

ENVIRONMENTAL AUDIT REPORT

of
JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,
Handewadi Road, Hadapsar, Pune



Year: 2022-23

Prepared by:

ENGRESS SERVICES

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REGISTRATION CERTIFICATES



MEDA REGISTRATION CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE



ISO: 9001-2015 CERTIFICATE



ISO: 14001-2015 CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of Resource Consumption & CO ₂ Emission	10
3	Study of Usage of Renewable Energy	12
4	Study of Indoor Air Quality	13
5	Study of Indoor Comfort Condition Parameters	14
6	Study of Waste Management	15
7	Study of Rain water Management	16
8	Study of Eco Friendly Initiatives	17
	Annexure	
I	Indoor Air Quality, Noise, & Indoor Comfort Standards	18

ACKNOWLEDGEMENT

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune 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 CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	37463	kWh
2	Annual CO ₂ Emissions	33.72	MT

4. Renewable Energy Usage & Reduction in CO₂ Emissions:

- The College has installed Solar PV Plant of capacity **3 KW**.
- The Energy generated by Solar PV Plant in 2022-23 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2022-23 is **3.24 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	53	31	34
2	Minimum	50	29	32

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.2	71	132	45
2	Minimum	27.1	69	105	40

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Microbial Waste	Provision of Autoclave
3	Sanitary Waste	Provision of Sanitary Waste Incinerator

8. Rain Water Management:

The rain water falling on terrace is used for increasing the underground water table.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on ban Single Use Plastic by Display of Posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy generation Days: **300 Nos**

11. References:

- For CO₂ Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Quality Standards: www.cpcb.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

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

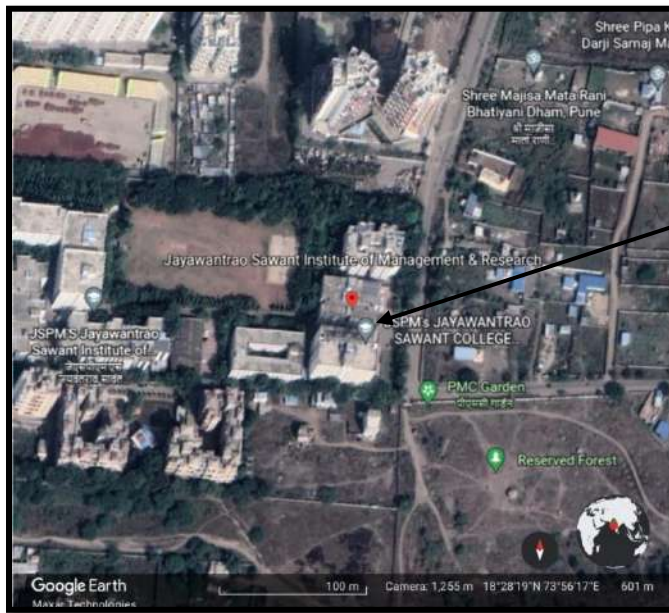
According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment"

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:



1.3 College Location Image:



College
Campus

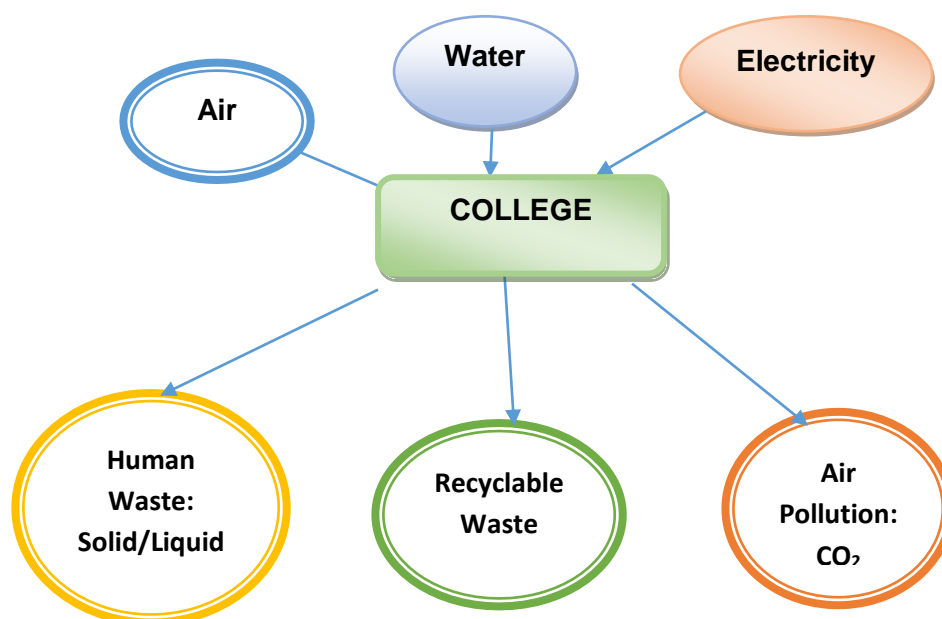
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

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 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 Electrical Energy is as under.

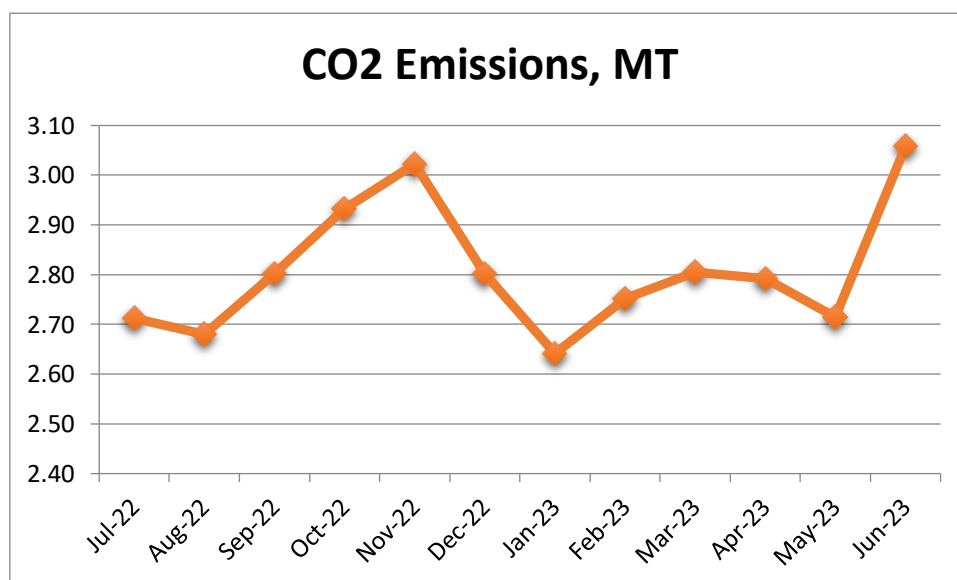
- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 2022-23:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-22	3014	2.71
2	Aug-22	2978	2.68
3	Sep-22	3114	2.80
4	Oct-22	3258	2.93
5	Nov-22	3358	3.02
6	Dec-22	3114	2.80
7	Jan-23	2935	2.64

8	Feb-23	3058	2.75
9	Mar-23	3117	2.81
10	Apr-23	3102	2.79
11	May-23	3017	2.72
12	Jun-23	3398	3.06
13	Total	37463	33.72
14	Maximum	3398	3.06
15	Minimum	2935	2.64
16	Average	3121.92	2.81

Chart No 2: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**
 In the following Table, we present the reduction in CO₂ emissions due to Solar Energy:

Table No 2: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 2022-23 = $1*2*3$	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.24	MT of CO₂

Photograph of 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.

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 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Classroom	50	30	33
2	Electronics Dept	51	31	34
3	Exam Section	53	32	34
4	NSS Room	52	31	33
5	Office	50	29	32
	Maximum	53	31	34
	Minimum	50	29	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 4: Study of Indoor Comfort Condition Parameters:

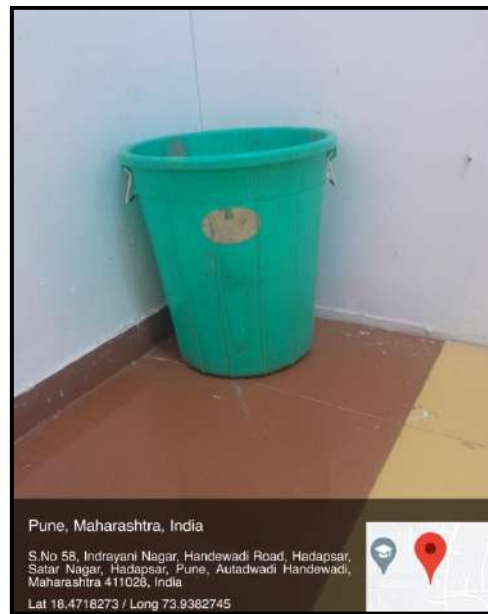
No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Classroom	27.1	70	124	44.3
2	Electronics Dept	27.2	69	105	42
3	Exam Section	27.1	69	132	41.9
4	NSS Room	27.1	71	126	45
5	Office	27.2	69	132	40
	Maximum	27.2	71	132	45
	Minimum	27.1	69	105	40

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste bins are located at various locations.

Photograph of Separate Waste Collection Bin:



6.2 Microbial Waste Management:

The Microbial Waste is completely degenerated in an Autoclave, before disposal.

6.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for Disposal of Sanitary Waste.

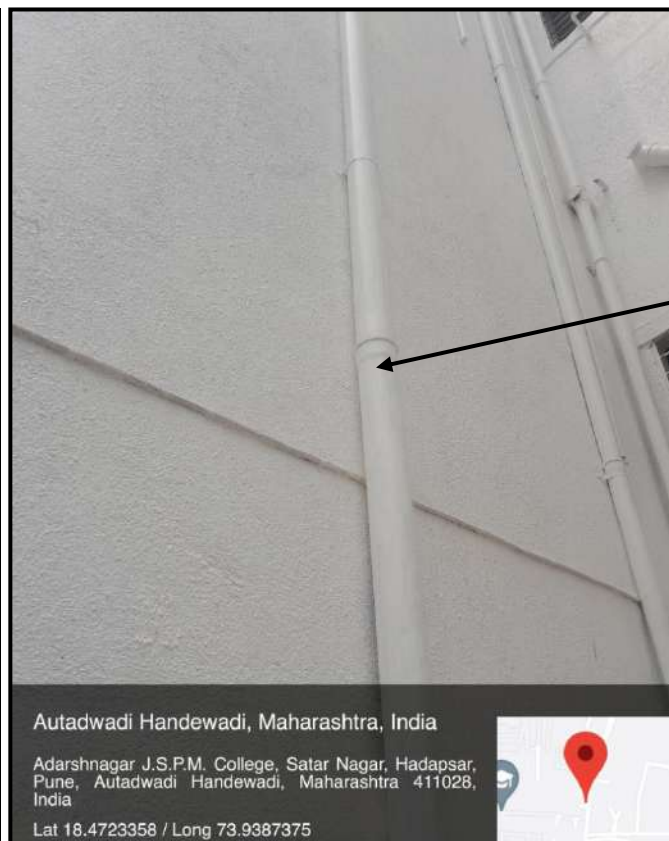
Photograph of Sanitary Waste Incinerator:



CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting Pipe:



Rain Water
Collecting Pipe

CHAPTER-VIII STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Resource Conservation:

The College has displayed posters emphasizing on importance of Ban Single Use Plastic.

Photograph of Poster on Ban Single Use Plastic:



ANNEXURE-I: VARIOUS AIR QUALITY, NOISE & 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 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

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

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

GREEN AUDIT REPORT

of

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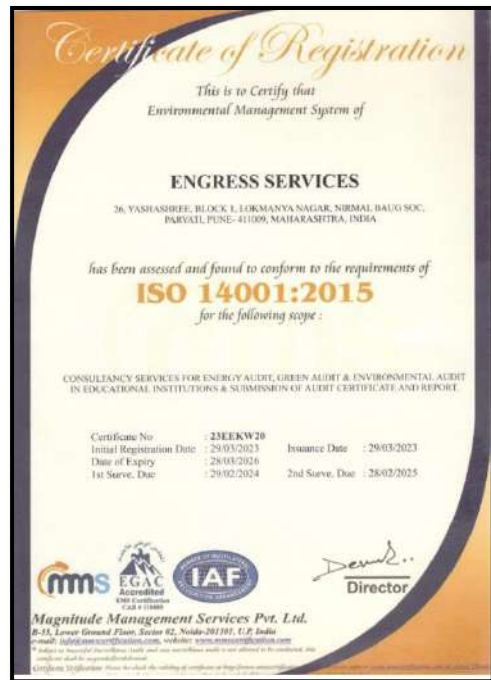


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1	Introduction	7
2	Study of Energy Consumption & CO ₂ Emission	8
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4	Study of Waste Management	10
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6	Study of Green & Sustainable Practices	12

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- Reduction in CO₂ Emissions in 2022-23 is **3.24 MT**

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No	Head	Particulars
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3	Sanitary Waste	Provision of Sanitary Waste Incinerator

5. Rain Water Management:

The rain water falling on terrace is used for increasing the underground water table.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on ban Single Use Plastic by Display of Posters

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2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
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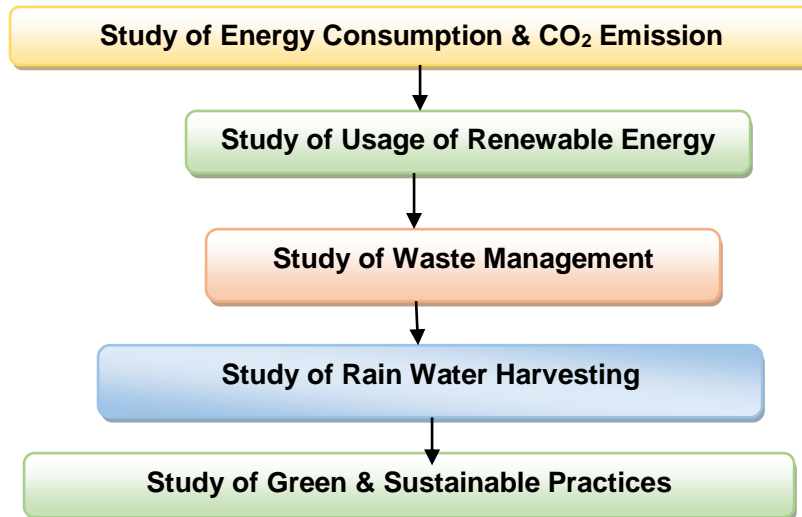
BEE	Bureau of Energy Efficiency
JSPM	Jayawant Shikshan Prasarak Mandal
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
Qty	Quantity

CHAPTER-I INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune

1.2 Audit Procedural Steps:



1.3 College Location Image:



College
Campus

CHAPTER-II

STUDY OF ENERGY CONSUMPTION & CO₂ EMISSION

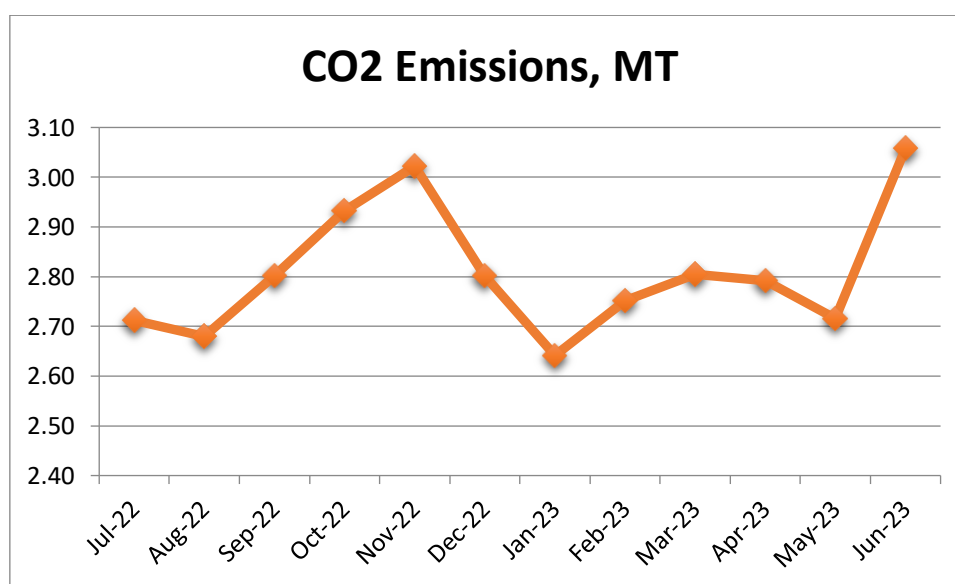
A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions:**

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Photograph of Roof Top Solar PV Plant:

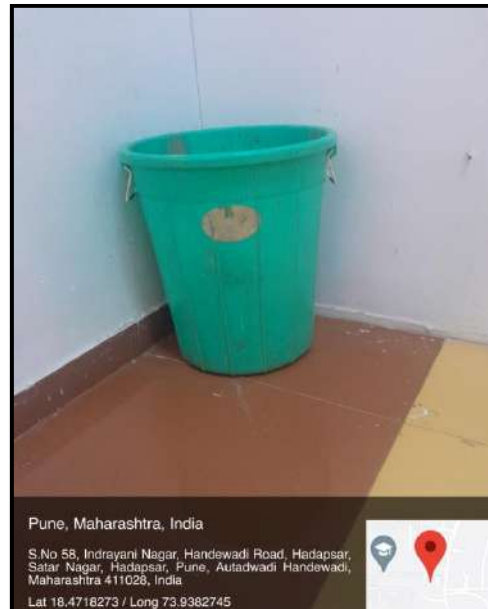


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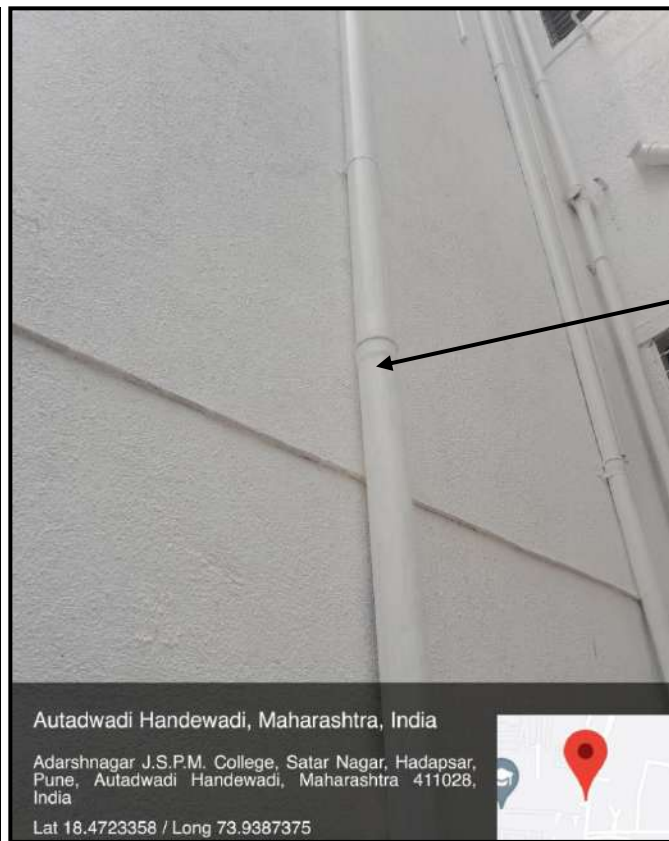
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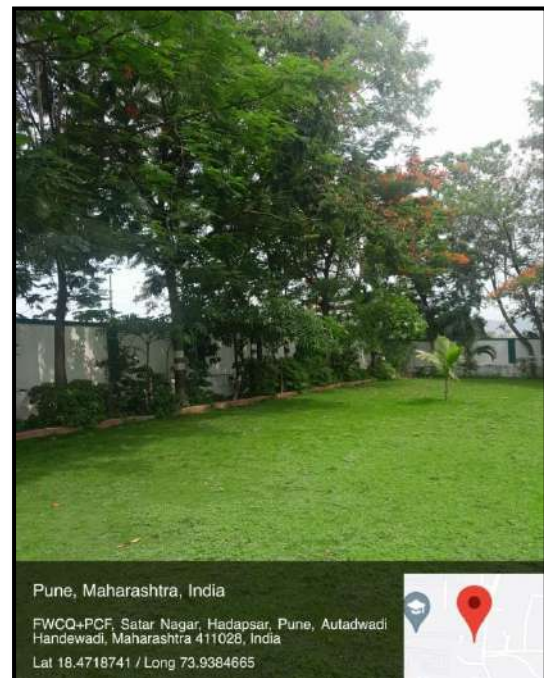
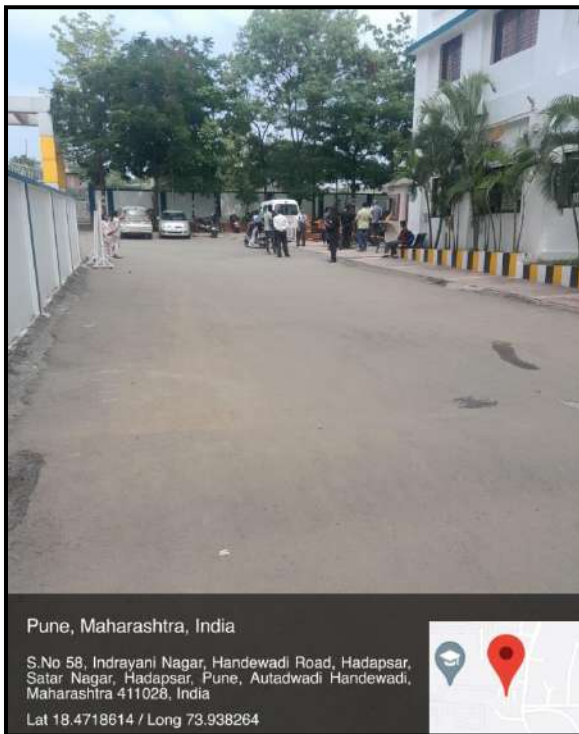
Rain Water
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CHAPTER VI STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Pedestrian Friendly Road & Internal Tree Plantation:

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

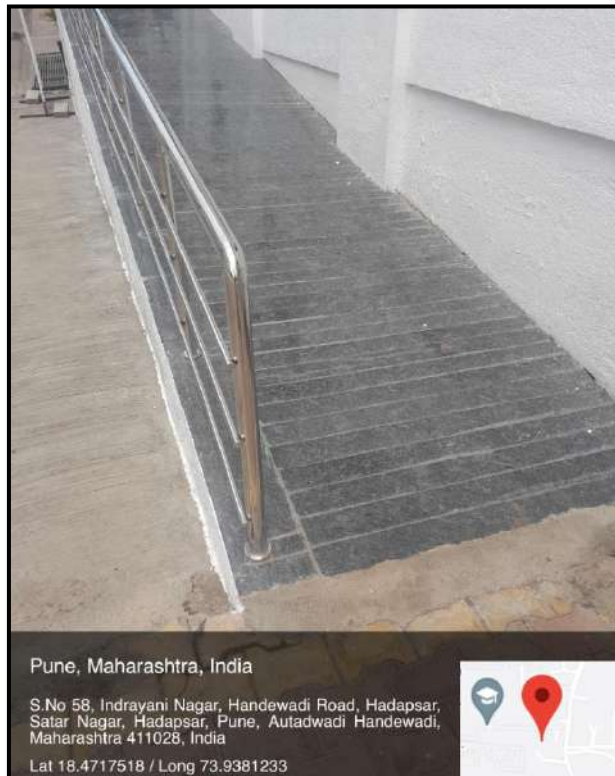
Photograph of Internal Road & Tree plantation:



6.2 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp.

Photograph of Ramp:



6.3 Creation of Awareness about Resource Conservation:

The College has displayed posters emphasizing on importance of Ban Single Use Plastic.

Photograph of Poster on Ban Single Use Plastic:



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- The Electrical Energy generated in 21-22 is **3600 kWh**.
- Reduction in CO₂ Emissions in 21-22 works out to be **3.24 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	63	38	42
2	Minimum	56	30	35

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	25.8	86	190	54
2	Minimum	25.4	84	115	45.6

7. Waste Management:

7.1 Solid Waste Management:

Waste is segregated at Source. Waste bins are provided at various locations.

7.2 Microbial Waste Management:

The Microbial Waste is degenerated in an Autoclave before disposal.

7.3 Sanitary Waste Management:

A Sanitary Waste Incinerator is provided in the Campus for Disposal of Sanitary Waste.

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The rain water falling on the terrace is used for increasing the Underground Water Table.

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- Internal Tree Plantation:
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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

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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 (Sitting 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)

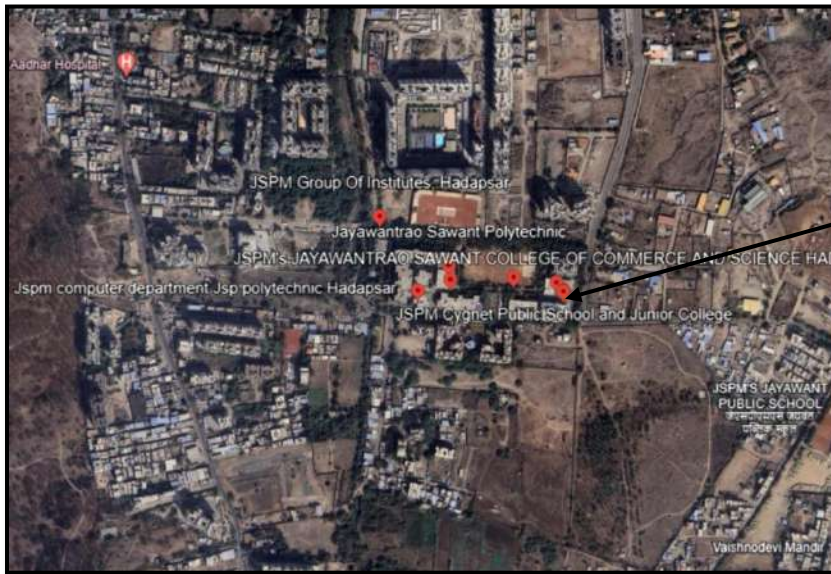
1.2 Objectives:

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

1.3 Table No 4: General Details of College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College
2	Address	Handewadi Road, Hadapsar, Pune 411 028
3	Affiliation	Savitribai Phule Pune University

1.4 Google Earth Image:



**College
Campus**

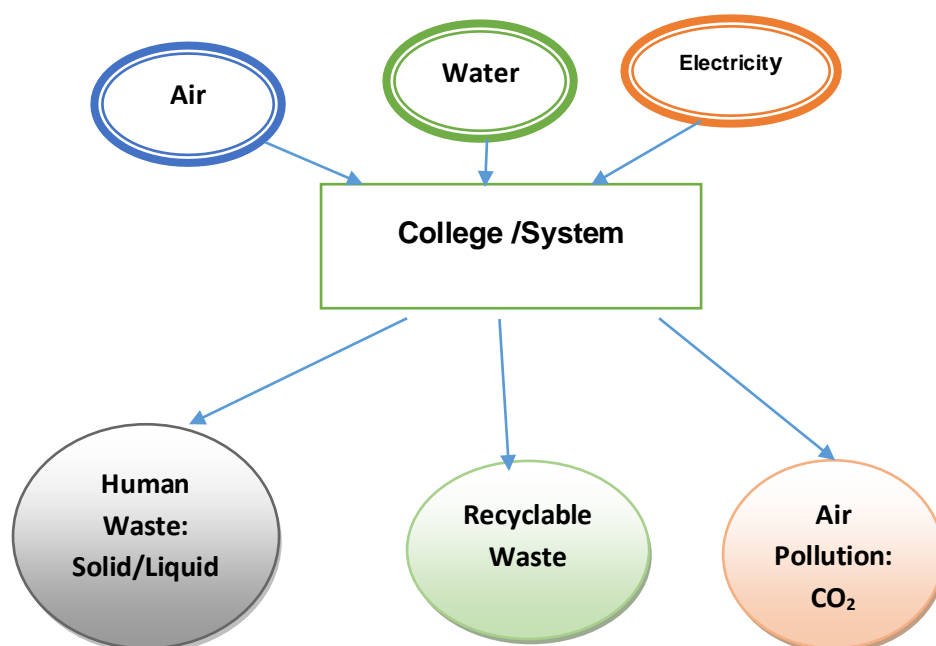
CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO₂ EMISSION

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 Electrical Energy is as under

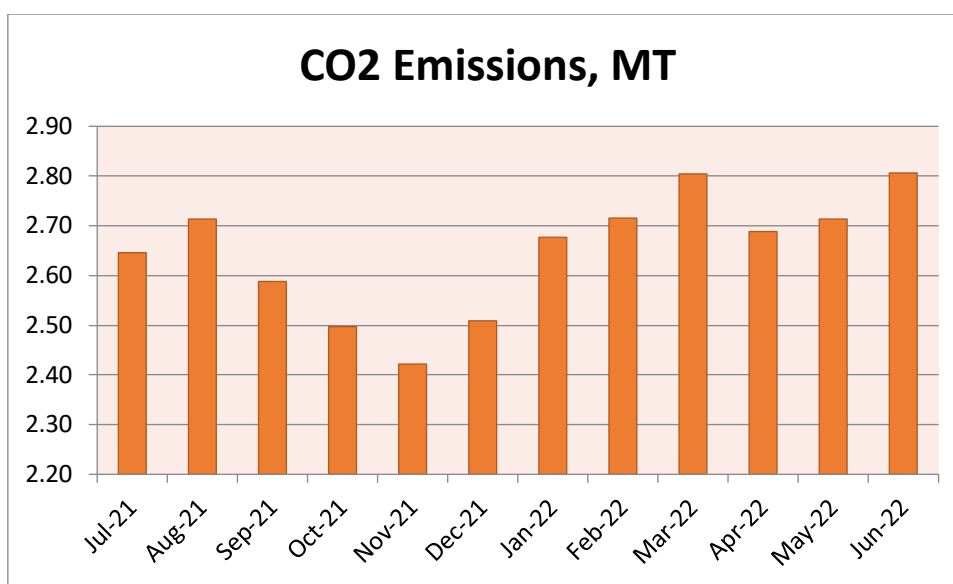
- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 21-22:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-21	2940	2.65
2	Aug-21	3015	2.71
3	Sep-21	2875	2.59
4	Oct-21	2775	2.50
5	Nov-21	2690	2.42
6	Dec-21	2787	2.51
7	Jan-22	2974	2.68
8	Feb-22	3018	2.72

9	Mar-22	3115	2.80
10	Apr-22	2987	2.69
11	May-22	3015	2.71
12	Jun-22	3117	2.81
13	Total	35308	31.78
14	Maximum	3117	2.81
15	Minimum	2690	2.42
16	Average	2942.33	2.65

Chart No 2: Month wise CO₂ Emissions:



CHAPTER III STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof TOP Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 21-22	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.24	MT of CO₂

Photograph of 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.

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.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 'air pollutant' has been defined as 'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment

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.

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
1	Office	60	36	48
2	Physics Lab	56	33	37
3	Chemistry Lab	63	38	39
4	Class room	61	37	42
5	Faculty Cabin	56	30	35
	Maximum	63	38	42
	Minimum	56	30	35

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
1	Office	25.8	85	131	45.6
2	Physics Lab	25.4	86	119	46
3	Chemistry Lab	25.5	86	115	52
4	Class room	25.7	84	182	54
5	Faculty Cabin	25.7	84	190	53.6
	Maximum	25.8	86	190	54
	Minimum	25.4	84	115	45.6

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Solid Waste Management:

The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



6.2 Microbial Waste Management:

The Microbial Waste is completely degenerated in an Autoclave, before disposal.

6.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:



CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting Pipe:



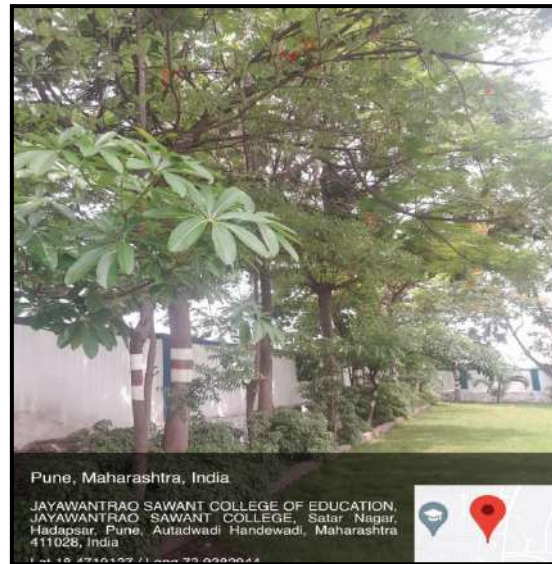
Rain Water
Collecting Pipe

CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness on Energy Conservation:

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

Photograph of Poster on Energy Conservation:



ANNEXURE-I: AIR 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 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

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

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

GREEN AUDIT REPORT

of

JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,

Handewadi Road, Hadapsar, Pune



Year: 2021-22

Prepared by:

ENGRESS SERVICES

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



REGISTRATION CERTIFICATES



BEE AUDITOR CERTIFICATE



MEDA EMPANELMENT CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of Present Energy Consumption	9
3	Study of Carbon Foot printing	10
4	Study of Usage of Renewable Energy	11
5	Study of Waste Management	12
6	Study of Rain water Management	13
7	Study of Green & Sustainable Practices	14

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College, Handewadi Road, Hadapsar, Pune for awarding us the assignment of Green Audit of their Campus for the Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune 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	35308	31.78
2	Maximum	3117	2.81
3	Minimum	2690	2.42
4	Average	2942.33	2.65

3. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.
- The Electrical Energy generated in 2021-22 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2021-22 works out to be **3.24 MT**.

4. Waste Management:

4.1 Solid Waste Management:

Waste is segregated at Source. Waste bins are provided at various locations.

4.2 Microbial Waste Management:

The Microbial Waste is degenerated in an Autoclave before disposal.

4.3 Sanitary Waste Management:

A Sanitary Waste Incinerator is provided in the Campus for Disposal of Sanitary Waste.

5. Rain Water Management:

The rain water falling on terrace is used for increasing the underground water table.

6. Green & Sustainable Initiatives

- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness on Energy Conservation Display of Posters

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh of Electrical Energy** per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

8. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarroftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
JSPM	Jayawant Shikshan Prasarak Mandal
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
Qty	Quantity

CHAPTER-I INTRODUCTION

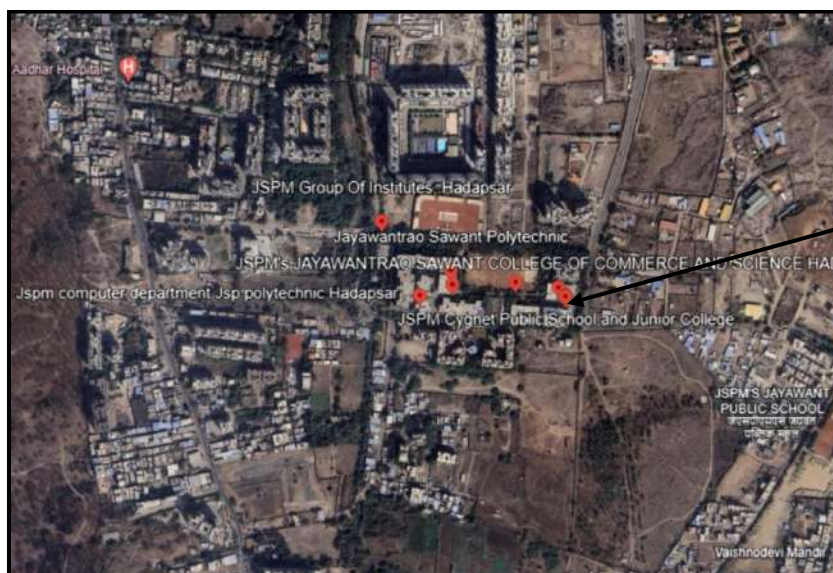
1.1 Objectives:

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

1.2 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College
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1.3 Google Earth Image:



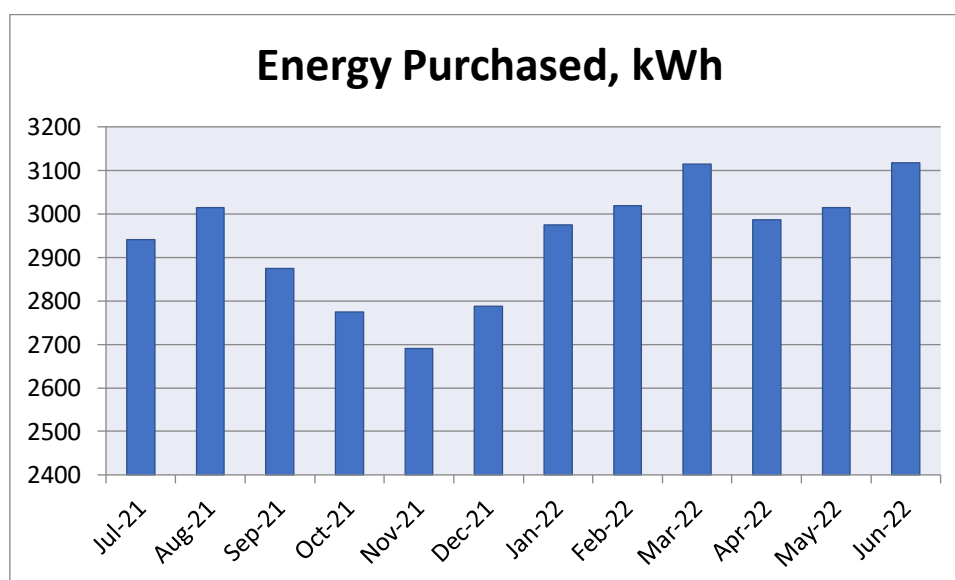
CHAPTER-II STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Bill Analysis- 2021-22:

No	Month	Energy Purchased, kWh
1	Jul-21	2940
2	Aug-21	3015
3	Sep-21	2875
4	Oct-21	2775
5	Nov-21	2690
6	Dec-21	2787
7	Jan-22	2974
8	Feb-22	3018
9	Mar-22	3115
10	Apr-22	2987
11	May-22	3015
12	Jun-22	3117
13	Total	35308
14	Maximum	3117
15	Minimum	2690
16	Average	2942.33

Chart No 1: Variation in Monthly Energy Consumption:



CHAPTER III

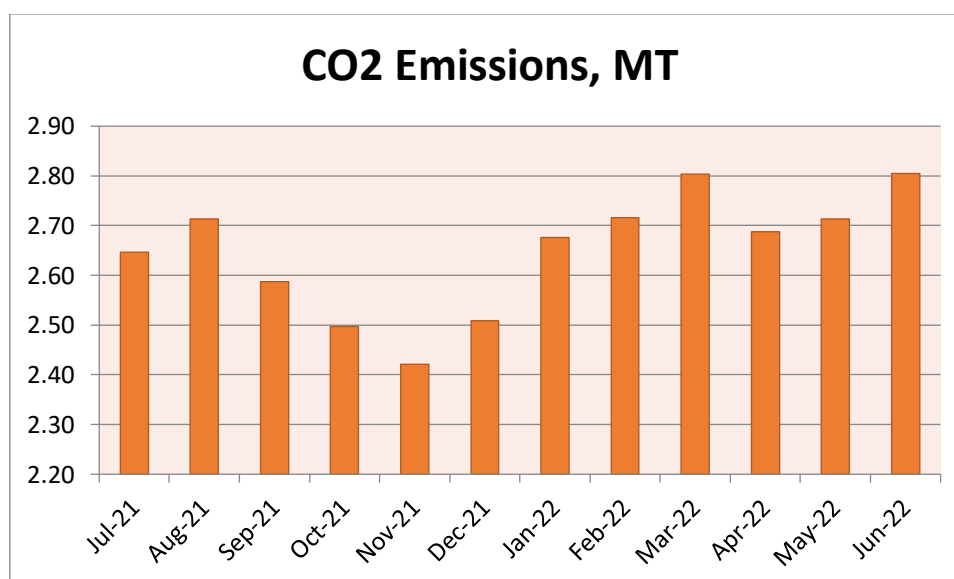
STUDY OF CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions: 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere**

Table No 4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-21	2940	2.65
2	Aug-21	3015	2.71
3	Sep-21	2875	2.59
4	Oct-21	2775	2.50
5	Nov-21	2690	2.42
6	Dec-21	2787	2.51
7	Jan-22	2974	2.68
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Chart No 2: Month wise CO₂ Emissions:



CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof TOP Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 21-22	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant =(4)*(5) /1000	3.24	MT of CO₂

Photograph of Roof Top Solar PV Plant:



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Solid Waste Management:

The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



5.2 Microbial Waste Management:

The Microbial Waste is completely degenerated in an Autoclave, before disposal.

5.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:



CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting Pipe:



Rain Water
Collecting 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.

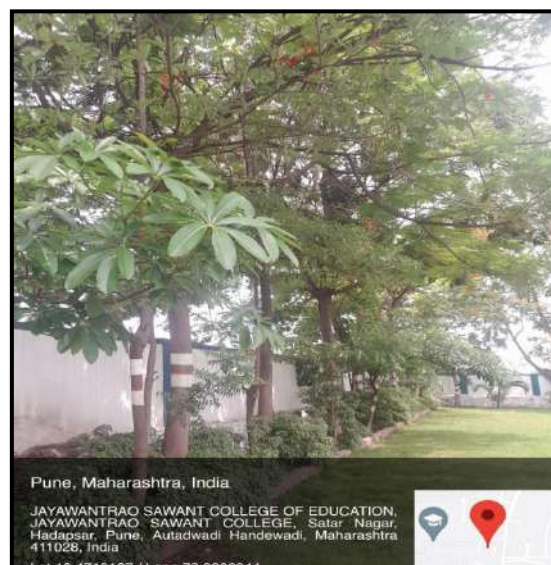
Photograph of Internal Road:



7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

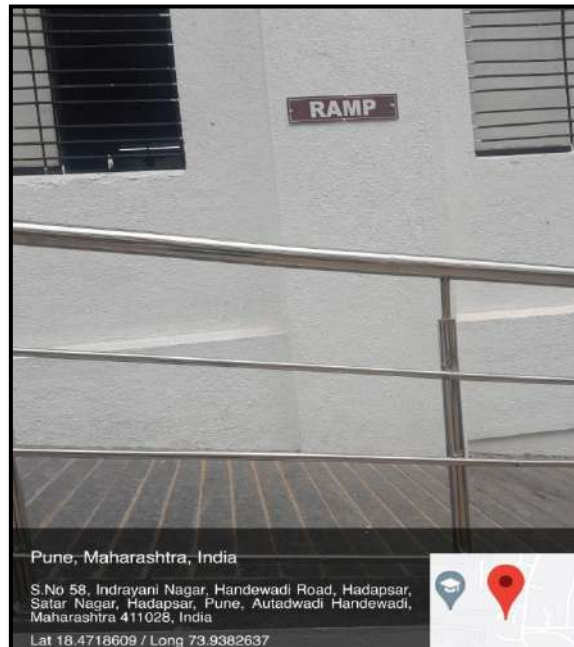
Photograph of Tree plantation:



7.3 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp as well as dedicated wash room.

Photograph of Ramp:



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:



ENVIRONMENTAL AUDIT REPORT

of
JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,
Handewadi Road, Hadapsar, Pune



Year: 2020-21

Prepared by:

ENRICH CONSULTANTS

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



REGISTRATION CERTIFICATES

Regn. No. EA-8192 No. 2942


National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Achyut Yashavant Mehendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India 
Controller of Examination

Date : 10th August 2007

BEE ENERGY AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RO 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: 020-35000450
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 Mukhtangan 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)

MEDA EMPANELMENT CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of Consumption of Resources & CO ₂ Emission	10
3	Study of Usage of Renewable Energy	12
4	Study of Indoor Air Quality	13
5	Study of Waste Management	14
6	Study of Rain water Management	15
7	Study of Environment Friendly Initiatives	16
	Annexure	
I	Various Indoor Air Quality Standards	17

ACKNOWLEDGEMENT

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune 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 CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	14253	12.83
2	Maximum	2902	2.61
3	Minimum	785	0.71
4	Average	14253	12.83

4. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3kWp**.
- The Electrical Energy generated in 2020-21 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2020-21 works out to be **3.24 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	95	56	69
2	Minimum	86	52	59

6. Waste Management:

6.1 Solid Waste Management:

Waste is segregated at Source. Waste bins are provided at various locations.

6.2 Microbial Waste Management:

The Microbial Waste is degenerated in an Autoclave before disposal.

6.3 Sanitary Waste Management:

A Sanitary Waste Incinerator is provided in the Campus for Disposal of Sanitary Waste.

7. Rain Water Management:

The rain water falling on the terrace is used for increasing the Underground Water Table.

