

# ENERGY AUDIT REPORT

## SAMARTH RURAL EDUCATION INSTITUTE'S, SAMARTH COLLEGE OF COMPUTER SCIENCE,

A/P Belhe, Tal: Junnar, Dist: Pune 412 410



Year: 2023-24

Prepared by:

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## Page 2

Page No. 24-0112 No. 2440



**National Productivity Council**  
(National Certifying Agency)

**PROVISIONAL CERTIFICATE**

*Acharya Teachnunt Mehendale*

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is a member of the Teachnunt

has passed the National Certification Examination for Energy Auditors in April 2007 conducted on behalf of the Bureau of Energy Efficiency & Energy Conservation, Government of India.

He/she is qualified for Certified Energy Manager as a Certified Energy Auditor

He/she shall be entitled to practice as Energy Auditor under the Energy Conservation Act, 2001, subject to the fulfillment of qualifications for the Certified Energy Auditor and issue of certificate of Authorization by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of successful certificate by the Bureau of Energy Efficiency.

Place : Delhi, India *Rajesh Kumar*  
Secretary to Government

Date : 07 August 2007

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*Director*

## 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 at Engress Services, Pune, express our sincere gratitude to the management of Samarth Rural Education Institute's Samarth College of Computer Science, A/P Belhe, Tal: Junnar, Dist: Pune, for awarding us the assignment of Energy Audit of their Campus for the Year: 2023-24.

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

## EXECUTIVE SUMMARY

1. Samarth College of Computer Science, A/P Belhe, Tal; Junnar, Dist: Pune consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

### 2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	41.11	kW
2	Annual Energy Consumed	28530	kWh

### 3. Per Capita Energy Consumption:

No	Particulars	Value	Unit
1	Annual Energy Consumed	28530	kWh
2	No of students studying in the College	700	Nos
3	Per Capita Energy Consumption = (1) / (2)	40.76	kWh/Annum

### 4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	40.20	%

### 5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of Solar Thermal Water Heating System at Hostel Block

### 6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO<sub>2</sub>** into atmosphere
2. Energy Consumption is computed based on Load Utilization Factor

### 7. References:

- Audit Methodology: [www.mahaurja.com](http://www.mahaurja.com)
- Energy Conservation Building Code: ECBC-2017: [www.beeindia.gov.in](http://www.beeindia.gov.in)
- For CO<sub>2</sub> Emissions: [www.ccd.gujarat.gov.in](http://www.ccd.gujarat.gov.in)

## **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 <sub>2</sub>	: Carbon Di Oxide
MT	: Metric Ton

## CHAPTER-I INTRODUCTION

### 1.1 Introduction:

An Energy Audit is conducted at Samarth Rural Education Institute's Samarth College of Computer Science, A/P Belhe, Tal: Junnar, Dist: 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](http://www.mahaurja.com))
- Tata Power: [www.tatapower.com](http://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 College Location Image:



College  
Campus

## CHAPTER-II

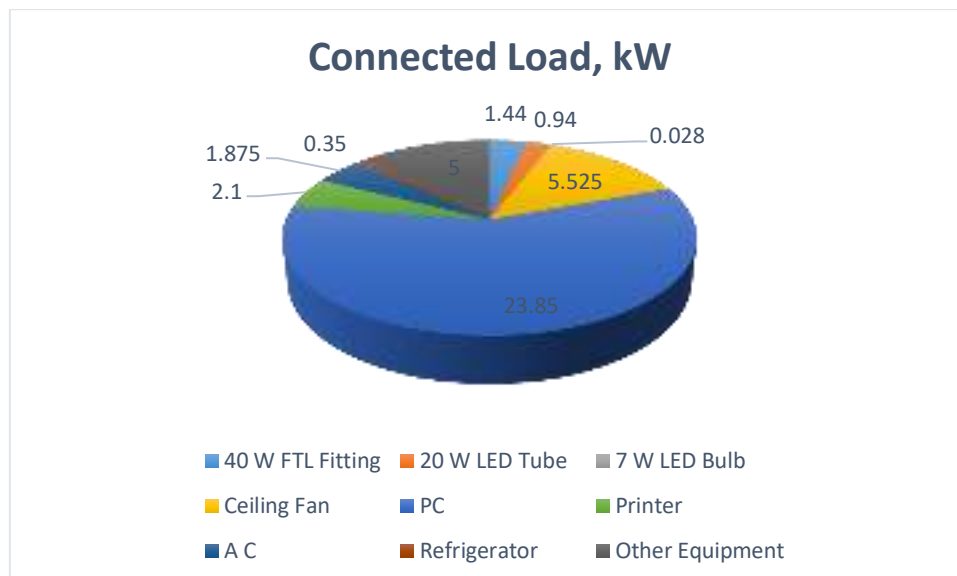
### STUDY OF CONNECTED LOAD

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

**Table No 1: Study of Equipment wise Connected Load:**

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	36	40	1.44
2	20 W LED Tube	47	20	0.94
3	7 W LED Bulb	4	7	0.028
4	Ceiling Fan	85	65	5.525
5	PC	159	150	23.85
6	Printer	12	175	2.1
7	A C	1	1875	1.875
8	Refrigerator	1	350	0.35
9	Other Equipment	20	250	5
10	<b>Total</b>			<b>41.11</b>

