

SHIKSHAN PRASARAK MANDAL MUL'S
KARMAVIR MAHAVIDYALAYA, MUL

DIST. CHANDRAPUR, STATE MAHARASHTRA - 441224

Affiliated to Gondwana University, Gadchiroli

(NAAC Accredited "B" CGPA: 2.12)

Email : kmvmahavidyalayamul@gmail.com

Website: webapp.kmvmul.ac.in

Phone no: 07174 220238

Address: Near Railway Crossing,
Chandrapur Road, Mul



SELF STUDY REPORT
2017-18 to 2021-22
Criterion IV

DVV CLARIFICATION

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, Green audit, Environment audit

2017-2018

ENERGY AUDIT REPORT OF Karmavir Mahavidyalaya, Mul Chandrapur



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



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
Email: eee@mahatja.com, Web: www.mahatja.com

ECN/2018-19/CR-05/4174

19th September, 2018

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

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

Name and Address of the firm : **Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Multangan English School,
Parvati, Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme*

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(Smita Kudarikar)
General Manager (EC)

Enrich Consultants, Pune



Energy Audit Report: Karmavir Mahavidyalaya, Mul: 17-18

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

Ref: EC/KMC/17-18/32

Date: 12/07/2018

CERTIFICATE

This is to certify that we have conducted Energy Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2017-18.

The College has adopted following Energy Efficient practices:

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

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



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6	Study of LED Lighting	15



ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of at Karmavir Mahavidyalaya, Mul for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 17-18.

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



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.3904
2	Maximum	365	0.3285
3	Minimum	11	0.0099
4	Average	221.33	0.1992

3. Energy Conservation projects already installed:

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

4. Usage of Alternate Energy:

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

5. Usage of LED Lighting:

- The Total Lighting load of College is 2.72 kW.
- The LED Lighting Load is 0.32 kW.
- The % of LED Lighting to Total Lighting Load is 11.76 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. 100 LPD Solar Thermal System saves 1500 kWh of Electrical Energy per Annum.
3. Daily working hours-4 Nos (For Lighting Calculations)
4. Annual working Days-120 Nos (For Lighting Calculations)

7. References:

- For CO₂ Emissions: www.tatapower.com



**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.



Chart No 3: Month wise CO₂Emissions:

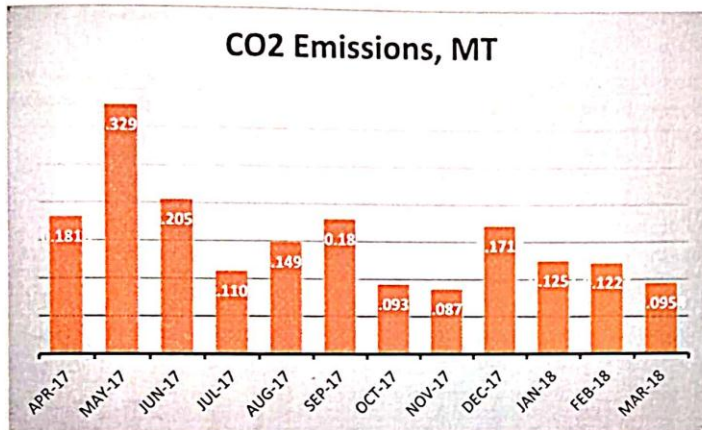


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	2058	1.852
2	Maximum	366	0.329
3	Minimum	97	0.087
4	Average	171.5	0.154

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
1	Apr-17	202
2	May-17	366
3	Jun-17	228
4	Jul-17	123
5	Aug-17	166
6	Sep-17	200
7	Oct-17	104
8	Nov-17	97
9	Dec-17	191
10	Jan-18	139
11	Feb-18	136
12	Mar-18	106
13	Total	2058
14	Maximum	366
15	Minimum	97
16	Average	171.5

Chart No 2: Variation in Monthly Energy Consumption:

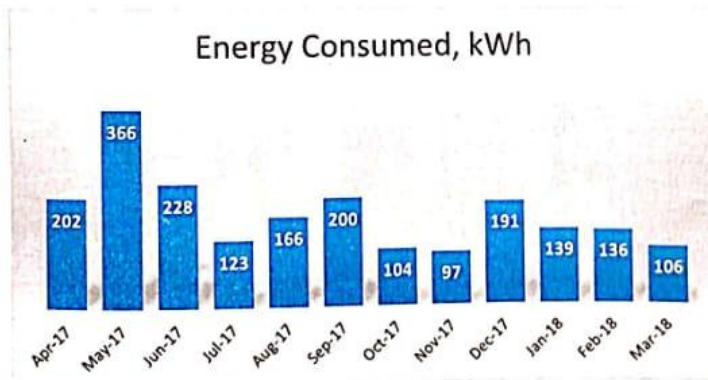


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1.	Total	2058
2	Maximum	366
3	Minimum	97
4	Average	171.5



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 CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Apr-17	202	0.181
2	May-17	366	0.329
3	Jun-17	228	0.205
4	Jul-17	123	0.110
5	Aug-17	166	0.149
6	Sep-17	200	0.18
7	Oct-17	104	0.093
8	Nov-17	97	0.087
9	Dec-17	191	0.171
10	Jan-18	139	0.125
11	Feb-18	136	0.122
12	Mar-18	106	0.095
13	Total	2058	1.852
14	Maximum	366	0.329
15	Minimum	97	0.087
16	Average	171.5	0.154

Enrich Consultants, Pune



CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study the present CO₂ 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	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



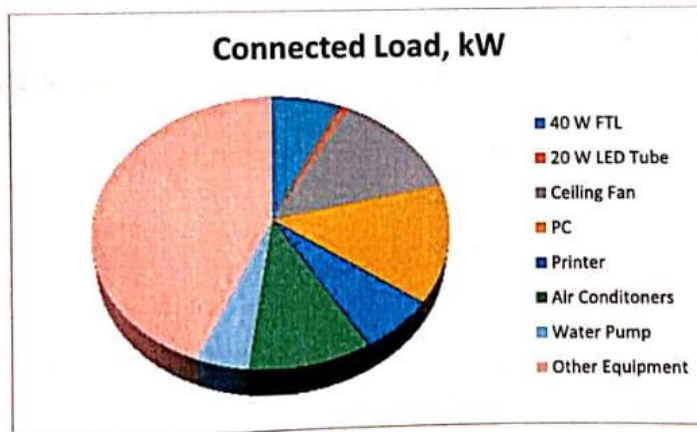
CHAPTER-II STUDY OF CONNECTED LOAD

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	60	40	2.4
3	20 W LED Tube	16	20	0.32
4	Ceiling Fan	71	65	4.615
5	PC	32	150	4.8
6	Printer	15	150	2.25
7	Air Conditioners	1	3500	3.5
8	Water Pump	2	746	1.492
9	Other Equipment	100	150	15
10	Total			34

Chart No 1: Study of Connected Load:



GREEN AUDIT REPORT
OF
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Chandrapur



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Prepared by:

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Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com



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 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	16	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.32	kW
7	Total Lighting Load=3+6	2.72	kW
8	Total LED Lighting Load= 6	0.32	kW
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	11.76	%



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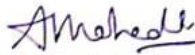
This is to certify that we have conducted Green Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2017-18.

The College has adopted following Green Initiatives:

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

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

For Enrich Consultants,


A Y Mehendale,
Certified Energy Auditor
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1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.3904
2	Maximum	365	0.3285
3	Minimum	11	0.0099
4	Average	221.33	0.1992

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy & CO₂ Emission Reduction:

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

5. Waste Management:

5.1 Segregation of Waste at Source:

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

5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

5.4 E-Waste Management:

It is recommended to dispose E-Waste through Authorized collecting agency.

5.5 Sanitary Waste Incinerator:

It is recommended to install Sanitary Waste Incinerator for sanitary waste disposal.

6. Rain Water Management:

The College has installed the Rainwater management 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
- Display of Posters on Resource Conservation
- Best Practices and Initiative for Social Awareness

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

9. References:

- For CO₂ 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 CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
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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	Apr-17	202
2	May-17	366
3	Jun-17	228
4	Jul-17	123
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Chart No 1: Variation in Monthly Energy Consumption:

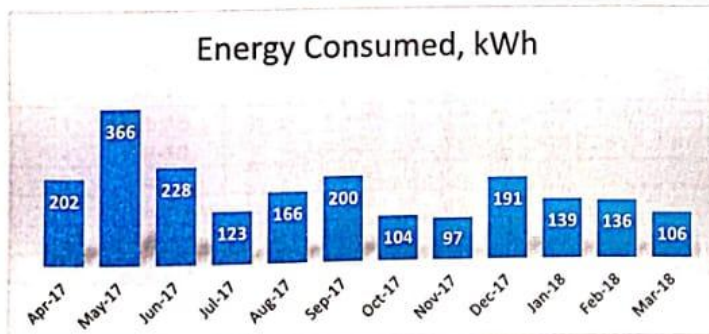


Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	2058
2	Maximum	366
3	Minimum	97
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CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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



Chart No 2: Month wise CO₂ Emissions:

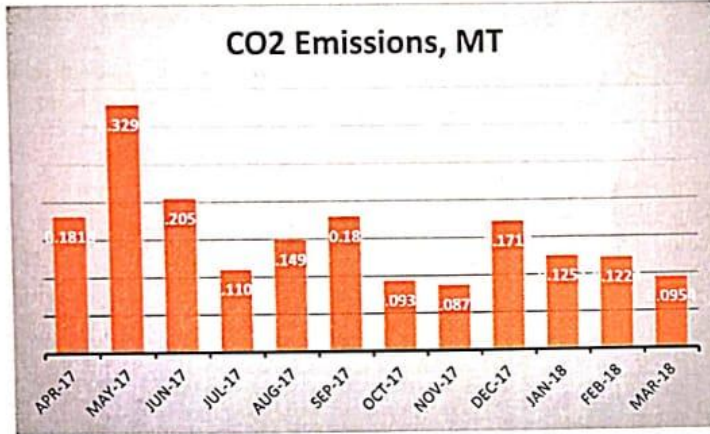


Table No 5: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2058	1.852
2	Maximum	366	0.329
3	Minimum	97	0.087
4	Average	171.5	0.154

CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

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



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



5.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

It is recommended to dispose E-Waste through Authorized Agency.

5.5 Sanitary Waste Incinerator:

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

Enrich Consultants, Pune



CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



7.2 Internal Tree Plantation:

Photograph of Tree plantation:

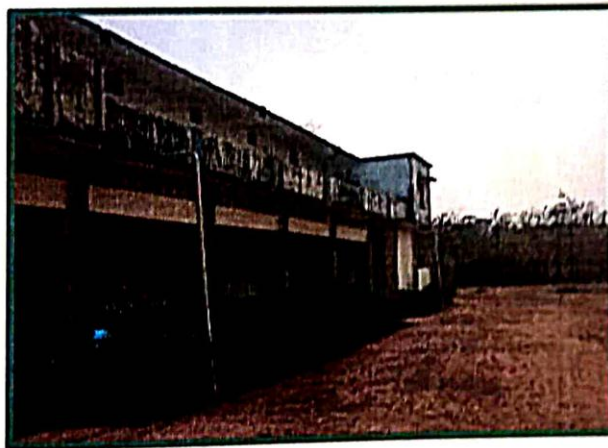


CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

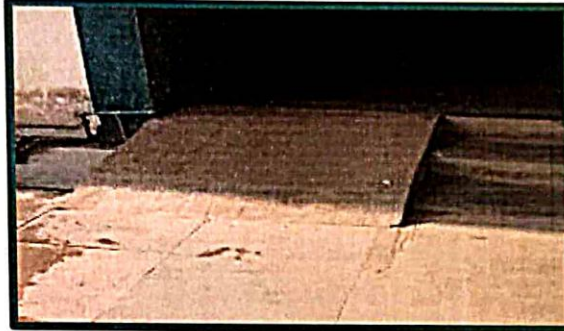
The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain Water Management Pipe:



7.3 Provision of Ramp:

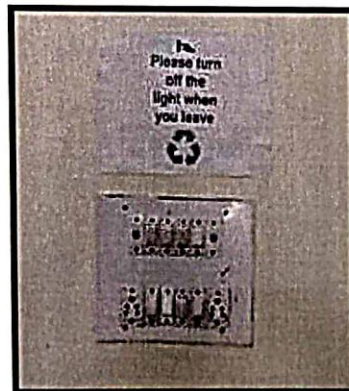
The College has facility for ramp, for easy movement for Divyaang.



