Sharadchandra Mahavidyalaya Shiradhon Ta. Kallam College Code - 184

Energy Audit Report

(2023-24)

Hindustani Education Society's

Sharadchandra Mahavidyalaya

Address: Tq. Kalamb Dist. Dharashiv - 413528 (M.S.)

Green Audit report Submitted by

Kedar Khamitkar & Associates

Energy Auditor Empanelled Mahaurja, Govt. of Maharashtra Institution

M: 9850244701 Email: kedarabachat@gmail.com

Co-Ordinator
IQAC, Sharadchandra
Mahavidyalaya, Shiradhon

Sharadchandra Mahavidyalaya Shiradhon IQAC

I/C Principal
Sharadchandra Mahavidyalaya
Shiradhon Tq.Kallam

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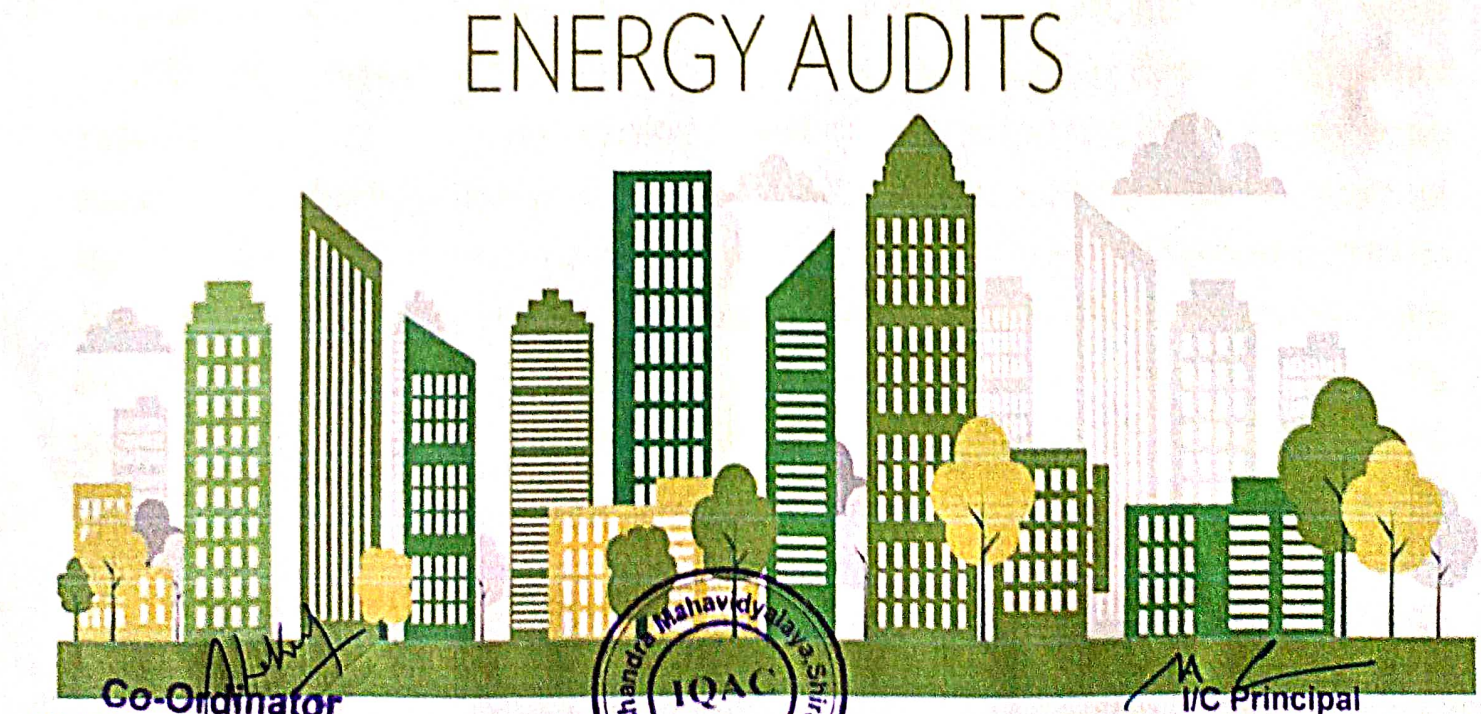

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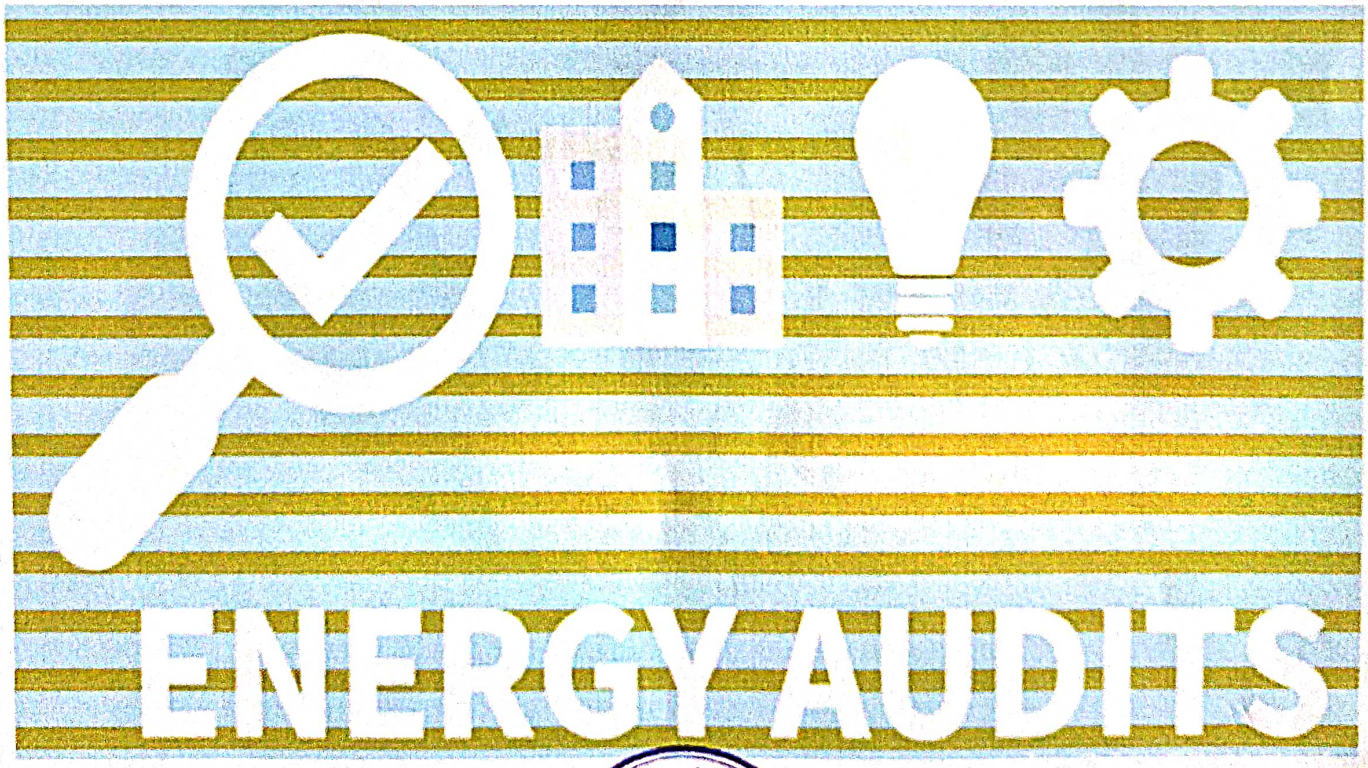
Executive Summary

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. 28 Nos.)	1882 KWh/Yr.	Rs. 0.50 Lakhs	2.6 Yrs.
2	**Improve Power Quality : @10 % Savings** Install Voltage Stabilizer (10 Numbers) each 20 KVa Capacity	1000 KWh/Yr.	Rs. 0.25 Lakhs	2.5 Yrs.
3	**Improve Lighting system:** a) Install LED with reflectors b) Install Occupancy sensors with Timing controls	1100 KWh/Yr.	Rs.0.35 Lakhs	3.1 Yrs.
4	**Install Solar Power Plant – 10 KWp**	9600 KWh/Yr.	Rs. 4.50 Lakhs	4.6 Yrs.
5	**Conduct 'Save Energy Program'** Awareness Project		NA	Immediate



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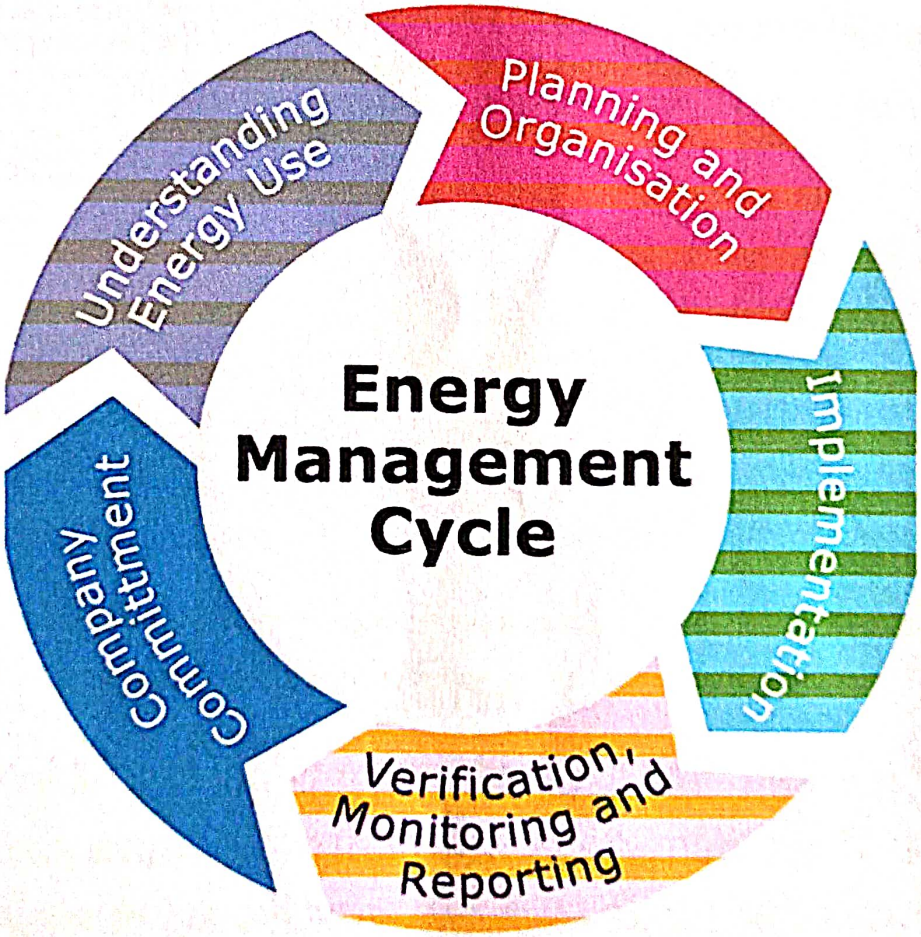
Preface

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 Sharadchandra Mahavidyalaya, Shiradhon was conceded by EA Team on 11th April 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 & every room. 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.



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Sharadchandra Mahavidyalaya Shiradhon IQAC

I/C Principal
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Shiradhon Tq.Kallam

Acknowledgement

We express our sincere gratitude to the I/C Principal Dr. Sajed A. Chaus Sir & authorities of Sharadchandra Mahavidyalaya, Shiradhon 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. The field studies would not have been completed on time without their interaction and guidance.

We are grateful to their cooperation during field studies and providing necessary data for the study.

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

Kedar Khamitkar

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

Date : 11.04.2024

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।

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Requirements for the NAAC

Government Empaneled Energy Auditor Team has been Conducted Detailed Energy Audit of Sharadchandra Mahavidyalaya Building Located at Shiradhon District Dharashiv (Maharashtra)

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

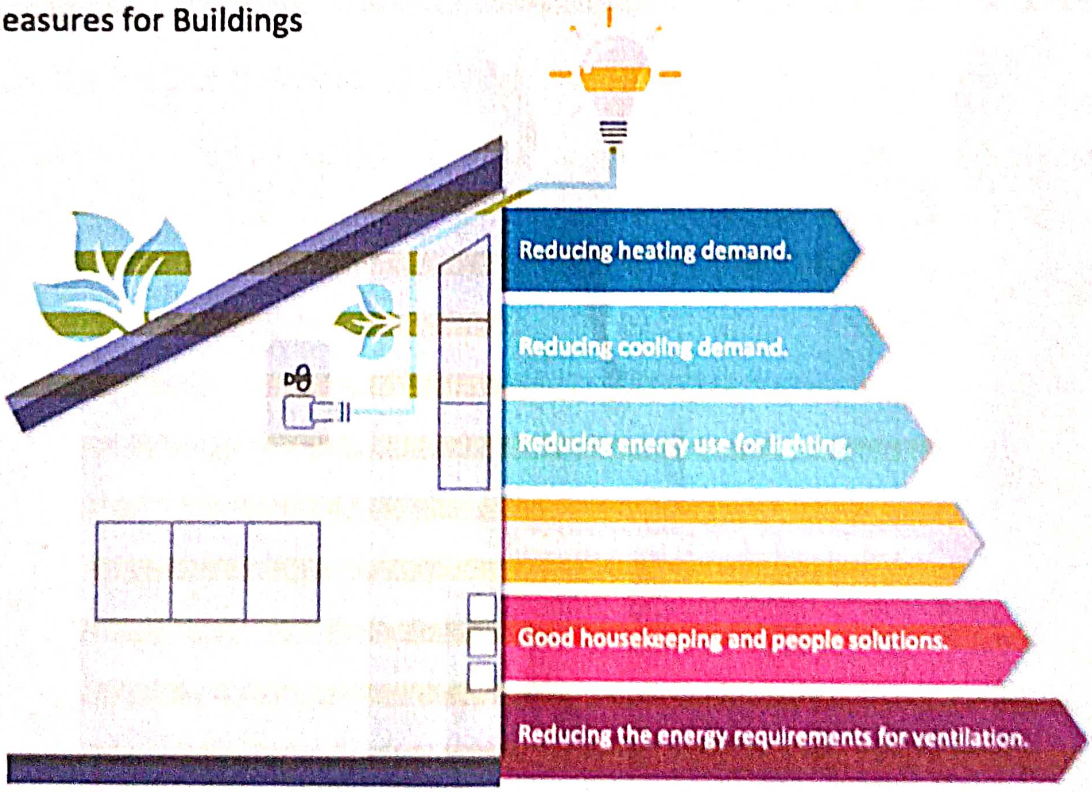
1. **Percentage of Annual Power requirements met through LED = 78 %**

   (Current year Data)

2. **Energy Performance Index = 0.68 KWh / Sq. Meter**

ENERGY EFFICIENCY IN BUILDINGS

EE Measures for Buildings



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Chapter 1 Introduction

Hindustani Education Society was established in 1978 by Hon. Late Nawaboddin Bashamiya Shaikh with a great vision. His vision behind the establishment of the society was to uplift the society. He established many educational institutions from KG to PG. He believed that education can make the students to stand on their own legs and offer various opportunities. Hence, he decided to start different streams of vocational education such as ITI, Polytechnic, Pharmacy, MCVC College, D.Ed., B.Ed., and M.Ed. to offer his students various opportunities in building their careers.

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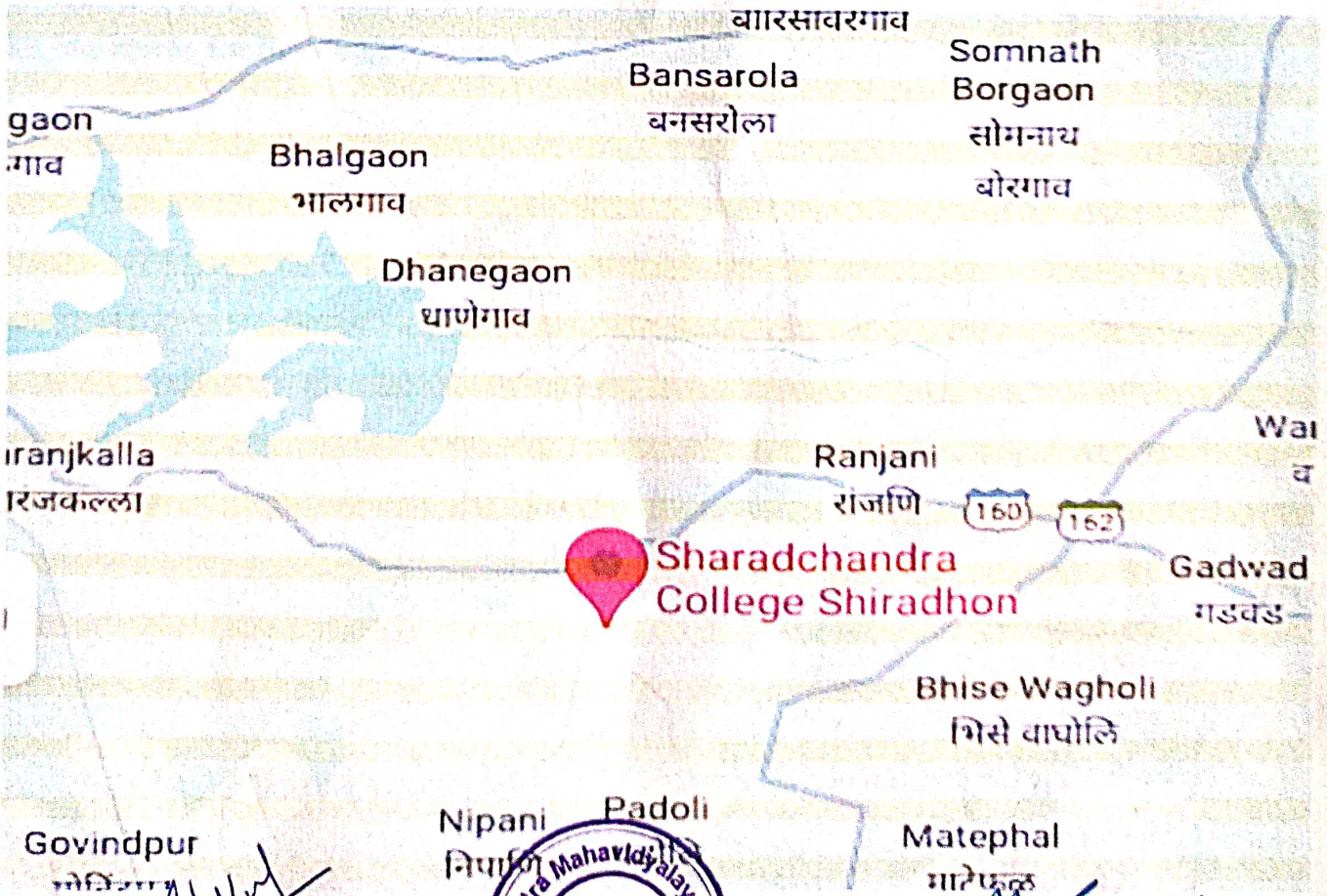

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Chapter 2: Energy Audit Objectives

The Sharadchandra Mahavidyalaya, Shiradhon 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:

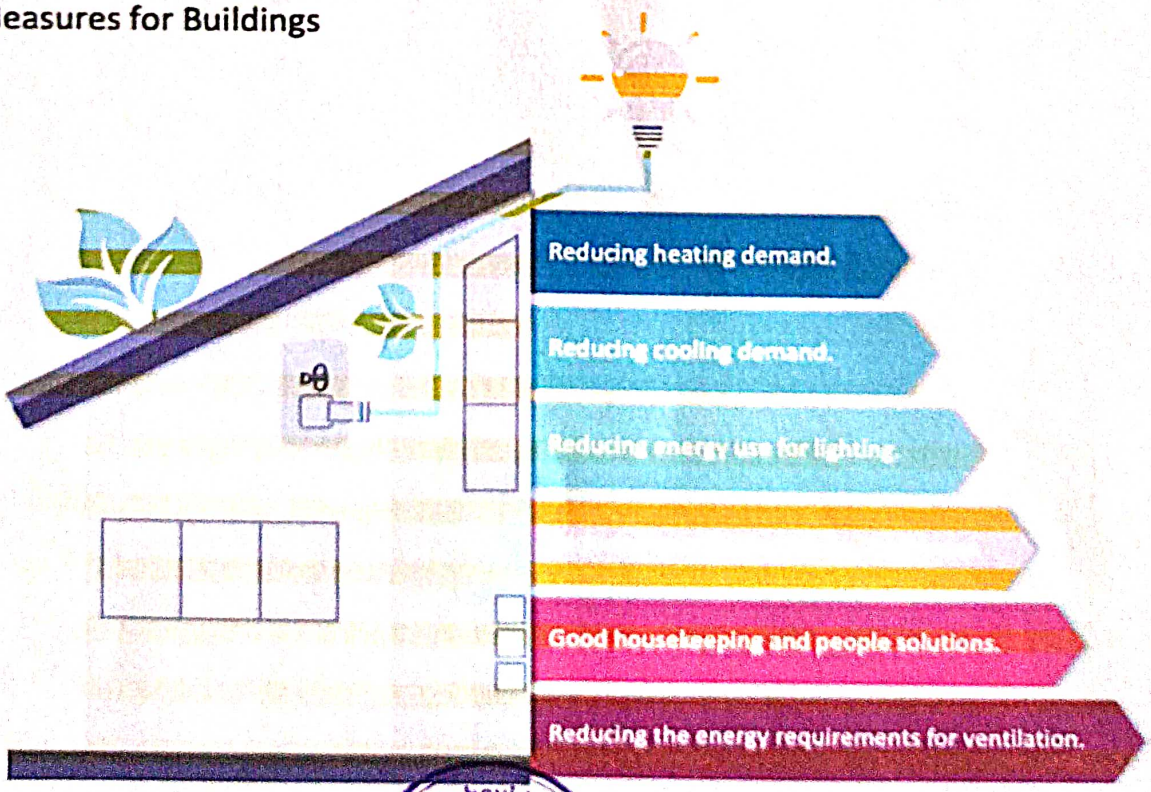
We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipment's. The key to such performance evaluation lies in the Sound knowledge of performance of equipment's and system as a whole.

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.

ENERGY EFFICIENCY IN BUILDINGS

EE Measures for Buildings



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Chapter 3 Energy Audit Methodology

Energy Audit Study is divided into following steps

1. Historical data analysis:

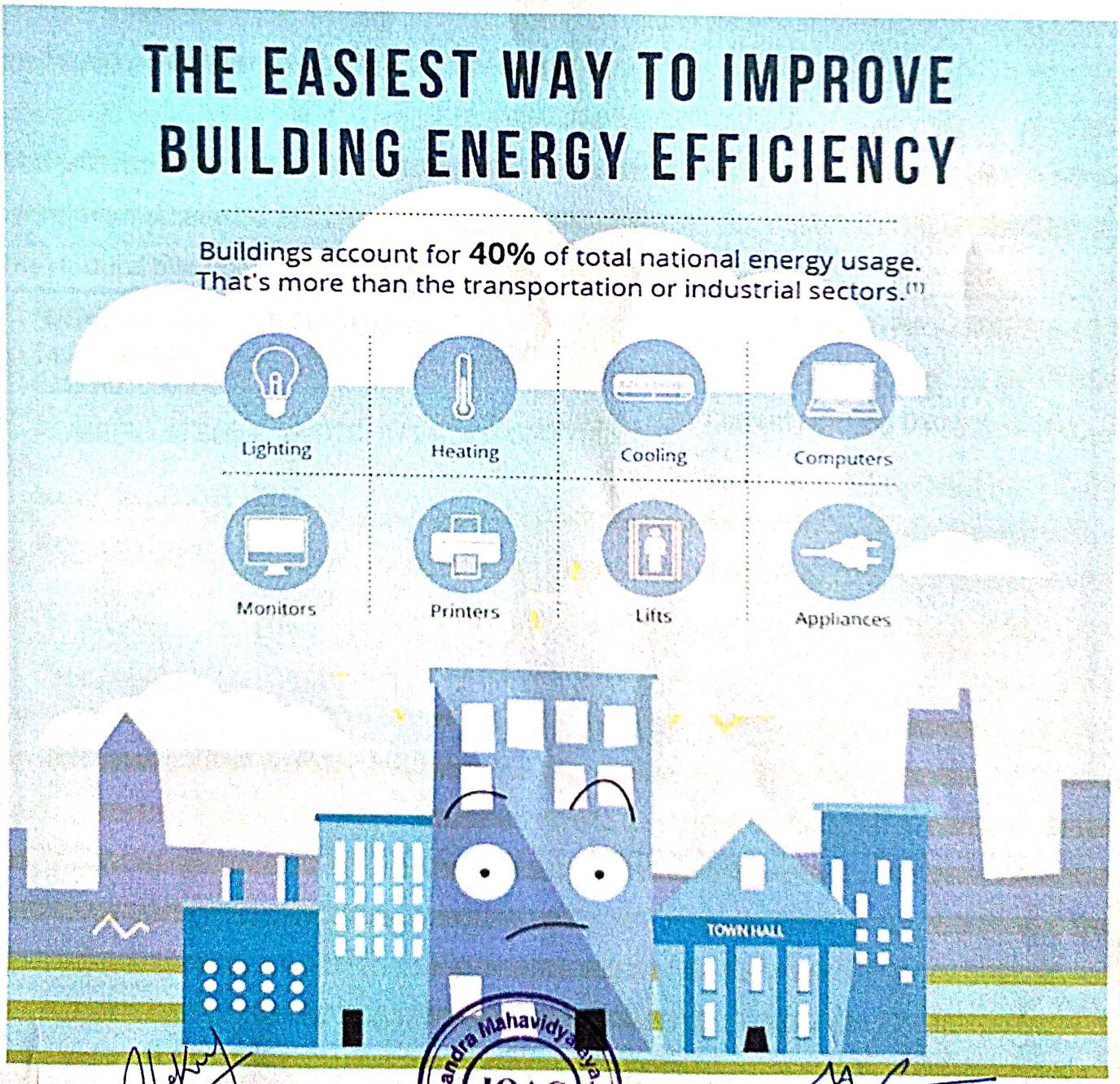
The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

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.



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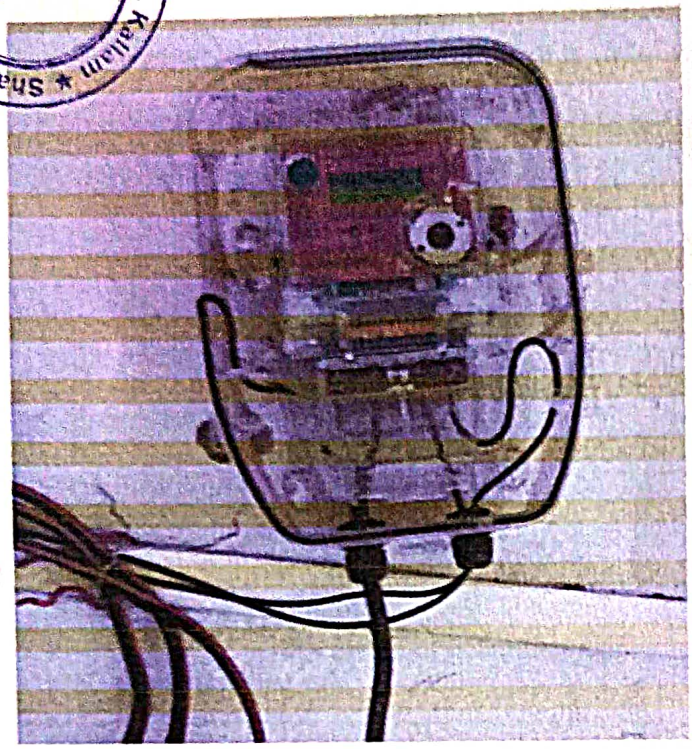
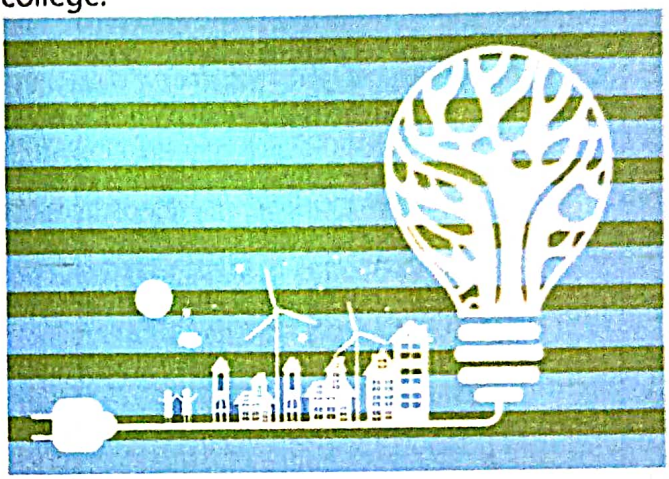
Chapter 4. Study of Electrical Systems



Electrical Energy Source:

The electrical supply to the Institute comes from Maharashtra State Electricity Distribution Co. Ltd with LT supply.

MSEDCL has been installed Energy meter in Campus which distributes electrical energy to college.



MSEDCL Supply

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

Billing Unit: 2666 :KALAM (R)S/DN
Tariff/Category: 052 /LT II Comm 1Ph < 20KW
Pole No: 00000008
PC/MR/Route Sequence/DTC: 4 / 24-2402-0647 /4430289
Meter No: 06508436327
Reading Group: L4

Supply Date: 05-Aug-2014
Sanct. Load: .34 KW
Security Deposit(Rs): 65.00
Current Reading Date: 15-JUN-24
Previous Reading Date: 15-MAY-24

Current Reading	Previous Reading	MF	Unit	Adj. Unit	Total
Not Available	1984	01	40	0	40

Meter status:Billed on Avg (FAULTY)
Bill Period: 1 Month(s) /

Observations :

Meter status: Billed on Average (FAULTY)

Suggestions :

1. Install rooftop solar power plant of 2 KWP capacity
2. Install occupancy sensors for lighting system

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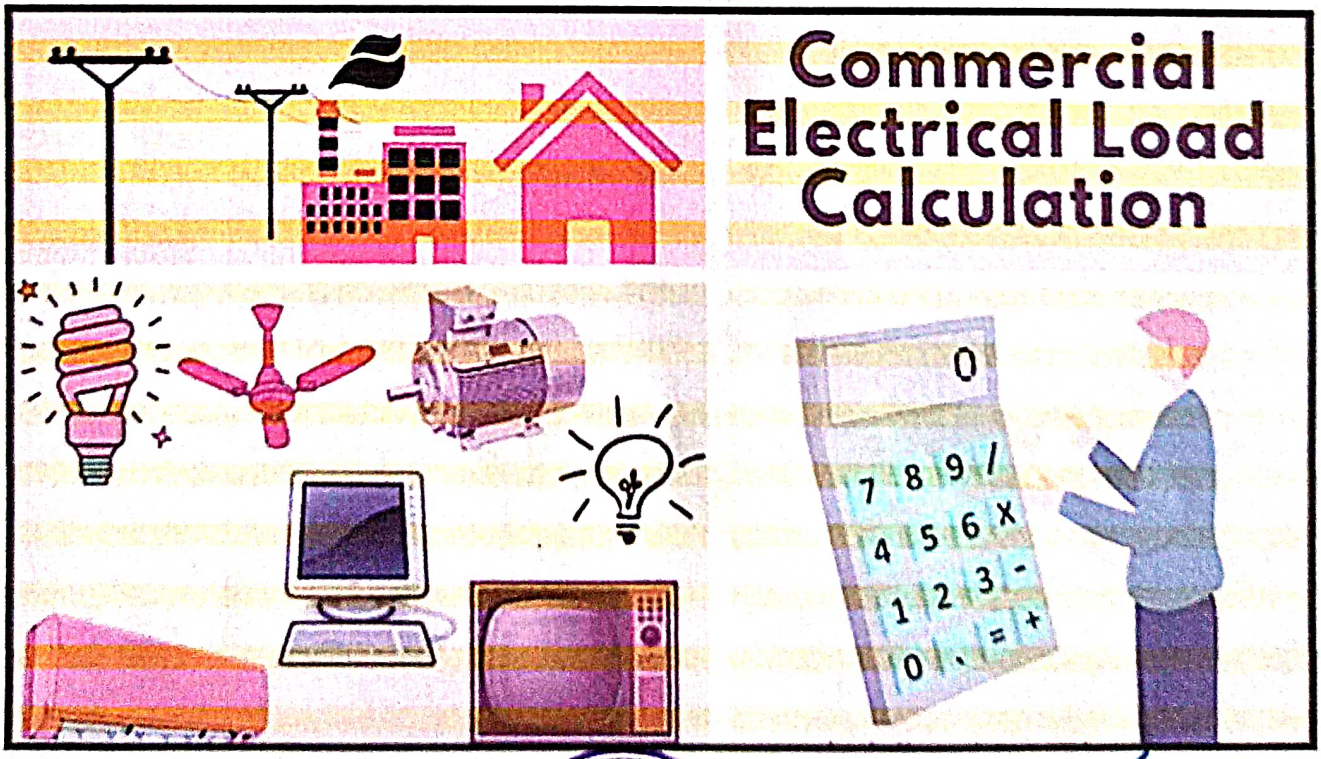
Connected Load Details

Major Energy use and Areas:

In the College Campus Electrical energy is used for various applications.

Sr. No.	Name of Appliances	Watt	Quantity	Wattage
1	LED Bulb	9	43	387
2	LED Tube	20	5	100
3	Computer	130	24	3120
4	Printers	250	2	500
5	Ceiling Fan	70	28	1960
6	Street Light LED	50	2	100
7	CFL Bulb	15	2	30
8	CFL Bulb	40	1	40
9	Filament Lamp	100	1	100
10	Other Miscellaneous Load			450
11			**Total**	**6787**



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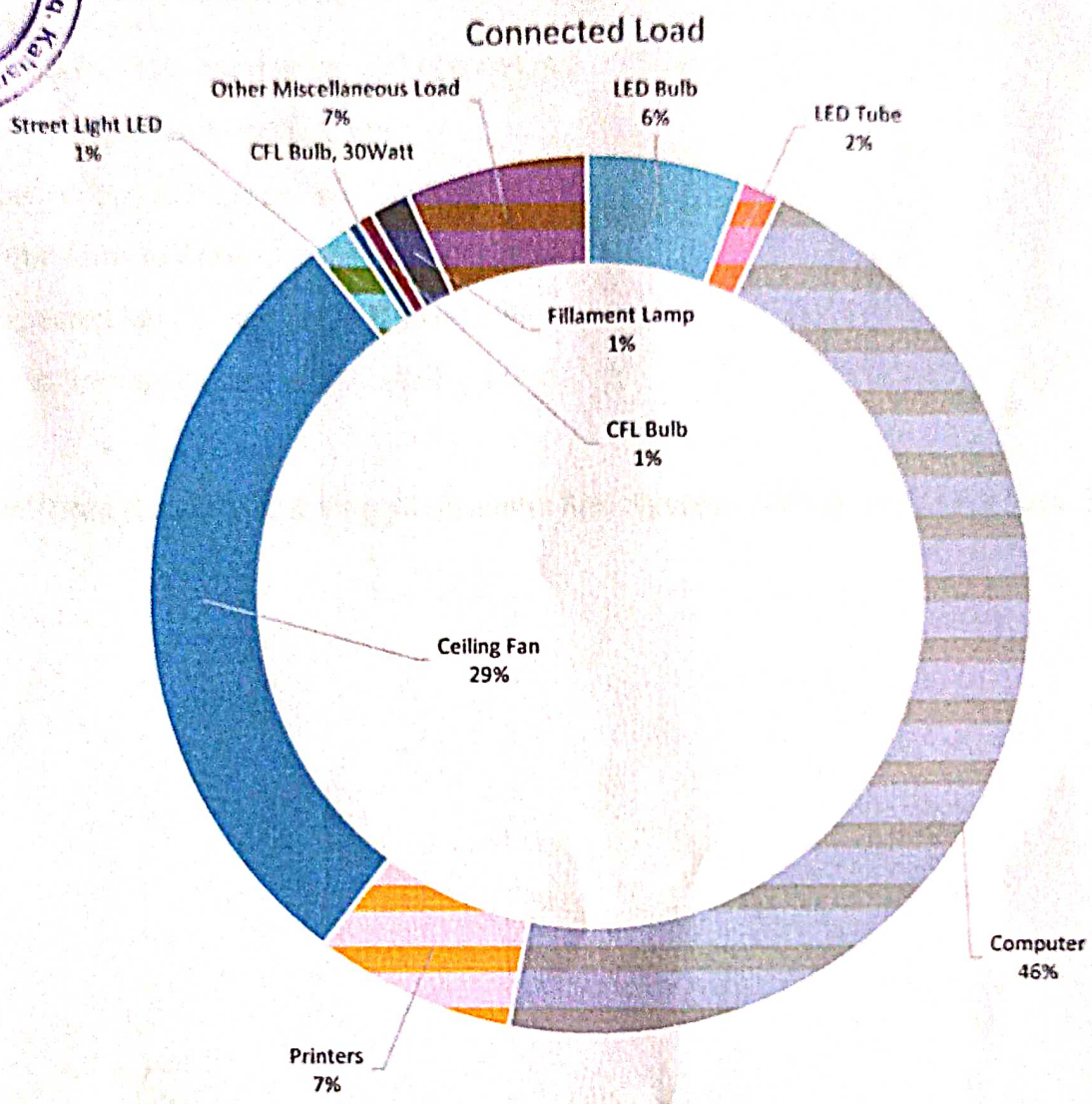
Connected Load Graphical View



Observations:

Total connected load 6787 KW Ceiling Fan System contributes 29%

Suggestion's:

1. Improve energy efficiency in Fan system. Replace inefficient fan with BLDC fan.
2. Install occupancy sensors with timing control for lighting system.

ENERGY EFFICIENCY

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Chapter 5 Performance Evaluation

5.1 Fan System:

Total number of fans used in the College campus = 28 No's

Consider @200 days Working 8 Hrs.

- Number of fans to be replace = 28 Nos.
- The Total Current Consumption = 3136 kWh
- The Expected fan Consumption = 1254 kWh
- Expected Saving per year = 1882 kWh/year

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

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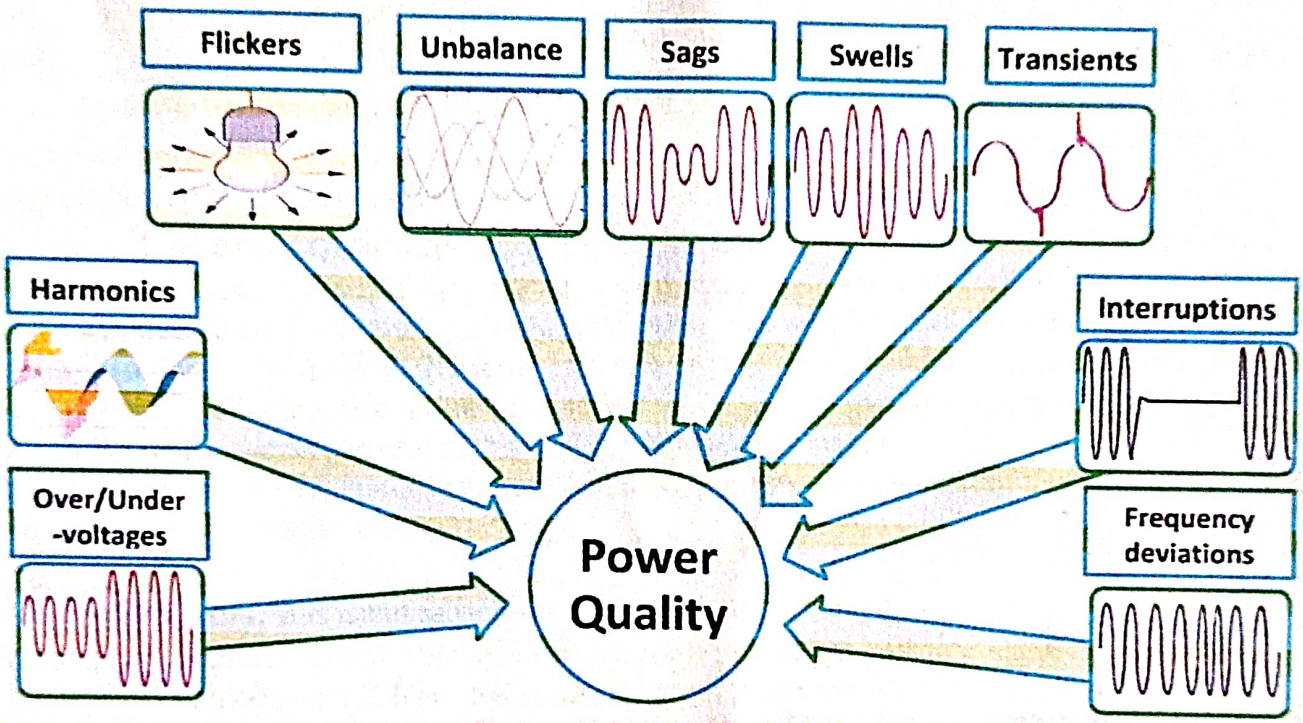
5.2 Improve Power Quality Supply

Power quality issues can affect the operation of critical loads and can have the negative impact on operation.

Factors that affect power quality:

Voltage fluctuations. Voltage fluctuations, such as sags, swells, or interruptions, can cause significant power quality issues. ... Harmonics. ... Power factor. ... Frequency variations.



Suggestions: Install Air cooled Voltage stabilizer 20 KVA capacity (11 Nos.) after Energy Meter : in the campus.

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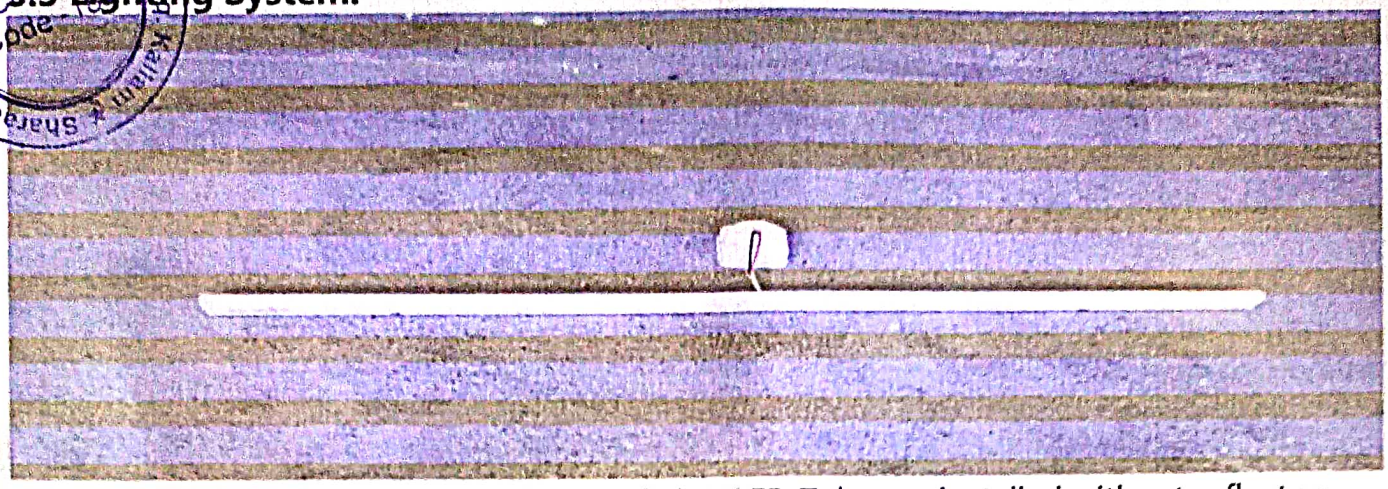
5.3 Lighting System:



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

Lux Level found LOW

Suggestions: Improve effectiveness of Lighting System.

Increase Lighting Efficiency by using reflectors.

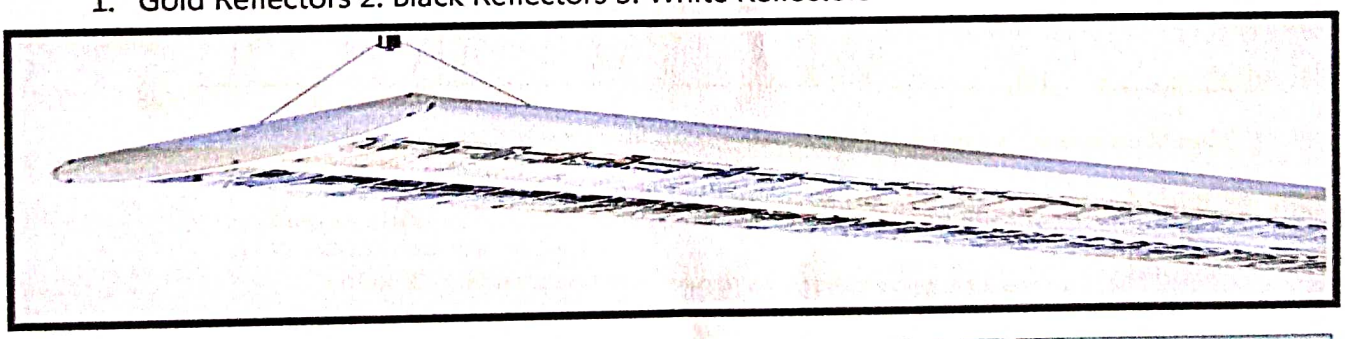
Light globes generally disperse light in all directions from the source. If a ceiling mounted light does not direct the light back down to the working plane, more fittings will be required to achieve the required lux levels. So the effectiveness of the reflectors (or minimizing losses due to poor reflectors) 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).

