GREEN AUDIT

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

Sustainability study

AUDIT REPORT

Studied for

Shetkari Shikshan Prasarak Mandal's

Bhagwan Mahavidyalaya

(Arts, Commerce and Science)

Ashti - 414203, Tal. Ashti,

Dist. Beed (M.S.)

Studied in the capacity of

Accredited and Certified

Green Building Professional

Studied by

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

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Background reference image Sasin Tipchai on unsplash

Disclaimer

The Audit Team has prepared this report for the **Shetkari Shikshan Prasarak Mandal's Bhagwan Mahavidyalaya (Arts, Commerce and Science)** located at *Ashti - 414203, Tal. Ashti, Dist. Beed (M.S.)* based on input data submitted by the Institute analysed by the team to the best of their abilities.

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

These can be implemented phase wise or as a whole depending on the decision taken by the internal team. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

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

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

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

sustainableacademe@gmail.com

Acknowledgement

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Our special thanks are extended are due to everyone from the Management.

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

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

Contents

1. Introduction

1.1 About the Institution

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- *To expose the students to the new technologies and trends, so as to enable them to face challenges of competitive world.*
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- *To organize and involve students in various educational activities, right from their entry in the college and to create positive academic atmosphere.*
- *To strive hard to improve the functioning of the institution through active participation of the staff, students, stakeholders & management.*

The Motto of the Institute is ***'Education for all'***

1.2 Statements of the Institution

1.2.1 Vision

The Institute proposes *"To educate and train the underprivileged rural youth, in order to bring about noticeable changes in their individual and public life"*

1.2.2 Mission

The Institute adheres and focuses towards *"A perpetual commitment to the enhancement of academic standard, uplift of the common man and inculcation of social commitment among the rural youth, irrespective of their class, caste, creed, religion and sex"*

1.3 Assessment of the Institute

1.3.1 Affiliation

The College is affiliated with the **Dr. Babasaheb Ambedkar Marathwada University,** formerly Marathwada University, is located in Aurangabad, Maharashtra, India.

1.3.2 Certification

The College has received the code under **All India Survey of Higher Education** (AISHE) wherein the code is C-34276.

1.3.3 Accreditation

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

Cycle	First	Second
CGPA	68.50	2.35
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Table 1: NAAC Accreditation details of the Institute

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

1.4 Facilities

The team emphasize on latest technological advancement through its educational initiatives. Some of the key facilities are listed below.

- Well-equipped classrooms, gymnasium
- Well stocked library
- Outdoor sports facilities
- Various environmental pockets
- Computer laboratory

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were **1,192 students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	03	01	**04**
2	Teaching staff	25	01	**26**
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Total Staff Members		**44**	**04**	**48**

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

The staff data shows the Institute premises had a total of **48 Staff Members.**

2.2 Summarised Populace analysis for 2021-2022

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The staff data shows the Institute premises had a total of **48 Staff Members.**

3. Research

3.1 Site Spread Area

The **campus is spread over 10 acres of land in a rural setup**

3.2 Institute Infrastructure

3.2.1 Establishment

The Institute was established on **27 August 1991**.

3.2.2 Spatial Organisation

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

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

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

3.3 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 with the timings being 09:00 am to 17:00 hours.

4. Investigation

4.1 Scope for improvement aspects

- **Water tanks in all areas**
  - **a.** Include the information about size, capacity and usage
  - **b.** Paint the tank in light blue colour
  - **c.** Add *signboards* about the usage such as 'Drinking' or 'Secondary'
  - **d.** Add *signboard and map* about the process/ system in practice

- **General aspects (Indoors areas)**
  - a. Zoning of the site w.r.t. space wise analysis
  - b. Signboards, signages, information and display boards at relevant locations.

- **Library in the Campus**
  - **a.** Include silence board at various locations and at entrance.
  - **b.** Install book drop box system at the entrance of the library.
  - **c.** Upgrade smart scanning system for every book
  - **d.** Include a self service station for digitalization.

5. Documentation

5.1 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.

