Energy Audit Certificate

2023-24

This is to certify that following utility has carried out College building Energy Audit in recognition of the organizations efforts for sustainable development.

Name of the Institute	: Dayanand Education Society's **DAYANAND COLLEGE OF PHARMACY,** LATUR. Barshi Road, Latur - 413531,
Date of Energy Audit	: **28/12/2024**
Name of Energy Auditor	: **KEDAR KHAMITKAR** Certified by BEE (Bureau of Energy Efficiency) Ministry of Power, Govt. of India
EA Certificate No . EA/12/2024/28/DCOPL	:

Empaneled Energy Auditor & Planner
Reg no. MEDA/ECN/CR-14/2020-21/EA-17
महाराष्ट्र ऊर्जा विकास अभिकरण
(Govt. of Maharashtra Institution)

Kedar C. Khamitkar * Regn. No. EA-8287 * Certified Energy Auditor

Kedar Khamitkar
Energy Auditor CEA-8287
Certified by BEE,
Ministry of Power, Govt. of India

संवर्धन ऊर्जांचे

Kedar Khamitkar & Associates
Empanelled with Mahaurja, Govt of Maharashtra Institution

ISO 9001:2015

ISO 9001-2015 Certified

Note : Certificate is based on organisation compliance on energy audit recommendations and continual maintenance of the system & conduction of surveillance audit

Energy Audit Report

(2023-24)

Dayanand Education Society's

Dayanand College of Pharmacy

Barshi road, Latur - 413531 Maharashtra

Energy Audit Conducted by

Kedar Khamitkar & Associates

Energy Auditor

(Empanelled Mahaurja, Govt. of Maharashtra Institution)

M: 9850244701 Email. : urjabachat@gmail.com

Requirements for the NAAC

CEA Team has been Conducted Detailed Energy Audit of M/s. Dayanand College of Pharmacy, Building Located at Latur – Maharashtra. During Energy Audit We have found Environmental Consciousness and Sustainability initiatives in their Campus.

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

   (Current Year Data) = 72 %

2. Percentage of Annual Power requirements met through Renewable Energy Sources

   (Current year Data) = 36 %

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

KEDAR KHAMITKAR
Govt. Certified
Energy Auditor
Reg.No.EA-8287
LATUR-Maharashtra

Place : Latur **Date :** 28/12/24

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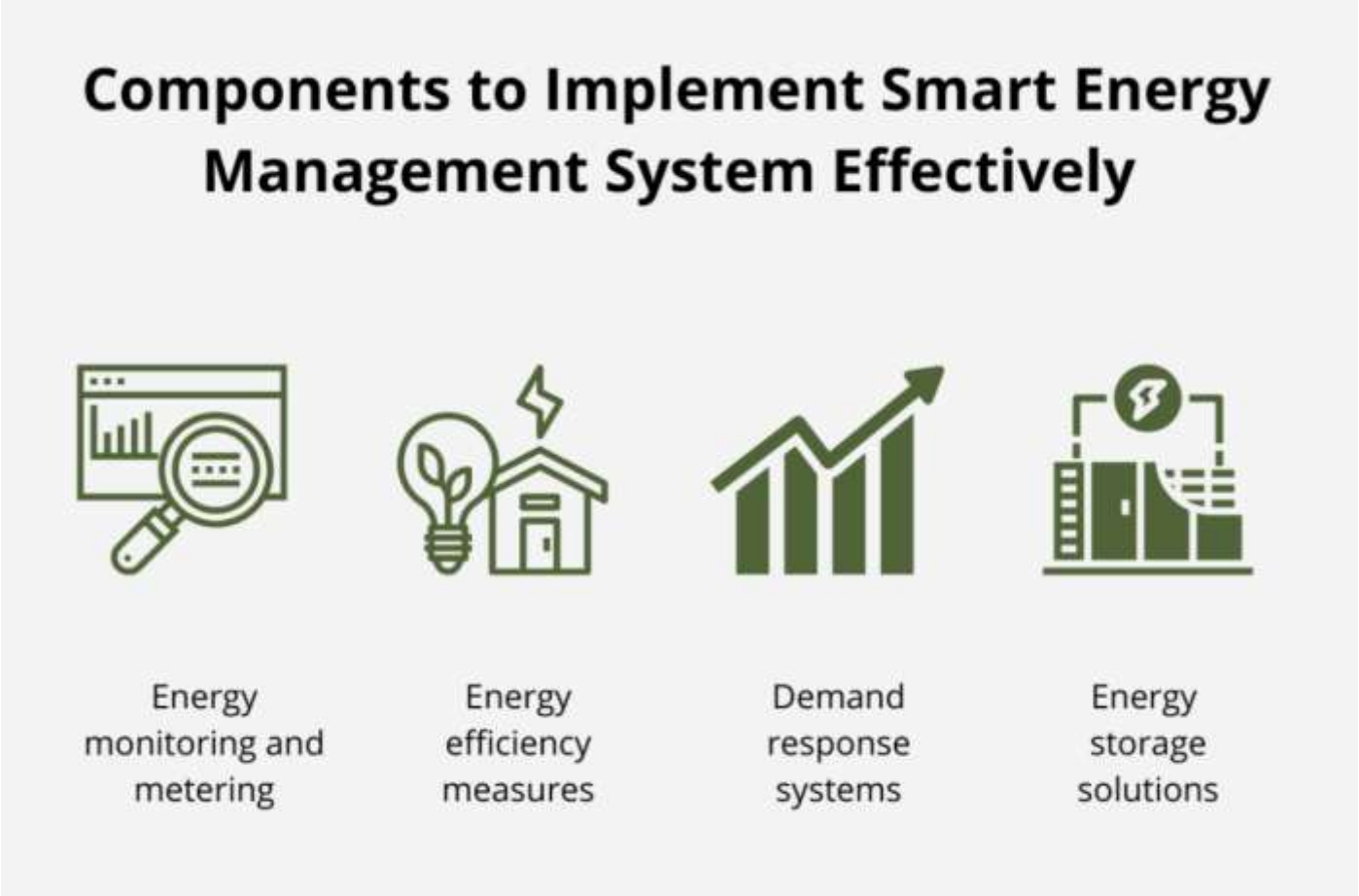
Executive Summary

