

|| जान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार || - शिक्षणमहर्षी डॉ. बापुजी साबुंखे

SHRI SWAMI VIVEKANAND SHIKSHAN SANSTHA, Kolhapur



Shri Swami Vivekanand Shikshan Sanstha, Kolhapur Sanchlit,

PADMABHUSHAN DR. VASANTRAODADA PATIL MAHAVIDYALAYA, TASGAON

GREEN AUDIT REPORT

Academic Year 2018-19



By

DS ENERGY CONSULTANCY & SERVICES, SANGLI

ACKNOWLEDGEMENT:

Green Audit Assessment Team thanks the management of Shri Swami Vivekanad Shikshan Sanstha Kolhapur Sanchit, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon for assigning this important work of Green Audit to DS Energy Consultancy and services, Sangli. We appreciate the cooperation to our Team for completion of study.

Our special thanks are to Principle of college Dr. Milind S. Hujare. Head of IQAC Dr. S.S. Patil, all head of the departments, teaching and non- teaching staff for giving us necessary inputs to carry out this very vital exercise of Green Audit.

We are also thankful to other staff and office members who were actively involved while collecting the data and conducting field measurements.

DISCLAIMER

Green Audit Team has prepared this report for Shri Swami Vivekanad Shikshan Sanstha Kolhapur Sanchit, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been complied in good faith based on information gathered.

It is further informed that the calculations are arrived flowing best estimates and no representation, warranty or undertaking, express 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.

Prepared by:

Prof. D. S. Patil

M.Tech(Energy Technology), B.E.(Mech)

Bureau of Energy Efficiency certified Energy Auditor

No: EA 31840

DISCLAIMER

Green Audit Team has prepared this report for Shri Swami Vivekanad Shikshan Sanstha Kolhapur Sanchit, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been complied in good faith based on information gathered.

It is further informed that the calculations are arrived flowing best estimates and no representation, warranty or undertaking, express 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.

eterman

Prepared by: Prof. D. S. Patil M.Tech(Energy Technology), B.E.(Mech) Bureau of Energy Efficiency certified Energy Auditor No: EA 31840

> D.S Energy Cunsultancy and Services 5/22, 'Prashant' ZP Colony, Near Waranali, Vishrambag, Sangli, 416415.

Scanned with CamScanner Consultancy to generation

CONTENTS

ACKNOWLEDGEMENT:
DISCLAIMER
EXECUTIVE SUMMERY6
INTRODUCTION7
STATEMENT OF ASSURANCE8
SUMMERY OF FINDINGS
OBJECTIVES AND SCOPE9
ABOUT COLLEGE
AUDIT GOALS OF THE COLLEGE
METHODOLOGY12
AUDIT FRAMEWORK AND DETAILED FINDINGS15
A] WATER MANAGEMENT15
B] ENERGY MANAGEMENT
c] GREEN CAMPUS
D] WASTE MANAGEMENT
E] CARBON FOOTPRINT
COMPREHENSIVE RECOMMENDATIONS
PHOTOGRAPHS:
A] TREE PLANTATION

EXECUTIVE SUMMERY

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the green campus for the institute which will lead for sustainable development . In accordance with the Green Campus Evaluation Plan, as suggested by the Internal Quality Assessment Cell (IQAC) of the college, Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchlit, PADMABHUSHAN DR. VASANTRAODADA PATIL MAHAVIDYALAYA, TASGAON planned for conducting a green audit of the college in April, 2018. After the field work and other formalities, the report was finally send for approval to the authority (principal and IQAC) in March 2018.

The purpose of the audit was to make sure that the practices followed in the campus are healthy and environment friendly. With this in mind, the specific objectives of the audit were to evaluate the degree to which the Departments are in compliance with the applicable regulations, policies and standards and to ensure that the development of the college aims at sustainable development and green campus. It works on several facets of green campus including water conservation, Electricity conservation, Tree plantation, Waste management, paperless work, Mapping of biodiversity. The methodology used included physical inspection of the campus and review of the relevant documentation. It can make tremendous impact on students' health and learning, college operational cost and the environment.

INTRODUCTION

Environmental audit or Green Audit is a systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements (EPA, 2003). In other words, it is a management tool comprising systematic, documented. Periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies which would include regulatory requirements and standards applicable. (International Chamber of Commerce, 1989)

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organizations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties. Environmental auditing is used to investigate, understand and identify opportunities for better green campus.

Utility of Green Auditing

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organization's environmental effects in a systematic and documented manner and will produce an environmental audit report.

STATEMENT OF ASSURANCE

This audit has been conducted for the first time in the college. The audit procedure tried to meet the terms of International Standards of Internal Auditing. In our decision, sufficient and appropriate audit procedures were completed and evidence gathered to support the precision of the conclusions reached and contained in this report. The conclusions are based on a comparison of the situations as they existed at the time of the audit.

SUMMERY OF FINDINGS

The main findings of the audit show that, in general, all the departments and students are aware about the need for environmental protection at a general level. It was also observed that a number of best practices such as maintaining garden, planting trees in the campus, Vemicompost to ensure a proper waste management technique, etc. are followed in the campus. However, on detailed review, it was observed that, as the college is implementing Green Campus Policy for the first time, many of the practices followed in the institution are still in nascent stage and needs further nurture. In addition, certain processes could benefit from further review in order to improve their efficiency, fairness and consistency.

OBJECTIVES AND SCOPE

The main objectives of the green audit are to promote the environment management and conservation in the college campus. The purpose of the audit is to identify. quantify, describe and prioritize framework of environment sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out green audit are

4 To introduce and make aware students to real concerns of environment and its Sustainability

- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- **4** To bring out a present status report on environmental compliance

ABOUT COLLEGE

Shri Swami Vivekanad Shikshan Sanstha Kolhapur Sanchit, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon was established on June 1962. The college is situated in a culturally rich locale, on the Sangli- Tasgaon Road, Tasgaon. It was founded by Shikashanmahrshi Dr. Bapuji Salunkhe with the aim of spreading education in rural area. Gradually the college gained eminence, not only from Tasgaon but also from nearby places.

Shri Swami Vivekanad Shikshan Sanstha Kolhapur Sanchit, Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon is a NAAC (B++ Grade) and 56 years old college having Three streams- Arts, Commerce and Science This is a government aided UGC-approved and NCTE recognized college affiliated by the Shivaji University. The college is situated on a beautiful campus of 11 acres inside The college building is located in a rural backdrop amidst lush green surroundings. The college has academic buildings and 1 hostel building. The college has an intention to adopt the 'Green Campus' system for environmental conservation and sustainability.

The goal is to reduce CO2 emission, energy and water usage, while creating an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The 'Green Campus' has been a very new concept adopted by this college. The college administration is still working on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, carbon footprints and Alternative Energy.

AUDIT GOALS OF THE COLLEGE

The college, with the advice of the Internal Quality Assessment Cell (IQAC) has set up an environmental quality assessment body (GREEN CAMPUS) that aimed at performing the green audit of the institution. The main objectives of the audit are:

- More efficient resource management
- > To provide basis for improved sustainability
- To create a green campus
- To enable waste management through reduction of waste generation, solid- waste and water recycling
- Recognize the cost saving methods through waste minimizing and managing
- Point out the prevailing and forthcoming complications
- Impart environmental education through systematic environmental management approach and Benchmarking for environmental protection
- Financial savings through a reduction in resource use
- Enhancement of college profile

METHODOLOGY

The Green Audit taken up by the Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon had been divided into three stages:

The Pre Audit Stage:

In the pre-audit stage, meetings provide an opportunity to support the capacity and objectives of the audit and enable discussions on the feasibility associated with the audit. The meeting provides the first opportunity to meet the audit and deal with several practical knowledge and concerns. The meeting provided the chance to gather information that the audit team can study before arriving on the site. The audit procedure and audit plan was handed over at this meeting and discussed in advance of the audit itself. In Padmabhushan Dr. Vasantraodada Patil Mahavidyalaya, Tasgaon, the planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of staff and the college management. The audit protocol and audit plan were handed over at this meeting and discusself.

The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus, etc., after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

The Audit Stage:

The Audit Stage encompasses of the team selection and the field works performed. Looking after the unique structure, location and ambiance of the college, the Green Audit Team focused on Material Issues pertaining to college which have the highest influence on the Green Attributes of the College. The Audit stage also focused on the Methodology adopted. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

The Post Audit Stage:

The post-audit stage ensures formulation of Draft findings and sent to management response. Since the audit is done internally, it was important to ensure management approval for the draft. After getting draft approval, the audit team went for final report formulation.

The methodology adopted to conduct the Green Audit of the Institution had the following components.