8. Environment Friendly Initiatives:

- Internal Tree Plantation:
- Creation of Awareness on 3R's Reduce, Reuse & Recycle by Display of Posters

9. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh of Electrical Energy** per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

10. References:

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- For Solar PV Energy generation: www.solarroftop.gov.in
- For AQI Standards: www.cpcb.com

ABBREVIATIONS

Kg	: Kilo Gram
JSPM	: Jayawant Shikshan Prasarak Mandal
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

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
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2011	National Green Tribunal (Practices and Procedure) Rules
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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. To study Resource Consumption & CO₂ Emissions
2. To Study Usage of renewable Energy
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study of Waste Management
6. To Study of Rain Water Management
7. To Study of Environment Friendly Initiatives

1.3 Table No 4: General Details of College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College
2	Address	Handewadi Road, Hadapsar, Pune 411 028
3	Affiliation	Savitribai Phule Pune University

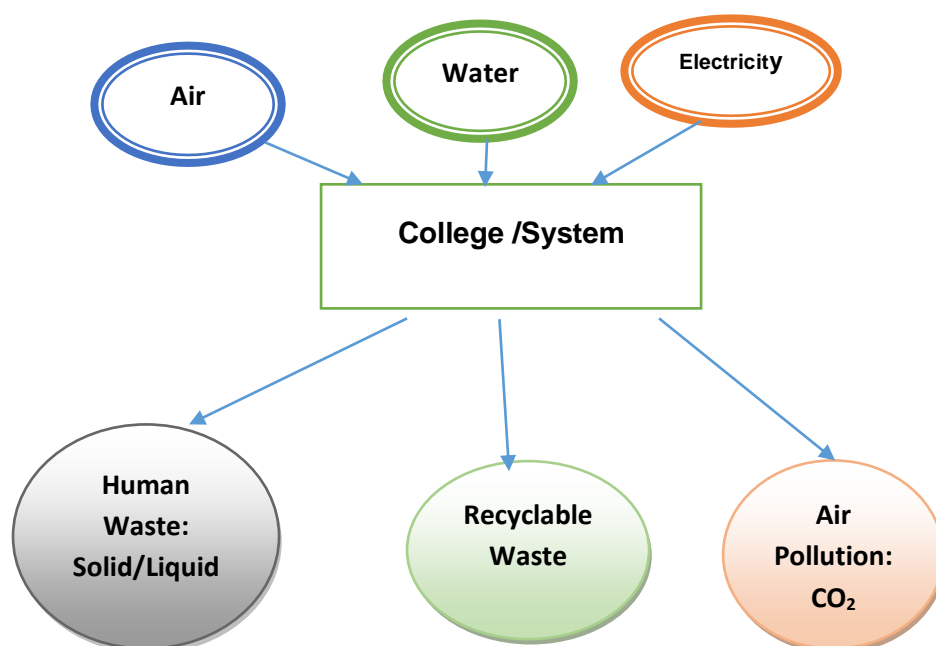
CHAPTER-II STUDY OF CONSUMPTION OF RECOURCES & CO₂ EMISSION

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 Electrical Energy is as under

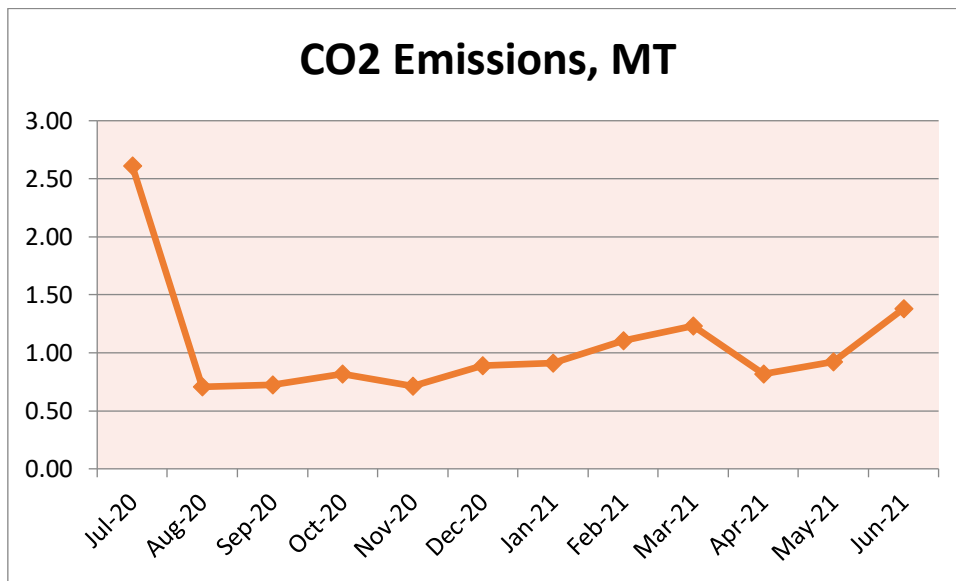
- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 20-21:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-20	2902	2.61
2	Aug-20	785	0.71
3	Sep-20	805	0.72
4	Oct-20	907	0.82
5	Nov-20	789	0.71
6	Dec-20	990	0.89
7	Jan-21	1012	0.91
8	Feb-21	1228	1.11

9	Mar-21	1368	1.23
10	Apr-21	907	0.82
11	May-21	1025	0.92
12	Jun-21	1535	1.38
13	Total	14253	12.83
14	Maximum	2902	2.61
15	Minimum	785	0.71
16	Average	1187.75	1.07

Chart No 2: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof TOP Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 20-21	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.24	MT of CO₂

Photograph of 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.

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.'**

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 'air pollutant' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

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.

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
1	Faculty Room	93	55	67
2	Microbiology Dept	90	54	64
3	Library	94	55	68
4	Classroom	86	52	59
5	Physics Dept	95	56	69
	Maximum	95	56	69
	Minimum	86	52	59

CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Solid Waste Management:

The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



5.2 Microbial Waste Management:

The Microbial Waste is completely degenerated in an Autoclave, before disposal.

5.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:



CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting Pipe:



CHAPTER-VII

STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

7.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



7.2 Creation of Awareness about 3 R's:

The College has displayed posters emphasizing on importance of 3 R's i.e Reduce, Reuse & Recycle.

Photograph of Poster on importance of 3R's i.e Reduce, Reuse & Recycle:



**ANNEXURE-I:
INDOOR AIR QUALITY 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 +

GREEN AUDIT REPORT

of

JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,

Handewadi Road, Hadapsar, Pune



Year: 2020-21

Prepared by:

ENRICH CONSULTANTS

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



REGISTRATION CERTIFICATES

Regn. No. EA-8192 No. 2942


National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Achyut Yashavant Mehendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India 
Controller of Examination

Date : 10th August 2007

BEE ENERGY AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RO 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: 020-35000450
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 Mukhtangan 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)

MEDA EMPANELMENT CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of Present Energy Consumption	9
3	Study of Carbon Foot printing	10
4	Study of Usage of Renewable Energy	11
5	Study of Waste Management	12
6	Study of Rain water Management	13
7	Study of Green & Sustainable Practices	14

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College, Handewadi Road, Hadapsar, Pune for awarding us the assignment of Green Audit of their Campus for the Year: 2020-21.

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune 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	14253	12.83
2	Maximum	2902	2.61
3	Minimum	785	0.71
4	Average	1187.75	1.07

3. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.
- The Electrical Energy generated in 2020-21 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2020-21 works out to be **3.24 MT**.

4. Waste Management:

4.1 Solid Waste Management:

Waste is segregated at Source. Waste bins are provided at various locations.

4.2 Microbial Waste Management:

The Microbial Waste is degenerated in an Autoclave before disposal.

4.3 Sanitary Waste Management:

A Sanitary Waste Incinerator is provided in the Campus for Disposal of Sanitary Waste.

5. Rain Water Management:

The rain water falling on terrace is used for increasing the underground water table.

6. Green & Sustainable Initiatives

- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness on 3R's Reduce, Reuse & Recycle by Display of Posters

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh of Electrical Energy** per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

8. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarroftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
JSPM	Jayawant Shikshan Prasarak Mandal
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 compute the CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Harvesting
6. Study of Green & Sustainable Practices

1.2 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College
2	Address	Handewadi Road, Hadapsar, Pune 411 028
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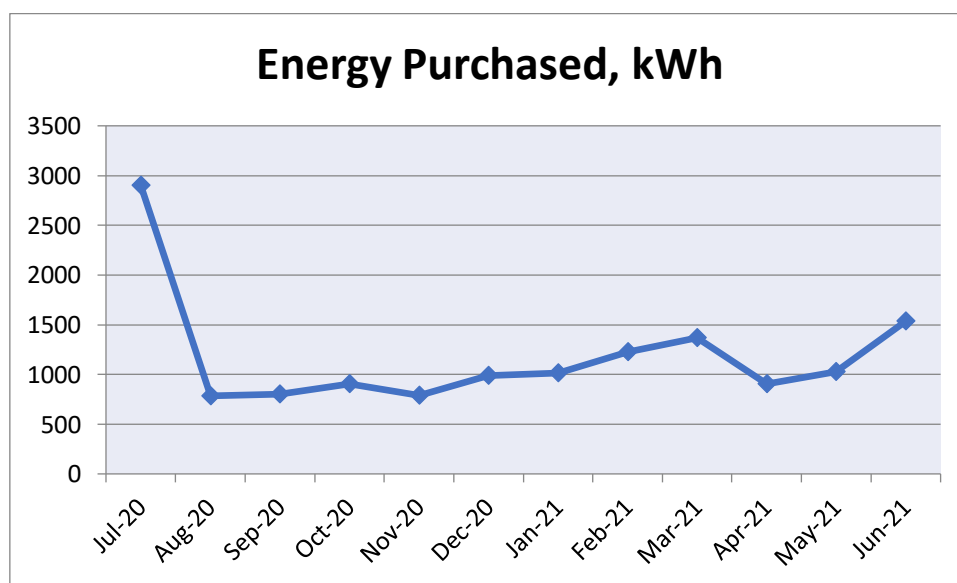
CHAPTER-II STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Bill Analysis- 2020-21:

No	Month	Energy Purchased, kWh
1	Jul-20	2902
2	Aug-20	785
3	Sep-20	805
4	Oct-20	907
5	Nov-20	789
6	Dec-20	990
7	Jan-21	1012
8	Feb-21	1228
9	Mar-21	1368
10	Apr-21	907
11	May-21	1025
12	Jun-21	1535
13	Total	14253
14	Maximum	2902
15	Minimum	785
16	Average	1187.75

Chart No 1: Variation in Monthly Energy Consumption:



CHAPTER III

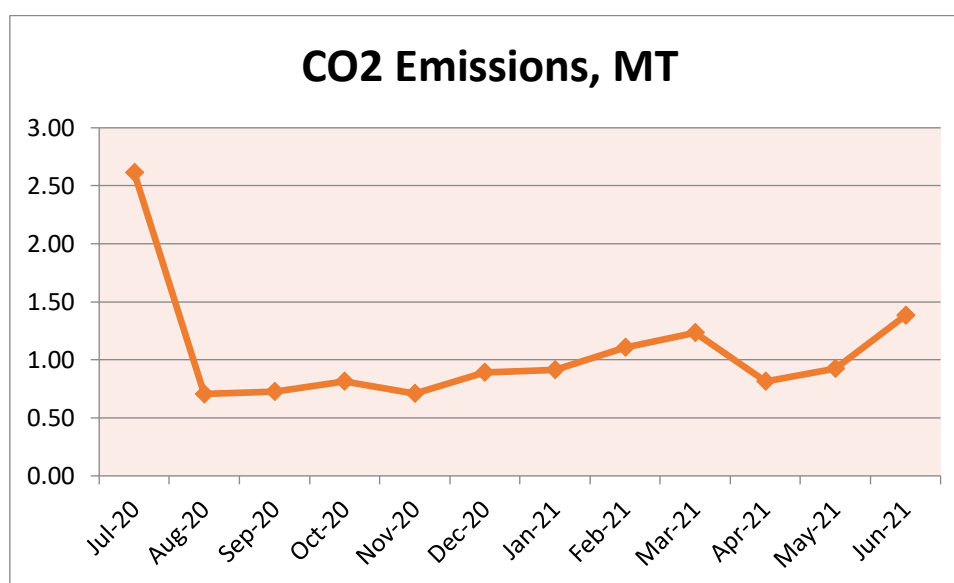
STUDY OF CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions: 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere**

Table No 4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-20	2902	2.61
2	Aug-20	785	0.71
3	Sep-20	805	0.72
4	Oct-20	907	0.82
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Chart No 2: Month wise CO₂ Emissions:



CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof TOP Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 20-21	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.24	MT of CO₂

Photograph of Roof Top Solar PV Plant:



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Solid Waste Management:

The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



5.2 Microbial Waste Management:

The Microbial Waste is completely degenerated in an Autoclave, before disposal.

5.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:



CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting 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 for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp as well as dedicated wash room.

Photograph of Ramp:



7.4 Creation of Awareness about 3 R's:

The College has displayed posters emphasizing on importance of 3 R's i.e Reduce, Reuse & Recycle.

Photograph of Poster on importance of 3R's i.e Reduce, Reuse & Recycle:



ENVIRONMENTAL AUDIT REPORT

of
JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,
Handewadi Road, Hadapsar, Pune



Year: 2019-20

Prepared by:

ENRICH CONSULTANTS

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



REGISTRATION CERTIFICATES

Regn. No. EA-8192		No. 2942
National Productivity Council (National Certifying Agency)		
PROVISIONAL CERTIFICATE		
This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u> son / daughter of Mr. <u>Yashavant</u> has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India. He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor. He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act. This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.		
Place : Chennai, India		 Controller of Examination
Date : 10 th August 2007		

BEE ENERGY AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY	
 Maharashtra Energy Development Agency (A Government of Maharashtra undertaking) 2 nd Floor, MHADA 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	19 th 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
<ul style="list-style-type: none">• 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)	

MEDA EMPANELMENT CERTIFICATE

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Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
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We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant Commerce & Science College, Hadapsar, Pune 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 CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	23526	21.17
2	Maximum	2557	2.30
3	Minimum	1012	0.91
4	Average	1960.50	1.76

4. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3kWp**.
- The Electrical Energy generated in 2019-20 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2019-20 works out to be **3.24 MT**.

5. Waste Management:

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Waste is segregated at Source. Waste bins are provided at various locations.

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The Microbial Waste is degenerated in an Autoclave before disposal.

6. Rain Water Management:

The rain water falling on the terrace is used for increasing the Underground Water Table.

7. Environment Friendly Initiatives:

- Internal Tree Plantation:

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh of Electrical Energy** per Day

3. Annual Solar Energy Generation Days: **300 Nos.**

10. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarroftop.gov.in

ABBREVIATIONS

Kg	:	Kilo Gram
JSPM	:	Jayawant Shikshan Prasarak Mandal
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode

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 (Sitting 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)
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1.2 Objectives:

1. To study Resource Consumption & CO₂ Emissions
2. To Study Usage of renewable Energy
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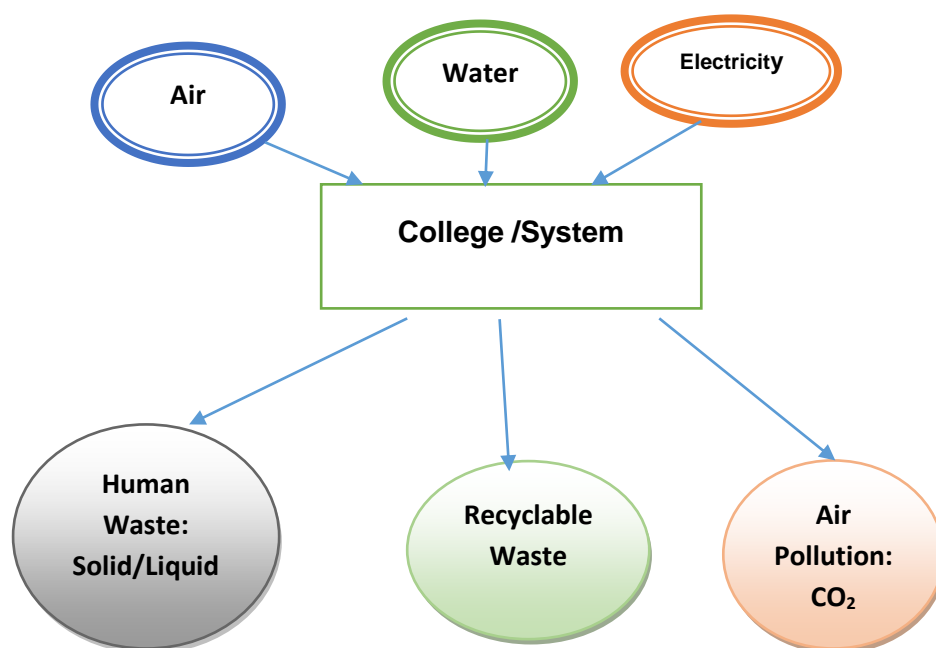
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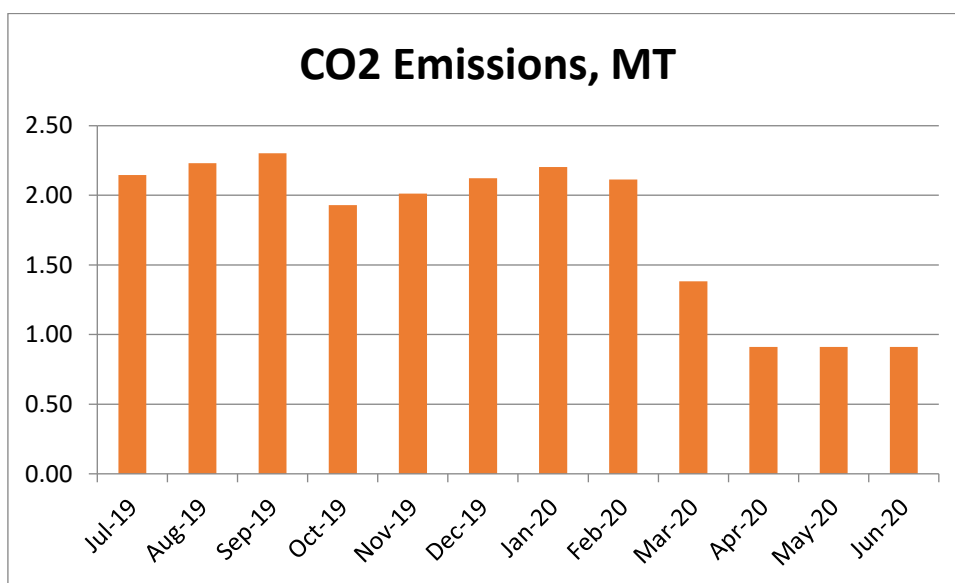
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3	Sep-19	2557	2.30
4	Oct-19	2145	1.93
5	Nov-19	2236	2.01
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9	Mar-20	1536	1.38
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13	Total	23526	21.17
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Chart No 2: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof TOP Solar PV Plant.

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4	Energy Generated in the Year: 19-20	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.24	MT of CO₂

Photograph of Roof Top Solar PV Plant:



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4.1 Solid Waste Management:

The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



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The Microbial Waste is completely degenerated in an Autoclave, before disposal.

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The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting Pipe:



CHAPTER-VII

STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

7.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



GREEN AUDIT REPORT

of

JAYAWANT SHIKSHAN PRASARAK MANDAL'S,
JAYAWANTRAO SAWANT COMMERCE & SCIENCE COLLEGE,
Handewadi Road, Hadapsar, Pune



Year: 2019-20

Prepared by:

ENRICH CONSULTANTS


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



REGISTRATION CERTIFICATES

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Place : Chennai, India		 Controller of Examination
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 (Smita Kudarikar) General Manager (EC)	

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INDEX

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II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Present Energy Consumption	8
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2. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	23526	21.17
2	Maximum	2557	2.30
3	Minimum	1012	0.91
4	Average	1960.50	1.76

3. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.
- The Electrical Energy generated in 2019-20 is **3600 kWh**.
- Reduction in CO₂ Emissions in 2019-20 works out to be **3.24 MT**.

