

# GREEN AUDIT REPORT

of

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



Year: 2018-19

Prepared by:

## Enrich Consultants

Yashashree, 26, Nirmal Bag Society,  
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**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)

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, Nimal 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)



## 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/JCOET/18-19/02

Date: 25/6/2019

### 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 2020-21.

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
- Nature Friendly Initiatives under NSS Program

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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## **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: 2018-19.

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> Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Total	60433	54.38
2	Maximum	6125	5.5125
3	Minimum	3621	3.2589
4	Average	5036.08	4.53

### 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:

As on today College has not installed solar rooftop power plant, solar thermal water heating plant. 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.

#### 5.4 E-Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

### 6. Rain Water Harvesting:

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



#### 7. Green & Sustainable Initiatives

- Maintenance of good Internal Road
- Maintenance of Internal Garden
- Nature Friendly Initiatives under NSS Program

#### 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- 2018-19:

No	Month	Energy Purchased, kWh
1	Jun-18	4715
2	Jul-18	5891
3	Aug-18	6023
4	Sep-18	6125
5	Oct-18	5820
6	Nov-18	3621
7	Dec-18	4121
8	Jan-19	4620
9	Feb-19	4625
10	Mar-19	4800
11	Apr-19	4952
12	May-19	5120
13	Total	60433
14	Maximum	6125
15	Minimum	3621
16	Average	5036.083333

Chart No 1: Variation in Monthly Energy Consumption:



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

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	60433
2	Maximum	6125
3	Minimum	3621
4	Average	5036.08



### 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

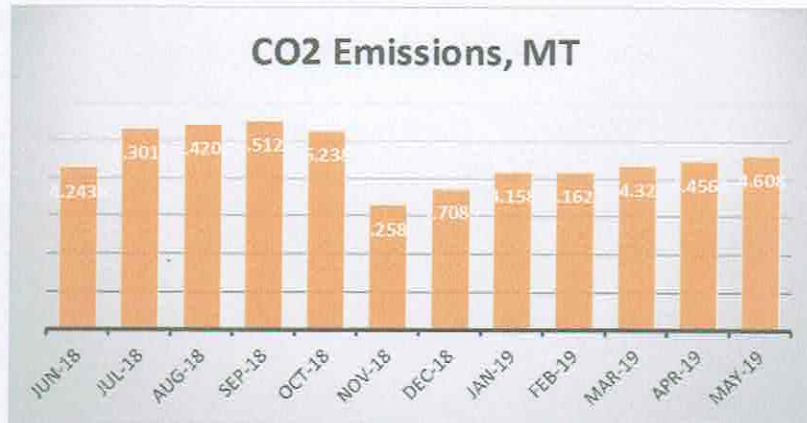
Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

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

No	Month	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Jun-18	4715	4.2435
2	Jul-18	5891	5.3019
3	Aug-18	6023	5.4207
4	Sep-18	6125	5.5125
5	Oct-18	5820	5.238
6	Nov-18	3621	3.2589
7	Dec-18	4121	3.7089
8	Jan-19	4620	4.158
9	Feb-19	4625	4.1625
10	Mar-19	4800	4.32
11	Apr-19	4952	4.4568
12	May-19	5120	4.608
13	Total	60433	54.3897
14	Maximum	6125	5.5125
15	Minimum	3621	3.2589
16	Average	5036.083	4.53



**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	60433	54.3897
2	Maximum	6125	5.5125
3	Minimum	3621	3.2589
4	Average	5036.083333	4.532475



**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:**

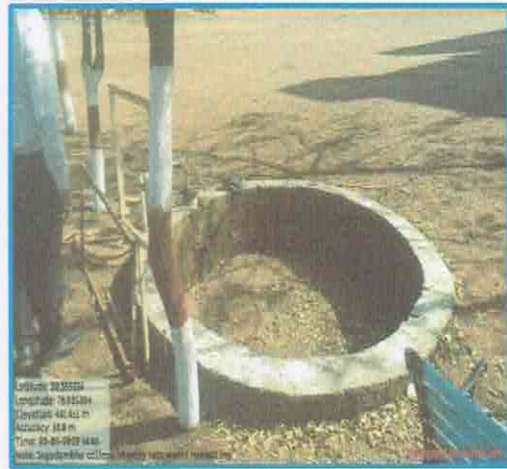
The College has installed Septic tanks and are cleaned periodically.

**5.4 E-Waste Management:** The E-Waste is disposed of through Authorized Agency.

## CHAPTER-VI STUDY OF RAIN WATER HARVESTING

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

Photograph of Rain water Harvesting Pipe:





## **CHAPTER-VII**

### **STUDY OF GREEN & NATURE FRIENDLY 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 Nature Friendly Initiatives under NSS Program:

The College has taken initiatives for water and forest conservation, tree plantation under National Service Scheme Unit.



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Year: 2018-19

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ECN/2017-18/CR-01/5726

30<sup>th</sup> November 2017

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Manager (EC)



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### CERTIFICATE

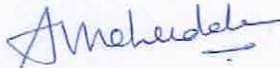
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The College has adopted following Energy Efficient practices:

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

No	Parameter/ Value	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Total	60433	54.3897
2	Maximum	6125	5.5125
3	Minimum	3621	3.2589
4	Average	5036.083333	4.532475

### 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, solar thermal water heating plant. 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 Demand of the College is **9560 kWh**.
- The Total Annual LED Lighting Demand is **8960 kWh**.
- The percentage of Annual LED Lighting to Annual Lighting Demand is **93.72 %**.

### 6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere
2. Daily working hours-**8 Nos**(For Lighting Calculations)
3. Annual working Days-**200 Nos**(For Lighting Calculations)

### 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
2. To Study present Energy Consumption
3. To compute 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:**

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1	Name of Institution	Jagdambha Bahuudeshiya Gramin Vikas Sanstha's, Jagdambha College of Engineering & Technology,
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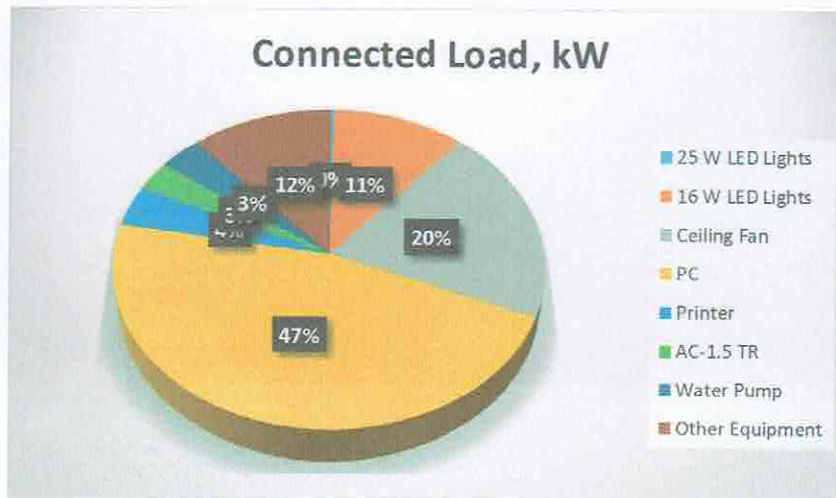
## CHAPTER-II STUDY OF CONNECTED LOAD

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	25 WFTL	15	25	0.375
2	20WLED	350	40	14
3	Ceiling Fan	395	65	25.675
4	PC	400	150	60
5	Printer	35	150	5.25
6	Ac	2	1875	3.75
7	Water Pump	2	2238	4.476
8	Other Equipment	100	150	15
9	<b>Total</b>			<b>129</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- 2018-19:**

No	Month	Energy Purchased, kWh
1	Jun-18	4715
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**Chart No 2: Variation in Monthly Energy Consumption:**



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

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	60433
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## 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 No 5: Month wise CO<sub>2</sub> Emissions:

No	Month	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
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Chart No 3: Month wise CO<sub>2</sub>Emissions:

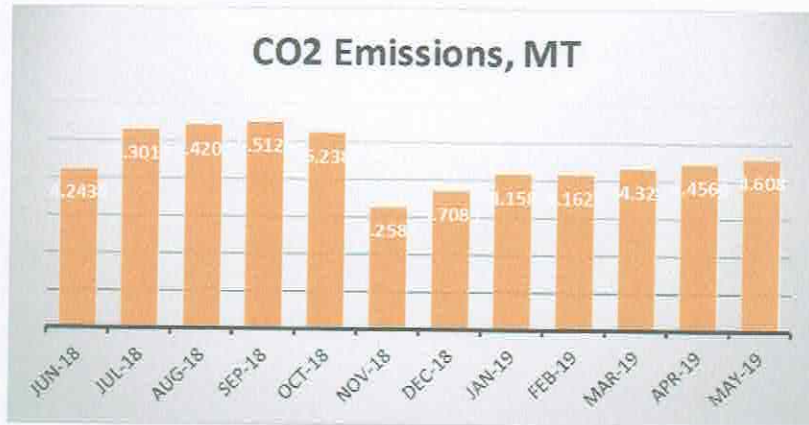


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	60433	54.38
2	Maximum	6125	5.51
3	Minimum	3621	3.25
4	Average	5036.08	4.53



## **CHAPTER V**

### **STUDY OF USAGE OF ALTERNATE ENERGY**

As on today College has not install solar roof-top PV plant, solar thermal water heating plant; the percentages of uses of alternate energy to the annual energy demand work to be zero percent.





## 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	No of 25 W LED Light Fittings	15	Nos
2	Demand of 25W LED Light Fitting	25	W/Unit
3	Total Electrical Load of 25 W LED Light Fittings	<b>0.375</b>	kW
4	No of 16 W LED Tube Lights	350	Nos
5	Demand of 16 W LED Tube Light	16	W/Unit
6	Total Electrical Load of 16 W LED Fittings	<b>5.6</b>	kW
7	Total Lighting Load=3+6	<b>5.975</b>	kW
8	Total LED Lighting Load= 6	<b>5.6</b>	kW
9	Average Daily Usage Period	8	Hours
10	Annual Working Days	200	Nos
11	Annual Total Lighting Load = 7*9*10	<b>9560</b>	kWh
12	Annual LED Lighting Load = 8*9*10	<b>8960</b>	kWh
13	Annual Lighting Requirement met by LED= $12 \times 100 / 11$	<b>93.72</b>	%

