

# ENVIRONMENTAL AUDIT REPORT

of  
Progressive Education Society's  
Modern College of Pharmacy,  
Sector 21, Yamuna Nagar, Nigdi 411 044



Year: 2021-22

Prepared by:

## ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,  
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**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

**Maharashtra Energy Development Agency**  
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ECN/2022-23/CR-43/1709 10<sup>th</sup> May, 2022

**CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

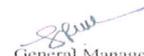
We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

**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 **09<sup>th</sup> 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](mailto:engress123@gmail.com)

Ref: ES/MCOP/21-22/03

Date: 11/6/2022

### CERTIFICATE

This is to certify that we have conducted Environmental Audit at Progressive Education Society's Modern College of Pharmacy, Nigdi, Pune, in the Academic year 2021-22.

The College has adopted following Environment Friendly Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Provision of Sanitary Waste Incinerator for Sanitary Waste Disposal
- Implementation of Rain Water Harvesting Project
- Tree Plantation in the campus
- Creation of Awareness on Resource 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 Environment Friendly.

For Engress Services,



**A Y Mehendale,**

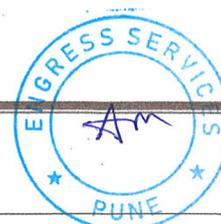
Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



## INDEX

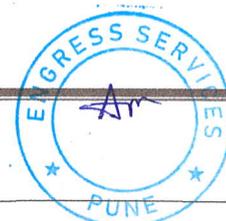
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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Progressive Education Society's Modern College of Pharmacy, Nigdi Pune 411044 , for awarding us the assignment of Environmental Audit of their Campus for the Academic Year: 21-22.

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



## EXECUTIVE SUMMARY

1. Progressive Education Society's Modern College of Pharmacy, Nigdi consumes Energy in the form of **Electrical Energy and LPG** used for various Electrical Equipment, office & other facilities.

### 2. Pollution due to College Activities:

- **Air pollution:** Mainly CO<sub>2</sub> on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

### 3. Present Energy Consumption & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	57606	100	52.11
2	Maximum	5233	14	4.75
3	Minimum	3906	2	3.52
4	Average	8862.46	15.38	8.02

### 4. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity **10kWp**.

### 5. Usage of Renewable Energy & Reduction in CO<sub>2</sub> Emission:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- The Electrical Energy generated in 21-22 is **12000 kWh**.
- Reduction in CO<sub>2</sub> Emissions in 21-22 is **10.8MT**.

### 6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	124	68	86
2	Minimum	100	60	76

### 7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	29.2	41	587	45
2	Minimum	28.8	40	147	36.9

## 8. Waste Management:

### 8.1 Segregation of Waste at Source:

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

### 8.2 Organic Waste Management:

It is recommended to install Bio Composting Unit to convert the Bio degradable Waste into Bio compost, which can be used in the internal garden.

### 8.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

### 8.4 Bio Medical Waste Management:

The College has entered a Memorandum of understanding with M/s. PASCO, for disposal of Bio Medical Waste.

### 8.5 Chemical Laboratory Waste Management:

The College is following the concept of Green Synthesis; hence, no Chemical Laboratory Waste is generated.

### 8.6 E-Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

## 9. Rain Water Harvesting:

The College has installed the Rainwater harvesting project, the rain water falling on the terrace is collected and is used for recharging the bore well.

## 10. Green & Sustainable Initiatives

- Good Internal Road
- Tree Plantation & Medicinal Plant Garden
- Provision of Ramp for Divyangajan
- Creation of Awareness by Display of Posters on Resource Conservation
- Tree Plantation and Cleanliness Drive Events, under National Service Scheme

## 11. Notes & Assumptions:

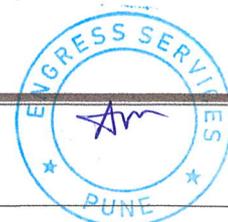
1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 Kg of LPG** releases **2.68 Kg of CO<sub>2</sub>** into atmosphere
3. **1 kWp Roof Top Solar PV** Plant releases **4 kWh** of Electrical Energy per Day.
4. Annual Solar Energy Generation Days: **300 Nos.**

## 12. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Solar PV Energy Generation: [www.solarrooftop.gov.in](http://www.solarrooftop.gov.in)
- For Various Indoor Air Parameters: [www.ishrae.com](http://www.ishrae.com)
- For AQI & Water Quality Standards: [www.cpcb.com](http://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

### 1.1 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:**

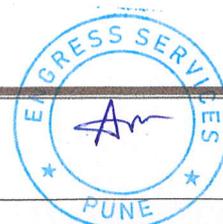
1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
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 Objectives:**

1. To study Resource Consumption & CO<sub>2</sub> Emissions
2. To Study CO<sub>2</sub> Emission Reduction
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study of Waste Management
6. To Study of Rain Water Harvesting
7. To Study of Environment Friendly Initiatives

**1.3 General Details of College: Table No 4:**

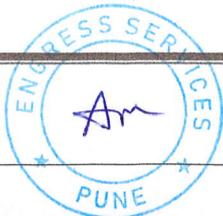
No	Head	Particulars
1	Name of Institution	Progressive Education Society's Modern College of Pharmacy
2	Address	Nigdi, Pune-411044
3	Year of Establishment	1998
4	Affiliation	Savitribai Phule Pune University



1.4 Google Earth Image:



College  
Campus



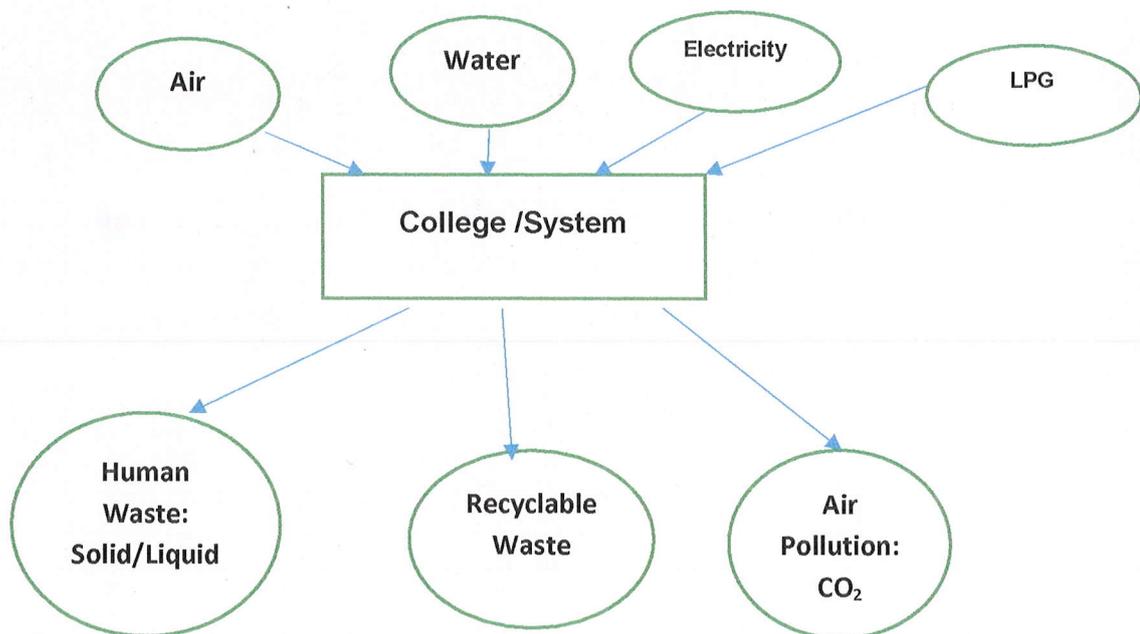
## CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO<sub>2</sub> EMISSION

