

Energy Audit Report

(2023-24)



Deogiri Pratishthan Sanchalit

TULSI COMPUTER SCIENCE & INFORMATION TECHNOLOGY COLLEGE, BEED.

Affiliated to Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhaji Nagar

Reg. No. Trans 2006 / 428 / 06 / Mashi - 3 Dt. 23 Jan 2008

Energy Audit report submitted by



Kedar Khamitkar & Associates

Energy Auditor & URJA MITRA Expert Empaneled Bureau of Energy Efficiency,
Ministry of Power Government of India
(Empanelled Mahaurja, Govt. of Maharashtra Institution)

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CERTIFICATE

Govt. Certified Energy Auditor Team has been Conducted Detailed Energy Audit of Deogiri Pratishthan Sanchalit, Tulsi Computer Science and Information Technology College, Beed (Maharashtra).

During Energy Audit We have found Environmental Consciousness & Sustainability initiatives in their Campus.

1. Percentage of Annual Lighting power requirement met through LED Bulbs = 97 %

2. Energy Performance Index EPI 14.41

(Current Year Data: Built-up Area 589.42 Sqm & Electricity Consumption 8499 KWh/year)



Kedar Khamitkar
Energy Auditor

(Certified by Bureau of Energy Efficiency, Ministry of Power, Gov. of India)
Empanelled Energy Auditor MAHAURJA ,Govt. of Maharashtra Institution

Date of Audit: 16th September 2024

Place: Adarsh Nagar, DP Road, Beed - 431 122



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Executive Summary

The objective of the audit was to study the energy consumption pattern of the facility, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods. The salient observations and recommendations are given below.

Sr.	Recommendations	Savings	Investment	Payback
1	Improve Energy Efficiency in Fan System : Replace Existing Inefficient Ceiling Fans with Efficient BLDC fans (Qty. 34 Nos.)	2300 KWh/Yr.	Rs. 0.61/- Lakhs	2.6 Yrs.
2	Improve Power Quality : Install Voltage Servo Stabilizer of 20 KVa Capacity	1000 KWh/Yr.	Rs. 0.20/- Lakhs	2 Yrs.
3	Use renewable Energy : Install rooftop solar power plant of 10 KWp	9600 KWh/Yr.	Rs. 4.50/- Lakhs	4.6 Yrs.
4	Conduct 'Save Energy Program' @5% savings Awareness in Staff & Students	-	No Investment	Immediate

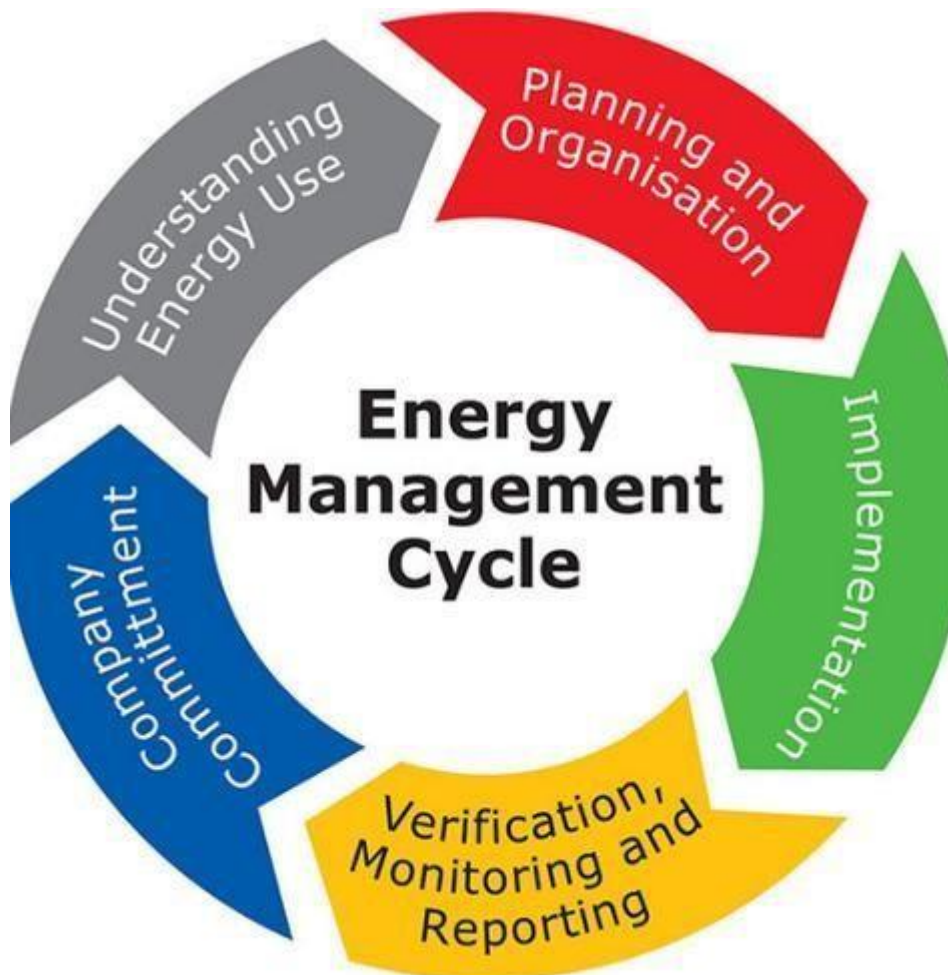


Preface

An energy audit is a study of a plant or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future.

