ENERGY AUDIT REPORT

of

SAIBALAJI EDUCATION SOCIETY'S,

SAIBALAJI INTERNATIONAL INSTITUTE OF MANAGEMENT SCIENCES,

Nere Dattawadi, Near Hinjewadi IT Park Pune 411 033



Year: 2021-22

Prepared by:

ENGRESS SERVICES

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

ENVIRONMENTAL AUDIT REPORT

of

SAIBALAJI EDUCATION SOCIETY'S,

SAIBALAJI INTERNATIONAL INSTITUTE OF MANAGEMENT SCIENCES,

Nere Dattawadi, Near Hinjewadi IT Park Pune 411 033



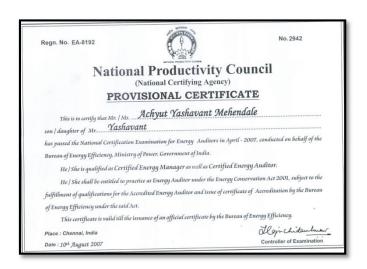
Year: 2021-22

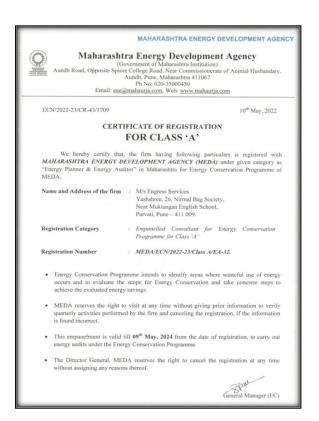
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REGISTRATION CERTIFICATES





BEE AUDITOR CERTIFICATE

MEDA EMPANELMENT CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE

Environmental Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

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Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SBIIMS/21-22/03 Date: 13/7/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033, in the Year 2021-22.

The Institute has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 5 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Septic Tank, for liquid Waste Management
- > Implementation of Rain Water Management Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness in respect of 3 R's: Reduce, Reuse and Recycle

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

For Engress Services,

A Y Mehendale,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788

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Environmental Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033, for awarding us the assignment of Environmental Audit of their Campus for the Year: 2021-22.

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

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EXECUTIVE SUMMARY

1. SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Pune consumes Energy in the form of Electrical Energy; used for various Electrical Equipment.

2. Pollution caused due to Institute Activities:

• Air pollution: Mainly CO₂ on account of Electricity Consumption

• Solid Waste: Bio degradable Garden Waste, Recyclable Waste and Human Waste

• Liquid Waste: Human liquid waste

3. Present Energy Consumption & CO₂ Emissions:

No	Parameter /Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	24558	22.10
2	Maximum	2369	2.13
3	Minimum	1798	1.62
4	Average	2046.5	1.84

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

- The Institute has installed Roof Top Solar PV Plant of Capacity 5 kWp.
- Energy generated by the Plant in 21-22 is 6000 kWh.
- Reduction in CO₂ Emission in CO₂ Emission in 21-22 is **5.4 kWh**.

5. Indoor Air Quality:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	65	38	49
2	Minimum	60	34	38

6. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	23.1	47	130	47
2	Minimum	22.9	46	103	41.6

7. Waste Management:

7.1 Segregation of Waste at Source:

The waste is segregated at the source. There are Waste Collection Bins at various locations, to collect the Waste.

Environmental Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

8. Rain Water Management:

The Rain Water from the terrace is collected through Pipes and is used to increase the Underground Water Table.

9. Environment Friendly Initiatives:

- Internal Tree Plantation
- Creation of Awareness in respect of 3 R's: Reduce, Reuse and Recycle

10. Assumptions:

- 1. Energy Consumption is computed based on Load Utilization Factor
- 2. 1 kWh of Electrical Energy releases 0.9 Kg of CO2 into atmosphere
- 3. Energy generated by Roof Top Solar PV Plant: 4 kWh/kWp per Day
- 4. Annual Solar Energy generation Days: 300 Nos

11. References:

- For CO₂ Emission computation: <u>www.tatapower.com</u>
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Standards: www.cpcb.com

ABBREVIATIONS

kWh : kilo-Watt Hour

Qty : Quantity
MT : Metric Ton

CO₂ : Carbon Di Oxide
LPD : Liters per Day
AQI : Air Quality Index

PM2.5 : Particulate Matter of Size 2.5 microns
PM 10 : Particulate Matter of Size 10 microns

CPCB : Central Pollution Control Board

ISHARE : The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I INTRODUCTION

1.1. Important Definitions:

1.1.1Environment: 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. Relevant Environmental Laws in India: Table No-1:

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

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

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

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

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 Audit Methodology:

- 1. Study of present Resource Consumption & CO₂ Emissions
- 2. Study of Usage of Renewable Energy
- 3. Study of Indoor Air Quality
- 4. Study of Indoor Comfort Conditions
- 5. Study of Waste Management
- 6. Study of Rain Water Management
- 7. Study of Environmental Friendly Initiatives.

