OTTOTRACTIONS
Energy - Engineering - Environment

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ENERGY AUDIT REPORT

GURUDEV ARTS & SCIENCE COLLEGE

PAYYANUR

Executed by

OTTOTRACTIONS
Energy-Engineering-Environment

2021

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

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

ENERGY AUDIT REPORT

GURUDEV COLLEGE OF ARTS & SCIENCE

Payyanur

OTTOTRACTIONS
Energy-Engineering-Environment

Energy Audit Report
Gurudev Arts & Science College
Report No: EA 808
2021-October

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 Gurudev Arts & Science College, Payyanur 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

Contents

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 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.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)

Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
GURUDEV COLLEGE OF ARTS & SCIENCE					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Ground Floor	0.12	0.040	37.11	164
2	Energy Saving by replacing existing 54 No's in-efficient ceiling fans with Energy Efficient Five star fans in Ground Floor	1.17	0.64	22.13	2627
3	Energy Saving in Lighting by replacing existing 29 No's T8 Lamps to 20W LED Tube in First Floor	0.09	0.23	4.64	928
4	Energy Saving in Lighting by replacing existing 2 No's T12 (55W) Lamps to 18 W LED Tube in First Floor	0.01	0.02	4.52	177
5	Energy Saving in Lighting by replacing existing 4 No's CFL(15W) Lamps to 9W LED BULB in First Floor	0.004	0.01	9.26	58
6	Energy Saving by replacing existing 49 No's in-efficient ceiling fans with Energy Efficient Five star fans in First floor	1.07	0.21	59.62	2383
7	Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Second Floor	0.12	0.01	100.00	164
8	Energy Saving by replacing existing 44 No's in-efficient ceiling fans with Energy Efficient Five star fans in Second Floor	0.96	0.19	59.62	2140
9	Energy Saving in Lighting by replacing existing 48 No's T8 Lamps to 20W LED Tube in Hostel	0.14	0.02	100.00	192
10	Energy Saving by replacing existing 48 No's in-efficient ceiling fans with Energy Efficient Five star fans in Second Floor	1.04	0.21	59.62	2335
	Total	4.73	1.57	45.65	11167
(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.)					

1

Introduction

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

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

1.1. General Building details and descriptions

Gurudev Arts and Science College was established in the year 2002 at Mathil, and is affiliated to Kannur University. It is one of the most Reputed Catholic Colleges managed by Corporate Educational Agency of the Catholic Diocese of Sulthan Bathery, Wayanad. His Excellency Most. Rev. Dr. Joseph Mar Thomas is the Manager and Patron of this college.

Started with two UG courses, the glory of Gurudev Arts and Science College reaches hither to with 12 UG courses and 4 PG courses by securing enthralling victories and progress in both

curricular and co-curricular fields throughout its journey. Now it imparts the silver light of knowledge to more than thousands of students who belong mainly to the rural areas of Kannur, Kasaragod and other Districts and thereby fulfills the higher education dreams of thousands of people and became an integral part in the overall development of these areas.

Excellence in educational performance and ethics in social norm shave marked the wonderful reputation of our institution. The college marches forward with enhanced vigor and vitality upholding the motto 'Lighted to Lighten'.

Gurudev Arts and Science College was established in the year 2002. It was founded by Gurudev Educational and Charitable Trust' Mr. M.V.Purushothaman was the founder chairman. The college has a humble beginning only with two UG courses. After the initial year of functioning at Payyanur in Safa Marva Tower, the college shifted to its own building atop the scene hill whirl, in the middle of Mathil town in 2003. More UG courses started and the college became one of the top most colleges affiliated to Kannur University within a short span of time.

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	1298	1298	1298
Staffs	77	77	77
Total Occupancy of the college	1375	1375	1375

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

Energy audit team

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

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

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Process description

The energy audit has been carried out at Gurudev Arts & Science College, Payyanur. The following is the baseline data of this building.

Form-A								
BASELINE DATA SHEET FOR GREEN AUDIT								
1	Name of the Organization	GURUDEV COLLEGE OF ARTS & SCIENCE						
2	Address (include telephone, fax & e-mail)	Gurudev Arts & Science College, P. O. Mathil, Payyanur, Kannur, Kerala-670307						
2	Year of Establishment	2002						
3	Name of building and total No. of Electrical Connections/building	College (1), Hostel (1)						
4	Total Number of Students	Boys	-	Girls	-	Total	1298	
5	Total Number of Staff	77						
6	Total Occupancy	1375						
7	Total area of green cover (m2)	1011.71						
8	Type of Electrical Connection	HT	0	LT	2			
9	Contract Demand (KVA) /Connection	NA						
10	Average Maximum Demand (KVA)	NA						
11	Total built up area of the building (M2)	2165						
12	Number of Buildings	2						
13	Average system Power Factor	NA						