5.1.1 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.*
- **Cleanliness Campaign -** *The Swachha Bharat Abhiyan is carried out on college premises as well as off-premises.*
- **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.*
- **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.*
- **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.*

5.1.2 Community development

The details of ***extension initiatives*** under various heads in Institute are documented below:

S. No.	Type	Since	Coordinator name
1	National Service Scheme (NSS)	Jun-95	Dr. Suryakant Dhonde Dr. Ashok Deokar, Dr. Balasaheb Gawade

Table 4: Details of the extension initiatives by the Institute

The details of the ***environmental activities*** conducted as part of the extension initiatives by the Institute are documented below:

S. No.	Initiative	Particulars	Date
1	Swacha Bharat Abhiyan	To climinate open defecats and improve Solid waste management,swacha Bharat Mission is a country wide campaign initiated by the Govt of India in 2014. It was celebrated by making cleanliness in the premises of rural Hospital adjacent to the college campus.	September 2022
2	Environment conservation Fortnight	To conserve the Environment. It was celebrated by planting trees and cleaning the college campus	01 to14June 2021
3	Swacha Bharat Abhiyan	To contribute in the campaign of clean India.	20 October 2021
4	Majhi Vasundhara	To increase and conserve the trees and medicinal plants.	28 September 2021

Table 5: Details of the environmental initiatives undertaken by Institute

5.2 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.

5.2.1 Waste produced

S. No.	Type of waste	Source	Current Disposal	Can be retreated?	Methodology
1	Solid waste	Toilets–Biodegradable waste	Soak pit connected for solid-liquid waste management	Yes	TREATED – Biogas plant can be initiated
2	Liquid waste	Toilets, washbasins		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		Yes	CONTINUE with the current practice
5	Plastic waste	Bottles, wrappers		Yes	TREATED – Tie-up with Bisleri's Bottles for change program or firm that is into clean fuels.
6	Dry waste in form of leaves	Open space & plantations, papers - Non biodegradable waste	TREATED – Dedicated zone where vermin-composting is undertaken	Yes	CONTINUE with the current practice but improvement is required
7	Organic regular waste	Dust, dirt dust waste from indoor spaces			
8	Bio-waste	Sanitary waste	Vending machine is available	Yes	Tie-up with local government for dedicated bio-waste handover

Table 6: Details of the waste management practices adopted by the team

5.3 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.

5.3.1 Water availability and consumption

5.3.1.1 Source of Primary water supply

The Institute requires water from the Local Municipality for drinking water purposes. **There are dedicated water tanks as overhead tank facilities available in the premises.**

5.3.1.2 Source of Secondary water supply

The Institute uses the following sources of water supply for secondary usages such as watering plants, kitchen, toilets, and wash basins and other spaces. **There are two bore wells available at present.**

5.3.1.3 Source of Tertiary water supply

The tertiary source of water is **the source of water harvesting; the project at present is practiced through artificial farm ponds in the premises.** *The team has suggested connecting the overflow pipe to the bore well for ground water recharging.*

5.3.1.4 Source of Reusing waste water

This initiative is not practiced at present. Since the campus **is located in RURAL premises,** the system is not an urgent requirement.

5.3.2 Areas of water usage

Based on the inventory done and data shared by the staff it was found that the premise has the facilities such as water cooler, toilets, washbasins etc.

5.4 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.

5.4.1 Facilities available

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

5.4.2 Hygiene aspects

The team should undertake steps to upgrade the hygiene areas of the site as per the instructions and discussion. ***The current practices however are fine.***

6. 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 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

6.1 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 slogans in local and national lanuage 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.

- **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.

- **Undertake environment study of local areas** – This aspect is w.r.t. environmental parameters and submits the same to local municipality for further up gradations.

- **Increase the organic farming practices -** The premises can have an organic farming facility in terms of farms, kitchen, terrace gardens the produce can be directly utilised in the premises.

6.2 Waste Audit

- **Signages -** Messages about avoiding wastage should be placed at appropriate locations.
- **Dustbins at every 100m -** There should be a dustbin at every 50-100m in open spaces
- **Plastic management for localities –** The can be frequent cloth/ paper bags distribution in local schools, slums, Institutes, medical, police stations.
- 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.
- Write to NGOs such as *Adar Poonawala Foundation* for twin litter dustbins and beautification projects.

6.3 Water Audit

- **Rain water bunds –** There should be landscape beautification project undertaken to appropriate channelize the rain water through bunds and similar facilities.

6.4 Health and Hygiene Audit

- **Avoid burning waste -** The waste produced on the premises should not be burned as it is dangerous to the health of students and staff
- **Pest control program -** The Institute should practice pest control programs with appropriate sanitation facilities through an appropriate agency.
- **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'
- **Toilet hygiene** – There should be facilities such as potpourri, camphor tablets in the toilet to avoid smell and health related issues.

Meeting with the team

Meeting with the team

Investigative parameters – ***Indoor areas of premises***

Meeting with the team

7. 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

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4. Investigation

4.1 Scope for improvement aspects

- **Extra care for the rooftop areas**
  - Introduce the signboards about 'No students are allowed to enter this area'
  - Increase the height of parapet walls
  - Upgrade the space as cool roof by painting it with cooltop material.
  - Undertake feasibility study of before and after temperature reading.
  - Take precautions to keep terrace areas free of any kind of storage materials

- **Messages on the beam area**

  Include quotes and messages from eminent personalities all over the premises on beam for inspiration and beautification.

- **General aspects (Outdoor areas)**
  - Increase in green cover on rooftop
  - Placards and manuals for awareness
  - Dedicated reserved parking for physically disabled
  - Development of breakout zones at relevant locations
  - Develop plantations around the vertical garden areas
  - Develop paved walkways
  - Introduce information boards everywhere
  - Increase sensitization programmes
  - Upgrade the website w.r.t. green initiatives
  - Introduce zone wise details at relevant locations

5. Documentation

5.1 Open Spaces

There is an open space in the plot utilised by all the shared campuses, this provides a good amenities and recreational spaces feature in premises.

5.2 Flora audit

A flora survey was carried out to identify the total numbers of plants and trees. The landscape area has a variety of plantations the details of the same are documented below.

S. No.	Plant Name	Type	Nos.	Planted By
1	*Amba*	Tree	5	Students
2	*Ashoka*	Tree	12	Students
3	*Acalypha*	Herb	Many	Students
4	*Awala*	Tree	4	Students
5	*Aracha Palm*	Tree	14	Students
6	*Alu*	Shrub	Many	Naturally
7	*Anjir*	Tree	1	Students
8	*Australian Acacia*	Tree	3	Students
9	*Bouganvel*	Shrub	47	Students
10	*Badam*	Tree	3	Students
11	*Bottle Palm*	Tree	11	Students
12	*Bottlebrush*	Tree	1	Students
13	*Bor*	Tree	8	Naturally
14	*Bamboo*	Tree	Many	Staff
15	*Bel*	Tree	1	Staff
16	*Brahmakamal*	Herb	1	Staff
17	*Bakul*	Tree	3	Students
18	*Bartondi*	Tree	2	Naturally
19	*Chinch*	Tree	4	Students
20	*Chandipat*	Shrub	4	Students
21	*Chafa*	Shrub/Tree	82	Students
22	*Cycas*	Tree	2	Students

23	*Cherry*	Tree	4	Students
24	*Cactus*	Herb	1	Students
25	*Duranta*	Shrub	Many	Students
26	*Euphorbia*	Shrub	Many	Students
27	*Ficus Tree*	Tree	9	Students
28	*Gulmohar*	Tree	6	Students
29	*Godi Babhul*	Tree	1	Naturally
30	*Gavati Chahha*	Herb	Many	Staff
31	*Ixora*	Shrub	14	Staff
32	*Jaswand*	Shrub	4	Students
33	*Jambhal*	Tree	3	Staff
34	*Jai*	Climbers	3	Students
35	*Jackfruit*	Tree	1	Staff
36	*Karanj*	Tree	20	Students
37	*Kanchan*	Tree	3	Students
38	*Kasvad*	Tree	13	Students
39	*Kadhipatta*	Shrub	1	Staff
40	*Korphad*	Herb	Many	Students
41	*Kaval*	Climbers	3	Naturally
42	*Limbu*	Shrub	5	Students
43	*Limb*	Tree	53	Naturally
44	*Madhumalti*	Climber	5	Students
45	*Mogara*	Shrub	1	Students
46	*Mahogani*	Tree	4	Students
47	*Nilgiri*	Tree	2	Students
48	*Nerium*	Shrub	14	Students
49	*Nandurki*	Tree	2	Students
50	*Pimpal*	Tree	9	Staff
51	*Papya*	Tree	3	Staff
52	*Peru*	Shrub	3	Staff
53	*Laxmitaru*	Tree	5	Staff
54	*Rose*	Shrub	4	Students
55	*Ramphal*	Tree	1	Students