Data collection for energy audit of college Building was conceded by BEE Certified EA Team. This audit was over sighted to inquire about convenience to progress the energy competence of the campus.

All data collected from each classroom, Library, and Office etc. The work is completed by considering how many Tubes, Fan, A.Cs, Electronic instruments, etc. in each room. How much was participation of each component in total electricity consumption.



Acknowledgement

We express our sincere gratitude to the Principal Dr. Lankeshwar Thorat & authorities of Deogiri Pratishthan Sanchalit Tulsi College of Computer Science and Information Technology for entrusting and offering the opportunity of energy performance assessment assignment.

We are thankful to Institute for their positive support in undertaking the task of system mapping and energy efficiency assessment of all electrical system & utilities in the Campus.



Kedar

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Energy Auditor, Certified by Bureau of Energy Efficiency,
Ministry of Power, Govt. of India
Empanelled MAHAURJA , Govt. of Maharashtra
Institution

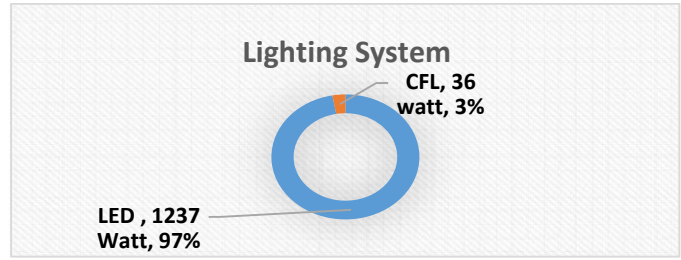
प्रतिज्ञा

हम सत्यनिष्ठा से प्रतिज्ञा करते हैं कि अपने सभी कार्यों में पेट्रोलियम उत्पादों के संरक्षण हेतु सतत प्रयासरत रहेंगे, ताकि देश की प्रगति के लिए आवश्यक इन सीमित संसाधनों की आपूर्ति अधिक समय तक सम्भव हो सके। आदर्श नागरिक होने के नाते हम लोगों को पेट्रोलियम पदार्थों के व्यर्थ उपयोग से बचने तथा पर्यावरण संरक्षण हेतु स्वच्छ ईंधन का प्रयोग करने के लिए जागरूक करेंगे।

Requirements for NAAC

1. Percentage of Annual Power requirements met through LED in the College

Type	Total
LED Lights Connected Load	1237
CFL Bulb Connected Load	36
Total Lighting Load	1273



Observations:

Percentage of Annual Power requirements met through LED Bulb/Tube Current year data is 97%

Energy Performance Index

Electrical Energy received to College campus from MSEDCL Maharashtra State Electricity Distribution Company Limited.

The Specific Energy Consumption (SEC) is the ratio of energy required per square meter.

Total Electricity Consumption = 8498 KWh /Year

Total Built-up Area 589.42 Sq. Meter

In this case the SEC is evaluated as electrical units consumed per square meter of area.

Observations:

EPI calculated as under (for Electricity): 14.42 KWh/Sq. Meter

As per BEE Star Rating Guidelines Existing College Building may be considered as 5 Star.

EPI KWH/Sq. Meter/Year	Star Label
80-70	1 Star
70-60	2 Star
60-50	3 Star
50-40	4 Star
Below 40	5 Star



