GREEN AUDIT REPORT

of

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

Year: 2017-18

Prepared by:

Enrich Consultants

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

ENRICH CONSULTANTS * PUNE *

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2017-18/CR-01/5726 30th 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)

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Enrich Consultants

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

Ref: EC/JCOET/20-21/02

Date: 21/8/2018

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 2017-18.

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 cleaned 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

ENRICH CONSULTANTS * PUNE *

INDEX

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: 17-18.

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_2 Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	65286	58.7574
2	Maximum	6729	6.0561
3	Minimum	3869	3.4821
4	Average	5440.5	4.89645

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy& CO_2 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.

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 Practices:

- Maintenance of good Internal Road
- Maintenance of Internal Garden

8. Notes &Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of **CO_2**into atmosphere

9. References:

- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO_2 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- 2017-18:

No	Month	Energy Purchased, kWh
1	Jun-17	5923
2	Jul-17	5286
3	Aug-17	6583
4	Sep-17	6353
5	Oct-17	5891
6	Nov-17	3869
7	Dec-17	4128
8	Jan-18	4793
9	Feb-18	4652
10	Mar-18	6125
11	Apr-18	4954
12	May-18	6729
13	Total	65286
14	Maximum	6729
15	Minimum	3869
16	Average	5440.5

Chart No 1: Variation in Monthly Energy Consumption:

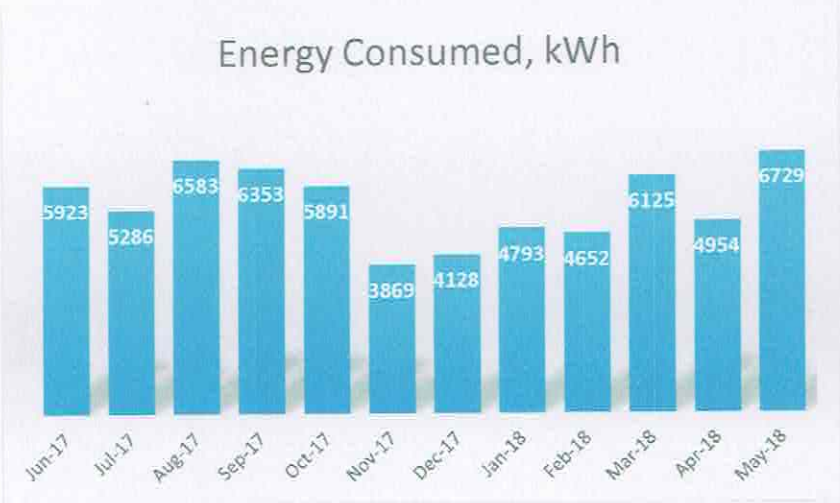

Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	65286
2	Maximum	6729
3	Minimum	3869
4	Average	5440.5

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_2 Emissions:

The basis of Calculation for CO_2 emissions is as under.

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jun-17	5923	5.3307
2	Jul-17	5286	4.7574
3	Aug-17	6583	5.9247
4	Sep-17	6353	5.7177
5	Oct-17	5891	5.3019
6	Nov-17	3869	3.4821
7	Dec-17	4128	3.7152
8	Jan-18	4793	4.3137
9	Feb-18	4652	4.1868
10	Mar-18	6125	5.5125
11	Apr-18	4954	4.4586
12	May-18	6729	6.0561
13	Total	65286	58.7574
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Chart No 2: Month wise CO_2Emissions:

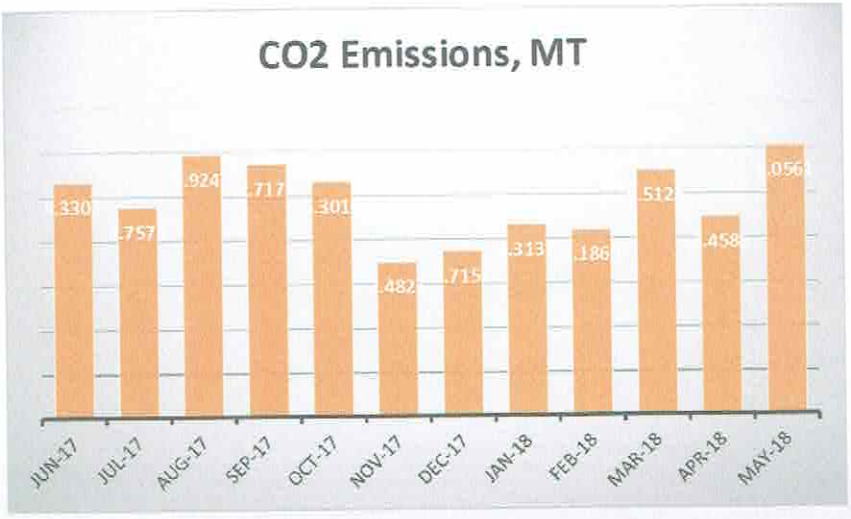

Table No 5: Variation in Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	65286	58.7574
2	Maximum	6729	6.0561
3	Minimum	3869	3.4821
4	Average	5440.5	4.89645

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:

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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,

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2. Present Energy Consumption& CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	65286	58.7574
2	Maximum	6729	6.0561
3	Minimum	3869	3.4821
4	Average	5440.5	4.89645

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 Load of the College is **10 kW.**
- The Total Annual LED Lighting Demand is **4 kW.**
- The percentage of Annual LED Lighting to Annual Lighting Demand is **40 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2**into atmosphere

