ENERGY AUDIT REPORT

of

Nutan Maharashtra Vidya Prasarak Mandal's,

NUTAN MAHARASHTRA INSTITUTE OF ENGINEERING & TECHNOLOGY, PUNE,

Vishnupuri, Talegaon Dabhade, Pune 410 507

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

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
Date : 10th August 2007

Controller of Examination

BEE AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2022-23/CR-43/1709 10th May, 2022

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 Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

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

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- 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.
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- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

MEDA REGIATRATION CERTIFICATE

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/NMIET/21-22/01 Date: 15/7/2022

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The Institute has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Installation of Solar Thermal Water Heating System at Hostel Block
- Installation of 25 kWp Roof Top Solar PV Plant

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

For Engress Services,

AYMehendale

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENGRESS SERVICES PUNE

ABBREVIATIONS

AC	:	Air conditioner
MSEDCL	:	Maharashtra Electricity Distribution Company Limited
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present level Energy Consumption
3. To Study the present CO_2 emissions
4. To study Usage of Alternate/Renewable Energy
5. To study usage of LED Lighting

1.2 Table No1: General Details of Institute:

No	Head	Particulars
1	Name	Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune
2	Address	Vishnupuri, Talegaon Dabhade, Pune 410 507
3	Year of Establishment	2008

1.3 Google Earth Location Image:

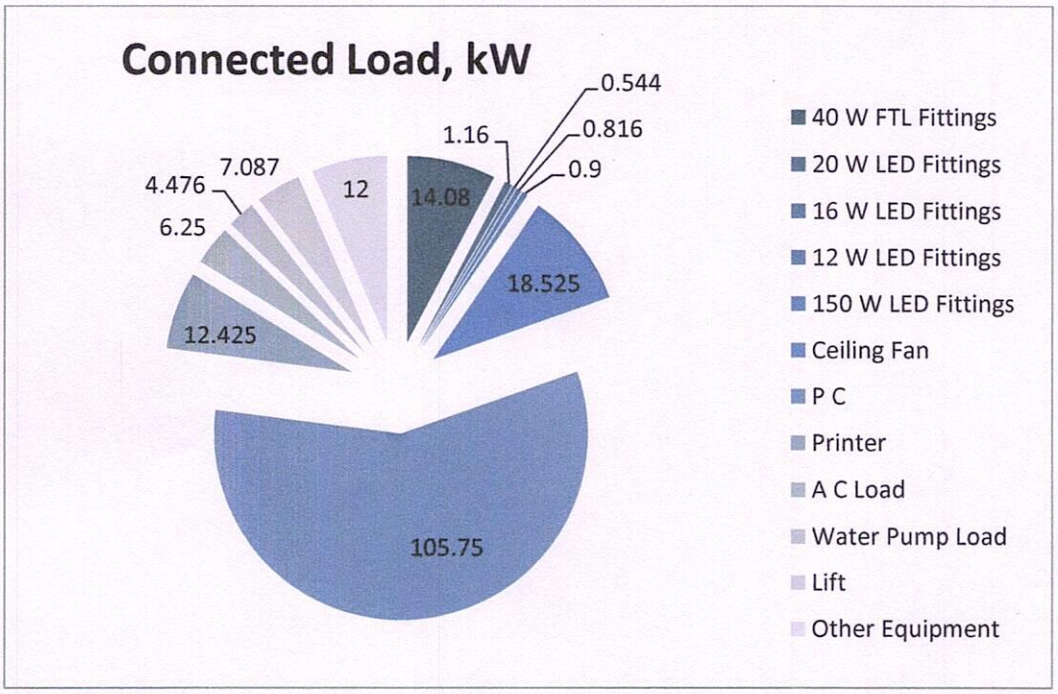
CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No-2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fittings	352	40	14.08
2	20 W LED Fittings	58	20	1.16
3	16 W LED Fittings	34	16	0.544
4	12 W LED Fittings	68	12	0.816
5	150 W LED Fittings	6	150	0.9
6	Ceiling Fan	285	65	18.525
7	P C	705	150	105.75
8	Printer	71	175	12.425
9	A C Load	5	1250	6.25
10	Water Pump Load	2	2238	4.476
11	Lift	1	7087	7.087
12	Other Equipment	48	250	12
13	**Total**			**184**

Chart No-1: Details of Connected Load:



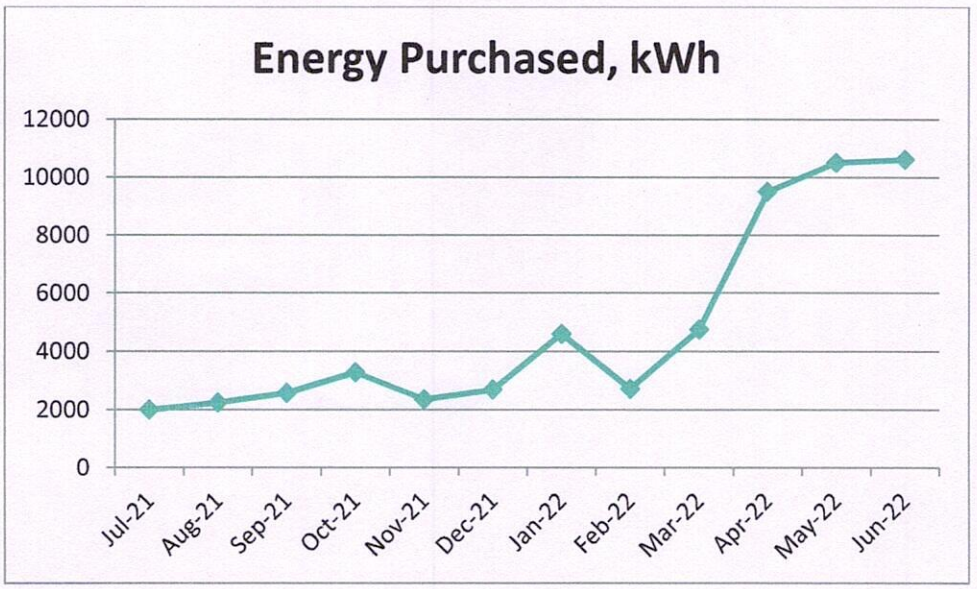
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption

Table No 3: Electrical Energy Purchase Analysis- 2021-22:

No	Month	Energy Purchased, kWh
1	Jul-21	1988
2	Aug-21	2238
3	Sep-21	2567
4	Oct-21	3272
5	Nov-21	2349
6	Dec-21	2686
7	Jan-22	4590
8	Feb-22	2710
9	Mar-22	4737
10	Apr-22	9493
11	May-22	10503
12	Jun-22	10608
13	Total	57741
14	Maximum	10608
15	Minimum	1988
16	Average	4811.75

Chart No 2: To study the variation of Month wise Energy Purchased, kWh:



CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

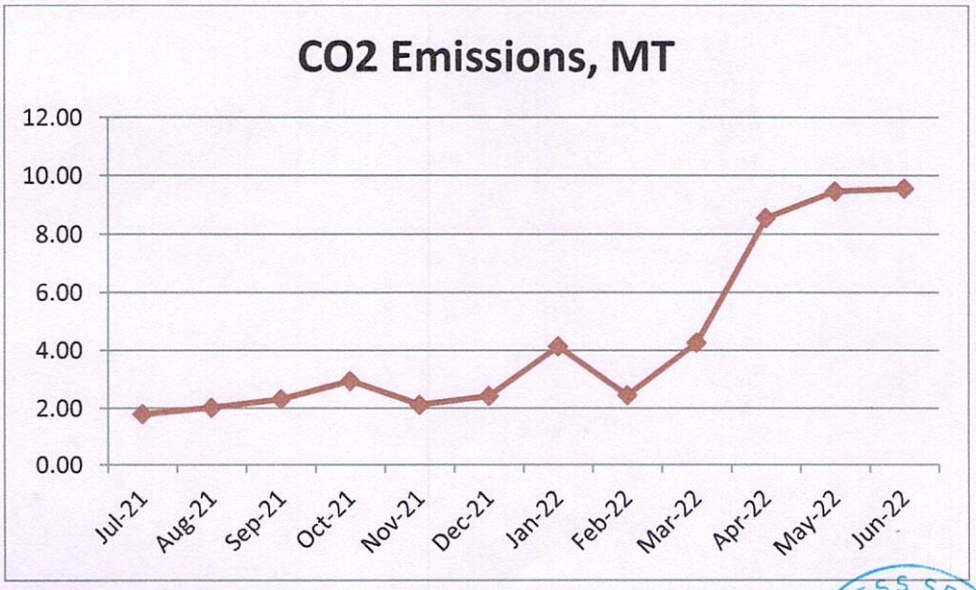
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the Institute for performing its day to day activities

Basis for computation of CO_2 Emissions: The basis of Calculation for CO_2 emissions due to Electrical Energy is: **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 4: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-21	1988	1.79
2	Aug-21	2238	2.01
3	Sep-21	2567	2.31
4	Oct-21	3272	2.94
5	Nov-21	2349	2.11
6	Dec-21	2686	2.42
7	Jan-22	4590	4.13
8	Feb-22	2710	2.44
9	Mar-22	4737	4.26
10	Apr-22	9493	8.54
11	May-22	10503	9.45
12	Jun-22	10608	9.55
13	Total	57741	51.97
14	Maximum	10608	9.55
15	Minimum	1988	1.79
16	Average	4811.75	4.33

Chart No 3: Representation of Month wise CO_2 emissions:



CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **25 kWp.**

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the Institute.

Table No 5: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**57741**	kWh/Annum
2	Installed Capacity of Solar PV Plant	25	kWp
3	Average Energy Generated by Solar PV Plant	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Total Solar Energy Generated=2*3*4	30000	kWh
6	Total Energy Demand= **(1)+(5)**	**87751**	kWh
7	% of Alternate Energy to Annual Requirement = **(5)*100/(6)**	**34.19**	**%**

Photograph of Roof Top Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In the following Table, we present the percentage of Total Lighting load met by LED lights.

Table No 6: Computation of Percent Usage of LEDs to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	352	Nos
2	Load/Unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fitting	**14.08**	kW
4	No of 20 W LED Fittings	58	Nos
5	Load/Unit of 20 W LEDL Fitting	20	W/unit
6	Total Load of 20 W LED Fitting	**1.16**	kW
7	No of 16 W LED Fittings	34	Nos
8	Load/Unit of 16 W LEDL Fitting	16	W/unit
9	Total Load of 16 W LED Fitting	**0.544**	kW
10	No of 12 W LED Fittings	68	Nos
11	Load/Unit of 12 W LEDL Fitting	12	W/unit
12	Total Load of 12 W LED Fitting	**0.816**	kW
13	No of 150 W LED Fittings	6	Nos
14	Load/Unit of 150 W LEDL Fitting	150	W/unit
15	Total Load of 150 W LED Fitting	**0.9**	kW
16	Total LED Lighting Load=6+9+12+15	**3.42**	kW
17	Total Lighting Load= 3+6+9+12+15	**17.50**	kW
18	% of LED to Total Lighting Load=**16*100/17**	**19.54**	%

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Year: 2021-22

Prepared by

ENGRESS SERVICES

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General Manager (EC)

MEDA REGIATRATION CERTIFICATE

ASSOCHAM
Ideate · Innovate · Impact

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 22/788

Deepak Sood
Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

ENGRESS SERVICES PUNE

ENGRESS SERVICES

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Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/NMIET/21-22/02 Date: 15/7/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune, in the Year 2021-22.

The Institute has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Installation of Solar Thermal Water Heating System at Hostel Block
- Installation of 25 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Rain Water Management Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of awareness about Energy Conservation by Display of Posters

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

For Engress Services,

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

ENGRESS SERVICES PUNE

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4	Study of Usage of Renewable Energy	12
5	Study of Waste Management	13
6	Study of Rain Water Harvesting	14
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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune, for awarding us the assignment of Green Audit of their Talegaon Dabhade Campus for the Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune consumes Energy in the form of **Electrical Energy; us**ed for various Electrical Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	57741	51.97
2	Maximum	10608	9.55
3	Minimum	1988	1.79
4	Average	4811.75	4.33

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Solar Thermal Water Heating System
- Installation of **25 kWp** Roof Top Solar PV Plant

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has installed **25 kWp** Roof Top Solar PV Plant
- Energy generated by Solar PV Plant in 21-22 is **30000 kWh**
- Reduction in CO_2 Emissions by usage of Solar Energy in 21-22 is **27 MT.**

5. Waste Management:

5.1 Segregation of Waste at Source:

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

5.2 Leftover Food Waste Management:

The Leftover food waste is handed over to Nagar Parishad.

6. Rain Water Harvesting:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground Water Table.

7. Green & Sustainable Practices:

- Well maintained internal road
- Well maintained Garden.
- Provision of Ramp for Divyangajan
- Creation of Awareness in respect of Energy Conservation by displaying Posters

ENGRESS SERVICES PUNE

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy generation Days: **300 Nos**

9. References:

- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

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 CO_2 emissions
3. To study Scope for usage of Renewable Energy
4. To study Waste Management:
5. To study Rain Water Harvesting
6. To study Green & Sustainable Practices.

1.2 Table No 1: General Details of Institute:

No	Head	Particulars
1	Name	Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune
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In this chapter, we present the analysis of Electricity Energy Consumption

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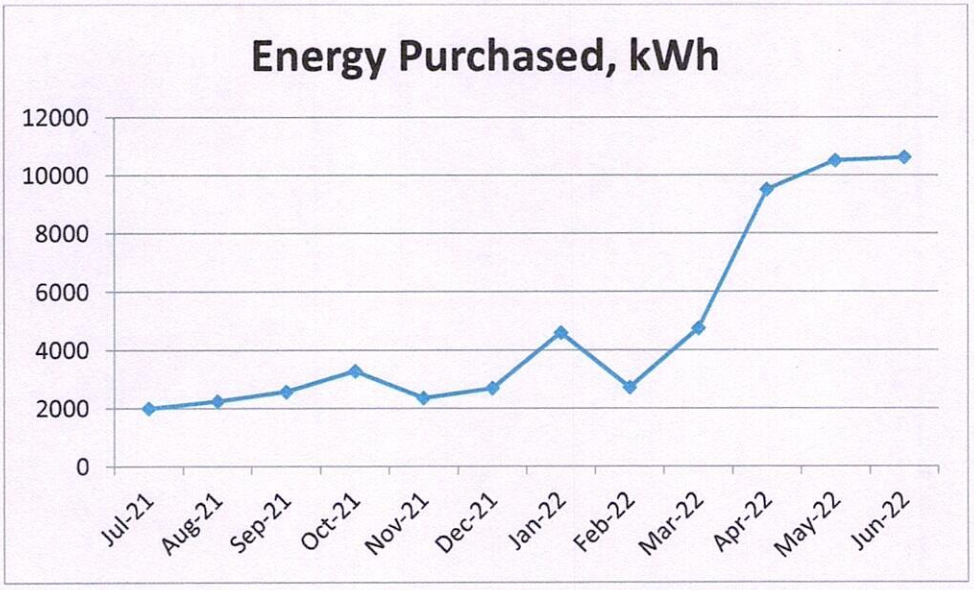

