

ENERGY AUDIT REPORT
of
Yashaswi Education Society's,
International Institute of Management Studies,
Chinchwad, Pune 411 033



Year: 2021-22

Prepared by:

ENGRESS SERVICES

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



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/2021-22/CR-43/441

8th February, 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 Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

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

Registration Number : *MEDA/ECN/2021-22/Class B/EA-07.*

- 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 **7th February, 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.

08/02/22
General Manager (EC)



Engress Services

Yashashree, 26, Nirmal Bag Society,
Near Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/YESIIMS/21-22/01

Date: 14/4/2022

CERTIFICATE

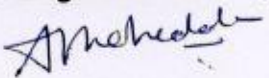
This is to certify that we have conducted Energy Audit at Yashaswi Education Society's International Institute of Management Science, Chinchwad, Pune, in the Year: 2021-22.

The Institute 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 Energy Conservation & making the campus Green.

For Engress Services,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Yashaswi Education Society's International Institute of Management Science, Chinchwad, Pune 411 033, for awarding us the assignment of Energy Audit of their Chinchwad Campus, for the Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Yashaswi Education Society's International Institute of Management Science Chinchwad consumes Energy in the form of Electrical Energy used for various gadgets, office & other facilities.

2. Present Energy Consumption & CO₂ Emission:

| No | Parameter/ Value | Electrical Energy Consumed, kWh | CO ₂ Emissions, MT |
|----|------------------|---------------------------------|-------------------------------|
| 1 | Total | 46067 | 41.46 |
| 2 | Maximum | 5542 | 4.99 |
| 3 | Minimum | 0 | 0.00 |
| 4 | Average | 3838.92 | 3.46 |

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Maximum Usage of Day-Lighting

4. Usage of Alternate Energy:

The Institute has yet to install the Roof Top Solar PV Plant. Therefore, at present the annual power requirement met by Renewable/Alternate Energy Sources stand at zero percent.

5. Usage of LED Lighting:

- The entire Lighting load of Institute is 16.36 kW.
- The LED Lighting Load is 2 kW.
- Percentage of Annual LED Lighting Load to Annual Lighting Load is 12.22 %.

6. Assumption:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

7. Reference:

- For CO₂ Emissions: www.tatapower.com

ABBREVIATIONS

| | |
|-----------------|-----------------------------|
| BEE | Bureau of Energy Efficiency |
| YES | Yashaswi Education Society |
| kWh | Kilo Watt Hour |
| kWp | Kilo Watt Peak |
| Kg | Kilo Gram |
| MT | Metric Ton |
| CO ₂ | Carbon Di Oxide |
| LPD | Liters per Day |
| LPG | Liquefied Petroleum Gas |
| FTL | Fluorescent Tube Light |
| CFL | Compact Fluorescent Light |
| LED | Light Emitting Diode |



CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present level of Energy Consumption
3. To compute CO₂ emissions
4. To study usage of Alternate Energy
5. To study Lighting

1.2 Table No 1: General Details of the Institute:

| No | Head | Particulars |
|-----------|-----------------------|--|
| 1 | Name of Institution | Yashaswi Education Society's International Institute of Management Science |
| 2 | Address | S.No.169/1A,Chichwad-Akurdi Link Road, Chinchwad, Pune 411033 |
| 3 | Year of Establishment | 2008 |
| 4 | Affiliation | Savitribai Phule Pune University |



CHAPTER-II STUDY OF CONNECTED LOAD

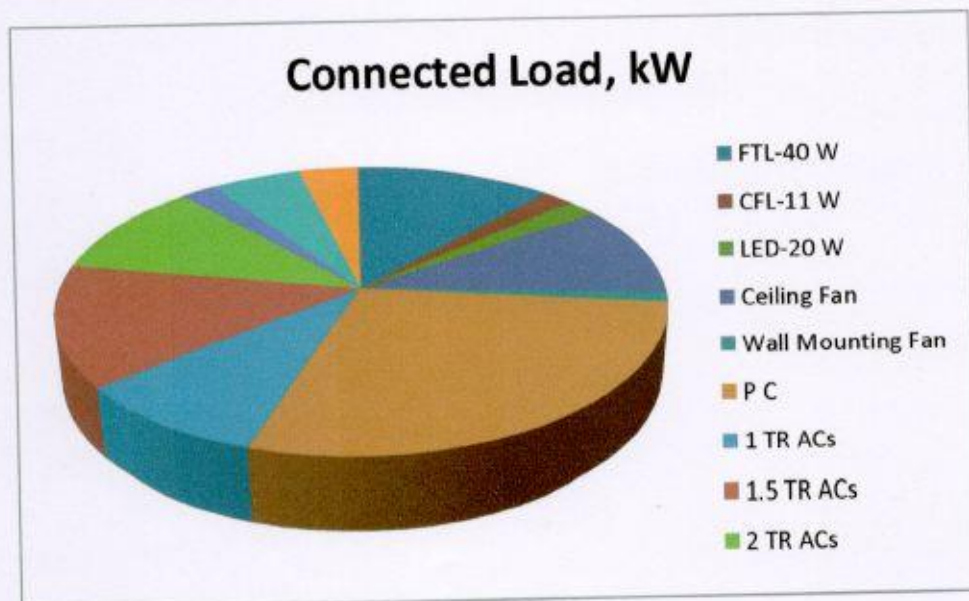
The major contributors to the connected load of the Institute are as under.

