

# GREEN AUDIT REPORT

of

Jagdambha Bahuudeshiya Gramin Vikas Sanstha's,  
JAGDAMBHA COLLEGE OF ENGINEERING & TECHNOLOGY,  
Yavatmal, 445 001



Year: 2016-17

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 9001:2002 Reg. No. RC 81/2402



**Maharashtra Energy Development Agency**

(A Government of Maharashtra Institution)  
2<sup>nd</sup> Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwade, Pune 411 006  
Ph No: 020-26614393/266144403, Fax No: 020-26615031  
Email: [ecan@mahauria.com](mailto:ecan@mahauria.com), Web: [www.mahauria.com](http://www.mahauria.com)

ECN/2014-15/CR-10/6a38

14 November, 2014

*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. 28,  
Nirmal Baug Society, Parvati,  
Pune - 411009.

Registration Category : Empanelled Consultant for Save Energy  
Programme.

Registration Number : MEDA/ECN/CR-10/2014-15/ 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 years 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.

  
(Hemant H. Patil)  
Manager (EC)



## Enrich Consultants

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

Ref: EC/JCOET/16-17/02

Date: 20/8/2017

### CERTIFICATE

This is to certify that we have conducted Green Audit at Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology, Yavatmal 445 001 in the Academic year 2016-17.

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 and is clean periodically.
- Implementation of Rain Water Harvesting Project
- Maintenance of good Internal Road
- Tree Plantation in the campus

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

For Enrich Consultants,



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



## INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Present Energy Consumption	10
3	Study of Carbon Foot printing	12
4	Study of Usage of Renewable Energy	14
5	Study of Waste Management	15
6	Study of Rain water Harvesting	16
7	Study of Green Practices	17





## **ACKNOWLEDGEMENT**

We Enrich Consultants, Pune, express our sincere gratitude to the management of Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology, Yavatmal, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 16-17.

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



## EXECUTIVE SUMMARY

1. Jagdambha Bahudeshiya Gramin Vikas Sanstha's Jagdambha College of Engineering & Technology, Yavatmal consumes Energy in the form of Electrical Energy used for various Electrical Equipment, office & other facilities.

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

No	Parameter/ Value	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Total	58384	52.54
2	Maximum	5678	5.11
3	Minimum	3980	3.58
4	Average	4865.33	4.37

### 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 solar power rooftop system and solar thermal water heating plant on the college building as per availability of funds.

### 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:

The College has installed bio-composting pit to converts bio-degradable wastes into the bio-fertilizers.

#### 5.3 Liquid Waste Management:

The College has installed Septic tanks and is cleaned periodically.

### 6. Rain Water Harvesting:

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



### 7. Green Initiatives

- Maintenance of good Internal Road
- Maintenance of Internal Garden

### 8. Notes & Assumptions:

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

### 9. References:

- 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 Objectives:

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

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

No	Head	Particulars
1	Name of Institution	Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology,
2	Address	Arni Road, Yavatmal 445 001
3	Affiliation	Sant Gadge Baba Amravati University



## CHAPTER-II STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills  
Table No 2: Electrical Bill Analysis- 2016-17:

No	Month	Energy Purchased, kWh
1	Jun-16	4763
2	Jul-16	4825
3	Aug-16	4914
4	Sep-16	5120
5	Oct-16	5326
6	Nov-16	3980
7	Dec-16	4211
8	Jan-17	4159
9	Feb-17	4521
10	Mar-17	5498
11	Apr-17	5389
12	May-17	5678
13	Total	58384
14	Maximum	5678
15	Minimum	3980
16	Average	4865.333333

Chart No 1: Variation in Monthly Energy Consumption:



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

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	58384
2	Maximum	5678
3	Minimum	3980
4	Average	4865.333333



