



Environment Audit



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Report


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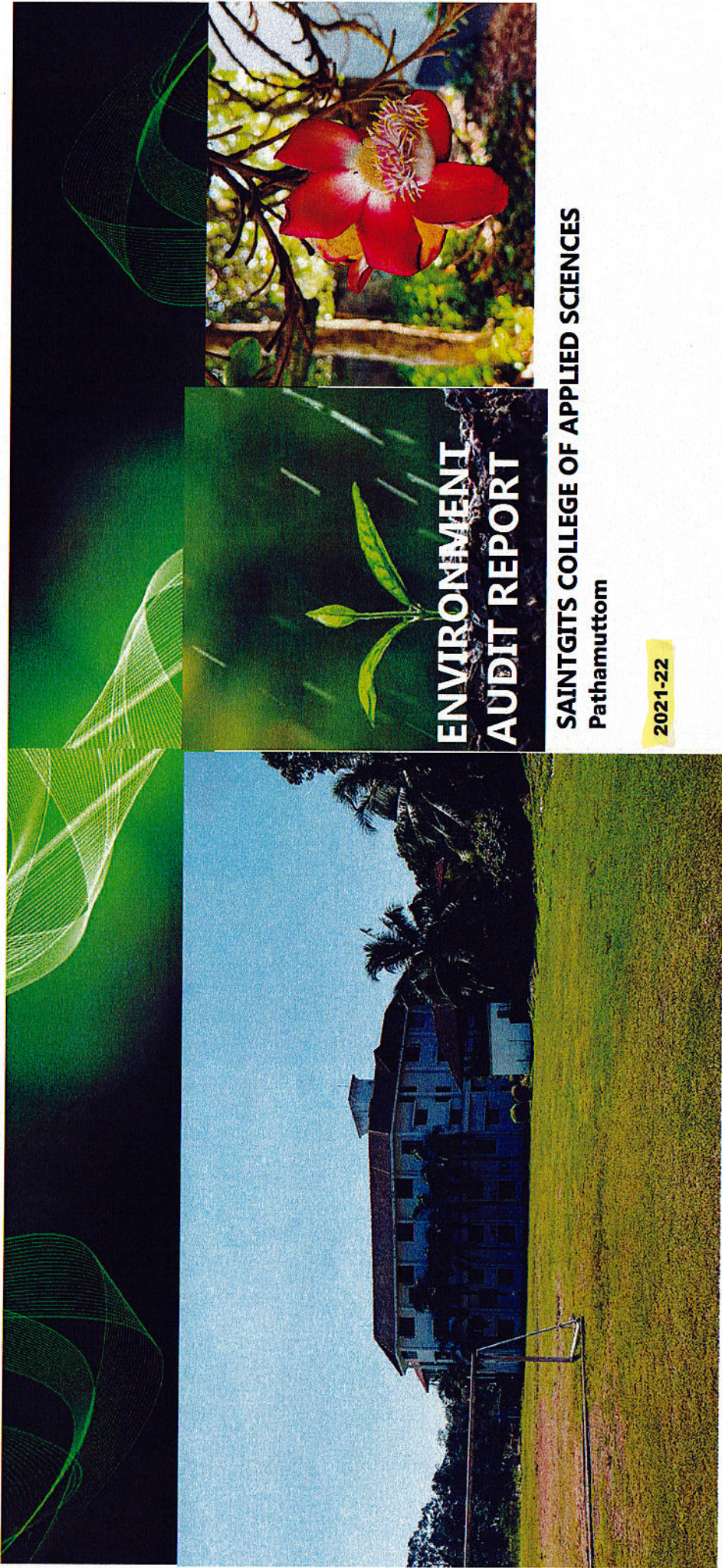
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ENVIRONMENT AUDIT REPORT

SAINTGITS COLLEGE OF APPLIED SCIENCES
Pathamuttom

2021-22

Executed by

OTTOTRACTIONS
Energy Infrastructure Management



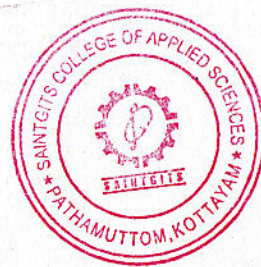
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Environment Audit Report
SAINTGITS COLLEGE OF APPLIED SCIENCES, PATHAMUTTOM
EA 973, 2022

Green Audit Team

Ottotractions


- | | |
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| 1 Er. Suresh Babu B V, | Accredited Energy Auditor, AEA 33 |
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About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award 2009" for the best performance as an Energy Auditor. Ottotractions is an ISO 9001-2015 and ISO 14001-2015 Certified organization, which ensures the quality of its services.

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Acknowledgment

We were privileged to work together with the administration and staff of Saintgits College of Applied Sciences, Pathamuttom especially Dr K K John, Principal for their timely help extended to complete the audit and bringing out this report.


With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of team OTTOTRACTIONS for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
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INTRODUCTION

Saintgits College of Applied Sciences, Pathamuttom has entrusted Ottotractions to carry out an environmental audit of their campus building.

Each section contains recommendations for improvements relating to environmental issues, which are consolidated in the action plan in section 4.

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BACKGROUND

Saintgits College of Applied Sciences is a new generation Arts and Science college launched in 2004. It has maintained high standards in academic as well as extra-curricular activities ever since it launched with a full capacity of students. With a scientifically planned teaching methodology, combined with some of the best and experienced faculty and state-of-the-art infrastructure, the institute has set a benchmark in graduate studies. In addition to the syllabus, the institution always caters to the all-round growth of the youth and with this objective in mind we offer value-added programmes. This institution is well known for campus placement and ensures higher education in esteemed national and international universities and institutes.



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Occupancy Details	
Particulars	2021-22
Total Students	1000
Staffs	54
Total Occupancy of the college	1054

Total student strength of the campus is 1054. For calculating per capita carbon emission estimation, the student strength is taken into account.



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ENVIRONMENTAL ISSUES

This section is broken down into the following different areas: waste, water, energy, resource and materials use and procurement. A final 'other' section is also included for any additional issues.


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1.1. Waste

The way communities generate and manage their waste plays an absolutely key role in their ability to use resources efficiently. All buildings contain bins for both general waste and mixed recyclables (plastic bottles, card, cans and paper). On average each floor in the buildings areas has its own general waste bin and one recycling bin. When the bins are emptied by the cleaning staff. Bins are marked and kept in different colors for identification, however in some locations throughout the building it was unclear which bins were for which waste streams.

There are four basic ways in which campus can do **plastic** recycling **collection** services for **plastic** bottles and containers – curbside, drop-off, buy-back or deposit/refund programs. The first, and most widely accessible, **collection** method is curbside **collection** of recyclables. The campus is installed bins to collect plastic bottles and single use plastics. The college has given a proper awareness on plastic waste problems and they are discouraging the students or teachers to carry plastics to the campus. The Bhoomitra Sena Club is very active in the campus and do a variety of programs to build awareness on waste management. The reports on different activities of the club are attached as technical supplement of this report.



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


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preparation. The food waste produced by the students and staffs of the campus after the consumption of meals. The degradable waste is treated in the biogas plant, the biogas generated is used in the kitchen. A state of art sewage treatment plant is installed in the campus

Degradable Waste Generation	
Saintgits College of Applied Sciences, Pathamuttom	
Particulars	2021-22
Total Occupancy	1054
Waste generated in kg /day	21.08
Waste generated in kg /Yr	4637.6

Burning plastics shall be strictly restricted inside the campus. **Burning plastic** and other wastes releases dangerous substances such as heavy metals, Persistent Organic Pollutants, and other toxics into the air and ash waste residues. Such pollutants contribute to the development of asthma, cancer, endocrine disruption, and the global burden of disease.

