



## Key Indicator - 7.1 Institutional Values and Social Responsibilities

**Metric No:7.1.3:** *Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following:*

1. Green audit / Environment audit
2. Energy audit
3. Clean and green campus initiatives
4. Beyond the campus environmental promotion activities

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# ENERGY AUDIT REPORT

of

Lokmanya Tilak Jankalyan Shikshan Sanstha's,  
**PRIYADARSHINI J. L. COLLEGE OF PHARMACY (DEGREE),**

MIDC Hingna Road, Nagpur



Year: 2021-22

Prepared by:

**ENGRESS SERVICES**



Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411009  
Email: [engress123@gmail.com](mailto:engress123@gmail.com)



**REGISTRATION CERTIFICATES**

Regn. No. EA-8192		No. 2942
<b>National Productivity Council</b> (National Certifying Agency)		
<b>PROVISIONAL CERTIFICATE</b>		
This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u>		
son / daughter of Mr. <u>Yashavant</u>		
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.		
He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.		
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.		
This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.		
Place : Chennai, India		
Date : 10 <sup>th</sup> August 2007	Controller of Examination	

**BEE AUDITOR CERTIFICATE**

	
<b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY</b>	
<b>Maharashtra Energy Development Agency</b> (Government of Maharashtra Institution) Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067 Ph No: 020-35000450 Email: <a href="mailto:eee@mahaurja.com">eee@mahaurja.com</a> , Web: <a href="http://www.mahaurja.com">www.mahaurja.com</a>	
ECN/2022-23/CR-43/1709	10 <sup>th</sup> May, 2022
<b>CERTIFICATE OF REGISTRATION FOR CLASS 'A'</b>	
We hereby certify that, the firm having following particulars is registered with <b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)</b> under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.	
<b>Name and Address of the firm</b>	: M/s Engress Services Yashshree, 26, Nirmal Bag Society, Near Muktagan English School, Parvati, Pune - 411 009.
<b>Registration Category</b>	: Empanelled Consultant for Energy Conservation Programme for Class 'A'
<b>Registration Number</b>	: MEDA/ECN/2022-23/Class A/EA-32.
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• This empanelment is valid till <b>09<sup>th</sup> May, 2024</b> from the date of registration, to carry out energy audits under the Energy Conservation Programme</li> <li>• The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.</li> </ul>	
 General Manager (EC)	

**MEDA REGIATRION CERTIFICATE**



# ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411 009  
Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/JLOP/21-22/01

Date: 15/6/2022

## ENERGY AUDIT CERTIFICATE

This is to certify that we have conducted Energy Audit at Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur in the Year 21-22.

The College has adopted following Energy Efficient Practices:

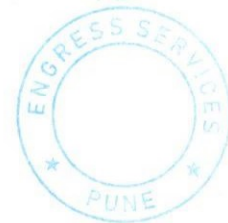
- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 33 kWp

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  
Certified Energy Auditor, EA-8192





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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur, for awarding us the assignment of Energy Audit of their Campus for the Year: 21-22.

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



## EXECUTIVE SUMMARY

1. Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur consumes Energy in the form of Electrical Energy & LPG; used for various Equipment.

### 2. Present Electrical Energy, LPG Purchase & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	2290	228	2.672
2	Maximum	321	38	0.316
3	Minimum	126	9	0.143
4	Average	190.83	19.00	0.22

### 3. Energy Conservation projects installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity **33 kWp**

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

No	Parameter/ Value	Energy Generated, kWh	Reduction in CO <sub>2</sub> Emissions, MT
1	Total	38110.79	34.30
2	Maximum	4051.14	3.65
3	Minimum	2189.96	1.97
4	Average	3175.90	2.86

### 5. Usage of LED Lighting:

- The Total LED Lighting Load of the College is **1.72 kW**.
- The Total Lighting Load of the College is **3.52 kW**.
- The percentage of LED Lighting to Total Lighting Load is **49 %**.

### 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

LTJSSS	:	Lokmanya Tilak Jankalyan Shikshan Sanstha
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

# CHAPTER-I INTRODUCTION

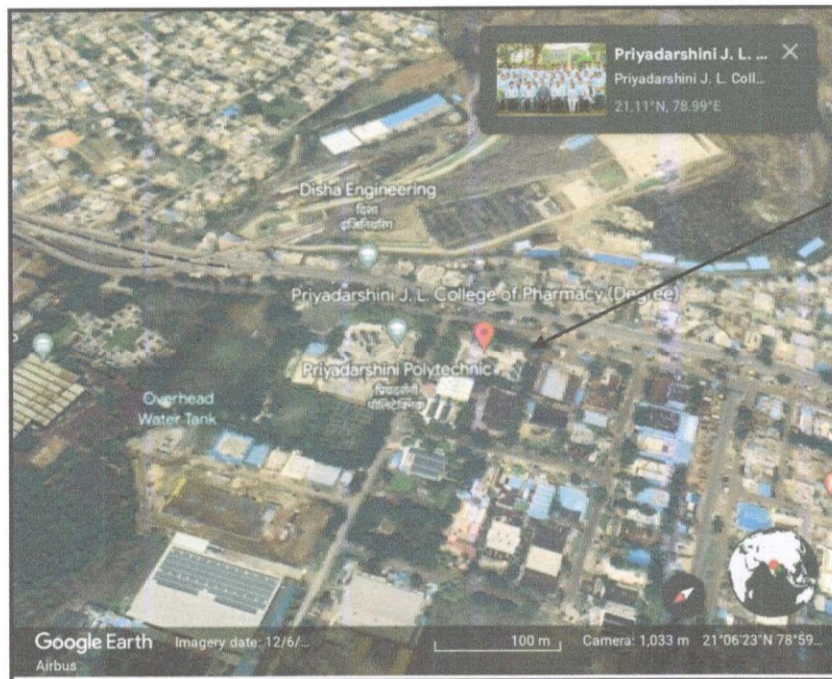
## 1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To Study the present 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:

No	Head	Particulars
1	Name of Institution	Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree),
2	Address	MIDC Hingna, Nagpur
3	Establishment	1997

## 1.3 Google Earth Image:



College  
Campus





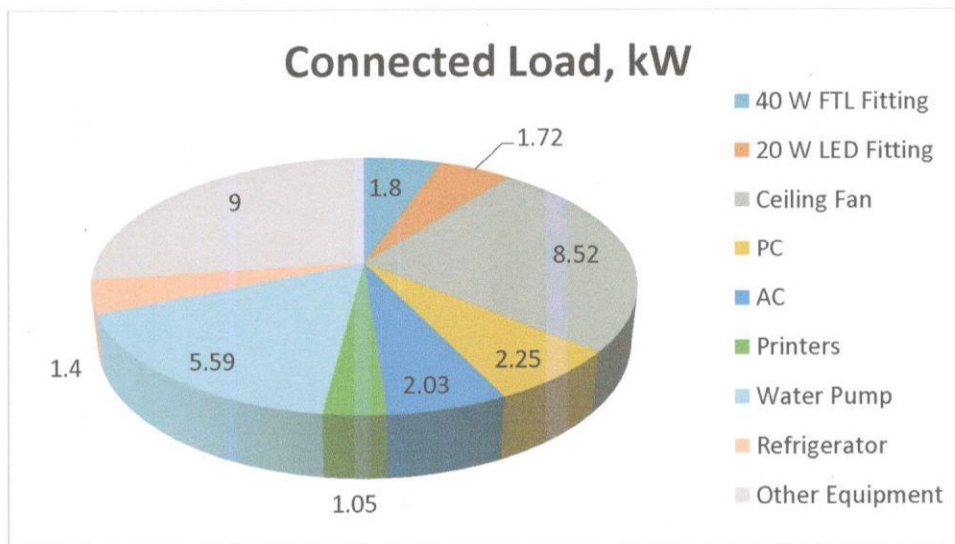
## CHAPTER-II STUDY OF CONNECTED LOAD

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

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

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	45	40	1.8
2	20 W LED Fitting	86	20	1.72
3	Ceiling Fan	131	65	8.52
4	PC	15	150	2.25
5	AC	1	2025	2.03
6	Printers	6	175	1.05
7	Water Pump	1	5595	5.59
8	Refrigerator	4	350	1.4
9	Other Equipment	30	300	9
10	<b>Total</b>			<b>33</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.