14	Details of capacitors connected	NA					
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1	TR 2	TR 3	TR 4	TR 5	TR 6
		NA	-	-	-	-	-
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks
		25	-	-	-	-	-
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.	LED Lighting, Tree Plantation, Awareness Programs, 20kWp Solar Power Plant					
18	Contact Person & Telephone number	Dr .K.T.Raveendran, Principal					
		9447491201					

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

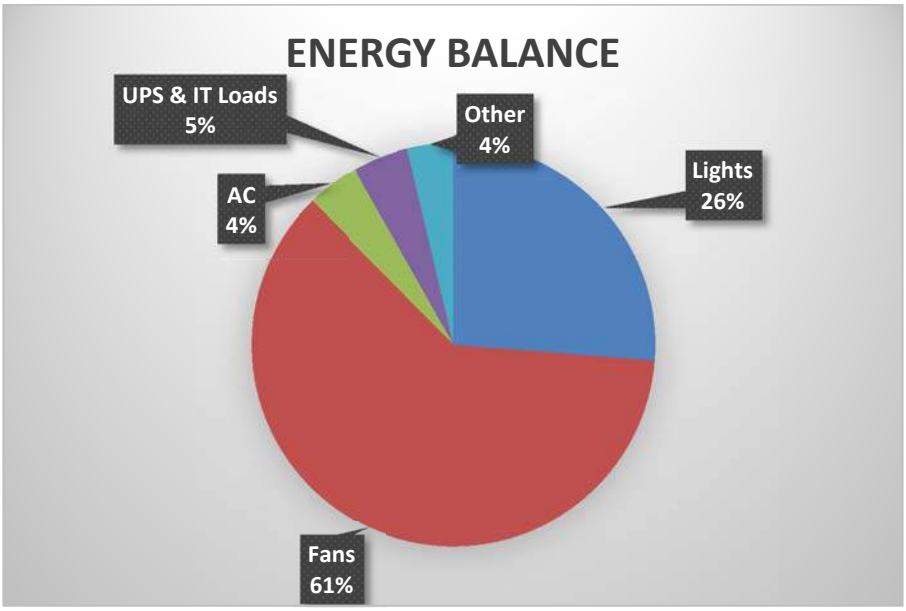
Electricity Connection Details		
MAR THOMA COLLEGE OF SCIENCE & TECHNOLOGY		
1	Name of the Consumer	GURUDEV COLLEGE OF ARTS & SCIENCE
		Payyannur, Kannur
2	Tariff	LT 6F 3Phase
3	Consumer Numbers	1166502012194, 1166505017896
5	Connected Load Total	49
6	Annual Electricity Consumption (kWh)	63994

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



61 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 26% AC and IT Equipment uses 13%.

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 **10.92Rs/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

Consumer number			1166502012194		
Electricity Bill Details (2019-20)					
Month	Amount	Fixed charge	Energy Consumption	Duty	Energy charge
Apr	24171	6020	1815	1815	16336
May	16345	6020	1033	1033	9293
Jun	19648	6020	1363	1363	12265
Jul	20016	6020	1400	1400	12596
Aug	26785	6020	2077	2077	18689
Sep	21261	6020	1524	1524	13717
Oct	21894	6020	1587	1587	14287
Nov	22922	6020	1690	1690	15212
Dec	28432	6020	2241	2241	20171
Jan	21373	6020	1535	1535	13818
Feb	32065	6020	2605	2605	23441
Mar	28568	6020	2255	2255	20293

Consumer number			1166502012194		
Electricity Bill Details (2017-18)					
Month	Amount	Fixed charge	Energy Consumption	Duty	Energy charge
Apr	21699	6020	1568	1568	14111
May	11462	6020	544	544	4898
Jun	8428	6020	241	241	2167
Jul	18020	6020	1200	1200	10800
Aug	18624	6020	1260	1260	11344
Sep	20887	6020	1487	1487	13380
Oct	17154	6020	1113	1113	10021
Nov	17303	6020	1128	1128	10155
Dec	18135	6020	1212	1212	10904
Jan	15808	6020	979	979	8809
Feb	19956	6020	1394	1394	12542
Mar	22659	6020	1664	1664	14975

Consumer number			1166502012194		
Electricity Bill Details (2016-17)					
Month	Amount	Fixed charge	Energy Consumption	Duty	Energy charge
Apr	19833	6020	1381	1381	12432
May	13798	6020	778	778	7000
Jun	18476	6020	1246	1246	11210
Jul	15835	6020	982	982	8834
Aug	15986	6020	997	997	8969
Sep	14880	6020	886	886	7974
Oct	15567	6020	955	955	8592
Nov	14244	6020	822	822	7402
Dec	14584	6020	856	856	7708
Jan	13680	6020	766	766	6894
Feb	18105	6020	1209	1209	10877
Mar	16672	6020	1065	1065	9587

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 is given below.

Diesel Consumption Details		
	Total	cost
	in L	
2016-17	591	44294
19-20	398	35818
20-21	45	

Diesel Consumption Details		
2017-18	Total	cost
	in L	Rs
August 03	120	9000
August 07	120	9000
August 08	120	9000
September 25	68	5104
January 09	64	4830
January 25	33	2500
January 30	65	4860

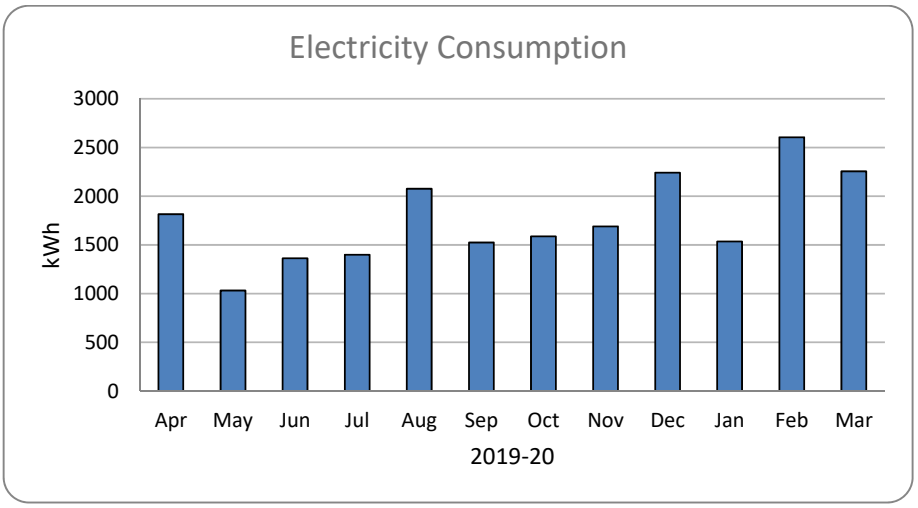
Diesel Consumption Details		
2019-20	Total in L	cost Rs
April 06	47	4214
July 20	47	4230
August 19	46	4179
September 20	134	12022
October 22	15	1380
October 28	16	1400
February 19	47	4204
February 28	47	4189

LPG

LPG Consumption Details				
	2017-2018	2018-19	2019-20	2020-21
No Cylinders In Hostel	48	45	48	12
Hostel LPG Consumption in kg	912	855	912	228
No of cylinders in college	17	17	20	2
College LPG Consumption in kg	323	323	380	38
Total in kg	1235	1178	1292	266

Base Line Energy Data				
GURUDEV COLLEGE OF ARTS & SCIENCE				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	53262	63994	8400
2	Electricity Solar - Off grid (kWh)	0.00	0.00	0.00
3	Electricity (KSEB + Off grid) kWh	53262	63994	8400
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	590.59	397.98	45.00
6	LPG (kg)	1178.00	1292.00	266.00
7	Biogas (kg)	0.00	0.00	0.00

Energy Consumption Profile				
Sl No	Fuel	2018-19	2019-20	2020-21
		(kCal)		
1	Electricity	45805320	55034418	7224000
2	Diesel	6201160	4178767	472500
3	LPG	14136000	15504000	3192000
4	Biogas	-	-	-
Total (kCal)		66142480	74717185	10888500



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 are of building.

OTTOTRACTIONS- ENERGY AUDIT				
GURUDEV COLLEGE OF ARTS & SCIENCE				
Energy Performance Index (EPI)				
Sl No	Particulars	2018-19	2019-20	2020-21
1	Total building area (m^2)	2165	2165	2165
2	Annual Energy Consumption (kCal)	66142480	74717185	10888500
3	Annual Energy Consumption (kWh)	76909.9	86880.4	12661.047
4	Total Energy in Toe	6.61	7.47	1.09
5	Specific Energy Consumption kWh/m^2	35.52	40.13	5.85

The Energy Performance Index (EPI)is

40.13kWh/m^2

This may be due to the lesser occupancy during pandemic shut downs, so the benchmark year may be take 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.

Gurudev Arts & Science College

ENERGY POLICY

(Draft)

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

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

Date ----------

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	
Energy Saving Proposal Code EA 808.01	
Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Ground Floor	
Existing Scenario	
41 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs, it is observed that the average utility of these fittings is of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	41
Total load (kW)	1.64
Annual Energy Consumption (kWh)	328
Expected Annual Energy saving for replacing all fittings (kWh)	164
Cost of Power	24.25
Annual saving in Lakhs Rs (1st year)	0.04
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.12
Simple Pay Back (in Months)	37.11

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.02	
Energy Saving by replacing existing 54 No's in-efficient ceiling fans with Energy Efficient Five-star fans in Ground Floor	
Existing Scenario	
There are 54 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	54
Total load (kW)	4.32
Annual Energy Consumption (kWh)	6912
Expected Annual Energy saving, for total replacement(kWh)	2627
Cost of Power (Rs)	24.25
Annual saving in Lakhs Rs (1st year)	0.64
Investment required for a total replacement (Lakhs Rs) [@2175 Rs per Fan with 50W at full speed]	1.17
Simple Pay Back (in Months)	22.13

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.03	
Energy Saving in Lighting by replacing existing 29 No's T8 Lamps to 20W LED Tube in First Floor	
Existing Scenario	
29 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs, it is observed that the average utility of these fittings is of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	29
Total load (kW)	1.16
Annual Energy Consumption (kWh)	1856
Expected Annual Energy saving for replacing all fittings (kWh)	928
Cost of Power	24.25
Annual saving in Lakhs Rs (1st year)	0.23
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.09
Simple Pay Back (in Months)	4.64

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.04	
Energy Saving in Lighting by replacing existing 2 No's T12 (55W) Lamps to 18 W LED Tube in First Floor	
Existing Scenario	
2 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers, it is observed that the average utility of these fittings is of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18 W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	2
Total load (kW)	0.11
Annual Energy Consumption (kWh)	264
Expected Annual Energy saving for replacing all fittings (kWh)	177
Cost of Power	9.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.01
Simple Pay Back (in Months)	4.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.05	
Energy Saving in Lighting by replacing existing 4 No's CFL (15W) Lamps to 9W LED BULB in First Floor	
Existing Scenario	
4 numbers of CFL (15 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers, it is observed that the average utility of these fittings is 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)	2400
No of fittings	4
Total load (kW)	0.06
Annual Energy Consumption (kWh)	144
Expected Annual Energy saving for replacing all fittings (kWh)	58
Cost of Power	9.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 100 per fittings] (Lakhs Rs)	0.0040
Simple Pay Back (in Months)	9.26

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.06	
Energy Saving by replacing existing 49 No's in-efficient ceiling fans with Energy Efficient Five-star fans in First floor	
Existing Scenario	
There are 49 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	49
Total load (kW)	3.92
Annual Energy Consumption (kWh)	6272
Expected Annual Energy saving, for total replacement(kWh)	2383
Cost of Power (Rs)	9.00
Annual saving in Lakhs Rs (1st year)	0.21
Investment required for a total replacement (Lakhs Rs) [@2175 Rs per Fan with 50W at full speed]	1.07
Simple Pay Back (in Months)	59.62

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.07	
Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Second Floor	
Existing Scenario	
41 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs, it is observed that the average utility of these fittings is of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	41
Total load (kW)	1.64
Annual Energy Consumption (kWh)	328
Expected Annual Energy saving for replacing all fittings (kWh)	164
Cost of Power	9.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.12
Simple Pay Back (in Months)	100.00

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.08	
Energy Saving by replacing existing 44 No's in-efficient ceiling fans with Energy Efficient Five-star fans in Second Floor	
Existing Scenario	
There are 44 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	44
Total load (kW)	3.52
Annual Energy Consumption (kWh)	5632
Expected Annual Energy saving, for total replacement(kWh)	2140
Cost of Power (Rs)	9.00
Annual saving in Lakhs Rs (1st year)	0.19
Investment required for a total replacement (Lakhs Rs) [@2175 Rs per Fan with 50W at full speed]	0.96
Simple Pay Back (in Months)	59.62

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.09	
Energy Saving in Lighting by replacing existing 48 No's T8 Lamps to 20W LED Tube in Hostel	
Existing Scenario	
48 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs, it is observed that the average utility of these fittings is of 30%.	
Proposed System	
The existing T8 may be replaced to LED tube of 20 W in phased manner and the savings will be of 50 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	48
Total load (kW)	1.92
Annual Energy Consumption (kWh)	384
Expected Annual Energy saving for replacing all fittings (kWh)	192
Cost of Power	9.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 300 per fittings] (Lakhs Rs)	0.14
Simple Pay Back (in Months)	100.00

