

March 1st, 2023.

To,
**Centre for Environmental Studies &
Paryavaran Mitra (Eco Club)
Mar Gregorios College of Law
Nalanchira.**

Dear Centre for Environmental Studies,

On behalf of Volunteer for India, we would like to express our heartfelt appreciation and gratitude for your contribution towards our waste management upcycling program. We are thrilled to accept the items collected as part of this initiative, which we believe will go a long way in reducing the environmental impact of waste in our community.

As you know, Volunteer for India is committed to making a positive impact on the environment by promoting sustainable practices that reduce waste and conserve resources. Your efforts in collecting and upcycling items demonstrate a shared commitment to this cause, and we are honored to have the opportunity to work with you.

The items collected as part of your waste management upcycling program will be put to good use in our community, either through repurposing, recycling, or donating to those in need. We believe that by working together, we can create a more sustainable future for all.

Once again, we would like to express our sincere appreciation for your contribution and look forward to continued collaboration in the future. Thank you for your commitment to the environment and for making a difference in our community.

Sincerely,



Gautham Ravindran,
Chief Executive Officer,
Volunteer for India



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 energy 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 Mar Gregorios College of Law , Thiruvananthapuram on their request.

Dated this 20th day of December 2021.



SURESH BABU B V

ACCREDITED ENERGY AUDITOR (AEA 33)
BUREAU OF ENERGY EFFICIENCY, GOVT OF INDIA



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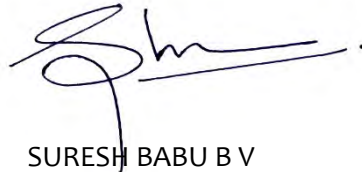
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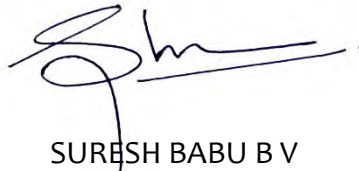
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The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010.

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Dated this 20th day of December 2021.



SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)





ENERGY AUDIT REPORT

MAR GREGORIOS COLLEGE OF LAW THIRUVANANTHAPURAM

Executed by



2021


OTTOTRACTIONS
Energy - Engineering - Environment
SRL A-21, Sasthamangalam, Thiruvananthapuram-695010
Ph:+919447068747, 9447621674,
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www.ottotractions.com



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
MAR GREGORIOS COLLEGE OF LAW

THIRUVANANTHAPURAM





Energy Audit Report
Mar Gregorios College of Law
Report No: EA 878
2021-December



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 Mar Gregorios College of Law, Thiruvananthapuram for their timely help extended to complete the audit and bringing out this report.

We thank the management of Mar Ivanios College for entrusting Ottotractions to conduct the audits in all its mentee institutes as part of its Paramarsh Scheme.

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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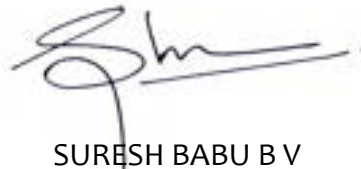
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SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)



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Executive Summary

Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects

Mar Gregorios College of Law, Thiruvananthapuram

Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	0.08	0.030	32.52	352
2	Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	0.05	0.014	47.69	160
3	Energy Saving by replacing existing 357 No's in-Efficient ceiling fans with Energy Efficient Five star fans	10.71	0.539	238.47	6340
	Total	11	1	106	6852
(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.)					
4	Installation of 30kWp Solar Power Plant	22.50	3.26	82.88	38325
5	Installation of 15Kg/day Biogas plant	0.2	0.26	9.39	5647
	Total	22.70	3.51	46.14	43972

1

Introduction

A detailed energy audit has been carried out at MAR GREGORIOS COLLEGE, THIRUVANANTHAPURAM by OTTOTRACTIONS in December 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

The Malankara Syrian Catholic Major Archiepiscopal Church has a prominent role in the advancement of education in the State of Kerala especially in the last eight decades; it has established hundreds of primary, secondary and higher secondary schools, industrial training institutes and many professional colleges. Mar Gregorios College of Law (MGCL) was established in 2012 as another milestone in the glorious Mar Ivanios Vidyanagar Campus which was founded in 1949 by the Servant of God Archbishop Geevarghese Mar Ivanios. Mar Ivanios Vidyanagar, the educational campus, emerged from the educational vision of the Malankara Syrian Catholic Major Archiepiscopal Church in the State of Kerala.

The sprawling 43 hectares of verdant campus, abundant in natural beauty is the ideal learning environment. The campus is blessed with 17 centres of excellence in education. The campus has been named “Mar Ivanios Vidyanagar” in fond remembrance of Archbishop Mar Ivanios, the founder of Mar Ivanios College, the first educational institution in the campus. Other Institutions in the campus are, to name a few, Mar Baselios College of Engineering and Technology, Mar Theophilos Training College, Sarvodaya Schools (Both CBSE and ICSE) and Bethany Navajeevan College of Physiotherapy, etc.

The College is administered by the Major Archdiocese of the Malankara Syrian Catholic Major Archiepiscopal Church through the Malankara Catholic Educational Society of the Archdiocese of Trivandrum. Mar Gregorios College of Law was envisioned as a centre of excellence in legal education. The college was instituted in the name of His Grace Most Reverend Archbishop Benedict Mar Gregorios, who was the second Metropolitan Archbishop of the Malankara Syrian Catholic Major Archiepiscopal Church. The college is affiliated to the University of Kerala and recognized by the Bar Council of India.

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	812	880	892
Staffs	31	32	31
Total Occupancy of the college	843	912	923

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
5. Ajay Dev K, Project Engineer
6. Jomon J S, Project Engineer

2

Process description

The energy audit has been carried out at Mar Gregorios College of Law, Thiruvananthapuram. The following is the baseline data of this building.

BASELINE DATA SHEET FOR GREEN AUDIT						
1	Name of the Organisation	Mar Gregorios College of Law, Thiruvananthapuram				
2	Address (include telephone, fax & e-mail)	Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram, Kerala, India, 695015 0471-2541120, 8089352686 info@mgcl.ac.in, mgcltvm@gmail.com				
2	Year of Establishment	2012				
3	Name of building and Total No. of Electrical Connections/building	Mar Gregorios College of Law [1]				
4	Total Number of Students	Boys	-	Girls	-	Total 880
5	Total Number of Staff	32				
6	Total Occupancy	912				
7	Total area of green cover	3 acre				
8	Type of Electrical Connection	HT	0	LT	1	
9	Contract Demand (KVA) /Connection	41.8				

10	Average Maximum Demand (KVA)	57					
11	Total built up area of the building (M ²)	7695					
12	Number of Buildings	1					
13	Average system Power Factor	-					
14	Details of capacitors connected	-					
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1					
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks
		NA	NA	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 Solar Power Plant, Biogas Plant , Nature Club					
18	Contact Person & Telephone number	Dr. John P C					
		8089352686					

3

Energy and utility system description

3.1.1 Electricity

Electricity is purchased from KSEB under LT 6F 3Phase GENERAL tariff, the details are given below. One 125 kVA Diesel Generator is in operation at this campus

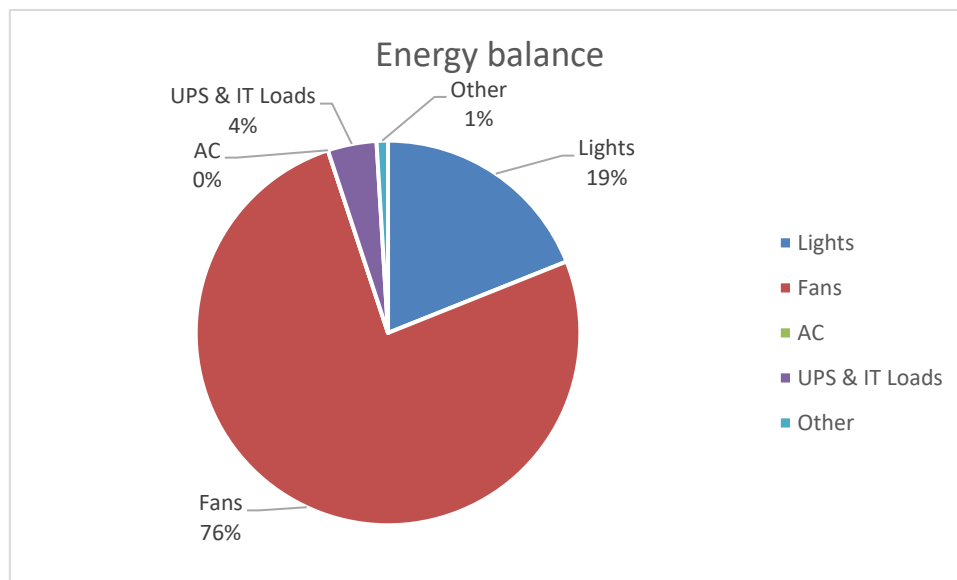
Electricity Connection Details		
Mar Gregorios College of Law, Thiruvananthapuram		
1	Name of the Consumer	Mar Gregorios College of Law, Thiruvananthapuram Nalanchira, Thiruvananthapuram
2	Tariff	LT-6F
3	Consumer Numbers	1145184020458
5	Connected Load Total	57kVA
6	Annual Electricity Consumption (kWh)	30096

3.2. Thermal Energy / Transportation

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

4

Energy Balance



76 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 19% AC and IT Equipment uses 4%.

5

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 **8.5 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										
Name of the Consumer				Mar Gregorious College of Law						
Connected Load (kW)				57	Consumer number		1145184020458			
Tariff				LT-6F (Three Phase)	Section		Nalanchira			
Month & Year	Monthly Consumption (kWh)	Average consumption (kWh)	Fixed charge (Rs)	Energy charge (Rs)	Duty (Rs)	Meter rent (Rs)	Extra fixed charge (Rs)	Extra energy charge (Rs)	Adjustment (Rs)	Total amount to be paid (Rs)
Jan-18	2298	2127	5040	20682	2068.2	17.7				28153
Jan-19	2508	2650	5040	22572.1	2257.2	17.7				29887
Jan-20	3570	3334	7980	32130.3	3213	36.7				43359

Observations

- PF shall be improved to unity, so that the maximum demand may be controlled.

Diesel

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

Fuel Bill		
Year	Amount	Litre
2018-2019	166748	2423.31
2019-2020	133926	1845.98
2020-2021	9900	116.02

Diesel Bill		
Month & Year	Litre	Amount
Feb-18	33.25	2531.98
Jun-18	33.26	2532
Feb-20	28.66	2000

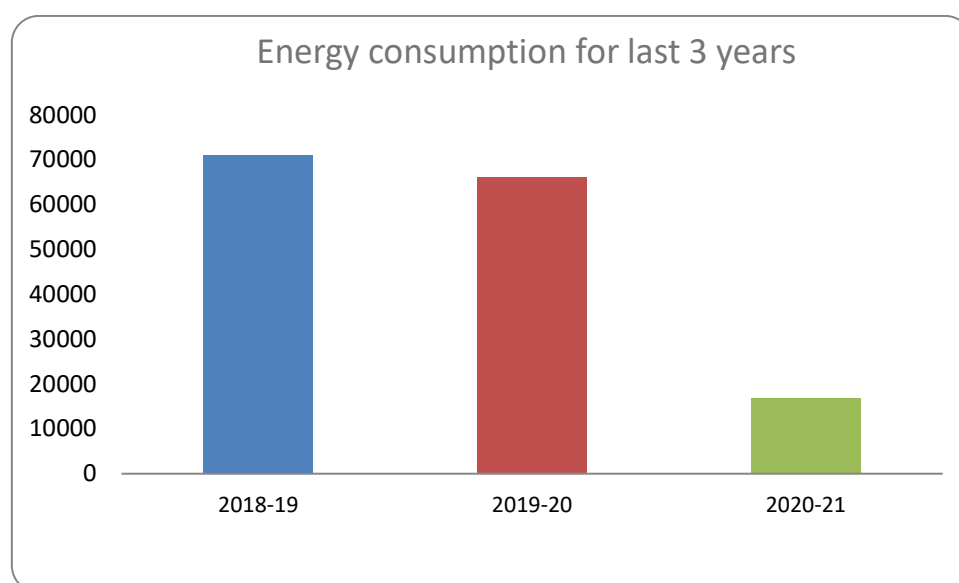
Petrol Bill		
Month & Year	Litre	Amount
May-18	3.31653	250
May-19	42.93	2863

LPG

LPG Consumption Details				
	2017-18	2018-19	2019-20	2020-21
No Cylinders In LAB	11	7	9	4
Laboratory LPG Consumption in kg	209	133	171	76
Canteen LPG Consumption in kg	912	866.4	798	114
Total in kg	1121	999.4	969	190

Base Line Energy Data				
Mar Gregorios College of Law, Thiruvananthapuram				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	27576.00	30096.00	12852.00
2	Electricity Solar - Off grid (kWh)	0.00	0.00	0.00
3	Electricity (KSEB + Off grid) kWh	27576.00	30096.00	12852.00
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	2423.31	1845.98	116.02
6	LPG (kg)	999.40	969.00	190.00
7	Biogas (kg)	-	-	-

Energy Consumption Profile				
Sl No	Fuel	2018-19	2019-20	2020-21
		(kCal)		
1	Electricity	23715360	25882560	11052720
2	Diesel	25444761	19382812	1218212
3	LPG	11992800	11628000	2280000
4	Biogas	-	-	-
Total		61152921	56893372	14550932



6

Energy efficiency in utility and process system

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

OTTOTRACTIONS- ENERGY AUDIT				
Mar Gregorios College of Law, Thiruvananthapuram				
Energy Performance Index (EPI)				
SI No	Particulars	2018-19	2019-20	2020-21
1	Total building area (m ²)	7695	7695	7695
2	Annual Energy Consumption (kCal)	61152921	56893372	14550932
3	Annual Energy Consumption (kWh)	71108.0	66155.1	16919.688
4	Total Energy in Toe	6.12	5.69	1.46
5	Specific Energy Consumption kWh/m ²	9.24	8.60	2.20

The Energy Performance Index (EPI) is

8.60 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.

Mar Gregorios College of Law

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.

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.
- Have different social and environmental clubs
- Installed LED bulbs
- Conducted Energy Conservation Training Programs

8

Energy Conservation Measures and Recommendations

OTTOTRACTIONS- ENERGY AUDIT						
Mar Gregorios College of Law, Thiruvananthapuram						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated Expected	ton of CO2 mitigated through out life
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	352	0.35	10	0.26	2.57
2	Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	160	0.16	10	0.12	1.17
3	Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five-star fans	6340	6.34	10	4.63	46.28
Total		6852	6.9	30.0	5.0	50.0

OTTOTRACTIONS- ENERGY AUDIT						
Mar Gregorios College of Law, Thiruvananthapuram						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved (Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life
		(kWh)	MWh	Years		
1	Installation of 30kWp Solar Power Plant	38325	38.33	25	27.98	699.43
2	Installation of 15Kg/day Biogas plant	5647	5.65	26	4.12	107.18
Total		43972	44	51	32	807

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 878.01	
Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
27 numbers of T8(40 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 T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	1480
No of fittings	27
Total load (kW)	1.08
Annual Energy Consumption (kWh)	639
Expected Annual Energy saving for replacing all fittings (kWh)	352
Cost of Power	8.50
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.08
Simple Pay Back (in Months)	32.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 878.02	
Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
36 numbers of CFL (15W) 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)	1480
No of fittings	60
Total load (kW)	0.90
Annual Energy Consumption (kWh)	400
Expected Annual Energy saving for replacing all fittings (kWh)	160
Cost of Power	8.50
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.05
Simple Pay Back (in Months)	47.69

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 878.03	
Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 357 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 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	1480
Total numbers of ordinary fans	357
Total load (kW)	28.56
Annual Energy Consumption (kWh)	21134
Expected Annual Energy saving, for total replacement(kWh)	6340
Cost of Power (Rs)	8.50
Annual saving in Lakhs Rs (1st year)	0.54
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	10.71
Simple Pay Back (in Months)	238.47

Energy Saving Proposal Code 878.04	
Installation of 30kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are placed on the roof it will help in improving RTTV (Roof Thermal Transmittance Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 30kW 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)	30
Total average kWh per day expected (3.5kWh/day average)	105.00
Total annual Generating Capacity (kWh)	38325
Cost of energy generated annually Lakhs Rs	3.26
Investment required (INR lakh)(Approx)	22.50
Simple Pay Back (in Months)	82.88
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	81.44

Sl.no	Installation of 15Kg/day Biogas plant	
1	Capacity of Bio gas plant(Kg/day)	15
2	Average Calorific Value of biogas (kCal/m ³)	3500
3	Annual Generation of Biogas Plant	1387.5
4	Daily production of biogas (kCal)	26250
5	LPG Saving in a day (kg)	2.1875
6	Annual LPG Saving (Kg)	405
7	Investment required (in Lakhs)	0.2
8	Annual Cost saving (in Lakhs)	0.26
9	Expected Annual Energy saving (kWh)	5647
10	Simple Pay Back (In Months)	9.39

