

ENVIRONMENTAL AUDIT REPORT

YASHAWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY,

Dnyangangotri, Near Gangapur Dam, Nashik 422 222



Year: 2023-24

Prepared by:

ENGRESS SERVICES

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ENGRESS SERVICES

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UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)



ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/YCMOU/23-24/03

Date: 18/7/2024

This is to certify that we have conducted Environmental Audit at Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik in the year 2023-24.

The University has adopted following Eco- Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Usage of BEE STAR Rated Equipment
- Installation of 218.184 kWp off Grid Solar PV Plant
- Installation of 27000 LPD Solar Thermal Water Heating System.
- Segregation of Waste at source
- Vermi Composting Arrangement for Conversion of Organic Waste
- Installation of Sanitary Waste Incinerator
- Provision of Septic Tank
- Construction of Internal Bandhara of Capacity 26.2 million Liters
- Construction of Farm Pond
- Rain Water Harvesting project for making use of rain water falling on terrace
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of Awareness on Plastic Free Campus by Display of Boards
- Usage of Solar Powered E Vehicle in the Campus

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green & Eco Friendly.


For Engress Services,

A Y Mehendale,

B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788



Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:


 भारत सरकार
 Government of India
 सूक्ष्म, नपु एवं मध्यम उद्यम विभाग
 Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER: UDYAM-MH-26-0135636

NAME OF ENTERPRISE: ENGRESS SERVICES

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

TYPE OF ENTERPRISE: SERVICES

MAJOR ACTIVITY: SERVICES

SOCIAL CATEGORY OF ENTREPRENEUR: GENERAL

NAME OF UNIT(S):

S.No.	Name of Unit(s)
1	Engress Services

OFFICIAL ADDRESS OF ENTERPRISE:

Flat/Door/Block No.	Name of Premises/ Building	Yashashree
26		

Village/Town: Pune Block: 1

Road/Street/Lane: Lokmanya Nagar/Nirmal Baug Soc City: Pune

State: MAHARASHTRA District: PUNE, Pin 411009

Mobile: 8767447244 Email: engress12@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE: 13/04/2021

DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS: 13/04/2021

S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	79 - Activities of head offices; management consultancy activities	7920 - Management consultancy activities	79200 - Management consultancy activities	Services

NATIONAL INDUSTRY CLASSIFICATION CODE(S):

DATE OF UDYAM REGISTRATION: 27/07/2021



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@maharaja.com, Web: www.maharaja.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
Yashashree, 26, Nirmal Baug Society, Near Muktaganj 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.

Deepak Sood
General Manager (EC)



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik 422 222 for awarding us the assignment of Environmental Audit of their Nashik Campus, for the Year: 2023-24.

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

EXECUTIVE SUMMARY

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

2. Pollution due to University Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	593435	kWh
2	Annual Diesel Consumed	9240	Liters
3	Annual CO ₂ Emissions	576.47	MT

4. Renewable Energy Usage & Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Solar PV Plant Capacity	218.184	kWp
2	Energy generated in 23-24	161820.8	kWh
3	Reduction in Annual CO ₂ Emissions	243.49	MT

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	46	26	32
2	Minimum	40	23	30

6. Indoor Comfort Conditions:

No	Parameter/Value	Lux Level	Noise Level, dB
1	Maximum	249	46
2	Minimum	215	42.7

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic waste	Provision of Vermi Composting Facility
3	Sanitary Waste	Provision of Sanitary Waste Incinerator

4	E Waste	Disposed of through Authorized Agency
5	Liquid Waste	Provision of Septic Tank

8. Rain Water Harvesting:

The University has installed Rain Water Harvesting Project in three ways:

1. Construction of Bandhara of Capacity 26.2 million Liters
2. Construction of Farm Pond
3. Rain Water Harvesting of Water falling on Terrace.

9. Environment Friendly Initiatives:

1. Tree Plantation in the campus
2. Creation of Awareness on Plastic Free Campus by display of Boards
3. Solar Powered E Vehicle Usage
4. Carbon Sequestration by Trees & Plants
5. Paperless Campus Initiatives

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO₂** into atmosphere
2. **1 kWp** Solar PV system generates **4 kWh** of Electrical Energy per Day
3. Annual Solar Energy Generation Days: **300 Nos**
4. **1 Liter of Diesel** releases **2.66 Kg of CO₂** into atmosphere.

11. References:

- For CO₂ Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Standards: www.cpcb.com

ABBREVIATIONS

Kg	: Kilo Gram
MSEDCL	: Maharashtra State Distribution Company Limited
MT	: Metric Ton
kWh	: kilo-Watt Hour
LPD	: Liters per Day
LED	: Light Emitting Diode
AQI	: Air Quality Index
PM-2.5	: Particulate Matter of Size 2.5 Micron
PM-10	: Particulate Matter of Size 10 Micron
CPCB	: Central Pollution Control Board
ISHRAE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I INTRODUCTION

1. Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

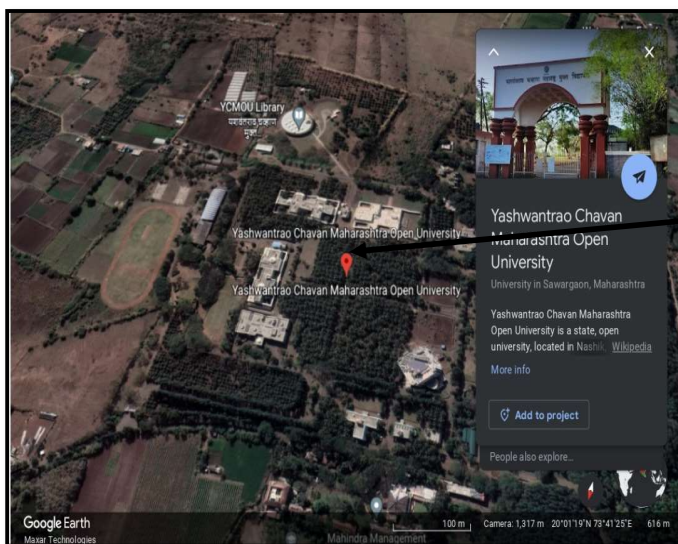
1.1.2 Environmental Audit: Definition:

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.3 Key Study Points:

No	Particulars
1	Study of Present Resource Consumption & CO ₂ Emission
2	Study of Usage of Renewable Energy
3	Study of Indoor Air Quality
4	Study of Indoor Lux & Noise Level
5	Study of Water Management
6	Study of Waste Management Practices
7	Study of Environment Friendly Practices

1.4 University Location Image:



University
Campus

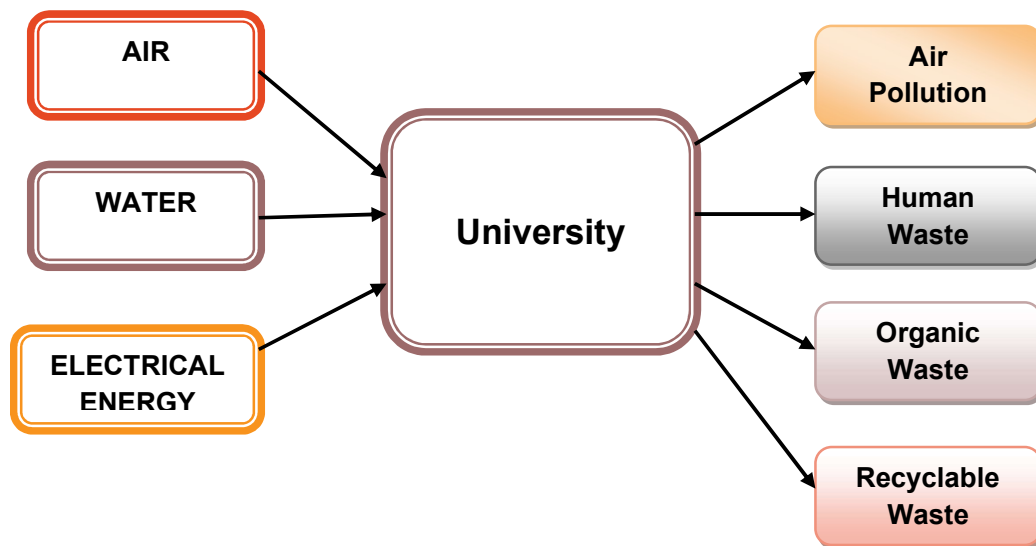
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The College consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.

Chart No 1: Representation of Resource Requirement & Waste of a College:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

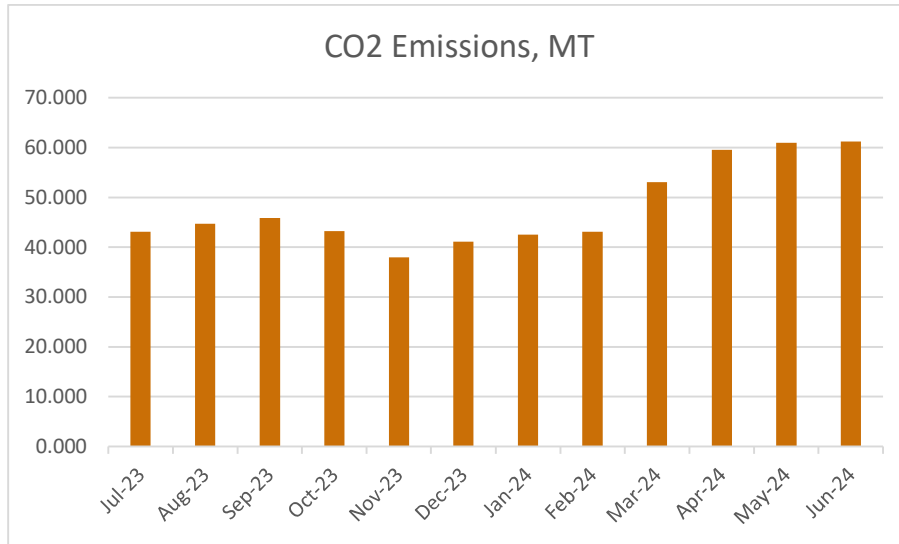
- **1 kWh** of Electrical Energy releases **0.93 Kg of CO₂** into atmosphere

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 23-24:

No	Month	Energy Purchased, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Jul-23	44371	700	43.127
2	Aug-23	43944	1460	44.752
3	Sep-23	43054	2200	45.892
4	Oct-23	45634	300	43.238
5	Nov-23	40118	250	37.975
6	Dec-23	43500	250	41.120
7	Jan-24	45400	100	42.488
8	Feb-24	45488	300	43.102
9	Mar-24	53655	1200	53.091

10	Apr-24	62560	500	59.511
11	May-24	62299	1130	60.944
12	Jun-24	63412	850	61.234
13	Total	593435	9240	576.47
14	Maximum	63412	2200	61.23
15	Minimum	40118	100	37.97
16	Average	49452.92	770.00	48.04

Chart No 2: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

3.1 The University has installed:

- Roof Top Solar PV Plant on various Buildings, Solar Street Lights, Solar Based Traffic Signals & Solar High Mast Lights.
- The Total Installed Solar PV Capacity is **218.184 kWp**
- Solar Thermal Water Heating System of Capacity **27000** Liters per Day
- The University is also installing Grid Connected Solar PV Plant of Capacity **300 kWp**

3.2 Table No 2: Reduction in CO₂ Emissions due to Usage of Solar Energy:

No	Particulars	Value	Unit
1	Total Installed Solar PV Capacity	218.184	kWp
2	Average Energy generated per Day	4	kWh/kWp
3	Annual Solar Generation Days	300	Nos
4	Annual Energy Generated =1*2*3	261820.8	kWh/kWp
5	1 kWh of Energy is equivalent to	0.9	Kg of CO ₂
6	Annual Reduction in CO ₂ Emissions =4*5/1000	235.64	MT

Photograph of Roof Top Solar PV Plant & Solar Thermal Water Heating System:



CHAPTER IV STUDY OF INDOOR AIR QUALITY

1. Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

2. Air quality is a measure of the suitability of air for breathing by people, plants and animals.

3. Air Quality Index: Air Quality Index (AQI) is a number used by government agencies to measure the **Air Pollution** levels and communicate it to the population.

In this Chapter, we present three important Parameters: **AQI-** Air Quality Index, **PM-2.5-** Particulate Matter of Size 2.5 micron and **PM-10-** Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	Kulsachiv Karyalaya	43	23	30
2	Auditorium	46	26	32
3	Finance Department	41	24	31
4	Office	40	24	30
5	Guest House	42	23	30
	Maximum	46	26	32
	Minimum	40	23	30

Table No 4: Air Quality Index Values & Concentration of PM 2.5 & PM10: (By CPCB):

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

Conclusion:

From the above measured values, we conclude that the observed values of AQI, PM-2.5 & PM-10 are in the **Satisfactory Range**, as per the guidelines given by Central Pollution Control Board.

