

7.1.2 - The Institution has facilities for alternate sources of energy and energy conservation:

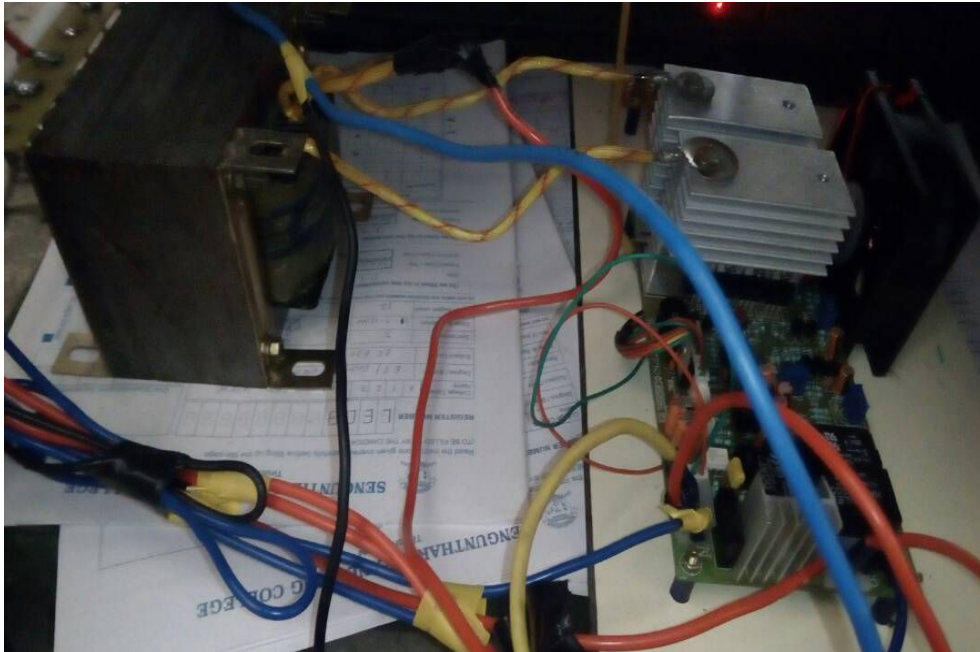
The College Campus has facilities for alternate sources of energy and energy conversation. The Management, the staff members and the students are committed in maintaining an eco-friendly atmosphere. The classrooms in our Campus are spacious, well lighted and ventilated to reduce the usage of electricity during daytime. Instruction boards about Electricity Consumption are displayed in various places to minimize the consumption of electricity. The essential initiatives have been taken to create awareness about energy crisis, energy consumption and effects of carbon emission.

I. Use of renewable energy - Solar Energy

1. Renewable Energy (Solar Energy) Utilization

1. “SOLAR INVERTER” is designed and installed at the department of Electrical and Electronics by our final year B.E. – EEE students.





2. Solar On Grid System

Solar energy generation was initiated in the academic year 2021-2022 and installed on our campus. On-grid means your solar system is tied to your local utility's GRID. This is what most residential homes will use because you are covered if your solar system under or over-produces in regard to your varying energy needs.





II. Sensor-based energy conservation

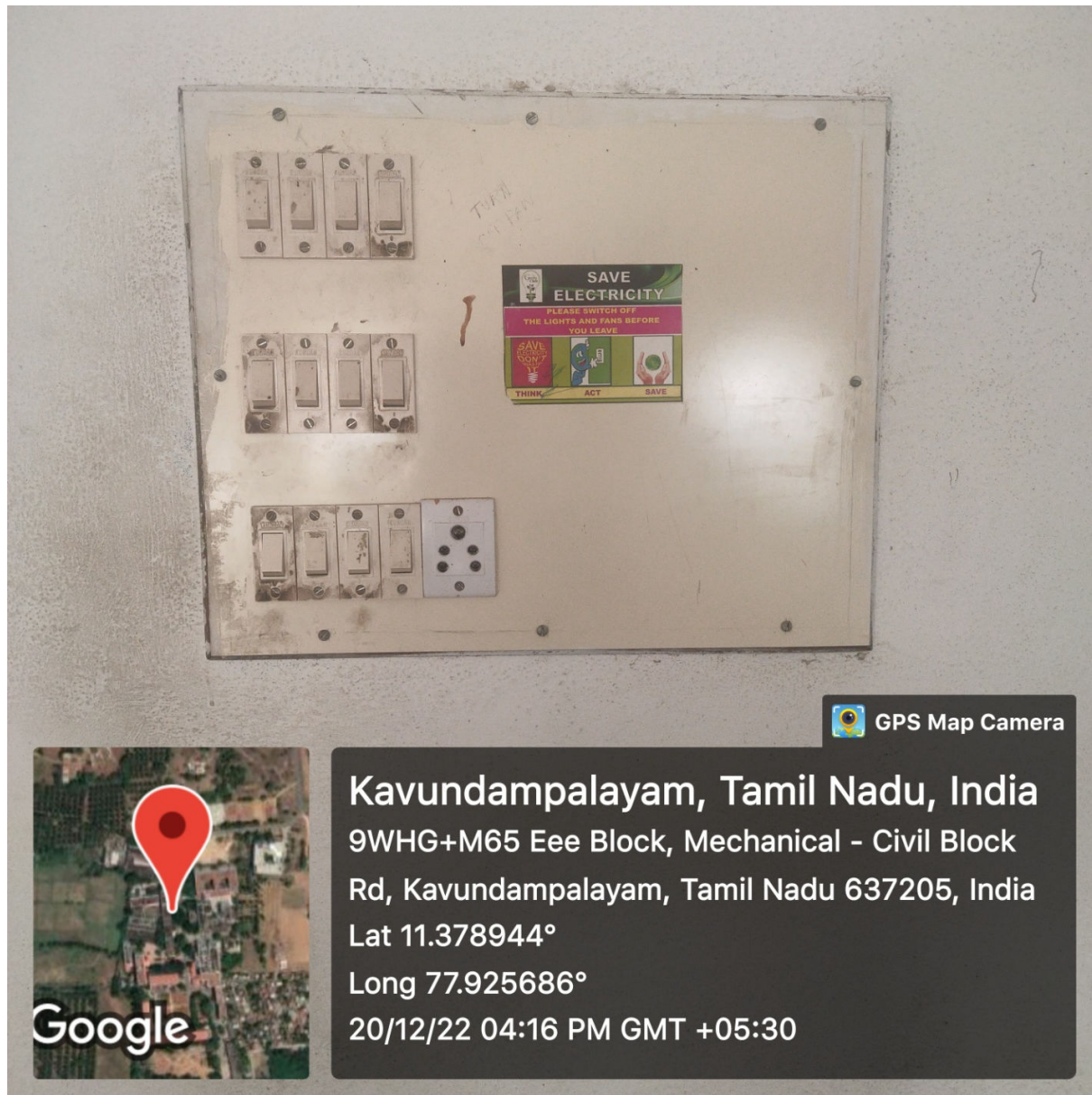
1. Sensor Based Energy Conservation

This energy saving system done by Third year BE Electrical and Electronics Engineering Automatic Street Light ON OFF using Sensor method. This technique can be used in real life because it can save electricity. Two kinds of sensors have been used which are light sensor and photoelectric sensor. The light sensor will detect darkness to activate the ON/OFF switch, so the streetlights will be ready to turn on and the photoelectric sensor will detect movement to activate the streetlights.



