



Loyola-ICAM College of Engineering and Technology (LICET)
Department of Electrical and Electronics Engineering
Electrical Engineers League (EEL)

Under

AICTE – Scheme for Promoting Interest, Creativity and Ethics among Students
(SPICES)

Event Report

Category: **Seminar**

Title of the Event: **Energy Management and Auditing**

Date: 11-02-2023

Venue: Fab Lab

Details of Participants

● Total No. of Participants: 32

● II EEE (Batch: 2021 – 2025): 32

Technological/ Academic/ Other benefits generated by conducting the event with respect to:

(a) the institution	<ul style="list-style-type: none">● Networking & building brand recognition - promote the institution and help people connect with our brand● Showcase the facilities at the institution by bringing the faculty from premium institutions
(b) the faculty	<ul style="list-style-type: none">● Strengthen faculty community and build relationships with each other● Meet like-minded individuals in person and encourage active engagement
(c) Students	<ul style="list-style-type: none">● To stay on the top of current trends, especially with technology, causing rapid change across many different industries.● Academic engagement/ engagement in scholarly activities
(d) Industry/ Society	<ul style="list-style-type: none">● Clarifying the image of the avenues of development in the near future● Contributing to make the literacy rate rise higher thereby helping build a more educated, empowered and aware society

Proceedings of the event

Category: Seminar

Report on **Energy Management and Auditing**

Date: 11-02-2023

Time: 10:00 am to 03:00 pm

Venue: Fab Lab

Resource Person: Mr. Gokul G, Global siting – After Sales, Vestas and EC member of IAEMP.

Audience: II EEE (Batch: 2021 – 2025)

A brief introduction on the types of sustainable energy resources and the need to conserve them was given by the guest speaker. He then discussed the ability to use digital technology to improve sustainability. He mainly focused on Disruptive Technologies such as Data analytics, Block chain, Autonomous vehicle, Artificial Intelligence, Virtual reality, Augmented reality, 3D Printing, Robotics and Renewable Resources. To acquire more knowledge on these technologies, he encouraged learning through an activity where students were split into groups and made to discuss the applications of these technologies in industries. This kindled interest among students made them understand the importance of these technologies in industries and helped them gain knowledge on the advancements happening in industries. He then briefed upon the Energy Conservation Act, 2001. Later to make the session more interactive, he started discussing the need to save energy and introduced the basic approaches of Energy Management like – Reduction in usage, Increase in efficiency and use of alternative energy forms.

After giving a short explanation on the Energy Conservation Methodologies, he gradually introduced Energy Audit Fundamentals, Methodologies and Case studies. He remarked that the main reason to save energy is to reduce the cost. To ensure this, energy auditing is done. He also stated that energy audit is the process of providing suggestions to minimize energy consumption to make it available for future and to reduce the cost of energy utilization. He then categorized energy auditing into 3 phases namely – Initiation phase, Audit and Analysis Phase, and lastly the Implementation phase. During his discussion, he mentioned that the Initiation Phase is based on the need and potential of economic return; Audit and Analysis phase involves the review of historical energy use, energy audit, engineering analysis and economic analysis and the last phase, Implementation phase is the most critical aspect of the entire program since this is the central goal of any energy management effort. Then he explained the types of energy audit – Preliminary energy audit, Targeted energy audit, Detailed energy audit. He stated that the preliminary energy audit involves the collection of available energy resources in the area under consideration, the details of the equipment and the collection of historical data. Targeted energy audit was explained with various real-life examples such as analyzing the energy utilization of a boiler, a compressor, etc. He then concluded that this type mainly focusses on analyzing the energy consumption of a particular equipment only. Finally, detailed energy audit was discussed by the speaker where the entire place had to be analyzed.

Furthermore, he enlightened the participants by highlighting the 10 steps involved in Detailed Energy Audit – Pre-Audit, Creating awareness, Data collection, Conduct survey and Monitoring, Conduct of detailed trials/

Experiments for selected energy guzzlers, Analysis of energy use, Identification and development of Energy Conservation Methodologies, Cost Benefit Analysis, Reporting and Presenting to the Top Managers, Implementation and Follow up. Each of these steps were discussed in detail by the speaker. He put forth that pre audit involves walk through audit which refers to the collection of historical data, informal interview with Energy Manager and Production Plant Manager. He then discussed the different ways to create awareness amidst public. Then a clear explanation on Process Flow Diagram and Energy Utility Diagram was put forth by the speaker. Then he explained the 4th step which involved measuring and monitoring energy utilization. Then, he made the students aware that in order to get maximum power consumption of a particular equipment, analysis has to be done at full load which is the 5th step involved in Detailed energy audit. Then, he added that identification and development of energy conservation opportunities was the main part of energy audit. Analysis on determining efficiency of motor was also discussed thereby helping the students to understand the concept in an elaborate manner. Cost benefit analysis was also clearly explained by the speaker through various statistical approaches. Finally, he elucidated the participants by giving an insight on how to report to the top manager and also how to implement the energy conservation methodologies put forward by detailed auditing.

In the last session, the speaker presented the energy auditing instruments used in measuring voltage, current, power factor, vibration and temperature. He also stated the function of power analyzers, flue gas analyzers, flow meters, thermometer, ultrasonic flow meter, infrared thermometer, anemometer, thermographic camera, ammeter, digital multimeter, pH meter, voltmeter and electrical conductivity meter. He added that these instruments are mainly used for optimizing the combustion efficiency by monitoring the Oxygen and CO levels in flue gas of boilers, furnaces etc. and calculation of CO₂ percentage in excess air level and efficiency. Details about energy conservation opportunities in electrical and mechanical utilities was also provided by the speaker. Finally, the speaker concluded by briefing the various opportunities available in energy auditing and how to become an energy auditor.

At last, the students were given an activity where they had to perform an energy audit by applying the 10 steps of detailed energy auditing. Data collected from the college regarding the number of fans, lights and other electrical equipment available in a classroom along with their power consumption was given and discussion on implementing energy audit with the collected information was made.

Relevant Courses in the current semester

EE3401 Transmission and Distribution <ul style="list-style-type: none"> • Transmission parameters 	and	EE3251 Electric Circuit Analysis <ul style="list-style-type: none"> • Applications of Electric circuits 	EE3403 Measurements and Instrumentation <ul style="list-style-type: none"> • Types of instruments used in Energy auditing
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Relevant Program Outcomes

- PO5 – Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6 – The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 – Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- PO8 – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9 – Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10 – Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- PO12 – Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Feedback

