

ENERGY AUDIT REPORT

of

NAVSAHYADRI GROUP OF INSTITUTE

Naigaon, Taluka: Bhor, Dist: Pune 412 213




Year: 2023-24

Prepared by:



ENGRESS SERVICES

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

REGISTRATION CERTIFICATES

| | | |
|---|---|--|
| Regn. No. EA-8192 |  | No.2942 |
| National Productivity Council (National Certifying Agency) PROVISIONAL CERTIFICATE | | |
| This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u> son / daughter of Mr. <u>Yashavant</u> has passed the National Certification Examination for Energy Auditors 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 fulfillment of qualifications for the 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 | |  Controller of Examination |
| Date : 10 th August 2007 | | |

BEE Auditor Certificate

| | |
|--|--|
| 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/2022-23/CR-43/1709 | 10 th 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 Yashshree, 26, Nirmal Bag Society, Near Muktagan English School, Parvati, Pune - 411 009. |
| Registration Category | : Empanelled Consultant for Energy Conservation Programme for Class 'A' |
| Registration Number | : MEDA/ECN/2022-23/Class A/EA-32. |
| <ul style="list-style-type: none">• 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. | |
|  General Manager (EC) | |

MEDA Empanelment Certificate

ENGRESS SERVICES

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

Ref: ES/NIP/21-22/01

Date: 18/5/2024

ENERGY AUDIT CERTIFICATE

Certificate No:ES/NESGOI/23-24/01

This is to certify that we have conducted Energy Audit at Navsahyadri Group Of Institute, Naigaon, Taluka: Bhore, District: Pune in the Year 2023-24.

The Institute has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment.
- Usage of BEE STAR Rated Equipment
- Installation of 15 kWp Roof Top Solar PV Plant
- Installation of Solar Thermal Water Heating System at Hostel Blocks.

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

ENGRESS SERVICES

Yashashree, 26, Nirmla Bag Society, Near Muktagan English School,
Parvati, Pune 411 009 Tel: 09890444795 Email: engress123@gmail.com
UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)



ENERGY AUDIT CERTIFICATE

Certificate No: ES/NESGOI/23-24/01

Date: 16/5/2024

This is to certify that we have conducted Energy Audit at Navsahyadri Education Society's Group of Institutes, Naigaon, Pune in the Academic year 2023-24.

The Institute has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Installation of 15 kWp Roof Top Solar PV Plant
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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



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ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Navsahyadri Group Of Institute, Naigaon, Taluka: Bhor, District: Pune for awarding us the assignment of Energy Audit of their Campus, for the Academic Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Navsahyadri Group Of Institute, Naigaon, Taluka: Bhor, District: Pune consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities.

2. Present Energy Consumption:

| No | Parameter/ Value | Energy Purchased, kWh | LPG Consumed, Kg | CO ₂ Emissions, MT |
|----|---------------------|--------------------------|---------------------|----------------------------------|
| 1 | Total | 36813 | 112 | 33.43 |
| 2 | Maximum | 3236 | 18 | 2.93 |
| 3 | Minimum | 2875 | 6 | 2.64 |
| 4 | Average | 3067.75 | 9.33 | 2.79 |

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **5 kWp** Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**.
- Annual Energy generated by Solar PV Plant is **6000 kWh**
- Energy Purchased in 21-22 is **36813 kWh**
- Total Annual Energy Demand of the Institute is **42813 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **14 %**.

5. Usage of LED Lighting:

- The Total LED Lighting load of Institute is **2.4 kW**.
- The Total Lighting Load of the Institute is **5.48 kW**.
- The % of LED Lighting to Total Lighting Load is **43.80 %**.

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO₂** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. References:

- For CO₂ Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

| | |
|-----------------|--|
| BEE | Bureau of Energy Efficiency |
| MSEDCL | Maharashtra Electricity Distribution Company Limited |
| kWh | Kilo Watt Hour |
| kWp | Kilo Watt Peak |
| Kg | Kilo Gram |
| MT | Metric Ton |
| CO ₂ | Carbon Di Oxide |
| LPG | Liquefied Petroleum Gas |
| FTL | Fluorescent Tube Light |
| LED | Light Emitting Diode |

CHAPTER-I INTRODUCTION

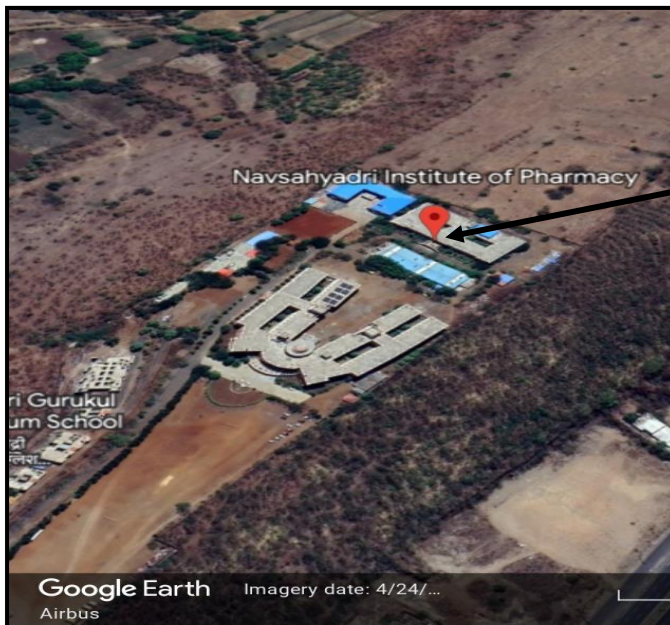
1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To compute the CO₂ Emissions
4. To study usage of Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the Institute:

| No | Head | Particulars |
|----|-----------------------|---|
| 1 | Name of Institute | Navsahyadri Group Of Institute |
| 2 | Address | Naigaon, Taluka: Bhor, District: Pune 412 213 |
| 3 | Year of Establishment | 2017 |

1.3 Google Earth Image:



Institute
Campus

CHAPTER-II STUDY OF CONNECTED LOAD

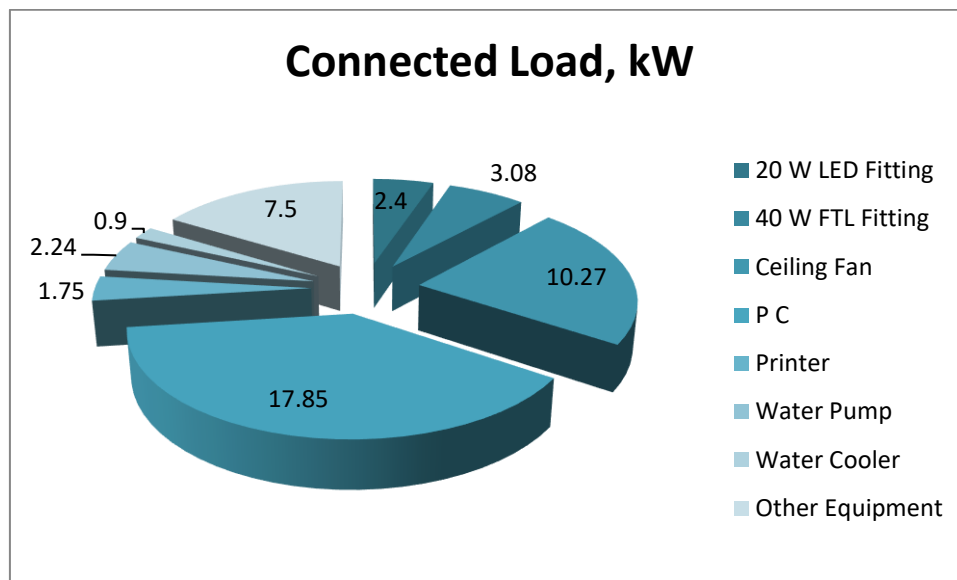
The major contributors to the connected load of the Institute are as under.

Table No 2: Equipment wise Connected Load:

| No | Equipment | Qty | Load/unit | Load, kW |
|----|------------------|-----|-----------|-----------|
| 1 | 20 W LED Fitting | 120 | 20 | 2.4 |
| 2 | 40 W FTL Fitting | 77 | 40 | 3.08 |
| 3 | Ceiling Fan | 158 | 65 | 10.27 |
| 4 | P C | 119 | 150 | 17.85 |
| 5 | Printer | 10 | 175 | 1.75 |
| 6 | Water Pump | 1 | 2238 | 2.24 |
| 7 | Water Cooler | 2 | 450 | 0.9 |
| 8 | Other Equipment | 30 | 250 | 7.5 |
| 9 | Total | | | 46 |

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No 3: Study of Electrical Energy & LPG Consumption: 21-22:

| No | Month | Energy Purchased, kWh | LPG Consumed, Kg |
|----|---------|-----------------------|------------------|
| 1 | Apr-21 | 2998 | 6 |
| 2 | May-21 | 3009 | 8 |
| 3 | Jun-21 | 3114 | 10 |
| 4 | Jul-21 | 3218 | 12 |
| 5 | Aug-21 | 3069 | 8 |
| 6 | Sep-21 | 3189 | 6 |
| 7 | Oct-21 | 2978 | 12 |
| 8 | Nov-21 | 2875 | 18 |
| 9 | Dec-21 | 2998 | 10 |
| 10 | Jan-22 | 3004 | 8 |
| 11 | Feb-22 | 3125 | 6 |
| 12 | Mar-22 | 3236 | 8 |
| 13 | Total | 36813 | 112 |
| 14 | Maximum | 3236 | 18 |
| 15 | Minimum | 2875 | 6 |
| 16 | Average | 3067.75 | 9.33 |

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

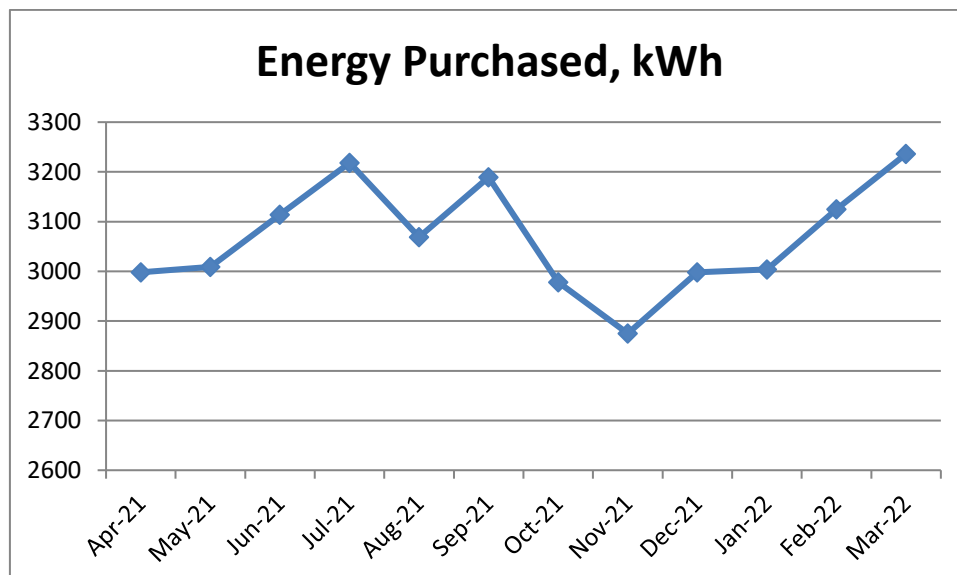
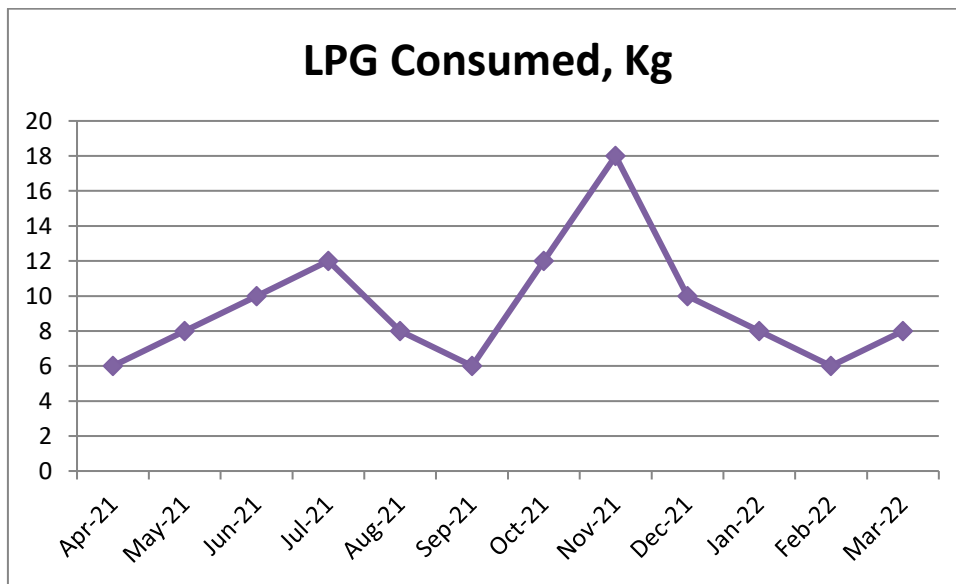


Chart No 3: Study of Month wise LPG Consumption:



CHAPTER-IV STUDY OF CO₂ EMISSION

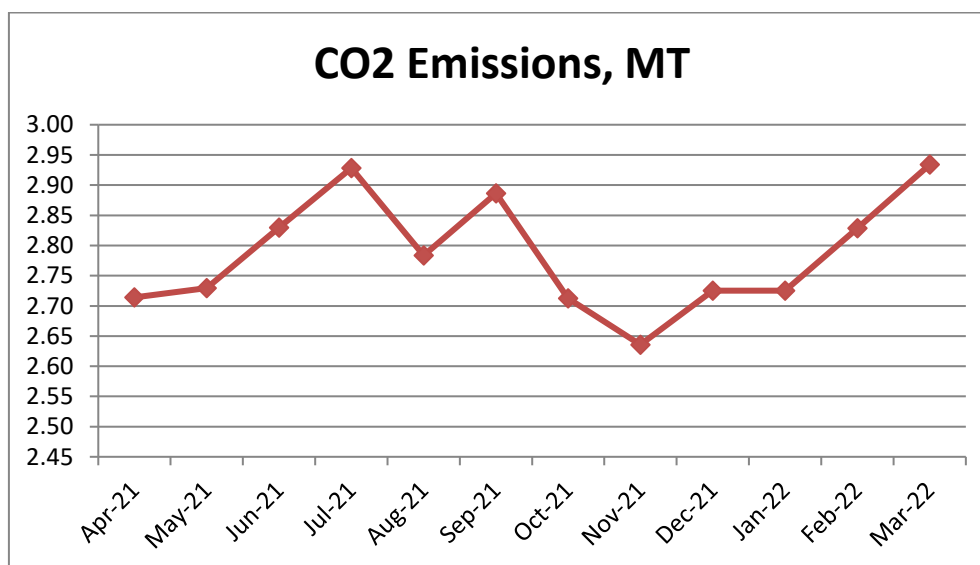
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions:**

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO₂ into atmosphere.

Table No 4: Month wise CO₂ Emissions:

| No | Month | Energy Purchased, kWh | LPG Consumed, Kg | CO ₂ Emissions, MT |
|----|---------|-----------------------|------------------|-------------------------------|
| 1 | Apr-21 | 2998 | 6 | 2.71 |
| 2 | May-21 | 3009 | 8 | 2.73 |
| 3 | Jun-21 | 3114 | 10 | 2.83 |
| 4 | Jul-21 | 3218 | 12 | 2.93 |
| 5 | Aug-21 | 3069 | 8 | 2.78 |
| 6 | Sep-21 | 3189 | 6 | 2.89 |
| 7 | Oct-21 | 2978 | 12 | 2.71 |
| 8 | Nov-21 | 2875 | 18 | 2.64 |
| 9 | Dec-21 | 2998 | 10 | 2.73 |
| 10 | Jan-22 | 3004 | 8 | 2.73 |
| 11 | Feb-22 | 3125 | 6 | 2.83 |
| 12 | Mar-22 | 3236 | 8 | 2.93 |
| 13 | Total | 36813 | 112 | 33.43 |
| 14 | Maximum | 3236 | 18 | 2.93 |
| 15 | Minimum | 2875 | 6 | 2.64 |
| 16 | Average | 3067.75 | 9.33 | 2.79 |

Chart No 4: Representation of Month wise CO₂ Emissions:



CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**.

In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the Institute.

Table No 5: Computation of % of Alternate Energy to Total Annual Energy Demand:

| No | Particulars | Value | Unit |
|----|---|--------------|---------|
| 1 | Energy Purchased from MSEDCL | 36813 | kWh |
| 2 | Installed Roof Top Solar PV Plant Capacity | 5 | kWp |
| 3 | Average Daily Energy Generated | 4 | kWh/kWp |
| 4 | Annual Generation Days | 300 | Nos |
| 5 | Annual Solar Energy Generated | 6000 | kWh |
| 6 | Total Energy Demand = (1) + (5) | 42813 | kWh |
| 7 | % of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6) | 14 | % |

Photograph of Roof Top Solar PV Plant:



CHAPTER VI STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load..

Table No 6: Percentage of Usage of LED Lighting to Total Lighting Load:

| No | Particulars | Value | Unit |
|-----------|--|--------------|-------------|
| 1 | No of 40 W FTL Fittings | 77 | Nos |
| 2 | Load/unit of 40 W FTL Fitting | 40 | W |
| 3 | Total Load for 40 W FTL Fittings | 3.08 | kW |
| | | | |
| 4 | No of 20 W LED Fittings | 120 | Nos |
| 5 | Load/unit of 20 W LED Fitting | 20 | W |
| 6 | Total Load for 20 W LED Fittings | 2.4 | kW |
| | | | |
| 7 | Total LED Lighting Load = 6 | 2.4 | kW |
| 8 | Total LED Lighting Load = 3+6 | 5.48 | kW |
| | | | |
| 9 | % of LED to Total Lighting Load= $7*100/8$ | 43.80 | % |