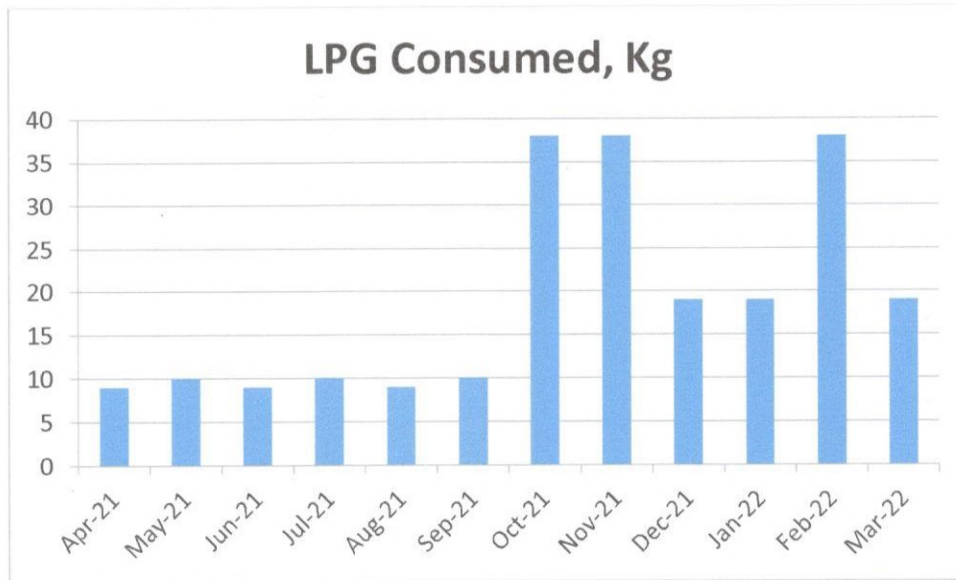
Table No 3: Electrical Energy & LPG Purchase Analysis- 2021-22:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-21	254	9
2	May-21	321	10
3	Jun-21	241	9
4	Jul-21	247	10
5	Aug-21	189	9
6	Sep-21	129	10
7	Oct-21	152	38
8	Nov-21	146	38
9	Dec-21	126	19
10	Jan-22	137	19
11	Feb-22	133	38
12	Mar-22	215	19
13	Total	2290	228
14	Maximum	321	38
15	Minimum	126	9
16	Average	190.83	19.00

Chart No 2: Variation in Monthly Energy Purchased:



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



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

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumed, Kg
1	Total	2290	228
2	Maximum	321	38
3	Minimum	126	9
4	Average	190.83	19.00

## CHAPTER-IV

### CARBON FOOT PRINTING

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

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

Table No 5: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-21	254	9	0.25
2	May-21	321	10	0.32
3	Jun-21	241	9	0.24
4	Jul-21	247	10	0.25
5	Aug-21	189	9	0.19
6	Sep-21	129	10	0.14
7	Oct-21	152	38	0.24
8	Nov-21	146	38	0.23
9	Dec-21	126	19	0.16
10	Jan-22	137	19	0.17
11	Feb-22	133	38	0.22
12	Mar-22	215	19	0.24
13	Total	2290	228	2.672
14	Maximum	321	38	0.316
15	Minimum	126	9	0.143
16	Average	190.83	19.00	0.22



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

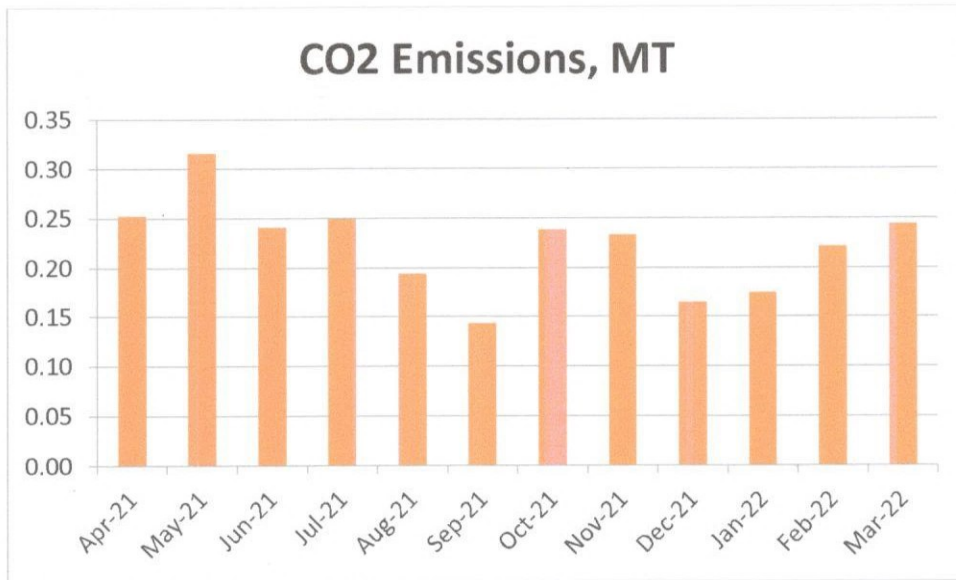


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	2290	228	2.672
2	Maximum	321	38	0.316
3	Minimum	126	9	0.143
4	Average	190.83	19.00	0.22



## CHAPTER-V

### STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity 33 kWp. In the following Table, we present the Energy generation & Reduction in CO<sub>2</sub> Emissions due to Solar Energy.

Table No 7: Month Wise Generation of Solar Energy & Reduction in CO<sub>2</sub> Emissions:

No	Month	Energy Generated, kWh	CO2 Emission Reduction, MT
1	Apr-21	3828.75	3.45
2	May-21	3798.33	3.42
3	Jun-21	2862.67	2.58
4	Jul-21	2189.96	1.97
5	Aug-21	2440	2.20
6	Sep-21	2739.11	2.47
7	Oct-21	2830.42	2.55
8	Nov-21	2946.86	2.65
9	Dec-21	3846	3.46
10	Jan-22	3456	3.11
11	Feb-22	3121.55	2.81
12	Mar-22	4051.14	3.65
13	Total	38110.79	34.30
14	Maximum	4051.14	3.65
15	Minimum	2189.96	1.97
16	Average	3175.90	2.86

Chart No 5: Month wise Solar Energy Generation:

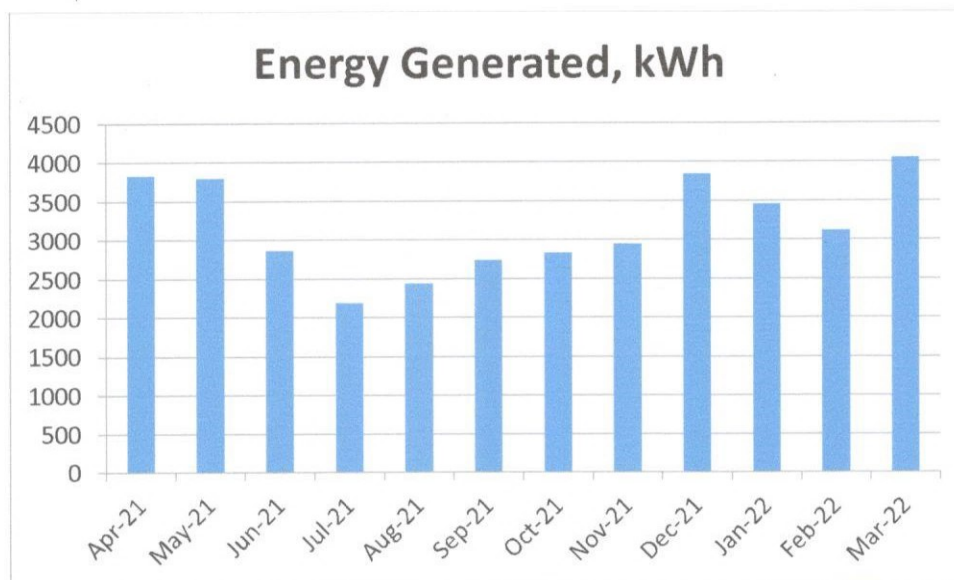
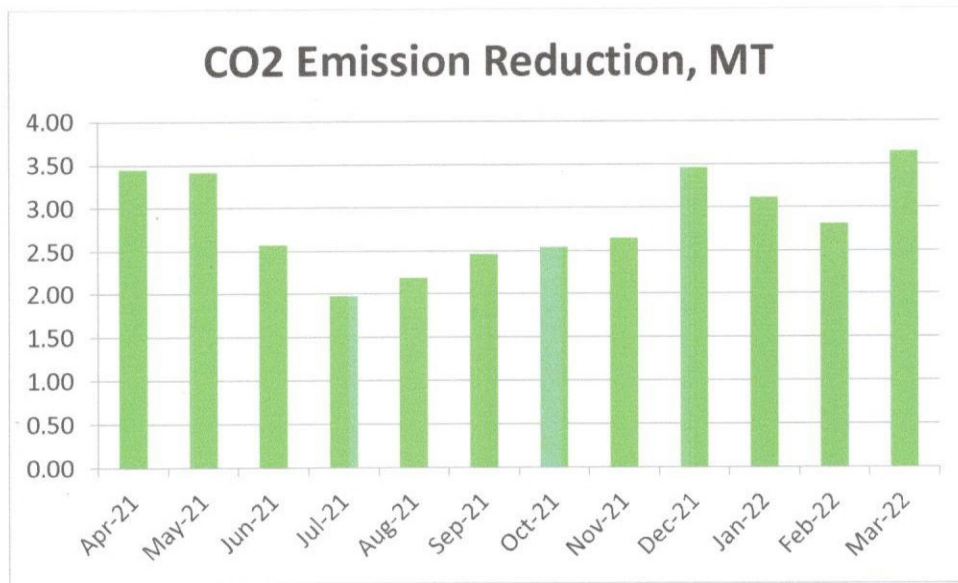


Chart No 6: Month wise Reduction in CO<sub>2</sub> Emissions:



## CHAPTER VI

### STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load.

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

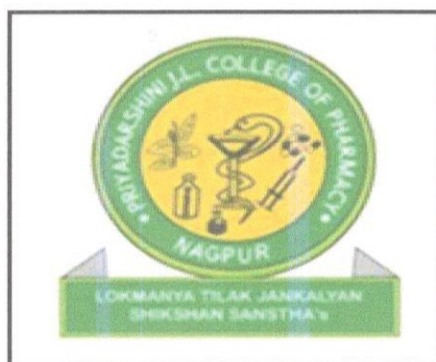
No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	45	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	1.8	kW
4	No of 20 W LED Tube Lights	86	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	1.72	kW
7	Total LED Lighting Load = 6	1.72	kW
8	Total Lighting Load =3+6	3.52	kW
9	Total Lighting Requirement met by LED = $7*100/8$	49	%

# ENERGY AUDIT REPORT

of

Lokmanya Tilak Jankalyan Shikshan Sanstha's,  
**PRIYADARSHINI J. L. COLLEGE OF PHARMACY (DEGREE),**

MIDC Hingna Road, Nagpur



Year: 2020-21

Prepared by:

**ENRICH CONSULTANTS**

Yashashree, 26, Nirmal Bag Society,  
Near Muktangan English School, Parvati, Pune 411009

Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)







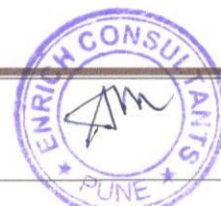
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Place : Chennai, India	 Controller of Examination	
Date : 10 <sup>th</sup> August 2007		

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<b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY</b> <small>An ISO 9001 : 2000 Reg. no. - RG 91 : 2462</small>	
 <b>Maharashtra Energy Development Agency</b> (Government of Maharashtra Institution) Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067 Ph No: 020-35000450 Email: eec@mahaurja.com, Web: www.mahaurja.com	
ECN/2021-22/CR-14/1577	22 <sup>nd</sup> April, 2021
<b>CERTIFICATE OF REGISTRATION FOR CLASS 'A'</b>	
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.	
<b>Name and Address of the firm</b>	: M/s Enrich Consultants Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
<b>Registration Category</b>	: Empanelled Consultant for Energy Conservation Programme for Class 'A'
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 General Manager (EC)	

### MEDA REGIATRATION CERTIFICATE





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The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 33 kWp

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

For Enrich Consultants,



**A Y Mehendale,**  
B E- Mechanical, M Tech, Energy  
Certified Energy Auditor, EA-8192



## INDEX

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



## EXECUTIVE SUMMARY

1. Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur consumes Energy in the form of **Electrical Energy & LPG**; used for various Equipment.

### 2. Present Electrical Energy, LPG Purchase & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	4055	95	3.904
2	Maximum	1068	10	0.967
3	Minimum	122	2	0.134
4	Average	337.92	7.92	0.33

### 3. Energy Conservation projects installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity **33 kWp**

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

- The College has installed Roof Top Solar PV Plant of Capacity **33 kWp**
- Energy generated in 20-21 **39600 kWh**
- Reduction in CO<sub>2</sub> Emissions in 20-21 is **35.64 MT**

### 5. Usage of LED Lighting:

- The Total LED Lighting Load of the College is **1.52 kW**.
- The Total Lighting Load of the College is **3.60 kW**.
- The percentage of LED Lighting to Total Lighting Load is **42 %**.

### 6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg** of CO<sub>2</sub> into atmosphere
3. Energy generated by Solar PV plant: **4 kWp/Day/kWp**
4. Annual Energy Generation Days in 20-21: **300 Nos**

### 7. Reference:

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

## ABBREVIATIONS

LTJSSS	:	Lokmanya Tilak Jankalyan Shikshan Sanstha
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





## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To Study the present 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:

No	Head	Particulars
1	Name of Institution	Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree),
2	Address	MIDC Hingna, Nagpur
3	Establishment	1997



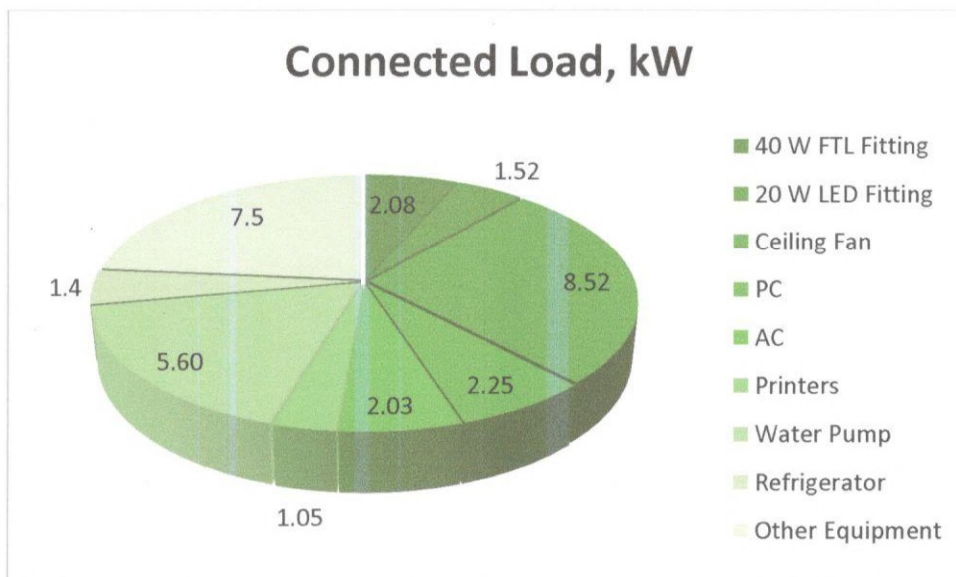
## CHAPTER-II STUDY OF CONNECTED LOAD

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	52	40	2.08
2	20 W LED Fitting	76	20	1.52
3	Ceiling Fan	131	65	8.52
4	PC	15	150	2.25
5	AC	1	2025	2.03
6	Printers	6	175	1.05
7	Water Pump	1	5595	5.60
8	Refrigerator	4	350	1.4
9	Other Equipment	25	300	7.5
10	<b>Total</b>			<b>32</b>

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



## CHAPTER-III

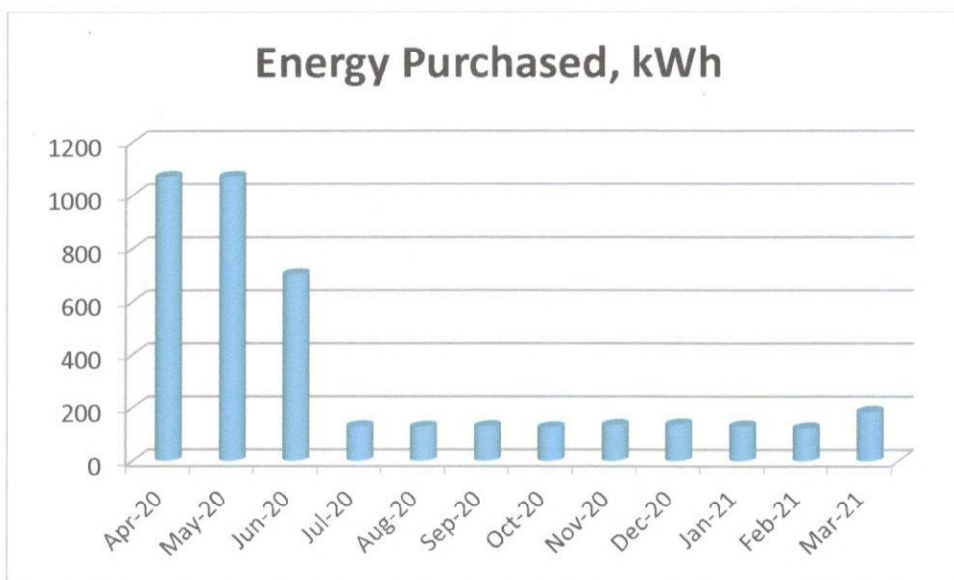
### STUDY OF PRESENT ENERGY CONSUMPTION

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

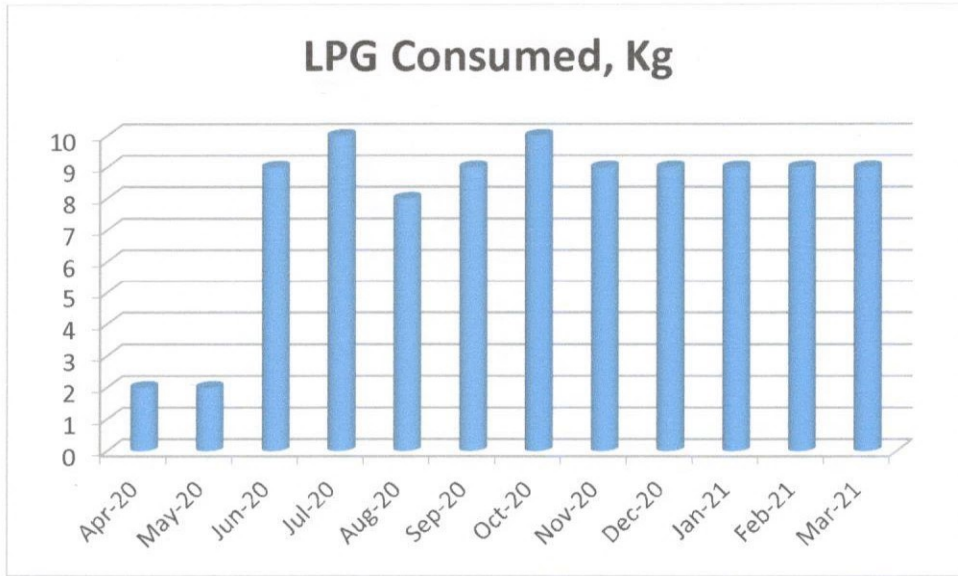
**Table No 3: Electrical Energy & LPG Purchase Analysis- 2020-21:**

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-20	1068	2
2	May-20	1068	2
3	Jun-20	702	9
4	Jul-20	129	10
5	Aug-20	127	8
6	Sep-20	129	9
7	Oct-20	125	10
8	Nov-20	134	9
9	Dec-20	137	9
10	Jan-21	130	9
11	Feb-21	122	9
12	Mar-21	184	9
13	Total	4055	95
14	Maximum	1068	10
15	Minimum	122	2
16	Average	337.92	7.92

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



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



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

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumed, Kg
1	Total	4055	95
2	Maximum	1068	10
3	Minimum	122	2
4	Average	337.92	7.92





## CHAPTER-IV

### CARBON FOOT PRINTING

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

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

Table No 5: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO2 Emissions, MT
1	Apr-20	1068	2	0.97
2	May-20	1068	2	0.97
3	Jun-20	702	9	0.66
4	Jul-20	129	10	0.14
5	Aug-20	127	8	0.14
6	Sep-20	129	9	0.14
7	Oct-20	125	10	0.14
8	Nov-20	134	9	0.14
9	Dec-20	137	9	0.15
10	Jan-21	130	9	0.14
11	Feb-21	122	9	0.13
12	Mar-21	184	9	0.19
13	Total	4055	95	3.904
14	Maximum	1068	10	0.967
15	Minimum	122	2	0.134
16	Average	337.92	7.92	0.33



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

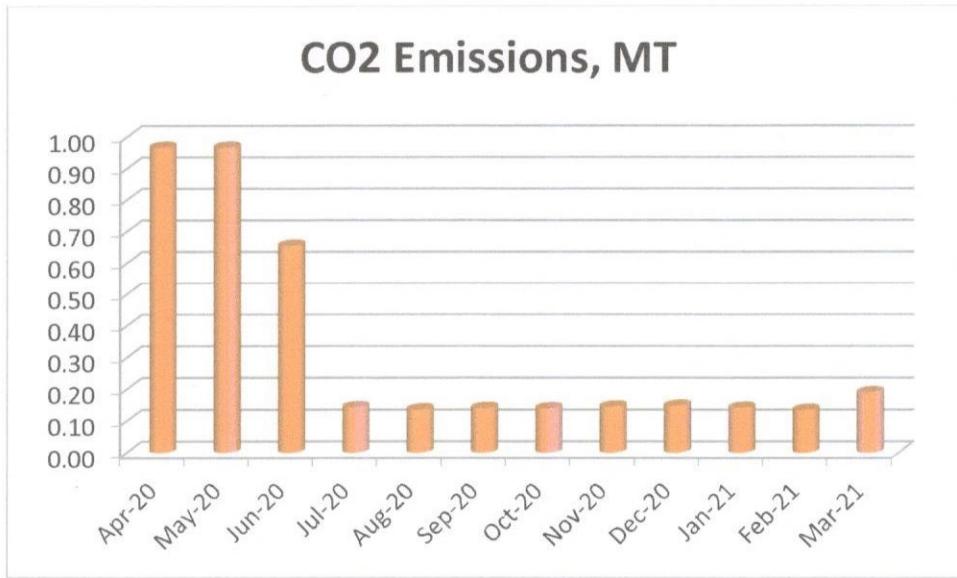


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	4055	95	3.904
2	Maximum	1068	10	0.967
3	Minimum	122	2	0.134
4	Average	337.92	7.92	0.33

## CHAPTER-V

### STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity 33 kWp.

In the following Table, we present the Reduction in CO<sub>2</sub> Emissions due to Solar Energy.

**Table No 7: Computation of Reduction in CO<sub>2</sub> Emissions:**

No	Particulars	Value	Unit
1	Capacity of Roof Top Solar PV Plant	33	kWp
2	Energy generated in 19-20	39600	38
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO <sub>2</sub>
4	Reduction in CO <sub>2</sub> Emission in 19-20 = $2*3/1000$	35.64	MT

:

## CHAPTER VI

### STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load.

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

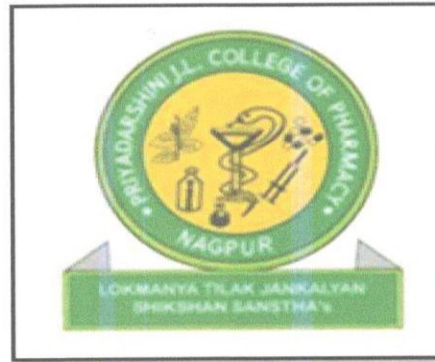
No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	52	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	2.08	kW
4	No of 20 W LED Tube Lights	76	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	1.52	kW
7	Total LED Lighting Load = 6	1.52	kW
8	Total Lighting Load = 3+6	3.60	kW
9	Total Lighting Requirement met by LED = $7 \times 100/8$	42	%

# ENERGY AUDIT REPORT

of

Lokmanya Tilak Jankalyan Shikshan Sanstha's,  
**PRIYADARSHINI J. L. COLLEGE OF PHARMACY (DEGREE),**

MIDC Hingna Road, Nagpur



Year: 2019-20

Prepared by:

**ENRICH CONSULTANTS**

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



### REGISTRATION CERTIFICATES

Regn. No. EA-8192		No. 2942
<b>National Productivity Council</b> (National Certifying Agency)		
<b>PROVISIONAL CERTIFICATE</b>		
This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u>		
son / daughter of Mr. <u>Yashavant</u>		
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.		
He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.		
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.		
This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.		
Place : Chennai, India		
Date : 10 <sup>th</sup> August 2007	Controller of Examination	

### BEE AUDITOR CERTIFICATE

<b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY</b>	
<b>Maharashtra Energy Development Agency</b> (A Government of Maharashtra undertaking)	
2 <sup>nd</sup> Floor, MHADA Commercial Complex, Opp. Trilad Nagar, Yerwada, Pune 411 006, Ph No: 020-26614393/266144403 Email: cee@mahaurja.com, Web: www.mahaurja.com	
ECN/2018-19/CR-05/4174	19 <sup>th</sup> September, 2018
<b>CERTIFICATE OF REGISTRATION FOR CLASS 'A'</b>	
We hereby certify that, the firm having following particulars is registered with <b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)</b> under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.	
<b>Name and Address of the firm</b>	<b>Enrich Consultants</b> Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktagan English School, Parvati, Pune - 411009.
<b>Registration Category</b>	Empanelled Consultant for Energy Conservation Programme
<b>Registration Number</b>	MEDA/ECN/CR-05/2018-19/EA-03
<ul style="list-style-type: none"> <li>• 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.</li> <li>• MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.</li> <li>• This empanelment is valid till <b>31<sup>st</sup> March 2021</b> from the date of registration, to carry out energy audits under the Energy Conservation Programme</li> <li>• The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.</li> </ul>	
 (Smita Kudarikar) General Manager (FC)	

### MEDA REGIATRATION CERTIFICATE





## ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411 009  
Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/JLCOP/19-20/01

Date: 10/7/2020

### ENERGY AUDIT CERTIFICATE

This is to certify that we have conducted Energy Audit at Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur in the Year 19-20.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 33 kWp

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

For Enrich Consultants,



**A Y Mehendale,**  
B E- Mechanical, M Tech, Energy  
Certified Energy Auditor, EA-8192



## INDEX

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5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15



## **ACKNOWLEDGEMENT**

We Enrich Services, Pune, express our sincere gratitude to the management of Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur, for awarding us the assignment of Energy Audit of their Campus for the Year: 19-20.

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



## EXECUTIVE SUMMARY

1. Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur consumes Energy in the form of Electrical Energy & LPG; used for various Equipment.

### 2. Present Electrical Energy, LPG Purchase & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	24581	285	22.887
2	Maximum	5226	38	4.805
3	Minimum	0	9	0.051
4	Average	2048.42	23.75	1.91

### 3. Energy Conservation projects installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity **33 kWp**

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

- The College installed Roof Top Solar PV Plant of Capacity **33 kWp**
- Energy Generated by Solar PV Plant in 19-20 is **13200 kWh**
- Reduction in CO<sub>2</sub> Emissions in 21-22 is **11.88 MT**

### 5. Usage of LED Lighting:

- The Total LED Lighting Load of the College is **1.52 kW**.
- The Total Lighting Load of the College is **3.60 kW**.
- The percentage of LED Lighting to Total Lighting Load is **42 %**.

### 6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg** of CO<sub>2</sub> into atmosphere
3. Energy generated by Solar PV plant: **4 kWp/Day/kWp**
4. Annual Energy Generation Days in 19-20: **100 Nos**

### 7. Reference:

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

## ABBREVIATIONS

LTJSSS	:	Lokmanya Tilak Jankalyan Shikshan Sanstha
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





## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To Study the present 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:

No	Head	Particulars
1	Name of Institution	Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree),
2	Address	MIDC Hingna, Nagpur
3	Establishment	1997

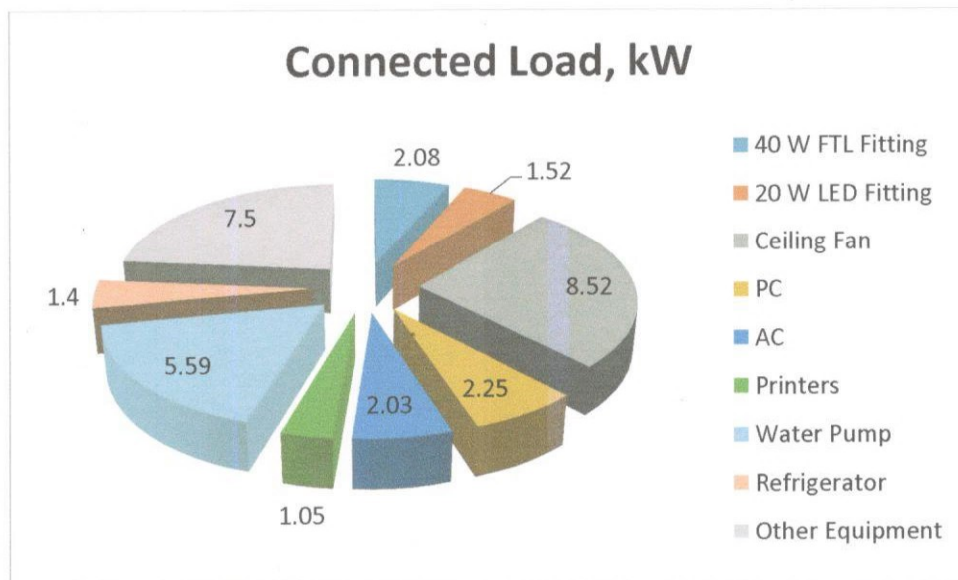
## CHAPTER-II STUDY OF CONNECTED LOAD

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	52	40	2.08
2	20 W LED Fitting	76	20	1.52
3	Ceiling Fan	131	65	8.52
4	PC	15	150	2.25
5	AC	1	2025	2.03
6	Printers	6	175	1.05
7	Water Pump	1	5595	5.60
8	Refrigerator	4	350	1.4
9	Other Equipment	25	300	7.5
10	<b>Total</b>			<b>32</b>

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



## CHAPTER-III

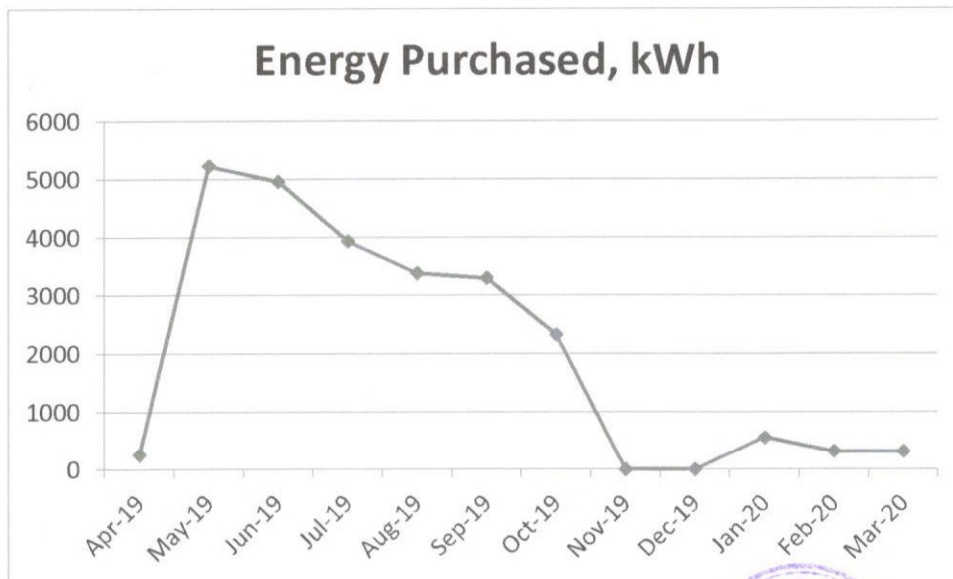
### STUDY OF PRESENT ENERGY CONSUMPTION

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

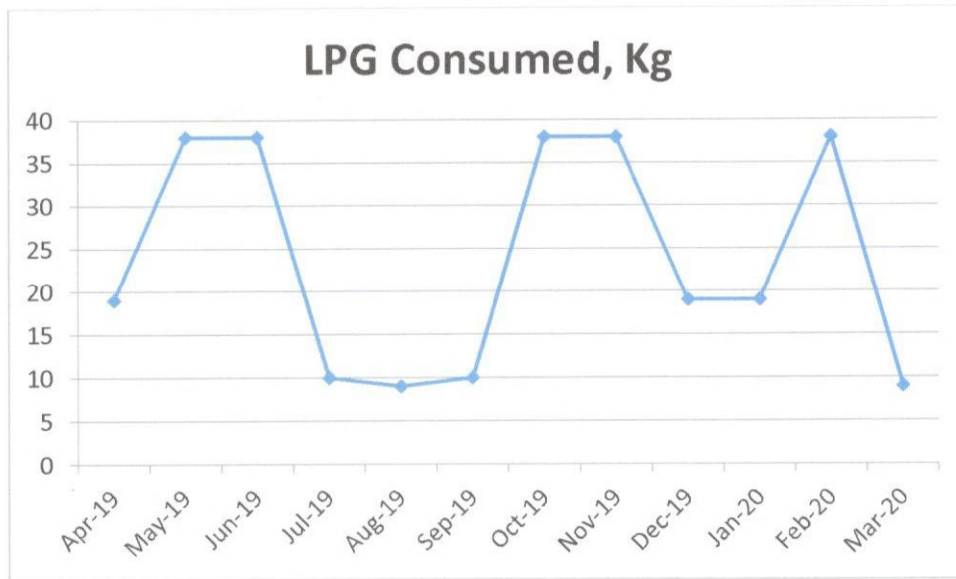
Table No 3: Electrical Energy & LPG Purchase Analysis- 2019-20:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-19	254	19
2	May-19	5226	38
3	Jun-19	4962	38
4	Jul-19	3935	10
5	Aug-19	3384	9
6	Sep-19	3302	10
7	Oct-19	2327	38
8	Nov-19	0	38
9	Dec-19	0	19
10	Jan-20	561	19
11	Feb-20	315	38
12	Mar-20	315	9
13	Total	24581	285
14	Maximum	5226	38
15	Minimum	0	9
16	Average	2048.42	23.75

Chart No 2: Variation in Monthly Energy Purchased:



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



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

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumed, Kg
1	Total	24581	285
2	Maximum	5226	38
3	Minimum	0	9
4	Average	2048.42	23.75





## CHAPTER-IV

### CARBON FOOT PRINTING

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

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

Table No 5: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO2 Emissions, MT
1	Apr-19	254	19	0.28
2	May-19	5226	38	4.81
3	Jun-19	4962	38	4.57
4	Jul-19	3935	10	3.57
5	Aug-19	3384	9	3.07
6	Sep-19	3302	10	3.00
7	Oct-19	2327	38	2.20
8	Nov-19	0	38	0.10
9	Dec-19	0	19	0.05
10	Jan-20	561	19	0.56
11	Feb-20	315	38	0.39
12	Mar-20	315	9	0.31
13	Total	24581	285	22.887
14	Maximum	5226	38	4.805
15	Minimum	0	9	0.051
16	Average	2048.42	23.75	1.91





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

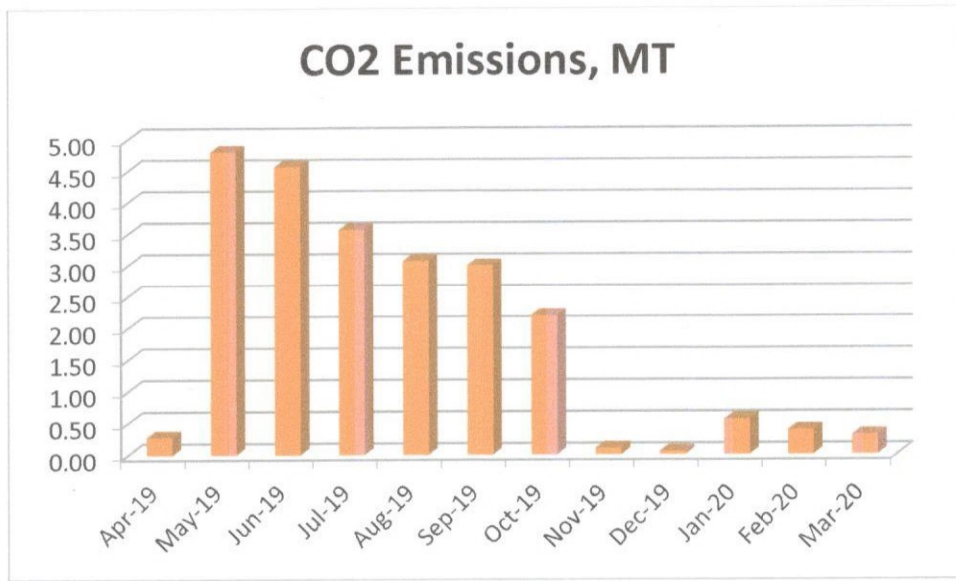


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	24581	285	22.887
2	Maximum	5226	38	4.805
3	Minimum	0	9	0.051
4	Average	2048.42	23.75	1.91



## CHAPTER-V

### STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity 33 kWp.

In the following Table, we present the Reduction in CO<sub>2</sub> Emissions due to Solar Energy.

