

ENERGY AUDIT REPORT
of
Jayawant Shikshan Prasarak Mandal's
Jayawantrao Sawant College of Pharmacy and Research,
Handewadi, Hadapsar, Pune



Year: 2020-21

Prepared by:

Enrich Consultants

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001:2000 Reg. no. RQ 91 / 2402



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

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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 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 (I.C.)



Enrich Consultants

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Ref: EC/JSCOPR/20-21/01

Date: 19/8/2021

CERTIFICATE

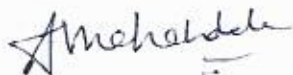
This is to certify that we have conducted Energy Audit at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi Pune, in the Academic year 2020-21

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 Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Hadapsar, Pune for awarding us the assignment of Energy Audit of their Campus for the Year: 2020-21.

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



EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, 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	33748	30.37
2	Maximum	3553	3.20
3	Minimum	2317	2.09
4	Average	2812	2.53

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 33748 kWh.
- Energy generated by Roof Top Solar PV Plant is 12000 kWh.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is 36 %.

4. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is 12770 kWh.
- The Total Annual LED Lighting Demand is 3208 kWh.
- The percentage of Annual LED Lighting to Annual Lighting Demand is 25 %.

5. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. Daily working hours-6 Nos (For Lighting Calculations)
3. Annual working Days-180 Nos (For Lighting Calculations)
4. Annual Solae 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	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research
2	Address	Handewadi, Hadapsar
3	Affiliation	Savitribai Phule Pune University



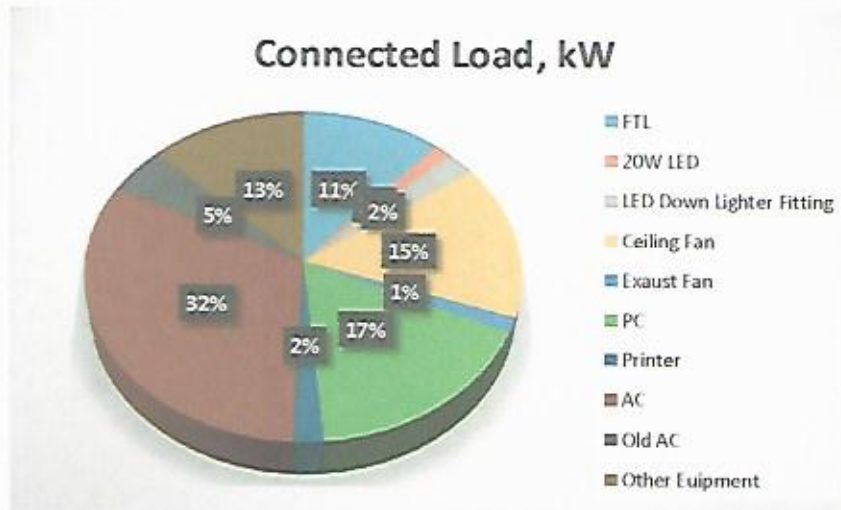
CHAPTER-II STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	FTL	166	40	6.64
2	20W LED	43	20	0.86
3	LED Down Lighter Fitting	76	18	1.368
4	Ceiling Fan	138	65	8.97
5	Exhaust Fan	16	52	0.832
6	PC	66	150	9.9
7	Printer	8	150	1.2
8	AC	10	1875	18.75
9	Old AC	1	2775	2.775
10	Other Equipment	50	150	7.5
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
1	Jul-20	2379
2	Aug-20	2317
3	Sep-20	2664
4	Oct-20	2684
5	Nov-20	2727
6	Dec-20	2845
7	Jan-21	3501
8	Feb-21	3513
9	Mar-21	3553
10	Apr-21	2663
11	May-21	2546
12	Jun-21	2356
13	Total	33748
14	Maximum	3553
15	Minimum	2317
16	Average	2812

Chart No 2: Variation in Monthly Energy Consumption:

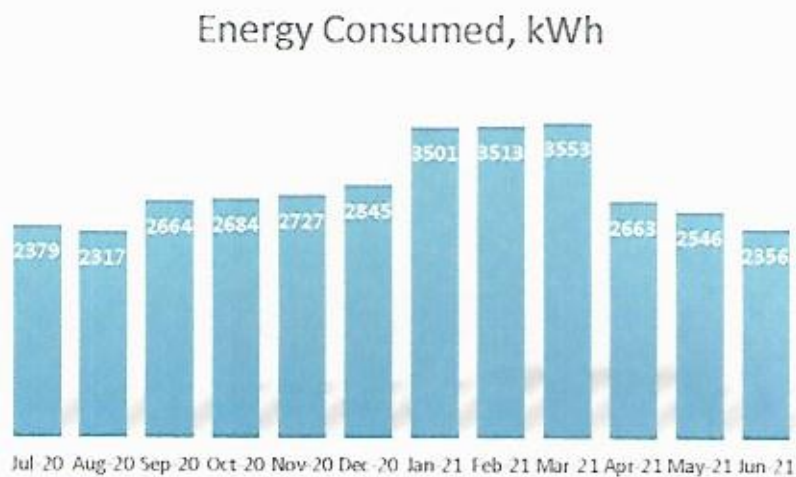


Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	33748
2	Maximum	3553
3	Minimum	2317
4	Average	2812



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	2379	2.14
2	Aug-20	2317	2.09
3	Sep-20	2664	2.40
4	Oct-20	2684	2.42
5	Nov-20	2727	2.45
6	Dec-20	2845	2.56
7	Jan-21	3501	3.15
8	Feb-21	3513	3.16
9	Mar-21	3553	3.20
10	Apr-21	2663	2.40
11	May-21	2546	2.29
12	Jun-21	2356	2.12
13	Total	33748	30.37
14	Maximum	3553	3.20
15	Minimum	2317	2.09
16	Average	2812	2.53



Chart No 3: Month wise CO₂ Emissions:

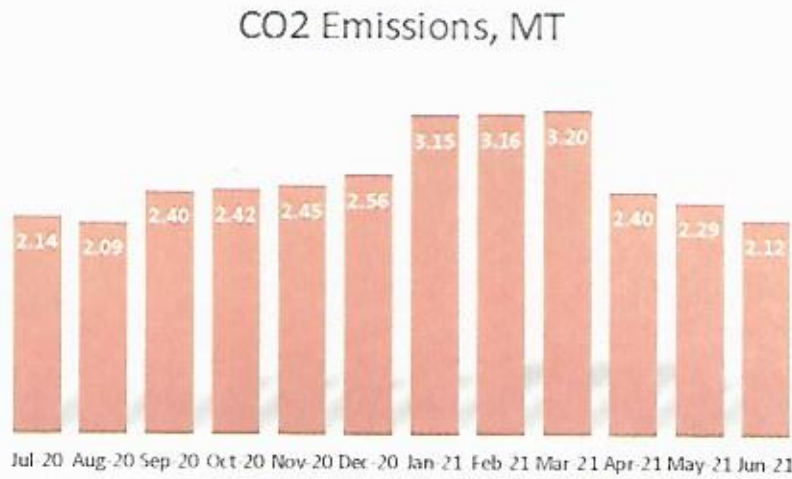


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	33748	30.37
2	Maximum	3553	3.20
3	Minimum	2317	2.09
4	Average	2812	2.53



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	33748	kWh/Annum
2	Capacity of Roof Top Solar PV Capacity	10	kWp
3	Average Energy Generated per kWp per Day	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated = 2*3*4	12000	kWh/Annum
6	Total Energy Requirement = (1) + (5)	45748	kWh/Annum
7	Percent of Alternate Energy to Annual Energy Requirement = (5)*100/(6)	36	%

Photograph of 3 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	166	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	6.64	kW
4	No of 20 W LED Tube Lights	43	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.86	kW
7	No of 18 W LED Fitting	76	Nos
8	Demand of 18 W LED Fitting	18	W/Unit
9	Total Electrical Load of 18 W LED Fitting	1.368	kW
10	Total Lighting Load= 3 + 6 + 9	8.868	kW
11	Total LED Lighting Load= 6 + 9	2.228	kW
12	Daily Working Period	8	Hrs/Day
13	Annual Working Days	180	Nos/Annum
14	Annual Lighting Load = 10* 12 * 13	12770	kWh/Annum
15	Annual LED Lighting Load = 11*12*13	3208	kWh/Annum
16	% of LED Lighting to Annual Lighting Requirement = (15)*100/(14)	25	%

