



KMM COLLEGE OF ARTS AND SCIENCE

Approved by AICTE & Govt. of Kerala | Affiliated to MG University, Kottayam

EDAPPALLY TOLL GATE | PIPE LINE JUNCTION | COCHIN PUBLIC SCHOOL ROAD | THRIKKAKARA | COCHIN - 682021

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GREEN AUDIT REPORT

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ECOMOUNT
ENGINEERING



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AUDIT CERTIFICATE

PRESENTED TO

KMM College **OF Arts and Science**

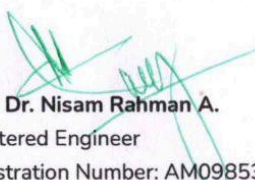
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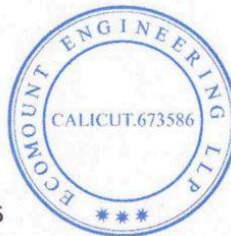
This certificate is awarded following a comprehensive assessment by Ecomount engineering Services for the implementation of institutional green framework to fulfil the requirement of ongoing

GREEN AUDIT

The green initiatives carried out by the institution have been verified on the report submitted and was found to be satisfactory

The efforts taken by the management and the faculty towards environment and sustainability are appreciated and noteworthy


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ACKNOWLEDGEMENT

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Also, we would like to thank Ms. Sabana Backer, (Principal), A M Aboobacker , (Manager), Dr. Muhammed Sajjad A (Director) and Dr. Aneeb K Jose (Vise Principal) of KMM College OF Arts and Science for giving us an opportunity to evaluate the environmental performance of the campus.



DISCLAIMER

Ecomount Engineering Services Audit Team has prepared this report for KMM College OF Arts and Science based on input data submitted by the representatives of College complemented with the best judgement capacity of the expert team.

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

It is further informed that the conclusions are arrived at by best estimates and no representation, warranty or undertaking, express or implied, is made and no responsibility is accepted by the 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.

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1. CONTEXT AND CONCEPT

In alignment with the directives of the National Assessment and Accreditation Council (NAAC), New Delhi, it has become imperative for Higher Educational Institutions to undertake annual Green, Environment, and Energy Audits. These audits are crucial for maintaining our commitment to Corporate Social Responsibility and play a significant role in mitigating global warming through effective Carbon Footprint reduction strategies.

The Green Audit encapsulates a comprehensive evaluation of environmental practices within the campus, assessing their direct and indirect impact on the ecosystem. It serves as a systematic approach to identify, quantify, and analyse the environmental footprint of the institution, thereby fostering a culture of sustainability and ecological responsibility.

This audit is designed to scrutinise various aspects such as waste minimization, recycling efforts, greening initiatives, water and wastewater management, and carbon footprints. It aims to provide actionable insights and recommendations that can significantly enhance the institution's environmental performance.



2. INTRODUCTION

Educational institutions are recognizing the importance of environmental stewardship. This has led to a surge in innovative practices aimed at creating sustainable and eco-friendly campuses. Green audits play a crucial role in achieving these goals by providing a comprehensive assessment of an institution's environmental impact.

What is a Green Audit?

A green audit, also known as an environmental audit or eco-audit, is a systematic review of an educational institution's environmental performance. It analyses how the institution interacts with the environment, focusing on key areas:

- **Energy Consumption:** This includes electricity, heating, and cooling costs. The audit evaluates energy efficiency of buildings, equipment, and practices.
- **Water Usage:** The audit assesses water consumption patterns for various purposes (e.g., irrigation, sanitation, labs). It identifies opportunities for water conservation and rainwater harvesting.
- **Waste Management:** The audit analyses the types and volumes of waste generated. It evaluates recycling practices, composting options, and waste minimization strategies.
- **Land Use and Biodiversity:** The audit assesses the institution's impact on land use, green spaces, and local flora and fauna. It may recommend sustainable landscaping practices and biodiversity conservation initiatives.

Benefits of Green Audits:

- **Reduced Environmental Impact:** Green audits provide valuable insights to minimise energy use, water consumption, and waste generation. This translates into a lighter environmental footprint for the institution.



- **Financial Savings:** Conservation efforts identified through green audits can lead to significant cost savings on utilities and waste disposal. These savings can be directed towards further sustainability initiatives.
- **Increased Environmental Awareness:** Green audits raise awareness about environmental issues among students, staff, and faculty. This fosters a culture of sustainability within the institution.
- **Compliance with Regulations:** Green audits help ensure compliance with environmental regulations, avoiding potential fines and legal issues.
- **Improved Public Image:** Educational institutions committed to sustainability practices attract environmentally conscious students, staff, and funding opportunities.
- **Promotes a Sense of Ownership:** Green audits actively involve students and staff in the process. This fosters a sense of responsibility for environmental practices within the institution.





3. OVERVIEW OF KMM COLLEGE OF ARTS AND SCIENCE

KMM College of Arts & Science strives to create a future society where ignorance, inequality, ill-health, illiteracy, poverty and powerlessness can be eradicated and where equitable development can take place providing equal access to education to all members of the society.

The institution believes in the strong linkage of training, education, research and action for sustainable development. Education is the key to enhance knowledge that creates both opportunities as well as the ability to make right choices.

KMM is an institution committed to excellence and our objective is to produce students with the ability to think critically, rationally, and communicate effectively. We strive to create a stimulating learning environment for a truly academic community of students, teachers and professionals.

The college provides exciting facilities and opportunities to enable the youngsters to work and live in a variety of settings within and outside the country.





4. VISION AND MISSION

Vision

To emerge as an institution par excellence, We integrate innovative technological capabilities, upholding ethical values and societal commitments with the right blend of knowledge, skill sets and professional attitude for the development of individuals.

Mission

Our College strives to achieve excellence in education by practising innovative teaching-learning pedagogical approach, and thereby creating a unique atmosphere in which our dedicated faculty and excellent infrastructure can produce young professionals and empower them to manage future challenges and fulfil societal commitments.

Courses provided by KMM College of Arts & Science:

1. Bachelor's Programs:

- **B.Com Model II (Computer Application):** This program combines commerce with computer application skills, preparing students for roles in business and technology.
- **B.Com Model I (Finance and Taxation):** Focuses on financial management, taxation laws, and accounting principles.
- **B.Com Model II (Finance and Taxation):** Similar to the first model but with additional emphasis on finance-related subjects.
- **B.Com Model II (Logistics Management):** Explores logistics, supply chain management, and transportation.
- **B.Sc Psychology Model I:** Provides foundational knowledge in psychology and human behaviour.
- **B.Sc Apparel and Fashion Design Model III:** Covers fashion design, textiles, and garment production.
- **B.A English Literature and Communication Studies Model III (Double Main):** Combines English literature with communication studies.



- **B.Sc Mathematics Model II (Computer Science):** Integrates mathematics and computer science.
- **BCA (Bachelor of Computer Applications):** Focuses on computer science, programming, and software development.
- **B.Sc Computer Science Model III:** In-depth study of computer science principles and applications.
- **B.Sc Cyber Forensics Model III:** Explores digital forensics, cybersecurity, and investigation techniques.
- **BBA (Bachelor of Business Administration):** Covers business management, marketing, and organisational behaviour.
- **BSW (Bachelor of Social Work):** Prepares students for social work and community service.

2. Master's Programs:

- **M.Com Finance and Taxation:** Advanced study of financial management and taxation.
- **M.Com Management and IT:** Combines management principles with information technology.
- **M.Com Marketing and International Business:** Focuses on marketing strategies and global business.
- **MBA (Master of Business Administration):** Comprehensive management education with specialisation options.
- **MCA (Master of Computer Applications):** Advanced computer science and software development.
- **MA English:** In-depth exploration of English literature and language.
- **MSc Mathematics:** Advanced mathematical concepts and applications.
- **MSc Psychology:** Further study of psychology and behaviour.
- **MSc Computer Science:** Advanced topics in computer science and research.



5. EXECUTIVE SUMMARY

Green auditing is an essential step to identify and determine whether the institution's practices are sustainable and ecological. Traditionally, we were upright and efficient users of natural resources. But over the period of time, excessive usage of resources like water, electricity, petrol, etc. have become habitual for everyone especially, in urban and semi-urban areas. Is it actually the right time to check if we (our process) are consuming more than required resources? Whether we are using resources sensibly?

Green audit standardised all such practices and provides an efficient way to use natural resources. In the time of climate change and resource exhaustion it is necessary to re-check the processes and convert it into green and sustainable. Green audit provides an approach for it. It also increases overall awareness among the folks working in institutions towards the eco-friendly environment.

This is the First attempt to conduct a green audit of this College campus for fulfilment of NAAC criteria. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil, water usage, vegetation, waste management practices and carbon footprint of the campus. Initially a questionnaire was shared to know about the existing resources of the campus and resource consumption pattern of the students and staff in the College.



The Data summary

Parameter	Electricity	Diesel (Generator/Transportation)	LPG	Total
Annual Consumption	53023	2560	256.4	
Unit of Measurement	kWh	Ltr.	Kg	
Present Gross CO2 Emission (Tons)	44.54	6.86	0.76	52.16
Present Net CO2 Emission (Tons)				51.576
Estimated CO ₂ Emission after Implementing decarbonisation Proposals				17.13
Per Capita Water Demand (Ltr/person/day)				23.7
Annual Savings by replacement/ Production	33423		200	
Unit of measurement	kWh		Kg	

Recommendation

The performance of the campus is good considering the measures that support the green practices and this can be further improved by implementing the energy saving proposals listed in the energy audit report and also by the recommendations below.

SL no	Recommendation	Reduction in emission (Ton)
1	Upgradation of biogas Plant	0.6
2	Energy saving proposals	29.10
3	Replace of 3 star AC to 5 Star	4.7476



6. GREEN AUDIT - ANALYSIS

6.1 GENERAL INFORMATION

1. Has any Green Audit been conducted earlier?

Ans: No, this is the second external audit organised by the college.

2. What is the total strength (people count) of the Institute?

<i>No. of students enrolled in 22-23</i>	<i>752</i>
<i>No. of teaching staffs</i>	<i>94</i>
<i>No. of non-teaching staffs</i>	<i>26</i>
<i>No. of boys admitted in Hostel (2022 Admission) (outside of the campus)</i>	<i>32</i>
<i>No. of girls admitted in Hostel (2022 Admission) (outside of the campus)</i>	<i>59</i>

**The number of students in the hostel was not considered for the calculation because the hostel building is not located on the campus premises. The college recommended that it should not be included in this audit.*

3. What is the total number of working days of your campus in a year?

Ans : There are one hundred eighty working days in a year

4. Where is the campus located?

Ans: Edappally toll gate, pipeline junction, cochin public school road, Thrikkakara, Kochi , Ernakulam 682021