56	*Rain Tree*	Tree	3	Students
57	*Saptaparni*	Tree	9	Students
58	*Shivan*	Tree	3	Students
59	*Suru*	Tree	1	Students
60	*Shankasur*	Shrub	35	Students
61	*Subabhul*	Tree	2	Naturally
62	*Sisam*	Tree	11	Naturally
63	*Sadafuli*	Shrub	2	Staff
64	*Sitaphal*	Shrub	4	Naturally
65	*Shevaga*	Tree	1	Staff
66	*Silvasa*	Tree	2	Staff
67	*Thuja*	Shrub	24	Students
68	*Tabio*	Tree	3	Students
69	*Tulas*	Shrub	1	Staff
70	*Tecoma*	Shrub	4	Students
71	*Tantani*	Shrub	5	Naturally
72	*Umber*	Tree	4	Staff
73	*Parijatak*	Shrub	8	Staff
74	*Vad*	Tree	14	Staff
75	*Dracena*	Herb	1	Staff
76	*Malti*	Climber	1	Staff
77	*Rheo*	Herb	1	Staff
78	*Thumbergia*	Herb	1	Staff
79	*Ruti*	Shrub	3	Naturally
80	*Date Palm*	Tree	1	Naturally
81	*Gokarn*	Climber	3	Naturally
82	*Neelmohar*	Tree	2	Tree
83	*Ganeshvel*	Climber	3	Students
84	*Pendanus*	Herb	1	Staff
85	*Tuti*	Tree	36	Students
86	*Kurki*	Herb	4	Students
87	*Ritha*	Tree	1	Students
88	*Shevanti*	Herbs	6	Students

89	*Cape Jasmine*	Climber	1	Students
90	*Pomegranate*	Shrub	1	Students
91	*Mandevilla*	Climber	1	Students

Table 4: Details of the Flora in the premises

At present there are more than 609 numbers of plantations in the premises. All of these are planted by the on various occasions and some have grown naturally.

5.3 Fauna audit

There are varieties of biodiversity available as fauna in the premises.

Fauna available	Names	Nos.
Birds	*Crow*	26
	Sparrow	20
	Parrot	5
Insects	*Grasshopper*	12
	Cockroach	2
	Wasp	4
	Honeybees	
	Cricket	3
	Butterflies	26
	Moth	2
	Locust	5
	Thrips	4
	Aphids	2
Invertebrates	*Earthworms*	
Reptiles	*Lizard*	14
	Snake	2
	Calotes	13
Amphibians	*Frog*	18
	Toad	12
Mammals	*Bat*	20
	Squirrel	24
	Cow	3
	Buffalo	2

Table 5: Details of the fauna in the premises

5.4 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.**

5.5 Carbon Footprint Audit

5.5.1 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.

5.5.2 Heat Island Reduction

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

5.5.3 Outdoor Light Pollution Study

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

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

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

6. Suggestions

The following suggestions are section-wise recommendations and are supposed to be **executed within the next 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

6.1 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.

- **Nutrition pits -** Certain pits can be demarcated as 'Nutrition pits' where the organic food from the kitchen and Canteen fruit peels and fruits or vegetables can be degraded for making nutrition-rich soil.

- **Xeriscaping** – This practice involves designing the open spaces and planning to use xeriscaping plants which require less water and beautify the premises equally. This type of practice should be implemented in areas where there is water shortage.

- **Garden development -** The existing open space should be designed as an Architectural landscape.

  - *Nursery documentation, expansion and beautification* – The premises should have a nursery, details can be decided as per the landscape beautification.

  - *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.

  - *The landscape redesign and ecological redesign* – This should be done to increase the shade cover in the entire premises.

  - *Introduce various types of gardens inside the premises* – The examples such as Flower gardens, Woodland gardens, Rock gardens, Water gardens, Vegetable and herb gardens, Roof gardens, Scented gardens, Medicinal gardens and Botanical gardens can be practiced.

6.2 Life safety

- **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.

- **Fire and life safety practices** – Provisions such as signages, fire alarm, smoke detectors, fire hydrant cabinets, sand buckets, hose reel, fire cabinet, fire water tank and fire pump near the entrance block whichever is applicable should be practiced.