Solid non degradable Waste Generation	
Saintgits College of Applied Sciences, Pathamuttom	
Particulars	2021-22
Total Occupancy	1054
Waste paper generated in kg /day	0.2108
Waste plastic generated in kg /day	0.3162
Waste paper generated in kg /Yr	46.38
Waste plastic generated in kg /Yr	69.56


WASTE MINIMIZATION AND RECYCLING		
1	Does your institute generate any waste? If so, what are they?	Yes, Solid waste, Canteen waste, paper, plastic, Horticulture Waste etc.
2	What is the approximate amount of waste generated per day? (in Kilograms/) (approx.)	22


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3	How is the waste generated in the institute managed? By	Reuse of one side printed Paper for internal communication. Kitchen waste is used to generate manures and biogas. Two types of Waste bins are provided at campus for biodegradable and non-biodegradable waste.
	1 Composting	In-house
	2 Recycling	In-house
	3 Reusing	In-house
	4 Others	
	(specify)	
4	Do you use recycled paper in institute?	Yes
5	Do you use reused paper in institute?	Yes
6	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.	Number of awareness programs through Bhoomitra Sena Club, Biodiversity Club and NSS Camp 2018
7	Can you achieve zero garbage in your institute? If yes, how?	Not yet achieved. Possible through waste management plan.

Green Cover Audit		
1	Is there a garden in your institute?	Yes
2	Do students spend time in the garden?	Yes
3	Total number of Plants in Campus	Plant type
		Trees
		Ornamental
		Approx. number
		205
		Not estimated
4	Number of Tree Plantation Drives organized by School per annum. (If Any)	Yes, through Bhoomitra Sena Club and Biodiversity club 3 plantation drives are organized.
5	Number of Trees Planted in Last FY.	25
	Survival Rate	100%


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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. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Detailed table is included in the technical supplement.

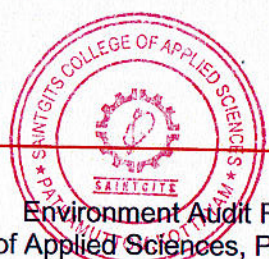
Carbon Sequestration	
Particulars	2021-22
Total No of Trees	204
Carbon sequestered by trees in the campus (tCO ₂ e)	6.68

Carbon sequestered by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO₂ sequestered in the tree
- Determining the weight of CO₂ sequestered in the tree per year

Carbon sequestered by each species of trees in the campus compound is given in the Table.3.19 Detailed calculation results are listed out in the tables provided in the technical supplements of 'Carbon sequestration'.


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Saintgits College of Applied Sciences, Pathamuttom		
List of Trees on the College Campus		
Sl.No	Name of the trees	Number
1	Anjili	06
2	Almond	28
3	Ambazham (Ambade)	02
4	Adalodakam (Justicia Adhatoda)	01
5	Arecanut trees	11
6	Coconut trees	11
7	Elanji Flowering tree (Mimusops elengi)	01
8	Custard Apple Trees	03
9	Danthapala (Sweet Indrajao)	02
10	Fig Trees	04
11	Gua	02
12	Bilimbi Tree	02
13	Kayam (Asafoetida)	01
14	Kumizh tree	01
15	Mango trees	11
16	Pathimugam (Sappan Wood)	01
17	Pathiri	01
18	Paeral (Baniayan tree)	01
19	Red Palm Trees	12
20	Rubber	07
21	Teak	02
22	Thazha (Screw Pine)	80

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23	Ungu	01
24	Vatta (Thodukanni)	12
25	Analivegam	01
26	Sarpa Gandhi	01
	Total Trees	205

3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 69.3 kg per year. Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus. A renewable energy project shall be implemented, i.e. 50kWp solar power plant which mitigates 46.63tCO_{2e} in the current year. So, the effective specific carbon emission per student is -1.37 kg of CO₂ per year only

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

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

- Resource optimization
- Energy efficiency
- Renewable energy



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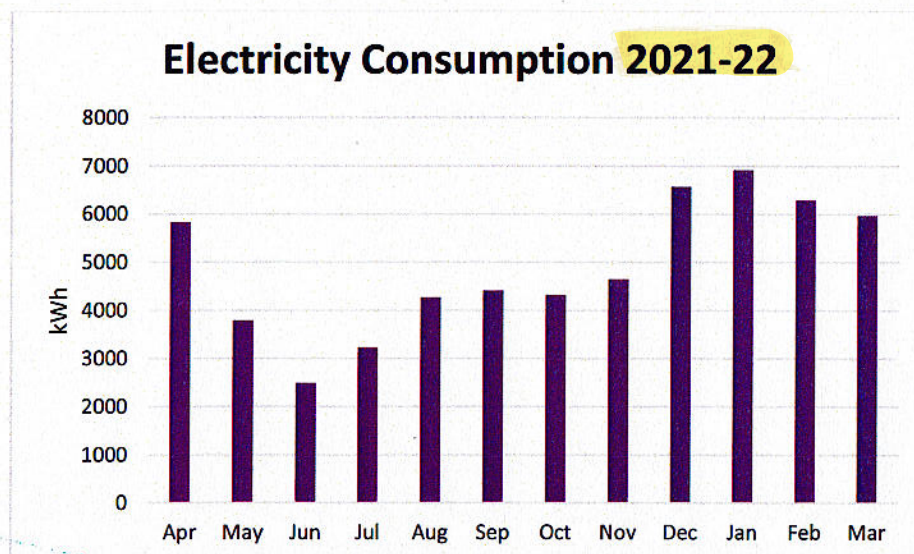
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Electricity Consumption

Base line Data (Electricity Bill)	
Code	EA 973
Facility	Saintgits College of Applied Sciences
Provider	KSEB
Contract Demand (kVA)	80
Connected Load (KW)	88
Tariff	HT II (B) GENERAL
Consumer Number	1346370050721
Energy Charge Rs/ kWh Z1	6.2
Energy Charge Rs/ kWh Z2	9.3
Energy Charge Rs/ kWh Z3	4.65
Demand Charge Rs/ kVA	440
Excess Demand Rs/kVA	220
Energy Bill Analysis interval	2021-22

Annual Electricity Consumption (kWh)		
Consumer No	2021-22	Connected Load (kW)
1346370050721	58716	88
Total	58716	88



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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 utilization 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 optimize its usage.

Currently, All Saints' College 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 optimization 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.



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.

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FUELS FOR COOKING

The campus can install 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. 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'

Renewable Energy

5kWp Solar power plant is installed in the campus which helps offsetting the carbon foot print. The details of these projects are given in the concerned chapters.

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.




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OTTOTRACTIONS- ENERGY AUDIT						
Saintgits College of Applied Sciences, Pathamuttom						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
SI No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life cycle
		(kWh)	MWh			
1	Energy Saving in Lighting by replacing existing 257 No's T12 (55W) Lamps to 18W LED Tube	6819	6.82	10	4.98	49.78
2	Energy Saving by replacing existing 260 No's in-efficient ceiling fans with Energy Efficient Five star fans	9784	9.78	10	7.14	71.43
Total		16603	17	10	12.12	121.20

OTTOTRACTIONS- ENERGY AUDIT						
Saintgits College of Applied Sciences, Pathamuttom						
Greenhouse Gas Mitigation through Renewable Energy Projects						
SI No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life
		(kWh)	MWh			
1	Installation of 50kWp Solar Power Plant	63875	63.88	25	46.63	1165.72
Total		63875	64	25	46.63	1166

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General Environmental Awareness Questionnaire	
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	No
Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
Dose stack monitoring of DG sets conducted by the Institute?	No
Is any warning notice, letter issued by state government bodies?	No
Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	No
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Does housekeeping schedule in your campus?	Yes
Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes
Does Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
Does Institute participated in National and Local Environmental Protection Movement?	Yes
Does the institute have any Recognition/certification for environment friendliness?	No
Does the institute use renewable energy?	Yes
Does the Institution conduct a green/environmental audit of its campus?	Yes
Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Yes (NAAC)