Automatic Street Light ON OFF using Sensor method

2. Instruction boards were displayed to conserve the Electricity in the college campus.

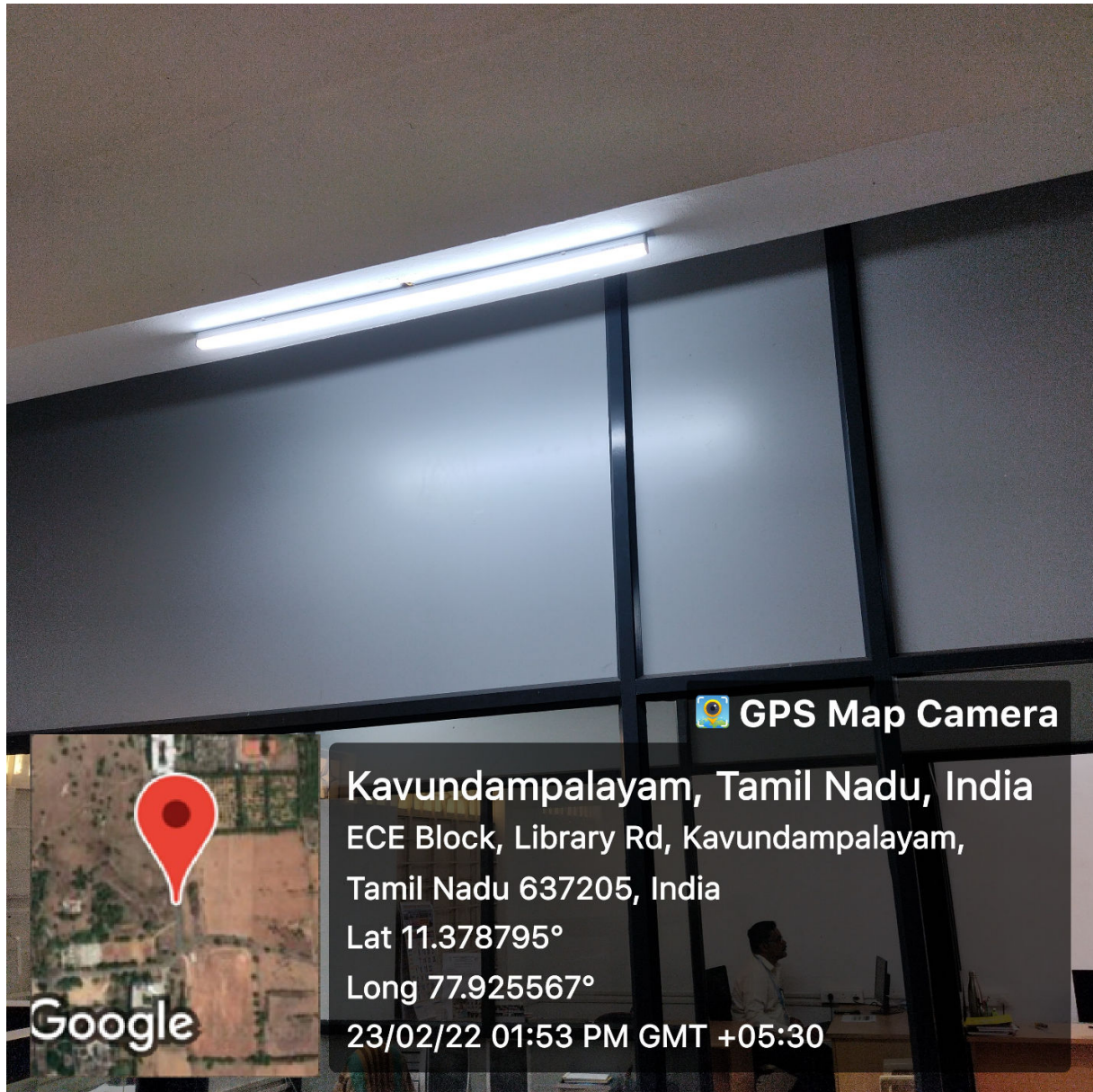


III. Use of LED bulbs/ power-efficient equipment

LED bulbs are used in the street lights, office and laboratories and energy efficient desktops and equipments are used to reduce the energy consumption.



