

ENERGY AUDIT REPORT
of
Jayawant Shikshan Prasarak Mandal's,
RAJARSHI SHAHU COLLEGE OF PHARMACY & RESEARCH,
Tathawade, Pune 411 033



Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
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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

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ECN/2022-23/CR-43/1709

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
Yashshree, 26, Nirmal Bag Society,
Near Muktangan 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.*

- 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)

ENGRESS SERVICES

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

Ref: ES/RSCOPR/21-22/01

Date: 18/6/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Jayawant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune 411 033, in the Year 2021-22.

.The College 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 10 kWp Roof Top Solar PV Plant

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,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune, for awarding us the assignment of Energy Audit of their Campus for the Year: 21-22.

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Rajarshi College of Pharmacy & Research, Tathawade, Pune consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	48771	44
2	Maximum	4986	4
3	Minimum	3260	3
4	Average	4064	4

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of 10 kWp Roof Top Solar PV Plant.

4. Usage of Alternate Energy:

- Energy purchased from MSEDCL is **48771 kWh**.
- Energy generated by Roof Top Solar PV Plant is **12000 kWh**.
- The Annual Energy Demand of the College is **60771 kWh**.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is **20 %**.

5. Usage of LED Lighting:

- The Total Lighting Load of the College is **8.5 kW**.
- The Total LED Lighting Load of the College is **3.3 kW**.
- The percentage of LED Lighting to Total Lighting Load is **39 %**.

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. Average Energy generated by Solar PV Plant in a Day: **4 kWh/kWp**
3. Annual Solar Energy Generation Days: **300 Nos.**

7. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar PV Plant Energy generation: www.solarrooftop.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 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To compute 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 College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research,
2	Address	Tathawade, Pune 411 033
3	Affiliation	Savitribai Phule Pune University

1.3 Google Earth Image:



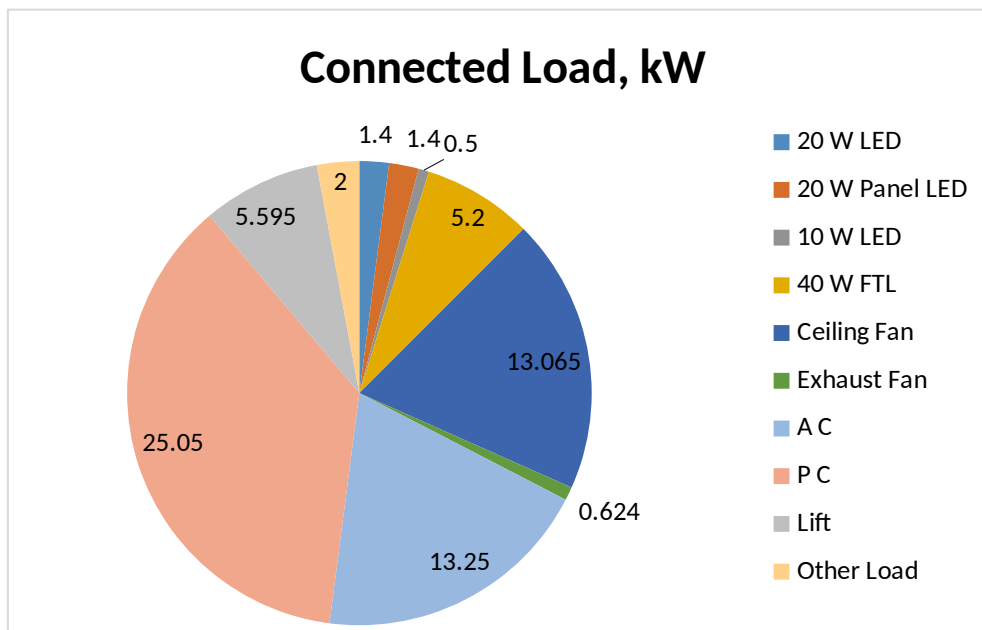
CHAPTER-II STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load/Unit, W	Load, kW
1	20 W LED	70	20	1.4
2	20 W Panel LED	70	20	1.4
3	10 W LED	50	10	0.5
4	40 W FTL	130	40	5.2
5	Ceiling Fan	201	65	13.07
6	Exhaust Fan	12	52	0.62
7	A C	10	1325	13.25
8	P C	167	150	25.05
9	Lift	1	5595	5.60
10	Other Load	10	200	2
11	Total			68

Chart No 1: Study of Connected Load:



CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Bills

Table No 3: Electrical Bill Analysis- 2021-22:

No	Month	Energy Purchased, kWh
1	Apr-21	3727
2	May-21	3278
3	Jun-21	3260
4	Jul-21	3454
5	Aug-21	3845
6	Sep-21	3947
7	Oct-21	4845
8	Nov-21	4986
9	Dec-21	3985
10	Jan-22	4125
11	Feb-22	4532
12	Mar-22	4787
13	Total	48771
14	Maximum	4986
15	Minimum	3260
16	Average	4064

Chart No 2: Variation in Monthly Energy Consumption:

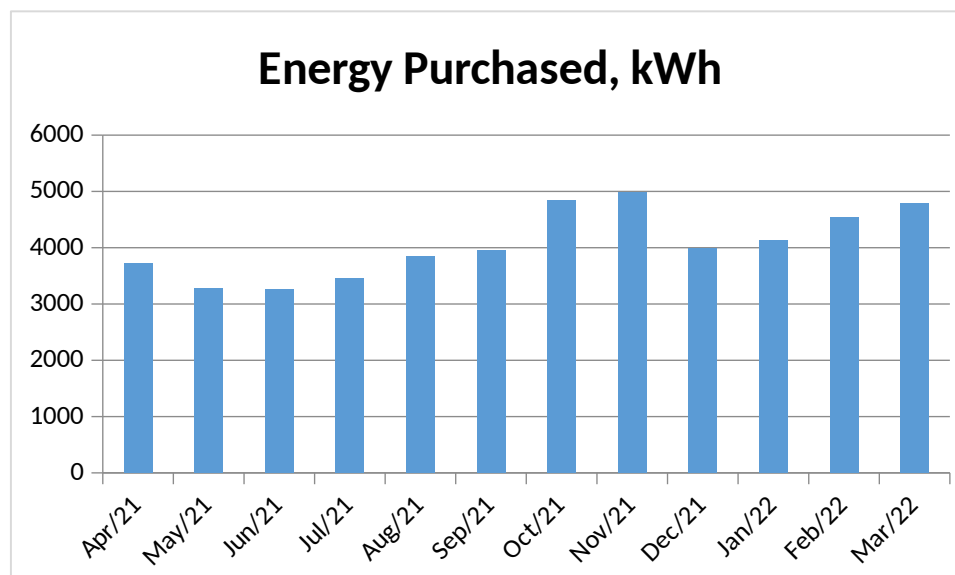


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	48771
2	Maximum	4986
3	Minimum	3260
4	Average	4064

CHAPTER-IV

STUDY OF 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 College for performing its day to day activities.

The College uses Electrical Energy for various Electrical gadgets.

Basis for computation of CO₂ Emissions:

- 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 College due to its Day to Day operations

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	3727	3.35
2	May-21	3278	2.95
3	Jun-21	3260	2.93
4	Jul-21	3454	3.11
5	Aug-21	3845	3.46
6	Sep-21	3947	3.55
7	Oct-21	4845	4.36
8	Nov-21	4986	4.49
9	Dec-21	3985	3.59
10	Jan-22	4125	3.71
11	Feb-22	4532	4.08
12	Mar-22	4787	4.31
13	Total	48771	44
14	Maximum	4986	4
15	Minimum	3260	3
16	Average	4064	4

Chart No 3: Month wise CO₂Emissions:

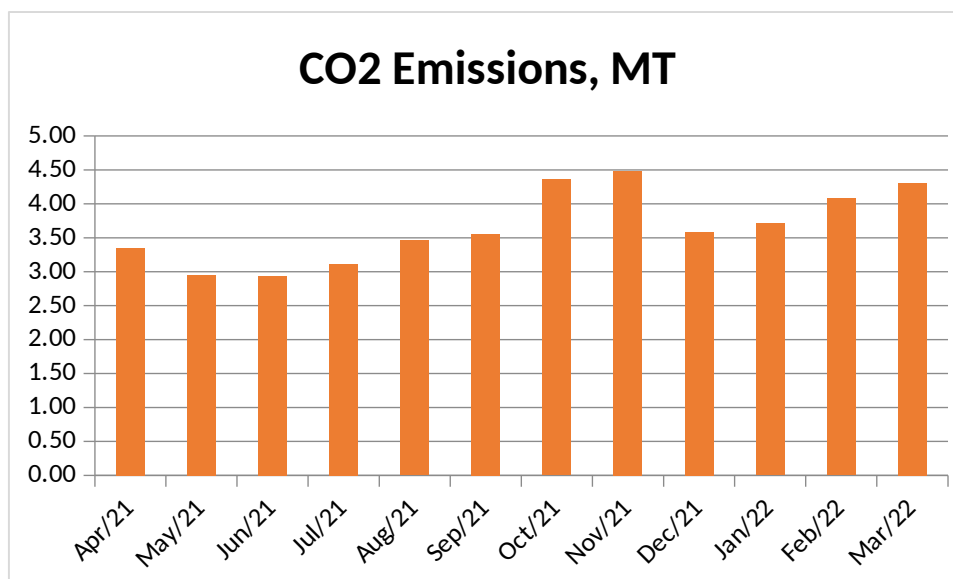


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	48771	44
2	Maximum	4986	4
3	Minimum	3260	3
4	Average	4064	4

CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

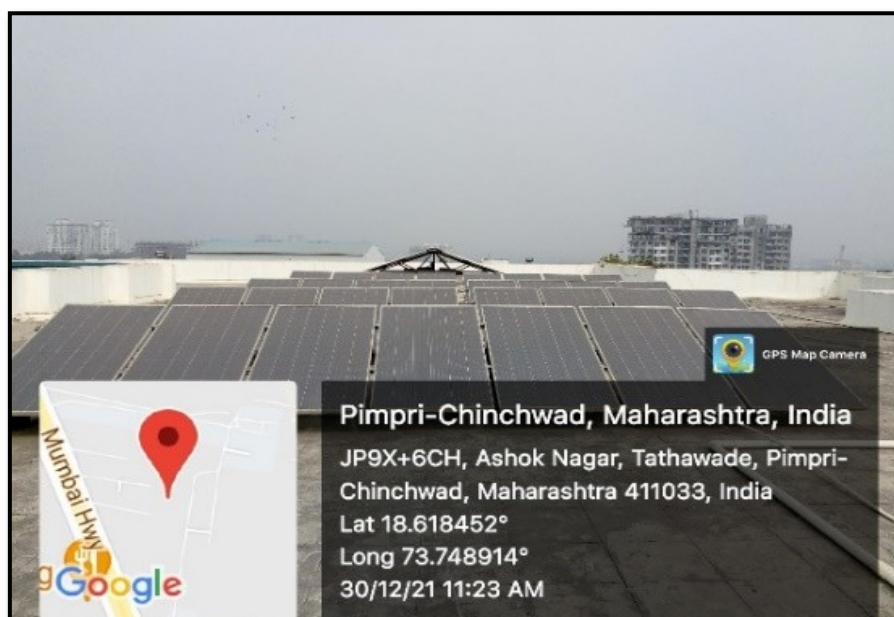
The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the College.

Table No 7: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Energy purchased from MSEDCL	48771	kWh
2	Roof Top Solar PV Plant Capacity	10	kWp
3	Average Energy generated per kWp	4	kWh
4	Annual Energy Generation Days	300	Nos
5	Energy generated by Solar PV Plant in 21-22 = $2*3*4$	12000	kWh
6	Total Energy Requirement = $1+5$	60771	kWh
7	% of Usage of Alternate Energy = $(5)*100/(6)$	20	%

Photograph of 10 kWp 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 Annual Lighting power requirement.

Table No 8: Percentage of Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Tube Lights	130	Nos
2	Demand of 40 W FTL Tube Light	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	5.2	kW
4	No of 20 W LED Tube Lights	140	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	2.8	kW
7	No of 10 W LED Down Lighter Fitting	50	Nos
8	Demand of 10 W LED Fitting	10	W/Unit
9	Total Electrical Load of 10 W LED Fitting	0.5	kW
10	Total LED Lighting Load = 6+9	3.3	kW
11	Total Lighting Load =3+6+9	8.5	kW
12	Total Lighting Requirement met by LEDs = 10*100/11	39	%