Energy Audit Report

(2020-21)

Panchakshari Shivacharya Trust's

Channabasweshwar Pharmacy College (Degree)

Basweshwar Chowk, Latur 413512 (Maharashtra)

Energy Audit Conducted by

Kedar Khamitkar & Associates

Energy Auditor (Empanelled Mahaurja, Govt. of Maharashtra)

M: 9850244701 Email. : urjabachat@gmail.com

Requirements for the NAAC

CEA Team has been Conducted Detailed Energy Audit of Channabasweshwar Pharmacy College (Degree), Latur Building Located at Latur- District 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) = **54** %

2. Building Energy Performance Index (EPI) = **1.89**

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

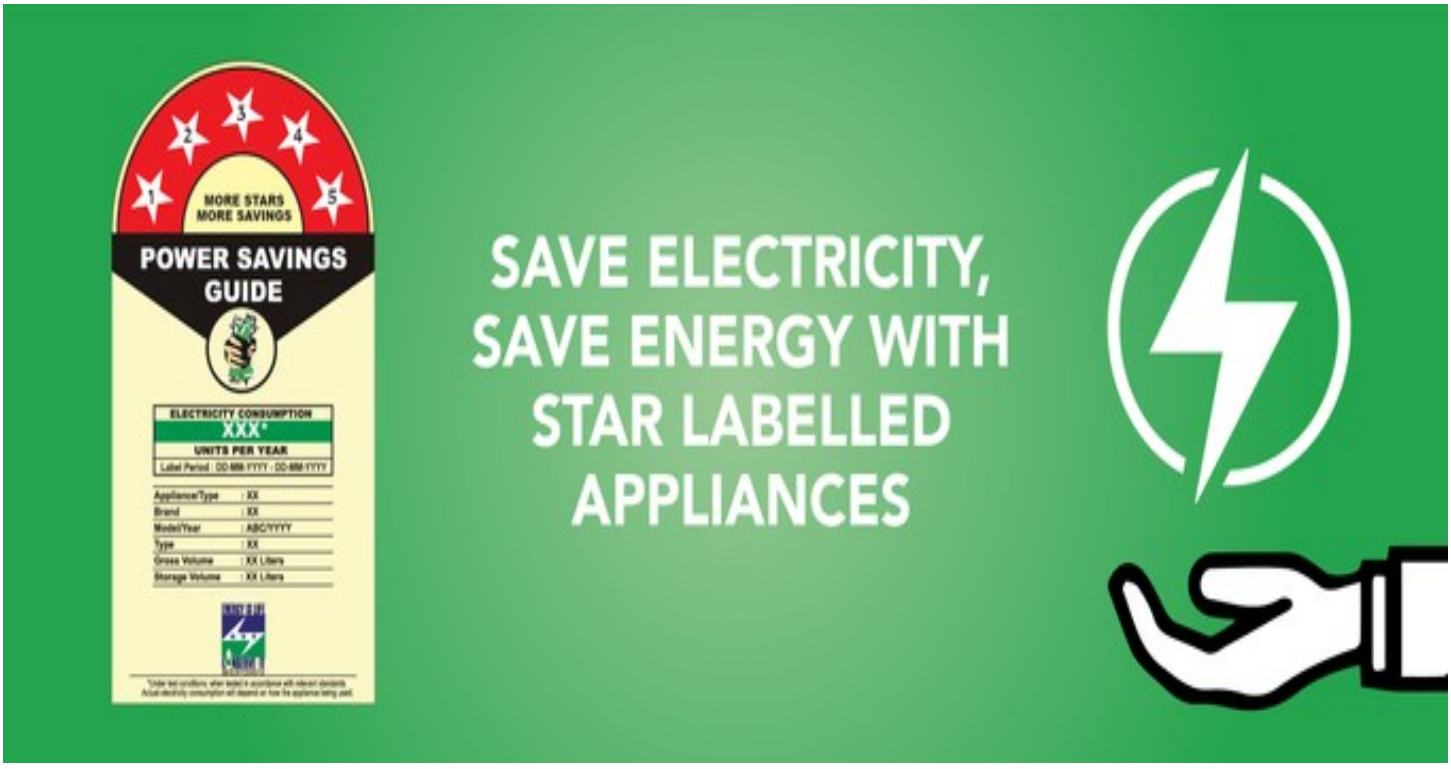
Kedar Khamitkar
Energy Auditor
(Certified by Bureau of Energy Efficiency, Ministry of Power, Gov. of India)
Empanelled Energy Auditor MAHAURJA , Govt. of Maharashtra Institution

INDEX

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.	**Install Rooftop Solar Power Plant** (10 KW Capacity)	9600 KWH/Year	Rs. 4.55/- Lakhs	4.7 Yrs.
2.	**Install Energy Efficient Fan System of 28 watt (**Existing Fan consumes 70w)	5000 KWH/Year	Rs. 2.20/- Lakhs	4.4 yrs.
3.	**Install occupancy Sensors** (Passages, Bathroom, Library etc.) (100 Sensors)	1000 KWH/Year	Rs. 65000/-	6.5 Yrs.
4.	**Install Signboards "Save Energy / Water"** Conduct Awareness Training Program	-	NA	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 Channabasweshwar Pharmacy College (Degree), Latur was conceded by EA Team on 29th March 2021. 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.