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 808.10	
Energy Saving by replacing existing 48 No's in-efficient ceiling fans with Energy Efficient Five-star fans in Second Floor	
Existing Scenario	
There are 48 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 38% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	48
Total load (kW)	3.84
Annual Energy Consumption (kWh)	6144
Expected Annual Energy saving, for total replacement(kWh)	2335
Cost of Power (Rs)	9.00
Annual saving in Lakhs Rs (1st year)	0.21
Investment required for a total replacement (Lakhs Rs) [@2175 Rs per Fan with 50W at full speed]	1.04
Simple Pay Back (in Months)	59.62

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 808.11	
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 10kW 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	9.29
Investment required (INR lakh) (Approx.)	22.50
Simple Pay Back (in Months)	29.05
Life cycle in Yrs.	25
Total Saving in Life Cycle (Approx.) RS lakh	232.35

OTTOTRACTIONS- ENERGY AUDIT						
GURUDEV COLLEGE OF ARTS & SCIENCE						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO_2 mitigated	Expected Tons of CO_2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Ground Floor	164	0.16	10	0.12	1.20
2	Energy Saving by replacing existing 54 No's in-efficient ceiling fans with Energy Efficient Five star fans in Ground Floor	2627	2.63	10	1.92	19.17
3	Energy Saving in Lighting by replacing existing 29 No's T8 Lamps to 20W LED Tube in First Floor	928	0.93	10	0.68	6.77
4	Energy Saving in Lighting by replacing existing 2 No's T12 (55W) Lamps to 18 W LED Tube in First Floor	177	0.18	10	0.13	1.29
5	Energy Saving in Lighting by replacing existing 4 No's CFL(15W) Lamps to 9W LED BULB in First Floor	58	0.06	10	0.04	0.42
6	Energy Saving by replacing existing 49 No's in-efficient ceiling fans with Energy Efficient Five star fans in First floor	2383	2.38	10	1.74	17.40
7	Energy Saving in Lighting by replacing existing 41 No's T8 Lamps to 20W LED Tube in Second Floor	164	0.16	10	0.12	1.20
8	Energy Saving by replacing existing 44 No's in-efficient ceiling fans with Energy Efficient Five star fans in Second Floor	2140	2.14	10	1.56	15.62
9	Energy Saving in Lighting by replacing existing 48 No's T8 Lamps to 20W LED Tube in Hostel	192	0.19	10	0.14	1.40
10	Energy Saving by replacing existing 48 No's in-efficient ceiling fans with Energy Efficient Five star fans in Second Floor	2335	2.33	10	1.70	17.04
Total		11167	11	10	8.15	82

Technical Supplements

GURUDEV COLLEGE OF ARTS & SCIENCE													
Location		LIGHTS					FAN			IT			AC
		T8	T12	LED TUBE	LED SQUARE	LED BULB	CF	WF	EF	PC	Printer	Scanner	1.0
2ND	S12	2					3						
	S118 & S13	2					4						
	S14						2						
	S15					1	2						
	Dept of commerce & management	3					3						
	S11,S10,S9,S8,S7,S6,S1,S2,S3	18					27						
	Microbiology Lab	16					3						
Total		**41**	**0**	**0**	**0**	**1**	**44**	**0**	**0**	**0**	**0**	**0**	**0**
IST	Classroom 1-7	7					14						
	F3						3						
	Chemistry Dept+Lab	5							3				
	F2	1					2						
	F1	2					2						
	F7					1	2						
	F8			1			2						
	F9	2		2			4						
	F10	3					2						1
	F11 F12			2			4						
	F13							1					

	F19	2					2						
	F18	1					2						
	Physics Lab	6					6						
	F16		1				2						
	F17		1				2						
Total		**29**	**2**	**5**	**0**	**1**	**49**	**1**	**3**	**0**	**0**	**0**	**1**
GND	Computer Lab					4	5			18			
	G15 G14 G17 G13 G12	10					10						
	PG Lab, Chemistry	5							4				
	G9 G8 G7	3					6						
	G1 G2	2					4						
	Bio Chemistry Lab	13					5						
	Dept of English	1					1						
	Store	1					1						
	Library	6		4		8	9			1			
	Auditorium				12	3	13	2	4				
	Snehalaya Ladies hostel(32 rooms)	48					48						
Total		**89**	**0**	**4**	**12**	**15**	**102**	**2**	**8**	**19**	**0**	**0**	**0**