Onsite Visit :

The Green Audit Assessment Team started the audit at the Institution on (write date) which extended for about 3 days. Greenhouse gas emissions and carbon footprint reduction through adoption of green energy and energy-efficient measures were assessed. The key focus was on assessing the status of the green cover of the Institution.

Focus Group Discussion :

The Focus Group included staff members and management people. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional, district, national and global level. The discussion revolved around three key questions: Do the members of the group consider themselves eco-conscious? Do they consider the Institution to be eco-friendly? What do they think are the issues that need to be given top priority?

Office/Building Survey :

Information on office-based environmental impacts like built-up area, utility bills, energy-saving devices and IT equipment was collected. This information was added to the carbon footprint data, generating a fairly clearer picture of the Institution's annual greenhouse gas emissions and impact of the reduction measures undertaken.

Carbon Footprint :

- Data collected from the following sources were taken into consideration to calculate carbon footprint emission and reduction. The floristic richness of the campus – total number of plants, trees, shrubs – was estimated. The impact of alternate green energy production and consumption to reduce fossil fuel-based energy was assessed, e.g. the number of CFL, LED, tube lights and electronic chokes was counted. The Carbon Footprint Calculator was used to arrive at conclusions.
- Carbon Footprint Calculator enables the measurement of carbon emission by the Institution. Besides, by breaking down the value to key 'carbon drivers', the institution can know how much of carbon footprint comes from which type of behaviour (high power-consuming incandescent bulbs vs. LED lights, solid waste management, etc.).

AUDIT FRAMEWORK AND DETAILED FINDINGS

The following audit framework is used for conducting Green Audit in 2017-18. The framework also lists the findings and observations for every criterion.

A] WATER MANAGEMENT

a) Audit Observations:

- **W** Regular checking and maintenance of pipelines are done to control water wastage.
- 4 the college has 3 aqua guard filters installed in all departments.
- Though water is used nominal in the college, but to ensure a further minimal rate, placards and warnings are set up in the college premise.
- ✤ No Water recycle Mechanism is adopted

b) Recommendation:

- Repair sources of water leakage, such as dripping taps.
- Use an efficient and hygienic water storage mechanism to minimize the loss of water during storage
- Encourage to decrease excess water usage.
- Install water recycling mechanism.

B] ENERGY MANAGEMENT

CARBON-Di-OXIDE EMISION

For consumption of 1 Unit (1 kWh) of Electricity, the CO2 emitted is 0.8 Kg. OR the Emission is 0.8 Kg/kWh. In the following Table we present the total units consumed and CO2 emitted as under:

Sr.No	month	Energy consumption	CO ₂ emitted in kg
		(kWh)	
1	January	5100	4080
2	February	4673	3738.4
3	March	3204	2563.2
4	April	2592	2073.6
5	May	3747	2997.6
6	June	3553	2842.4
7	July	4291	3432.8
8	August	3461	2768.8
9	September	4652	3721.6
10	October	3628	2902.4
11	November	3918	3134.4
12	December	3528	2822.4
	Avg	3862.25	3089.8

Chart: Monthly CO₂ Variation



a) Audit Observations:

- The college does not have any choice other than WBSEB for electric supply. The college also has 1 ecofriendly generator for the supply of emergency electricity to save our ecosystem.
- The college is planning for introduction of SOLAR PANNELS.
- + The college is using LED lights but not as much as expected.
- College ensures that all electronic and electrical equipment, such as computers, are switched off when not in use and is generally configured in power saving mode when such option is available
- The college tries to put the main switch off when there is no need of electricity.

b) Recommendation:

- Appreciate that it is preferable to purchase electricity from a company that invests in new sources of renewable and carbon-neutral electricity
- Look in to the possibility of on-site micro-generation of renewable electricity.
- Give preference to the most energy efficient and environmentally sound appliances available, this includes only using energy-saving light bulbs
- Encourage staff, students and conference guests to save energy through visible reminders, incentives and information to increase awareness. This particularly concerns turning off electrical appliances when not in use

C] GREEN CAMPUS

The Carbon Audit tools and analysis methodology were developed collectively by the Green Audit Team and based on that the audit was conducted in three major thematic areas. Carbon footprint is historically defined as the total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as carbon dioxide equivalent. Collected data at college campus is given below.