6.3 Pollution Control

- **Avoid burning waste -** The waste produced on the premises should not be burned as it is dangerous to the health of students and staff

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

- **Plant more radiation absorbing plants -** The following flora halps in redcuing the harmful effects to a cetain extent, the Institute can develop a radiation free zone and take to planting these through potted plants or permanent planting:

    a. Spider plant
    b. Rubber plant
    c. Asparagus fern
    d. Snake plant
    e. Nelumbo nucifera (Includes colourful flowers)
    f. Cactus
    g. Areca palm
    h. Mustard green
    i. Betel
    j. Aloe vera
    k. Sprengers asparagus
    l. Fiddle fig

Meeting with the team

Meeting with the team

Investigative parameters – ***Indoor areas of premises***

Meeting with the team

7. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

- 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-motorizes vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.
- Reference images for suggestions:
  - https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387
  - https://earthbound.report/2021/07/14/5-ways-to-reduce-the-urban-heat-island-effect/

ENERGY AUDIT

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

Sustainability study

AUDIT REPORT

Studied for

Shetkari Shikshan Prasarak Mandal's

Bhagwan Mahavidyalaya
(Arts, Commerce and Science)

Ashti - 414203, Tal. Ashti,
Dist. Beed (M.S.)

Studied in the capacity of

Accredited and Certified
Green Building Professional

Studied by

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

Background reference image Janko Ferlic on pexels

Disclaimer

The Audit Team has prepared this report for the **Shetkari Shikshan Prasarak Mandal's Bhagwan Mahavidyalaya (Arts, Commerce and Science)** located at *Ashti - 414203, Tal. Ashti, Dist. Beed (M.S.)* based on input data submitted by the Institute analysed by the team to the best of their abilities.

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

These can be implemented phase wise or as a whole depending on the decision taken by the internal team. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

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

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

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

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Acknowledgement

The Audit Assessment Team extends its appreciation to the **Shetkari Shikshan Prasarak Mandal's Bhagwan Mahavidyalaya (Arts, Commerce and Science), Maharashtra** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are extended are due to everyone from the Management.

Our heartfelt thanks are extended to the Chairperson of the entire process **Dr. Dattatray Wagh,** (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. Ramdas Kawade*** *(Assistant Prof.),* ***Dr. Namdeo Waghule*** *(Assistant Prof.),* ***Dr. Pralhad Khetmalas*** *(Assistant Prof.),* ***Dr. Shatrughna Kardule*** *(Assistant Prof.),* ***Dr. Balasaheb Gawade*** *(Assotant Prof.),* ***Dr. Abasaheb Pokale*** *(Assistant Prof.)* ***and Dr. Dilip Jare*** *(Assistant Prof.).*
- Admin staff members – ***Mr. Rohidas Hingane*** *(O.S.)*
- Non-teaching staff members (Library attendants) – ***Mr. Shantaram Ambekar*** *(Lab. Attendant) and* ***Mr. Ananta Dhonde*** *(Lab. Attendant)*

We appreciate the cooperation of the **entire Teaching, Non-teaching, and Admin staff** for their support while collecting the data.

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

Contents

1. Introduction

1.1 About the Institution

The institution works towards student and societal welfare and development through the following aim:

- *To aim at overall personality development of the students through curricular, co- curricular and extracurricular activities.*
- *To expose the students to the new technologies and trends, so as to enable them to face challenges of competitive world.*
- *To undertake faculty development programmes to improve academic standard of the institution.*
- *To organize and involve students in various educational activities, right from their entry in the college and to create positive academic atmosphere.*
- *To strive hard to improve the functioning of the institution through active participation of the staff, students, stakeholders & management.*

The Motto of the Institute is ***'Education for all'***

1.2 Statements of the Institution

1.2.1 Vision

The Institute proposes *"To educate and train the underprivileged rural youth, in order to bring about noticeable changes in their individual and public life"*

1.2.2 Mission

The Institute adheres and focuses towards *"A perpetual commitment to the enhancement of academic standard, uplift of the common man and inculcation of social commitment among the rural youth, irrespective of their class, caste, creed, religion and sex"*

1.3 Assessment of the Institute

1.3.1 Affiliation

The College is affiliated with the **Dr. Babasaheb Ambedkar Marathwada University,** formerly Marathwada University, is located in Aurangabad, Maharashtra, India.

1.3.2 Certification

The College has received the code under **All India Survey of Higher Education** (AISHE) wherein the code is C-34276.

1.3.3 Accreditation

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

Cycle	First	Second
CGPA	68.50	2.35
Grade	C++	B
Year	2004	2018

Table 1: NAAC Accreditation details of the Institute

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

1.4 Facilities

The team emphasize on latest technological advancement through its educational initiatives. Some of the key facilities are listed below.

- Well-equipped classrooms, gymnasium
- Well stocked library
- Outdoor sports facilities
- Various environmental pockets
- Computer laboratory

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were **1,192 students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	03	01	**04**
2	Teaching staff	25	01	**26**
3	Non-Teaching staff	16	02	**18**
Total Staff Members		**44**	**04**	**48**

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

The staff data shows the Institute premises had a total of **48 Staff Members.**

2.2 Summarised Populace analysis for 2021-2022

2.2.1 Students data

The data (shared by the Institute) shows there were **995 students.**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	03	01	**04**
2	Teaching staff	25	01	**26**
3	Non-Teaching staff	16	02	**18**
Total Staff Members		**44**	**04**	**48**

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

The staff data shows the Institute premises had a total of **48 Staff Members.**

3. Research

3.1 Site Spread Area

The **campus is spread over 10 acres of land in a rural setup**

3.2 Institute Infrastructure

3.2.1 Establishment

The Institute was established on **27 August 1991**.

3.2.2 Spatial Organisation

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

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

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

3.3 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 with the timings being 09:00 am to 17:00 hours.

4. Investigation

4.1 Observations

The following points were observed during the investigation.

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

4.2 Energy efficiency analysis

4.2.1 Energy efficient practices for alternative sources

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

- Solar tree
- Solar parking

4.2.2 Energy efficient equipment

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

5. Documentation

5.1 Primary sources of energy consumption

- **Electrical (Metered) –** Light, Fans, Equipments, Pumps comprise these sources.
- **Renewable energy –** There are **'two solar panels and one solar hot water heater system'** available.

5.2 Secondary sources of energy consumption

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

S. No.	Name	Nos.
1	UPS	10
2	Inverters	03
3	Batteries	12
4	Gas cylinders	02

Table 4: Details of secondary sources of energy consumption

5.3 Actual electrical consumption as per bills

The expenses incurred are comparatively less.

S. No.	Month	Year	Amount	Units consumed
Academic year 1 (2022-23)				
1	June	2022	26,108	3,248
2	July	2022	8,954	1,007
3	August	2022	18,443	1,057
4	September	2022	26,749	10,973
5	October	2022	36,098	1,039
6	November	2022	8,974	1,003
7	December	2022	19,551	1,186

8	January	2023	27,162	832
9	February	2023	33,881	728
10	March	2023	39,965	643
11	April	2023	7,670	842
12	May	2023	16,707	960
Academic year 2 (21-22)				
13	June	2021	18,003	741
14	July	2021	24,096	741
15	August	2021	12,199	741
16	September	2021	-6,567	16,080
17	October	2021	-699	721
18	November	2021	5,744	804
19	December	2021	13,451	955
20	January	2022	17,679	1,445
21	February	2022	23,343	687
22	March	2022	28,984	673
23	April	2022	5,759	694
24	May	2022	11,518	694

Table 5: Details of the electrical consumption

5.4 Calculated Electrical Consumption as per inventory

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

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

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

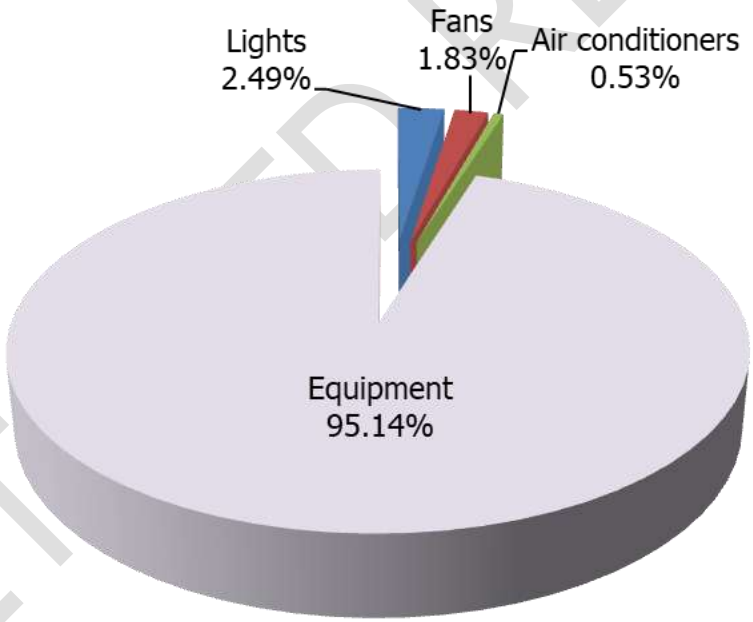

Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consume 95.14% whereas the lights consume 2.49% while the fans consume 1.83% and the air conditioners consume 0.53% of the total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are a total of **282 lights on the premises;** the following table shows the various types of lights on the premises.

S. No.	Type	Nos.
1	**LED lights** *(Energy efficient appliance)*	277
2	**Halogen lights** *(Non-Energy efficient appliance)*	05

Table 6: 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 **6,586 kWh** of energy.

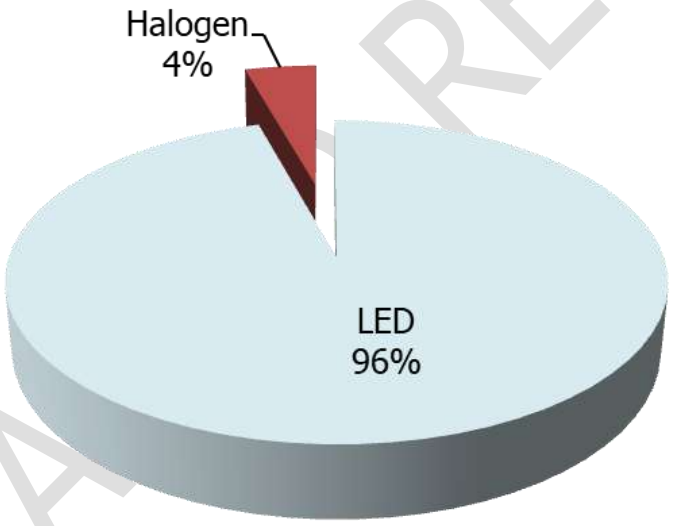

Figure 2: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on-premises shows **LED lights consume 96%** whereas the **Halogen lights consume 4%** 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 **92 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	91
2	Wall mounted fans	01

Table 7: 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 **4,851 kWh** of the energy.

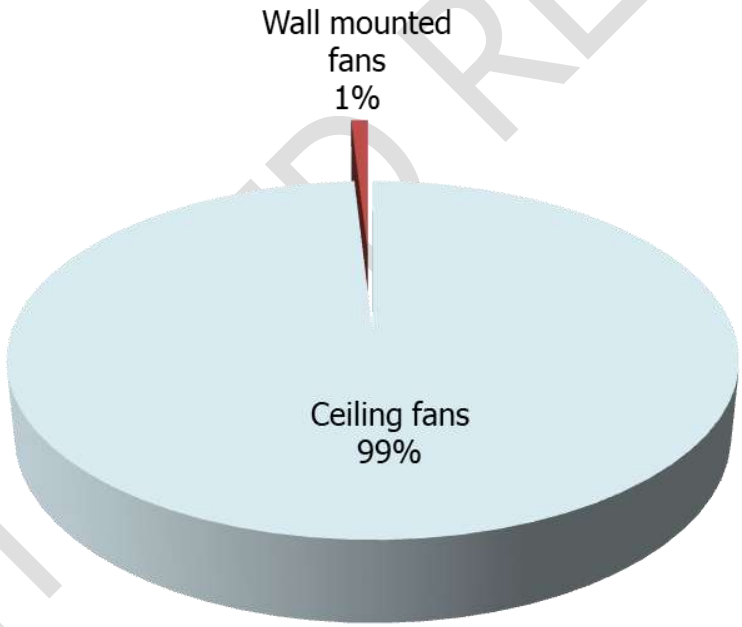

Figure 3: Types of fans based on power consumption

The above analysis shows the **Ceiling fans consume 99%** whereas the **wall mounted fans consume 1%** of the total power consumed by fans.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

There is **one air conditioner** on the entire premises**.**

5.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **1,414 kWh** of energy.

5.7.3 About the replacement of current air conditioners

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

5.8 Equipment

5.8.1 Types of Equipment

There are **143 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **2,51,735 kWh** of energy.

