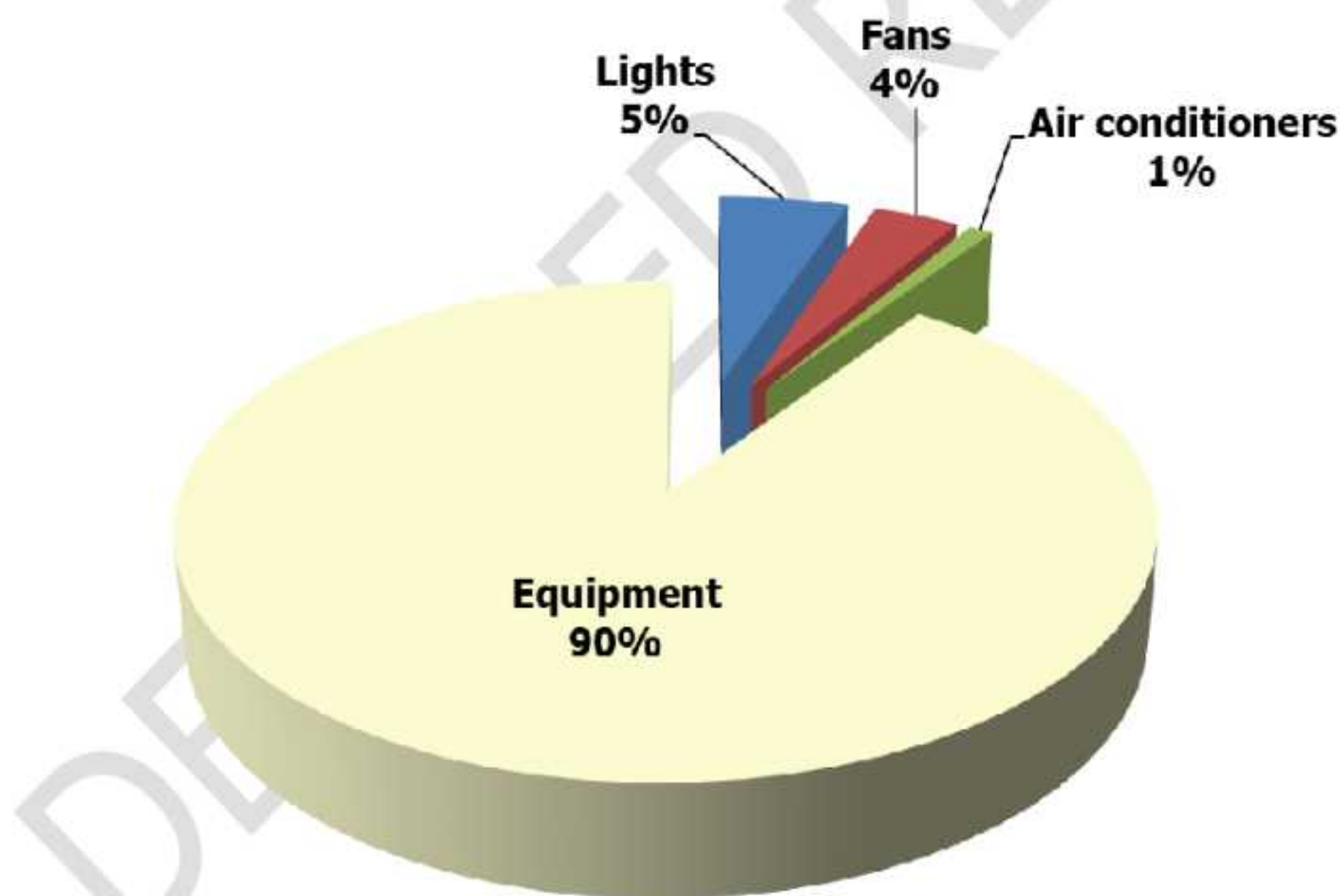


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consumes 90% whereas the lights consume 5% while the fans consume 4% and air conditioners consume 1% of the total calculated electrical energy.

4.5 Lights

4.5.1 Types of lights based on the numbers

There are **177 nos. of LED lights** on the premises.

4.5.2 Types of lights based on the power consumption

The energy consumption of lights is **5,407 kWh** of energy and the **LED lights consume 100%** of the total power consumed by lights.

4.6 Fans

4.6.1 Types of fans based on the numbers

There are a total of **99 nos. of fans** on the premises as follows:

S. No.	Type	Nos.
a.	Ceiling fans	96
b.	Table fans	3

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

4.6.2 Types of fans based on the power consumption

The energy consumption of fans is **3,590 kWh** of the energy.

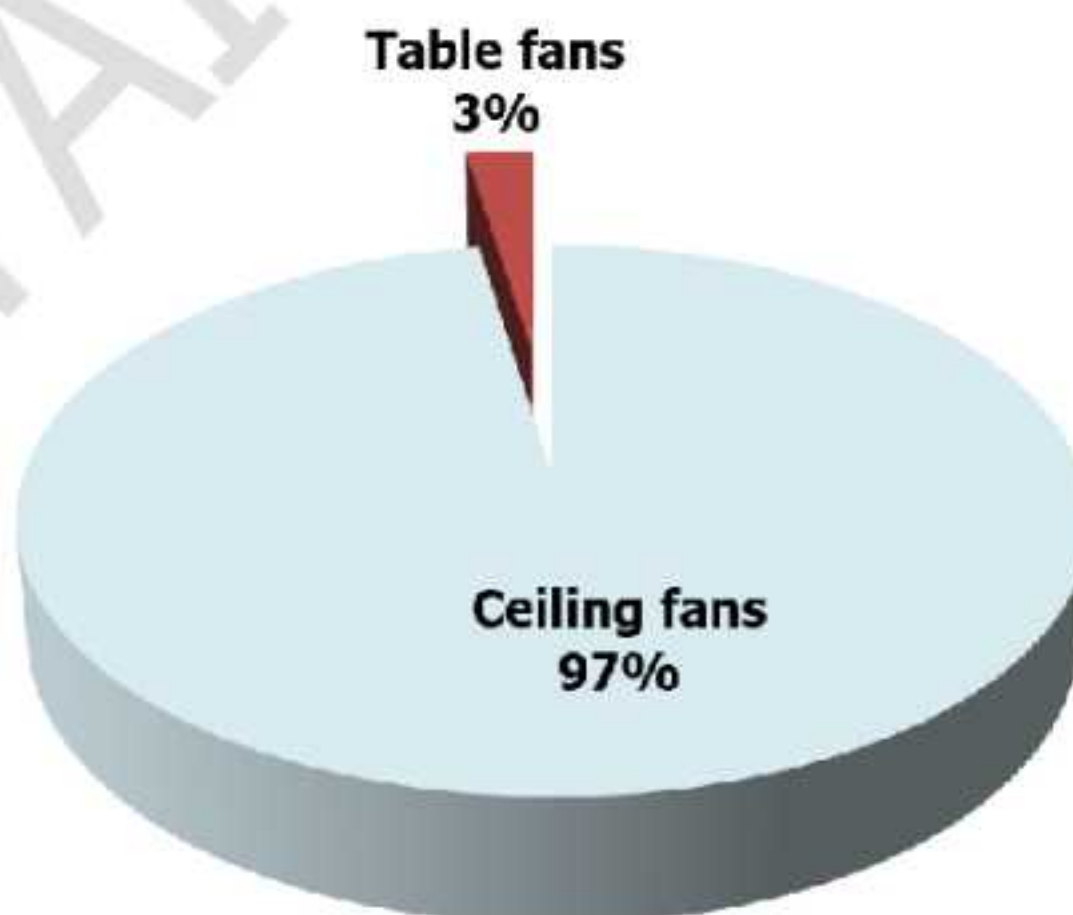


Figure 2: Types of fans based on power consumption

The above analysis shows the **Ceiling fans consume 97%** whereas the **table fans consume 3%** of the total power consumed by fans.

4.7 Air conditioners

4.7.1 Types of air conditioners based on the numbers

There is **1 nos. of air conditioners** on the entire premises.

4.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **2,018 kWh** of energy.

4.7.3 About the replacement of current air conditioners

- The current air conditioner is well maintained and does
- 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.

4.8 Equipment

4.8.1 Types of Equipment

There are **224 nos. of equipment** in the Educational sector.

4.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **92,937 kWh** of energy.