Sr.No.	Type of trees	No. of trees/ area
1	Full grown trees	220
2	Semi grown trees	120
3	Bushes	500
4	lawn	60X30

A] Tools to measure Carbon Absorbtion:

Assumptions

1. Number of mature trees in 1 acre = 700

2. Carbon absorption capacity of 700 trees is equivalent to carbon emitted by a speeding car for 26,000 miles

3. 26,000 miles = 41,843 km

4. Average kilometres covered by a car per litre of petrol is 20 km

5. Total quantity of petrol consumed by the car (41,843/20) = 2092 litres

The carbon emitted by a car due to consumption of 1 litre of petrol is 2.3 kg CO2. At this rate the total quantity of carbon emitted by 2092 litres of petrol (2092×2.3 kg) = 4812 kg CO2 or 4.8 tonnes of CO2. Therefore, the carbon absorption of one full-grown tree is 4812/700 = 6.8 kg CO2. The footprint calculation is based on the standard unit of 1 litre petrol = 2.3 kg CO2.

1. Carbon absorption capacity of one full-grown tree = 6.8 kg CO2. Therefore the carbon absorption capacity of 220 full-grown trees in the campus of the Institution (220×6.8 kg CO2) = 1496 kg of CO₂.

2. The carbon absorption capacity of 120 semi-grown trees is 50% of that of full grown trees. Hence, the carbon absorption (120×3.4 kg CO₂) = 408 Kg of CO₂.

3. There are 500 bushes of various species being raised in the gardens of the Institution. Carbon absorption of bush plants varies widely according to the species. Certain bushes absorb as high as 49,000 g CO2 per plant, whereas some others absorb as low as 150 g CO2 per plant. In the absence of a detailed scientific study and botanical survey, the per-plant carbon absorption was assumed to be 200 g (in consultation with environment scientists). Based on this, the total carbon absorption of 500 plants was calculated to be 500×200 g = 100000 g or 100kg.

4. College has lawn around 60 X 30 Sq.m. Buffalo variegated grass, Mexican grass and indigenous grass species are being raised and maintained in the lawn. The total area of the lawn is 1800 sq.m. i.e 19375 Sq.ft the carbon absorption capacity of a 10 sq.ft. area of lawn is 1 g CO2. Hence, for 19375 sq.ft. of lawn absorbs 1937.5 g or 2 kg CO2 per day. At this rate, the total carbon absorption per year (2 kg x 365) = 730 kg

Sr.No.	Type of trees	No. of trees/ area	Quantity of CO2 absorption per tree	Total quantity of CO2 absorbed (Kg)
1	Full grown trees	220	6.8 kg	1496 kg
2	Semi grown trees	120	3.4 kg	408 kg
3	Bushes	500	200 gram	100 Kg
4	lawn	60X30	10/sqft	730 Kg

B] Tools to measure oxygen emission:

According to the Arbor Day Foundation, 'a mature leafy tree produces as much oxygen in a season as 10 people inhale in a year' A person breathes 7 or 8 litres of air per minute. Air is about 20% oxygen. But the exhaled air has about 15% oxygen, and hence the net consumption is about 5%. Therefore, a person uses about 550 litres of pure oxygen each day.

Calculation of oxygen emission by flora:

The number of litres in 1 kilogram depends on the density of the substance being measured. Litre is a unit of volume, and kilogram a unit of mass. Litres and kilograms are approximately equivalent when the substance measured has a density of close to 1 kilogram per litre.

- ^{1.} On average, one full-grown tree produces nearly 117.6 kg of oxygen each year. Two mature trees can provide enough oxygen for a family of four. Total oxygen emitted by 220 full-grown trees per year (117.6 kg \times 220) = 25,872 Kg of O₂
- 2. One semi-grown tree produces 58.8 kg of oxygen per year. Total oxygen emitted by semi-grown trees (58.8 kg \times 120) = 7056 kg of O₂ (oxygen emission is 50% of that of the full-grown tree).
- 3. Total oxygen emitted by 500 bushes is calculated based on the following oxygen-inhaling requirement per person per day. A normal human being requires 550 litres of oxygen per day. 400 bushes produce enough oxygen per day to enable a person to breathe adequate quantity of oxygen of 550 litres. Total quantum of oxygen produced by 400 plants per day is 550 litres of oxygen. Taking 400 plants as one unit, the number of units of bushes in the campus (500/400) = 1.25 Total quantity of oxygen produced by 1.25 units is (1.25 × 550 litres) = 687.5 litres of oxygen per day. The annual production of oxygen at this rate (687.5 × 365) = 250,937.5 litres or kg of oxygen per year

4. Lawn is an incredible oxygen-making machine. A 25-sq.ft. area will supply enough oxygen to support one person for a day. Quantitatively speaking, this area of grass produces 550 litres of oxygen per day. The total area of lawn in the campus is 19375 sq.ft. In units, the value (19375/25) = 775 units, which produce (775 × 550 litres of oxygen) = 426,250 litres of oxygen per day. Total quantity of oxygen produced by the 19375 sq.ft. of lawn per year (426,250 litres/day × 365) = 155,581,250 litres or kg of oxygen per year.