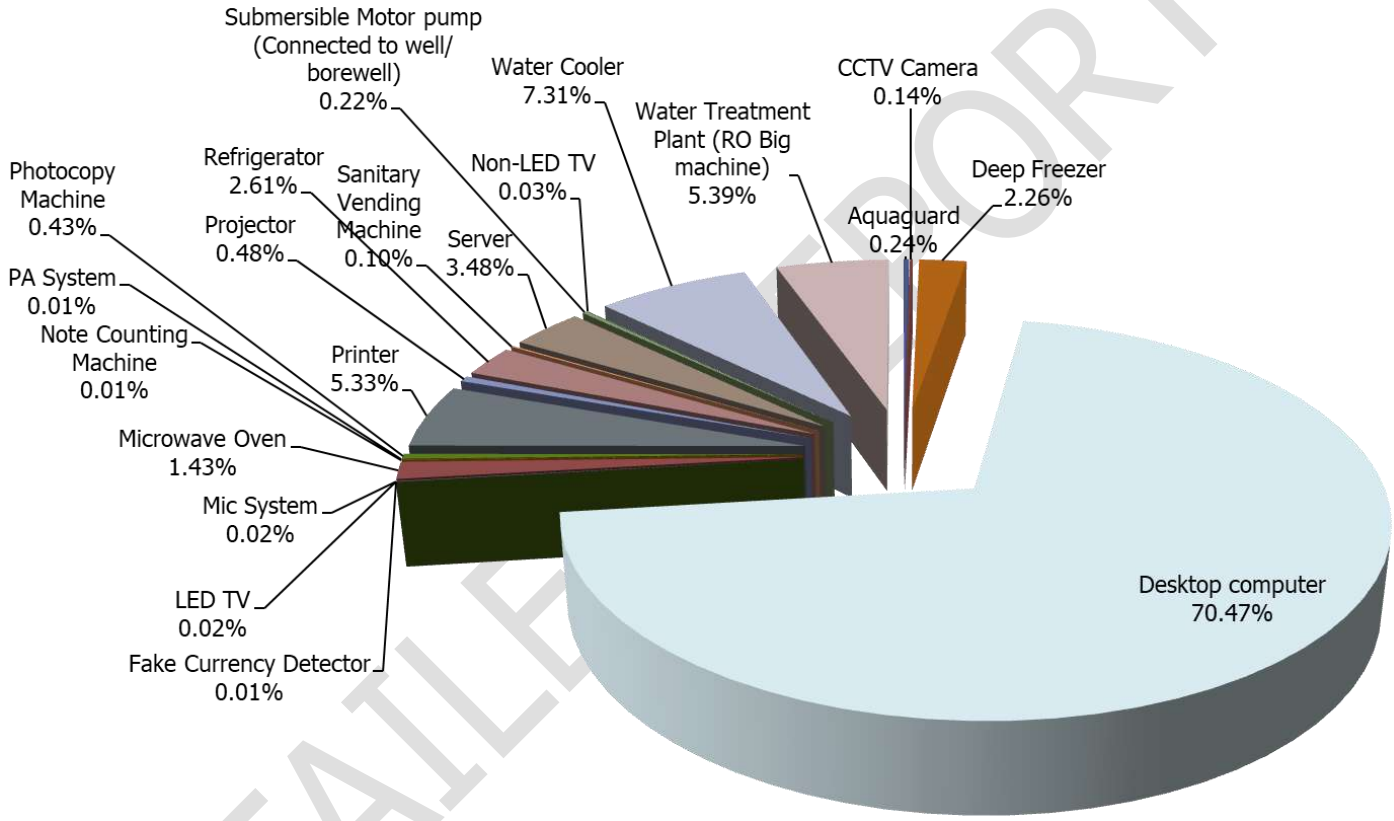

Figure 4: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **desktop computer consumes more energy at 70.47%** while the **water cooler consumes 7.31%** whereas the **printer consumes 5.33%** and the **water treatment plant (RO Big machine) consumes 5.39%** these are the maximum consumers as compared to other equipment.

6. Suggestion

6.1 Section-wise suggestions

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

6.1.1 Electromechanical systems - Electrical and Lighting

Section 1 - Non-LED lights

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

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

It will be suggested to either replace these now if the Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

Section 2 - Ceiling fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 45W when in use. These should be replaced with energy efficient fans consuming 14W when in use.

Our technical research shows that there would be a reduction of an average of **69% reduction** in energy consumption if replaced with energy efficient appliance.

It will be suggested to either replace these now if the Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

6.2 General suggestions

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

6.2.1 Alternatives sources to become clean and green energy campus

6.2.1.1 Solar farms

This option can be explored with due discussion with the surrounding and adjacent farmland owners. This will serve as a noble project and will provide dual benefits to farm land and University w.r.t to electricity bill power reduction.

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

Source: Image by Zsuzsa Bóka from Pixabay

6.2.2.2 Smart gardening

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

Plate 2: Solar farm concept for the Institute (For reference purpose only)

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

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

Meeting with the team

Meeting with the team

Investigative parameters – ***Indoor areas of premises***

Meeting with the team

7. Compilation

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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

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