1.3 Google Earth Location Image:



Environmental Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

1.4 General Details of Institute: Table No: 4:

No	Head	Particulars
1	Name	SaiBalaji Education Society's, SaiBalaji International Institute of Management Sciences
2	Address	Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033
3	Year of Establishment	2009

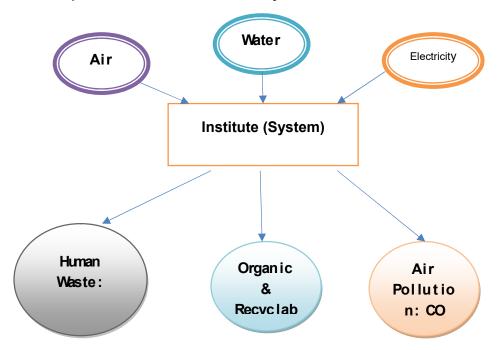
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The Institute consumes following Natural/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:



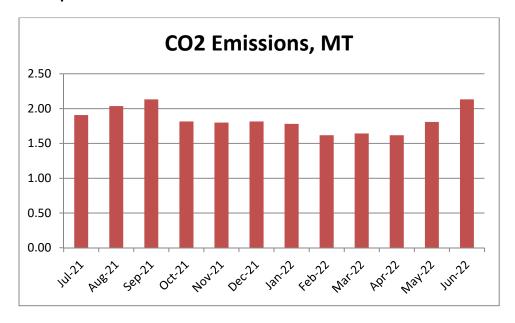
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. Here we compute the emissions of Carbon-Di-Oxide, by usage of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere.

Table No 5: Study of Energy Consumed & CO₂ Emission: 2021-22:

No	Month	Energy Purchased, kWh	CO₂ Emissions, MT
1	Jul-21	2118	1.91
2	Aug-21	2263	2.04
3	Sep-21	2369	2.13
4	Oct-21	2017	1.82
5	Nov-21	1998	1.80
6	Dec-21	2017	1.82
7	Jan-22	1978	1.78
8	Feb-22	1798	1.62

9	Mar-22	1825	1.64
10	Apr-22	1798	1.62
11	May-22	2008	1.81
12	Jun-22	2369	2.13
13	Total	24558	22.10
14	Maximum	2369	2.13
15	Minimum	1798	1.62
16	Average	2046.5	1.84

Chart No 2: Representation of Month wise CO₂ emissions:



CHAPTER-III STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity 5 kWp.

In this Chapter, we compute the reduction in CO₂ Emissions on account of Usage of Solar Energy.

Table No 6: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Solar PV Plant	5	kWp
2	Average Energy Generated by Solar PV Plant	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Total Solar Energy Generated=2*3*4	6000	kWh
5	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO ₂
6	Reduction in CO2 Emissions in 21-22 =4*5/1000	5.4	MT

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 an 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 liveability.

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	HOD Cabin	65	38	49
2	Girls Common Room	61	37	40
3	Admin & Account	60	36	38
4	Conf. Room	63	37	45
5	Faculty Room	60	34	39
6	Classroom-6		38	43
	Maximum		38	49
	Minimum	60	34	38

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 Parameters:

No	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
1	HOD Cabin	22.9	47	103	47
2	Girls Common Room	23	47	114	44.2
3	Admin & Account	23.1	46	130	41.6
4	Conf. Room	23.1	46	112	45
5	Faculty Room	22.9	46	125	42.1
6	Classroom-6	23	47	119	45.3
	Maximum	23.1	47	130	47
	Minimum	22.9	46	103	41.6

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

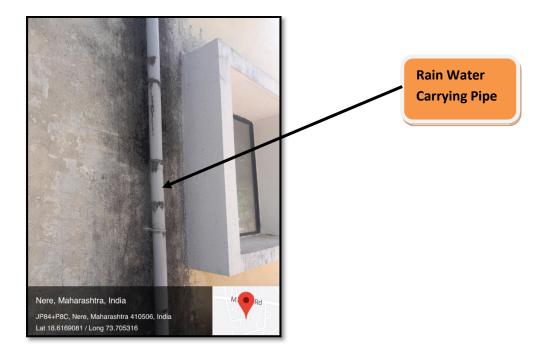
Photograph of Waste Collection Bin:



CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The Rain Water from the terrace is collected through Pipes and is used to increase the underground water table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY PRACTICES

8.1Tree Plantation in the Campus:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus. **Photograph of Tree Plantation:**



8.2 Creation of Awareness about 3 R's: Reduce, Reuse and Recycle:

The Institute has displayed Posters on Importance of 3 R's, namely Reduce, Reuse and Recycle.

