

GREEN AUDIT REPORT

2023-2024

SREE NARAYANA COLLEGE CHATHANNUR



**AN INITIATIVE OF THE BHOOMITHRASENA CLUB AND
NATURE CLUB, SREE NARAYANA COLLEGE,
CHATHANNUR, FACILITATED BY IQAC**

PREPARED BY:

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SREE NARAYANA COLLEGE CHATHANNUR

(NAAC Re-accredited with 'A' Grade Affiliated to University of Kerala)

CERTIFICATE

This is to Certify that Sree Narayana College, Chathannoor, Kollam, Kerala has successfully conducted a detailed GREEN AUDIT- 2024 by the Nature Club, NSS and Bhoomithrasena Club in association with IQAC.



Principal

Sree Narayana College Chathannur
PRINCIPAL
SREE NARAYANA COLLEGE
CHATHANNUR

Govt. of Kerala
**Haritha Keralam Mission
Certificate**

..... **S.N. COLLEGE, CHATHANNUR**..... is hereby certified as GREEN INSTITUTION for imparting the culture of environmental conservation to the society. This Institution has secured **A.. GRADE** in demonstrating exemplary and efficient practices adhering green protocol in the fields of waste management, water security, energy and biodiversity conservation in this campus.

Congratulations


Dist. Coordinator
..... **KOLLAM**..... Dist.


Dr. T.N. Seema
State Coordinator
Navakeralam Karmapadhati
Vice Chairperson, Haritha Keralam Mission

BSNL Bhavan, Third floor, Uppalam Road, Statue, Thiruvananthapuram 695001
Phone : 0471 2449939, E mail : navakeralamgok@gmail.com, Website: nkp.kerala.gov.in

Green Institution Certificate

Preface

Education, at its core, reflects a commitment to addressing environmental challenges and embracing the values of environmental stewardship as a natural extension of scholarly endeavors, teaching, and learning. In its effort to enhance environmental quality and preserve a pristine campus for future generations, Sree Narayana College Chathanoor has undertaken a self-assessment of its environmental standards, based on the model available to it, done by a professional agency, last year. This initiative aims to:

1. **Assess Current Environmental Conditions:** Establish a comprehensive baseline of the campus's natural and physical environment.
2. **Evaluate Sustainability Practices:** Examine existing approaches to water and energy use, waste management, procurement, and transportation.
3. **Foster Environmental Awareness:** Encourage a participatory approach to environmental auditing that engages the campus community.
4. **Develop Strategic Reports:** Compile baseline data on best practices and outline actionable strategies for advancing environmental quality in the years to come.

This report is compiled by a committee consisting of NSS, Nature Club, Bhoomithra Sena and the Botany department of Sree Narayana college Chathannur, constituted by the Principal Sree Narayana College Chathannur. IQAC. thanks the committee and the Principal for this report.

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1.Introduction

SREE NARAYANA COLLEGE, CHATHANOOR

Sree Narayana College, Chathannur situates at Karamcode, near to the KSRTC Bus Station Chathannur in Kollam district in Kerala. The College is managed by the Sree Narayana Trusts, Kollam, one of the leading educational agencies in the state. It is affiliated to the University of Kerala, and has 12 B recognition from the UGC.

The first Principal of the college was the noted academician Prof. K. Udayakumar. Ever since its inception in 1981, Sree Narayana College, Chathannur has catered to the educational and intellectual needs of young men and women from the rural areas of south Kollam.

The college offers degree courses in Mathematics, Commerce, Chemistry & Industrial Chemistry and History. At the Post-Graduate level, the college offers M.Sc Mathematics and M.Com (Finance stream). Various clubs and study centers function to encourage and nurture the aesthetic and literary talents of its members.

Conscious of its inceptual obligation, it takes education to the doorsteps of the poor and marginalized sections of the society and endeavours to mould a humane, intellectually progressive, morally awakened and socially committed group of young men and women.

ABOUT THIS AUDIT

The Sustainable Development Goals (SDGs), introduced by the United Nations in 2015, serve as a powerful framework for fostering transformative change. These goals outline a comprehensive action plan aimed at ensuring the well-being of both the planet and society by 2030. The SDGs present an opportunity to develop integrated, multidimensional strategies for adapting to climate change. They tackle critical issues essential to human progress and sustainable development, including poverty, hunger, climate action, gender equality, access to clean water and sanitation, and the promotion of responsible consumption and production practices.