Table No 2: Equipment wise Connected Load:

| No | Equipment | Qty | Load, W/Unit | Load, kW |
|----|-------------------|-----|--------------|------------|
| 1 | FTL-40 W | 311 | 40 | 12.44 |
| 2 | CFL-11 W | 148 | 13 | 1.92 |
| 3 | LED-20 W | 100 | 20 | 2 |
| 4 | Ceiling Fan | 161 | 65 | 10.47 |
| 5 | Wall Mounting Fan | 20 | 52 | 1.04 |
| 6 | P C | 193 | 150 | 28.95 |
| 7 | 1 TR ACs | 7 | 1350 | 9.45 |
| 8 | 1.5 TR ACs | 7 | 2025 | 14.18 |
| 9 | 2 TR ACs | 4 | 2700 | 10.8 |
| 10 | Water pump | 1 | 2238 | 2.24 |
| 11 | Lift | 1 | 5595 | 5.60 |
| 12 | Other Equipment | 30 | 125 | 3.75 |
| 13 | Total | | | 103 |

Now we present the above Load, in a Chart, as under.

Chart No 1: Connected Load:



CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Energy Consumption
Table No 3: Study of Electrical Energy Consumption: 2021-22:

| No | Month | Energy Consumed, kWh |
|----|---------|----------------------|
| 1 | Apr-21 | 0 |
| 2 | May-21 | 5524 |
| 3 | Jun-21 | 4264 |
| 4 | Jul-21 | 3966 |
| 5 | Aug-21 | 3604 |
| 6 | Sep-21 | 3423 |
| 7 | Oct-21 | 3952 |
| 8 | Nov-21 | 3894 |
| 9 | Dec-21 | 4241 |
| 10 | Jan-22 | 3358 |
| 11 | Feb-22 | 4299 |
| 12 | Mar-22 | 5542 |
| 13 | Total | 46067 |
| 14 | Maximum | 5542 |
| 15 | Minimum | 0 |
| 16 | Average | 3838.92 |

Chart No: 2: To study the variation of Monthly Electrical Energy Consumption:

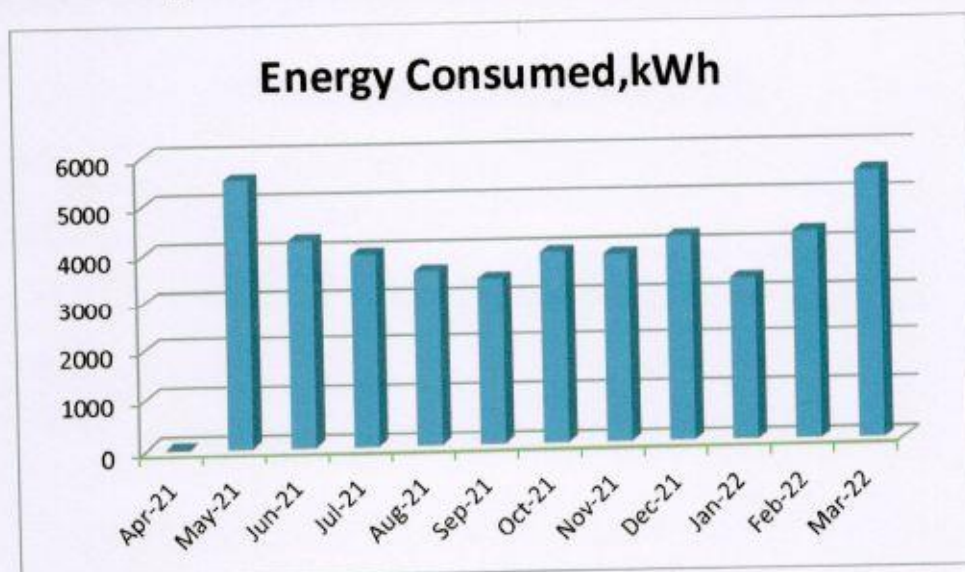


Table No 4: Variation in Important Parameters:

| No | Parameter/ Variation | Electrical Energy Consumed, kWh |
|----|-------------------------|------------------------------------|
| 1 | Total | 46067 |
| 2 | Maximum | 5542 |
| 3 | Minimum | 0 |
| 4 | Average | 3838.92 |



CHAPTER-IV CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the Institute for performing its day to day activities

The Institute uses Energy in the form of Electrical Energy for various Electrical gadgets.

Basis of Computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the Institute due to its Day to Day operations

Table No 5: Month wise CO₂ Emissions:

| No | Month | Energy Consumed, kWh | CO ₂ Emission, MT |
|----|---------|----------------------|------------------------------|
| 1 | Apr-21 | 0 | 0.00 |
| 2 | May-21 | 5524 | 4.97 |
| 3 | Jun-21 | 4264 | 3.84 |
| 4 | Jul-21 | 3966 | 3.57 |
| 5 | Aug-21 | 3604 | 3.24 |
| 6 | Sep-21 | 3423 | 3.08 |
| 7 | Oct-21 | 3952 | 3.56 |
| 8 | Nov-21 | 3894 | 3.50 |
| 9 | Dec-21 | 4241 | 3.82 |
| 10 | Jan-22 | 3358 | 3.02 |
| 11 | Feb-22 | 4299 | 3.87 |
| 12 | Mar-22 | 5542 | 4.99 |
| 13 | Total | 46067 | 41.46 |
| 14 | Maximum | 5542 | 4.99 |
| 15 | Minimum | 0 | 0.00 |
| 16 | Average | 3838.92 | 3.46 |