Photograph of Poster on importance of 3 R's: Reduce, Reuse and Recycle:



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 33ºC	
2	Humidity	Less Than 70%	

GREEN AUDIT REPORT

of

SAIBALAJI EDUCATION SOCIETY'S,

SAIBALAJI INTERNATIONAL INSTITUTE OF MANAGEMENT SCIENCES,

Nere Dattawadi, Near Hinjewadi IT Park Pune 411 033



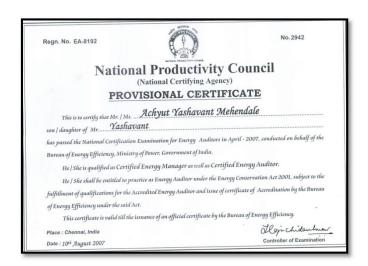
Year: 2021-22

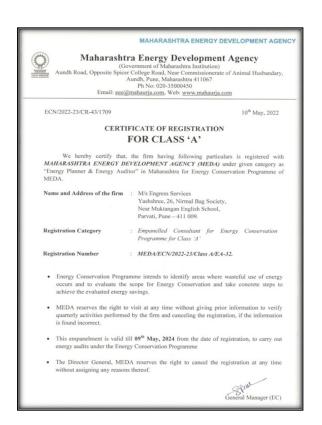
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Green Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

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Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SBIIMS/21-22/02 Date: 13/7/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033, in the Year 2021-22.

The Institute has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 5 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Septic Tank, for liquid Waste Management
- Implementation of Rain Water Management Project
- Good Internal Road
- ➤ Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness in respect of 3 R's: Reduce, Reuse and Recycle

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

For Engress Services,

A Y Mehendale,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788

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5	Study of Waste Management	12
6	Study of Rain Water Management	13
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Green Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033, 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. SaiBalaji Education Society's SaiBalaji International Institute of Management Sciences, Pune consumes Energy in the form of Electrical Energy; used for various Electrical Equipment.

2. Present Energy Consumption & CO₂ Emission:

No	Parameter /Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	24558	22.10
2	Maximum	2369	2.13
3	Minimum	1798	1.62
4	Average	2046.5	1.84

3. Usage of Renewable Energy & CO₂ Emission Reduction:

- The Institute has installed Roof Top Solar PV Plant of Capacity 5 kWp.
- Energy generated by the Plant in 21-22 is 6000 kWh
- Reduction in CO₂ Emission in CO₂ Emission in 21-22 is 5.4 kWh

4. Waste Management:

4.1 Segregation of Waste at Source:

The waste is segregated at the source. There are Waste Collection Bins at various locations, to collect the Waste.

5. Rain Water Management:

The Rain Water from the terrace is collected through Pipes and is used to increase the Underground Water Table.

6. Green & Sustainable Practices:

- Well maintained internal road
- Well maintained Internal Tree Plantation.
- Provision of Ramp for Divyangajan
- Creation of Awareness in respect of 3 R's: Reduce, Reuse and Recycle

7. Assumptions:

- 1. Energy Consumption is computed based on Load Utilization Factor
- 2. 1 kWh of Electrical Energy releases 0.9 Kg of CO2 into atmosphere
- 3. Energy generated by Roof Top Solar PV Plant: 4 kWh/kWp per Day
- 4. Annual Solar Energy generation Days: 300 Nos

8. References:

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

Green Audit Report: SaiBalaji International Institute of Management Sciences, Pune: 2021-22

ABBREVIATIONS

LED : Light Emitting Diode

kWh : kilo-Watt Hour

Qty : Quantity W : Watt

kW : Kilo Watt
MT : Metric Ton

CHAPTER-I INTRODUCTION

1.1 Objectives:

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

1.2 Table No 1: General Details of Institute:

No	Head	Particulars		
1	Name	SaiBalaji Education Society's, SaiBalaji International Institute of		
•	Name	Management Sciences		
2	Address	Nere Dattawadi, Near Hinjewadi IT Park, Pune 411 033		
3	Year of Establishment	2009		