The proposed interventions focus on:

- a. Optimizing energy consumption
- b. Enhancing transportation systems
- c. Minimizing waste production

Occupancy Details	
Particulars	2023-24
Total Students	482
Staffs	41
Total Occupancy of the college	523

BASELINE DATA SHEET FOR GREEN AUDIT							
1	Name of the Organisation	Sree Narayana College, Chathannur					
2	Address (include telephone, fax & e-mail)	Karamcode P.O., Chathannoor, Kerala 691579					
3	Year of Establishment	1981					
4	Name of building and Total No. of Electrical Connections/building	SN College ,2 LT Connection					
5	Total Number of Students	Boys	164	Girls	318	Total	482
6	Total Number of Staff	41					
7	Total Occupancy	523					
8	Total area of green cover (hectare)	8.75					
9	Type of Electrical Connection	HT		LT	2		
10	Total Connected Load (kW)	NA					

11	Average Maximum Demand (KVA)	-					
12	Total built up area of the building (M ²)	3250					
13	Number of Buildings	2					
14	Average system Power Factor	0.96					
15	Details of capacitors connected	NA					
16	Transformer Details (Nos., kVA, Voltage ratio)	TR 1					
		NA					
17	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks
18	Details of motors	Rating		Nos.		Remarks	
		5 to 10		1			
		10 to 50					
		Above 50					
19	Brief write-up about the firm and the energy/environmental conservation activities already undertaken.	Bhoomithrasena club, Water conservation activities, Energy conservation activities					
20	Contact Person & Telephone number	Principal					
		0474-2593312					

2. METHODOLOGY



2.1. Sensitisation

Low Carbon campus initiatives are successful when everyone in the campus is engaged including students, teachers and staff. A team of students, teachers and staff were formed to participate in the audit.



During the audit the students and staffs were sensitised on the project and trained to be a part of the data collection team. This helped in conducting the survey in a participatory mode so that the awareness will penetrate to the grass root level. During the data collection field visit it was stressed that the team will spread these ideas to their homes and friends. This will help in a horizontal and vertical spread of the message to a wider group..

Energy

In the campus carbon emission from energy consumption is categorised under two headings viz. energy from Electrical and Thermal. Energy used for transportation is calculated under transportation sector.