Chart No 3: Representation of Month wise CO₂ emissions:

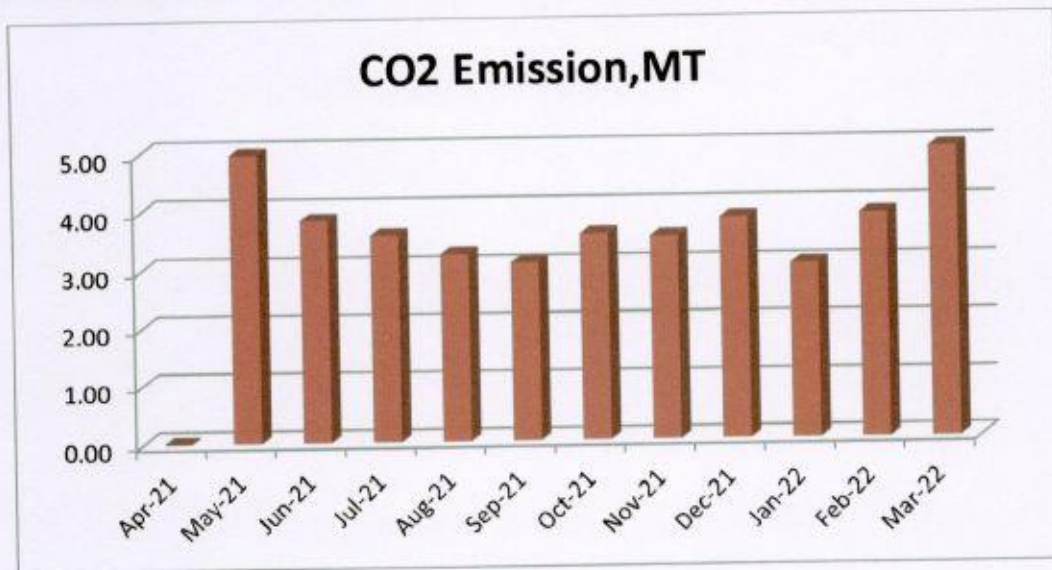


Table No 6: Important Parameters:

| No | Parameter/ Value | Energy Consumed, kWh | CO2 Emissions, MT |
|----|------------------|----------------------|-------------------|
| 1 | Total | 46067 | 41.46 |
| 2 | Maximum | 5542 | 4.99 |
| 3 | Minimum | 0 | 0.00 |
| 4 | Average | 3838.92 | 3.46 |

CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

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

As on today, the annual power requirement met by Renewable/Alternate Energy source stands to be zero percent.



CHAPTER VI STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Annual Lighting power requirement, as under.

Table No 7: Percentage of Usage of LED Lighting to Annual Lighting Load:

| No | Particulars | Value | Unit |
|----|--|--------------|--------|
| 1 | No of 40 W FTL Fittings | 311 | Nos |
| 2 | Load/Unit of 40 W FTL Fitting | 40 | W/Unit |
| 3 | Total Load of 311 Nos, 40 W Fittings | 12.44 | kW |
| 4 | No of 11 W CFL Fittings | 148 | Nos |
| 5 | Load/Unit of 11 W CFL Fitting | 13 | W/Unit |
| 6 | Total Load of CFL Fittings | 1.92 | kW |
| 7 | No of 20 W LED Fittings | 100 | Nos |
| 8 | Load/Unit of 20 W LED Fittings | 20 | W/Unit |
| 9 | Total Load of 100 Nos, 20 W LED Fittings | 2 | kW |
| 10 | Total Lighting Load= (3)+ (6) | 16.36 | kW |
| 11 | Total LED Lighting Load= (6) | 2 | kW |
| 12 | % of Annual LED Lighting to Total Lighting Load= (11)*100/(10) | 12.22 | % |

ENERGY AUDIT REPORT

of

Yashaswi Education Society's,
INTERNATIONAL INSTITUTE OF MANAGEMENT STUDIES,
Chinchwad, Pune 411 033



Year: 2022-23

Prepared by:

ENGRESS SERVICES

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



ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

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

Date: 25/5/2023

This is to certify that we have conducted Energy Audit at Yashaswi Education Society's, International Institute of Management Science, Chinchwad, Pune, in the Year: 2022-23.

The Institute 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 Energy Conservation & making the campus Green.

For Engress Services,



A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192



REGISTRATION CERTIFICATES

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
 (Government of Maharashtra Institution)
 Amalshi Road, Opposite Spruce College Road, Deccan Colony (confluence of Amalshi Durbhary)
 Amalshi, Pune - Maharashtra - 411067
 Phone: 020-33661150
 E-mail: ee@maharaja.com Web: www.maharaja.com

FCN: 9025294R-41/1/09 10th May, 2022

**CERTIFICATE OF REGISTRATION
FOR CLASS 'A'**

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 Engress Services,
 Yashdree, 26, Amalshi Bag Society,
 Near Mukangan High School,
 Parvati, Pune - 411 069

Registration Category : Empanelled Consultant for Energy Conservation Programme for Class 'A'


Registration Number : MEDA/FCN/2022-23/Class AEA-32

- 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.