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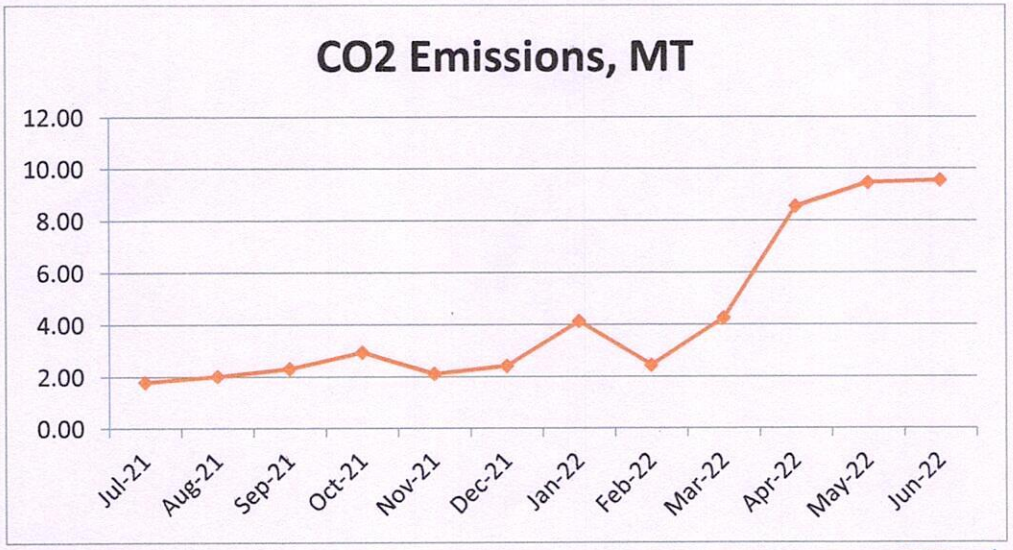
Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **25 kWp**
We now calculate the reduction in CO_2 Emission due to Solar PV Plant.

Table No 4: Computation of Reduction in CO_2 Emission:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	25	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	**30000**	kWh
5	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO_2
6	**Annual Reduction in CO_2 Emission = (4) * (5) /1000**	**27**	**MT**

Photograph of Roof Top Solar PV Plant:

CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The Institute has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

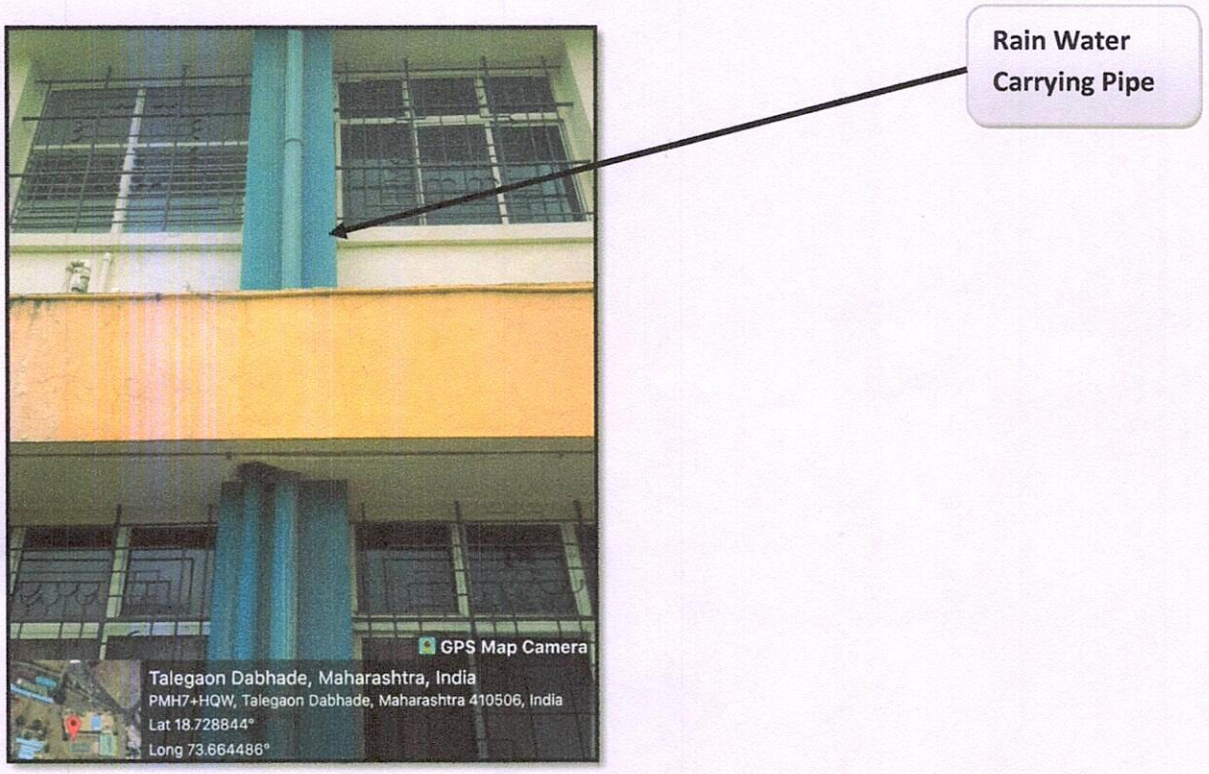
5.2 Leftover Food Waste Management:

The Leftover food waste is handed over to Nagar Parishad.

CHAPTER-VI
STUDY OF RAIN WATER HARVESTING

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground Water Table.

Photograph of Rain Water Carrying Pipe:

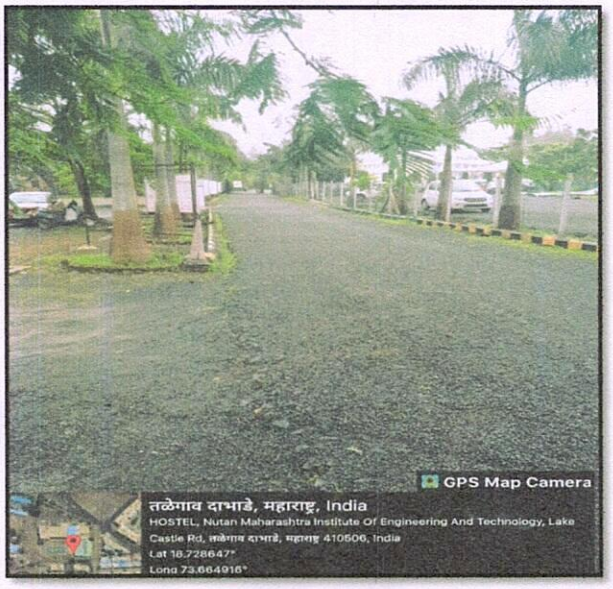


CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Internal Road:

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

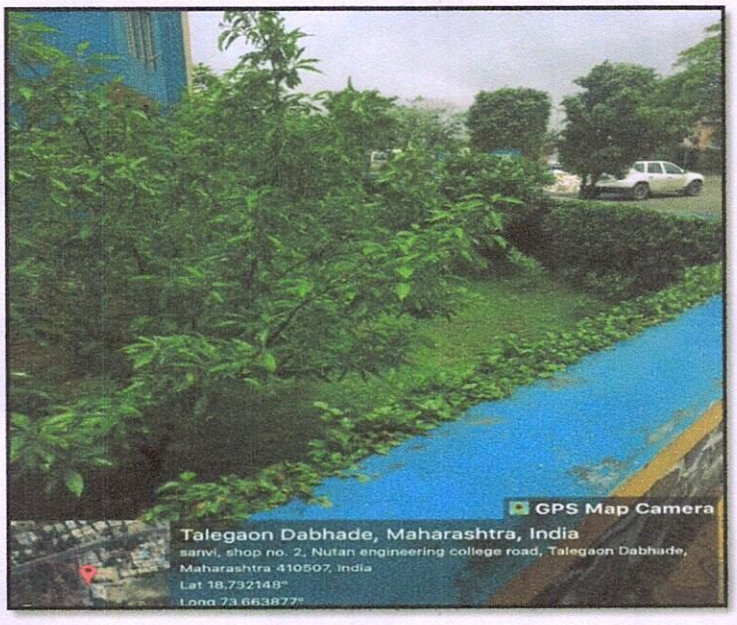
Photograph of Internal Road:



7.2 Tree Plantation:

The Institute has Tree Plantation in the campus.

Photograph of Internal Tree Plantation:



7.3 Provision of Ramp for Divyangajan:

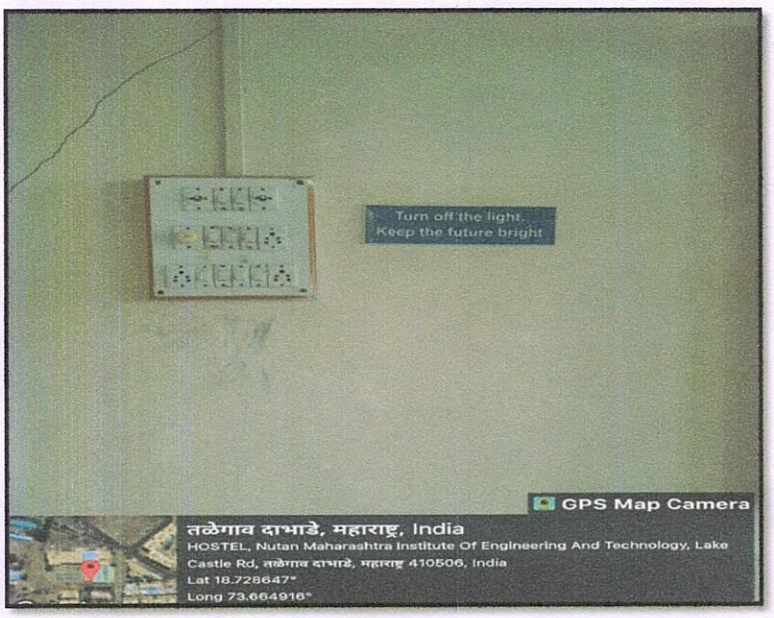
The Institute has made provision of Ramp for easy movement of Divyangajan.

Photograph of Ramp:

7.4 Creation of Awareness about Resource Conservation:

The Institute has displayed Posters on Importance of Energy Conservation.

Photograph of Poster on importance of Energy Conservation:



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- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** 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 REGIATRATION CERTIFICATE

ASSOCHAM
Ideate · Innovate · Impact

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 22/788

Deepak Sood
Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/NMIET/21-22/03 Date: 15/7/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune, 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
- Installation of Solar Thermal Water Heating System at Hostel Block
- Installation of 25 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Rain Water Management Project
- Internal Tree Plantation
- Creation of awareness about Energy Conservation by Display of Posters

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

For Engress Services,

ENGRESS SERVICES PUNE

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

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune, for awarding us the assignment of Environmental Audit of their Talegaon Dabhade 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. Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune, Vishnupuri, Talegaon Dabhade, Pune consumes Energy in the form of **Electrical Energy; us**ed for various Electrical Equipment.

2. Pollution caused due to Institute Activities:

- **Air pollution:** Mainly CO_2 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 & CO_2 Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	57741	51.97
2	Maximum	10608	9.55
3	Minimum	1988	1.79
4	Average	4811.75	4.33

4. Projects implemented for Environmental Conservation:

- Usage of Energy efficient LED fittings
- Installation of Solar Thermal Water Heating System at Hostel Block
- Installation of **25 kWp** Roof Top Solar PV Plant

5. Usage of Renewable Energy & Reduction in CO_2 Emissions:

- The Institute has installed **25 kWp** Roof Top Solar PV Plant
- Energy generated by Solar PV Plant in 21-22 is **30000 kWh**
- Reduction in CO_2 Emissions by usage of Solar Energy in 21-22 is **27 MT.**

6. Indoor Air Quality:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**51**	**31**	**33**
2	Minimum	**40**	**25**	**30**

7. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	**28.6**	**68**	**138**	**45**
2	Minimum	**28.3**	**65**	**98**	**42**

8. Waste Management:

8.1 Segregation of Waste at Source:

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

8.2 Leftover Food Waste Management:

The Leftover food waste is handed over to Nagar Parishad.

9. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used to increase the underground Water Table.

10. Environment Friendly Initiatives:

- Tree Plantation and Well maintained Garden.
- Creation of Awareness in respect of Energy Conservation by displaying posters

11. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy generation Days: **300 Nos**

12. References:

- For CO_2 Emission computation: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

ABBREVIATIONS

kWh	:	kilo-Watt Hour
Qty	:	Quantity
MT	:	Metric Ton
CO_2	:	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

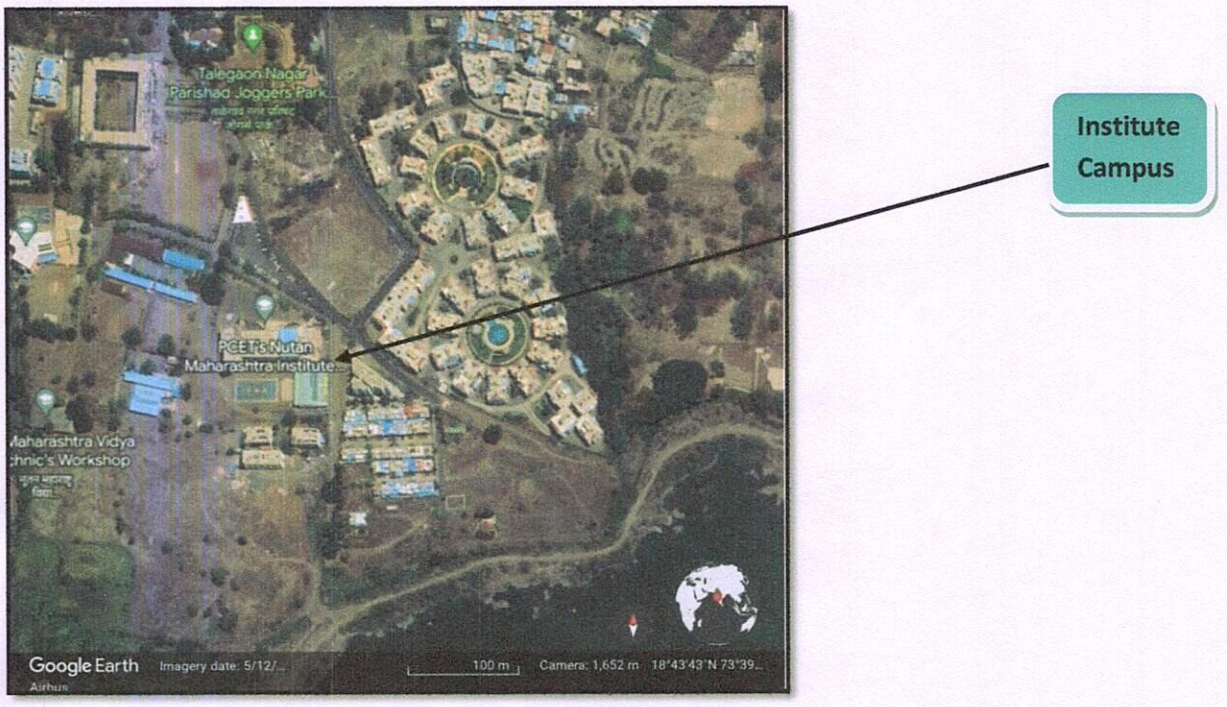
1.1.6 National Environmental Plans & Policy Documents: Table No-3:

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 & CO_2 Emissions
2. Study of CO_2 emission Reduction
3. Study of Indoor Air Quality
4. Study of Indoor Comfort Conditions
5. Study of Waste Management
6. Study of Rain Water Harvesting
7. Study of Environmental Friendly Initiatives.

1.3 Google Earth Location Image:



1.3 General Details of Institute: Table No: 4:

No	Head	Particulars
1	Name	Nutan Maharashtra Vidya Prasarak Mandal's Nutan Maharashtra Institute of Engineering & Technology Pune
2	Address	Vishnupuri, Talegaon Dabhade, Pune 410 507
3	Year of Establishment	2008

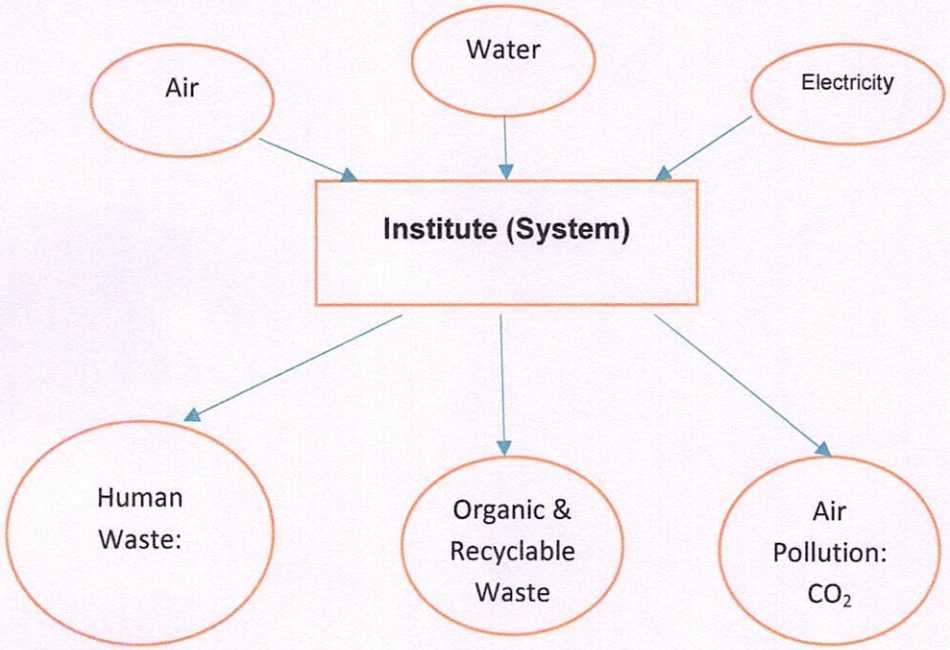
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

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:



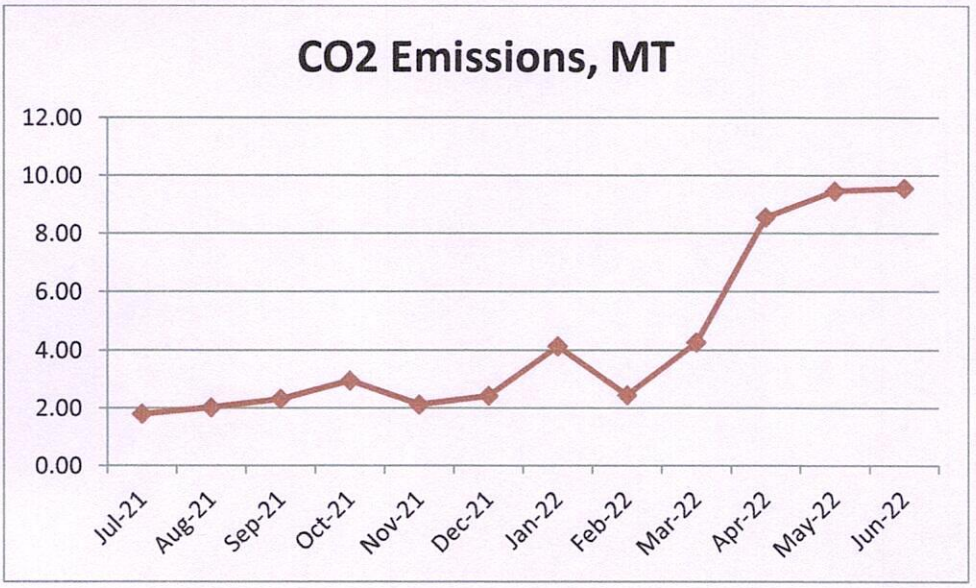
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. Here we compute the emissions of Carbon-Di-Oxide, by usage of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy is **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 5: Study of Energy Purchased & CO_2 Emission: 2021-22:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-21	1988	1.79
2	Aug-21	2238	2.01
3	Sep-21	2567	2.31
4	Oct-21	3272	2.94
5	Nov-21	2349	2.11
6	Dec-21	2686	2.42
7	Jan-22	4590	4.13
8	Feb-22	2710	2.44

9	Mar-22	4737	4.26
10	Apr-22	9493	8.54
11	May-22	10503	9.45
12	Jun-22	10608	9.55
13	Total	57741	51.97
14	Maximum	10608	9.55
15	Minimum	1988	1.79
16	Average	4811.75	4.33

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **25 kWp**
We now calculate the reduction in CO_2 Emission due to Solar PV Plant.

Table No 6: Computation of Reduction in CO_2 Emission:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	25	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	**30000**	kWh
5	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO_2
6	**Annual Reduction in CO_2 Emission = (4) * (5) /1000**	**27**	**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 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
3. PM 10- Particulate Matter of Size 10

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Admin Office	40	25	33
2	DOM Lab	45	27	32
3	Placement office	41	25	30
4	Physics Lab	46	28	33
5	Class Room-1	45	27	32
6	Class Room-2	51	31	32
	Maximum	**51**	**31**	**33**
	Minimum	**40**	**25**	**30**

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, ^{0}C	Humidity, %	Lux Level	Noise Level, dB
1	Admin Office	28.4	65	138	44
2	DOM Lab	28.3	68	112	45
3	Placement office	28.3	67	110	43
4	Physics Lab	28.4	67	98	42
5	Class Room-1	28.3	68	102	44
6	Class Room-2	28.6	65	117	43
	Maximum	**28.6**	**68**	**138**	**45**
	Minimum	**28.3**	**65**	**98**	**42**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Institute has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

6.2 Leftover Food Waste Management:

The Leftover food waste is handed over to Nagar Parishad.

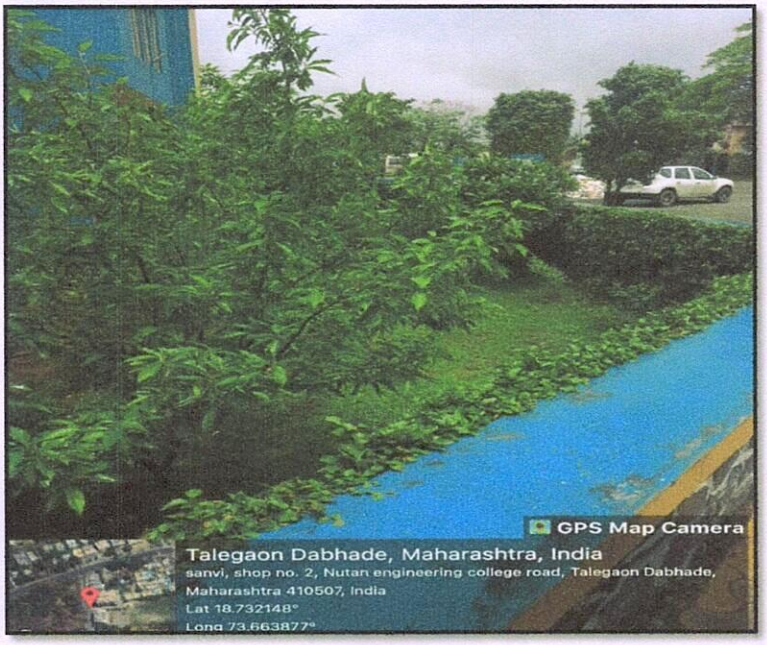
CHAPTER-VII
STUDY OF RAIN WATER HARVESTING

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace 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 Resource Conservation:
The Institute has displayed Posters on Importance of Energy Conservation.
Photograph of Poster on importance of Energy Conservation:

ANNEXURE-I: INDOOR AIR QUALITY, NOISE & INDOOR COMFORT PARAMETER 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 33^0C
2	Humidity	Less Than 70%