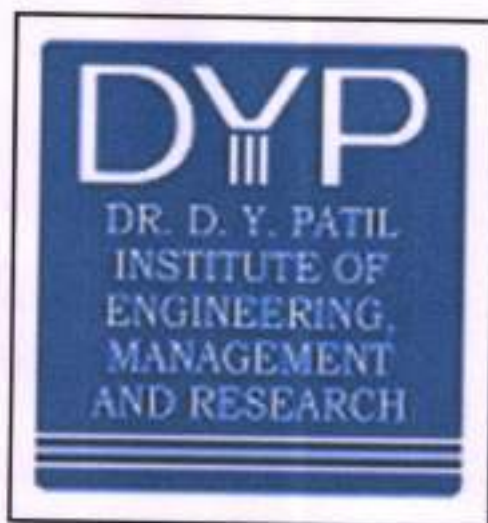


ENERGY AUDIT REPORT
of
Dr D Y Patil Pratishthan's,
Dr. D. Y. Patil Institute of Engineering Management
and Research, Akrudi, Pune



Year: 2020-21

Prepared by

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RD 91 / 2462



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-14/1577

22nd April, 2021

**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 Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

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

Registration Number : MEDA/ECN/2021-22/Class A/EA-03

- 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 **21st April, 2023** 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)



Enrich Consultants

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

Ref: EC/DYPIEMR/20-21/01

Date: 25/7/2021

CERTIFICATE

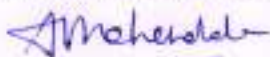
This is to certify that we have conducted Energy Audit at Dr D Y Patil Pratishthan's Dr. D. Y. Patil Institute of Engineering Management and Research, Akurdi, Pune in the Academic year 2020-21.

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
- Installation of **20 kWp** Roof Top Solar PV Plant.
- Installation of **1500 LPD** Solar Thermal Water Heating System

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Dr D Y Patil Pratishthan's Dr. D. Y. Patil Institute of Engineering Management and Research, Akurdi, Pune, for awarding us the assignment of Energy Audit of Akurdi campus for the Academic Year: 2020-21.

We are thankful to all the Head of the Departments & Staff members for helping us during the field study.



EXECUTIVE SUMMARY

1. Dr. D. Y. Patil Pratishthan's Dr. D. Y. Patil Institute of Engineering Management and Research, Akurdi, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption:

| No | Parameter /Value | Energy Purchased, kWh | CO ₂ Emissions, MT |
|----|------------------|-----------------------|-------------------------------|
| 1 | Total | 61047 | 54.94 |
| 2 | Maximum | 9718 | 8.75 |
| 3 | Minimum | 2942 | 2.65 |
| 4 | Average | 5087.25 | 4.58 |

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Maximum usage of Day Lighting
- Installation of **20 kWp** Roof Top Solar PV Plant
- Installation of **1500 LPD** Solar Thermal Water Heating System

4. Usage of Alternate / Renewable Energy:

- The Institute has installed **20 kWp** Roof Top Solar PV Plant.
- The Energy purchased from MSEDCL in 2020-21 is **61047 kWh**
- Energy generated by Solar PV Plant is **24000 kWh**
- Therefore the percentage of Usage of Alternate Energy to Annual Energy Demand in the Year: 2020-21 works out to be **28.22 %**.

5. Usage of LED Lighting:

- The total Total Lighting Load is **34.21 kW**,
- The Annual LED Lighting Load is **34.21 kWh**.
- The % of Total Lighting Requirement met by LED Lighting is **100 %**.

6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. Average Energy generated by **1 kWp** Roof Top Solar PV System: **4 kWh**
3. Annual Solar Energy Generation Days: **300 Nos**

7. References:

1. For CO₂ Emissions: www.tatapower.com
2. For Solar PV Energy Generation: www.solarroftop.gov.in

ABBREVIATIONS

| | |
|-----|----------------------------|
| AC | : Air conditioner |
| CFL | : Compact Fluorescent Lamp |
| FTL | : Fluorescent Tube Light |
| LED | : Light Emitting Diode |
| PL | : Pin Type Light Fitting |
| kWh | : kilo-Watt Hour |
| Qty | : Quantity |
| W | : Watt |
| kW | : Kilo Watt |
| D/L | : Down Lighter |
| PC | : Personal Computer |
| MT | : Metric Ton |

CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. present level of Energy Consumption
3. To Study the present CO₂ emissions
4. To study Usage of Renewable Energy
5. To study usage of LED Lights

1.2 Table No 1: General Details of Institute:

| No | Head | Particulars |
|----|-----------------------|---|
| 1 | Name | Dr D Y Patil Pratishthan's Dr. D. Y. Patil Institute of Engineering Management and Research, Akurdi |
| 2 | Address | D Y Patil Educational Complex, Sector 29, Nigdi, Pradhikaran, Akurdi, Pune |
| 3 | Year of Establishment | 2012-13 |



CHAPTER-II

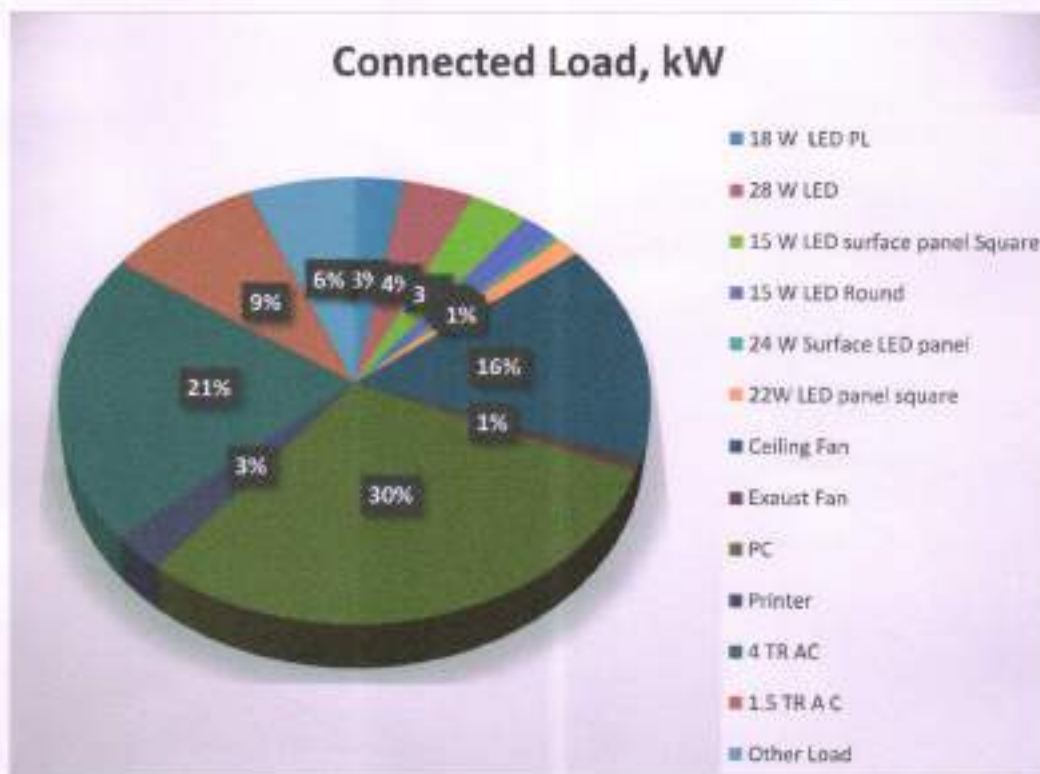
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No-2: Study of Equipment wise Connected Load:

| No | Equipment | Qty | Load, W/Unit | Load, kW |
|----|-------------------------------|-----|--------------|------------|
| 1 | 18 W LED PL | 384 | 18 | 6.91 |
| 2 | 28 W LED | 348 | 28 | 9.74 |
| 3 | 15 W LED surface panel Square | 551 | 15 | 8.27 |
| 4 | 15 W LED Round | 316 | 15 | 4.74 |
| 5 | 24 W Surface LED panel | 51 | 24 | 1.22 |
| 6 | 22W LED panel square | 151 | 22 | 3.32 |
| 7 | Ceiling Fan | 587 | 65 | 38.16 |
| 8 | Exhaust Fan | 26 | 65 | 1.69 |
| 9 | PC | 563 | 125 | 70.38 |
| 10 | Printer | 43 | 150 | 6.45 |
| 11 | 4 TR AC | 10 | 5000 | 50.00 |
| 12 | 1.5 TR A C | 12 | 1800 | 21.60 |
| 13 | Other Load | 100 | 150 | 15.00 |
| 14 | Total | | | 237 |

Chart No-1: Details of Connected Load:



CHAPTER-III

STUDY OF ELECTRICAL ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption

Table No 3: Electrical Energy Consumption Analysis- 2020-21:

| No | Month | Energy Purchased, kWh |
|----|---------|-----------------------|
| 1 | Jul-20 | 2942 |
| 2 | Aug-20 | 3663 |
| 3 | Sep-20 | 4420 |
| 4 | Oct-20 | 9718 |
| 5 | Nov-20 | 4045 |
| 6 | Dec-20 | 4592 |
| 7 | Jan-21 | 7558 |
| 8 | Feb-21 | 7276 |
| 9 | Mar-21 | 5548 |
| 10 | Apr-21 | 3998 |
| 11 | May-21 | 3208 |
| 12 | Jun-21 | 4079 |
| 13 | Total | 61047 |
| 14 | Maximum | 9718 |
| 15 | Minimum | 2942 |
| 16 | Average | 5087.25 |

Chart No 2: To study the variation of Month wise Energy Consumption, kWh:

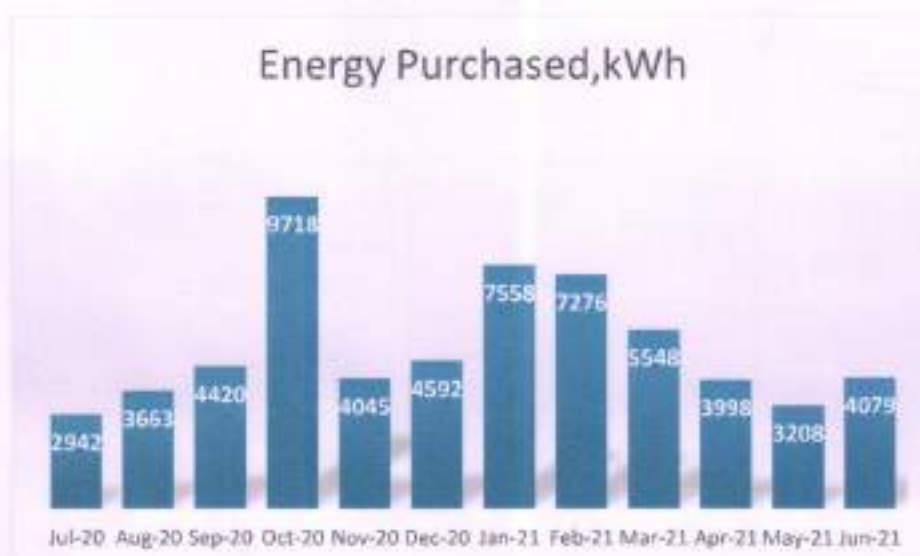


Table No 4: Key Parameters:

| No | Parameter | Energy Purchased, kWh |
|----|-----------|-----------------------|
| 1 | Total | 61047 |
| 2 | Maximum | 9718 |
| 3 | Minimum | 2942 |
| 4 | Average | 5087.25 |

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 Electrical Energy for various Electrical gadgets.

Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy are: 1 Unit (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 Purchased, kWh | CO ₂ Emission ,MT |
|----|---------|-----------------------|------------------------------|
| 1 | Jul-20 | 2942 | 2.65 |
| 2 | Aug-20 | 3663 | 3.30 |
| 3 | Sep-20 | 4420 | 3.98 |
| 4 | Oct-20 | 9718 | 8.75 |
| 5 | Nov-20 | 4045 | 3.64 |
| 6 | Dec-20 | 4592 | 4.13 |
| 7 | Jan-21 | 7558 | 6.80 |
| 8 | Feb-21 | 7276 | 6.55 |
| 9 | Mar-21 | 5548 | 4.99 |
| 10 | Apr-21 | 3998 | 3.60 |
| 11 | May-21 | 3208 | 2.89 |
| 12 | Jun-21 | 4079 | 3.67 |
| 13 | Total | 61047 | 54.94 |
| 14 | Maximum | 9718 | 8.75 |
| 15 | Minimum | 2942 | 2.65 |
| 16 | Average | 5087.25 | 4.58 |

Chart No 3: Representation of Month wise CO₂ emissions:

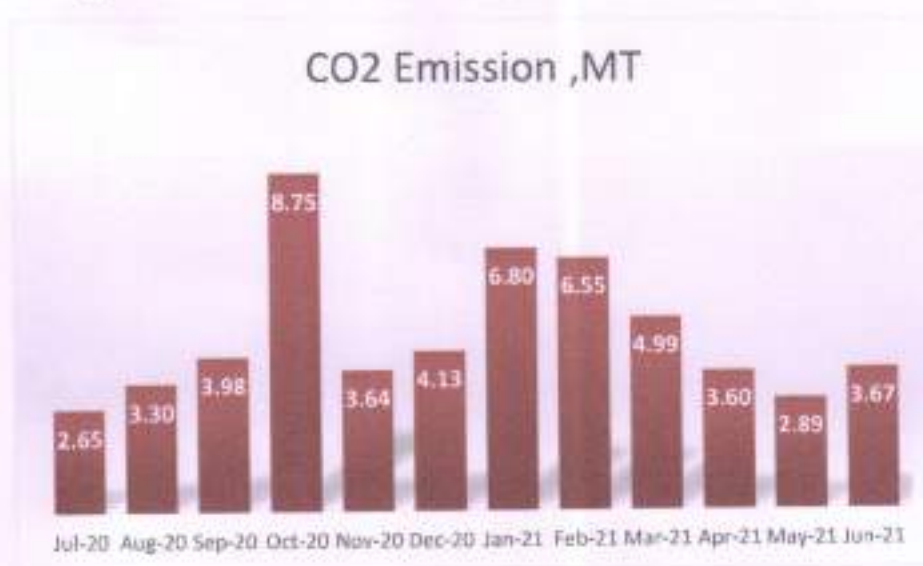


Table No 6: Key Parameters:

| No | Value | Energy Purchased, kWh | CO ₂ emissions, MT |
|----|---------|-----------------------|-------------------------------|
| 1 | Total | 61047 | 54.94 |
| 2 | Maximum | 9718 | 8.75 |
| 3 | Minimum | 2942 | 2.65 |
| 4 | Average | 5087.25 | 4.58 |

CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

The Institute has installed **20 kWp** Roof Top Solar PV Plant.

In this Chapter, we compute the percentage of usage of Alternate / Renewable Energy to Annual Energy Demand of the Institute.

Table No 7: Computation of % usage of Alternate Energy to Annual Energy Demand:

| No | Particulars | Value | Unit |
|----|---|-------|---------|
| 1 | Energy Purchased from MSEDCL | 61047 | kWh |
| 2 | Installed Roof Top Solar PV Plant Capacity | 20 | kWp |
| 3 | Average Daily Energy Generated | 4 | kWh/kWp |
| 4 | Annual Generation Days | 300 | Nos |
| 5 | Annual Solar Energy Generated | 24000 | kWh |
| 6 | Total Energy Demand = (1) + (5) | 85047 | kWh |
| 7 | % of Usage of Alternate Energy to Total Annual Energy Demand= (5)*100/ (6) | 28.22 | % |

Photograph of Roof Top Solar PV Plant:



CHAPTER VI

STUDY OF USAGE OF LED LIGHTS

In the following Table, we present the percentage of annual Lighting load met by LED lights.

Table No 8: Computation of Percent Usage of Annual LED Usage to Annual Lighting Power Requirement:

| No | Particulars | Value | Unit |
|----|--|-------|--------|
| 1 | 18 W LED PL | 384 | Nos |
| 2 | 28 W LED | 348 | Nos |
| 3 | 15 W LED surface panel Square | 551 | Nos |
| 4 | 15 W LED Round | 316 | Nos |
| 5 | 24 W Surface LED panel | 51 | Nos |
| 6 | 22 W LED panel square | 151 | Nos |
| | | | |
| 7 | Demand of 18 W LED PL Fitting | 18 | W/Unit |
| 8 | Demand of 28 W LED Fitting | 28 | W/Unit |
| 9 | Demand of 15 W LED Square Fitting | 15 | W/Unit |
| 10 | Demand of 15 W LED Round Fitting | 15 | W/Unit |
| 11 | Demand of 24 W LED Fitting | 24 | W/Unit |
| 12 | Demand of 22 W LED Fitting | 22 | W/Unit |
| | | | |
| 13 | Load of 18 W LED PL Fitting | 6.91 | kW |
| 14 | Load of 28 W LED Fitting | 9.74 | kW |
| 15 | Load of 15 W LED Square Fitting | 8.27 | kW |
| 16 | Load of 15 W LED Round Fitting | 4.74 | kW |
| 17 | Load of 24 W LED Fitting | 1.22 | kW |
| 18 | Load of 22 W LED Fitting | 3.32 | kW |
| | | | |
| 19 | Total Lighting Load=13+14+15+16+17+18 | 34.21 | kW |
| 20 | Total LED Lighting load=18 | 34.21 | kW |
| | | | |
| 21 | % of Usage of LED to Total Lighting Load= $20 \times 100 / 19$ | 100 | % |