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Best Practices and Initiatives	
Renewable Energy	Yes
Solar Power Plant	Yes
Energy Audit and Green Audit Conducted	Yes
Biogas Plant installed	No
Biodiversity Conservation	Yes
Green Cover	Yes
Tree Plantation Drives	Yes
ECO clubs	Yes
Groundwater Recharge	Yes
Rain Water Harvesting System.	Yes
Pollution Reduction Public Transportation	Yes
E Waste Management	Yes
Connected to authorized recycler	Yes
Solid Waste Management	Yes
Lifting of garbage from the campus on alternate days by the Municipal Corporation.	No
Adoption of Village	Yes
CSR	Yes
Water Conservation	Yes
Energy Conservation	Yes

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CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on a wide range of issues related to Environmental aspects. The audit has identified several observations for making the campus premise more environmentally friendly. The recommendations are also mentioned with observations for Saintgits College of Applied Sciences team to initiate actions.



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Carbon Foot Print			
Sl. No.	Particulars	2021-22	tCO ₂ e
1	Electricity (kWh)	58716	48.15
2	Diesel (L)	5687	18.20
3	LPG (kg)	0.00	0.00
4	Biogas (m ³)	0.00	0.00
5	Degradable Waste in kg/yr.	4637.6	2.92
6	Paper Waste in kg/yr	46.38	0.03
Total Carbon Foot Print tCO₂e/yr			69.29

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO ₂ e/yr	69.29
2	Carbon Sequestrated tCO ₂ e/yr	6.68
3	Carbon mitigated by Renewable Energy tCO ₂ e/yr (Installed)	5.24
4	Carbon mitigated by Renewable Energy tCO ₂ e/yr (Proposed)	46.63
5	Carbon mitigated by Energy Efficiency (Proposed) tCO ₂ e/yr	12.12
6	Effective Carbon footprint tCO ₂ e/yr	-1.37
7	Total No of Students	1000
8	Specific Carbon Footprint kg CO ₂ e/Student/Yr	-1.37

However, there is scope for further improvement, particularly in relation to waste minimization and energy monitoring. By implementing a basic environmental management system, current good practice can be formalized and a framework can be set up for monitoring, implementation of action plans and continual improvement.

The audit team observed that the overall site is maintained well from an environmental perspective. There are no major observations but few things are important to initiate urgently are waste management records by monthly inventory of hazardous waste, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings; environment policy and initiation of composting at campus.



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- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle
- Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control Of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control Of Pollution] Cess Act-1977 (Amended 2003) and Rules- 1978
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices



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TECHNICAL SUPPLEMENTS

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Saintgits College of Applied Sciences, Pathamuttom

List of Trees on the College Campus

S/N	Name of the trees	Number
1	Anjili	06
2	Almond	28
3	Ambazham (Ambade)	02
4	Adalodakam (Justicia Adhatoda)	01
5	Arecanut trees	11
6	Coconut trees	11
7	Elanji Flowering tree (Mimusops elengi)	01
8	Custard Apple Trees	03
9	Danthapala (Sweet Indrajao)	02
10	Fig Trees	04
11	Gua	02
12	Bilimbi Tree	02
13	Kayam (Asafoetida)	01
14	Kumizh tree	01
15	Mango trees	11
16	Pathimugam (Sappan Wood)	01
17	Pathiri	01
18	Paeral (Baniayan tree)	01
19	Red Palm Trees	12
20	Rubber	07
21	Teak	02
22	Thazha (Screw Pine)	80
23	Ungu	01
24	Vatta (Thodukanni)	12
25	Analivegam	01
26	Sarpa Gandhi	01
	Total Trees	203

Trees Identified and Counted by

Resha
Ms. Reshma Shyna Shajan

Dr. K. K. John
Dr. K. K. John
Principal

Dr. K. K. John
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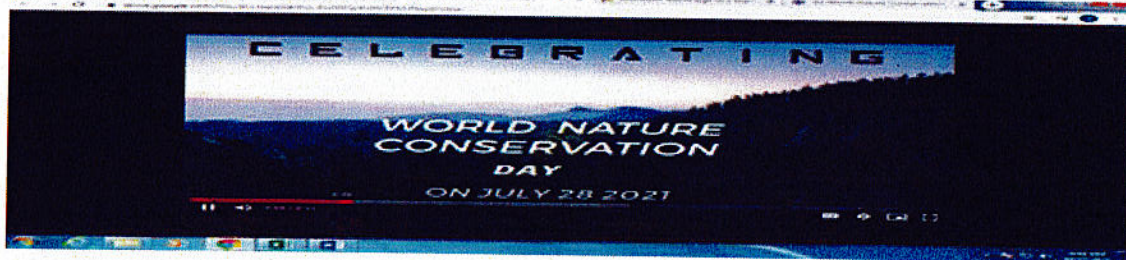
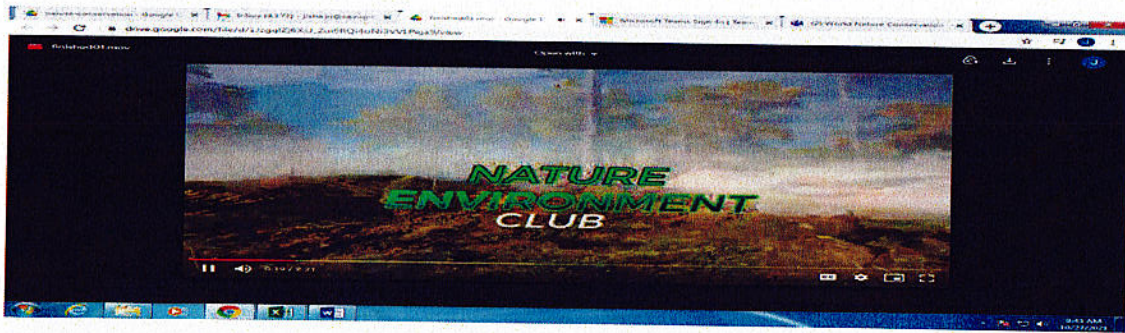


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NATURE CONSERVATION DAY

The department of Computer Applications and Nature and Environment club celebrated nature conservation day on July 28, 2021 with an ample programme. The students and faculties engaged the event with a pleasant manner and the program may have a positive impact on each and every one. The participants took a pledge for protecting the environment and they keenly observed the short movie about nature protection. The participants were give a positive response about the program and they assured they will follow a way of life without affecting the ecosystem.

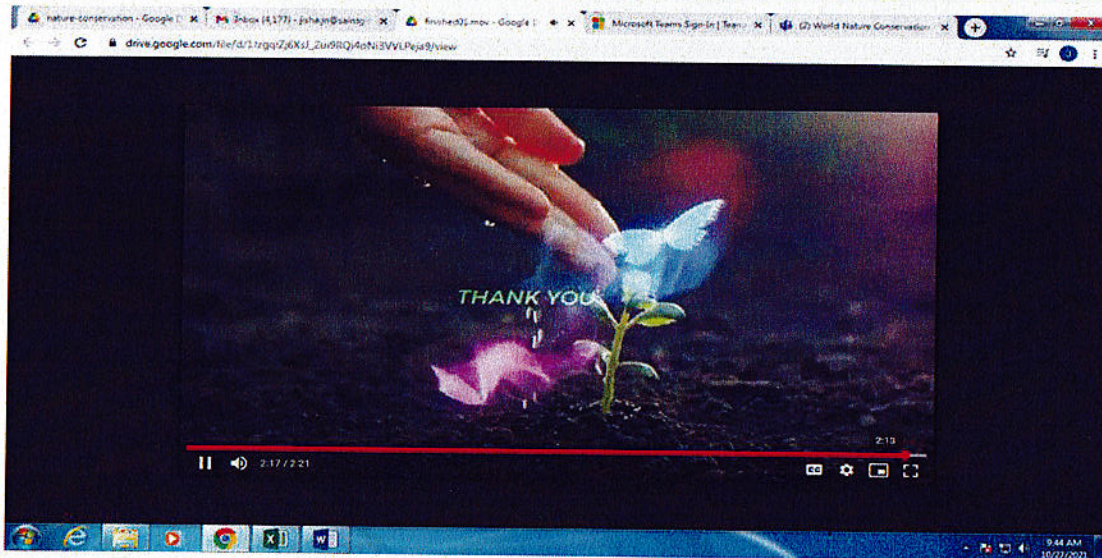
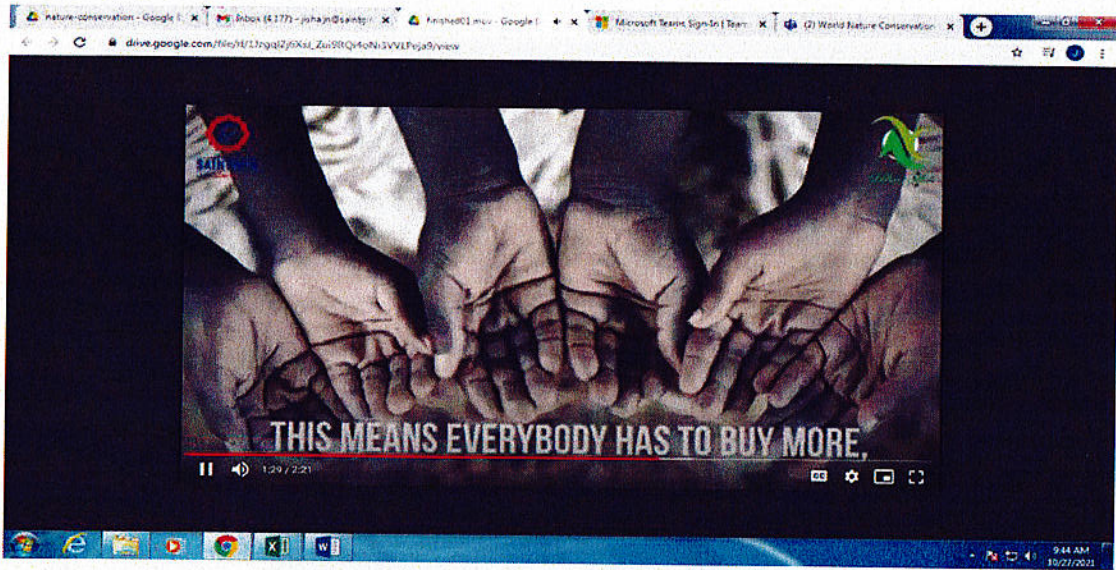


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ONLINE QUIZ COMPETITION- WORLD COCONUT DAY

SCAS Organic Farming Club in association with IQAC conducted an Online Quiz Competition mark the World coconut Day on September 2nd 2021. It was conducted through Google Forms. 68 students participated in the program. This competition will help students to know more about the importance of Coconut and the uses of it. The winners were given e-certificate.

The following students were selected as the winners.