Acknowledgement

We express our sincere gratitude to the Principal Sir & authorities of Channabasweshwar Pharmacy College 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 their cooperation during field studies and providing necessary data for the study.

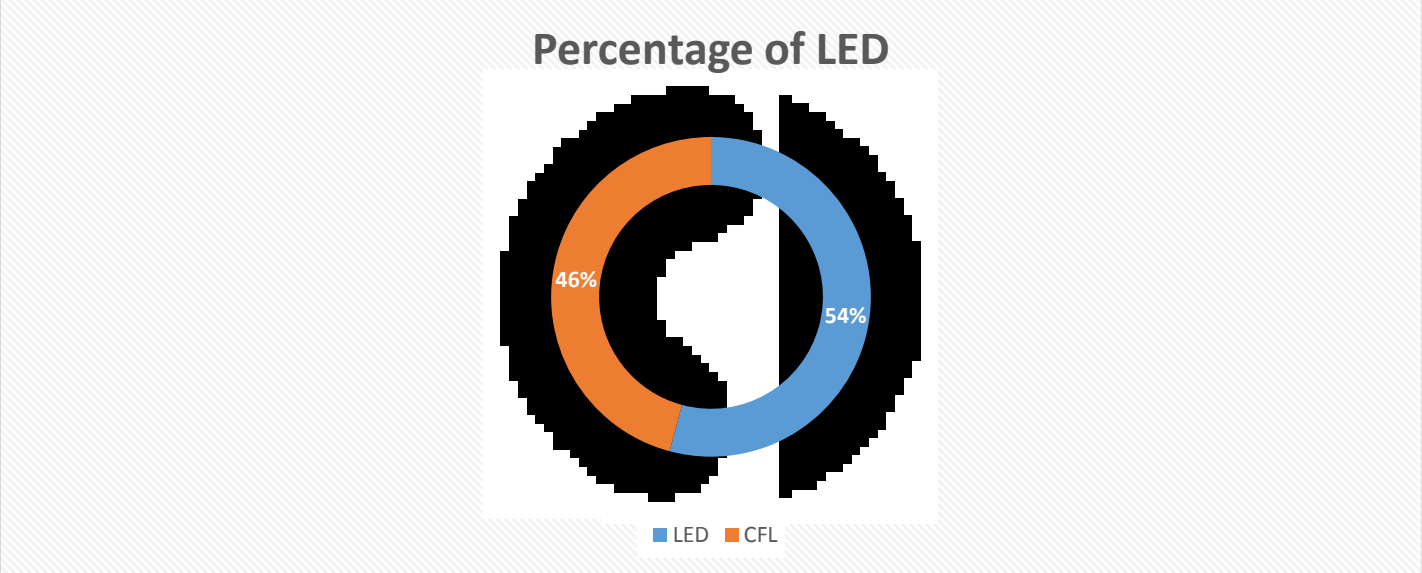
With Best Wishes,
Kedar Khamitkar

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

Requirements for NAAC

1. Percentage of use LED Lighting

Type	Total
LED Lights Connected Load	2744
CFL Bulb Connected Load	2321
Total Lighting Load	**5065**



Observations: Percentage of Annual Power requirements met through LED Bulb/Tube Current year data is **54**%

Suggestions: Replace 46% Inefficient CFL lighting with Efficient LED Lighting

2. Energy Performance Index (EPI)

Channabasweshwar Pharmacy College (Degree), Latur Uses Electrical Energy 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 **6856** KWH /Year

Total Built-up Area **3625** Sq. Meter

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

Observations:

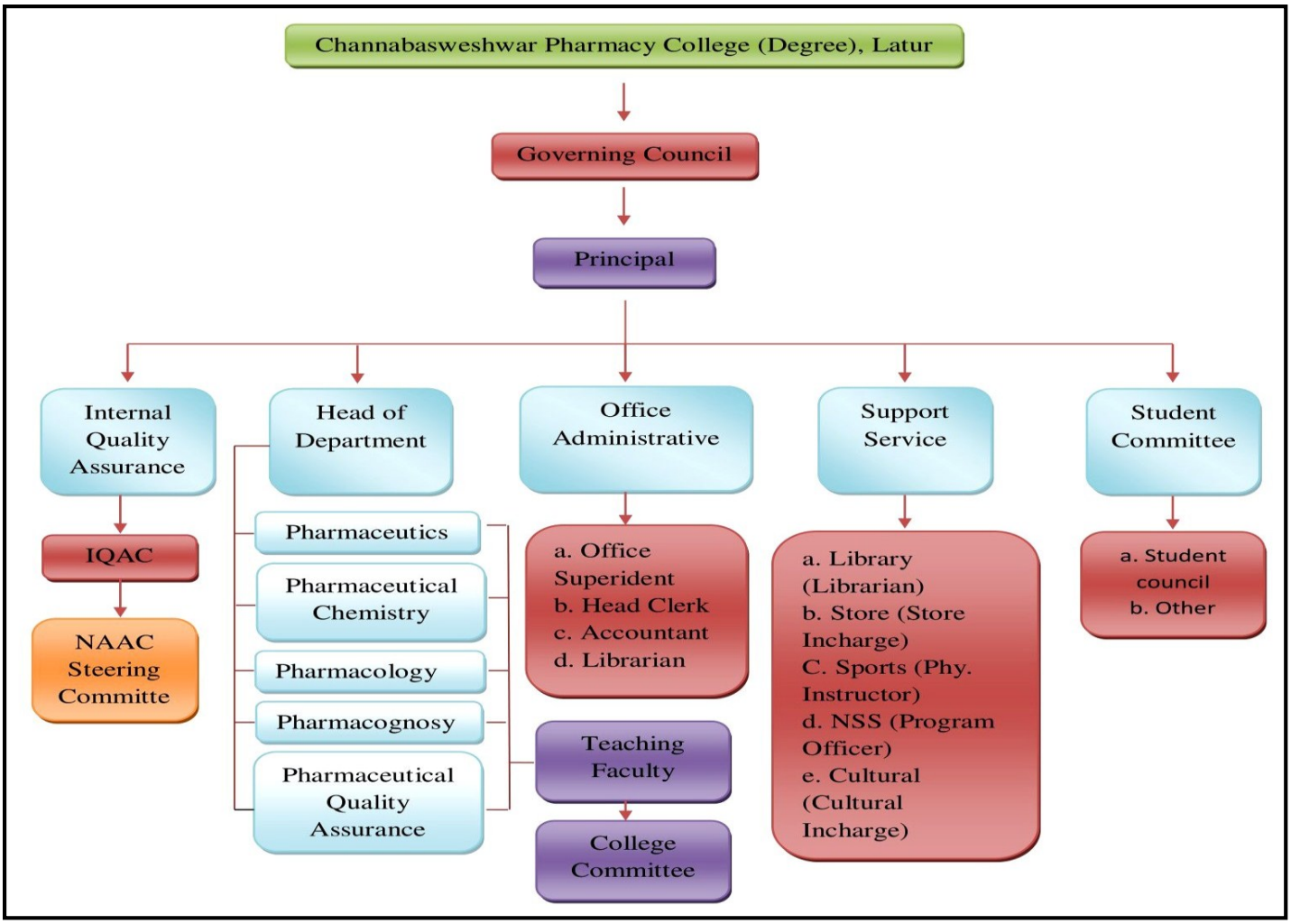
EPI calculated as under (for Electricity): 1.89 KWH/Sq. Meter

Chapter: 1 Introduction

About the College:

Panchakshari Shivacharya Trust, Channabasweshwar Pharmacy College (Degree), Latur was established in the year2010. "Panchakshari Shivacharya Trust" is a charitable trust registered under Bombay act 1950. It undertakes educational and social activities. This trust has started Channabashweshwar pharmacy polytechnic in Latur in 1980. After realizing the prospects and potential of the course in the emerging scenario of global pharmaceutical industry and education, Channabasweshwar Pharmacy College (Degree) was started in 2010, Bachelor of Pharmacy. Thereafter postgraduate course in 2012 M. Pharmacy (Pharmaceutics and Pharmaceutical Quality Assurance). Since 2019 the College has recognized as Approved Ph. D Research Centre. Thereafter the Pharm D course in 2020. College is having its own well-structured building, well equipped laboratories, and library with number of reference books, international journals with e-library, good computing facility and research laboratory. The College is promoting green initiatives to make positive environment within the campus

Location: The College is situated at Kava road, Latur, 50 meters away from Basweshwar Chowk, 1.0 km from bus stand and 5.0 km from railway station.