LED street lights in the campus roads



LED lights in the Office

ENERGY, ENVIRONMENT & GREEN AUDIT – FOLLOW-UP AUDIT REPORT

DETAILS OF THE CLIENT

SENGUNTHAR ENGINEERING COLLEGE

(AUTONOMOUS)

Tiruchengode, Namakkal – 637 205, Tamil Nadu, India



Estd. 2001

DATE OF AUDIT

09 JUNE 2022

(Audited and Accounted for the period of 2021-22)

AUDIT CONDUCTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(Chennai ♦ Coimbatore ♦ Erode)

Mobile: +91- 80567 19372, 99420 14544 (Whatsapp) E-mail: ramkalamcect@gmail.com



ACKNOWLEDGEMENT

RAM KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING, Coimbatore - 641 062 is thankful to the Management, Principal, Faculty and Technical team members of **SENGUNTHAR ENGINEERING COLLEGE (Autonomous)**, Tiruchengode, Namakkal - 637 205, Tamil Nadu, India for providing an opportunity to conduct the **Follow-up Energy, Environment and Green Audit** process for the college premises.

It is our great pleasure which must be recorded here that the management of **SENGUNTHAR ENGINEERING COLLEGE** extended 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 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.

<u>Management Team Members</u>	
Jansons. Thiru. T. S. NATARAJAN	Chairman
Prof. A. BALADHANDAPANI, M.A., M. Phil.,	Secretary & Correspondent
Er. A.B. MADHAN, M.E., (Ph. D).	CEO
Mr. ARAVIND THIRUNAVUKKARASU, MCA, M.E.,	Director - CR
Dr. K. UMADEVI, M.Tech., Ph.D.	Principal

<u>Audit Team Members</u>	
Dr. S.R. SIVARASU, Ph.D.	BEE Certified Energy Auditor (EA-27299) Lead Auditor-ISO-14001:2015 (EMS), IGBC AP, GRIHA CP, CII CP in SWM Carbon Footprint Auditor & Implementor Mobile: +91- 80567 19372, 99420 29372

**ENERGY, ENVIRONMENT &
GREEN AUDIT – FOLLOW-UP AUDIT REPORT**

**1. INTRODUCTION TO
ENERGY-ENVIRONMENT-GREEN AUDIT
(FOLLOW-UP AUDIT)**

1.1: Preface about the Institution:

- **Sengunthar Engineering College** was established with the ideal motto of “**Education, Edification and Elevation**”, in the year 2001 underneath of Sengunthar Charitable Trust which always aspires to hone the skills of young minds, maintains better standards and develops scientific temper. Sengunthar has been producing successful professionals, technocrats, entrepreneurs and academicians, since its inception.
- This Co-educational, Self-financing Engineering College, started with the approval of the **Government of Tamilnadu** in 2001 and it is approved by the **All India Council for Technical Education (AICTE), New Delhi** and affiliated to **Anna University, Chennai**. It has been recognized by **UGC, New Delhi** under **Section 2(f)** and **12(B)** of the UGC Act, 1956 and also **Accredited with “A” Grade by NAAC**. The college is certified as **ISO 9001:2015** Institution by **BSCIC**. Our institution has been granted Autonomous status by UGC, New Delhi and Anna University, Chennai for Ten years from the academic year 2019-2020 to 2028-29. The College started with 3 Under-Graduate Programmes with the Student-Strength of 104 in the year, 2001, now offers **5 Under-Graduate Programmes** and **4 Post-Graduate Programmes** with the Student strength of **392** (Excluding First Year student strength in UG & PG Programmes).

1.2: Vision:

- ✓ To produce talented engineers and technicians to meet the challenge of the modern world and to train the young people to understand the human values.

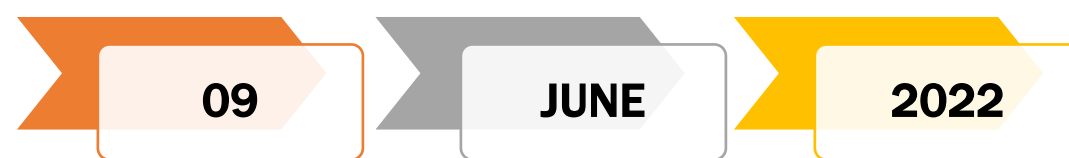
1.3: Mission Statement:

- To offer professional education and bring out the hidden talents from the rural based students as our nation depends on rural mass.

1.4: Quality Policy:

- ❖ To Provide Quality Technical Education in Under Graduate and Post Graduate level as per the University Syllabus and in strict compliance with AICTE requirements
- ❖ Quality Education encompasses the needs and expectations of all interested stakeholders with a strong focus on THE student-centric approach
- ❖ To Build good characterized students and make them employable and successful in their life by inculcating life skills

1.5: Date of Audit:



**ENERGY, ENVIRONMENT &
GREEN AUDIT – FOLLOW-UP AUDIT REPORT**

**2. STUDY ON ENERGY
CONSUMPTION PATTERN**

2.1: Energy Consumption Pattern (Electrical and Thermal):

S. No.	Description	Details	
Electrical Energy (Consumption)			
1.	Name of the customer (As per the utility bill)	SENGUNTHAR ENGINEERING COLLEGE & T.P.ARUMUGAM	
2.	Tariff Structure	Rs. 7.50/kWh + Rs. 120/kW as demand charges (fixed charges accounted for the sanctioned demand)	
3.	Energy Suppliers	Tamilnadu Generation & Distribution Corporation (TANGEDCO)	
4.	Capacity of Diesel Generator (DG) Sets	125 kVA-2 No's, 62.4 kVA & 15 kVA-1 Each	
		All are air-cooling. Internal fuel tank & separate earthing done	
5.	Annual Electricity Generation from DG (kWh)	2,188 kWh (0.83 % of total annual electrical energy)	
6.	Annual Diesel Consumption for DG (L)	900 Litres (1.6 % of total annual diesel consumption)	
Thermal Energy (Consumption)			
7.	Types of Thermal Energy Used	Liquefied Petroleum Gas (LPG)	Cooking
		Diesel (Ordinary)	Transport + DG
8.	Annual LPG & Diesel Consumption for Transport	17,385 kg & 39,651 Liters	
General Loads (Both Electrical and Thermal)			
9.	Lighting System	Indoor lighting: Conversion of Florescent Tube Light (FTL) into LED in a phased manner	
		Outdoor lighting: All the street lightings are LED based energy efficient lamps.	
10.	Fan Loads (Ceiling)	<ul style="list-style-type: none"> All the ceiling fans are conventional fans. 	
11.	HVAC System	<ul style="list-style-type: none"> Unitary air conditioning system installed in the required places. Most of the AC units are BEE star rated and the outdoor units are mostly placed in shade. A welcome step in the energy conservation is; all the air conditioned rooms are set with 24°C as room temperature as per BEE norms. 	
12.	Motors and Pump loads	<ul style="list-style-type: none"> Mainly used for water distribution, purification, waste water treatment. 	

		<ul style="list-style-type: none"> • Small motors used in kitchen equipment's.
13.	Uninterrupted Power System (UPS)	<ul style="list-style-type: none"> • All the computers, server, surveillance system, projectors, telephonic units are connected with UPS of 57 kVA with nominal back up time of 15-30 min.

Table-1: Annual Consumption of Electrical & Thermal Energy Parameters (2020-21)

S. No.	Month	Units Consumed (kWh)	Energy Generated from DG ¹ (kWh)	LPG Consumed ² (kg)	Diesel Consumed (Litres)	
					DG	Transport
1.	Jun-21	6,416	240	119	69.4	288.2
2.	Jul-21	11,998	166	570	48.3	927.3
3.	Aug-21	13,443	190	285	54.9	1,402.7
4.	Sep-21	17,445	255	570	73.8	3,128.5
5.	Oct-21	19,445	140	1,140	40.6	2,,679.2
6.	Nov-21	26,539	126	1,710	36.5	3,110.8
7.	Dec-21	26,304	202	1,710	58.6	5,129.9
8.	Jan-22	18,079	213	1,995	61.6	1,738.8
9.	Feb-22	20,441	204	1,425	59.1	2,955.0
10.	Mar-22	34,748	152	1,710	44.0	6,907.9
11.	Apr-22	32,673	144	1,995	41.8	5,228.3
12.	May-22	34,114	156	1,995	45.6	6,154.2
Average		21,804	182.3	1,449	52.8	3,304.2
Total		2,61,645	2,188.0	17,385	634.0	39,650.8
<ul style="list-style-type: none"> ➤ ² Cumulative energy produced by all the four DGs and their respective diesel consumption ➤ ² 19 kg of commercial cylinders are used ➤ The cost of electricity for all the four services varies from Rs.9.00/kWh. ➤ The cost of the LPG is Rs. 92.0/kg. 						

**ENERGY, ENVIRONMENT &
GREEN AUDIT – FOLLOW-UP AUDIT REPORT**

**3. ESTIMATION OF
CO₂ EMISSION AND NEUTRALIZATION
(ELECTRICITY, DIESEL, LPG & MATURED TREE)**

3.1: Assessment of Annual Energy Usage:

Table-2 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-2: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	Electricity (LT Service)	Powering to all electrical / electronic / HVAC equipment's	From TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquefied Petroleum Gas (LPG)	Used only for cooking	
4.	Matured Trees	The college has nearly 298 nos of varieties of matured trees with more than 10 years old.	

3.2: Environmental System: CO₂ Balance Sheet (2021-22)

Environment audit is the best tool to assess the CO₂ emission and neutralization and chalk out the plans to reduce it from the present values. Table-3 provides the balance sheet indicating various energy carriers associated with the regular activities of the college and their CO₂ mapping.

Table-3: Environmental System: CO₂ Balance Sheet (2021-22)

S. No.	Annual Energy Consumption & CO ₂ Emission (Tons/Annum)			CO ₂ Neutralization (Tons/Annum)		
	Description	Energy Quantity	CO ₂ Emission	Description	Energy Usage	CO ₂ Neutralized
1.	Electrical Energy	2,61,645 kWh	214.5	DG Energy Generation	2,188 kWh	1.8
2.	Diesel	40,284.8 Litres	106.4	Matured Trees	298 No's	6.4
3.	LPG	17,385 kg	52.2			
4.	Total Emission		373.1	Total-Neutralized		8.2
Balance CO₂ to be Neutralized = 364.9 Tons/Annum						

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 matured tree can able to absorb nearly CO ₂ at a rate of 48 lbs./year (nearly 21.8 kg); hence total CO ₂ to be neutralized is $\frac{(21.8 \times 298)}{1,000} = 6.4 \frac{\text{Tons}}{\text{Annum}}$

3.4: References:

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

³ <http://www.tenmilliontrees.org/trees/#:~:text=A%20mature%20tree%20absorbs%20carbon,the%20average%20car's%20annual%20mileage>

**ENERGY, ENVIRONMENT &
GREEN AUDIT – FOLLOW UP AUDIT REPORT**

**4. ACTIVITIES COMPLETED
&
RECOMMENDATIONS**

4.1: Activities Completed:

The audit team appreciates that the management of **SENGUNTHAR ENGINEERING COLLEGE** has taken several measures to save energy and to protect the environment inside the college campus. The followings are the activities completed accounted for the last one year.

I. Clean Camp:

Place: Sengunthar Engineering College (Autonomous), Tiruchengode.

The NSS unit of our college conducted a campus cleaning camp on **19th April 2022** under the guidance of NSS Programme officers at Sengunthar Engineering College (Autonomous), Tiruchengode. Totally 70 NSS Volunteers were engaged in this Programme. The NSS Programme officers divided the NSS Volunteers into several groups. Each group was allocated with a particular area for cleaning.



II. Clean India Safe India:

On **27 October 2021**, the NSS organized the “Clean India Safe India” activity at the place of Mandakapalayam village near Sengunthar Engineering College, Tiruchengode. Our 30 NSS Volunteers are participated that activity and clean the village. Swachh Bharat Abhiyan is a Clean India drive and Mission launched as a National campaign by the Indian Government aimed at maintaining cleanliness of streets, roads and infrastructure of the Country.



III. WEED ERADICATION AND TEMPLE CLEANING”

The NSS unit of the college conducted a Temple cleaning on **08 March 2021** under the guidance of NSS Programme officers at Muneeswaran Temple. Totally 30 NSS Volunteers were engaged in this cleaning Programme. The NSS Programme officers divided the NSS Volunteers into several groups. Each group members were allocated with a particular area for cleaning.



IV. World Earth Day:

Entrepreneurship Development Cell, Sengunthar Engineering College organized a Seminar on **“Global Environmental Issues: A Major Challenges in Cities”** on **23th April 2022** and nearly **180 students** are participated in this event. Ride bicycle instead of riding bikes & car and save water. It is a reminder to protect the environment, restore damaged ECO systems and to live a more sustainable life.



V. World Environment Day:

Entrepreneurship Development Cell, Sengunthar Engineering College organized a Seminar on **“Living Sustainably In Harmony with Nature Environment”** on **25th July 2022**. The pandemic that the world has been facing for over a year now, has taught us an important lesson - We should respect and value the gifts we have got from Mother Nature. For too long now, humans have been exploiting earth’s natural ecosystems for their benefit and in the process destroying them forever. It is high time now that we all come together and become more aware and conscious of the way we are utilizing our natural resources. Nearly **95 participants** were attended and benefited from this seminar.



VI. Tree Plantation Drive

In order to increase the green coverage; the college management planted additional native trees inside the campus.



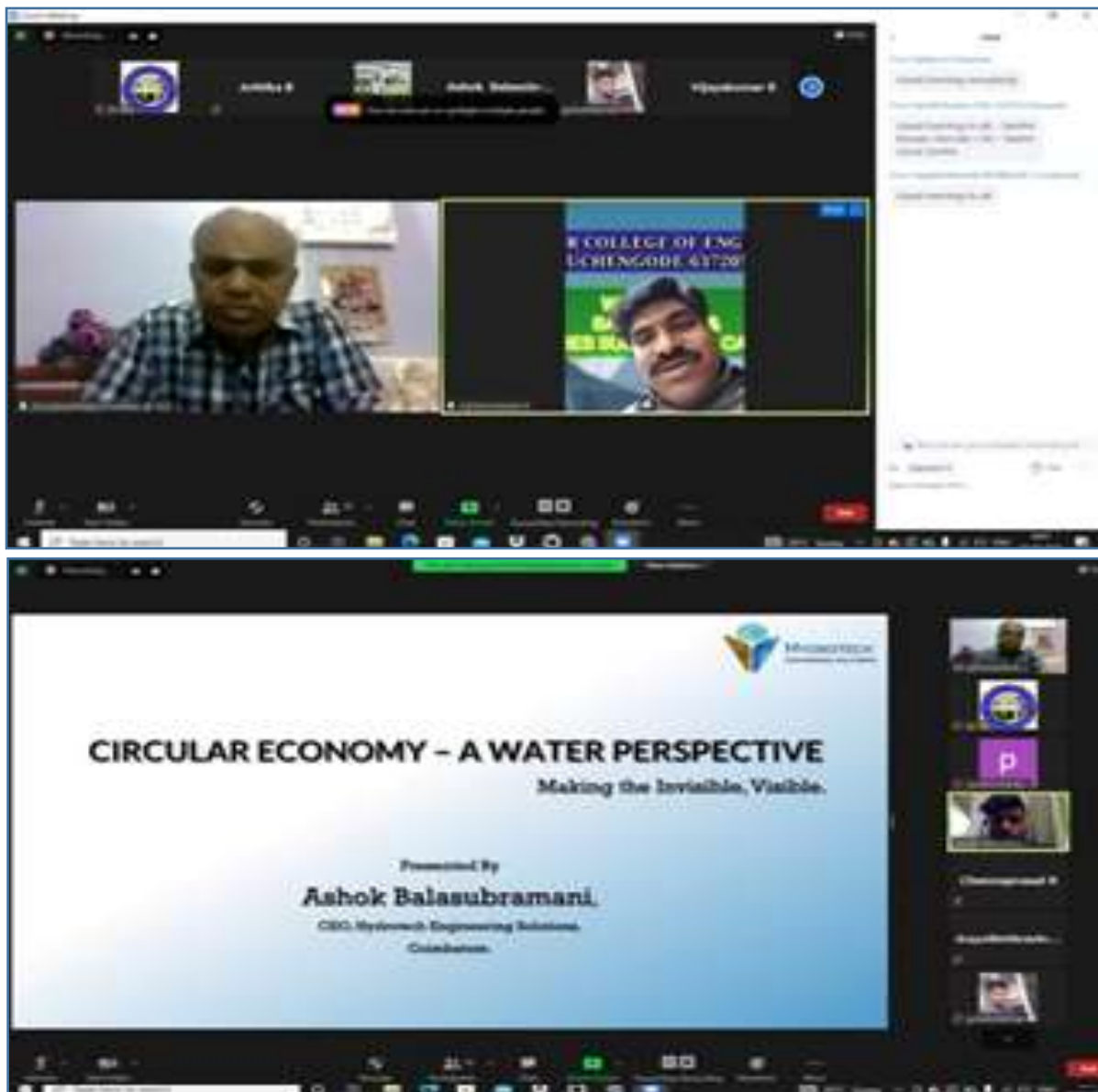
VII. Drivers Safety Awareness Program: Road Safety and Financial Literacy Program for drivers:

Nearly 34 drivers were attended & benefited from this seminar.



VIII. World Water Day:

An online seminar was conducted to celebrate the World Water Day on **24th March 2022**. Nearly **50 students** are participated & got benefited from this seminar. **Mr. Ashok Balasubramani**, CEO, Hydrotech Engineering Solutions was the chief guest and delivered the keynote address.



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
- 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,



(Dr. S.R. SIVARASU)

Dr. S.R. SIVARASU, Ph.D.,
BEE Certified Energy Auditor (EA-27299)
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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. SENGUNTHAR ENGINEERING COLLEGE (Autonomous)**, Tiruchengode, Namakkal – 637 205, Tamil Nadu, India, by **RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING**, Coimbatore-641 062, Tamilnadu, India.

ENERGY AUDIT CERTIFICATE

This is to certify that, we have conducted a *FOLLOW-UP ENERGY AUDIT* in
M/s. SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)
Tiruchengode, Namakkal – 637 205, Tamil Nadu, India.

AUDIT SUMMARY

Date of Audit	09 JUNE 2022
Present Annual Energy Consumption	2,61,645 kWh + 17,385 kg LPG
Proposed Annual Energy Savings	26,165 kWh + 1,739 kg LPG
% of Energy Savings	10 % Electrical + 10 % LPG
Proposed Annual Financial Savings	Rs. 4.0 Lakhs
Expected Initial Investment	Rs. 6.0 Lakhs
Simple Payback Period	18 Months
Audit Period	June-2021 to May - 2022

Audit conducted and verified by

(Dr. S.R. SIVARASU)

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RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

ENVIRONMENT AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed a Follow-up **ENVIRONMENT AUDIT** in

M/s. SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)

Tiruchengode, Namakkal - 637 205, Tamil Nadu, India.

AUDIT SUMMARY

S. No.	Annual Energy Consumption & CO ₂ Emission (Tons/Annum)			CO ₂ Neutralization (Tons/Annum)		
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3.	LPG	17,385 kg	52.2			
4.	Total Emission		373.1	Total-Neutralized		8.2
Balance CO₂ to be Neutralized = 364.9 Tons/Annum						

(Audited on 09 June 2022 & Accounted from June-2021 to May-2022)

Systems Audited:

• Electricity Consumption	• Usage of Chemical, Salts & Acids
• Diesel Consumption (Transport + DG)	• Floor and Vessel Cleaning agents
• LPG Consumption (Cooking)	• RO Plant and Water Distribution System
• Solid Waste Handling & Management	• E-Waste Management

Audit conducted and verified by



(Dr. S.R. SIVARASU)

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