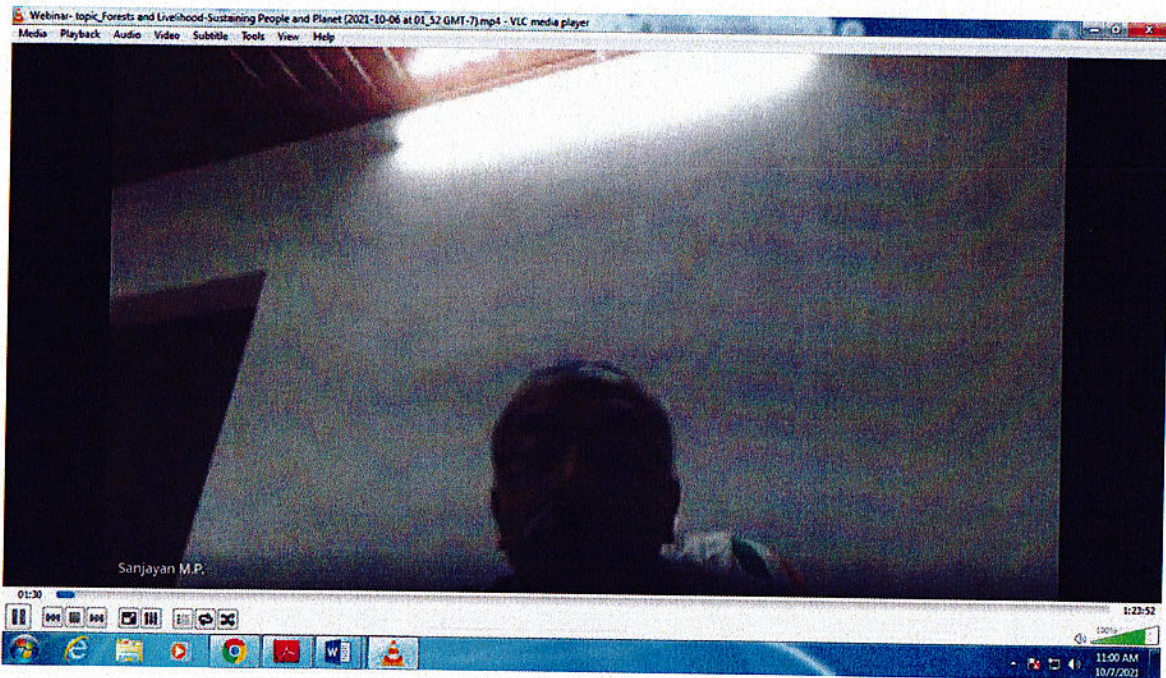
Anita Susan Aji (S3 B.Com CA(A))	-	First
Kevin Varghese (S3 B.Com CA(B))	-	Second
Mahima Mary Philip (S3 B.Com CA(B))	-	Third
Emie Treesa Abraham (S3 B.Com Tax)	-	Third

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Webinar - "Forests & Livelihood-Sustaining People and Planet"

The Nature and Environment Club and Department of computer applications in association with Forestry division, Kottayam and IQAC conducted a webinar on "Forests & Livelihood-Sustaining People and Planet" on 6th October 2021. M P Sanjayan, ACF SIP, Kottayam was the resource person. It was conducted from 2.30 PM to 4.00 PM. Students and faculties of various departments were attended the webinar. Feedback for the webinar was also collected via Google forms issued at the end of the webinar. 72 attendees were attended the webinar.



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Report of Activities During 2021-22

- **World Environment Day**

On the occasion of World Environment Day, students from the department of Corporate Economics and Commerce released videos on the importance of environment protection.

- **Webinar on Environment**

The Department of Commerce and The Department of Computer Applications organized webinars on the theme of Environment on 23rd September 2021 and 6 October 2021 respectively for the students of the college.

- **Short Film Contest**

The UNAI Club organized a short film contest on the theme campus sustainability on 27th October 2021. Students from our college and students from the sister concerns participated in the contest. The winners were awarded certificates.

- **Paper Bag making training**

The Life Skills Club along with IQAC and NSS organized a paper bag making training program for all the first-year students of our college. They were given training to use old newspapers to produce paper bags.

- **Garden Club**


The garden club of the college conducted a drive to create a garden in the college on 20th February 2022 called "Donate a Plant". Students and faculty brought donated plants for the club which were planted and maintained by the members of the Garden Club.

- **Organic Farming Club**

The organic farming club conducted a organic farming drive on 13 April 2022 by planting traditional crops. The club aimed at familiarizing the new generation with the traditional crops of the state.

- **Tree Sapling Distribution**

The NSS unit of the college distributed 100 Vietnam Early Jack Fruit tree saplings to the people in the neighborhood. Panchayat member, Mrs. Salini Thomas inaugurated the drive.


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