

ENERGY AUDIT REPORT

of

Jaywant Shikshan Prasarak Mandal's,
Rajarshi Shahu College of Pharmacy & Research,
Tathawade, Pune 411 033



Year: 2020-21

Prepared by:

Enrich Consultants

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
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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 Mukhtangan 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 Mukangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/RSCOPR/20-21/01

Date: 18/7/2021

CERTIFICATE

This is to certify that we have conducted Energy Audit at Jaywant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune 411 033, in the Academic year 2020-21.

.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 Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Jaywant 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: 2020-21.

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

EXECUTIVE SUMMARY

1. Jaywant 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.

1. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	54544	49.09
2	Maximum	6410	5.77
3	Minimum	3984	3.59
4	Average	4877	4.39

2. Energy Conservation projects already installed:

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

3. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- Energy purchased from MSEDCL is **54544 kWh**.
- Energy generated by Roof Top Solar PV Plant is **12000 kWh**.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is **18.03 %**.

4. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is **10752 kWh**.
- The Total Annual LED Lighting Demand is **3552 kWh**.
- The percentage of Annual LED Lighting to Annual Lighting Demand is **33 %**.

5. Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. Daily working hours-**8 Nos** (For Lighting Calculations)
3. Annual working Days-**180 Nos** (For Lighting Calculations)
4. Annual Solar Energy Generation Days: **300 Nos**.

6. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar PV Plant Energy generation: www.solarroftop.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 present Energy Consumption
2. To Study the present CO₂ emissions
3. To study usage of Alternate Energy
4. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

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

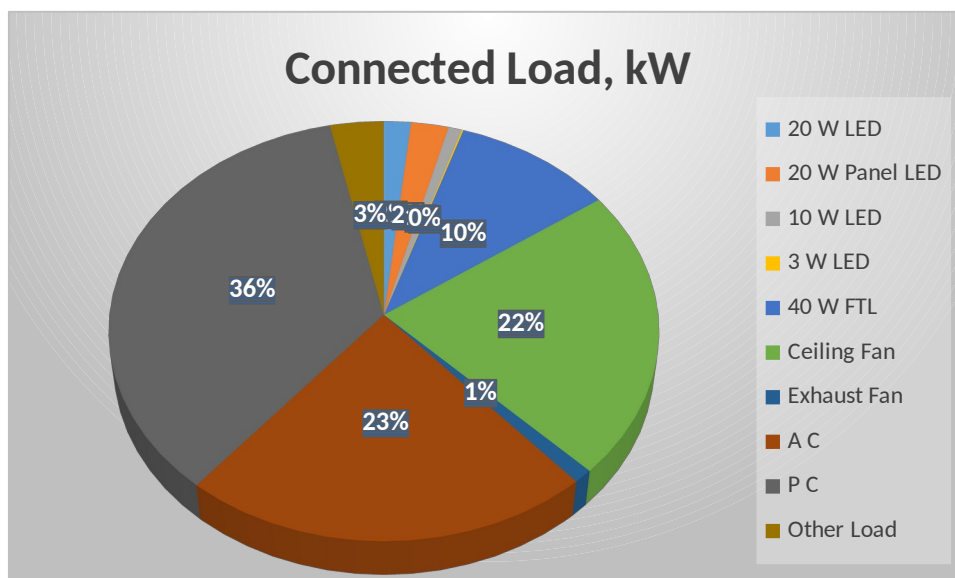
CHAPTER-II STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load/Unit, W	Load, kW
1	20 W LED	50	20	1
2	20 W Panel LED	70	20	1.4
3	10 W LED	50	10	0.5
4	3 W LED	20	3	0.06
5	40 W FTL	150	40	6
6	Ceiling Fan	201	65	13.07
7	Exhaust Fan	12	52	0.624
8	A C	10	1325	13.25
9	P C	167	125	20.88
10	Other Load	10	200	2.00
11	Total			59

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- 2020-21:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Jul-20	4039	3.64
2	Aug-20	4289	3.86
3	Sep-20	4442	4.00
4	Oct-20	4584	4.13
5	Nov-20	4857	4.37
6	Dec-20	5427	4.88
7	Jan-21	6410	5.77
8	Feb-21	5705	5.13
9	Mar-21	6230	5.61
10	Apr-21	4555	4.10
11	May-21	4007	3.61
12	Jun-21	3984	3.59
13	Total	54544	49.09
14	Maximum	6410	5.77
15	Minimum	3984	3.59
16	Average	4877	4.39

Chart No 2: Variation in Monthly Energy Consumption:

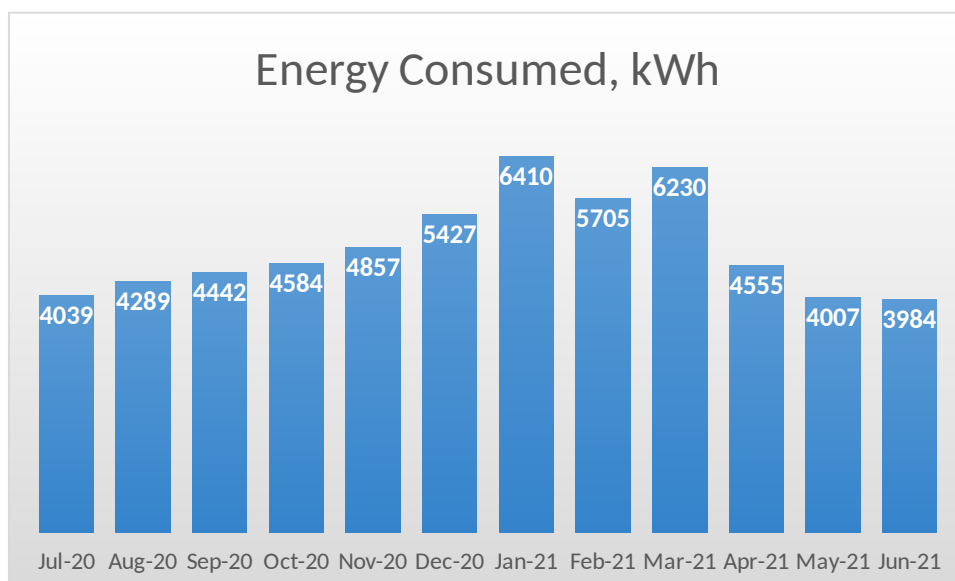


Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	54544
2	Maximum	6410
3	Minimum	3984
4	Average	4877

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 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 Consumed, kWh	CO2 Emissions, MT
1	Jul-20	4039	3.64
2	Aug-20	4289	3.86
3	Sep-20	4442	4.00
4	Oct-20	4584	4.13
5	Nov-20	4857	4.37
6	Dec-20	5427	4.88
7	Jan-21	6410	5.77
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12	Jun-21	3984	3.59
13	Total	54544	49.09
14	Maximum	6410	5.77
15	Minimum	3984	3.59
16	Average	4877	4.39

Chart No 3: Month wise CO₂ Emissions:

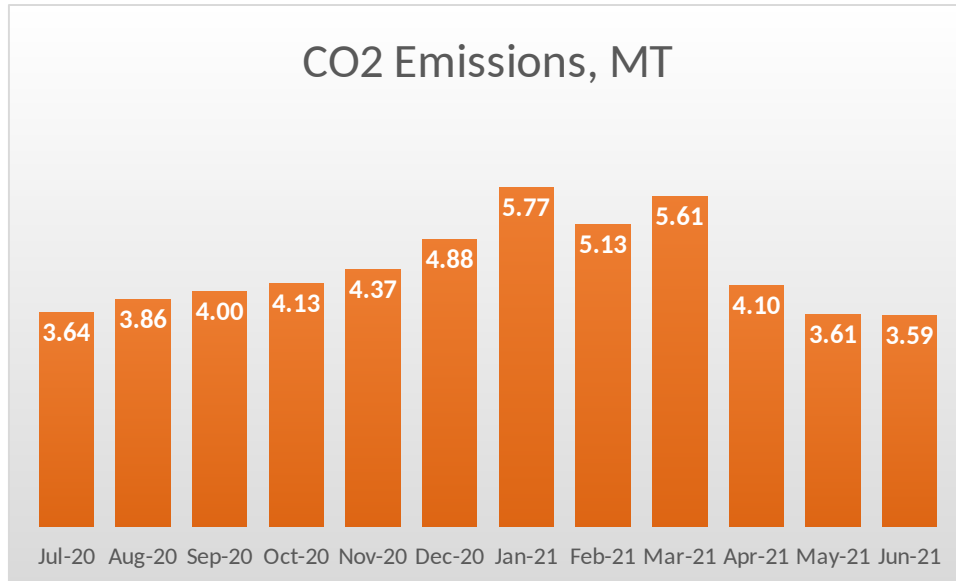


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	54544	49.09
2	Maximum	6410	5.77
3	Minimum	3984	3.59
4	Average	4877	4.39

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	Roof Top Solar PV Plant Capacity	10	kWp
2	Average Energy generated per kWp	4	kWh
3	Annual Energy Generation Days	300	Nos
4	Energy generated by Solar PV Plant in 20-21= 1*2*3	12000	kWh
5	Energy purchased from MSEDCL	54544	kWh
6	Total Energy Requirement = 4+5	66544	kWh
7	% of Usage of Alternate Energy = (4)*100/(6)	18.03	%

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	150	Nos
2	Demand of 40 W FTL Tube Light	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	6	kW
4	No of 20 W LED Tube Lights	120	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	2.4	kW
7	No of 3 W LED Down Lighter Fitting	20	Nos
8	Demand of 3 W LED Fitting	3	W/Unit
9	Total Electrical Load of 3 W LED Fitting	0.06	kW
10	No of 10 W LED Down Lighter Fitting	50	Nos
11	Demand of 10 W LED Fitting	10	W/Unit
12	Total Electrical Load of 10 W LED Fitting	0.5	kW
13	Total Lighting Load=3+6+9+12	8.96	kW
14	Total LED Lighting Load= 6+9+12	2.96	kW
15	Average Daily Usage Period	8	Hours
16	Annual Working Days	150	Nos
17	Annual Total Lighting Load = 13*15*16	10752	kWh
18	Annual LED Lighting Load = 14*15*16	3552	kWh
19	Annual Lighting Requirement met by LED= 18*100/17	33	%