

ENERGY, ENVIRONMENT & GREEN AUDIT – FOLLOW UP AUDIT REPORT

DETAILS OF THE CLIENT

THAMIRABHARANI ENGINEERING COLLEGE

Thatchanallur, Tirunelveli – 627 358, Tamil Nadu, India.



DATE OF AUDIT

02 JUNE 2023

(Audited and Accounted for the Year 2022-23)

AUDIT CONDUCTED AND SUBMITTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(Chennai ♦ Coimbatore ♦ Erode)

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Thatchanallur, Tirunelveli - 627 358

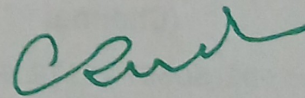
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1. ACKNOWLEDGEMENT



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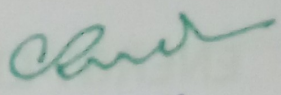
ACKNOWLEDGEMENT

RAM KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING Coimbatore - 641 062 is thankful to the Management, Faculty and Technical team members of M/s. THAMIRABHARANI ENGINEERING COLLEGE, Thatchanallur, Tirunelveli - 627 358, Tamil Nadu, India for providing an opportunity to conduct the follow-up Energy, Environment and Green Audit for college promises.

It is our great pleasure which must be recorded here that the management of M/s. THAMIRABHARANI ENGINEERING COLLEGE all possible support and assistance resulting in expeditious completion of the audit process. The audit team appreciates the cooperation and guidance extended during course of site visit and measurements. We are also thankful to the all those who gave us the necessary inputs and information to carry out this very vital exercise of green audit.

Finally, we offer our sincere thanks to all the members in the engineering division/ technical/non-technical and office members who were directly and indirectly involved with us during collection of data and conducting field measurements

<i>Management Team Members</i>	
Mr. M. R. PAULRAJ	Chairman
Mr. SETHIL KUMAR PALRAJ	Secretary
<i>Audit Team Members</i>	
Dr. S.R. SIVARASU	BEE Certified Energy Auditor (EA-27299) Lead Auditor-ISO-14001:2015 (EMS). IGBC AP, GRIHA CP Email: ramkalamcect@gmail.com Moblle: 80567 19372, 99420 29372


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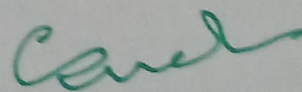
THAMIRABHARANI ENGINEERING COLLEGE

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2. INTRODUCTION

TO

ENERGY-ENVIRONMENT-GREEN AUDIT PROCESS



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2.1: Preamble:

- ★ **Thamirabharani Engineering College** which is in the Tirunelveli Corporation limits is located at Thatchanallur, 5km away from Palayamkottai and 40 km from Tuticorin airport. Unfolding its grandeur over 25 acres of land, the college exhibits an attractive panorama conducive to studies. Considering a holistic approach to life and education, an ambient infrastructure is provided for the students. They enjoy a natural sanctuary of birds, magnificent scenery of evergreen trees and amazing mountains and a gorgeous garden of multicoloured flowers. **Thamirabharani Engineering College** was founded with the noble vision to raise professionals and leaders of high academic calibre and unblemished character, nurtured with a strong motivation and commitment to serve humanity. TEC aims at educating & training its students to become not only competent professionals but also excellent human beings to influence the quality of life of people around.
- ★ **Thamirabharani Engineering College** was established with the goal of producing outstanding students in Technical and Business fields and preparing them to tackle the challenges of a dynamic and rapidly changing world. The management implements an interdisciplinary approach to the programs of Anna University, making sure that practical applications are combined with the classroom material. All the programs offered by the institute are recognized by and affiliated to statutory bodies like the All India Council of Technical Education (AICTE), New Delhi and Anna University, Chennai. In a nutshell, Thamirabharani Engineering College is a co-educational, residential, technological college imparting holistic education to develop the technical and the character of the students.

2.2: Vision:

- To be a center of excellence in Engineering, exposing emerging technologies and instilling Entrepreneurial Attitude.

2.3: Mission:

- ☞ Empower students through effective teaching and learning process for the development of critical thinking, effective communication and creativity.
- ☞ Develop industry readiness by encouraging learning by doing, exposing current innovation and providing adequate facilities for Research.
- ☞ Create the entrepreneurship desire by developing individual skills, professional ethics, moral values and societal concern.