Technical Supplements

Mar Gregorios College of Law, Thiruvananthapuram																			
Sl. No	Location	LIGHTS							FAN				IT			AC			
		T5	T8	T12	ICL	CFL	LED T	LED B	SPOT LIGHT	CF	EF	WF	PC	Printer	Scanner	Projector	1	1.5	2
1	Office 1						2			2			2						
2	Office 2					10	2			9			6						
3	Corridor					1													
4	Library						16			11			15			1			
5	class						3			2									
6	class1					2	5			2								1	
7	206		4							6						1			
8	class		2							2			4						
9	207					7				7									
10	class		3							8									
11	uo									2									
12	u1						5			6									
13	11 classroom (Floor 1)						50			66									
14	11 classroom (Floor 2)						55			66									
15	11 classroom (Floor 3)						53			66									
TOTAL		0	27	0	0	60	247	0	0	357	0	0	81	0	0	6	0	3	0

Electricity Bill Details										
Name of the Consumer				Mar Gregorios College of Law						
Connected Load (kW)				57	Consumer number		1145184020458			
Tariff				LT-6F (Three Phase)	Section		Nalanchira			
Month & Year	Monthly Consumption (kWh)	Average consumption (kWh)	Fixed charge (Rs)	Energy charge (Rs)	Duty (Rs)	Meter rent (Rs)	Extra fixed charge (Rs)	Extra energy charge (Rs)	Adjustment (Rs)	Total amount to be paid (Rs)
Jan-18	2298	2127	5040	20682	2068.2	17.7				28153
Jan-19	2508	2650	5040	22572.1	2257.2	17.7				29887
Jan-20	3570	3334	7980	32130.3	3213	36.7				43359

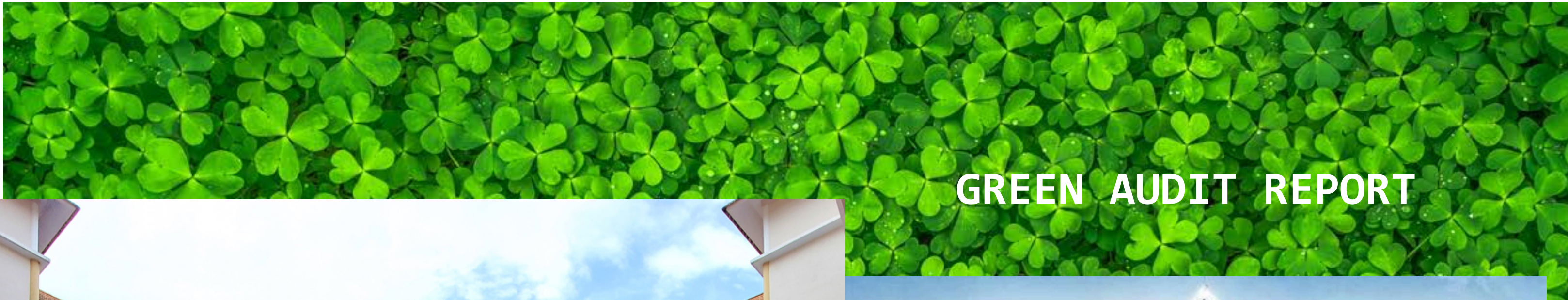
KERALA STATE ELECTRICITY BOARD LIMITED

DEMAND CUM DISCONNECTION NOTICE

(As per Regulation 122 & 123 of Kerala Electricity Supply Code 2014)

Section	[4518]-Electrical Section Nalanchira	Phone#	0471-2531686	Customer Care	1912	
Consumer#	1145184020458	Reg. Mob# 854xxxx262	Regular CC Bill	KSEBL GSTIN: 32AAECK2277NBZ1		
Name & Mailing Address		For redressing complaints/grievance approach the concerned CGRF				
THE DIRECTOR MAR GREGORIUS COLLEGE OF LAW TC 11/2394(3)		South: Chairperson,CGRF(South),KSEB Ltd, Vidythi Bhavanam,Kottarakkara-691506, Ph:0474-2060220 Central: Chairperson,CGRF(Central),KSEB Ltd, Power House Building Ernakulam-682018, Ph:0484-2394288 North: Chairperson,CGRF(North),KSEB Ltd,Gandhi Road,Kozhikode-32, Ph:0495-2367820 State Electricity Ombudsman, Pallikkavil Building,Mamangalam, Edappally, Kochi-682024 Ph:0484-2346488				
Bill#	4518220100110	Bill Area	M01/1	DTR	JAI MATHA	
Billing Period	1/2022[Monthly]	Tariff/Phase	LT-6F/Three	Pole#	JM-28/5	
Bill Date	01-01-2022	Due Date	11-01-2022	DC Date	28-01-2022	
Contract Demand	(Nil) VA [75% : 0KV, 130% : 0KV]	Connected Load	57000 Watts	Security Deposit	Rs.57000.00	
Meter#	GOE000050004337180	Average consumption(Monthly)				
Meter Digits	6.2	Power Unit/Zone	CUMULATIVE			
Meter Type/Owner	TOD/KSEB	KWH	3750			
Last Billed Rdg. Date		Prev. Rdg. Date		Prev. Meter Rdg. Status		
01-12-2021		01-12-2021		Working		
Prst. Rdg. Date		Prst. Meter Rdg. Status				
01-01-2022		Working				
Power Unit	Zone	Trading	Initial Reading(IR)	Final Reading(FR)	OMF	
KWH	Cumulative	Import	2278.00	2409.00	30	
Units*			3930			
Remarks :			Bill Details			
Last Paid Amount - Rs.47516.00 Last Payment Date - 06-12-2021					[INR] Amount(Rs.)	
			a)	Fixed Charges	Fixed Charge[FC]	7980.00
					Sub Total	7980.00
			b)	Energy Charges	Energy Charge[EC]	35370.00
					Sub Total	35370.00
			c)	Other Charges	Electricity Duty[ED]	3537.00
					Meter Rent[MR]	30.00
					Sub Total	3567.00
			d)	GST	MR-CGST	2.70
					MR-SGST	2.70
					Sub Total	5.40
			e)	Round Off		-0.40
			e)	Total Amt.(Bill#4518220100110) (a+b+c+d+e)		46922.00
			f)	Surcharge		0.00
			g)	Reconnection Fee		0.00
h)	Interim Bills		0.00			
i)	Arrears		0.00			
j)	Less paid/adj.		-0.00			
k)	Less Advance		-0.00			
	Net Payable(e+f+g+h+i-j-k)		46922.00			
Demand for 1/2022 is Rupees Forty Six Thousand Nine Hundred and Twenty Two Only						

E&OE **Payment Options:** Cash,Cheque,DD,MO. **Online:** www.kseb.in (Debit/Credit Cards,Net Banking). Other Platforms: BBPS,Friends,Akshaya,CSC,NACH



GREEN AUDIT REPORT



MAR GREGORIOS COLLEGE OF LAW

THIRUVANANTHAPURAM

2021


OTTOTRACTIONS
Energy-Engineering-Environment
SRL A-21, Sasthamangalam, Thiruvananthapuram-695010
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Executed by


OTTOTRACTIONS
Energy-Engineering-Environment

GREEN AUDIT REPORT
MAR GREGORIOS COLLEGE OF LAW
THIRUVANANTHAPURAM





Green Audit Report
Mar Gregorios College of Law
Report No: EA 877
2021-December

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 MAR GREGORIOS COLLEGE OF LAW for their timely help extended to complete the audit and bringing out this report.

We thank the management of Mar Ivanios College for entrusting Ottotractions to conduct the audits in all its mentee institutes as part of its Paramarsh Scheme.

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

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Technical Supplement		

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 Mar Gregorios College of Law, Thiruvananthapuram 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.

Mar Gregorios College of Law

The Malankara Syrian Catholic Major Archiepiscopal Church has a prominent role in the advancement of education in the State of Kerala especially in the last eight decades; it has established hundreds of primary, secondary and higher secondary schools, industrial training institutes and many professional colleges. Mar Gregorios College of Law (MGCL) was established in 2012 as another milestone in the glorious Mar Ivanios Vidyanagar Campus which was founded in 1949 by the Servant of God Archbishop Geevarghese Mar Ivanios. Mar Ivanios Vidyanagar, the educational campus, emerged from the educational vision of the Malankara Syrian Catholic Major Archiepiscopal Church in the State of Kerala. The sprawling 43 hectares of verdant campus, abundant in natural beauty is the ideal learning environment. The campus is blessed with 17 centres of excellence in education. The campus has been named “Mar Ivanios Vidyanagar” in fond remembrance of Archbishop Mar Ivanios, the founder of Mar Ivanios College, the first educational institution in the campus. Other Institutions in the campus are, to name a few, Mar Baselios College of Engineering and Technology, Mar Theophilos Training College, Sarvodaya Schools (Both CBSE and ICSE) and Bethany Navajeevan College of Physiotherapy, etc.

The College is administered by the Major Archdiocese of the Malankara Syrian Catholic Major Archiepiscopal Church through the Malankara Catholic Educational Society of the Archdiocese of Trivandrum. Mar Gregorios College of Law was envisioned as a centre of excellence in legal education. The college was instituted in the name of His Grace Most Reverend Archbishop Benedict Mar Gregorios, who was the second Metropolitan Archbishop of the Malankara Syrian Catholic Major Archiepiscopal Church. The college is affiliated to the University of Kerala and recognized by the Bar Council of India.

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	812	880	892
Staffs	31	32	31
Total Occupancy of the college	843	912	923

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	Mar Gregorios College of Law, Thiruvananthapuram					
2	Address (include telephone, fax & e-mail)	Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram, Kerala, India, 695015 0471-2541120, 8089352686 info@mgcl.ac.in, mgcltvm@gmail.com					
2	Year of Establishment	2012					
3	Name of building and Total No. of Electrical Connections/building	Mar Gregorios College of Law [1]					
4	Total Number of Students	Boys	-	Girls	-	Total	880
5	Total Number of Staff	32					
6	Total Occupancy	912					
7	Total area of green cover	3 acre					
8	Type of Electrical Connection	HT	0	LT	1		
9	Contract Demand (KVA) /Connection	41.8					
10	Average Maximum Demand (KVA)	57					
11	Total built up area of the building (M ²)	7695					
12	Number of Buildings	1					
13	Average system Power Factor	-					
14	Details of capacitors connected	-					
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1	NA				
		NA	NA				
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks
		125	NA	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 Solar Power Plant , Biogas Plant , Nature Club					
18	Contact Person & Telephone number	Dr. John P C					
		8089352686					

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 visited 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 1375 occupants of this campuses will reach same number of households. This message will spread to at least 5500 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 CO₂ emitted per year, a number that can be supplemented by tons of CO₂-equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

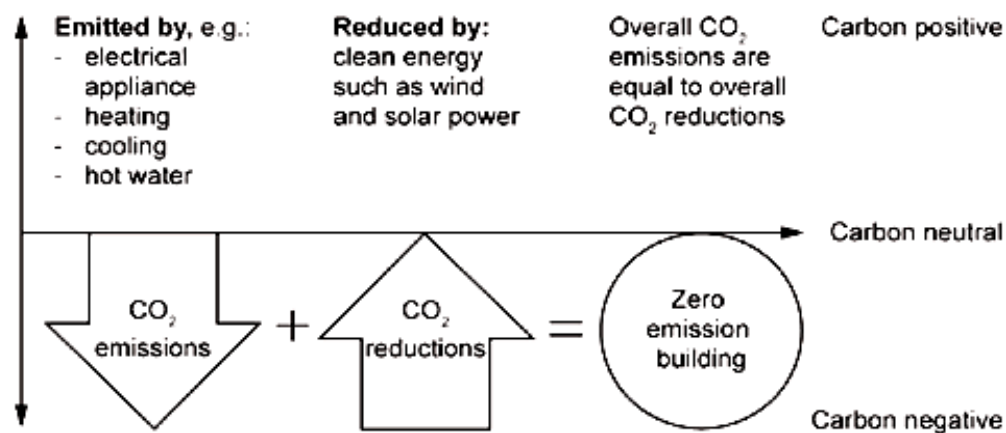
Global Warming Potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is 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 (CO₂).

Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO ₂	variable §	1	1	1
Methane *	CH ₄	12±3	56	21	6.5
Nitrous oxide	N ₂ O	120	280	310	170
HFC-23	CHF ₃	264	9100	11700	9800
HFC-32	CH ₂ F ₂	5.6	2100	650	200
HFC-41	CH ₃ F	3.7	490	150	45
HFC-43-10mee	C ₅ H ₂ F ₁₀	17.1	3000	1300	400
HFC-125	C ₂ H ₂ F ₅	32.6	4600	2800	920
HFC-134	C ₂ H ₂ F ₄	10.6	2900	1000	310
HFC-134a	CH ₂ FCF ₃	14.6	3400	1300	420
HFC-152a	C ₂ H ₄ F ₂	1.5	460	140	42
HFC-143	C ₂ H ₃ F ₃	3.8	1000	300	94
HFC-143a	C ₂ H ₃ F ₃	48.3	5000	3800	1400
HFC-227ea	C ₃ H ₂ F ₇	36.5	4300	2900	950
HFC-236fa	C ₃ H ₂ F ₆	209	5100	6300	4700
HFC-245ca	C ₃ H ₃ F ₅	6.6	1800	560	170
Sulphur hexafluoride	SF ₆	3200	16300	23900	34900
Perfluoromethane	CF ₄	50000	4400	6500	10000
Perfluoroethane	C ₂ F ₆	10000	6200	9200	14000
Perfluoropropane	C ₃ F ₈	2600	4800	7000	10100
Perfluorobutane	C ₄ F ₁₀	2600	4800	7000	10100
Perfluorocyclobutane	c-C ₄ F ₈	3200	6000	8700	12700
Perfluoropentane	C ₅ F ₁₂	4100	5100	7500	11000
Perfluorohexane	C ₆ F ₁₄	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 sequestered 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 transportations 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 CO₂ sequestrated in the tree
- Determining the weight of CO₂ sequestrated in the tree per year

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

3

RESULTS & DISCUSSIONS



3.1 CARBON FOOTPRINT ESTIMATION

3.1.1 ENERGY

a. Electricity

Electricity is purchased from KSEB under 1 LT Connections, the details are given below.

Electricity Connection Details		
Mar Gregorios College of Law, Thiruvananthapuram		
1	Name of the Consumer	Mar Gregorios College of Law, Thiruvananthapuram Nalanchira, Thiruvananthapuram
2	Tariff	LT-6F
3	Consumer Numbers	1145184020458
5	Connected Load Total	57kW
6	Annual Electricity Consumption (kWh)	30096

Electricity Bill Analysis (from 2018 to 2020)

Electricity Bill Details							
Name of the Consumer				Mar Gregorios College of Law			
Connected Load (kW)				57	Consumer number		
Tariff				LT-6F (Three Phase)	Section		
Month & Year	Monthly Consumption (kWh)	Average consumption (kWh)	Fixed charge (Rs)	Energy charge (Rs)	Duty (Rs)	Meter rent (Rs)	Total amount to be paid (Rs)
Jan-18	2298	2127	5040	20682	2068.2	17.7	28153
Jan-19	2508	2650	5040	22572.1	2257.2	17.7	29887
Jan-20	3570	3334	7980	32130.3	3213	36.7	43359

b. Diesel

Diesel Bill		
Month & Year	Litre	Amount
Feb-18	33.25	2531.98
Jun-18	33.26	2532
Feb-20	28.66	2000

c. Petrol

Petrol Bill		
Month & Year	Litre	Amount
May-18	3.31653	250
May-19	42.93	2863

Fuel Bill		
Year	Amount	Litre
2018-2019	166748	2423.31
2019-2020	133926	1845.98
2020-2021	9900	116.02

d. LPG

LPG Consumption Details				
	2017-2018	2018-19	2019-20	2020-21
No Cylinders In LAB	11	7	9	4
Laboratory LPG Consumption in kg	209	133	171	76
Canteen LPG Consumption in kg	912	866.4	798	114
Total in kg	1121	999.4	969	190

Base Line Energy Data				
Mar Gregorios College of Law, Thiruvananthapuram				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	27576.00	30096.00	42840.00
2	Electricity Solar - Off grid (kWh)	0.00	0.00	0.00
3	Electricity (KSEB + Off grid) kWh	27576.00	30096.00	42840.00
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	2423.31	1845.98	116.02
6	LPG (kg)	999.40	969.00	190.00
7	Biogas (kg)	-	-	-

Energy Consumption Profile				
SI No	Fuel	2018-19	2019-20	2020-21
		(kCal)		
1	Electricity	23715360	25882560	36842400
2	Diesel	25444761	19382812	1218212
3	LPG	11992800	11628000	2280000
4	Biogas	-	-	-
Total		61152921	56893372	40340612

Thermal Fuel Consumption			
Mar Gregorios College of Law, Thiruvananthapuram			
	2018-19	2019-20	2020-21
Annual LPG consumption in kg	999.4	969	190
Annual Diesel consumption in L	2423.31	1845.98	116.02
Annual petrol consumption in L	3.3	42.9	0
Annual Biogas consumption in m ³	-	-	-

Diesel consumption	
Year	Cost
2018-19	166748
2019-20	133926
2020-21	9900

Specific Energy Consumption

OTTOTRACTIONS- ENERGY AUDIT				
Mar Gregorios College of Law, Thiruvananthapuram				
Energy Performance Index (EPI)				
SI No	Particulars	2018-19	2019-20	2020-21
1	Total building area (m ²)	7695	7695	7695
2	Annual Energy Consumption (kCal)	61152921	56893372	40340612
3	Annual Energy Consumption (kWh)	71108.0	66155.1	46907.688
4	Total Energy in Toe	6.12	5.69	4.03
5	Specific Energy Consumption kWh/m ²	9.24	8.60	6.10

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			
Mar Gregorios College of Law, Thiruvananthapuram			
	2018-19	2019-20	2020-21
Total Occupancy	843	912	923
Waste generated in kg /day	16.24	17.6	17.84
Waste generated in kg /Yr	2143.68	2323.2	2354.88

Non-Degradable waste

Solid non degradable Waste Generation			
Mar Gregorios College of Law, Thiruvananthapuram			
	2018-19	2019-20	2020-21
Total Occupancy	843	912	923
Waste paper generated in kg /day	0.1624	0.176	0.1784
Waste plastic generated in kg /day	0.2436	0.264	0.2676
Waste paper generated in kg /Yr	35.728	38.72	39.248
Waste plastic generated in kg /Yr	42.87	46.46	47.10

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 are discussed below. The emission factors considered for estimation and its units are given.

Emission Factors		
Item	Factor	Unit
Electricity	0.00082	tCO ₂ e/kWh
LPG	0.0015	tCO ₂ e/kg
Diesel	0.0032	tCO ₂ e/kg
Petrol	0.0031	tCO ₂ e/kg
Food Waste	0.00063	tCO ₂ e/kg
Paper Waste	0.00056	tCO ₂ e/kg
Plastic Waste	0.00034	tCO ₂ e/kg

Carbon Foot Print 2018-21

Carbon Foot Print							
Sl. No.	Particulars	2018-19	tCO ₂ e	2019-20	tCO ₂ e	2020-21	tCO ₂ e
1	Electricity (kWh)	27576	22.61	30096	24.68	12852	10.54
2	Diesel (L)	2423.31	7.75	1845.98	5.91	116.02	0.37
3	LPG (kg)	999.40	1.50	969.00	1.45	190.00	0.29
4	Biogas (m ³)	-	-	-	-	-	-
5	Degradable Waste in kg/yr.	2225.52	1.40	2407.68	1.52	2436.72	1.54
6	Paper Waste in kg/yr	37.09	0.02	40.13	0.02	40.61	0.02
7	Plastic Waste in kg/yr	44.51	0.02	48.15	0.02	48.73	0.02
Total Carbon Foot Print tCO₂e/yr			33.30		33.60		12.77

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 sequestered according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Carbon Sequestration			
Particulars	2018-19	2019-20	2020-21
Total number of trees	29	35	37
Carbon sequestered by trees in the campus (tCO ₂ e)	0.98	1.04	1.15

Trees sequester carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestered by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table 3.18. Detailed table is included in the technical supplement.

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

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

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

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 **33.60 tCO₂e** per year by the campus. The total carbon sequestration by trees in the campus compound is **1.04 tCO₂e**.

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 tCO ₂ e	33.30	33.60	12.77
2	Total carbon sequestration tCO ₂ e	0.98	1.04	1.15
3	Amount of carbon mitigated through renewable energy tCO ₂ e	0.00	0.00	0.00
4	To be mitigated tCO ₂ e	32.33	32.56	11.62
5	Total No of Students	812	880	892
6	Specific Carbon Footprint kg CO ₂ e/Student/Yr	39.81	37	13.03

The total specific carbon emission is estimated as **37** kg of CO₂e per student for the year 2019-20 and **13.03** kg of CO₂e 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 37 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 can install a biogas plant to treat food waste and the biogas thus generated can be 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						
Mar Gregorios College of Law, Thiruvananthapuram						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Year ly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	352	0.35	10	0.26	2.57
2	Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	160	0.16	10	0.12	1.17
3	Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five-star fans	6340	6.34	10	4.63	46.28
Total		6852	6.9	30.0	5.0	50.0

OTTOTRACTIONS- ENERGY AUDIT						
Mar Gregorios College of Law, Thiruvananthapuram						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life cycle
		(kWh)	MWh	Years		
1	Installation of 30kWp Solar Power Plant	38325	38.33	25	27.98	699.43
2	Installation of 15Kg/day Biogas plant	5647	5.65	26	4.12	107.18
Total		43972	44	51	32	807

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 877.01	
Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
27 numbers of T8(40 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 T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	1480
No of fittings	27
Total load (kW)	1.08
Annual Energy Consumption (kWh)	639
Expected Annual Energy saving for replacing all fittings (kWh)	352
Cost of Power	8.50
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.08
Simple Pay Back (in Months)	32.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 877.02	
Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
36 numbers of CFL (15W) 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)	1480
No of fittings	60
Total load (kW)	0.90
Annual Energy Consumption (kWh)	400
Expected Annual Energy saving for replacing all fittings (kWh)	160
Cost of Power	8.50
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.05
Simple Pay Back (in Months)	47.69

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 877.03	
Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five-star fans	
Existing Scenario	
There are 357 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 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	1480
Total numbers of ordinary fans	357
Total load (kW)	28.56
Annual Energy Consumption (kWh)	21134
Expected Annual Energy saving, for total replacement(kWh)	6340
Cost of Power (Rs)	8.50
Annual saving in Lakhs Rs (1st year)	0.54
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	10.71
Simple Pay Back (in Months)	238.47

Energy Saving Proposal Code 877.04	
Installation of 30kWp 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 30kW 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)	30
Total average kWh per day expected (3.5kWh/day average)	105.00
Total annual Generating Capacity (kWh)	38325
Cost of energy generated annually Lakhs Rs	3.26
Investment required (INR lakh)(Approx.)	22.50
Simple Pay Back (in Months)	82.88
Life cycle in Yrs.	25
Total Saving in Life Cycle (Approx.) RS lakh	81.44

Sl.no	Installation of 15Kg/day Biogas plant	
1	Capacity of Bio gas plant(Kg/day)	15
2	Average Calorific Value of biogas (kCal/m ³)	3500
3	Annual Generation of Biogas Plant	1387.5
4	Daily production of biogas (kCal)	26250
5	LPG Saving in a day (kg)	2.1875
6	Annual LPG Saving (Kg)	405
7	Investment required (in Lakhs)	0.2
8	Annual Cost saving (in Lakhs)	0.26
9	Expected Annual Energy saving (kWh)	5647
10	Simple Pay Back (In Months)	9.39

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
Mar Gregorios College of Law, Thiruvananthapuram					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	0.08	0.030	32.52	352
2	Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	0.05	0.014	47.69	160
3	Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five-star fans	10.71	0.539	238.47	6340
	Total	11	1	106	6852
(The saving is 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.)					
4	Installation of 30kWp Solar Power Plant	22.50	3.26	82.88	38325
5	Installation of 15Kg/day Biogas plant	0.2	0.26	9.39	5647
	Total	22.70	3.51	46.14	43972

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 tCO ₂ e/yr	33.60
2	Carbon Sequestered tCO ₂ e/yr	1.15
3	Carbon mitigated by Renewable Energy tCO ₂ e/yr	27.98
4	Carbon mitigated by Renewable Energy(Biogas) tCO ₂ e/yr	4.12
5	Carbon mitigated by Energy Efficiency (Proposed) tCO ₂ e/yr	5.00
6	Effective Carbon footprint tCO ₂ e/yr	-0.54
7	Total No of Students	880.00
8	Specific Carbon Footprint kg CO ₂ e/Student/Yr	-0.61

From this study it was found that carbon footprint of the campus to be -0.67 kgCO₂e/ Student/ Year in place of current footprint i.e.,33.60 kgCO₂e/ student/ Year. This will be achieved after implementing energy efficiency projects and implementation of 30kWp solar power plant. And to achieve this an investment of 33.55 lakhs Rs is required through energy efficiency and renewable energy projects proposed. It will be around 3811.9 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	10.85
2	Cost of implementation in Renewable Energy Lakhs Rs	22.70
3	Total Lakhs Rs	33.55
4	Total number of students	880
5	Cost per student to make the campus carbon negative Rs/ Student	3811.9