Sr.No.	Type of trees	No. of trees/ area	Quantity of oxygen emmision per tree per year	Total Quantity of oxygen emission in kg
1	Full grown trees	220	117.6 kg	25,872 kg
2	Semi grown trees	120	58.8 kg	7056kg
3	Bushes	500	687.5 kg per day	250,937.5 Kg
4	lawn	60X30	426,250 kg per day	155,581,250 Kg

Summary:

Sr. No.	Type of trees	No. of trees/ area	Quantity of CO2 absorbtio n per tree	Total quantity of CO2 absorbed (tonnes)	Quantity of oxygen emmision per tree	Total Quantity of oxygen emmision
1	Full grown trees	220	6.8 kg	1496 kg	117.6 kg	25,872 kg
2	Semi grown trees	120	3.4 kg	408 kg	58.8 kg	7056 kg
3	Bushes	500	200 gram	100 Kg	687.5 kg per day	250,937.5 Kg
4	lawn	60X30	10/sqft	730 Kg	426,250 kg per day	155,581,250 Kg
			2734 kg or			
			Approx. 3		155,865,115.5 kg	
			Tonne		155,865.115	
Total			per year		tonne per year	

a) Audit Observations:

- College already has a well maintained garden.
- The college celebrates an annual tree plantation program in the campus where students and teachers plant trees in the campus
- Moderate amounts of bio-fertilizers are used in the college.
- Negligible amounts of washing liquids are used in the college and all the toilet cleaners are not eco-friendly.
- Nontoxic chemicals are included in Shivaji University practical curriculum. Most of the waste generated is water-soluble and ultimately disposed through normal sewage system, diluted largely so biomagnifications is negligent.

b) <u>Recommendation:</u>

- Encourage the faculties and students to plant trees in the garden.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. are biodegradable and non-toxic
- Dispose the chemical waste generated from the laboratories in a scientific manner

D] WASTE MANAGEMENT

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone.

The present Prime Minister of India Sri Narendra Modi launched 'Swachh Bharat Abhiyan' (Clean India Mission) on 2nd October, 2014. In this mission, the proper use of dust/waste bins is one of the major priorities. For the implementation of this mission, collective mass effort is necessary. For proper segregation and management, proper use of waste bins is the only solution for waste management purpose in the college campuses.

Quantity of Waste generated:

- Biodegradables 1kg/Day (office, classrooms)
- Non Biodegradables 1 & ½ kg/Day (office, classrooms)
- Biodegradable- 1kg/day (labs)
- Non- Biodegradable- ½ kg /Day (including glass bottles)
- Hazardous waste -150gm/Day
- Canteen waste: Biodegradables- 20kg/Day

Non-Biodegradables – ½ kg/Day

Total Waste:

Biodegradable waste – 22kg/Day Non- Biodegradables- 2 ¾ kg/Day Hazardous waste – 150 grams/ Day

a) Audit Observations:

- The college does not have any such recycling device to carry on the waste recycle procedure.
- The college has set up separate bins to ensure proper segregation and collection of the various wastes. The responsibility of recyclable waste is however still not taken up the college.
- The college organized several seminar and community program by the departments to ensure both consciousness and awareness among students and community members.
- All dry wastes (paper, metal, glass, other dry waste, e-waste, etc.)are separated in different bins in the college and resell to the local vendor

Sr. No	Area	No of Waste bins
1.	Art Campus	2
2.	Science campus	2
3.	Commerce campus	2
4.	Hostel Ladies	2
5.	Canteen	3

b) Recommendation:

- Make full use of all recycling facilities provided by Gram Panchayat and private suppliers, including glass, cans, white and brown paper, batteries, print cartridges, cardboard and furniture.
- The color coded bins for different wastes are placed at different locations of the campus for collection of waste and its easy sorting at source.
- Compost or cause to be composted, all organic waste, green waste and non-recycled collected from kitchens, gardens, offices and rooms.
- Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated
- Dispose all waste, whether solid or otherwise, in a scientific manner and ensure that it is not released directly to the environment
- Recycle and reuse of kitchen wastes (from canteen and hostels) and garden waste

E] CARBON FOOTPRINT

Solar water heater at hostel:

Resident: 100

Assuming an average requirement of 20 L of hot water per day

Thus daily amount of hot water used= 100x20 = 2000 L

An average flat plate collector area of 2 m² gives 125L of hot water per day.