5. Which of the following are available in your institute?

<i>Garden area</i>	<i>- Available</i>
<i>Playground</i>	<i>- Available</i>
<i>Kitchen</i>	<i>- Available</i>
<i>Toilets</i>	<i>- Available</i>
<i>Garbage Or Waste Store Yard</i>	<i>- Available</i>
<i>Laboratory</i>	<i>- Available</i>
<i>Canteen</i>	<i>-Available</i>
<i>Hostel Facility</i>	<i>-Available (Outside of the Campus)</i>
<i>Guest House</i>	<i>-Available</i>



6. Which of the following are found near your institute?

<i>Municipal dump yard</i>	<i>Not in vicinity of institute</i>
<i>Garbage heap</i>	<i>No Garbage heaps</i>
<i>Public convenience</i>	<i>Public convenience is available</i>
<i>Sewer line</i>	<i>No</i>
<i>Stagnant water</i>	<i>No stagnant water</i>
<i>Open drainage</i>	<i>No</i>
<i>Industry – (Mention the type)</i>	<i>No</i>
<i>Bus / Railway station</i>	<i>Bus/taxi connectivity</i>
<i>Market / Shopping complex</i>	<i>Available</i>

6.2 ENERGY AUDIT

6.2.1 Energy Audit Summary

Baseline energy performance: Electricity consumption analysis

Sub-metering: Sub metering of Electricity in the major usage areas to provide for better control. Also records shall be kept for all the sub metres to understand the variation in the consumption pattern in each section.

Equipment and utility description

Ceiling fan loads: Ceiling fans are installed in majority of the areas by replacing it with Brushless DC fans which consume in the range of 25 to 30W at full speed, instead of 60 -70W in normal fans, will reduce the power consumption considerably. Also, while purchasing new fans priority should be given for BLDC

AC loads: Replace the continuously working AC's with 5 star rated AC. Setting temperature of the AC's should be 24-25oC.

Light Loads: Replace the fluorescent tubes with LED lights. Motion sensors should provide for the toilets.



Behavioural Changes

- Use of student volunteers for reducing electricity consumption in college
- Encourage student projects in connection with energy conservation areas such as in renewable energy area, use of terrain advantage of college buildings, automatic system for control the light, fan and air conditioning requirements
- Proper recording of log books, consumption of fuel (Electricity, LPG) to maintain by the facility manager. Along with this a facility management to be formed and the committee headed by Principal or any deputed person and the committee members include the persons from academics, students, PTA, Administration and facility engineer for verification

6.2.1.1 Recommendation for reducing Carbon Footprint

Particulars	Energy consumption reduction (kWh)	Carbon Emission reduction (Ton CO ₂)	% of total
Replacement of 52 no : T8 tubes with 20W LED tube	1223	1.03	3.53
Replacement of 64 no : Fans with BLDC Fans	3010	2.52	8.65
On grid solar installation of 20kW system	29200	24.52	84.26
Total	334433	29.10	100

6.2.2 LOAD BALANCE - ELECTRICAL

6.2.2.1 Load Details

The details of the loads in the college at the audit time are given below

<i>Sl.No:</i>	<i>Particulars</i>	<i>Total Power kW</i>
1	Light & Fan Loads	26.77
2	AC Loads	14.66
3	PC & Other Loads	14.55
4	Motor Loads	7
5	Miscellaneous Loads	2
Total		64.98



6.2.2.2 KSEB Bill Data

Base line data given below based on the Electricity bill provided by the supplier of electricity to the College. Details obtained from the KSEB bill for the month of April 2022-March 2023 is as follows in the Table.

Particulars	Details
Consumer No	1157311021621
Connected Load (kW)	29.68
Tariff	LT VII (A) Three
Average monthly electricity consumption (kWh/month)	2,510
Average Energy charges (Rs/month)	31,669/-
Average Demand charges (Rs/month)	5,250/-

Particulars	Details
Consumer No	1157318029031
Connected Load (kW)	128.66
Tariff	LT VI (F) Three
Average monthly electricity consumption (kWh/month)	1,050
Average energy charges (Rs/month)	17,050/-
Average Demand charges (Rs/month)	6,300/-

Particulars	Details
Consumer No	1157312027938
Connected Load (kW)	128.66
Tariff	LT VII (A)
Average monthly electricity consumption (kWh/month)	850
Average energy charges (Rs/month)	10,120/-
Average Demand charges (Rs/month)	1200/-



6.2.2.3 UNINTERRUPTIBLE POWER SUPPLY (UPS)

<i>Block</i>	<i>Floor</i>	<i>Room Number</i>	<i>Location</i>	<i>UPS Details</i>		<i>Battery Details</i>	
				<i>Rated KVA</i>	<i>Make</i>	<i>Make/type/no:</i>	<i>Volt/Ah</i>
MAIN BLOCK	Ground floor		Lab Ground	5	Powerplus	Live Guard/SMF/8	12/120
			Vice Principal	3	Neowatt	Live Guard/SMF/4	12/120
Block A	First floor		Computer Lab	3	Consul Neowatt	Live Guard//SMF/4	12/150
			Computer Lab	5	Power Plus	Live Guard/SMF/4	12/150

Suggestions

- Proper ventilation should provide for UPS and batteries.
- The UPS room should be kept neat and clean.
- Petroleum jelly should be applied to the battery terminals for better life.

