7.1.3
ENERGY / GREEN & ENVIRONMENT AUDIT REPORTS

1	**Energy Audit Report**	CLICK HERE
2	**Green Audit Report**	CLICK HERE
3	**Environment Audit Report**	CLICK HERE

OTTOTRACTIONS
Energy - Engineering - Environment

170 Devinagar, Valiyavila, Thirumala P.O, Trivandrum
+919447068747, 9447621674, email:ottotractions@email.com,
otenergy@gmail.com, www.ottotractions.com

ENERGY AUDIT REPORT

PROVIDENCE WOMEN'S COLLEGE

KOZHIKKODE

Executed by

OTTOTRACTIONS
Energy-Engineering-Environment

2021

Accredited Energy Auditor: AEA-33
Empanelled Accredited Energy Auditor: EmAEA-33
Bureau of Energy Efficiency,
Government of India.

Empanelled Energy Auditor: EMCEEA-0211F,
EMC (Energy Management Centre-Kerala)

ENERGY AUDIT REPORT

PROVIDENCE WOMEN'S COLLEGE

CALICUT

OTTOTRACTIONS
Energy-Engineering-Environment

Energy Audit Report
Providence Women's College
Report No: EA 805
2021-September

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Empaneled Accredited Energy Auditor, AEA 33
Bureau of Energy Efficiency
Government of India

Empaneled Energy Auditor, EMCEEA-0211F,
Energy Management Centre
Government of Kerala.

Authorized Energy Auditor, GEDA/ENC/EAC: Autho/2014/8/103/2316,
Gujarat Energy Development Agency
Government of Gujarat

Empaneled Energy Auditor, India SME Technology Services Ltd
A joint Venture of SIDBI, SBI, Indian Bank, Oriental Bank of Commerce
& Indian Overseas Bank

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” for the best performance as an Energy Auditor.

Acknowledgment

We were privileged to work together with the administration and staff of Providence Women's College 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 audit team 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
For OTTOTRACTIONS

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OTTOTRACTIONS
Energy | Engineering | Environment

Certification

This is to certify that

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010.

This Certificate is issued to Providence Women's College, Kozhikkode on their request.

Dated this 12th day of September 2021.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)

OTTOTRACTIONS * EMPANELED ACCREDITED ENERGY AUDITOR, BEE * AEA- 0033

Empaneled Accredited Energy Auditor
Bureau of Energy Efficiency
AEA-33, Government of India.

Empaneled Energy Auditor
Government of Kerala.
EMCEEA-0211F, EMC - Kerala

SRL-A21 Sasthamangalam P.O
Thiruvananthapuram, Kerala- 695010
Ph: 9447068747, 9447621674
otenergy@gmail.com,
ottotractions@email.com
www.ottotractions.com

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
PROVIDENCE WOMEN'S COLLEGE					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube	0.56	0.24	28.13	2976
2	Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube	0.35	0.34	12.21	4238
3	Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB	0.01	0.005	30.36	67
4	Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans	8.29	0.93	107.32	11582
	Total	9.20	1.51	44.50	18863.35
(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.)					
Consolidated Cost Benefit Analysis of Renewable Energy Projects					
5	Installation of 40 kWp Solar Power Plant	30.00	4.09	88.06	51100

1

Introduction

A detailed energy audit has been carried out at Providence Women's college, Kozhikkode by OTTOTRACTIONS in September 2021. During the energy audit energy saving opportunities has been identified to help improving energy efficiency of the facility. OTTOTRACTIONS is an Accredited Energy Auditor of Bureau of Energy Efficiency and Empaneled Energy Auditor of Energy Management Centre, Government of Kerala. The energy audit has identified energy conservation opportunities and recommended projects to improve energy efficiency of the facility.

This energy audit report complies with the clauses in *Energy Conservation Act, 2001* on mandatory energy audit (**Form 4** [refer regulation 6(2)] guidelines for preparation of energy audit report) and complies with the G.O (Rt) No.2/2011/PD dated 01.01.2011 issued by Government of Kerala on mandatory energy audit.

1.1. General Building details and descriptions

Providence Women's College, Calicut, Kerala, founded by the sisters of Apostolic Carmel came into being on 1st July, 1952. It was the sacred mission of Mother Veronica the foundress of the congregation to train young women who had embraced religious life and send them far and wide on vocations of service to the community. Providence Women's College was the result of the efforts of such a committed group, headed by Mother Gabrielle, who became the Founder Principal. This was a dream come true for the young women in the Malabar region who had to otherwise go as far as Mangalore or Madras in search of a women's college. Thus, this college opened a new chapter in the annals of Malabar, as its first women's college. The college is registered under the Apostolic Carmel Education Society, S No.4 of 1957, Calicut. The Managing

Governing Body includes the Provincial Superior, Educational Secretary, the Principal, the Local Manager, a representative of the management and a religious staff nominated by the Provincial Superior.

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	1793	1778	1848
Staffs	84	83	85
Total Occupancy of the college	1877	1861	1933

For calculating specific energy consumption, the total built-up area is taken into account.

Energy audit team

The Energy Audit team is listed below. Besides this list various domine experts also participated in this project.

1. Suresh Babu B V, Accredited Energy Auditor, AEA 33
2. B. Zachariah, Chief Technical Consultant
3. Abin Baby, Project Engineer
4. Devan J, Project Engineer

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Process description

The energy audit has been carried out at Providence Women's college. The following is the baseline data of this building.

Form-A											
BASELINE DATA SHEET FOR GREEN AUDIT											
1	Name of the Organisation	PROVIDENCE WOMEN'S COLLEGE									
2	Address (include telephone, fax & e-mail)	Providence College Rd, Malaparamba, Kozhikode, Kerala 673009,providencecollegecalicut@gmail.com									
2	Year of Establishment	1952									
3	Name of building and total No. of Electrical Connections/building	HT (1)									
4	Total Number of Students	Boys	-	Girls	-	Total	1848				
5	Total Number of Staff	85									
6	Total Occupancy	1933									
7	Total area of green cover (Acre)	37									
8	Type of Electrical Connection(nos)	HT	1	LT	0						
9	Contract Demand (KVA) /Connection	70									
10	Average Maximum Demand (KVA)	57.75									
11	Total built up area of the building (m^2)	21506									
12	Number of Buildings	7									
13	Average system Power Factor	0.94									
14	Details of capacitors connected	NA									
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1	TR 2	TR 3	TR 4	TR 5	TR 6				
		NA	NA	NA	NA	NA	NA				
15	DG Set Details (kVA)	DG1	DG2	DG3	DG4	DG5	Remarks				
		10	NA	NA	NA	NA	-				
16	Details of motors	Rating		Nos.		Remarks					
		5 to 10		NA		NA					
		10 to 50		NA		NA					
		Above 50		NA		NA					

3
Energy and utility system description

3.1.1 Electricity

Electricity is purchased from KSEB under HT II (A) GENERAL tariff, the details are given below. One 37kWp solar power plant installed in the building.

Electricity Connection Details		
PROVIDENCE WOMEN'S COLLEGE		
1	Name of the Consumer	PROVIDENCE WOMEN'S COLLEGE Providence College Rd, Malaparamba, Kozhikode, Kerala 673009,providencecollegecalicut@gmail.com
2	Tariff	HT II(A) GENERAL
3	Consumer Number	1365980025581
5	Connected Load Total	50kVA
6	Annual Electricity Consumption (kWh)	122273

3.2. Thermal Energy / Transportation

There is no buses operated from college for transportation. LPG is used for cooking in the canteen and diesel is used to operate Diesel Generators and buses.

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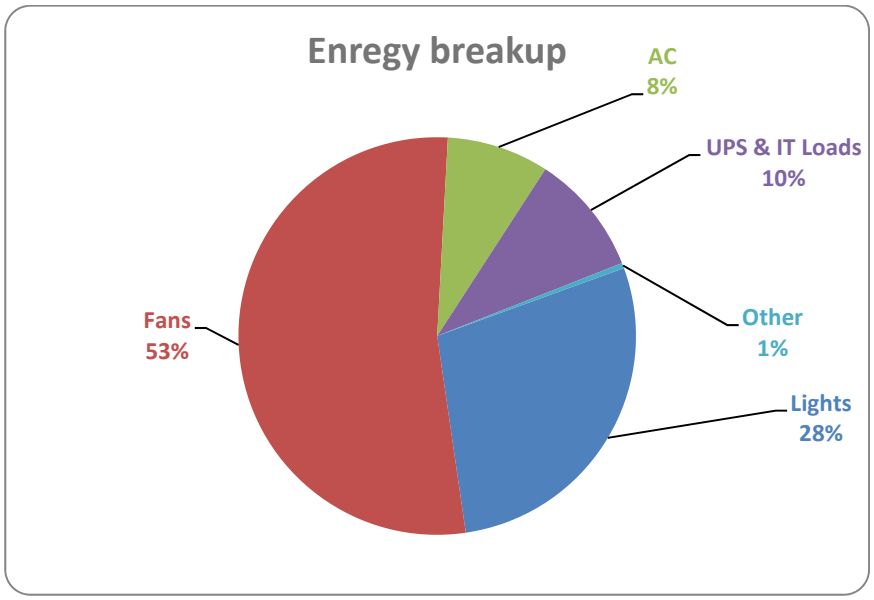
Energy Balance



53 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 28%. AC and IT Equipment uses 18%.

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Performance evaluation of major utilities and process equipment's /systems.

5.1. List of equipment and process where performance testing was done.

5.1.1. Electrical System

5.1.2. Lighting & Fans

5.2. Results of performance testing

5.2.1. Electrical System

The average unit cost of electricity is **8.20 Rs/kWh**. This is taken as the basis for the financial analysis of electrical energy efficiency projects. The information on average energy consumption is taken from the historical electricity bill analysis. The electricity is fed from a centralized substation.

Electricity Consumption

Electricity Bill Details (2021-22)												
Month	Name of the Consumer			PROVIDENCE WOMEN'S COLLEGE								
	Contract Demand(kVA)		50	Consumer number & Section			1365980025581					
	Tariff		HT II(A) GENERAL				Karaparamba					
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	3408	1610	2712	7730	31.93	26.67	28.48	0.9	1099.98		63803.04	8.25
May	369	1008	1906	3283	22.06	25.93	15.73	0.91	370.78		35325.19	10.76
Jun	0	473	1430	1903	27.44	14.28	15.37	0.89	349.27		25461.33	13.38
Jul	411	764	1327	2502	21.73	16.78	15.39	0.89	500.24		30378	12.14
Aug	1710	878	1567	4155	31..2	16.61	15.66	0.92	352.99		40437.13	9.73
Sep												
Oct												

Electricity Bill Details (2020-21)												
Month	Name of the Consumer			PROVIDENCE WOMEN'S COLLEGE								
	Contract Demand(kVA)		50	Consumer number & Section			1365980025581					
	Tariff		HT II(A) GENERAL				Karaparamba					
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	2398	1513	2535	6446	39.84	26.52	20.57	0.94		183.93	56047.18	8.7
May	0	0	813	813	16.63	19.17	8.38	0.90		85.36	18003.05	22.1
Jun	0	0	1521	1521	15.39	22.39	14.94	0.91		127.76	21428.91	14.1
Jul	835	715	1140	2690	21.19	10.57	10.37	0.89		541.45	31685.7	11.8
Aug	766	769	1272	2807	20.05	17.01	11.1	0.88		724.12	32753.06	11.7
Sep	152	588	955	1695	19.15	16.4	6.59	0.83		931.13	25815.05	15.2
Oct	1735	1227	1934	4896	22.9	20.18	16.61	0.92		422.18	45936.46	9.4
Nov	2195	1415	2344	5954	22.95	21.95	22.27	0.91		680.46	52361.35	8.8
Dec	2038	1047	1725	4810	25.68	21.27	18.41	0.89		960.84	45217.14	9.4
Jan	1483	839	1208	3530	22.42	17.83	14.41	0.85		1531.95	38171.71	10.8
Feb	2744	1144	1622	5510	29.74	24.81	14.42	0.87		1748.36	50836.35	9.2
Mar	2874	1339	2038	6251	29.76	25.75	19.2	0.89		1256.56	55096.93	8.8

Electricity Bill Details (2019-20)												
Month	Name of the Consumer				PROVIDENCE WOMEN'S COLLEGE							
	Contract Demand(kVA)		50		Consumer number & Section			1365980025581				
	Tariff		HT II(A) GENERAL					Karaparamba				
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	7335	1594	2998	11927	40.62	20.24	24.28	0.95	-1616.56		88128.15	7.39
May	3596	913	1613	6122	31.23	18.87	16.32	0.91	-166.73		55217.31	9.02
Jun	2861	550	1049	4460	23.1	13.89	7.98	0.87	724.59		45799.23	10.27
Jul	5952	1274	2041	9267	43.03	28.83	15.47	0.95	-1268.16		73508.4	7.93
Aug	7605	1852	3031	12488	42	30	21	0.95	-669.71		96066.16	7.69
Sep	6624	1690	2742	11056	44.2	25.01	19.78	0.96	-314.03		88393.85	8.00
Oct	6222	1520	2418	10160	49.76	26.63	24.52	0.97	-577.67		82829.81	8.15
Nov	8242	1944	3148	13334	48.52	29.61	23.44	0.96	-378.53		102611.9	7.70
Dec	9349	2085	3532	14966	57.75	23.7	24.11	0.97	-847.03		114160.2	7.63
Jan	6705	1557	2639	10901	47.93	24.59	23.18	0.96	-308.55		87455.64	8.02
Feb	5904	1959	3283	11146	47	31	22	0.91	1266.13		88572.04	7.95
Mar	2398	1513	2535	6446	39.84	26.52	20.57	0.94	183.93		56047.18	8.69

Observations

- PF shall be improved to unity, so that the maximum demand may be controlled.
- Due to low power factor penalty is there.

Diesel

The campus has one Diesel Generator set in operation. The details of DG is given below.

Diesel Consumption Details		
Year	in L	Rs
16-17	58.5	3800
17-18	357.1	25000
18-19	145.4	12356
19-20	59.9	5394
20-21	0	0

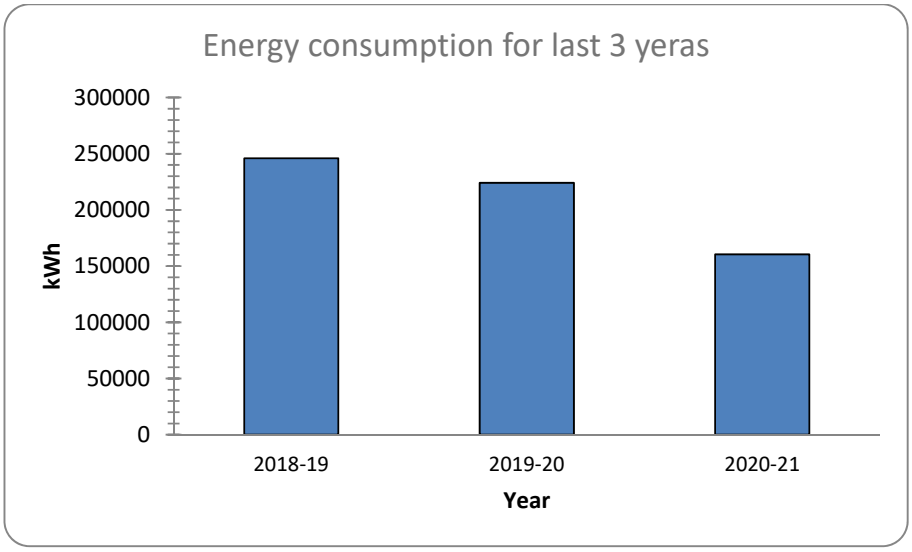
LPG

LPG Consumption in college		
Year	Cost	Consumption (kg)
18-19	9365	177.935
19-20	4224	80.256
20-21	4650	73.625

LPG Consumption in Hostel	
Year	Consumption (kg)
18-19	1368
19-20	1414
20-21	456

Base Line Energy Data				
PROVIDENCE WOMEN'S COLLEGE				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	102126	103932	39885
2	Electricity Solar - Off grid (kWh)	47268	47268	47268
3	Electricity (KSEB + Off grid) kWh	149393	151200	87152
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	145.36	59.93	0.00
6	LPG (kg)	1546	1494	530
7	Biogas(Kg)	20700	14490	18630

Energy Consumption Profile				
Sl No	Fuel	2018-19	2019-20	2020-21
		(kCal)		
1	Electricity	128478238	130031613	74950763
2	Diesel	1526329	629300	0
3	LPG	18551220	17926272	6355500
4	Biogas	63000000	44100000.00	56700000.00
Total (kCal)		211555787	192687185	138006263
Total (kWh)		245995.1	224054.87	160472.399



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Energy efficiency in utility and process system

The specific energy consumption is normally taken as the ratio of total energy consumed to the total are of building.

OTTOTRACTIONS- ENERGY AUDIT				
PROVIDENCE WOMEN'S COLLEGE				
Energy Performance Index (EPI)				
Sl No	Particulars	2018-19	2019-20	2020-21
1	Total building area (m²)	21506	21506	21506
2	Annual Energy Consumption (kCal)	211555787	211587185	144306263
3	Annual Energy Consumption (kWh)	245995.1	246031.6	167797.98
4	Total Energy in Toe	21.16	21.16	14.43
5	Specific Energy Consumption kWh/m²	11.44	11.44	7.80

The Energy Performance Index (EPI) is

7.80 kWh/m²

This may be due to the lesser occupancy during pandemic shut downs, so the benchmark year may be taken as 2019-20. All the proposals for energy savings are prepared based on the data during 2019-20.

7

Evaluation of energy management system

Energy management policy

There is no written energy policy available, but environment policy is available which includes energy conservation also. A draft energy management policy is given below. The management may constitute an energy management policy and display the same in the plant to motivate the staff.

PROVIDENCE WOMEN'S COLLEGE

ENERGY POLICY

(Draft)

We are committed to optimally utilize various forms of energy in a cost effective manner to effect conservation of energy resources. We are committed to conserve the energy which is a scarce resource with the requisite consistency in the efficiency, effectiveness in the cost involved in the operations and ensuring that production quality and quantity, environment, safety, health of people are maintained. We are also committed to increase the renewable energy share of the total energy we use.

We are also committed to monitor continuously the saving achieved and reduce its specific energy consumption by minimum of 2% every year.

PROVIDENCE WOMEN'S COLLEGE CALICUT-9

Date 20/09/2021

Head of the Institution

Principal
Providence Women's College
Kozhikode - 673 009

7.1. Energy management monitoring system

- **Energy Management Cell** has to be constituted with an objective to revise action plan for energy conservation thereby reducing the production cost.
- Energy conservation tips/ posters are displayed in crucial points.
- Use of renewable energy has to be encouraged.

7.2. Training to staff responsible for operational and Documentation.

- The staff and students need to be made more aware of the importance of energy saving and management.
- Log books shall be maintained to record Electricity Consumption and Diesel consumption.
- Meter reading shall be taken and compared with KSEB regularly.
- Better operating practices regarding appliances and fixtures should be taught to the staff.

7.3. Best Practices

- Have solid waste management program
- Conducted Green Audit.
- Installed solar power plant
- Installed 50m3 latrine connected biogas plant.
- Have different social and environmental clubs
- Installed LED bulbs
- Conducted Energy Conservation Training Programs

8

Energy Conservation Measures and Recommendations

OTTOTRACTIONS- ENERGY AUDIT						
PROVIDENCE WOMEN'S COLLEGE						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO_2 mitigated	CO_2 mitigated through out
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube	2976	2.98	10	2.17	21.72
2	Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube	4238	4.24	10	3.09	30.94
3	Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB	67	0.07	10	0.05	0.49
4	Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans	11582	11.58	10	8.46	84.55
Total		18863	19	10	13.77	138

Energy Saving Proposal Code EA 804.01	
Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube	
Existing Scenario	
186 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	186
Total load (kW)	7.44
Annual Energy Consumption (kWh)	5952
Expected Annual Energy saving for replacing all fittings (kWh)	2976
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.24
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.56
Simple Pay Back (in Months)	28.13

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 804.02	
Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube	
Existing Scenario	
115 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18 W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	115
Total load (kW)	6.33
Annual Energy Consumption (kWh)	6325
Expected Annual Energy saving for replacing all fittings (kWh)	4238
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.34
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.35
Simple Pay Back (in Months)	12.21

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 804.03	
Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB	
Existing Scenario	
8 numbers of CFL(15 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	8
Total load (kW)	0.12
Annual Energy Consumption (kWh)	168
Expected Annual Energy saving for replacing all fittings (kWh)	67
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 170 per fittings](Lakhs Rs)	0.01
Simple Pay Back (in Months)	30.36

Energy Saving Proposal Code EA 804.5	
Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 381 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 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	381
Total load (kW)	30.48
Annual Energy Consumption (kWh)	30480
Expected Annual Energy saving, for total replacement(kWh)	11582
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.93
Investment required for a total replacement (Lakhs Rs)[@2175 Rs per Fan with 50W at full speed]	8.29
Simple Pay Back (in Months)	107.32

Energy Saving Proposal Code 804.06

Installation of 40 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 place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 40kW at the beginning stage. 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)	40
Total average kWh per day expected (3.5kWh/day average)	140.00
Total annual Generating Capacity (kWh)	51100
Cost of energy generated annually Lakhs Rs	4.09
Investment required (INR lakh)(Approx)	30.00
Simple Pay Back (in Months)	88.06
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	102.20

Technical Supplements

PROVIDENCE WOMEN'S COLLEGE												
LOCATION	LIGHT					FAN		IT		AC		
	T8	T12	CFL	LED TUBE	LED BULB	CF	EF	PC	Projector	1.5	2tr	3tr
Hall	4					5			1			
Classroom 1-5	5					10						
Computer room	1					2		5				
Staffroom	1					2						
Principal room	1					2						
Auditorium	10					32						
Science Block												
Physics section	6	3			1	8						
Chemistry section Staffroom		1				3						
Chemistry lab		5		2		9	4					
Classroom 1-2				2		2						
Class 1		1				1						
Class 2	1					1						

Hostel *137	137					137						
canteen						3						
Library Block		39				48						
Office Block	5	4		2		6		1				
Conference room		8		1		3						
Audio visual room	3		8	4		4						
Network admin	1					1						
Principal room	3	1		2		3						
Classroom 1-8	8					16						
Computer lab						10		101		1		1
Class 1-5		10				10						
Assembly block		43				21		4				
PG Block *3					12	42			3	5		
Total	**186**	**115**	**8**	**13**	**13**	**381**	**4**	**111**	**4**	**6**	**0**	**1**

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GREEN AUDIT REPORT

OTTOTRACTIONS
Energy-Engineering-Environment
170 Devinagar, Valiyavila, Thirumala P.O
Thiruvananthapuram-695006 Ph:+919447068747, 9447621674,
email:aea@ottotractions.com, otenergy@gmail.com
www.ottotractions.com

PROVIDENCE WOMEN'S COLLEGE

KOZHIKKODE

2021

Executed by

OTTOTRACTIONS
Energy-Engineering-Environment

GREEN AUDIT REPORT

PROVIDENCE WOMEN'S COLLEGE

CALICUT

Green Audit Report

Providence Women's College

Report No: EA 804

2021-September

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.

Acknowledgment

We were privileged to work together with the administration and staff of Providence Women's College 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 audit team 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

Preface

Educational institutions always had an important leadership role in society in demonstrating types of changes that used to occur with respect to the prime issues of the time. All around the world, educational institutions are taking steps to declare themselves the next carbon neutral school as a part of the global trend of becoming sustainable. In 2007, Victoria University School of Architecture and Design declared themselves the first carbon neutral campus in the world through the purchase of carbon credits. This concept is not a sustainable model as it does not guarantee the capture of carbon forever and also it is expensive.

The potential for any academic institution- (may be a school in a remote village or a university in an urban setting) - to become the driver for change is huge. Its role of practicing leadership in its community can be utilized to encourage and influence carbon neutral living.

The biggest factors that contribute towards emission are Energy, Transportation and Waste. Any reduction in the carbon emission by the above sectors, starts with the behavioral changes (Low cost) and/or technological investments (High cost). In order to make these changes, the students are to be educated properly on the concept of carbon neutral campuses and methods to reduce it.

In India, the concept of carbon neutral campuses is gaining momentum. Green Audit in Campuses measures the amount of Green House Gases (GHG) emissions produced as a result of its operations through an accounting like inventory of all the sources of GHGs and carbon sequestration in the school campus. Based on this, the total carbon footprint is estimated. Measures are recommended to bring down the carbon footprint of the campus and to make it a carbon neutral campus.

B Zachariah

Director, OTTOTRACTIONS

Contents

OTTOTRACTIONS
Energy | Engineering | Environment

Certification

This is to certify that

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The green audit for the year 2020-21 has been carried out in accordance with the various rules and regulations in India.

This Certificate is issued to Providence Women's College, Kozhikkode on their request. Dated this 12th day of September 2021.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)
BUREAU OF ENERGY EFFICIENCY, GOVT OF INDIA

OTTOTRACTIONS * EMPANELED ACCREDITED ENERGY AUDITOR, BEE * AEA- 0033

Empaneled Accredited Energy Auditor
Bureau of Energy Efficiency
AEA-33, Government of India.

Empaneled Energy Auditor
Government of Kerala.
EMCEEA-0211F, EMC - Kerala

SRL-A21 Sasthamangalam P.O
Thiruvananthapuram, Kerala- 695010
Ph: 9447068747, 9447621674
otenergy@gmail.com,
ottotractions@email.com
www.ottotractions.com

OTTOTRACTIONS
Energy Engineering Environment

1

Introduction

Background

All across the developed countries, educational institutions are now moving to a sustainable future by becoming carbon neutral and greener spaces. They are taking responsibility for their environmental impact and are working to neutralize those effects. To become carbon neutral, institutions are working to reduce their emissions of greenhouse gases, cut their use of energy, use energy efficient equipment, use more renewable energy, plant and protect green cover and emphasize the importance of sustainable energy sources. Institutions that have committed to becoming carbon neutral have recognized the threat of global warming and are therefore committing to reverse the trend. Studies on this line has not struck roots in most of the developing countries-especially among students.

The Sustainable Development Goals (SDGs), launched by the United Nations in 2015, are an excellent vehicle for driving this change. They represent an action plan for the planet and society to thrive by 2030. The SDGs provide a window of opportunity for creating multidimensional operational approaches for climate change adaptation. They address poverty, hunger and climate change, among other issues central to human progress and sustainable development, such as gender equality, clean water and sanitation, and responsible consumption and production.

The Green Audit of Providence Women's College, Calicut aims to assist campus to reduce their carbon footprint and educate tomorrow's leaders about strategies for carbon mitigation using their campus as a model. Also, this audit covers institutes responses towards SDGs by covering SDG 3,6,7,11,13,15. The green audit also aims to educate students and teachers on the concept of carbon footprint and to enable the students to collect data pertaining to the carbon

emissions and carbon sequestration in their campus and to calculate the specific carbon footprint of the campus.

The project also suggests plans to make the campus carbon neutral or even carbon negative by implementing carbon mitigation strategies in areas such as,

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration etc.

The major objectives of the audit are:

- To make aware students and teachers on the concept of carbon footprint.
- To calculate the specific carbon footprint of the campus and classify it as carbon negative, neutral or positive.
- To create carbon mitigation plans to reduce their footprint based on the data generated.

Providence Women's College

Providence Women's College, Calicut, Kerala, founded by the sisters of Apostolic Carmel came into being on 1st July, 1952. It was the sacred mission of Mother Veronica the foundress of the congregation to train young women who had embraced religious life and send them far and wide on vocations of service to the community. Providence Women's College was the result of the efforts of such a committed group, headed by Mother Gabrielle, who became the Founder Principal. This was a dream come true for the young women in the Malabar region who had to otherwise go as far as Mangalore or Madras in search of a women's college. Thus, this college opened a new chapter in the annals of Malabar, as its first women's college. The college is registered under the Apostolic Carmel Education Society, S No.4 of 1957, Calicut. The Managing Governing Body includes the Provincial Superior, Educational Secretary, the Principal, the Local Manager, a representative of the management and a religious staff nominated by the Provincial Superior.

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	1793	1778	1848
Staffs	84	83	85
Total Occupancy of the college	1877	1861	1933

For calculating per capita carbon emission estimation, only the student strength is taken into account.

BASELINE DATA SHEET FOR GREEN AUDIT											
1	Name of the Organisation	PROVIDENCE WOMEN'S COLLEGE									
2	Address (include telephone, fax & e-mail)	Providence College Rd, Malaparamba, Kozhikode, Kerala 673009,providencecollegecalicut@gmail.com									
2	Year of Establishment	1952									
3	Name of building and total No. of Electrical Connections/building	HT (1)									
4	Total Number of Students	Boys	-	Girls	-	Total	1848				
5	Total Number of Staff	85									
6	Total Occupancy	1933									
7	Total area of green cover (Acre)	37									
8	Type of Electrical Connection(nos)	HT	1	LT	0						
9	Contract Demand (KVA) /Connection	70									
10	Average Maximum Demand (KVA)	57.75									
11	Total built up area of the building (m^2)	21506									
12	Number of Buildings	7									
13	Average system Power Factor	0.94									
14	Details of capacitors connected	NA									
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1	TR 2	TR 3	TR 4	TR 5	TR 6				
		NA	NA	NA	NA	NA	NA				
15	DG Set Details (kVA)	DG1	DG2	DG3	DG4	DG5	Remarks				
		10	NA	NA	NA	NA	-				
16	Details of motors	Rating		Nos.		Remarks					
		5 to 10		NA		NA					
		10 to 50		NA		NA					
		Above 50		NA		NA					
17	Brief write-up about the firm and the energy/environmental conservation activities already undertaken.	Installed 37kWp solar power plant, Biogas plants are used for cooking.									
18	Contact Person & Telephone number	Principal									
		0495 -2371696									

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. A sensitisation among students and teachers on the concept of carbon footprint was conducted.

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. It is assumed that through 1861 occupants of this campuses will reach same number of households. This message will spread to at least 7444 individuals approximately.

2.2 Estimation of carbon footprint

A carbon footprint is the amount of greenhouse gases—primarily carbon dioxide—released into the atmosphere by a particular human activity. A carbon footprint can be a broad measure or be applied to the actions of an individual, a family, an event, an organization, or even entire nation. It is usually measured as tons of CO_2 emitted per year, a number that can be supplemented by tons of CO_2-equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

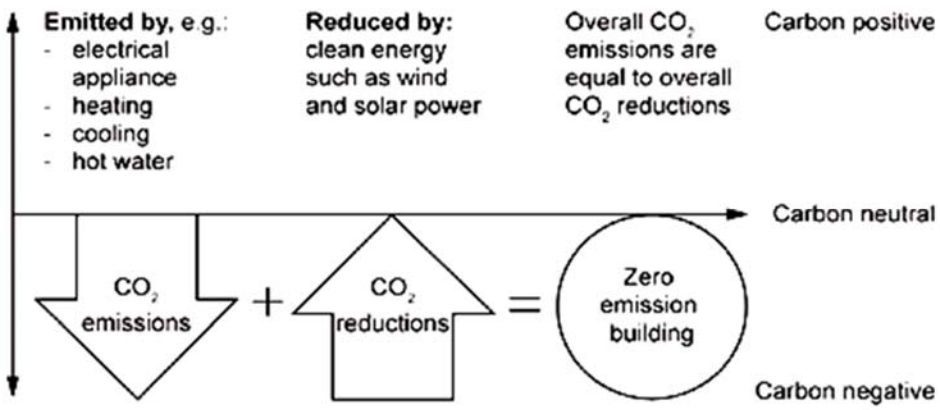
Global Warming Potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (CO_2).

Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO2	variable §	1	1	1
Methane *	CH4	12±3	56	21	6.5
Nitrous oxide	N2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
HFC-41	CH3F	3.7	490	150	45
HFC-43-10mee	C5H2F10	17.1	3000	1300	400
HFC-125	C2HF5	32.6	4600	2800	920
HFC-134	C2H2F4	10.6	2900	1000	310
HFC-134a	CH2FCF3	14.6	3400	1300	420
HFC-152a	C2H4F2	1.5	460	140	42
HFC-143	C2H3F3	3.8	1000	300	94
HFC-143a	C2H3F3	48.3	5000	3800	1400
HFC-227ea	C3HF7	36.5	4300	2900	950
HFC-236fa	C3H2F6	209	5100	6300	4700
HFC-245ca	C3H3F5	6.6	1800	560	170
Sulphur hexafluoride	SF6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100
Perfluorobutane	C4F10	2600	4800	7000	10100
Perfluorocyclobutane	c-C4F8	3200	6000	8700	12700
Perfluoropentane	C5F12	4100	5100	7500	11000
Perfluorohexane	C6F14	3200	5000	7400	10700

The methodology for carbon footprint calculations are still evolving and it is emerging as an important tool for green house management. In the present study carbon emission data from the campus is estimated under four categories viz.

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration

Carbon neutrality refers to achieving net zero GHG emission by balancing the measured amount of carbon released into atmosphere due to human activities, with an equal amount sequestrated in carbon sinks. It is crucial to restrict atmospheric concentrations of GHGs released from various socio-economic, developmental and life style activities using biological or natural processes. It is recognized that addressing climate change is not as simple as switching to renewable energy or offsetting GHG emissions. Rather, providing an opportunity for innovation in new developmental activities for viable and effective approach to address the problem.



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.

Transportation

There is no vehicles operates from campus for its logistics.

Carbon emission from transportation to be calculated by using the following formula:

Carbon Emission = Number of each type of vehicles × Avg. fuel consumed per year ×

Emission factors (based on the fuel used by the vehicle)

Waste Minimisation

The waste generated from the campus is also responsible for the greenhouse gas emission. So, in order to calculate the total carbon foot print of the campus it is necessary to estimate the greenhouse gas emission from the waste generated in the campus by the activity of the students, teachers and staffs.

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.

Carbon Sequestration

Carbon sequestration is the process involved in the long-term storage of atmospheric carbon dioxide. Trees remove carbon dioxide from the atmosphere through the natural process of photosynthesis and store the carbon in their leaves, branches, stems, bark, and roots.

Carbon sequestrated 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 CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Detailed calculations and results are given in the technical supplements of this document.

3

RESULTS AND DISCUSSIONS

3.1 CARBON FOOTPRINT ESTIMATION

3.1.1 ENERGY

a. Electricity

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

Electricity Connection Details		
PROVIDENCE WOMEN'S COLLEGE		
1	Name of the Consumer	PROVIDENCE WOMEN'S COLLEGE Providence College Rd, Malaparamba, Kozhikode, Kerala 673009,providencecollegecalicut@gmail.com
2	Tariff	HT II(A) GENERAL
3	Consumer Number	1365980025581
5	Connected Load Total	50kVA
6	Annual Electricity Consumption (kWh)	122273

Electricity Bill Analysis (from 2018 to 2021)

Electricity Bill Details (2021-22)												
Month	Name of the Consumer				PROVIDENCE WOMEN'S COLLEGE							
	Contract Demand(kVA)		50		Consumer number & Section			1365980025581				
	Tariff		HT II(A) GENERAL					Karaparamba				
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	3408	1610	2712	7730	31.93	26.67	28.48	0.9	1099.98		63803.04	**8.25**
May	369	1008	1906	3283	22.06	25.93	15.73	0.91	370.78		35325.19	**10.76**
Jun	0	473	1430	1903	27.44	14.28	15.37	0.89	349.27		25461.33	**13.38**
Jul	411	764	1327	2502	21.73	16.78	15.39	0.89	500.24		30378	**12.14**
Aug	1710	878	1567	4155	31..2	16.61	15.66	0.92	352.99		40437.13	**9.73**
Sep												
Oct												

Electricity Bill Details (2020-21)												
Month	Name of the Consumer				PROVIDENCE WOMEN'S COLLEGE							
	Contract Demand(kVA)		50		Consumer number & Section			1365980025581				
	Tariff		HT II(A) GENERAL					Karaparamba				
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	2398	1513	2535	6446	39.84	26.52	20.57	0.94		183.93	56047.18	**8.7**
May	0	0	813	813	16.63	19.17	8.38	0.90		85.36	18003.05	**22.1**
Jun	0	0	1521	1521	15.39	22.39	14.94	0.91		127.76	21428.91	**14.1**
Jul	835	715	1140	2690	21.19	10.57	10.37	0.89		541.45	31685.7	**11.8**
Aug	766	769	1272	2807	20.05	17.01	11.1	0.88		724.12	32753.06	**11.7**
Sep	152	588	955	1695	19.15	16.4	6.59	0.83		931.13	25815.05	**15.2**
Oct	1735	1227	1934	4896	22.9	20.18	16.61	0.92		422.18	45936.46	**9.4**
Nov	2195	1415	2344	5954	22.95	21.95	22.27	0.91		680.46	52361.35	**8.8**
Dec	2038	1047	1725	4810	25.68	21.27	18.41	0.89		960.84	45217.14	**9.4**
Jan	1483	839	1208	3530	22.42	17.83	14.41	0.85		1531.95	38171.71	**10.8**
Feb	2744	1144	1622	5510	29.74	24.81	14.42	0.87		1748.36	50836.35	**9.2**
Mar	2874	1339	2038	6251	29.76	25.75	19.2	0.89		1256.56	55096.93	**8.8**

Electricity Bill Details (2019-20)												
Month	Name of the Consumer				PROVIDENCE WOMEN'S COLLEGE							
	Contract Demand(kVA)		50		Consumer number & Section			1365980025581				
	Tariff		HT II(A) GENERAL					Karaparamba				
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr	7335	1594	2998	11927	40.62	20.24	24.28	0.95	-1616.56		88128.15	**7.38896202**
May	3596	913	1613	6122	31.23	18.87	16.32	0.91	-166.73		55217.31	**9.01948873**
Jun	2861	550	1049	4460	23.1	13.89	7.98	0.87	724.59		45799.23	**10.2688857**
Jul	5952	1274	2041	9267	43.03	28.83	15.47	0.95	-1268.16		73508.4	**7.93227582**
Aug	7605	1852	3031	12488	42	30	21	0.95	-669.71		96066.16	**7.69267777**
Sep	6624	1690	2742	11056	44.2	25.01	19.78	0.96	-314.03		88393.85	**7.99510221**
Oct	6222	1520	2418	10160	49.76	26.63	24.52	0.97	-577.67		82829.81	**8.15254035**
Nov	8242	1944	3148	13334	48.52	29.61	23.44	0.96	-378.53		102611.9	**7.69550472**
Dec	9349	2085	3532	14966	57.75	23.7	24.11	0.97	-847.03		114160.2	**7.62797007**
Jan	6705	1557	2639	10901	47.93	24.59	23.18	0.96	-308.55		87455.64	**8.02271718**
Feb	5904	1959	3283	11146	47	31	22	0.91	1266.13		88572.04	**7.94653149**
Mar	2398	1513	2535	6446	39.84	26.52	20.57	0.94	183.93		56047.18	**8.69487744**

Electricity Bill Details (2018-19)												
Month	Name of the Consumer				PROVIDENCE WOMEN'S COLLEGE							
	Contract Demand(kVA)		50		Consumer number & Section			1365980025581				
	Tariff		HT II(A) GENERAL					Karaparamba				
	kWh				kVA			PF	PF Incentive	PF Penalty	Rs (Total)	Rs/kwh
	Z1	Z2	Z3	Total	Z1	Z2	Z3					
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												
Jan	5761	1414	2462	9637	40.56	22.79	20.74	0.94	-1050.68		75527.54	7.83724603
Feb	5657	1346	2312	9315	40.41	20.86	22.63	0.93	-762.21		73916.07	7.93516586
Mar	6767	1599	2719	11085	46.81	21.34	18.5	0.95	-1512.64		83665.71	7.54765088

b. Diesel

Diesel Consumption Details		
Year	in L	Rs
16-17	58.5	3800
17-18	357.1	25000
18-19	145.4	12356
19-20	59.9	5394
20-21	0	0

c. LPG

LPG Consumption in college		
Year	Cost	Consumption (kg)
18-19	9365	177.935
19-20	4224	80.256
20-21	4650	73.625

LPG Consumption in Hostel	
Year	Consumption (kg)
18-19	1368
19-20	1414
20-21	456

Base Line Energy Data				
PROVIDENCE WOMEN'S COLLEGE				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	102126	103932	39885
2	Electricity Solar - Off grid (kWh)	47268	47268	47268
3	Electricity (KSEB + Off grid) kWh	149393	151200	87152
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	145.36	59.93	0.00
6	LPG (kg)	1546	1494	530
7	Biogas(Kg)	20700	14490	18630

Energy Consumption Profile				
Sl No	Fuel	2018-19	2019-20	2020-21
		(kCal)		
1	Electricity	128478238	130031613	74950763
2	Diesel	1526329	629300	0
3	LPG	18551220	17926272	6355500
4	Biogas	63000000	44100000.00	56700000.00
Total (kCal)		211555787	192687185	138006263
Total (kWh)		245995.1	224054.87	160472.399

Thermal Fuel Consumption			
PROVIDENCE WOMEN'S COLLEGE			
	2018-19	2019-20	2020-21
Annual LPG consumption in kg	1545.935	1494	529.625
Annual Diesel consumption in L	145.36	59.93	0.00
Annual petrol consumption in L	0.0	0.0	0
Annual Biogas consumption in m3	18000	12600	16200

Specific Energy Consumption

OTTOTRACTIONS- ENERGY AUDIT				
PROVIDENCE WOMEN'S COLLEGE				
Energy Performance Index (EPI)				
Sl No	Particulars	2018-19	2019-20	2020-21
1	Total building area (m^2)	21506	21506	21506
2	Annual Energy Consumption (kCal)	211555787	211587185	144306263
3	Annual Energy Consumption (kWh)	245995.1	246031.6	167797.98
4	Total Energy in Toe	21.16	21.16	14.43
5	Specific Energy Consumption kWh/m^2	11.44	11.44	7.80

In 2020-21 the energy consumption was less due to lock down based on covid 19 pandemic. So the specific energy consumption in 2019-20 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			
PROVIDENCE WOMEN'S COLLEGE			
	2018-19	2019-20	2020-21
Total Occupancy	1877	1861	1933
Waste generated in kg /day	37.54	46.525	15.464
Waste generated in kg /Yr	4955.28	6141.3	2041.25

Non-Degradable waste

Solid non degradable Waste Generation			
PROVIDENCE WOMEN'S COLLEGE			
	2018-19	2019-20	2020-21
Total Occupancy	1877	1861	1933
Waste paper generated in kg /day	0.38	0.41	0.19
Waste plastic generated in kg /day	0.56	0.62	0.29
Waste paper generated in kg /Yr	82.59	90.98	42.53
Waste plastic generated in kg /Yr	123.88	136.47	63.79

3.4. Transportation

There is no bus operating from the college.

Carbon Emission Profile (2020-21)

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.

Emission Factors		
Item	Factor	Unit
Electricity	0.00079	tCo_2e/kWh
LPG	0.0015	tCo_2e/kg
Diesel	0.0032	tCo_2e/kg
Petrol	0.0031	tCo_2e/kg
Food Waste	0.00063	tCo_2e/kg
Paper Waste	0.00056	tCo_2e/kg
Plastic Waste	0.00034	tCo_2e/kg

Carbon Foot Print 2020-21

Carbon Foot Print							
Sl. No.	Particulars	2018-19	tCO2e	2019-20	tCO2e	2020-21	tCO2e
1	Electricity (kWh)	102126	80.68	103932	82.11	39885	31.51
2	Diesel (L)	145.36	0.47	59.93	0.19	0.00	0.00
3	LPG (kg)	177.94	0.27	80.26	0.12	73.63	0.11
4	Biogas (Kg)	20700.00	28.98	14490.00	20.29	18630.00	26.08
5	Degradable Waste in kg/yr.	4955.28	3.12	6141.30	3.87	2041.25	1.29
6	Paper Waste in kg/yr	82.59	0.05	90.98	0.05	42.53	0.02
7	Plastic Waste in kg/yr	123.88	0.04	136.47	0.05	63.79	0.02
Total Carbon Foot Print tCO2e/yr			113.60		106.67		59.03

3.5. 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 sequestrated 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.

Carbon Sequestration			
Particulars	2018-19	2019-20	2020-21
Total number of trees	400	420	428
Carbon sequestrated by trees in the campus (tCO2e)	2.49	2.65	3.32

Trees sequestrate 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 sequestrated 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. Details of the trees in the campus compound are given in the Table 3.18. Detailed table is included in the technical supplement.

Carbon sequestrated 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 CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Carbon sequestrated 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'.

Form 5										
Sl. No	Name of tree (Botanical name)	Circumference (cm)	Stem diameter (cm)	Height of trees (m)	Total weight of tree	Weight of carbon	No.of similar trees	Total carbon sequest	Carbon Sequestrated by	Average age (years)
1	Anacardium occidentale	36	11.46	2	10.90	0.00	10	0.045	0.004	6
2	Mangifera indica	32	10.19	3	12.92	0.01	25	0.133	0.005	7
3	Spoudias pinnata	30	9.55	4	15.14	0.01	1	0.006	0.006	8
4	Cananga odorata	26	8.28	5	14.22	0.01	1	0.006	0.006	9
5	Polyalthia longifolia	24	7.64	6	14.54	0.01	15	0.090	0.006	10
6	Alstonia macrophylla	22	7.00	7	14.25	0.01	2	0.012	0.006	11
7	Alstonia scholaris	28	8.91	6	19.79	0.01	1	0.008	0.008	12
8	Areca catechu	32	10.19	3	12.92	0.01	10	0.053	0.005	13
9	Caryota urens	20	6.37	5	8.41	0.00	1	0.003	0.003	14
10	Cocos nucifera	34	10.82	4	19.45	0.01	300	2.407	0.008	15
11	Chrysalidocarpus lutescens	25	7.96	3	7.89	0.00	1	0.003	0.003	16
12	Tecoma stans	31	9.87	2	8.09	0.00	2	0.007	0.003	17
13	Spathodea campanulate	39	12.41	5	31.99	0.01	3	0.040	0.013	18
14	Oroxylon indicum	21	6.68	6	11.13	0.00	1	0.005	0.005	19
15	Casuarina equisetifolia	24	7.64	4	9.69	0.00	4	0.016	0.004	20
16	Terminalia catappa	26	8.28	3	8.53	0.00	4	0.014	0.004	21
17	Muntingia calabura	37	11.78	4	23.04	0.01	3	0.029	0.010	22
18	Bridelia retusa	44	14.01	5	40.72	0.02	2	0.034	0.017	23
19	Mallotus tetracoccus	46	14.64	6	53.41	0.02	2	0.044	0.022	24
20	Phyllanthus acidus	37	11.78	5	28.80	0.01	1	0.012	0.012	25

21	Phyllanthus emblica	35	11.14	4	20.61	0.01	2	0.017	0.009	26
22	Macaranga indica	33	10.50	6	27.49	0.01	10	0.113	0.011	27
23	Abrus pricatorium	36	11.46	5	27.26	0.01	2	0.022	0.011	28
24	Gliricidia sepum	39	12.41	3	19.20	0.01	25	0.198	0.008	29
25	Pongamia pinnata	42	13.37	5	37.10	0.02	2	0.031	0.015	30
26	Adenanthera pavonina	45	14.32	2	17.04	0.01	2	0.014	0.007	31
27	Dalbergia sisso	48	15.28	6	58.16	0.02	1	0.024	0.024	32
28	Butea monosperma	29	9.23	2	7.08	0.00	1	0.003	0.003	33
29	Bauhinia purpurea	31	9.87	4	16.17	0.01	5	0.033	0.007	34
30	Delonix regia	33	10.50	3	13.74	0.01	1	0.006	0.006	35
31	Saraca asoka	26	8.28	5	14.22	0.01	2	0.012	0.006	36
32	Cassia fistula	25	7.96	2	5.26	0.00	3	0.007	0.002	37
33	Cassia siamea	22.5	7.16	5	10.65	0.00	5	0.022	0.004	38
34	Tamarindus indica	20	6.37	4	6.73	0.00	10	0.028	0.003	39
35	Peltophorum pterocarpum	17.5	5.57	3	3.87	0.00	10	0.016	0.002	40
36	Acacia caesia	26	8.28	5	14.22	0.01	1	0.006	0.006	41
37	Acacia auriculiformis	28	8.91	6	19.79	0.01	2	0.016	0.008	42
38	Samania saman	32	10.19	4	17.23	0.01	5	0.036	0.007	43
39	Cinnamomum camphora	30	9.55	6	22.72	0.01	1	0.009	0.009	44
40	Cinnamomum zeylanicum	24	7.64	3	7.27	0.00	4	0.012	0.003	45
41	Strychnos nux-vomica	28	8.91	5	16.49	0.01	4	0.027	0.007	46
42	Magnolia nilgirica	35	11.14	4	20.61	0.01	1	0.009	0.009	47
43	Azadirachta indica	31	9.87	5	20.21	0.01	5	0.042	0.008	48
44	Cipadessa baccifera	31.4	9.99	6	24.89	0.01	1	0.010	0.010	49
45	Artocarpus heterophyllus	31.8	10.12	4	17.02	0.01	50	0.351	0.007	50
46	Artocarpus incises	32.2	10.25	3	13.09	0.01	2	0.011	0.005	51
47	Ficus auriculata	32.6	10.38	5	22.35	0.01	1	0.009	0.009	52
48	Ficus benghalensis	33	10.50	6	27.49	0.01	1	0.011	0.011	53
49	Ficus religiosa	33.4	10.63	4	18.77	0.01	1	0.008	0.008	54
50	Ficus racemosa	33.8	10.76	5	24.03	0.01	2	0.020	0.010	55
51	Myristica fragrans	34.2	10.89	6	29.52	0.01	15	0.183	0.012	56
52	Eucalyptus globulus	34.6	11.01	4	20.15	0.01	1	0.008	0.008	57
53	Eugenia caryophyllata	35	11.14	3	15.46	0.01	1	0.006	0.006	58
54	Syzygium cumini	35.4	11.27	5	26.36	0.01	2	0.022	0.011	59
55	Dendrocalamus strictus	35.8	11.40	6	32.35	0.01	20	0.267	0.013	60
56	Caralia brachiate	36.2	11.52	3	16.54	0.01	2	0.014	0.007	61
57	Aegle marmelos	36.6	11.65	4	22.54	0.01	1	0.009	0.009	62
58	Morinda citrifolia	37	11.78	2	11.52	0.00	1	0.005	0.005	63
59	Anthocephalus kadamba	37.4	11.90	6	35.31	0.01	1	0.015	0.015	64
60	Santalum album	37.8	12.03	5	30.05	0.01	10	0.124	0.012	65
61	Chrysophyllum cainito	38.2	12.16	4	24.56	0.01	2	0.020	0.010	66
62	Achras zapota	38.6	12.29	3	18.80	0.01	4	0.031	0.008	67
63	Mimusops elenji	39	12.41	2	12.80	0.01	4	0.021	0.005	68
64	Pouteria campechiana	39.4	12.54	3	19.59	0.01	1	0.008	0.008	69
65	Ailanthus excelsa	39.8	12.67	2	13.33	0.01	4	0.022	0.005	70
66	Simarouba glauca	40.2	12.80	2	13.60	0.01	2	0.011	0.006	71
67	Kleinhovia hospita	40.6	12.92	4	27.74	0.01	1	0.011	0.011	72
68	Trema orientalis	41	13.05	5	35.36	0.01	2	0.029	0.015	73
69	Citharexylum spinosum	41.4	13.18	5	36.05	0.01	1	0.015	0.015	74
70	Gmelina arborea	41.8	13.31	3	22.05	0.01	1	0.009	0.009	75
71	Tectona grandis	42.2	13.43	2	14.98	0.01	20	0.124	0.006	76
72	Mesua ferra	42.6	13.56	2	15.27	0.01	1	0.006	0.006	77
73	Bombax malabaricum	43	13.69	4	31.11	0.01	2	0.026	0.013	78
74	Lagerstroemia indica	43.4	13.81	3	23.77	0.01	10	0.098	0.010	79
75	Auracaria heterophulla	43.8	13.94	4	32.28	0.01	3	0.040	0.013	80
76	Cycas circinalis	44.2	14.07	2	16.44	0.01	2	0.014	0.007	81
77	Cycas revoluta	36	11.46	3	16.36	0.01	3	0.020	0.007	82
						Total	428	3.317	0.1899	

Details of the trees having diameter more than 15cm and having heights above 150cm from ground level is taken for the study

CARBON FOOTPRINT OF THE CAMPUS (2019-20)

Various carbon emitting activities such as consumption of energy, transportation and waste generation leads to the total emission of **106.67 tCO_2e** per year by the campus. The total carbon sequestration by trees in the campus compound is **2.65 tCO_2e**.

Thus, the current carbon footprint of the campus will be the difference of total carbon emission and total carbon sequestration/mitigation. the following table shows the carbon footprint level of 2020-21.

Specific CO2 Footprint

Amount of Carbon to be mitigated for Low Carbon Campus				
Sl No	Particulars	2018-19	2019-20	2020-21
1	Total carbon emission tCO2e	113.60	106.67	59.03
2	Total carbon sequestration tCO2e	2.49	2.65	3.32
3	Amount of carbon mitigated through renewable energy tCO2e	66.32	57.63	63.42
4	To be mitigated tCO2e	44.79	46.39	-7.71
5	Total No of Students	1793	1778	1848
6	Specific Carbon Footprint kg CO2e/Student/Yr	24.98	26.09	-4.17

The total specific carbon emission is estimated as **26.09** kg of CO_2e per student for the year 2019-20 and **-4.17** kg of CO_2e per student for the year 2020-21. (the reduction in CO2 foot print is due to the impact of pandemic year)

4

Carbon Mitigation Plans

The total emission of the carbon dioxide per student is **26.09** kg per year (2019-2020). 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.

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 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.

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. The campus installed biogas plant to treat food waste and the biogas thus generated used in kitchen. 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'

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.

OTTOTRACTIONS- ENERGY AUDIT						
PROVIDENCE WOMEN'S COLLEGE						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO_2	CO_2 mitigated through out
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube	**2976**	2.98	10	2.17	21.72
2	Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube	**4238**	4.24	10	3.09	30.94
3	Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED	**67**	0.07	10	0.05	0.49
4	Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans	**11582**	11.58	10	8.46	84.55
Total		**18863**	**19**	**10**	**13.77**	**138**

OTTOTRACTIONS- ENERGY AUDIT						
PROVIDENCE WOMEN'S COLLEGE						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO_2 mitigated	CO_2 mitigated through out life
		(kWh)	MWh	Years		
1	Energy Generation from 37kWp Solar Power Plant installed	**50644**	50.64	25	36.97	924.25
2	Installation of 40 kWp Solar Power Plant	**51100**	51.10	26	41.90	1089.45

Energy Saving Proposal Code EA 804.01	
Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube	
Existing Scenario	
186 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	186
Total load (kW)	7.44
Annual Energy Consumption (kWh)	5952
Expected Annual Energy saving for replacing all fittings (kWh)	2976
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.24
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.56
Simple Pay Back (in Months)	28.13

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 776.05	
Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
115 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18 W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	115
Total load (kW)	6.33
Annual Energy Consumption (kWh)	6325
Expected Annual Energy saving for replacing all fittings (kWh)	4238
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.34
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.35
Simple Pay Back (in Months)	12.21

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 804.03	
Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB	
Existing Scenario	
8 numbers of CFL(15 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	8
Total load (kW)	0.12
Annual Energy Consumption (kWh)	168
Expected Annual Energy saving for replacing all fittings (kWh)	67
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 170 per fittings](Lakhs Rs)	0.01
Simple Pay Back (in Months)	30.36

Energy Saving Proposal Code EA 804.04	
Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 381 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 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	381
Total load (kW)	30.48
Annual Energy Consumption (kWh)	30480
Expected Annual Energy saving, for total replacement(kWh)	11582
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.93
Investment required for a total replacement (Lakhs Rs)[@2175 Rs per Fan with 50W at full speed]	8.29
Simple Pay Back (in Months)	107.32

Energy Saving Proposal Code 804.05	
Installation of 40 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 place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 40kW at the beginning stage. 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)	40
Total average kWh per day expected (3.5kWh/day average)	140.00
Total annual Generating Capacity (kWh)	51100
Cost of energy generated annually Lakhs Rs	4.09
Investment required (INR lakh)(Approx)	30.00
Simple Pay Back (in Months)	88.06
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	102.20

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
PROVIDENCE WOMEN'S COLLEGE					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	**Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube**	1.54	0.24	77.81	2976
2	**Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube in Third Floor**	0.95	0.34	33.79	4238
3	**Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB in GROUND and first Floor**	0.01	0.005	30.36	67
4	**Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans**	8.29	0.93	107.32	11582
	Total	10.80	1.51	62.32	18863.35
(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.)					
Consolidated Cost Benefit Analysis of Renewable Energy Projects					
5	**Installation of 40 kWp Solar Power Plant**	30.00	4.09	88.06	51100

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.

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO2e/yr	106.67
2	Carbon Sequestrated tCO2e/yr	2.65
3	Carbon mitigated by Renewable Energy tCO2e/yr (installed) (Solar)	36.97
4	Carbon mitigated by Renewable Energy tCO2e/yr (Proposed) (Solar)	41.90
5	Carbon mitigated by Renewable Energy (Installed) (Biogas)	28.98
6	Carbon mitigated by Energy Efficiency (Proposed) tCO2e/yr	13.77
7	Effective Carbon footprint tCO2e/yr	-17.60
8	Total No of Students	1778.00
9	Specific Carbon Footprint kg CO2e/Student/Yr	-9.90

From this study it was found that carbon footprint of the campus to be **26.09** $kgCO_2e$/ Student/ Year in place of current footprint i.e., **-9.90** $kgCO_2e$/ student/ Year. This will be achieved after implementing energy efficiency projects and implementation of 40kWp solar power plant. To achieve this an investment of **39.20 lakhs Rs** is required through energy efficiency and renewable energy projects proposed. It will be around **2204.9 Rs per student** to make the campus the carbon negative.

Cost to make the campus Carbon Negative		
1	Cost of implementation in Energy Efficiency Lakhs Rs	9.20
2	Cost of implementation in Renewable Energy Lakhs Rs	30.00
3	Total Lakhs Rs	39.20
4	Total number of students	1778
5	Cost per student to make the campus carbon negative Rs/ Student	2204.9

REFERENCES

Reports and Books

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6

TECHNICAL SUPPLEMENT

PROVIDENCE WOMEN'S COLLEGE												
LOCATION	LIGHT					FAN		IT		AC		
	T8	T12	CFL	LED TUBE	LED BULB	CF	EF	PC	Projector	1.5	2tr	3tr
Hall	4					5			1			
Classroom 1-5	5					10						
Computer room	1					2		5				
Staffroom	1					2						
Principal room	1					2						
Auditorium	10					32						
Science Block												
Physics section	6	3			1	8						
Chemistry section Staffroom		1				3						
Chemistry lab		5		2		9	4					
Classroom 1-2				2		2						
Class 1		1				1						
Class 2	1					1						

Hostel *137	137					137						
canteen						3						
Library Block		39				48						
Office Block	5	4		2		6		1				
Conference room		8		1		3						
Audio visual room	3		8	4		4						
Network admin	1					1						
Principal room	3	1		2		3						
Classroom 1-8	8					16						
Computer lab						10		101		1		1
Class 1-5		10				10						
Assembly block		43				21		4				
PG Block *3					12	42			3	5		
Total	**186**	**115**	**8**	**13**	**13**	**381**	**4**	**111**	**4**	**6**	**0**	**1**

List of trees in the campus

Sl. No	Botanical name	Common name	Family	Number of trees
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2	Mangifera indica	Mavu	"	25
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4	Cananga odorata	Swarna chembakam	Annonaceae	1
5	Polyalthia longifolia	Aranamaram	"	15
6	Alstonia macrophylla	Devils tree	Apocynaceae	2
7	Alstonia scholaris	Yakshippala	"	1
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9	Caryota urens	Anappana	"	1
10	Cocos nucifera	Thengu	"	300
11	Chrysalidocarpus lutescens	Palm	"	1
12	Tecoma stans	Manja arali	Bignoniaceae	2
13	Spathodea campanulate		"	3
14	Oroxylon indicum	Palaka payyani	"	1
15	Casuarina equisetifolia	Kattadi	Casuarinaceae	4
16	Terminalia catappa		Combretaceae	4
17	Muntingia calabura	Panchara pazham	Elaeocarpaceae	3
18	Bridelia retusa		Euphorbiaceae	2
19	Mallotus tetracoccus		"	2
20	Phyllanthus acidus		"	1
21	Phyllanthus emblica		"	2
22	Macaranga indica	Vatta/Uppoothi	"	10

23	Abrus pricatorium	Kunnikkuru	Fabaceae- Papilionaceae	2
24	Gliricidia sepum	Seema Konna	"	25
25	Pongamia pinnata		"	2
26	Adenanthera pavonina	Manjadi	"	2
27	Dalbergia sisso	Irool	"	1
28	Butea monosperma	Plasu	"	1
29	Bauhinia purpurea	Mandaram	Caesalpiniaceae	5
30	Delonix regia	Gulmohar	"	1
31	Saraca asoka	Asokam	"	2
32	Cassia fistula	Kanikonna	"	3
33	Cassia siamea		"	5
34	Tamarindus indica	Valan puli	"	10
35	Peltophorum pterocarpum	Copper pod	"	10
36	Acacia caesia	Inja	Mimosaseae	1
37	Acacia auriculiformis		"	2
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43	Azadirachta indica	Aryaveppu	Meliaceae	5
44	Cipadessa baccifera		"	1
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48	Ficus benghalensis	Peral	"	1
49	Ficus religiosa	Arayal	"	1
50	Ficus racemosa	Athi	"	2
51	Myristica fragrans	Jathi	Myristicaceae	15

52	Eucalyptus globulus	Eucalyptus	Myrtaceae	1
53	Eugenia caryophyllata	Clove	"	1
54	Syzygium cumini	Njaval	"	2
55	Dendrocalamus strictus		Poaceae	20
56	Caralia brachiate		Rhizophoraceae	2
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58	Morinda citrifolia	Noni	Rubiaceae	1
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77	Cycas revoluta		"	3

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ENVIRONMENTAL AUDIT REPORT

PROVIDENCE WOMEN'S COLLEGE

KOZHIKKODE

2021

OTTOTRACTIONS
Energy-Engineering-Environment

170 Devinagar, Valiyavila, Thirumala P.O
Thiruvananthapuram-695006 Ph:+919447068747, 9447621674,
email:aea@ottotractions.com, otenergy@gmail.com
www.ottotractions.com

Executed by

OTTOTRACTIONS
Energy-Engineering-Environment

ENVIRONMENT AUDIT REPORT

PROVIDENCE WOMEN'S COLLEGE

CALICUT

September 2021

OTTOTRACTIONS
Energy-Engineering-Environment

Environment Audit Report
PROVIDENCE WOMEN'S COLLEGE
REPORT No: EA 806
2021- September

Environment Audit Team

Ottotractions

1	Er. Suresh Babu B V,	Accredited Energy Auditor, AEA 33
2	Er. B. Zachariah	Director, Ottotractions
3	Er. Abin Baby,	Project Engineer, Ottotractions
4	Er. Devan J	Project Engineer, Ottotractions

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.

Acknowledgment

We were privileged to work together with the administration and staff of Providence Women's College, Calicut 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

Contents

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Energy | Engineering | Environment

Certification

This is to certify that

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The environmental audit for the year 2020-21 has been carried out in accordance with the various rules and regulations in India.

This Certificate is issued to Providence Women's College, Kozhikkode on their request.

Dated this 12th day of September 2021.

SURESH BABU B V

ACCREDITED ENERGY AUDITOR (AEA 33)

BUREAU OF ENERGY EFFICIENCY, GOVT OF INDIA

OTTOTRACTIONS * AEA-0033 * EMPANELED ACCREDITED ENERGY AUDITOR, BEE

Empaneled Accredited Energy Auditor
Bureau of Energy Efficiency
AEA-33, Government of India.

Empaneled Energy Auditor
Government of Kerala.
EMCEEA-0211F, EMC - Kerala

SRL-A21 Sasthamangalam P.O
Thiruvananthapuram, Kerala- 695010
Ph: 9447068747, 9447621674
otenergy@gmail.com,
ottotractions@email.com
www.ottotractions.com

INTRODUCTION

Ottotractions was asked by the Providence Women's College, Calicut 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.

BACKGROUND

Providence Women's College, Calicut, is one of the largest higher education centers for women in the state of Kerala. It was established in 1952 by the sisters of Apostolic Carmel, as a noble initiative to spread the message of empowerment through education among the women folk in the Malabar region. After the initial years of functioning in the premises of Providence High School, Calicut, the college shifted to its own building atop the picturesque

Florican Hill. Providence College is the result of the collective effort of a committed group headed by our founder Principal, Mother Gabrielle.

It was affiliated to the Madras University in 1952 and later on it became part of Kerala University in 1958 and finally it was brought under the University of Calicut in 1968. The college provides instruction in 6 post graduate courses and 13 under graduate courses. 6 UGC approved Add On Courses, 7 Certificate Courses and 4 Diploma Courses are offered by the college along with the main stream of academic instruction. Along with the A grade awarded by NAAC, the college has also been granted the status of CPE – College with Potential for Excellence by the UGC. The academic exercises of the college are well supported by the non curricular initiatives. The qualified teachers, the vibrant students, the enlightened

leadership and the provision for manifestation of talents of the students constitute the fabric of Providence Women's College. Quality of life coupled with the cultivation of healthy life attitudes has been the main agenda of the management

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	1793	1778	1848
Staffs	84	83	85
Total Occupancy of the college	1877	1861	1933

Total student strength of the campus is 1933. For calculating per capita carbon emission estimation, the student strength is taken into account.

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.

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. SGC has given a proper awareness on plastic waste problems and they are discouraging the students or teachers to carry plastics to the campus. The ECO club is very active in the campus and do a verity of programs to build awareness on waste management. The reports on different activities of the club is 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 preparation. The food waste produced by the students and staffs of the campus after the consumption of meals.

Degradable Waste Generation			
PROVIDENCE WOMEN'S COLLEGE			
	2018-19	2019-20	2020-21
Total Occupancy	1877	1861	1933
Waste generated in kg /day	37.54	46.525	15.464
Waste generated in kg /Yr	4955.28	6141.3	2041.25

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

PROVIDENCE WOMEN'S COLLEGE			
	2018-19	2019-20	2020-21
Total Occupancy	1877	1861	1933
Waste paper generated in kg /day	0.38	0.41	0.19
Waste plastic generated in kg /day	0.56	0.62	0.29
Waste paper generated in kg /Yr	82.59	90.98	42.53
Waste plastic generated in kg /Yr	123.88	136.47	63.79

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/month) (approx.)		Bio Non- Hazardous others Degradable Biodegradable
3	How is the waste generated in the institute managed? By		Reuse of one side printed Paper for internal communication. Sewage water is discharged to public Sewer. Kitchen waste is used to generate manures. 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 ECO Club
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 428 Not estimated
4	Number of Tree Plantation Drives	Yes, Through ECO club		
5	Number of Trees Planted in Last FY.	NA		
	Survival Rate			80%

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 sequestrated 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 sequestrate 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 sequestrated 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. Details of the trees in the campus compound are given in the Table. Detailed table is included in the technical supplement.

Carbon Sequestration			
Particulars	2018-19	2019-20	2020-21
Total number of trees	400	420	428
Carbon sequestrated by trees in the campus (tCO2e)	2.49	2.65	3.32

Carbon sequestrated 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 CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

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

List of trees in the campus				
Sl. No	Botanical name	Common name	Family	Number of trees
1	Anacardium occidentale	Parangi mavu	Anacardiaceae	10
2	Mangifera indica	Mavu	"	25
3	Spoudias pinnata	Ambazham	"	1
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3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 26.09kg per year (2019-20). 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. 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

- Electricity Consumption

Base Line Energy Data				
PROVIDENCE WOMEN'S COLLEGE				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	102126	103932	39885
2	Electricity Solar - Off grid (kWh)	47268	47268	47268
3	Electricity (KSEB + Off grid) kWh	149393	151200	87152
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	145.36	59.93	0.00
6	LPG (kg)	1546	1494	530
7	Biogas(Kg)	20700	14490	18630

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Total	**186**	**115**	**8**	**13**	**13**	**381**	**4**	**111**	**4**	**6**	**0**	**1**

During the energy audit filed studies, 115 Numbers T12, 186 T-8 lamps were identified, which is considered as inefficient. 8 CFLs and 13 LED tubes were found during the audit. The detailed energy efficiency projects are given in the respective chapters of this report.

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, they 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.

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

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.

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
PROVIDENCE WOMEN'S COLLEGE					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	**Energy Saving in Lighting by replacing existing 186 No's T8 Lamps to 20W LED Tube**	0.56	0.24	28.13	2976
2	**Energy Saving in Lighting by replacing existing 115 No's T12 (55W) Lamps to 18 W LED Tube**	0.35	0.34	12.21	4238
3	**Energy Saving in Lighting by replacing existing 8 No's CFL(15W) Lamps to 9W LED BULB**	0.01	0.005	30.36	67
4	**Energy Saving by replacing existing 381 No's in-efficient ceiling fans with Energy Efficient Five star fans**	8.29	0.93	107.32	11582
	Total	9.20	1.51	44.50	18863.35
(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.)					
Consolidated Cost Benefit Analysis of Renewable Energy Projects					
5	**Installation of 40 kWp Solar Power Plant**	30.00	4.09	88.06	51100

Water Conservation Activities

List four uses of water in your institute	Basic use of water in campus: 1. Drinking – Ground Water 2. Gardening – Rain water 3. Kitchen and Toilets – 4. Others –
How does your institute store water? Are there any water saving techniques followed in your institute?	Overhead Water Tanks and Sumps installed for storage of water. Water conservation are in place

If there is water wastage, specify why and How can the wastage be prevented / stopped?	No
Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many litres of water have been used.	No logbooks are available
Does your institute harvest rain water?	Yes
Is there any water recycling system?	Yes

Solar Power plant

General Environmental Awareness Questioner

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?	Yes
Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
Dose stack monitoring of DG sets conducted by the Institute?	Yes
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
Dose Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
Dose Institute participated in National and Local Environmental Protection Movement?	Yes
Dose Institute has any Recognition/certification for environment friendliness?	Yes
Dose Institute using renewable energy?	Yes
Dose Institution conducts 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

Best Practices and Initiatives	
Renewable Energy	Yes
Solar Power Plant	
Energy Audit and Green Audit Conducted	
Biogas Plant installed	
Biodiversity Conservation	Yes
Green Cover	
Tree Plantation Drives	Yes
ECO clubs	
Ground Water Recharge	Yes
Rain Water Harvesting System.	
Pollution Reduction Public Transportation	Yes
E Waste Management	Yes
Connected to authorized recycler	
Solid Waste Management	Yes
Lifting of garbage from campus on alternate day by Municipal Corporation.	
Adoption of Village	Yes
CSR	
Water Conservation	Yes
Energy Conservation	Yes

RECOMMENDATIONS

1. Implement a utility monitoring program.
    - Allocate staff to carry out meter readings for electricity, waste and water on regular basis
    - Add monitoring data to spreadsheet so results can be viewed graphically
    - Compare with the utility bills meter readings in order to ensure accuracy;

2. Consider adopting and implementing a sustainable procurement policy which takes into account the whole life cycle of a product, and make sure environmental issues are written into tenders when contracting out.
3. Consider trialing recycled paper again – many recycled brands today, such as Evolve, are just as good as virgin paper.
4. Trial the use of re-manufactured (i.e. refilled) ink and toner cartridges rather than purchasing new ones.
5. Consider producing some designated 'environmental' pages on the intranet to make it easier for staff to find environmental information. If possible a discussion forum could be set up to allow easy internal communications and staff to make suggestions for environmental improvements.
6. Environmental training could be formalized and carried out for all staff. It does not have to be too long or onerous, providing it covers key points, particularly in relation to waste so all staff are aware of the legal requirements. At the very least, environmental information should be included in the induction pack.
7. It is strongly recommended that environmental information is also given to students and staff during induction. It is particularly important for them to be aware of what waste they can dispose on site and where the can dispose of it, and what waste streams they must take away with them.
8. Consider implementing an environmental management system to incorporate all improvements and monitoring requirements. It does not need to be a complex system certified to any particular standard, merely a way of ensuring that baselines are set and progress is measured. Formation of Environment Policy and communicated to all faculties and other staff.
9. Plan for Zero Waste Campus Project
10. E-waste monthly inventory be maintained at campus as per E waste rules 2016.
11. Water Meter should be installed at institute for monitoring of water consumption per capita.
12. Increase in Environmental promotional activities for spreading awareness at campus.
13. Environment/Green committee formation for regulating eco-friendly initiatives at campus premises and periphery.

CONCLUSION

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

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 environmental perspective. There is 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.

References

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- 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)
- http://providencecollegecalicut.com/department_details/?id=NQ%3D%3D
- http://providencecollegecalicut.com/department_details/?id=MTM%3D

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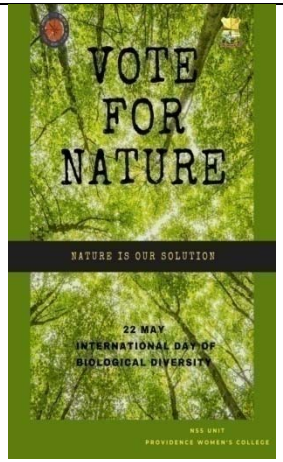
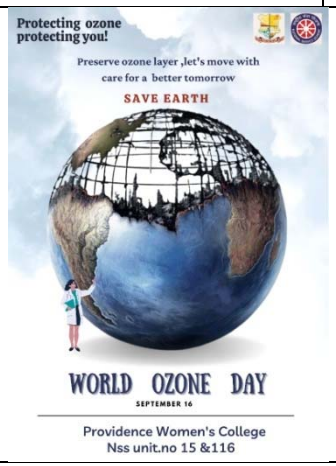
TECHNICAL SUPPLEMENTS

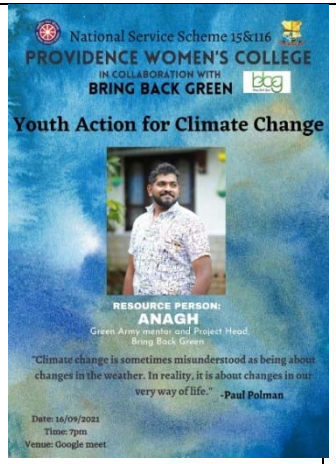
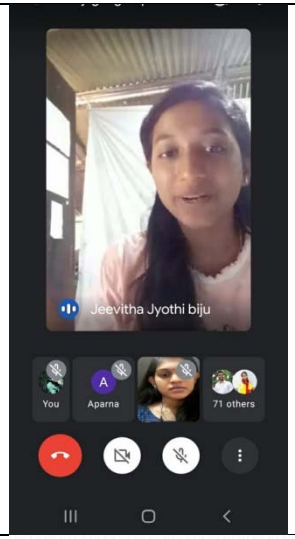
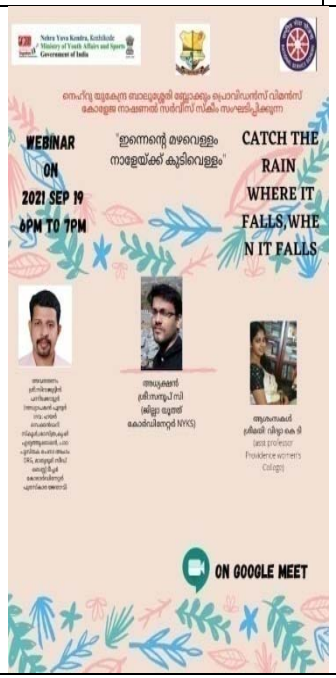
NSS ACTIVITIES: 1 MAY 2021-TILL DATE

Green Campus Initiatives (8 Programmes)

22 MAY 2021	TRIBUTE TO SUNDARLAL BAHUGUNA			https://anchor.fm/kaathodukaathoram/episodes/A-devotion-to-Sunderlal-Bahuguna-e11e12u	NUMBER OF VOLUNTRS :10 NAME OF VOULNTEERS : Thasni(history),jeevitha(phsycology),fida(physics),sneha(english),devika(english),sinifa(bcom),hilma(history),aleetta(english),dinsha(bcom),arya(maths). Podcast summary: On may 22, the 10 leaders of nss unit of providence conducted a podcaste based on the death of sundarlal bahuguna(famous enviornmentlist).in this part, the leaders were divided in to 3 grupes 1.content creators 2.podcaste 3.editing .this were the 3 groups.in this, 6 leaders were the content creators(thasni,sneha,aleetta,arya,sinifa,devika),and 3 leaders were giving sound to podcaste (hilma,dinsha,fida)and the editer was (jeevitha). And atlast we published the audio on our official podcaste channel kathod kathoram.

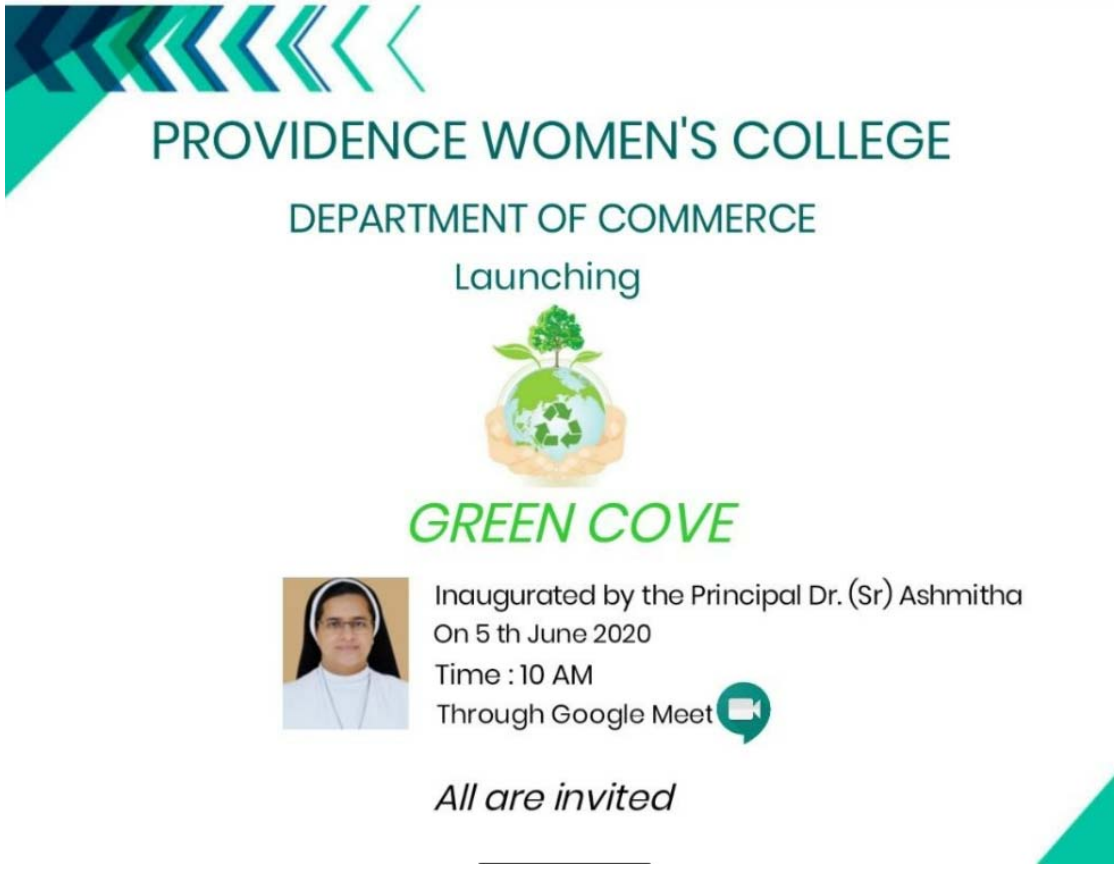
5 JUNE 2021	WORLD ENVIRONMENT DAY			https://anchor.fm/kaathodukaathoram/episodes/--World-Environment-Day-e126t4q	We celebrated Environment day on June 5th, our program was to challenge everyone to gift a tree sapling to kids #GIFTAFUTURE. This was meant to ensure the availability of tree saplings to kids as there is no other means like school or any other gathering will not be conducted in this pandemic situation. And also we accepted the challenge from our district coordinater to plant 10 tree saplings by each volunteer.
				https://youtu.be/Dqm8_PQ4nnw	. In order to celebrate this day our group under dinsha proposed an idea of a puppet show. Script writing and sound mixing was done by jeevitha jyothi of psychology department. Another 5 volunteers Rinu,Rose Maria,Rushin,Sabeeha, Sandra,gave their voices. Rifa, our volunteer, was the one who made the beautiful puppets and created the video. The video tells us about the importance of protecting our nature. It also encourages each and every person out there to plant trees. The video was almost 5 minutes. It has been posted in both YouTube and Instagram page @nssprovidence.

28 JULY 2021	WORLD NATURE CONSERVATION DAY		https://anchor.fm/kaathodukaathoram/episodes/World-Nature-Conservation-Day-e15465e https://youtu.be/dQ87GCF5zEg Instagram link: https://www.instagram.com/tv/CR3vlowgR3r/?utm_medium=share_sheet	As the part of world Conservation day, NSS voluteers of Providence Womens college planned to release an animation video regarding the importance of nature . It was presented on 28th July by Arya K and team. Also this animation video had been uploaded to the NSS Youtube channel named Sevanarpana PWC NSS. Due to the covid pandemic all the programme was conducted via google meet . Our Programme officers also talked a few words on that day.
16 Sep 2021	OZONE DAY		https://anchor.fm/kaathodukaathoram/episodes/World-Ozone-Day-e17e7kc	"Go green, go genius, stamp the carbon, stand tall, and stitch the ozone layer." September 16 World Ozone day.I Vidya lakshmi T , of Zoology presented a podcast on Ozone day. September 16th is observed as World Ozone Day or International Day for the Preservation of Ozone Layer since 1995. It is observed to spread awareness among peoplw about depletion of Ozone layer and to find solutions to preserve it.

		 	Meet link: https://meet.google.com/pyr-jvvz-djs	NSS Units(15 & 116) of Providence Women's College in collaboration with BRING BACK GREEN conducted a webinar on the topic 'Youth Action for Climate Change' in connection with Ozone Day.The webinar was conducted on September 16th , 7 pm via Google meet. Bring Back Green is a Thiruvananthapuram based initiative which comprises youngsters. They have suitable alternatives for plastics. The webinar was led by Mr, Anagh (Green Army Mentor and Project Head, Bring Back Green). He talked about the climate change we experience and their reasons. He suggested many alternatives for plastic materials such as electric scooters, cloth bags, cloth pads, etc. We realised that it is time to change. All the NSS volunteers actively participated in the webinar.
19 SEP 2021	CATCH THE RAIN in collaboration with Nehru Yuva Kendra	 	https://meet.google.com/hxu-emzh-mib https://pledge.mygov.in/catch-the-rain/	NSS Units (15 & 116) of Providence Women's College in collaboration with Nehru Yuva Kendra, Kozhikode conducted a webinar as part of the campaign 'Catch the rain when it falls' on 19 th September, 6 pm via Google meet. The program was inaugurated by Mr. Sachin Dev (MLA of Balussery) and the Presidential address was delivered by Mr. Sanoop .C(District Youth Coordinator, NYKS). The webinar was led by Mr.Sirajudheen who is a teacher at Govt. Higher secondary school Panoor, a writer, and Mathrubhoomi Seed Best Teacher coordinator award winner.

19 OCT 2021	WEBINAR ON AMENDMENT OF FOREST CONSERVATION ACT 1980 IN COLLABORATION WITH THE NGO BRING BACK GREEN			MEET LINK: https://meet.google.com/cvh-dwjt-tpw	On 19/10/21 , we the the NSS volunteers of providence women's college got yet another informative session, which provided several key pieces of information. The topic was amendment of forest conservation act,1980 and we got a apt person to talk about this -Chief guest and speaker of the day Alphonsa, assistant professor, department of Law, university of Calicut. The programme hosted by Jeevitha Jyoti byju of second dc psychology.The seminar began at 7:00 pm with a prayer by rushin of second dc history, then came the welcome speech by vidhula of second dc economics.Then chief guest stresses the need to preserve our environment. The session was interesting and a informative one . After that, the webinar concluded with a vote of thanks by fathima shanza of second dc economics.

The Green Cove Club - 2020



As a part of World Environment Day observation, the Department of Commerce launched a new club **"Green Cove"**. The club was inaugurated by the Principal, Dr. Sr. Ashmitha *via* Google meet. The aim behind the club was to raise awareness among the students regarding the inevitability of ensuring a healthy and clean environment. Under the club, activities like observing national and international commemorative days, quiz competitions, debates, seminars were conducted for the students by which they had a self-assessment of what they are doing to protect our environment. The club also took on certain projects to support the Green Campus initiatives of the college.

Video release on Nature Conservation

As part of ***World Nature Conservation Day***, a short video was launched on 28th July, 2020 in our YouTube channel by the members of Green Commerce club, which reminds us of the importance of nature and the need to protect it.
Link to the video – http://youtube.com/4ftXG8EHlQY

Green Initiatives under Green Cove Club

- 11TH July - Green cove organized an inter-collegiate Digital poster making competition as part of *World Population Day*. Total of 7 Posters were received from various colleges. The winner of the competition is Ms. Revathi. E of St. Xavier's college of arts and science and was awarded with1month recharge coupon as a token of appreciation along with an E-certificate.

- As part of World Population Day, students launched a video in the department YouTube channel "**Maanda**": When things have things to say, under the Green Commerce Club.

- 29TH July – The Club Organized a **Face painting competition** as part of ***International Tiger Day*** and the Winner of the Competition was Ms. Nakshatra Subhash, 2nd year psychology, Providence Women's College. E-certificate and a cash prize of Rs. 500 was awarded to the winner

- 20TH August - Green commerce club organized a **"National Level Online Quiz Competition"** on 20th August as part of **Indian Akshay Urja Day**. The topic of the Quiz competition is Renewable Energy Sources. Total of 86 participants registered from different states of India. After online registration the participants were added to a WhatsApp group and instructions regarding quiz were provided in the group. Out of 86 participants, 54 of them attended the quiz and those who qualified 60% and above marks were given E- certificates

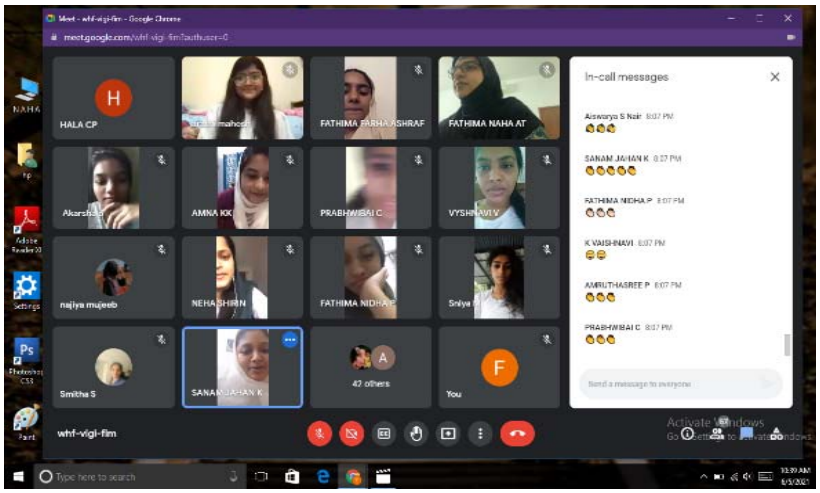
- 20TH August - As part of **World Mosquito Day**, the club launched an informative video which puts an insight into the contributions of Dr. Ronald Ross to the scientific world on transmission of Malaria. The video includes the precautions to be taken to prevent mosquito bites and the various symptoms of diseases spread by mosquitoes.

- 28TH September - As a part of **Green Consumer Day,** Green commerce club organized an **Online pencil drawing competition** on the topic "Consumerism and its impact on the environment". The winner of the competition was Ms. Anamika P of Karunya Institute of Technology and Science, Coimbatore and the winner were duly facilitated with e - certificate.

- 24TH to 28TH March - One-week online craft making workshop was arranged under **Green cove** for children between the age 10-15 and for College students. The title of workshop was **"Online craft making using waste material".** The Resource persons were Melissa Olivia Cruz (Alumnae), Ananya G.K. and Rahiba of II M. Com. A workshop was arranged on 24th and 25th for children, recorded videos were posted in WhatsApp group, which was later uploaded in the YouTube channel 'calypso'. There were 5 participants between the age 10-15 and all were provided E-certificate after completion of workshop. From 26th to 28th March, online craft making classes were arranged for college students and 7 participants were awarded with E-certificate after completion.

Quiz Environ

The Department of Travel and Tourism Management conducted a department wise quiz competition in connection with the World Environment Day on 5th June, 2020. 67 Students from various departments of the college participated in the program where, Fathima Naha was awarded with the first prize.



Environment Day Webinar

As part of World Environmental Day, Department of Physics, Providence Women's College conducted a webinar on the topic Tropical Cyclones. The webinar was conducted via Google meet on 5th June, 2020. The chief guest of the day was Dr. Rajasree VPM who is a post doc fellow at the Centre for Atmospheric and Climate Physics Research (CACP)University of Hertfordshire, UK. 48 participants including the students and teachers were enrolled for this online meet up.

Sustainability day pledge

As part of **Sustainability Day**, Green cove released a video to remind the human community the importance of caring for the environment, to reduce plastic use and to plant more trees to protect nature. Students of the Commerce Department also took a pledge on October 28th to ensure a plastic free environment. 52 students participated in the event.

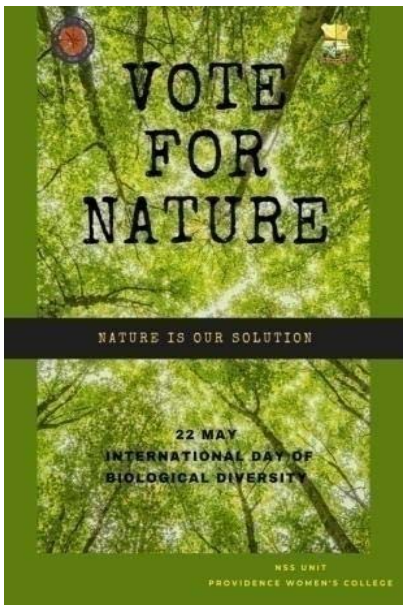
Digging for the future – Compost pit making by the NSS volunteers

The SS volunteers prepared Dry leaf compost on 21st December, 2020 in their home premises.

Dr. Vidya explained the process of making the dry leaf compost. All the volunteers got hands-on experience on creating their own compost pits within their home compound by means of YouTube video tutorials.

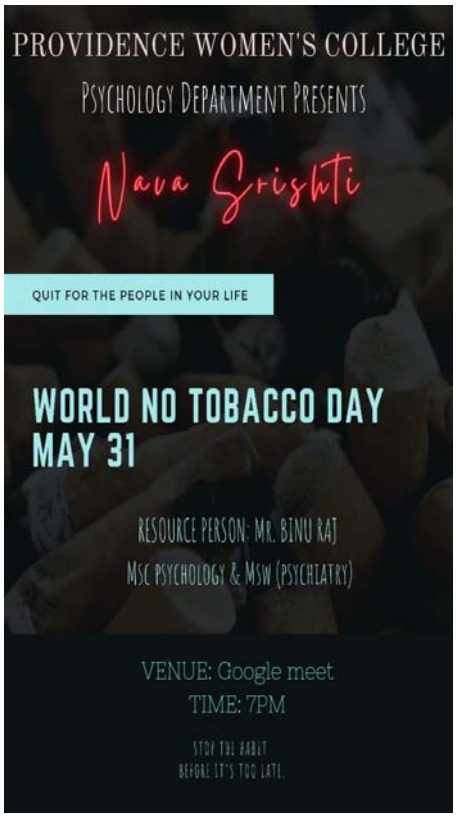
Clean Veggies in Clean Campus – An Effort of the NSS unit

As the part of Covid 19 pandemic outbreak and lock down, college was closed for several months which resulted in the overgrowth of the crop plants and dominance of weeds in the vegetable garden. With the active participation of the NSS volunteers, 11th to 14th January, 2020 restoration of the same was carried out by proper weeding and replantation. The perishable crops were replaced by drought resistant crops like tapioca for an increased possibility of sustenance during the unpredictable conditions of the pandemic period.



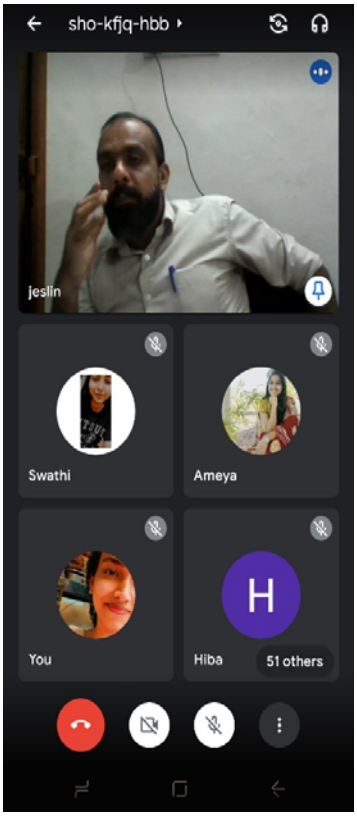
A Tribute to Sunderlal Bahuguna

On 22nd May, 2021 the 10 leaders of the NSS unit of the college made a podcast based on the contributions of Sundarlal Bahuguna, the renowned Indian environmentalist. The leaders were divided into 3 groups – content creators, Podcast makers and the Editing team. The Audio was released officially in the Podcast channel – '**Kathod Kathoram'.** The link to the same is https://anchor.fm/kaathodukaathoram/episodes/A-devotion-to-Sunderlal-Bahuguna-e11e12u



A Ray of Hope

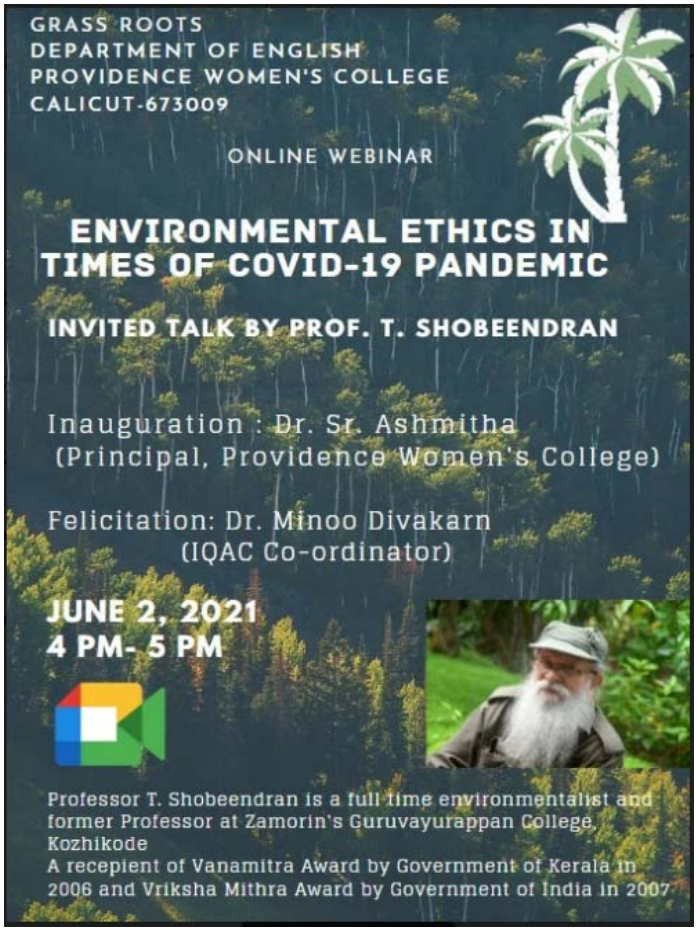
The Department of Psychology organized a talk on 31st May 2021, via Google meet so as to make students aware of the importance of eliminating the use of Tobacco and their role in supporting the affected class of people in the society. The Consultant psychologist Mr. Binu Raj served as the resource person



Words from the Peers

The Department of English in association with Environment Club organised a talk on environment ethics in times of Covid 19 pandemic. The speaker was Prof. Shobeendran T., the renowned environmentalist. The programme was conducted online on Google meet platform on 2nd June, 2021 at 4 p.m.

The link for the online programme was http://meet.google.com/mex-uajx-kxx



The Altruistic Approach

On the occasion of the World Environment Day, the NSS unit of the college offered a challenge named #GIFTAFUTURE. The event was meant to ensure the availability of tree saplings to kids as there were no other means like school or other gatherings during the pandemic situation. The participants posted the hash tagged photographs of gifting a tree sapling to their kids on Instagram.

Along with this, the volunteers also accepted the challenge of planting 10 saplings each which was initiated by the NSS District Co-ordinator.

https://anchor.fm/kaathodukaathoram/episodes/--World-Environment-Day-e126t4q

Meet my Tree

The NSS unit of the college organized "meet my tree campaign" via Google meet on 5th June, 2021.

As a part of World Environment Day observation, each volunteer planted a tree sapling (total of 100 saplings) at their houses and each of them showed their saplings to each other through a video conference.

The Puppet show - Message in Marionettes

An elegant part of the World Environment Day observation was the puppet show designed by the NSS volunteers. Rifa made the beautiful puppets and did the videography for the same. Script writing and sound mixing was done by Jeevitha Jyothi of the Department of Psychology. The NSS volunteers Rinu, Rose Maria, Rushin, Sabeeha, and Sandra provided the vocals. The 5 min. video which explains the importance of protecting nature by planting trees, has been uploaded in both YouTube and Instagram page @nssprovidence.

https://youtube/Dqm8_PQ4nnw

Home Garden Contest

An online garden contest was arranged for students of Providence Women's College on 5th June 2021 in connection with world environment day 2021. Students were encouraged to make homestead gardens and were asked to submit videos of the home garden for judgement.

A total of 15 entries were received. Sadiya (2 sem Computer Science) on the first prize. Alka VJ (5th sem Psychology) and Fathima Thahaniya P (2 sem Psychology) bagged 2nd and 3rd prizes, respectively.

Maintenance of Herbal Garden

An herbal garden is maintained in the campus including 78 species of medicinal plants which include mostly herbs. A few shrubs and trees are also planted. As a special section, a home remedy corner is also maintained associated with the herbal garden. 15 PG students

Green Earth-Clean Earth

On behalf of World Environment Day-2021 Department of Travel and Tourism Management observed "Green Earth-Clean Earth" program on 5th June, 2021. Quiz Competition, a Jumbled Word program and This/That program were the competitions conducted. Videos of the drawings done by the students was presented along with the videos showing the growth of green gram and collage on World Environment Day, which were also prepared by the students. Speech on the use of Plastic by the students was the highlight. The program was conducted to give awareness to everyone about our mother Earth and how to protect, maintain and sustain her for the future generations.

MERIKA – Skill Expo

MERIKA is a green campus initiative by the Department of Business Administration of Providence Women's College. The objective of this initiative is to promote the usage of cloth bags over polythene bags which is extremely hazardous to the environment. Our students Ms Maneesha K and Ms Rudha M P of II BBA were assigned to stitch and distribute these cloth bags and purses in our campus. The unused fabrics from shops were collected and hand stitched by our students to produce good quality reusable cloth bags. These products were available for sale at affordable prices at the college campus. It was a huge success as many students purchased these bags and switched to an environment friendly lifestyle. Moreover, the profit obtained from this initiative was used for charity programs organised by the BBA department for various contributions towards old age homes and schools.

Clearing the E-Trash

The Department of Computer Science launched the E-Bin programme on 10th June, 2021 which enabled the appropriate disposal of the E-wastes from the campus as well as from the homes of the staff and students. The 1hour E-waste challenge was extremely successful where the wastes could be collected in a broad scale and handed over to the concerned authorities for its ecologically safe disposal.

The students of the Department of Computer Science brought up the seed pen concept. They learned to make pens using paper and a seed at its tip so that, after use even it is disposed carelessly, it would degrade as well as the seed would germinate to form a plant. 100 pens were made and distributed in the campus among the staff and students.

Our Buds as Resource Persons

Megha Suresh of II PG English presented an online talk titled "A Peep into the After-Effects of War and Human Activities on the Environment: Gone with the Wind from an Eco-Feminist Perspective" in the Invited Student Talk Series, organised as part of the World Environment Day 2021 observance organised on 26th July, 2021, by Al-Shifa Arts and Science College, Perinthalmanna.


AL SHIFA COLLEGE OF ARTS & SCIENCE

CERTIFICATE
OF APPRECIATION

This certificate is presented to Mr./ Ms. **Megha Suresh**, 2nd MA English, Providence Women's College, Malaparamba, Calicut, Kerala, for presenting an online talk titled, "A Peep into the After-Effects of War and Human Activities on the Environment: 'Gone With the Wind' from an ecofeminist perspective ", on 26 July, 2021, in the Invited Student Talk Series, organised as part of the World Environment Day 2021 observance, jointly under the aegis of the Department of English and Nature Club, Al Shifa College of Arts and Science. Kizhattoor, Perinthalmanna, Kerala.

Principal

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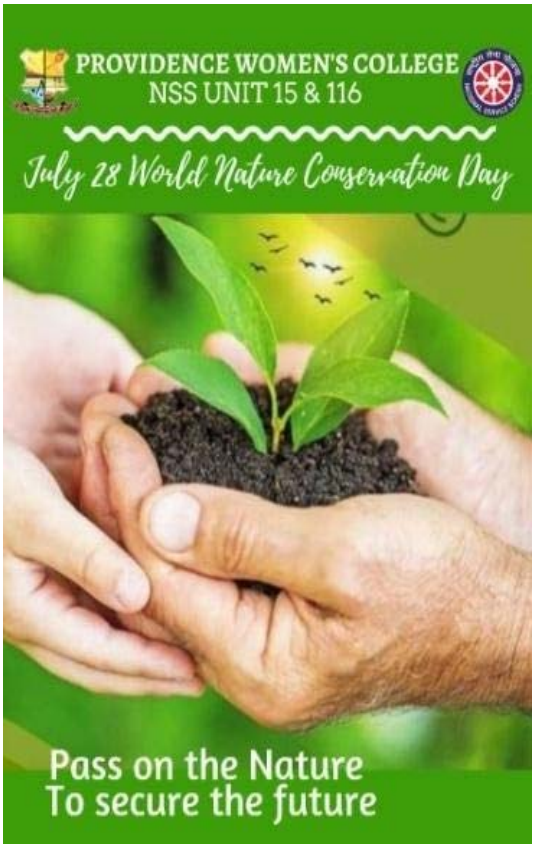
Made for free with Certify'em

International Ozone Day Observation

The students of the Department of English made an awareness video on the importance of preserving the environment and the ozone layer, for a better future. The programme was on 16th September, 2021. The link of the video ishttps://youtu.be/Wp9DklYdevw



Conserving Mother Nature

An animated video was released by the NSS volunteers of the college as a part of observing World Nature Conservation Day on 28th July, 2020. The session was conducted online wherein the programme officers presided over the gathering. The video explains the importance of conserving nature and our role in fulfilling the same. The presentation was done by Arya K. and team and later the video was uploaded in the NSS YouTube channel – Sevanaparwana PWC NSS.

https://anchor.fm/kaathodukaathoram/episodes/World-Nature-Conservation-Day-e15465e

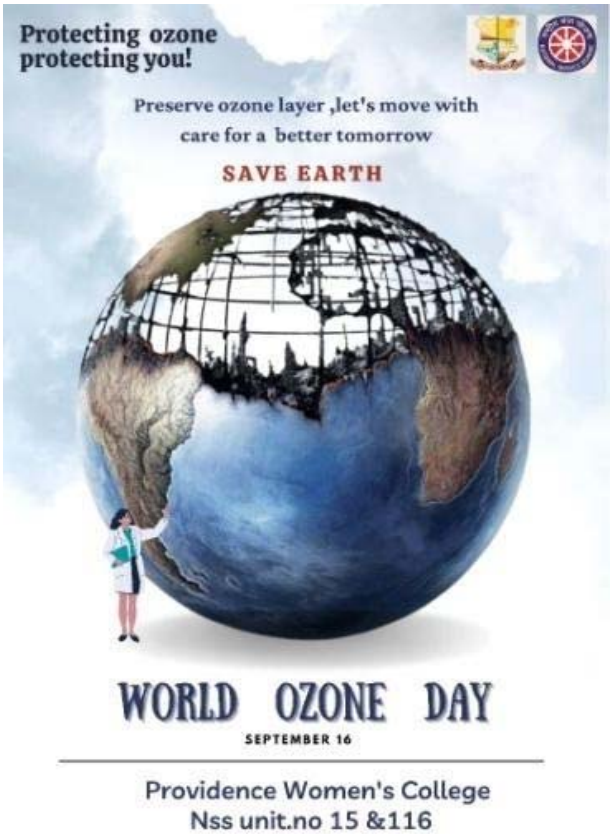
https://youtu.be/dQ87GCF5zEg
Instagram link:
https://www.instagram.com/tv/CR3vlowgR3r/?utm_medium=share_sheet

"Go green, go genius, stamp the carbon, stand tall, and stitch the ozone layer."

September 16th is observed as World Ozone Day or International Day for the Preservation of Ozone Layer since 1995. It is observed to spread awareness among people about depletion of Ozone layer and to find solutions to preserve it. As a part of the observation of International Ozone Day of this year, Vidyalakshmi T. of the Department of Zoology presented a podcast on16th September, 2021.

The link for the same is:

https://anchor.fm/kaathodukaathoram/episodes/World-Ozone-Day-e17e7kc



Inter-Collegiate Quiz on Ozone

On behalf of observing International Ozone layer, the NSS unit of the College conducted an Inter- collegiate online Quiz competition to create awareness and to conscientize students about the need to protect the Ozone layer of the Earth's atmosphere. The registration was done through Google doc form on 16. 9. 2021. Nearly 300 students from more than 20 colleges got registered for the event. 160 students including 40 male participants attended the Quiz. E-certificates were issued to the students who secured a score of 80% and above.

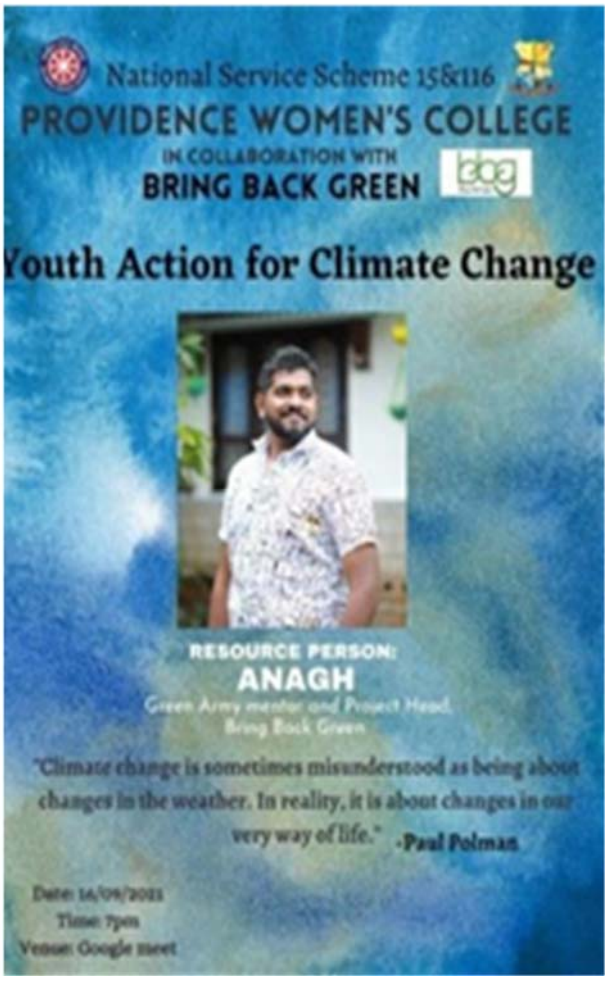
Catch the Rain Campaign

The NSS Units (15 & 116) of Providence Women's College in collaboration with Nehru Yuva Kendra, Kozhikode conducted a webinar as part of the campaign 'Catch the rain when it falls' on 19th September, 6 pm via Google meet.

The program was inaugurated by Mr. Sachin Dev (MLA of Balussery) and the Presidential address was delivered by Mr. Sanoop .C (District Youth Coordinator, NYKS). The webinar was led by Mr.Sirajudheen, the renowned writer and teacher at Govt. Higher Secondary School Panoor, and also the winner of Mathrubhoomi Seed Best Teacher coordinator award.

https://meet.google.com/hxu-emzh-mib

https://pledge.mygov.in/catch-the-rain/



Youth Action for Climate Change

A webinar was organized in alliance with BRING BACK GREEN - a collective of young people working as a NGO based at Thiruvananthapuram. It was conducted on behalf of the observation of International Ozone Day on the topic ''Youth Action for Climate Change' on 16th September, 2021 *via* Google meet.

The webinar was led by Mr. Anagh (Green Army Mentor and Project Head, Bring Back Green). He explained the climate change we experience and the reasons for the same. He suggested and encouraged to use alternatives for plastic materials such as electric scooters, cloth bags, cloth pads, etc. The session reminded that its high time to change the routine plastic usage and adverse practices.

https://meet.google.com/pyr-jvvz-djs

Maintenance of Campus Biodiversity Register (flora)

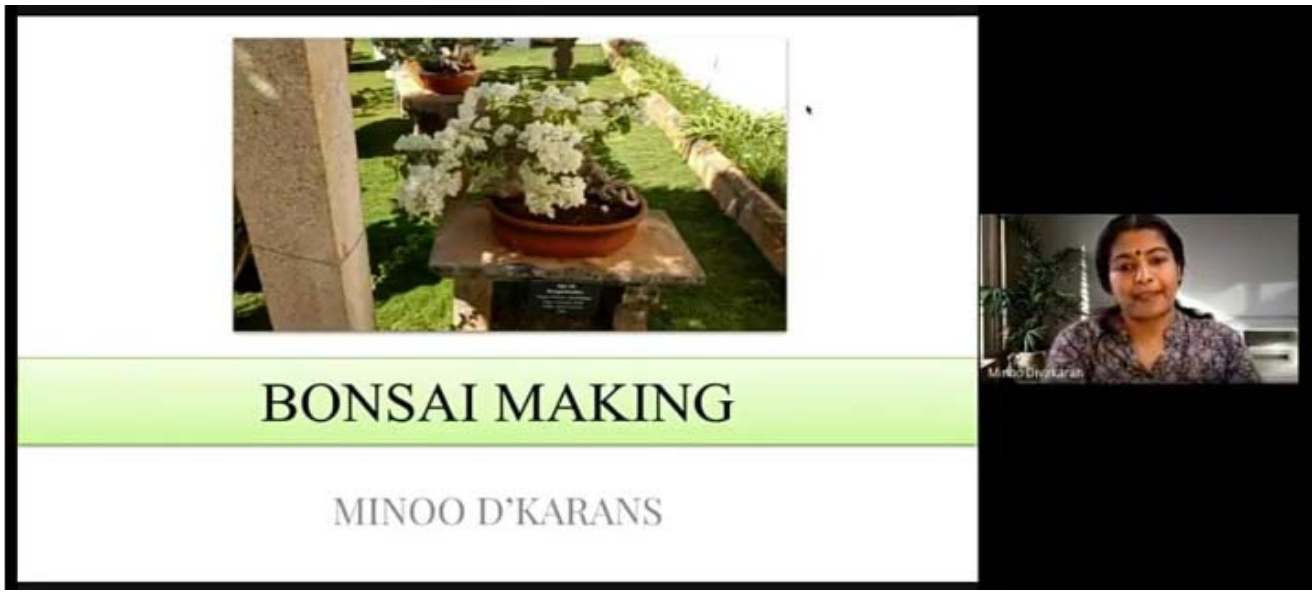
A campus Biodiversity Register was prepared, joining hands with Kerala State Biodiversity Board in 2009. The register is maintained and updated every year. According to 4th October, 2021, a total of 538 species of angiosperms belonging to 117 families, 6 species of gymnosperms belonging to 4 families, 11 species of pteridophytes under 4 families, 7 species of bryophytes under 3 families and 7 types of special collections including Dasapushpangal, Nalpamaram, Birthstar plants, Dasamoolangal, Thriphala, Trikatu, Sugandha triphala etc. were recorded during the year 2021. 15 PG students participated in the survey for recording the species on the campus.

The Vibrant NATURE CLUB

The Department if Botany in association with the Nature Club of Providence Women's College organized a series of skill development programmes to enhance the practical knowledge and skills of the students. It includes Bonsai making, mushroom cultivation. Biofertilizer technology, Organic farming, Vermicomposting. The details of each day's program are as follow:

Bonsai Making – A Green Skill Initiative

A class on bonsai making was organised for students of 3 BSc and 2 BSc Botany on 10th October 2021. Training on making different styles of bonsai, like upright, formal slanted, informal slanted, and cascade etc. were shown. The theory part was online, which was followed by online demonstration sessions. 20 selected students participated in the training programme.