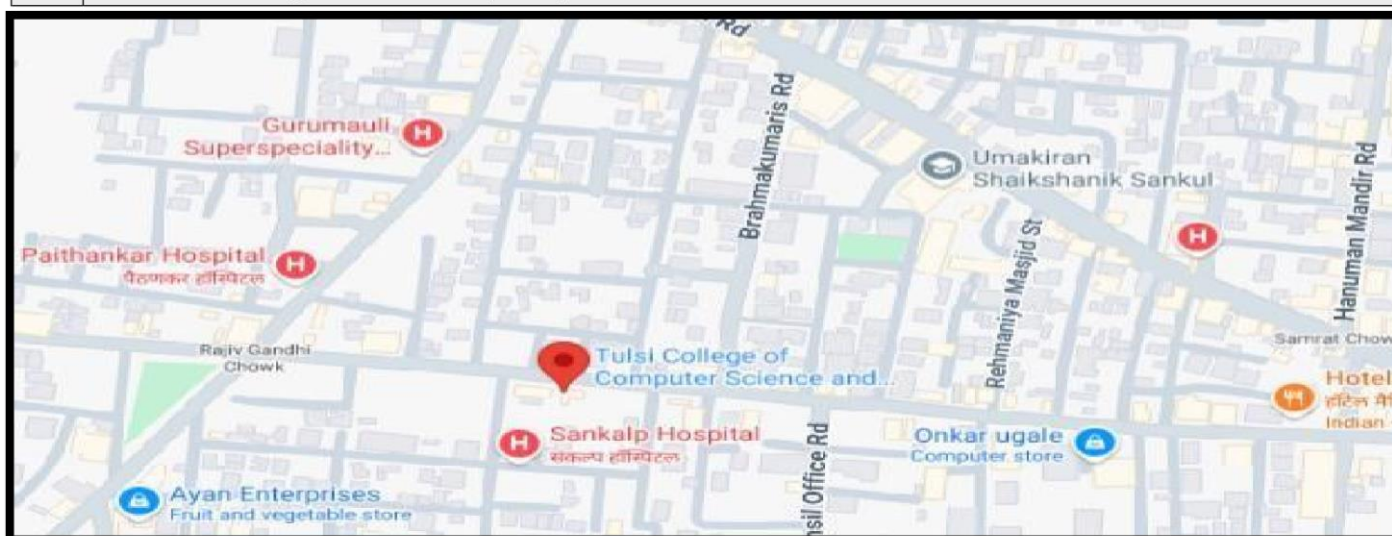
Chapter: 1 Introduction

Deogiri Pratishthan Sanchalit Deogiri Pratishthan Sanchalit Tulsi Computer Science and IT College, Beed is a leading IT educating minority institute affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad started in 2006 & declared as a minority institute in 2012.

College is situated in the canter of Beed city at Adarsh Nagar with campus area 589.42 sq. /m. College is mono-faculty i.e. science faculty program for UG like BCS, BCA, BSc & PG like ,MSc computer & MMS are effectively run by college . Nearly 670 students from Beed and nearby villages are taking education in the college. College provides value added courses like communication skill etc, short term courses like MSCIT, DTP etc. Number of alumni students are performing their best in various careers or businesses. While keeping vision and mission in our mind, the college tries to develop good citizens with good moral values.



Sr.	Degree Courses offered
1	Bachelor of Science
2	Bachelor of Science (Computer Science)
3	Bachelor of Computer Application
4	Master of Science (Computer Science)
5	Master of Management Science (MCM)



Address : Shikshak Colony Rd, behind ITI Gov, Dnyaneshwar Nagar, Beed, Maharashtra 431122

Chapter 2: Energy Audit Objectives

Deogiri Pratishthan Sanchalit Tulsi Computer Science and Information Technology College Building entrusted the work of conducting a detailed Energy Audit of campus with the main objectives given below:

- ☐ To study the present pattern of energy consumption
- ☐ To identify potential areas for energy optimization
- ☐ To recommend energy conservation proposals with cost benefit analysis.

Scope of Work, Methodology and Approach:

Scope of work and methodology were as per the proposal. While undertaking data Collection, field trials and their analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility. **Approach to Energy Audit:**

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipment's. The key to such performance evaluation lies in the Sound knowledge of performance of equipment's and system as a whole.

Energy Audit:

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused Attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

ENERGY EFFICIENCY IN BUILDINGS

EE Measures for Buildings



Chapter: 3 Energy Audit Methodology

Energy Audit Study is divided into following steps

1. Historical data analysis:

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

2. Actual measurement and data analysis:

This step involves actual site measurement and field trials using various portable Measurement instruments. It also involves input to output analysis to establish actual operating Equipment efficiency and finding out losses in the system.

3. Identification and evaluation of Energy Conservation Opportunities:

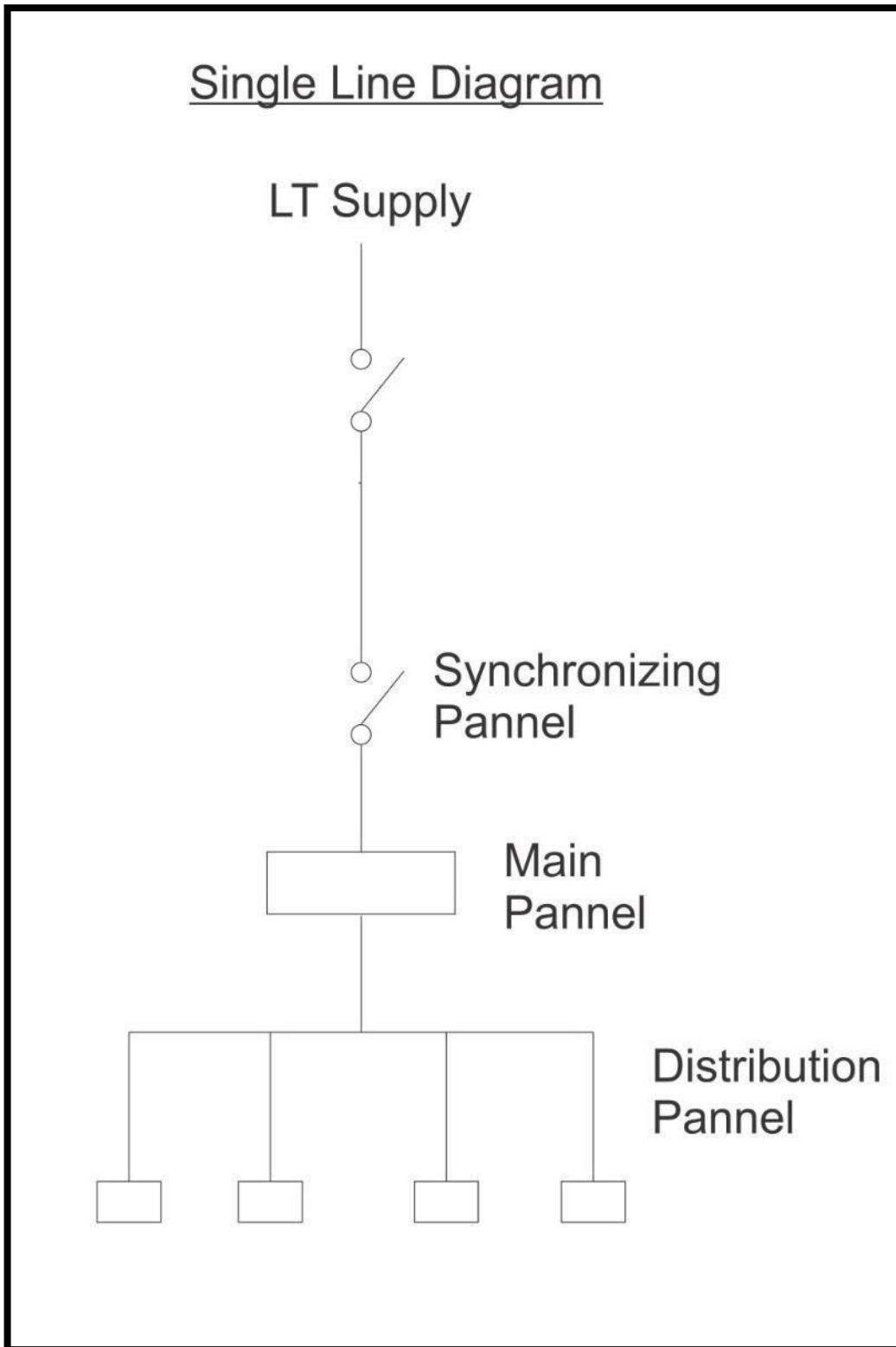
This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the Proposed modifications with payback period.



Chapter: 4. Study of Electrical Systems

Electrical Energy Sources:

1. The electrical supply to the Institute comes from MSEDCCL LT supply.

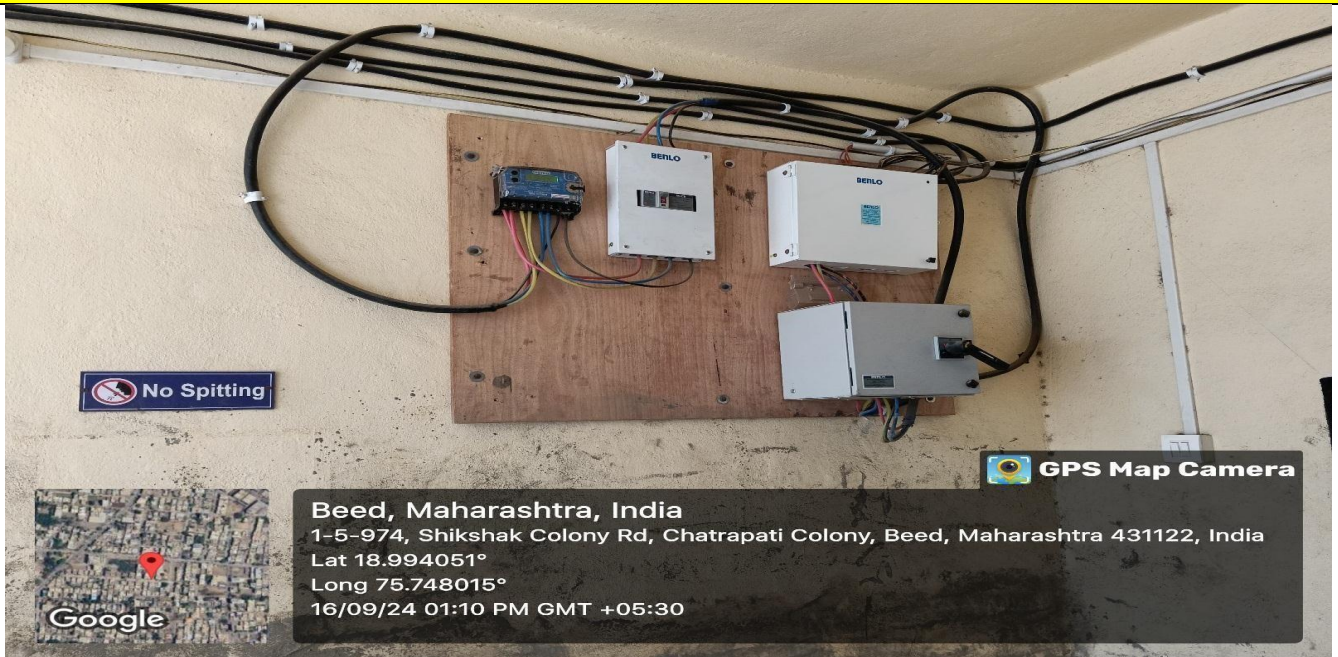


Observations:

MSEDCCL has been installed one common Energy meter in Campus which distributes electrical energy to college building.

MSEDCL Supply : MEDCO Energy Meter details

MSEDCL LT Supply Meter - A Consumer No. 576010279738



Observations: Electrical Safety measures need to review!

Wood electrical panel boards are not allowed because wood is flammable and can be damaged by beetles, which can lead to electrical safety hazards

Suggestions for the Electrical Safety:

- Install Sign Boards. Prohibition, Warning, Mandatory and Emergency
- Conduct Electrical Safety Audit & Earth resistance Test periodically to avoid accident.