6.2.2.4 DIESEL GENERATOR

Diesel generator used in the college as backup supply. There is only one DG provided in the facility. The following table gives the basic details of the diesel generator in the facility

<i>Sl. No</i>	<i>Generator Details</i>			<i>Engine Details</i>		
	<i>Rated kVA</i>	<i>Make</i>	<i>Serial No</i>	<i>Rated kW</i>	<i>Make</i>	<i>Serial No</i>
1	30 KVA	Kirloskar	3H/816/1200	30.9/4.2 hp	kirloskar	3H08422/2222348

Inference & Suggestions

- The diesel consumption for DG was not recorded properly. A log book to monitor the diesel consumption (L) and unit
- consumption(kWh) shall be maintained and record it after its running.



6.2.2 REPLACEMENT OF FLUORESCENT LIGHT FITTINGS WITH LED LIGHTS

The present light fittings are mainly the fluorescent light of different ratings. By replacing these light fittings with LEDs, the consumption of electricity will reduce considerably.

Particulars	Units	T12	T8
Power of Fluorescent lights	Watts	40	36
Power of proposed LED tube	Watts	20	20
Difference in Wattage	Watts	20	16
Avg No: of working hours/day	Hrs	7	7
No: of working days per year (Average)	Nos	210	210
No: of working hours per annum	Hrs	1470	1470
Number of Lights operating	Nos	0	52
kWh Saving per Annum	kWh	0	1223
Cost per kWh (Average)	Rs	12.50	12.50
Annual Financial Savings	Rs	0	15287
Cost of LED tube	Rs	300	300
Investment for LED lights	Rs	0	15600
Simple Payback period	Months	0	12

Summary of this proposal

Annual Unit Savings	kWh	1223
Total Savings	Rs	15287
Total Investment	Rs	15600
Payback Period	months	12

6.2.3 REPLACEMENT OF CEILING FANS IN THE OFFICE WITH ENERGY EFFICIENT BLDC FANS

A BLDC fan takes in AC voltage and internally converts it into DC using SMPS. The main difference between BLDC and ordinary DC fans is the commutation method. A commutation is the technique of changing the direction of current in the motor for rotational movement. In a BLDC motor, there are no brushes, so the commutation is done by the driving algorithm in the Electronics. The main advantage is that over a period, due to mechanical contact in a brushed motor the commutators can undergo wear and tear, this thing is eliminated in BLDC Motor making the motor more rugged for long-term use. To explain BLDC technology in simpler terms, BLDC uses a combination of Permanent Magnets and Electronics to achieve the kind of efficiency and performance it delivers. A BLDC fan consists of 3 main components: - 1. Stator 2. Rotor 3. Electronics



PROPOSAL

Replace the ceiling fans with BLDC in the as per preference of operating hours as office areas, staff rooms, hostel and in classrooms; the calculation for the savings given in the table. Replace $\frac{1}{3}$ of Total Fan Replace with Each Year, Total 320 Fans as 64 Fans

Particulars	Units	College
Power of existing ceiling fans at full speed	Watts	60
Power of BLDC fans at full speed	Watts	28
Difference in Wattage	Watts	32
Avg No: of working hours/day	Hrs.	7
No: of working days per year (Average)	Days	210
No: of working hours per annum	Hrs	1470
Number of Ceiling Fans operating	Nos	64
kWh Saving per Annum	kWh/annum	3,010
Cost per kWh (Average)	Rs/kWh	12.50
Annual Financial Savings	Rs/annum	37,632
Cost of BLDC Fans	Rs/no	3,500
Investment for BLDC Fans	Rs	2,24,000
Simple Payback period	Months	72

Summary of the proposal

Annual Unit Savings	kWh/annum	3,010
Total Savings	Rs/annum	37,632
Total Investment	Rs	2,24,000
Payback Period	Months	72



6.3 WASTE MINIMIZATION AND RECYCLING

1. Does your institute generate any waste? If so, what are they?

Ans: Yes, Solid waste, Canteen waste, paper, plastic, laboratories waste, e-waste, etc.

2. What is the approximate amount of waste generated per day? (in KG approx.)

Biodegradable waste = 5 Kg

Non-biodegradable waste = 5 Kg

3. How is the waste managed in the institute? By Composting, Recycling, Reusing, Others (specify)

1. **Recycling:**

- **Recycling Bins:** Colleges typically have designated recycling bins placed strategically across campus.
- **Awareness Campaigns:** Awareness campaigns to educate students and staff about the importance of recycling.

2. **Composting:**

- **Campus Composting:** Organic waste from dining halls, food courts, and landscaping is collected and composted. The campus has a 5 kg Bio gas plant.
- **Compost Bins:** Compost bins are placed near dining areas, encouraging students to dispose of food scraps, and other organic matter separately.
- **Benefits:** Composting reduces landfill waste, enriches soil, and supports sustainable gardening practices.

3. **Reuse Initiatives:**

- **Textbook Exchange Programs:** Students can exchange or sell their textbooks to fellow students, reducing the need for new book purchases each semester.

4. **E-Waste Management:**

- **Electronic Recycling:** Colleges handle electronic waste (e-waste) responsibly. Old computers, printers, and other devices are recycled or refurbished.

5. **Reducing Single-Use Plastics:**

- **Water Bottle Refill Stations:** Installing water bottle refill stations reduces the use of disposable plastic water bottles.
- **Reusable Containers:** Encouraging students to use reusable containers for takeout meals minimises plastic waste.



6. Collaboration with Local Authorities:

- **Municipal Services:** Colleges collaborate with local waste management services to ensure proper disposal of non-recyclable waste.