### 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

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 Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Jun-16	4763	4.2867
2	Jul-16	4825	4.3425
3	Aug-16	4914	4.4226
4	Sep-16	5120	4.608
5	Oct-16	5326	4.7934
6	Nov-16	3980	3.582
7	Dec-16	4211	3.7899
8	Jan-17	4159	3.7431
9	Feb-17	4521	4.0689
10	Mar-17	5498	4.9482
11	Apr-17	5389	4.8501
12	May-17	5678	5.1102
13	Total	58384	52.5456
14	Maximum	5678	5.1102
15	Minimum	3980	3.582
16	Average	4865.333333	4.3788





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

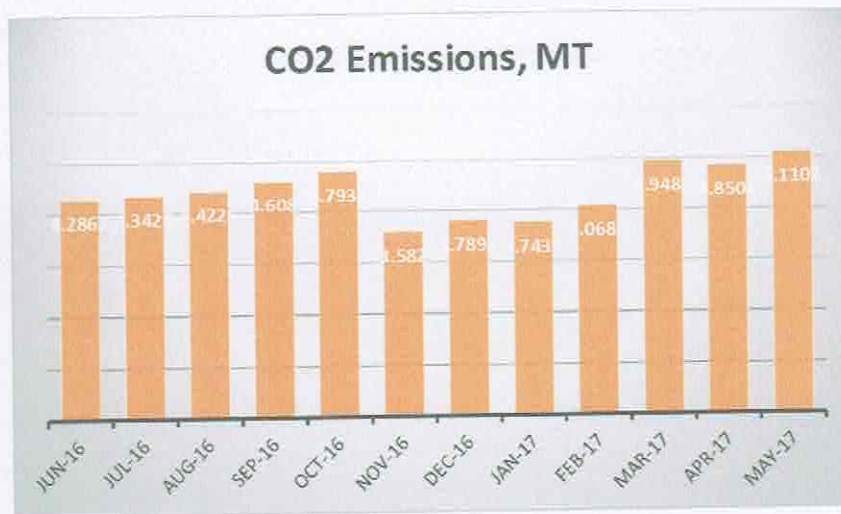


Table No 5: Variation in Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	58384	52.5456
2	Maximum	5678	5.1102
3	Minimum	3980	3.582
4	Average	4865.333333	4.3788





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

It is recommended to install solar roof-top power plant and solar thermal water heater on the college building, as per the availability of funds.



## 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.

#### Photograph of Waste Collection Bins:



### 5.2 Organic Waste Management:

The College has installed bio-composting pit to convert, bio degradable wastes into the bio-fertilizers.



### 5.3 Liquid Waste Management:

The College has installed Septic tanks and is cleaned periodically.

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

The College has implemented the Rain Water Harvesting Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water level.

**Photograph of Rain water Harvesting Pipe:**



## **CHAPTER-VII STUDY OF GREEN 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:**



# ENERGY AUDIT REPORT

of

Jagdambha Bahudeshiya Gramin Vikas Sanstha's,  
JAGDAMBHA COLLEGE OF ENGINEERING & TECHNOLOGY,  
Yavatmal, 445 001



Year: 2016-17

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. RD/ET/2482



**Maharashtra Energy Development Agency**

(A Government of Maharashtra Institution)

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)

ECN/2014-15/CR-10/6038

14 November, 2014

**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. 25,  
Nirmal Baug Society, Parvati,  
Pune - 411009.

Registration Category : Empanelled Consultant for Save Energy  
Programme.

Registration Number : MEDA/ECN/CR-10/2014-15/ 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 years 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.

  
(Hemant H. Patil)  
Manager (EC)



## Enrich Consultants

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

Ref: EC/JCOET/16-17/01

Date: 20/8/2017

### CERTIFICATE

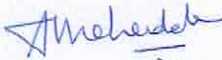
This is to certify that we have conducted Energy Audit at Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology, Yavatmal 445 001 in the Academic year 2016-17.

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

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	7
1	Introduction	8
2	Study of Connected Load	9
3	Study of Present Energy Consumption	11
4	Carbon Foot Printing	13
5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15



## **ACKNOWLEDGEMENT**

We Enrich Consultants, Pune, express our sincere gratitude to the management of Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology, Yavatmal, for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 16-17.

