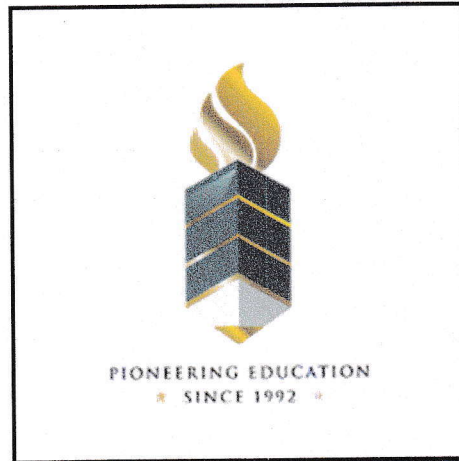


ENERGY AUDIT REPORT
of
RAHUL COLLEGE OF EDUCATION
Navghar Raod, Bhayander (East), Thane 401 105

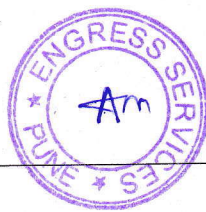


Year: 2022-23

Prepared by:

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ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/RCOE /22-23/01

Date: 1/7/2023

This is to certify that we have conducted Energy Audit at Rahul College of Education, Bhayander (East) Thane 401 105, in the Academic year 2022-23.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting

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

For Engress Services,



A Y Mehendale,

B E-Mechanical, M Tech- Energy

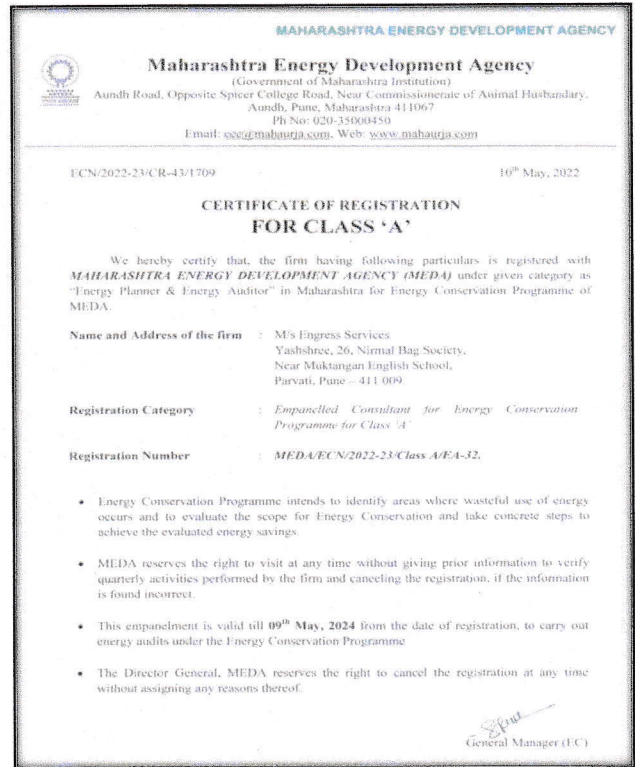
BEE Certified Energy Auditor, EA-8192



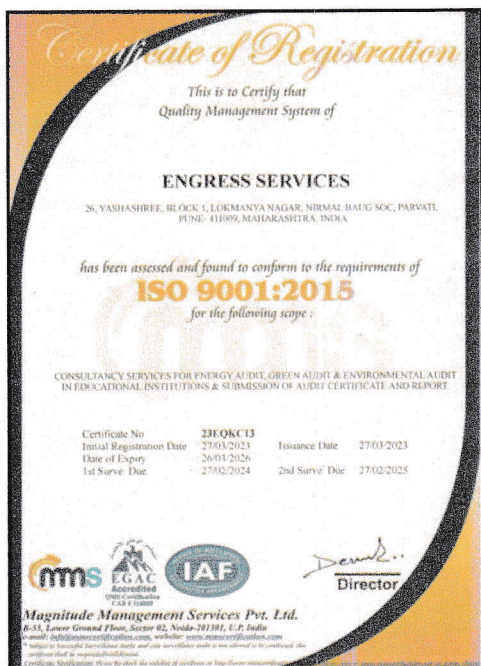
REGISTRATION CERTIFICATES



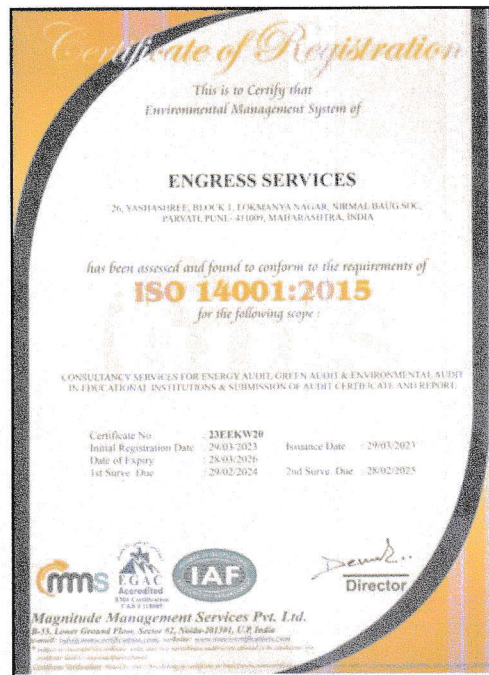
AUDITOR CERTIFICATE



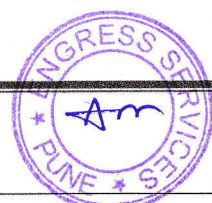
MEDA Registration Certificate



ISO: 9001-2015 Certificate



ISO: 14001-2015 Certificate



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Rahul College of Education, Bhayander (East) Thane 401 105, for awarding us the assignment of Energy Audit of their Campus for the Year: 2022-23.

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



EXECUTIVE SUMMARY

1. **Rahul College of Education, Bhayander**, consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	66.35	kW
2	Annual Energy Consumed	24324	kWh

3. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	21.19	%

4. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings

5. 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
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
CFL	:	Compact Fluorescent Light
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO ₂	:	Carbon Di Oxide
MT	:	Metric Ton



CHAPTER-I INTRODUCTION

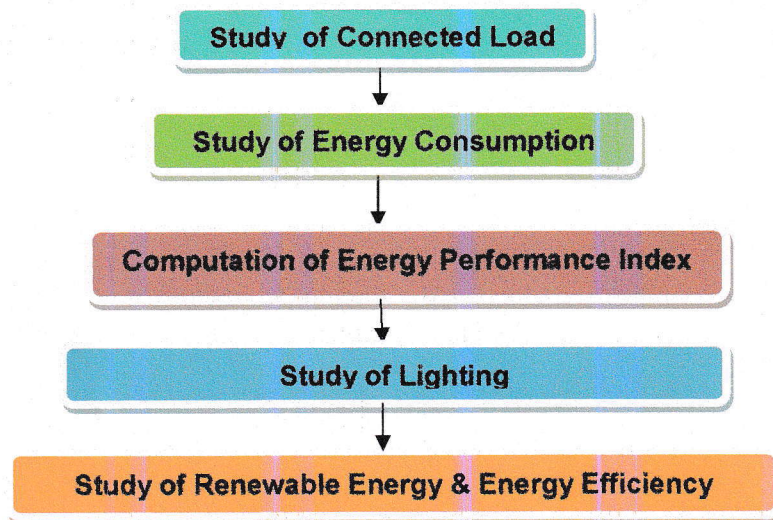
1.1 Introduction:

An Energy Audit is conducted at Rahul College of Education, Bhayander (East) Thane.

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:



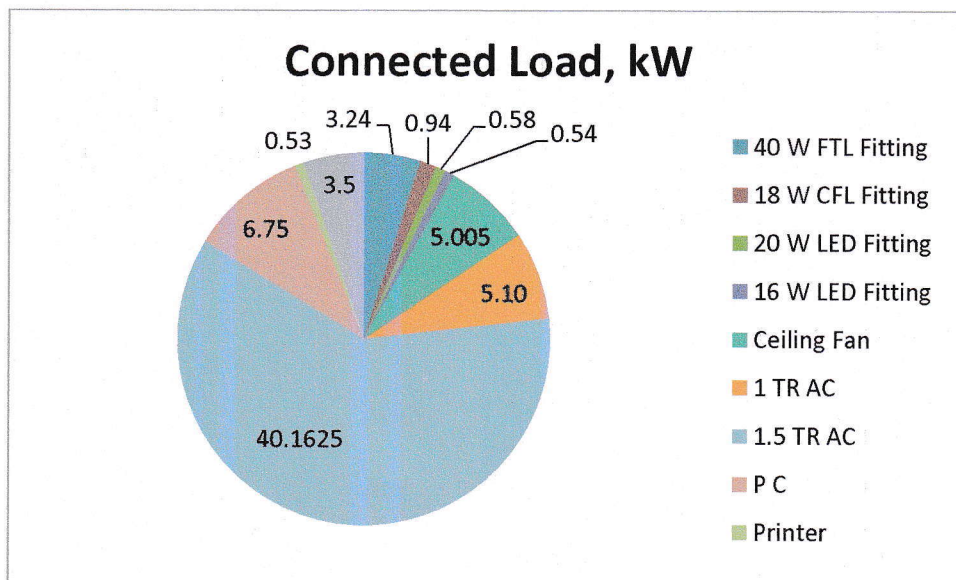
CHAPTER-II STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	40 W FTL Fitting	81	40	3.24
2	18 W CFL Fitting	47	20	0.94
3	20 W LED Fitting	29	20	0.58
4	16 W LED Fitting	34	16	0.54
5	Ceiling Fan	77	65	5.005
6	1 TR AC	4	1275	5.10
7	1.5 TR AC	21	1912.5	40.1625
8	P C	45	150	6.75
9	Printer	3	175	0.53
10	Other Equipment	10	350	3.5
Total				66.35