These 4 important safety signs can be broken into categories:

ELECTRICAL SAFETY AUDITS

Benefits of Electrical Safety Audit

- Identify Potential Electrical Hazards in the Facility
- Prevent and Minimize Loss of Life & Property
- Avoid Fire Due to Short Circuiting
- Compliance with Applicable Safety Regulatory
- Ensure Longevity of Electronic Equipment

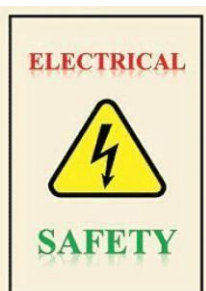
Testing Inspection Certification

CAUTION
Electrical Room

DANGER



**Authorised
Personnel only**



Electrical panels should also have secure covers to ensure no wires are exposed that could cause electrical shock. This also prevents the internal mechanisms from being exposed to dust, dirt, and moisture. Electrical panel boxes in commercial buildings should be secured and accessible by trained personnel only.

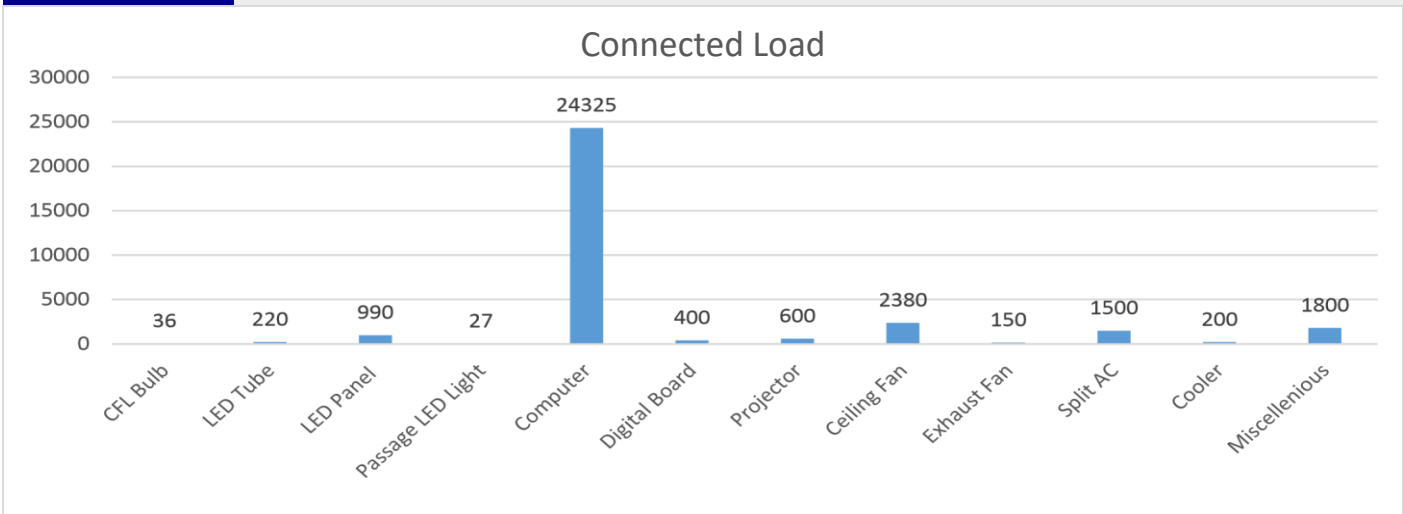
The electrical bills from MSEDCL May 23 to April 24 have been studied.

	Consumer No.	576010279738
Details of Electricity Demand	Tariff	090 / LT I Res 1-Phase
Sanctioned Load	1	KW
Meter Status	Normal	

Annual Electricity Consumption = 11693 KWh/Year

Major Energy use and Areas: In the College Campus Electrical energy is used for various applications like: Computers, Printers, Xerox machines, Router System, Lighting, Fans, Flood light, Pumping Motor, AirConditioning etc.

Graphical View: Connected Load Details



Observations: Computers contributes 24.3 KW Maximum Load

Suggestions:

There are many ways to save energy with computers, including:

- Use power management settings: Set your computer to sleep mode when it's inactive.
- You can also use energy-saving modes that shut down the monitor, hard drive, and computer after a period of inactivity.
- Use a power strip: Plug your monitor, printer, and other accessories into a power strip or surge protector. When you're not using them, you can turn off the power strip to prevent them from drawing power.
- Turn off your monitor: If you're going to be away for 20 minutes or more, turn off your monitor.



Chapter: 5. Improve Energy Efficiency in electrical utilities

5.1 Fan System:

Total number of fans used in the College Building = 34 No's Consider @200 days Working 8 Hrs.