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



## EXECUTIVE SUMMARY

1. Jagdambha Bahuudeshiya Gramin Vikas Sanstha's Jagdambha College of Engineering & Technology, Yavatmal consumes Energy in the form of Electrical Energy used for various Electrical Equipment, office & other facilities.

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

No	Parameter/ Value	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Total	58384	52.5456
2	Maximum	5678	5.1102
3	Minimum	3980	3.582
4	Average	4865.333333	4.3788

### 3. Energy Conservation projects already installed:

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

### 4. Usage of Alternate Energy:

It is recommended to install solar power rooftop system and solar thermal water heating plant on the college building as per availability of funds.

### 5. Usage of LED Lighting:

- The Total Annual Lighting Load of the College is **13 kW**.
- The Total Annual LED Lighting Load is **1 kW**.
- The percentage of Annual LED Lighting to Annual Lighting Demand is **7.69 %**.

### 6. Assumptions:

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

### 7. Reference:

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

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

No	Head	Particulars
1	Name of Institution	Jagdambha Bahudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology,
2	Address	Arni Road, Yavatmal 445 001
3	Affiliation	Sant Gadge Baba Amravati University



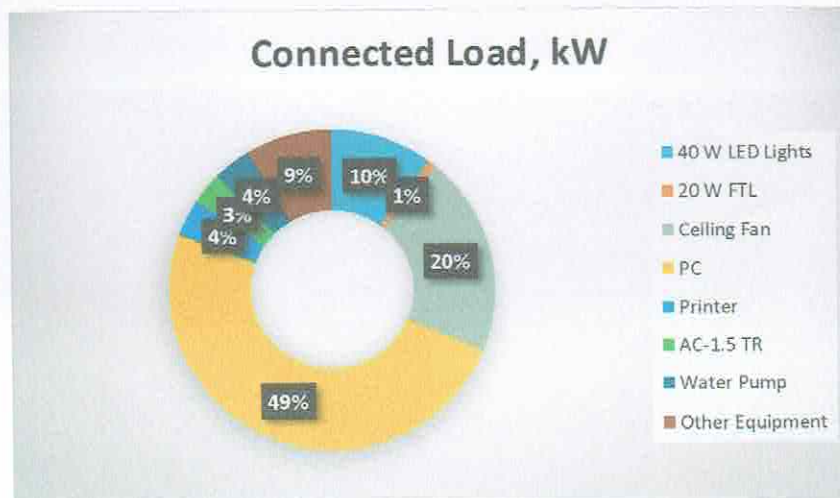
## CHAPTER-II STUDY OF CONNECTED LOAD

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 LED Lights	300	40	12
2	20 W FTL	50	20	1
3	Ceiling Fan	365	65	23.73
4	PC	385	150	57.75
5	Printer	30	150	4.5
6	AC-1.5 TR	2	1875	3.75
7	Water Pump	2	2238	4.48
8	Other Equipment	100	100	10
9	<b>Total</b>			<b>117</b>

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



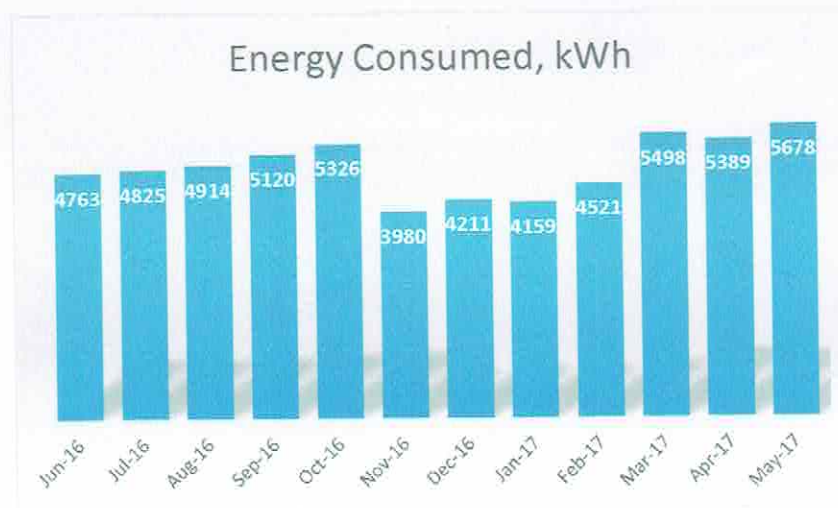
### CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 3: Electrical Bill Analysis- 2016-17:

No	Month	Energy Purchased, kWh
1	Jun-16	4763
2	Jul-16	4825
3	Aug-16	4914
4	Sep-16	5120
5	Oct-16	5326
6	Nov-16	3980
7	Dec-16	4211
8	Jan-17	4159
9	Feb-17	4521
10	Mar-17	5498
11	Apr-17	5389
12	May-17	5678
13	Total	58384
14	Maximum	5678
15	Minimum	3980
16	Average	4865.33

Chart No 2: Variation in Monthly Energy Consumption:



**Table No4: Variation in Important Parameters:**

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	58384
2	Maximum	5678
3	Minimum	3980
4	Average	4865.333333





## 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

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 No5: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Jun-16	4763	4.2867
2	Jul-16	4825	4.3425
3	Aug-16	4914	4.4226
4	Sep-16	5120	4.608
5	Oct-16	5326	4.7934
6	Nov-16	3980	3.582
7	Dec-16	4211	3.7899
8	Jan-17	4159	3.7431
9	Feb-17	4521	4.0689
10	Mar-17	5498	4.9482
11	Apr-17	5389	4.8501
12	May-17	5678	5.1102
13	Total	58384	52.5456
14	Maximum	5678	5.1102
15	Minimum	3980	3.582
16	Average	4865.333333	4.3788



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

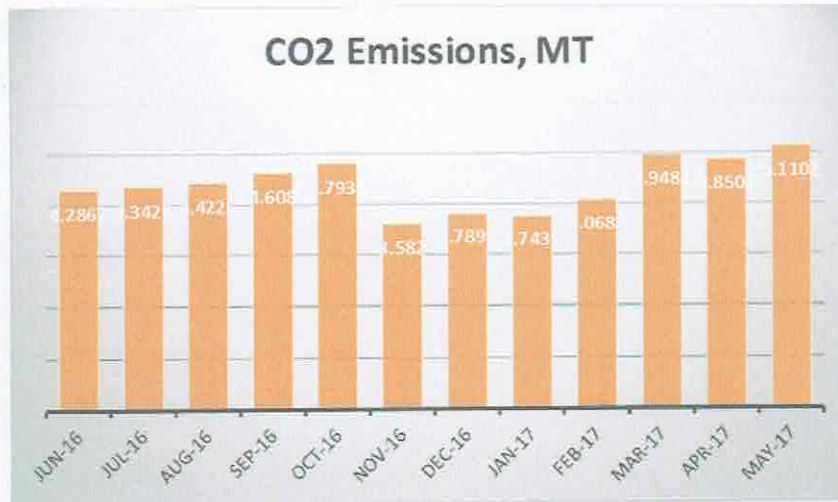


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	58384	52.54
2	Maximum	5678	5.11
3	Minimum	3980	3.58
4	Average	4865.33	4.37



## CHAPTER V 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	No of 40 W FTL Light Fittings	300	Nos
2	Demand of 40 W FTL Light Fitting	40	W/Unit
3	Total Electrical Load of 40 W LED Light Fittings	12	kW
4	No of 20 W LED Tube Lights	50	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	1	kW
7	Total Lighting Load=3+6	13	kW
8	Total LED Lighting Load= 6	1	kW
9	% of LED to Total Lighting Load = $8 \times 100 / 7$	7.69	%

