

ENERGY AUDIT REPORT

of

Shri Wagheshwar Gramvikas Pratishthan's,
LOKNETE SHRI DADA PATIL PHARATE
COLLEGE OF PHARMACY,
Mandavgan Pharata, Taluka: Shirur, District: Pune



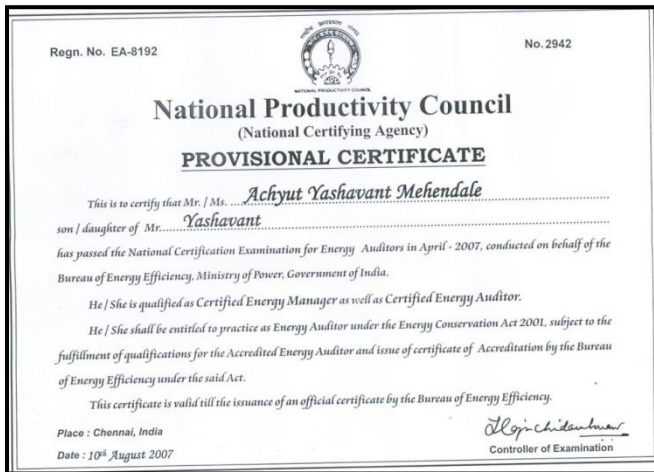
Year: 2022-23

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Mukhtangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

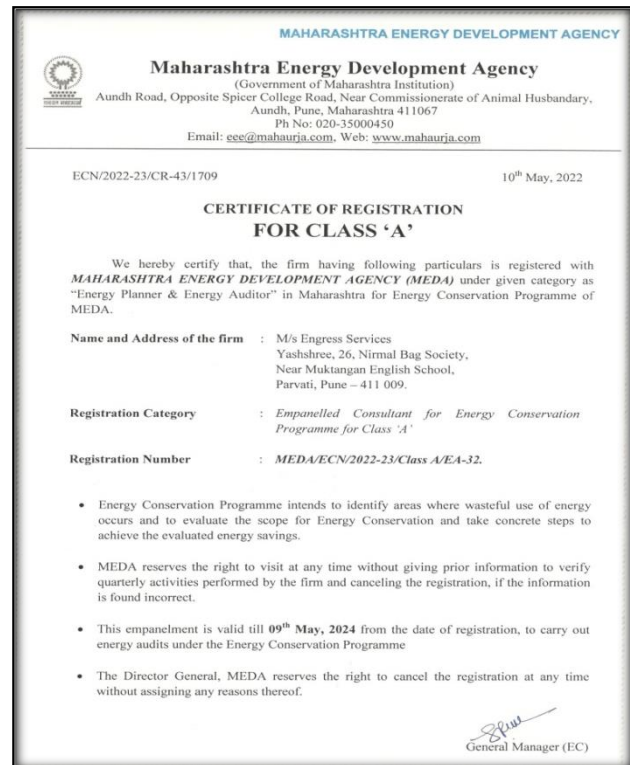
REGISTRATION CERTIFICATES



AUDITOR CERTIFICATE



ISO: 9001-2015 Certificate



MEDA Registration Certificate



ISO: 14001-2015 Certificate

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Present Energy Consumption	9
4	Study of Energy Performance Index	10
5	Study of Lighting	11
6	Study of Renewable Energy & Energy Efficiency	13

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Shri Wagheshwar Gramvikas Pratishthan's Loknete Shri Dada Patil Pharate College Of Pharmacy, Mandavgan Pharate, Taluka: Shirur, District: Pune, for awarding us the assignment of Energy Audit of their Mandavgan campus for the Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Shri Wagheshwar Gramvikas Pratishthan's Loknete Shri Dada Patil Pharate College Of Pharmacy, Mandavgan Pharate, Taluka: Shirur, District: Pune consumes Energy in the form of **Electrical Energy**; used for various gadgets, Office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	18.5	kW
2	Annual Energy Consumed	20675	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	20675	kWh
2	Total Built up area of College	5791	m ²
3	Energy Performance Index $= (1) / (2)$	3.57	kWh/m ²

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

No	Particulars	Value	Unit
1	Lighting Power Density	6.4	W/m ²
2	% of Usage of LED Lighting to Total Lighting Load	100	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- The College has installed Solar Thermal Water Heating System at the Hostel

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

AC	: Air conditioner
SWGP	: Shri Wagheshwar Gramvikas Pratishthan
BEE	: Bureau of Energy Efficiency
LED	: Light Emitting Diode
kWh	: kilo-Watt Hour
Qty	: Quantity
W	: Watt
kW	: Kilo Watt
PC	: Personal Computer
MT	: Metric Ton
MSEDCL	: Maharashtra State Electricity Distribution Company Limited

