

ENVIRONMENTAL AUDIT REPORT

of

Jaywant Shikshan Prasarak Mandal's,
RAJARSHI SHAHU COLLEGE OF PHARMACY & RESEARCH,
Tathawade, Pune 411 033



Year: 2022-23

Prepared by:

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ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/RSCOPR /22-23/03

Date: 11/6/2023

This is to certify that we have conducted Environmental Audit at Jaywant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune 411 033, in the Year 2022-23.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at source
- Installation of Vermi Composting Pit
- Implementation of Rain Water Harvesting Project
- Tree Plantation in the campus
- Creation of Awareness on Water Conservation, by Display of Posters

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



MEDA REGISTRATION CERTIFICATE

ASSOCHAM GEM CP CERTIFICATE



ISO: 9001-2015 CERTIFICATE

ISO: 14001-2015 CERTIFICATE

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jaywant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune, for awarding us the assignment of Environmental Audit of their Campus for the Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Jaywant Shikshan Prasarak Mandal's Rajarshi Shahu College of Pharmacy & Research, Tathawade, Pune consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

2. Pollution due to College 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	34604	kWh
2	Annual LPG Consumed	114	Kg
3	Annual CO ₂ Emissions	31.45	MT

4. Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- The Energy generated by Solar PV Plant in 22-23 is **12000 kWh**.
- Reduction in CO₂ Emissions in 22-23 is **10.4 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	65	40	45
2	Minimum	60	35	39

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature , °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	28.2	82	123	45
2	Minimum	28	80	98	39

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Vermi Composting Pit
3	Chemical Fumes	Provision of Fumigation Chamber
4	E Waste Management	Disposed through Society

8. Rain Water Harvesting:

The College has installed the Rainwater harvesting project; the rain water falling on the terrace is collected and is used for increasing the underground water table.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Water Conservation Display of Posters

10. Assumptions:

1. Energy Consumed is computed based on Load Utilization Factor
2. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
3. **1 Kg** of LPG releases **2.68 Kg of CO₂** into atmosphere
4. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
5. Annual Solar Energy generation Days: **300 Nos**

11. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality 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. 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

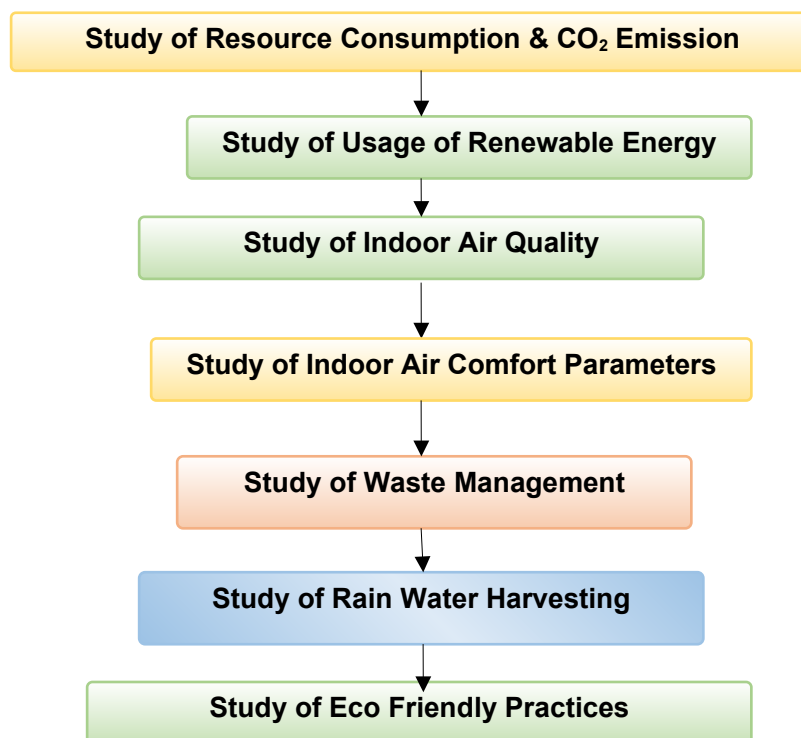
1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

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. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.4 Audit Procedural Steps:



1.5 College Location Image:



CHAPTER-II

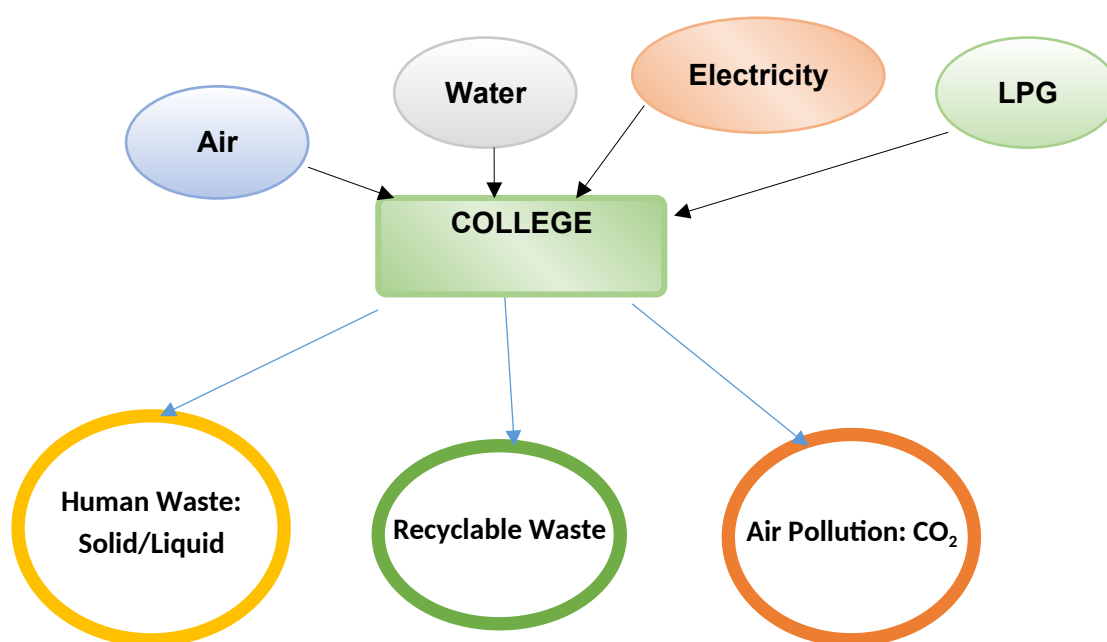
STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The College consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy & LPG

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

Chart No 1: Representation of College as System & Study of Resources & Waste



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.

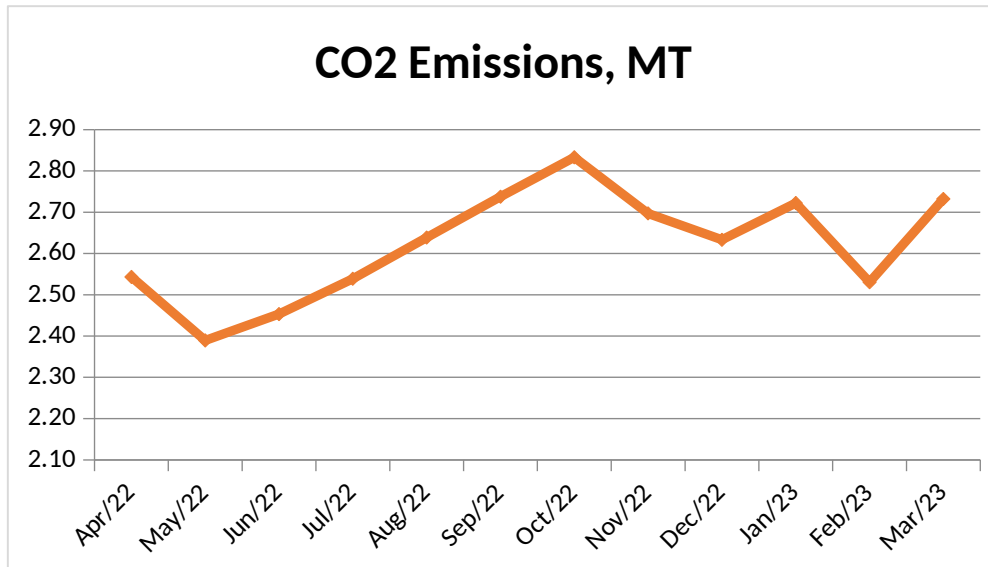
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
- **1 Kg** of **LPG** releases **2.68 Kg of CO₂** into atmosphere.

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 22-23:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Apr-22	2796	10	2.54
2	May-22	2628	9	2.39
3	Jun-22	2696	10	2.45
4	Jul-22	2794	9	2.54
5	Aug-22	2905	9	2.64
6	Sep-22	3015	9	2.74
7	Oct-22	3118	10	2.83
8	Nov-22	2967	10	2.70
9	Dec-22	2896	10	2.63
10	Jan-23	2998	9	2.72

11	Feb-23	2785	9	2.53
12	Mar-23	3006	10	2.73
13	Total	34604	114	31.45
14	Maximum	3118	10	2.83
15	Minimum	2628	9	2.39
16	Average	2883.67	9.5	2.62

Chart No 2: Month wise CO₂ Emissions:



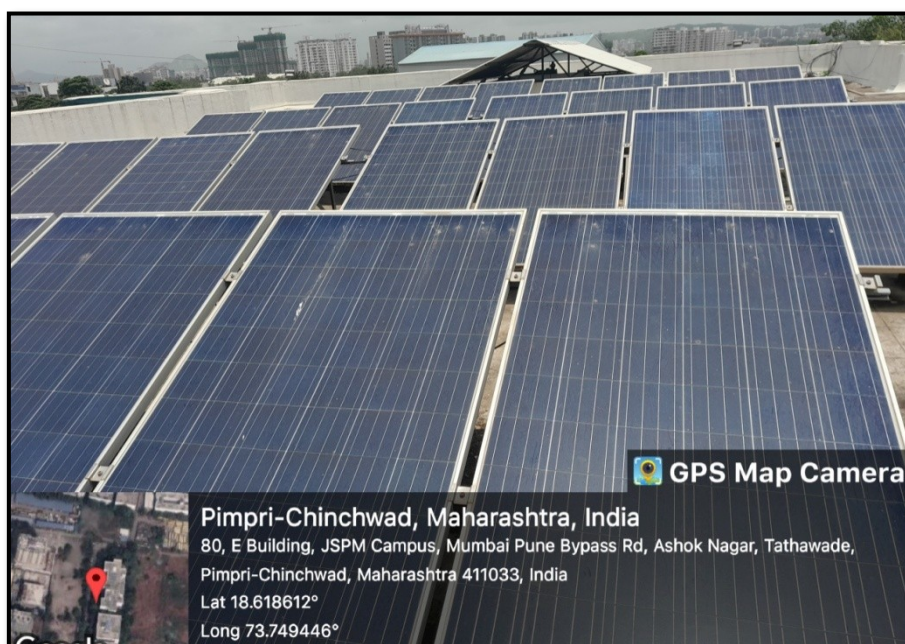
CHAPTER III STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**
 In the following Table, we present the reduction in CO₂ emissions due to Solar Energy:

Table No 2: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	10	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 22-23	12000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	10.8	MT of CO₂

Photograph of Roof Top Solar PV Plant:



CHAPTER IV STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

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

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

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

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Library	64	39	44
2	Office	61	35	39
3	Classroom	63	37	45
4	faculty Room	60	34	39
5	Pharmaceutics Lab	63	38	49
6	Girls Common Room	65	40	44
7	Preparation room	62	36	44
8	Pharmacology Lab	60	36	39
	Maximum	65	40	45
	Minimum	60	35	39

CHAPTER V STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 4: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Library	28.2	82	120	42
2	Office	28.1	81	114	44.5
3	Classroom	28.2	82	105	42.6
4	faculty Room	28.1	82	122	43
5	Pharmaceutics Lab	28.1	81	123	45
6	Girls Common Room	28	80	119	39
7	Preparation room	28	80	116	41.2
8	Pharmacology Lab	28.2	81	98	43.8
	Maximum	28.2	82	123	45
	Minimum	28	80	98	39

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The recyclable waste, like paper, plastic waste is segregated at source and is handed over to Authorized Agency for further action.

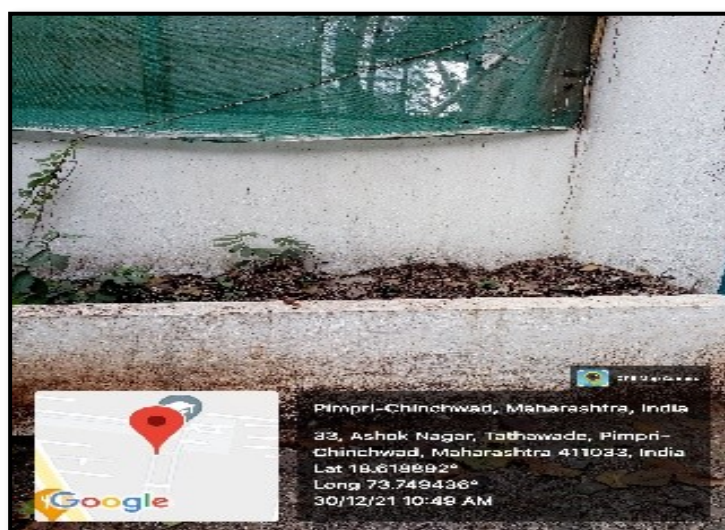
Photograph of Waste Collection Bin:



6.2 Organic Waste Management:

The Organic Waste like leafy waste is composted in a Vermi composting Pit.

Photograph of Vermi Composting Pit:



6.3 Chemical

& Fumes Management:

The Chemicals are stored out of reach of students in a Fuming Chamber.

Storage

CHAPTER-VII

STUDY OF RAIN WATER HARVESTING

The College has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an underground Tank and is further used for domestic purpose after treatment.

Photograph of Rain Water Carrying Pipe:



Rain Water
Carrying Pipe

CHAPTER-VIII

STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Water Conservation:

The College has displayed posters emphasizing on importance of Water Conservation.

Photograph of Poster on Water Conservation:



ANNEXURE-I:

VARIOUS AIR QUALITY, NOISE & COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

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 +

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

3. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33°C
2	Humidity	Less Than 70%