The Institute 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 College as System & Study of Resources & Waste**



Now we compute the Generation of CO<sub>2</sub> on account of consumption of Electrical Energy. The basis of Calculation for CO<sub>2</sub> emissions due to LPG & Electrical Energy are as under

- 1 kWh of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
- 1 Kg of LPG releases **2.68 Kg of CO<sub>2</sub>** into atmosphere

**Table No 5: Study of Consumption of Electrical Energy, LPG & CO<sub>2</sub> Emissions: 21-22:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-21	4872	4	4.40
2	May-21	5000	8	4.52
3	Jun-21	5233	14	4.75
4	Jul-21	5855	12	5.30
5	Aug-21	4622	19	4.21

6	Sep-21	5274	38	4.85
7	Oct-21	6074	38	5.57
8	Nov-21	5695	19	5.18
9	Dec-21	6541	19	5.94
10	Jan-22	5891	19	5.35
11	Feb-22	5782	38	5.31
12	Mar-22	6042	38	5.54
13	Total	66881	266	60.91
14	Maximum	6541	38	5.94
15	Minimum	4622	4	4.21
16	Average	5573.42	22.17	5.08

Chart No 2: Month wise CO<sub>2</sub>Emissions:

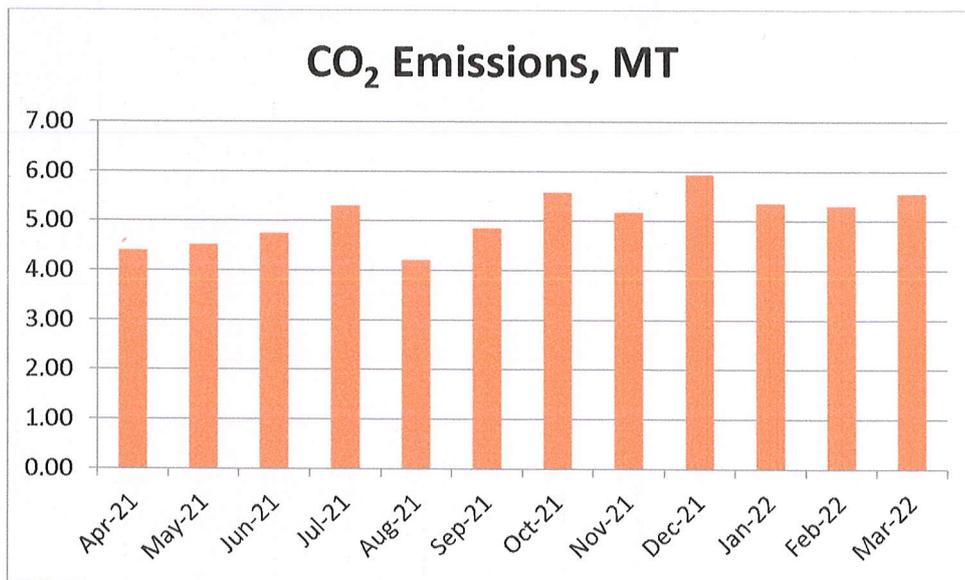


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	66881	266	60.91
2	Maximum	6541	38	5.94
3	Minimum	4622	4	4.21
4	Average	5573.42	22.17	5.08

### CHAPTER III STUDY OF CO<sub>2</sub> EMISSION REDUCTION

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

In the following Table, we compute the Annual Reduction in CO<sub>2</sub> Emissions due to installation of Roof Top Solar PV Plant.

**Table No 7: Computation of Annual Reduction in CO<sub>2</sub> 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: 21-22	<b>12000</b>	kWh
5	1 kWh of Electrical Energy saves	<b>0.9</b>	Kg/kWh
6	<b>Qty of CO<sub>2</sub> Saved by Solar PV Plant = (4)*(5) /1000</b>	<b>10.8</b>	<b>MT of CO<sub>2</sub></b>

**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.

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. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the AQI requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

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
	Ground Floor			
1	Store Room	103	61	81
2	Industry Lab	100	60	76
3	Animal House	100	61	78
4	GYM	106	62	82
	Stilt Floor			
1	Pharma Chem Lab	110	64	81
2	Instrumental Room	113	64	85



3	NSS Office	112	64	84
4	Faculty Room	120	66	85
	First Floor			
1	Classroom-I	123	67	86
2	Tutorial Room-I	115	66	85
3	exam section	112	64	82
4	Library	118	67	85
	Second Floor			
1	Board Room	113	63	80
2	Departmental office	113	64	82
3	Phy. Lab	110	66	81
4	Pharmaceutics Lab	120	67	81
	Third Floor			
1	Tutorial Room-III	124	68	81
2	Pharma Research Lab	116	65	82
3	IQAC Room	115	63	84
4	Faculty Room	113	64	82
	Maximum	<b>124</b>	<b>68</b>	<b>86</b>
	Minimum	<b>100</b>	<b>60</b>	<b>76</b>

## 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
	<b>Ground Floor</b>				
1	Store Room	29.2	40	587	45
2	Industry Lab	29.1	41	541	44.6
3	Animal House	29.2	41	498	44.9
4	GYM	29.1	41	213	42
	<b>Stilt Floor</b>				
1	Pharma Chem Lab	29.2	41	201	39.8
2	Instrumental Room	28.9	41	236	39.4
3	NSS Office	28.9	40	245	38.9
4	Faculty Room	28.9	41	312	39
	<b>First Floor</b>				
1	Classroom-I	29.1	40	547	42.6
2	Tutorial Room-I	29	41	512	41.2
3	exam section	29.1	41	496	44.1
4	Library	29.1	41	451	41.3
	<b>Second Floor</b>				
1	Board Room	29.2	40	149	42.3
2	Departmental office	28.9	40	169	41.6
3	Phy Lab	28.8	40	198	45
4	Pharmaceutics Lab	28.9	41	197	36.9
	<b>Third Floor</b>				
1	Tutorial Room-III	29	41	187	36.9
2	Pharma Research Lab	29	41	147	38.5
3	IQAC Room	29.1	40	163	41.3
4	Faculty Room	28.9	41	209	42
	Maximum	<b>29.2</b>	<b>41</b>	<b>587</b>	<b>45</b>
	Minimum	<b>28.8</b>	<b>40</b>	<b>147</b>	<b>36.9</b>

## CHAPTER VI STUDY OF WASTE MANAGEMENT

### 6.1 Segregation of Waste at Source:

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

#### Photograph of Waste Collection Bins:



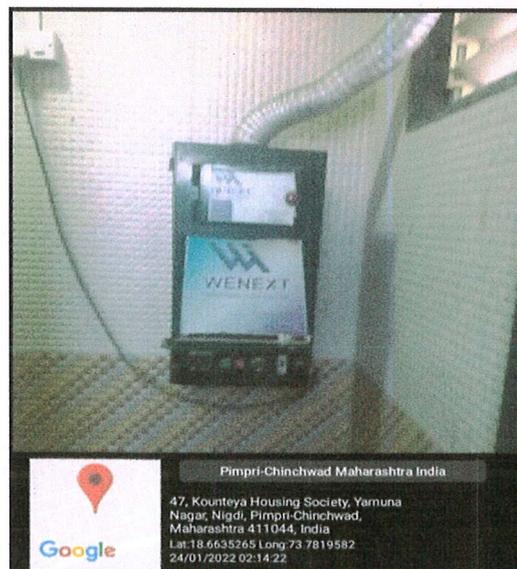
### 6.2 Organic Waste Management:

It is recommended to install Bio Composting Unit to convert the Bio degradable Waste into Bio compost, which can be used in the internal garden.

### 6.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

#### Photograph of Sanitary Waste Incinerator:



**6.4 Bio Medical Waste Management:**

The College has entered a Memorandum of understanding with M/s. PASCO, for disposal of Bio Medical Waste.

**6.5 Chemical Laboratory Waste Management:**

The College is following the concept of Green Synthesis; hence, no Chemical Laboratory Waste is generated.

**6.6 E-Waste Management:**

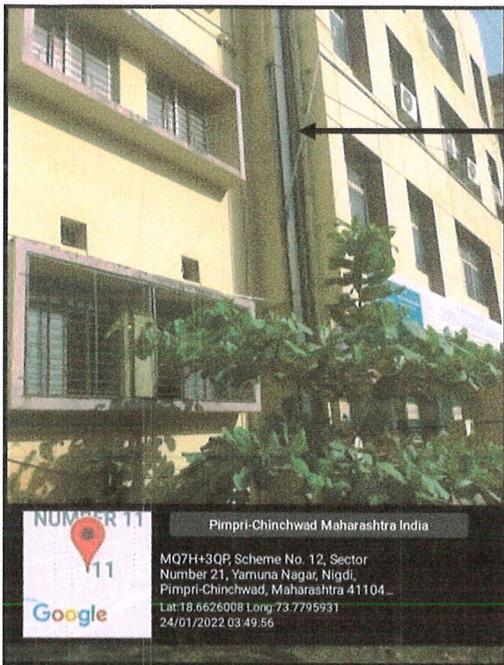
It is recommended to dispose of the E Waste through Authorized Agency.



## CHAPTER-VII STUDY OF RAIN WATER HARVESTING

The College has implemented the Rain Water Harvesting Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to recharge the bore well.

Photograph of Rain water Harvesting Pipe:



Rain Water  
Collecting Pipe

Photograph of Rain water Harvesting Recharging Well Section:



Recharge Point

## CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

### 8.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



### 8.2 Creation of Awareness about Resource Conservation:

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

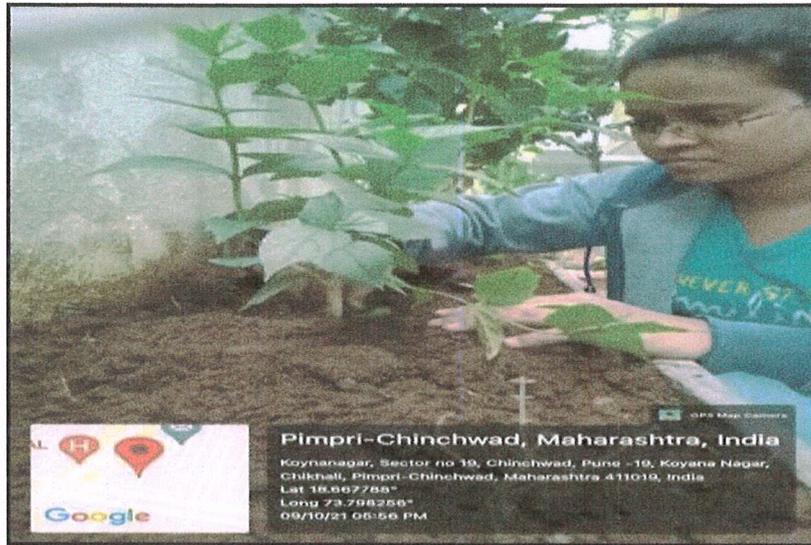
Photograph of Poster on Resource Conservation:



### 8.3 Tree Plantation Program, under Mazi Vasundhara Abhiyan:

The College, under the NSS, conducted Mazi Vasundhara Program. Tree Plantation was done.

Photograph of Tree Plantation under Mazi Vasundhara Abhiyan:



### 8.4 Cleanliness Drive Program:

Under, NSS, Cleanliness Drive was conducted in the Village: Jamavade, in Taluka: Maval of Pune District.

Photograph of Cleanliness Drive Event:



**ANNEXURE-I:  
VARIOUS AIR QUALITY, WATER 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 Water Quality Standards:**

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5

### 3. 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

### 4. Thermal Comfort Conditions: For Non-conditioned Buildings:

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

**GREEN AUDIT REPORT**  
of  
**Progressive Education Society's**  
**MODERN COLLEGE OF PHARMACY,**  
Sector 21, Yamuna Nagar, Nigdi, Pune 411 044



Year: 2021-22

Prepared by:

**ENGRESS SERVICES**

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Near Muktangan English School, Parvati, Pune 411009  
Phone: 09890444795, Email: [engress123@gmail.com](mailto:engress123@gmail.com)



**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

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(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](mailto:eee@mahaurja.com), Web: [www.mahaurja.com](http://www.mahaurja.com)

ECN/2022-23/CR-43/1709 10<sup>th</sup> May, 2022

**CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

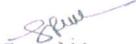
We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

**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 **09<sup>th</sup> 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 Muktang English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/MCOP/21-22/02

Date: 11/6/2022

### CERTIFICATE

This is to certify that we have conducted Green Audit at Progressive Education Society's Modern College of Pharmacy, Nigdi, Pune, in the Academic year 2021-22.

The College has adopted following Green Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Provision of Sanitary Waste Incinerator for Sanitary Waste Disposal
- Implementation of Rain Water Harvesting Project
- Maintenance of Good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of Awareness on Resource 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 Green.

For Engress Services,



**A Y Mehendale,**  
Certified Energy Auditor, EA-8192  
ASSOCHAM GEM Certified Professional: GEM: 22/788



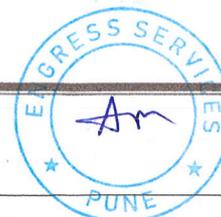
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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Progressive Education Society's Modern College of Pharmacy, Nigdi Pune 411044, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 21-22.

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



## EXECUTIVE SUMMARY

1. Progressive Education Society's Modern College of Pharmacy, Nigdi consumes Energy in the form of Electrical Energy and LPG used for various Electrical Equipment, office & other facilities.

### 2. Present Energy Consumption & CO<sub>2</sub> Emissions:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	66881	266	60.91
2	Maximum	6541	38	5.94
3	Minimum	4622	4	4.21
4	Average	5573.42	22.17	5.08

### 3. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient BEE STAR Rated Equipment
- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp.

### 4. Usage of Renewable Energy & CO<sub>2</sub> Emission Reduction:

- The College has installed Roof Top Solar PV Plant of Capacity 10kWp.
- The Electrical Energy generated in 21-22 is 12000 kWh.
- Reduction in CO<sub>2</sub> Emissions in 21-22 is 10.8 MT.

### 5. Waste Management:

#### 5.1 Segregation of Waste at Source:

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

#### 5.2 Organic Waste Management:

It is recommended to install Bio Composting Unit to convert the Bio degradable Waste into Bio compost, which can be used in the internal garden.

#### 5.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

#### 5.4 Bio Medical Waste Management:

The College has entered a Memorandum of understanding with M/s. PASCO, for disposal of Bio Medical Waste.

### 5.5 Chemical Laboratory Waste Management:

The College is following the concept of Green Synthesis; hence, no Chemical Laboratory Waste is generated.

### 5.6 E-Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

### 6. Rain Water Harvesting:

The College has installed the Rainwater harvesting project, the rain water falling on the terrace is collected and is used for recharging the bore well.

### 7. Green & Sustainable Initiatives

- Good Internal Road
- Tree Plantation & Medicinal Plant Garden
- Provision of Ramp for Divyangajan
- Creation of Awareness by Display of Posters on Resource Conservation
- Tree Plantation & Cleanliness Drive, under National Service Scheme

### 8. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 Kg of LPG** releases **2.68 Kg of CO<sub>2</sub>** into atmosphere
3. **1 kWp Roof Top Solar PV** Plant releases **4 kWh** of Electrical Energy per Day.
4. Annual Solar Energy Generation Days: **300 Nos.**

### 9. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Roof Top Solar Energy generation: [www.solarrooftop.gov.in](http://www.solarrooftop.gov.in)

## ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO <sub>2</sub>	Carbon Di Oxide
Qty	Quantity

## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Present Energy Consumption
2. To Study CO<sub>2</sub> emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Harvesting
6. Study of Green & Sustainable Practices

### 1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Progressive Education Society's Modern College of Pharmacy
2	Address	Sector 21, Yamuna Nagar, Nigdi 411 044
3	Year of Establishment	1998
4	Affiliation	Savitribai Phule Pune University

### 1.3 Google Earth Image:



College  
Campus

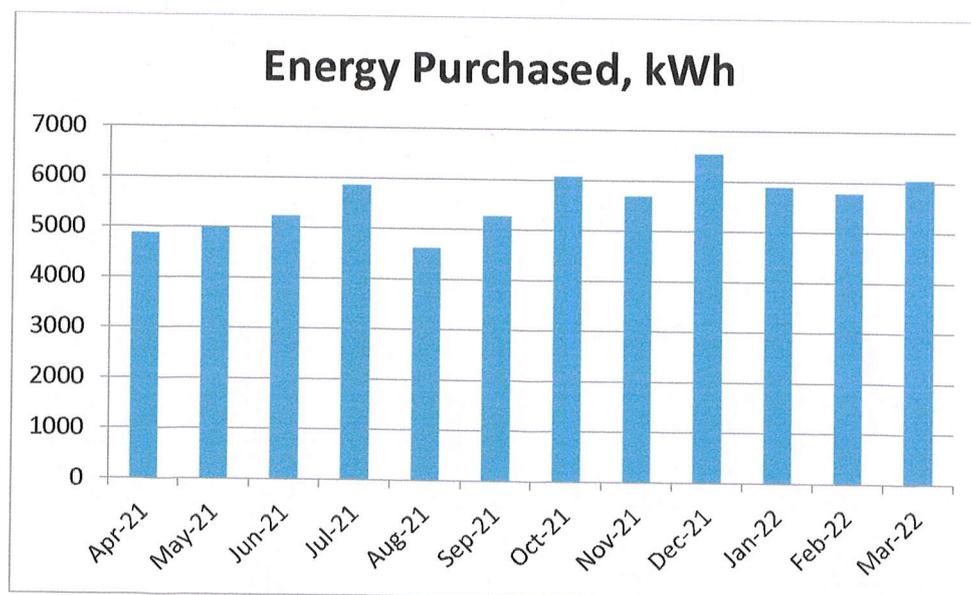
## CHAPTER-II STUDY OF PRESENT ENERGY CONSUMPTION

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

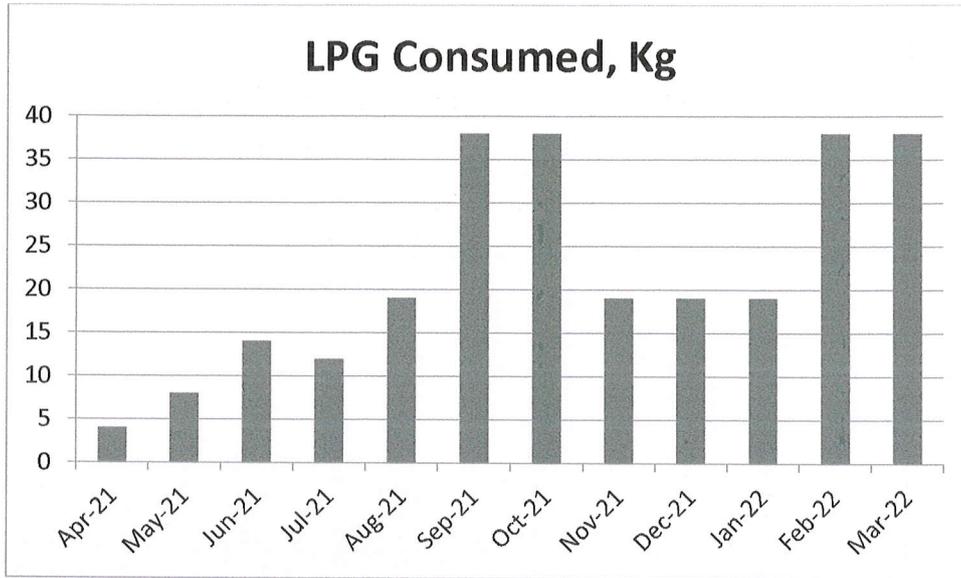
**Table No 2: Electrical Energy & LPG Consumption Analysis- 2021-22:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-21	4872	4
2	May-21	5000	8
3	Jun-21	5233	14
4	Jul-21	5855	12
5	Aug-21	4622	19
6	Sep-21	5274	38
7	Oct-21	6074	38
8	Nov-21	5695	19
9	Dec-21	6541	19
10	Jan-22	5891	19
11	Feb-22	5782	38
12	Mar-22	6042	38
13	Total	66881	266
14	Maximum	6541	38
15	Minimum	4622	4
16	Average	5573.42	22.17

**Chart No 1: Variation in Monthly Energy Purchased:**



**Chart No 2: Variation in Variation in Monthly LPG Consumption:**



**Table No 3: Variation in Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	66881	266
2	Maximum	6541	38
3	Minimum	4622	4
4	Average	5573.42	22.17

### CHAPTER III

## 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 and LPG as the Energy Source.

#### Basis for computation of CO<sub>2</sub> Emissions:

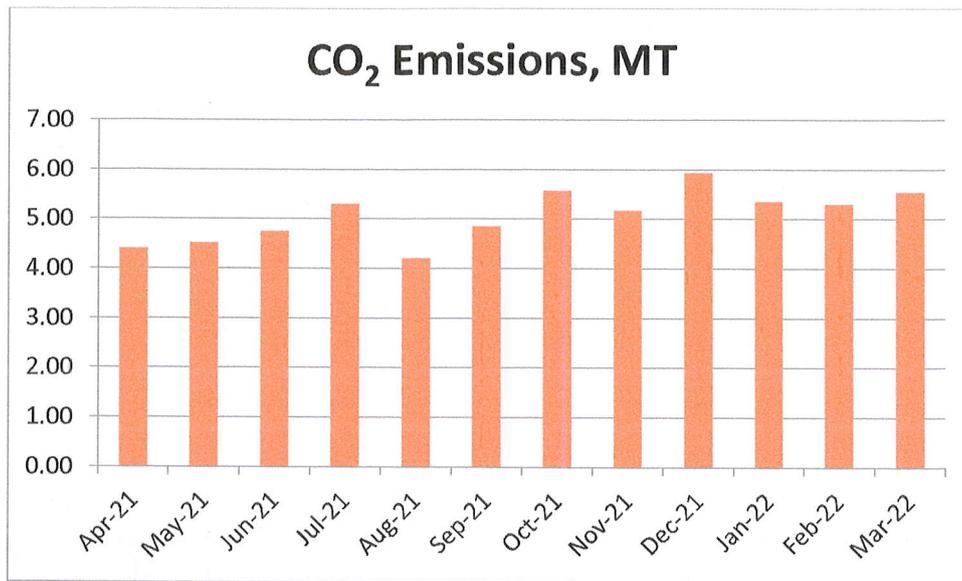
- 1 kWh of Electrical Energy releases 0.9 Kg of CO<sub>2</sub> into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO<sub>2</sub> into atmosphere

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

**Table No 4: Month wise CO<sub>2</sub> Emissions:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-21	4872	4	4.40
2	May-21	5000	8	4.52
3	Jun-21	5233	14	4.75
4	Jul-21	5855	12	5.30
5	Aug-21	4622	19	4.21
6	Sep-21	5274	38	4.85
7	Oct-21	6074	38	5.57
8	Nov-21	5695	19	5.18
9	Dec-21	6541	19	5.94
10	Jan-22	5891	19	5.35
11	Feb-22	5782	38	5.31
12	Mar-22	6042	38	5.54
13	Total	66881	266	60.91
14	Maximum	6541	38	5.94
15	Minimum	4622	4	4.21
16	Average	5573.42	22.17	5.08

**Chart No 3: Month wise CO<sub>2</sub>Emissions:**



**Table No 5: Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	66881	266	60.91
2	Maximum	6541	38	5.94
3	Minimum	4622	4	4.21
4	Average	5573.42	22.17	5.08

## CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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

In the following Table, we compute the Annual Reduction in CO<sub>2</sub> Emissions due to installation of Roof Top Solar PV Plant.

**Table No6: Computation of Annual Reduction in CO<sub>2</sub> 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: 21-22	12000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO <sub>2</sub> Saved by Solar PV Plant $= (4) * (5) / 1000$	10.8	MT of CO <sub>2</sub>

**Photograph of Roof Top Solar PV Plant:**

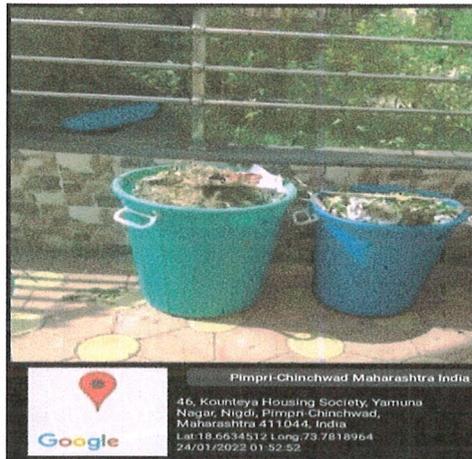


## CHAPTER V STUDY OF WASTE MANAGEMENT

### 5.1 Segregation of Waste at Source:

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

#### Photograph of Waste Collection Bins:



### 5.2 Organic Waste Management:

It is recommended to install Bio Composting Unit to convert the Bio degradable Waste into Bio compost, which can be used in the internal garden.

### 5.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

#### Photograph of Sanitary Waste Incinerator:



**5.4 Bio Medical Waste Management:**

The College has entered a Memorandum of understanding with M/s. PASCO, for disposal of Bio Medical Waste.

**5.5 Chemical Laboratory Waste Management:**

The College is following the concept of Green Synthesis; hence, no Chemical Laboratory Waste is generated.

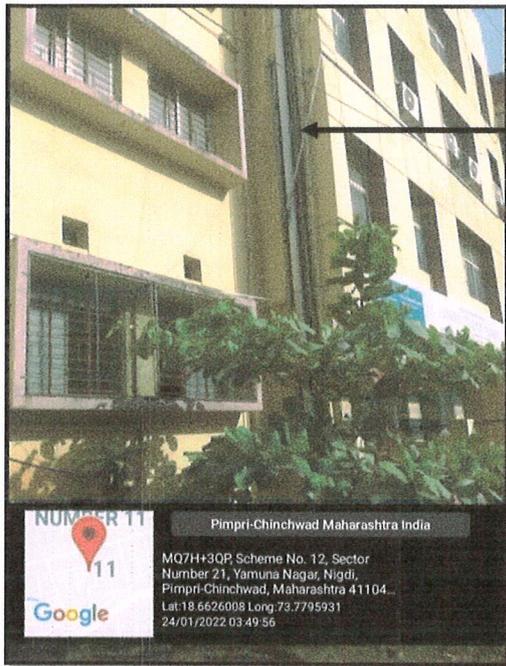
**5.6 E-Waste Management:**

It is recommended to dispose of the E Waste through Authorized Agency.

## CHAPTER-VI STUDY OF RAIN WATER HARVESTING

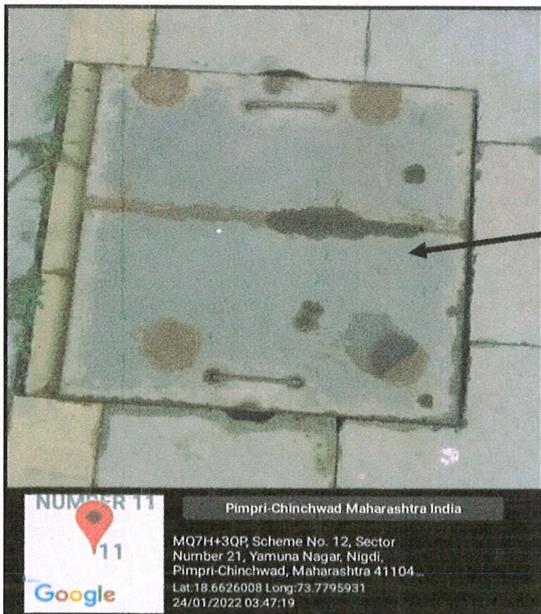
The College has implemented the Rain Water Harvesting Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to recharge the bore well.

Photograph of Rain water Harvesting Pipe:



Rain Water  
Collecting Pipe

Photograph of Rain water Harvesting Recharging Well Section:



Recharge Point

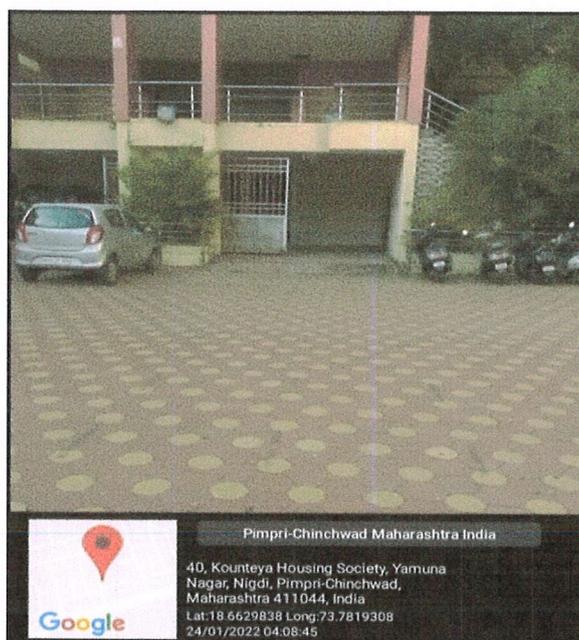
## CHAPTER-VII

### STUDY OF GREEN & SUSTAINABLE PRACTICES

#### 7.1 Pedestrian Friendly Roads:

The College has well maintained internal road to facilitate the easy movement of the students within the campus.

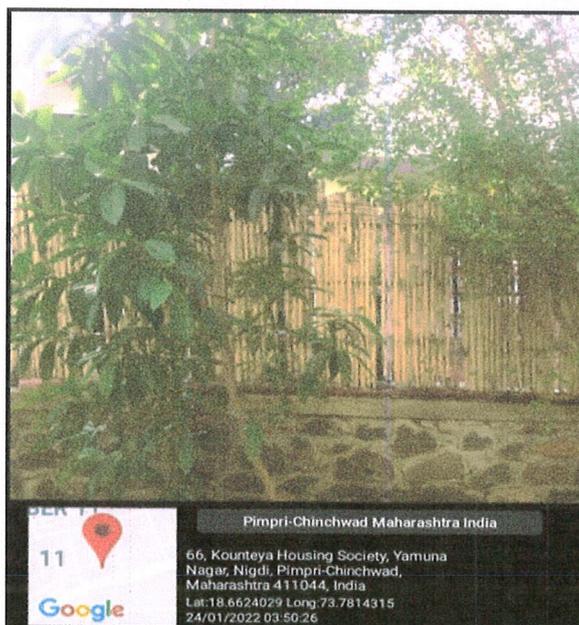
Photograph of Internal Road:



#### 7.2 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



### 7.3 Provision of Ramp:

For easy movement of Divyangjan, the College has made provision of Ramp.

Photograph of Ramp:



### 7.4 Creation of Awareness about Energy Conservation:

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

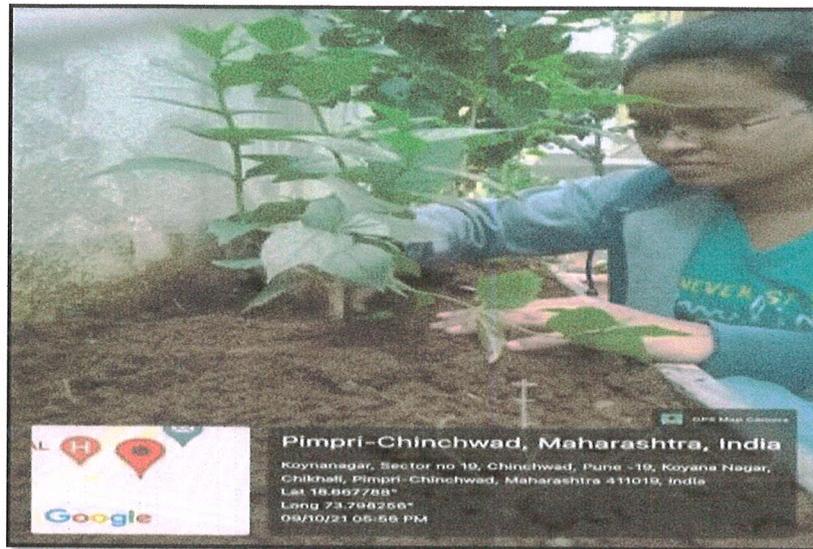
Photograph of Poster on Water Conservation:



### 7.5 Tree Plantation Program under Mazi Vasundhara Abhiyan:

The College, under the NSS, conducted Mazi Vasundhara Program. Tree Plantation was done.

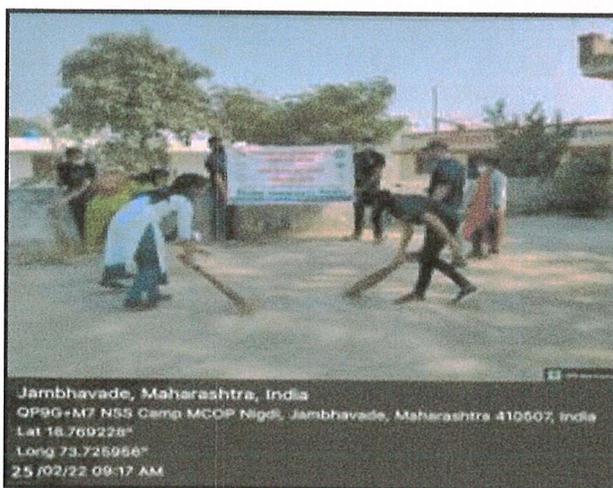
#### Photograph of Tree Plantation under Mazi Vasundhara Abhiyan:



### 7.6 Cleanliness Drive Program:

Under, NSS, Cleanliness Drive was conducted in the Village: Jamavade, in Taluka: Maval of Pune District.

#### Photograph of Cleanliness Drive Event:



**ANNEXURE-1:**  
**DETAILS OF TREES& PLANTS:**

**1. List of Trees:**

No	Common Name Of Tree	Qty
1	Palm	130
2	Audumbar	2
3	Ficus	10
4	Pimpal	1
5	Palas	1
6	Ashoka	2
7	Sonchampa	2
8	Christmas	3
9	Mango	1
10	Chikoo	1
11	Rubber	1
12	Umberell Palm	5
13	Ticoma	2
14	Papaya	1
15	Shevri	1
16	Tagar	1
17	Ixzora	4
18	Kadunim	3
19	<b>Total</b>	<b>171</b>

**2. List of Ornamental Plants:**

No	Common Name
1	Coleus
2	Drecena
3	Song Of India
4	Hibiscus
5	Gokarna
6	Cactus
7	Tulsi
8	Rose
9	Jai

## 3. List of Medicinal Plants:

No.	Botanical Name	No.	Botanical Name
1.	<i>Adhatodavasic</i>	29.	<i>Lawsoniainermis</i>
2.	<i>Aegle marmelos</i>	30.	<i>Magnolia champaca</i>
3.	<i>Aloe barbadensis</i>	31.	<i>Mangiferaindica</i>
4.	<i>Andrographispaniculata</i> Nees.	32.	<i>Mimosa pudica</i>
5.	<i>Annona reticulate</i> L	33.	<i>Musa acuminata</i>
6.	<i>Asparagus racemosus</i> Wild.	34.	<i>Myristicafragrans</i>
7.	<i>Azadirachtaindica</i>	35.	<i>Pimentadioica</i>
8.	<i>Bergerakoenigii</i>	36.	<i>Piper betel</i>
9.	<i>Butea monosperma</i>	37.	<i>Piper longum</i>
10.	<i>Cassia angustifolia</i>	38.	<i>Piper nigrum</i>
11.	<i>Catharanthusroseus</i>	39.	<i>Pongamiapinnata</i>
12.	<i>Centellaasiatica</i>	40.	<i>Pterocarpussantalium</i>
13.	<i>Chrysalidocarpuslutescens</i>	41.	<i>Ricinuscommunis</i>
14.	<i>Cinnamomumzeylanicum</i> Breyn.	42.	<i>Rutagraveolens</i>
15.	<i>Citrus limon</i>	43.	<i>Sapindusmukorossi</i>
16.	<i>Costusigneus</i>	44.	<i>Saraca asoca</i>
17.	<i>Curcuma amada</i>	45.	<i>Syzygium aromaticum</i>
18.	<i>Curcuma longa</i>	46.	<i>Syzygiumcumini</i>
19.	<i>Cymbopogon citrates</i>	47.	<i>Tamarindusindica</i>
20.	<i>Elettariacardamomum</i>	48.	<i>Terminalia arjuna</i>
21.	<i>Eucalyptus globules</i>	49.	<i>Terminalia bellirica</i>
22.	<i>Ficusglomerata</i>	50.	<i>Terminalia chebula</i>
23.	<i>Ficusracemosa</i>	51.	<i>Tinosporacordifolia</i>
24.	<i>Gymnemasylvestre</i>	52.	<i>Trachyspermumammi</i>
25.	<i>Helicteresisora</i>	53.	<i>Vitexnegundo</i> L
26.	<i>Hemidesmusindicus</i>	54.	<i>Withaniasomnifera</i>
27.	<i>Hibiscus rosa-sinensis</i>	55.	<i>Eleocarpusganitrus</i>
28.	<i>Kalanchoepinnata</i>	56.	<i>Cinamomumcamphora</i>
29.	<i>Bryophyllumpinnatum</i>		

**ENERGY AUDIT REPORT**  
of  
**Progressive Education Society's  
Modern College of Pharmacy,  
Sector 21, Yamuna Nagar, Nigdi, Pune 411 044**



**Year: 2021-22**

Prepared by:

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society,  
Near Muktang English School, Parvati, Pune 411009  
Phone: 09890444795, Email: [engress123@gmail.com](mailto: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](mailto:eee@mahaurja.com), Web: [www.mahaurja.com](http://www.mahaurja.com)

ECN/2022-23/CR-43/1709

10<sup>th</sup> 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  
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Near Muktangan English School,  
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General Manager (EC)



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Near Muktang English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/MCOP/21-22/01

Date: 11/6/2022

### CERTIFICATE

This is to certify that we have conducted Energy Audit at Progressive Education Society's Modern College of Pharmacy, Nigdi, Pune, in the Academic year 2021-22.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum usage of Day Lighting
- Installation of 10 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



## INDEX

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## **ACKNOWLEDGEMENT**

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



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1	Total	66881	266	60.91
2	Maximum	6541	38	5.94
3	Minimum	4622	4	4.21
4	Average	5573.42	22.17	5.08

### 3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of **10 kWp** Roof Top Solar PV Plant

### 4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- Energy purchased from MSEDCL is **66881 kWh**.
- Energy generated by Roof Top Solar PV Plant is **12000 kWh**.
- The Annual Energy Demand of the College is: **78881 kWh**.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is **15.21 %**.

### 5. Usage of LED Lighting:

- The Total Lighting Load of the College is **16.90 kW**.
- The Total LED Lighting Load of the College is **2.16 kW**.
- The percentage of LED Lighting to Total Lighting Load is **15.45 %**.

### 6. Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 Kg of LPG** releases **2.68 Kg of CO<sub>2</sub>** into atmosphere
3. **1 kWp Roof Top Solar PV** Plant generates **4 kWh** of Electrical Energy per Day.
4. Annual Solar Energy Generation Days: **300 Nos.**

### 7. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Roof Top Solar PV Plant Energy generation: [www.solarroftop.gov.in](http://www.solarroftop.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 <sub>2</sub>	:	Carbon Di Oxide
MT	:	Metric Ton



## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load and Present Energy Consumption
2. To Study the present CO<sub>2</sub> emissions
3. To study usage of Alternate Energy
4. To study usage of LED Lighting

### 1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of Institution	Progressive Education Society's Modern College of Pharmacy
2	Address	Sector 21, Yamuna Nagar, Nigdi 411 044
3	Year of Establishment	1998
4	Affiliation	Savitribai Phule Pune University

### 1.3 Google Earth Image:



College  
Campus

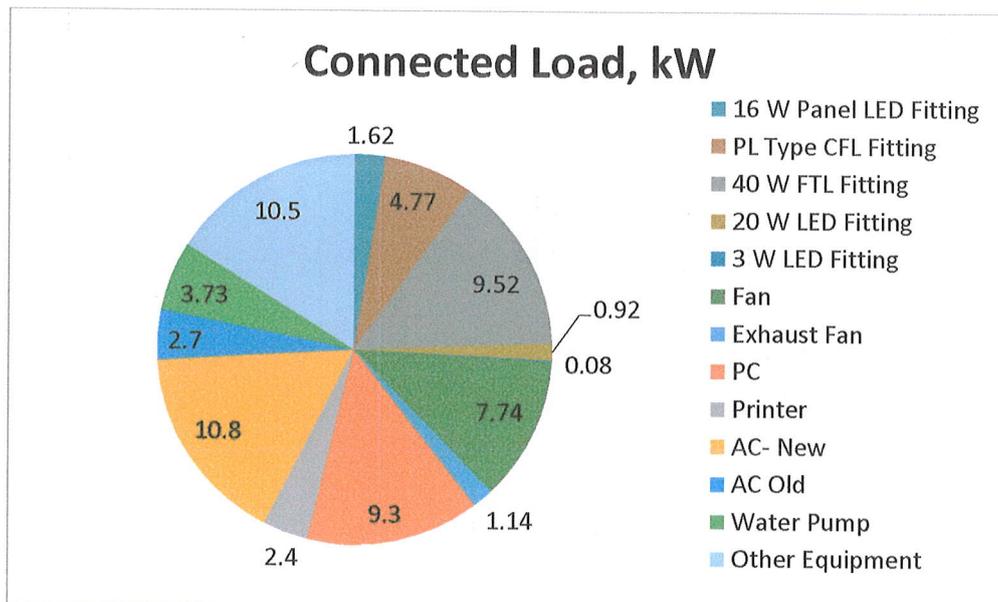
## CHAPTER-II STUDY OF CONNECTED LOAD

The major contributors to the connected load of the College include:

**Table No 2: Study of Equipment wise Connected Load:**

No	Equipment	Qty	Load, W/Unit	Load, kW
1	16 W Panel LED Fitting	101	16	1.62
2	PL Type CFL Fitting	149	32	4.77
3	40 W FTL Fitting	238	40	9.52
4	20 W LED Fitting	46	20	0.92
5	3 W LED Fitting	25	3	0.08
6	Fan	119	65	7.74
7	Exhaust Fan	22	52	1.14
8	PC	62	150	9.30
9	Printer	16	150	2.40
10	AC- New	6	1800	10.80
11	AC Old	1	2700	2.70
12	Water Pump	1	3730	3.73
13	Other Equipment	70	150	10.50
14	<b>Total</b>			<b>65.21</b>

**Chart No 1: Study of Connected Load:**



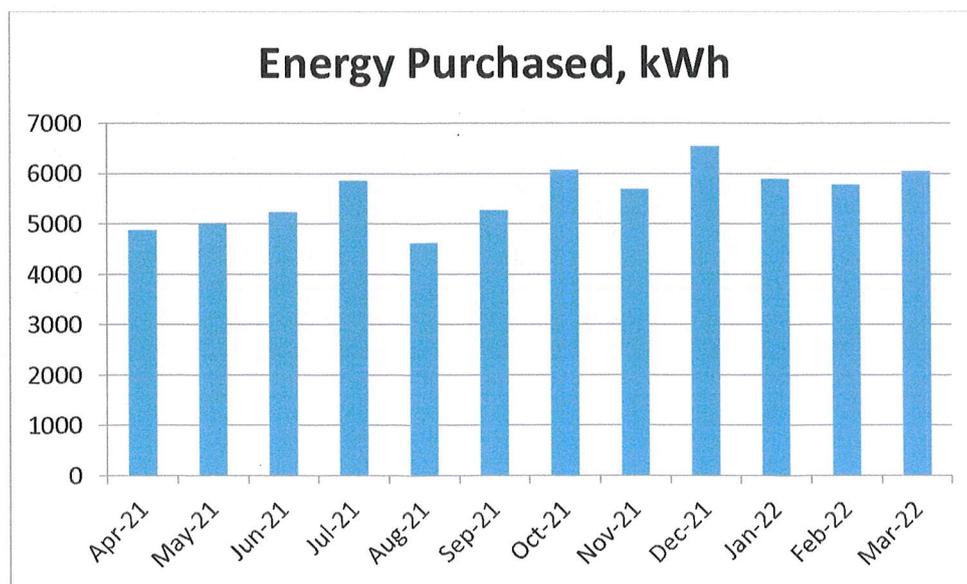
### CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

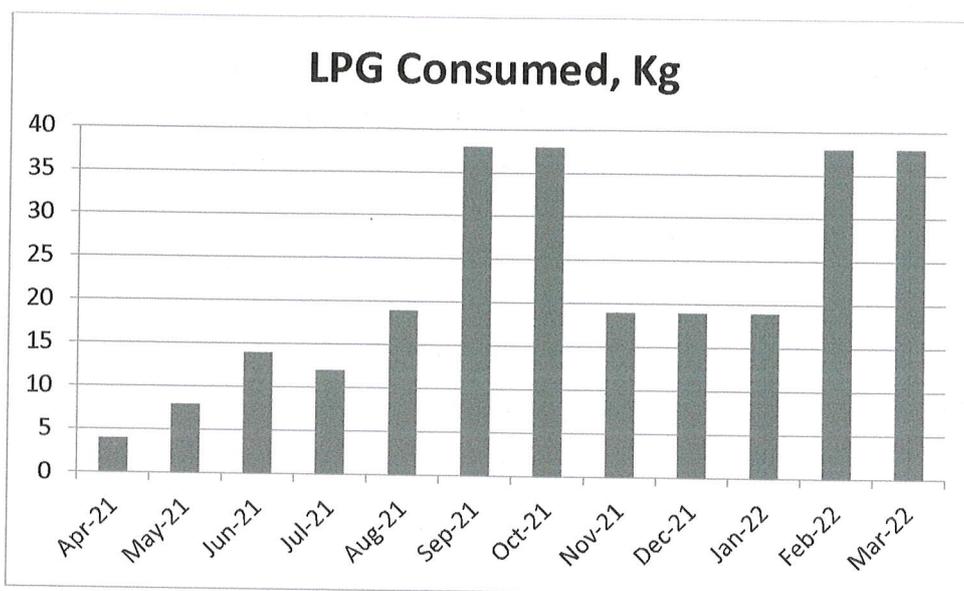
**Table No 3: Electrical Energy & LPG Consumption Analysis- 2021-22:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-21	4872	4
2	May-21	5000	8
3	Jun-21	5233	14
4	Jul-21	5855	12
5	Aug-21	4622	19
6	Sep-21	5274	38
7	Oct-21	6074	38
8	Nov-21	5695	19
9	Dec-21	6541	19
10	Jan-22	5891	19
11	Feb-22	5782	38
12	Mar-22	6042	38
13	Total	66881	266
14	Maximum	6541	38
15	Minimum	4622	4
16	Average	5573.42	22.17

**Chart No 2: Variation in Monthly Energy Consumption:**



**Chart No 3: Variation in Monthly LPG Consumption:**



**Table No 4: Variation in Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	66881	266
2	Maximum	6541	38
3	Minimum	4622	4
4	Average	5573.42	22.17

## 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 and LPG as the Energy Source.

### Basis for computation of CO<sub>2</sub> Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO<sub>2</sub> into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO<sub>2</sub> into atmosphere

Based on the above Data we compute the CO<sub>2</sub> 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<sub>2</sub> Emissions:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-21	4872	4	4.40
2	May-21	5000	8	4.52
3	Jun-21	5233	14	4.75
4	Jul-21	5855	12	5.30
5	Aug-21	4622	19	4.21
6	Sep-21	5274	38	4.85
7	Oct-21	6074	38	5.57
8	Nov-21	5695	19	5.18
9	Dec-21	6541	19	5.94
10	Jan-22	5891	19	5.35
11	Feb-22	5782	38	5.31
12	Mar-22	6042	38	5.54
13	Total	66881	266	60.91
14	Maximum	6541	38	5.94
15	Minimum	4622	4	4.21
16	Average	5573.42	22.17	5.08

Chart No 4: Month wise CO<sub>2</sub>Emissions:

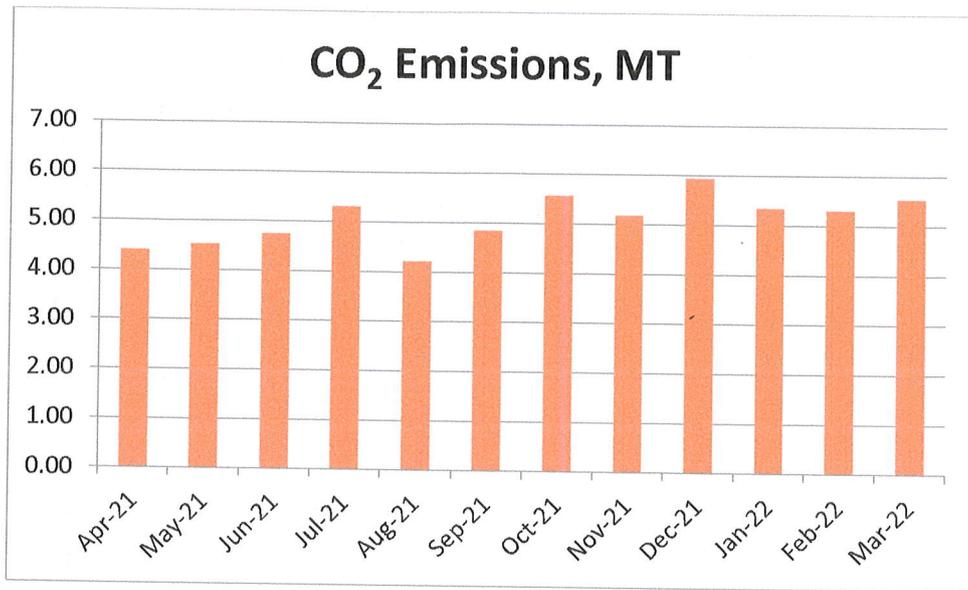


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	66881	266	60.91
2	Maximum	6541	38	5.94
3	Minimum	4622	4	4.21
4	Average	5573.42	22.17	5.08

## CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **10 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	57606	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	12000	kWh
6	Total Energy Demand = (1) + (5)	69606	kWh
7	% of Usage of Alternate Energy to Total Annual Energy Demand= (5)*100/ (6)	17.24	%

**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 40 W FTL Fittings	238	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	<b>9.52</b>	kW
4	No of 20 W LED Tube Lights	46	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	<b>0.92</b>	kW
7	No of 16 W Panel LED Fittings	101	Nos
8	Demand of 16 W Panel LED Fittings	16	W/Unit
9	Total Electrical Load of 16 W Panel LED Fittings	<b>1.62</b>	kW
10	No of 3 W LED Fittings	25	Nos
11	Demand of 3 W LED Fittings	3	W/Unit
12	Total Electrical Load of 3 W LED Fittings	<b>0.075</b>	kW
13	No of PL Type 32 W CFL Fittings	149	Nos
14	Demand of PL Type 32 W CFL Fittings	32	W/Unit
15	Total Electrical Load of PL Type 32 W CFL Fittings	<b>4.768</b>	kW
16	Total LED Lighting Load= 6+9+12	<b>2.61</b>	kW
17	Total Lighting Load=3+6+9+12+15	<b>16.90</b>	kW
18	Annual Lighting Requirement met by LED= $16 \times 100 / 17$	<b>15.45</b>	%