CHAPTER V STUDY OF INDOOR LUX & NOISE PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include: **Lux Level and Noise Level.**

Table No 5: Study of Indoor Lux & Noise Level Parameters:

No	Location	Lux Level,	Noise Level, dB
1	Kulsachiv Karyalaya	246	45.1
2	Auditorium	236	43
3	Finance Department	249	44.3
4	Office	215	46
5	Guest House	226	42.7
	Maximum	249	46
	Minimum	215	42.7

Recommended Lux & Noise Level: As per BEE & ISHRAE Guidelines:

A) Noise Level Reference:		
No	Location	Noise Level Range, dB
1	Offices	45-50
2	Occupied Class Room	40-45
3	Libraries	35-40
B) Reference Lux Level, Lumens:		
1	For Class Rooms	200 Plus
2	For Reading Rooms	200 Plus

Conclusion:

From the above measured values, we conclude that:

- The Noise Level is within the prescribed Limit
- The Lux Level at various locations is Okay

CHAPTER VI STUDY OF RAIN WATER MANAGEMENT

The University has implemented the Rain Water Harvesting Project by three ways, namely:

1. Yashwant Bandhara
2. Farm Pond and
3. Collecting the rain water from terrace & using the same for Bore well recharging.

6.1 Yashwant Bandhara: The Water Storage capacity is about **26.2 million Liters.**
Photograph of Yashwant Bandhara:



6.2 Farm Pond:

The University has a farm pond which can store approximately -- million liters of Water. This farm pond has helped the nearby farmers, as the underground water level has increased substantially due to this farm pond.

Photograph of Farm Pond:



6.3 Rain water harvesting from Terrace at Main Building:

The rain water falling on the terrace is used to recharge the bore well.



Photograph of Rain Water Collecting Pipe from Terrace:




CHAPTER-VII STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

Details of Waste Management Practices:

No	Head	Observation	Photograph
1	Solid Waste	Segregation of Waste at Source: Provision of Waste Collection Bins	<p>Waste Collection Bin:</p>  <p>GPS Map Camera Sawargaon, Maharashtra, India 2MCR+9V2, YCMOU, Sawargaon, Maharashtra 422222, India Lat 20.020883° Long 73.692164° 25/08/23 01:44 PM GMT +05:30</p>
2	Organic Waste	Provision of Vermi-composting facility & about 100 MT of Vermi compost is produced annually and is used in the own campus.	<p>Vermi Composting Facility</p>  <p>GPS Map Camera Sawargaon, Maharashtra, India 2MHQ+57V, Sawargaon, Maharashtra 422222, India Lat 20.025828° Long 73.688972°</p>


<p>3</p>	<p>Sanitary waste</p>	<p>Provision of Sanitary Waste Incinerator</p>	<p style="text-align: center;">Sanitary Waste Incinerator</p> 
<p>4</p>	<p>E Waste</p>	<p>E Waste is disposed of through Authorized Agency, M/s. Arihant E-Recycling Pvt. Ltd.</p>	
<p>5</p>	<p>Liquid Waste</p>	<p>Provision of Septic Tank in the Campus</p>	

CHAPTER-VIII STUDY OF ECO FRIENDLY PRACTICES

In this Chapter, we present the Eco-Friendly Practices, followed by the College.

Details of Eco-Friendly Practices:

No	Head	Observation	Photograph
1	Tree Plantation	Internal Tree Plantation in the Campus	<p>Internal Tree Plantation:</p> 
2	Creation of Awareness among Stake Holders	Display of Poster on Plastic Free Campus	<p>Poster on Plastic Free Campus:</p> 

<p>3</p>	<p>Promotion of E Vehicle</p>	<p>Usage of E Vehicle in the Campus</p>	<p style="text-align: center;">E Vehicle</p> 
<p>4</p>	<p>Carbon Sequestration</p>	<p>There are about 17000 Well Grown trees. Good amount of Carbon is sequestered in these Trees</p>	
<p>5</p>	<p>Paperless Campus Initiatives</p>	<p>The University is taking various measures to make the Day-to-Day operations Paper less. There about Thirteen sections/operations wherein software-based solutions are adopted are:</p> <ul style="list-style-type: none"> • E-Books Down load • YCMOU Regional Centers • Finance • Admission • Results • Migration • Grievances • Scanned copy of Mark list, to name a few • Revaluation of Answer Book • E-Tenders 	