[Signature]
General Manager (A.C.S)

MEDA Registration Certificate

Regn. No. EA 8192 No. 2942


National Productivity Council
 (National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. Achyut Yashavant Mehendale
 son / daughter of Mr. Yashavant
 has passed the National Certification Examination for Energy Auditor in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for an Accredited Energy Auditor and issue of Certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

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

Place: Chennai, India *[Signature]*
Controller of Examination

Date: 10th August, 2007

AUDITOR CERTIFICATE

State of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES
 26, YASHANSHREE, BLOCK 1, LOKMANSYANAGAR, NEARAI BAG, SIX PARVATI, PUNE - 411069, MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of
ISO 9001:2015
 for the following scope:

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT
 INTERNATIONAL INSTITUTIONS & SUBMISSION OF AGREEMENT CERTIFICATE AND REPORT

| | | | |
|--------------------------------|------------|-----------------|------------|
| Certificate No. | 2310NK13 | Issuance Date | 27/01/2023 |
| Initial Registration Date | 27/01/2023 | | |
| Date of 1 st Surve. | 26/01/2026 | 2nd Surve. Date | 27/02/2025 |

   *[Signature]*
Director

Magnitude Management Services Pvt. Ltd.
 B-15, Lower Ground Floor, Sector 02, Noida-201101, U.P. India
 Contact: 011-26108888, 011-26108889, 011-26108890, 011-26108891, 011-26108892
 Website: www.magnitude.com, www.magnitude.in, www.magnitude.org
 Email: info@magnitude.com, sales@magnitude.com, support@magnitude.com

ISO: 9001-2015 Certificate

State of Registration




This is to Certify that
Environmental Management System of

ENGRESS SERVICES
 26, YASHANSHREE, BLOCK 1, LOKMANSYANAGAR, NEARAI BAG, SIX PARVATI, PUNE - 411069, MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of
ISO 14001:2015
 for the following scope:

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT
 INTERNATIONAL INSTITUTIONS & SUBMISSION OF AGREEMENT CERTIFICATE AND REPORT

| | | | |
|--------------------------------|------------|-----------------|------------|
| Certificate No. | 231LEK20 | Issuance Date | 29/01/2023 |
| Initial Registration Date | 29/01/2023 | | |
| Date of 1 st Surve. | 29/01/2026 | 2nd Surve. Date | 29/02/2025 |

   *[Signature]*
Director

Magnitude Management Services Pvt. Ltd.
 B-15, Lower Ground Floor, Sector 02, Noida-201101, U.P. India
 Contact: 011-26108888, 011-26108889, 011-26108890, 011-26108891, 011-26108892
 Website: www.magnitude.com, www.magnitude.in, www.magnitude.org
 Email: info@magnitude.com, sales@magnitude.com, support@magnitude.com

ISO: 14001-2015 Certificate



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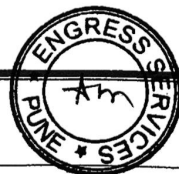
| Sr. No | Particulars | Page No |
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| 3 | Study of Present Energy Consumption | 10 |
| 4 | Study of Energy Performance Index | 11 |
| 5 | Study of Lighting | 12 |
| 6 | Study of Renewable Energy & Energy Efficiency | 14 |



ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Yashaswi Education Society's International Institute of Management Science, Chinchwad, Pune 411 033, for awarding us the assignment of Energy Audit of their Chinchwad Campus, for the Year: 2022-23.

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



EXECUTIVE SUMMARY

1. Yashaswi Education Society's International Institute of Management Science Chinchwad 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 | 93 | kW |
| 2 | Annual Energy Purchased | 53346 | kWh |

3. Energy Performance Index:

| No | Particulars | Value | Unit |
|----|--|---------|--------------------|
| 1 | Total Annual Energy Consumed | 53346 | kWh |
| 2 | Total Built up area of Institute | 2992.65 | m ² |
| 3 | Energy Performance Index $= (1) / (2)$ | 17.83 | kWh/m ² |

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

| No | Particulars | Value | Unit |
|----|---|-------|------------------|
| 1 | Lighting Power Density | 2.91 | 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
- Usage of BEE STAR Rated equipment

6. Assumption:

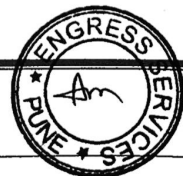
1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

7. References:

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

ABBREVIATIONS

| | |
|-----------------|-----------------------------|
| BEE | Bureau of Energy Efficiency |
| YES | Yashaswi Education Society |
| kWh | Kilo Watt Hour |
| kWp | Kilo Watt Peak |
| Kg | Kilo Gram |
| MT | Metric Ton |
| CO ₂ | Carbon Di Oxide |
| LPD | Liters per Day |
| LPG | Liquefied Petroleum Gas |
| FTL | Fluorescent Tube Light |
| CFL | Compact Fluorescent Light |
| LED | Light Emitting Diode |



CHAPTER-I INTRODUCTION

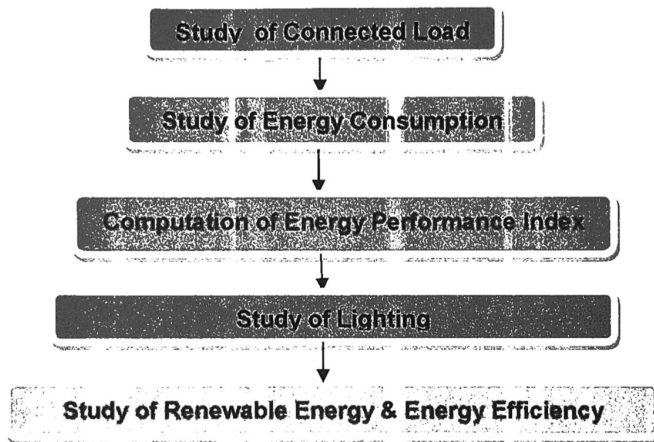
1.1 Introduction:

An Energy Audit is conducted at Yashaswi Education Society's International Institute of Management Science, Chinchwad, Pune.

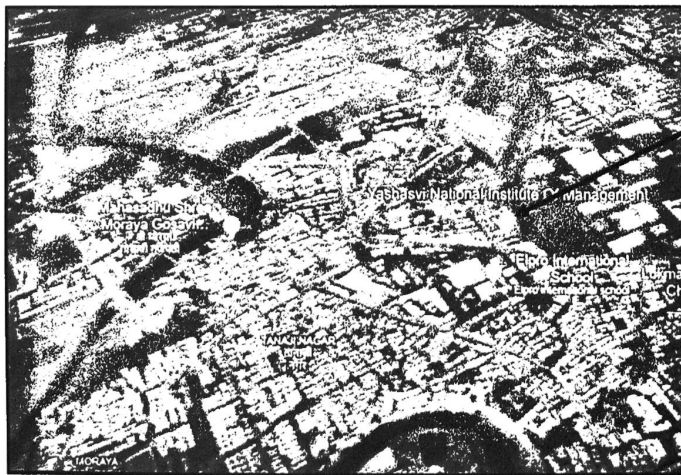
The guidelines followed for conducting the Energy Audit are:

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

1.2 Audit Procedural Steps:



1.3 Institute Location Image:



CHAPTER-II

STUDY OF CONNECTED LOAD

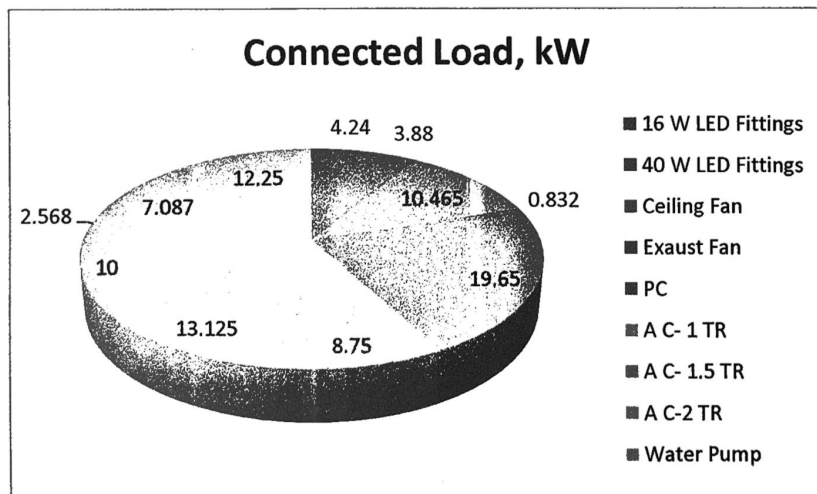
The major contributors to the connected load of the Institute are as under.

Table No 1: Equipment wise Connected Load:

| No | Equipment | Qty | Load, W/unit | Load, kW |
|----|-------------------|-----|--------------|-----------|
| 1 | 16 W LED Fittings | 265 | 16 | 4.24 |
| 2 | 40 W LED Fittings | 97 | 40 | 3.88 |
| 3 | Ceiling Fan | 161 | 65 | 10.465 |
| 4 | Exhaust Fan | 16 | 52 | 0.832 |
| 5 | PC | 131 | 150 | 19.65 |
| 6 | A C- 1 TR | 7 | 1250 | 8.75 |
| 7 | A C- 1.5 TR | 7 | 1875 | 13.125 |
| 8 | A C-2 TR | 4 | 2500 | 10 |
| 9 | Water Pump | 1 | 2568 | 2.568 |
| 10 | Lift | 1 | 7087 | 7.087 |
| 11 | Other Equipment | 35 | 350 | 12.25 |
| 12 | Total | | | 93 |

Now we present the above Load, in a Chart, as under.

Chart No 1: Connected Load:



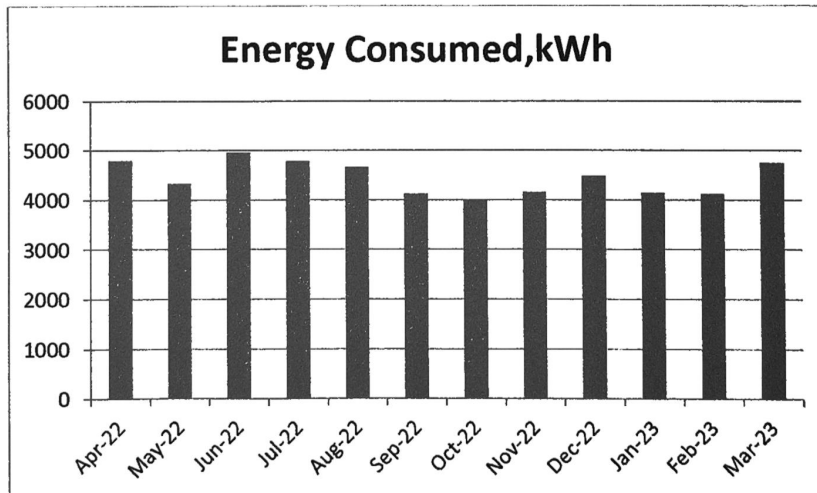
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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 | Apr-22 | 4798 | 4.32 |
| 2 | May-22 | 4336 | 3.90 |
| 3 | Jun-22 | 4968 | 4.47 |
| 4 | Jul-22 | 4785 | 4.31 |
| 5 | Aug-22 | 4669 | 4.20 |
| 6 | Sep-22 | 4125 | 3.71 |
| 7 | Oct-22 | 3991 | 3.59 |
| 8 | Nov-22 | 4161 | 3.74 |
| 9 | Dec-22 | 4486 | 4.04 |
| 10 | Jan-23 | 4149 | 3.73 |
| 11 | Feb-23 | 4129 | 3.72 |
| 12 | Mar-23 | 4749 | 4.27 |
| 13 | Total | 53346 | 48.01 |
| 14 | Maximum | 4968 | 4.47 |
| 15 | Minimum | 3991 | 3.59 |
| 16 | Average | 4445.5 | 4.00 |

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 Institute as under:

Table No 3: Computation of Energy Performance Index:

| No | Particulars | Value | Unit |
|----|-------------------------------------|---------|--------------------|
| 1 | Total Annual Energy Purchased | 53346 | kWh |
| 2 | Total Built up area of Institute | 2992.65 | m ² |
| 3 | Energy Performance Index =(1) / (2) | 17.83 | 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 Institute.

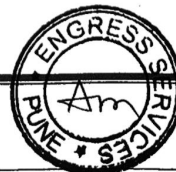
Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

Table No 4: Computation of Lighting Power Density: Class Room: 201:

| No | Particulars | Value | Unit |
|----|---|-------------|------------------------|
| 1 | Qty of 16 W Fittings in Class Room: | 12 | Nos |
| 2 | Load of 16 W Fitting | 16 | W/unit |
| 3 | Total Load of 16 Nos, 16 W Fittings | 192 | W |
| 4 | Built up area of Class Room: 201 | 66 | m ² |
| 5 | Lighting Power Density = (3)/(4) | 2.91 | W/m² |

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

| No | Particulars | Value | Unit |
|----|---|-------------|--------|
| 1 | No of 16 W LED Fittings | 265 | Nos |
| 2 | Load/Unit of 16 W LED Fittings | 16 | W/Unit |
| 3 | Total Load of 16 W LED Fittings | 4.24 | kW |
| 4 | No of 40 W LED Fittings | 97 | Nos |
| 5 | Load/Unit of 40 W LED Fittings | 40 | W/Unit |
| 6 | Total Load of 40 W LED Fittings | 3.88 | kW |
| 7 | Total LED Lighting Load= (3)+(6) | 8.12 | kW |
| 8 | Total LED Lighting Load= (3) + (6) | 8.12 | kW |
| 9 | % of LEDs to Total Lighting Load= (7)*100/(8) | 100 | % |



CHAPTER VI STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

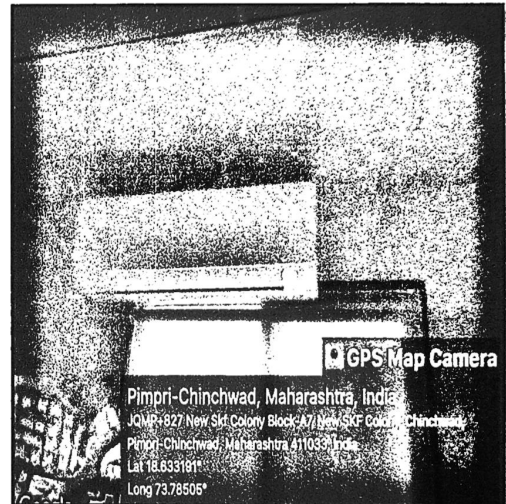
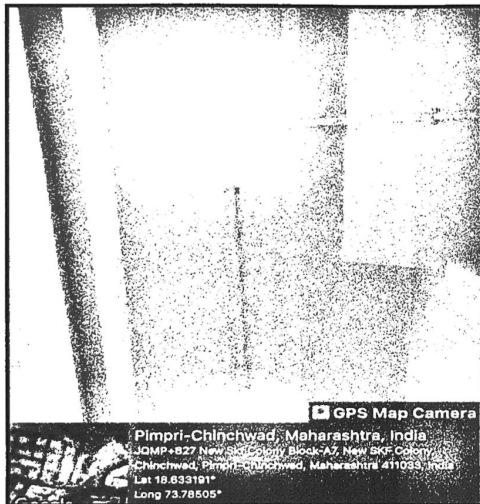
6.1 Usage of Renewable Energy:

The Institute has yet to install Roof Top Solar PV Plant.

