Late Chindhuji Laxmanrao Purke Shikshan Prasarak Mandal's

Indira Gandhi Kala Mahavidyalaya,

Ralegaon - 445402, Dist. Yavatmal (M.S.)

Affiliated to Sant Gadge Baba Amravati University

Website -www.igkmralegaon.org **E-mail - igkm490@gmail.com**

ENVIRONMENTAL AUDIT

Index

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/IGC/23-24/03 **Date: 30/05/2024**

This is to certify that we have conducted Environmental Audit at Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal, in the Academic year 2023-24.

.The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Segregation of Waste at Source
- Installation of Bio Composting Unit for conversion of Organic Waste
- Installation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness on Water Conservation by display of posters

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

For Engress Services,

ENGRESS SERVICES PUNE

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENVIRONMENTAL AUDIT REPORT

INDIRA GANDHI KALA MAHAVIDYALAYA,

RALEGAON DIST: YAVATMAL 445 402

Year: 2023-24

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-[illegible]
NAME OF ENTERPRISE	ENGRESS SERVICES
TYPE OF ENTERPRISE	Micro
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL
NAME OF UNIT(s)	1. Engress Services
OFFICAL ADDRESS OF ENTERPRISE	MAHARASHTRA
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	[illegible]
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	[illegible]
NATIONAL INDUSTRY CLASSIFICATION CODE(S)	[illegible]
DATE OF UDYAM REGISTRATION	27/07/2021

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the Green and Eco Friendly Management Certified Professional Test (GEM-CP) with "Excellent Performance" on 05 June 2017

Certificate of Registration

This is to Certify that Quality Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope

Director

Hegemonic Management Services Pvt. Ltd.

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION FOR CLASS "A"

This is to certify that the firm having following particulars is registered with MAHARASHTRA ENERGY DEVELOPMENT AGENCY and MEDA (MEDA) and is entitled to undertake Energy Conservation Programmes of various

Name and Address of the Firm: M/s Engress Services, Pune

Registration Category: Energy Conservation Programmes

Registration Number: MEDA/EA/2021/[illegible]

- Energy Conservation Programmes include to identify areas where substantial use of energy can be and to undertake the study for Energy Conservation and other allied work as per the recommendations thereof.
- MEDA reserves the right to visit all the sites without giving prior information to such agencies and inspect the work executed by the firm and recording the requirements of the Administration in this connection.
- This registration is valid up to 30th Nov. 2024 from the date of registration or such other period as the Energy Conservation Programme.
- The Executive Director, MEDA reserves the right to cancel the registration at any time without assigning any reason thereof.

Executive Director

Certificate of Registration

This is to certify that Environmental Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope

Director

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ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal, for awarding us the assignment of Environmental Audit of their Ralegaon Campus for the Year: 2023-24

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

EXECUTIVE SUMMARY

1. Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal consumes Energy in the form of Electrical Energy; used for various Electrical Equipment, office & other facilities.

2. Pollution due to College Activities:

- Air pollution: Mainly CO_2 on account of Electricity Consumption
- Solid Waste: Bio degradable Garden Waste, Paper & Plastic Waste
- Liquid Waste: Human liquid waste

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumed	8336	kWh
2	Annual CO_2 Emissions	7.50	MT

4. Usage of Renewable Energy:

- It is recommended to install Solar Power Project on the College Building.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	57	39	61
2	Minimum	52	34	54

6. Indoor Lux & Noise Level Parameters:

No	Parameter/Value	Lux Level	Noise Level, dB
1	Maximum	310	41
2	Minimum	210	37

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Liquid Waste	The Institute has installed Septic Tank
3	E Waste	The Institute has disposed The E Waste through Authorized Agency

8. Rain Water Management:

The Rain water falling on terrace is collected through Pipe and is used to increase the underground water table.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Energy Conservation Display of Posters

10. Assumption:

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

11. References:

- For CO_2 Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI 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. Important Definitions:

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

1.2. Environmental Audit: Definition:

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

1.2 Key Study Points:

No	Particulars
1	Study of Present Resource Consumption & CO_2 Emission
2	Study of Usage of Renewable Energy
3	Study of Indoor Air Quality
4	Study of Indoor Lux & Noise Level
5	Study of Water Management
6	Study of Waste Management Practices
7	Study of Environment Friendly Practices

1.3 College Location Image:

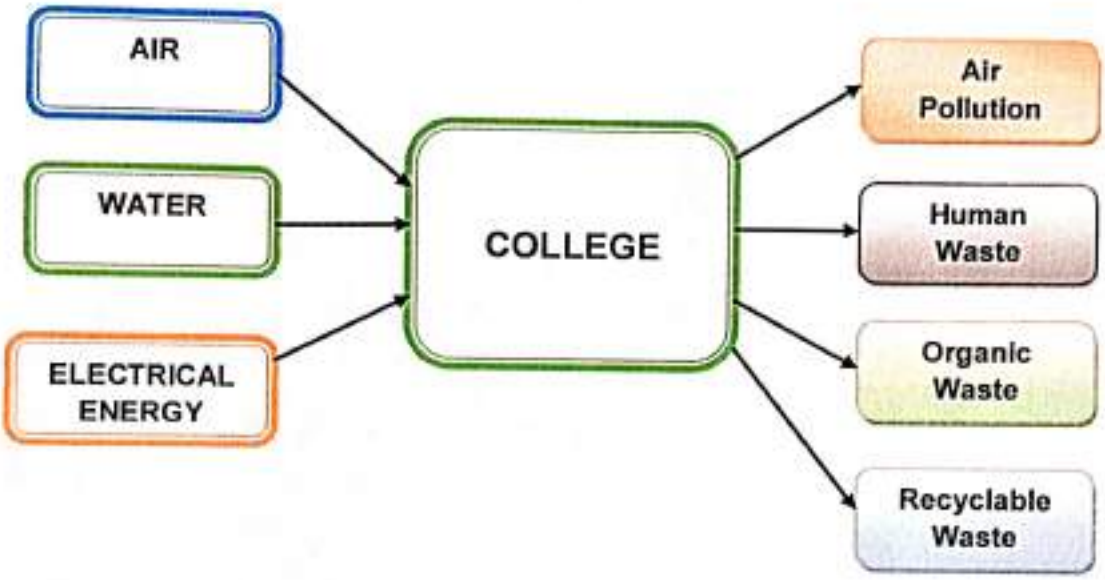
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The College 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 Resource Requirement & Waste of a College:



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy is as under.

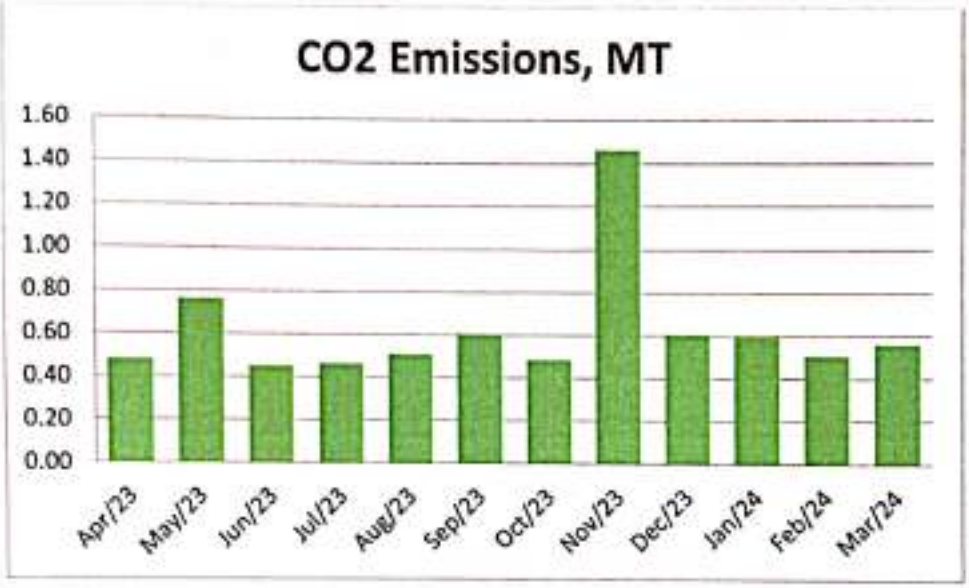
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 1: Study of Purchase of Energy & CO_2 Emissions: 23-24:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-23	540	0.49
2	May-23	848	0.76
3	Jun-23	504	0.45
4	Jul-23	515	0.46
5	Aug-23	565	0.51
6	Sep-23	673	0.61
7	Oct-23	542	0.49
8	Nov-23	1626	1.46
9	Dec-23	675	0.61

10	Jan-24	660	0.59
11	Feb-24	565	0.51
12	Mar-24	623	0.56
13	Total	8336	7.50
14	Maximum	1626	1.46
15	Minimum	504	0.45
16	Average	694.667	0.63

Chart No 2: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

3.1 Usage of Renewable 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.

3.2 Energy Efficiency Measures Adopted:

- The Institute has adopted Energy Efficient LED Lighting.

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

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

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

3. Air Quality Index: Air Quality Index (AQI) is a number used by government agencies to measure the Air Pollution levels and communicate it to the population.

In this Chapter, we present three important Parameters: **AQI**- Air Quality Index, **PM-2.5**- Particulate Matter of Size 2.5 micron and **PM-10**- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
	Ground Floor			
1	Principal Cabin	54	35	56
2	Staff Room	56	34	60
3	Class Room	57	34	54
4	Music Department	56	37	61
5	Chemistry Department	54	35	61
	First Floor			
6	Class Room	52	36	58
7	Botany Department	56	39	61
8	Zoology Department	54	35	59
9	Physics Department	56	34	60
10	**Maximum**	**57**	**39**	**61**
11	**Minimum**	**52**	**34**	**54**

Table No 4: Air Quality Index Values & Concentration of PM 2.5 & PM10: (By CPCB):

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 +

Conclusion:

From the above measured values, we conclude that the observed values of AQI, PM-2.5 & PM-10 are in the Satisfactory, as per the guidelines given by Central Pollution Control Board.

CHAPTER V
STUDY OF INDOOR LUX & NOISE PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include: **Lux Level and Noise Level.**

Table No 4: Study of Indoor Comfort Condition Parameters:

No	Location	Lux Level	Noise Level, dB
Ground Floor			
1	Principal Cabin	220	37
2	Staff Room	240	39.2
3	Class Room	210	37
4	Music Department	230	40
5	Chemistry Department	245	39.2
First Floor			
8	Class Room	244	38.2
9	Botany Department	310	38
10	Zoology Department	305	41
11	Physics Department	289	42
15	**Maximum**	310	41
16	**Minimum**	**210**	**37**

Recommended Lux & Noise Level: As per BEE & ISHRAE Guidelines:

A) Noise Level Reference:		
No	**Location**	**Noise Level Range, dB**
1	Offices	45-50
2	Occupied Class Room	40-45
3	Libraries	35-40
B) Reference Lux Level, Lumens:		
1	For Class Rooms	**200 Plus**
2	For Reading Rooms	**200 Plus**

Conclusion:

From the above measured values, we conclude that

- The Noise Level is within the prescribed Limit
- The Lux Level at various locations is Okay

CHAPTER VI
STUDY OF RAIN WATER MANAGEMENT

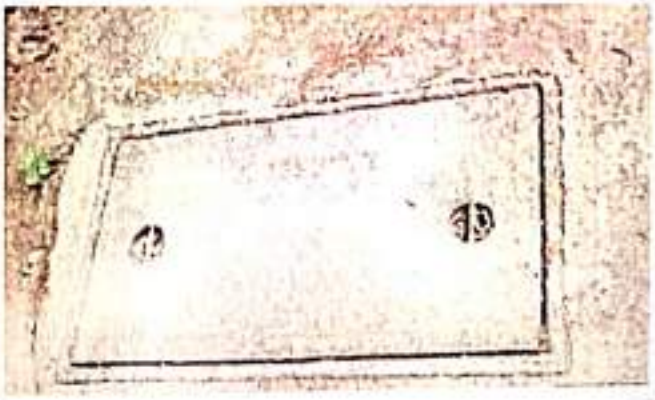
The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore well.

Photograph of Rain Water Management Bore well Recharge Section:

CHAPTER-VII
STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

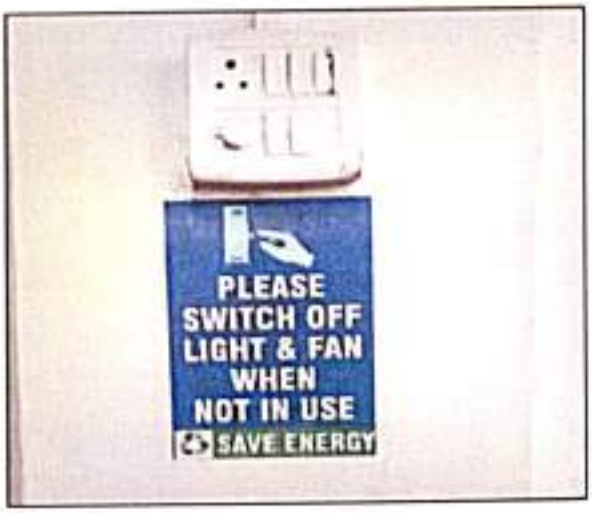
Details of Waste Management Practices:

No	Head	Observation	Photograph
1	**Solid Waste**	Segregation of Waste at Source: Provision of Waste Collection Bins	
2	**Organic Waste**	Provision of Bio Composting Bed: For conversion into Bio Compost	
3	**Liquid Waste**	The Institute has installed Septic Tanks it cleans periodically.	

CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY PRACTICES

In this Chapter, we present the Eco Friendly Practices, followed by the College.

Details of Eco Friendly Practices:

No	Head	Observation	Photograph
1	Tree Plantation	Tree Plantation in the Campus	
2	Creation of Awareness among Stake Holders	Display of Poster on Energy Conservation	

ENVIRONMENTAL AUDIT REPORT

OF

INDIRA GANDHI KALA MAHAVIDYALAYA,

RALEGAON DIST: YAVATMAL 445 402

Year: 2022-23

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
Parvati, Pune 411 009 Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/IGC/22-23/03 **Date: 06/07/2023**

This is to certify that we have conducted Environmental Audit at Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal, in the Year 2022-23.

The Institute has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Segregation of Waste at Source
- Installation of Bio Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation 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 Eco Friendly.

For Engress Services,

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

REGISTRATION CERTIFICATES


Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION

FOR CLASS 'A'

MEDA Registration Certificate


GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Excellent Performance"

GEM Certified Professional Certificate


Certificate of Registration

This is to Certify that

Quality Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope

Director

Magnitude Management Services Pvt. Ltd.

ISO: 9001-2015 Certificate


Certificate of Registration

This is to Certify that

ENGRESS SERVICES

ISO 14001:2015

Director

ISO: 14001-2015 Certificate

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune express our sincere gratitude to the management of Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal for awarding us the assignment of Environmental Audit of their Campus for the Year 2022-23.

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

EXECUTIVE SUMMARY

1. **Indira Gandhi Kala Mahavidyalaya, Ralegaon, Yavatmal** consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. **Pollution due to Institute Activities:**

   - **Air pollution:** Mainly CO_2 on account of Electricity Consumption
   - **Solid Waste:** Bio degradable Garden Waste
   - **Liquid Waste:** Human liquid waste

3. **Present Energy Consumption & CO_2 Emission:**

No	Particulars	Value	Unit
1	Annual Energy Consumption	**9062**	kWh
2	Annual CO_2 Emissions	**8.15**	MT

4. **Various initiatives taken for Environmental Conservation:**

   - Usage of Energy Efficient LED fittings
   - Bio Composting Pit Installation

5. **Indoor Air Quality Parameters:**

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	49	32	44
2	Minimum	36	24	32

6. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	33.2	46	310	39
2	Minimum	32.5	41	210	36

7. **Waste Management:**

7.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

7.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

7.3 Liquid Waste Management:

The Institute has installed Septic Tank and it cleans periodically.

7.4 Sanitary Waste Management:

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

7.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

8. Rain Water Management:

The Institute has installed the Rainwater Management project; the rain water falling on the terrace is collected through pipes and is used for recharging the land water table and gardening purpose.

9. Environment Friendly Initiatives:

- Maintenance of Internal Garden: About **100 Plus** Trees in the campus.
- Display of Posters on Resource Conservation

10. Assumption:

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

11. References:

- For CO_2 Emissions: www.tatapower.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. Important Definitions:

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

1.2. Environmental Audit: Definition:

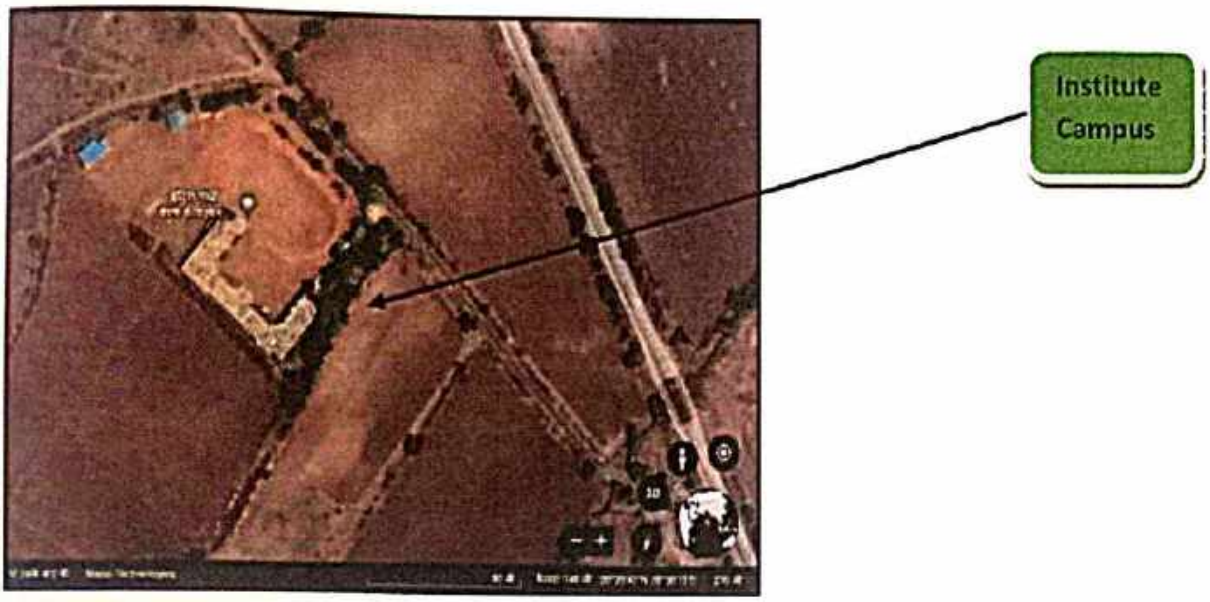
An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

*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*

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

1.4 Audit Procedural Steps:

1.5 Institute Location Image:

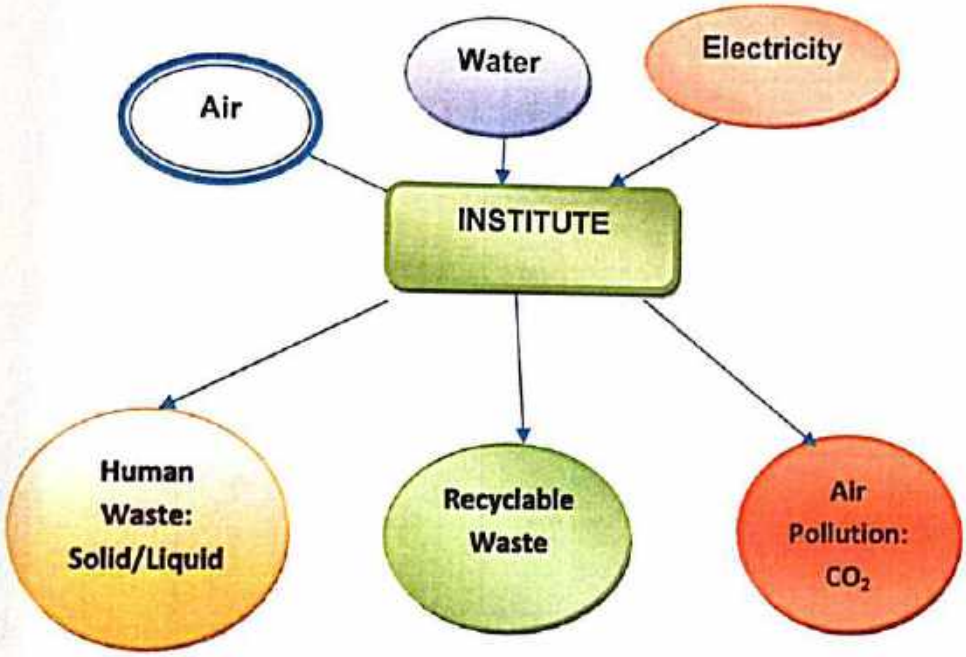


CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy.
The basis of Calculation for CO_2 emissions due to Electrical Energy is as under.

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

Table No 5: Study of Consumption of Electrical Energy & CO_2 Emissions: 22-23:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-22	853	0.767
2	May-22	945	0.850
3	Jun-22	1004	0.903
4	Jul-22	545	0.490
5	Aug-22	407	0.366
6	Sep-22	673	0.605
7	Oct-22	542	0.487
8	Nov-22	1626	1.463

9	Dec-22	675	0.607
10	Jan-23	680	0.612
11	Feb-23	533	0.479
12	Mar-23	579	0.521
13	Total	9062	8.155
14	Maximum	1626	1.463
15	Minimum	407	0.366
16	Average	755.167	0.679

Chart No 2: Month wise CO_2 Emissions:

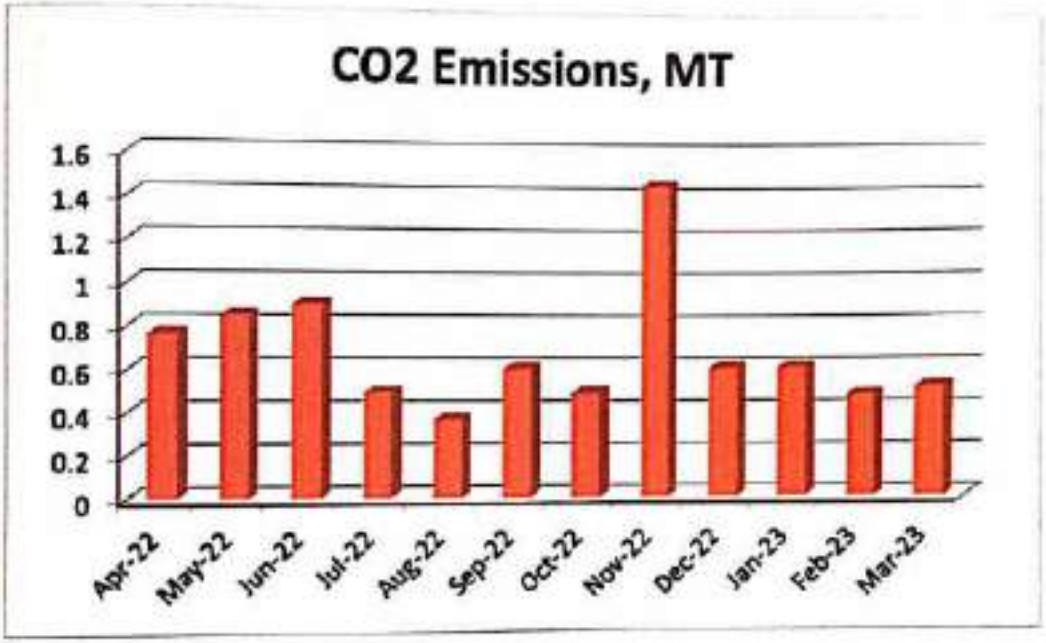


Table No 6: Important Parameters:

No	Parameter/ Value	Net Energy Consumption (kWh)	CO2 Emissions MT
1	Total	9062	8.155
2	Maximum	1626	1.463
3	Minimum	407	0.366
4	Average	755.167	0.679

CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has not installed Roof Top Solar PV Plant. It is recommended to install Roof Top Solar PV Plant.

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.**

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

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 10 micron

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
Ground Floor				
1	Principal Cabin	47	29	37
2	Staff Room	46	28	36
3	Class Room	49	30	44
4	Music Department	48	29	40
5	Chemistry Department	45	28	36
First Floor				
8	Class Room	46	30	44
9	Botany Department	44	29	40
10	Zoology Department	48	32	41
11	Physics Department	36	24	32
15	Maximum	49	32	44
16	Minimum	36	24	32

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 No 8: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
		Ground Floor			
1	Principal Cabin	33	46	280	37
2	Staff Room	33	46	240	38
3	Class Room	32.6	44	210	37.2
4	Music Department	32.6	42	230	39
5	Chemistry Department	32.5	41	245	37.1
		First Floor			
8	Class Room	33.1	42	244	37.1
9	Botany Department	33	44	310	36
10	Zoology Department	33.2	45	305	36
11	Physics Department	33	44	289	37
15	Maximum	33.2	46	310	39
16	Minimum	32.5	41	210	36

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

Photograph of Waste Collection Bins:

6.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

Photograph of Bio Composting Pit:

6.3 Liquid Waste Management:

The Institute has installed Septic Tanks it cleans periodically.

6.4 Sanitary Waste Management:

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

6.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The College has installed the Rainwater management project and bore well charging project, is used to increase the underground water table, but the piping system for rain water collection is under maintenance. It is recommended for intact the project.

Photograph of Rain Water Charging:

CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The Institute has well maintained landscaped garden in the campus.

Photograph of Tree plantation:

8.2 Creation of Awareness about Water & Energy Conservation:

The Institute has displayed posters emphasizing on importance of Water & Energy Conservation.

Photograph of Poster on Water 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%

PRINCIPAL
Indira Gandhi Kala Mahavidyalaya
Ralegaon Dist.Yavatmal

ENGRESS SERVICES PUNE

Enrich Consultants

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

Ref: EC/IGC/21-22/06

Date: 25/05/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Indira Gandhi Kala Mahavidyalay, Ralegaon, Yavatmal - 445 402 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,

ENRICH CONSULTANTS * PUNE *

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * Pune *

ENERGY AUDIT REPORT

OF

INDIRA GANDHI KALA MAHAVIDYALAY, RALEGAON DIST: YAVATMAL 445 402

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

ENRICH CONSULTANTS • Pune •

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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: 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 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***

- 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

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

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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of at Indira Gandhi Kala Mahavidyalay Ralegaon, 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. Indira Gandhi Kala Mahavidyalay, Ralegaon, Yavatmal - 445 402 consumes Energy in the form of Electrical Energy used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption& CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	5457	4.911
2	Maximum	777	0.699
3	Minimum	287	0.258
4	Average	454.75	0.409

3. Energy Conservation projects already installed:

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

4. Usage of Alternate Energy:

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

5. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is 233.28 kWh.
- The Total Annual LED Lighting Demand is 233.28 kWh.
- The percentage of Annual LED Lighting to Annual Lighting Demand is 100%.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO_2 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 CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
IQAC	:	Internal Quality Assurance Cell
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

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

1.2Table No 1: General Details of the College:

No	Head	Particulars
1	Name of Institution	Indira Gandhi Kala Mahavidyalay
2	Address	Kalamb Road,Ralegaon,Dist: Yavatmal 445 402
3	Affiliation	Sant Gadge Baba Amravati University

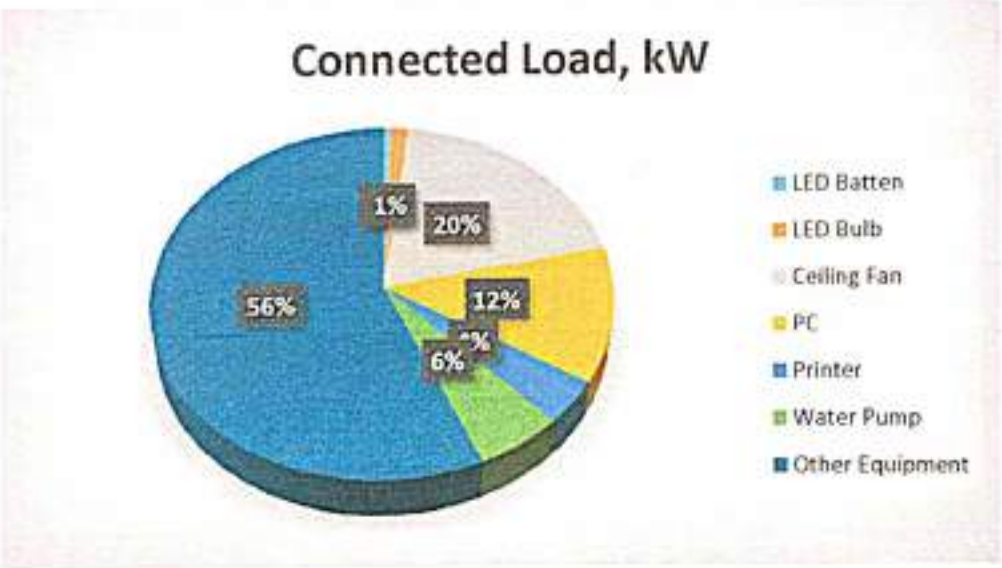
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	LED Batten	7	20	0.14
2	LED Bulb	40	9	0.36
3	Ceiling Fan	80	65	5.2
4	PC	22	150	3.3
5	Printer	7	150	1.05
6	Water Pump	1	1492	1.492
7	Other Equipment	100	150	15
8	**Total**			**27**

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	485
2	May-21	643
3	Jun-21	777
4	Jul-21	304
5	Aug-21	287
6	Sep-21	439
7	Oct-21	382
8	Nov-21	500
9	Dec-21	425
10	Jan-22	409
11	Feb-22	325
12	Mar-22	481
13	Total	5457
14	Maximum	777
15	Minimum	287
16	Average	454.75

Chart No 2: Variation in Monthly Energy Consumption:

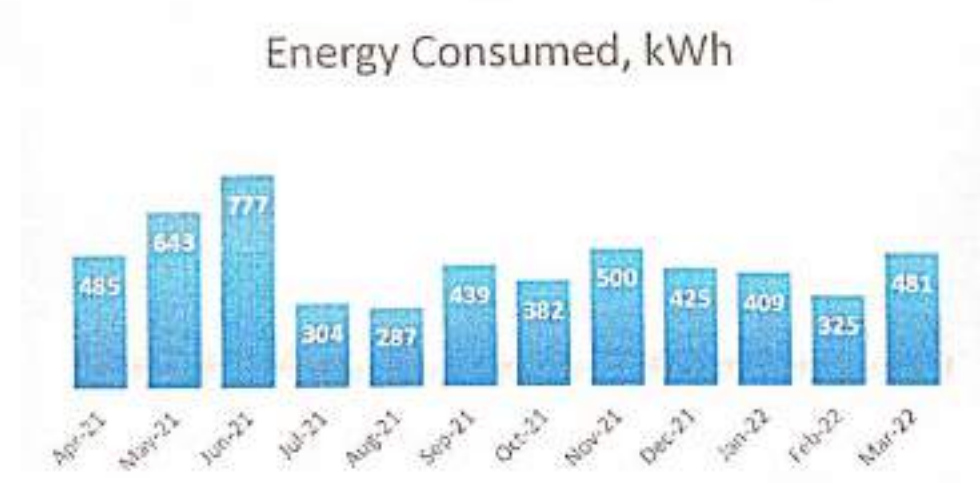


Table No4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	5457
2	Maximum	777
3	Minimum	287
4	Average	454.75

CHAPTER-IV
CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by taking into account the usage of the Electrical Energy.

Basis for computation of CO_2 Emissions:

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

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

Table No5: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-21	485	0.4365
2	May-21	643	0.5787
3	Jun-21	777	0.6993
4	Jul-21	304	0.2736
5	Aug-21	287	0.2583
6	Sep-21	439	0.3951
7	Oct-21	382	0.3438
8	Nov-21	500	0.45
9	Dec-21	425	0.3825
10	Jan-22	409	0.3681
11	Feb-22	325	0.2925
12	Mar-22	481	0.4329
13	Total	5457	4.9113
14	Maximum	777	0.6993
15	Minimum	287	0.2583
16	Average	454.75	0.4092

Chart No 3: Month wise CO_2Emissions:

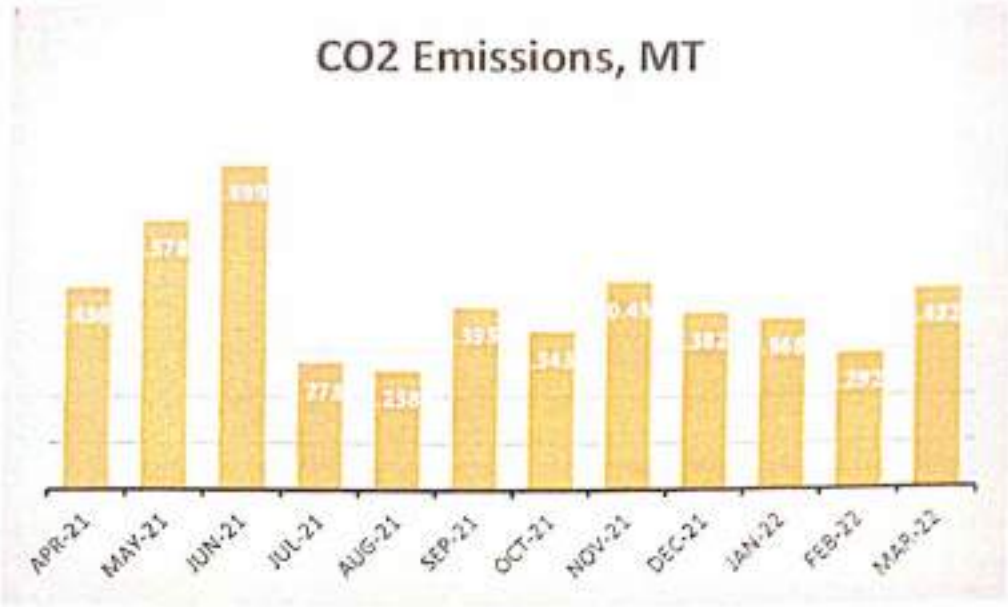


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	5457	4.9113
2	Maximum	777	0.6993
3	Minimum	287	0.2583
4	Average	454.75	0.4092

CHAPTER V
STUDY OF USAGE OF ALTERNATE ENERGY

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

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Annual Lighting power requirement.

Table No 8: Percentage of Usage of LED Lighting to Annual Lighting Load:

1	No of 9 W LED Bulb Light Fittings	40	Nos
2	Demand of 9 W LED Bulb Light Fitting	9	W/Unit
3	Total Electrical Load of 9 W LED Bulb Light Fittings	**0.36**	kW
4	No of 18 W LED Tube Lights	7	Nos
5	Demand of 18 W LED Tube Light	18	W/Unit
6	Total Electrical Load of 18 W LED Fittings	**0.126**	kW
7	Total Lighting Load=3+6	**0.486**	kW
8	Total LED Lighting Load= 6	**0.486**	kW
9	Average Daily Usage Period	4	Hours
10	Annual Working Days	120	Nos
11	Annual Total Lighting Load = 7*9*10	**233.28**	kWh
12	Annual LED Lighting Load = 8*9*10	**233.28**	kWh
13	**Annual Lighting Requirement met by LED= 12*100/11**	**100.00**	%