

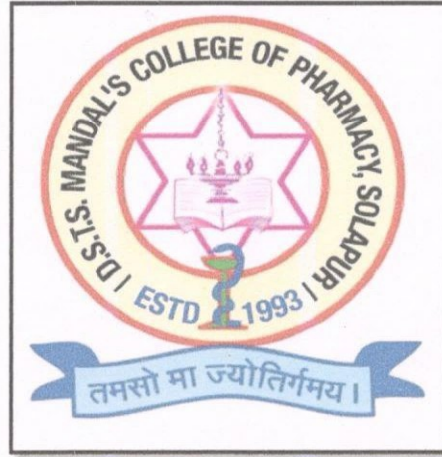
ENVIRONMENTAL AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur



Year: 2019-20

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,

Near Muktangnan English School, Parvati, Pune 411009

Phone: 09890444795 Email: enrichcons@gmail.com



MAHARASHTRA ENERGY DEVELOPMENT AGENCY



Maharashtra Energy Development Agency

(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174

19th September, 2018

**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 : **Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme*

Registration Number : *MEDA/ECN/CR-05/2018-19/EA-03*

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** 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.


19/9/18

(Smita Kudarikar)
General Manager (EC)



Enrich Consultants

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

Ref: EC/DSTSCOP/19-20/03

Date: 13/7/2020

CERTIFICATE

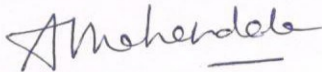
This is to certify that we have conducted Environmental Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2019-20.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Segregation of Waste at Source
- Vermi Composting Bed for Conversion of Organic Waste
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Installation of Rain Water Management Project
- Internal Tree Plantation in the campus

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor,
EA-8192



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4	Study of Waste Management	14
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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur for awarding us the assignment of Environmental Audit of their Solapur Campus, for the Academic Year: 19-20.

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



EXECUTIVE SUMMARY

1. **Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur** consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities

2. Pollution caused due to College Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity & LPG Consumption.
- **Solid Waste:** Bio degradable Garden Waste, Recyclable Waste and Human Waste.
- **Liquid Waste:** Human liquid Waste.

3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	13159	266	12.56
2	Maximum	1849	57	1.72
3	Minimum	258	9	0.26
4	Average	1096.58	22.17	1.05

4. Usage of Renewable Energy & CO₂ Emission Reduction:

- The College has yet to install Roof Top Solar PV Plant of Capacity **10 kWp**
- Energy generated by Solar PV Plant in 19-20 is **12000 kWh**
- Annual Reduction in CO₂ Emissions in 19-20 is **10.8 MT**.

5. Waste Management:

5.1 Segregation of Waste at Source:

The solid waste is segregated at source. Waste Bins are located at various locations.

5.2 Organic Waste Management:

A Vermi Composting Bed is used to convert the Organic waste into Bio compost.

5.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

5.4 Bio Medical Waste Management:

No Bio medical Waste is generated in the College.

5.5 E Waste Management:

The E Waste is disposed of through M/s. Mahalaxmi e Recyclers Pvt. Ltd.

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The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

7. Environmental Friendly Initiatives:

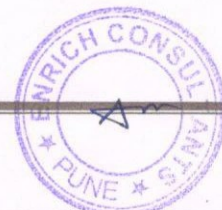
- Tree Plantation in the campus

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO₂** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

9. References:

- For CO₂ Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in



ABBREVIATIONS

Kg	:	Kilo Gram
DSTS	:	Dakshin Solapur Taluka Shikshan
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode
CPCB	:	Central Pollution Control Board



CHAPTER-I

INTRODUCTION

1.1 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:

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"

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

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
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1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
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2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research College)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Audit Methodology:

1. To study Resource Consumption & CO₂ Emissions
2. To Study Usage of Renewable Energy
3. To study Waste Management
4. To Study Rain Water Management
5. To Study Environment Friendly Initiatives

1.3 General Details of College: Table No: 4

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

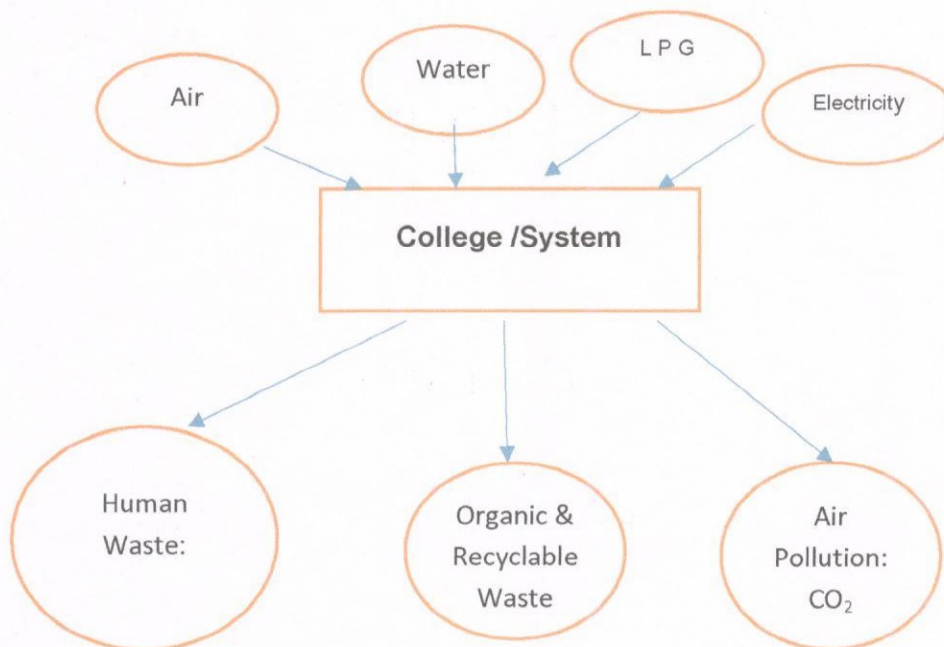
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The College consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

