SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY
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Kuniamuthur, Coimbatore - 641008

17.3.7 – REPORT OF SDG 7 – AFFORDABLE AND CLEAN ENERGY

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Green campus policy

Sri Krishna College of Engineering and Technology is recognized for its "Clean and Green" campus, where a harmonious blend of environmentally friendly practices and education fosters a culture of sustainability and eco-friendly initiatives. The Green Campus and Environment Policy aim to introduce innovative co-curricular and extracurricular initiatives, inspiring students and staff to actively lead and contribute to positive change. The green campus concept offers an opportunity to take the lead in redefining its environmental culture and developing new paradigms by creating sustainable solutions to environmental, social and economic needs of mankind.

Policy Statement

- Promote environmental consciousness and sustainability among the stakeholders and the neighborhood community.
- Enhancing campus air quality is prioritized through multiple measures, including the use of environmentally friendly vehicles, urging stakeholders to opt for public transportation, and implementing restricted vehicle entry barriers within the campus.
- Establish and maintain rain water harvesting structures to maximize the ground water recharging capacity of the runoff.
- Regular tree plantation drives to improve the green cover in the campus.
- Security personnel monitor the entrance of the college, contributing to the seamless functioning of pedestrian facilities.
- The college campus promotes sustainability by replacing traditional fuels like coal and oil with renewable energy sources. Biogas, generated from organic waste, is used as a clean and efficient energy alternative for cooking and heating, contributing to waste management. Electric vehicles (E-vehicles) are utilized for campus transportation, significantly reducing carbon emissions and dependence on fossil fuels. Solar water heaters provide hot water by harnessing sunlight, minimizing electricity usage and promoting energy

conservation. These initiatives reflect the campus's commitment to environmental responsibility, demonstrating practical applications of renewable energy while inspiring students and staff to adopt eco-friendly practices in their lives.

- Raise awareness and seek the adoption of environmental good practice and the reduction of any adverse effects on the environment.
- Raise the awareness by organizing seminars, debates and activities focused on climate change, environmental protection and various environmental issues.

Scope of the Policy

- The Green Campus Policy will develop exciting new co-curricular and extracurricular practices that encourage students and staff to take the lead in creating positive change.
- The initiatives necessitate a comprehensive review of all infrastructural and administrative functions, emphasizing energy efficiency, sustainability, and environmental considerations.

Objectives of the Policy

- To encourage students to keep the environment clean.
- To educate students to create awareness amongst the public.
- To make students understand the importance of the environment and its problem areas.
- To protect and conserve ecological systems and resources within the campus.
- To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations.
- To integrate environmental concerns into policies, plans and programmes for social development and outreach activities.
- ·To collaborate with all stakeholders and the local community, fostering awareness and advocating for the adoption of environmentally sound practices while minimizing adverse effects on the environment.

- To consistently enhance efforts in contributing to climate protection, adapting to climate change, and preserving global resources.
- To efficiently utilize all resources, including energy and water, with a focus on minimizing waste generation.
- To be a plastic-free campus.
- To periodically conduct environmental and energy audits for assessment and improvement purposes.
- To implement paperless practices.
- To adopt new initiatives implemented by regulatory agencies through Government schemes.

Policy Guidelines

- The Policy will be reviewed, once every five years or earlier subject to matter of exigencies, as the case may be.
- The policy will be reviewed with the sole intent of understanding the efficacy of (i) implementing sustainable 'Green Campus' practices in the institution and (ii) its facilities for creating an infrastructure for developing and strengthening implementation, provisions and operations including the aspects of resource usage, building infrastructure, transportation, use of services, advent of local, national and international regulations and standards.
- To this extent institution will facilitate the active participation of its stakeholders, particularly students, faculty, administrators and staff as well as external organizations in the implementation of this policy.

Policy Procedures

- To raise awareness among students and encourage them to minimize the use of polluting products.
- To inspire students to embrace environmental friendly practices, such as using paper bags and conserving electricity.

Policy Outcomes

- Awareness is disseminated regarding the hazards that are adversely impacting the environment.
- Students and teachers realize their individual responsibilities to save the environment.

Carbon Neutral Initiatives

The following are the initiatives to reduce the Carbon Footprint in the Institution:

- Assessments of the Campus Carbon Footprint to analyze inventory and implement initiatives to minimize emissions.
- Use of electric vehicles by staffs, students and visitors to commute inside the campus.
- Expanding the campus green cover by planting appropriate species that can counterbalance carbon emissions within the campus community.

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Note:
This Policy document is approved in the 11th Governing Body meeting held on 30.12.2020.

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ENERGY-EFFICIENT RENOVATION AND BUILDING

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ENERGY AUDIT CELL

Sri Krishna College of Engineering and Technology (SKCET) is grateful to spearhead the implementation of Renewable Energy initiatives within our campus. This transition towards Renewable energy holds significant advantages, as it serves to protect the environment along with fostering the energy independently and curtails our relies on conventional power sources.

The synergistic approach of embracing renewable energy y solutions in conjunction with conventional energy through energy audits formulate a robust strategy towards sustainable non-polluted energy in future. It empowers to diminish our carbon footprint in our campus, to enhance efficient energy cultivation, and concurrently elated the growth of energy sector with environmental and economic benefits throughout our campus.

SCOPE OF THE CELL

SKCET's primary objective to support for sustainable renewable energy sources in fostering socio-economic development through energy audit cell. The institution is persistently committed to minimize the energy wastage through various schemes within our campus.

Our institution diligently educates the staffs and students about the critical importance of energy conservation in our campus. We also endeavor to raise awareness among public and actively engaging with the user community people in operating and managing renewable energy projects in all scope of their lives, also promoting innovative concepts for real-time implementation.

We actively instill energy conservation practices, such as automating lighting systems to facilitate efficient On/Off system automatically. We emphasize the individual responsibility for switching off lights and equipment when they are not in use, in a bid to conserve energy.

OBJECTIVE OF THE CELL

- To enhance energy efficiency and awareness of conservation policies, reducing costs and environmental impact.
- To promote practices towards sustainable energy among students and staff.
- To use an Android based Mobile Application for continuous monitoring to encourage responsible behavior on individuals.
- To implement renewable energy trends among the campus and to reduce fossil fuel-based power production in our campus.
- To cultivate a culture of continuous innovation for long-term sustainability and environmental stewardship.
- To conduct regular energy audits to reduce consumption.

GUIDELINES AND PROCEDURES

The Energy Audit Cell (EAC) associated with the Institutional National Service Scheme (NSS), involving department coordinators, faculty, and students for outreach activities in schools and rural areas.

To fulfill our objectives and carry out community outreach, we adhere to the following policy guidelines for effective energy management:

• Prioritize ecological responsibility, with a focus on garden preservation.

• Embrace Renewable Energy, particularly solar power and solar water heating.

• Conduct energy audits to evaluate electricity usage in various installations.

• Invest in Energy Star-rated appliances, including LED lights, computers with LED monitors, and automated lighting systems.

• Maintain an user-friendly sustainability website with tips, links, and recommendations aligned with policy goals.

• Implement energy conservation measures to realize cost savings.

• Engage students in outreach activities to instill the importance of energy-saving methods for the benefit of future generations.

STANDARD OF PRACTICE (SOP)

1. Minimize the excessive electrical appliance usage during peak load conditions and emphasize energy reuse and recycling.
2. Replace malfunctioning equipment with more energy-efficient alternatives.
3. Explore energy-saving solutions like using inverters in main buildings.
4. Avoid using portable heating and cooling devices unnecessarily.
5. Harness cost-effective alternative energy sources, such as solar PV systems.
6. Conduct regular energy audits and submit relevant documents for potential energy-saving measures.
7. Set printers, computers, and electronic devices to enter "POWER SAVING MODE" after 15 minutes of inactivity whenever possible.
8. Promote the habit of turning off lights and fans when they're not in use.
9. Unplug all plug-in devices, like laptop chargers and mobile phone chargers, when they are not in use.
10. Encourage the use of natural daylight whenever feasible.
11. Reduce monthly energy costs through:
    a. Lowering energy consumption and losses to enhance energy efficiency.

b. Expanding the utilization of renewable energy resources.

c. Prioritizing renewable energy systems in buildings.

d. Displaying energy conservation articles on notice boards and energy-saving slogans in classrooms to raise awareness among students about effective power utilization.

Ref :https://www.breda.bih.nic.in/BEE.aspx

Website: https://skcet.ac.in/the-impact-rankings-2025/sdg-7-affordable-and-clean-energy/

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Energy efficiency services for industry

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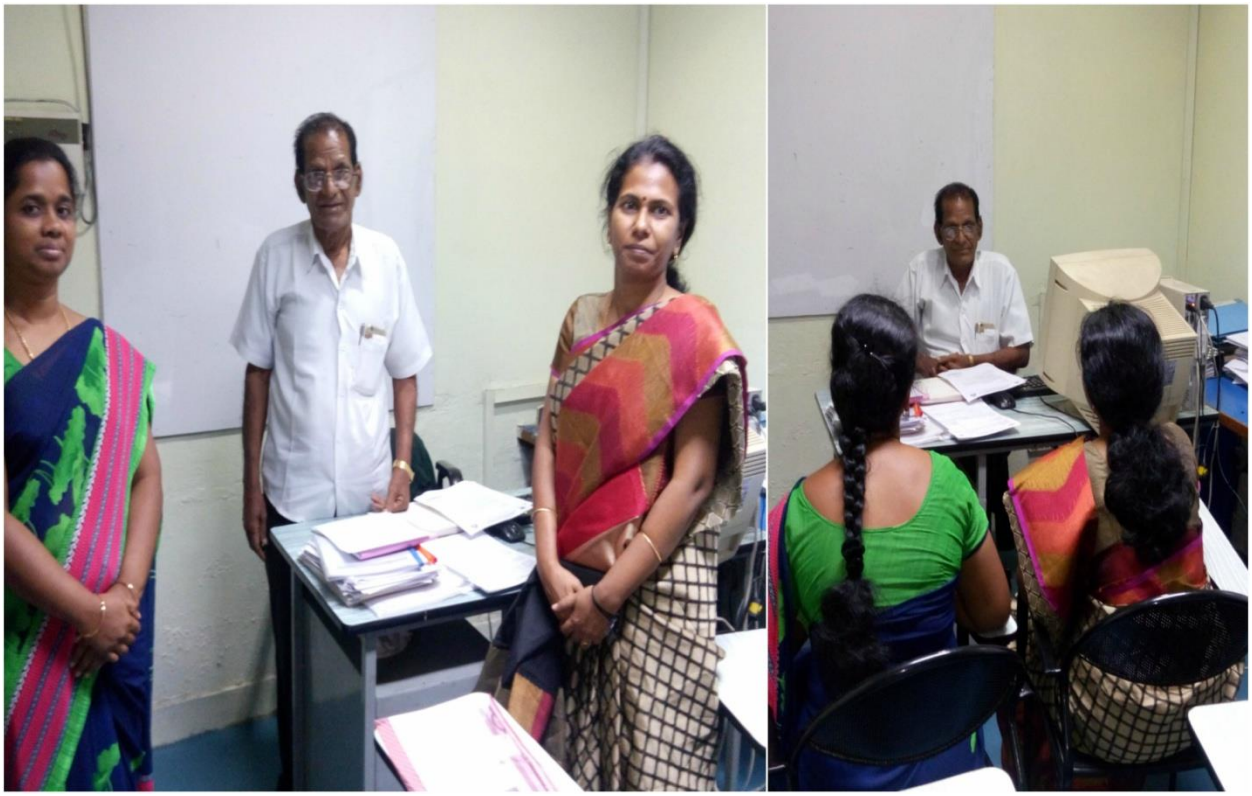
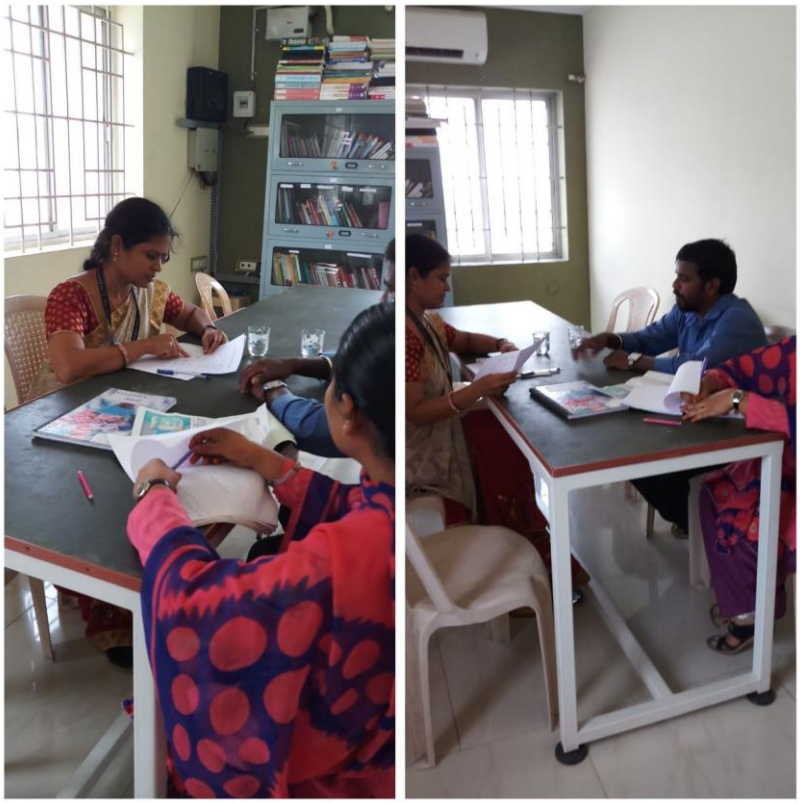
DISCUSSION ON THE ENERGY EFFICIENCY POLICY WITH INDUSTRY PERSON BY THE FACULTY

The Faculty from EEE department visited various industries and provided suggestion for energy efficiency implementation key ideas

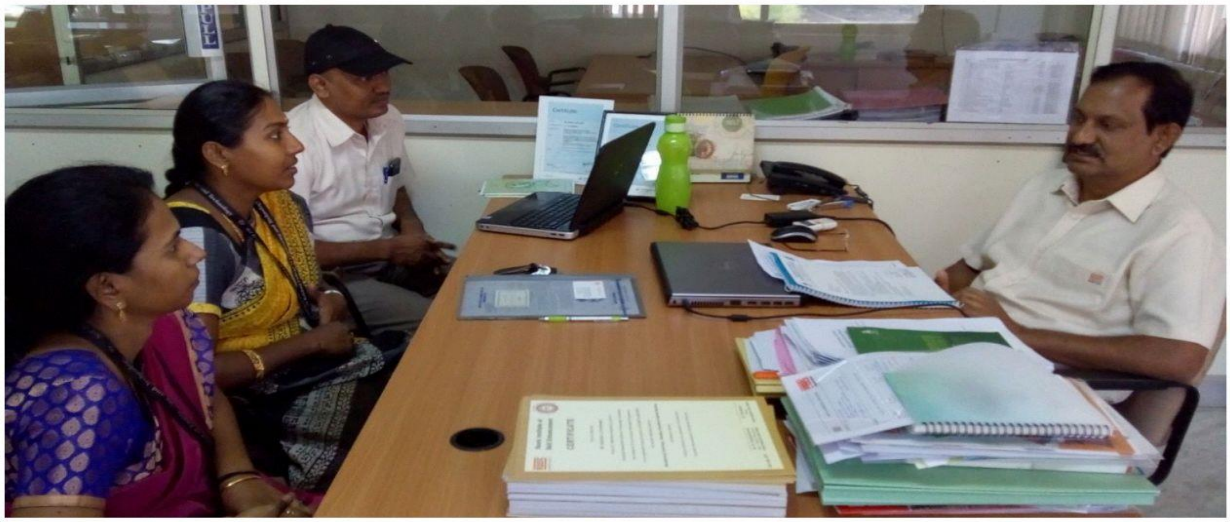
S.No	Date	Name of the Staff	Company Visited and Person Intracted
1.	25.11.2022	Dr.A.Radhika Dr.R.Geethamani	Vyshal Precision Products Private Ltd, Coimbatore. Mr.J.Chandran (HR Manager) 4222513064
2.	10.11.2022	Dr.R.Sumathi	MAS Solar System, Coimbatore. Mr.Vishnu Manager
3.	27.05.2022	Dr.A.Radhika Dr.J.Karthika	ROOTS Industries India Limited, Coimbatore. Mr.N.Sampathkumar, (Assistant Manager) Email: sampath@roots.co.in
4.	06.05.2022	Dr.A.Radhika Dr.R.Geethamani	Precision CNC Pvt Limited, Coimbatore Mr.R.Mathan MD 9965204567
5.	09.02.2022	Dr.Ramji Tiwari Dr.P.Vinoth Kumar	Bhairav Indutries Mr.Sudash Chandra Tiwari CEO



Prof. R. Geethamani & Prof. A. Radhika Visited Mr. J.Chandran, Human Resource Of "Vishal Precision Products Private Limited", Coimbatore. Discussed about the implementation of Digital Technologies for energy efficiency



Dr.R.Sumathi Visited Mas Solar System, Coimbatore. Discussed about The Solar Thermal Projects for Improved Output from the Solar Collector



Prof. J.Karthika & Prof. A.Radhika Visited Roots Coimbatore , Discussed about the Modernization and Integration for the improved efficiency

Dr.A.Radhika and Dr.R.Geethamani visited Precision CNC Pvt Limited, Coimbatore, and discussed about the implementation of Digital Technologies for energy efficiency

Dr.Ramji Tiwari And Dr.P.Vinoth Kumar Visited Bhairav Indutries Pvt Ltd,Coimbatore met Mr.Sudash Chandra Tiwari,Suggested for Solar Plant Implementtion for Reducing Eb Bill

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Local Community Outreach for Energy Efficiency

ENERGY AUDIT CELL

Energy audit cell is one which aims in creating a more secure future from the view of energy needs. The members of the cell strive to generate awareness regarding the necessity to focus on conservation of energy and the cell has organised various programs to create awareness among the students and staff of our college. The cell tries to make the students and general public aware of the grave scenario and how wastage of energy should be considered almost a cardinal sin. It seeks to find out the methods to reduce the energy consumption. The Cell encourages the use of „Green Energy" and to limit the use of fossil fuels. The cell members create awareness about conducting the energy audit to find wastage of energy and in finding opportunities for energy conservation. The cell also actively participates in research and development programmes to build small scale projects and devices plans on how these projects can be implemented more feasibly on a larger scale. The cell is progressing leaps and bounds in this field and hopes to continue doing so for years to come.

OUR WORK

Objectives

- To reduce the wastage of energy in the college.
- To create awareness among the staffs and students about the need for energy conservation.
- To harness the environment friendly RE sources and to enhance their contribution to the socio-economic development.
- To create public awareness and involve users/local community along with capacity building in establishing, operating and managing RE projects.
- To support efforts for developing, demonstrating and commercializing new and emerging technologies in the RE sector.
- To reduce monthly energy cost.
    - To decrease energy consumption and loss, to increase energy utilization efficiency.
    - To extend the usage of renewable energy resources.
    - To prioritize renewable energy systems in the buildings to be built newly.
    - To implement the measures for energy conservation & realization of savings.

FUNCTIONS AND ACTIVITIES

- Implementation of New Recommendation from Audit report.
- Slogan competition and poster presentation- Event to be conducted.
- Encouraging the projects related to designing energy efficient devices.
- Programme to create awareness based on the audit conducted in the college.

SKCET - ENERGY AUDIT CELL

ENERGY AUDIT CELL ACTIVITIES 2022-2023

EVENTS MAPPING TO SDG 7

S.No	Event	Description
1	Energy Saving for Future Generations	Awareness programme on the topic “Energy Saving for Future Generations” was organized for Government Higher Secondary School, Ikkarai Poluvampatti, Coimbatore
2	Energy consumption to the Society	Create awareness about the Energy consumption to the society at Paladurai Village
3	Energy conservation outreach program	Create awareness about the Energy consumption to the society at Theethipalayam Village

ENERGY SAVING FOR FUTURE GENERATIONS

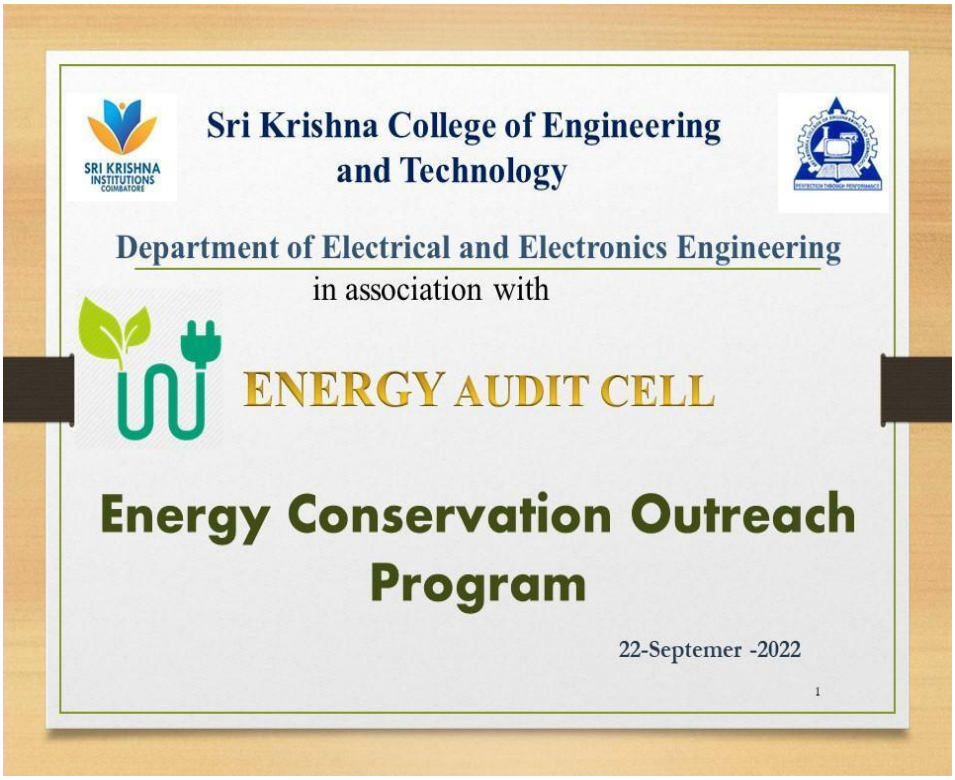
As a part of the Energy Conservation Week Celebration, Awareness programme on the topic **"Energy Saving for Future Generations"** was organized for Government Higher Secondary School, Ikkarai Poluvampatti, Coimbatore in association with Ikkarai Poluvampatti Panchayat. More than 50 School Students eagerly interacted and participated in the Energy Conservation Quotes competition. The **winning student - Master Dhayanath** was appreciated with an award for his excellence.