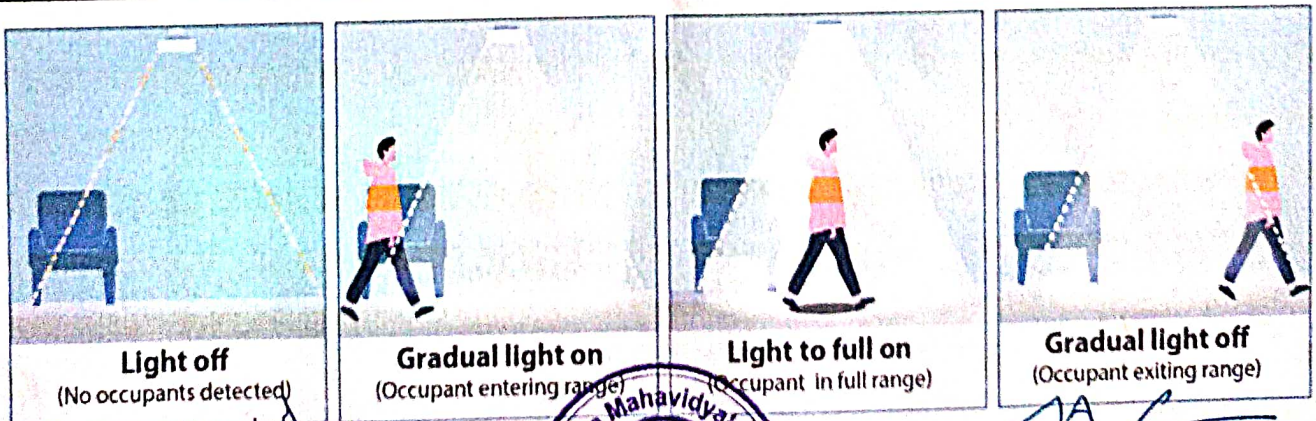
Proposed:-

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





Suggestions: Install occupancy sensors to reduce Losses.

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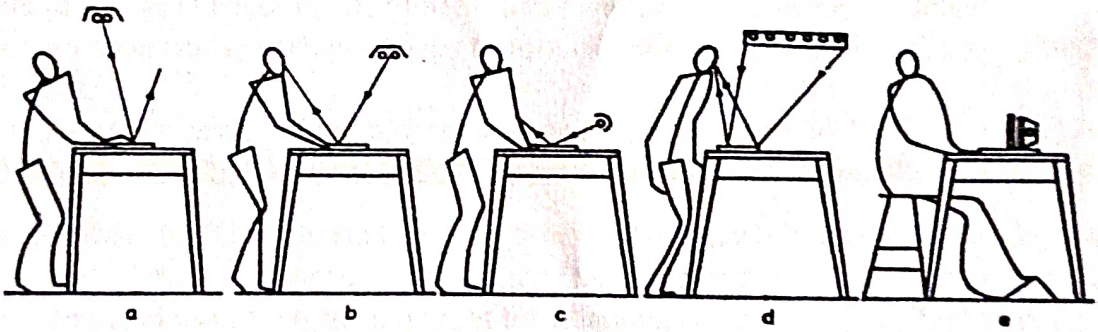
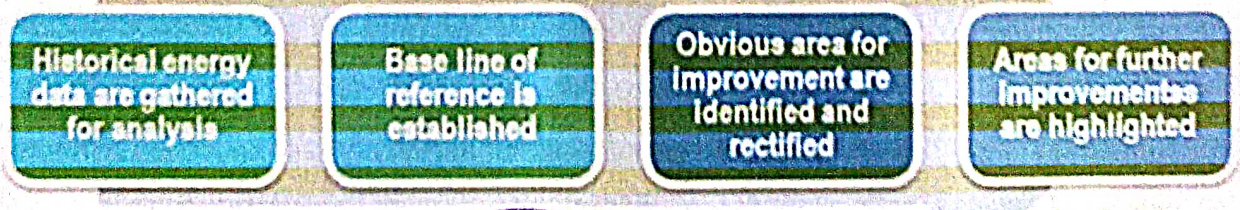
Chapter: 6 Guidelines for Identified Energy Saving Opportunities

- Use as much natural day light as possible by use of translucent roofing sheets.
- 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



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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.

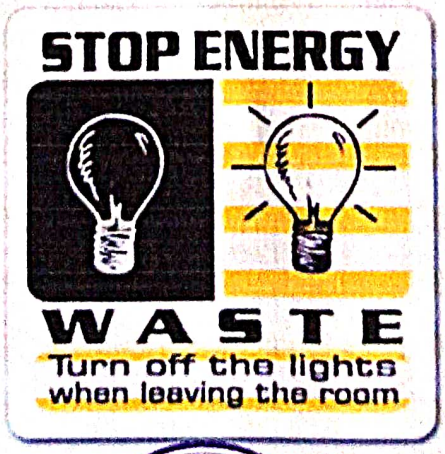
Display the stickers of save electricity

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.



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Chapter 7: Conclusion

A total investment of Approx. Five Lakh & Sixty rupees (Rs. 5.60/- Lakhs) amount is estimated for the energy efficiency improvement & renewable energy projects

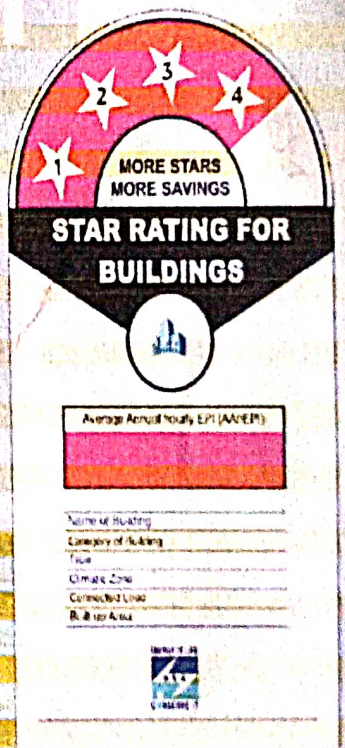
Energy Savings expected around @ 13580 KWH/year.

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 m^2 (10,000 ft^2) 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.



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