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

Chart No 1: Representation of College as System:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to LPG & Electrical Energy are 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 5: Study of Consumption of Energy & CO₂ Emissions: 19-20:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg	CO ₂ Emissions, MT
1	Apr-19	1687	19	1.57
2	May-19	1619	19	1.51
3	Jun-19	852	11	0.80
4	Jul-19	258	9	0.26

5	Aug-19	1191	9	1.10
6	Sep-19	1322	57	1.34
7	Oct-19	1849	19	1.72
8	Nov-19	959	19	0.91
9	Dec-19	934	19	0.89
10	Jan-20	582	38	0.63
11	Feb-20	1099	38	1.09
12	Mar-20	807	9	0.75
13	Total	13159	266	12.56
14	Maximum	1849	57	1.72
15	Minimum	258	9	0.26
16	Average	1096.58	22.17	1.05

Chart No 2: Study of CO₂ Emission:

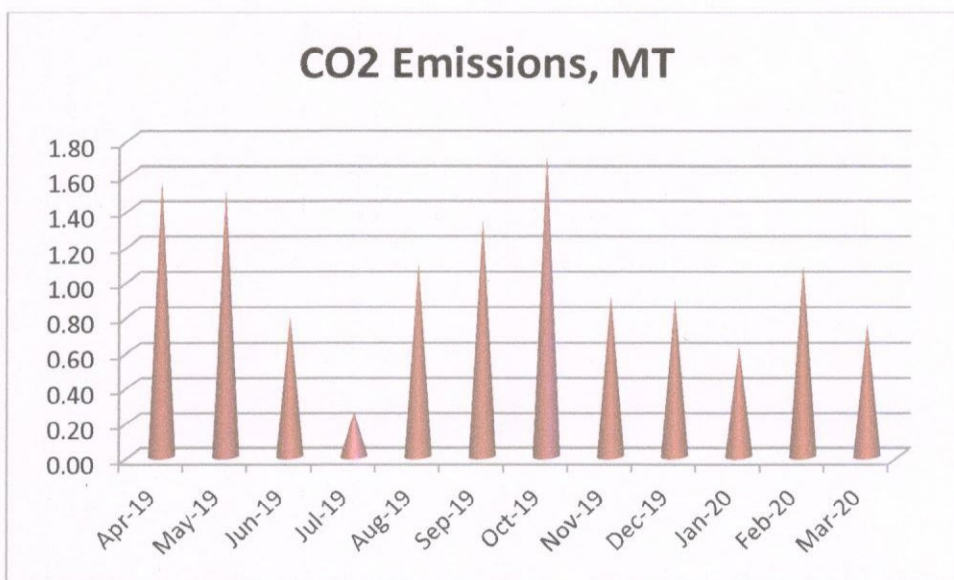


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	13159	266	12.56
2	Maximum	1849	57	1.72
3	Minimum	258	9	0.26
4	Average	1096.58	22.17	1.05



CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed a Roof Top Solar PV Plant of capacity 10 kWp.

In the following Table we present the Annual Reduction in CO₂ Emissions due to Solar PV Plant.

Table No 7: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	10	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	12000	kWh
5	1 kWh of Electrical Energy emits	0.9	Kg of CO ₂
6	Annual Reduction in CO ₂ Emissions = (4) * (5) /1000	10.8	MT

Photograph of Roof Top Solar PV Plant:



CHAPTER IV

STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The solid waste is segregated at source. Waste Bins are kept at various points.

Photograph of Waste Collection Bin:



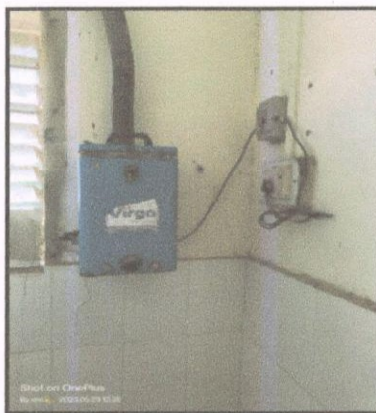
4.2 Organic Waste Management:

A Vermi composting Bed is used to convert the Organic waste into Bio compost.

4.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



4.4 Bio Medical Waste Management:

No Bio medical Waste is generated in the College.