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4.1 Solid Waste Management:

Waste is segregated at Source. Waste bins are provided at various locations.

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The Microbial Waste is degenerated in an Autoclave before disposal.

5. Rain Water Management:

The rain water falling on terrace is used for increasing the underground water table.

6. Green & Sustainable Initiatives

- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh of Electrical Energy** per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

8. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarroftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
JSPM	Jayawant Shikshan Prasarak Mandal
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 compute the CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Harvesting
6. Study of Green & Sustainable Practices

1.2 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant Commerce & Science College
2	Address	Handewadi Road, Hadapsar, Pune 411 028
3	Affiliation	Savitribai Phule Pune University

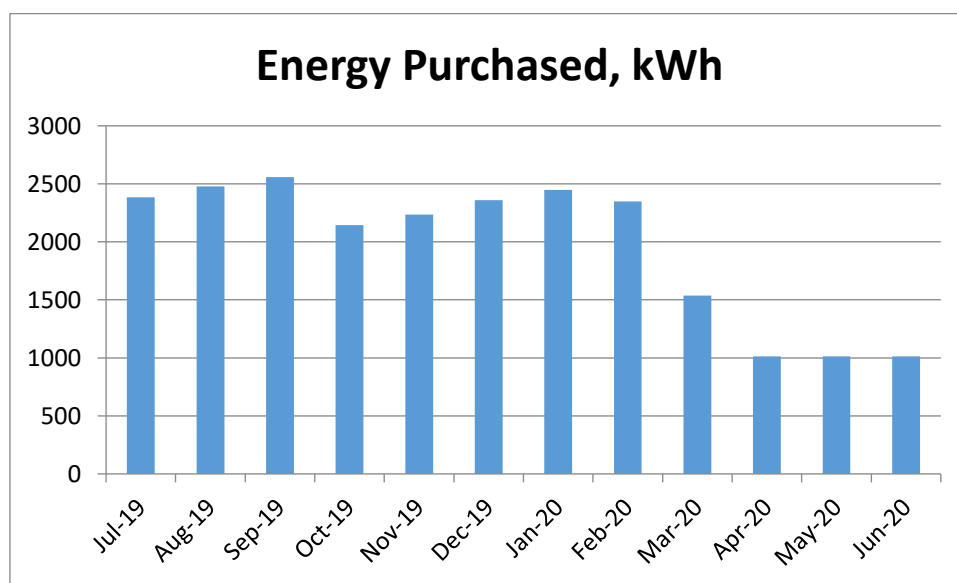
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In this chapter, we present the analysis of Electrical Energy.

Table No 2: Electrical Bill Analysis- 2019-20:

No	Month	Energy Purchased, kWh
1	Jul-19	2385
2	Aug-19	2478
3	Sep-19	2557
4	Oct-19	2145
5	Nov-19	2236
6	Dec-19	2358
7	Jan-20	2447
8	Feb-20	2348
9	Mar-20	1536
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11	May-20	1012
12	Jun-20	1012
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Chart No 1: Variation in Monthly Energy Consumption:



CHAPTER III

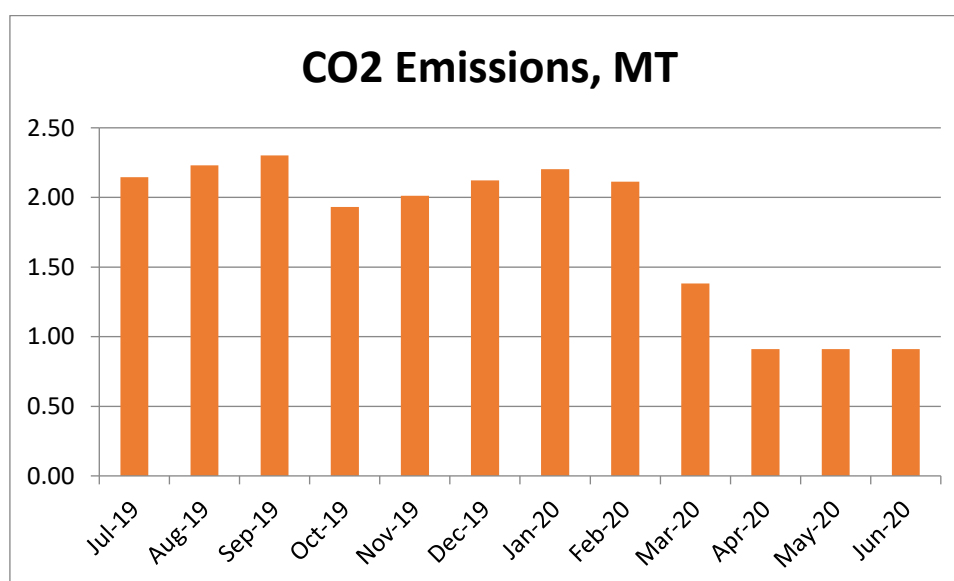
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A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions: 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere**

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Photograph of Roof Top Solar PV Plant:



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The Waste is segregated at Source. Waste Bins are kept at various locations in the Campus.

Photograph of Waste Collection Bin:



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The Microbial Waste is completely degenerated in an Autoclave, before disposal.

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STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from the terrace. The Rain Water is used to increase the underground water table.

Photograph of Rain water Collecting 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 for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp as well as dedicated wash room.

Photograph of Ramp:



GREEN AUDIT REPORT

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No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	24970	22.47
2	Maximum	2234	2.01
3	Minimum	1887	1.70
4	Average	2080.83	1.87

3. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **3 kWp**.
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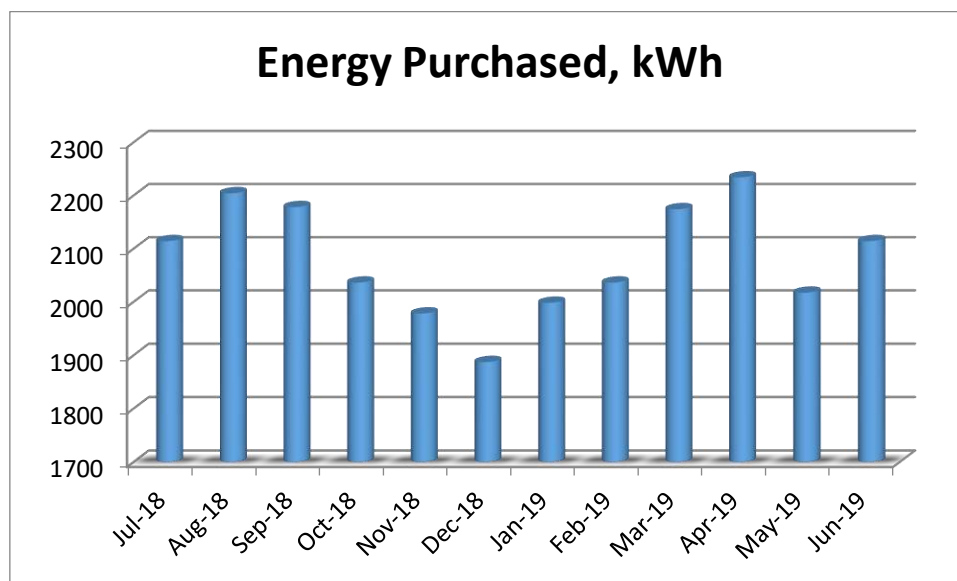
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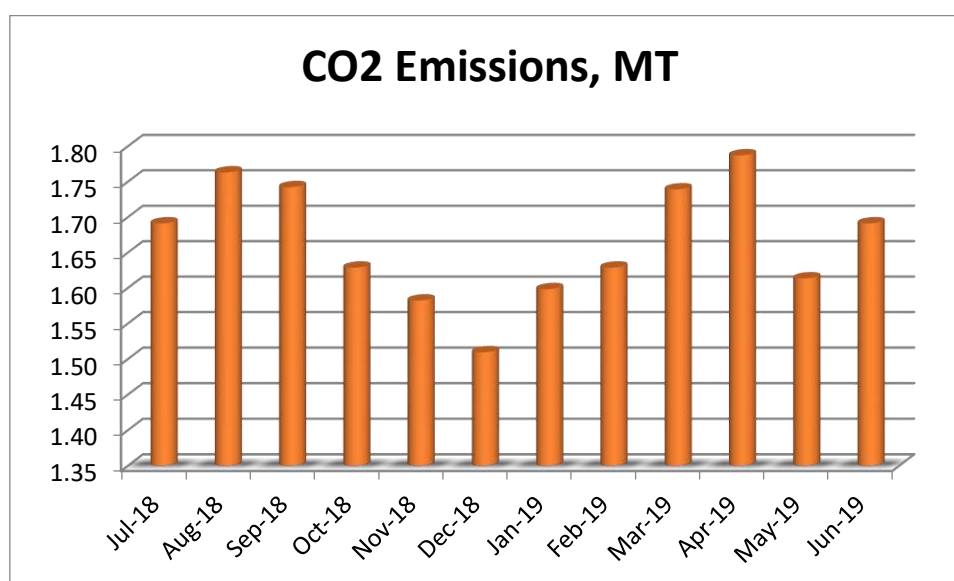
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5	Nov-18	1978	1.58
6	Dec-18	1887	1.51
7	Jan-19	1998	1.60
8	Feb-19	2036	1.63
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