Table No 7: Computation of Reduction in CO<sub>2</sub> Emissions:

No	Particulars	Value	Unit
1	Capacity of Roof Top Solar PV Plant	33	kWp
2	Energy generated in 19-20	13200	38
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO <sub>2</sub>
4	Reduction in CO <sub>2</sub> Emission in 19-20 = $2*3/1000$	11.88	MT



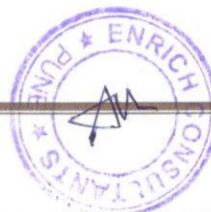
## CHAPTER VI

### STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load.

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	52	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	<b>2.08</b>	kW
4	No of 20 W LED Tube Lights	76	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	<b>1.52</b>	kW
7	Total LED Lighting Load = 6	<b>1.52</b>	kW
8	Total Lighting Load =3+6	<b>3.60</b>	kW
9	Total Lighting Requirement met by LED = $7 \times 100/8$	<b>42</b>	%



# ENERGY AUDIT REPORT

of

Lokmanya Tilak Jankalyan Shikshan Sanstha's,  
**PRIYADARSHINI J. L. COLLEGE OF PHARMACY (DEGREE),**  
MIDC Hingna Road, Nagpur

**Year: 2018-19**

Prepared by:

## **Enrich Consultants**



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



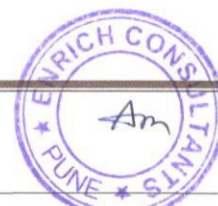
### REGISTRATION CERTIFICATES

Regn. No. EA-8192		No. 2942
<b>National Productivity Council</b> (National Certifying Agency)		
<b>PROVISIONAL CERTIFICATE</b>		
<p><i>This is to certify that Mr / Ms. <u>Achyut Yashavant Mehendale</u></i>  <i>son / daughter of Mr. <u>Yashavant</u></i>  <i>has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the</i>  <i>Bureau of Energy Efficiency, Ministry of Power, Government of India.</i></p> <p><i>He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.</i>  <i>He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the</i>  <i>fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau</i>  <i>of Energy Efficiency under the said Act.</i></p> <p><i>This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.</i></p>		
Place : Chennai, India	 Controller of Examination	
Date : 10 <sup>th</sup> August 2007		

### BEE AUDITOR CERTIFICATE

<b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY</b>	
 <b>Maharashtra Energy Development Agency</b> (A Government of Maharashtra undertaking) 2 <sup>nd</sup> Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006, Ph No: 020-26614393/266144403 Email: eec@mahaurja.com, Web: www.mahaurja.com	
ECN/2018-19/CR-05/4174	19 <sup>th</sup> September, 2018
<b>CERTIFICATE OF REGISTRATION FOR CLASS 'A'</b>	
<p>We hereby certify that, the firm having following particulars is registered with <b>MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)</b> under given category as "Energy Planner &amp; Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.</p>	
<b>Name and Address of the firm</b>	<b>Enrich Consultants</b> Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktagan English School, Parvati, Pune - 411009.
<b>Registration Category</b>	Empanelled Consultant for Energy Conservation Programme
<b>Registration Number</b>	MEDA/ECN/CR-05/2018-19/EA-03
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 (Smita Kudarikar) General Manager (EC)	

### MEDA REGIATRATION CERTIFICATE





## Enrich Consultants

Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411 009  
Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/JLCOP/18-19/01

Date: 14/6/2019

### CERTIFICATE

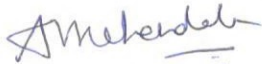
This is to certify that we have conducted Energy Audit at Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur in the Year 18-19.

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 Enrich Consultants,



**A Y Mehendale,**  
B E- Mechanical, M Tech, Energy  
Certified Energy Auditor, EA-8192



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



## EXECUTIVE SUMMARY

1. Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur consumes Energy in the form of **Electrical Energy & LPG**; used for various Equipment.

2. Present Electrical Energy, LPG Purchase & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	43837	380	40.472
2	Maximum	6642	76	6.080
3	Minimum	2371	9	2.338
4	Average	3653.08	31.67	3.37

3. Energy Conservation projects installed:

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

4. Renewable Energy Generation:

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

5. Usage of LED Lighting:

- The Total LED Lighting Load of the College is **1.38 kW**.
- The Total Lighting Load of the College is **3.78 kW**.
- The percentage of LED Lighting to Total Lighting Load is **37 %**.

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

LTJSSS	:	Lokmanya Tilak Jankalyan Shikshan Sanstha
LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
FTL	:	Fluorescent Tube Light
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO <sub>2</sub>	:	Carbon Di Oxide
MT	:	Metric Ton





## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To Study the present 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:

No	Head	Particulars
1	Name of Institution	Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree),
2	Address	MIDC Hingna, Nagpur
3	Establishment	1997



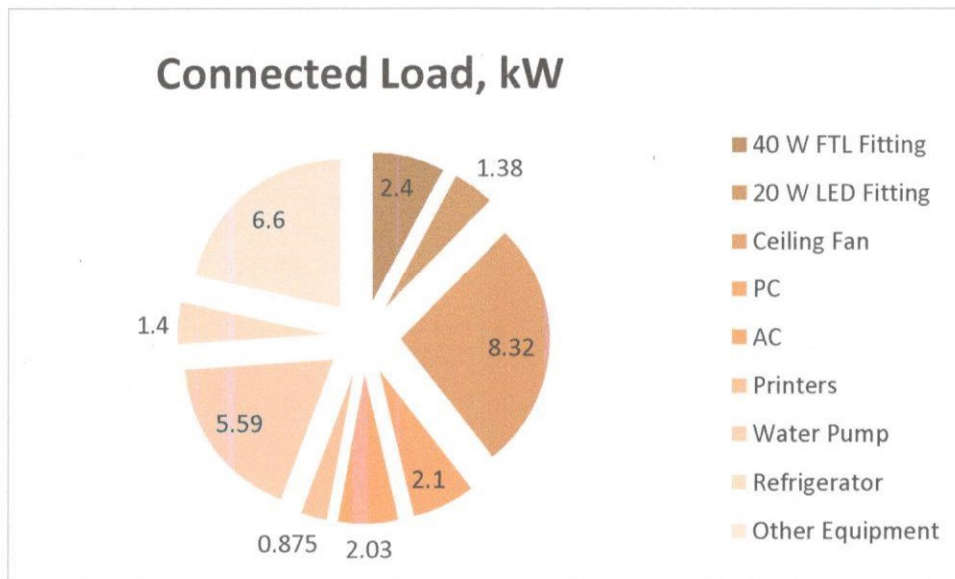
## CHAPTER-II STUDY OF CONNECTED LOAD

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	60	40	2.40
2	20 W LED Fitting	69	20	1.38
3	Ceiling Fan	128	65	8.32
4	PC	14	150	2.1
5	AC	1	2025	2.03
6	Printers	5	175	0.875
7	Water Pump	1	5595	5.60
8	Refrigerator	4	350	1.4
9	Other Equipment	22	300	6.6
10	<b>Total</b>			<b>31</b>

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



## CHAPTER-III

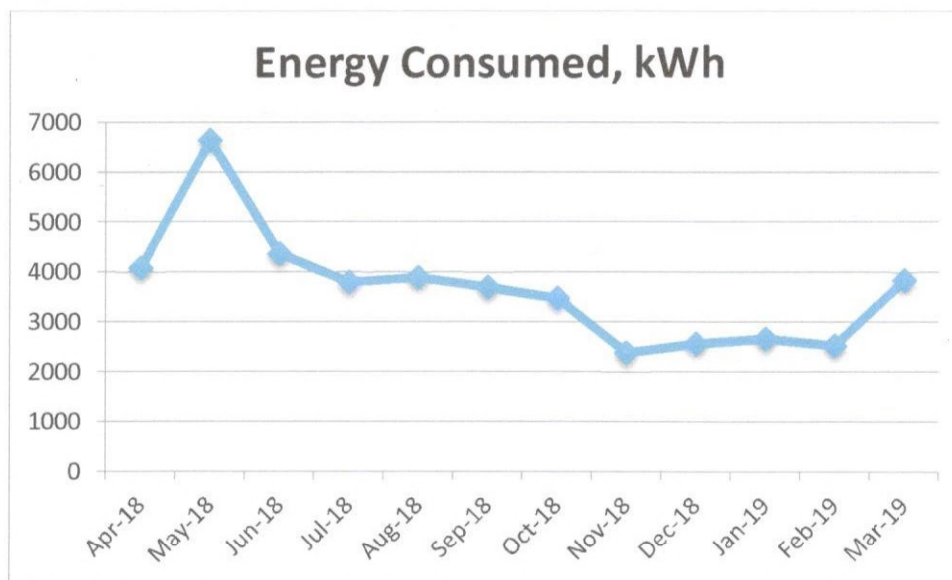
### STUDY OF PRESENT ENERGY CONSUMPTION

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

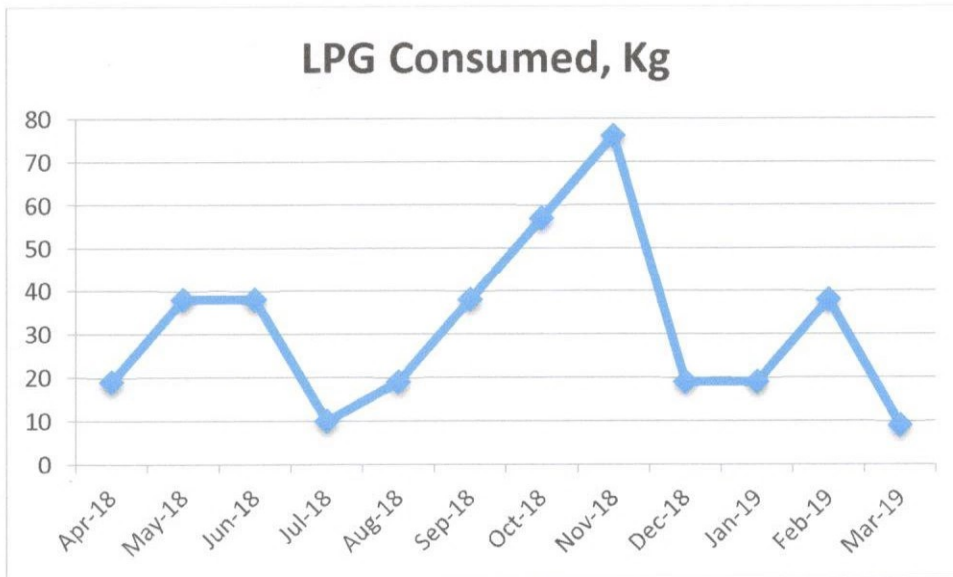
Table No 3: Electrical Energy & LPG Consumption Analysis- 2018-19:

No	Month	Energy Consumed, kWh	LPG Consumed, Kg
1	Apr-18	4069	19
2	May-18	6642	38
3	Jun-18	4359	38
4	Jul-18	3790	10
5	Aug-18	3885	19
6	Sep-18	3687	38
7	Oct-18	3468	57
8	Nov-18	2371	76
9	Dec-18	2557	19
10	Jan-19	2655	19
11	Feb-19	2520	38
12	Mar-19	3834	9
13	Total	43837	380
14	Maximum	6642	76
15	Minimum	2371	9
16	Average	3653.08	31.67

Chart No 2: Variation in Monthly Energy Consumed:



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



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

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumed, Kg
1	Total	43837	380
2	Maximum	6642	76
3	Minimum	2371	9
4	Average	3653.08	31.67





## CHAPTER-IV

### CARBON FOOT PRINTING

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

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 Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-18	4069	19	3.71
2	May-18	6642	38	6.08
3	Jun-18	4359	38	4.02
4	Jul-18	3790	10	3.44
5	Aug-18	3885	19	3.55
6	Sep-18	3687	38	3.42
7	Oct-18	3468	57	3.27
8	Nov-18	2371	76	2.34
9	Dec-18	2557	19	2.35
10	Jan-19	2655	19	2.44
11	Feb-19	2520	38	2.37
12	Mar-19	3834	9	3.47
13	Total	43837	380	40.472
14	Maximum	6642	76	6.080
15	Minimum	2371	9	2.338
16	Average	3653.08	31.67	3.37





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

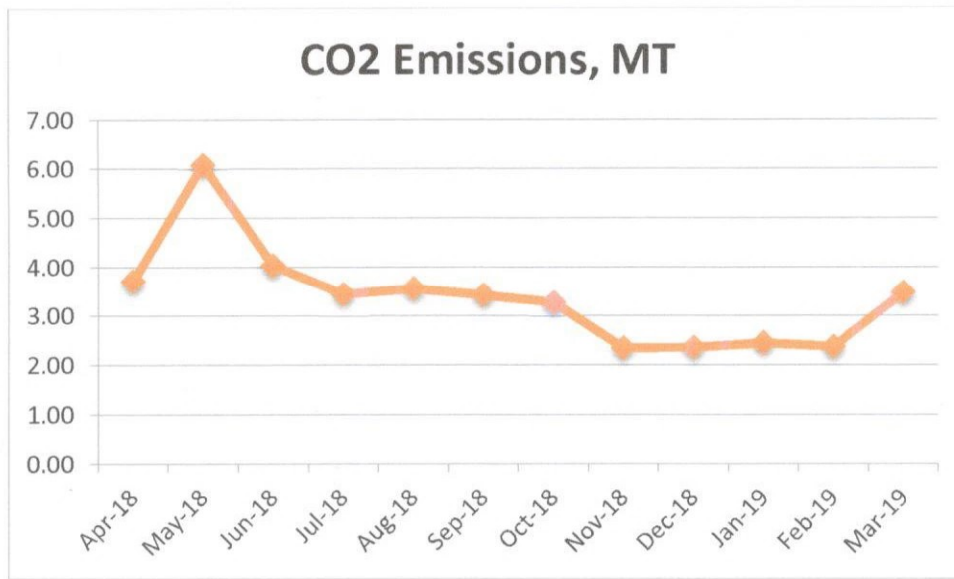
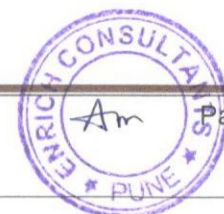


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	43837	380	40.472
2	Maximum	6642	76	6.080
3	Minimum	2371	9	2.338
4	Average	3653.08	31.67	3.37



## **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.

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	60	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	2.4	kW
4	No of 20 W LED Tube Lights	69	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	1.38	kW
7	Total LED Lighting Load= 6	1.38	kW
8	Total Lighting Load=3+6	3.78	kW
9	Total Lighting Requirement met by LED = $7*100/8$	37	%

# ENERGY AUDIT REPORT

of

Lokmanya Tilak Jankalyan Shikshan Sanstha's,  
**PRIYADARSHINI J. L. COLLEGE OF PHARMACY (DEGREE),**

MIDC Hingna Road, Nagpur

**Year: 2017-18**

Prepared by:

**Enrich Consultants**


Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411009

Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)



## REGISTRATION CERTIFICATE

**MAHARASHTRA ENERGY DEVELOPMENT AGENCY**

 **Maharashtra Energy Development Agency**  
(A Government of Maharashtra undertaking)  
2<sup>nd</sup> Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006  
Ph No: 020-26614393/266144403. Fax No: 020-26615031  
Email: [econ@mahaurja.com](mailto:econ@mahaurja.com) , Web: [www.mahaurja.com](http://www.mahaurja.com)

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ECN/2017-18/CR-01/5726 30<sup>th</sup> November 2017

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

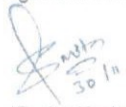
We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor in Maharashtra under Save Energy Programme of MEDA.

**Name and Address of the firm** : Enrich Consultants  
Yashashree, Plot No. 26, Nirmal Baug  
Society, Parvati, Pune - 411009.

**Registration Category** : Empanelled Consultant for Save Energy Programme.

**Registration Number** : **MEDA/ECN/CR-01/2017-18/EA-37**

- The Save Energy Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid upto **3 year** from the date of registration, to carry out energy audits under the Save Energy Programme of MEDA.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

  
(Smita Kudarikar)  
Manager (EC)

## MEDA REGIATRATION CERTIFICATE



## Enrich Consultants

Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411 009  
Email: [enrichcons@gmail.com](mailto:enrichcons@gmail.com)

Ref: EC/JLCOP/17-18/01

Date: 9/7/2018

### CERTIFICATE

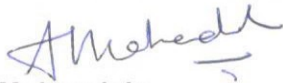
This is to certify that we have conducted Energy Audit at Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur in the Year 17-18.

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 Enrich Consultants,



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



## INDEX

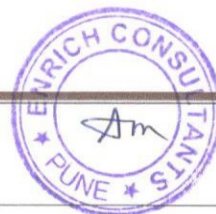
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3	Study of Present Energy Consumption	10
4	Carbon Foot Printing	12
5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15



## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur, for awarding us the assignment of Energy Audit of their Campus for the Year: 17-18.

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



## EXECUTIVE SUMMARY

1. Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree), MIDC Hingna, Nagpur consumes Energy in the form of Electrical Energy & LPG; used for various Equipment.

2. Present Electrical Energy, LPG Purchase & CO<sub>2</sub> Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	31336	285	28.97
2	Maximum	3829	38	3.548
3	Minimum	2089	9	1.931
4	Average	2611.33	23.75	2.41

3. Energy Conservation projects installed:

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

4. Renewable Energy Generation:

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

5. Usage of LED Lighting:

- The Total LED Lighting Load of the College is **1.1 kW**.
- The Total Lighting Load of the College is **3.98 kW**.
- The percentage of LED Lighting to Total Lighting Load is **28 %**.

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

## ABBREVIATIONS

LTJSSS	:	Lokmanya Tilak Jankalyan Shikshan Sanstha
LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
FTL	:	Fluorescent Tube Light
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO <sub>2</sub>	:	Carbon Di Oxide
MT	:	Metric Ton



## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To Study the present 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:

No	Head	Particulars
1	Name of Institution	Lokmanya Tilak Jankalyan Shikshan Sanstha's Priyadarshini J. L. College of Pharmacy (Degree),
2	Address	MIDC Hingna, Nagpur
3	Establishment	1997



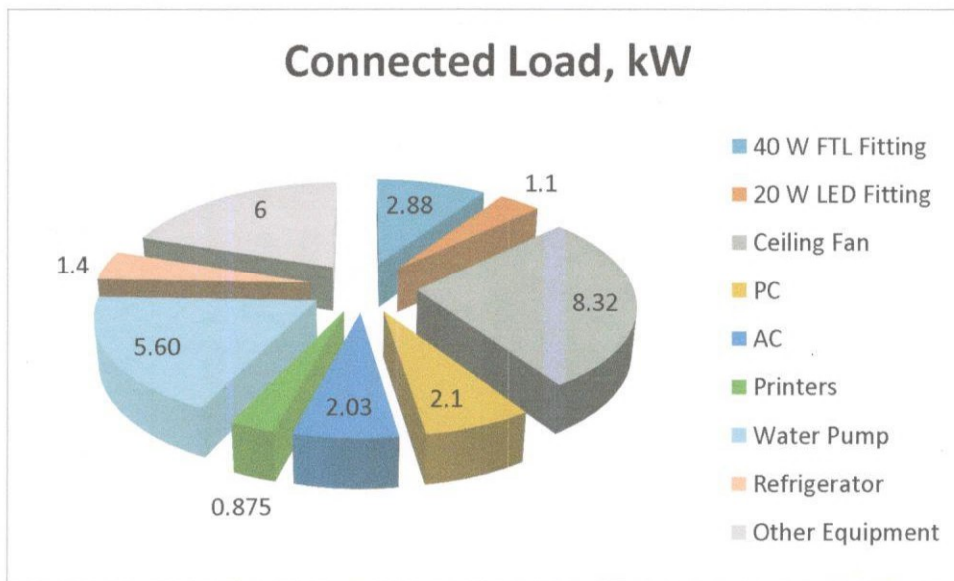
## CHAPTER-II STUDY OF CONNECTED LOAD

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	72	40	2.88
2	20 W LED Fitting	55	20	1.1
3	Ceiling Fan	128	65	8.32
4	PC	14	150	2.1
5	AC	1	2025	2.03
6	Printers	5	175	0.875
7	Water Pump	1	5595	5.60
8	Refrigerator	4	350	1.4
9	Other Equipment	20	300	6
10	<b>Total</b>			<b>30</b>

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



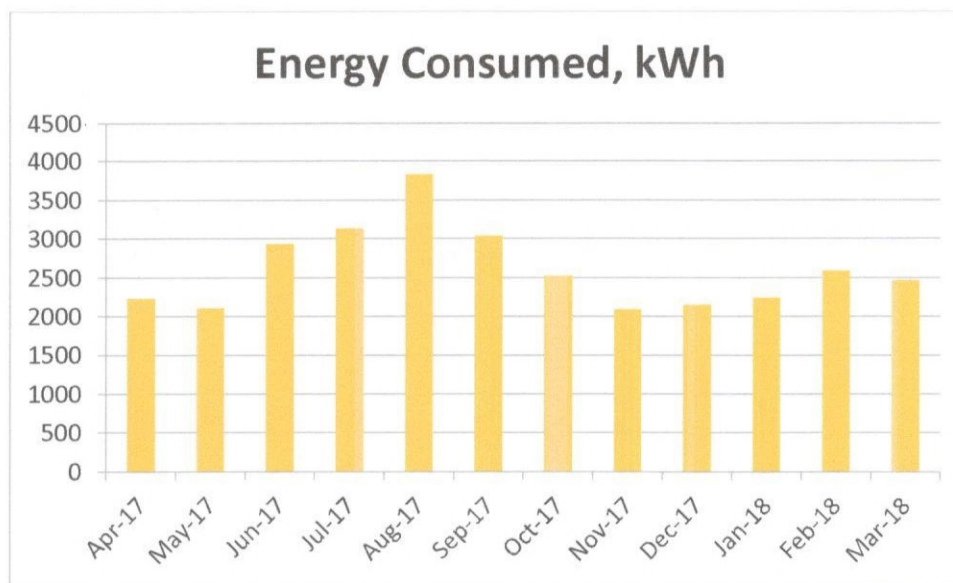
## CHAPTER-III

### STUDY OF PRESENT ENERGY CONSUMPTION

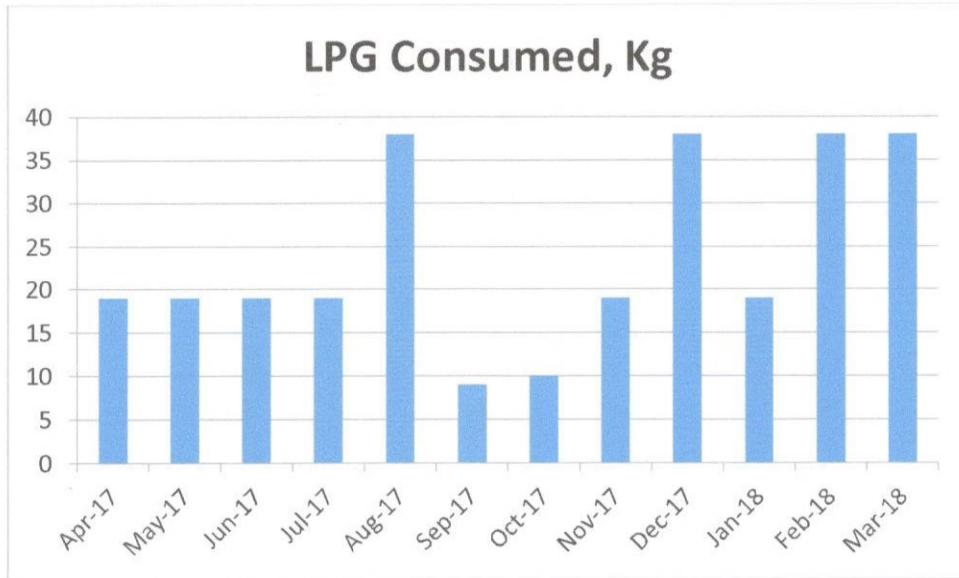
In this chapter, we present the analysis of Electrical Energy Consumption.  
Table No 3: Electrical Energy & LPG Consumption Analysis- 2017-18:

No	Month	Energy Consumed, kWh	LPG Consumed, Kg
1	Apr-17	2232	19
2	May-17	2109	19
3	Jun-17	2935	19
4	Jul-17	3136	19
5	Aug-17	3829	38
6	Sep-17	3039	9
7	Oct-17	2522	10
8	Nov-17	2089	19
9	Dec-17	2149	38
10	Jan-18	2238	19
11	Feb-18	2590	38
12	Mar-18	2468	38
13	Total	31336	285
14	Maximum	3829	38
15	Minimum	2089	9
16	Average	2611.33	23.75

Chart No 2: Variation in Monthly Energy Consumed:



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



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

No	Parameter/ Variation	Energy Consumed, kWh	LPG Consumed, Kg
1	Total	31336	285
2	Maximum	3829	38
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## CHAPTER-IV

### CARBON FOOT PRINTING

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

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 Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Apr-17	2232	19	2.06
2	May-17	2109	19	1.95
3	Jun-17	2935	19	2.69
4	Jul-17	3136	19	2.87
5	Aug-17	3829	38	3.55
6	Sep-17	3039	9	2.76
7	Oct-17	2522	10	2.30
8	Nov-17	2089	19	1.93
9	Dec-17	2149	38	2.04
10	Jan-18	2238	19	2.07
11	Feb-18	2590	38	2.43
12	Mar-18	2468	38	2.32
13	Total	31336	285	28.97
14	Maximum	3829	38	3.548
15	Minimum	2089	9	1.931
16	Average	2611.33	23.75	2.41



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

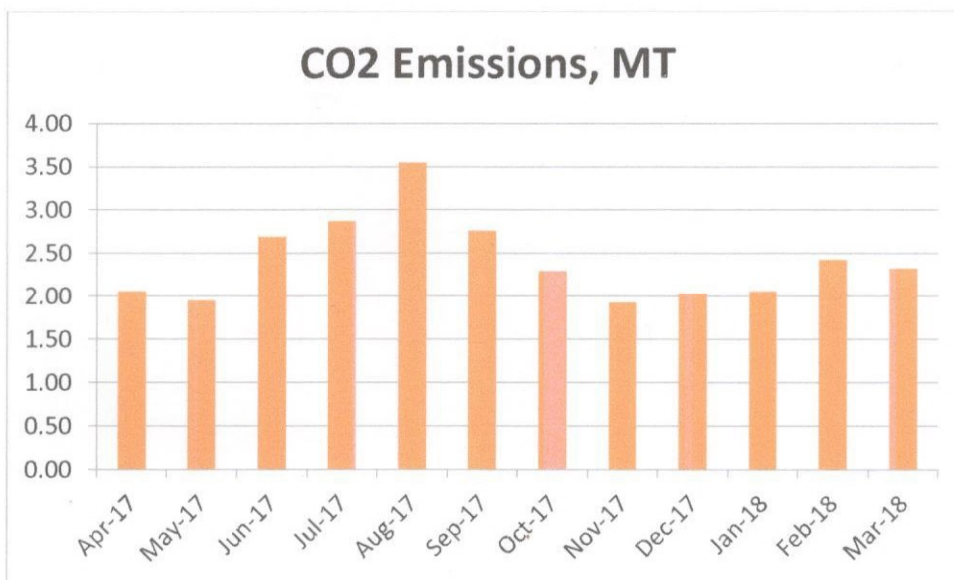


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg	CO <sub>2</sub> Emissions, MT
1	Total	31336	285	28.97
2	Maximum	3829	38	3.548
3	Minimum	2089	9	1.931
4	Average	2611.33	23.75	2.41

## **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.

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	72	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	<b>2.88</b>	kW
4	No of 20 W LED Tube Lights	55	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	<b>1.1</b>	kW
7	Total LED Lighting Load= 6	<b>1.1</b>	kW
8	Total Lighting Load=3+6	<b>3.98</b>	kW
9	Total Lighting Requirement met by LED = $7 \times 100 / 8$	<b>28</b>	%