4.5 E Waste Management:

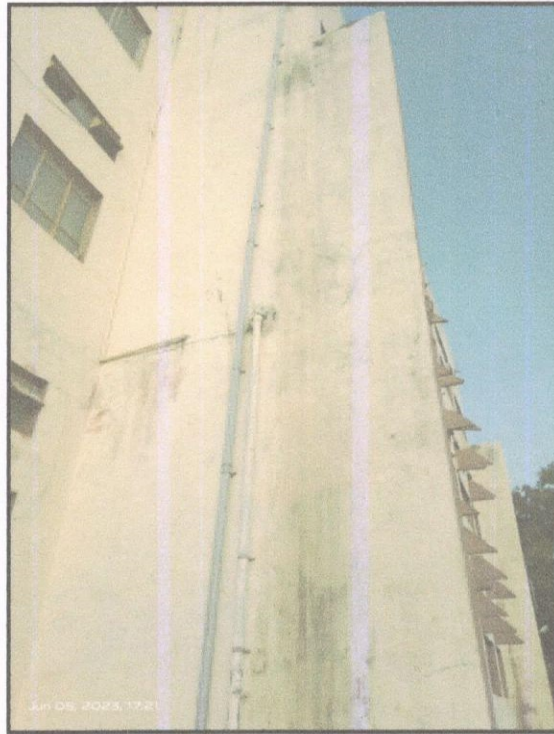
The E Waste is disposed of through M/s. Mahalaxmi e Recyclers Pvt. Ltd.

CHAPTER-V

STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

Photograph of Rain Water Collecting Pipe:



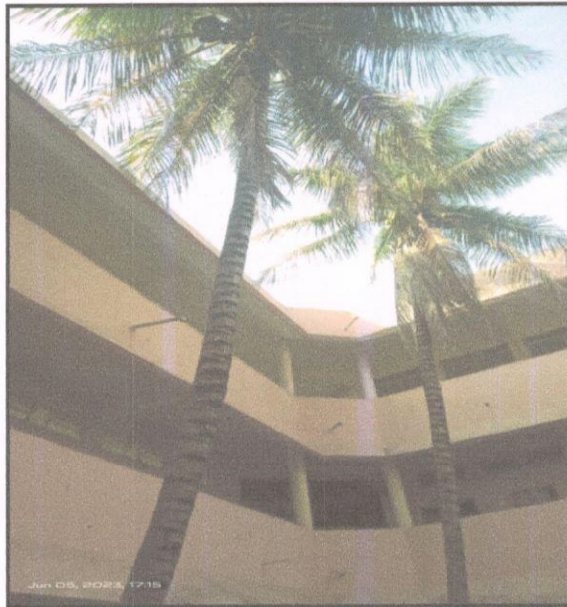
CHAPTER-VI

STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES

6.1 Internal Tree Plantation:

The College has well maintained Medicinal Plant Garden.

Photograph of Medicinal Plants in the campus:



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Jule Solapur-1, Vijapur Road, Solapur



Year: 2020-21

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktagan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462



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/2021-22/CR-14/1577

22nd April, 2021

**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 Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : *MEDA/ECN/2021-22/Class A/EA-03*

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- This empanelment is valid till **21st April, 2023** 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)



Enrich Consultants

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

Ref: EC/DSTSCOP/20-21/03

Date: 18/6/2021

CERTIFICATE

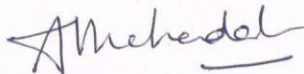
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The College has adopted following Environment Friendly Practices:

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- Installation of Rain Water Management Project
- Internal Tree Plantation in the campus

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

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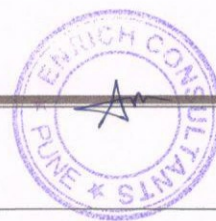


A Y Mehendale,
Certified Energy Auditor,
EA-8192



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EXECUTIVE SUMMARY

1. **Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur** consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities

2. Pollution caused due to College Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity & LPG Consumption.
- **Solid Waste:** Bio degradable Garden Waste, Recyclable Waste and Human Waste.
- **Liquid Waste:** Human liquid Waste.

3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	4363	133	4.28
2	Maximum	807	38	0.75
3	Minimum	81	0	0.07
4	Average	363.58	11.08	0.36

4. Usage of Renewable Energy & CO₂ Emission Reduction:

- The College has yet to install Roof Top Solar PV Plant of Capacity **10 kWp**
- Energy generated by Solar PV Plant in 20-21 is **12000 kWh**
- Annual Reduction in CO₂ Emissions in 20-21 is **10.8 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	83	50	64
2	Minimum	73	44	55

6. Waste Management:

6.1 Segregation of Waste at Source:

The solid waste is segregated at source. Waste Bins are located at various locations.

6.2 Organic Waste Management:

A Vermi Composting Bed is used to convert the Organic waste into Bio compost.

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The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

8. Environmental Friendly Initiatives:

- Tree Plantation in the campus

9. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO₂** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

10. References:

- For CO₂ Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in
- For AQI & Water Quality Standards: www.cpcb.com



ABBREVIATIONS

Kg	:	Kilo Gram
DSTS	:	Dakshin Solapur Taluka Shikshan
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
KLPD	:	Kilo Litres 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



CHAPTER-I

INTRODUCTION

1.1 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

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2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

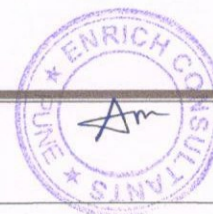
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8.	Technology Vision 2030 (The Energy Research College)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Audit Methodology:

1. To study Resource Consumption & CO₂ Emissions
2. To Study CO₂ Emission Reduction
3. To study Indoor Air Quality Parameters
4. To Study Waste Management
5. To Study Rain Water Management
6. To Study Environment Friendly Initiatives

1.3 General Details of College: Table No: 4

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur



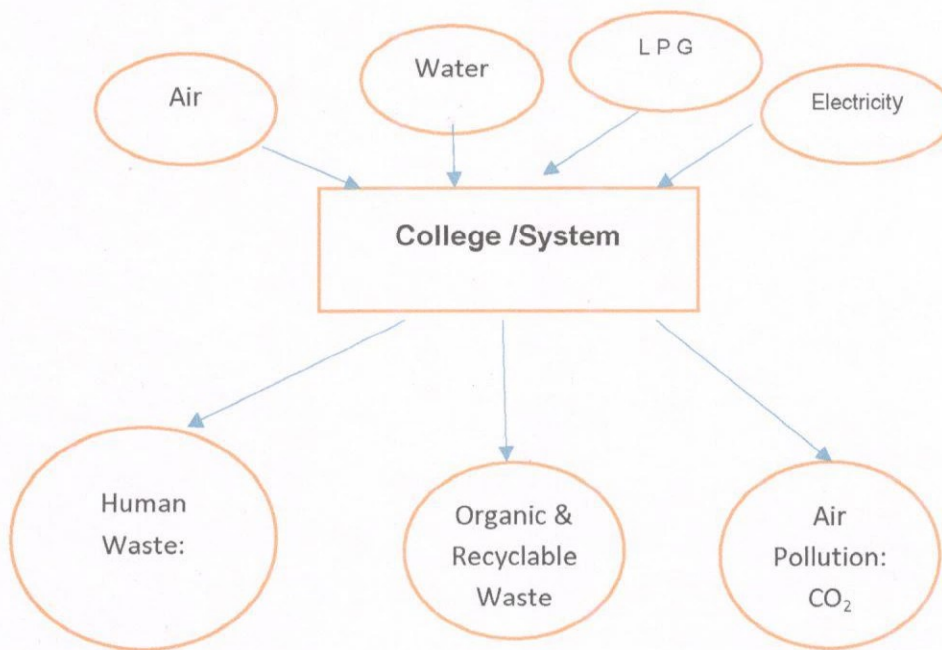
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The College consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

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

Chart No 1: Representation of College as System:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to LPG & Electrical Energy are 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 5: Study of Consumption of Energy & CO₂ Emissions: 20-21:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg	CO ₂ Emissions, MT
1	Apr-20	807	9	0.75
2	May-20	81	0	0.07
3	Jun-20	81	0	0.07
4	Jul-20	288	9	0.28

5	Aug-20	261	19	0.29
6	Sep-20	282	38	0.36
7	Oct-20	468	19	0.47
8	Nov-20	336	9	0.33
9	Dec-20	180	9	0.19
10	Jan-21	494	6	0.46
11	Feb-21	512	9	0.48
12	Mar-21	573	6	0.53
13	Total	4363	133	4.28
14	Maximum	807	38	0.75
15	Minimum	81	0	0.07
16	Average	363.58	11.08	0.36

Chart No 2: Study of CO₂ Emission:

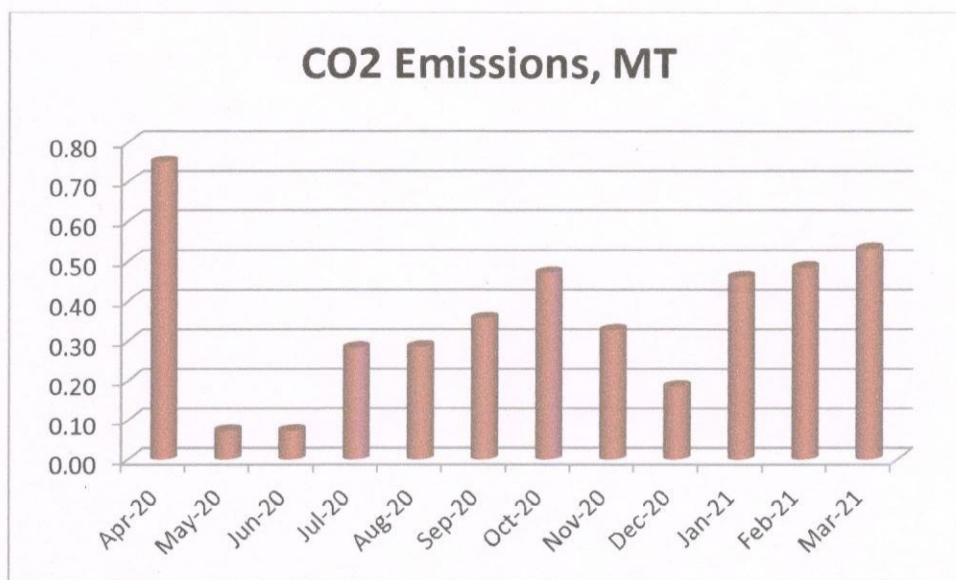


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	4363	133	4.28
2	Maximum	807	38	0.75
3	Minimum	81	0	0.07
4	Average	363.58	11.08	0.36



CHAPTER IV STUDY OF CO₂ EMISSION REDUCTION

The College has installed a Roof Top Solar PV Plant of capacity **10 kWp**.

In the following Table we present the Annual Reduction in CO₂ Emissions due to Solar PV Plant.