- Number of fans to be replace = 34 Nos.
- The Total Current Consumption = 3800 kWh
- The Expected fan Consumption = 1500 kWh
- Expected Saving per year = 2300 kWh/year

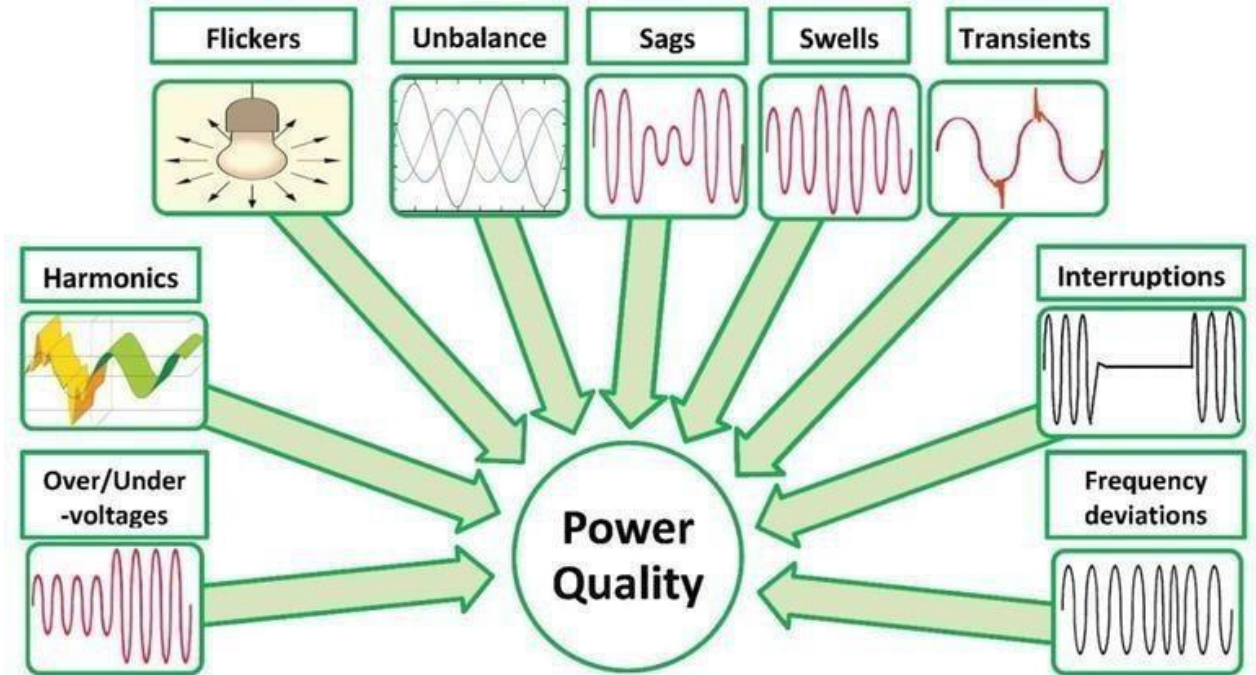
Suggestions: Replace existing Inefficient Fan System (70W) with Five Star BLDC (28W)



5.2 Monitor Power Quality Supply

Power quality issues can affect the operation of critical loads and can have the negative impact on operation. This power quality analyser can monitor the cost of energy wasted due to poor power quality.

Power quality refers to the level of consistency, reliability, and stability of electrical power.



Suggestions: Install Voltage Servo Stabilizer of 25 KVa Capacity



5.3 Lighting System:



Observations: In the campus Majority LED Tube are installed without reflectors.

Measured Lux Level LOW

Suggestions: Increase Lighting Efficiency by using reflectors.

White is the most reflective color and can make a room look larger and brighter.

Light globes generally disperse light in all directions from the source. If a ceiling mounted light does not direct the light back down to the working plane, more fittings will be required to achieve the required lux levels. So the effectiveness of the reflectors (or minimizing losses due to poor reflectors) is important. Reflectors should be both reflective as well as carefully designed to disperse light effectively on the working plane at the design height of the fitting (e.g., light should not be concentrated in one area, providing too much light, whilst falling short of required levels in another area).



Proposed:- Improve effectiveness of Lighting System.

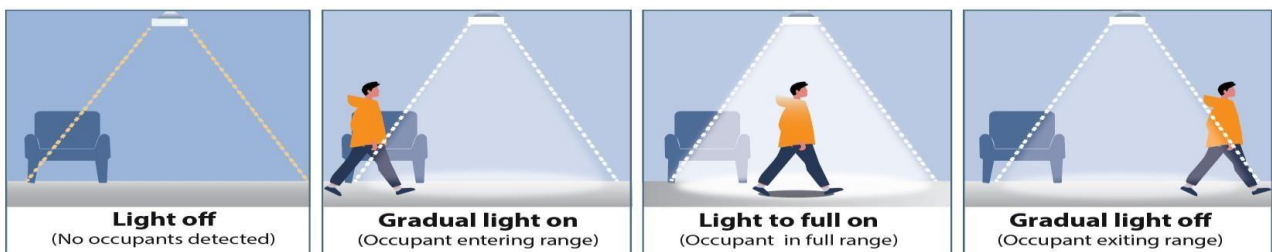
Silver Reflectors. This is the reflector that reflects the most light.
 White Reflectors. More flexible between indoor and outdoor use.

1. Gold Reflectors
2. Black Reflectors
3. White Reflectors

Recommended LUX Level

Activity	Illumination (lux, lumen/m ²)
Public areas with dark surroundings	20 - 50
Simple orientation for short visits	50 - 100
Working areas where visual tasks are only occasionally performed	100 - 150
Warehouses, Homes, Theaters, Archives	150
Easy Office Work, Classes	250
Normal Office Work, PC Work, Study Library, Groceries, Show Rooms, Laboratories	500
Supermarkets, Mechanical Workshops, Office Landscapes	750

Suggestions: Install occupancy sensors to reduce Losses.



