

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

DETAILS OF THE CLIENT

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

Valley Campus, Pollachi Highway, Coimbatore - 641 032, Tamil Nadu, INDIA



DATE OF AUDIT

10 JUNE 2024

(Audited and Accounted for the Year June-2023 to May-2024)

AUDIT CONDUCTED AND SUBMITTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(An ISO 9001:2015 Certified Company & Registered under MSME, GoI)

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1. ACKNOWLEDGEMENT



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. HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)**, Valley Campus, Pollachi Highway, Coimbatore - 641 032, 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. HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)** has provided 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.

<u>Management Team Members</u>	
Shri. T.S.R. KHANNAIYANN	Founder & Chairman
Smt. SARASUWATHI KHANNAIYANN	Managing Trustee
Shri. K. SAKTHIVEL	Trustee
Dr. PRIYA SATISH PRABHU	Managing Trustee & Secretary
Dr. K. KARUNAKARAN	Chief Executive Officer
Dr. J. JAYA	Principal
<u>Audit Team Member</u>	
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2. INTRODUCTION TO ENERGY-ENVIRONMENT-GREEN AUDIT PROCESS



2.1: Preamble:

Hindusthan College of Engineering and Technology (HiCET) was established in the year **2000** by the great Industrialist and Philanthropist, **Thiru. T.S.R. Khannaiyann**, founder Chairman of Hindusthan Educational and Charitable Trust whose determination and dynamism made possible the realization of this institution of excellence. Surrounded with nature's pristine beauty and an excellent infrastructure coupled with dedicated and experienced faculty has made the campus a much sought-after abode of learning. HiCET is one of the premier technological institutions inculcating quality and value-based education through innovative teaching learning process for holistic development of the students.

At present, the college is offering **16 UG Programmes**, **6 PG Programmes** and **14 Research Programmes**. Currently around **6,000 students** pursuing various Undergraduate Programmes (B.E./B.Tech.), Postgraduate Programmes (M.E./M.Tech, MBA & MCA) and Research Programs (Ph.D.) in the institution and are mentored by above **366 well qualified** and experienced faculty members. The institution is recognized under **Section 2(f) and 12B** of University Grants Commission (UGC) and is an Autonomous Institution from 2016-17, affiliated to Anna University, Chennai with permanent affiliation for most of the programmes, approved by the All India Council for Technical Education (AICTE). **86.6 %** of eligible programs are NBA accredited and our institution has been accredited by **NAAC 'A++' Grade** with CGPA of **3.69 out of 4 in Cycle 2** and Institution Ranked NIRF - India Rankings 2024 in Band **201-300** in Engineering category and Band **11-50 in Innovation** category. Also an **ISO 9001:2015** certified institution.

Many Industry-Integrated programmes and the Hinnovation Centre of the institution encourages creativity, innovation and risk acceptance, identifying business thereby encouraging entrepreneurship and start-ups. AICTE IDEA Lab was established in the campus with a grant of Rs. 1 crore. Recognized as IPR Nodal Centre by Tamil Nadu State Council for Science and Technology (TNSCST) by Government of Tamil Nadu. Received 4 star rating by Institution's Innovation Council (IIC), Ministry of Education, Government of India. AICTE Margdarshan and DST FIST approved college.

Educational Philosophy:

- ❖ The educational philosophy of Hindusthan College of Engineering and Technology typically emphasizes hands-on, practical learning experiences that help students apply theoretical concepts to real-world problems. This can include a strong emphasis on project-based learning, internships, and value addition, as well as a focus on developing critical thinking, problem-solving, and teamwork skills.
- ❖ The programmes offered also place a heavy emphasis on promoting ethical and responsible practices, including sustainability, equity, empathy and professionalism.
- ❖ The overall goal is to produce well-rounded engineers who are equipped to tackle complex challenges and make a positive impact in the world.
- ❖ Hindusthan College of Engineering and Technology march towards greatness by following the educational doctrines of our beloved leader, Dr APJ Abdul Kalam in transforming the youth of today to become leaders of tomorrow.
- ❖ According to the great visionary leader and noble personality, Dr APJ Abdul Kalam, the aims of Education is
 - To create good human beings with skill and expertise
 - To create enlightened citizens
 - To inculcate creative mind of the child
 - To make learning more effective by the use of technology

- To build self confidence among the students.
- To develop moral leadership in different fields.
- To create entrepreneurs rather than job seekers
- To facilitate innovation, inventions and discovery
- To make the country energy independent

❖ Hindusthan College of Engineering and Technology fully endorse the words of the visionary leader and adopts in its growth along with New National Education Policy 2020.

Quality Policy:

Hindusthan College of Engineering and Technology aims at providing the best education which will mould the students as the right characters, who will cater to the needs of the society. While providing the various inputs for the best education, Hindusthan College of Engineering and Technology will constantly thrive upon continual improvement with the utmost commitment for the complete satisfaction of the stakeholder.

2.2: Vision:

- To become a premier institution by producing professionals with strong technical knowledge, innovative research skills and high ethical values.

2.3: Mission:

- IM1: To provide academic excellence in technical education through novel teaching methods.
- IM2: To empower students with creative skills and leadership qualities.
- IM3: To produce dedicated professionals with social responsibility.

2.4: Scope of the Audit Process:

- **Energy Audit:** To 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).
- **Environmental Audit:** Identification of history of activities, present environmental practices followed, monitoring records and known sources of environmental issues inside the college.
- **Green Audit:** Assessment on Campus greenery in terms of mature trees, flowering shrubs, bushes, medicinal plants, adoption of green energy generation and utilization, reduction of CO₂ due to green energy system and identification of possible implementation and enhancement of current greenery practices.

2.5: Outcomes of the Follow-up Audits:

- To check the activities implemented by the institution as per the recommendation of the main report.
- To ascertain the activities implemented as per the guidelines and standards
- To provide suggestions to improve further towards environmental sustainability

2.6: Date of Audit:



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3. ESTIMATION OF CO₂ EMISSION & NEUTRALIZATION (CO₂ Balance Sheet)



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.	Electricity (Two LT Services)	Powering to all electrical / electronic / HVAC equipment's	From state government utility
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used only for cooking	
4.	Seasonal Wood		From local vendor
5.	Mature Trees	The college has nearly 1,435 mature trees of different varieties which are more than 10 years old.	

Table-2: Analysis of Annual Energy Consumption of all types of Fuels (2023-24)

S. No.	Month	Units Consumed (kWh) ¹	Energy from Solar PV System (kWh)	LPG Consumed (kg) ²	Wood Consumed (Tons) ³	Diesel Consumed (DG + Transport)
1.	June	36,324	6,800	418	4	1,950
2.	July	31,932	7,550	475	4	5,860
3.	Aug	29,428	9,500	1,007	11	5,710
4.	Sep	35,765	8,850	1,425	11	6,210
5.	Oct	40,272	5,600	1,444	15	5,820
6.	Nov	44,041	4,815	1,425	16	6,640
7.	Dec	45,807	6,268	1,368	17	6,380
8.	Jan	28,180	6,569	1,425	16	6,280
9.	Feb	39,054	7,290	1,444	16	6,370
10.	Mar	49,420	8,389	1,501	17	5,970
11.	Apr	27,069	9,869	1,501	16	1,550
12.	June	35,782	9,580	1,292	17	2,230
Average		36,923	7,590	1,227	13.3	5,081
Total		4,43,075	91,080	14,725	160	60,970
1 Cumulative energy consumption of 2 LT services 2 Cumulative consumption of 3 hostels 3 Cumulative consumption of 3 hostels				→ The average cost of the Electricity is Rs. 12.20/kWh → The average cost of LPG is Rs.108.70/kg → The average cost of the Wood is Rs. 3,540/Ton		

3.2: Environmental System: CO₂ Balance Sheet (2022-23):

Table-3: CO₂ Balance Sheet Indicating its Emission and Neutralization

S. No.	Annual Energy Consumption & CO ₂ Emission			Annual CO ₂ Neutralization		
	Description	Parameters	Emission (Tons)	Description	Parameters	Neutralized (Tons)
1.	Electrical	4,43,075 kWh	363.3	Solar PV	91,080 kWh	74.7
2.	Wood	160 Tons	304.0			
3.	Diesel	60,970 Litres	161.0	Matured Trees	1,435 Nos	31.3
4.	LPG	14,725 kg	44.2	Solar Thermal System*	18,992 kWh	15.6
Total Emission			872.5	Total-Neutralized		121.6
Balance CO₂ to be Neutralized = 750.9 Tons/Annum						

(* Equivald to electrical equivalent)

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 = $\left[\text{LPG Consumption (kg)} \times \frac{3.0 \text{ kg of CO}_2 \text{ emission}}{\text{kg of LPG Consumption}} \right]$
For Wood = $\left[\text{Wood Consumption (Ton)} \times 1.9 \text{ Tons of CO}_2 \text{ Emission/Ton of Wood Consumption} \right]$
A mature tree is 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 $\frac{(21.8 \times 1,435)}{1,000} = 31.3 \frac{\text{Tons}}{\text{Annum}}$

3.4: References:

[https:// https://ecoscore.be/](https://ecoscore.be/)

<http:// https://tenmilliontrees.org/>



CO₂ Emission:
872.5 Tons/Annum



CO₂ Reduction
121.2 T6ons/Annum



CO₂ to be Neutralized
750.9 Tons/Annum

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4. ACTIVITIES COMPLETED & RECOMMENDATIONS



4.1: Activities Completed:

The audit team appreciates that the management of **HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)** has been implemented “**Go Green Initiative**” 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.

A. AN AWARENESS TALK ON "DRIVE DEFENSIVELY, NOT OBSESSIVELY (23-12-2023):

- Awareness and promote road safety created among the first year students - new license holders.
- Young participants are inspired to adopt responsible road behaviours toward road safety.
- Students acquired the knowledge on road safety, safety rules, traffic regulations, safe ride and drive
- More than **110 members** participated and benefited.
- **Conducted by the Science and Humanities in association with Uyir club**



B. SAFE STREET (27-01-2024):

- ✓ Spectators gain a better understanding of road safety issues, including the importance of following traffic rules and wearing seat belts and Helmets.
- ✓ More than **14 members** participated and benefited.
- ✓ **Conducted by the Rotaract & Uyir club Members**



C. Online Quiz Competition on World Environment Day (05-06-2023):

- ❖ The participant gained knowledge on Environmental issues and sustainable practices
- ❖ More than **80 members** participated and benefited.
- ❖ **Conducted by the Maha Kavi Bharathi Tamil Mandram, Nature Club & Green Thumbs**

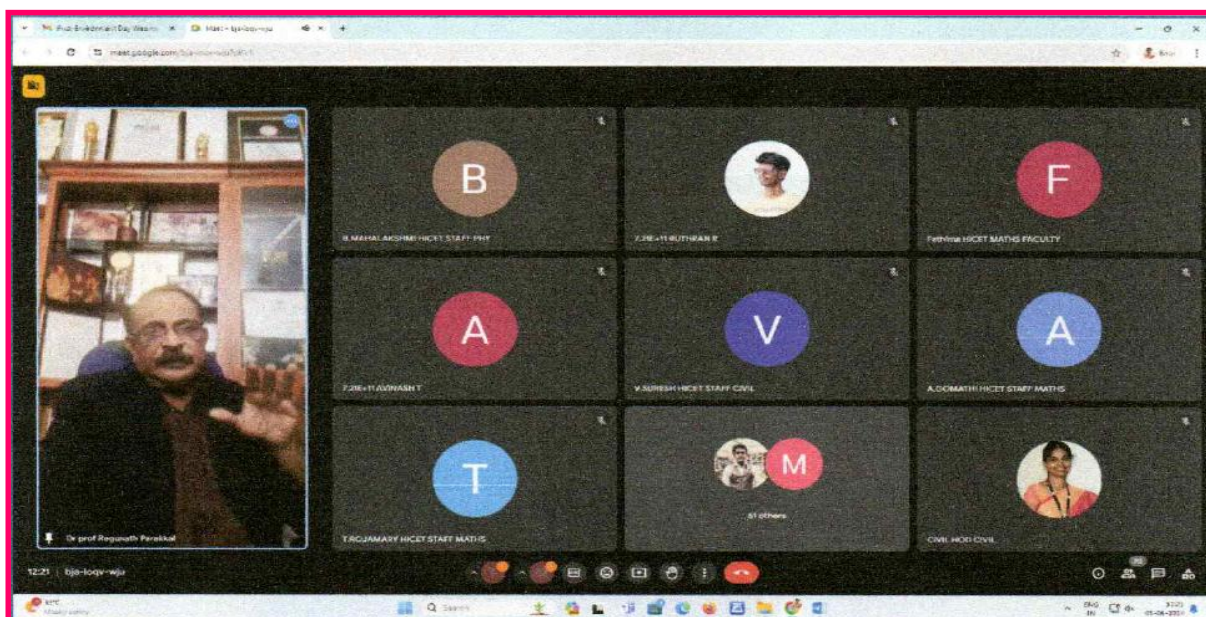
D. SEMINAR ON LE THE EARTH BREATH ON NATIONAL POLLUTION DAY (18-12-2023):

- Create students awareness and stimulate innovation by highlighting the causes and consequences of pollution from industrial processes and human negligence, while prompting them to explore and implement diverse strategies for pollution prevention and a cleaner environment.
- Participants gain a deepened understanding of pollution causes, recognizing the environmental impacts of industrial processes and individual actions.
- Increased awareness fosters a sense of responsibility and commitment among participants towards addressing and mitigating pollution issues.
- More than **80 members** participated and benefited.



E. WEBINAR ON LAND RESTORATION, DESERTIFICATION AND DROUGHT RESILIENCE: (05-06-2023):

- ☞ Illustrate the causes and impacts of land degradation and desertification
- ☞ Described the different land restoration techniques and drought resilience strategies.
- ☞ More than **130 members** participated and benefited.
- ☞ **Conducted by Institution Innovation Council (IIC), Nature Club & Green Thumbs**



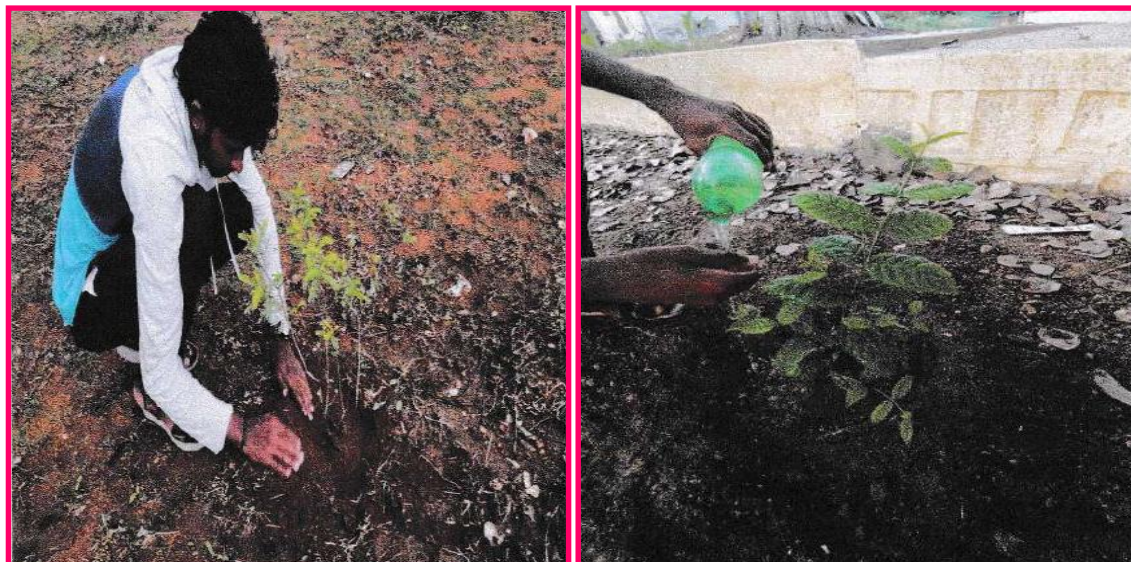
F. AWARENESS PLEDGE ON NATIONAL ENERGY CONSERVATION DAY (14-12-2023):

- ➔ Participants pledged to adopt more energy efficient practices in their daily life such as reducing electricity consumption, using energy efficient appliances and promoting renewable energy sources.
- ➔ This awareness pledge on National Energy Conservation Day was a resounding success, significantly raising awareness and encouraging sustainable energy practices participants.
- ➔ More than **50 members** participated and benefited.
- ➔ **Conducted by Celebration Club**



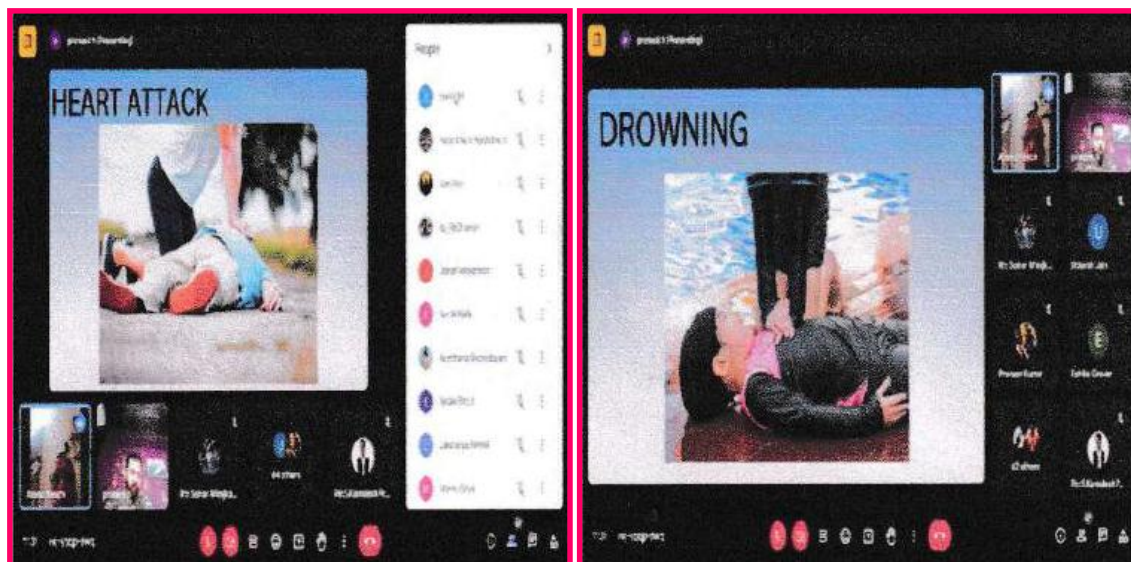
G. M-PLANTING PHASE 4 (18-05-2024):

- This event provides a value support to environment by planting medical plants
- The people around the area appreciated the work of Rotaract students'
- The Rotaract students have successfully completed phase 4 of "M-Planting" which rvas concluded in the surroundings.
- More than **45 members** participated in this event and conducted by **Rotaract Club**



H. WEBINAR ON FIRST AID SAVES LIFE (02-03-2024):

- This initiative aimed to disseminate vital information on essential first aid procedures for handling accidents.
- More than **65 members** participated in this event and conducted by **Rotaract Club**



4.2: Recommendations:

1. Connect load end compensation capacitors to reduce the cable distribution loss.
2. Set the air conditioning area temperature within a range of 24-26°C to have better human comfort and hence to save power.
3. Provide electronic energy meters and run-hour meters for each pump.
4. Improve power factor to at least 0.98 or more. Rectify harmonics distortion.
5. Install sub-metering to monitor power consumption in various sections.
6. Replace existing window with energy efficient window (high R-value, low solar heat gain coefficient, low conductivity, low-emissivity glazing, airtight, etc.).
7. **Diesel Generator:** Consider fuel oil additives in case they benefit fuel oil properties.
8. **Diesel Generator:** Provide adequate instrumentation for monitoring performance, and plan for operations and maintenance accordingly.
9. Consider using light tubes to bring sun light in the room / shop floor or canteen.
10. Control lighting with clock timers, delay timers, photocells and/or occupancy sensors.
11. To conduct an Indoor Lighting Audit and assess the illumination level at various places
12. Use environmentally friendly refrigerants in air conditioning system

Audit Conducted and Verified by,



(Dr. S.R. SIVARASU)

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COMPLETION OF THE REPORT

This report is prepared as a part of the **Energy, Environment and Green Audit** process conducted at **M/s. HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)**, Valley Campus, Pollachi Highway, Coimbatore - 641 032, Tamil Nadu, INDIA by **RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING**, Coimbatore-641 062, Tamilnadu, India.