7. References:

- For CO_2 Emissions: 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_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study the present CO_2 emissions
3. To study usage of Alternate Energy
4. To study usage of LED Lighting

1.2Table No 1: General Details of the College:

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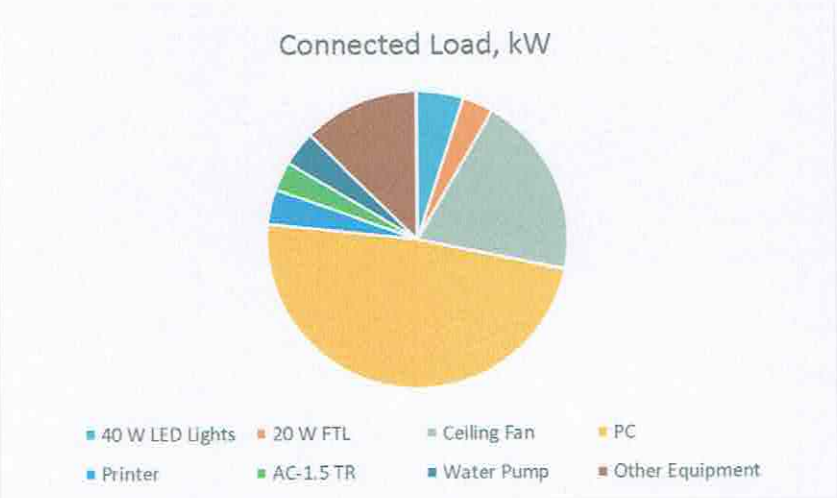
CHAPTER-II
STUDY OF CONNECTED LOAD

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	40 W LED Lights	150	40	6
2	20 W FTL	200	20	4
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	150	15
9	**Total**			**119**

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- 2017-18:

No	Month	Energy Purchased, kWh
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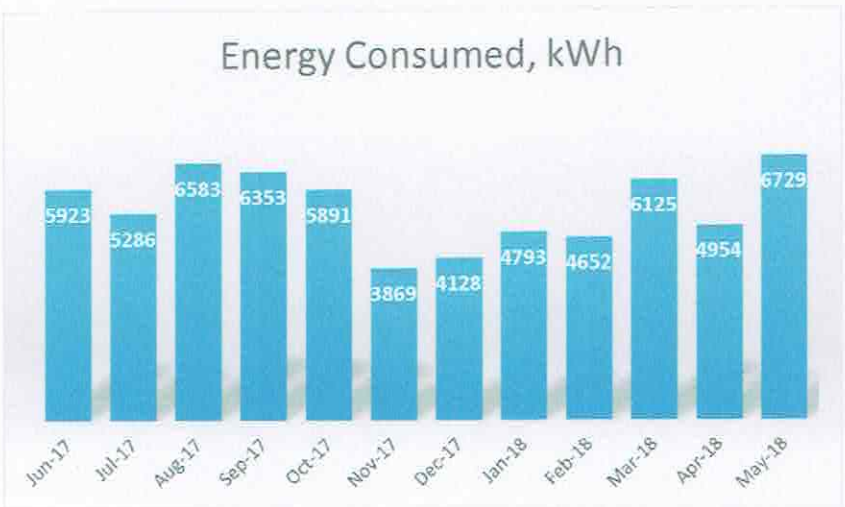

Table No4: Variation in Important Parameters:

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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_2 Emissions:

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
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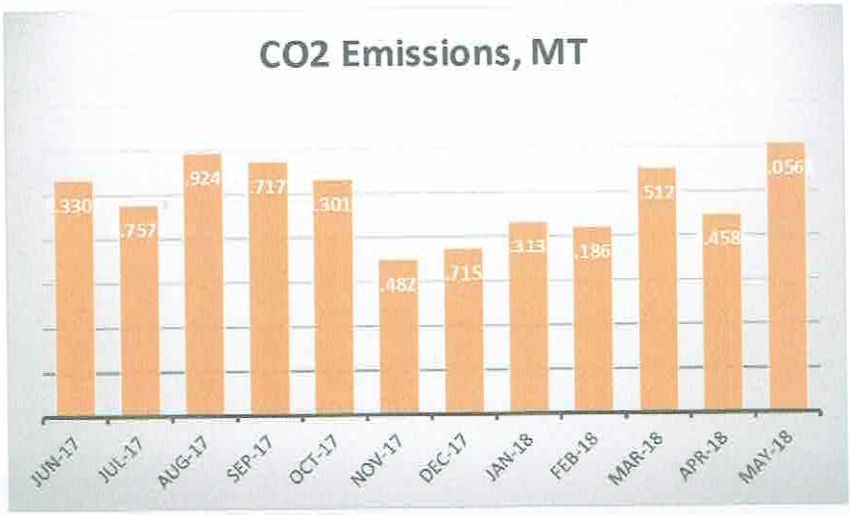

Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	65286	58.7574
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3	Minimum	3869	3.4821
4	Average	5440.5	4.89645

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 percentage 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 40 W FTL Light Fittings	150	Nos
2	Demand of 40 W FTL Light Fitting	40	W/Unit
3	Total Electrical Load of 40 W LED Light Fittings	6	kW
4	No of 20 W LED Tube Lights	200	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	4	kW
7	Total Lighting Load=3+6	10	kW
8	Total LED Lighting Load= 6	4	kW
9	% of LED to Total Lighting Load = 8*100/7	40	%