1.3 Google Earth Location Image:

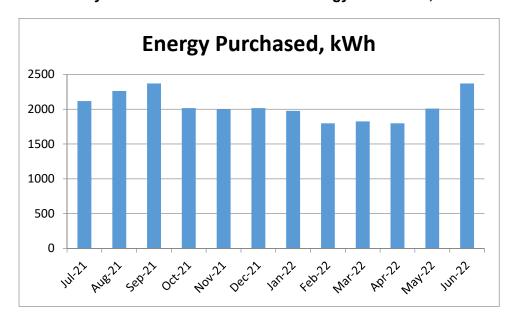


CHAPTER-II STUDY OF ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption Table No 2: Electrical Energy Consumption Analysis- 2021-22:

No	Month	Energy Purchased,
		kWh
1	Jul-21	2118
2	Aug-21	2263
3	Sep-21	2369
4	Oct-21	2017
5	Nov-21	1998
6	Dec-21	2017
7	Jan-22	1978
8	Feb-22	1798
9	Mar-22	1825
10	Apr-22	1798
11	May-22	2008
12	Jun-22	2369
13	Total	24558
14	Maximum	2369
15	Minimum	1798
16	Average	2046.5

Chart No 1: To study the variation of Month wise Energy Consumed, kWh:



CHAPTER-III STUDY OF CARBON FOOT PRINTING

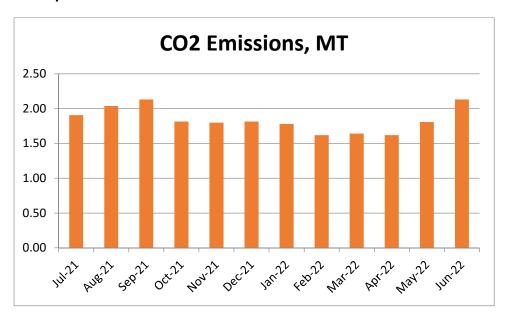
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. Basis for computation of CO₂ Emissions:

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

Table No 3: Month wise CO₂ Emissions:

No	Month	Energy Purchased, CO ₂ Emissi	
		kWh	MT
1	Jul-21	2118	1.91
2	Aug-21	2263	2.04
3	Sep-21	2369	2.13
4	Oct-21	2017	1.82
5	Nov-21	1998	1.80
6	Dec-21	2017	1.82
7	Jan-22	1978	1.78
8	Feb-22	1798	1.62
9	Mar-22	1825	1.64
10	Apr-22	1798	1.62
11	May-22	2008	1.81
12	Jun-22	2369	2.13
13	Total	24558	22.10
14	Maximum	2369	2.13
15	Minimum	1798	1.62
16	Average	2046.5	1.84

Chart No 2: Representation of Month wise CO₂ emissions:



CHAPTER-IV STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity 5 kWp.

In this Chapter, we compute the reduction in CO₂ Emissions on account of Usage of Solar Energy.

Table No 4: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Solar PV Plant	5	kWp
2	Average Energy Generated by Solar PV Plant	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Total Solar Energy Generated=2*3*4	6000	kWh
5	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO ₂
6	Reduction in CO2 Emissions in 21-22 =4*5/1000	5.4	MT

Photograph of Roof Top Solar PV Plant:

CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

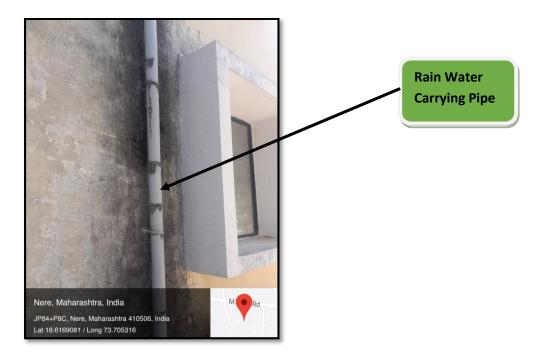
Photograph of Waste Collection Bin:



CHAPTER-VI STUDY OF RAIN WATER MANAGEMENT

The Rain Water from the terrace is collected through Pipes and is used to increase the underground water table.

Photograph of Rain Water Carrying Pipe:

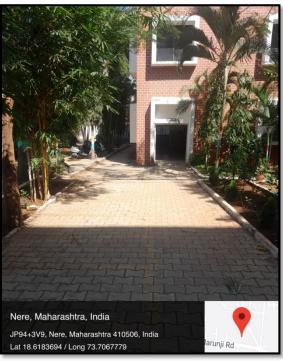


CHAPTER-VII STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Internal Road:

The Institute 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 Institute has well maintained Tree Plantation in the campus.

Photograph of Internal Tree Plantation:



7.3 Creation of Awareness about 3 R's: Reduce, Reuse and Recycle:

The Institute has displayed Posters on Importance of 3 R's, namely Reduce, Reuse and Recycle.

Photograph of Poster on importance of 3 R's: Reduce, Reuse and Recycle:

