ENERGY AUDIT REPORT

of

JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
IMPERIAL COLLEGE OF ENGINEERING & RESEARCH,
WAGHOLI, PUNE

Year: 2021-22

DESHPANDE RAJKUMAR SHRIDHAR

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Prepared by:

ENGRESS SERVICES

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Phone: 09890444795 Email: engress123@gmail.com

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 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

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Tel: 09890444795 Email: engress123@gmail.com

Ref: EC/ICOER/20-21/01 Date: 22/5/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Jayawant Shikshan Prasarak Mandal's Imperial College of Engineering & Research, Wagholi, Pune, in the Academic 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 Imperial College of Engineering & Research, Wagholi, Pune for awarding us the assignment of Energy Audit of their Campus for the Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Imperial College of Engineering & Research, Wagholi, Pune consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, Office & other facilities.

2. Present Energy Consumption& CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	93013	83.71
2	Maximum	11125	10.01
3	Minimum	5468	4.92
4	Average	7751	6.98

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Installation of **10 kWp** Roof Top Solar PV Plant.
- Maximum Usage of Day Lighting

4. Usage of Alternate Energy:

- The Energy purchased from MSEDCL is **93013 kWh.**
- College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Energy generated by Roof Top Solar PV Plant is **12000 kWh.**
- Total Energy Demand is **105013 kWh.**
- The % of Usage of Alternate Energy to Annual Energy Demand is **11.43 %.**

5. Usage of LED Lighting:

- The Total Lighting Load of the College is **24.62 kW.**
- The Total LED Lighting Load is **24.62 kWh.**
- The percentage of Annual LED Lighting to Annual Lighting Demand is **100 %.**

6. Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of **CO_2**into atmosphere
2. Average Energy Generated by **1 kWp** Solar PV Plant is **4 kWh/Day**
3. Annual Solar Generation Days: **300 Nos.**

7. References:

- For CO_2 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 the present CO_2 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 Imperial College of Engineering & Research
2	Address	Wagholi, Pune 411 046
3	Affiliation	Savitribai Phule Pune University

1.3 Google Earth Image:

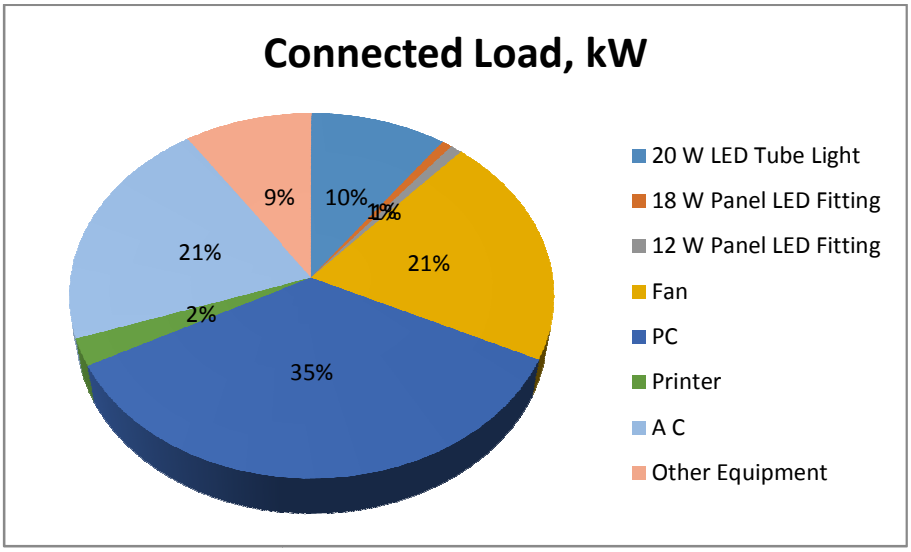
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/ Unit,	Load, kW
1	20 W LED Tube Light	1060	20	21.2
2	18 W Panel LED Fitting	90	18	1.62
3	12 W Panel LED Fitting	150	12	1.8
4	Fan	731	60	43.86
5	PC	749	100	74.9
6	Printer	34	150	5.1
7	A C	22	2025	44.55
8	Other Equipment	100	200	20
9	**Total**			**213**

Chart No 1: Study of Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy.

Table No 3: Electrical Energy Consumption Analysis- 21-22:

No	Month	Energy Purchased, kWh
1	Apr-21	6756
2	May-21	5641
3	Jun-21	5468
4	Jul-21	8180
5	Aug-21	7210
6	Sep-21	8365
7	Oct-21	8426
8	Nov-21	8125
9	Dec-21	11125
10	Jan-22	8756
11	Feb-22	7985
12	Mar-22	6976
13	Total	93013
14	Maximum	11125
15	Minimum	5468
16	Average	7751

Chart No 2: Variation in Monthly Energy Purchased:

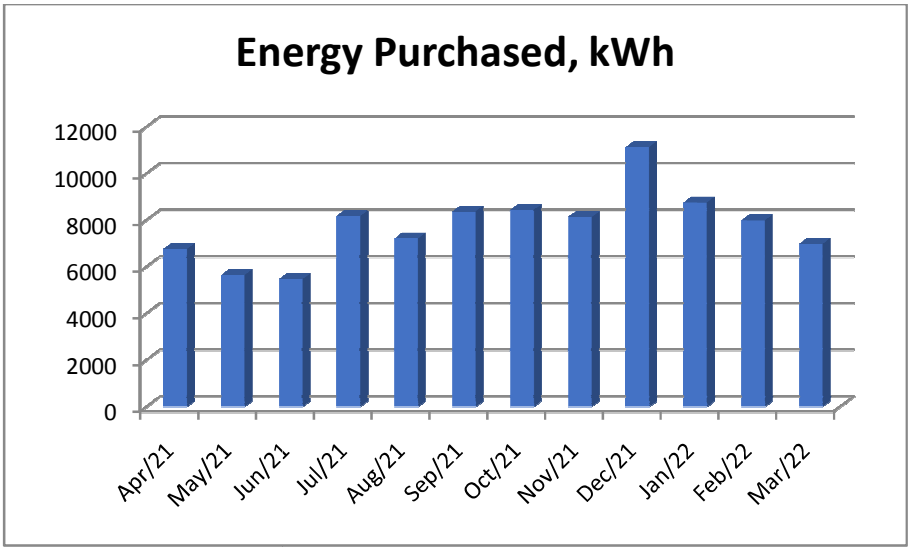


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	93013
2	Maximum	11125
3	Minimum	5468
4	Average	7751

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 CO_2 Emissions:

- 1 kWh of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No 5: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-21	6756	6.08
2	May-21	5641	5.08
3	Jun-21	5468	4.92
4	Jul-21	8180	7.36
5	Aug-21	7210	6.49
6	Sep-21	8365	7.53
7	Oct-21	8426	7.58
8	Nov-21	8125	7.31
9	Dec-21	11125	10.01
10	Jan-22	8756	7.88
11	Feb-22	7985	7.19
12	Mar-22	6976	6.28
13	Total	93013	83.71
14	Maximum	11125	10.01
15	Minimum	5468	4.92
16	Average	7751	6.98

Chart No 3: Month wise CO_2Emissions:

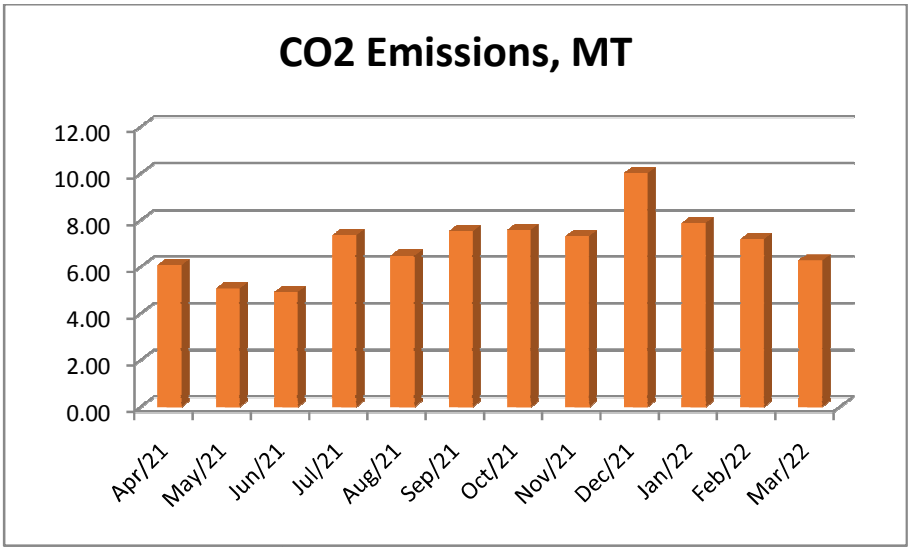


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	93013	83.71
2	Maximum	11125	10.01
3	Minimum	5468	4.92
4	Average	7751	6.98

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 21-22= **1*2*3**	**12000**	kWh
5	Energy purchased from MSEDCL	93013	kWh
6	Total Energy Requirement = **4+5**	105013	kWh
7	**% of Usage of Alternate Energy = (4)*100/(6)**	**11.43**	**%**

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 Annual Lighting power requirement.

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

No	Particulars	Value	Unit
1	No of 20 W LED Tube Lights	1060	Nos
2	Demand of 20 W LED Tube Light	20	W/Unit
3	Total Electrical Load of 20 W LED Fittings	**21.2**	kW
4	No of 18 W LED D/L Fitting	90	Nos
5	Demand of 18 W LED D/L Fitting	18	W/Unit
6	Total Electrical Load of 18 W LED D/L Fittings	**1.62**	kW
7	No of 12 W LED D/L Fitting	150	Nos
8	Demand of 12 W LED D/L Fitting	12	W/Unit
9	Total Electrical Load of 12 W LED D/L Fittings	**1.8**	kW
10	Total Lighting Load=**3+6+9**	**24.62**	kW
11	Total LED Lighting Load= **3+6+9**	**24.62**	kW
12	**Annual Lighting Requirement met by LED= 11*100/10**	**100**	**%**