Chapter 2: Energy Audit Objectives

Channabasweshwar Pharmacy College (Degree), Latur 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.

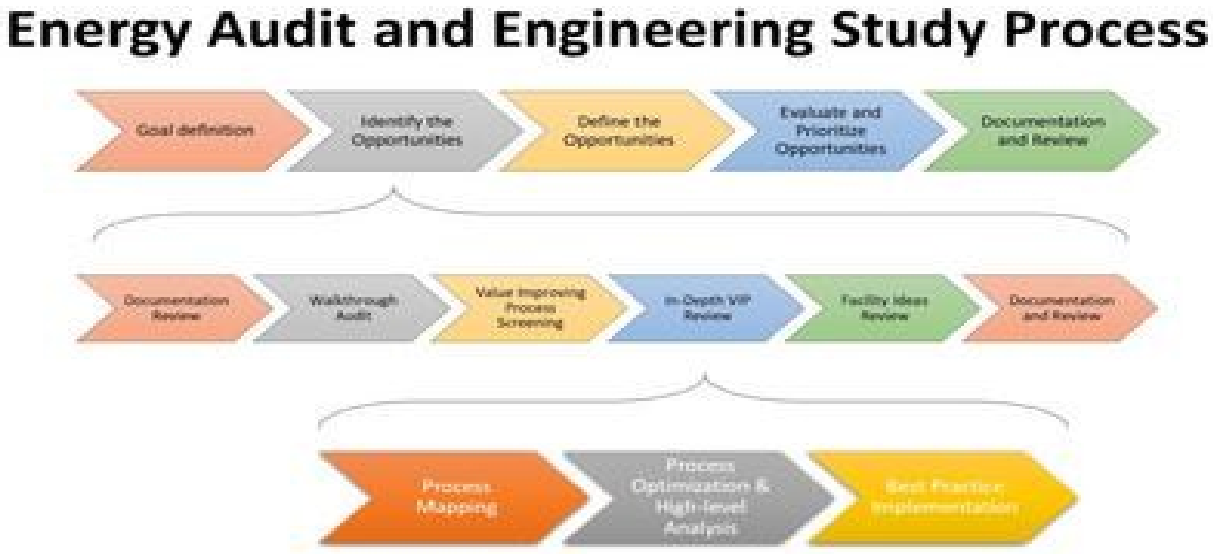
2. Actual measurement and data analysis:

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.

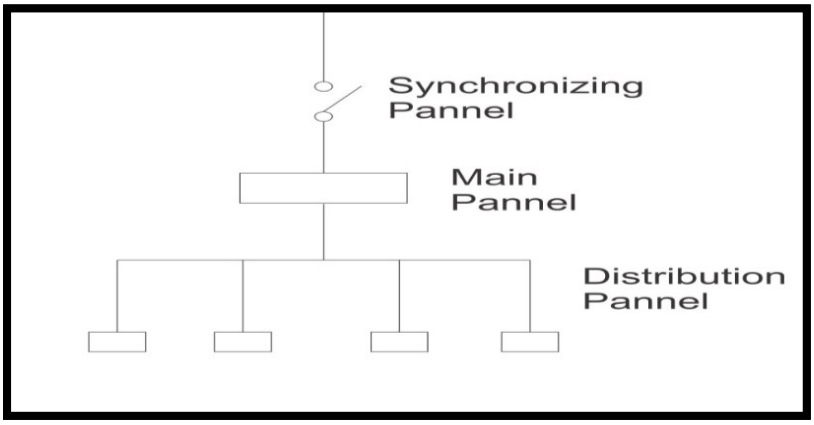
Figure 2: Summary of of Energy Audit phases



Chapter: 4. Study of Electrical Systems

Electrical Energy Sources:

The electrical supply to the Institute comes from MSEDCL LT supply.



MSEDCL LT supply: Mahavitaran has been installed three meters in Campus.

The details of meter are as under

Meter - A Consumer No. 610557505868
Meter - B Consumer No. 610550188492
Meter - C Consumer No. 610550207241

MSEDCL Supply

The electrical bills from MSEDCL for 12 months from April 2018 to March 2019 have been studied.

Meter 'A' Details:

		Consumer No.	610557505868
SN	**Details of Electricity Demand**	**Tariff**	**073 /LT-X B I 0-20KW Pub Ser oth**
1	Sanctioned Load	**6.91**	KW

Meter 'B' Details:

		Consumer No.	610550188492
SN	**Details of Electricity Demand**	**Tariff**	**73 LT-VII B I**
1	Sanctioned Load	**3.73**	KW
2	Contract Demand	**4**	kVA
3	Recorded Maximum Demand	**5**	kVA

Meter 'C' Details:

		Consumer No.	610550207241
SN	**Details of Electricity Demand**	**Tariff**	**052 / LT II Comm 3Ph < 20KW**
1	Sanctioned Load	**4**	KW

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 etc.

Department of Pharmacognosy (Floor: First)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	BOD incubator	01	Bio Tech.	500W
2	Muffle Furnace	01	-	6000 W
3	Hot Air Oven	01	-	230W
4	Heating Mantle	12	-	200W
5	Moisture Balance	01	-	550W
6	Digital Balance	02	Phoenix	250W
7	Water bath	01	Dolphin	1500W
8	Micro centrifuge	01	-	240V
9	Hot Plate	02	Dolphin	1200W
10	U.V. Cabinet	01	-	240 W
11	Vacuum pump	01	Crompton	230W
12	Electric microscope	01	Saglo Company	20W
13	Printer	01	HP 1020 Plus	240W
14	Scanner	01	Canon	50W

Department of Pharmacology (Floor: Second)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	Aerators	10	Dolphin	220 W
2	Act photometer	01	B.R. Instrument	250 W
3	Clinical centrifuge	01	AVI Scientific	500 W
4	Digital Balance	01	SEKA-NERA	18 W
5	Sherrington's Rotating Drum	10	Orchid Scientific	240 W
6	Organ bath	18	Orchid Scientific	230 W
7	Rota rod apparatus	01	Orchid Scientific	220 W
8	Stimulator	01	-	220 W
9	Eddy's Hot Plate	01	Orchid Scientific	220 W
10	Printer	01	Canon	240 W

Department of Pharmaceutical Chemistry (Floor: Ground)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	Fuming chamber	01	-	120 W
2	PH meter	01	Systronic	324 W
3	Heating mantle	02	Solanki Entreprises	200W
4	Mechanical stirrer	01	REMI	230 W
5	Still distillation	01	-	1500 W
6	Muffle Furnace	01	Dolphin	6000 W
7	Vacuum pump	01	JEBIVAK	230 W
8	Centrifuge	02	REMI	240 W
9	Rotary Shaker	01	REMI	260 W
10	Hot air oven	01	TEMPOV	1200W
11	Incubator	01	NAVYUG	120W
12	Flame photometer	01	ELICO	10W
13	Photoelectric colorimeter	01	PHOTOCON	10W
14	Auto colorimeter	03	Dolphin	12W
15	Digital Balance	01	-	250V
16	Digital balance	03	PHOENIX	6W
17	Hot plate	02	Dipa Enterprises	1200W
18	Hot air oven	01 + 01	Biotechnics India & Dodal Enterprises	1200W
19	Vacuum pump	01	Lab Equipment Ambala Cant	180W
20	Melting point apparatus	01	Kshitis Innovation	120W

Department of Pharmaceutics (Floor: Ground)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	Digital balance	02	Rajesh Chemical	230 W
2	Water bath	03	Rajesh Chemical	1000W
3	Bulk density apparatus	01	-	10W
4	Sieve shaker	02	Rajesh Chemical	180W
5	Rotator	01	-	1200W
6	Autoclave	01	Rajesh Chemical	1KW
7	Hot plate	02	B.R. Instruments	200W
8	Hot air oven	01	Singla Scientific	1100W
9	Heating mantle	02	Dipa Enterprises	350W
10	Friability test	01	Magumps	10W

M. Pharm (Floor: Second)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	FT – IR Spectrometer	01	PerkinElmer	18W
2	HPLC Instrumentation	01	Agilant Technologies	100-240W
3	Stability Chamber	01	Termolab	230W
4	UV Spectrophotometer	01	Shimadzu	180-240W
5	Probe Sonicator	02	Athema	220-240W
6	Electromagnetic Sieve	01	Electrolab	220W
7	Disintegration Tester	02	Electrolab	220W
8	Deep Freezer	01	Raj Lab Instrument	290W
9	Freeze	01	Godrej	130W
10	Dissolution Test Apparatus	01	Lab India	230W
11	Hot Air Oven	01	Nisco	220-380W
12	pH Meter	01	Lab India	230W
13	Heating Mantle	03	Labline	110W
14	Flame Photometer	01	Microcontroller	220W

Department of Pharmaceutical Analysis (Floor: First)

Sr. No.	Name of Appliance	Quantity	Type	Wattage
1	Photoflurometer	01	ELICO	150W
2	Digital pH meter	02	Dolphin	120W
3	Digital Potentiometer	01	Equiptronics	60W
4	Digital nephalometer	01	Equiptronics	80W
5	Polari meter half shade	01	Dolphin	200W
6	Flame photometer	01	Equiptronics	300W
7	UV - Spectrophotometer	01	Optizen	250W
8	Window AC	01	Carrier	1 Ton
9	Refrigerator	01	Videocon	450W
10	Digital Balance	02	Phoenix	1500W
11	Electric water bath	01	-	1000W
12	Magnetic stirrer with hot plate	04	Solanki Enterprises	600W
13	Heating mental	01	Kumar sales	300W
14	Tissue Homogenizer	01	-	100W
15	Binocular Microscope	01	Blisco	80W
16	Digital Colony Counter	01	-	60W

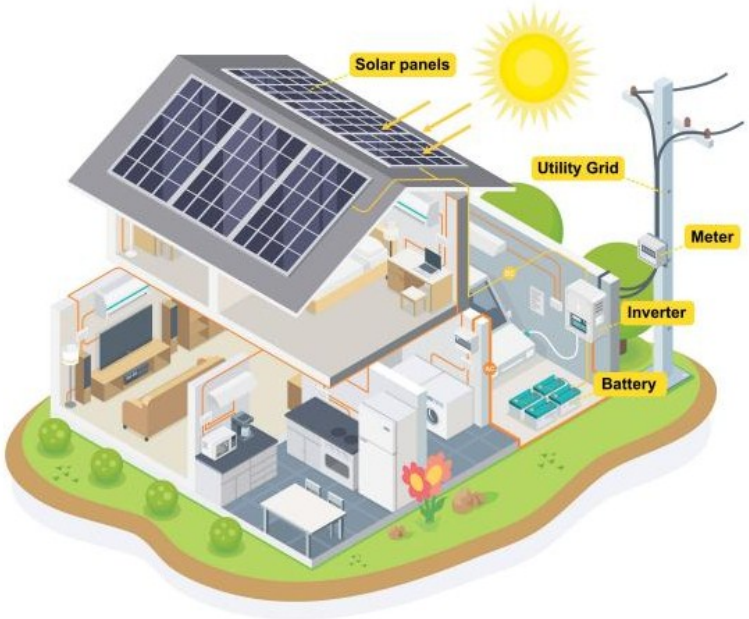
Annual Electricity Consumption Historical Electricity Bill:

Month	610550188492	610550207241	610557505868	KWH
April 2020	30	97	309	436
May 2020	30	97	309	436
June 2020	800	119	911	1830
July 2020	304	50	146	500
August 2020	150	36	112	298
September 2020	234	19	247	500
October 2020	314	13	201	528
November 2020	266	14	212	492
December 2020	805	52	271	1128
January 2021	0	47	98	145
February 2021	62	25	95	182
March 2021	322	23	36	381
			Total	**6856**

General Observations based on Electricity Bill:

Total Annual Electricity Imported from Mahavitran **6856** KWH/year

Suggestions: Install 7 KW Roof-Top Solar Power plant.



Chapter: 5 Performance Evaluation

5.1 Fan System

Existing Fan System : (70W)

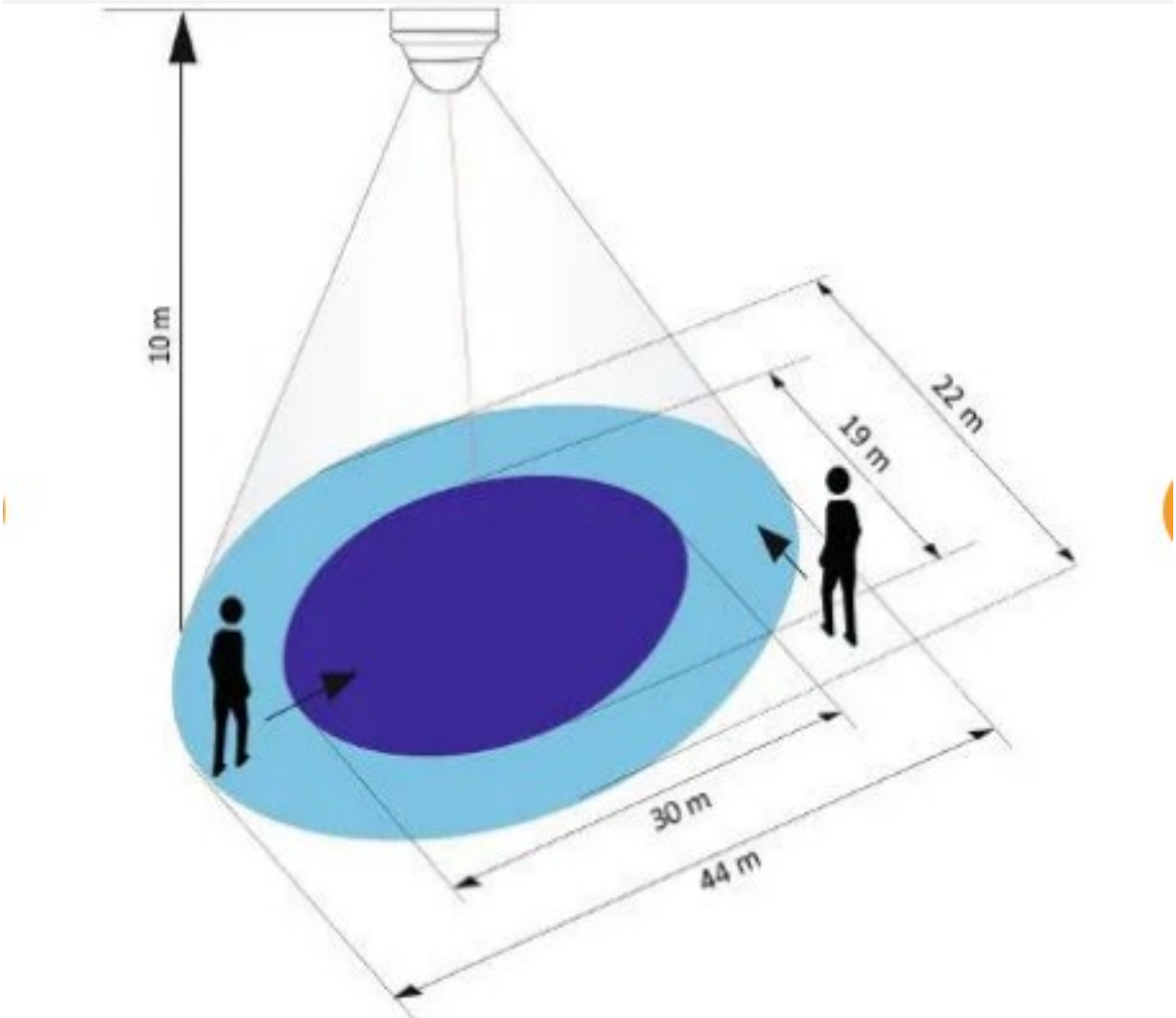
Total number of fans used in the campus = 110 Nos.

- Number of fans to be replace = 110Nos.
- The Total Current Consumption =8300 kWh
- The Expected fan Consumption =3300 kWh
- Expected Saving per year = 5000 kWh/year

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

5.2 Install Occupancy Sensors:

Occupancy sensors use four types of signals to detect the presence of people: infrared radiation (sensors that detect heat), ultrasonic waves (sensors that detect shifts in sound waves), microwaves, and acoustics. PIR sensors Passive infrared (PIR) sensors are the most common type of occupancy sensor.



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 IL luminance 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

Measures to improve ILER:

1. Provide mirror optics luminaires for lamps. Many lamps do not have reflectors
2. Replace existing 36 W lamps and electromagnetic ballast by more efficient T5 tube lights having electronic ballasts.
3. Reduce mounting height of lamps to 1.5 meters from the working plane. This can increase illuminance on work place without spending more power. This helps in improving ILER.
4. Improve reflectance of walls & ceiling by providing light colored, preferably white, painted surface Lighting is provided in commercial buildings, indoor and outdoor for providing comfortable working environment.

The primary objective is to provide the required lighting effect for the lowest installed load i.e highest lighting at lowest power consumption.

Measures to improve task lighting effectiveness:

1. Proper relocation of light sources to improve task lighting and increase diversity ratio to 3:1.
2. Reduce the mounting height up to 1.5 meter

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
Normal Drawing Work, Detailed Mechanical Workshops, Operation Theatres	1,000
Detailed Drawing Work, Very Detailed Mechanical Works	1500 - 2000
Performance of visual tasks of low contrast and very small size for prolonged periods of time	2000 - 5000
Performance of very prolonged and exacting visual tasks	5000 - 10000
Performance of very special visual tasks of extremely low contrast and small size	10000 - 20000

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.