6.2 Energy Efficiency Measures adopted:

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

Photographs of STAR Rated AC & LED Lighting:



ENERGY AUDIT REPORT

Yashaswi Education Society's,
INTERNATIONAL INSTITUTE OF MANAGEMENT STUDIES,
Chinchwad, Pune 411 033



Year: 2023-24

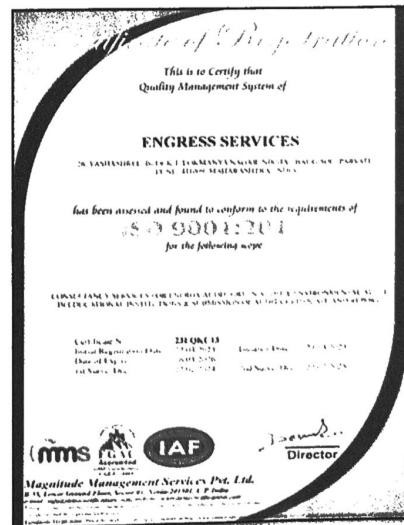
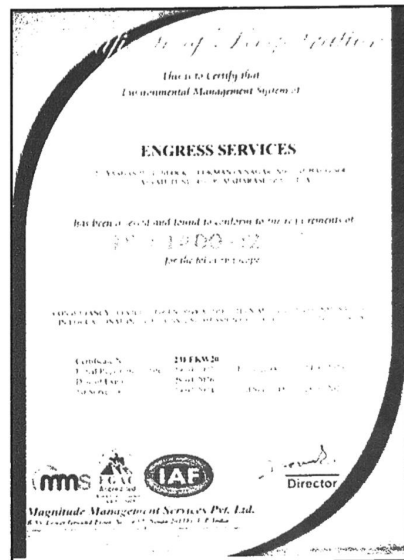
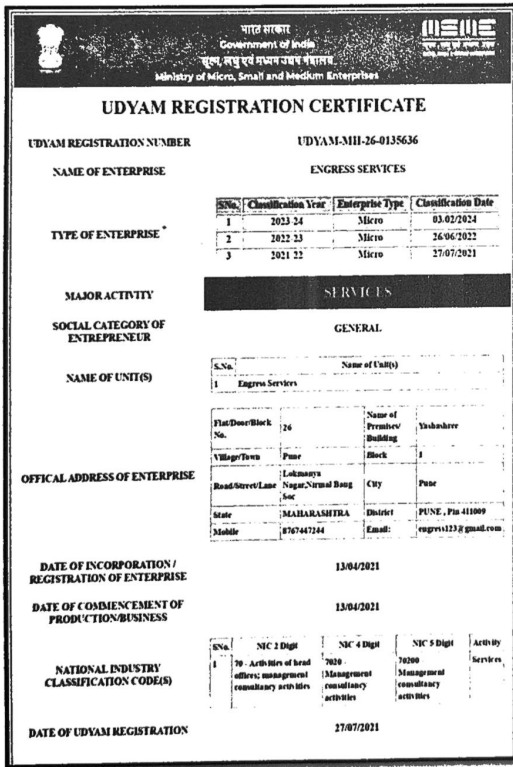
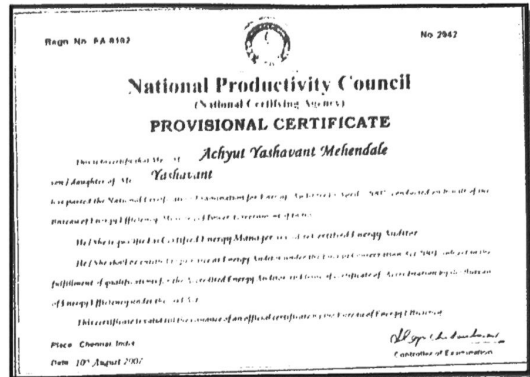
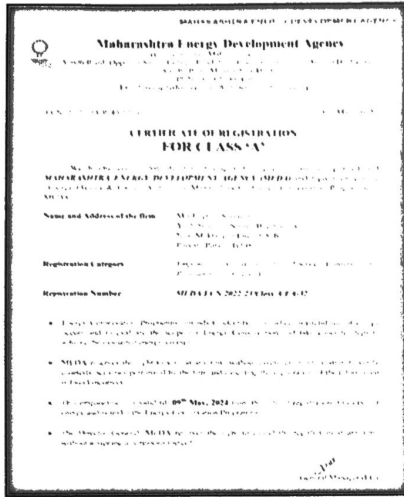
Prepared by:

ENGRESS SERVICES

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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 Yashaswi Education Society's International Institute of Management Science, Chinchwad, Pune 411 033, for awarding us the assignment of Energy Audit of their Chinchwad Campus, for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. Yashaswi Education Society's International Institute of Management Science Chinchwad 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 | 95.77 | kW |
| 2 | Annual Energy Consumed | 113048 | kWh |

3. Per Capita Energy Consumption:

| No | Particulars | Value | Unit |
|----|---|--------|-----------|
| 1 | Total Annual Energy Consumed | 113048 | kWh |
| 2 | No of students studying in the College | 442 | Nos |
| 3 | Per Capita Energy Consumption = (1) / (2) | 255.76 | kWh/Annum |

4. Study of % Usage of LED Lighting:

| No | Particulars | Value | Unit |
|----|---|-------|------|
| 1 | % of Usage of LED Lighting to Total Lighting Load | 100 | % |

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated equipment

6. Assumption:

1. 1 kWh of Electrical Energy releases 0.93 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.ccd.gujarat.gov.in

ABBREVIATIONS

| | | |
|-----------------|---|--|
| LED | : | Light Emitting Diode |
| 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 Yashaswi Education Society's International Institute of Management Science, Chinchwad, 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 College Location Image:



Institute
Campus

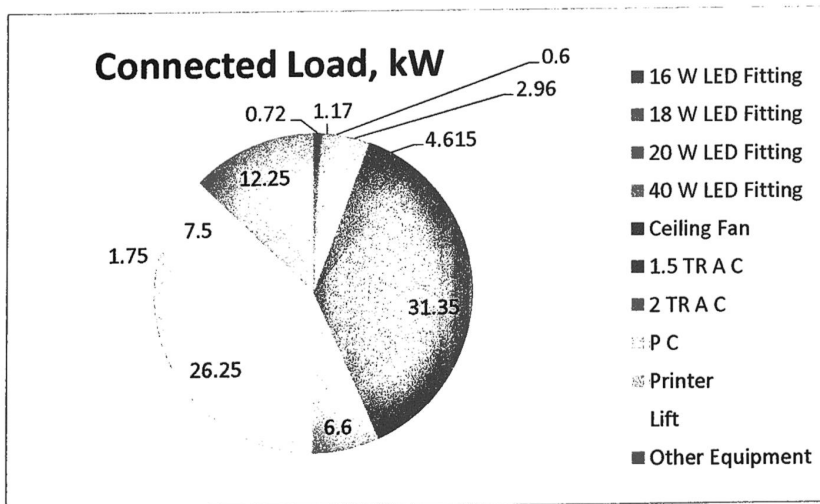
CHAPTER-II STUDY OF CONNECTED LOAD

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 | 16 W LED Fitting | 45 | 16 | 0.72 |
| 2 | 18 W LED Fitting | 65 | 18 | 1.17 |
| 3 | 20 W LED Fitting | 30 | 20 | 0.6 |
| 4 | 40 W LED Fitting | 74 | 40 | 2.96 |
| 5 | Ceiling Fan | 71 | 65 | 4.615 |
| 6 | 1.5 TR A C | 19 | 1650 | 31.35 |
| 7 | 2 TR A C | 3 | 2200 | 6.6 |
| 8 | P C | 175 | 150 | 26.25 |
| 9 | Printer | 10 | 175 | 1.75 |
| 10 | Lift | 1 | 7500 | 7.5 |
| 11 | Other Equipment | 35 | 350 | 12.25 |
| 12 | Total | | | 95.77 |

Chart No 1: Study of Connected Load:

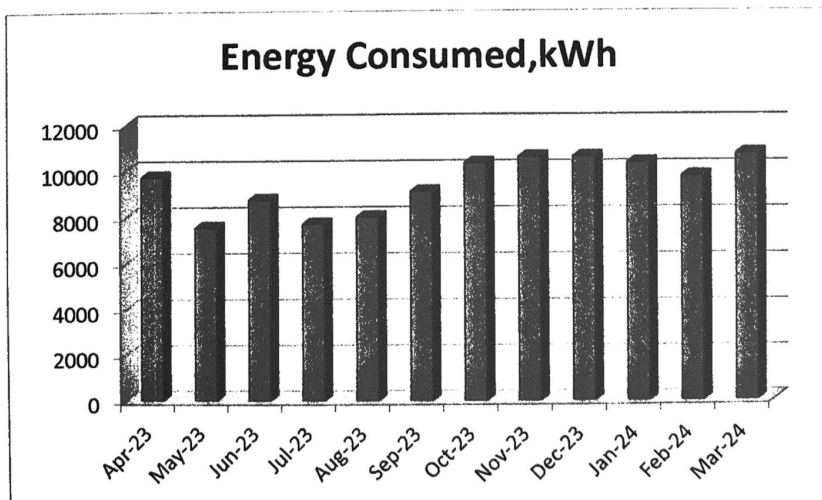


CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy Consumption.
Table No 2: Electrical Energy Consumption Analysis- 2023-24:

| No | Month | Energy Consumed, kWh | CO ₂ Emissions, MT |
|----|---------|----------------------|-------------------------------|
| 1 | Apr-23 | 9746 | 9.06 |
| 2 | May-23 | 7542 | 7.01 |
| 3 | Jun-23 | 8741 | 8.13 |
| 4 | Jul-23 | 7694 | 7.16 |
| 5 | Aug-23 | 7985 | 7.43 |
| 6 | Sep-23 | 9087 | 8.45 |
| 7 | Oct-23 | 10304 | 9.58 |
| 8 | Nov-23 | 10575 | 9.83 |
| 9 | Dec-23 | 10583 | 9.84 |
| 10 | Jan-24 | 10325 | 9.60 |
| 11 | Feb-24 | 9750 | 9.07 |
| 12 | Mar-24 | 10716 | 9.97 |
| 13 | Total | 113048 | 105.13 |
| 14 | Maximum | 10716 | 9.97 |
| 15 | Minimum | 7542 | 7.01 |
| 16 | Average | 9420.67 | 8.76 |

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



CHAPTER-IV

STUDY OF PER CAPITA ENERGY CONSUMPTION

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

It is determined by:

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

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 | 113048 | kWh |
| 2 | Total No of Students in the Institute | 442 | Nos |
| 3 | Energy Performance Index = (1) / (2) | 255.76 | 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^2)

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.

Computation of LED Lighting to Total Lighting Load:

- 1. Total Lighting Load is 5.45 kW.**
- 2. Total LED Lighting Load is 5.45 kW.**
- 3. % of LED to Total Lighting Load is 100%**

CHAPTER-VI STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The Institute has yet to install Roof Top Solar PV Plant.

6.2 Energy Efficiency Measures adopted:

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

Photographs of STAR Rated AC & LED Lighting:

