

ENERGY AUDIT REPORT

of
YASHAWANTRAO CHAVAN MAHARASHTRA
OPEN UNIVERSITY,
Dnyangangotri, Near Gangapur Dam, Nashik 422222



Year: 2021-22

Prepared by:

ENGRESS SERVICES

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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

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.

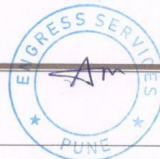
Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

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: ES/YCMOU/21-22/01

Date: 11/6/2022

CERTIFICATE

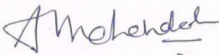
This is to certify that we have conducted Energy Audit at Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik in the year 2021-22.

The University has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum Usage of Day Lighting
- Maintenance of Power Factor close to Unity.
- Installation of **13625 LPD** Solar Thermal Water Heating System
- Under Installation Off Grid **55 kWp** Solar PV Plant

We appreciate the support of Management and involvement of faculty & Staff members 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 at Engress Services, Pune, express our sincere gratitude to the management of Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik 422222 for awarding us the assignment of Energy Audit of their Nashik Campus, for the Year: 2021-22.

We are thankful to:

- Prof. Dr. P. G. Patil, Vice Chancellor
- Dr. Dinesh Bhonde, Registrar
- Dr. Surya Gunjal, CIQA Director
- Shri Kiran Hire, Junior Engineer
- Shri Nandakumar Jadhav, Electrician
- Shri Sandeep Bhagwat, Farm Manager

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

EXECUTIVE SUMMARY

1. Yashwantrao Chavan Maharashtra Open University, Nashik uses Energy in three forms, namely: **Electrical Energy and Diesel and.**

2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Electrical Energy Purchased, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Total	501718	28700	528.46
2	Maximum	52466	2560	54.08
3	Minimum	33359	2090	35.62
4	Average	41809.83	2391.67	44.04

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of Maximum Day Lighting
- Installation of 13625 LPD Solar Thermal Water Heating System.
- Under Installation of off Grid 55 kWp Solar PV Plant.

4. Usage of Alternate Energy:

1. The University has installed a **13625 LPD** Solar Thermal Water Heating System.
2. The University is also installing Off Grid Solar PV Plants which include: Roof Top Plants, Solar Outdoor Lighting and Solar PV based Water Pump.
3. The Total Solar PV Plant capacity is **55 kWp**.

5. Usage of LED Lighting:

- The Total Lighting Load of the University is **37.78 kW**.
- The Total LED Lighting Load is **25.18 kW**.
- The percentage of LED Lighting Usage to Total Lighting Load is **66.65 %**.

6. Assumptions:

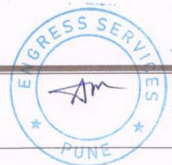
1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Liter of Diesel** releases **2.68 Kg of CO₂** into atmosphere.

7. Reference:

- For calculation of CO₂ Emissions: www.tatapower.com

ABBREVIATIONS

kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
LPD	Liters per Day
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
Qty	Quantity
LED	Light Emitting Diode



CHAPTER-I
INTRODUCTION

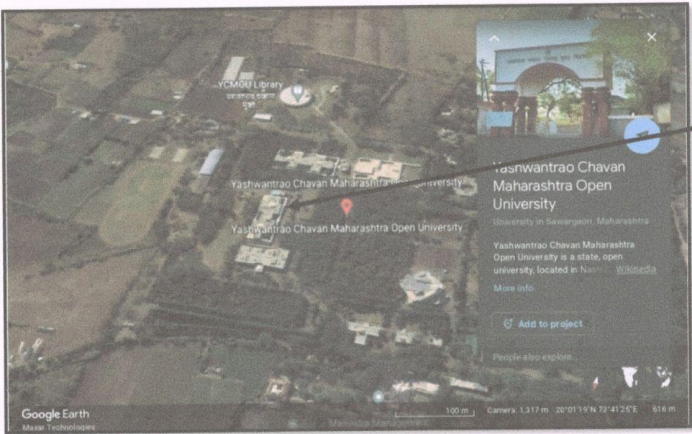
1.1 Objectives:

- 1. To study Connected Load.
- 2. To study present level of Energy Consumption
- 3. To Compute the CO₂ emissions
- 4. To study usage of Renewable Energy
- 5. To study Usage of LED Lighting

1.2 Table No 1: General Details of the University:

No	Head	Particulars
1	Name of Institution	Yashwantrao Chavan Maharashtra Open University
2	Address	Dnyangangotri, Near Gangapur Dam, Nashik 422 222
3	Year of Establishment	1989
4	Academic Programs Offered	200 Plus

1.3 Google Earth Image:



University
Campus



CHAPTER-II
STUDY OF CONNECTED LOAD

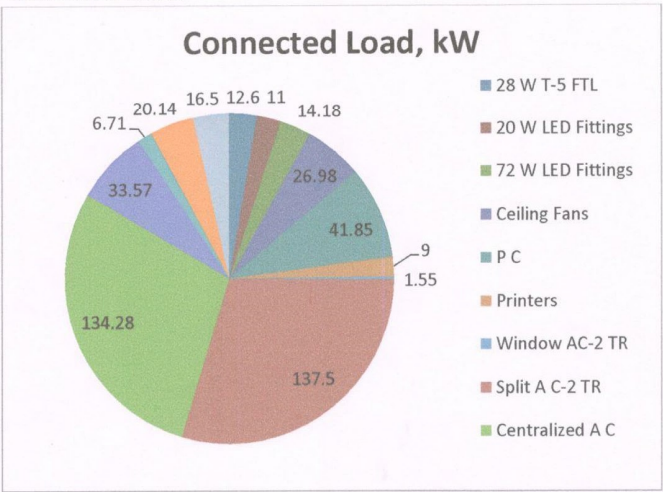
The major contributors to the connected load of the University are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	28 W T-5 FTL	450	28	12.6
2	20 W LED Fittings	550	20	11
3	72 W LED Fittings	197	72	14.18
4	Ceiling Fans	415	65	26.98
5	P C	310	135	41.85
6	Printers	60	150	9
7	Window AC-2 TR	5	310	1.55
8	Split A C-2 TR	50	2750	137.5
9	Centralized A C	5	26856	134.28
10	Water Pump- 7.5 HP	6	5595	33.57
11	Water Pump- 3 HP	3	2238	6.71
12	Lift	3	6714	20.14
13	Other Equipment	110	150	16.5
14	Total			466

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption, as under.

Table No. 3: Study of Electrical Energy and Diesel Consumption: 21-22:

No	Month	Energy Purchased, kWh	Diesel Consumed, Liters
1	Apr-21	48321	2449
2	May-21	44012	2540
3	Jun-21	46867	2360
4	Jul-21	44528	2280
5	Aug-21	41360	2416
6	Sep-21	38444	2560
7	Oct-21	36614	2430
8	Nov-21	33359	2390
9	Dec-21	37795	2540
10	Jan-22	37578	2510
11	Feb-22	40374	2090
12	Mar-22	52466	2135
13	Total	501718	28700
14	Maximum	52466	2560
15	Minimum	33359	2090
16	Average	41809.83	2391.67

Chart No 2: Variation of Monthly Electrical Energy Consumption:

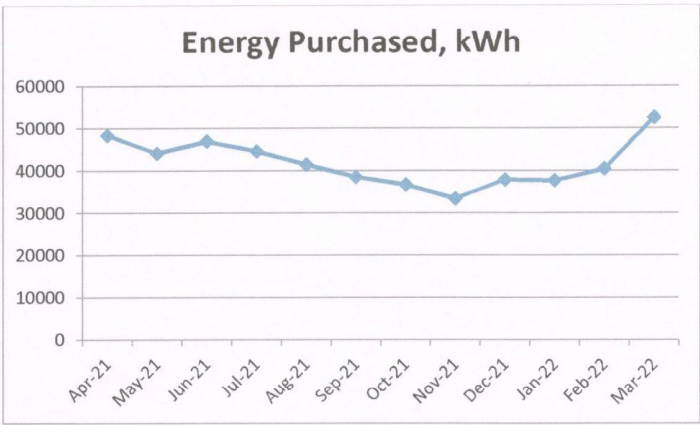


Chart No 3: Study of Month wise Diesel Consumption:

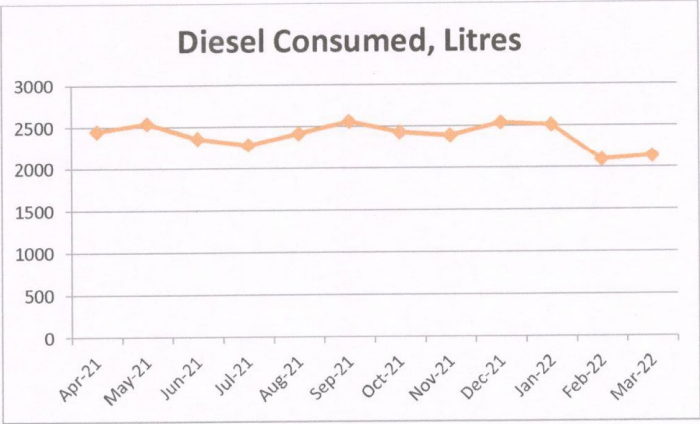


Table No 4: Important Parameters:

No	Parameter/ Value	Electrical Energy Consumed, kWh	Diesel Consumed, Liters
1	Total	501718	28700
2	Maximum	52466	2560
3	Minimum	33359	2090
4	Average	41809.83	2391.67

CHAPTER-IV

COMPUTATION OF CO₂ EMISSIONS

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 University for performing its day to day activities

The University uses three forms of Energy namely: Electrical Energy for various Electrical gadgets, LPG and Diesel.

Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy & Diesel are as under

- 1 Unit (kWh) of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
- 1 Liter of Diesel releases **2.68 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 University due to its Day to Day operations

Table No 5: Month wise Energy Consumption & CO₂ Emissions:

No	Month	Energy Purchased, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Apr-21	48321	2449	50.05
2	May-21	44012	2540	46.42
3	Jun-21	46867	2360	48.51
4	Jul-21	44528	2280	46.19
5	Aug-21	41360	2416	43.70
6	Sep-21	38444	2560	41.46
7	Oct-21	36614	2430	39.47
8	Nov-21	33359	2390	36.43
9	Dec-21	37795	2540	40.82
10	Jan-22	37578	2510	40.55
11	Feb-22	40374	2090	41.94
12	Mar-22	52466	2135	52.94
13	Total	501718	28700	528.46
14	Maximum	52466	2560	54.08
15	Minimum	33359	2090	35.62
16	Average	41809.83	2391.67	44.04

Chart No 4: Representation of Month wise CO₂ emissions:

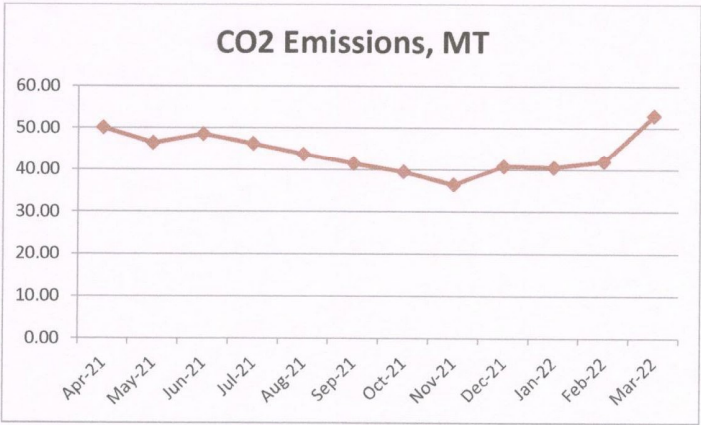


Table No 6: Variation in Important Parameters:

No	Parameter/ Value	Electrical Energy Consumed, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Total	501718	28700	528.46
2	Maximum	52466	2560	54.08
3	Minimum	33359	2090	35.62
4	Average	41809.83	2391.67	44.04



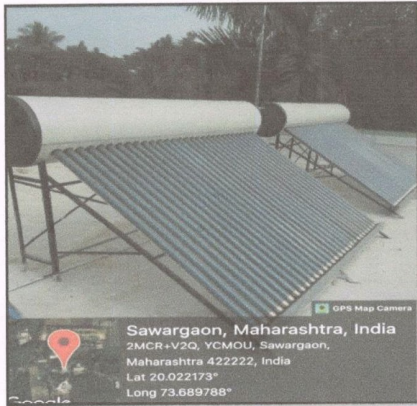
CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The University has installed Solar Thermal Water Heating System. The details of installation are as under.

Table No 7: Details of Solar Thermal Water Heating System:

No	Location	Capacity in LPD
1	Yash Inn Centre	8625
2	Godavari Hostel	2500
3	Abhyagat Niwas	2500
4	Total	13625

Photograph of Solar Thermal Water Heating System:



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, as under.

Table No 8: Computation of Percent Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of T-5, 28 W FTL Fittings	450	Nos
2	Load/Unit of T-5, 28 W FTL Fitting	28	W/Unit
3	Total Load of 600 Nos, T-5 Fittings	12.6	kW
4	No of 20 W LED Fittings	550	Nos
5	Load/Unit of 20W LED Fitting	20	W/Unit
6	Total Load of 400 Nos, 20 W LED Fittings	11	kW
7	No of 72 W LED Fittings	197	Nos
8	Load/Unit of 72 W LED Fittings	72	W/Unit
9	Total Load of 192 Nos, 72 W LED Fittings	14.18	kW
10	Annual LED Lighting Load = 6+9	25.18	kWh
11	Total Annual Lighting Load= 3+6+9	37.78	kWh
12	% of Annual LED Lighting to Total Lighting Load = $10 \times 100 / 11$	66.65	%