

ENERGY AUDIT REPORT

ASM's INSTITUTE OF PROFESSIONAL STUDIES,
Pimpri, Pune 411 018



Year: 2023-24

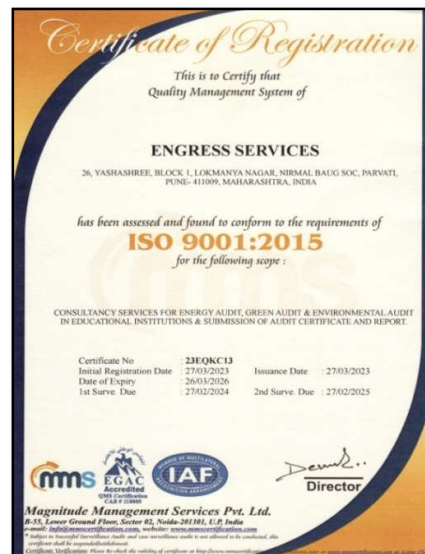
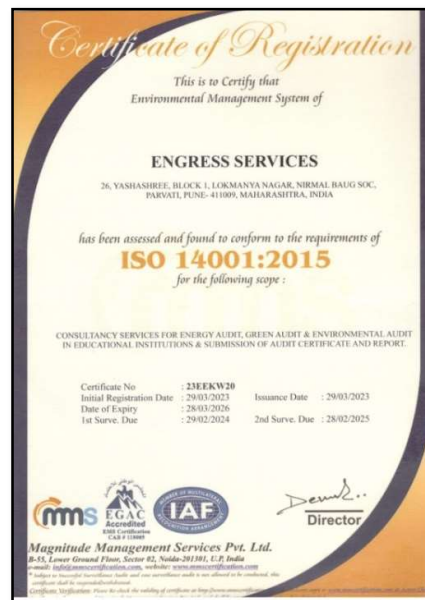
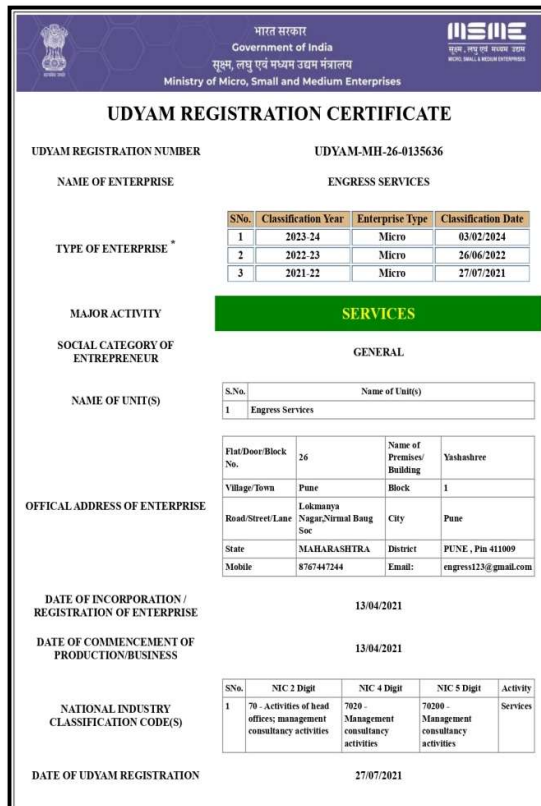
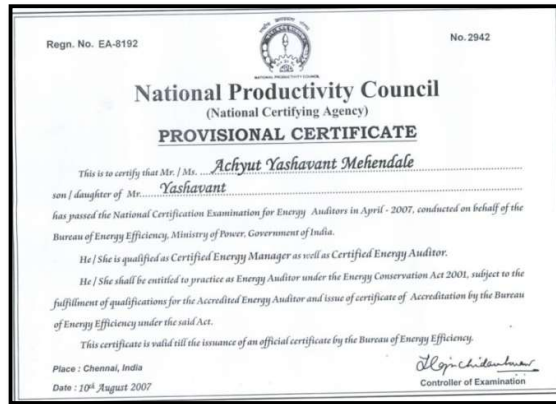
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REGISTRATION CERTIFICATES: BEE, UDYAM, MEDA, ISO-9001 & 14001:



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of ASM's Institute of Professional Studies, Pimpri, Pune 411 018, for awarding us the assignment of Energy Audit of their Pimpri campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. **ASM's Institute of Professional Studies, Pimpri, 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	71.94	kW
2	Annual Energy Purchased	77035	kWh

3. Per Capita Energy Consumption:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	77035	kWh
2	Energy Generated by Solar PV Plant	2616	kWh
3	Total Energy Consumed= 1+2	79651	kWh
4	Total No of Students	206	Nos
5	Per Capita Energy Consumption = (3) / (4)	386.65	kWh/Annum

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
2	% of Usage of LED Lighting to Total Lighting Load	57.13	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **2.18 kWp** Roof Top Solar PV Plant

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO₂** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**
4. Energy consumed is computed based on Load Utilization Factor

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO₂ Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy Generation: www.rooftopsolar.gov.in

ABBREVIATIONS

LED	:	Light Emitting Diode
ATSS	:	Audyogik Tantra Shikshan Sanstha
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
IQAC	:	Internal Quality Assurance Cell
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 ASM's Institute of Professional Studies, Pimpri, Pune

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 Key Study Points:

No	Particulars
1	Study of Present Connected Load
2	Study of Present Energy Consumption
3	Study of Per Capita Energy Consumption
4	Study of Lighting
5	Study of Energy Efficiency & Renewable Energy

1.3 Institute Location Image:



Institute
Campus

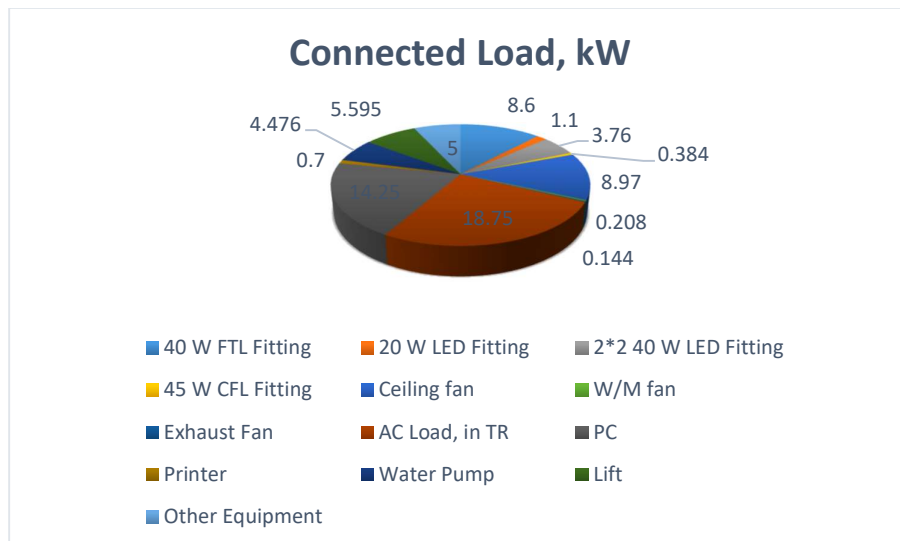
CHAPTER-II STUDY OF CONNECTED LOAD

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	40 W FTL Fitting	215	40	8.6
2	20 W LED Fitting	55	20	1.1
3	2*2 40 W LED Fitting	94	40	3.76
4	45 W CFL Fitting	8	48	0.384
5	Ceiling fan	138	65	8.97
6	W/M fan	4	52	0.208
7	Exhaust Fan	4	36	0.144
8	AC Load, in TR	1	18750	18.75
9	PC	95	150	14.25
10	Printer	4	175	0.7
11	Water Pump	2	2238	4.476
12	Lift	1	5595	5.595
13	Other Equipment	25	200	5
14	Total			71.94

Chart No 1: Study of Connected Load:



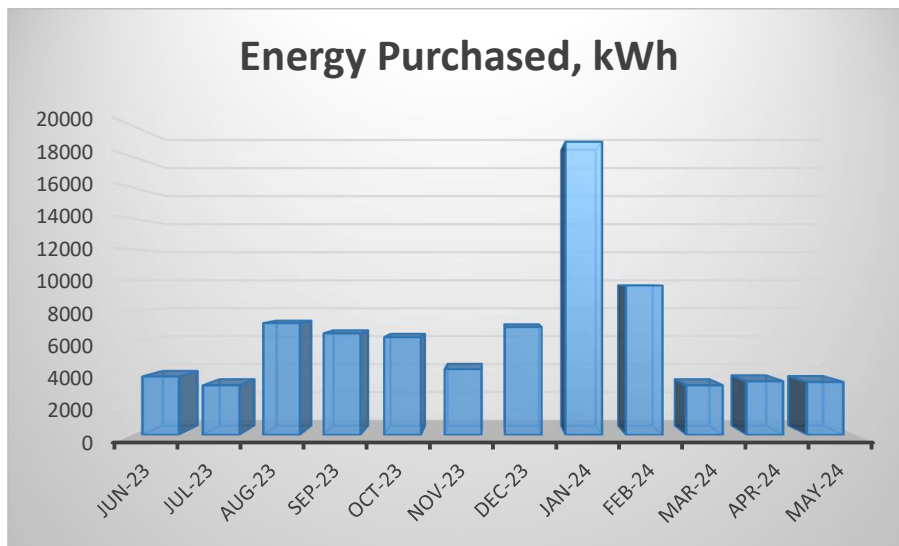
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2023-24:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jun-23	3779	3.51
2	Jul-23	3209	2.98
3	Aug-23	7231	6.73
4	Sep-23	6569	6.11
5	Oct-23	6323	5.88
6	Nov-23	4261	3.96
7	Dec-23	6979	6.49
8	Jan-24	18917	17.59
9	Feb-24	9659	8.98
10	Mar-24	3209	2.98
11	Apr-24	3472	3.23
12	May-24	3427	3.19
13	Total	77035	71.64
14	Maximum	18917	17.59
15	Minimum	3209	2.98
16	Average	6420	5.97

Chart No 2: Monthly Energy Consumption Details:



CHAPTER-IV

STUDY OF PER CAPITA ENERGY CONSUMPTION

Per Capita Energy Consumption Index: Per Capita Energy Consumption Index of an educational Institute/Institute is its Annual Energy Consumption in Kilo Watt Hours per student studying in the Institute/Institute.

It is determined by:

$$\text{Per Capita Energy Consumption Index} = \frac{\text{Annual Energy Consumption in kWh}}{\text{(Total No of students studying)}}$$

Table No 3: Computation of Energy Consumption:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	77035	kWh
2	Energy Generated by Solar PV Plant	2616	kWh
3	Total Energy Consumed= 1+2	79651	kWh
4	Total No of Students	206	Nos
5	Per Capita Energy Consumption= (3) / (4)	386.65	kWh/Annum

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. 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 Institute.

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

No	Particulars	Value	Unit
1	Qty of 40 W FTL Fittings	215	Nos
2	Load per Unit of 40 W FTL Fitting	40	W/Unit
3	Total Load of 40 W FTL Fittings	8.6	kW
4	Qty of 20 W LED Fittings	55	Nos
5	Load per Unit of 20 WLED Fitting	20	W/Unit
6	Total Load of 20 W LED Fittings	1.1	kW
7	Qty of 40 W LED Fittings	94	Nos
8	Load per Unit of 40 WLED Fitting	40	W/Unit
9	Total Load of 40 W LED Fittings	3.64	kW

10	Qty of 45 W CFL Fittings	8	Nos
11	Load per Unit of 45 W CFL Fitting	48	W/Unit
12	Total Load of 45 W CFL Fittings	3.64	kW
13	Total LED Lighting Load =6+9	9.7	kW
14	Total Lighting Load= 3+6+9+12	16.98	kW
15	Percentage of LED to Total Lighting Load= $13 \times 100 / 14$	57.13	%

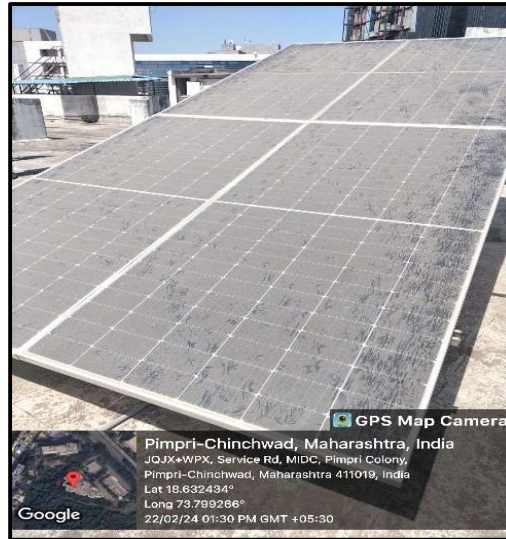
CHAPTER-VI STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The Institute has installed:

- Roof Top Solar PV Plant of Capacity **2.180 kWp**

Photograph of Roof Top Solar PV Plant:



6.2 Energy Efficiency Measures adopted:

1. Usage of Energy Efficient LED Light Fittings
2. Usage of BEE STAR Rated Equipment

Photograph of LED Lighting & STAR Rated AC:

