

# ENERGY AUDIT REPORT

2018



ALPHONSA COLLEGE

ARUNAPURAM P.O., PALA 686 574

*Prepared by*

**School of Environmental Sciences**

**Mahatma Gandhi University, Kottayam**



**Mahatma Gandhi University**  
**SCHOOL OF ENVIRONMENTAL SCIENCES**  
Priyadarsini Hills P.O., Kottayam-686560, Kerala, India

---

17.12.2018

**ENERGY AUDIT CERTIFICATE**

This is to certify that the data collection for the energy audit at Alphonso College, Pala has been carried out diligently and truthfully; The Energy Audit report was prepared with utmost professionalism, care, and diligence, accurately reflecting the factual information gathered.

Signature and seal

Name and designation

**DIRECTOR**  
School of Environmental Sciences  
Mahatma Gandhi University  
Kottayam, Kerala.

## **Energy Audit Team**

**Dr. EV Ramasamy**, Professor & Director

**Dr. CT Aravindakumar**, Professor

**Dr. Baiju KR**, Associate Professor

**Dr. Mahesh Mohan**, Assistant Professor

**Dr. Sylas VP**, Assistant Professor

**Mr. Sajithkumar K J**, Research Scholar

**Mr. Vishnu NG**, Project Fellow

## **Table of contents**

<b>SI No</b>	<b>Topics</b>	<b>Page number</b>
1	Executive summary	4
2	Introduction	5
3	Objectives of energy audit	7
4	Target Areas	8
5	Methodology adopted	8
6	Survey forms	9
7	Audit stage	10
8	Energy Audit Report	11
9	Suggestions and Recommendations	14

### **Executive Summary**

A detailed energy audit has been carried out at Alphonsa College, Pala by School of environmental Sciences, Mahatma Gandhi university, Kottayam in October 2018. This is the first attempt to conduct energy auditing of this college campus. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc. Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college.

During the energy audit energy saving opportunities has been identified to help improving energy efficiency of the facility. The energy audit has identified energy conservation opportunities and recommended projects to improve energy efficiency of the facility.

## **INTRODUCTION**

### ***About college***

Alphonsa college, Pala, Kottayam District is one of the pioneer institutions for higher education for women in the state of Kerala (Fig. 1). Established in 1964 as a junior college with 400 students and 13 teachers, Alphonsa college has now attained the status of a First Grade Women's College. The institution at present is run under the efficient stewardship of His Excellency Mar Jacob Murickan, the Manager Rev. Dr. Joseph Kollampampil, the Pro- Manager and Rev. Dr. Sr. Gigimol M.G., the Principal.

The fundamental aim of the college is to impart sound learning to young women under circumstances congenial to their all-round development. It encourages the students to aim at excellence not only in academic pursuits, but also in every aspect of human endeavour to achieve perfection.

The students are prompted to strive for academic excellence so that in course of time they may take up suitable careers for the betterment of their lives and also of their families and society at large. The various co-curricular activities of the college especially the extension programmes provide them with a rare social consciousness that motivates them to reach out to their fellowmen particularly the needy and the marginalised.

### **Vision Statement of the College**

*'The perfect woman nobly planned'.*

To create self-reliant and liberated young women with traditional cultural values and moral integrity, who will be agents of social transformation in their families and society

### **Mission Statement of the College.**

*To equip our students with deep knowledge and globally acceptable skills.*

To develop values of self-respect, tolerance, discipline, hard work and patriotism. To promote learning that will contribute to women empowerment by enabling women to become self-reliant.