CHAPTER-I INTRODUCTION

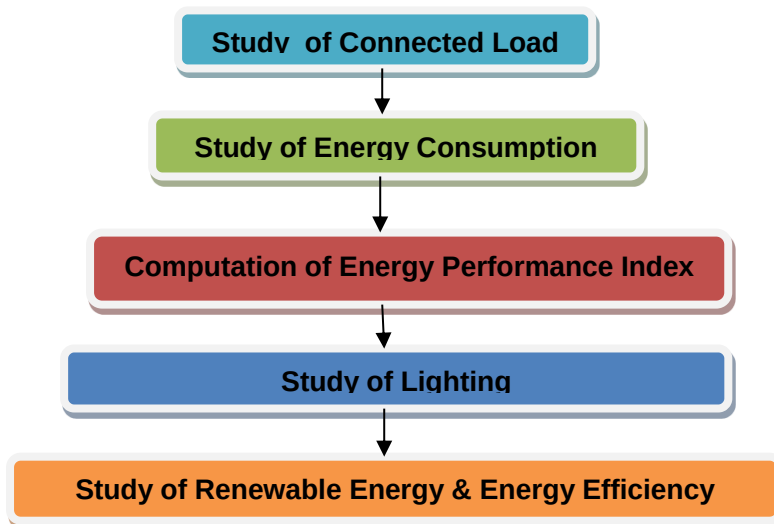
1.1 Introduction:

An Energy Audit is conducted at Loknete Shri Dada Patil Pharate College of Pharmacy Mandavgan Pharate.

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 Google Earth Image:



College
Campus

CHAPTER-II

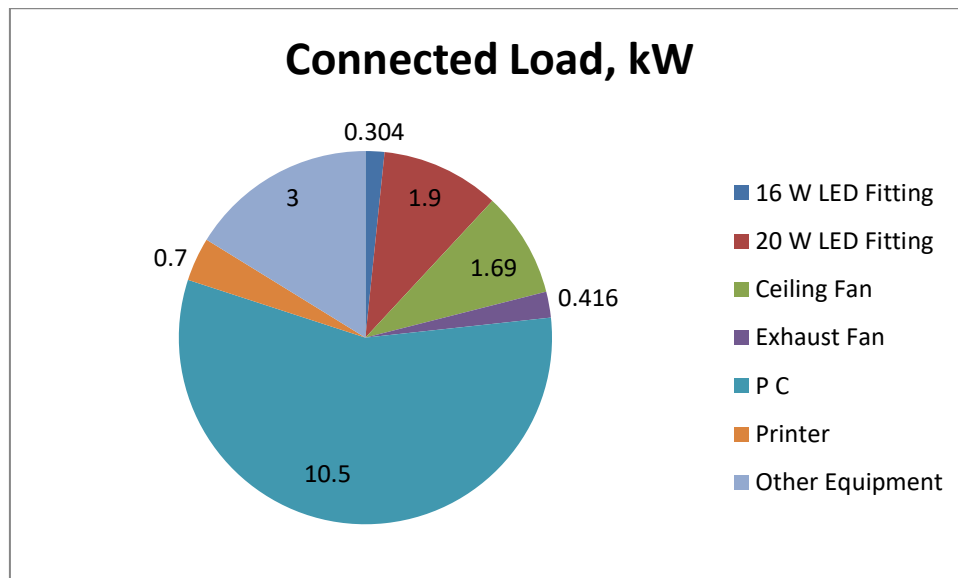
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	16 W LED Fitting	19	16	0.304
2	20 W LED Fitting	95	20	1.9
3	Ceiling Fan	26	65	1.69
4	Exhaust Fan	8	52	0.416
5	P C	70	150	10.5
6	Printer	4	175	0.7
7	Other Equipment	15	200	3
8	Total			18.5

Chart No 1: Details of Connected Load:



CHAPTER-III

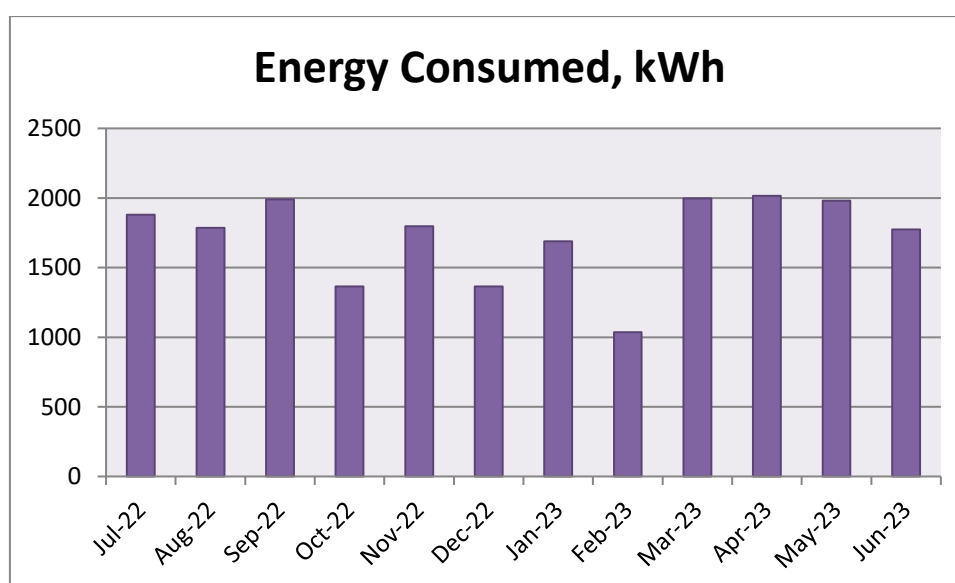
STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2022-23:

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jul-22	1880	1.69
2	Aug-22	1785	1.61
3	Sep-22	1990	1.79
4	Oct-22	1365	1.23
5	Nov-22	1798	1.62
6	Dec-22	1365	1.23
7	Jan-23	1689	1.52
8	Feb-23	1036	0.93
9	Mar-23	1997	1.80
10	Apr-23	2015	1.81
11	May-23	1980	1.78
12	Jun-23	1775	1.60
13	Total	20675	18.61
14	Maximum	2015	1.81
15	Minimum	1036	0.93
16	Average	1722.92	1.55

Chart No 2: Variation in Monthly Energy Consumed, kWh:



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 College as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	20675	kWh
2	Total Built up area of College	5791	m ²
3	Energy Performance Index =(1) / (2)	3.57	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 the Lighting Power Density of Class Room and the percentage usage of LED Lighting to total Lighting Load of the College.

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

Table No 4: Computation of Lighting Power Density: Class Room:

No	Particulars	Value	Unit
1	Qty of 20 W Fittings in Class Room:	24	Nos
2	Load of 20 W Fitting	20	W/unit
3	Total Load of 6 Nos, 40 W Fittings	480	W
4	Built up area of Class Room:	75	m ²
5	Lighting Power Density = (3)/(4)	6.4	W/m ²

Table No 5: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 16 W LED Fittings	19	Nos
2	Load of 16 W LED Fitting	16	W/unit
3	Total Load of 16 W LED fitting	0.304	kW
4	No of 20 W LED Fittings	95	Nos
5	Load of 20 W LED Fitting	20	W/unit
6	Total Load of 20 W LED fitting	1.9	kW
7	Total LED Lighting Load=3+6	2.204	kW
8	Total Lighting Load=3+6	2.204	kW
9	% of LEDs to Total Lighting Load= $7 \times 100 / 8$	100	%

CHAPTER-VI

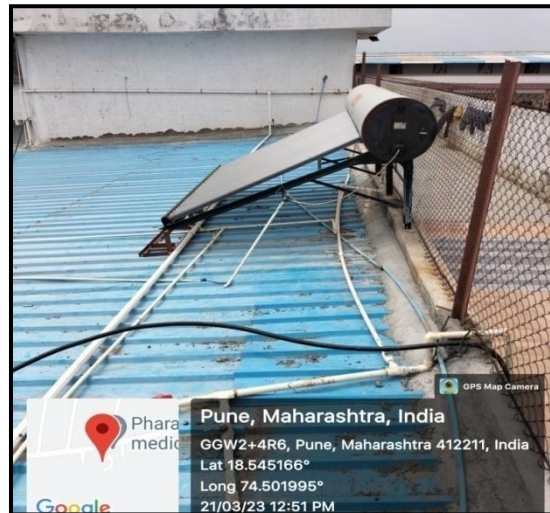
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The College has installed Solar Thermal Water Heating System at the Hostel Block

The College has yet to install Roof top Solar PV Plant.

Photograph of Roof Top Solar Thermal Water Heating System:



6.2 Energy Efficiency Measures adopted:

- The College has Energy Efficient LED Fittings.
- Usage of BEE STAR Rated Equipment

Photographs of STAR Rated AC & LED Lighting:

