ENERGY AUDIT REPORT

of

Shri Shivaji Education Society's,
ARTS & COMMERCE COLLEGE, JARUD,
Dist: Amravati 444 908

Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
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,
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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 PUNE

ENGRESS SERVICES

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

Ref: ES/ACCJ/21-22/01

Date: 10/6/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Shri Shivaji Education Society's Arts & Commerce College, Jarud, Dist: Amravati in the Year 2021-22.

.The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 3 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

ENGRESS SERVICES * PUNE *

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Shri Shivaji Education Arts & Commerce College, Jarud, Dist: Amravati, for awarding us the assignment of Energy Audit of their Campus for the Year: 21-22.

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

EXECUTIVE SUMMARY

1. Shri Shivaji Education Society's Arts & Commerce College, Jarud, Dist: Amravati 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	1834	1.65
2	Maximum	174	0.16
3	Minimum	121	0.11
4	Average	152.83	0.14

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of **3 kWp** Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **3 kWp.**
- Energy purchased from MSEDCL is **1834 kWh.**
- Energy generated by Roof Top Solar PV Plant is **3600 kWh.**
- The Annual Energy Demand of the College is: **5434 kWh.**
- The percentage of Usage of Alternate Energy to Annual Energy Demand is **66 %.**

5. Usage of LED Lighting:

- The Total Lighting Load of the College is **0.59 kW.**
- The Total LED Lighting Load of the College is **0.25 kW.**
- The percentage of LED Lighting to Total Lighting Load is **42 %.**

6. Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy per Day.
3. Annual Solar Energy 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 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	Shri Shivaji Education Society's Arts & Commerce College
2	Address	Jarud, Dist: Amravati 444 908
3	Affiliation	Sant Gadgebaba Amravati University

1.3 Google Earth Image:

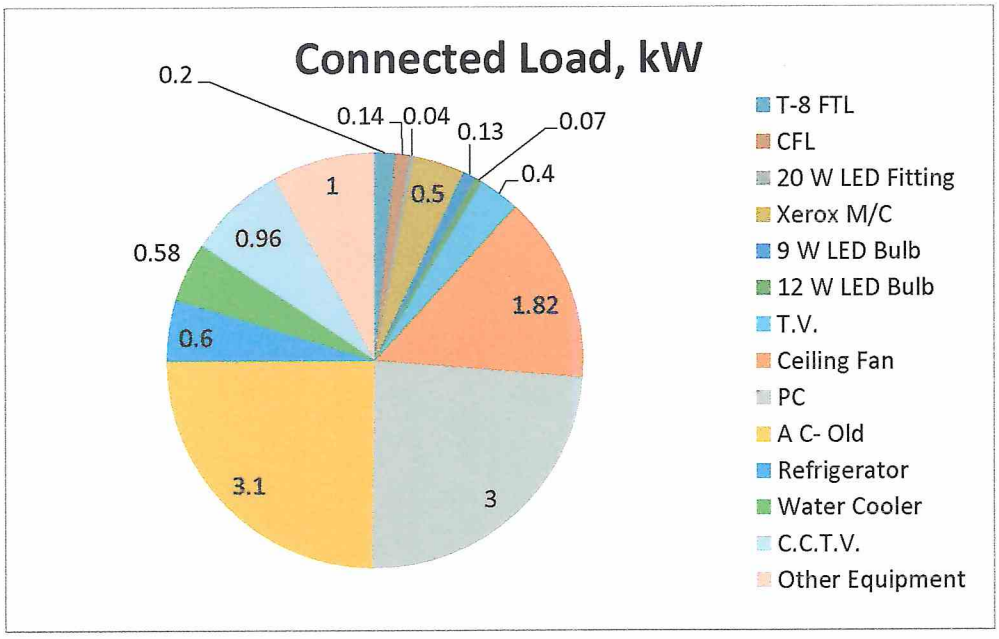
CHAPTER-II
STUDY OF CONNECTED LOAD

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, W/Unit	Load, kW
1	T-8 FTL	5	40	0.2
2	CFL	10	14	0.14
3	20 W LED Fitting	2	20	0.04
4	Xerox M/C	2	250	0.5
5	9 W LED Bulb	14	9	0.13
6	12 W LED Bulb	6	12	0.07
7	T.V.	2	200	0.4
8	Ceiling Fan	28	65	1.82
9	PC	20	150	3
10	A C- Old	2	1550	3.1
11	Refrigerator	2	300	0.6
12	Water Cooler	1	575	0.58
13	C.C.T.V.	8	120	0.96
14	Other Equipment	5	200	1
15	**Total**			**13**

Chart No 1: Study of Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 3: Electrical Energy Consumption Analysis- 2021-22:

No	Month	Energy Purchased, kWh
1	Apr-21	156
2	May-21	168
3	Jun-21	172
4	Jul-21	164
5	Aug-21	174
6	Sep-21	121
7	Oct-21	145
8	Nov-21	154
9	Dec-21	168
10	Jan-22	150
11	Feb-22	131
12	Mar-22	131
13	Total	1834
14	Maximum	174
15	Minimum	121
16	Average	152.83

Chart No 2: Variation in Monthly Energy Consumption:

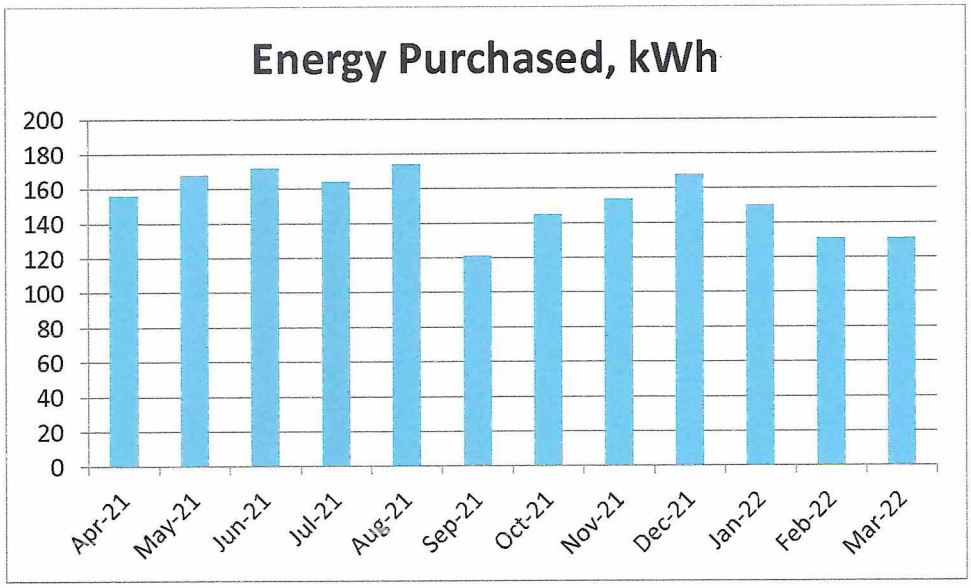


Table No 4: Variation in Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh
1	Total	1834
2	Maximum	174
3	Minimum	121
4	Average	152.83

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 as the Energy Source.

Basis for computation of CO_2 Emission:

- **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	156	0.14
2	May-21	168	0.15
3	Jun-21	172	0.15
4	Jul-21	164	0.15
5	Aug-21	174	0.16
6	Sep-21	121	0.11
7	Oct-21	145	0.13
8	Nov-21	154	0.14
9	Dec-21	168	0.15
10	Jan-22	150	0.14
11	Feb-22	131	0.12
12	Mar-22	131	0.12
13	Total	1834	1.65
14	Maximum	174	0.16
15	Minimum	121	0.11
16	Average	152.83	0.14

Chart No 3: Month wise CO_2Emissions:

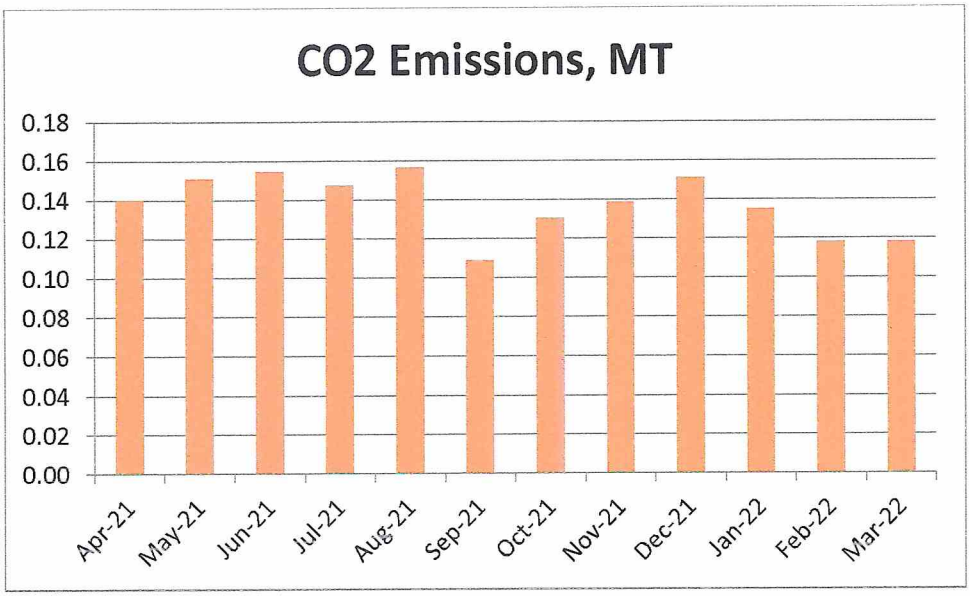


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	1834	1.65
2	Maximum	174	0.16
3	Minimum	121	0.11
4	Average	152.83	0.14

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 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	**1834**	kWh
2	Installed Roof Top Solar PV Plant Capacity	3	kWp
3	Average Daily Energy Generated per kWp	4	kWh
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**3600**	kWh
6	Total Energy Demand = (1) + (5)	**5434**	kWh
7	**% of Alternate Energy to Annual Energy Demand=5*100/6**	**66**	**%**

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 Total Lighting Load.

Table No 8: Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of T-8 FTL fittings	5	Nos
2	Load/per Fitting	40	W/Unit
3	Total Load of T-8 FTL Fittings	**0.2**	kW
4	No of CFL fittings	10	Nos
5	Load/per Fitting	14	W/Unit
6	Total Load of CFL Fittings	**0.14**	kW
7	No of 20 W LED fittings	2	Nos
8	Load/per Fitting	20	W/Unit
9	Total Load of 20 W LED Fittings	**0.04**	kW
10	No of 9 W LED fittings	9	Nos
11	Load/per Fitting	9	W/Unit
12	Total Load of 9 W LED Fittings	**0.081**	kW
13	No of 12 W LED Bulb	6	Nos
14	Load/per Fitting	12	W/Unit
15	Total Load of LED Bulbs	**0.072**	kW
16	No of 07 W LED D/L fittings	5	Nos
17	Load/per Fitting	7	W/Unit
18	Total Load of 16 W LED D/L Fittings	**0.035**	kW
19	No of 40 W Square LED fittings	2	Nos
20	Load/per Fitting	10	W/Unit
21	Total Load of 40 W Square LED Fittings	**0.02**	kW
22	Total LED Lighting Load = **9+12+15+18+21**	**0.25**	kW
23	Total Lighting Load = **3+6+9+12+15+18+21**	**0.59**	kW
24	**% of Total Lighting Load met by LEDs=22*100/23**	**42**	%