**Chart No 1: Study of Connected Load:**





## CHAPTER-III

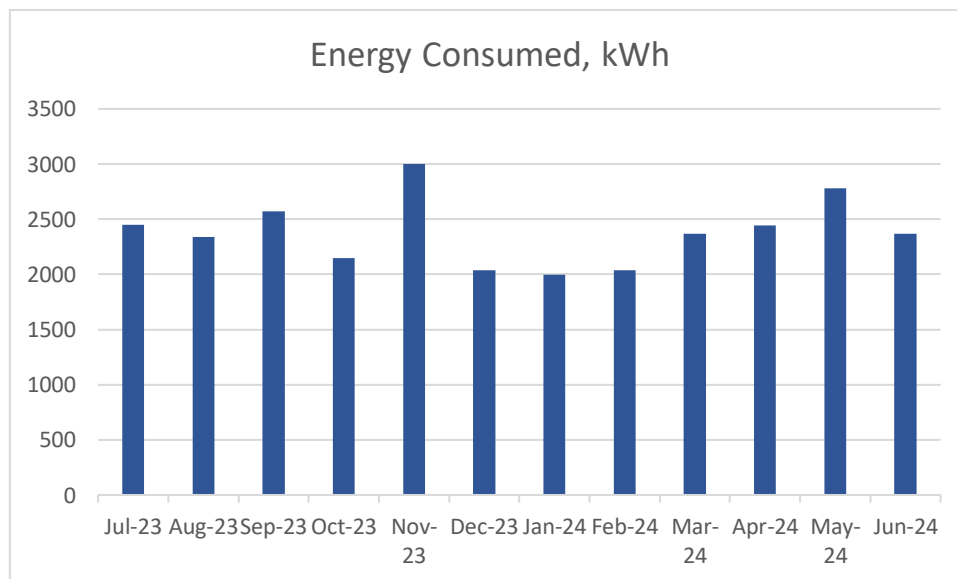
### STUDY OF PRESENT ENERGY CONSUMPTION

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

**Table No 2: Study of Electrical Energy Consumption Analysis: 2023-24:**

No	Month	Energy Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	Jul-23	2450	2.28
2	Aug-23	2336	2.17
3	Sep-23	2569	2.39
4	Oct-23	2145	1.99
5	Nov-23	2998	2.79
6	Dec-23	2036	1.89
7	Jan-24	1998	1.86
8	Feb-24	2036	1.89
9	Mar-24	2369	2.20
10	Apr-24	2445	2.27
11	May-24	2780	2.59
12	Jun-24	2368	2.20
13	Total	28530	26.53
14	Maximum	2998	2.79
15	Minimum	1998	1.86
16	Average	2377.5	2.21

**Chart No 2: Variation in Monthly Energy Consumption:**



## CHAPTER-IV

### STUDY OF PER CAPITA ENERGY CONSUMPTION

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

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 Per Capita Energy Consumption:**

No	Particulars	Value	Unit
1	Annual Energy Consumed	28530	kWh
2	No of students studying in the College	700	Nos
3	Per Capita Energy Consumption = (1) / (2)	40.76	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/m<sup>2</sup>)

**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 Lighting Power density and 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	36	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	1.44	kW
4	No of 20 W LED Tube Lights	47	Nos
5	Demand of 20 W LED Fitting	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.94	kW
7	No of 7 W LED Tube Lights	4	Nos
8	Demand of 7 W LED Fitting	7	W/Unit

<b>9</b>	Total Electrical Load of 7 W LED Fittings	<b>0.028</b>	<b>kW</b>
<b>10</b>	Total LED Lighting Load = <b>6+9</b>	<b>0.97</b>	<b>kW</b>
<b>11</b>	Total Lighting Load = <b>3+6+9</b>	<b>2.41</b>	<b>kW</b>
<b>12</b>	<b>% of LED Lighting to Total Lighting Load = (10)*100/(11)</b>	<b>40.20</b>	<b>%</b>

## **CHAPTER-VI**

### **STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY**

#### **6.1 Usage of Renewable Energy:**

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

#### **Photograph of Solar Thermal Water Heating System:**



#### **6.2 Energy Efficiency Projects:**

- Usage of Energy Efficient LED Lighting
- Usage of Energy Efficient BEE STAR Rated Equipment

#### **Photographs of LED Lighting:**