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6

TECHNICAL SUPPLEMENT



Mar Gregorios College of Law, Thiruvananthapuram																			
Sl. No	Location	LIGHTS								FAN			IT			AC			
		T5	T8	T12	ICL	CF L	LED T	LED B	SPOT LIGHT	CF	E F	W F	P C	Printer	Scanner	Projector	1	1.5	2
1	Office 1						2			2			2						
2	Office 2					10	2			9			6						
3	Corridor					1													
4	Library						16			11			15			1			
5	class						3			2									
6	class1					2	5			2								1	
7	206		4							6						1			
8	class		2							2			4						
9	207					7				7									
10	class		3							8									
11	uo									2									
12	u1						5			6									
13	11 classroom (Floor 1)						50			66									
	11 classroom (Floor 2)						55			66									
13	11 classroom (Floor 3)						53			66									
TOTAL		0	27	0	0	60	247	0	0	357	0	0	81	0	0	6	0	3	0

List of Trees in the Campus (above 15 cms growth)			
Sl No	Name	Botanical	Number
1	Almond Tree	Terminalia Cutappa	1
2	Mango Tree	Mangifera Indica	5
3	Burflower Tree	Neolamarckia cadamba	1
4	Fig Tree	Ficus Carica	1
5	Wild Jack Tree	Artocarpis Hirsutus	12
6	Cashew Tree	Anacardium Occidentale	1
7	Guava Tree	Psidium Guajava	1
8	Coconut Tree	Cocos Nucifera	6
9	Gooseberry	Phyllanthus Emblica	1
10	Rambuttan	Nephelium Lappaceum	2
11	Teak	Tectona Grandis	2
12	Kino Tree	Pterocarpus Marsupium	1
13	New Zealand Laurel	Corynocarpus Laevigatus	1
14	Papaya	Carica Papaya	1
15	Mangium Tree	Acacia Mangium	1

Electricity Bill Details										
Name of the Consumer				Mar Gregorios College of Law						
Connected Load (kW)				57	Consumer number		1145184020458			
Tariff				LT-6F (Three Phase)	Section		Nalanchira			
Month & Year	Monthly Consumption (kWh)	Average consumption (kWh)	Fixed charge (Rs)	Energy charge (Rs)	Duty (Rs)	Meter rent (Rs)	Extra fixed charge (Rs)	Extra energy charge (Rs)	Adjustment (Rs)	Total amount to be paid (Rs)
Jan-18	2298	2127	5040	20682	2068.2	17.7				28153
Jan-19	2508	2650	5040	22572.1	2257.2	17.7				29887
Jan-20	3570	3334	7980	32130.3	3213	36.7				43359

KERALA STATE ELECTRICITY BOARD LIMITED

DEMAND CUM DISCONNECTION NOTICE

(As per Regulation 122 & 123 of Kerala Electricity Supply Code 2014)

Section	[4518]-Electrical Section Nalanchira	Phone#	0471-2531686	Customer Care	1912	
Consumer#	1145184020458	Reg. Mob# 854xxxx262	Regular CC Bill	KSEBL GSTIN: 32AAECK2277NBZ1		
Name & Mailing Address		For redressing complaints/grievance approach the concerned CGRF				
THE DIRECTOR MAR GREGORIUS COLLEGE OF LAW TC 11/2394(3)		South: Chairperson,CGRF(South),KSEB Ltd, Vydythi Bhavanam,Kottarakkara-691506, Ph:0474-2060220 Central: Chairperson,CGRF(Central),KSEB Ltd, Power House Building Ernakulam-682018, Ph:0484-2394288 North: Chairperson,CGRF(North),KSEB Ltd,Gandhi Road,Kozhikode-32, Ph:0495-2367820 State Electricity Ombudsman, Pallikkavil Building,Mamangalam, Edappally, Kochi-682024 Ph:0484-2346488				
Bill#	4518220100110	Bill Area	M01/1	DTR	JAI MATHA	
Billing Period	1/2022[Monthly]	Tariff/Phase	LT-6F/Three	Pole#	JM-28/5	
Bill Date	01-01-2022	Due Date	11-01-2022	DC Date	28-01-2022	
Contract Demand	(Nil) VA [75% : 0KV, 130% : 0KV]	Connected Load	57000 Watts	Security Deposit	Rs.57000.00	
Meter#	GOE000050004337180	Average consumption(Monthly)				
Meter Digits	6.2	Power Unit/Zone	CUMULATIVE			
Meter Type/Owner	TOD/KSEB	KWH	3750			
Last Billed Rdg. Date	Prev. Rdg. Date	Prev. Meter Rdg. Status	Prst. Rdg. Date	Prst. Meter Rdg. Status		
01-12-2021	01-12-2021	Working	01-01-2022	Working		
Power Unit	Zone	Trading	Initial Reading(IR)	Final Reading(FR)	OMF	Units*
KWH	Cumulative	Import	2278.00	2409.00	30	3930
Remarks :			Bill Details			
Last Paid Amount - Rs.47516.00 Last Payment Date - 06-12-2021			[INR] Amount(Rs.)			
			a)	Fixed Charges	Fixed Charge[FC]	7980.00
					Sub Total	7980.00
			b)	Energy Charges	Energy Charge[EC]	35370.00
					Sub Total	35370.00
			c)	Other Charges	Electricity Duty[ED]	3537.00
					Meter Rent[MR]	30.00
					Sub Total	3567.00
			d)	GST	MR-CGST	2.70
					MR-SGST	2.70
					Sub Total	5.40
			e)	Round Off		-0.40
			e)	Total Amt.(Bill#4518220100110) (a+b+c+d+e)		46922.00
			f)	Surcharge		0.00
g)	Reconnection Fee		0.00			
h)	Interim Bills		0.00			
i)	Arrears		0.00			
j)	Less paid/adj.		-0.00			
k)	Less Advance		-0.00			
	Net Payable(e+f+g+h+i-j-k)		46922.00			
Demand for 1/2022 is Rupees Forty Six Thousand Nine Hundred and Twenty Two Only						

E&OE **Payment Options:** Cash,Cheque,DD,MO. **Online:** www.kseb.in (Debit/Credit Cards,Net Banking). Other Platforms: BBPS,Friends,Akshaya,CSC,NACH



ENVIRONMENTAL AUDIT REPORT

**MAR GREGORIOS COLLEGE OF LAW,
THIRUVANANTHAPURAM**

2021

Executed by



ENVIRONMENT AUDIT REPORT

MAR GREGORIOS COLLEGE OF LAW

THIRUVANANTHAPURAM

December 2021





Environment Audit Report
MAR GREGORIOS COLLEGE OF LAW
Report No: EA 879
2021- December

Environment Audit Team

Ottotractions

- | | |
|------------------------|-----------------------------------|
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| 4 Er. Devan J | Project Engineer, Ottotractions |
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About OTTOTRACTIONS

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

Acknowledgment

We were privileged to work together with the administration and staff of Mar Gregorios College of Law, Thiruvananthapuram. for their timely help extended to complete the audit and bringing out this report.

We thank the management of Mar Ivanios College for entrusting Ottotractions to conduct the audits in all its mentee institutes as part of its Paramarsh Scheme

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

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

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

Thank you.

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

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INTRODUCTION

Ottotractions was asked by the Mar Gregorios College of Law, Thiruvananthapuram 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

The Malankara Syrian Catholic Major Archiepiscopal Church has a prominent role in the advancement of education in the State of Kerala especially in the last eight decades; it has established hundreds of primary, secondary and higher secondary schools, industrial training institutes and many professional colleges. Mar Gregorios College of Law (MGCL) was established in 2012 as another milestone in the glorious Mar Ivanios Vidyanagar Campus which was founded in 1949 by the Servant of God Archbishop Geevarghese Mar Ivanios. Mar Ivanios Vidyanagar, the educational campus, emerged from the educational

vision of the Malankara Syrian Catholic Major Archiepiscopal Church in the State of Kerala. The sprawling 43 hectares of verdant campus, abundant in natural beauty is the ideal learning environment. The campus is blessed with 17 centres of excellence in education. The campus has been named “Mar Ivanios Vidyanagar” in fond remembrance of Archbishop Mar Ivanios, the founder of Mar Ivanios College, the first educational institution in the campus. Other Institutions in the campus are, to name a few, Mar Baselios College of Engineering and Technology, Mar Theophilos Training College, Sarvodaya Schools (Both CBSE and ICSE) and Bethany Navajeevan College of Physiotherapy, etc.

The College is administered by the Major Archdiocese of the Malankara Syrian Catholic Major Archiepiscopal Church through the Malankara Catholic Educational Society of the Archdiocese of Trivandrum. Mar Gregorios College of Law was envisioned as a centre of excellence in legal education. The college was instituted in the name of His Grace Most Reverend Archbishop Benedict Mar Gregorios, who was the second Metropolitan Archbishop of the Malankara Syrian Catholic Major Archiepiscopal Church. The college is affiliated to the University of Kerala and recognized by the Bar Council of India.



Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	812	880	892
Staffs	31	32	31
Total Occupancy of the college	843	912	923

Total student strength of the campus is 880. 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 variety of programs to build awareness on waste management. The reports on different activities of the club are attached as technical supplement of this report.

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

Degradable Waste Generation			
Mar Gregorios College of Law, Thiruvananthapuram			
	2018-19	2019-20	2020-21
Total Occupancy	843	912	923
Waste generated in kg /day	16.86	18.24	18.46
Waste generated in kg /Yr	2225.52	2407.68	2436.72

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			
Mar Gregorios College of Law, Thiruvananthapuram			
	2018-19	2019-20	2020-21
Total Occupancy	843	912	923
Waste paper generated in kg /day	0.1686	0.1824	0.1846
Waste plastic generated in kg /day	0.2529	0.2736	0.2769
Waste paper generated in kg /Yr	37.092	40.128	40.612
Waste plastic generated in kg /Yr	44.51	48.15	48.73

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	Approx. number
		Trees	37
		Ornamental	Not estimated
4	Number of Tree Plantation Drives organized by School	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 sequestered according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequester carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestered by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. 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	29	35	37
Carbon sequestered by trees in the campus (tCO ₂ e)	0.98	1.04	1.15

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

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

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

List of Trees in the Campus (above 15 cms growth)			
Sl No	Name	Botanical	Number
1	Almond Tree	Terminalia Cutappa	1
2	Mango Tree	Mangifera Indica	5
3	Burflower Tree	Neolamarckia cadamba	1
4	Fig Tree	Ficus Carica	1
5	Wild Jack Tree	Artocarpis Hirsutus	12
6	Cashew Tree	Anacardium Occidentale	1
7	Guava Tree	Psidium Guajava	1
8	Coconut Tree	Cocos Nucifera	6
9	Gooseberry	Phyllanthus Emblica	1
10	Rambuttan	Nephelium Lappaceum	2
11	Teak	Tectona Grandis	2
12	Kino Tree	Pterocarpus Marsupium	1
13	New Zealand Laurel	Corynocarpus Laevigatus	1
14	Papaya	Carica Papaya	1
15	Mangium Tree	Acacia Mangium	1

3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 36.94kg 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				
Mar Gregorios College of Law, Thiruvananthapuram				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	27576.00	30096.00	12852.00
2	Electricity Solar - Off grid (kWh)	0.00	0.00	0.00
3	Electricity (KSEB + Off grid) kWh	27576.00	30096.00	12852.00
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	2423.31	1845.98	116.02
6	LPG (kg)	999.40	969.00	190.00
7	Biogas (kg)	-	-	-

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	812	880	892
Staffs	31	32	31
Total Occupancy of the college	843	912	923

Mar Gregorios College of Law, Thiruvananthapuram														
S L N o	Location	LIGHTS						FAN			IT		AC	
		T5	T8	T12	ICL	CFL	LED T	CF	EF	WF	PC	Projector	1.5	2
1	Office 1						2	2			2			
2	Office 2					10	2	9			6			
3	Corridor					1								
4	Library						16	11			15	1		
5	class						3	2						
6	class1					2	5	2					1	
7	206		4					6				1		
8	class		2					2			4			
9	207					7		7						
10	class		3					8						
11	uo							2						
12	u1						5	6						
13	11 classroom (Floor 1)						50	66						
	11 classroom (Floor 2)						55	66						
13	11 classroom (Floor 3)						53	66						
TOTAL		0	27	0	0	60	247	357	0	0	81	6	3	0

During the energy audit filed studies, 27 Numbers T8 lamps identified, which is considered as inefficient. 247 LED Tubes were found during the audit. The detailed energy efficiency projects are given in the respective chapters of this report.

Mar Gregorios College of Law		
Sl. No	Location	Avg. Lux
1	Office 1	89
2	Office 2	78
3	Corridor	53
4	Library	97
5	class	83
6	Floor1	88
7	Floor2	86
8	Floor3	87
9	U0	88
10	U1	91

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 - Kilometers 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					
Mar Gregorios College of Law, Thiruvananthapuram					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 27 No's T8 (40W) Lamps to 18W LED Tube	0.08	0.030	32.52	352
2	Energy Saving in Lighting by replacing existing 60 No's CFL(15W) Lamps to 9W LED Bulb	0.05	0.014	47.69	160
3	Energy Saving by replacing existing 357 No's in-efficient ceiling fans with Energy Efficient Five star fans	10.71	0.539	238.47	6340
	Total	11	1	106	6852
(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.)					
4	Installation of 30kWp Solar Power Plant	22.50	3.26	82.88	38325
5	Installation of 15Kg/day Biogas plant	0.2	0.26	9.39	5647
	Total	22.70	3.51	46.14	43972

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

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	Yes
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.	No
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	Yes
Biodiversity Conservation	
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) in 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 setup 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 wastes of 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 they 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 away 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 setup 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)
- Relevant Indian Standard Code practices

TECHNICAL SUPPLEMENTS

Centre for Environmental Studies/ Eco Club

Report

World environment day June 5 2018

The eco club of Mar Gregorios College of Law was formally inaugurated on June 5 by **MR. BALAN MADHAVAN**, the renowned photographer and recipient of UN award. A logo designing competition and poster designing competition on the topic *see green see life* on the inaugural day. The logo for eco club is designed by Rahul Krishnan of VI semester BBA LLB. Maghna Praseeda G S of VI semester B.com LLB won first prize in poster designing competition. The inaugural ceremony was followed by a small photography exhibition by Mr. Balan Madhavan, on his Antarctic expedition.



International Yoga Day June 21, 2018

The international yoga day was inaugurated by **Rev. Dr. Philip Neri, former director of Bethany college of Physiotherapy, Nalanchira** who is a great exponent of yoga. The function began with a detailed speech on yoga and it was followed by a performance, around 50 students participated in the event.

With aim of making an *healthy campus* it is planned to conduct yoga practice for the students on every Wednesdays in the campus under the leadership of Ms. Maghna Praseeda G S who has secured first rank in the certificate in yoga and meditation, university of Kerala (centre for adult, continuing education and extension).



International Day for Preservation of Ozone Layer September 16, 2018

In association with international day for preservation of ozone layer various literary activities such as poster designing, elocution English and Malayalam and environmental quiz were conducted.

LIST OF WINNERS

ELOCUTION

ENGLISH

1. MERLIN JACOB- 8TH SEM BA LLB
SHILPA SANJEEVAN- 2ND SEM BBA LLB
2. NIKSHITA ANNIE THOMAS- 6TH SEM BBA LLB
3. ESWARY ANIL KUMAR- 6TH BA LLB
VAISHNAVI 2ND BA LLB

MALAYALAM

1. JESNA H 8TH BBA
2. GEETHU L 2ND BA
3. NIRLA R U 8TH BA

QUIZ

1. KAVYA SURESH – 6TH BA
ASWATHI S. NAIR – 6TH BA
2. JITHIN 2ND BA
GRIDHAR 2ND BA
3. SARA JOHN 2ND BBA
ARUNDATHI 2ND BBA



Newsletter, official release 2018

The eco club newsletter “**PARYAVARAN MITRA**” was officially released by His Beatitude Moran Mor Baselios Cardinal Cleemis, the patron of our college on 1st October 2018. The

newsletter is published bi-monthly which includes details about different activities of the club and also tries to address various environmental related issues.



Plant adoption and manufacturing unit, 2018

In commemoration with world vegan day and kerala privai, on 1st November 2018, plant adoption and paper pen and bag manufacturing units were inaugurated by academic advisor Prof. Dr. Vikraman Nair. The paper pen and bag manufacturing unit function on every Thursdays in the college.





Vegetable garden, 2018

With an aim of promoting a culture of organic farming among students the preliminary work for a vegetable garden within the campus is in progress.



World AIDS day 2018

In order to create awareness among students about the day posters were designed by the members .



Christmas 2018

With the aim of promoting sustainable and greener Christmas members of the eco club made paper stars and decorated trees.

World plant a vegetable garden day May 19 2019

As part of world plant a vegetable garden day the initiative was revived along with a medicinal garden within the campus.

International Yoga Day, 2019

The international yoga day 2019 was observed by yoga demonstration of students within the campus under the guidance of eco club.

Christmas, December, 20, 2019

With the aim of promoting sustainable and greener Christmas members of the eco club made paper stars and decorated trees



SPECIAL EDITIONS OF NEWSLETTER

Since the Pandemic limited activities within the campus, the dedicated group of eco club members came up with the idea of special editions of newsletter comprising activities conducted by the students at home. These editions include activities like gardening, craft making, environmental experiences etc of students

2018- 2019 edition

2019-2020 edition

2020-2021 edition

ESTABLISHMENT OF CENTRE FOR ENVIRONMENTAL STUDIES

The Centre for Environmental Studies is dedicated for sustainable development and it reflects our commitment towards the environment. The centre is established with the aim of creating environmental awareness and education.

Mission

To develop skills and best practices for sustainable development, and make significant contributions towards environmental protection

Objectives

- To promote environmental awareness among all segments of the society
- To educate students and inculcate eco-friendly attitude
- To conduct research and disseminate solutions community issues

- To inculcate proper attitude towards environment conservation

REPORT OF PROGRAMMES CONDUCTED ON 22-03-2021

In connection with world forestry day and world water day, two events were conducted by Paryavaran Mitra on 22nd March 2021.

1. Tree planting drive:

Highlighting the importance **World Forestry Day** tree planting drive was conducted in the college premises under the **Social Forestry** initiative in association with **Kerala Forest Department**.

Time:- 9:00 am

Participants: Staff and students

Number of saplings: more than 50

2. Webinar

In order to create awareness about the conservation of water a webinar was conducted on the topic "**Right to water and Right over Water**".

Resource of person: Prof. Dr Sairam Bhat, Professor of law & centre coordinator, Centre for environmental law education research and advocacy, National law school of India university Bangalore

Date: 22-03-2021

Time: 3:00 pm to 4:00 pm

About the speaker: Prof. Dr Sairam Bhat is professor of law & centre coordinator of Centre for Environmental Law Education Research and Advocacy at National Law School of India university Bangalore. He is also the author of "Environmental Law Handbook for Law Practitioners", "Law Relating to Business Contracts in India" and many others. He is the recipient of Young India Environmental Law Fellowship.

Description: during this webinar he presented various aspects relating to the right to water and different dimensions of right over water. A clear cut understanding about the pros and cons of water privatisation, water related disputes, water stress and crisis etc were given through the lecture.

Program: the program was conducted through Microsoft Teams, team named MGCL events. There were more than 156 participants.

The meeting began with welcome address by Ms. Jincy P Babu, Assistant Professor and Coordinator of eco club which was followed by introductory remarks by Dr. Deepthi U, Assistant Professor Mgcl. The lectures lasted for 45 minutes and after that question were asked

and discussions on the same were conducted. Arundathi D , Student proposed the Vote of Thanks.

REPORT OF PROGRAMMES CONDUCTED ON JUNE 5, 2021

1. Competition:

As part of the World Environment Day, poster designing essay writing and photography competitions for the students and following students are the winners.

List of winners:

ESSAY WRITING

1. SHILPA SANJEEVAN- 8TH SEM BBA LLB
2. PREM HARSHAN – 2ND SEM BA LLB
3. NAVAMI GOPAN- 2ND SEM BA LLB

POSTER DESIGNING

1. SHERLIN SHAJI VARGHESE- 1ST SEM BA LLB
2. ANARGHA V SUNIL- 7TH SEM BBA LLB
3. MEGHA ANN VARUGHESE- 2ND BA LLB

PHOTOGRAPHY

1. ELITA ANNA SHEEN- 5TH SEM BA LLB
2. **Inauguration of Eco club activities for the Academic Year 2021-2022 and a talk on significance of the day**

Inauguration of eco club activities was conducted along with a talk on the relevance of environment day.

Resource of person: Dr. Parivelan K M, Chairperson; Associate Professor, Nodal Centre Of Excellence, For Human Rights Education; Centre For Statelessness, And Refugee Studies, School Of Law, Rights And Constitutional Governance, Tata Institute Of Social Sciences.

Date: 05-06-2021

Time: 4:00 pm to 5:00 pm

About the speaker: Dr. Parivelan K M, Chairperson; Associate Professor, Nodal Centre Of Excellence, For Human Rights Education; Centre For Statelessness, And Refugee Studies, School Of Law, Rights And Constitutional Governance, Tata Institute Of Social Sciences. Previously he had served at United Nations Development Programme (UNDP) for facilitating the post-Tsunami recovery and at United Nations High Commissioner for Refugees (UNHCR) and facilitated the voluntary repatriation of Sri Lankan refugees as part of peace process. He also taught at Pondicherry (Central) University, Puducherry.

Description: during this webinar he presented various aspects relating to the right to water and different dimensions of right over water. A clear cut understanding about relevance of the day, why environment is to be protected, impact of disasters on the environment etc were discussed.

Program: the program was conducted through Microsoft Teams, team named MGCL events. There were more than 156 participants.

The meeting began with welcome address by Ms. Jincy P Babu, Assistant Professor and Coordinator of eco club which was followed by introductory remarks by Ms. Abhaya B K, Assistant Professor. The lectures lasted for 45 minutes and after that question were asked and discussions on the same were conducted. Shilpa Sanjeevan, Student proposed the Vote of Thanks.

INTERNATIONAL DAY FOR CLIMATE ACTION 24-10-2021 AND WORLD SUSTAINABILITY DAY

I. PHOTOGRAPHY COMPETITION

An all India intercollegiate photography competition was announced on the theme **vengeance of nature.** Entries were open for all students till November 1st. Each work should be directly or indirectly associated with the theme and should accompanied with 50 words.

The winners are:

1. Mohammed Shinan S
First year Bsc Physics
SB college Changanseery
Picture name: the river returned everything we threw away
2. Abhijith Gopal
3rd year BBA LLB
Christ(deemed to be university)
Banglore
Picture name: Burnt waste amid covid haste

II. ECO CRAFTER HUNT

The competition was conducted for students of MGCL to identify the best person who converts waste into anything useful. Entries were open till November 6th.
Special mention: Milton Johnny J S, 10th semester BBA LLB

PLASTIC FREE CAMPUS CAMPAIGN NOVEMBER 2021

According to the UGC dated 08-10-2021, and as part of AZADI KA AMIRT MAHOSTAV, SWECHATHA HI SEWA CAMPAIGN the eco club of MGCL in association with Centre For Environmental Studies is initiating PLASTIC FREE CAMPUS CAMPAIGN

I. Logo designing competition

A logo designing competition was conducted for centre for environmental studies for the students of MGCL.

Selected logo was designed by A K Karthik, 6th semester B.com LLB

II. Slogan writing and digital poster making competition

A digital poster making and slogan writing competition was conducted to create awareness on waste disposal among students.

Best poster and slogan: - A K Karthik

6th semester B.com LLB

III. Awareness program on Waste Management and Disposal

Date:- November 16, 2021

Time: 10:00 am

Venue: seminar hall

Attendees: Eco club Members and cleaning Staff

Resource Person: P Kesavan Nair, Managing Director, Clean Kerala Company Ltd, Thiruvananthapuram.

Description: the program was to create an awareness on the methods for collection segregation and disposal of waste generated in the campus. The speaker detailed about the scope of recycling and reuse of non-biodegradable waste.

Program: - the program started with silent prayer followed by welcome note by Prakrithi R Nair of 8th BBA LLB. The speaker then explained the contents in detailed which was concluded by discussion on the doubts and suggestions by students. Owshed Kurian of 3rd BA LLB delivered vote of thanks.

IV. Beach cleaning drive and waste disposal awareness by green volunteers

The green volunteers of our eco club actively participated along with SUSTERA foundation, environmental NGO in mass beach cleaning drive and waste disposal awareness activities in VETTUKADU BEACH.

UPCOMING EVENTS

- 1. NATIONAL CONFERENCE OF ENVIRONMENTAL LAW FACULTIES AND NATIONAL SEMINAR ON ENVIRONMENTAL CRIMES ON DECEMBER 21 AND 22 IN ASSOCIATION WITH MAHARASHTRA NATIONAL LAW UNIVERSITY.**
- 2. SPECIAL MONTHLY EDITION OF NEWSLETTER BY DECEMBER**