5. How would you spread the message of recycling to others in the community?

Following are the ways through which college is spreading the awareness about recycling

1. **Campaigns:** These are organised efforts to promote recycling. They might include initiatives like setting up recycling bins around campus, encouraging students to use reusable water bottles, or promoting the use of recycled materials in art projects.
2. **Rally:** A rally is a public gathering to promote a cause. A recycling rally might involve speeches, demonstrations, and the distribution of educational materials. It's a great way to get the community involved and make a public commitment to recycling.
3. **Webinars and Seminars:** These are educational events where experts can share information about the importance of recycling and how to do it effectively. They can be held in-person or online, making them accessible to a wide audience.

6. Can you achieve zero garbage in your institute? If yes, how?

Not yet achieved. Possible through waste management policy and planning.

6.4 GREENING THE CAMPUS

1. Is there a garden in your institute?

Yes, about 120 Sq Ft areas are developed as Gardens and around 330 Potted flower plants in the garden areas. 600 Sq mtr are going to be used for gardening in the coming year.

2. Do students spend time in the garden?

Yes, students spend around 1-2 Hours in morning and evening.

3. Total number of Plants on Campus?

Plant type with approx. count

Full grown Trees - 2 Nos

Small Trees - 22 Nos

Grass Cover 12 SQM



4. Is the College campus having any Agricultural/horticulture departments (If yes, give details).

No.

5. How many Tree/vegetable Plantation Drives organised by campus per annum?

Plantation Drives were Organised by campus in the last Year. Total 10 trees and 300 Flower plants planted in this Year with more than 80% survival rate.

6. Is there any Plant Distribution Program for Students and Community?

Landscape, Plantation Of trees outside the campus with the help and coordination of National service scheme departments.

6.5 INFORMATION, EDUCATION AND COMMUNICATION (IEC) ACTIVITIES

1. AWARENESS CAMPAIGN ON USE OF PAPER BAG

The Department of Fashion Design organised a paper bag awareness campaign and workshop on the use of paper bags on 22nd August 2022 as part of social outreach activity. The motto of this campaign was "Be a part of the solution and not part of the pollution". Students under the guidance of teachers made 100's of paper bags and they were distributed in the shops in the locality of the college. also conducted a workshop for the other departments of the college including students, teaching and non- teaching staff on how to make paper bags. By doing this, we could motivate them to discard plastic bags and use paper bags instead.



2. CLEANLINESS DRIVE

The Department of BBA organised a cleanliness drive on 29th June 2022 at Fort Kochi Beach. Students and teachers participated in the cleaning activity on the beachside, with the municipality workers also assisting the students with waste management.



3. AWARENESS CAMPAIGN ON THE USE OF PAPER BAGS

The NCC Cadets of College organised a paper bag awareness campaign as an eco-friendly alternative to plastic bags on 12th July 2023. The main objective of this campaign was to raise awareness about the environmental benefits of using paper bags over plastic bags. As part of this campaign, the cadets had made paper bags and distributed those bags to nearby shops, and also made posters and videos and published them on the social media platform

12th July - International Paper Bag Day



4. CLEAN UP DRIVE

A cleaning drive was organised in Thrikkakara Municipality under the leadership of District Suchitwa Mission of Pampala Muktam Nava Keralam Camp. Bharat Mata College Thrikkakara, KMM College of Arts and Science, St. Paul's College Kalamassery and Polytechnic Kalamassery NSS



and NCC students were part of the cleaning drive. Students removed the piles of garbage lying at places of Sea Port Airport Road and Pipeline Junction. The garbage removed as part of the drive was handed over to Thrikkakara Municipal Corporation.

5. CAMPAIGN TO PRESERVE WATER BODIES

The NCC Cadets of KMM College of Arts and Science, conducted a campaign to raise awareness about the importance of cleanliness and cleaned the sea shores of Cherai beach, Munambum by collecting plastic & other waste material on 8th June 2023 at 10:00 am based on the “PUNEET SAGAR ABHIYAN”. The main aim of the “PUNEET SAGAR ABHIYAN ” is to rid coastal areas, beaches, lakes, rivers, and ponds of plastic waste and other pollutants. This campaign played a crucial role in emphasising the role of each and every individual to preserve the water bodies of his or her surroundings.



6. HEALTH AND HYGIENE AWARENESS

As part of a seven day camp at the adopted School, the second day was dedicated to health and hygiene awareness. Additionally, a cleanliness drive was organised at the adopted school, involving both volunteers and faculty members from both institutions. The volunteers initiated the creation of an herbal garden at the adopted school, with plants collected from the neighbourhood and the volunteer’s homes.



7. ENVIRONMENTAL CONSERVATION ACTIVITIES

As part of a seven days camp at the adopted school, the third day was focused on Environmental conservation activities. Volunteers planted saplings and conducted a clean-up drive in and around the village. Workshops on waste management, recycling, and sustainable practices were held. The day concluded with a quiz competition on environmental issues to reinforce the knowledge gained.



8. AWARENESS CAMPAIGN ON PLASTIC FREE INDIA

The NCC Cadets of KMM College of Arts and Science, Thrikkakara conducted an Awareness rally on the topic “PLASTIC FREE INDIA” on 4th June 2023 as part of the World Environment Day. The motto of the campaign was to bring about solutions to plastic pollution and to promote awareness with regards to environmental protection. The cadets went to nearby shops and gave awareness about how to reduce the usage of plastic and to reuse plastic. Cadets made posters and placards for the rally and published them on the social media platform.