7.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



ANNEXURE-1:

DETAILS OF TREES & PLANTS:

The college has more than 1000 trees planted within campus, some of that listed below:

Sr.No.	Plant Name	Scientific Name
1	Karanj	Milletia pinnata
2	Gulmohar	Delonix regia
3	Saptaparni	Alstonia scholaris
4	Palas	Butea monosperma
5	Behada	Terminalia bellirica
6	Kaduneem	Azadirachta indica
7	Ashoka	Saraca asoca
8	Pimpal	Ficus religiosa
9	Lemon	Citrus lemon
10	Vidya	Thuja sp.
11	Chafa	Magnolia champaca
12	Hibiscus	Hibiscus rosa- sinensis
13	Teak Wood	Tectona grandis
14	Babul	Vachellia nilotica
15	Mehandi	Lawsonia inermis



Energy audit, Green audit, Environment audit

2018-2019

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Year: 2018-19

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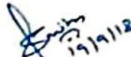
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- As on today College has not installed solar rooftop power plant. It is recommended to install solar power rooftop system on the college building as per availability of funds.

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- For CO₂ 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 CO₂ 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	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



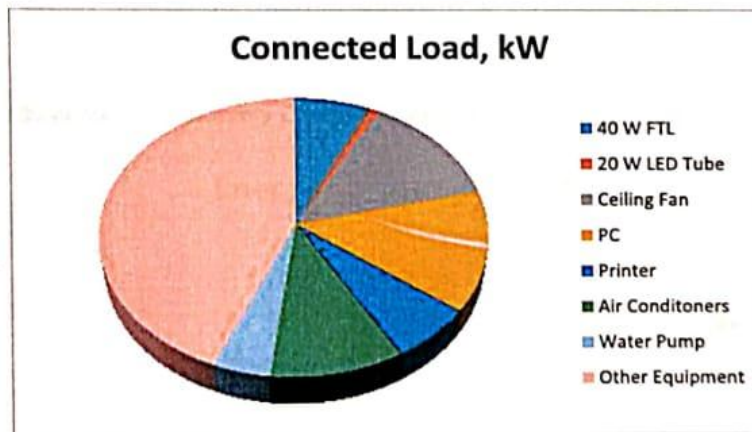
CHAPTER-II STUDY OF CONNECTED LOAD

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	60	40	2.4
3	20 W LED Tube	16	20	0.32
4	Ceiling Fan	71	65	4.615
5	PC	32	150	4.8
6	Printer	15	150	2.25
7	Air Conditioners	1	3500	3.5
8	Water Pump	2	746	1.492
9	Other Equipment	100	150	15
10	Total			34

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	Apr-18	132
2	May-18	122
3	Jun-18	62
4	Jul-18	52
5	Aug-18	100
6	Sep-18	165
7	Oct-18	135
8	Nov-18	107
9	Dec-18	135
10	Jan-19	71
11	Feb-19	103
12	Mar-19	111
13	Total	1295
14	Maximum	165
15	Minimum	52
16	Average	107.916

Chart No 2: Variation in Monthly Energy Consumption:

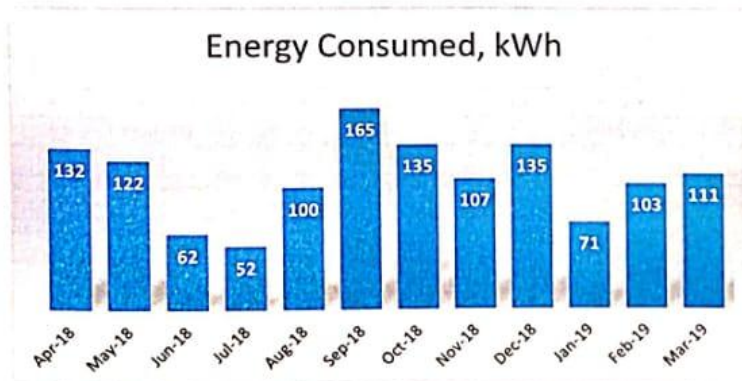


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	1295
2	Maximum	165
3	Minimum	52
4	Average	107.916

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 CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Apr-18	132	0.118
2	May-18	122	0.109
3	Jun-18	62	0.055
4	Jul-18	52	0.046
5	Aug-18	100	0.09
6	Sep-18	165	0.148
7	Oct-18	135	0.121
8	Nov-18	107	0.096
9	Dec-18	135	0.121
10	Jan-19	71	0.063
11	Feb-19	103	0.092
12	Mar-19	111	0.099
13	Total	1295	1.165
14	Maximum	165	0.148
15	Minimum	52	0.046
16	Average	107.916	0.097



Chart No 3: Month wise CO₂Emissions:

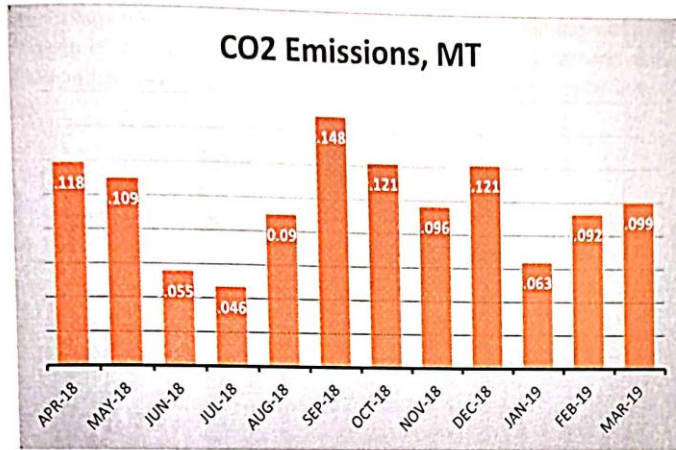
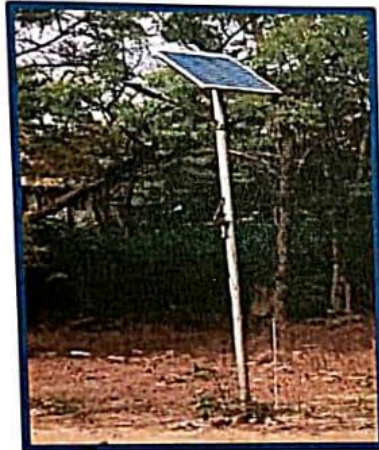


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	1295	1.165
2	Maximum	165	0.148
3	Minimum	52	0.046
4	Average	107.916	0.097

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, College has taken initiate to used solar energy by installing solar street lamp within the campus.



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 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	16	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.32	kW
7	Total Lighting Load=3+6	2.72	kW
8	Total LED Lighting Load= 6	0.32	kW
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	11.76	%

GREEN AUDIT REPORT
OF
Karmavir Mahavidyalaya, Mul
Chandrapur



Year: 2018-19

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY



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

ECN/2018-19/CR-05/4174

19th September, 2018

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

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

Name and Address of the firm : **Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune - 411009.

Registration Category : Empanelled *Consultant for Energy Conservation Programme*

Registration Number : **MEDA/ECN/CR-05/2018-19/EA-03**

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.


(Smita Kudarikar)
General Manager (EC)

Enrich Consultants, Pune



Enrich Consultants

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

Ref: EC/KMC/18-19/40

Date: 23/04/2019

CERTIFICATE

This is to certify that we have conducted Green Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2018-19.

The College has adopted following Green Initiatives:

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

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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4	Study of Usage of Renewable Energy	14
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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of at Karmavir Mahavidyalaya, Mul, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 2018-19.

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



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	1295	1.165
2	Maximum	165	0.148
3	Minimum	52	0.046
4	Average	107.916	0.097

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy & CO₂ Emission Reduction:

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

5. Waste Management:

- 5.1 Segregation of Waste at Source:

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

- 5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

- 5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

- 5.4 E-Waste Management:

It is recommended to dispose E-Waste through Authorized E-Waste collecting agency.

- 5.5 Sanitary Waste Incinerator:

It is recommended to install Sanitary Waste Incinerator for sanitary waste disposal.

6. Rain Water Management:

The College has installed the Rainwater management 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
- Display of Posters on Resource Conservation
- Best Practices and Initiative for Social Awareness

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

9. References:

- For CO₂ 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



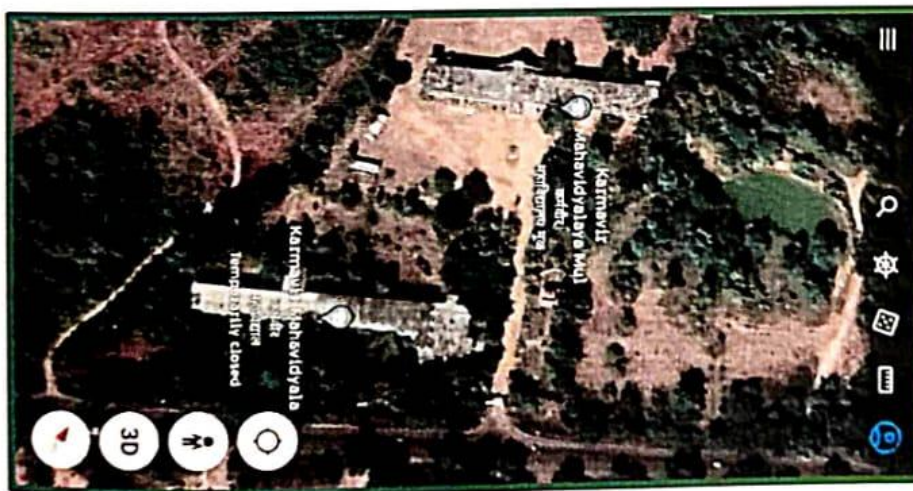
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



Enrich Consultants, Pune



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	Apr-18	132
2	May-18	122
3	Jun-18	62
4	Jul-18	52
5	Aug-18	100
6	Sep-18	165
7	Oct-18	135
8	Nov-18	107
9	Dec-18	135
10	Jan-19	71
11	Feb-19	103
12	Mar-19	111
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14	Maximum	165
15	Minimum	52
16	Average	107.916

Chart No 1: Variation in Monthly Energy Consumption:

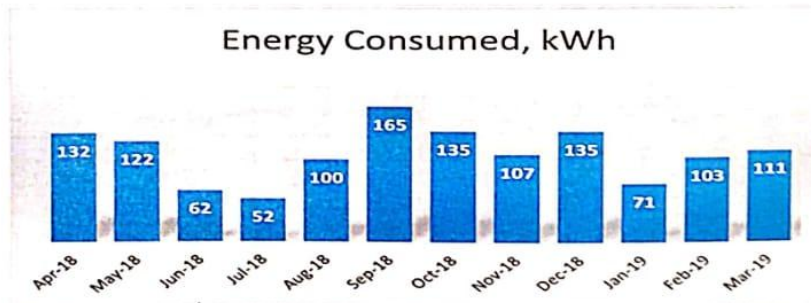


Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	1295
2	Maximum	165
3	Minimum	52
4	Average	107.916

Enrich Consultants, Pune



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 CO₂ Emissions:

The basis of Calculation for CO₂ emissions is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Apr-18	132	0.118
2	May-18	122	0.109
3	Jun-18	62	0.055
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Chart No 2: Month wise CO₂ Emissions:

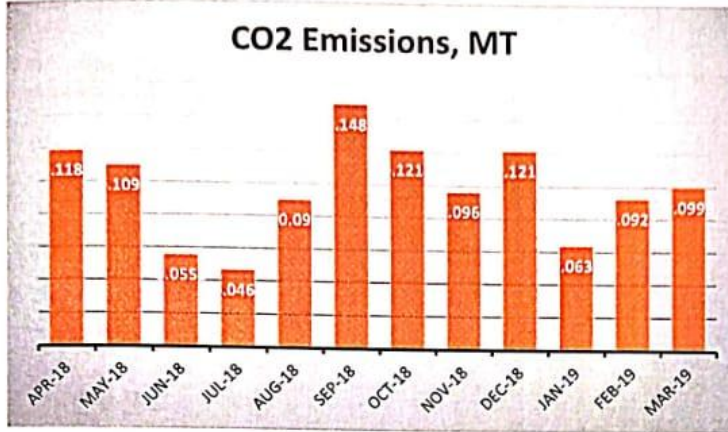


Table No 5: Variation in Important Parameters:

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2	Maximum	165	0.148
3	Minimum	52	0.046
4	Average	107.916	0.097



CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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



CHAPTER V STUDY OF WASTE MANAGEMENT

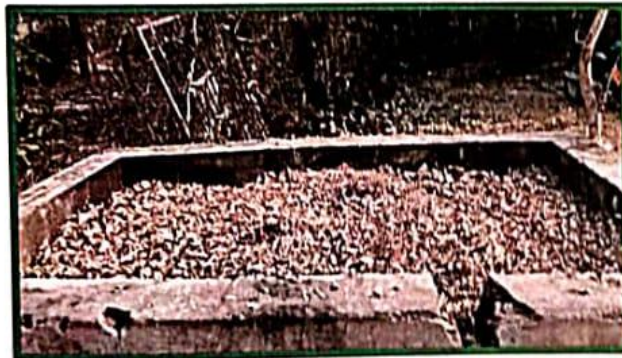
5.1 Segregation of Waste at Source:

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



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



5.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

It is recommended to dispose E-Waste through Authorized Agency.

5.4 Sanitary Waste Incinerator:

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

CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:



CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



7.2 Internal Tree Plantation:

Photograph of Tree plantation:



7.3 Provision of Ramp:

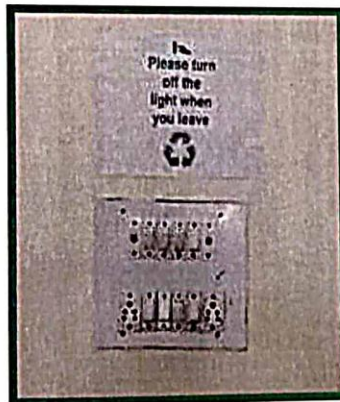
The College has facility for ramp, for easy movement for Divyaang.



7.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



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

The college has more than 1000 trees planted within campus, some of that listed below:

Sr.No.	Plant Name	Scientific Name
1	Karanj	Millettia pinnata
2	Gulmohar	Delonix regia
3	Saptaparni	Alstonia scholaris
4	Palas	Butea monosperma
5	Behada	Terminalia bellirica
6	Kaduneem	Azadirachta indica
7	Ashoka	Saraca asoca
8	Pimpal	Ficus religiosa
9	Lemon	Citrus lemon
10	Vidya	Thuja sp.
11	Chafa	Magnolia champaca
12	Hibiscus	Hibiscus rosa- sinensis
13	Teak Wood	Tectona grandis
14	Babul	Vachellia nilotica
15	Mehandi	Lawsonia inermis

**Energy audit, Green audit, Environment audit
2019-20**

**ENERGY AUDIT REPORT
OF
Karmavir Mahavidyalaya, Mul
Chandrapur**



Year: 2019-20

Prepared by:

Enrich Consultants

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



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
Email: eec@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174

19th September, 2018

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

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(Smita Kudarikar)
General Manager (EC)

Enrich Consultants, Pune



Energy Audit Report: Karmavir Mahavidyalaya, Mul: 19-20

Enrich Consultants

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

Ref: EC/KMC/19-20/14

Date: 27/08/2020

CERTIFICATE

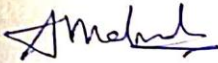
This is to certify that we have conducted Energy Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2019-20.

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



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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 Karmavir Mahavidyalaya, Mul for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 19-20.

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



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	5996	5.3964
2	Maximum	1181	1.0629
3	Minimum	11	0.0099
4	Average	499.66	0.4497

3. Energy Conservation projects already installed:

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

4. Usage of Alternate Energy:

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

5. Usage of LED Lighting:

- The Total Lighting load of College is 2.56 kW.
- The LED Lighting Load is 0.48 kW.
- The % of LED Lighting to Total Lighting Load is 18.75 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. 100 LPD Solar Thermal System saves 1500 kWh of Electrical Energy per Annum.
3. Daily working hours- 4 Nos (For Lighting Calculations)
4. Annual working Days-120 Nos (For Lighting Calculations)

7. References:

- For CO₂ 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 CO₂ 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	Karmavir Mahavidyalaya
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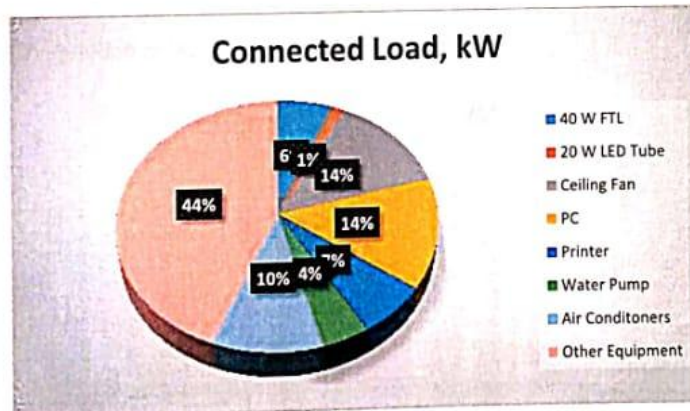
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The major contributors to the connected load of the College include:

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	52	40	2.08
2	20 W LED Tube	24	20	0.48
4	Ceiling Fan	71	65	4.615
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7	Water Pump	2	746	1.492
8	Air Conditioners	1	3500	3.5
9	Other Equipment	100	150	15
10	Total			34

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- 2019-20:

No	Month	Energy Purchased, kWh
1	Apr-19	1181
2	May-19	739
3	Jun-19	677
4	Jul-19	607
5	Aug-19	577
6	Sep-19	585
7	Oct-19	648
8	Nov-19	377
9	Dec-19	304
10	Jan-20	278
11	Feb-20	11
12	Mar-20	12
13	Total	5996
14	Maximum	1181
15	Minimum	11
16	Average	499.666

Chart No 2: Variation in Monthly Energy Consumption:

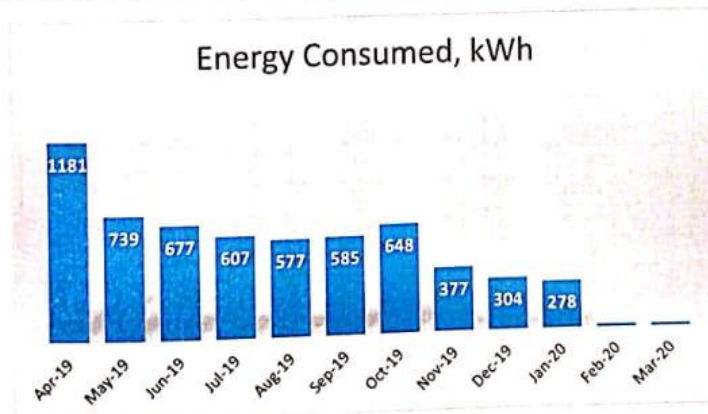


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	5996
2	Maximum	1181
3	Minimum	11
4	Average	499.666

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 CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-19	1181	1.062
2	May-19	739	0.665
3	Jun-19	677	0.609
4	Jul-19	607	0.546
5	Aug-19	577	0.519
6	Sep-19	585	0.526
7	Oct-19	648	0.583
8	Nov-19	377	0.339
9	Dec-19	304	0.273
10	Jan-20	278	0.250
11	Feb-20	11	0.009
12	Mar-20	12	0.010
13	Total	5996	5.396
14	Maximum	1181	1.062
15	Minimum	11	0.009
16	Average	499.666	0.449

Chart No 3: Month wise CO₂ Emissions:

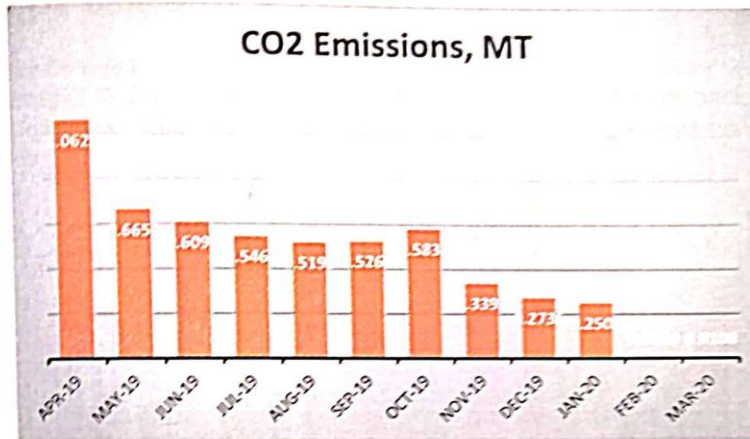


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	5996	5.396
2	Maximum	1181	1.062
3	Minimum	11	0.009
4	Average	499.666	0.449

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, College has taken initiate to used solar energy by installing solar street lamp within the campus.



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 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	24	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.48	kW
7	Total Lighting Load=3+6	2.56	kW
8	Total LED Lighting Load= 6	0.48	kW
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	18.75	%

GREEN AUDIT REPORT
OF
Karmavir Mahavidyalaya, Mul
Chandrapur



Year: 2019-20

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY



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

ECN/2018-19/CR-05/4174

19th September, 2018

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

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

Name and Address of the firm : **Enrich Consultants** -
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Mukangan English School,
Parvati, Pune - 411009.

Registration Category : Empanelled *Consultant for Energy Conservation Programme*

Registration Number : *MEDA/ECN/CR-05/2018-19/EA-03*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.


(Smita Kudarikar)
General Manager (E.C)

Enrich Consultants, Pune



Enrich Consultants

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

Ref: EC/KMC/19-20/14

Date: 27/08/2020

CERTIFICATE


This is to certify that we have conducted Green Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2019-20.

The College has adopted following Green Initiatives:

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

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

For Enrich Consultants,


A Y Mehendale,
Certified Energy Auditor
EA-8192



INDEX

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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of at Karmavir Mahavidyalaya, Mul, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 2019-20.

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

EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	5996	5.3964
2	Maximum	1181	1.0629
3	Minimum	11	0.0099
4	Average	499.66	0.4497

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy & CO₂ Emission Reduction:

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

5. Waste Management:

5.1 Segregation of Waste at Source:

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

5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

5.4 E-Waste Management:

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

5.5 Sanitary Waste Incinerator:

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

6. Rain Water Management:

The College has installed the Rainwater management 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
- Display of Posters on Resource Conservation
- Best Practices and Initiative for Social Awareness

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

9. References:

- For CO₂ 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

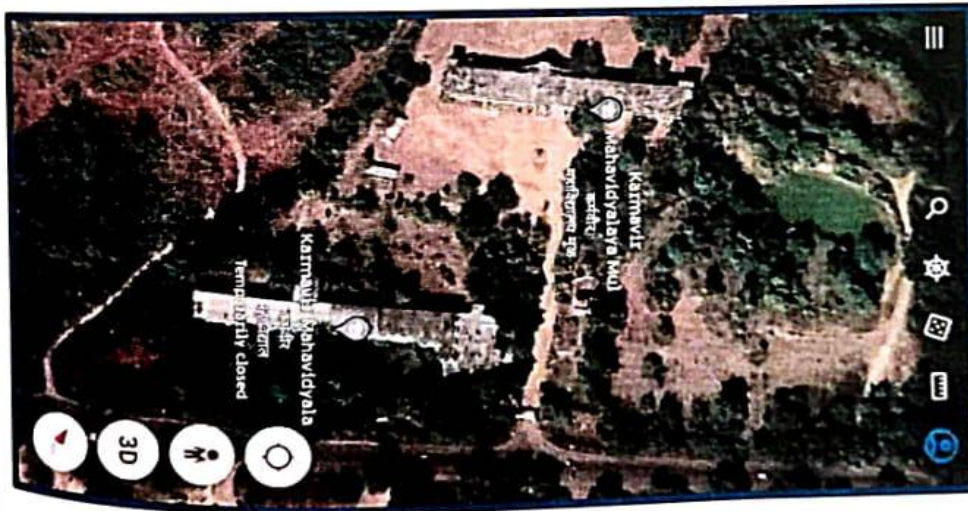
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



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- 2019-20:

No	Month	Energy Purchased, kWh
1	Apr-19	1181
2	May-19	739
3	Jun-19	677
4	Jul-19	607
5	Aug-19	577
6	Sep-19	585
7	Oct-19	648
8	Nov-19	377
9	Dec-19	304
10	Jan-20	278
11	Feb-20	11
12	Mar-20	12
13	Total	5996
14	Maximum	1181
15	Minimum	11
16	Average	499.666

Chart No 1: Variation In Monthly Energy Consumption:

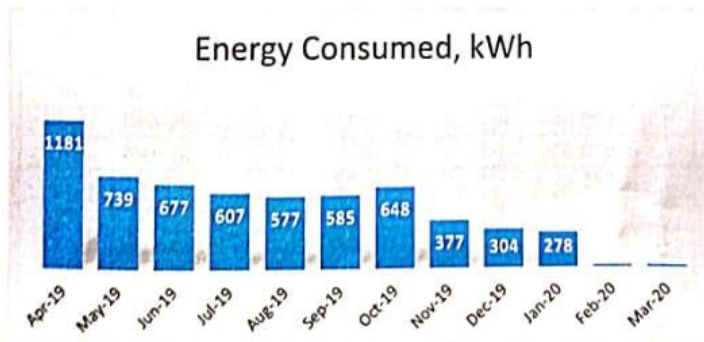


Table No 3: Variation In Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	5996
2	Maximum	1181
3	Minimum	11
4	Average	499.666

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 CO₂ Emissions:

The basis of Calculation for CO₂ emissions is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-19	1181	1.062
2	May-19	739	0.665
3	Jun-19	677	0.609
4	Jul-19	607	0.546
5	Aug-19	577	0.519
6	Sep-19	585	0.526
7	Oct-19	648	0.583
8	Nov-19	377	0.339
9	Dec-19	304	0.273
10	Jan-20	278	0.250
11	Feb-20	11	0.009
12	Mar-20	12	0.010
13	Total	5996	5.396
14	Maximum	1181	1.062
15	Minimum	11	0.009
16	Average	499.666	0.449

Chart No 2: Month wise CO₂ Emissions:

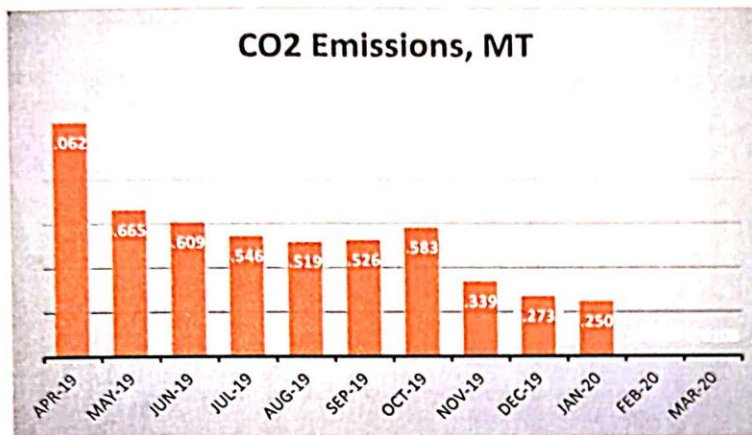


Table No 5: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	5996	5.396
2	Maximum	1181	1.062
3	Minimum	11	0.009
4	Average	499.666	0.449

CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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

5.2 Overall
The College
Findings

5.3 Liquid Waste

The College

5.4 Air

The College

5.5 Noise

The College

5.6

5.7

5.8

5.9

5.10

5.11

5.12

5.13

5.14

5.15

5.16

5.17

5.18

5.19



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

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



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



5.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

5.5 Sanitary Waste Incinerator:

The College has not install Sanitary Waste Incinerator. It is recommended to install Sanitary Waste Incinerator.

CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:

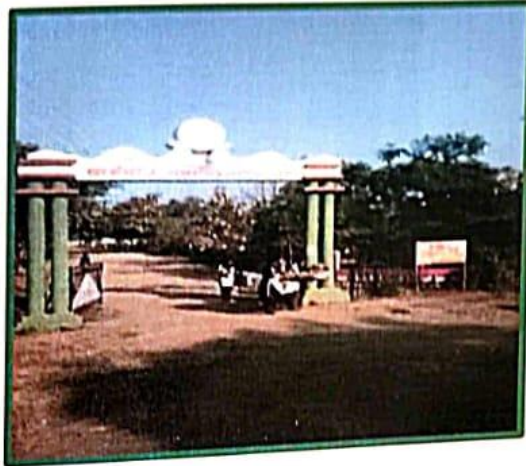


CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



7.3 Provision of Ramp:

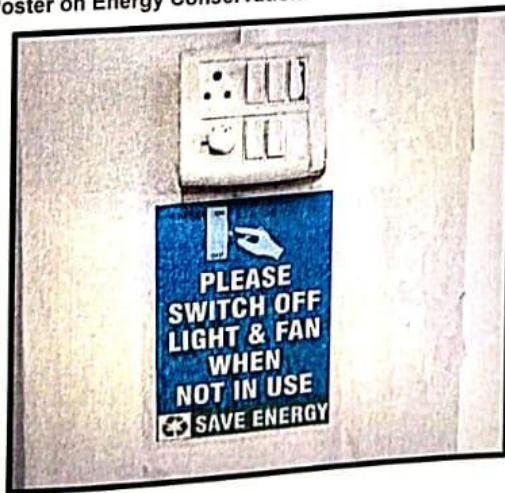
The College has facility for ramp, for easy movement for Divyaang.



7.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



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

The college has more than 1000 trees planted within campus, some of that listed below:

Sr.No.	Plant Name	Scientific Name
1	Karanj	Millettia pinnata
2	Gulmohar	Delonix regia
3	Saptaparni	Alstonia scholaris
4	Palas	Butea monosperma
5	Behada	Terminalia bellirica
6	Kaduneem	Azadirachta indica
7	Ashoka	Saraca asoca
8	Pimpal	Ficus religiosa
9	Lemon	Citrus lemon
10	Vidya	Thuja sp.
11	Chafa	Magnolia champaca
12	Hibiscus	Hibiscus rosa- sinensis
13	Teak Wood	Tectona grandis
14	Babul	Vachellia nilotica
15	Mehandi	Lawsonia inermis



Energy audit, Green audit, Environment audit

2020-21

ENERGY AUDIT REPORT OF Karmavir Mahavidyalaya, Mul Chandrapur



Year: 2020-21

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001:2008 Reg. no. PG 91 / 2462



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,

Aundh, Pune, Maharashtra 411067

Ph No. 020-35000450

Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577

22nd April, 2021

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

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

Name and Address of the firm : M/s Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangam English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation
Programme for Class 'A'

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

Enrich Consultants, Pune



Energy Audit Report: Karmavir Mahavidyalaya, Mul: 20-21

Enrich Consultants

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

Ref: EC/KMC/20-21/21

Date: 22/05/2021

CERTIFICATE

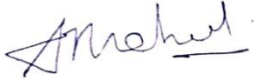
This is to certify that we have conducted Energy Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2020-21.

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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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 *Karmavir Mahavidyalaya, Mul* for awarding us the assignment of *Energy Audit of their Campus* for the Academic Year: 20-21.

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

Enrich Consultants, Pune



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	427	0.384
2	Maximum	66	0.059
3	Minimum	11	0.009
4	Average	35.583	0.032

3. Energy Conservation projects already installed:

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

4. Usage of Alternate Energy:

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

5. Usage of LED Lighting:

- The Total Lighting load of College is 2.56 kW.
- The LED Lighting Load is 0.48 kW.
- The % of LED Lighting to Total Lighting Load is 18.75 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. 100 LPD Solar Thermal System saves 1500 kWh of Electrical Energy per Annum.
3. Daily working hours-4 Nos (For Lighting Calculations)
4. Annual working Days-120 Nos (For Lighting Calculations)

7. References:

- For CO₂ 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



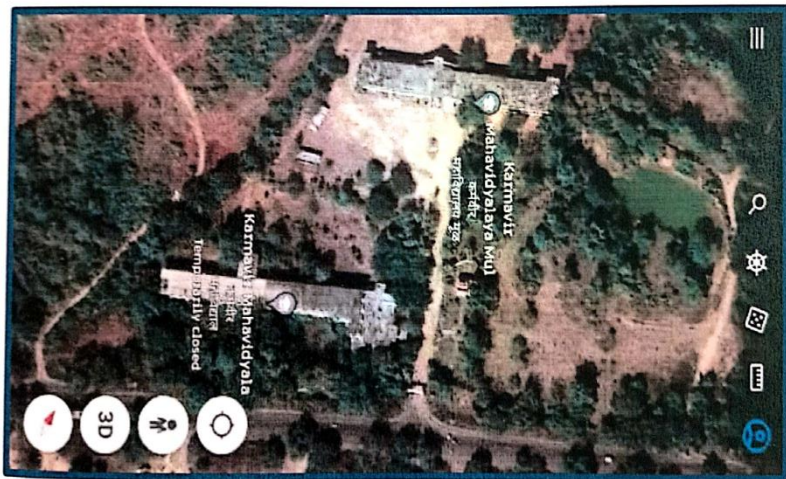
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study the present CO₂ 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	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



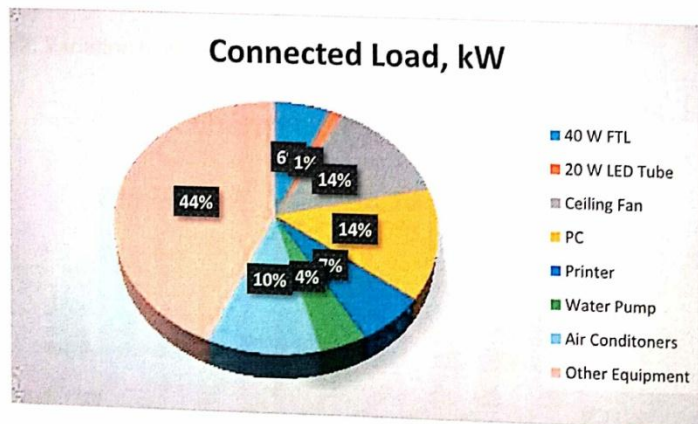
CHAPTER-II STUDY OF CONNECTED LOAD

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	52	40	2.08
2	20 W LED Tube	24	20	0.48
4	Ceiling Fan	71	65	4.615
5	PC	32	150	4.8
6	Printer	15	150	2.25
7	Water Pump	2	746	1.492
8	Air Conditioners	1	3500	3.5
9	Other Equipment	100	150	15
10	Total			34

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- 2020-21:

No	Month	Energy Purchased, kWh
1	Apr-20	21
2	May-20	63
3	Jun-20	63
4	Jul-20	45
5	Aug-20	66
6	Sep-20	52
7	Oct-20	31
8	Nov-20	23
9	Dec-20	17
10	Jan-21	20
11	Feb-21	11
12	Mar-21	15
13	Total	427
14	Maximum	66
15	Minimum	11
16	Average	35.583

Chart No 2: Variation in Monthly Energy Consumption:

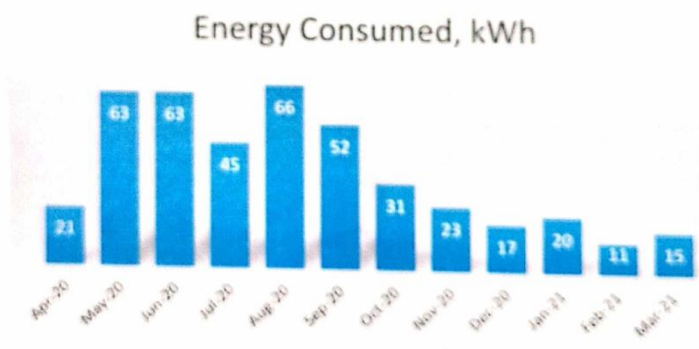


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	427
2	Maximum	66
3	Minimum	11
4	Average	35.58



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 CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-20	21	0.018
2	May-20	63	0.056
3	Jun-20	63	0.056
4	Jul-20	45	0.040
5	Aug-20	66	0.059
6	Sep-20	52	0.046
7	Oct-20	31	0.027
8	Nov-20	23	0.020
9	Dec-20	17	0.015
10	Jan-21	20	0.018
11	Feb-21	11	0.009
12	Mar-21	15	0.013
13	Total	427	0.384
14	Maximum	66	0.059
15	Minimum	11	0.009
16	Average	35.583	0.032

Enrich Consultants, Pune



Chart No 3: Month wise CO₂ Emissions:

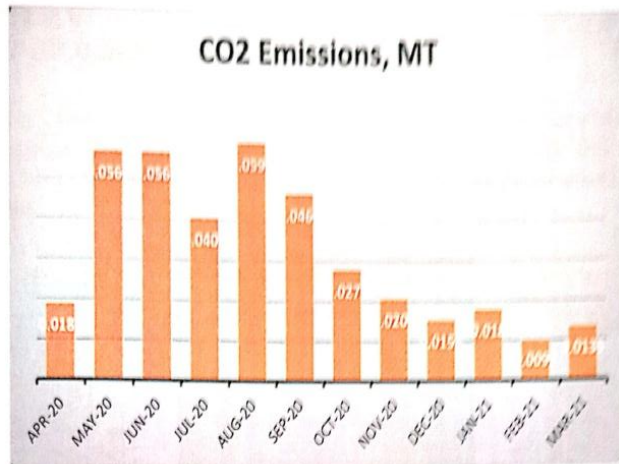


Table No 6: Important Parameters:

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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. College has taken initiate to used solar energy by installing solar street lamp within the campus.



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 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	24	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.48	kW
7	Total Lighting Load=3+6	2.56	kW
8	Total LED Lighting Load= 6	0.48	kW
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	18.75	%



GREEN AUDIT REPORT
OF
Karmavir Mahavidyalaya, Mul
Chandrapur



Year: 2020-21

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY
As ISO 9001:2008 Reg. No. 0429117362

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaerda.com, Web: www.mahaerda.com

ECN/2021-22/CR-14/1577 22nd April, 2021

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


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

Name and Address of the firm : M/s Enrich Consultants
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Near Muktagan English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation Programme for Class 'A'

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.


General Manager (EC)

Enrich Consultants, Pune



Enrich Consultants

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

Ref: EC/KMC/20-21/21

Date: 20/07/2021

CERTIFICATE

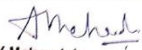
This is to certify that we have conducted Green Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2020-21.

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 Tank and is cleaned periodically.
- Implementation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

For 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 at Karmavir Mahavidyalaya, Mul, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 2020-21.

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

Enrich Consultants, Pune



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	427	0.384
2	Maximum	66	0.059
3	Minimum	11	0.009
4	Average	35.583	0.032

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy & CO₂ Emission Reduction:

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

5. Waste Management:

5.1 Segregation of Waste at Source:

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

5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

5.4 E-Waste Management:

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

5.5 Sanitary Waste Incinerator:

It is recommended to install Sanitary Waste Incinerator for sanitary waste disposal.

6. Rain Water Management:

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



Green Audit Report: Karmavir Mahavidyalaya, Mul: 20-21

7. Green & Sustainable Initiatives

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

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

9. References:

- For CO₂ Emissions: www.tatapower.com

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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



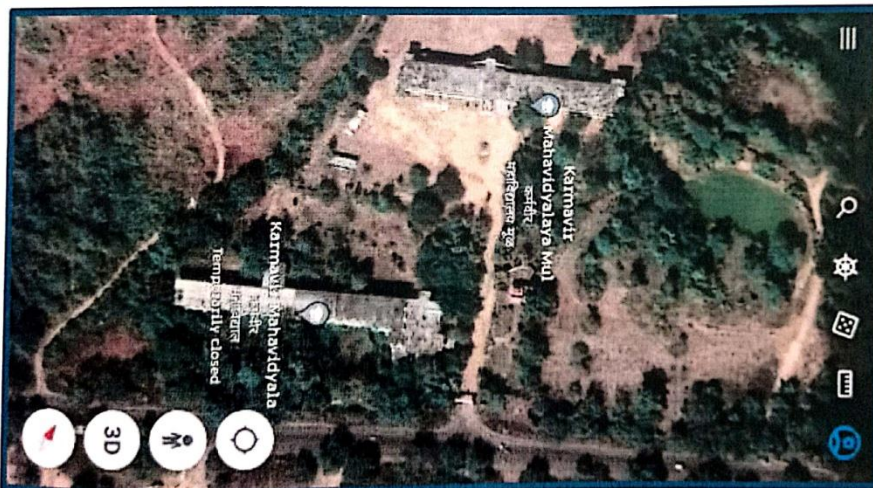
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



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- 2020-21:

No	Month	Energy Purchased, kWh
1	Apr-20	21
2	May-20	63
3	Jun-20	63
4	Jul-20	45
5	Aug-20	66
6	Sep-20	52
7	Oct-20	31
8	Nov-20	23
9	Dec-20	17
10	Jan-21	20
11	Feb-21	11
12	Mar-21	15
13	Total	427
14	Maximum	66
15	Minimum	11
16	Average	35.583

Chart No 1: Variation in Monthly Energy Consumption:

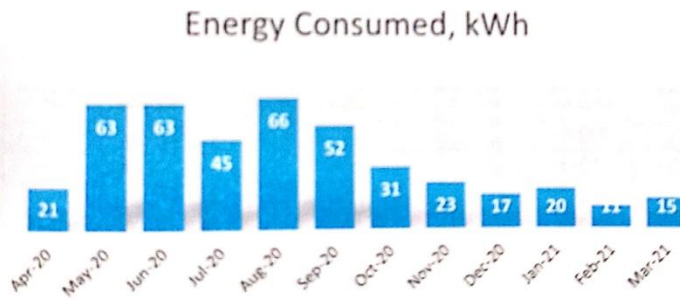


Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	427
2	Maximum	66
3	Minimum	11
4	Average	35.58

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 CO₂ Emissions:

The basis of Calculation for CO₂ emissions is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-20	21	0.018
2	May-20	63	0.056
3	Jun-20	63	0.056
4	Jul-20	45	0.040
5	Aug-20	66	0.059
6	Sep-20	52	0.046
7	Oct-20	31	0.027
8	Nov-20	23	0.020
9	Dec-20	17	0.015
10	Jan-21	20	0.018
11	Feb-21	11	0.009
12	Mar-21	15	0.013
13	Total	427	0.384
14	Maximum	66	0.059
15	Minimum	11	0.009
16	Average	35.583	0.032



Chart No 2: Month wise CO₂ Emissions;

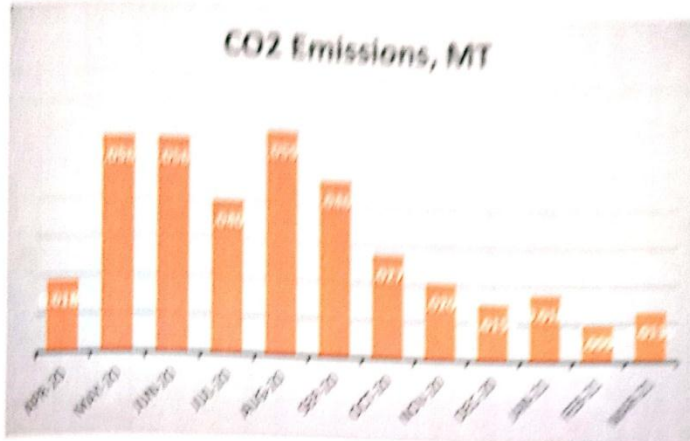


Table No 5: Variation in Important Parameters;

No	Parameter/ Variation	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	427	0.384
2	Maximum	66	0.059
3	Minimum	11	0.009
4	Average	35.583	0.032

CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

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



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



5.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

5.5 Sanitary Waste Incinerator:

The College has not install Sanitary Waste Incinerator. It is recommended to install Sanitary Waste Incinerator.

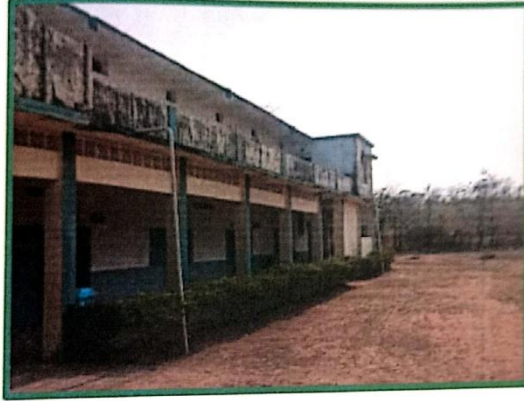
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CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:

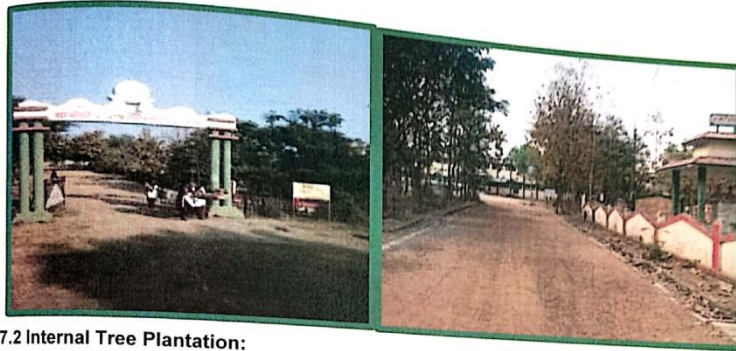


CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



7.3 Provision of Ramp:

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



7.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



7.5 Best Practices and Initiative for Social Awareness:

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

Photograph of Best Practices and Initiative:



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

The college has more than 1000 trees planted within campus, some of that listed below:

Sr.No.	Plant Name	Scientific Name
1	Karanj	Millettia pinnata
2	Gulmohar	Delonix regia
3	Saptaparni	Alstonia scholaris
4	Palas	Butea monosperma
5	Behada	Terminalia bellirica
6	Kaduneem	Azadirachta indica
7	Ashoka	Saraca asoca
8	Pimpal	Ficus religiosa
9	Lemon	Citrus lemon
10	Vidya	Thuja sp.
11	Chafa	Magnolia champaca
12	Hibiscus	Hibiscus rosa- sinensis
13	Teak Wood	Tectona grandis
14	Babul	Vachellia nilotica
15	Mehandi	Lawsonia inermis

ENVIRONMENTAL AUDIT REPORT OF Karmavir Mahavidyalaya, Mul Chandrapur



Year: 2020-2021

Prepared by:

Enrich Consultants

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





MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001:2008 Reg. No. MG 91/1802

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No. 020-35000450
Email: eee@mahaarja.com, Web: www.mahaarja.com

ECN/2021-22/CR-14/1577

22nd April, 2021

CERTIFICATE OF REGISTRATION FOR CLASS 'A'

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

Name and Address of the firm : M/s Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation Programme for Class 'A'

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

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General Manager (EC)



Enrich Consultants

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

Ref: EC/KMC/20-21/21

Date: 22/05/2021

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2020-21.

The College has adopted following Environment Friendly Practices:

- 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 tanks and cleans periodically.
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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ACKNOWLEDGEMENT

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

Enrich Consultants, Pune



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Various Pollution due to College Activities:
 - Air pollution: Mainly CO₂ on account of Electricity Consumption
 - Solid Waste: Bio degradable Garden Waste
 - Liquid Waste: Human liquid waste
3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	427	0.384
2	Maximum	66	0.059
3	Minimum	11	0.009
4	Average	35.583	0.032

4. Various initiatives taken for Energy Conservation:

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

5. Usage of Renewable Energy & Reduction in CO₂ Emission:

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

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	84	76	72
2	Minimum	80	71	66

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	39.5	36	310	42
2	Minimum	38	34	250	37

8. Waste Management:

8.1 Segregation of Waste at Source:

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

8.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

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The College has installed Septic and is cleaned periodically.

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

9. Rain Water Management:

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

10. Environment Friendly Initiatives:

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

11. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

12. References:

- For CO₂ Emissions: www.tatapower.com
- For Energy Saved by Solar Thermal Water Heating System: www.mahaurja.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	: Kilo Gram
MSEDCL	: Maharashtra State Distribution Company Limited
MT	: Metric Ton
kWh	: kilo-Watt Hour
LPD	: Liters per Day
LED	: Light Emitting Diode
AQI	: Air Quality Index
PM-2.5	: Particulate Matter of Size 2.5 Micron
PM-10	: Particulate Matter of Size 10 Micron
CPCB	: Central Pollution Control Board
ISHRAE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers



CHAPTER-I INTRODUCTION

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

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

1.1.2. Environmental Audit: Definition:

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

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

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

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

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

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

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

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

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. Study Resource Consumption & CO₂ Emissions
2. Study of CO₂ Emission Reduction
3. Study of Indoor Air Quality Parameters
4. Study of Indoor Comfort Condition Parameters
5. Study of Waste Management
6. Study of Rain Water Management
7. Study of Environment Friendly Initiatives

1.3 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



Erech Consultants, Pune



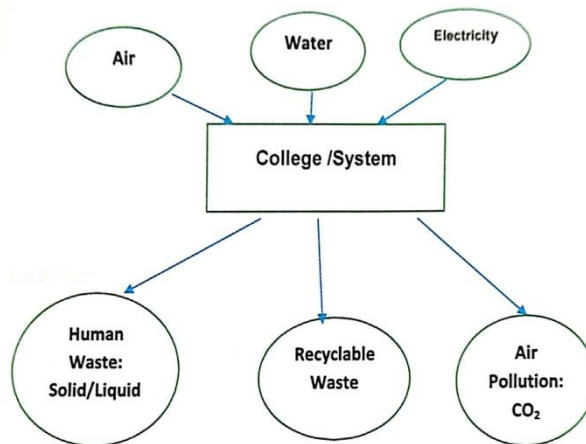
CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.

Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy.

The basis of Calculation for CO₂ emissions due to usage of Electrical Energy are as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 2020-21:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-20	21	0.018
2	May-20	63	0.056
3	Jun-20	63	0.056
4	Jul-20	45	0.040
5	Aug-20	66	0.059
6	Sep-20	52	0.046
7	Oct-20	31	0.027
8	Nov-20	23	0.020
9	Dec-20	17	0.015
10	Jan-21	20	0.018
11	Feb-21	11	0.009
12	Mar-21	15	0.013
13	Total	427	0.384
14	Maximum	66	0.059
15	Minimum	11	0.009
16	Average	35.583	0.032

Chart No 2: Month wise CO₂ Emissions:

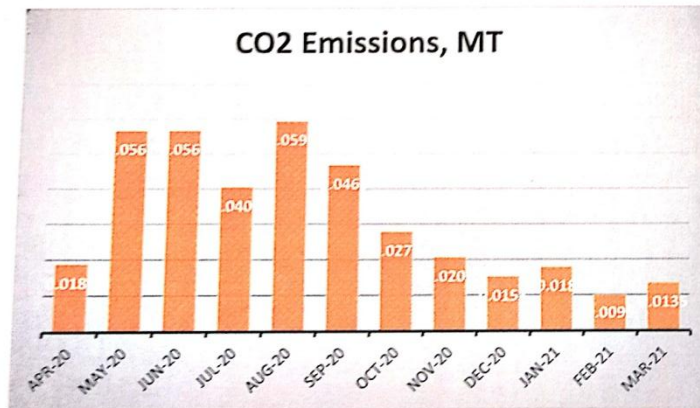


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	427	0.384
2	Maximum	66	0.059
3	Minimum	11	0.009
4	Average	35.583	0.032

CHAPTER III STUDY OF CO₂ EMISSION REDUCTION

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



CHAPTER IV STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

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

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

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

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

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

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 'air pollution' has been defined as 'the presence in the atmosphere of any air pollutant.'

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the AQI requires an **air monitor** and an **air pollutant** concentration over a specified averaging period.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Locations	AQI	PM2.5	PM10
(Arts & Commerce Building)				
1	Principal Cabin	80	74	72
2	Admin Office	82	76	71
3	IQAC Room	82	73	71
4	Staff Room	80	74	71
5	Commerce Dept.	81	74	72
6	Humanities Dept.	80	71	70
7	ICT Room	80	72	72

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8	NSS Room	81	73	72
9	Class Room 1	83	73	71
10	Class Room 2	82	74	70
Science Building				
11	Community Hall	84	72	68
12	Class Room 1	83	72	67
13	Class Room 2	82	72	67
14	Physics Lab	82	73	68
15	Chemistry Lab	82	72	68
16	Biology Lab	83	74	69
17	Staff Room	83	74	68
18	Library	83	72	66
19	Maximum	84	76	72
20	Minimum	80	71	66

CHAPTER V STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No9: Study of Indoor Comfort Condition Parameters:

No	Locations	Temperature (°C)	Humidity (%)	Lux Level	Noise Level (dB)
Arts & Commerce Building					
1	Principal Cabin	38	35	295	40
2	Admin Office	38	34	290	41
3	IQAC Room	39	35	310	40
4	Staff Room	38	38	260	40
5	Commerce Dept.	39.5	35	305	41
6	Humanities Dept.	39.5	35	305	42
7	ICT Room	39	35	298	42
8	NSS Room	39	35	298	42
9	Class Room 1	38	35	305	40
10	Class Room 2	38	36	310	40
Science Building					
11	Community Hall	38	36	286	40
12	Class Room 1	38	36	290	40
13	Class Room 2	39	35	295	41
14	Physics Lab	39.5	35	278	42
15	Chemistry Lab	38	35	280	40
16	Biology Lab	38	36	285	40
17	Staff Room	39	36	256	41
18	Library	38	35	250	37
19	Maximum	39.5	36	310	42
20	Minimum	38	34	250	37

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

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

Photograph of Waste Collection Bins:



6.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



6.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

6.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

6.5 Sanitary Waste Incinerator:

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

CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:



CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



**ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR
COMFORT STANDARDS:**

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5

3. Recommended Noise Level Standards:

No	Location	Noise Level (dB)
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33°C
2	Humidity	Less Than 70%



Energy audit, Green audit, Environment audit

2021-2022

ENERGY AUDIT REPORT OF Karmavir Mahavidyalaya, Mul Chandrapur



Year: 2021-22

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35009450
Email: eec@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577

22nd April, 2021

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

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

Name and Address of the firm : M/s Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktagan English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation
Programme for Class 'A'

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)



Energy Audit Report: Karmavir Mahavidyalaya, Mul. 21-22

Enrich Consultants

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

Ref: EC/KMC/21-22/25

Date: 09/02/2023

CERTIFICATE

This is to certify that we have conducted Energy Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2021-22.

The College has adopted following Energy Efficient practices:

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

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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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 Karmavir Mahavidyalaya, Mul for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 21-22.

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



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.3904
2	Maximum	365	0.3285
3	Minimum	11	0.0099
4	Average	221.33	0.1992

3. Energy Conservation projects already installed:

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

4. Usage of Alternate Energy:

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

5. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is 460.80 kWh.
- The Total Annual LED Lighting Demand is 211.12 kWh.
- The percentage of Annual LED Lighting to Annual Lighting Demand is 45.83 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. 100 LPD Solar Thermal System saves 1500 kWh of Electrical Energy per Annum.
3. Daily working hours-4 Nos (For Lighting Calculations)
4. Annual working Days-120 Nos (For Lighting Calculations)

7. References:

- For CO₂ 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



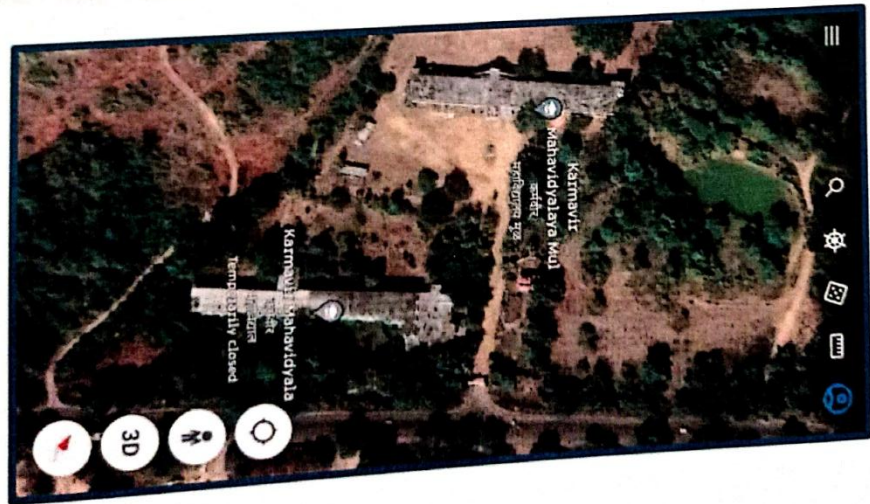
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study the present CO₂ 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	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



CHAPTER-II

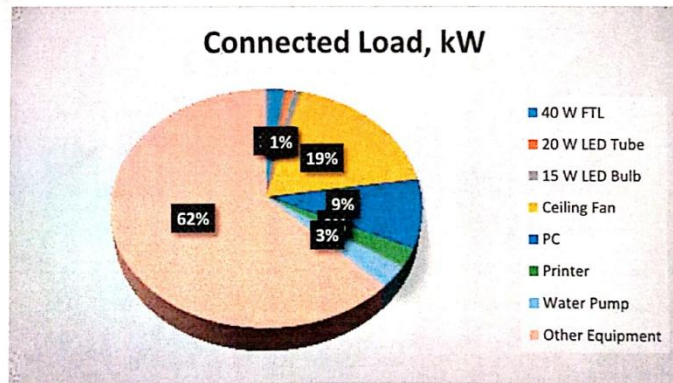
STUDY OF CONNECTED LOAD

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	52	40	2.08
2	20 W LED Tube	24	20	0.48
4	Ceiling Fan	71	65	4.615
5	PC	32	150	4.8
6	Printer	15	150	2.25
7	Water Pump	2	746	1.492
8	Air Conditioners	1	3500	3.5
9	Other Equipment	100	150	15
10	Total			34

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- 2021-22:

No	Month	Energy Purchased, kWh
1	Apr-21	342
2	May-21	242
3	Jun-21	141
4	Jul-21	213
5	Aug-21	270
6	Sep-21	321
7	Oct-21	273
8	Nov-21	365
9	Dec-21	278
10	Jan-22	189
11	Feb-22	11
12	Mar-22	11
13	Total	2656
14	Maximum	365
15	Minimum	11
16	Average	221.33

Chart No 2: Variation in Monthly Energy Consumption:

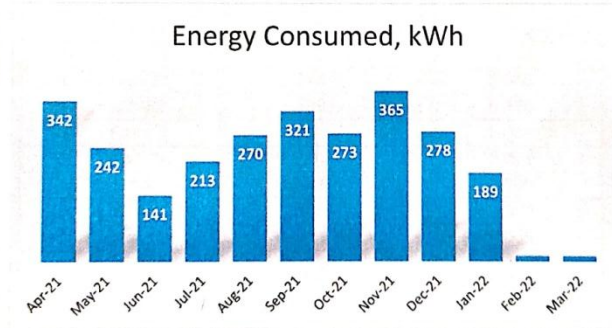


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	2656
2	Maximum	365
3	Minimum	11
4	Average	221.33



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 CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	342	0.307
2	May-21	242	0.217
3	Jun-21	141	0.126
4	Jul-21	213	0.191
5	Aug-21	270	0.243
6	Sep-21	321	0.288
7	Oct-21	273	0.245
8	Nov-21	365	0.328
9	Dec-21	278	0.250
10	Jan-22	189	0.170
11	Feb-22	11	0.009
12	Mar-22	11	0.009
13	Total	2656	2.390
14	Maximum	365	0.328
15	Minimum	11	0.009
16	Average	221.33	0.199



Chart No 3: Month wise CO₂ Emissions:

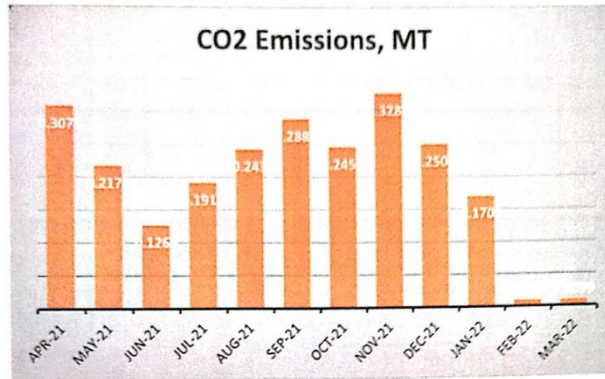


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	2656	2.390
2	Maximum	365	0.328
3	Minimum	11	0.009
4	Average	221.33	0.199



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, College has taken initiate to used solar energy by installing solar street lamp within the campus.



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 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	24	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.48	kW
7	Total Lighting Load=3+6	2.56	kW
8	Total LED Lighting Load= 6	0.48	kW
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	18.75	%

GREEN AUDIT REPORT
OF
**Karmavir Mahavidyalaya, Mul
Chandrapur**



Year: 2021-22

Prepared by:

Enrich Consultants

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



MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001:2015 Reg. No. 42331/2482

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eeec@maharaja.com, Web: www.maharaja.com

ECN/2021-22/CR-14/1577 22nd April, 2021

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


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

Name and Address of the firm : M/s Enrich Consultants
Yashabree, Plot No. 26, Nirmal Bag Society,
Near Muktiangan English School, Parvati,
Pune - 411009.

Registration Category : Empowered Consultant for Energy Conservation Programme for Class 'A'

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

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- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empowerment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme.
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General Manager (EC)



Enrich Consultants

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

Ref: EC/KMC/21-22/25

Date: 09/02/2023

CERTIFICATE

This is to certify that we have conducted Green Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2021-22.

The College has adopted following Green Initiatives:

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

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

INDEX

Enrich Consultants, Pune



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ACKNOWLEDGEMENT

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

Enrich Consultants, Pune



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.3904
2	Maximum	365	0.3285
3	Minimum	11	0.0099
4	Average	221.33	0.1992

3. Various initiatives taken for Energy Conservation:

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

4. Usage of Renewable Energy & CO₂ Emission Reduction:

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

5. Waste Management:

- 5.1 Segregation of Waste at Source:

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

- 5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

- 5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

- 5.4 E-Waste Management:

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

- 5.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator. It is recommended to install the sanitary waste disposal.

6. Rain Water Management:

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

Enrich Consultants, Pune



7. Green & Sustainable Initiatives

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

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

9. References:

- For CO₂ 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



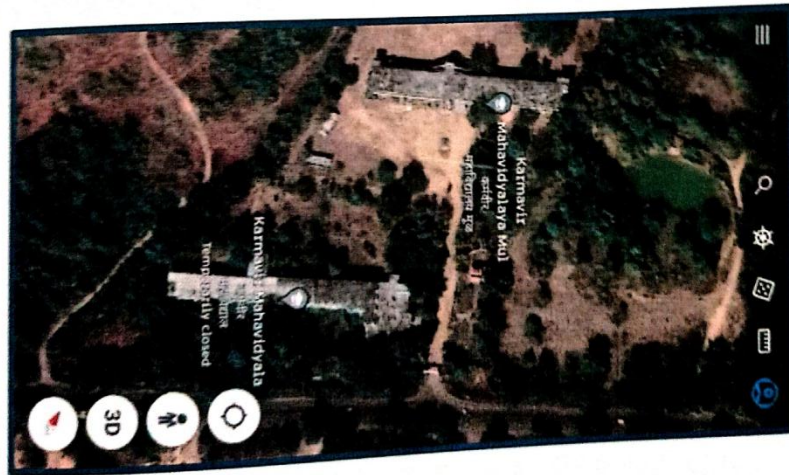
CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



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- 2021-22:

No	Month	Energy Purchased, kWh
1	Apr-21	342
2	May-21	242
3	Jun-21	141
4	Jul-21	213
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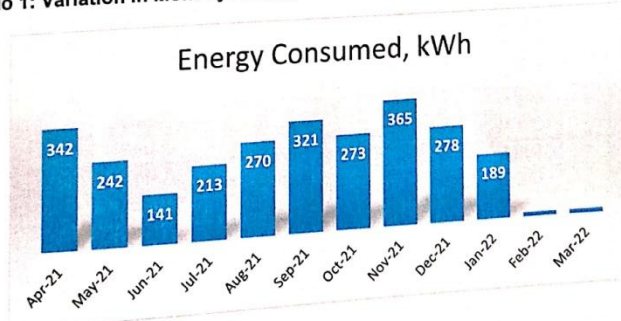


Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	2656
2	Maximum	365
3	Minimum	11
4	Average	221.33



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 CO₂ Emissions:

The basis of Calculation for CO₂ emissions is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	342	0.307
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Chart No 2: Month wise CO₂Emissions:

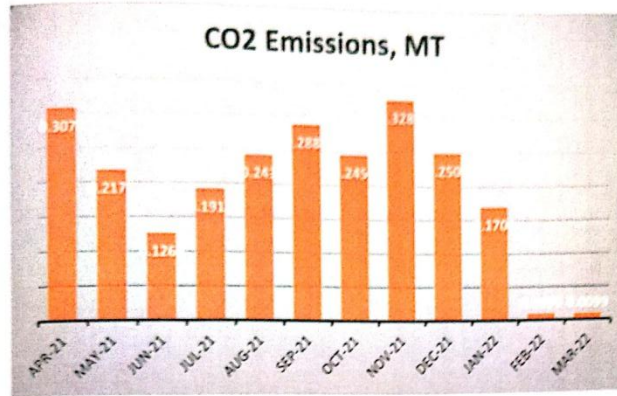


Table No 5: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.390
2	Maximum	365	0.328
3	Minimum	11	0.009
4	Average	221.33	0.199

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

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



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

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



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



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The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

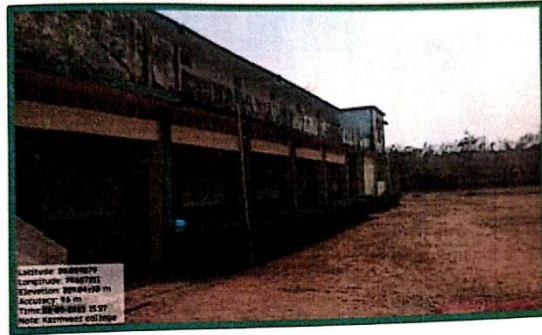
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CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:



Enrich Consultants, Pune



CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:

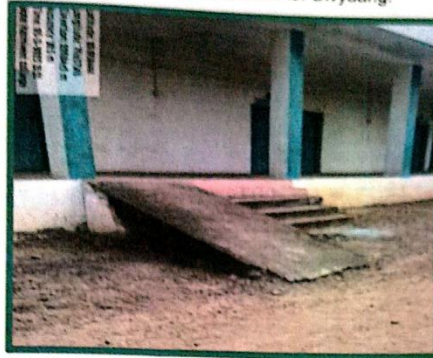


Enrich Consultants, Pune



7.3 Provision of Ramp:

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



7.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



ANNEXURE-1:

DETAILS OF TREES & PLANTS:

The college has more than 1000 trees planted within campus, some of that listed below:

Sr.No.	Plant Name	Scientific Name
1	Karanj	Millettia pinnata
2	Gulmohar	Delonix regia
3	Saptaparni	Alstonia scholaris
4	Palas	Butea monosperma
5	Behada	Terminalia bellirica
6	Kaduneem	Azadirachta indica
7	Ashoka	Saraca asoca
8	Pimpal	Ficus religiosa
9	Lemon	Citrus lemon
10	Vidya	Thuja sp.
11	Chafa	Magnolia champaca
12	Hibiscus	Hibiscus rosa- sinensis
13	Teak Wood	Tectona grandis
14	Babul	Vachellia nilotica
15	Mehandi	Lawsonia inermis



ENVIRONMENTAL AUDIT REPORT
OF
Karmavir Mahavidyalaya, Mul
Chandrapur



Year: 2021-2022

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
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MAHARASHTRA ENERGY DEVELOPMENT AGENCY
AN ISO 9001 : 2009 Reg. No. ME/91 / 2962

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(Government of Maharashtra Institution)
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Email: esse@mahaaurja.com, Web: www.mahaaurja.com

ECN/2021-22/CR-14/1577 22nd April, 2021

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


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

Name and Address of the firm : M/s Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktagan English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation Programme for Class 'A'

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.


General Manager (EC)



Enrich Consultants, Pune



Enrich Consultants

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

Ref: EC/KMC/21-22/25

Date: 09/02/2023

CERTIFICATE

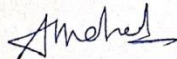
This is to certify that we have conducted Environmental Audit at Karmavir Mahavidyalaya, Mul in the Academic year 2021-22.

The College has adopted following Environment Friendly Practices:

- 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 tanks and cleans periodically.
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

For Enrich Consultants,



A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788



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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management Karmavir Mahavidyalaya, Mul for awarding us the assignment of Environmental Audit of their Campus for the Academic Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Karmavir Mahavidyalaya, Mul consumes Energy in the form of Electrical Energy Used for various Electrical Equipment, Office & other facilities.
2. Various Pollution due to College Activities:
 - Air pollution: Mainly CO₂ on account of Electricity Consumption
 - Solid Waste: Bio degradable Garden Waste
 - Liquid Waste: Human liquid waste
3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.3904
2	Maximum	365	0.3285
3	Minimum	11	0.0099
4	Average	221.33	0.1992

4. Various initiatives taken for Energy Conservation:

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

5. Usage of Renewable Energy & Reduction in CO₂ Emission:

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

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	109	103	107
2	Minimum	99	98	97

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	33	29	314	42
2	Minimum	31	28	246	37



8. Waste Management:

8.1 Segregation of Waste at Source:

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

8.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

8.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

8.4 E-Waste Management:

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

9. Rain Water Management:

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

10. Environment Friendly Initiatives:

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

11. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

12. References:

- For CO₂ Emissions: www.tatapower.com
- For Energy Saved by Solar Thermal Water Heating System: www.mahauria.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com



ABBREVIATIONS

Kg	: Kilo Gram
MSEDCL	: Maharashtra State Distribution Company Limited
MT	: Metric Ton
kWh	: kilo-Watt Hour
LPD	: Liters per Day
LED	: Light Emitting Diode
AQI	: Air Quality Index
PM-2.5	: Particulate Matter of Size 2.5 Micron
PM-10	: Particulate Matter of Size 10 Micron
CPCB	: Central Pollution Control Board
ISHRAE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers



CHAPTER-I INTRODUCTION

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

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

1.1.2. Environmental Audit: Definition:

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

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

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

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

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

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

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules



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

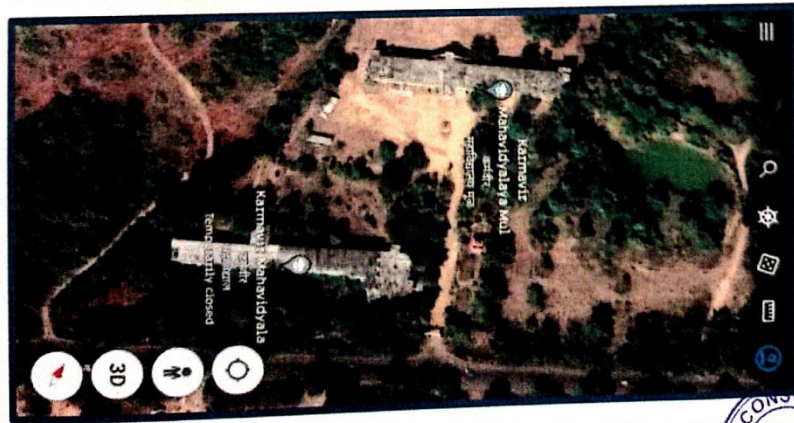
1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. Study Resource Consumption & CO₂ Emissions
2. Study of CO₂ Emission Reduction
3. Study of Indoor Air Quality Parameters
4. Study of Indoor Comfort Condition Parameters
5. Study of Waste Management
6. Study of Rain Water Management
7. Study of Environment Friendly Initiatives

1.3 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	Karmavir Mahavidyalaya
2	Address	Near Railway Crossing, MSH7, Mul Dist: Chandrapur 441 224
3	Affiliation	Gondwana, University, Gadchiroli



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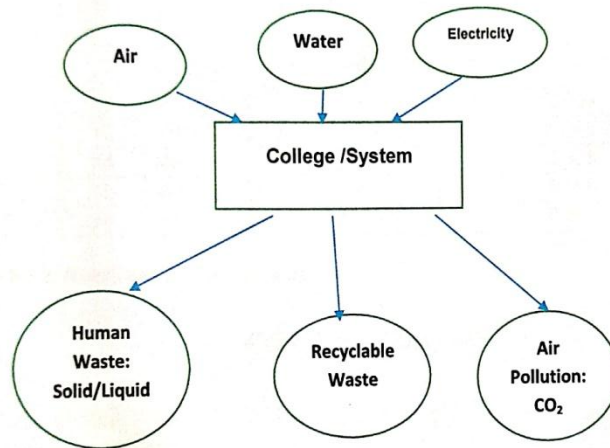


CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.
Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy.

The basis of Calculation for CO₂ emissions due to usage of Electrical Energy are as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 2021-22:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	342	0.307
2	May-21	242	0.217
3	Jun-21	141	0.126
4	Jul-21	213	0.191
5	Aug-21	270	0.243
6	Sep-21	321	0.288
7	Oct-21	273	0.245
8	Nov-21	365	0.328
9	Dec-21	278	0.250
10	Jan-22	189	0.170
11	Feb-22	11	0.009
12	Mar-22	11	0.009
13	Total	2656	2.390
14	Maximum	365	0.328
15	Minimum	11	0.009
16	Average	221.33	0.199

Chart No 2: Month wise CO₂ Emissions:

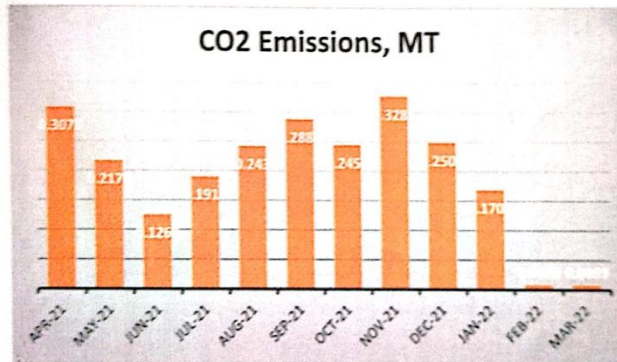


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	2656	2.390
2	Maximum	365	0.328
3	Minimum	11	0.009
4	Average	221.33	0.199



CHAPTER III
STUDY OF CO₂ EMISSION REDUCTION

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



CHAPTER IV STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

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

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

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

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

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

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 'air pollution' has been defined as 'the presence in the atmosphere of any air pollutant.'

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the AQI requires an **air monitor** and an **air pollutant** concentration over a specified averaging period.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Locations	AQI	PM2.5	PM10
(Arts & Commerce Building)				
1	Principal Cabin	108	101	107
2	Admin Office	107	102	107
3	IQAC Room	107	101	105
4	Staff Room	107	103	103
5	Commerce Dept.	106	101	102
6	Humanities Dept.	105	98	101
7	ICT Room	103	101	104

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8	NSS Room	109	102	101
9	Class Room 1	106	101	97
10	Class Room 2	105	101	101
Science Building				
11	Community Hall	99	102	98
12	Class Room 1	103	101	101
13	Class Room 2	105	102	102
14	Physics Lab	107	102	104
15	Chemistry Lab	99	100	104
16	Biology Lab	105	104	103
17	Staff Room	104	102	103
18	Library	106	101	102
19	Maximum	109	103	107
20	Minimum	99	98	97

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CHAPTER V STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No9: Study of Indoor Comfort Condition Parameters:

No	Locations	Temperature (°C)	Humidity (%)	Lux Level	Noise Level (dB)
Arts & Commerce Building					
1	Principal Cabin	32	29	290	40
2	Admin Office	32	28	291	41
3	IQAC Room	33	28	301	40
4	Staff Room	32.5	29	265	40
5	Commerce Dept.	32.5	28	302	41
6	Humanities Dept.	39.5	28	304	42
7	ICT Room	33	28	290	42
8	NSS Room	33	28	287	42
9	Class Room 1	33	28	301	40
10	Class Room 2	33	29	314	40
Science Building					
11	Community Hall	32	29	279	40
12	Class Room 1	32	28	289	40
13	Class Room 2	32.5	28	291	41
14	Physics Lab	32.5	29	275	42
15	Chemistry Lab	33	28	277	40
16	Biology Lab	33	28	296	40
17	Staff Room	33	28	295	41
18	Library	31	28	246	37
19	Maximum	33	29	314	42
20	Minimum	31	28	246	37

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

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

Photograph of Waste Collection Bins:



6.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



6.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

6.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

6.5 Sanitary Waste Incinerator:

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

CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management 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 table.

Photograph of Rain Water Management Pipe:

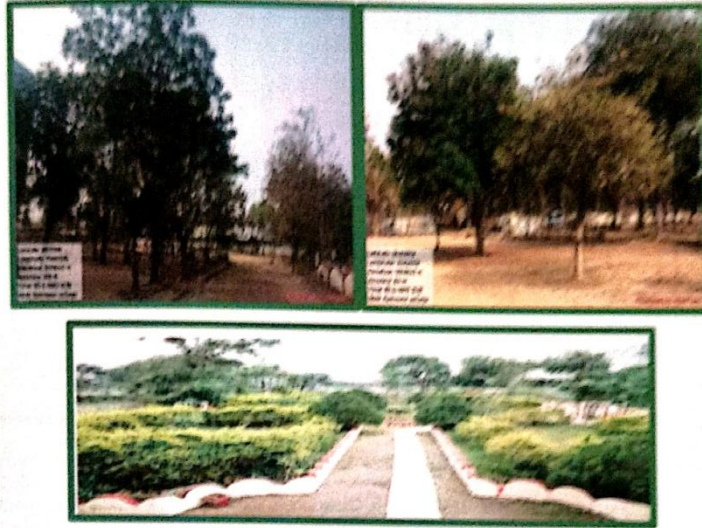


CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



**ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR
COMFORT STANDARDS:**

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5



3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33°C
2	Humidity	Less Than 70%