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 Power Quality Install Voltage Servo Stabilizer of 100 KVa Capacity	3000 KWh/Yr.	Rs. 1.25/- Lakhs	4.1 Yrs.
2	Improve Energy Efficiency in Fan System Replace Existing Inefficient Ceiling Fans with Efficient BLDC fans (Qty. 150 Nos.)	6800 KWh/Yr.	Rs. 3/- Lakhs	4.4 Yrs.
3	Install additional Solar Power Plant of 10 KWp	9600 KWh/Yr.	Rs. 4.50 Lakhs	4.6 yrs.
4	Conduct 'Save Energy Program'	-	No Investment	Immediate

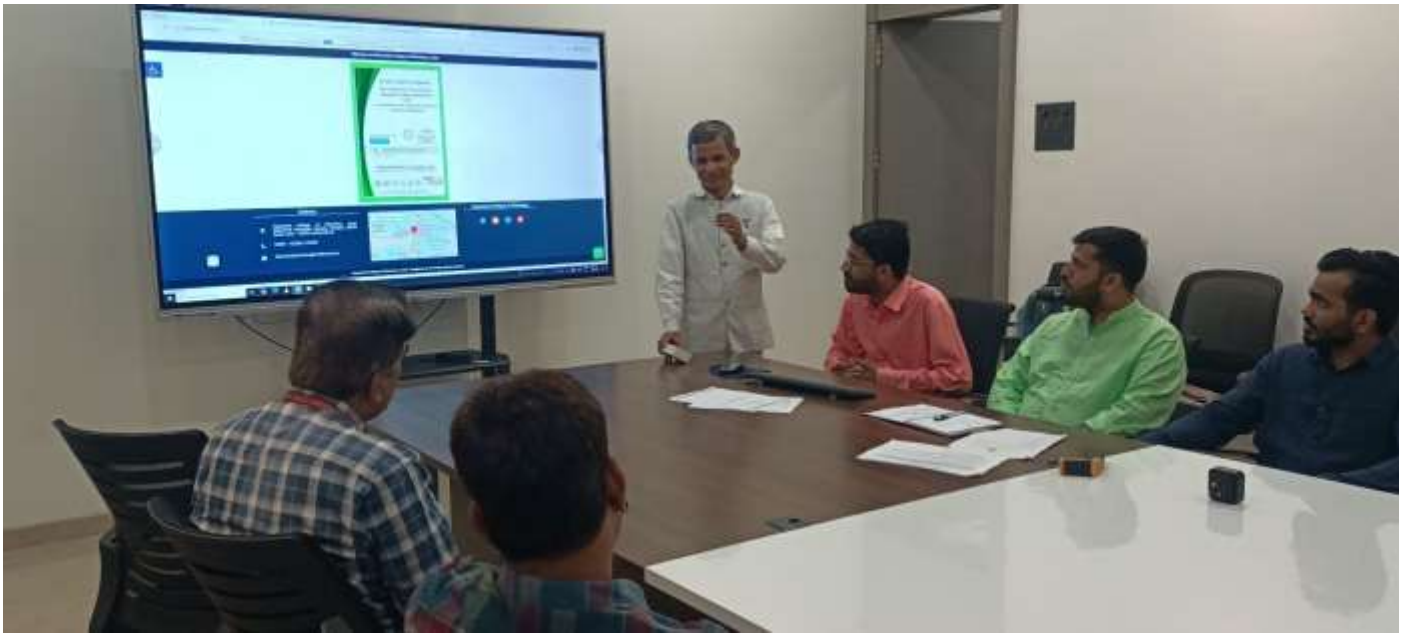


Preface

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 the Dayanand College of Pharmacy, Latur was conceded by EA Team on 28th Dec 2024. This audit was over sighted to inquire about convenience to progress the energy competence of the campus.

All data collected from each classroom, Laboratory, 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.



An "energy audit team discussion" refers to a meeting where a group of professionals involved in conducting an energy audit for a building or facility come together to analyze collected data, identify potential energy inefficiencies, brainstorm potential solutions, and discuss the best course of action for improving energy efficiency based on their findings.

Acknowledgement

We express our sincere gratitude to the authorities of Dayanand Education Society's Dayanand College of Pharmacy & Honorable Principal Dr. K. L. Satpute Madam 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 and other workshop equipment.

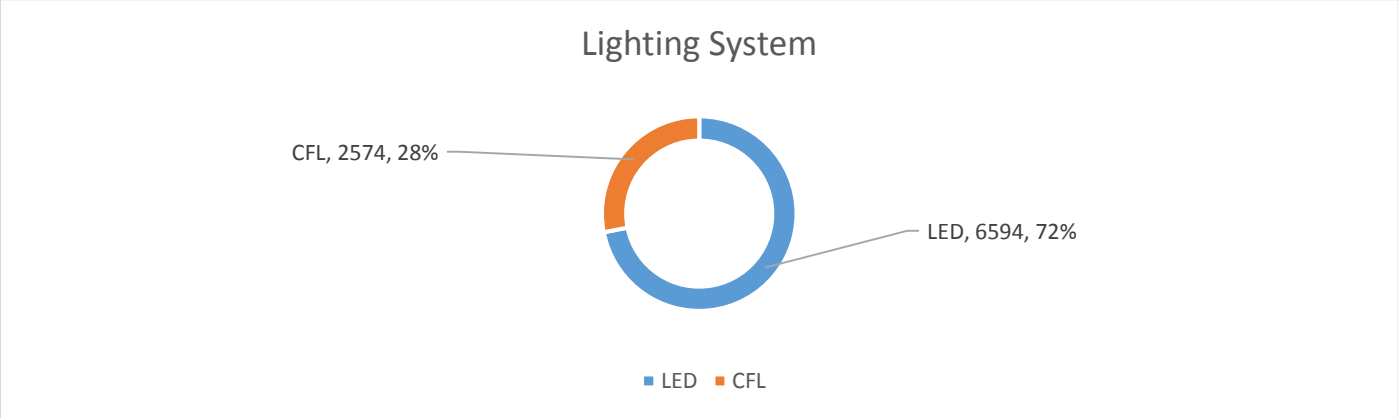
The field studies would not have been completed on time without their interaction and guidance. We are grateful to Mr. Sarda Sir, Mr. Nirbhay Sir, Mr. V.R. Chavan, Mr. M.S.Shaikh, Mr. I.P. More and Mr.P.S.Kale sir for their cooperation received during field studies and providing necessary data such as Electricity bills, Electrical equipment's data for the study.