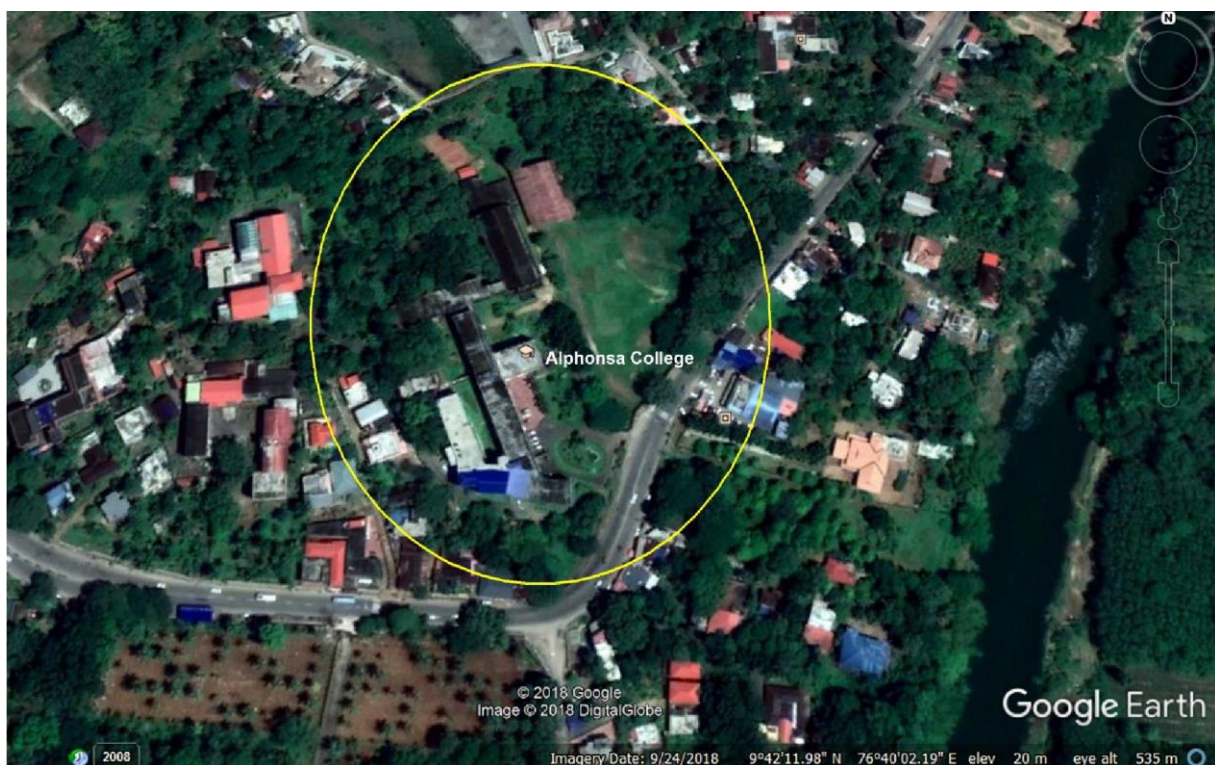


Fig. 1 Location of Alphonso College

***Courses offered by the College***

<b>P G Courses – 6</b>			
Aided Courses	M.Sc. Zoology	M.A English	M.A Political Science
Self-Financing	M.Sc. Chemistry	M.A English	M.Sc. Clinical Nutrition and Dietetics
<b>U G Courses – 13</b>			
Aided Courses	B.A English	B.A Economics	B.A History
	B.Sc. Physics	B.Sc. Botany	B.Sc. Zoology
	B.Sc. Physics (Voc.)	B.Sc. Chemistry	B.Sc. Mathematics
Self-Financing	B.Com	B.Sc. Clinical Nutrition and Dietetics	
	B.Voc. Fashion Technology		
	B.Voc. Sports Nutrition and Physiotherapy		

*The student and faculty strength of the college is listed below:*

No of students		1912
No of teachers		88
No of Non-teaching staffs		25
Gents	14	
Ladies	2011	
Total		2025

### **Physical Structure**

The college is located in about 9.5 acres of land. The built-up area of the college is 7.9 acres.

Departments	16
Laboratories	13
Conference halls	4
Libraries	1 main library+ department libraries
Auditorium	1
Canteens	1

### **OBJECTIVES OF ENERGY AUDIT**

The specific objectives of this energy audit are:

1. To monitor the energy consumption pattern of the college
2. To assess the carbon foot print of the college
3. To assess whether the measures implemented by Alphonsa College have helped to reduce the Carbon Footprint.
4. To impart energy conservation plans to the college
5. Providing a database for corrective actions and future plans.



## **TARGET AREAS**

### **Auditing for Energy Management**

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

### **Auditing for Carbon Footprint**

Burning of fossil fuels (such as petrol) has an impact on the environment through the emission of greenhouse gases into the atmosphere. The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions. Vehicular emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important.

## **METHODOLOGY ADOPTED**

The methodology adopted to conduct the Green Audit of the Institution had the following components

### **Onsite Visit**

Four day field visit was conducted by the Energy Audit Team . The key focus of the visit was on assessing the status of energy conservation strategies.

### **Focus Group Discussion**

The Focus Group discussions were held with the nature club members, ENCON club members, staff members and the management focusing various aspects of Energy Audit. The discussion was focused on identifying the attitudes and awareness towards energy conservation at the institutional and local level.

### **Energy management and Carbon foot print analysis Survey**

With the help of teachers and students, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

## Survey forms

### 1. Energy audit

Room No. / name	Electrical device/ items	Number	Power	usage time (hr/day)

*Item: Bulbs (CFL, incandescent, LED); A/c, fan, computer, instruments*

### 2. Carbon foot print analysis

- 1 Total number of vehicles used by the stakeholders of the college.(per day)
- 2 No of cycles used
- 3 No of two wheelers used (average distance travelled and quantity od fuel and amount used per day)
- 4 No of cars used (average distance travelled and quantity od fuel and amount used per day)
- 5 No of persons using public transportation
- 6 No of persons using college conveyance
- 7 No of generators used per day
- 8 Amount of fuel used
- 9 Number of LPG cylinders used in canteen/labs
- 10 Use of any other fossil fuels in the college
- 11 Any suggestion to reduce the use of fuel

## **AUDIT STAGE**

Energy auditing in **Alphonsa college, Pala** began with the assessment of the status of the energy conservation strategies adopted in the college. The team monitored different facilities at the college, determined different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances.

College records and documents were verified several times to clarify the data received through survey and discussions.

## ENERGY AUDIT REPORT

Table 1 shows the energy consumption pattern of the college for a month. The college has consumed an average of 9515.15 kW/hr electricity in a month and the one year electricity bill amount was 1,97,090/-.

Table 1

Sl No	Electrical appliances/instruments	Number	Power (W)/unit	Total power (W)	kW	Operation /day	kW/hr	No of days in month	Total consumption per month
1	CFL	63	14	882	0.882	4	3.528	25	88.2
2	TUBE	272	38	10336	10.336	4	41.344	25	1033.6
4	LED BULB	97	9	873	0.873	4	3.492	25	87.3
5	LED TUBE	42	20	840	0.84	4	3.36	15	50.4
6	PROJECTOR	10	280	2800	2.8	1	2.8	25	70
7	SPEAKERS	36	10	360	0.36	1	0.36	25	9
8	FAN	233	60	13980	13.98	4	55.92	20	1118.4
9	COMPUTER	140	250	35000	35	4	140	20	2800
10	LAPTOPS	10	50	500	0.5	4	2	20	40

11	PRINTERS	2	60	120	0.12	1	0.12	20	2.4
12	PHOTOSTAT MACHINE	6	650	3900	3.9	2	7.8	15	117
13	SCANNER	1	50	50	0.05	0.5	0.025	15	0.375
14	UPS	3	1000	3000	3	12	36	20	720
15	INDUCTION	1	2000	2000	2	0.25	0.5	15	7.5
16	A/C	2	7000	14000	14	1	14	15	210
17	REFRIGERATOR	7	150	1050	1.05	24	25.2	30	756
18	TABLE FAN	2	55	110	0.11	2	0.22	25	5.5
19	MIXER GRINDER	2	750	1500	1.5	2	3	15	45
20	OVEN	3	1500	4500	4.5	2	9	10	90
22	CENTRIFUGE	2	850	1700	1.7	0.25	0.425	8	3.4
23	AUTOCLAVE	1	1700	1700	1.7	1	1.7	4	6.8
24	ULTRASOUND	1	700	700	0.7	0.25	0.175	5	0.875
25	LAMINAR FLOW	1	600	600	0.6	1	0.6	15	9
26	EXHAUST FAN	1	32	32	0.032	4	0.128	25	3.2
27	IRON BOX	2	2000	4000	4	0.25	1	15	15
28	SEWING MACHINE	6	100	600	0.6	4	2.4	25	60
29	COLOUR BULB	13	60	780	0.78	1	0.78	5	3.9
30	INCUBATOR	2	40	80	0.08	4	0.32	25	8
31	DISTILLATION UNIT	1	1000	1000	1	1	1	12	12
32	SANITARY NAPKIN INCINERATOR	6	1200	7200	7.2	1	7.2	25	180

### Carbon Foot Print Analysis

1. Total number of vehicles used by the stakeholders of the college : 10
2. Number of cycles used : 0
3. No: of two wheelers used : 8  
Average distance travelled : 10 km  
Average quantity of fuel used : ½ Ltr
4. No: of cars used : 21  
Average distance travelled : 425 km/21 km= 20 km  
Average quantity of fuel used : 1 Ltr
5. No: of persons using public transportation : 700
6. No: of persons using college conveyance : ----
7. No: of generators used per day : 1 (140 KVA Kirlosker) (Using **20 hrs / Month**)
8. Amount of fuel used : 60 Ltr
9. No: of LPG cylinders used in canteen/ Labs : 13
10. Use of any other fossil fuels in the college : Using firewood in the college canteen
11. Any suggestion to reduce the use of fuel :-- ---

## **SUGGESTIONS AND RECOMMENDATIONS**

### **Energy management**

The energy audit recommend to avoid the use of more energy consuming electrical appliances and to replace with more environment friendly and energy efficient appliances (for example five stars rated Air conditioner) in the college. The potential of renewable energy sources have to be explored. As the college has a very large roof area for installing solar panels so that it can be effectively used for generating power.

It is recommended to install the following solar powered appliances in the campus;

Solar powered water heater and cooker in the college canteen

Solar powered street lights and LED display board