Table No 7: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	10	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	12000	kWh
5	1 kWh of Electrical Energy emits	0.9	Kg of CO ₂
6	Annual Reduction in CO ₂ Emissions = (4) * (5) /1000	10.8	MT

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 litres** 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 liveability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

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

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 'air pollution' has been defined as 'the presence in the atmosphere of any air pollutant.'

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.

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 10micron

Table No 8: Indoor Air Quality Parameters:

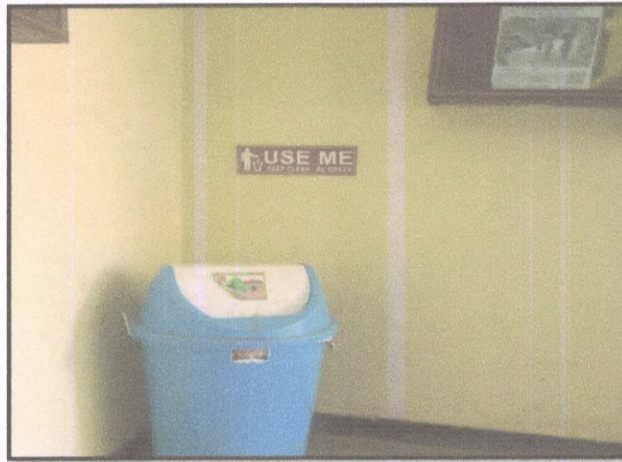
No	Location	AQI	PM-2.5	PM-10
1	Instrument Room	73	44	55
2	Staff Room	81	49	64
3	Lecture Hall	80	48	61
4	Computer Lab	83	50	62
5	Office	81	49	60
6	Pharma. Analysis Lab	81	49	64
	Maximum	83	50	64
	Minimum	73	44	55

CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The solid waste is segregated at source. There are separate bins for collection of Waste at various points.

Photograph of Waste Collection Bin:



5.2 Organic Waste Management:

A Vermi composting Bed is used to convert the Organic waste into Bio compost.

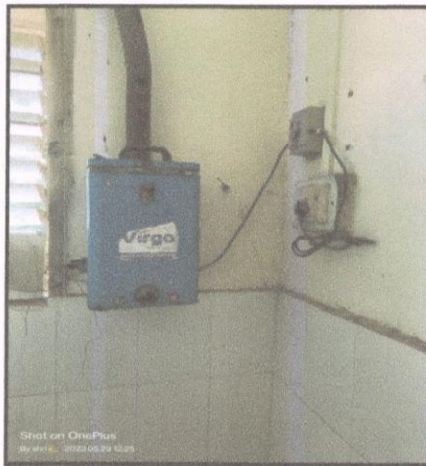
Photograph of Bio Composting Pit:



5.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



5.4 Bio Medical Waste Management:

No Bio medical Waste is generated in the College.

5.5 E Waste Management:

The E Waste is disposed of through M/s. Mahalaxmi e Recyclers Pvt. Ltd.

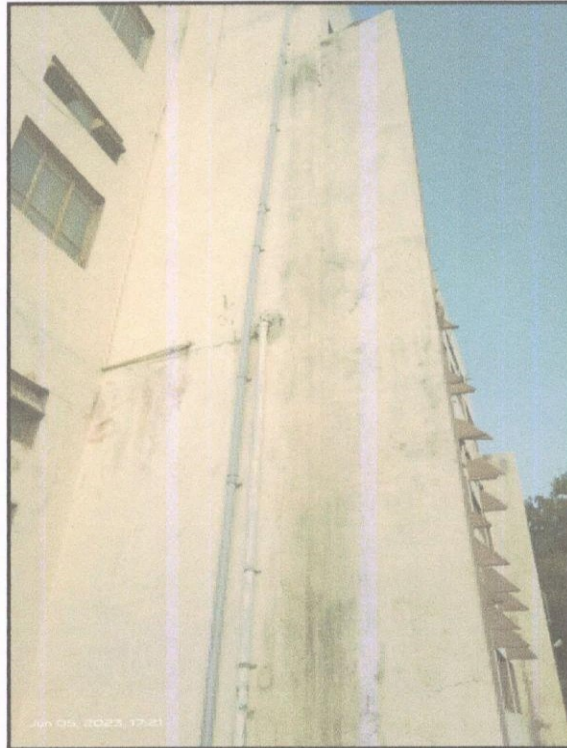


CHAPTER-VII

STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

Photograph of Underground Rain Water Carrying Pipe:



CHAPTER-VIII

STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES

8.1 Internal Tree Plantation:

The College has well maintained Medicinal Plant Garden.

Photograph of Medicinal Plants in the campus:



**ANNEXURE-I:
AIR QUALITY 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 +

ENVIRONMENTAL AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur



Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Mukhtangan 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,
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'**

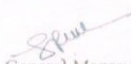
We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Mukhtangan 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

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

Ref: ES/DSTSCOP/21-22/03

Date: 12/6/2022

CERTIFICATE

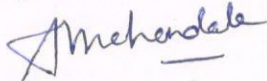
This is to certify that we have conducted Environmental Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2021-22.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Vermi Composting Pit Arrangement for Conversion of Organic Waste
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Installation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of Awareness on Energy 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,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



INDEX

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I	Indoor Air Quality, Comfort Condition & Noise Standards	21

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur for awarding us the assignment of Environmental Audit of their Solapur Campus, for the Academic Year: 21-22.

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



EXECUTIVE SUMMARY

1. **Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur** consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities

2. Pollution caused due to College Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity & LPG Consumption.
- **Solid Waste:** Bio degradable Garden Waste, Recyclable Waste and Human Waste.
- **Liquid Waste:** Human liquid Waste.

3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	2904	266	3.33
2	Maximum	745	57	0.72
3	Minimum	0	9	0.02
4	Average	242.00	22.17	0.28

4. Usage of Renewable Energy & Reduction in CO₂ Emission:

- The College has yet to install Roof Top Solar PV Plant of Capacity **10 kWp**
- Energy generated by Solar PV Plant in 21-22 is **12000 kWh**
- Annual Reduction in CO₂ Emissions in 21-22 is **10.8 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	66	40	49
2	Minimum	56	34	42

6. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.4	73	140	45
2	Minimum	27.2	71	109	41.9

7. Waste Management:

7.1 Segregation of Waste at Source:

The solid waste is segregated at source. Waste Bins are located at various locations.

7.2 Organic Waste Management:

Vermi Composting Pit Arrangement is used to convert the Organic waste into Bio compost.

7.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

7.4 Bio Medical Waste Management:

No Bio medical Waste is generated in the College.

7.5 Chemical Laboratory Liquid Waste Management:

The Chemical Laboratory Liquid Waste is first diluted with Salt solution & then drained into the municipal drainage line.

7.6 Chemicals' Storage & Fumes' Management:

Hazardous chemicals are kept away from the reach of students in the fumigation Chamber.

7.7 E Waste Management:

The E Waste is disposed of through M/s. Mahalaxmi e Recyclers Pvt. Ltd.

8. Rain Water Management:

The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

9. Environmental Friendly Initiatives:

- Tree Plantation in the campus
- Creation of Awareness by Display of Posters on Plastic Free Campus.

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO₂** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

11. References:

- For CO₂ Emissions: www.tatapower.com
- 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
DSTS	:	Dakshin Solapur Taluka Shikshan
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
KLPD	:	Kilo Litres 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

1.1 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:

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"

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

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

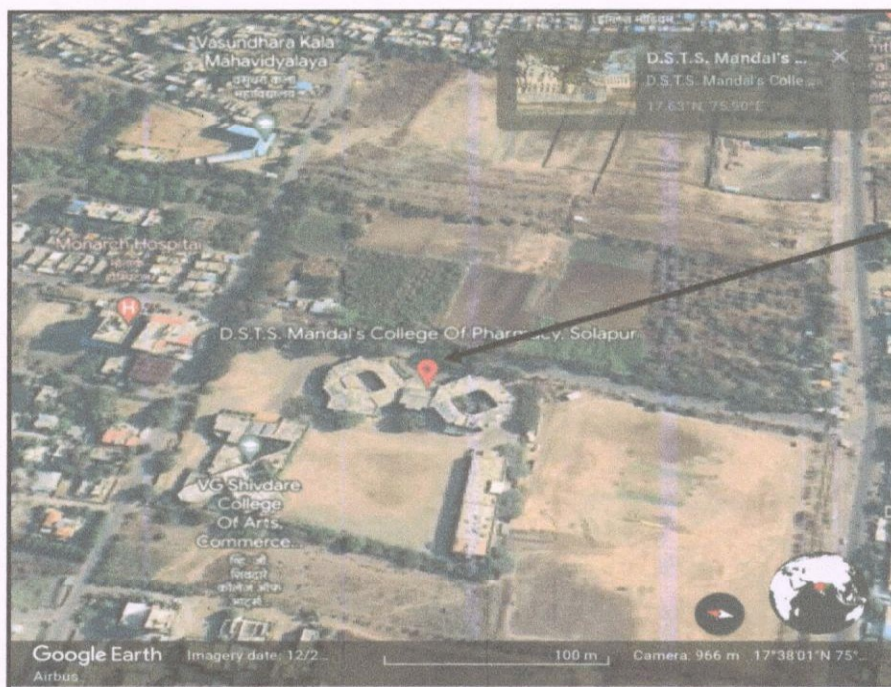
1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research College)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Audit Methodology:

1. To study Resource Consumption & CO₂ Emissions
2. To Study CO₂ Emission Reduction
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study Waste Management
6. To Study Rain Water Management
7. To Study Environment Friendly Initiatives

1.3 Google Earth Image:



College
Campus



1.4 General Details of College: Table No: 4

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur



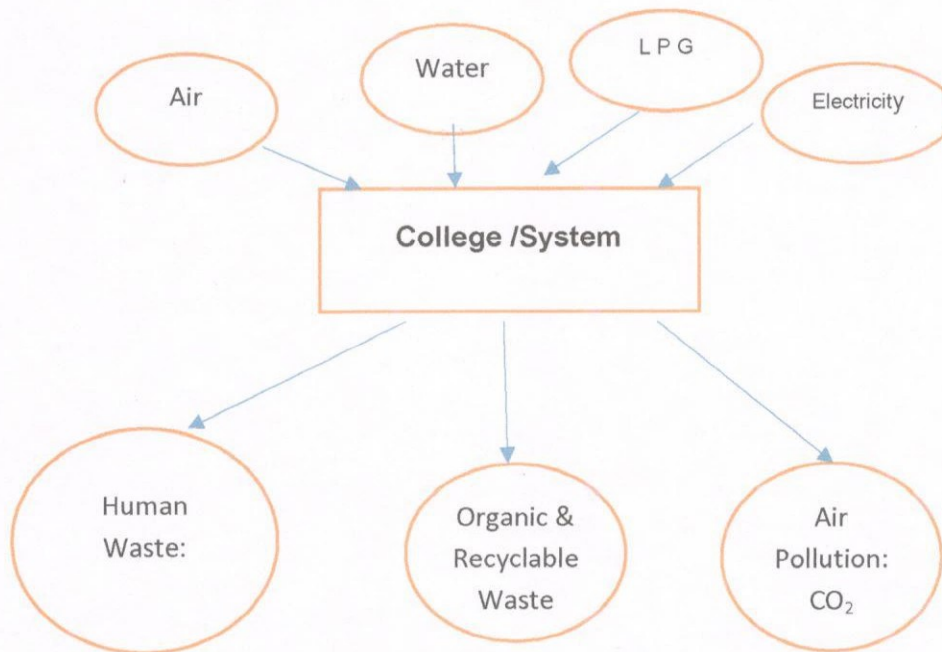
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The College consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

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

Chart No 1: Representation of College as System:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to LPG & Electrical Energy are 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 5: Study of Consumption of Energy & CO₂ Emissions: 21-22:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg	CO ₂ Emissions, MT
1	Apr-21	384	10	0.37
2	May-21	0	9	0.02
3	Jun-21	0	9	0.02
4	Jul-21	0	19	0.05

5	Aug-21	0	38	0.10
6	Sep-21	0	38	0.10
7	Oct-21	0	57	0.15
8	Nov-21	233	19	0.26
9	Dec-21	745	19	0.72
10	Jan-22	584	19	0.58
11	Feb-22	418	10	0.40
12	Mar-22	540	19	0.54
13	Total	2904	266	3.33
14	Maximum	745	57	0.72
15	Minimum	0	9	0.02
16	Average	242.00	22.17	0.28

Chart No 2: Study of CO₂ Emission:

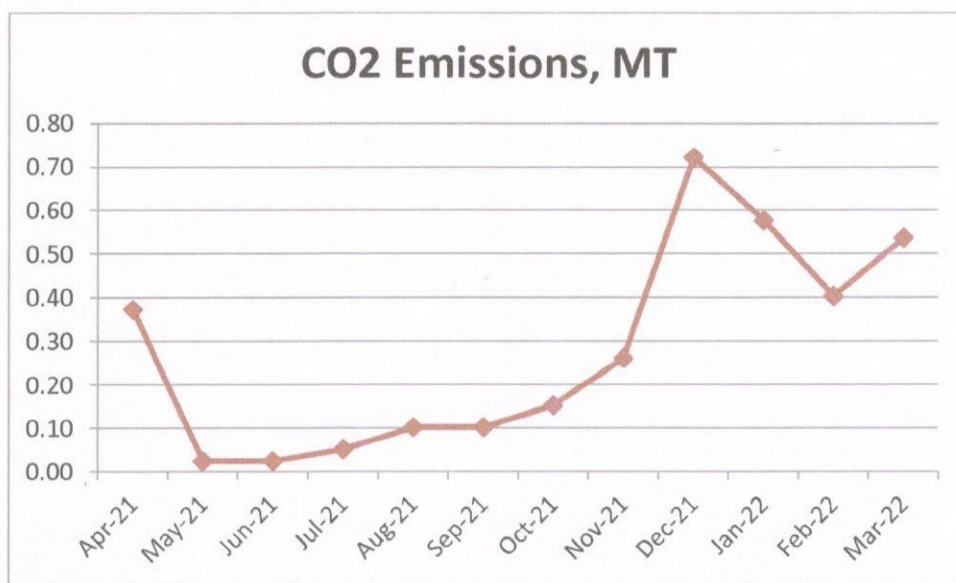


Table No 6: Various Important Parameters:

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CHAPTER III

STUDY OF CO₂ EMISSION REDUCTION

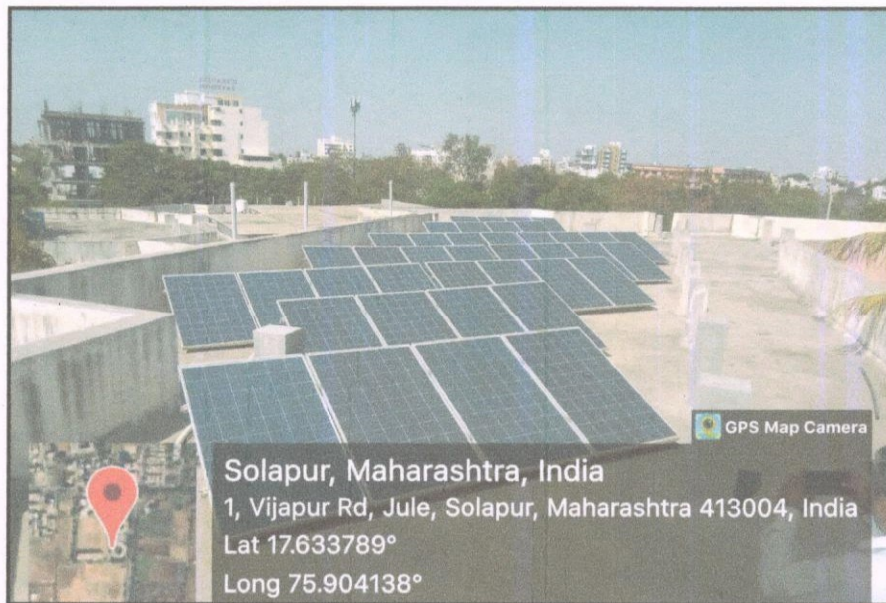
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5	1 kWh of Electrical Energy emits	0.9	Kg of CO ₂
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Photograph of Roof Top Solar PV Plant:



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 litres** 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 liveability.

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Table No 8: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	Computer Lab-2	60	36	43
2	NBA Cell	56	34	42
3	Pharma. Chem. Lab	66	40	49
4	Staff Room	63	38	45
5	Tutorial room	65	39	48
6	QA research Cell	64	38	44
	Maximum	66	40	49
	Minimum	56	34	42

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 9: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Computer Lab-2	27.3	71	109	42
2	NBA Cell	27.4	72	113	42.1
3	Pharma. Chem. Lab	27.4	71	119	41.9
4	Staff Room	27.3	71	126	45
5	Tutorial room	27.2	72	132	44.8
6	QA research Cell	27.3	73	140	44.3
	Maximum	27.4	73	140	45
	Minimum	27.2	71	109	41.9

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The solid waste is segregated at source. There are separate bins for collection of Waste at various points.

Photograph of Waste Collection Bin:



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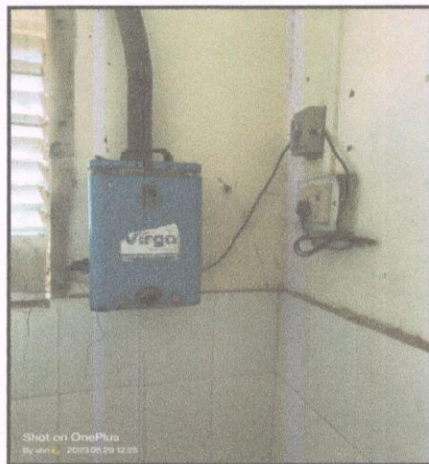
Photograph of Bio Composting Pit:



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Photograph of Sanitary Waste Incinerator:



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No Bio medical Waste is generated in the College.

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Hazardous chemicals are kept away from the reach of students in the fumigation Chamber.

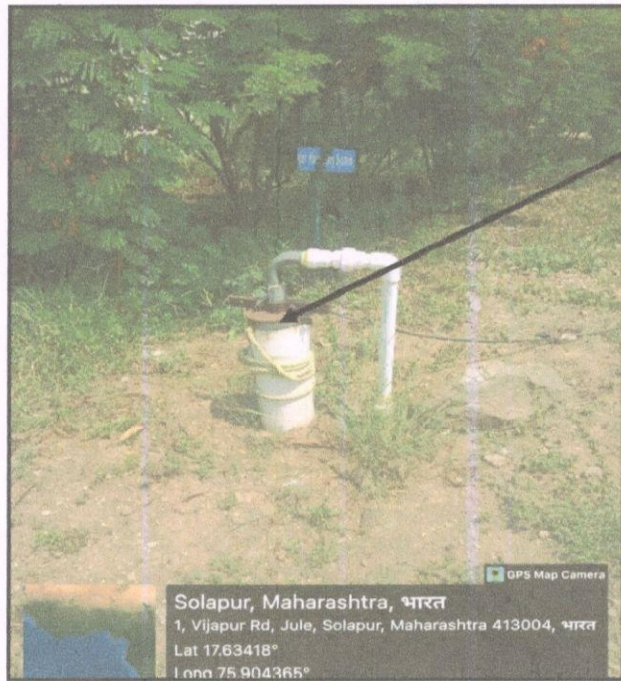
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CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project, wherein the Rain Water from terrace is collected and is used to recharge the bore well.

Photograph of Bore well Recharge Point:



Rain Water
Harvesting

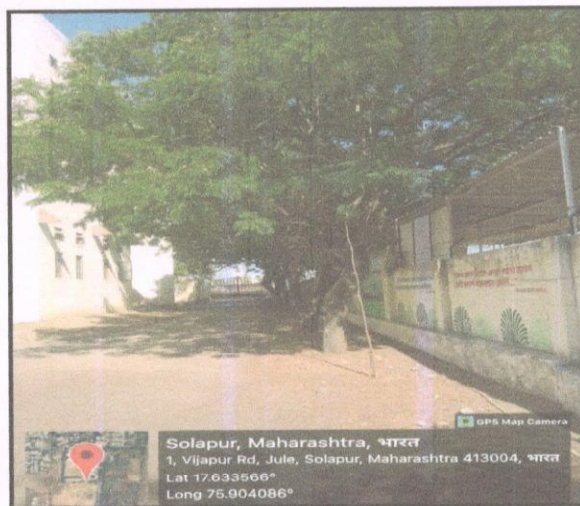
CHAPTER-VIII

STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES

8.1 Internal Tree Plantation:

The College has well maintained Medicinal Plant Garden.

Photograph of Medicinal Plants in the campus:



8.2 Creation of Awareness on Energy Conservation:

The College has displayed Poster emphasizing on Energy Conservation.

Photograph of Poster on Energy Conservation:



ANNEXURE-I:**AIR QUALITY, NOISE & INDOOR 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%