Session Take-Away:

- Power saving methods at schools and home
- Usage of LED lamps
- Saving of Power to save Money
- Benefits of using Star Rated Appliances
- Importance of Solar PV system

ENERGY SAVED IS ENERGY GENERATED!!

ENERGY CONSERVATION OUTREACH PROGRAM AT PALATHURAI VILLAGE



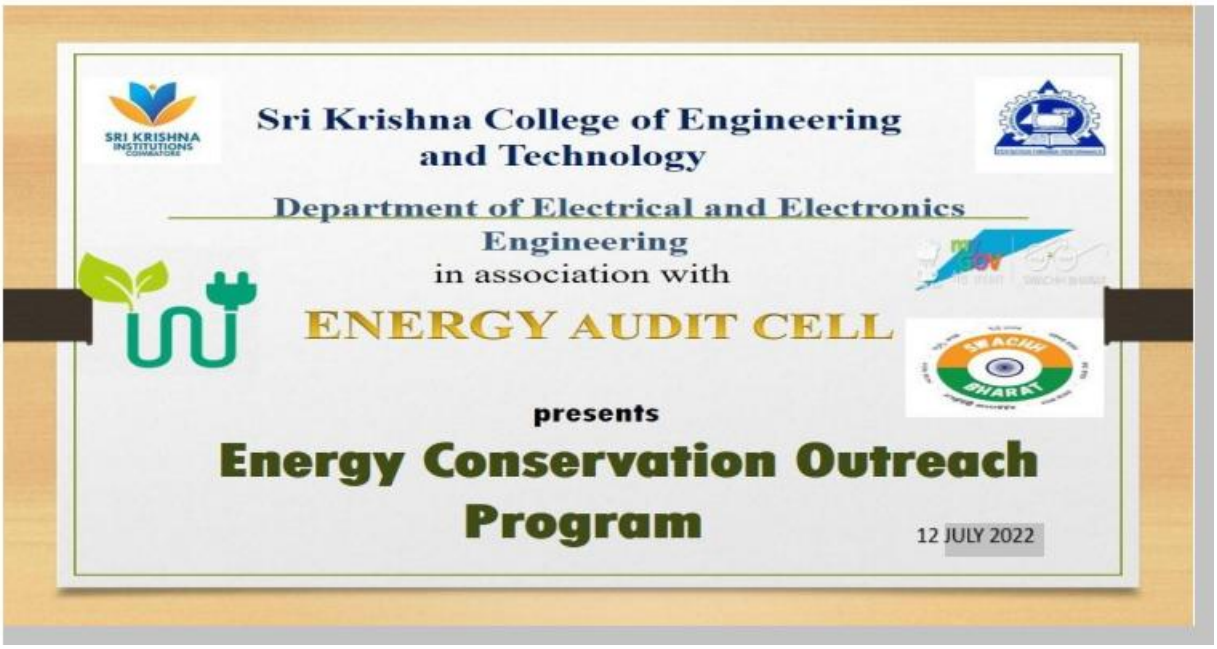
Energy conservation outreach program was conducted on 22nd September 2022 at Palathurai panchayat, Coimbatore. To create awareness about the energy consumption to the society which includes the usage of solar panels for domestic appliances, solar heater benefits, usage of LED lamps in lighting system and Solar Roof for smart home projects.

Session Take-Away:

- Power saving methods at home
- Usage of LED lamps
- Saving of Power to save Money
- Benefits of using Star Rated Appliances
- Importance of Solar PV system
- Need for Energy Management.

 # SAVE ENERGY, SAVE MONEY, SAVE NATION, SAVE THE PLANET!!!

ENERGY CONSERVATION OUTREACH PROGRAM AT THEETHIPALAYAM VILLAGE



Energy conservation outreach program was conducted on 12th July 2022 at Theetheepalayam panchayat, Coimbatore. To create awareness about the energy consumption to the society which includes the usage of solar panels for domestic appliances, solar heater benefits, usage of LED lamps in lighting system and SolarRoof for smart home projects.

CONSERVATION IS THE KEY; LET"S UNLOCK A SUSTAINABLE FUTURE

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UPGRADE BUILDINGS TO HIGHER ENERGY EFFICIENCY

SKCET CAMPUS

The main objectives of using LED lamps instead of conventional lamps such as, Energy efficiency, Extended life, Cold temperature operation, instant-on and durability, which emits light in all directions. This directional lighting capability reduces wasted light and energy.

LIBRARY BLOCK LED LIGHT PHOTOS

LED LAMPS INSTALLED IN DIFFERENT LOCATIONS OF SKCET CAMPUS

In SKCET campus, we installed LEDs at different places. The main objectives of using LED lamps instead of conventional lamps such as, Energy efficiency, Extended life, Cold temperature operation, instant-on and durability, which emits light in all directions. This directional lighting capability reduces wasted light and energy.

Percentage of annual lighting power requirements met through LED bulbs

Total Number of fluorescent Lamps : 5182 Nos X 36 W = 186552W

Total Number of LED lamps : 1130 Nos

{[230 Nos X96W] + [900 Nos X36W]} = 53100W

$Percentage\ of\ annual\ lighting\ power\ requirements\ met\ through\ LED$ }

$= \frac{53100}{239652}$ X100

= 22.10%

STREET LIGHT PHOTOS

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UPGRADE BUILDINGS TO HIGHER ENERGY EFFICIENCY

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DEPARTMENT OF ELECTRICAL MAINTENANCE

Solar Water Heater details 08/11/22

S.No	Location	Solar thermal panel Serial numbers	Quantity	Capacity in Liters/ Tank	Geographic Location
1.	HoR M-A	73454,73455,73456,73457,73458,73459,73460,73461,73462,73463,73464,73465,73466,73467,73469,73474,73475,73476,73477,73478,73479,73480,73481,73482,73496,73483,73484,73485,73486,73488,	30	2000/2	
2.	HoR M-B	73546,73562,73564,73518,73459,73555,73540,7356673549,73535,73550,73536,73534,73545,73560,73544,73588,73547,73528,73514,73496,73553,73559,73565,73552,73538,73537,73551,73539,73557,73543,73567	32	2000/2	
3.	HoR M-C	65553,65550,65549,61196,66627,66621,66635,68656,66628,65522,68659,68658,66636,66630,68655,68653,61238,66623,66629,65551,68657,68654,66631,68651, 61241	25	2000/2	

4.	HoR M-D	14683,14583,14678,14756,14666,14665,14634,14637,14698,14736,14684,14691,14684,14665,18659,18676,18634,18638,18367,18368,18644,18646,18630,18352,18618,14664,14766,14646,14679,14650,14689,14673,14640	33	1000/6	
5.	HoR M-E	62158,62159,62628,62120,62172,62161,62791,62162,62170,62167,62166,62165,62164,62163,62169,67518,67517,67456,62619,67515,67520,67514,67510,67524,67523,67511,67522,67521,65433	29	2000/2	
6.	HoR W-B1	62245,66246,66247,66315,66317,66325,66251,66254,66253,66333,66340,66345,66342,66357,66358,66359,66360,66361,66362,66363,66364,66370,66372,66373,66374,66376,66377,66379,66380,66382,66385,66388	32	2000/2	
7.	HoR W-B2	65528-65541 62284-62287 62289-62299	20	2000/2	

Note: All the above solar panel elements are 4 kW and 2 inch

DEPARTMENT OF ELECTRICAL MAINTENANCE

Solar Water Heater details

08/11/23

S.No	Location	Tank Quantity	Capacity in Liters/ Tank	Heating element / Heat pump rating
1.	HoR M - A	2	1000	4 kW,2''
2.	HoR M - B	2	1000	4 kW,2''
3.	HoR M - C	2	1000	4 kW,2''
4.	HoR M - D	6	1000	4 kW,2''
5.	HoR M - E	2	1000	4 kW,2''
6.	HoR M - Dining Block	2	5000	4 kW,2''
7.	HoR W – B1	2	1000	4 kW,2''
8.	HoR W – B2	2	1000	3 kW,1.25"

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CARBON REDUCTION AND EMISSION REDUCTION PROCESS

EXECUTIVE SUMMARY

Energy Analysis:

→ A detailed audit was conducted **SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY,** Kuniamuthur, Coimbatore, Tamil Nadu – 641 008 India.

→ The audit team has come out with ***Energy Conservation Proposals (ENCONs)*** and the summary of all the ENCONs are given below:

S. No.	Description	Parameters		
		Present		**Savings**
1.	Annual Energy Consumption	27,47,477 kWh + 13,490 kg LPG	2576102 kWh + 8,120 kg LPG	**1,71,375 kWh + 5,370 kg LPG**
				Rs. 25.8 Lakhs
3.	Annual CO2 Emission	2293.5 Tons	2,136.9 Tons	156.6 Tons
	Initial Investment Required	Rs. 25.3 Lakhs		
5.	Simple Payback Period	**Nearly 1.0 Year**		
	Overall Reduction of Energy	**6.2 % Electricity + 9.5 % LPG**		

Note:

- Apart from the Energy Conservation, the audit team proposes ***many technical recommendations*** focusing on energy, equipment's life improvement, safety and best operating practices
- All types of energy carriers (like Electricity, LPG and Wood) used for regular applications are considered

Audit Conducted & Verified by

(Dr. S.R. SIVARASU)

Dr. S.R. SIVARASU,Ph.D.,
BEE Certified Energy Auditor (EA-27299)
Lead Auditor - ISO 14001: EMS
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

Table-1: Energy Conservation Proposal (ENCON) along with Annual Energy and Financial Savings

S. No.	Proposed Energy Conservation Measures	% Saving & Source	Estimated Savings		Initial Investment (Rs.)	Payback Period	CO_2 Reduction (Tons/Annum)
			Annual Energy Savings	Monetary Savings (Rs.)			
Energy Conservation Proposal (ENCONs) on Electrical Energy							
1.	Improvement in the Supply Power Factor and Avoid Excess Demand Penalty (EDC)	Elimination of EDC	–	3,76,961	2,00,000	0.5 Years	–
2.	Reduction of Belt & Pulley Transmission Losses from Motor to Machine in STP Aerator Blower Motor	8 % on STP Motor	6,400 kWh	65,920	30,000	0.5 Years	5.2
3.	Reduction of Energy Consumption through retrofitting VFD in One of the Aerator Blower Motor	25 % on STP Motor	20,000 kWh	2,06,000	2,00,000	1.0 Years	16.4
4.	Reduction of Cable Losses & Active Power Consumption using DB Level Capacitor Compensation	1.0 % (Electrical)	27,475 kWh	2,82,993	84,000	0.3 Year	22.5
5.	Replacement of Fluorescent Lamps with Energy Efficient Lamps (Swap FTL to LED Lamps)	50 % on Lighting	24,000 kWh	2,47,200	1,00,000	0.4 Years	1.8
6.	Replacement of Existing Convention Ceiling Fans into Electronically Commutated BLDC Fans	50 % on Fans	42,000 kWh	4,32,600	8,40,000	1.9 Years	34.4
7.	Replacement of Existing UPS with Centralized UPS and reduction Battery based E-Waste Management	3 % on UPS consumption	51,500 kWh	5,30,450	6,00,000	1.1 Years	42.2
Energy Conservation Proposal (ENCONs) on Thermal Energy							
8.	Replacement of conventional cylinders with XtraTEJ LPG cylinders with high flame temperature	5 % of LPG	675 kg	55,013	Zero Cost	Immediate	2.0
9.	Reduction of LPG Consumption using Regular Burner Cleaning and Swapping of Active Burners.	5 % of LPG used for Stove	270 kg	22005	10,000	0.5 Years	0.8

10.	Reduction of Heat Energy Exposed in the Boiler Outer Side + Steam Pipes Lines using TCC	10 % of Boiler LPG	405 kg	33,008	50,000	1.5 Years	1,2
11.	Reduction of LPG in Dosa making Stove by replacing Conventional Burner with Radiant Burners	20 % of LPG for Dosa Stove	1,020 kg	83,130	1,20,000	1.4 Years	3.1
12.	Boiler Feed Water Pre-heating using Solar Thermal Energy System (Fuel Substitution)	Fuel Substitution	3,000 kg	2,44,500	3,00,000	1.2 Years	9.0
Total		**171375 kWh + 5370 kg of LPG**		**2579779**	**2534000**	**–**	**156.6**

Recommendations and Best Operating Practices:

- ⊕ All SSB must be fitted with digital energy meters are the readings must be taken daily.
- ⊕ Prepare block wise maintenance checklist of electrical and thermal system
- ⊕ Calculate the Unit Per Litre (UPL) for every run of DG and average it for monthly
- ⊕ Adopt a policy and fix a target to convert the existing conventional lightings and fans into energy efficient lights and fans
- ⊕ Define and apply appropriate power schemes to reduce power consumption when the system is idle
- ⊕ Earth pits must be visible for easy access, should be done regular maintenance and measure their values annually
- ⊕ Similar to Fan, now BLDC based ACs are made available in the market; which consumes less amount of energy (Power) during its starting and running condition.
- ⊕ It is essential and the right time to form an Energy Management Team

4.1: Assessment of Existing Electrical and Thermal Energy Systems:

<table>
<tr><th>S. No.</th><th>Description</th><th colspan="4">Details</th></tr>
<tr><td colspan="6">Electrical Energy Usage</td></tr>
<tr><td>1.</td><td>Name of the customer</td><td colspan="4">SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY,</td></tr>
<tr><td>2.</td><td>Communication Address</td><td colspan="4">Kuniamuthur, Coimbatore, Tamil Nadu – 641 008 India.</td></tr>
<tr><td>3.</td><td>Service Number Type of Supply & Tariff</td><td colspan="4">High Tension Consumer HT SC No – 221; HT-IIB2</td></tr>
<tr><td rowspan="6">4.</td><td rowspan="6">Tariff Structure
(As per ToD)</td><td>ToD</td><td>Up to Aug-2022</td><td>Up to June-23</td><td>From July-23</td></tr>
<tr><td>Industrial</td><td>Rs. 6.35/kWh</td><td>Rs. 7.50/kWh</td><td>Rs. 7.65/kWh</td></tr>
<tr><td>Peak Hour</td><td>Rs. 1.27/kWh</td><td>Rs. 1.69/kWh</td><td>Rs. 1.90/kWh</td></tr>
<tr><td>Night Rebate</td><td>Rs.0.3175/kWh</td><td>Rs.0.3375/kWh</td><td>Rs.0.4125/kWh</td></tr>
<tr><td>Fixed Charge</td><td>Rs. 350/kVA</td><td>Rs. 550/kVA</td><td>Rs. 562/kVA</td></tr>
<tr><td colspan="4">90 % of the Permitted PD</td></tr>
<tr><td>5.</td><td>Energy Suppliers</td><td colspan="4">Tamilnadu Generation & Distribution Corporation (TANGEDCO)</td></tr>
<tr><td>6.</td><td>Generator Details</td><td colspan="4">500 X 2 kVA (External fuel tank – 990 L)
125 X 2 kVA (Internal fuel tank – 220 L)
63 X 1 kVA (Internal fuel tank – 80 L)</td></tr>
<tr><td>7.</td><td>DG Operation</td><td colspan="4">500, 500, 125 kVA Manual operation only
125, 63 kVA Automatic operation</td></tr>
<tr><td colspan="6">Annual Electrical Energy Consumption, Electricity Consumption from DG & Diesel Consumption</td></tr>
<tr><td>Electricity</td><td>27,47,477 kWh</td><td>Diesel for DG</td><td>28,390 Litres</td><td>Units Generated</td><td>88,968 kWh</td></tr>
<tr><td colspan="6">Thermal Energy Used</td></tr>
<tr><td rowspan="2">8.</td><td colspan="2">Liquified Petroleum Gas (LPG)</td><td colspan="3">Cooking</td></tr>
<tr><td colspan="2">Diesel (Ordinary)</td><td colspan="3">Transport + DG</td></tr>
<tr><td colspan="6">Annual Energy Consumption of Thermal System</td></tr>
<tr><td colspan="2">LPG</td><td>13,490 kg</td><td>Diesel for Transport</td><td colspan="2">50,595 Litres</td></tr>
<tr><td colspan="6">General Loads (Both Electrical and Thermal)</td></tr>
<tr><td rowspan="2">9.</td><td rowspan="2">Lighting System</td><td colspan="4">❖ Indoor lighting: The management is now committed to convert the existing FTL into LED in a phased manner</td></tr>
<tr><td colspan="4">❖ Outdoor lighting: All the street lightings are LED based energy efficient lamps
❖ Requested to retrofit timer based ON-OFF control in the existing street lighting system</td></tr>
<tr><td>10.</td><td>Fan Loads (Ceiling)</td><td colspan="4">❖ Conventional ceiling fans only</td></tr>
</table>

		❖ The audit team requested to change the conventional fans into **BLDC based Electronically Commutated fans** in a phased manner
11.	Air Conditioning System	• Mostly **BEE star rated** ACs and the outdoor units are mostly placed in shaded area of the respective building
12.	Motors and Pump loads	• Mainly used for water distribution, purification and waste water treatment • Small motors are used in hotel kitchen equipment's & in the canteen
13.	Uninterrupted Power System (UPS)	• All the computers, servers, surveillance systems, projectors, telephonic units are connected with UPS with nominal back up time of **15-30 min** • Total capacity of the UPS is nearly **380 kVA**

Table-2: Annual Energy Consumption and Energy Generation (2022-23)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumed (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jun-22	2,13,560	1,140	2,230	4,210	6,440
2.	Jul-22	1,60,802	1,140	3,270	4,310	7,580
3.	Aug-22	1,87,888	1,140	950	4,395	5,345
4.	Sep-22	2,20,070	1,425	2,550	4,305	6,855
5.	Oct-22	1,82,662	1,140	1,480	3,895	5,375
6.	Nov-22	2,66,375	1,140	3,070	4,125	7,195
7.	Dec-22	2,11,812	855	2,290	4,270	6,560
8.	Jan-23	2,21,446	950	2,360	4,355	6,715
9.	Feb-23	2,57,245	1,140	880	4,345	5,225
10.	Mar-23	2,72,698	1,140	3,640	4,255	7,895
11.	Apr-23	2,66,845	1,140	2,180	4,330	6,510
12.	May-23	2,86,074	1,140	3,490	3,800	7,290
Total		27,47,477	13,490	28,390	50,595	78,985

- The cost of the electricity is Rs. 10.25 /kWh.
- The cost of the LPG is Rs. 81.50/kg
- The average Unit Per Litre (UPL) of the DG is 3.0 kWh/Litre of Diesel.

5.1: Assessment of Annual Energy Usage:

Table-3 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-3: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	Electricity (HT Service)	Powering to all electrical / electronic / HVAC equipment's	From TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used only for cooking	
4.	Mature Trees, Bushes & shrubs	The college has nearly **7,925** mature trees of different varieties which are more than 10 years old.	

5.2: Environmental System: CO_2 Balance Sheet:

→ CO_2 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 CO_2 mapping.

Table-4: Environmental System: CO_2 Balance Sheet (2022-23)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Energy	CO_2 Emission (Tons)	Description	Parameters	CO_2 Neutralized (Tons)
1.	Electricity	27,47,477 kWh	2,252.93	Solar Hot Water	2,17,000 kWh[1]	177.9
2.	Diesel	78,985 Litres	208.52	Mature Tree	7,925 Nos	172.8
3.	LPG	13,490 kg	40.47	Electricity (DG)	88,968 kWh	73.0
Total Emission			2,501.9	Total-Neutralized		423.7
Balance CO_2 to be Neutralized = 2,078.2 Tons/Annum; Per capita Emission = 0.36 Tons/Person						

(Note: No. of Students, Faculty & Staff for the year 2022-23 is 5,756)

([1] Electrical equivalent is considered)

5.3: Calculation Table:

For Electricity = $\left[\text{kWh x } \frac{0.82 \text{ kg of CO2 emission}}{\text{kWh}}\right]$
For Diesel = $\left[\text{Diesel Consumption (Litre)x } \frac{2.64 \text{ kg of CO2 emission}}{\text{Litre of Fuel Consumption}}\right]$
For LPG = $\left[\text{LPG Consumption (kg)x } \frac{3.0 \text{ kg of CO2 emission}}{\text{kg of LPG Consumption}}\right]$
A mature tree is able to absorb nearly CO_2 at a rate of 21.8 kg/annum; $\frac{(21.8\ x 7925)}{1{,}000} = 172.8\ \frac{\text{Tons}}{\text{Annum}}$

5.4: Recommendations:

From the above discussion points; it is evident that activities taken forward to neutralize the CO_2 is predominant and to become a Net-Zero Carbon Emission buildings. The management has to plan several activities achieve the target.

- Increase the foot print of trees planted inside the college campus.
- Encourage the students to plant more trees and account them all.
- It is a right time to install considerable amount of roof top solar PV plant and generate the electricity. This must reduce the utility supply and hence reduce the direct CO_2 reduction.
- As per the Solar Policy-2019 from Government of Tamilnadu; for any educational institutions have to implement substantiate a minimum of 6 % of its energy generation from renewable energy source.
- Convert existing convention street lightings into solar based battery-operated lightings.
- Identify higher fuel consuming vehicle and either rework or replace it.
- Conduct training programmes for the transport staffs at regular interval and encourage them to maintain the vehicles at good condition throughout the year.

5.5: 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

CO_2 Emission:

2,501.9 Tons/Annum

CO_2 Reduction

245.8 Tons/Annum

CO_2 to be Neutralized

2,256.1 Tons/Annum