Chapter: 6 Guidelines for Identified Energy Saving Opportunities

- Use day lighting effectively by locating work stations requiring good illuminance near the windows.
- Minimize illuminance in non- task areas by reducing the wattage of lamps or number of fittings
- Avoid use of incandescent/tungsten filament lamps. The power consumed by these lamps is 80% more than the fluorescent lamps (discharge) for same lumen output.
- Use electronic ballasts in place of conventional ballast for fluorescent lamps.
- Task lighting saves energy, utilize it whenever possible.
- All surfaces absorb light to some degree and lower their reflectance. Light colored surfaces are more efficient and need to be regularly painted or washed in order to ensure economical use of light.
- Maintenance is very important factor. Evaluate present lighting maintenance program and revise it as necessary to provide the most efficient use of lighting system.
- Clean luminaries, ceilings, walls, lamps etc. on a regular basis.
- Controls are very effective for reducing lighting cost. Provide separate controls for large ratings.
- Install switching or dimmer controls to provide flexibility when spaces are used for multiple purpose and require different amounts of illumination for various activities.
- Switching arrangements should permit luminaries or rows of luminaires near natural light sources like windows or roof lights to be controlled separately.
- Separate lighting feeder and maintain the feeder at permissible voltages by using transformers. • Install occupancy sensors for indoor cabin light controls

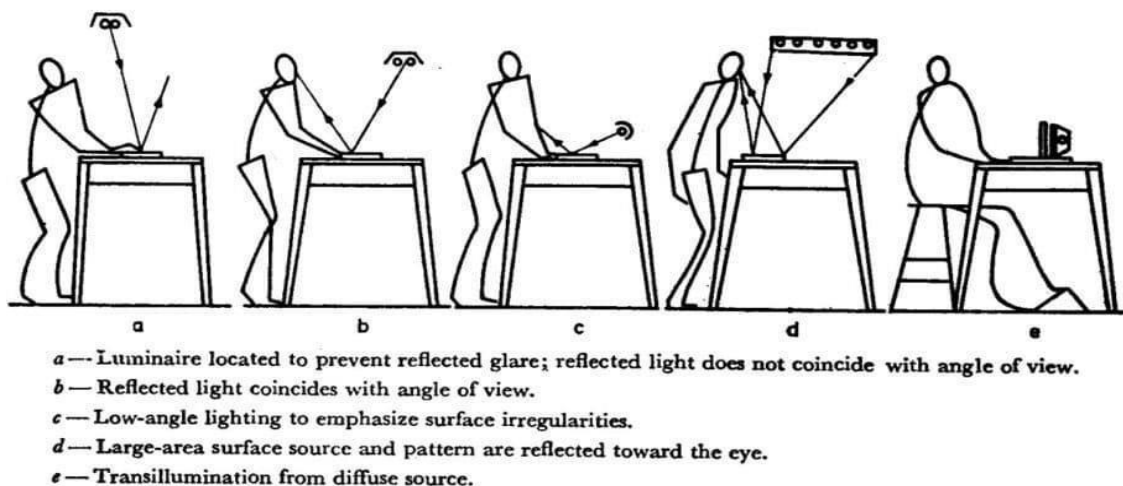
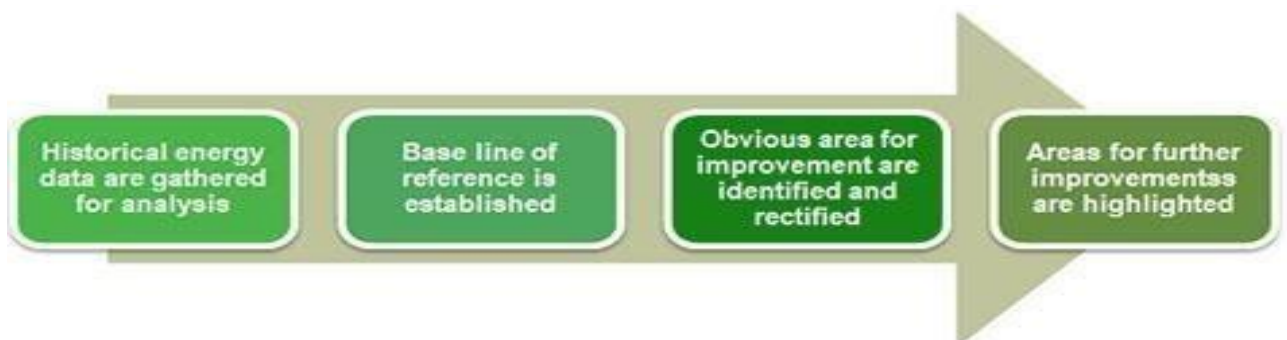


FIG. 2 EXAMPLES OF PLACEMENT OF SUPPLEMENTED LUMINAIRES



Conduct Institutional Training / Awareness Program

14th December 'National Energy Conservation day'

The National Energy Conservation Day is organised on 14th December every year by the Bureau of Energy Efficiency (BEE) with an aim to showcase India's achievements in energy efficiency and conservation. BEE - Ministry of Power celebrate every year Energy Conservation Week from 14th December – 20th December.

Create Awareness:

All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity.

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc.
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to create energy efficiency/ renewable energy awareness among the college campus i.e. solar, wind, Biogas energy. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.

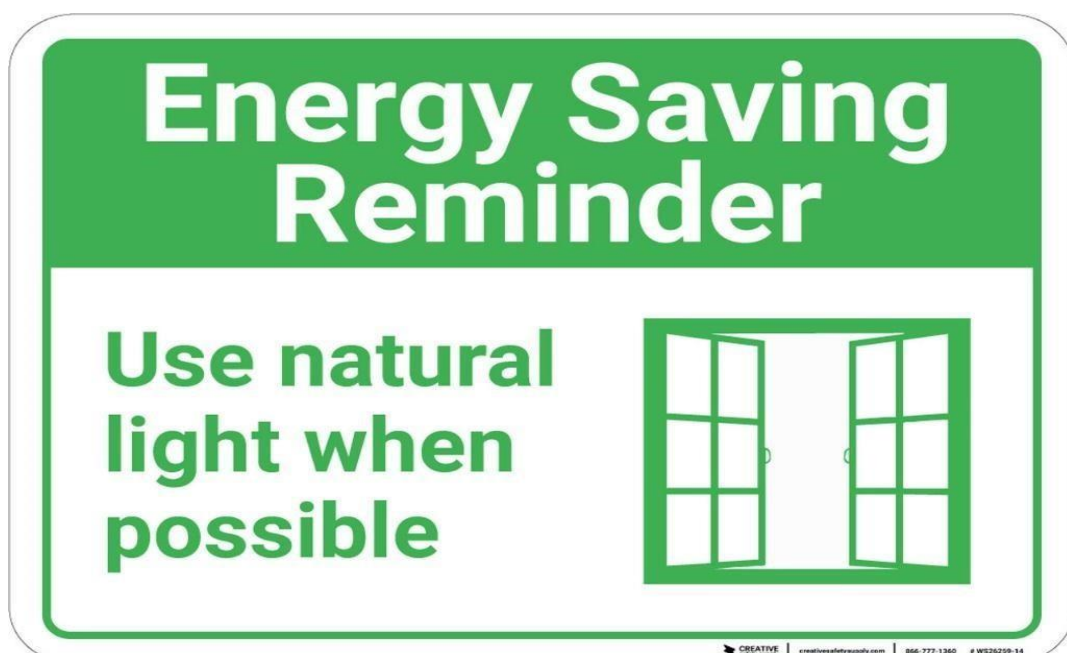
Display the stickers of save electricity

Save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity.

- ☑ Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.
- ☑ All projectors to be kept OFF or in idle mode if there will be no presentation slides.
- ☑ All computers to have power saving settings to turn off monitors and hard discs , say after 10 minutes/30 minutes.
- ☑ The comfort/Default air conditioning temperature to be set between 24°C to 26°C.

USE OF ELECTRICITY DURING PEAK HOUR AND OFF PEAK HOUR

The applicable electricity tariff is not also based on timing of the day but it may not be applicable in case of domestic LT/ HT type connection. This will also helpful in maintaining the demand graph. It is recommended to avoid use of electrical gadget for cleaning, watering etc. during the peak hours. This type of work should be operational during the off peak hour.



Chapter: 7 Best Practices & Activities

Institute has been declared their Environment Policy

Policy Document On Environment and Energy Usage

- To install LED bulbs in the complete campus to save energy
- To operate institute building in most efficient energy manner.
- Maximum use of Renewable Energy.
- Encourage a culture of Energy conservation on campus.
- To take additional measures to continuously improve our energy consumption.
- To develop and maintain Energy Management System based on ISO: 50001.
- To encourage use of advanced technology to minimize energy consumption.
- To engage in dialogue with the government agencies, and actively work with the local organizations in the areas of environment, energy efficiency and sustainable development.
- To strengthen our employees' and students' environmental knowledge and skills in order to improve our own environmental performance.
- To provide information and training opportunities on energy saving measures.
- To train our employees and students through our Enviro Club to make them 'Go Green Specialists' and partners to plant trees each year.

Principal



Chapter 8: Conclusion

A total Investment of Approx. Five lakhs & Thirty one thousand rupees (Rs. 5.31/- Lakhs) amount is estimated for the energy efficiency improvement & renewable energy projects

Energy Savings expected around 12900 KWh/year.

Energy Efficiency in Buildings

Checking Energy Efficiency at the Designing Stage by following
Energy Conservation Building Code (ECBC)

BEE, Ministry of Power, Govt. of India launched Energy Conservation Building Code (ECBC) in 2007. The main features of ECBC are:

- To provide minimum requirements for the energy efficient design and construction of buildings.
- It considers five climatic zones in India, sets minimum energy performance standards for large commercial buildings or building complexes that have a connected load of 500 kW or greater.
- The code is also applicable to all buildings with a conditioned floor area of 1,000 m² (10,000 ft²) or greater, and is recommended for all other buildings also.
- The provisions of this code apply to:
 - (a) Building envelopes, except for unconditioned storage spaces or warehouses
 - (b) Mechanical systems and equipment, including heating, ventilating, and air conditioning
 - (c) Service hot water heating
 - (d) Interior and exterior lighting
 - (e) Electrical power and motors.