2.4: Quality Policy:

We are committed to produce excellent technical personnel with ethical and moral values for overall growth of the country through;

- Resolute efforts at all levels.
- Continuous improvement in infrastructure.
- Improved teaching-learning process by committed and continually trained faculty.

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2.5: Scope of the Audit Process:

- **Energy Audit:** Conduct a detailed energy audit in the college campus with a main focus to identify judicious usage of electrical and thermal energy (where, when, why and how energy is being utilized).
- To ascertain the best practices to be followed in energy conservation, energy management, recommended safety measures and continuous energy monitoring system.
- **Environmental Audit:** Identification of history of activities, present environmental practices followed, monitoring records and known sources of environmental issues inside the college.
- Adoption of natural resources as input (such as energy and water), processing and utilization and generation of wastes (including hazardous and toxic),
- Handling and storage of all types of wastes (Solid, liquid and grousers), transportation of waste from source to yard, reuse and recycling possibilities, storage mechanism and effective disposal.
- Measurement of effectives of pollution control (air, water and soil pollution), maintenance logs, emission test reports and routine analytical reports.
- Providing constant awareness to all stakeholders on Environment Impacts, risk analysis and Ecology.

2.6: Outcomes of the Follow-up Audits:

- Recommendations based on field measurement with achievable Energy Conservation (ENCON) proposals under No cost/Low cost and Cost Investment categories
- Minimization of present energy cost by adjusting and optimizing energy usage and reduction of energy wastage without affecting the regular activities
- Identification of possible cost and energy saving from energy conservation, waste reduction, reuse and recycling
- Formation of methodology for long term road map for maintaining green environment within the campus and encourage the stakeholders for continuous improvements

2.7: Date of Audit:

02 JUNE 2023

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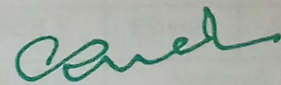
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3. ESTIMATION OF CO₂ EMISSION & NEUTRALIZATION



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3.1: Assessment of Annual Energy Usage:

Table-1 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-1: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	One LT Service for College Operation	Powering to all electrical / electronic / HVAC equipment's / Motors / Pumps	From TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used for cooking application	
4.	Mature Trees	Nearly 626 nos of different varieties with more than 10 years old.	

Table-2: Analysis of Annual Energy Consumption of all types of Fuels

S. No.	Month	Electricity Generation (kWh)		LPG Consumption (kg)	Diesel Consumed (L)		
		EB	From DG		DG	Transport	Total
1.	Jun-22	9,675	203	374	63.4	5,991.5	6,055
2.	Jul-22	6,024	101	408	31.7	6,088.7	6,120
3.	Aug-22	4,372	0	544	0.0	5,345.7	5,346
4.	Sep-22	6,198	68	408	21.1	8,724.3	8,745
5.	Oct-22	5,120	67	493	21.0	7,273.7	7,295
6.	Nov-22	6,905	69	534	21.5	8,152.6	8,174
7.	Dec-22	8,266	0	442	0.0	6,962.3	6,962
8.	Jan-23	6,819	135	425	42.3	5,652.9	5,695
9.	Feb-23	6,483	68	289	21.1	5,634.6	5,656
10.	Mar-23	8,204	0	544	0.0	6,648.5	6,649
11.	Apr-23	7,183	0	323	0.0	5,043.8	5,044
12.	May-23	7,656	68	391	21.4	6,109.0	6,130
Average		6,909	65	431.3	20.3	6,469.0	6,489.3
Total		82,905	779	5,175	243.6	77,627.5	77,871.1

3.2: Environmental System: CO₂ Balance Sheet:

- CO₂ Balance sheet is the indicator on the carbon emission and their neutralization in a year
- As per the Environmental Management System (EMS); only Scope-1 & Scope-2 based energy consumption is accounted.
- The following tables provide the balance sheet indicating various energy carriers associated with the regular activities and their CO₂ mapping.

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Table-8: Environmental System: CO₂ Balance Sheet (2022-23)

S. No.	Annual Energy Consumption & CO ₂ Emission			Annual CO ₂ Neutralization		
	Description	Annual Usage	CO ₂ Emission (Tons)	Description	Annual Usage	CO ₂ Neutralized (Tons)
1.	Diesel	77,871 Litres	205.6	Mature Trees	626 No's	13.6
2.	Electrical Energy	82,905 kWh	68.0			
3.	LPG	5,175 kg	15.5			
Total Emission			289.1	Total-Neutralized		13.6
Balance CO ₂ to be Neutralized = 275.4 Tons/Annum & Per Capita CO ₂ Consumption = 0.31 Tons/Annum ¹						

(¹ Total strength of students, teaching and technical staff = 879)

3.3: Calculation Table:

For Electricity = $\left[\text{kWh} \times \frac{0.82 \text{ kg of CO}_2 \text{ emission}}{\text{kWh}} \right]$
For Diesel = $\left[\text{Diesel Consumption (Litre)} \times \frac{2.64 \text{ kg of CO}_2 \text{ emission}}{\text{Litre of Fuel Consumption}} \right]$
For LPG = $\left[\text{LPG Consumption (kg)} \times \frac{3.0 \text{ kg of CO}_2 \text{ emission}}{\text{kg of LPG Consumption}} \right]$
A mature tree is able to absorb nearly CO ₂ at a rate of 21.8 kg/annum; hence total CO ₂ to be neutralized is $\frac{(21.8 \times 626)}{1,000} = 13.6 \frac{\text{Tons}}{\text{Annum}}$

3.4: References:

¹ <https://ecoscore.be/en/info/ecoscore/co2>

² <http://www.tenmilliontrees.org/trees/#:-:text=A%20mature%20tree%20absorbs%20carbon,the%20average%20car's%20annual%20mileage>

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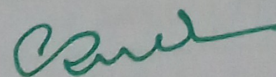
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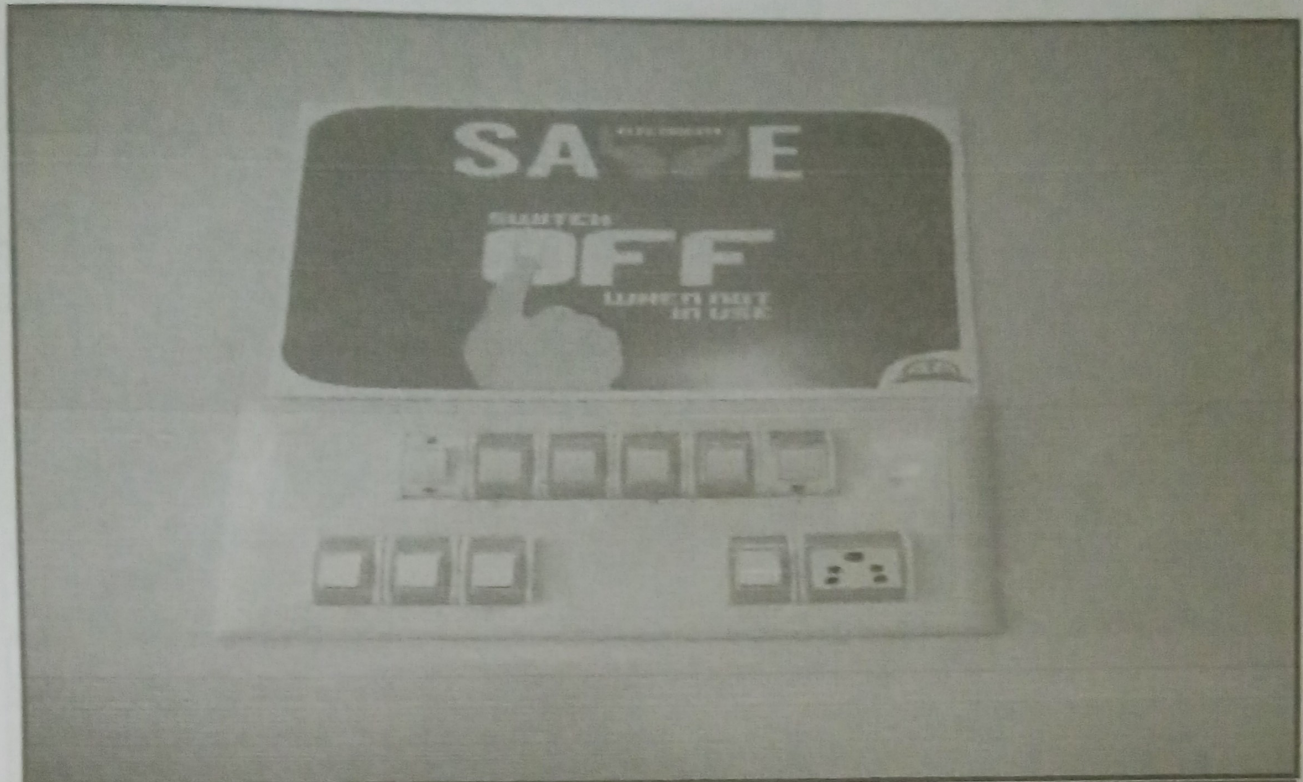
4. ACTIVITIES COMPLETED & RECOMMENDATIONS