Chart No 1: Study of Connected Load:



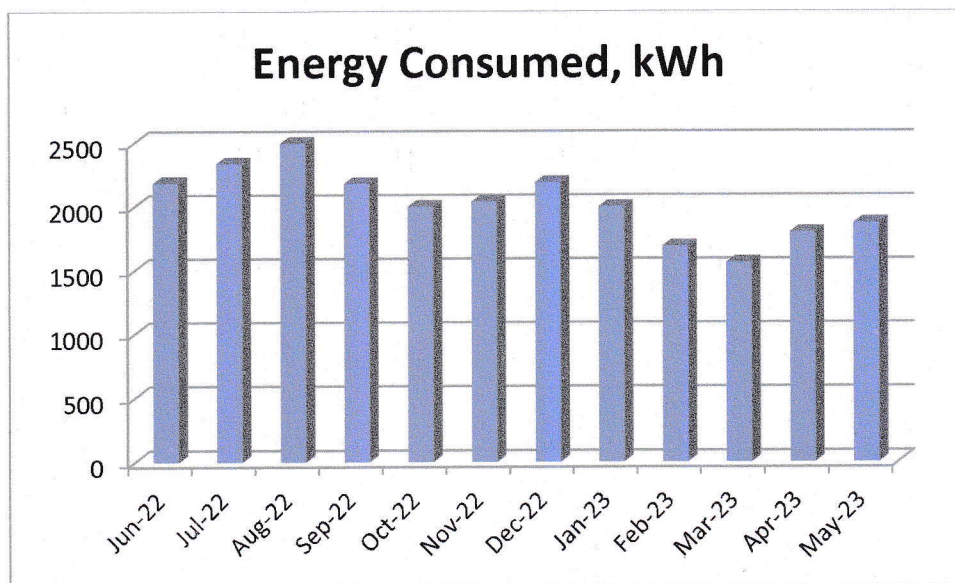
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

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

No	Month	Energy Consumed, kWh
1	Jun-22	2185
2	Jul-22	2337
3	Aug-22	2496
4	Sep-22	2178
5	Oct-22	1998
6	Nov-22	2036
7	Dec-22	2187
8	Jan-23	1997
9	Feb-23	1687
10	Mar-23	1559
11	Apr-23	1796
12	May-23	1868
13	Total	24324
14	Maximum	2496
15	Minimum	1559
16	Average	2027.00

Chart No 2: Variation in Monthly Energy Consumption:



CHAPTER-III 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 percentage usage of LED Lighting to total Lighting Load of the College.

Table No 4: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	81	Nos
2	Load of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fitting	3.24	kW
4	No of 18 W CGL Fittings	47	Nos
5	Load of 18 W CGL Fitting	20	W/unit
6	Total Load of 18 W CGL Fitting	0.94	kW

7	No of 20 W LED Fittings	29	Nos
8	Load of 20 W LED Fitting	20	W/unit
9	Total Load of 20 W LED Fitting	0.58	kW
10	No of 16 W LED Fittings	34	Nos
11	Load of 16 W LED Fitting	16	W/unit
12	Total Load of 16 W LED Fitting	0.544	kW
13	Total LED Lighting Load= 9+12	1.124	kW
14	Total Lighting Load= 3+6+9+12	5.304	kW
15	% of LED to Total Lighting Load= $13 \times 100 / 14$	21.19	%

CHAPTER-V

STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

5.1 Usage of Renewable Energy:

The College has yet to install Roof Top Solar PV Plant

5.2 Energy Efficiency Measures adopted:

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

Photographs of STAR Rated AC & LED Lighting:

