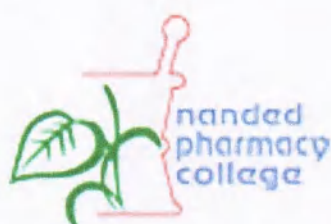


## NANDED PHARMACY COLLEGE, NANDED



### **7. INSTITUTIONAL VALUES AND BEST PRACTICES**

#### **7.1. Institutional Values & Social Responsibilities**


##### **7.1.3. Quality Audits on Environment and Energy**

**Regularly Undertaken by the Institution**

**Relevant Documents for Energy, Green**

**& Environmental Audit (Audit Reports)**




  
**Prof. (Dr.) N.B. Ghiware**  
**PRINCIPAL**  
**Nanded Pharmacy College**  
**Nanded.**

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**Prof. (Dr.) N.B. Ghiware**  
**PRINCIPAL**  
Nanded Pharmacy College  
Nanded.

**AUDIT REPORTS OF  
AY 2020-2021**

**ENERGY AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



Year: 2020-21

Prepared by:

**ENRICH CONSULTANTS**

Yashashree, 26, Nirmal Bag Society,  
Near Muktangam English School, Parvati, Pune 411009  
Phone: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)



**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2452



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

ECN/2021-22/CR-14/1577

22<sup>nd</sup> 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*

- 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 **21<sup>st</sup> 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 Muktang English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/NPC/20-21/01

Date: 28/05/2021

## CERTIFICATE

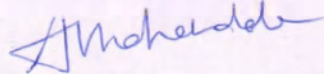
This is to certify that we have conducted Energy Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded in the Year 2020-21.

The College has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting

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

For Enrich Consultants,



**A Y Mehendale,**  
Certified Energy Auditor  
EA-8192



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6	Study of Usage of LED Lighting	15



## **ACKNOWLEDGEMENT**

We at Enrich Consultants, Pune, express our sincere gratitude to the management of at Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded for awarding us the assignment of Energy Audit of their Nanded Campus, for the Academic Year: 2020-21.

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





## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Consumed, kWh	LPG Consumption, Kg
1	Total	22218	62
2	Maximum	4862	7
3	Minimum	1211	3
4	Average	1851.5	5.17

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting

4. Usage of Alternate Energy:

- The College has yet to install Roof Top Solar PV Plant.

5. Usage of LED Lighting:

- The Total Lighting load of College is **3.69 kW**.
- The LED Lighting Load is **0.09 kW**.
- The % of LED Lighting to Total Lighting Load is **2.44 %**.

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

7. Reference:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)

## **ABBREVIATIONS**

BEE	Bureau of Energy Efficiency
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO <sub>2</sub>	Carbon Di Oxide
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

## **CHAPTER-I INTRODUCTION**

### **1.1 Objectives:**

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

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

<b>No</b>	<b>Head</b>	<b>Particulars</b>
1	Name of the Institution	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
3	Year of Establishment	1996

## CHAPTER-II STUDY OF CONNECTED LOAD

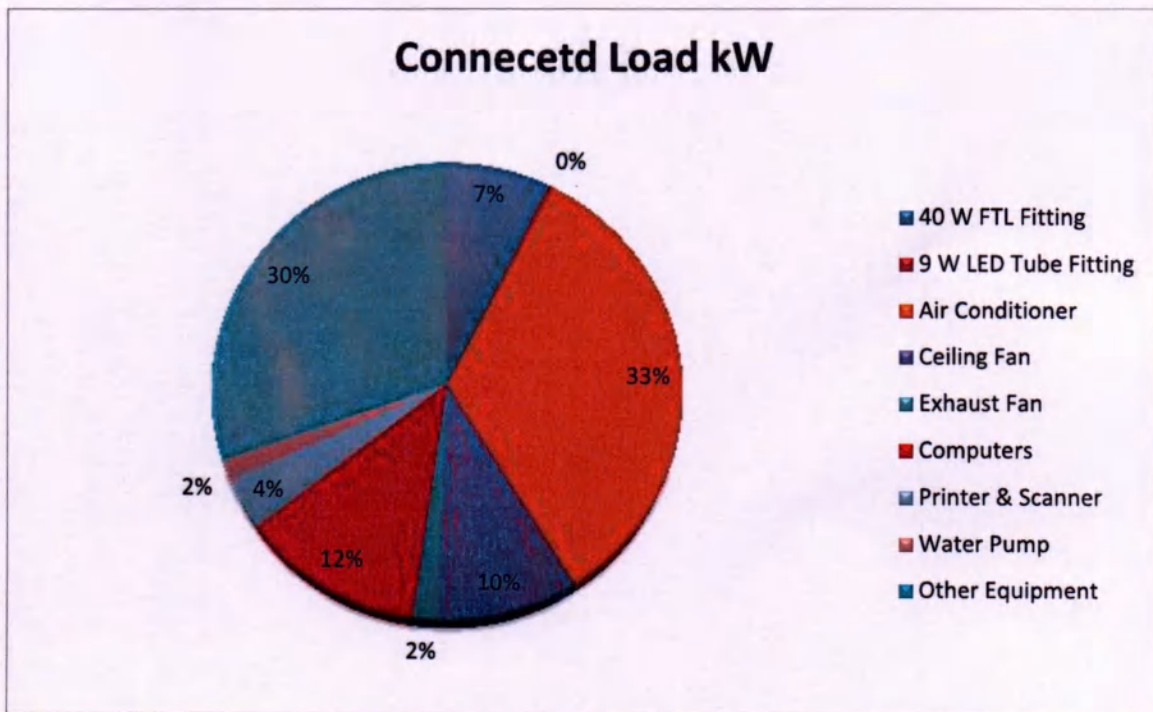
The major contributors to the connected load of the College are as under.

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

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	90	40	3.6
2	9 W LED Tube Fitting	10	18	0.18
3	Air Conditioner	11	1500	16.5
4	Ceiling Fan	72	65	4.68
5	Exhaust Fan	17	50	0.85
6	Computers	40	150	6
7	Printer & Scanner	12	150	1.8
8	Water Pump	1	746	0.746
9	Other Equipment	100	150	15
10	<b>Total</b>			<b>45.756</b>

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

**Chart No1: Connected Load:**



### CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

**Table No. 3: Study of Electrical Energy & LPG Consumption: 20-21:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg
1	Mar-20	1305	3
2	Apr-20	1265	4
3	May-20	1211	3
4	Jun-20	1360	7
5	Jul-20	2085	6
6	Aug-20	1890	6
7	Sep-20	4862	5
8	Oct-20	1520	6
9	Nov-20	1680	6
10	Dec-20	2251	5
11	Jan-21	1548	5
12	Feb-21	1241	6
13	Total	22218	62
14	Maximum	4862	7
15	Minimum	1211	3
16	Average	1851.5	5.17

**Chart No 2: To study the variation of Monthly Electrical Energy Consumption:**

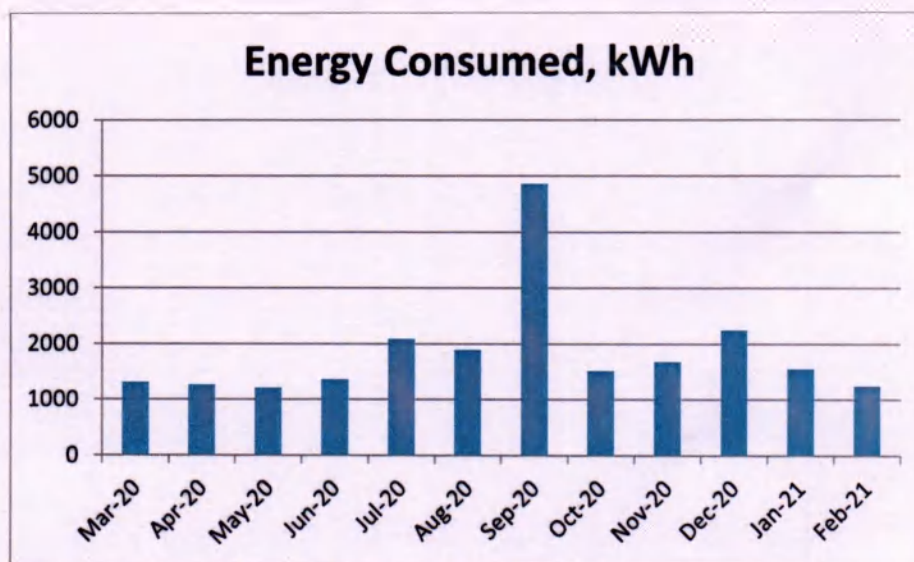


Chart No 3: To Study the variation of Monthly LPG Consumption:

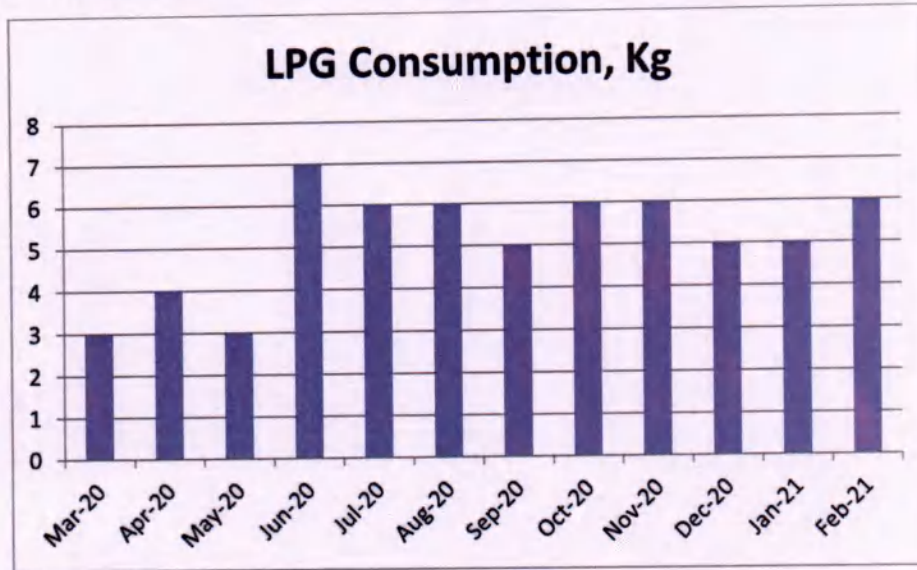


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg
1	Total	22218	62
2	Maximum	4862	7
3	Minimum	1211	3
4	Average	1851.5	5.17

## CHAPTER-IV STUDY OF CO<sub>2</sub> EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

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

The basis of Calculation for CO<sub>2</sub> emissions due to LPG & Electrical Energy are as under

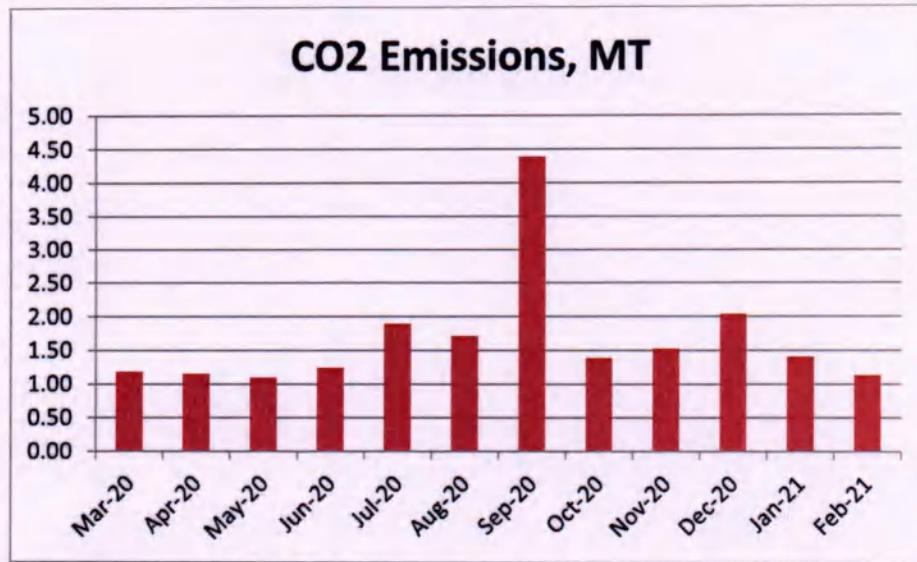
- 1 kWh of Electrical Energy releases 0.9 Kg of CO<sub>2</sub> into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO<sub>2</sub> into atmosphere

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 Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-20	1305	3	1.18
2	Apr-20	1265	4	1.15
3	May-20	1211	3	1.10
4	Jun-20	1360	7	1.24
5	Jul-20	2085	6	1.89
6	Aug-20	1890	6	1.72
7	Sep-20	4862	5	4.39
8	Oct-20	1520	6	1.38
9	Nov-20	1680	6	1.53
10	Dec-20	2251	5	2.04
11	Jan-21	1548	5	1.41
12	Feb-21	1241	6	1.13
13	Total	22218	62	20.16
14	Maximum	4862	7	4.39
15	Minimum	1211	3	1.10
16	Average	1851.5	5.17	1.68

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



**Table No 6: Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	22218	62	20.16
2	Maximum	4862	7	4.39
3	Minimum	1211	3	1.10
4	Average	1851.5	5.17	1.68



**CHAPTER-V**  
**STUDY OF USAGE OF ALTERNATE ENERGY**

The College has yet to install 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, as under.

**Table No 7: Percentage of Usage of LED Lighting to Total Lighting Load:**

<b>No</b>	<b>Particulars</b>	<b>Value</b>	<b>Unit</b>
1	Qty of 40 W FTL Light Fittings	90	Nos
2	Load per Fitting	40	W/Unit
3	Total Load of 40 W FTL Fitting	<b>3.6</b>	kW
4	Qty of 9 W LED Light Fittings	10	Nos
5	Load per Fitting	9	W/Unit
6	Total Load of 9 W LED Fitting	<b>0.09</b>	kW
7	Total Lighting Load=3+6	<b>3.69</b>	kW
8	Total LED Lighting Load=6	<b>0.09</b>	kW
9	% of Total Lighting Demand met by LED Lighting= $8*100/7$	<b>2.44</b>	%

**GREEN AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



Year: 2020-21

Prepared by:

**ENRICH CONSULTANTS**

Yashashree, 26, Nirmal Bag Society,  
Near Muktangam English School, Parvati, Pune 411009  
Phone: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)



**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2482



**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/2021-22/CR-14/1577

22<sup>nd</sup> 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  
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Near Muktangan English School, Parvati,  
Pune - 411009.

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Programme for Class 'A'

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

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- 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,  
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Tel: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/NPC/20-21/02Date: 28/05/2021

## CERTIFICATE

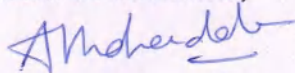
This is to certify that we have conducted Green Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded in the Year 2020-21.

The College has adopted following Energy Efficient and Green Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Segregation of Waste at Source
- Installation of Rain Water Management Project
- Maintenance of Good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- 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 Green.

For Enrich Consultants,



**A Y Mehendale,**  
Certified Energy Auditor,  
EA-8192



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5	Study of Waste Management	15
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7	Study of Green & Sustainable Practices	17

## **ACKNOWLEDGEMENT**

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded for awarding us the assignment of Green Audit of their Nanded Campus, for the Academic Year: 2020-21.

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



## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.

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

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	22218	62	20.16
2	Maximum	4862	7	4.39
3	Minimum	1211	3	1.10
4	Average	1851.5	5.17	1.68

3. Energy Conservation measures adopted:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting

4. Usage of Renewable Energy:

The College has yet to install Roof Top Solar PV Plant

5. Waste Management:

5.1 Segregation of Waste at Source:

The solid waste is segregated at source. There are separate bins for collection at various points and is disposed of for further for recycling.

5.2 Organic Waste Management:

It is recommended to go for Bio composting for conversion of organic waste.

5.3 Sanitary Waste Management:

The College has not install Sanitary Waste Incinerator, It is recommended to install Sanitary Waste Incinerator for disposal of the Sanitary Waste.

6. Rain Water Management:

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

7. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness on Energy Conservation, by Display of Posters



**8. Assumptions:**

- 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

**9. Reference:**

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)

## ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO <sub>2</sub>	Carbon Di Oxide
LPG	Liquefied Petroleum Gas

## **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 Management
6. Study of Green & Sustainable Practices

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

<b>No</b>	<b>Head</b>	<b>Particulars</b>
1	Name of the Institution	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
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## CHAPTER-II STUDY OF PRESENT ENERGY CONSUMPTION

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

**Table No. 3: Study of Electrical Energy & LPG Consumption: 20-21:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg
1	Mar-20	1305	3
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6	Aug-20	1890	6
7	Sep-20	4862	5
8	Oct-20	1520	6
9	Nov-20	1680	6
10	Dec-20	2251	5
11	Jan-21	1548	5
12	Feb-21	1241	6
13	Total	22218	62
14	Maximum	4862	7
15	Minimum	1211	3
16	Average	1851.5	5.17

**Chart No: 1: Study of variation of Monthly Electrical Energy Consumption:**

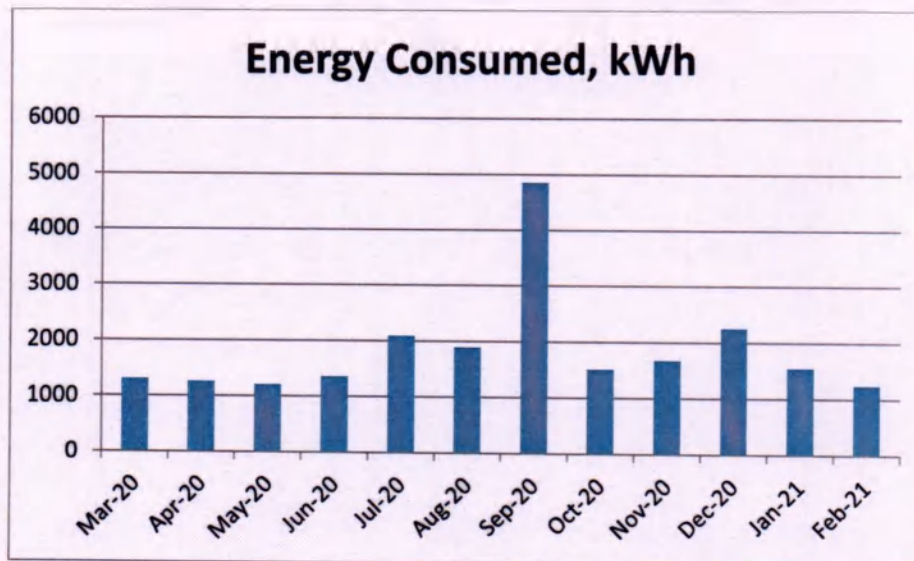


Chart No 3: To Study the variation of Monthly LPG Consumption:

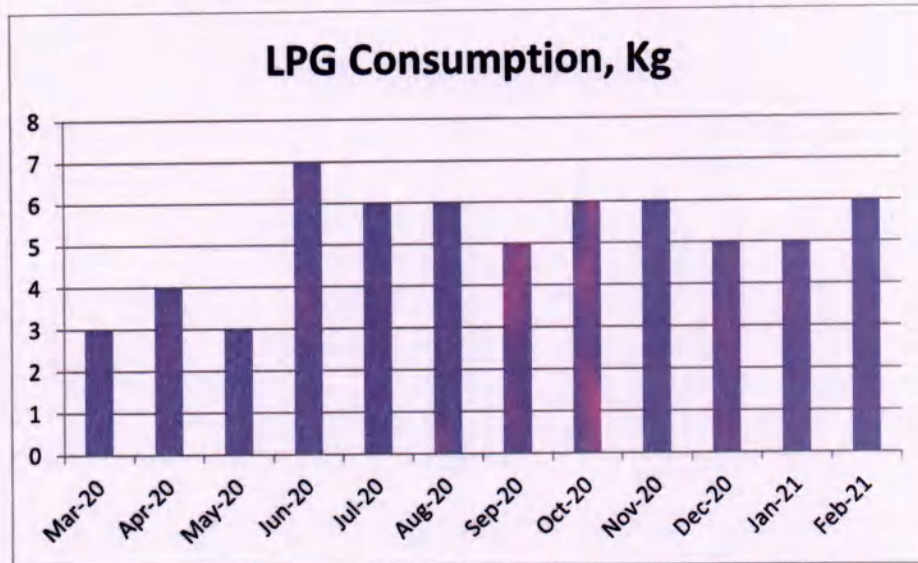


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg
1	Total	22218	62
2	Maximum	4862	7
3	Minimum	1211	3
4	Average	1851.5	5.17

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

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

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

The basis of Calculation for CO<sub>2</sub> emissions due to LPG & Electrical Energy are as under

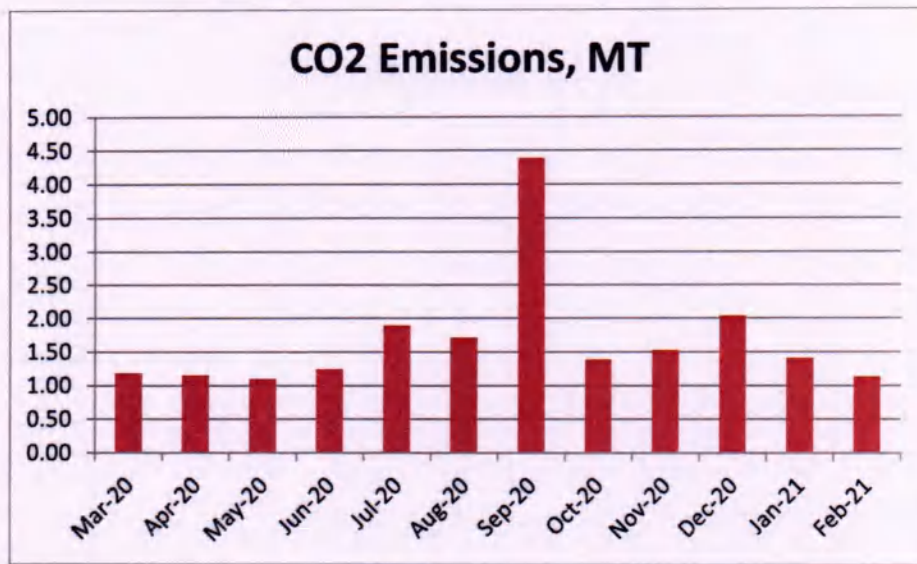
- 1 kWh of Electrical Energy releases 0.8 Kg of CO<sub>2</sub> into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO<sub>2</sub> into atmosphere

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 Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-20	1305	3	1.18
2	Apr-20	1265	4	1.15
3	May-20	1211	3	1.10
4	Jun-20	1360	7	1.24
5	Jul-20	2085	6	1.89
6	Aug-20	1890	6	1.72
7	Sep-20	4862	5	4.39
8	Oct-20	1520	6	1.38
9	Nov-20	1680	6	1.53
10	Dec-20	2251	5	2.04
11	Jan-21	1548	5	1.41
12	Feb-21	1241	6	1.13
13	Total	22218	62	20.16
14	Maximum	4862	7	4.39
15	Minimum	1211	3	1.10
16	Average	1851.5	5.17	1.68

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



**Table No 5: Variation in Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	22218	62	20.16
2	Maximum	4862	7	4.39
3	Minimum	1211	3	1.10
4	Average	1851.5	5.17	1.68

**CHAPTER-IV**  
**STUDY OF USAGE OF RENEWABLE ENERGY**

The College has yet to install Roof Top Solar PV Plant



## **CHAPTER V STUDY OF WASTE MANAGEMENT**

### **5.1 Segregation of Waste at Source:**

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

#### **Photograph of Waste Collection Bin:**



### **5.2 Organic Waste Management:**

It is recommended to go for Bio composting to convert the Organic waste into Bio compost.

### **5.3 Sanitary Waste Management:**

The College has not install Sanitary Waste Incinerator, It is recommended to install Sanitary Waste Incinerator for disposal of the Sanitary Waste.

## **CHAPTER-VI**

### **STUDY OF RAIN WATER MANAGEMENT**

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

**Photograph of Underground Rain Water Carrying Pipe:**



## **CHAPTER-VII**

### **STUDY OF GREEN AND SUSTAINABLE PRACTICES**

#### **7.1 Pedestrian Friendly Road & Internal Tree Plantation:**

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

**Photograph of internal road in the campus:**



#### **7.2 Provision of Ramp for Divyangajan:**

The College has made provision for Ramp for easy movement of Divyangajan. Also dedicated wash rooms are made available.

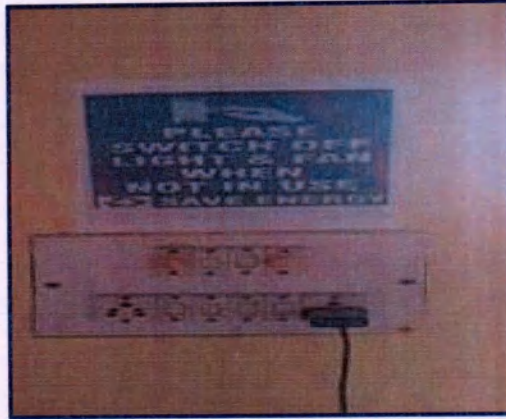
**Photograph of Ramp:**



### 7.3 Creation of Awareness on Energy Conservation:

The College has displayed board on Energy Conservation, to create awareness among the stake holders.

#### Photograph of Display Board on Energy Conservation:



**ANNEXURE-1:****LIST OF TREES & PLANTS IN THE CAMPUS:**

Sr. No.	Botanical Name	Family	Common Name	Total
1.	<i>Saraca asoca</i>	Fabaceae	Ashoka	17
2.	<i>Tectona grandis</i>	Lamiaceae	Sagwan	16
3.	<i>Terminalia catappa L.</i>	Combretaceae	Jungli Badam	04
4.	<i>Borassus frabellifer</i>	Arecaceae	Palm	07
5.	<i>Cocos nucifera L.</i>	Arecaceae	Coconut	12
6.	<i>Syzygium cumini L.</i>	Myrtaceae	Jamun	06
7.	<i>Azadirachta indica</i>	Meliaceae	Neem	04
9.	<i>Ficus benghalensis</i>	Moraceae	Banyan	02
10.	<i>Ficus carica</i>	Moraceae	Fig (Audumbar)	01
11.	<i>Ficus religiosa</i>	Moraceae	Peepal	01
12.	<i>Mangifera indica</i>	Anacardiaceae	Mango	04
13.	<i>Carica papaya</i>	Caricaceae	Papaya	01
14.	<i>Moringa oleifera</i>	Moringaceae	Moringa	01
15.	<i>Acacia arabica</i>	Fabaceae	Babul	05
16.	<i>Bambusa vulgaris</i>	Poaceae	Bamboo	01
17.	<i>Schleichera oleosa</i>	Sapindaceae	Kusum	01
18.	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Parijat	03
19.	<i>Pithecellobium dulce</i>	Fabaceae	Manila tamarind (Pink Imli)	01
20.	<i>Annona squamosa L.</i>	Annonaceae	Custard Apple (Sitafal)	02
21.	<i>Delonix regia</i>	Fabaceae	Gulmohar	01
22.	<i>Citrus limon</i>	Rutaceae	Lemon	02
23.	<i>Punica granatum</i>	Lythraceae	pomegranate (Anar)	01
24.	<i>Olneya tesota</i>	Fabaceae	Iron wood	01
25.	<i>Chinese ixora</i>	Rubiaceae	Ishwara	01
26.	<i>Hydrangea macrophylla</i>	Hydrangeaceae	Hortensia	01

# ENVIRONMENTAL AUDIT REPORT

of

Shri Sharda Bhavan Education Society's

## Nanded Pharmacy College

Shyam Nagar, Nanded



Year: 2020-21

Prepared by

### ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,  
Near Muktangan English School, Parvati, Pune 411009  
Phone: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)



**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2482



**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/2021-22/CR-14/1577

22<sup>nd</sup> 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*

- 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 **21<sup>st</sup> 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 Mukangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/NPC/20-21/03

Date: 28/05/2021

## CERTIFICATE

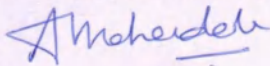
This is to certify that we have conducted Environmental Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded in the Year 2020-21.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Segregation of Waste at Source
- 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 Enrich Consultants,



**A Y Mehendale,**  
Certified Energy Auditor,  
EA-8192





## INDEX

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## **ACKNOWLEDGEMENT**

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded for awarding us the assignment of Environmental Audit of their Nanded Campus, for the Academic Year: 2020-21.

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

## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.

2. **Pollution caused due to College Activities:**

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

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

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	22218	62	20.16
2	Maximum	4862	7	4.39
3	Minimum	1211	3	1.10
4	Average	1851.5	5.17	1.68

4. **Usage of Renewable Energy:**

- The College has yet to install Roof Top Solar PV Plant

5. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	34.5	41	345	41
2	Minimum	32	39	299	36

6. **Waste Management:**

6.1 **Segregation of Waste at Source:**

The solid waste is segregated at source. There are separate bins for collection at various points and is disposed of for further for recycling.

6.2 **Organic Waste Management:**

It is recommended to go for Bio composting for conversion of organic waste.

6.3 **Sanitary Waste Management:**

The College has not install Sanitary Waste Incinerator, It is recommended to install Sanitary Waste Incinerator for disposal of the Sanitary Waste.

### 7. Rain Water Management:

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

### 8. Environmental Friendly Initiatives:

- Internal Tree Plantation
- Creation of awareness on Energy Conservation by Display of Posters

### 9. Assumptions:

- 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

### 10. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)

## **ABBREVIATIONS**

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode
CPCB	:	Central Pollution Control Board
LPG	:	Liquefied Petroleum Gas

## 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 & CO<sub>2</sub> 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 the Institution	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
3	Year of Establishment	1996

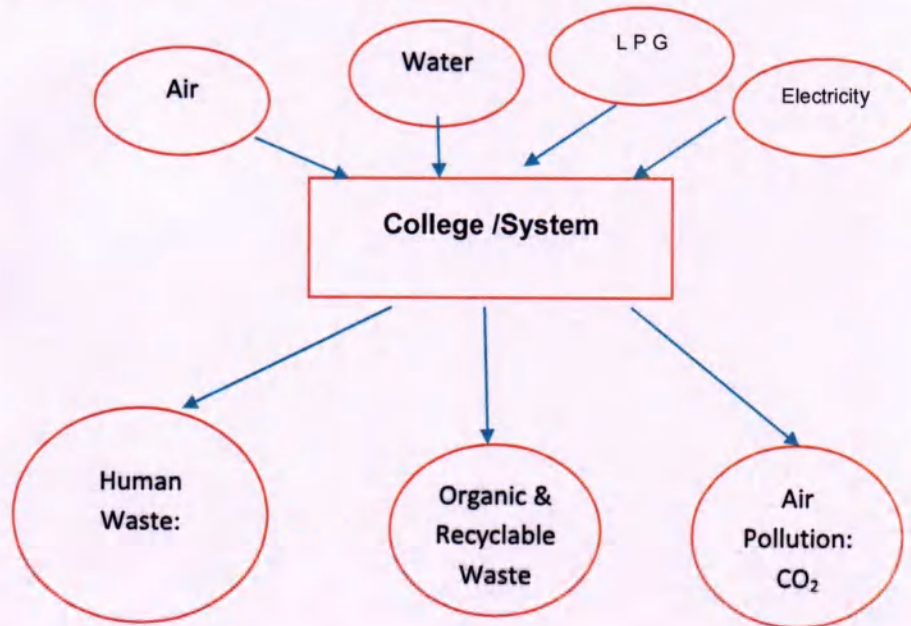
## CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO<sub>2</sub> EMISSION

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:**

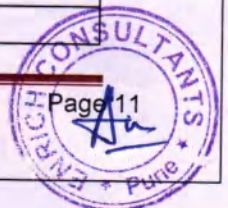


Now we compute the Generation of CO<sub>2</sub> on account of consumption of Electrical Energy. The basis of Calculation for CO<sub>2</sub> emissions due to LPG & Electrical Energy are as under

- 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 Electrical Energy & LPG Consumption: 20-21:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-20	1305	3	1.18
2	Apr-20	1265	4	1.15
3	May-20	1211	3	1.10
4	Jun-20	1360	7	1.24
5	Jul-20	2085	6	1.89





6	Aug-20	1890	6	1.72
7	Sep-20	4862	5	4.39
8	Oct-20	1520	6	1.38
9	Nov-20	1680	6	1.53
10	Dec-20	2251	5	2.04
11	Jan-21	1548	5	1.41
12	Feb-21	1241	6	1.13
13	Total	22218	62	20.16
14	Maximum	4862	7	4.39
15	Minimum	1211	3	1.10
16	Average	1851.5	5.17	1.68

Chart No 2: Study of CO<sub>2</sub> Emission:

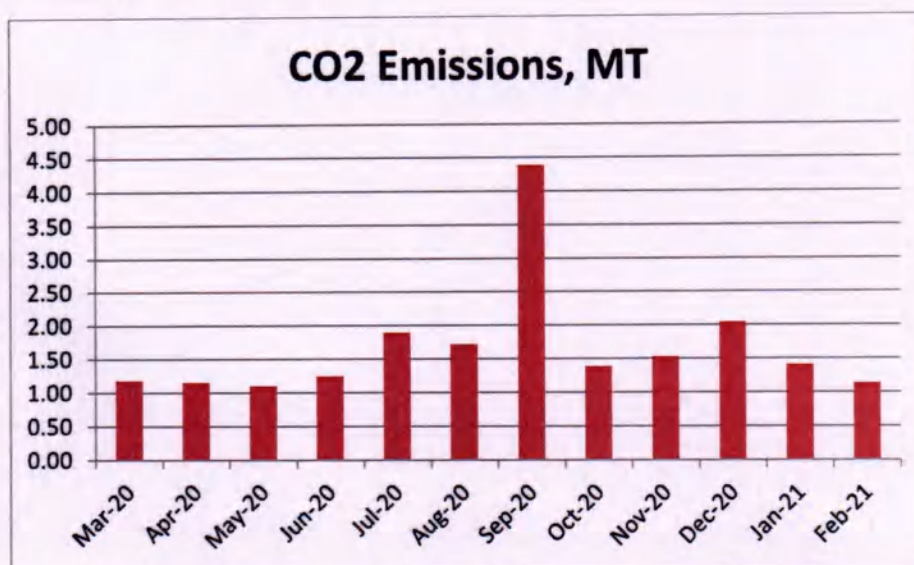


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	22218	62	20.16
2	Maximum	4862	7	4.39
3	Minimum	1211	3	1.10
4	Average	1851.5	5.17	1.68

### **CHAPTER III**

## **STUDY OF CO<sub>2</sub> EMISSION REDUCTION**

As on today College has not installed solar roof-top PV plant, solar thermal water heating plant, it is recommend to install solar rooftop plant on the College building.



## **CHAPTER IV 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 7: Study of Indoor Comfort Condition Parameters:**

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Principal Chamber	32	39	305	36
2	Administrative office	34	39	303	37
3	Class Room:1	34	40	345	40
4	Class Room:2	34.5	40	311	41
5	Class Room:3	34.3	41	321	39
6	Pharmaceutics Lab	34.1	41	326	38
7	Computer Center	32.9	40	332	36
8	Library	33.9	39	307	37
9	Seminar Hall	34.5	40	299	36
10	Maximum	34.5	41	345	41
11	Minimum	32	39	299	36

## **CHAPTER V STUDY OF WASTE MANAGEMENT**

### **5.1 Segregation of Waste at Source:**

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

#### **Photograph of Waste Collection Bin:**



### **5.2 Organic Waste Management:**

It is recommended to go for Bio composting to convert the Organic waste into Bio compost.

### **5.3 Sanitary Waste Management:**

The College has not install Sanitary Waste Incinerator, It is recommended to install Sanitary Waste Incinerator for disposal of the Sanitary Waste.

## **CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT**

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

**Photograph of Underground Rain Water Carrying Pipe:**



## **CHAPTER-VII**

### **STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES**

#### **7.1 Internal Tree Plantation:**

The College has well maintained Internal Tree Plantation.

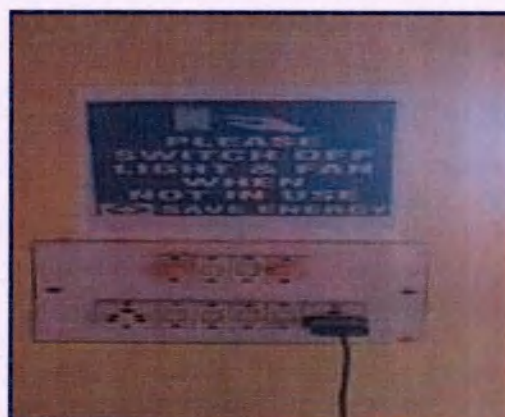
**Photograph of Trees in the campus:**



#### **7.2 Creation of Awareness on Energy Conservation:**

The College has displayed board on Energy Conservation, to create awareness among the stake holders.

**Photograph of Display Board on Energy Conservation:**



**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%



**AUDIT REPORTS OF  
AY 2021-2022**

**ENERGY AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



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](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

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

Ref: ES/NPC/21-22/01

Date: 14/06/2022

### CERTIFICATE

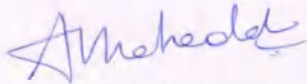
This is to certify that we have conducted Energy Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded, In the Academic Year 2021-22.

The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting

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

Sr. No	Particulars	Page No
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5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15



## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 21-22.

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



## EXECUTIVE SUMMARY

1. **Nanded Pharmacy College, Nanded** consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.
2. **Present Energy Consumption & CO<sub>2</sub> Emission:**

No	Parameter/ Value	Energy Consumed, kWh	LPG Consumption, Kg
1	Total	25839	65
2	Maximum	7476	7
3	Minimum	1218	3
4	Average	2153.25	5.416

3. **Energy Conservation projects already installed:**

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting

4. **Usage of Alternate Energy:**

- As on today College has not installed solar rooftop power plant. It is recommended to install solar power rooftop system on the college building as per availability of funds.

5. **Usage of LED Lighting:**

- The Total Lighting load of College is **3.69 kW**.
- The LED Lighting Load is **0.09 kW**.
- The % of LED Lighting to Total Lighting Load is **2.44 %**.

6. **Assumptions:**

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere.
2. **100 LPD** Solar Thermal System saves **1500 kWh** of Electrical Energy per Annum.
3. Average Energy generated by **1 kWp** Solar PV Plant: **4 kWh/Day**.
4. Annual Solar Energy Generation Days: **300 Nos**.
5. **1 Kg** of LPG releases **2.68 Kg** of CO<sub>2</sub> into atmosphere

7. **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)
- 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**

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
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO <sub>2</sub>	:	Carbon Di Oxide
MT	:	Metric Ton
LPG	:	Liquefied Petroleum Gas



## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study 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	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
3	Affiliation	S.R.T.Marathawada University, Nanded



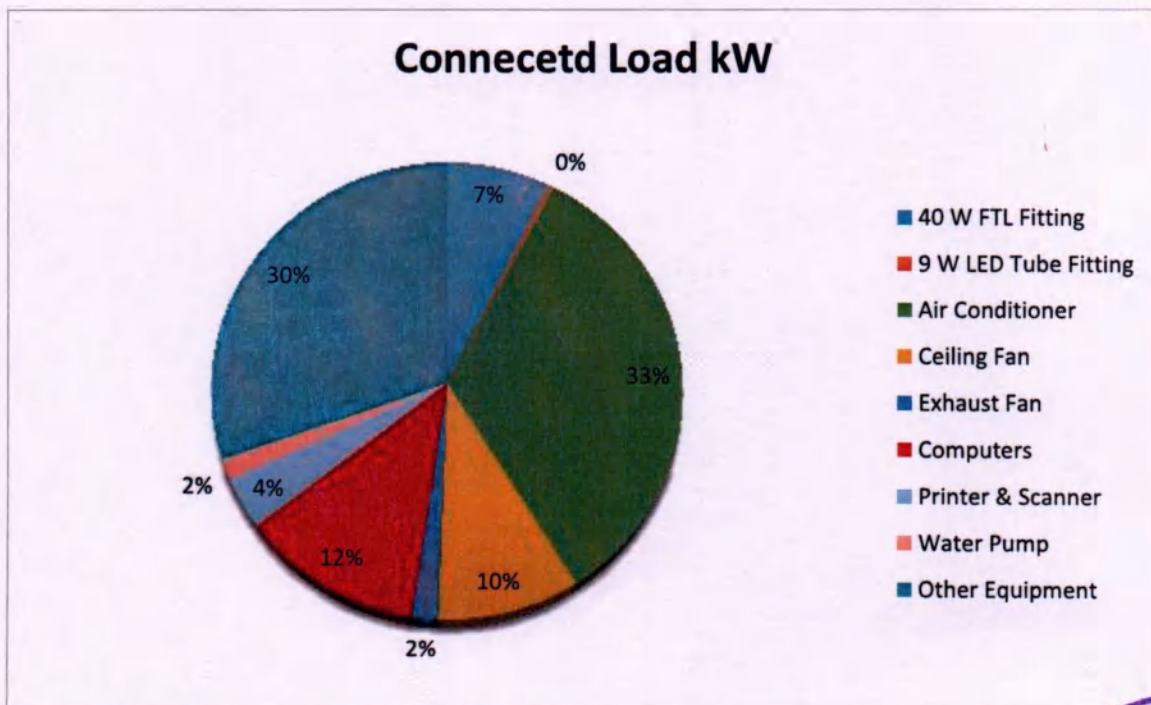
## CHAPTER-II STUDY OF CONNECTED LOAD

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	40 W FTL Fitting	90	40	3.6
2	9 W LED Tube Fitting	10	18	0.18
3	Air Conditioner	11	1500	16.5
4	Ceiling Fan	72	65	4.68
5	Exhaust Fan	17	50	0.85
6	Computers	40	150	6
7	Printer & Scanner	12	150	1.8
8	Water Pump	1	746	0.746
9	Other Equipment	100	150	15
10	<b>Total</b>			<b>45.756</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 Consumption.

Table No. 3: Study of Electrical Energy & LPG Consumption: 21-22:

No	Month	Energy Consumed, kWh	LPG Consumption, Kg
1	Mar-21	1318	3
2	Apr-21	1269	4
3	May-21	1218	5
4	Jun-21	1366	7
5	Jul-21	2124	6
6	Aug-21	1967	5
7	Sep-21	7476	6
8	Oct-21	1516	7
9	Nov-21	1751	6
10	Dec-21	3045	5
11	Jan-22	1548	4
12	Feb-22	1241	7
13	Total	25839	65
14	Maximum	7476	7
15	Minimum	1218	3
16	Average	2153.25	5.416

Chart No 2: Variation in Monthly Energy Consumption:

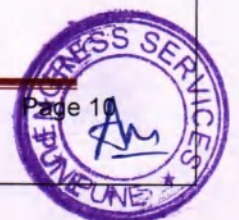
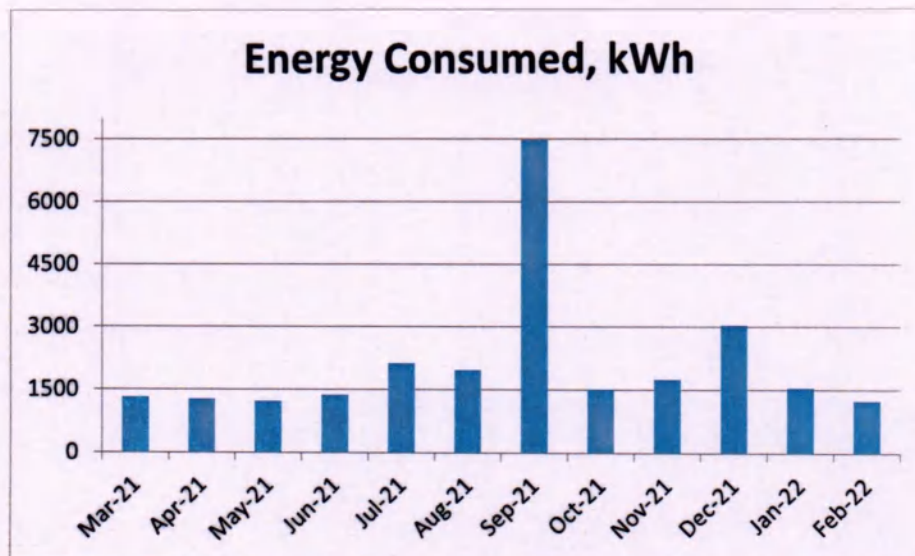


Chart No 3: Variation in Monthly LPG Consumption:

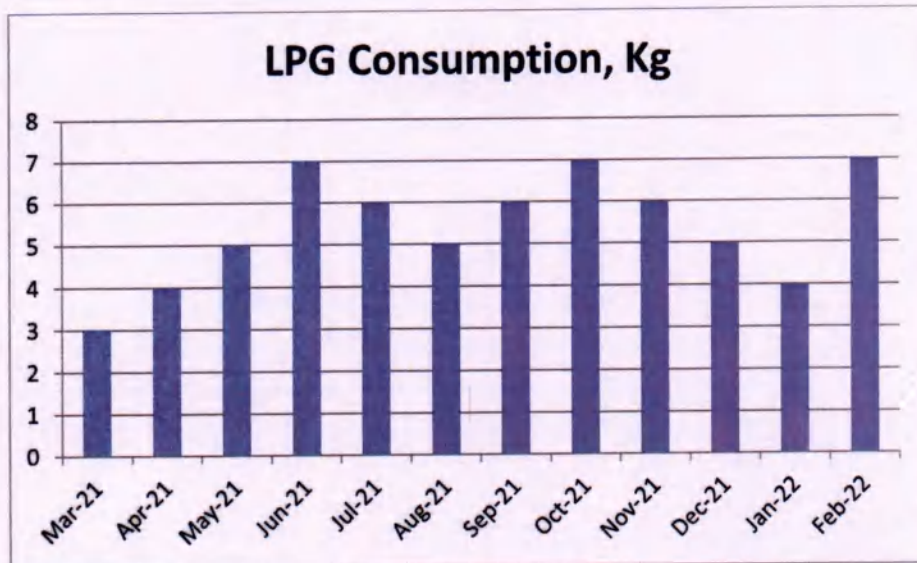


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg
1	Total	25839	65
2	Maximum	7476	7
3	Minimum	1218	3
4	Average	2153.25	5.416

## CHAPTER-IV 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 taking into account the usage of the Electrical Energy.

### 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 Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-21	1318	3	1.19
2	Apr-21	1269	4	1.15
3	May-21	1218	5	1.11
4	Jun-21	1366	7	1.25
5	Jul-21	2124	6	1.93
6	Aug-21	1967	5	1.78
7	Sep-21	7476	6	6.74
8	Oct-21	1516	7	1.38
9	Nov-21	1751	6	1.59
10	Dec-21	3045	5	2.75
11	Jan-22	1548	4	1.40
12	Feb-22	1241	7	1.14
13	Total	25839	65	23.43
14	Maximum	7476	7	6.74
15	Minimum	1218	3	1.11
16	Average	2153.25	5.416	1.95

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

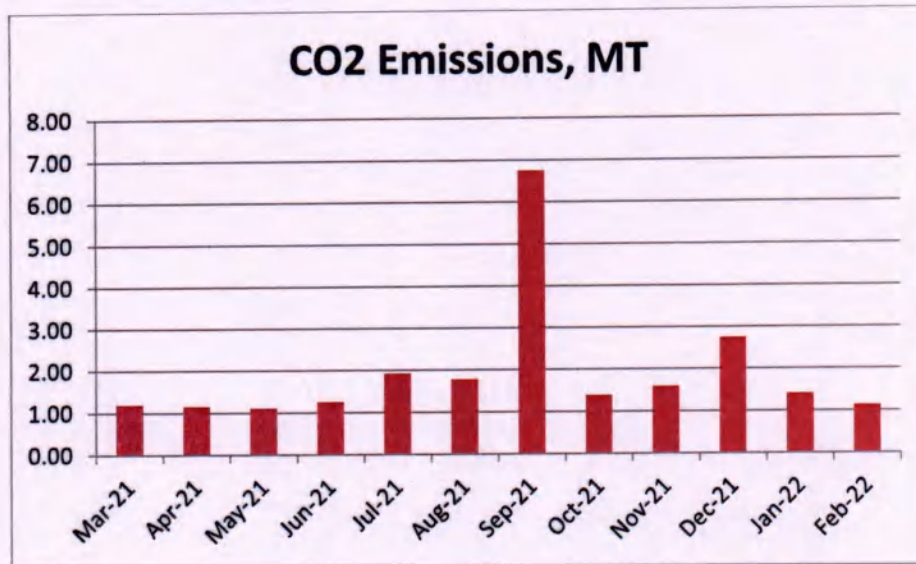


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	25839	65	23.43
2	Maximum	7476	7	6.74
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4	Average	2153.25	5.416	1.95



## **CHAPTER V STUDY OF USAGE OF ALTERNATE ENERGY**

As on today College has not install solar roof-top PV plant, it is recommended to install solar roof-top PV plant on the college building.



## CHAPTER VI STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Annual Lighting power requirement.

**Table No 8: Percentage of Usage of LED Lighting to Annual Lighting Load:**

No	Particulars	Value	Unit
1	Qty of 40 W FTL Light Fittings	90	Nos
2	Load per Fitting	40	W/Unit
3	Total Load of 40 W FTL Fitting	<b>3.6</b>	kW
4	Qty of 9 W LED Light Fittings	10	Nos
5	Load per Fitting	9	W/Unit
6	Total Load of 9 W LED Fitting	<b>0.09</b>	kW
7	Total Lighting Load=3+6	<b>3.69</b>	kW
8	Total LED Lighting Load=6	<b>0.09</b>	kW
9	% of Total Lighting Demand met by LED Lighting= $8 \times 100 / 7$	<b>2.44</b>	%



**GREEN AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



**Year: 2021-22**

Prepared by:

**Engress Services**

Yashashree, 26, Nirmal Bag Society,  
Near Muktangan 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@mahaerda.com](mailto:eee@mahaerda.com), Web: [www.mahaerda.com](http://www.mahaerda.com)

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

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

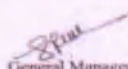
We hereby certify that, the firm having following particulars is registered with MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA) under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

**Name and Address of the firm** : M/s Engress Services  
Yashshree, 26, Nirnal Bag Society,  
Near Mukangan 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 Muktangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/NPC/21-22/01

Date: 14/06/2022

## CERTIFICATE

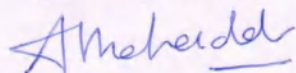
This is to certify that we have conducted Green Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded in the Academic year 2021-22.

The College has adopted following Green Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Provision of Separate bins for Dry & Wet Waste
- The College has installed Septic Tank and is cleaned periodically.
- Implementation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

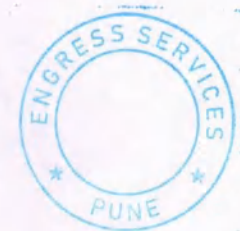
For EngressServices,



**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 at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 2021-22.

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



## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & 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 Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	25839	65	23.43
2	Maximum	7476	7	6.74
3	Minimum	1218	3	1.11
4	Average	2153.25	5.416	1.95

3. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting

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

- It is recommended to install roof-top solar PV Plant on college building.

5. Waste Management:

5.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

5.2 Organic Waste Management:

It is recommended to go for Bio composting for conversion of organic waste.

5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

5.4 E-Waste Management:

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

5.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator, it is recommended to install Sanitary Waste Incinerator for disposal sanitary waste.

6. Rain Water Management:

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

### 7. Green & Sustainable Initiatives

- Maintenance of good Internal Road
- Maintenance of Internal Garden
- Display of Posters on Resource Conservation
- Best Practices and Initiative for Social Awareness

### 8. Notes & Assumptions:

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

### 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)
- 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**

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
LPG	Liquefied Petroleum Gas



## 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 Management
6. Study of Green & Sustainable Practices

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

No	Head	Particulars
1	Name of Institution	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
3	Affiliation	S.R.T.Marathawada University, Nanded



## CHAPTER-II

### STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No 2: Study of Electrical Energy & LPG Consumption - 2021-22:

No	Month	Energy Consumed, kWh	LPG Consumption, Kg
1	Mar-21	1318	3
2	Apr-21	1269	4
3	May-21	1218	5
4	Jun-21	1366	7
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Chart No 1: Variation in Monthly Energy Consumption:

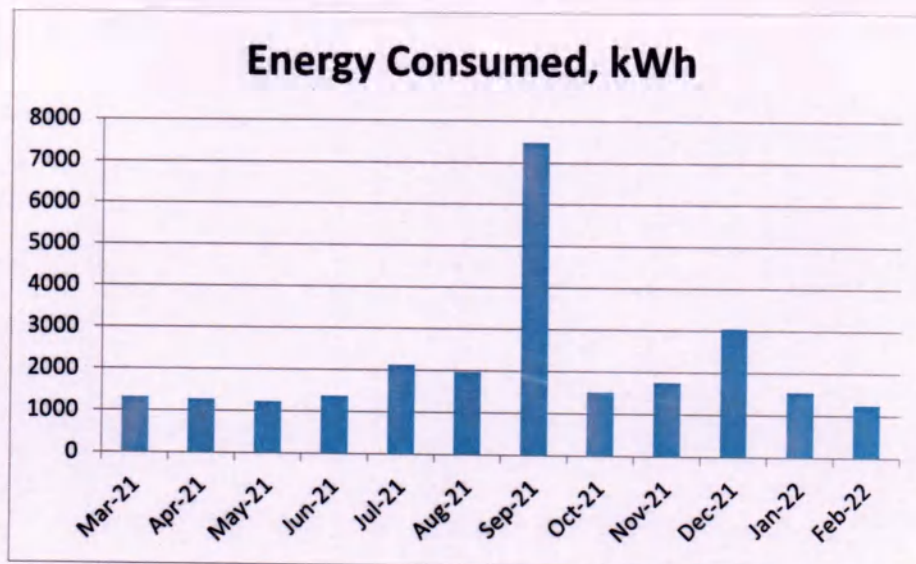


Chart No 3: To Study the variation of Monthly LPG Consumption:

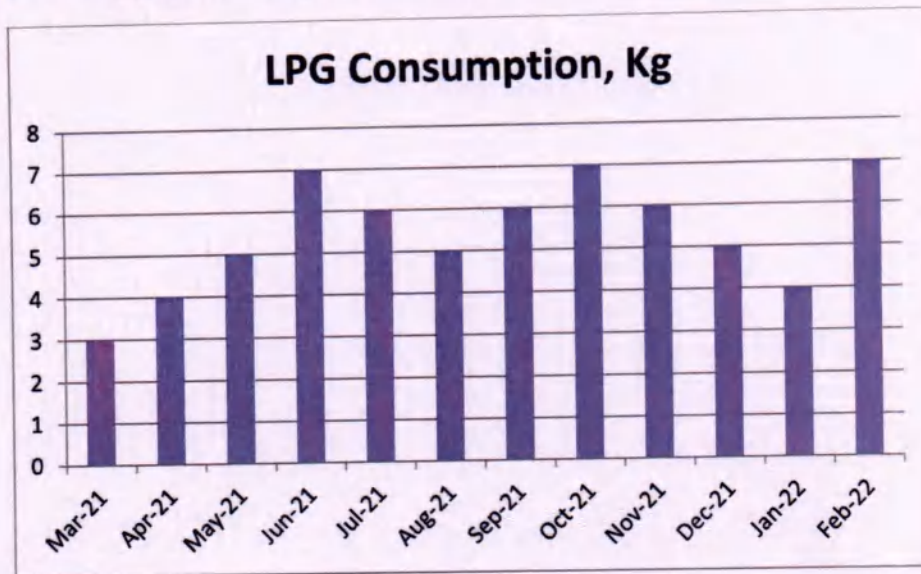


Table No 3: Variation in Important Parameters:

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1	Total	25839	65
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4	Average	2153.25	5.416

### 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 for various Electrical gadgets.

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

The basis of Calculation for CO<sub>2</sub> emissions is 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

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 No4: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
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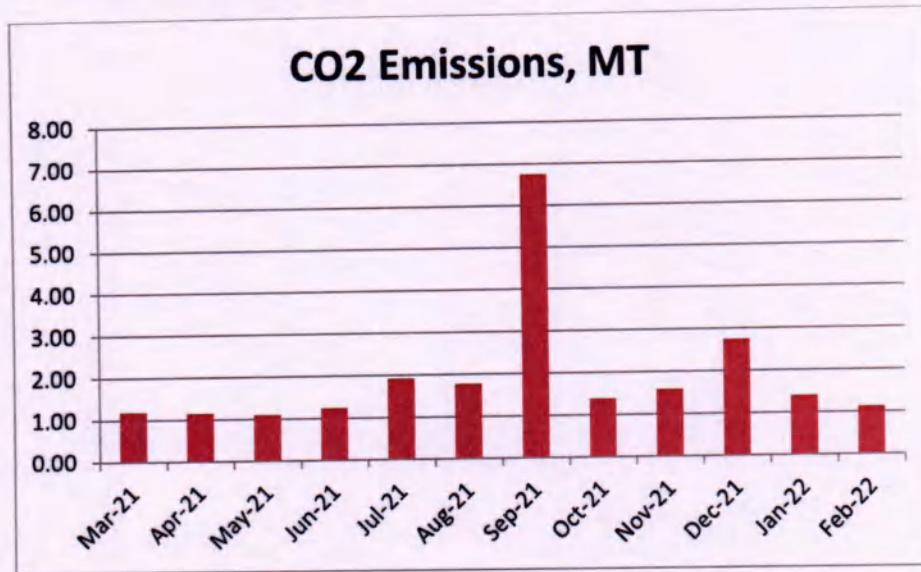


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**CHAPTER IV**  
**STUDY OF USAGE OF RENEWABLE ENERGY**

As on today College has not install solar roof-top 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 waste collecting agent for further recycling.



### **5.2 Bio Composting Pit:**

It is recommended to go for Bio composting to convert the Organic waste into Bio compost.

### **5.3 Liquid Waste Management:**

The College has installed Septic tank and is cleaned periodically.

### **5.4 E-Waste Management:**

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

### **5.5 Sanitary Waste Incinerator:**

The College has not installed Sanitary Waste Incinerator, it is recommended to install Sanitary Waste Incinerator for disposal sanitary waste.

## CHAPTER-VI

### STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore-well.

**Photograph of Rain Water Management Section:**





## **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 landscaped garden in the campus.

#### **Photograph of Tree plantation:**



### 7.3 Provision of Ramp:

The College has facility for ramp, for easy movement for Divyaang.



### 7.4 Creation of Awareness about Water Conservation:

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

Photograph of Poster on Water Conservation awareness:



**7.5 Best Practices and Initiative for Social Awareness:**

The College has taken initiative for different social awareness program, like water conservation, trees plantations, society cleanness, Plastic Bans etc under National Service Scheme.

**Photograph of Best Practices:**



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

Presently the College Campus has more than 100 trees:

Sr. No.	Botanical Name	Family	Common Name	Total
1.	<i>Saraca asoca</i>	Fabaceae	Ashoka	17
2.	<i>Tectona grandis</i>	Lamiaceae	Sagwan	16
3.	<i>Terminalia catappa L.</i>	Combretaceae	Jungli Badam	04
4.	<i>Borassus frabellifer</i>	Arecaceae	Palm	07
5.	<i>Cocos nucifera L.</i>	Arecaceae	Coconut	12
6.	<i>Syzygium cumini L.</i>	Myrtaceae	Jamun	06
7.	<i>Azadirachta indica</i>	Meliaceae	Neem	04
9.	<i>Ficus benghalensis</i>	Moraceae	Banyan	02
10.	<i>Ficus carica</i>	Moraceae	Fig (Audumbar)	01
11.	<i>Ficus religiosa</i>	Moraceae	Peepal	01
12.	<i>Mangifera indica</i>	Anacardiaceae	Mango	04
13.	<i>Carica papaya</i>	Caricaceae	Papaya	01
14.	<i>Moringa oleifera</i>	Moringaceae	Moringa	01
15.	<i>Acacia arabica</i>	Fabaceae	Babul	05
16.	<i>Bambusa vulgaris</i>	Poaceae	Bamboo	01
17.	<i>Schleichera oleosa</i>	Sapindaceae	Kusum	01
18.	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Parijat	03
19.	<i>Pithecellobium dulce</i>	Fabaceae	Manila tamarind (Pink Imli)	01
20.	<i>Annona squamosa L.</i>	Annonaceae	Custard Apple (Sitafal)	02
21.	<i>Delonix regia</i>	Fabaceae	Gulmohar	01
22.	<i>Citrus limon</i>	Rutaceae	Lemon	02
23.	<i>Punica granatum</i>	Lythraceae	pomegranate (Anar)	01
24.	<i>Oneya tesota</i>	Fabaceae	Iron wood	01
25.	<i>Chinese ixora</i>	Rubiaceae	Ishwara	01
26.	<i>Hydrangea macrophylla</i>	Hydrangeaceae	Hortensia	01

# ENVIRONMENTAL AUDIT REPORT

of

Shri Sharda Bhavan Education Society's

## Nanded Pharmacy College

Shyam Nagar, Nanded



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](mailto:engress123@gmail.com)



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

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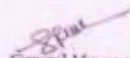
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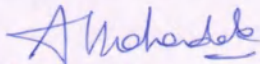
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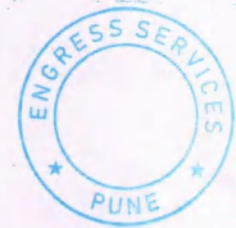
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We are thankful to all the Principal and Staff members for helping us during the field study.



## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities

2. **Various 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 Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	25839	65	23.43
2	Maximum	7476	7	6.74
3	Minimum	1218	3	1.11
4	Average	2153.25	5.416	1.95

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

- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting

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

- It is recommended to install roof-top solar PV Plant on college building as per availability of funds.

6. **Indoor Air Quality Parameters:**

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	51	34	45
2	Minimum	41	30	40

7. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	34.1	45	301	41
2	Minimum	33	42	245	36

## 8. Waste Management:

### 8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

### 8.2 Organic Waste Management:

It is recommended to go for Bio composting for conversion of organic waste.

### 8.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

### 8.4 E-Waste Management:

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

## 9. Rain Water Management:

The College has Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground water table.

## 10. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Display of Posters on Resource Conservation

## 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. Average Energy generated by **1 kWp** Solar PV Plant : **4 kWh/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 Energy Saved by Solar Thermal Water Heating System: [www.mahaurja.com](http://www.mahaurja.com)
- 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
LPG	: Liquefied Petroleum Gas



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

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

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

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

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

No	Head	Particulars
1	Name of Institution	Shri Sharda Bhavan Education Society's, Nanded Pharmacy College, Nanded
2	Address	Shyam Nagar, Nanded 431 605
3	Affiliation	S.R.T.Marathawada University, Nanded



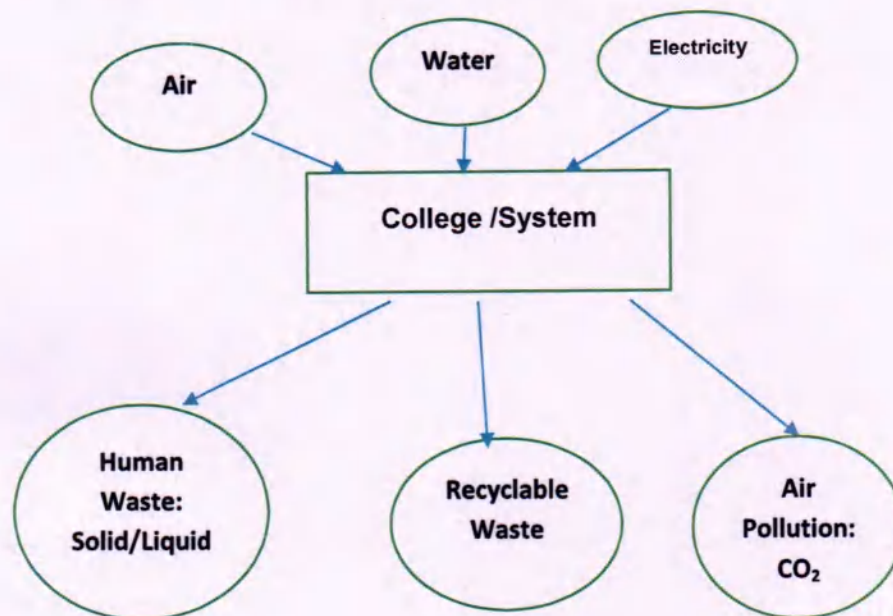
## CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO<sub>2</sub> EMISSION

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.

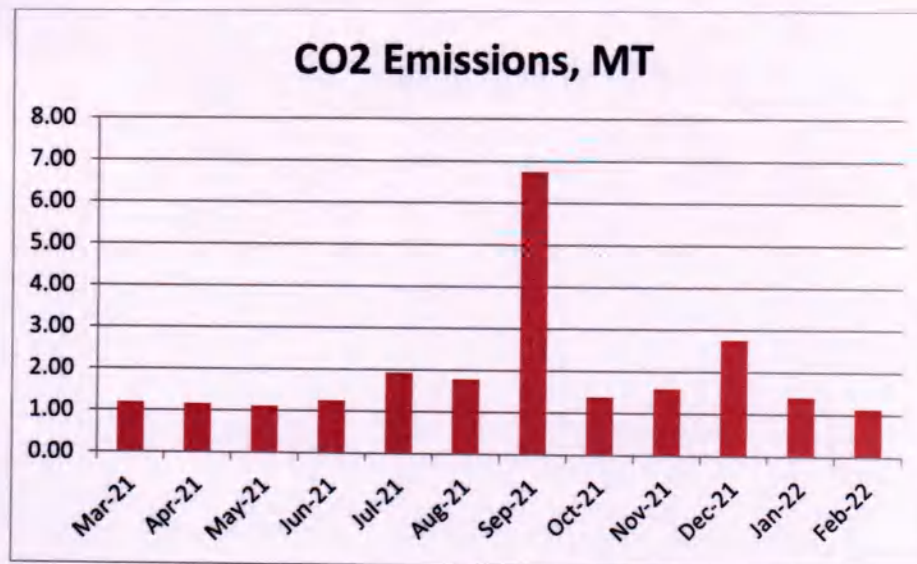
The basis of Calculation for CO<sub>2</sub> emissions due to usage of Electrical Energy are as under

- 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 LPG & Electrical Energy & CO<sub>2</sub> Emissions: 2021-22:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-21	1318	3	1.19
2	Apr-21	1269	4	1.15
3	May-21	1218	5	1.11
4	Jun-21	1366	7	1.25
5	Jul-21	2124	6	1.93
6	Aug-21	1967	5	1.78
7	Sep-21	7476	6	6.74
8	Oct-21	1516	7	1.38
9	Nov-21	1751	6	1.59
10	Dec-21	3045	5	2.75
11	Jan-22	1548	4	1.40
12	Feb-22	1241	7	1.14
13	Total	25839	65	23.43
14	Maximum	7476	7	6.74
15	Minimum	1218	3	1.11
16	Average	2153.25	5.416	1.95

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



**Table No 6: Important Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	25839	65	23.43
2	Maximum	7476	7	6.74
3	Minimum	1218	3	1.11
4	Average	2153.25	5.416	1.95



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

As on today College has not install solar roof-top 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
1	Principal Chamber	49	32	42
2	Administrative office	49	32	41
3	HOD Cabins	51	32	42
4	Faculty Room	48	31	42
5	Placement Cell	43	32	45
6	Class Room:1	46	32	41
7	Class Room:2	50	33	42
8	Class Room:3	41	30	40
9	Pharmaceutics Lab	47	34	43

Environmental Audit Report: Nanded Pharmacy College, Nanded: 21-22

10	Pharmacognosy Lab	47	33	44
11	Computer Center	42	31	42
12	IQAC office	44	32	41
13	Library	42	31	43
14	Seminar Hall	44	31	42
15	NSS Cell	41	30	41
16	Maximum	51	34	45
17	Minimum	41	30	40



## **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	Principal Chamber	34	43	294	39
2	Administrative office	34	42	250	41
3	HOD Cabins	34.1	43	245	38
4	Faculty Room	34	45	250	38
5	Placement Cell	34	44	260	39
6	Class Room:1	33.9	43	261	40
7	Class Room:2	33.7	44	256	40
8	Class Room:3	34	43	246	41
9	Pharmaceutics Lab	33.8	42	256	39
10	Pharmacognosy Lab	33.5	44	296	37
11	Computer Center	33.6	44	301	36
12	IQAC office	34.1	43	297	41
13	Library	34.1	45	299	40
14	Seminar Hall	33	44	289	36
15	NSS Cell	33.1	43	289	37
16	Maximum	34.1	45	301	41
17	Minimum	33	42	245	36

## **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 waste collecting agent for further recycling.

#### **Photograph of Waste Collection Bins:**



### **6.2 Bio Composting Pit:**

It is recommended to go for Bio composting to convert the Organic waste into Bio compost.

### **6.3 Liquid Waste Management:**

The College has installed Septic tank and is cleaned periodically.

### **6.4 E-Waste Management:**

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

### **6.5 Sanitary Waste Incinerator:**

The College has not installed Sanitary Waste Incinerator, it is recommended to install Sanitary Waste Incinerator for disposal sanitary waste.

## CHAPTER-VI

### STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore-well.

Photograph of Rain Water Management Section:



## **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 Water Conservation:**

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

**Photograph of Poster on Water Conservation awareness:**



**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 <sup>0</sup> C
2	Humidity	Less Than 70%

**AUDIT REPORTS OF  
AY 2022-2023**

**ENERGY AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



Year: 2022-23

Prepared by:

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society  
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Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

MEDA Registration No: ECN/2022-23/CR-43/1709

ISO: 9001-2015 Certified (Cert No: 23EQKC13),

ISO: 14001-2015 Certified (Cert No: 23EEKW20)

# ENERGY AUDIT CERTIFICATE

**Certificate No: ES/NPC/22-23/01**

**Date: 20/06/2023**

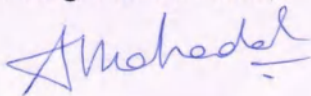
This is to certify that we have conducted an Energy Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded in the Year 2022-23.

The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of Solar Street Light System

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

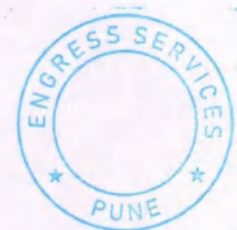
**For Engress Services,**



**A Y Mehendale,**

B E-Mechanical, M Tech- Energy

BEE Certified Energy Auditor, EA-8192





## INDEX

Sr. No	Particulars	Page No
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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded for awarding us the assignment of Energy Audit of their Campus for the Year: 2022-23.

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



## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of Electrical Energy & LPG used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Annual Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	46.05	kW
2	Annual Energy Consumption	33564	kWh
3	Annual CO <sub>2</sub> Emissions	30.39	MT

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	33564	kWh
2	Total Built up area of Institute	2833	m <sup>2</sup>
3	Energy Performance Index = (1) / (2)	11.84	kWh/m <sup>2</sup>

4. Study of Lighting Power Density & % of LED Lighting:

No	Particulars	Value	Unit
1	Lighting Power density	0.48	W/m <sup>2</sup>
2	% of Usage of LED Lighting to Total Lighting Load	19.16	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Solar Street Light System

6. Assumption:

- 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

7. References:

- Audit Methodology: [www.mahaurja.com](http://www.mahaurja.com)
- Energy Conservation Building Code: ECBC-2017: [www.beeindia.gov.in](http://www.beeindia.gov.in)
- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)





## **ABBREVIATIONS**

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
BEE	:	Bureau of Energy Efficiency
ECBC	:	Energy Conservation Building Code
MEDA	:	Maharashtra Energy Development Agency
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO <sub>2</sub>	:	Carbon Di Oxide
MT	:	Metric Ton

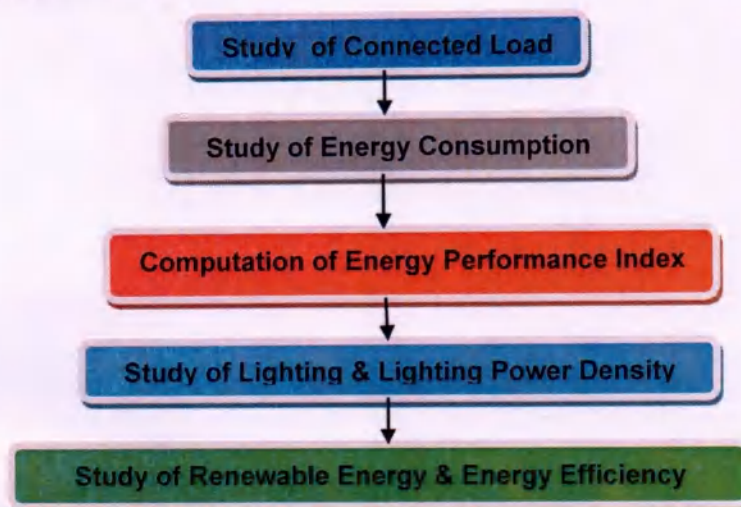
## CHAPTER-I INTRODUCTION

### 1.1 Introduction:

An Energy Audit is conducted at Nanded Pharmacy College, Nanded. The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency ([www.mahaurja.com](http://www.mahaurja.com))
- Tata Power: [www.tatapower.com](http://www.tatapower.com)

### 1.2 Audit Procedural Steps:



### 1.3 Institute Location Image:



Institute  
Campus

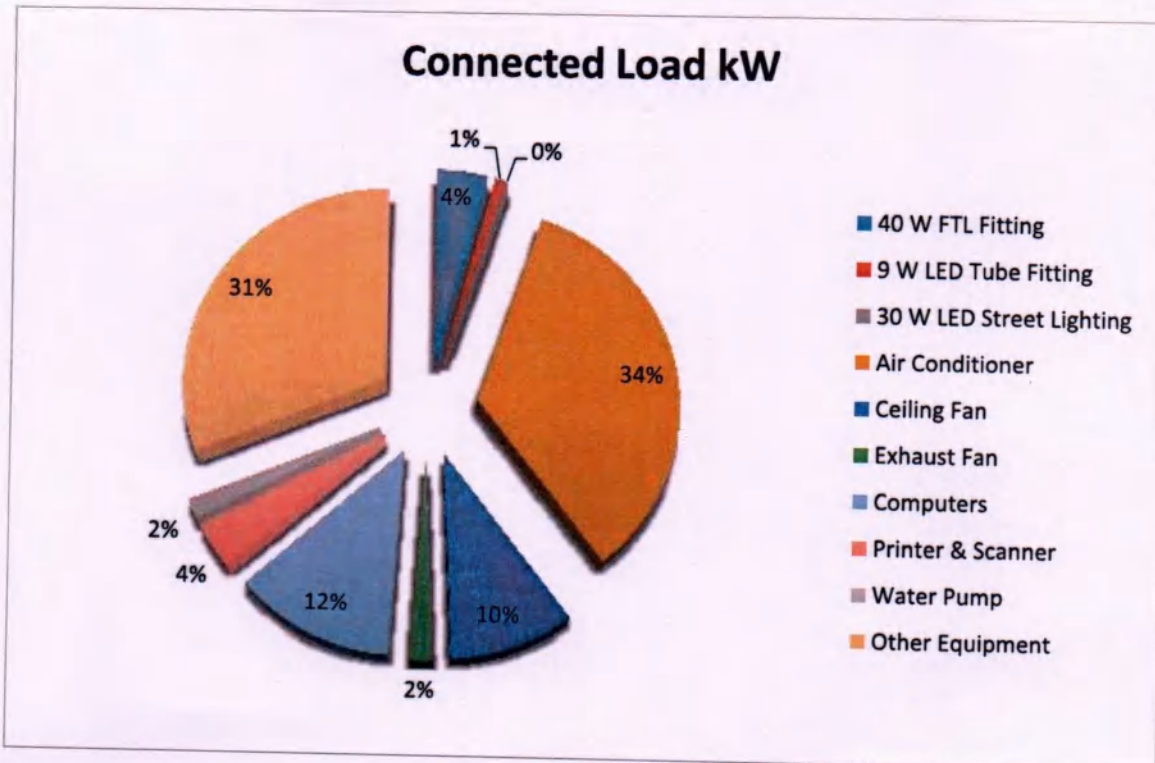
## CHAPTER-II STUDY OF CONNECTED LOAD

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

**Table No 1: Study of Equipment wise Connected Load:**

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	50	40	2
2	9 W LED Tube Fitting	46	9	0.414
3	30 W LED Street Lighting	2	30	0.06
4	Air Conditioner	11	1500	16.5
5	Ceiling Fan	72	65	4.68
6	Exhaust Fan	17	50	0.85
7	Computers	40	150	6
8	Printer & Scanner	12	150	1.8
9	Water Pump	1	746	0.746
10	Other Equipment	100	150	15
11	<b>Total</b>			<b>46.05</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 Consumption.

**Table No 2: Electrical Energy & LPG Consumption Analysis- 2022-23:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-22	1746	3	1.58
2	Apr-22	2848	4	2.57
3	May-22	1945	5	1.76
4	Jun-22	6829	3	6.15
5	Jul-22	1549	3	1.40
6	Aug-22	1478	7	1.35
7	Sep-22	2147	7	1.95
8	Oct-22	2147	8	1.95
9	Nov-22	4993	7	4.51
10	Dec-22	1664	8	1.52
11	Jan-23	1664	6	1.51
12	Feb-23	4554	8	4.12
13	Total	33564	69	30.39
14	Maximum	6829	8	6.15
15	Minimum	1478	3	1.35
16	Average	2797	5.75	2.53

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

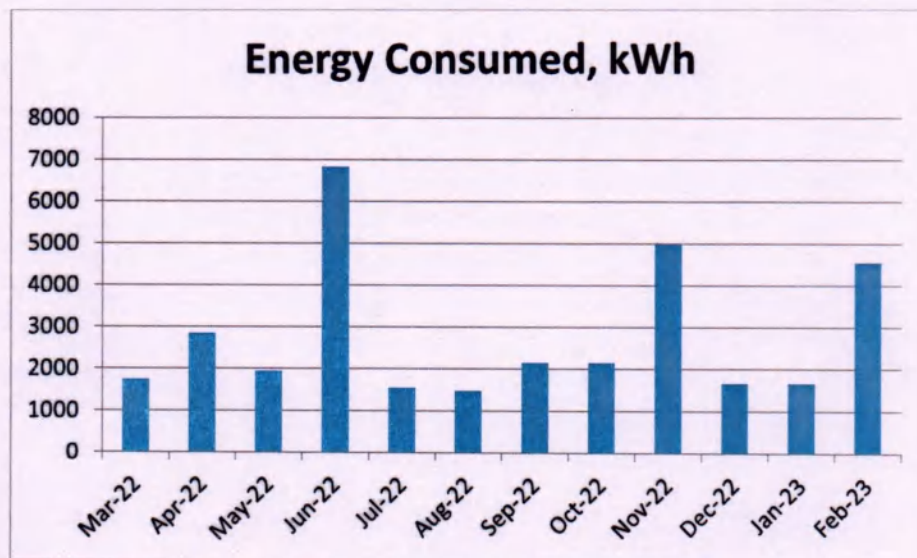


Chart No 3: Variation in Monthly LPG Consumption:

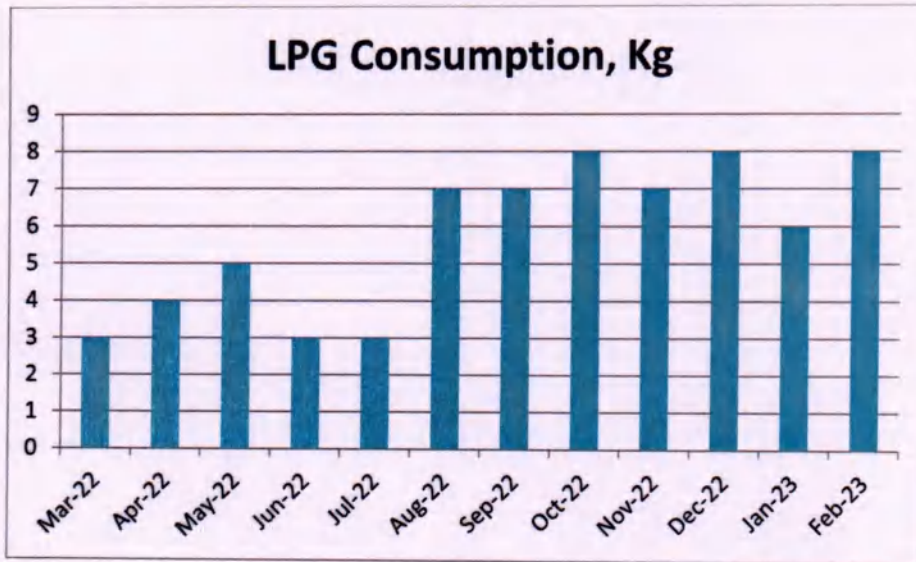


Table No 3: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	33564	69	30.39
2	Maximum	6829	8	6.15
3	Minimum	1478	3	1.35
4	Average	2797	5.75	2.53

## **CHAPTER-IV**

### **STUDY OF ENERGY PERFORMANCE INDEX**

**Energy Performance Index:** Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$\text{EPI} = \frac{\text{Annual Energy Consumption in kWh}}{\text{Total Built-up area in m}^2}$$

Now we compute the EPI for the Institute as under:

**Table No 4: Computation of Energy Performance Index:**

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	33564	kWh
2	Total Built up area of Institute	2833	m <sup>2</sup>
3	Energy Performance Index =(1) / (2)	<b>11.84</b>	kWh/m <sup>2</sup>

## CHAPTER V STUDY OF LIGHTING

### Terminology:

1. **Lumen** is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.
2. **Lux** is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.
3. **Circuit Watts** is the total power drawn by lamps and ballasts in a lighting circuit under assessment.
4. **Installed Load Efficacy** is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m<sup>2</sup>)
5. **Lamp Circuit Efficacy** is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)
6. **Installed Power Density.** The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior  
Unit: watts per square metre per 100 lux (W/m<sup>2</sup>/100 lux) 100 Installed power density (W/m<sup>2</sup>/100 lux)
7. **Lighting Power Density:** It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute: Lighting Power Density of a Class Room. We also compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

**Table No 5: Computation of Lighting Power Density:**

No	Particulars	Value	Unit
1	No of 9 W LED Tube Lights in Class Room	4	Nos
2	Demand of 9 W LED Tube Light	9	W/Unit
3	Total Lighting Load in the Class Room= (1) * (2)	36	W
4	Area of Class Room	75	m <sup>2</sup>
5	Lighting Power Density = (3)/ (4)	0.48	W/m <sup>2</sup>

Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

**Table No 6: Percentage Usage of LED Lighting to Annual Lighting Load:**

No	Particulars	Value	Unit
1	Qty of 40 W FTL Light Fittings	50	Nos
2	Load per Fitting	40	W/Unit
3	Total Load of 40 W FTL Fitting	2	kW
4	Qty of 30 W LED Street Light Fittings	2	Nos
5	Load per Fitting	30	W/Unit
6	Total Load of 30 W Street LED Fitting	0.06	kW
7	Qty of 9 W LED Light Fittings	46	Nos
8	Load per Fitting	9	W/Unit
9	Total Load of 9 W LED Fitting	0.414	kW
10	Total Lighting Load=3+6+9	2.474	kW
11	Total LED Lighting Load=6+9	0.474	kW
12	% of Total Lighting Demand met by LED Lighting= $23 \times 100 / 22$	19.16	%



## **CHAPTER-VI**

### **STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY**

The Institute has installed Solar Street Lighting System, but it is recommended to install Solar PV Plant on the College Building.

**Photograph of Solar Street Lighting System:**



**GREEN AUDIT REPORT**  
of  
Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



Year: 2022-23

Prepared by:

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society  
Near Muktangang English School, Parvati, Pune 411009  
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## ENGRESS SERVICES

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MEDA Registration No: ECN/2022-23/CR-43/1709  
ISO: 9001-2015 Certified (Cert No: 23EQKC13),  
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

# GREEN AUDIT CERTIFICATE

Certificate No: ES/NPC/22-23/02

Date: 20/06/2023

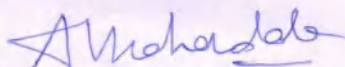
This is to certify that we have conducted Green Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded, in the Year 2022-23.

The College has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of Solar Street Light System
- Segregation of Waste at Source
- Installation of Bio Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation of Sanitary Waste Incinerator
- Installation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of awareness by display of Posters on Resource Conservation

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,

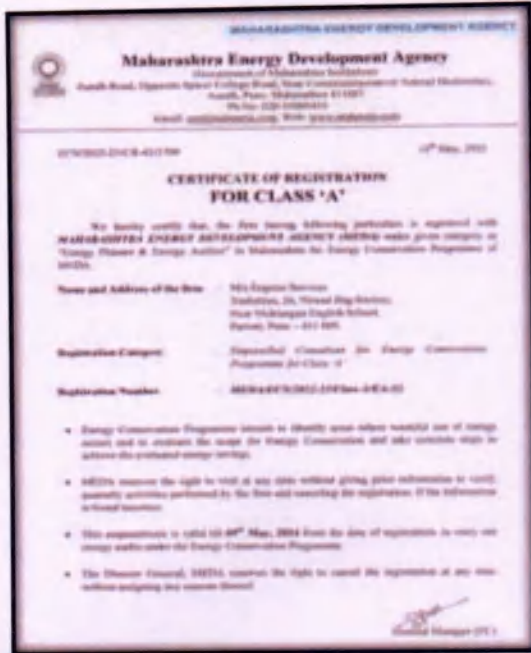


**A Y Mehendale,**

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



## REGISTRATION CERTIFICATES



MEDA Registration Certificate



GEM Certified Professional Certificate



ISO: 9001-2015 Certificate



ISO: 14001-2015 Certificate



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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded for awarding us the assignment of Green Audit of their Campus for the Year: 2022-23.

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

## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.

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

No	Particulars	Value	Unit
1	Annual Energy Consumption	33564	kWh
2	Annual CO <sub>2</sub> Emissions	30.39	MT

3. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of Solar Street Light System

4. Waste Management:

5.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

5.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

5.3 Liquid Waste Management:

The Institute has installed Septic Tank and it cleans periodically.

5.4 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

5.6 E Waste Management:

The E Waste is disposed through Authorized Agency by institution.

6. Rain Water Management:

The Institute has installed the Rainwater Management project; the rain water falling on the terrace is collected through pipes and is used for recharging bore-well.

#### 7. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Maintenance of Internal Garden: 100 plus Trees in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Resource Conservation Display of Posters

#### 8. Assumption:

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

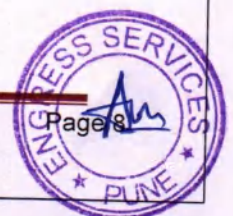
#### 9. Reference:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)



## 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

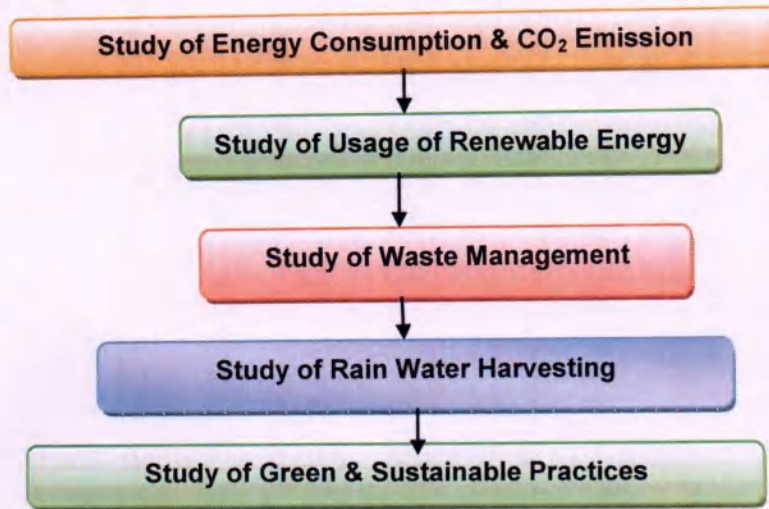


## CHAPTER-I INTRODUCTION

### 1.1 Introduction:

A Green Audit is conducted at Nanded Pharmacy College, Nanded.

### 1.2 Audit Procedural Steps:



### 1.3 Institute Location Image:



Institute  
Campus

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

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 Institute for performing its day to day activities

The Institute uses Electrical Energy for various Electrical gadgets.

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

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is 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

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

Table No 1: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-22	1746	3	1.58
2	Apr-22	2848	4	2.57
3	May-22	1945	5	1.76
4	Jun-22	6829	3	6.15
5	Jul-22	1549	3	1.40
6	Aug-22	1478	7	1.35
7	Sep-22	2147	7	1.95
8	Oct-22	2147	8	1.95
9	Nov-22	4993	7	4.51
10	Dec-22	1664	8	1.52
11	Jan-23	1664	6	1.51
12	Feb-23	4554	8	4.12
13	Total	33564	69	30.39
14	Maximum	6829	8	6.15
15	Minimum	1478	3	1.35
16	Average	2797	5.75	2.53

Chart No 1: Month wise CO<sub>2</sub> Emissions:

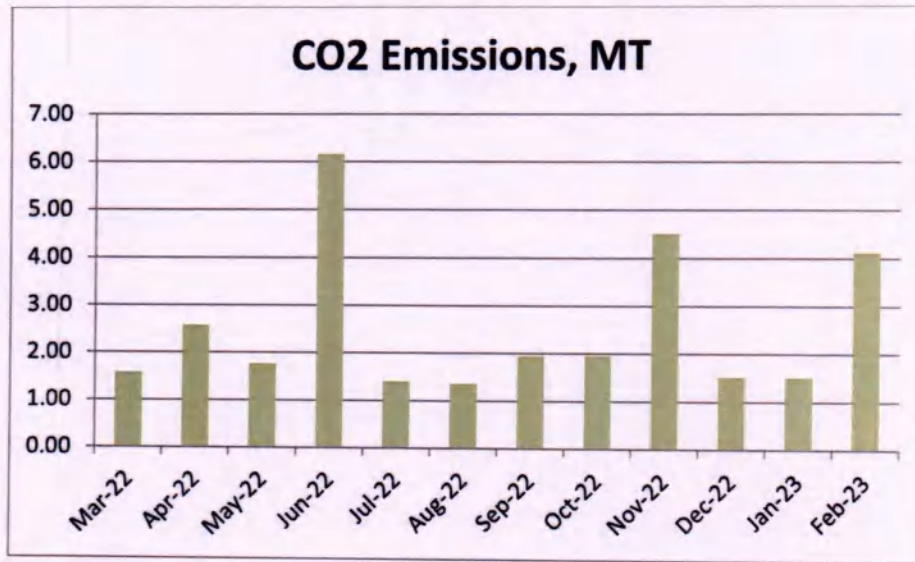


Table No 2: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg	CO2 Emissions, MT
1	Total	33564	69	30.39
2	Maximum	6829	8	6.15
3	Minimum	1478	3	1.35
4	Average	2797	5.75	2.53

### **CHAPTER III**

## **STUDY OF USAGE OF RENEWABLE ENERGY**

The Institute has installed Solar Street Lighting System, but it is recommended to install Solar PV Plant on the College Building.

**Photograph of Solar Street Lighting System:**



## CHAPTER IV STUDY OF WASTE MANAGEMENT

### 4.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

#### Photograph of Waste Collection Bins:



### 4.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

#### Photograph of Bio Composting Pit:



### 4.3 Liquid Waste Management:

The Institute has installed Septic Tanks it cleans periodically.

**4.4 Sanitary Waste Management:**

The Institute has installed Sanitary Waste Incinerator for disposal of the Sanitary Waste.



**4.5 E Waste Management:**

The E Waste is disposed through Authorized Agency by institution.

## CHAPTER V STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore-well.

Photograph of Rain Water Management Section:





## CHAPTER VI STUDY OF GREEN & SUSTAINABLE PRACTICES

### 6.1 Pedestrian Friendly Road & Internal Tree Plantation:

The Institute has well maintained internal road to facilitate the easy movement of the students within the campus. The Institute has well maintained landscaped garden in the campus.

Photograph of Internal Road & Tree plantation:



### 6.2 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the Institute has made provision of Ramp.

Photograph of Ramp:



### 6.3 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



**6.4 Best Practices and Initiative for Social Awareness:**

The College has taken initiative for different social awareness program, like water conservation, trees plantations, society cleanness etc under National Service Scheme.

**Photograph of Best Practices:**



**ANNEXURE-1:****LIST OF TREES & PLANTS IN THE CAMPUS:**

Sr. No.	Botanical Name	Family	Common Name	Total
1.	<i>Saraca asoca</i>	Fabaceae	Ashoka	17
2.	<i>Tectona grandis</i>	Lamiaceae	Sagwan	16
3.	<i>Terminalia catappa L.</i>	Combretaceae	Jungli Badam	04
4.	<i>Borassus frabellifer</i>	Arecaceae	Palm	07
5.	<i>Cocos nucifera L.</i>	Arecaceae	Coconut	12
6.	<i>Syzygium cumini L.</i>	Myrtaceae	Jamun	06
7.	<i>Azadirachta indica</i>	Meliaceae	Neem	04
9.	<i>Ficus benghalensis</i>	Moraceae	Banyan	02
10.	<i>Ficus carica</i>	Moraceae	Fig (Audumbar)	01
11.	<i>Ficus religiosa</i>	Moraceae	Peepal	01
12.	<i>Mangifera indica</i>	Anacardiaceae	Mango	04
13.	<i>Carica papaya</i>	Caricaceae	Papaya	01
14.	<i>Moringa oleifera</i>	Moringaceae	Moringa	01
15.	<i>Acacia arabica</i>	Fabaceae	Babul	05
16.	<i>Bambusa vulgaris</i>	Poaceae	Bamboo	01
17.	<i>Schleichera oleosa</i>	Sapindaceae	Kusum	01
18.	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Parijat	03
19.	<i>Pithecellobium dulce</i>	Fabaceae	Manila tamarind (Pink Imli)	01
20.	<i>Annona squamosa L.</i>	Annonaceae	Custard Apple (Sitafal)	02
21.	<i>Delonix regia</i>	Fabaceae	Gulmohar	01
22.	<i>Citrus limon</i>	Rutaceae	Lemon	02
23.	<i>Punica granatum</i>	Lythraceae	pomegranate (Anar)	01
24.	<i>Olneya tesota</i>	Fabaceae	Iron wood	01
25.	<i>Chinese ixora</i>	Rubiaceae	Ishwara	01
26.	<i>Hydrangea macrophylla</i>	Hydrangeaceae	Hortensia	01

# ENVIRONMENTAL AUDIT REPORT

of

Shri Sharda Bhavan Education Society's  
**Nanded Pharmacy College**  
Shyam Nagar, Nanded



Year: 2022-23

Prepared by:

## **ENGRESS SERVICES**

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Date: 20/06/2023

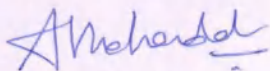
This is to certify that we have conducted Environmental Audit at Shri Sharda Bhavan Education Society's Nanded Pharmacy College, Nanded, in the Year 2022-23.

The College has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of Solar Street Light System
- Segregation of Waste at Source
- Installation of Sanitary Waste Incinerator
- Installation of Bio Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness by display of Posters on Resource Conservation

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

For Engress Services,



**A Y Mehendale,**

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





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## **ACKNOWLEDGEMENT**

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



## EXECUTIVE SUMMARY

1. Nanded Pharmacy College, Nanded consumes Energy in the form of **Electrical Energy & LPG** used for various Electrical Equipment, office & other facilities.

2. **Pollution due to Institute 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	Particulars	Value	Unit
1	Annual Energy Consumption	33564	kWh
2	Annual CO <sub>2</sub> Emissions	30.39	MT

4. **Various initiatives taken for Environmental Conservation:**

- Usage of Energy Efficient LED fittings
- Installation of Solar Street Light System
- Installation of Bio Composting Pit

5. **Indoor Air Quality Parameters:**

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	52	34	44
2	Minimum	41	29	37

6. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	33.2	45	310	41
2	Minimum	32.7	42	240	35

7. **Waste Management:**

7.1 **Segregation of Waste at Source:**

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

### 7.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

### 7.3 Liquid Waste Management:

The Institute has installed Septic Tank and it cleans periodically.

### 7.4 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

### 7.5 E Waste Management:

The E Waste is disposed through Authorized Agency by institution.

### 8. Rain Water Management:

The Institute has installed the Rainwater Management project; the rain water falling on the terrace is collected through pipes and is used for recharging the bore well.

### 9. Environment Friendly Initiatives:

- Maintenance of Internal Garden: About **100 Plus** Trees in the campus.
- Display of Posters on Resource Conservation

### 10. Assumption:

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

### 11. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- 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. Important Definitions:

#### 1.1. Environment: Definition as per environment Protection Act: 1986

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

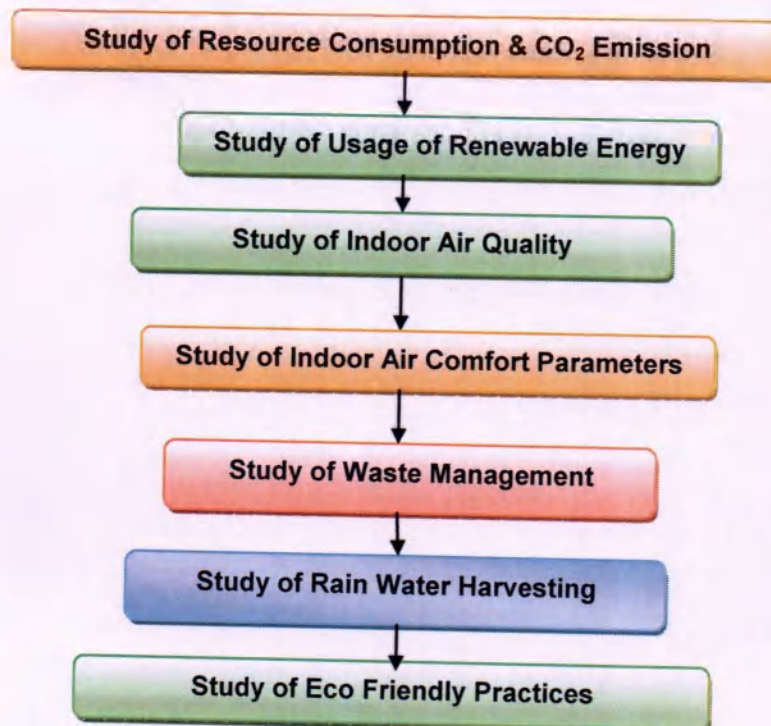
#### 1.2. Environmental Audit: Definition:

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

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

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

#### 1.4 Audit Procedural Steps:



**1.5 Institute Location Image:**



Institute  
Campus

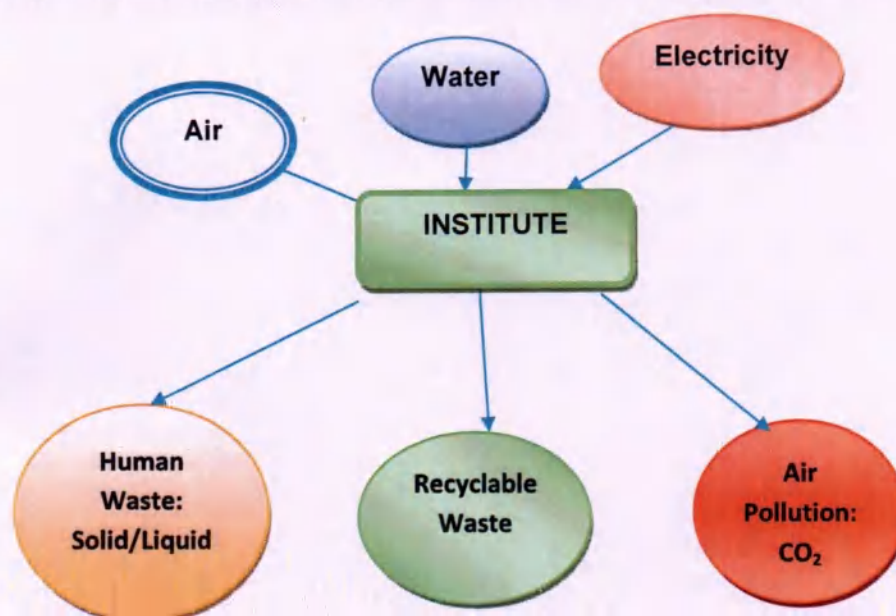


## CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO<sub>2</sub> EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.  
**Chart No 1: Representation of Institute 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 Electrical Energy is 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: 22-23:**

No	Month	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Mar-22	1746	3	1.58
2	Apr-22	2848	4	2.57
3	May-22	1945	5	1.76
4	Jun-22	6829	3	6.15
5	Jul-22	1549	3	1.40

6	Aug-22	1478	7	1.35
7	Sep-22	2147	7	1.95
8	Oct-22	2147	8	1.95
9	Nov-22	4993	7	4.51
10	Dec-22	1664	8	1.52
11	Jan-23	1664	6	1.51
12	Feb-23	4554	8	4.12
13	Total	33564	69	30.39
14	Maximum	6829	8	6.15
15	Minimum	1478	3	1.35
16	Average	2797	5.75	2.53

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

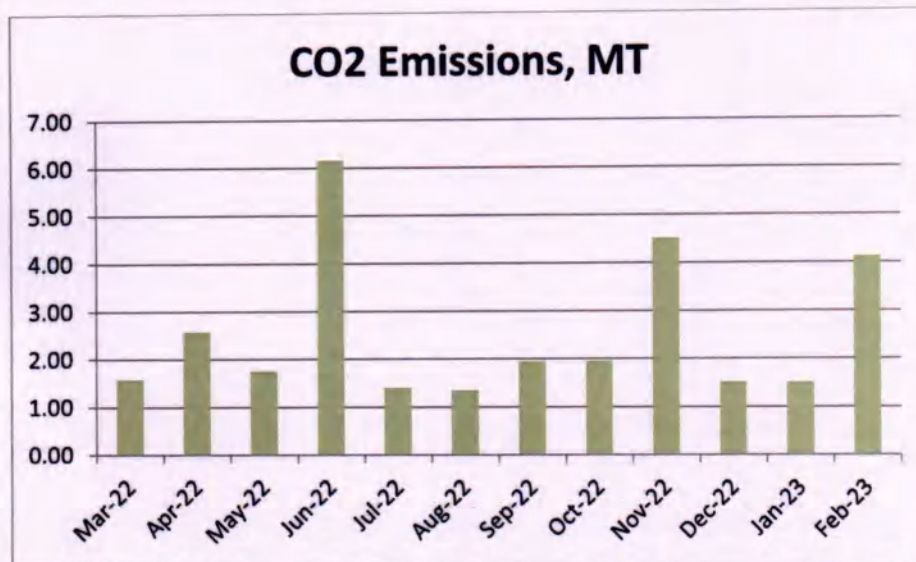


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumption, Kg	CO <sub>2</sub> Emissions, MT
1	Total	33564	69	30.39
2	Maximum	6829	8	6.15
3	Minimum	1478	3	1.35
4	Average	2797	5.75	2.53



### **CHAPTER III**

## **STUDY OF USAGE OF RENEWABLE ENERGY**

The Institute has installed Solar Street Lighting System, but it is recommended to install Solar PV Plant on the College Building.

**Photograph of Solar Street Lighting System:**



## CHAPTER IV STUDY OF INDOOR AIR QUALITY

### 4.1 Importance of Air Quality:

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

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

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

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

### 4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. 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 10 micron

**Table No 7: Indoor Air Quality Parameters:**

No	Location	AQI	PM-2.5	PM-10
1	Principal Chamber	48	32	43
2	Administrative office	48	29	40
3	HOD Cabins	52	32	41
4	Faculty Room	48	30	41
5	Placement Cell	42	33	44
6	Class Room:1	47	33	43
7	Class Room:2	51	33	42
8	Class Room:3	41	29	38
9	Pharmaceutics Lab	48	34	41
10	Pharmacognosy Lab	47	32	42
11	Computer Center	41	29	37
12	IQAC office	44	32	42
13	Library	43	32	43
14	Seminar Hall	42	31	42

15	NSS Cell	41	30	41
16	Maximum	52	34	44
17	Minimum	41	29	37



## 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 8: Study of Indoor Comfort Condition Parameters:**

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Principal Chamber	33	42	291	37
2	Administrative office	33	44	245	38
3	HOD Cabins	33.2	44	240	39
4	Faculty Room	33	45	250	38
5	Placement Cell	32.8	44	260	39
6	Class Room:1	32.8	43	261	41
7	Class Room:2	32.7	43	281	40
8	Class Room:3	33.1	44	274	40
9	Pharmaceutics Lab	33	45	256	38
10	Pharmacognosy Lab	32.9	44	296	35
11	Computer Center	33	45	301	35
12	IQAC office	33	45	297	41
13	Library	32.8	45	299	40
14	Seminar Hall	33.2	44	310	37
15	NSS Cell	32.9	43	289	37
16	Maximum	33.2	45	310	41
17	Minimum	32.7	42	240	35

## CHAPTER VI STUDY OF WASTE MANAGEMENT

### 6.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

#### Photograph of Waste Collection Bins:



### 6.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

#### Photograph of Bio Composting Pit:



**6.3 Liquid Waste Management:**

The Institute has installed Septic Tanks it cleans periodically.

**6.4 Sanitary Waste Management:**

The Institute has installed Sanitary Waste Incinerator for disposal of the Sanitary Waste.



**6.5 E Waste Management:**

The E Waste is disposed through Authorized Agency by institution.

## CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore-well.

Photograph of Rain Water Management Section:



## CHAPTER-VIII STUDY OF ECO FRIENDLY INITIATIVES

### 8.1 Internal Tree Plantation:

The Institute has well maintained landscaped garden and medicinal tree plantation in the campus.

Photograph of Tree plantation:



### 8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:





**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 <sup>0</sup> C
2	Humidity	Less Than 70%