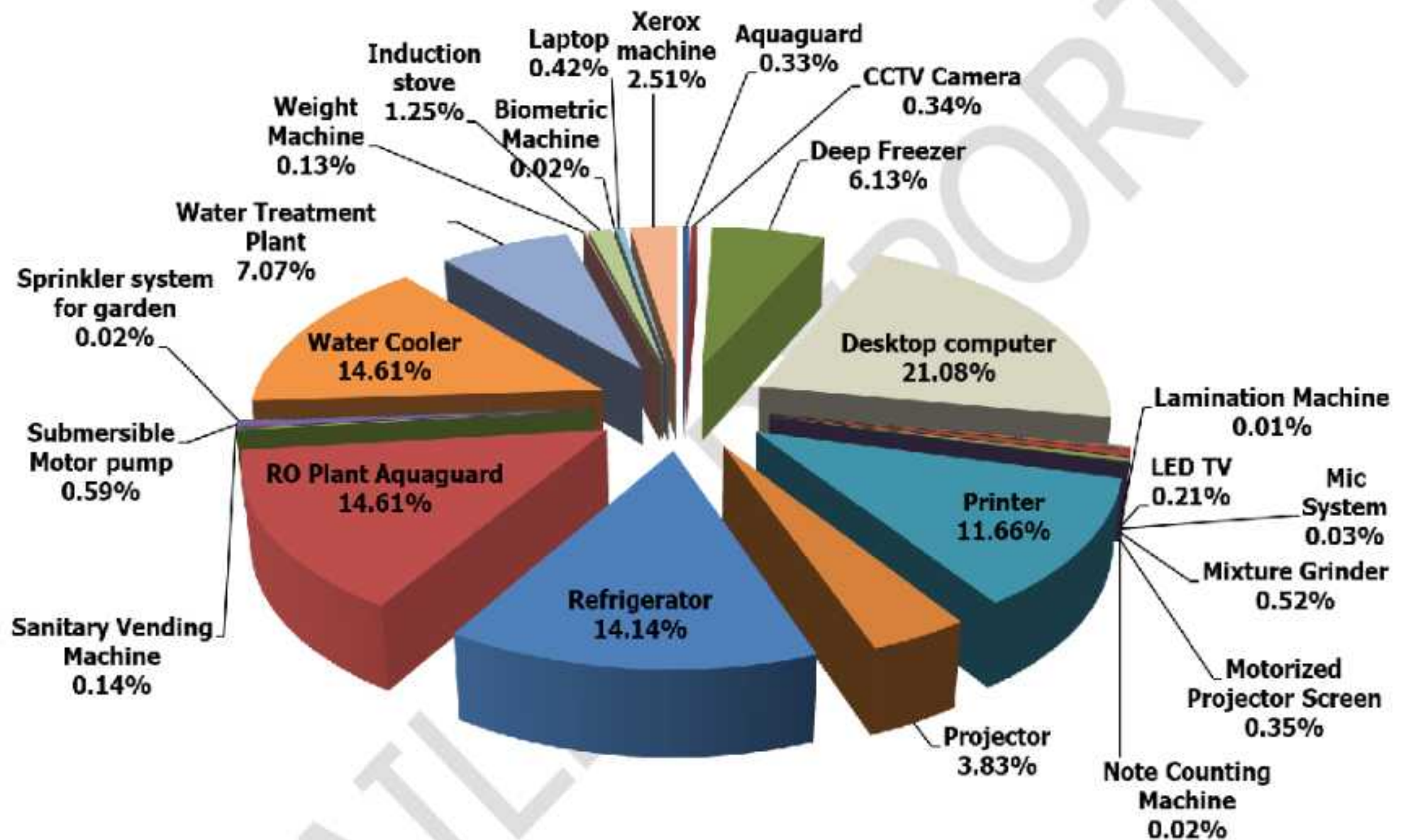


Figure 3: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **desktop computer consumes more energy at 21.08%** while the **water cooler and RO plant Aquaguard consumes 14.61%** the **refrigerator consumes 14.14%** and the **printer consumes 11.66%** these are the maximum consumers as compared to other equipment.

5. Suggestion

5.1 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.

5.1.1 Electromechanical systems - Electrical and Lighting

Section 1 - 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 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 Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

5.2 General suggestions

The following details are consolidated study recommendations related to 'entire Institute' and should be considered as **second priority** for implementation, once the section wise recommendations are implemented. The following recommendations should be **implemented within 2.5 to 3.5 years from the date of the Report submission.**

5.2.2 Alternatives towards Smart premises – General aspects

- **Laboratories spaces (Equipment)** - Use of *Microwave synthesizers, Ultrasonic bath and ultrasonic probe* to minimize consumption of electricity for research work and practical.
- **Building system spaces (Energy conservation connected via bluetooth)** – Use of *Sensor Based air conditioners in required areas.*



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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>



Savitribai Phule
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 SATARA.