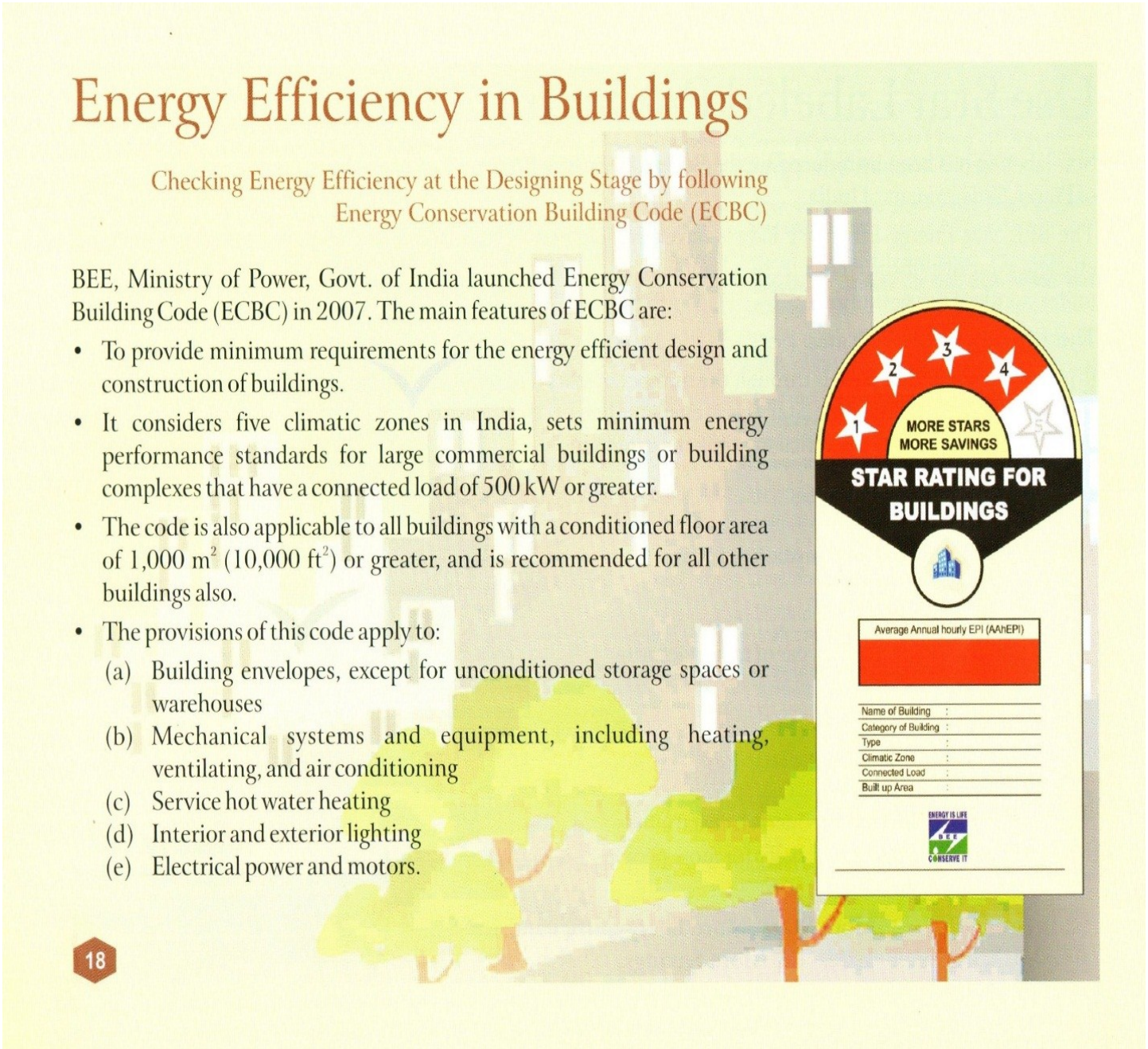
USE OF ELECTRICITY DURING PEAK HOUR AND OFF PEAK HOUR

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.

Chapter 7: Conclusion

A total Investment of Rs. 7.40/- (Approx. Seven Lakhs & Forty Thousand) amount is estimated for the energy efficiency improvement projects)

Energy Savings expected around 15600 KWH/year.



PCRA

FIVE WAYS TO CONTROL CLIMATE CHANGE

 GREEN YOUR COMMUTE	Explore new options to commute and reduce your carbon footprint. Choose to walk, share car, ride bicycle, or electric vehicle.
 CONSERVE FUEL	Stop the reckless of fuel and use it more sensibly. Conserving fuel reduces pollution for a cleaner and greener environment.
 GET AN ENERGY AUDIT DONE	Get an energy audit done to determine the overuse of energy.
 PLANT TREES	Plant trees and support reforestation. This way CO_2 level will be decreased, as trees use sunlight to absorb carbon dioxide from the atmosphere through photosynthesis and store it as carbon in the form of wood.
 REDUCE, REUSE & RECYCLE	Reduce paper use, reuse whatever you can and recycle waste materials into a valuable resource. Be an environmentally conscious consumer.

PCRA COMMITTED TO PETROLEUM CONSERVATION FOR A CLEANER AND GREENER ENVIRONMENT

#JUST CLIMATE ACTION