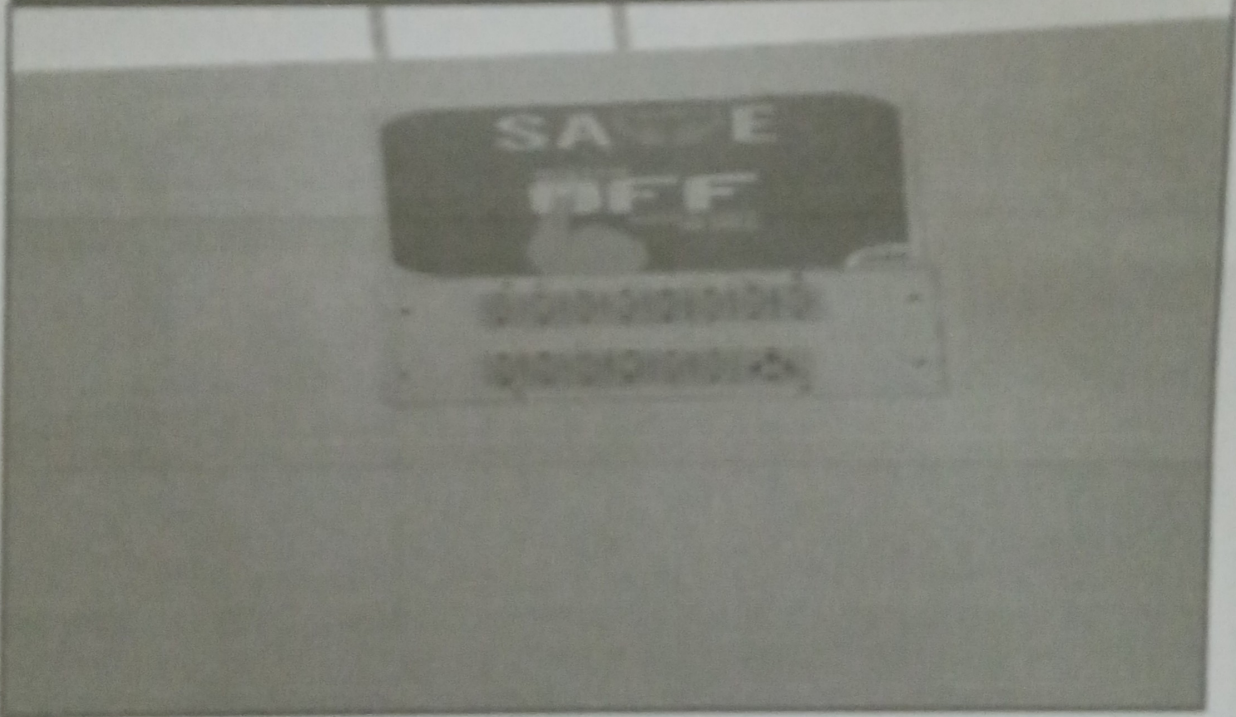
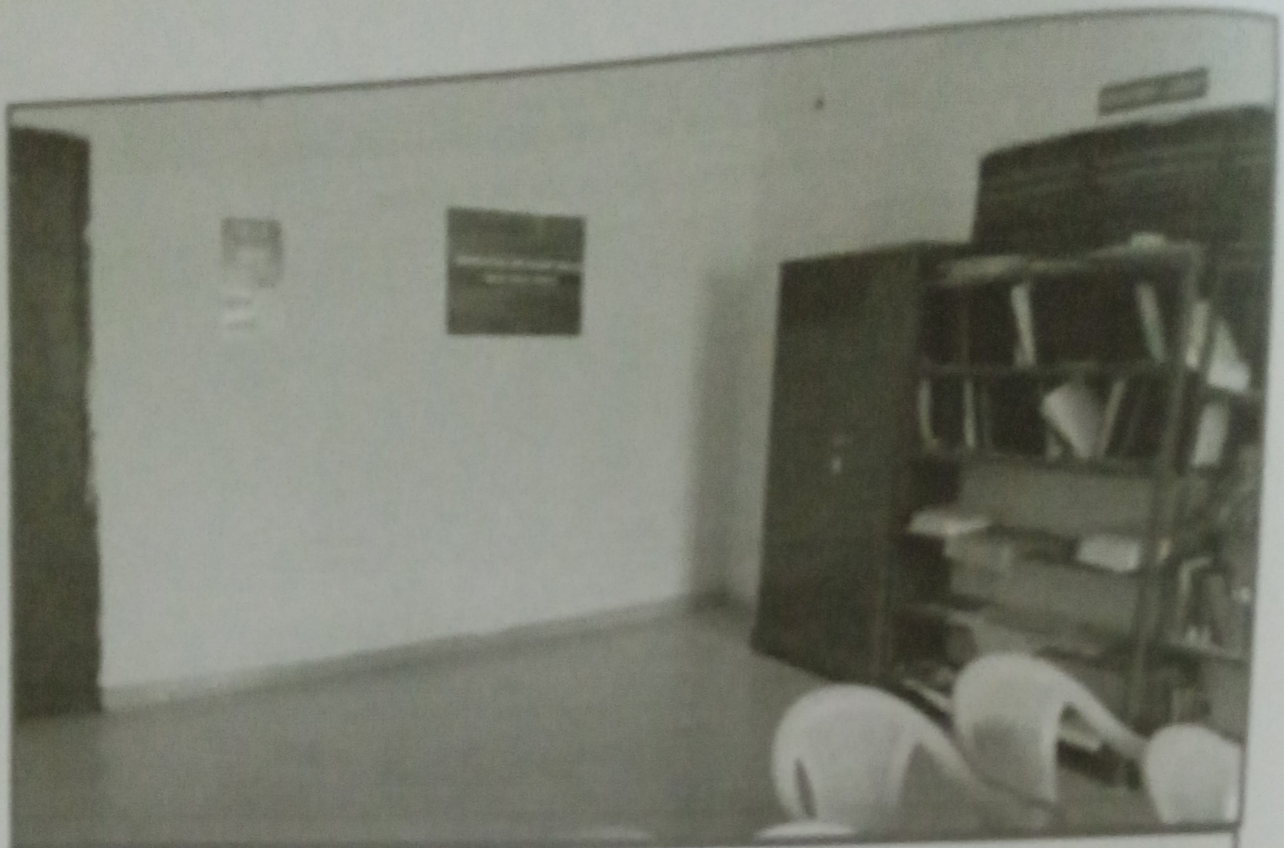
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4.1: Activities Completed:

The audit team appreciates that the management of **THAMIRABHARANI ENGINEERING COLLEGE** has taken to paste the Save Energy Sticker in all prominent places and shown below:



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4.2: Recommendations:

- Prepare a schedule to clean the air filters of AC indoor units at regular intervals
- Observe the performance of the AC unit before and after air filter cleaning
- Convert the common switches used for lights and fans into single controlled system
- Compensate the electrical distribution losses by connecting load end capacitors
- Conversion of Fluorescent lamps into Energy Efficient LED saves good amount of energy
- Measure the earth resistance at regular interval and maintain within the standard.
- Observe the voltage drop between supply point and load end and ensure that the voltage drop must be minimum

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- Voltage drop at the load end can be improved by load end capacitors compensation
- Battery voltage of each UPS must be measured and monitored. This ensures good practices on UPS & battery maintenance.
- Prepare and adhere a cleaning schedule for UPS (both inside and outside the cabinet) and ensure proper heat dissipation
- Conduct some kind of awareness programmes on Energy Conservation to all the stake holders.
- Reduce the LPG consumption by regularly clean the burners
- Decrease the LPG consumption by arresting the leakages on the distribution pipes.
- Foot valve of all the submersible and open well pipes must be cleaned at regular intervals and this ensure i) free flow of water and ii) reduced power consumption.
- Awareness programmes must be conducted to all the students and staffs. Disseminate the success stories on achieved energy conservation.
- Provide training to the transport staffs to reduce the fuel consumption
- Create a policy for chemical, acids and salts for safe storage, handling and disposal
- Recommend to use mechanical cleaning device for sewage treatment plant.

Audit Conducted and Verified by,

S.R. Sivarasu

(Dr. S.R. SIVARASU)

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COMPLETION OF THE REPORT

This report is prepared as a part of the Follow-Up Energy, Environment and Green Audit process conducted at M/s. P THAMIRABHARANI ENGINEERING COLLEGE, Thatchanallur, Tirunelveli - 627 358, Tamil Nadu, India by RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING, Coimbatore-641 062, Tamilnadu, India.

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