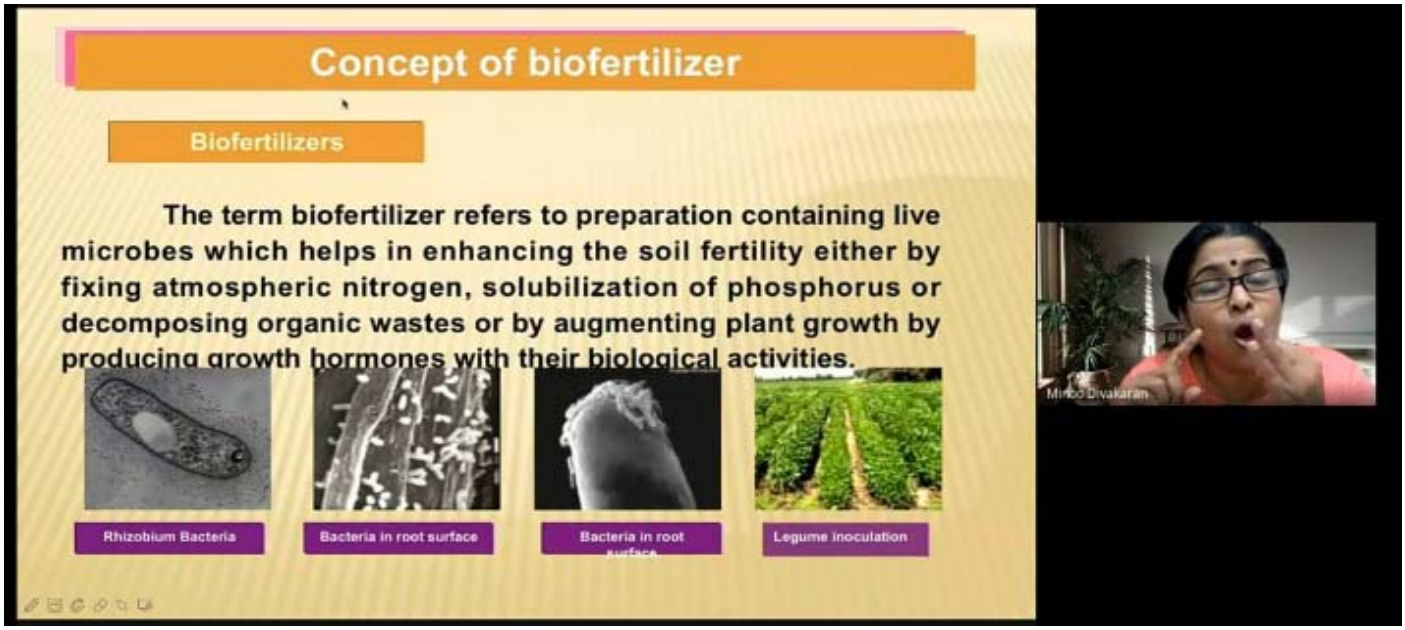


Mushroom cultivation

A class on mushroom cultivation was arranged through google meet online platform on 11th October 2021 for 30 students from 2 & 3 year BSc Botany. Cultivation technique of oyster mushrooms were demonstrated. Economic importance and nutritional benefits of mushrooms, were dealt with in detail. Marketing strategies of mushrooms, preparation of value-added products from mushroom were also explained.

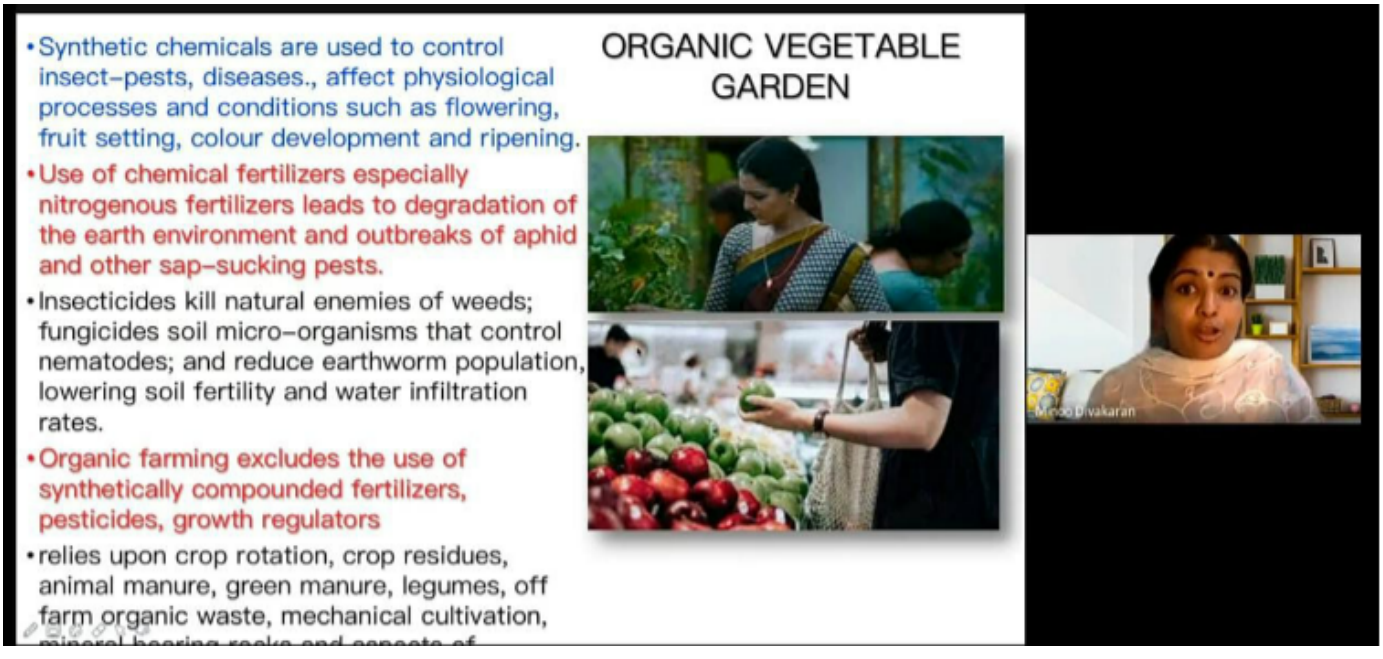
Biofertilizer Technology

A training programme on the preparation of biofertilizers using eco-friendly stuff was arranged on 12th October 2021. Benefits of different types of biofertilizers, their preparation methods etc. were dealt in detail. The training was imparted for 20 selected students from 2nd year BSc Degree class.



Practicing Organic Vegetable Farming

A class on was conducted on 14-10-2021 for PG students. Organic vegetable farming, the production system that relies on biological processes and natural materials to manage soil fertility and pest populations and to promote healthy crop growth. Detailed structure. Lessons on preparation of bed, use of organic fertilizers, use of organic pest control mechanisms etc. were dealt in detail.



Vermicomposting

An online training session on vermicomposting was arranged on 14th October 2021. Two methods of vermicomposting - vermicomposting in bin and vermicomposting in vermicompost pile were demonstrated. 30 students from 3rd year BSc Botany attended the class.

Plant Propagation Techniques

A training programme on plant propagation methods was organised on 15th October 2021. Conventional and other types of propagation methods including cuttings, budding, grafting, layering etc. were demonstrated. 42 students from 2 year BSc Botany attended the training programme.

Making Kokedama

KOKEDAMA making
Video from Minoo Divakaran
www.youtube.com

https://youtu.be/XtWDj2zShYg 11:05 AM

An online training programme on kokedama making was conducted on 23-11-2021 for 94 students including BSC and MSc students of Botany. Students prepared their own kokedamas using the technique demonstrated. The demonstration video was uploaded in the YouTube channel for further reference. The image shows the Kokedama [prepared by the students.

Webinar - Bring Back Green

The NSS unit of the college organized a webinar on Webinar on Amendment of Forest Conservation Act 1980 in Collaboration with The NGO - Bring Back Green 19th October, 2021. The Chief guest and Speaker of the day was Ms Alphonsa Jojan, Assistant Professor, Department of Law, University of Calicut. The programme hosted by Jeevitha Jyoti Byju of the Department of Psychology.

MEET LINK: https://meet.google.com/cvh-dwjt-tpw

Clean Campus

The students of the College get in to the campus regularly do as to maintain the premises clean and beautiful. As a part of Green Campus Initiative, NSS volunteers and the students of Department of Psychology took part in the Clean Campus Campaign on 10th November, 2021.

Undertaking the Energy Conservation Pledge

The students and teachers of the College undertook the pledge for the conservation of the non-renewable energy resources available. The programme was organized by the Department of Physics in according to the instructions of the Ministry of Environment, Forest and Climate change.

Certificate
Fuel Conservation 2021 Pledge

I do hereby solemnly pledge that I shall be continuously striving to conserve petroleum products in all spheres of our activities so that supplies of these scarce resources last longer for the progress of our country. I will shoulder the responsibility of a good citizen and endeavour to create awareness among the masses to avoid wasteful use of petroleum products, so as to build a new & healthy India for our future generations by ensuring a better environment.

8884754636
December, 14 2021
Shyamila M
Signature

Ministry of Environment, Forest and Climate Change
Certificate
Swachh Bharat Harit Bharat
This is to certify that
Agnes P John
has taken the 'Green Pledge' and committed himself/herself to join the 'Awareness campaign to avoid the use of single use plastics' and consciously contribute in creating a healthy, sustainable environment by making positive changes in his/her everyday life.
2452423837
December, 14 2021

Certificate
Fuel Conservation 2021 Pledge

I do hereby solemnly pledge that I shall be continuously striving to conserve petroleum products in all spheres of our activities so that supplies of these scarce resources last longer for the progress of our country. I will shoulder the responsibility of a good citizen and endeavour to create awareness among the masses to avoid wasteful use of petroleum products, so as to build a new & healthy India for our future generations by ensuring a better environment.

3968257436
December, 14 2021
Minnu
Signature

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Fuel Conservation 2021 Pledge

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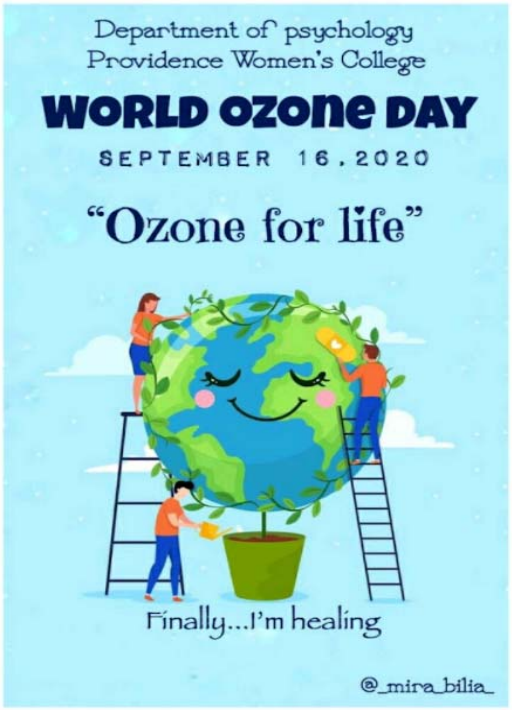
3935567897
December, 14 2021
Sini R.
Signature



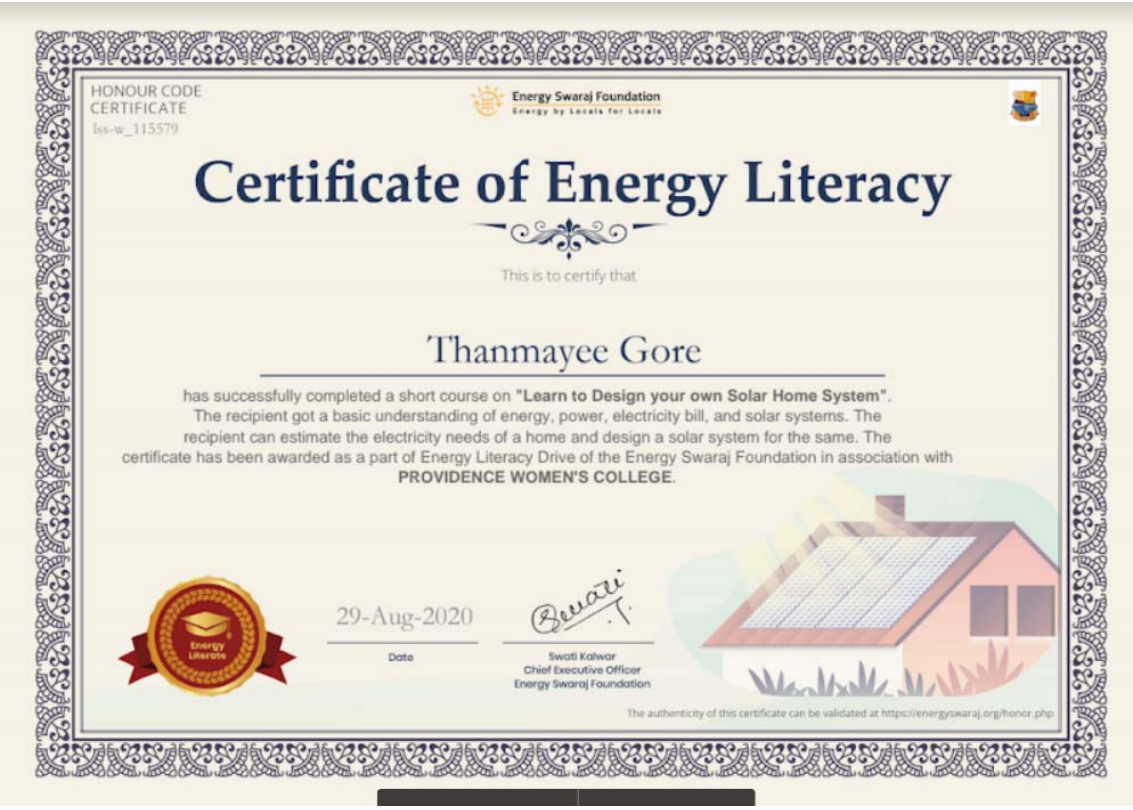
Planting & Recycling Programme

As a part of Observing the World Ozone Day, the Department of Psychology organized a mission to plant trees and remove the plastic wastes into a recyclable form. Students and of the department participated in the programme held on 16th September 2020.

Course on Energy Literacy

Learn to Design a Solar System" is a course, which gives a unique opportunity to become Energy Literate irrespective of their educational background and experience. Department of Physics conducted an Energy Literacy Drive in association with Energy Swaraj Foundation with a course on "Learn to Design your own Solar Home System". The recipient got a basic understanding of energy, power, electricity bill, and solar systems. The recipient can estimate the electricity needs of a home and design a solar system of energy for the same. Students above the age 14 could attend the course. There are 15 videos in the course. Students need to watch each and every video to successfully complete the course Students must clear the quiz to get the certificate. For detailed instructions, the department organized an awareness session for people in different regions of Kerala. About 365 students registered for the program. Those students who scored above 25% were awarded with the e-Certificate.

https://energyswaraj.org/take-quiz.php?organization_id=organization_1599



Inter-collegiate Photography contest

In connection with World Environment Day, the Department of Mathematics conducted an Inter-Collegiate photography contest. 73 participants from various colleges participated. The winners were announced and gifted with special rewards.

NilishnaVR
Govt. College Madappally

Thulasi S
St. Joseph's College, Irinjalakuda

Harinandan
SNGC, Chelannur

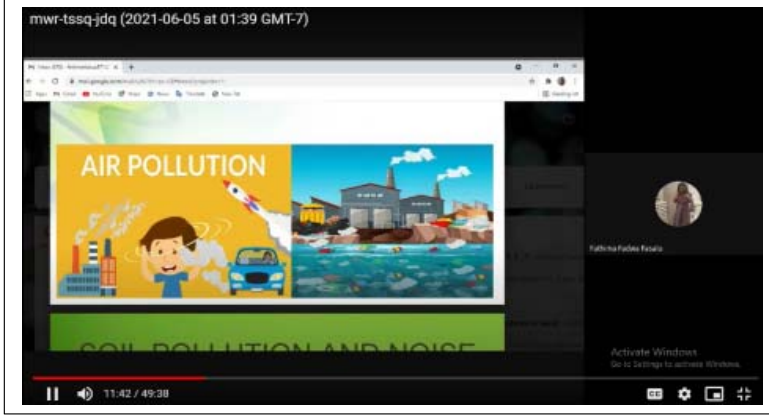
PROVIDENCE WOMEN'S COLLEGE
Department of Business Administration

World Environment Day

Webinar for kids on June 5 2021 @ 2PM

Interaction with the Kids

On behalf of the World Environments Day observation, the Department of Business Administration conducted a Webinar for the school kids. The session was carried out by Fadwa Faslu where the discussions on Sustainable Development, Cleaning the Environment, 3Rs and Biodiversity. The feed back of the students were collected which showed the active participation and benefit for the students.



DIY Courses for Women

The Department of Commerce organized a One Week online course for household women. DIY for environment conservation under which sessions on vertical garden and Micro green seeds was provided for household women. The coordinators of the course were Ananya T. B. of III B. Com and Neethusha of II B. Com.

The first two days (28th -29th June) dealt with the method of creating hanging garden using unused plastic bottles. 14 members participated in the event on the first day and 13 on the second day.

Day 3 (30th June) was involved in Microgreen concept in which waste plastic cups were utilized. 12 members participated in the same.

Day 4 (1st July) dealt with creating gardens in balcony using the throw away plastics. 11 members participated in the event.

Day 5 was engaged with the green innovative thoughts to beautify the gardens. 22 members participated on the last day of the workshop.

The event was really interesting and enriching for the home makers.

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