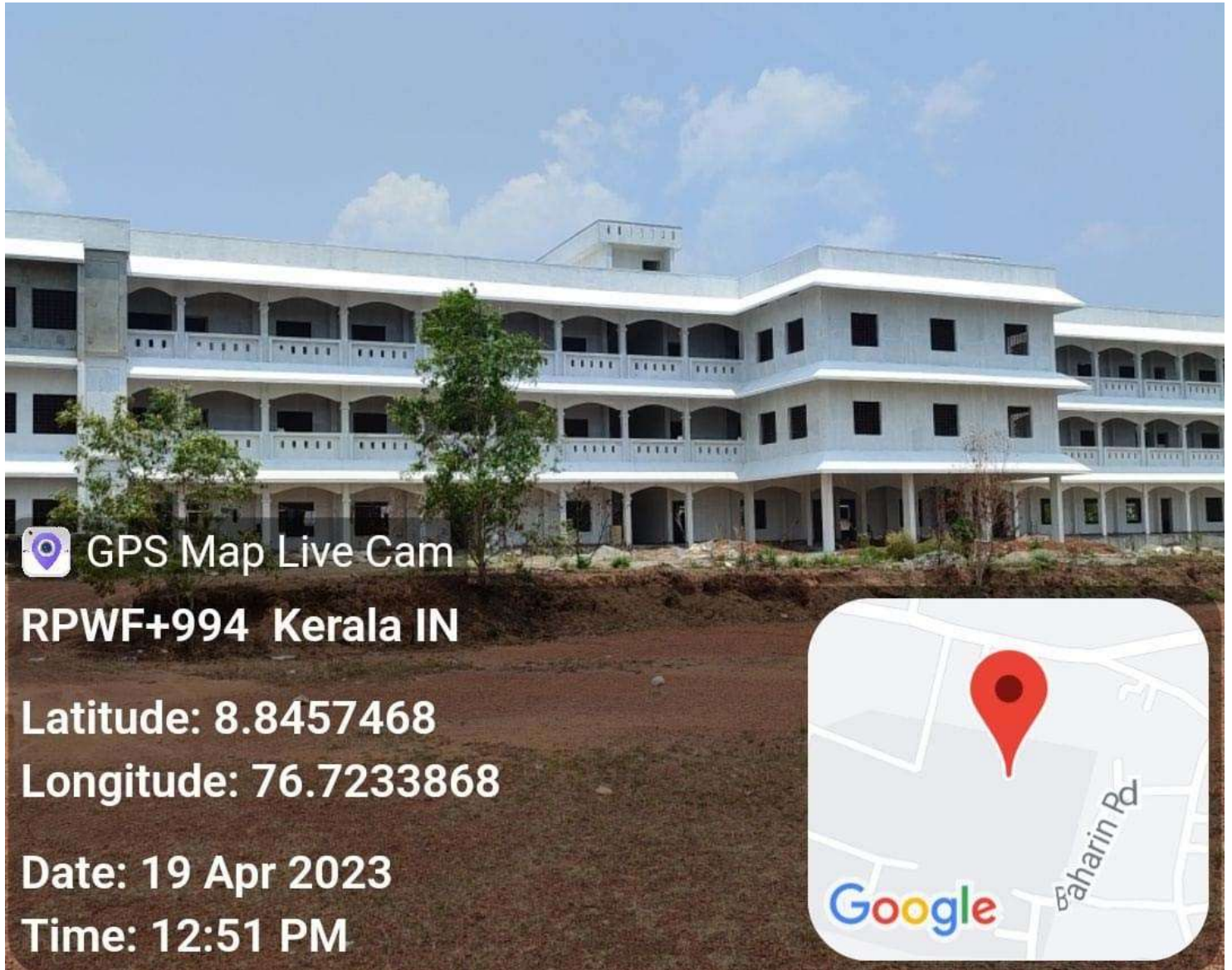


A detailed energy audit is conducted to understand the energy consumption of the campus. Information on total connected loads, their duration of usage and documents like electricity bills are evaluated. Connected loads are calculated by conducting a survey on electrical equipment on each location. Duration of usage was found out by surveying the users. The survey of equipment was conducted in a participatory mode. The fuel consumption for cooking, like LPG, was studied by analysing the annual fuel bills and usage schedules during the study. Discussions were carried out with the concerned individuals who actually operate the cooking system.

Waste Minimisation

The waste generated from the campus is also responsible for the greenhouse gas emission. The calculation of the waste generated has been conducted by keeping measuring buckets for collecting the waste generated in a day. This waste so generated was calculated by weighing it.

3. RESULTS AND DISCUSSIONS



3.1 CARBON FOOTPRINT ESTIMATION

3.1.1 ENERGY

a. Electricity

Electricity is purchased from KSEB under HT Connection, the details are given below.

Electricity Connection Details		
Sree Narayana College, Chathanoor		
1	Name of the Consumer	Sree Narayana College, Chathanoor Chathanoor
2	Tariff	LT-6A General
3	Consumer Number	1145751027868, 1145754004277
4	Connected Load Total (kW)	NA
5	Annual Electricity Consumption (kWh)	17516

Diesel

Diesel Consumption Details		
	Total	cost
	in L	Rs
23-24	300	28800

LPG

LPG Consumption Details	
Particulars	2022-23
No Cylinders	12
Canteen LPG Consumption in kg	228
Total in kg	228

Base Line Energy Data		
Sree Narayana College, Chathanoor		
		2022-23
1	Electricity KSEB (kWh)	17516
2	Electricity Solar Consumption (kWh)	2555
3	Electricity (KSEB + Solar) kWh	20071
4	Electricity Solar Export (kWh)	0
5	Diesel (L)	300.00
6	LPG (kg)	228
7	Biogas (m ³)	0.00

Renewable Energy

Solar Power Plant	
Particulars	Remarks
Capacity kWp	2
Annual Generation	2555

A 2kWp solar power plant is installed in the college.

Specific Energy Consumption

OTTOTRACTIONS- ENERGY AUDIT		
Sree Narayana College, Chathanoor		
Energy Performance Index (EPI)		
Sl No	Particulars	2022-23
1	Total building area (m ²)	3250
2	Annual Energy Consumption (kCal)	23146937
3	Annual Energy Consumption (kWh)	26915.04
4	Total Energy in Toe	2.31
5	Specific Energy Consumption kWh/m ²	8.28

The specific energy consumption in 2022-23 may be taken as benchmark.

3.3. Waste Generation total

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation.

The food waste produced by the students and staffs of the campus after the consumption of meals.



Degradable Waste

Degradable Waste Generation	
Sree Narayana College, Chathanoor	
Year	2023-24
Total Occupancy	523
Waste generated in kg /day	5
Waste generated in kg /Yr	1000

Non-Degradable waste

Solid non degradable Waste Generation	
Sree Narayana College, Chathanoor	
Year	2023-24
Total Occupancy	523
Waste paper generated in kg /day	0.120
Waste plastic generated in kg /day	0.180
Waste paper generated in kg /Yr	24
Waste plastic generated in kg /Yr	36

3.4. Transportation

There are no vehicles operates from the campus so it is not considered to calculate the carbon footprint.

Carbon Emission Profile (2023-24)

Carbon emissions in the campus due to the day-to-day activities are calculated and is discussed below. The emission factors considered for estimation and its units are given.

Carbon Foot Print 2023-24

Sl. No.	Particulars	2023-24
1	Electricity (kWh)	20071
2	Diesel (L)	300
3	LPG (kg)	228
4	Biogas (M3)	1
5	Degradable Waste in kg/yr.	1440
6	Paper Waste in kg/yr	14.4
7	Plastic Waste in kg/yr	21.6
Total Carbon Foot Print tCO2e/yr		

CARBON SEQUESTRATION

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestered according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequester carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestered by a tree can be calculated by different methods.

List of Trees in Campus

List of Trees in the Campus		
Sl No	Name	Number
1	Teak	5
2	Mahagoni	8
3	Jack fruit	5
Total		18

Base Line Energy Data		
Sree Narayana College, Chathanoor		
		2022-23
1	Electricity KSEB (kWh)	17516
2	Electricity Solar Consumption (kWh)	2555
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Renewable Energy

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Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimisation
- Energy efficiency
- Renewable energy

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the

carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilisation of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Currently, the campus is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimisation can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

Carbon Mitigation Proposals

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

Sree Narayana College, Chathanoor						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Year ly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Installation of 15 kWp Solar Power Plant	19163	19.16	25	15.71	392.83
	Total	19163	19	25	16	393

Energy Saving by replacing existing 95No's in-efficient ceiling fans with Energy Efficient Five star fans/BLDC Fans	
Existing Scenario	
There are 95 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 55% with higher service value (air delivery/watt). The operating factor is taken as 50%	
Financial Analysis	
Annual working hours (hrs)	1760
Total numbers of ordinary fans	95
Total load (kW)	7.60
Annual Energy Consumption (kWh)	5350
Expected Annual Energy saving, for total replacement(kWh)	3344
Cost of Power (Rs)	8.30
Annual saving in Lakhs Rs (1st year)	0.28
Investment required for a total replacement (Lakhs Rs)[@2500 Rs per Fan with 30W at full speed]	2.38
Simple Pay Back (in Months)	102.68

Installation of 15 kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are placed in the roof top it will help improving RTTV (Roof Thermal Transmittance Value) of the building.	
Proposed System	
It is proposed to install a 20kWp Solar Power Plant in addition to the existing one. The state and central government is pushing and giving good assistance to the installation. It can be installed as an internal grid connected system which is much cheaper than off grid system. Now days the technology provides trouble free grid interactive and connected system. The installation will provide 25yrs trouble free generation with only 20% efficiency loss at the 25th year.	
Financial Analysis	
Proposed Solar installed Capacity (kW)	15
Total average kWh per day expected (3.5kWh/day average)	52.50

Annual generation kWh	19163
Cost of energy generated annually Lakhs Rs	1.59
Investment required (INR lakh)(Approx)	8.25
Simple Pay Back (in Months)	62.25
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	39.76

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
Sree Narayana College, Chathanoor					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Lakhs Rs)/Yr	Months	kWh/Yr
1	Energy Saving by replacing existing 95No's in-efficient ceiling fans with Energy Efficient Five star fans/BLDC Fans	2.38	0.278	102.68	3344
	Total	2.38	0.28	102.68	3344
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

Here, three major methods are taken in to account as the plans for reducing the carbon

emission of the campus.

- Resource optimisation
- Energy efficiency
- Renewable energy

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively

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ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus uses commercial LPG cylinders for its cooking purpose, apart from the fuel generated from the biogas plant. Installation of a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food is another method. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle.

Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'.

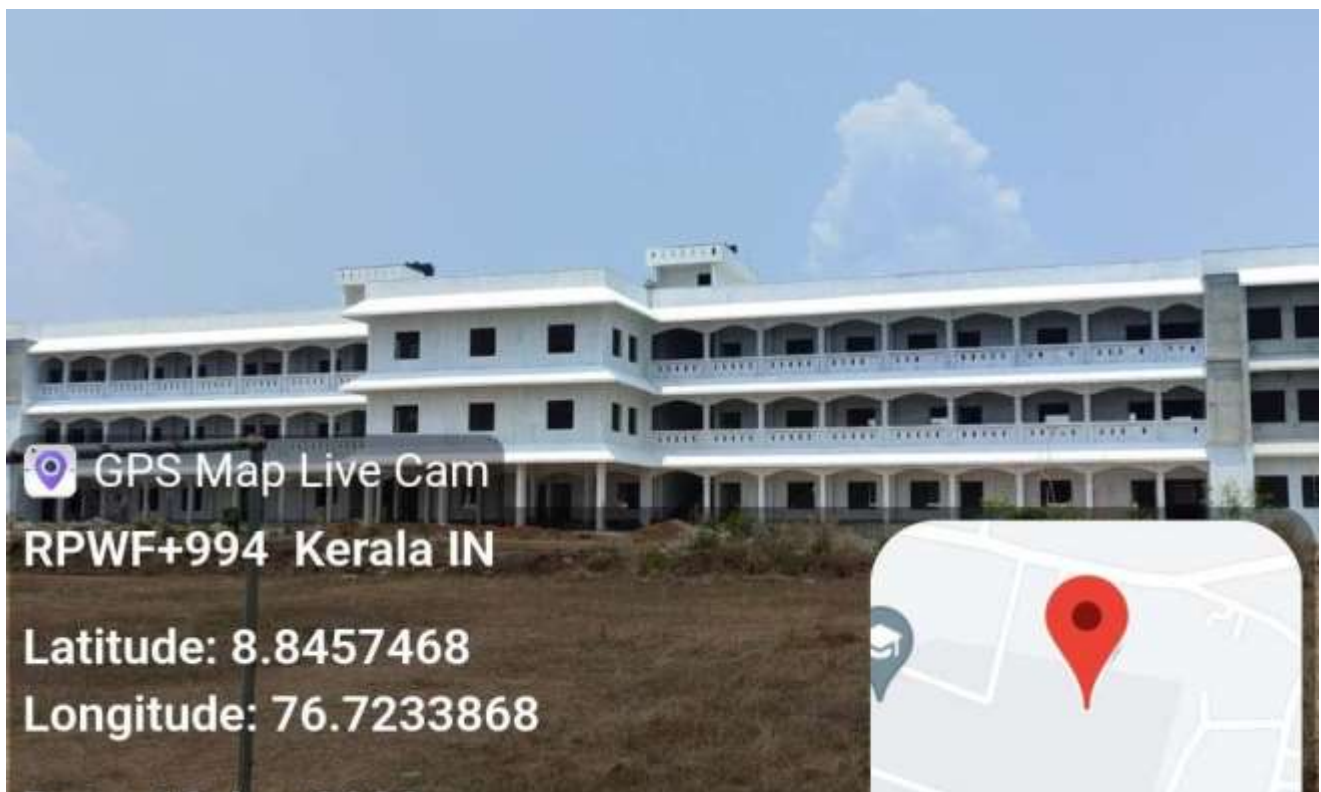
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Simple Pay Back (in Months)	62.25
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	39.76

5. CONCLUSION



The carbon emission from different sectors namely, Energy, Transportation and wastes were calculated using standard procedures. Carbon sequestration by the trees present in the campus was also estimated. From these the total carbon footprint of the campus was arrived at.

Cost to make the campus Carbon Negative		
1	Cost of implementation in Energy Efficiency Lakhs Rs	2.38
2	Cost of implementation in Renewable Energy Lakhs Rs	8.25
3	Total Lakhs Rs	10.63
4	Total number of students	482
5	Cost per student to make the campus carbon negative Rs/ Student	1771