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

Requirements for NAAC

1. Percentage of Annual Power requirements met through LED at DCOPL

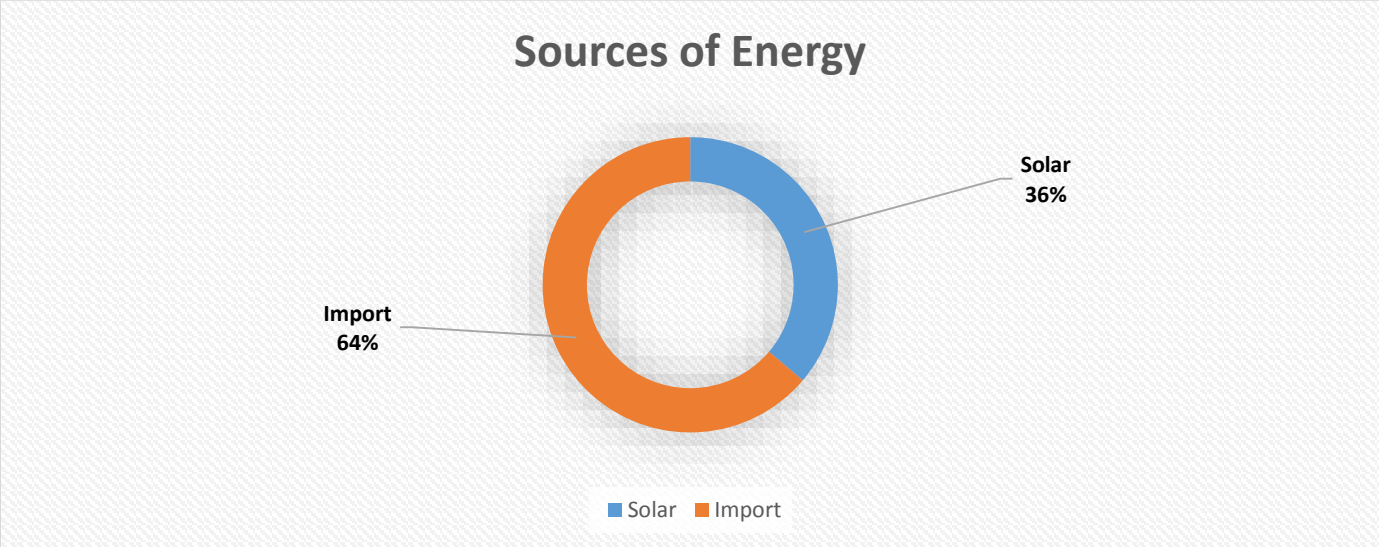
Type	Total
LED Lights Connected Load	6594 Watt
CFL Bulb Connected Load	1300 Watt
Total Lighting Load	**7894 Watt**



Observations:
Percentage of Annual Power requirements met through LED Bulb/Tube Current year data is 72%
Suggestions: Replace 28% Inefficient CFL lighting with Efficient LED Lighting

2. Percentage of Annual Power requirements met through Renewable Energy

Average Renewable Energy units generated	17280	KWh
Nonrenewable Energy (Mahavitaran) imported	30445	KWh
Annual Total Power Requirement	**47725**	**KWh**



Observations: Percentage of Annual Power requirements met through Renewable Energy Sources Current year data is 36%
Suggestions: Reduce Import from MAHAVITRAN

- Install solar streetlights
- Install Motion sensors

Energy Performance Index (EPI)

Electrical Energy received to Dayanand College of Pharmacy, Latur 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 30445 KWh /Year

Total Built-up Area 3228.66 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): 9.43 KWh/Sq. Meter

As per BEE Star Rating Guidelines Existing Dayanand College of Pharmacy, Latur Buildings 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

ENERGY CONSERVATION BUILDING CODE

Chapter: 1 Introduction

Dayanand Education Society's Dayanand College of Pharmacy was established in the year 2009 with the vision "To nurture the future pharmacists with a focused approach for overall professional development and excellence". Our college is approved by DTE Maharashtra & PCI New Delhi, affiliated to MSBTE and Swami Ramanand Teerth Marathwada University, Nanded Maharashtra.

The Dayanand College of Pharmacy offers Diploma, Degree & PG (Pharmaceutics, Pharmaceutical Quality Assurance, Pharmacology, and Regulatory Affairs) courses in Pharmacy.

Address : Barshi Rd, Prakash Nagar, Latur- 413531 Maharashtra

Chapter 2: Energy Audit Objectives

Dayanand College of Pharmacy Building entrusted the work of conducting a detailed Energy Audit of campus with the main objectives given bellow:

- 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:

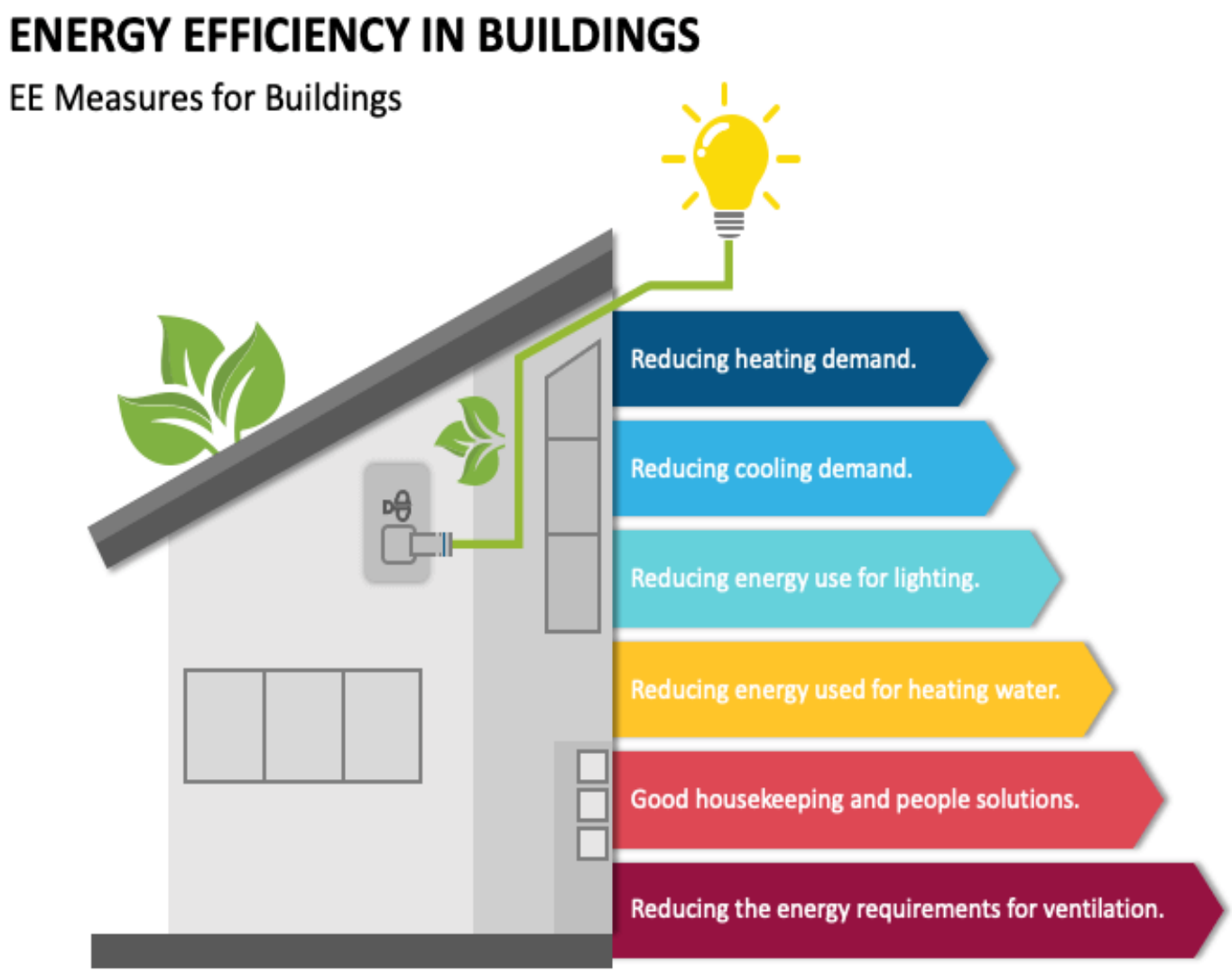
Scope of work and methodology were as per the proposal .While undertaking data Collection, field trials and their analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

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.



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.

4. Instruments used for Energy Audit

- Power Quality Analyser

- Lux Meter

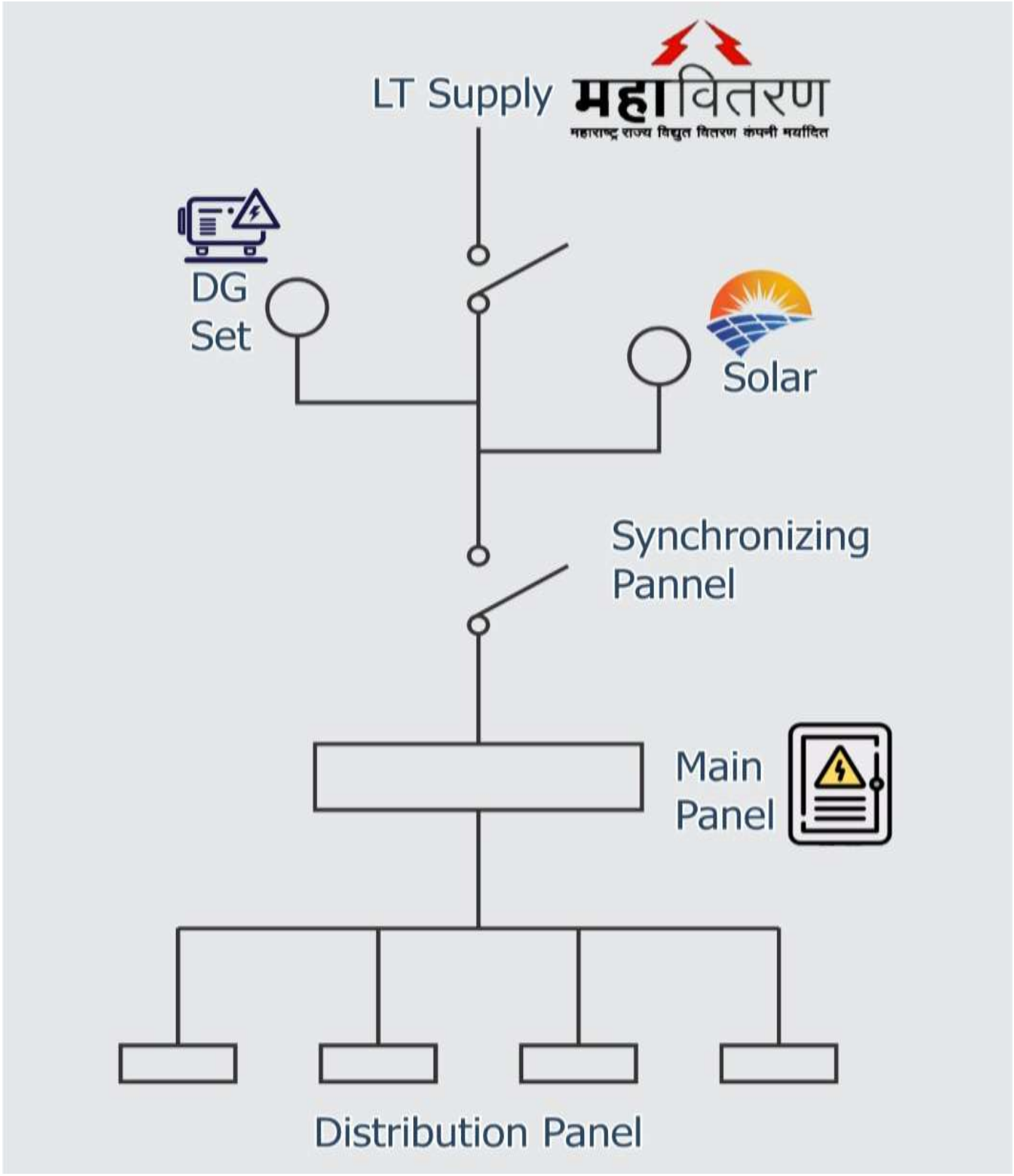
- Earth resistance Socket Tester

- Noncontact Thermometer

Chapter: 4. Study of Electrical System & Observations on Electrical Safety

Electrical Energy Sources: The electrical supply to the Institute comes from

1. MSEDCL LT Supply Meter - A Consumer No. 610551351427
2. Rooftop Solar Power Plant Capacity 18 KWp
3. Diesel Generator 62.5 KVA



Observations: 1. Electricity generated KWh from Diesel Generator record not available
2. MSEDCL has been installed one common Energy meter in Campus which distributes electrical energy to DCOPL building.

Suggestions: Keep Logbook: Electricity generated KWh from D.G. set

MSEDCL Supply

Electric Safety : A study of electrical systems, with a focus on electrical safety, involves examining the components and design of an electrical network, while critically evaluating potential hazards and implementing preventive measures to ensure the safety of people working with or around electricity, including proper grounding, circuit protection devices, insulation, and adherence to safety protocols.

Existing Condition: Electrical Panel Board

Observations: Electrical Safety measures need to review!

-Install Safety Distribution Panel board.

-Install Sign Boards. Prohibition, Warning, Mandatory and Emergency.

These 4 important safety signs can be broken into categories:

Suggestions for the Electrical Safety:

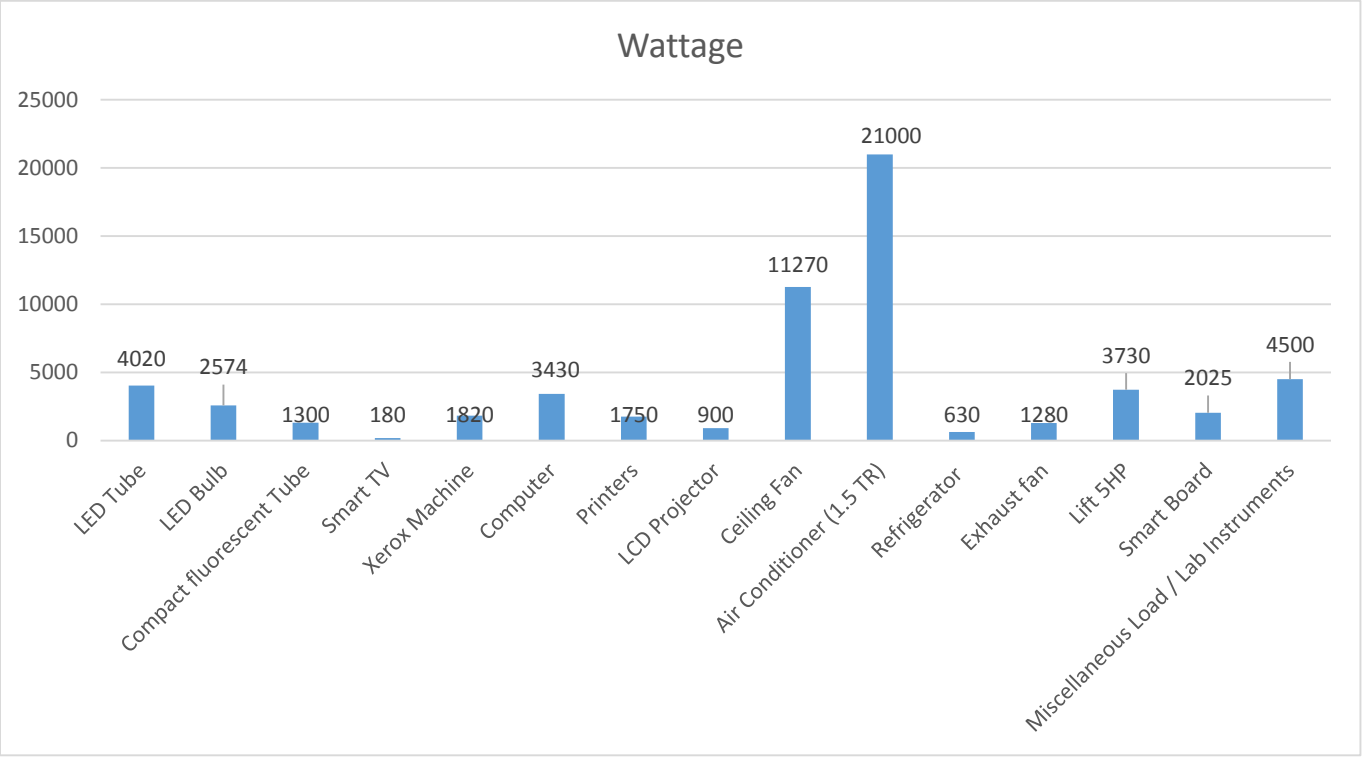
Electrical panels should also have secure covers to ensure no wires are exposed that could cause electrical shock. This also prevents the internal mechanisms from being exposed to dust, dirt, and moisture. Electrical panel boxes in commercial buildings should be secured and accessible by trained personnel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

Connected Load Details

Major Energy use and Areas: In the College Campus Electrical energy is used for various applications like: Computers, Printers, Xerox machines, LCD Projector, Router System, Lighting, Fans, Flood light, Pumping Motor, Air-Conditioning & Other Laboratory Equipment's etc.

Sr.	Name of Appliances	Watt	Qty.	Wattage
1	LED Tube	20	201	4020
2	LED Bulb	18	112	2574
3	Compact fluorescent Tube	52	25	1300
4	Smart TV	90	2	180
5	Xerox Machine	1820	1	1820
6	Computer	70	49	3430
7	Printers	250	7	1750
8	LCD Projector	300	3	900
9	Ceiling Fan	70	161	11270
10	Air Conditioner (1.5 TR)	1500	14	21000
11	Refrigerator	210	3	630
12	Exhaust fan	40	32	1280
13	Lift 5HP	3730	1	3730
14	Smart Board	225	9	2025
15	Miscellaneous Load / Lab Instruments			4500
			Total	60409

Graphical View



Observations Fan system contributes 11.2 Kilowatts.

Suggestion's Improve Energy Efficiency in Fan System

Chapter: 5. Historical Electricity Consumption Bill:

Energy Meter Details: The electrical bills from MSEDCL April- 2023 to Nov - 2024 have been studied.

		Consumer No.	610609003380
Sr. No.	Details of Electricity Demand	Tariff	146 HT-VIII B
1	Sanctioned Load	720	KW

Month	Electricity Consumption (KWh)	Amount (Rupees)
Nov-24	2,237	22370.84
Oct-24	3,255	32320.8
Sep-24	2,300	22985.06
Aug-24	3,181	31574.28
Jul-24	2,408	24037.99
Jun-24	2,639	26290.11
May-24	3,616	35596.51
Apr-24	3,635	35780.59
Mar-24	2,400	22613.34
Feb-24	2,774	25910.75
Jan-24	1,000	9667.12
Dec-23	1,000	9667.12
Nov-23	1,000	9667.12
Oct-23	0	422
Sept-23	0	422
Aug-23	0	422
July-23	0	422
June-23	0	422
May-23	0	422
April-23	0	422

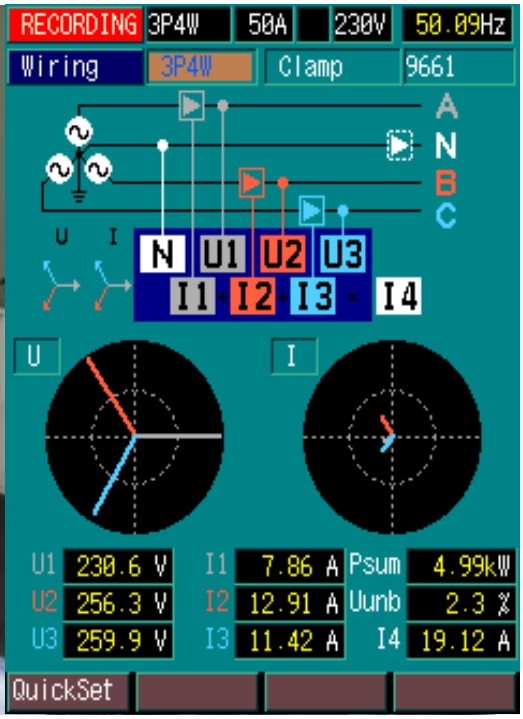
Suggestion: Install additional rooftop Solar Power Plant of 10KW Capacity

Chapter: 6. Performance Evaluation

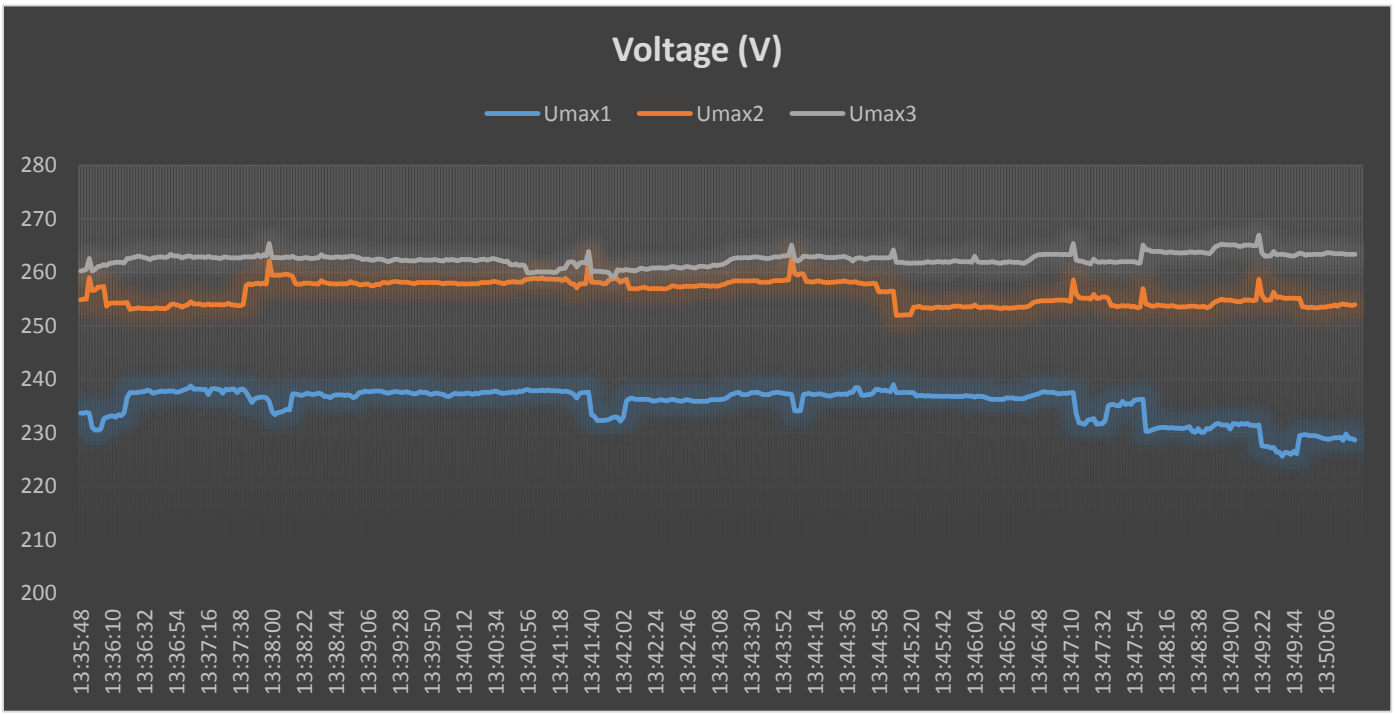
5.1 Power Quality Analysis Test by Power Quality Analyser

Power quality analysis is a crucial procedure that assesses the overall safety and efficiency of a building or facility's power supply. By scrutinizing elements such as power flow, grounding, and harmonics, this process aims to determine the quality of electric power. Power quality refers to the level of consistency, reliability, and stability of electrical power.

Power Quality is a combination of Voltage profile, Frequency profile, Harmonics contain and reliability of power supply.



Voltage Profile : Poor Power Quality Supply to DCOPL



Suggestions: Install Voltage Servo Stabilizer of 100 KVa Capacity

5.2 Fan System:

Total number of fans used in the DCOPL campus = 150 No's

Consider @180 days Working 6 Hrs.

- Number of fans to be replace = 150 No's.
- The Total Current Consumption =11340 kWh
- The Expected fan Consumption = 4540 kWh
- Expected Saving per year = 6800 kWh/year

Suggestions: Replace existing Inefficient Fan System (75W) with Five Star BLDC (28W)

5.3 Lighting System : Lux level Measurements at DCOPL

Measured Lux Level found LOW:

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

Suggestions: Increase Lighting Efficiency by using reflectors.

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

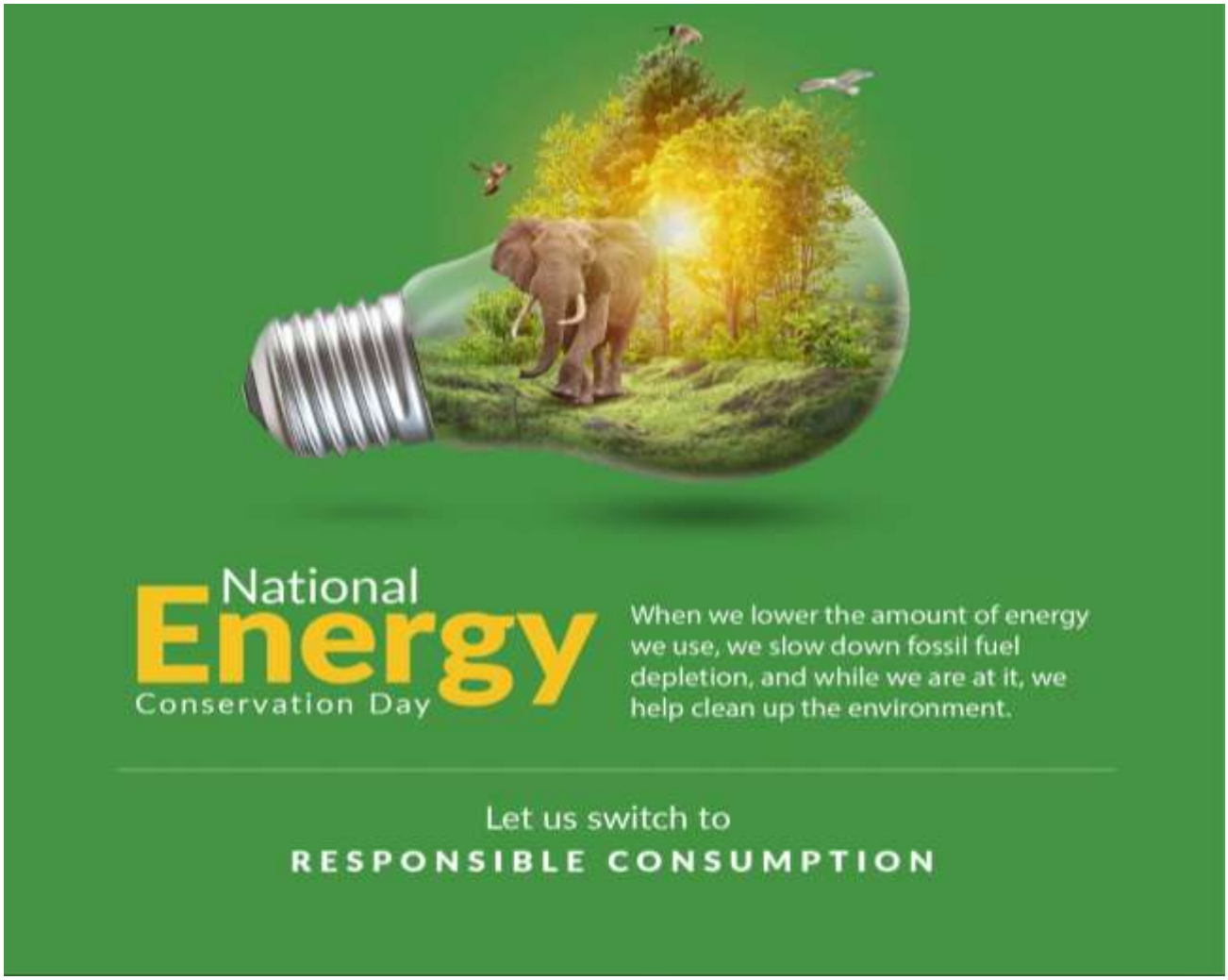
Illuminance (lux)	Activity	Area
100	Casual seeing	Corridors, changing rooms, stores
150	Some perception of detail	Loading bays, switch rooms, plant rooms
200	Continuously occupied	Foyers, entrance halls, dining rooms
300	Visual tasks moderately easy	Libraries, sports halls, lecture theatres.
500	Visual tasks moderately difficult	General offices, kitchens, laboratories, retail shops.
750	Visual tasks difficult	Drawing offices, meat inspection, chain stores.

Suggestions: Install occupancy sensors to reduce Losses.

Chapter: 6 Best Practices & Activities

1. National Energy Conservation Week Celebration

Joint initiative between MEDA Gov. of Maharashtra Institution and Dayanand Education Society on 14th December 2024.



2. Solar Power Plant at DCOPL Campus

Use of renewable Energy:

Observations: Institute has been installed 18 KWp Capacity Rooftop solar power plant.

Suggestions :

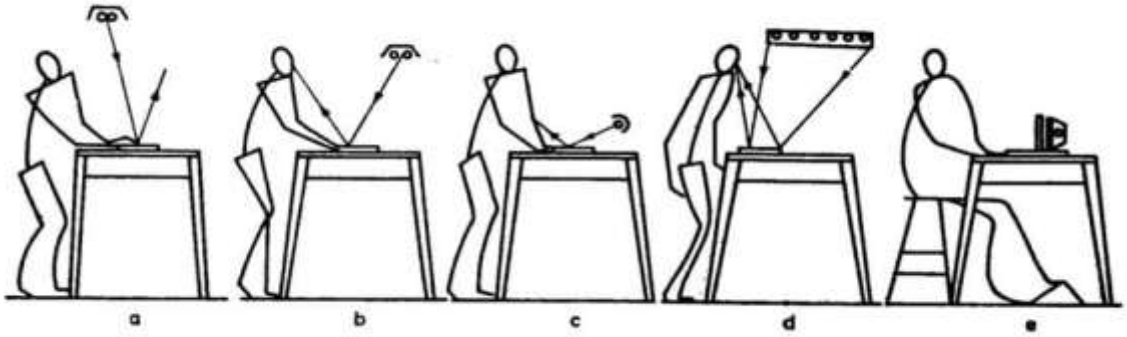
1. Install Solar Street Lights to Minimize Electricity Import during Night.
2. Install Occupancy Sensors to minimize electricity unknown losses.
3. Install Solar Pumping system.

3. Efforts for Energy Conservation

Observation: Installed Energy Conservation Pledge / Awareness Sign-board for Awareness

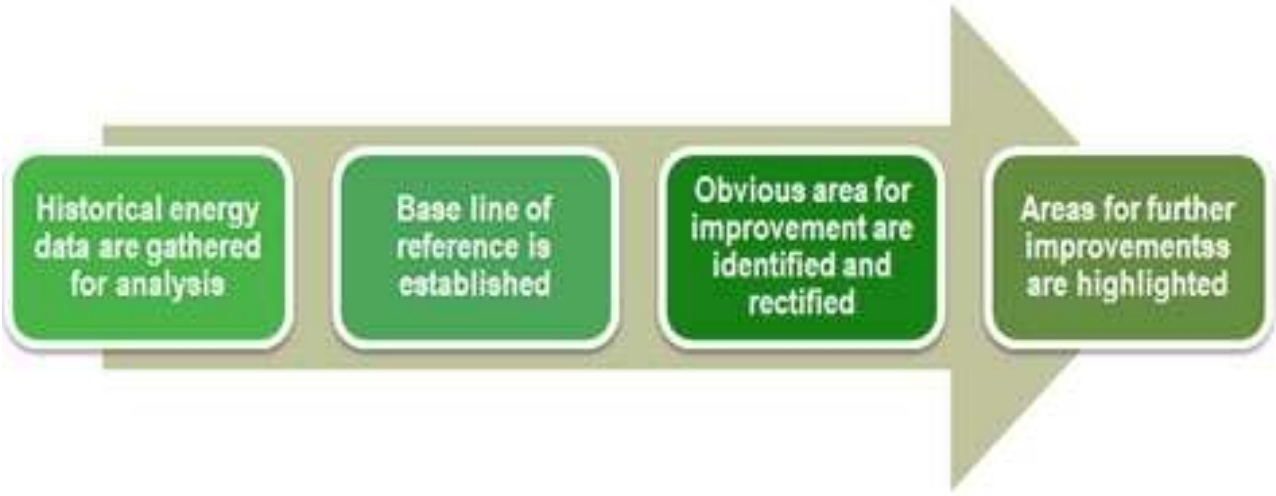
Chapter: 7 Guidelines for Identified Energy Saving Opportunities

• 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



a — Luminaire located to prevent reflected glare; reflected light does not coincide with angle of view.
b — Reflected light coincides with angle of view.
c — Low-angle lighting to emphasize surface irregularities.
d — Large-area surface source and pattern are reflected toward the eye.
e — Transillumination from diffuse source.

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 after10 minutes/30 minutes.
- The comfort/Default air conditioning temperature to be set between 24˚C to26˚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.

General Recommendations:

Improve Performance of Solar Power Plant

The generation of the solar panel is not uniform throughout the year.

Suggestion: Improve PV Panel effectiveness

Suggestions : Clean your solar panels :

Since solar panels don't have any moving parts, they require very little maintenance. However, it's best to clean your solar panels occasionally as dust and dirt can accumulate on the surface, reducing efficiency.

How often you should clean your solar panels depends on several factors such as how frequently it rains and how much it costs you to have them cleaned.

Over the course of a year, dust and dirt may only cause a 5% decline in output. However, if they get very dirty — perhaps in a location that does not get regular rainfall — the output decline can be greater than 20%. Therefore, cleaning your solar panels once a year is a pretty good idea.

Chapter 8: Conclusion

A total Investment of Approx. Eight lakhs & Seventy Five thousand rupees (Rs. 8.75/- Lakhs) amount is estimated for the energy efficiency improvement & renewable energy projects

Energy Savings expected around 19400 KWh/year.