Required collector plate area = 16 m2

Available collector plate area = 20 m2

Solar water heater is successfully used in Girls hostel

a) Use of Renewable Energy

Hybrid (Solar with wind miles) energy generation system is available in college campus. The device has rated power 2KW.

Assuming total working hours -4 hours

Total kWh or units energy obtained from renewable source is 8 kWh

Equipment working on renewable energy

Sr. No	Equipment	Quantity	Actual consumption by equipment	Total Energy consumption in kWh or units
1.	Computer	1	520 W	520W x 4 = 2080Wh 2.08kWh
2.	Printer	1	200 W	200W x 4 = 800Wh 0.8 kWh
3.	Tube light	2	40 W	80W x 4 = 320Wh 0.32 kWh
4.	Fan	2	78 W	156W x 4 = 624Wh 0.624 kWh
			Total	5.736 kWh

Total daily energy consumption by Renewable Energy source = 3.824 kWh

Therefore monthly energy consumption by Renewable Energy source = 21.92 kWh

Monthly Average energy consumption by Electricity board = 3862.25 kWh



a) Audit Observations:

- About 60% of the students and teaching and non- teaching staffs of the college use bicycle as the main mode of transport. The college also encourages transport by bicycle to students.
- College encourages UGC projects on sustainable development/ natural resources. There is compulsory ENVS paper of 100 marks in the University Syllabus for all the students of all streams to develop Environmental Awareness.
- College does not directly or indirectly participate in depletion and degradation of natural resources
- Seminars and awareness programs are conducted periodically on nature and natural resources.

b) Recommendation:

- Ensure use of ecofriendly transport option
- Review architecture of existing buildings and reviews ways, in consultation with experts, to reduce usage of energy for such buildings, offering greatest efficiency for energy and water usage.
- Conduct environmental awareness posters and seminars as a part of the program

COMPREHENSIVE RECOMMENDATIONS

There exists vast scope to improve the green campus status of the College through biodiversity promotion and tapping green energy sources.

- 1. Another 5,000 sq.ft. area of lawn shall be raised through the involvement of students from NSS or NCC to enhance oxygen emission by another 40%.
- Compostable solid waste shall be collected and deposited in solid waste collection tanks. These
 wastes shall be profitably converted into compost and applied to gardens and trees to reduce
 the application of chemical-based fertilizers and pesticides.
- 3. Solar panels shall be installed on top of the buildings to produce another 10,000 kW of electricity. To enhance solar power productivity, aluminium foil-based reflectors shall be installed on the eastern and western sides of the solar panel.
- 4. Energy-efficient measures such as replacement of all incandescent bulbs with LED lamps, old electrical regulators of fans with energy-efficient electronic regulators, air-conditioning units with all-star rated systems need to be undertaken.
- 5. Students from the Computer Science Department shall be trained as e-waste managers to manage e-waste. These e-managers shall be in constant touch with schools, orphanages and parish houses through social media and inform them of the outdated computer systems that shall be used by them. They also shall dispose of the less efficient, damaged and nonfunctioning e-wastes to the vendors.
- 6. Biogas plants shall be installed in the campus using solid waste and night soil generated from the Girls Hostel in the campus. The biogas shall be used by the Hostel Kitchen and College canteen.
- 7. Water quality testing laboratory will be installed in one part of the laboratory to test the the drinking water to ensure the students are free from water-borne diseases. All the water taps shall be fitted with high-efficiency aerator taps to reduce wastage of water. All toilets shall be fitted with dual flush water closets, which will reduce water consumption by 40%.
- 8. Environment education shall be imparted to all college students through 1-hr life-skill classes once a week. This will create wide-level environment consciousness among the student community. They will be sensitized to encourage pillion riding with their peers or use public transport instead of two wheelers. Moreover, they will also motivate their parents to replace all the incandescent or fluorescent bulbs with energy-efficient LED bulbs.

PHOTOGRAPHS:

A] TREE PLANTATION