AWARENESS RALLY – WORLD ENVIRONMENT DAY



6.6 WATER AND WASTEWATER MANAGEMENT

1. List uses of water in your institute

Basic use of water in campus:

Drinking – 32KL/month

Gardening – 9.9KL/month

Kitchen and Toilets – 592 KL/month

Others – 6 KL/month

Total =639.9 KL/Month

Per capita water demand =Daily water consumption / Number of person

$$= 21330/900= 23.7 \text{ Litter}$$

SL NO	STORAGE TYPE	CAPACITY (L)	QUANTITY	TOTAL (L)
1	Overhead water tank (4.2x2.2x1.5)m ³	13860 L	1	13860
2	PVC Drinking OH tank	1000	1	1000
TOTAL CAPACITY				14860 L

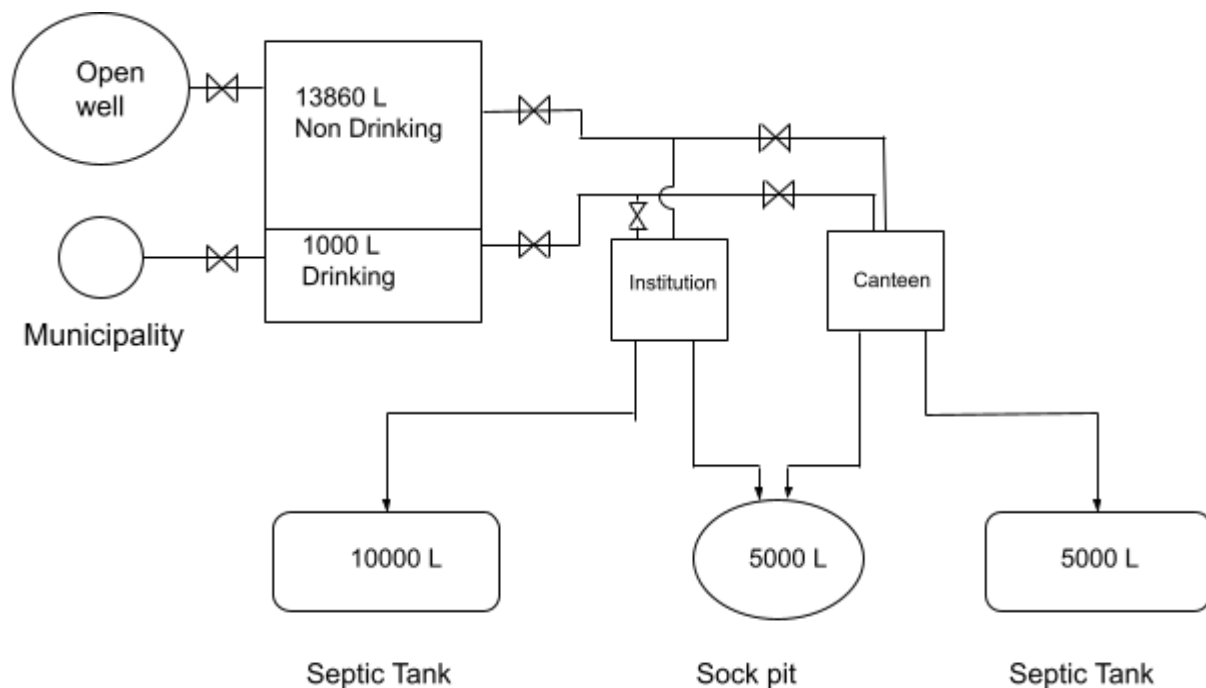
Saving Techniques:-

1. Avoid overflow of water, controlled valves are provided in the water supply system.
2. Close supervision for the water supply system.
3. Provide low-flow fixture faucets, showerheads, and water closets to reduce water usage without compromising functionality.
4. Implement rainwater harvesting storage system for irrigation and other non-potable purposes.
5. Recycle greywater from sinks, showers, wash basins etc. for use in flushing toilets and irrigation.
6. Use drip irrigation systems for landscaping to minimise water waste.



7. Encourage students to participate in projects and research focused on water conservation.
8. Use water metres for the both drinking water non drinking water in order to measure the water usage precisely
9. Install dual-flush toilets in order to provide options for different levels of water usage.

Water Flow Diagram



Recommendation:-

1. Implementation of STP/ETP - The output water can be used for Irrigation purpose, it will significantly reduce the usage of water for irrigation purpose .
2. It is highly recommended to provide WTP
3. founded damages and leakage , need to change all the CP and sanitary fixtures (Water taps , Health faucet, shower with mixer , Urinals, Water closet and flush system etc .)
4. Suggested submersible pumps with more than 80% efficiency
5. Need to provide manhole for sock pit
6. Recommended to implement rainwater harvesting tank or rain water percolation pit
7. Suggested to provide grease trap in kitchen waste water outlet
8. Recommended to add clean out provision for waste water line and soil water line



9. Recommended to provide gully trap , grease trap and sufficient manholes for both college and canteen
10. Suggested to test the water periodically (especially during the monsoon). check and evaluate the presence of E Coli bacteria, coliform bacteria, salmonella bacteria, pH of the water and turbidity etc . all those parameters to be met ISO standards or PCB standard of india.

6.7 CARBON FOOTPRINT - EMISSION & ABSORPTION

EMISSION

1. Electricity used per year - CO2 emission from Electricity

(electricity used per year in kWh/1000) x 0.84

*53023 kWh/1000*0.84*

*(53023/1000)*0.84 = 44.54 Ton*

2. LPG/PNG used per year - CO2 emission from LPG/PNG

(LPG/PNG used per year in KG) x 2.99

*256.4/1000*2.99= 0.76 Ton*

3. Diesel used per year CO2 emission from HDS (Diesel)

(Diesel used per year in litres/1000) x 2.68

*1040/1000*2.68 = 2.78 Ton*

4. Transportation per year (car) CO2 emission from transportation (Bus and Car)

Colleges have one Car with Rare Use.

*1520/1000*2.68 = 4.07 Ton.*

Total CO2 emission per year - (44.54+0.76+2.78+4.07) = 52.16 Ton



ABSORPTION BY THE INSTITUTION LAND

The Data

Full grown Trees - 2 Nos

Small Trees - 22 Nos

Hedge Plants 330 Nos

Vegetable/fruit plans - 150 Nos

Grass Cover 15 SQM

Reference and calculations

- *There are 2 full grown trees and 22 semi grown trees of different species, (Carbon absorption capacity of one full grown tree 22 kg CO₂, Semi grown tree is 6.5 Kg)*
- *There are approximately 320 Flower Plants of various species being raised in the gardens and grown in the areas where no buildings are built (Carbon absorption of bush and flower plants varies widely with their species. Certain bushes/Flowers absorb very high levels of CO₂ whereas some others absorb very low levels of CO₂. In the absence of a detailed scientific study, 200g of CO, absorption is taken per bush/Flower and can be considered 150g for the vegetations.*
- *The lawns on the campus have buffalo grass, Mexican grass and indigenous grass species and cover a total area of 160 sq. ft. Carbon absorption capacity of a 10 sq. ft. area of lawn is 1 g per day*

*Full grown Trees - =2*22/1000 = 0.044 Ton*

*Small Trees =22*6.5/1000 = 0.143 Ton*

*Flower Plants =320*0.2 /1000 = 0.064 Ton*

*Grass Cover =(160/10)*0.01*365 /1000 = 0.584 Ton*

Total Absorption by the institution = 0.835 Ton



CARBON FOOTPRINT

The carbon footprint of the campus is calculated by adding the carbon emissions from various energy sources.

Parameter	Tons of Co ₂
Gross Carbon Emission	52.16
Carbon Sequestration	0.584
Net Carbon Emission	51.576

Carbon Mitigation Plans

RECOMMENDATION

The energy audit report includes some energy-saving recommendations. Implementing these proposals not only reduces the facility's energy consumption but also its carbon footprint.

Tree Plantation

1. **Carbon Sequestration:** Planting more trees, we can enhance carbon sequestration, effectively reducing atmospheric CO₂ levels.
2. **Oxygen Production:** Trees release oxygen (O₂) into the atmosphere. This not only supports human and animal life but also balances the carbon-oxygen cycle.
3. **Shade and Cooling:** Trees provide shade, reducing the need for energy-intensive air conditioning. Additionally, they cool the surrounding environment by releasing water vapour through transpiration.
4. **Soil Health:** Tree roots stabilise soil, preventing erosion and promoting healthy soil structure. Healthy soils store carbon and enhance overall ecosystem health.
5. **Urban Carbon Sink:** Urban tree planting helps offset carbon emissions from vehicles, industries, and buildings. Strategically placed trees absorb pollutants and improve air quality.



Waste Management

The significance of proper waste management in the context of sustainable development and environmental preservation cannot be overstated. Adopting a holistic waste management approach is not only beneficial for college, but it is also critical for creating a greener, cleaner, and more sustainable future for future generations. We recommend upgrading the biogas plant from 1 m³ to 10 m³ to properly manage waste and reduce the use of LPG. *The recommended LPG can produce approx 200 kg of LPG annually.* It will reduce **0.6 Ton** of carbon emission.

Energy Management

- 1) The replace of T8 and T12 Light with LED Tube
- 2) Replace 20% old fan(60W) with with BLDC Fan(32W)
- 3) Implementing Solar Power Plant of 20 kW

Implementing energy saving proposals listed = **29.10 Ton**

Carbon reduction by replacing the AC = **4.7476 Ton**

Environment

Air Conditioners

The facility employs split air conditioners in different areas The details are given below.

The facility primarily uses R32 refrigerant air conditioners. The refrigerant's global warming potential (GWP) and ozone depletion potential (ODP) are listed below.

SL NO	LOCATION	FLOOR	MAKE	TR	STAR	EER	POWER (W)	REF.	YEAR
1	Marketing room	GF	Lloyd Inverter	1 TR	3	3.93	1050	R 32	2023
2	Vice Principal-1	GF	Godrej inverter	1.5TR	3	3.65	1630	R 32	2022



3	Vice Principal-2	GF	Godrej Inverter	1.5TR	3	3.65	1630	R 32	2022
4	Exam hall-Viva	1F	Godrej	1 TR	3	3.93	1110	R 32	2023
5	Exam hall-Viva	1F	Godrej	1 TR	3	3.93	1110	R 32	2023
6	MBA class	1F	Voltas Inverter	1 TR	3	3.8	1150	R 32	2023
7	MBA class	1F	Voltas Inverter	1 TR	3	3.8	1150	R 32	2023
8	Room 13	1F	LG Non invert	1.5 TR	3	-	5225	R 32	2017
9	Principal room	GF	Godrej inverter	1 TR	3	3.65	1110	R 32	2023

Refrigerant :-

SL NO	REFRIGERANT	GWP	ODP	CLASS
1	R 32	675	0	A2L
2	R-410 a	2088	0	A1

R22 is a hydrochlorofluorocarbon (HCFC) refrigerant that is commonly used in air conditioning and refrigeration systems. It is also known as chlorodifluoromethane. In accordance with the Montreal Protocol on Substances that Deplete the Ozone Layer, the Indian government has taken steps to phase out the use of ozone-depleting substances, including HCFCs. As part of these efforts, R22 production and importation have been prohibited in India. Instead, the country has switched to more environmentally friendly refrigerants like R410A, which have less of an impact on ozone depletion. As a result, it is recommended that existing R22 used AC be replaced with the most recent energy efficient 5 star AC with environmentally friendly refrigerant. The savings calculation is shown below.

R410A has been widely used for many years, meaning it is readily available and there are numerous products and components designed specifically for this refrigerant. R410A typically operates at a higher pressure, which can lead to improved heat transfer efficiency in some systems. R410A has been the industry standard for many years and offers some advantages in



terms of safety and availability, R32 is emerging as a more environmentally friendly and efficient alternative. The choice between them may depend on specific application requirements, regulatory considerations, and long-term sustainability goals.

Saving Calculation for Replacing Air Conditioners:-

PARTICULARS	UNIT	PRINCIPAL ROOM	VICE PRINCIPAL ROOM-1	VICE PRINCIPAL ROOM-2	MARKETING ROOM	EXAM HALL	MBA CLASS	ROOM 13
Present 3 star AC	Watts	1110	1630	1630	1050	1110X2 =2220	1115X2 =2230	5225
Proposed 5 star AC	Watts	814	1210	1210	860	814X2 =1628	840x2 =1680	1284
Difference in wattage	Watts	296	420	420	190	592	550	3941
Average of Working Hours	Hrs	6	6	6	4	3	6	4
Number of AC	Nos	1	1	1	1	2	2	1
Working days per year	Days	200	200	200	200	200	200	200
Daily power saving	Kwh	1.77	2.52	2.52	0.76	1.77	3.3	15.7
Kwh Saving per annum	Kwh	354	504	504	152	354	660	3140
Cost per Kwh	Rs	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Annual Financial saving	Rs	2407.2	3427.2	3427.2	1033.6	2407.2	4488	21352
Cost Of AC	Rs	35000	38500	38500	36500	35000	34000	45000
Investment for AC	Rs	35000	38500	38500	36500	70000	68000	45000
Simple payback period	Months	174	134	134	423	348	181	25
Saving in emission	Ton of Co2	0.29	0.423	0.423	0.127	0.297	0.55	2.63



7. GENERAL RECOMMENDATION

1. Environmental Parameters in Purchase Policy:

- Incorporate environmental criteria into your institution's purchase policy. Consider factors like product lifecycle, recyclability, and energy efficiency. This ensures a cradle-to-grave approach, promoting sustainable practices.
- Implement energy-saving practices such as using LED lighting, optimising HVAC systems, and promoting energy-conscious behaviour among staff and students.

2. Water Balancing and Audit:

- Conduct a water audit to monitor water usage and identify areas of wastage. Implement water-saving measures and raise awareness among staff and students about responsible water consumption.

3. Water Meter Installation:

- Install water metres in every building to track water consumption per capita. Regular monitoring allows for better management and conservation efforts.

4. Drip Irrigation Implementation:

- Adopt drip irrigation systems for landscaping and green spaces. Drip irrigation delivers water directly to plant roots, minimising wastage and promoting efficient water use.

5. Sprinklers for Gardening:

- Increase the use of sprinkler systems for maintaining gardens and lawns. Properly timed sprinklers can reduce water usage while keeping the campus green.



6. Flow Rate Regulation:

- Regularly check tap flow rates. Ensure they do not exceed 2.5 litres per minute. Repair any leaks promptly to prevent water loss.

7. Community Plantation Drives:

- Collaborate with nearby villages, local bodies, NGOs, and municipal corporations to organise tree plantation drives. Increasing green cover contributes to carbon sequestration and biodiversity.

8. Environmental Training Programs:

- Arrange training sessions on environmental management systems and nature conservation. Involve schools and local communities to create awareness and foster sustainable practices.
- Regularly educate students, faculty, and staff about environmental issues, conservation, and sustainable practices.

9. Waste Collection Center:

- Establish an e-waste collection centre on campus. Proper disposal and recycling of electronic waste are essential for minimising environmental impact.
- Set up efficient waste segregation and recycling systems. Encourage the use of reusable containers and minimise single-use plastics.

10. Green Building Guidelines:

- Develop green building guidelines for future expansion projects. Consider energy-efficient designs, renewable energy sources, and sustainable materials.



8. CONCLUSION

This audit involves considerable team discussions and meetings with key staff members on a variety of environmental-related topics.

Overall 55% of the Total land is College campus and 25 % used for landscaping and green cover the remaining used for amenities . The College makes a significant effort to act in an environmentally responsible manner and takes into account the environmental effects of the majority of its activities. The recommendations in this report suggest some more ways in which the College can work to improve its practices and develop into a more sustainable institution, despite the fact that it performs rather well overall.

It's important to begin a few things, such as Tree Plantation, Solar installation, drip irrigation and Biogas Plant and control of the water flow from the taps. Additionally, we strongly advise completion of the Energy audit recommendations.