

ENERGY AUDIT REPORT
of
Shree Santkrupa Shikshan Sanstha's
**SHREE SANTKRUPA COLLEGE OF
PHARMACY,**

Ghogaon (Shivajinagar) Dist. Satara (M.H.) – 415 111



Year: 2022-23

Prepared by:

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ENERGY AUDIT CERTIFICATE

Certificate No: CE/SCP/22-23/01

Date: 07/11/2023

This is to certify that we have conducted an Energy Audit at Shree Santkrupa College of Pharmacy, Ghogaon, in the Year 2022-23.

.The Institute has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Solar Power Plant

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For, M/s.Chandrakant Electricals, Co.



(Chandrakant Nanvare)

MEDA Registration Certificates

MAHARASHTRA ENERGY DEVELOPMENT AGENCY



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-01/1708

10th May, 2022

CERTIFICATE OF REGISTRATION FOR CLASS 'B'

We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s. Chandrakant Electrical, Co.
A/P: Shetphale, Tal: Atpadi,
Dist.: Sangli – 415 306.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'B'*

Registration Number : *MEDA/ECN/2022-23/Class B/EA-09.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

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ACKNOWLEDGEMENT

We M/s.Chandrakant Electricals, Co.,Sangli, express our sincere gratitude to the management of Shree Santkrupa College of Pharmacy, Ghogaon for awarding us the assignment of Energy Audit of their Campus for the Year: 2022-23.

We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. **Shree Santkrupa College of Pharmacy, Ghogaon** consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Annual Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	52	kW
2	Annual Energy Consumption	18593	kWh
3	Annual CO ₂ Emissions	17.13	MT

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	18593	kWh
2	Total Built up area of Institute	5901.66	m ²
3	Energy Performance Index =(1) / (2)	3.15	kWh/m ²

4. Study of Lighting Power Density & % of LED Lighting:

No	Particulars	Value	Unit
1	Lighting Power Density	0.86	W/m ²
2	% of Usage of LED Lighting to Total Lighting Load	4.41	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 25 Kw Capacity Solar Power Plant

6. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO₂ Emissions: www.tatapower.com

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
BEE	:	Bureau of Energy Efficiency
ECBC	:	Energy Conservation Building Code
MEDA	:	Maharashtra Energy Development Agency
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO ₂	:	Carbon Di Oxide
MT	:	Metric Ton

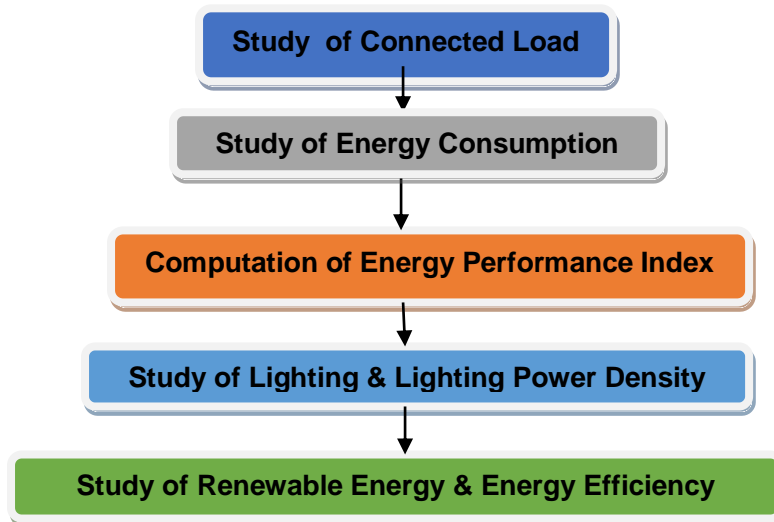
CHAPTER-I INTRODUCTION

1.1 Introduction:

An Energy Audit is conducted at Shree Santkrupa College of Pharmacy, Ghogaon. The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 Institute Location Image:



Institute
Campus

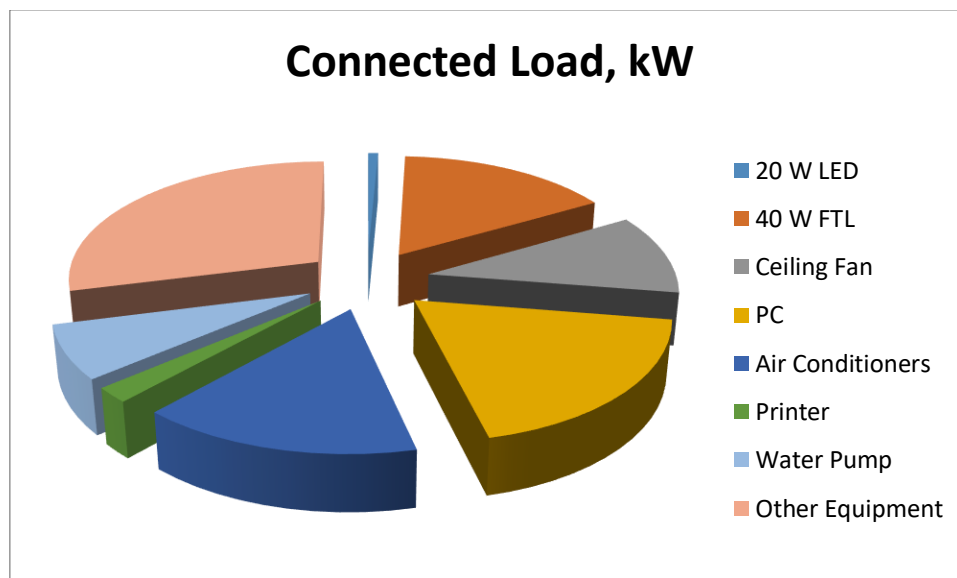
CHAPTER-II STUDY OF CONNECTED LOAD

The major contributors to the connected load of the Institute include:

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	20 W LED	19	20	0.38
2	40 W FTL	206	40	8.24
3	Ceiling Fan	86	65	5.59
4	PC	65	150	9.75
5	Air Conditioners	4	2000	8
6	Printer	7	150	1.05
7	Water Pump	1	3730	3.73
8	Other Equipment	100	150	15
9	Total			52

Chart No 1: Study of Connected Load:



CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy Consumption.

Table No 2: Electrical Bill Analysis- 2022-23:

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO2 Emissions, MT
1	Apr-22	1143	10	1.06
2	May-22	1356	12	1.25
3	Jun-22	1440	11	1.33
4	Jul-22	1560	13	1.44
5	Aug-22	1725	12	1.58
6	Sep-22	1668	14	1.54
7	Oct-22	1710	14	1.58
8	Nov-22	1653	13	1.52
9	Dec-22	1473	14	1.36
10	Jan-23	1650	12	1.52
11	Feb-23	1563	12	1.44
12	Mar-23	1652	12	1.52
13	Total	18593	149	17.13
14	Maximum	1725	14	1.58
15	Minimum	1143	10	1.06
16	Average	1549.41	12.42	1.43

Chart No 2: Variation in Monthly Energy Consumption:

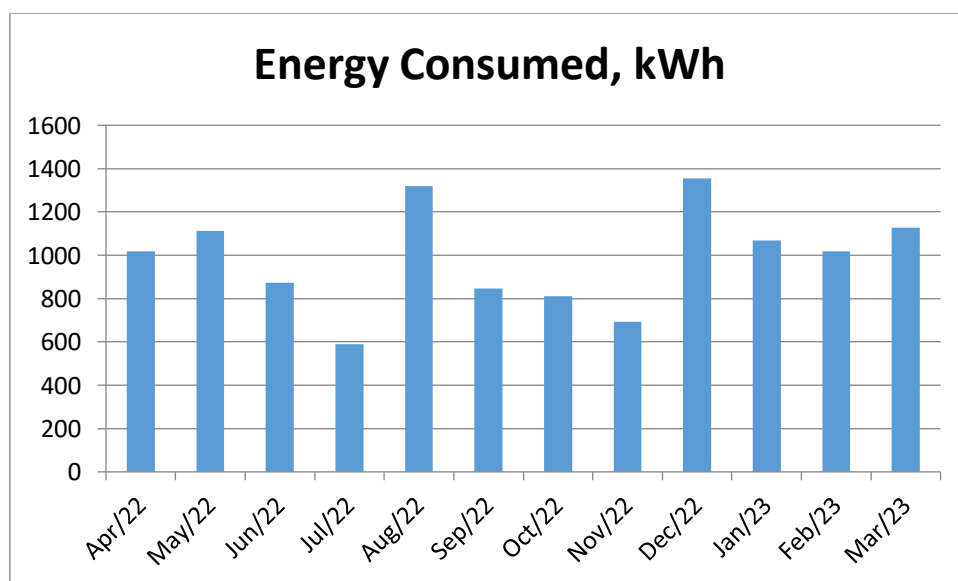


Chart No 3: Variation in Monthly LPG Consumption:

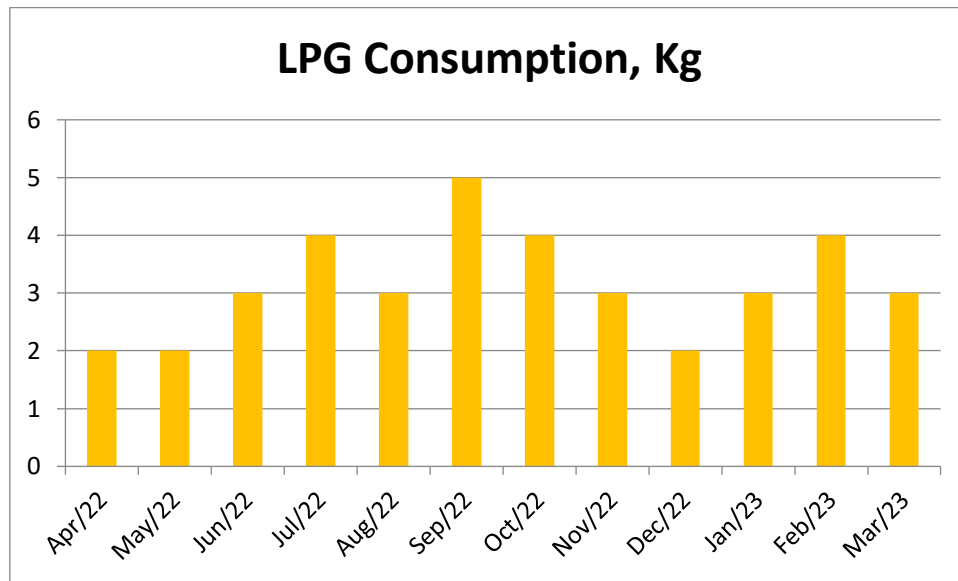


Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg	CO ₂ Emissions, MT
1	Total	18593	149	17.13
2	Maximum	1725	14	1.58
3	Minimum	1143	10	1.06
4	Average	1549.41	12.42	1.43

CHAPTER-IV

STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$\text{EPI} = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total Built-up area in m}^2\text{)}}$$

Now we compute the EPI for the Institute as under:

Table No4: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	18593	kWh
2	Total Built up area of Institute	5901.66	m ²
3	Energy Performance Index =(1) / (2)	3.15	kWh/m ²

CHAPTER V STUDY OF LIGHTING

Terminology:

1. Lumen is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. Lux is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. Circuit Watts is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m²)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior

Unit: watts per square metre per 100 lux (W/m²/100 lux) 100 Installed power density (W/m²/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute: Lighting Power Density of a Class Room. We also compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

Table No 5: Computation of Lighting Power Density:

No	Particulars	Value	Unit
1	No of 20 W LED Tube Lights in Class Room	04	Nos
2	Demand of 20 W LED Tube Light	20	W/Unit
3	Total Lighting Load in the Class Room= (1) * (2)	80	W
4	Area of Class Room	92.47	m ²
5	Lighting Power Density = (3)/ (4)	0.86	W/m ²

Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

Table No 6: Percentage Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	206	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	8.24	kW
4	No of 20 W LED Tube Lights	19	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.38	kW
7	Annual Total Lighting Load = 3+6	8.62	kWh
8	Annual LED Lighting Load = 6	0.38	kWh
9	Annual Lighting Requirement met by LED= $8*100/7$	4.41	%

CHAPTER-VI STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

The Institute has installed a **25 kWp** capacity Roof top Solar PV Plant this year.
Now we compute the Percentage of Alternate Energy to Annual Energy demand:

Table No 7: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	18593	kWh
2	Installed Roof Top Solar PV Plant Capacity	25	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	30000	kWh
6	Total Energy Demand = (1) + (5)	35887	kWh
7	Expecting % of Usage of Alternate Energy to Total Annual Energy Demand for Current Year Consumption= (5)*100/ (6)	61	%

