Pune District Education Association's
INSTITUTE OF TECHNICAL EDUCATION,
RESEARCH & MANAGEMENT
Estd. June 2010

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Ph.: 020-27650788
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7.1.2

Environmental Consciousness Sustainability and Divyangan Friendly initiatives

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Sr. No.	Summary	Report
1	Alternate sources of energy and energy conservation measures	1. Policy document for energy usage 2. Facility for alternative sources of energy 3. Photos of solar panel
2	Management of the various types of degradable and non- degradable waste	Policy document for waste management Photos of waste management
3	Water Conservation	Construction of tanks and maintenance of water bodies photos
4	Green Campus Initiatives	Policies for Environmental and Green Campus Initiatives Green Campus Certificates Tree Plantation Activities Campus Cleaning Activities
5	Disabled friendly, barrier free environment	Barrier Free Entry Disabled friendly washrooms

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Sec.28, Ganganagar, PCNTDA, Akurdi, Pune-44.

Director
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Alternate sources of energy and energy conservation measures

Pune District Education Association's

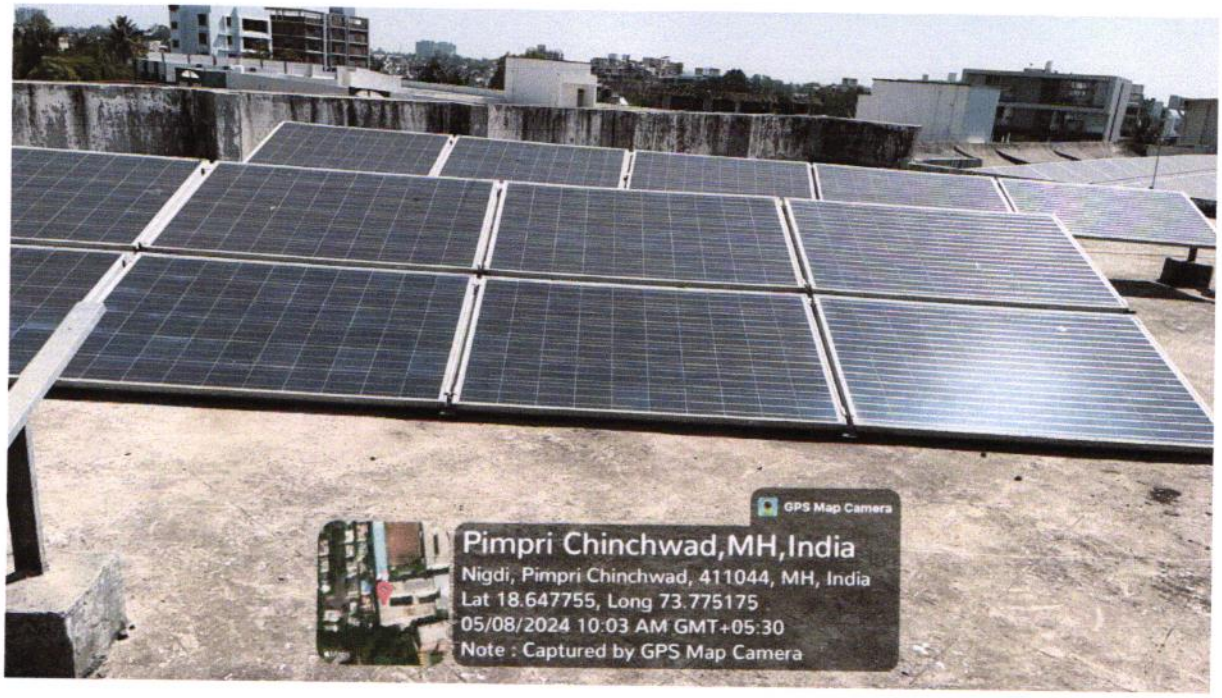
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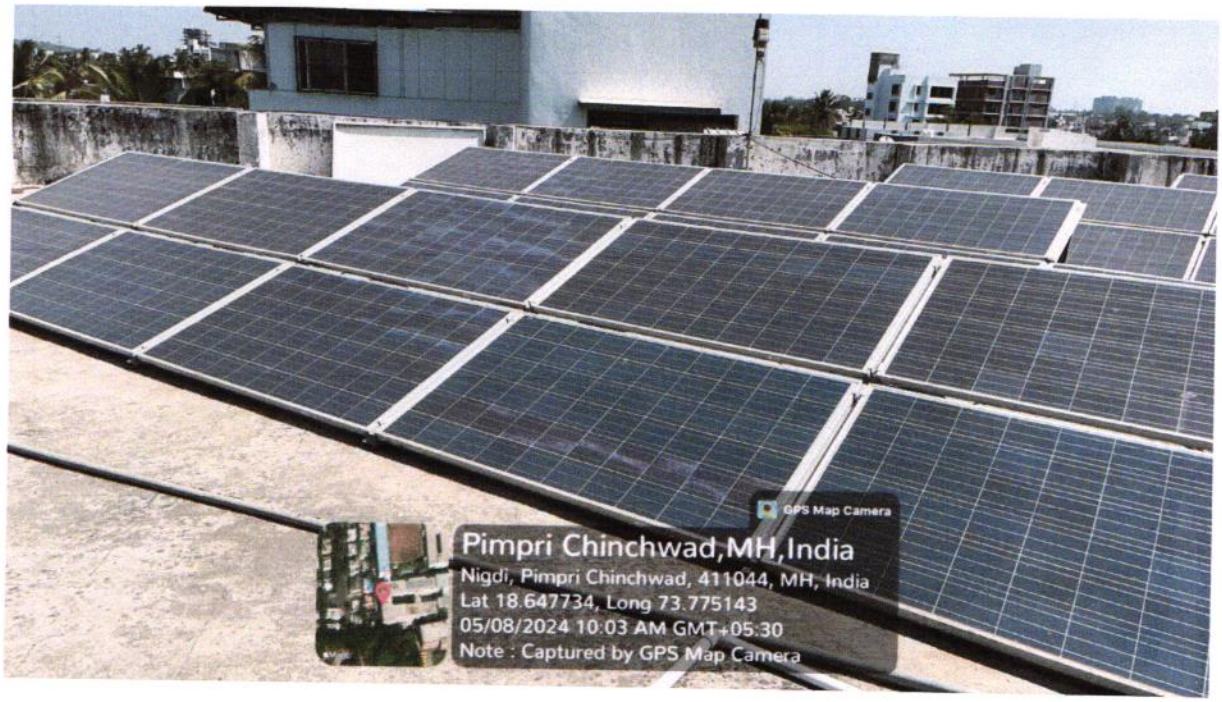
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Institute of Technical Education Research and Management follows energy usage policy which is designed for systematic energy management to minimize its impact on the environment. The policy implies to identify alternative natural renewable energy resources to reduce the burden of cost as well as pollution and to find out answer to the impending energy crisis. The college believes in reducing the consumption of electricity produced by non-renewable resources by switching to renewable energy sources like solar energy for purpose of electricity requirement of the campus. We commit to install and use environment-friendly electrical appliances that help to save energy. The college uses power saving equipment's such as LED lighting, energy efficient equipment's and electronic appliances like CCTVs, Computers etc.

Natural renewable energy sources like solar energy have remarkably reduced the electricity bills of the campus to the negative side.

Policy

- To install energy efficient energy lights LED's in entire campus, to lower energy consumption, decrease maintenance costs and to save the energy and expenses.
- To prefer regular use of energy efficient equipment's over conventional equipment's.
- To conduct regular energy audits and follow the instructions and advices given by auditing agency.
- To reduce air pollution in college campus we promote use of bicycles, public transportation and pedestrian-friendly roadways and also we restrict entry of automobiles in college campus.
- To take more initiatives for continuous decrease in energy usage.

Sec.28, Ganganagar, Akurdi, Pune-44

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- To promote use of recent advanced technology to decrease energy consumption.
- To ensure the accessibility of required resources to accomplish our objectives.
- To actively work with the local organizations in the areas of energy efficiency as well as environment protection. These organizations include Government agencies, Municipal Corporation and affiliated University.
- To give information and guidance opportunities on energy conservation measures.
- To encourage and provide opportunities to employees and students to connect with initiatives for environmental protection
- To promote promotional activities and knowledge or environment protection among our students by displaying boards and hoardings in the campus for energy conservation.
- To utilize daylight at its maximum extent and turn off unnecessary lights.

Facilities for alternate sources of energy and energy conservation measures

- We conduct various energy conservation practices to save energy. Some energy conservation measures are as follows;
- We installed energy efficient energy lights LED's in all college campus. It helps us to lower energy consumption, decrease maintenance costs and used as energy efficient system to save the energy and expenses.
- We conduct energy audits and follow the instructions and advices given by auditing agency

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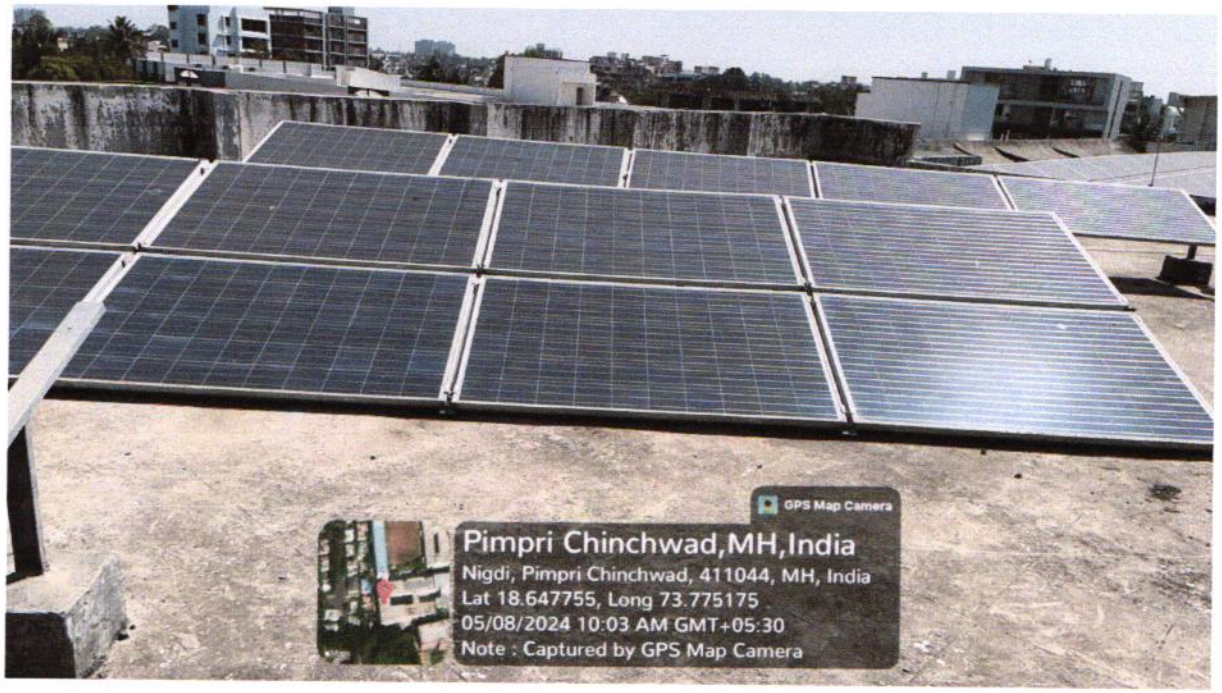
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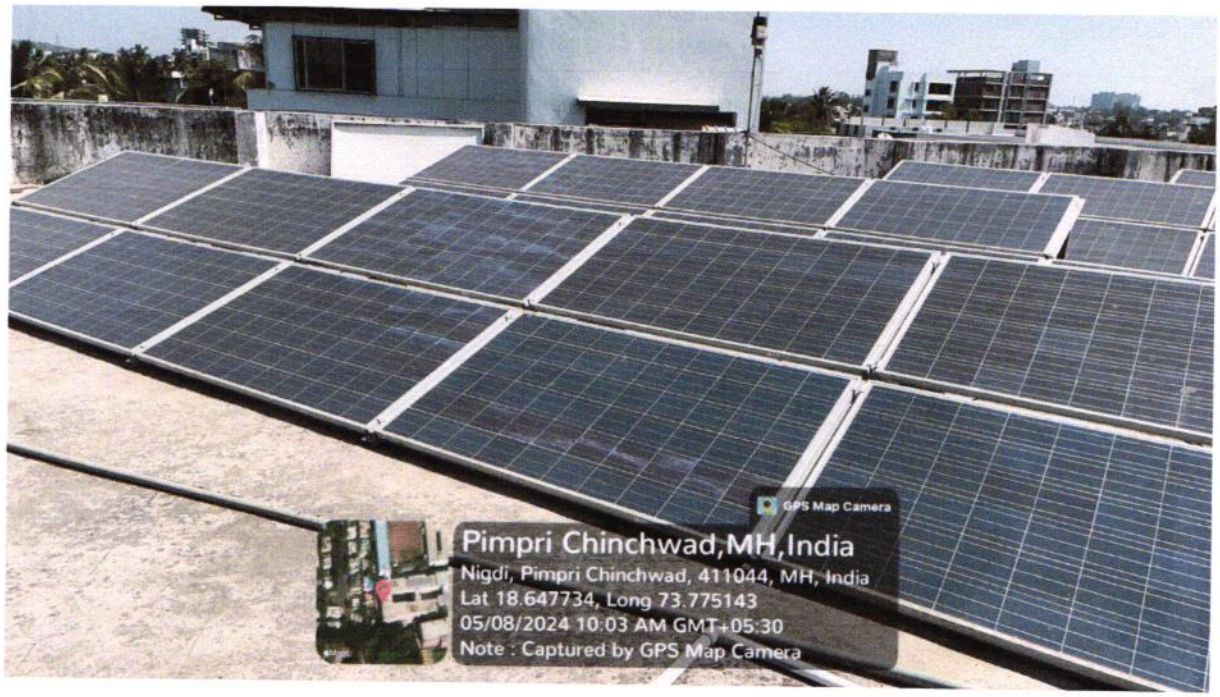
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Policy for management of degradable and non-degradable waste

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Policy for management of degradable and non-degradable waste Institute of Technical Education Research and Management has concern to safeguard environment, health and well-being through implementation of effective waste management practices such as segregation of waste and recycling of it. There are following types of wastes generated in the college as,

Policy Objectives:

The objectives of management of degradable non-degradable and waste policy are:

1. Disposal of solid waste through segregation, collection and treatment and disposal in an environmentally friendly manner.

2. To encourage environmental awareness in order to enhance and encourage related to waste minimization, reuse and recycling of waste.

3. Appropriate disposal and handling of different types of wastes.

4. To decrease consumption and the amount of waste produced as well as encourage for recovering and recycling waste where possible.

5. To conduct various awareness programmes such as cleanliness drives and plastic free activities.

6. To utilize solid waste in the form for compost.

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Water conservation facility

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Water conservation facility

Rain water harvesting is a system which includes the collection and storage of rain water to increase the underground level of water. The Institute of Technical Education Research and Management has implemented the Rain Water harvesting project. The rain water falling on the terrace is collected through pipes then it is collected in tank and is used for increasing the underground water level.

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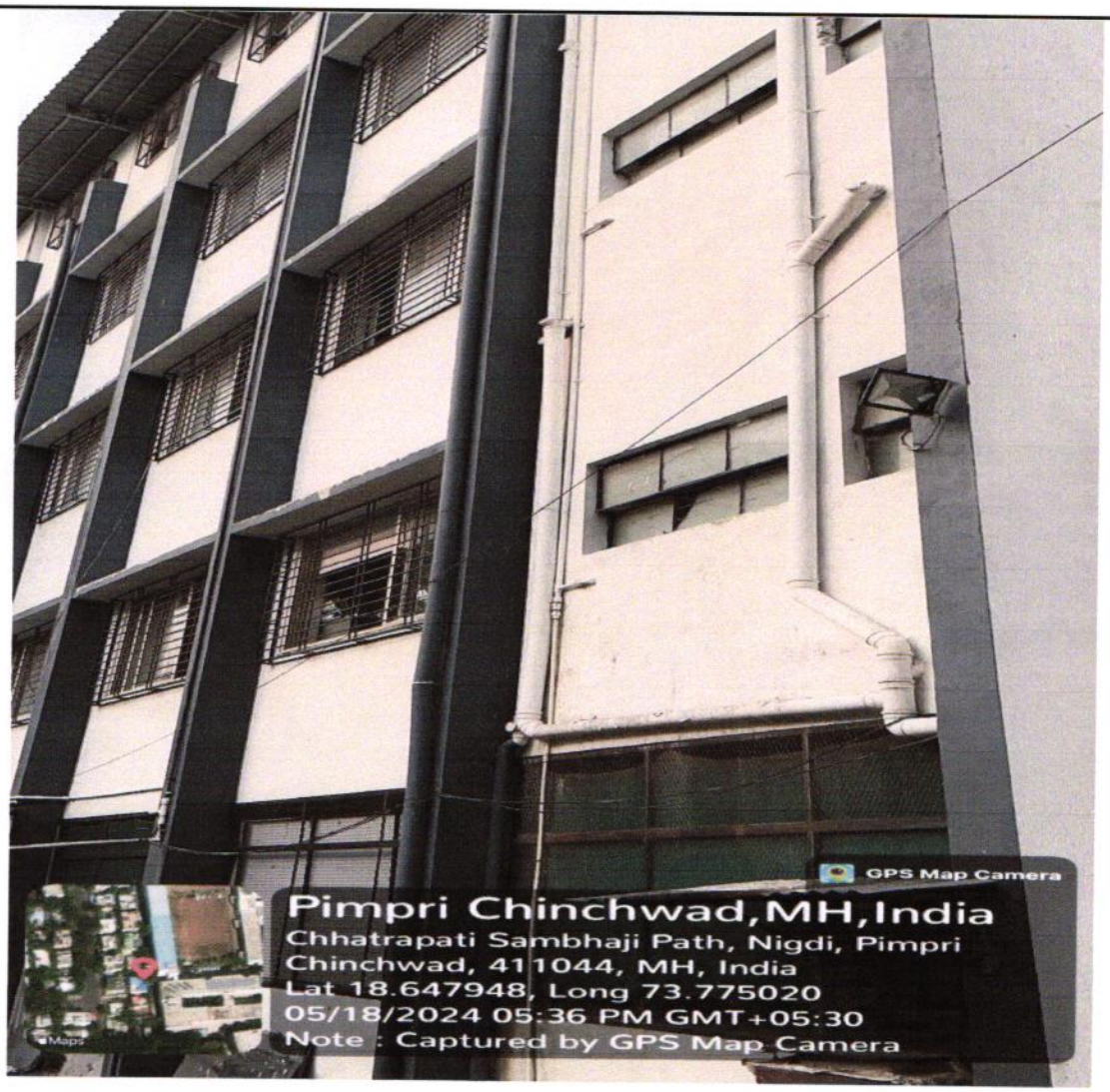
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Drinking Water Facility in Campus



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Green campus Initiatives

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Green campus Initiatives

Sr. No	Name of Activity
1	Policies for Environmental and Green Campus Initiatives
2	Green Campus Certificates
3	Tree Plantation Activities
4	Campus Cleaning Activities

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POLICIES FOR ENVIRONMENTAL AND GREEN CAMPUS INITIATIVES

The Institute of Technical Education Research and Management has taken initiatives to implement eco-friendly practices in the campus. A green campus is a concept where continuous efforts are taken to establish environmentally sustainable and eco- friendly practices. The Institute of Technical Education Research and Management is regularly engaged in a variety of eco-friendly practices in our campus such as tree plantation, installation of solar energy panels etc. Efforts are being made to develop the campus on green concepts, particularly concentrating on water conservation, use of alternative and renewable sources of energy, use of different energy conservation methods, solid waste management, E-waste management etc.

Scope of the Policy:

The Green Campus, Energy and Environment Policies will develop exciting new practices that encourage students in creating positive change. Green campus is achieved by making significant progress in the campus in collaboration with community. The Institute has performed various protocols and programmes under green campus initiatives.

Objectives of the green campus program:

To protect and preserve ecological systems and natural resources within the campus.

To incorporate environmental initiatives into policies, plans and programmes for social development and outreach activities.

To continuously expand our contribution to climate protection and adaptation to climate change and to the conservation of comprehensive resources.

Effective use of conventional sources of energies for daily power needs, appropriate disposal and handling of different types of wastes etc.

Everyone at the The Institute of Technical Education Research and Management will work together to encourage a beliefs of self- sustainability and make the whole campus environmental friendly.

To constantly improve the effective use of all natural resources like energy, water etc.

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To decrease consumption and the amount of waste produced as well as encourage for recovering and recycling waste where possible.

Major points focused under policies are:

Clean campus initiatives

Availability of sufficient dustbins for collection of different types of garbage

Organization of campus cleaning activities and programmes Environment promotional activities and programmes

Landscaping with trees and plants

Water conservation system

Green Audit

Energy Audit

The Institute of Technical Education Research and Management actively coordinates cleanliness activities in the college campus and beyond the campus by organizing different activities like Swachh Bharat Abhiyan. The entry of automobiles inside the campus is restricted to reduce environmental pollution of campus. We encourage our students and staff to use public transportation. Single–use plastic stuffs such as plastic bottles, bags, spoons, straws and cups are banned completely and awareness is created among all teaching, nonteaching staff and students. Landscaping initiatives are best methods to build awareness around the environment. The landscape of trees and plants provide the students and staff with clean and cool air and a soothing environment. The Municipal Corporation's water supply and bore well are the sources of water supply to the college campus. Our college is aware about the water conservation measures and problems associated with water shortage and therefore we follow the practices for water conservation and efficient use of available water. Water tanks are constructed in campus for proper storage of water. Water is pumped into storage tanks located at different places in the campus. Overhead storage tanks are also available. The water is distributed through pipe network in college campus.

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Campus Cleaning Activities





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Tree Plantation Activities





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Nirmalya Collection





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Plastic Collection





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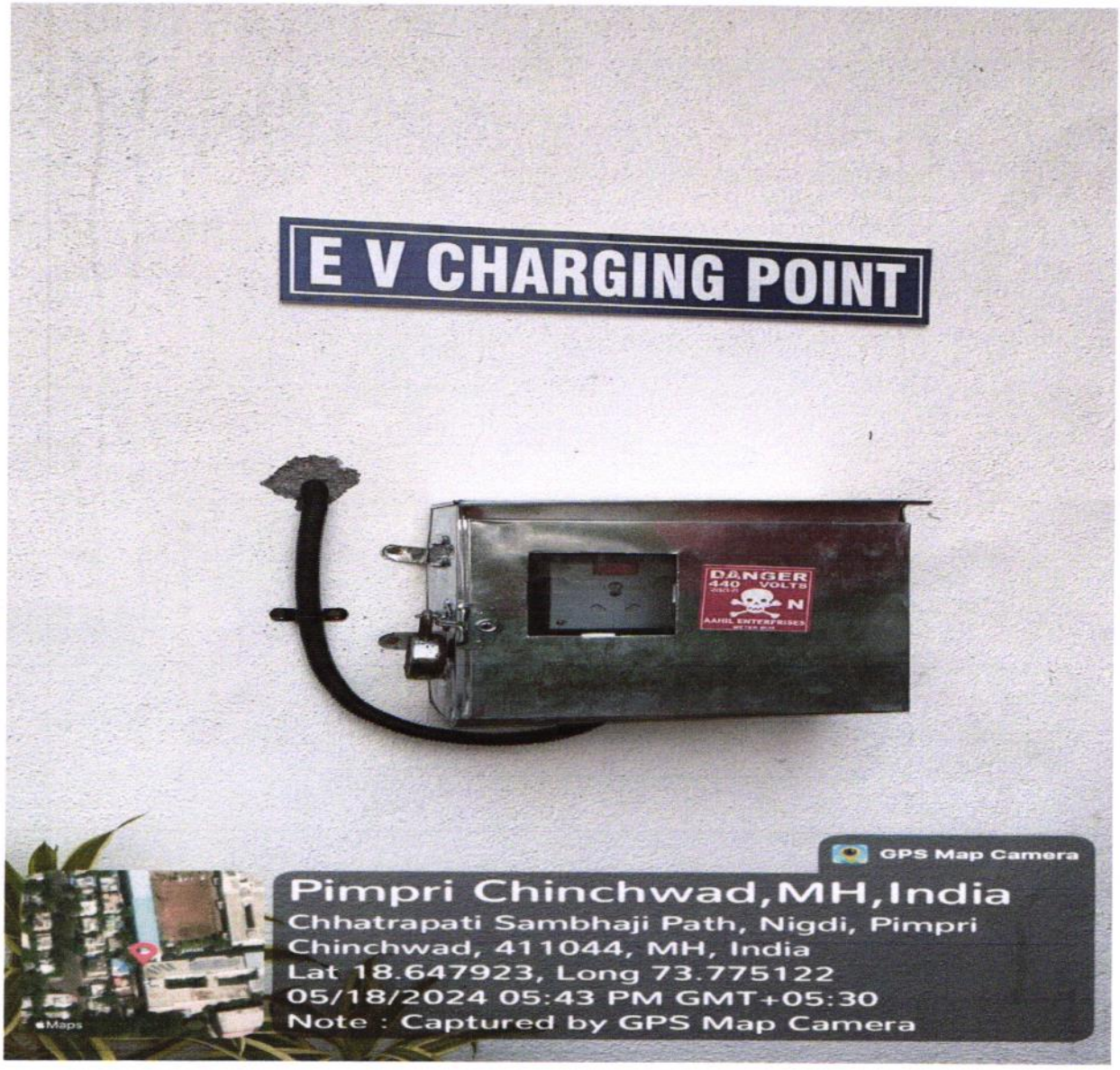
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EV Charging Point



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GREEN AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

Year: 2022-23

Prepared by:

ENGRESS SERVICES

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

REGISTRATION CERTIFICATES



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: eee@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.
- 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 REGISTRATION CERTIFICATE



GEM Certificate

ASSOCHAM
Ideate Innovate Impact

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



Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No	: 23EQKC13		
Initial Registration Date	: 27/03/2023	Issuance Date	: 27/03/2023
Date of Expiry	: 26/03/2026		
1st Surve. Due	: 27/02/2024	2nd Surve. Due	: 27/02/2025

mms EGAC Accredited IAF

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India

ISO: 9001-2015 CERTIFICATE



Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope :

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Certificate No	: 23EEKW20		
Initial Registration Date	: 29/03/2023	Issuance Date	: 29/03/2023
Date of Expiry	: 28/03/2026		
1st Surve. Due	: 29/02/2024	2nd Surve. Due	: 28/02/2025

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Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India

ISO: 14001-2015 CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Energy Consumption & CO_2 Emission	8
3	Study of Usage of Renewable Energy	9
4	Study of Waste Management	10
5	Study of Rain water Management	11
6	Study of Green & Sustainable Practices	12

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Green Audit of their Campus for the Year: 2022-23.

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

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EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emissions:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**19619**	kWh
2	Annual CO_2 Emissions	**17.66**	MT

3. Usage of Renewable Energy:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed

6. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

7. Green & Sustainable Initiatives:

- Good internal road
- Internal Tree Plantation.
- Display of Posters on Water Conservation

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

9. Reference:

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

ABBREVIATIONS

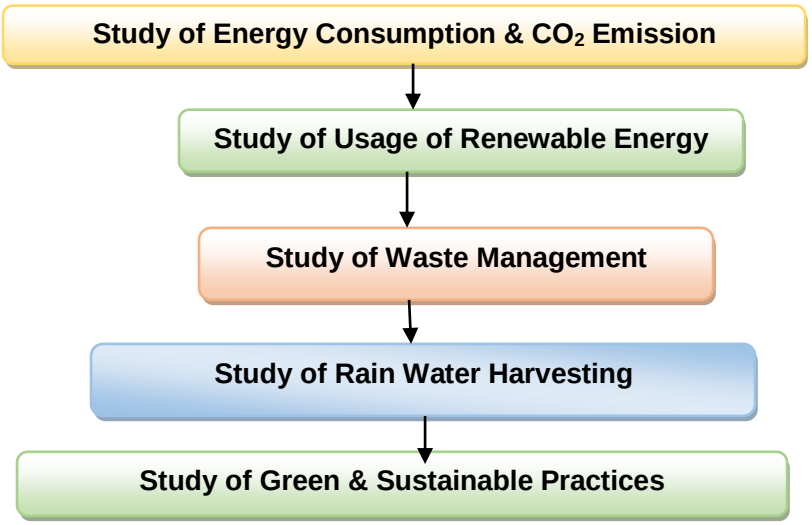
PDEA	:	Pune District Education Association
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

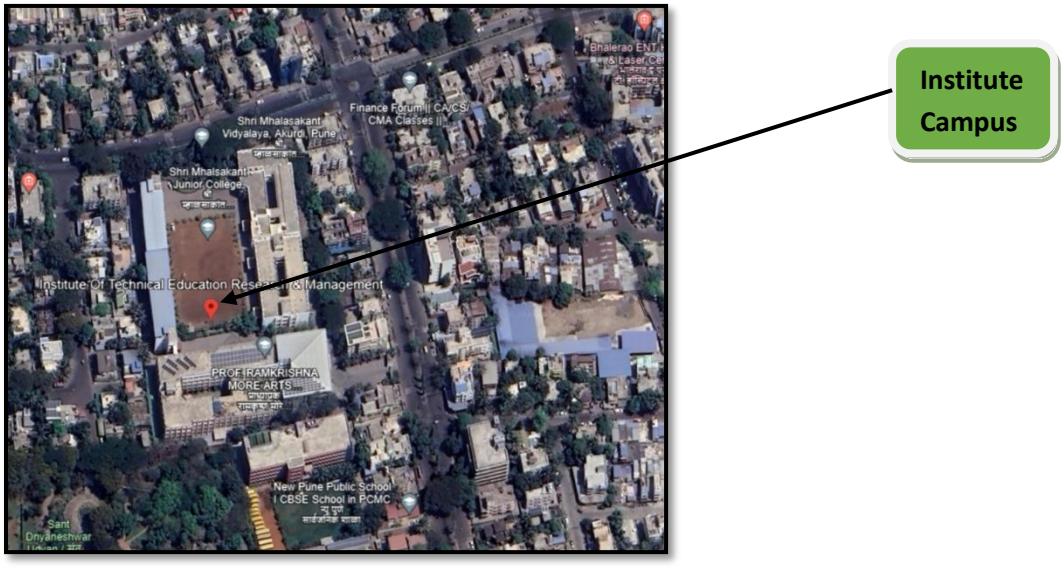
1.1 Introduction:

A Green Audit is conducted at District Education Association's Institute of Technical Education Research and Management, Ganganagar, Akurdi, Pune

1.2 Audit Procedural Steps:



1.3 Google Earth Image:



CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

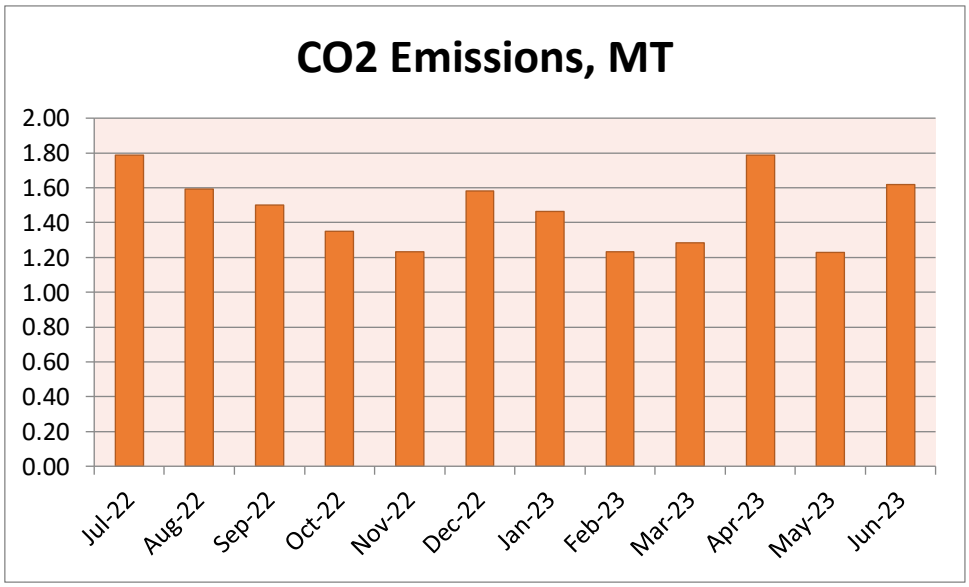
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

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

Table No 1: Month wise CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emission, MT
1	Jul-22	1985	1.79
2	Aug-22	1769	1.59
3	Sep-22	1668	1.50
4	Oct-22	1502	1.35
5	Nov-22	1369	1.23
6	Dec-22	1758	1.58
7	Jan-23	1625	1.46
8	Feb-23	1368	1.23
9	Mar-23	1425	1.28
10	Apr-23	1987	1.79
11	May-23	1365	1.23
12	Jun-23	1798	1.62
13	Total	19619	17.66
14	Maximum	1987	1.79
15	Minimum	1365	1.23
16	Average	1634.92	1.47

Chart No 1: Month wise CO_2Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**5.4**	**MT**

Photograph of Roof Top Solar PV Plant:



CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 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 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

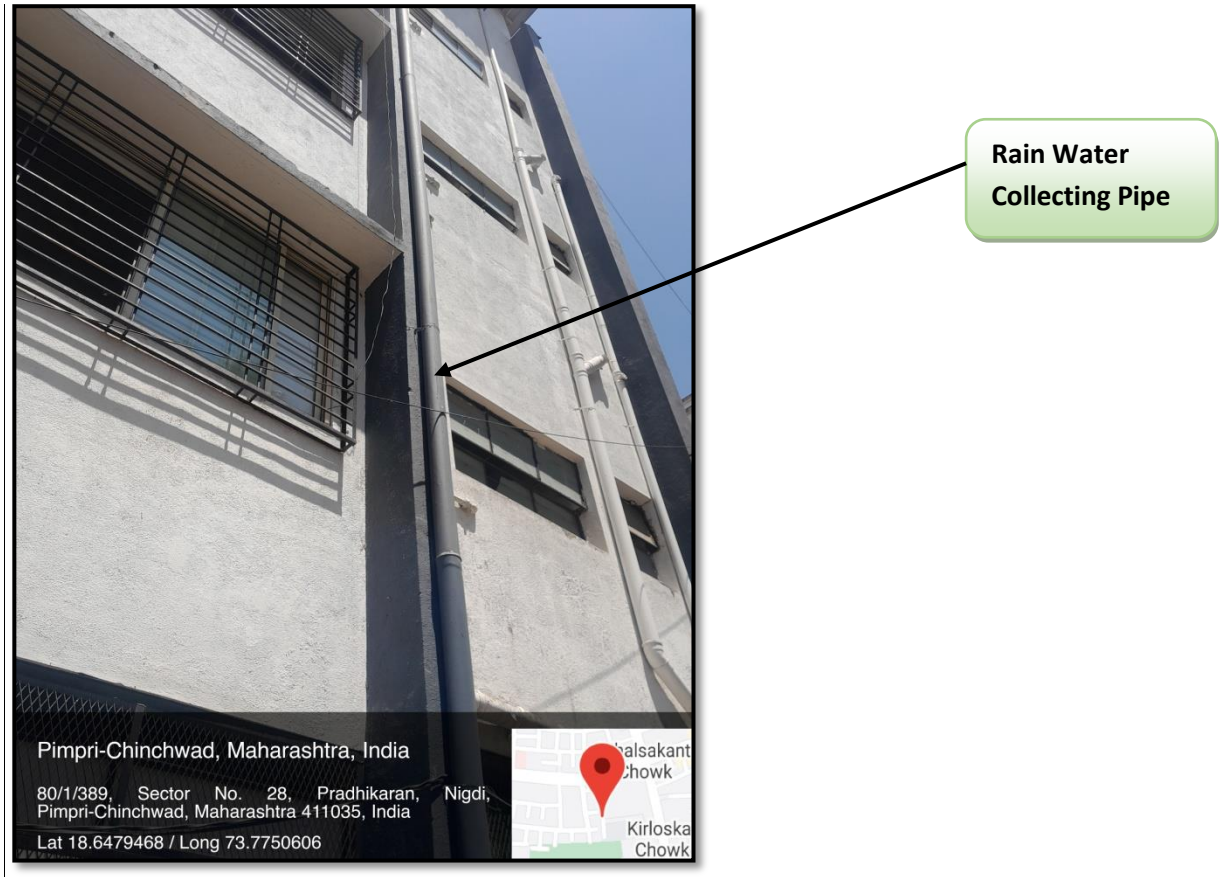
Photograph of Bio Composting Bed:



CHAPTER-V
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road:



6.2 Internal Tree Plantation:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



6.3 Creation of Awareness about Water Conservation:

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

Photograph of Poster on Water Conservation:



GREEN AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

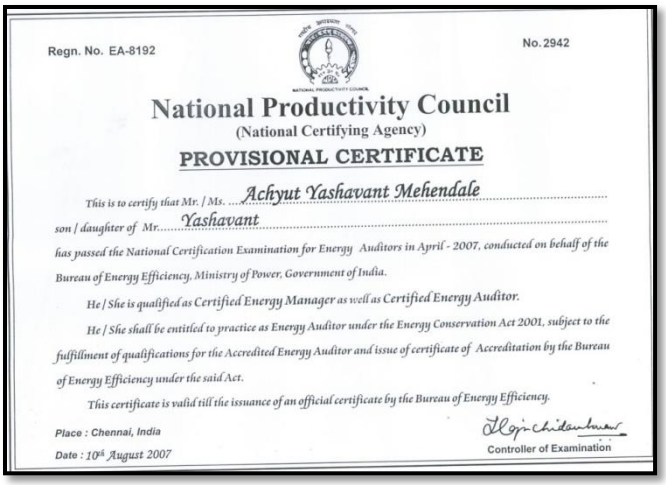
Year: 2021-22

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: eee@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.
- 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 EMPANELMENT CERTIFICATE



GEM Certificate

ASSOCHAM
Ideate Innovate Impact

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

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of 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 Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 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. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	17827	16.04
2	Maximum	1678	1.51
3	Minimum	1235	1.11
4	Average	1485.58	1.34

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar PV Plant is **6000 kWh**
- Reduction in CO2 Emission is **5.4 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 Organic waste Management:

The Institute has a Bio Composting Bed for disposal of the Organic Waste.

6. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

7. Green & Sustainable Practices:

- Good internal road
- Internal Tree Plantation.
- Creation of Awareness in respect of Energy Conservation by displaying posters

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

9. References:

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

ABBREVIATIONS

PDEA	:	Pune District Education Association
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

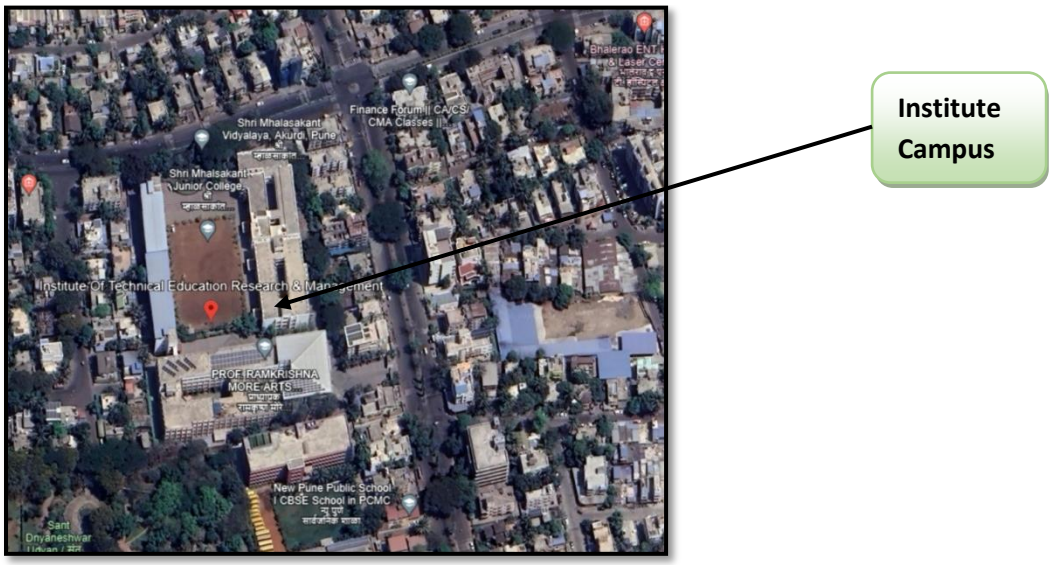
1.1 Objectives:

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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

1.3 Google Earth Location Image:



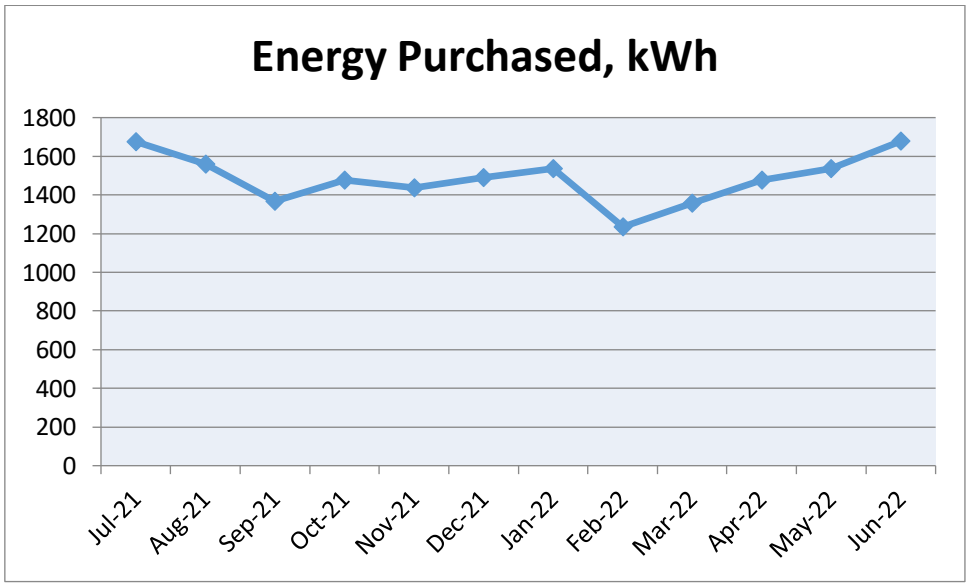
CHAPTER-II
STUDY OF ENERGY CONSUMPTION

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	1675
2	Aug-21	1558
3	Sep-21	1369
4	Oct-21	1478
5	Nov-21	1436
6	Dec-21	1489
7	Jan-22	1536
8	Feb-22	1235
9	Mar-22	1359
10	Apr-22	1478
11	May-22	1536
12	Jun-22	1678
13	Total	17827
14	Maximum	1678
15	Minimum	1235
16	Average	1485.58

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



CHAPTER-III
STUDY OF CARBON FOOT PRINTING

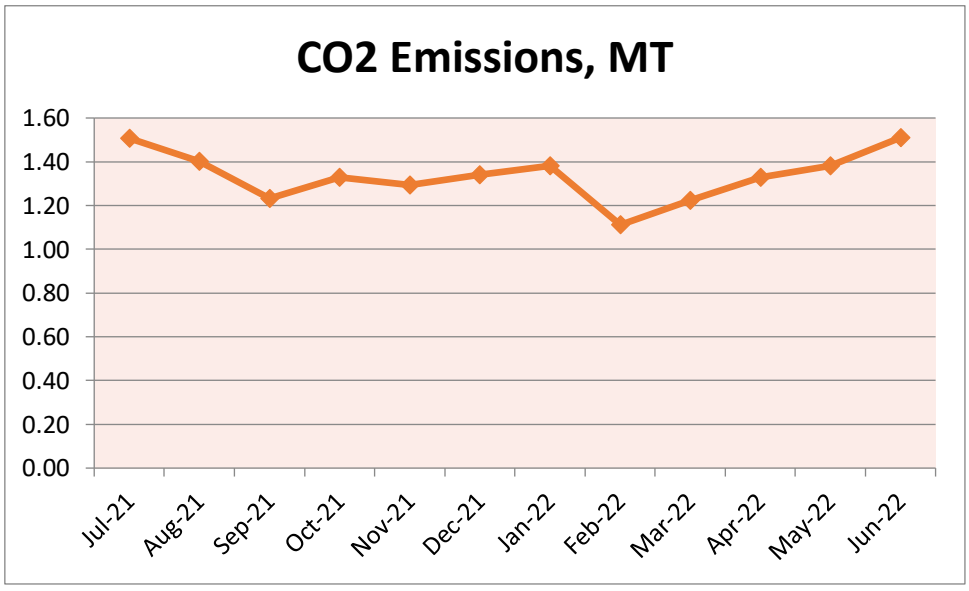
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

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

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-21	1675	1.51
2	Aug-21	1558	1.40
3	Sep-21	1369	1.23
4	Oct-21	1478	1.33
5	Nov-21	1436	1.29
6	Dec-21	1489	1.34
7	Jan-22	1536	1.38
8	Feb-22	1235	1.11
9	Mar-22	1359	1.22
10	Apr-22	1478	1.33
11	May-22	1536	1.38
12	Jun-22	1678	1.51
13	Total	17827	16.04
14	Maximum	1678	1.51
15	Minimum	1235	1.11
16	Average	1485.58	1.34

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**5.4**	**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 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

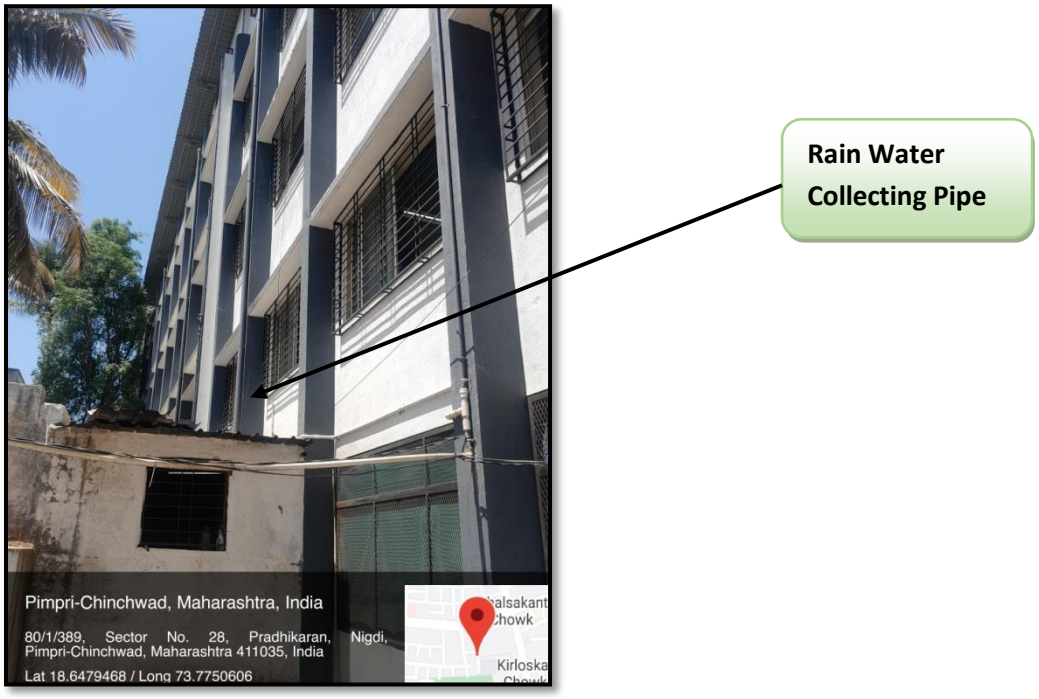
Photograph of Bio Composting Bed:



CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging 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.

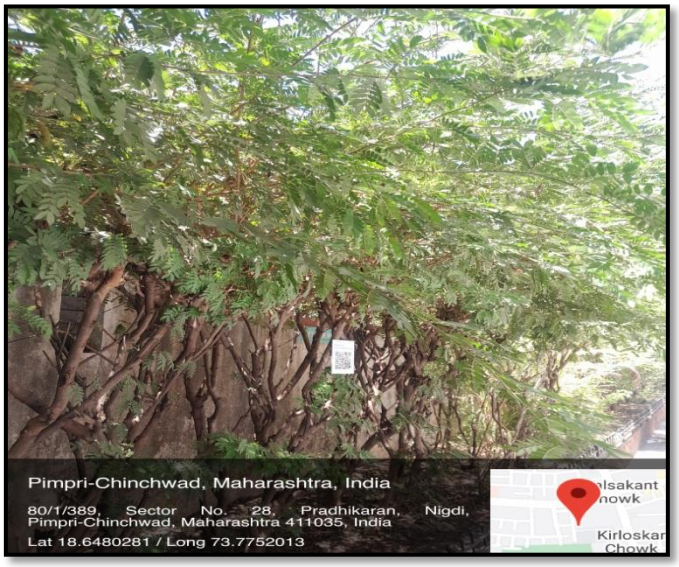
Photograph of Internal Road:



7.2 Tree Plantation:

The Institute has Tree Plantation in the campus.

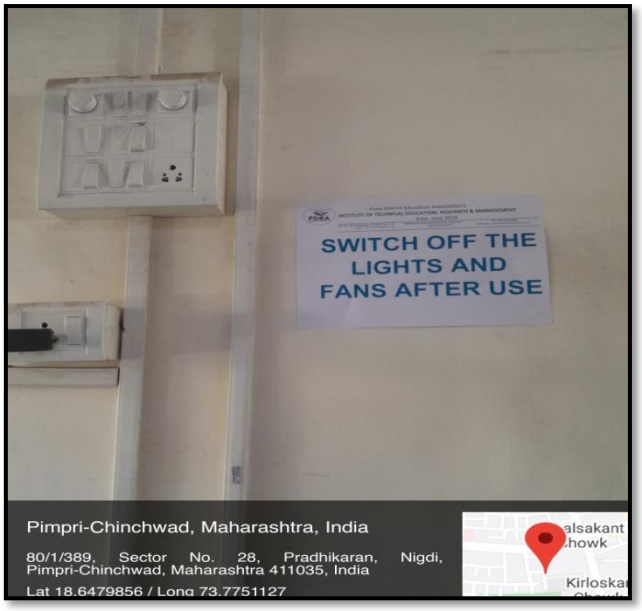
Photograph of Internal Tree Plantation:



7.3 Creation of Awareness about Resource Conservation:

The Institute has displayed Posters on Importance of Energy Conservation.

Photograph of Poster on importance of Energy Conservation:



GREEN AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

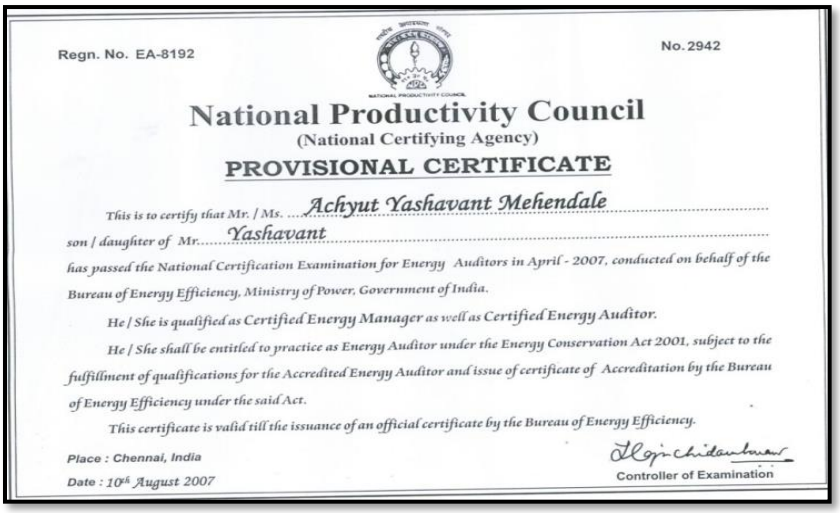
Year: 2020-21

Prepared by

ENRICH CONSULTANTS

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

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 ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

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

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

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

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

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

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

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

General Manager (EC)

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 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 Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 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. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	11080	9.97
2	Maximum	1298	1.17
3	Minimum	625	0.56
4	Average	923.33	0.83

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar PV Plant is **6000 kWh**
- Reduction in CO2 Emission is **5.4 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 Organic waste Management:

The Institute has a Bio Composting Bed for disposal of the Organic Waste.

6. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

7. Green & Sustainable Practices:

- Good internal road
- Internal Tree Plantation.
- Creation of Awareness in respect of Plastic Free Campus by display of Posters

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

9. References:

- For CO_2 Emissions: www.tatapower.com
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ABBREVIATIONS

PDEA	:	Pune District Education Association
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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

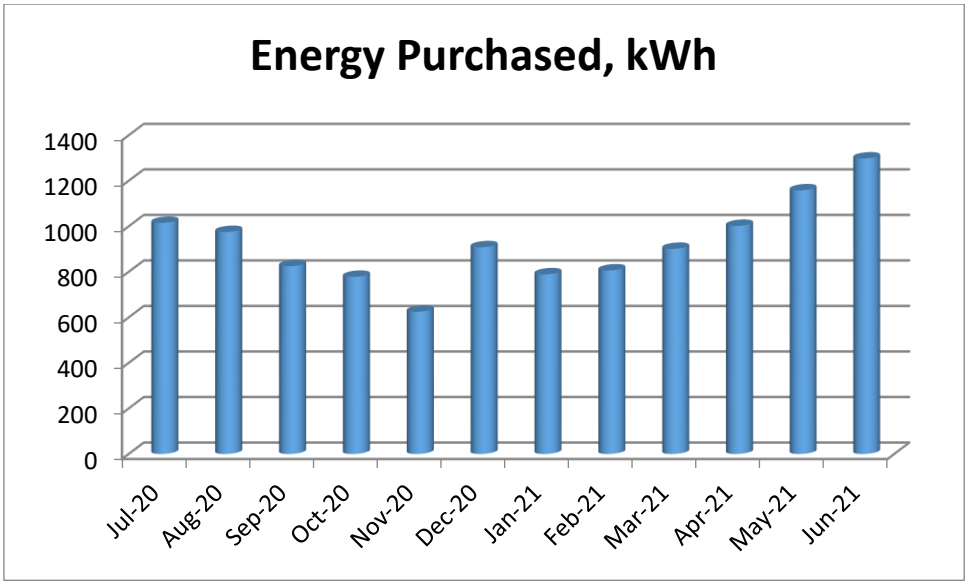
CHAPTER-II
STUDY OF ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2020-21:

No	Month	Energy Purchased, kWh
1	Jul-20	1015
2	Aug-20	975
3	Sep-20	825
4	Oct-20	778
5	Nov-20	625
6	Dec-20	908
7	Jan-21	789
8	Feb-21	806
9	Mar-21	901
10	Apr-21	1002
11	May-21	1158
12	Jun-21	1298
13	Total	11080
14	Maximum	1298
15	Minimum	625
16	Average	923.33

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



CHAPTER-III
STUDY OF CARBON FOOT PRINTING

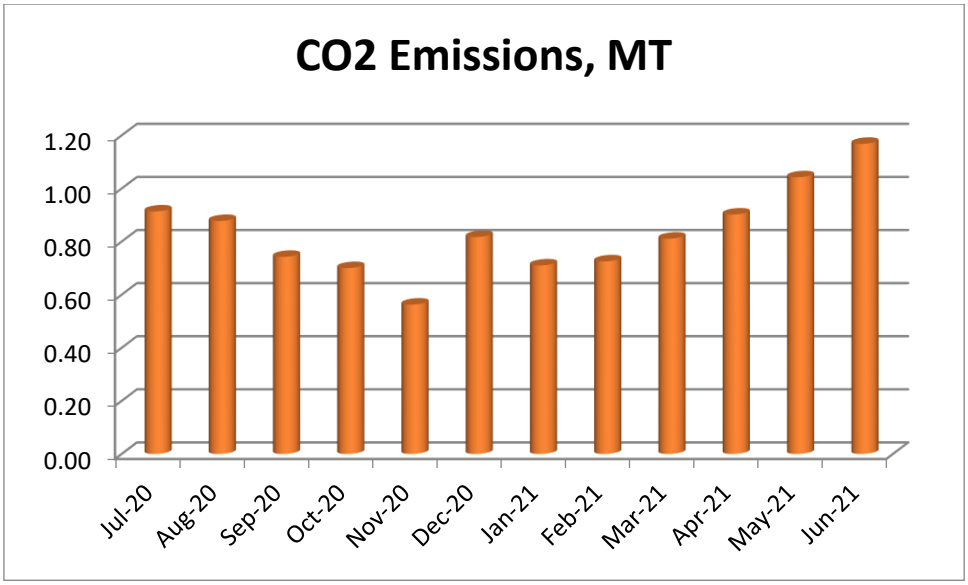
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

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

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-20	1015	0.91
2	Aug-20	975	0.88
3	Sep-20	825	0.74
4	Oct-20	778	0.70
5	Nov-20	625	0.56
6	Dec-20	908	0.82
7	Jan-21	789	0.71
8	Feb-21	806	0.73
9	Mar-21	901	0.81
10	Apr-21	1002	0.90
11	May-21	1158	1.04
12	Jun-21	1298	1.17
13	Total	11080	9.97
14	Maximum	1298	1.17
15	Minimum	625	0.56
16	Average	923.33	0.83

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**5.4**	**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 Organic Waste Management:
The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

Photograph of Bio Composting Bed:



CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging 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 Creation of Awareness about Plastic Free Campus:

The Institute has displayed Posters on Importance of Plastic Free Campus.

Photograph of Poster on importance of Plastic Free Campus:


Pune District Education Association's
INSTITUTE OF TECHNICAL EDUCATION, RESEARCH & MANAGEMENT
Estd. June 2010
LET US KEEP
OUR CAMPUS
PLASTIC FREE

GREEN AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

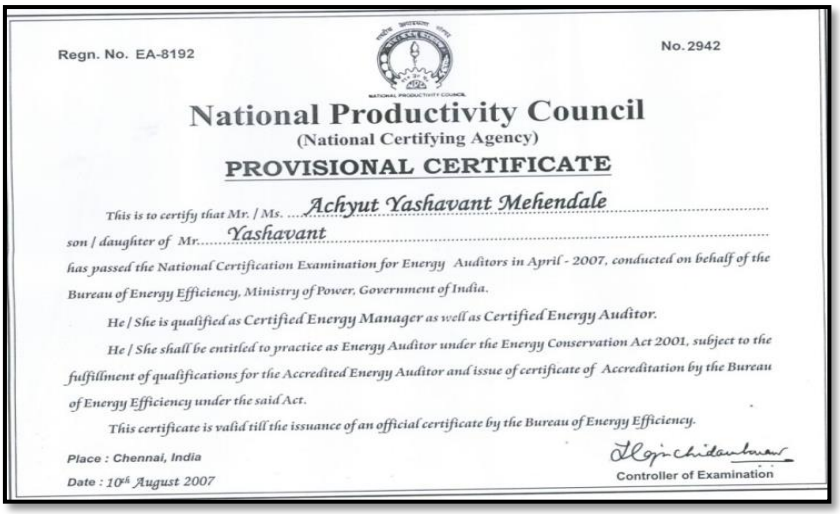
Year: 2019-20

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktangan 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
Date : 10th August 2007

Controller of Examination

BEE ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

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

Registration Category : Empanelled *Consultant for Energy Conservation Programme*

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31stMarch 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

MEDA REGISTRATION CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of 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 Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Green Audit of their Campus for the Year: 2019-20.

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	13868	12.48
2	Maximum	1687	1.52
3	Minimum	650	0.59
4	Average	1155.67	1.04

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar PV Plant is **6000 kWh**
- Reduction in CO2 Emission is **5.4 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 Organic waste Management:

The Institute has a Bio Composting Bed for disposal of the Organic Waste.

6. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

7. Green Practices:

- Good internal road
- Internal Tree Plantation.

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

9. References:

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

ABBREVIATIONS

PDEA	:	Pune District Education Association
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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

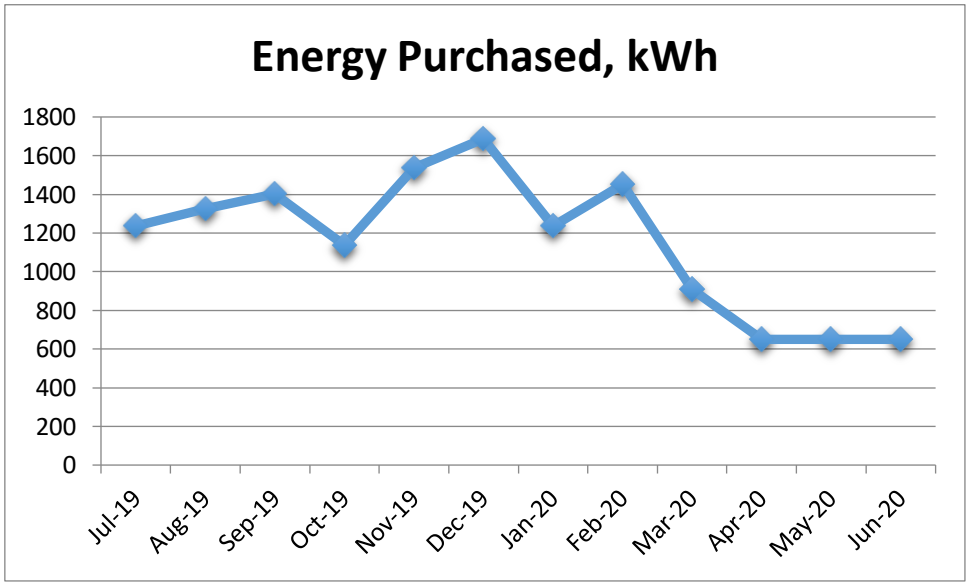
CHAPTER-II
STUDY OF ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2019-20:

No	Month	Energy Purchased, kWh
1	Jul-19	1236
2	Aug-19	1325
3	Sep-19	1402
4	Oct-19	1136
5	Nov-19	1536
6	Dec-19	1687
7	Jan-20	1236
8	Feb-20	1452
9	Mar-20	908
10	Apr-20	650
11	May-20	650
12	Jun-20	650
13	Total	13868
14	Maximum	1687
15	Minimum	650
16	Average	1155.67

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



CHAPTER-III
STUDY OF CARBON FOOT PRINTING

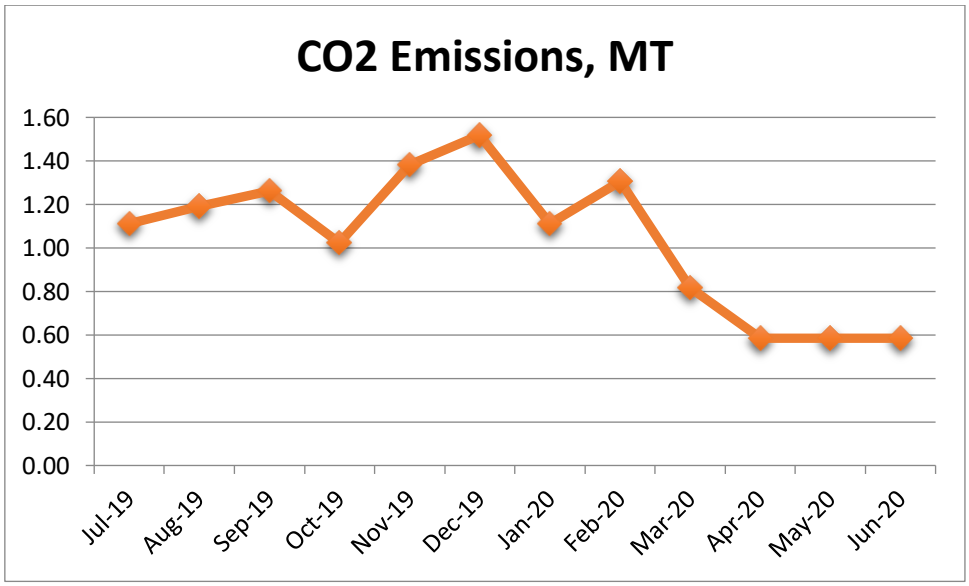
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

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

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-19	1236	1.11
2	Aug-19	1325	1.19
3	Sep-19	1402	1.26
4	Oct-19	1136	1.02
5	Nov-19	1536	1.38
6	Dec-19	1687	1.52
7	Jan-20	1236	1.11
8	Feb-20	1452	1.31
9	Mar-20	908	0.82
10	Apr-20	650	0.59
11	May-20	650	0.59
12	Jun-20	650	0.59
13	Total	13868	12.48
14	Maximum	1687	1.52
15	Minimum	650	0.59
16	Average	1155.67	1.04

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**5.4**	**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.

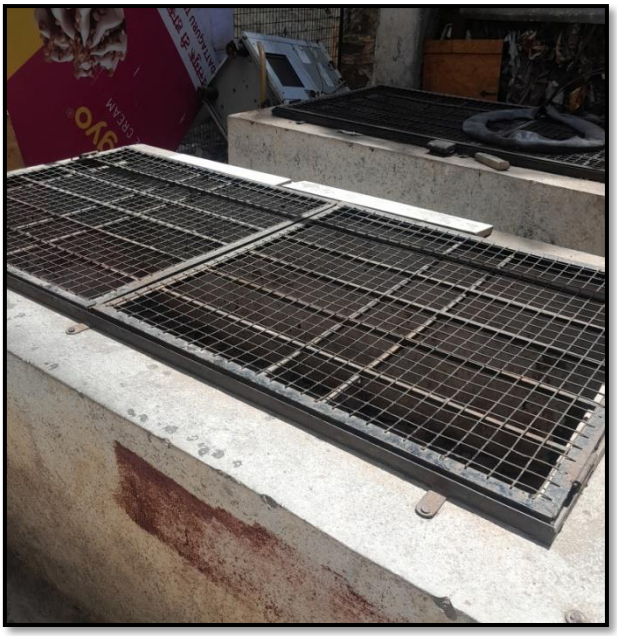
Photograph of Waste Collection Bin:



5.2 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

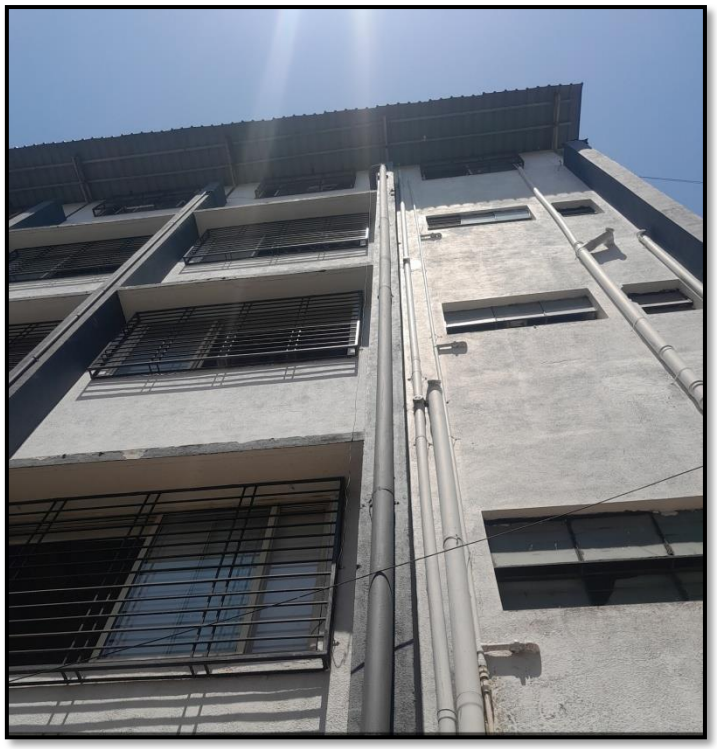
Photograph of Bio Composting Bed:



CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:

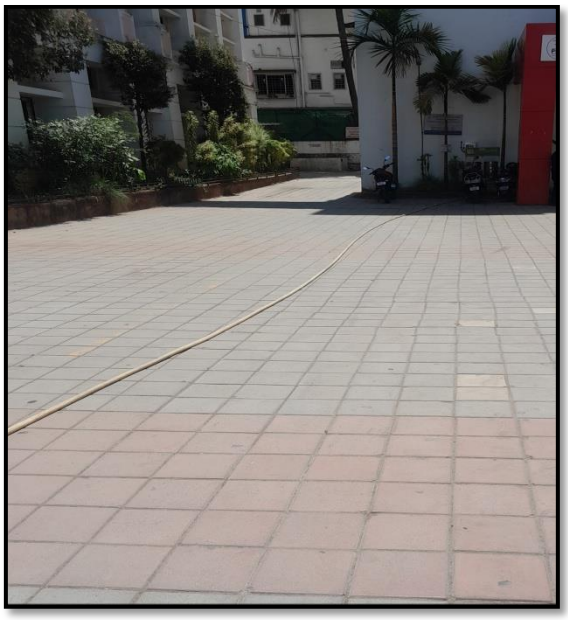


CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Internal Road:

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

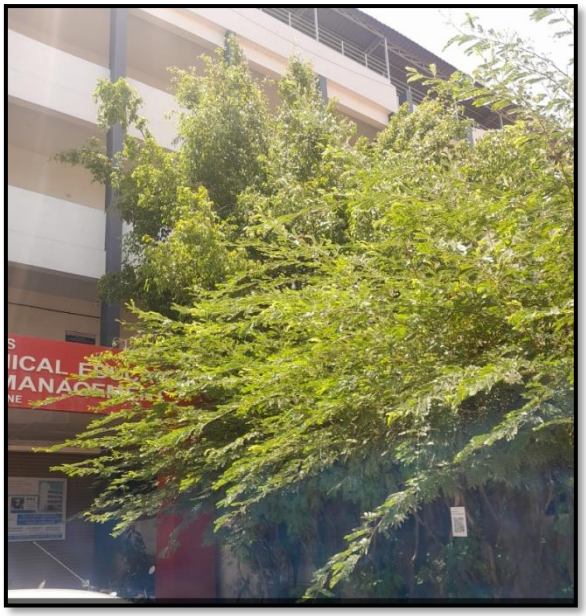
Photograph of Internal Road:



7.2 Tree Plantation:

The Institute has Tree Plantation in the campus.

Photograph of Internal Tree Plantation:



GREEN AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

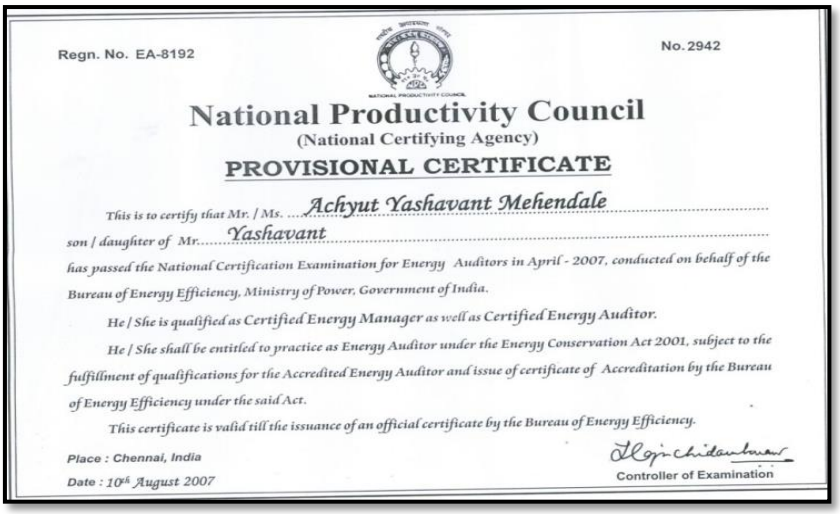
Year: 2018-19

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktangan 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
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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 ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

Name and Address of the firm : **Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
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19/9/18
(Smita Kudarikar)
General Manager (EC)

MEDA REGISTRATION CERTIFICATE

INDEX

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

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Green Audit of their Campus for the Year: 2018-19.

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	21250	19.01
2	Maximum	2165	1.95
3	Minimum	1102	0.88
4	Average	1770.83	1.58

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has yet to install Roof Top Solar PV Plant

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 Organic waste Management:
The Institute has a Bio Composting Bed for disposal of the Organic Waste.

6. Rain Water Management:
The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

7. Green Practices:

- Good internal road
- Internal Tree Plantation.

8. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg** of **CO_2** into atmosphere
2. Energy consumption is computed based on Load Utilization Factor

ABBREVIATIONS

PDEA	:	Pune District Education Association
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
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1.2 Table No 1: General Details of Institute:

No	Head	Particulars
1	Name	PDEA's Institute of Technical Education Research and Management
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3	Year of Establishment	2010

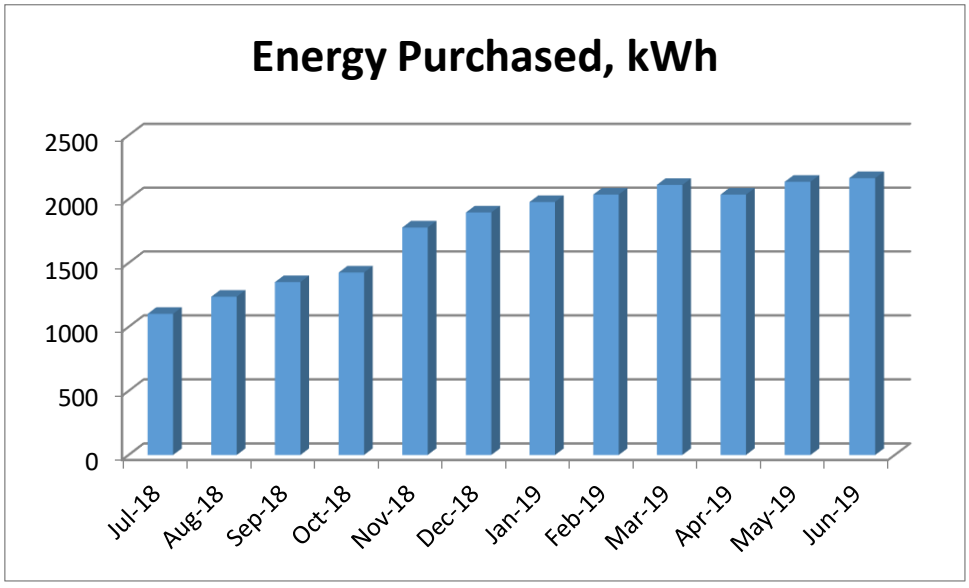
CHAPTER-II
STUDY OF ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2018-19:

No	Month	Energy Purchased, kWh
1	Jul-18	1102
2	Aug-18	1236
3	Sep-18	1350
4	Oct-18	1425
5	Nov-18	1778
6	Dec-18	1896
7	Jan-19	1978
8	Feb-19	2036
9	Mar-19	2112
10	Apr-19	2036
11	May-19	2136
12	Jun-19	2165
13	Total	21250
14	Maximum	2165
15	Minimum	1102
16	Average	1770.83

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



CHAPTER-III
STUDY OF CARBON FOOT PRINTING

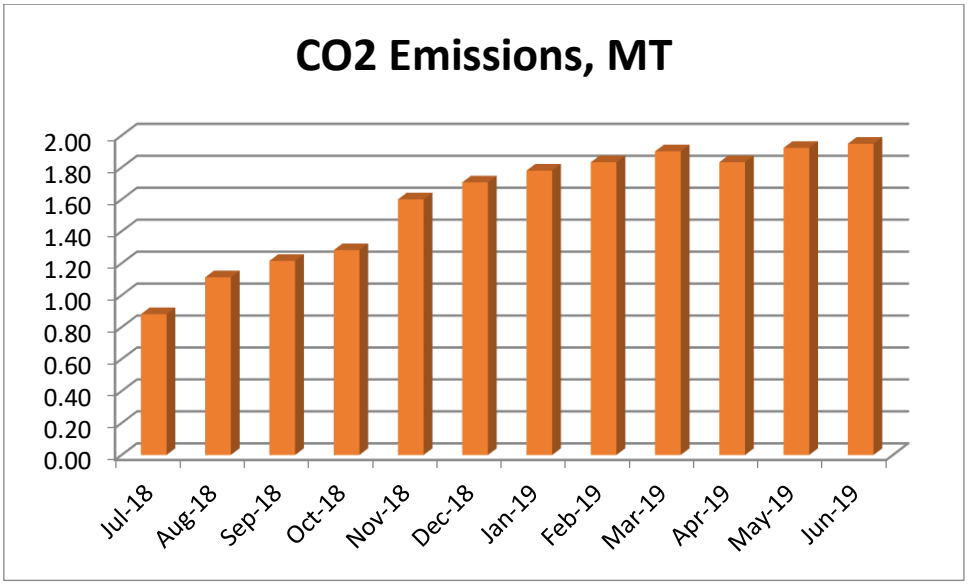
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

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

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-18	1102	0.88
2	Aug-18	1236	1.11
3	Sep-18	1350	1.22
4	Oct-18	1425	1.28
5	Nov-18	1778	1.60
6	Dec-18	1896	1.71
7	Jan-19	1978	1.78
8	Feb-19	2036	1.83
9	Mar-19	2112	1.90
10	Apr-19	2036	1.83
11	May-19	2136	1.92
12	Jun-19	2165	1.95
13	Total	21250	19.01
14	Maximum	2165	1.95
15	Minimum	1102	0.88
16	Average	1770.83	1.58

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

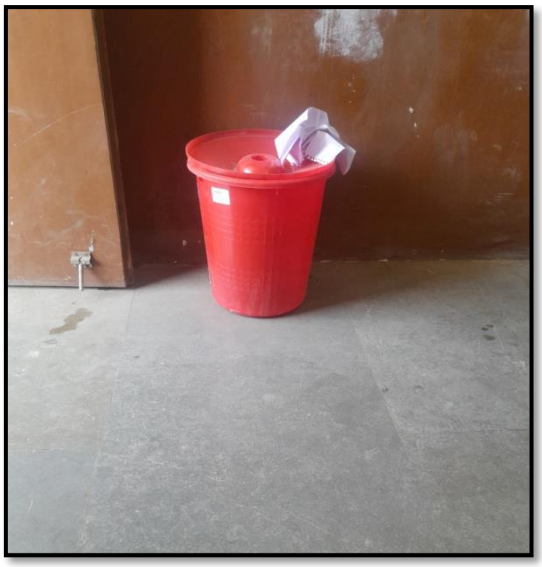
The Institute has yet to install Roof Top Solar PV Plant

CHAPTER V
STUDY OF WASTE MANAGEMENT

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

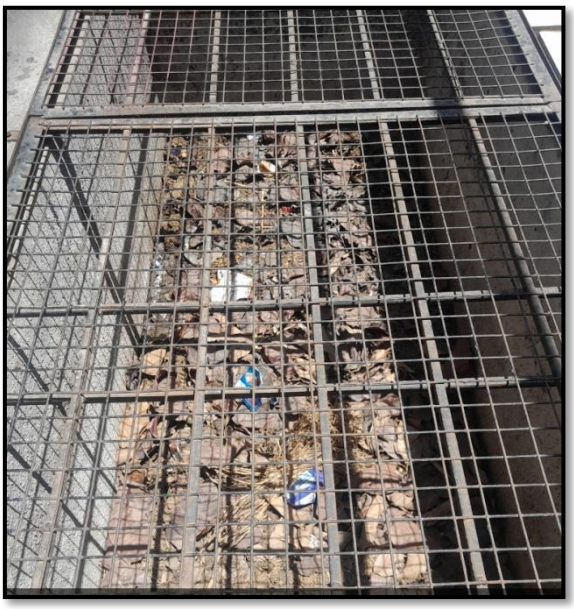
Photograph of Waste Collection Bin:



5.2 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

Photograph of Bio Composting Bed:



CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:

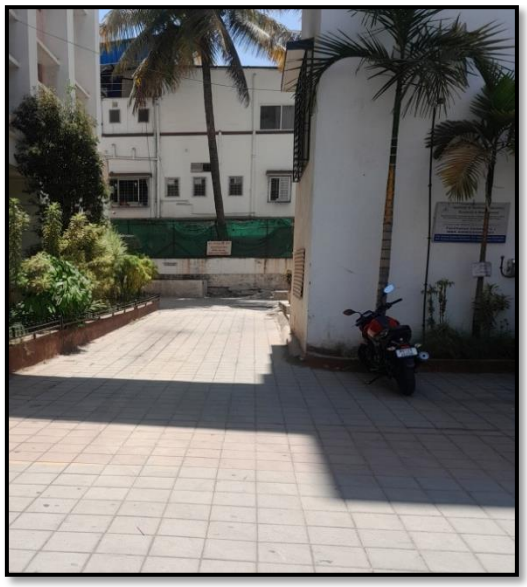


CHAPTER-VII
STUDY OF GREEN PRACTICES

7.1 Pedestrian Friendly Internal Road:

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

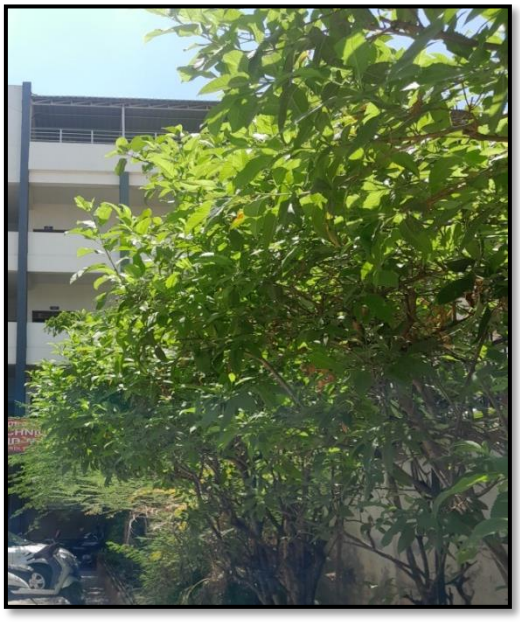
Photograph of Internal Road:



7.2 Tree Plantation:

The Institute has Tree Plantation in the campus.

Photograph of Internal Tree Plantation:



ENVIRONMENTAL AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

Year: 2022-23

Prepared by:

ENGRESS SERVICES

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

REGISTRATION CERTIFICATES



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: eee@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.*

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- 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 REGISTRATION CERTIFICATE



GEM Certificate

ASSOCHAM

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



Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No	: 23EQKC13		
Initial Registration Date	: 27/03/2023	Issuance Date	: 27/03/2023
Date of Expiry	: 26/03/2026		
1st Surve. Due	: 27/02/2024	2nd Surve. Due	: 27/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 9001-2015 CERTIFICATE



Certificate of Registration

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Environmental Management System of

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26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope :

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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

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Pollution due to Institute Activities:

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

3. Present Energy Consumption & CO_2 Emissions:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**19619**	kWh
2	Annual CO_2 Emissions	**17.66**	MT

4. Usage of Renewable Energy:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**67**	**41**	**49**
2	Minimum	**50**	**30**	**32**

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	**30.5**	**74**	**227**	**45**
2	Minimum	**30.3**	**72**	**203**	**42**

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed

8. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

9. Eco Friendly Initiatives:

- Internal Tree Plantation.
- Creation of Awareness on Water Conservation by Display of Posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

11. References:

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

ABBREVIATIONS

kWh	:	kilo-Watt Hour
Qty	:	Quantity
MT	:	Metric Ton
CO_2	:	Carbon Di Oxide
PDEA	:	Pune District Education Association
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
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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

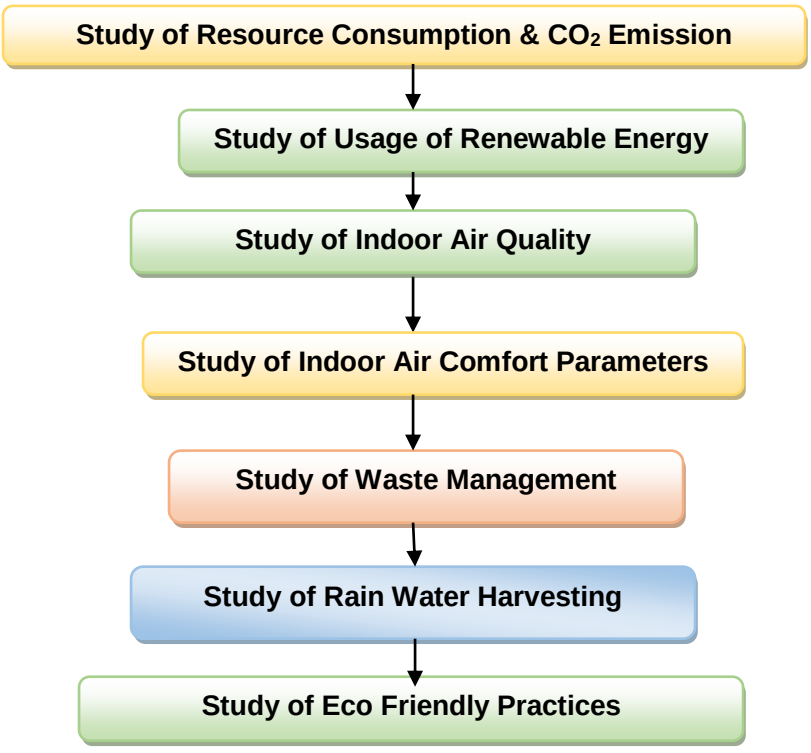
1.1.2 Environmental Audit: Definition:

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

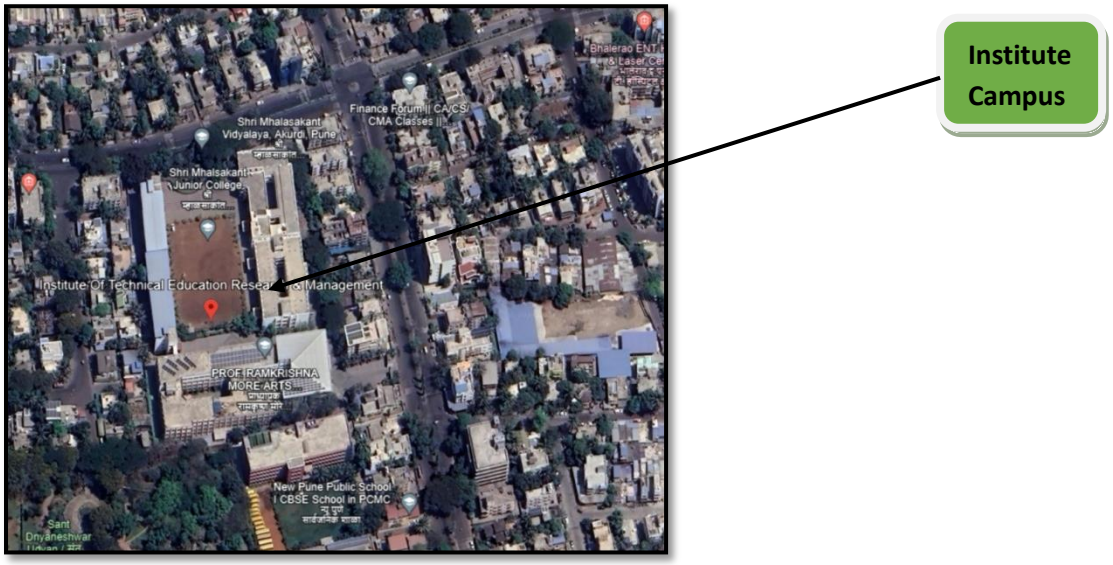
According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

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.

1.2 Audit Procedural Steps:



1.3 Google Earth Image:

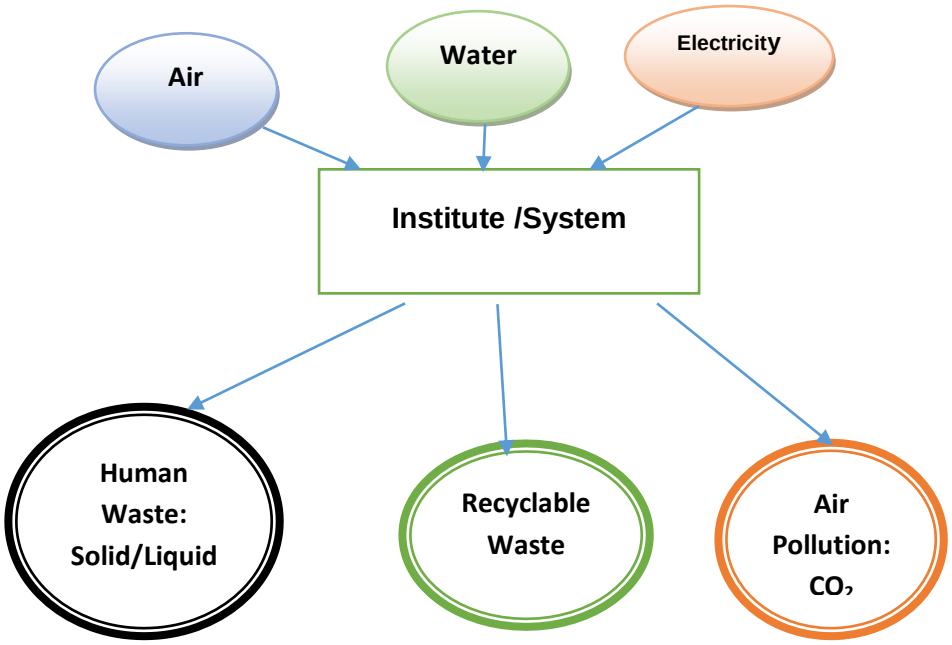


CHAPTER-II
STUDY OF CONSUMPTION OF RECOURCES & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy.

The basis of Calculation for CO_2 emissions due to Electrical Energy is as under

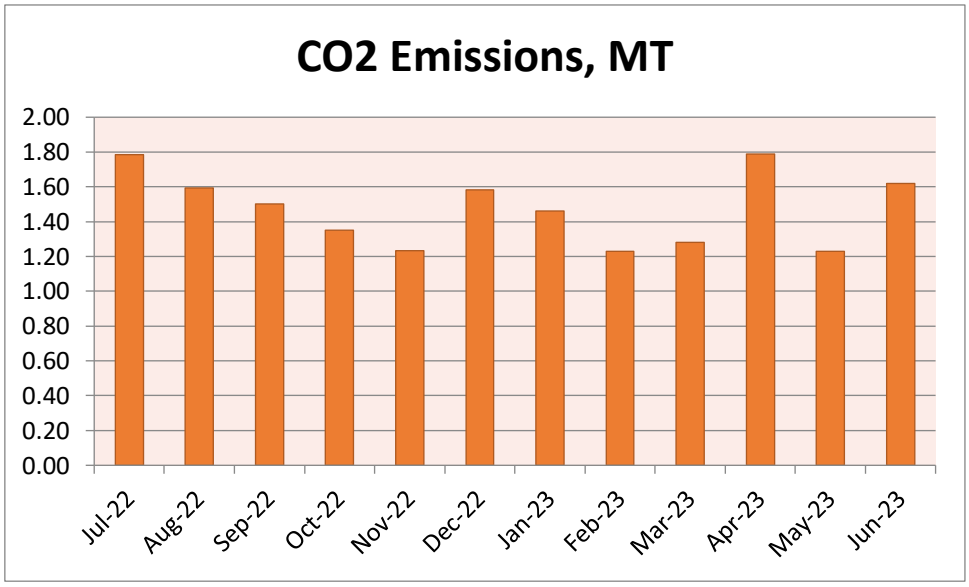
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 1: Study of Consumption of Electrical Energy & CO_2 Emissions: 22-23:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jul-22	1985	1.79
2	Aug-22	1769	1.59
3	Sep-22	1668	1.50
4	Oct-22	1502	1.35
5	Nov-22	1369	1.23
6	Dec-22	1758	1.58
7	Jan-23	1625	1.46

8	Feb-23	1368	1.23
9	Mar-23	1425	1.28
10	Apr-23	1987	1.79
11	May-23	1365	1.23
12	Jun-23	1798	1.62
13	Total	19619	17.66
14	Maximum	1987	1.79
15	Minimum	1365	1.23
16	Average	1634.92	1.47

Chart No 2: Month wise CO_2Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
We now calculate the reduction in CO_2 Emission due to Solar PV Plant.

Table No 2: Computation of Reduction in CO_2 Emission:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**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 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.

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 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	MBA C/R 1	67	41	49
2	Computer Lab	50	30	32
3	Seminar hall	66	39	46
4	Library	61	36	40
5	Admin Section	60	36	42
	Maximum	**67**	**41**	**49**
	Minimum	**50**	**30**	**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, ^{0}C	Humidity, %	Lux Level	Noise Level, dB
1	MBA C/R 1	30.5	74	213	42.6
2	Computer Lab	30.4	72	227	42
3	Seminar hall	30.5	74	223	44.3
4	Library	30.3	74	203	45
5	Admin Section	30.4	73	219	44
	Maximum	**30.5**	**74**	**227**	**45**
	Minimum	**30.3**	**72**	**203**	**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 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

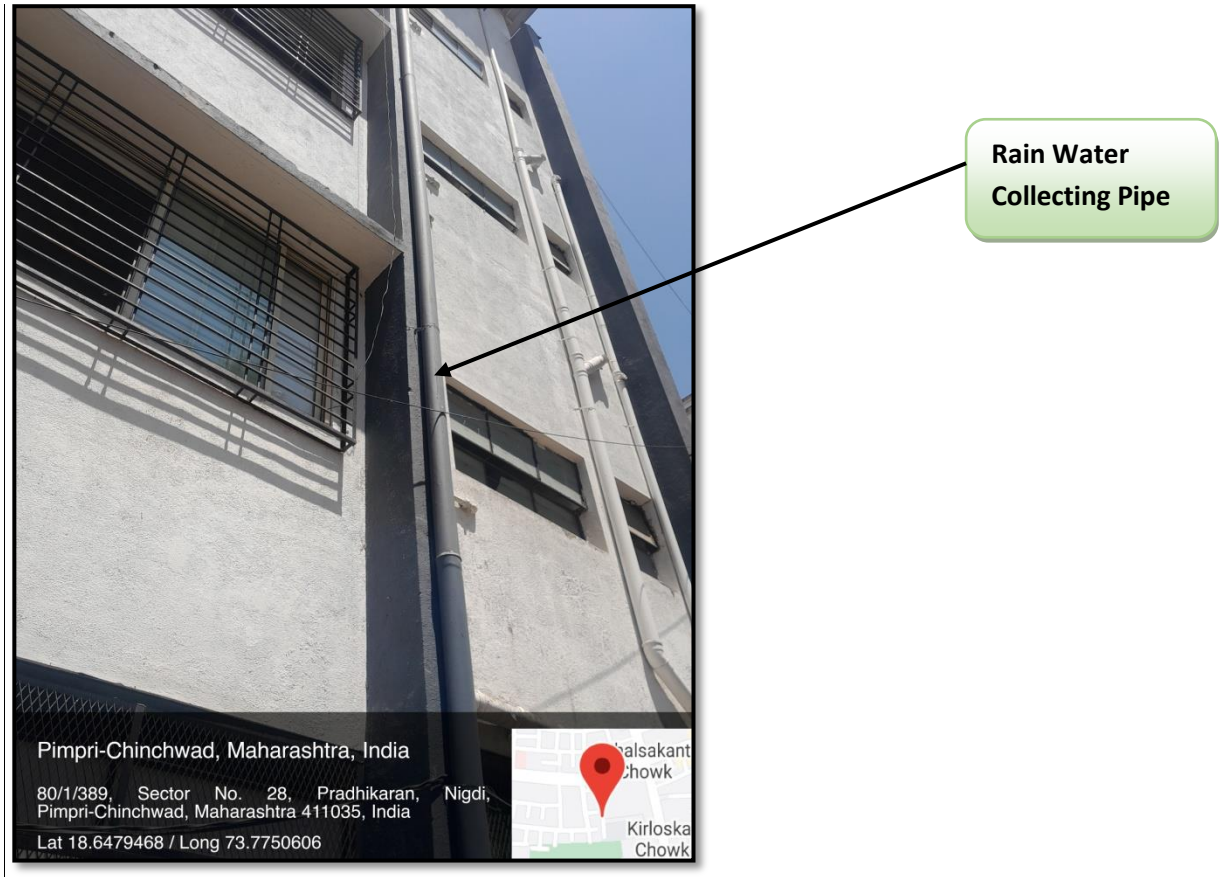
Photograph of Bio Composting Bed:



CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Water Conservation:

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

Photograph of Poster on Water 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 33^0C
2	Humidity	Less Than 70%

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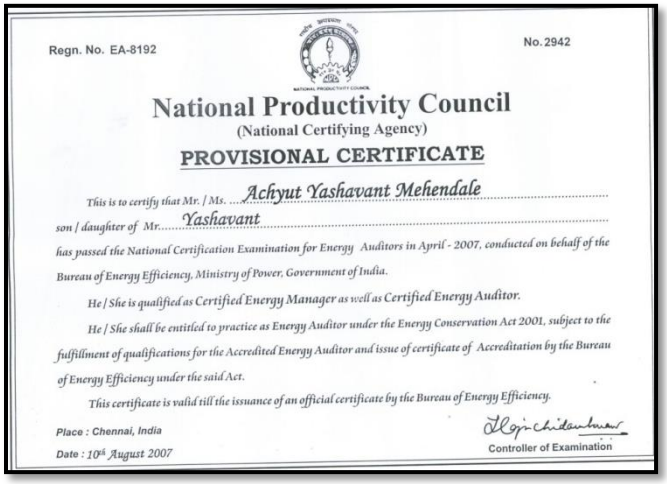
Year: 2021-22

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.

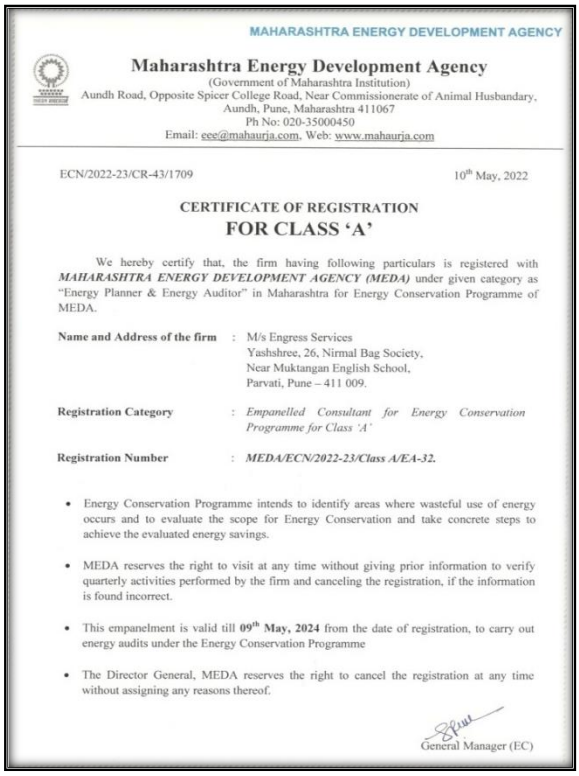
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

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

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06 June, 2022

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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

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- **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	17827	16.04
2	Maximum	1678	1.51
3	Minimum	1235	1.11
4	Average	1485.58	1.34

4. Projects implemented for Environmental Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

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

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
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- Reduction in CO2 Emission is **5.4 MT**

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No	Parameter/Value	AQI	PM-2.5	PM-10
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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

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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:

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

1989	Hazardous Waste (Management and Handling) Rules
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2011	National Green Tribunal (Practices and Procedure) Rules
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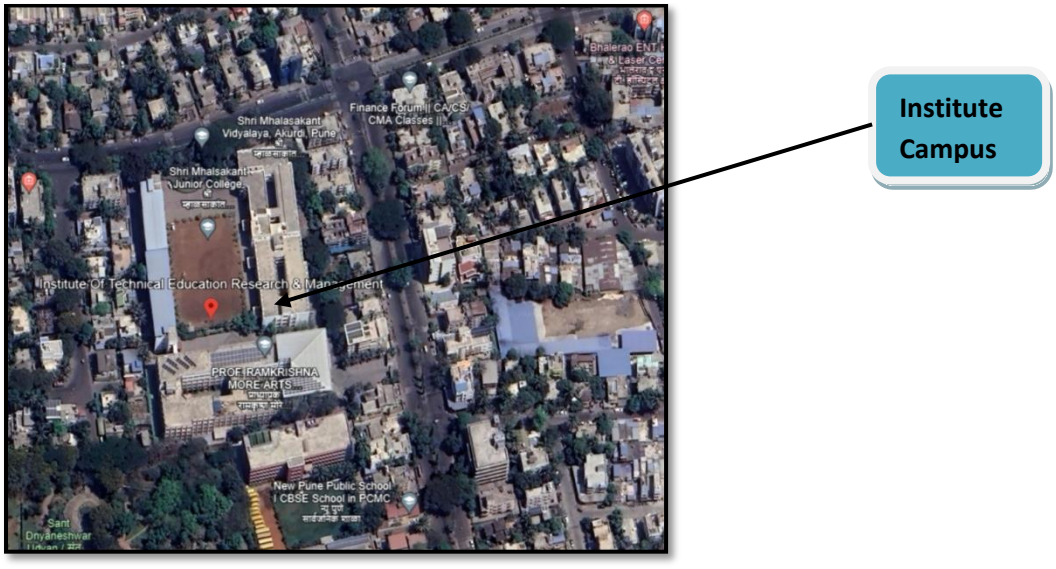
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1. Study of present Resource Consumption & CO_2 Emissions
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3. Study of Indoor Air Quality
4. Study of Indoor Comfort Conditions
5. Study of Waste Management
6. Study of Rain Water Harvesting
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1.3 Google Earth Location Image:



1.2 Table No1: General Details of Institute:

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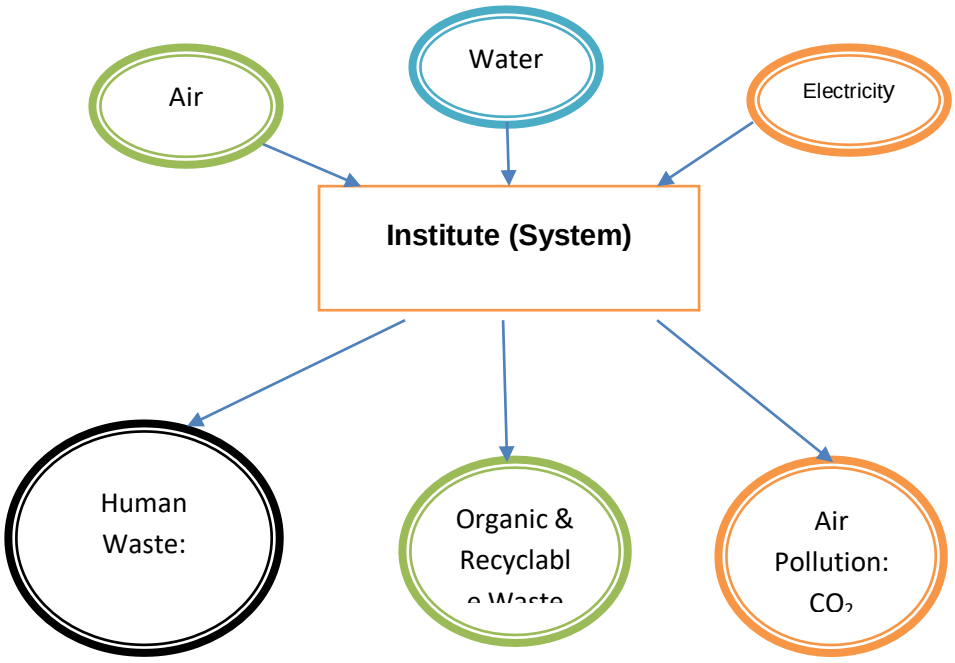
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

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:



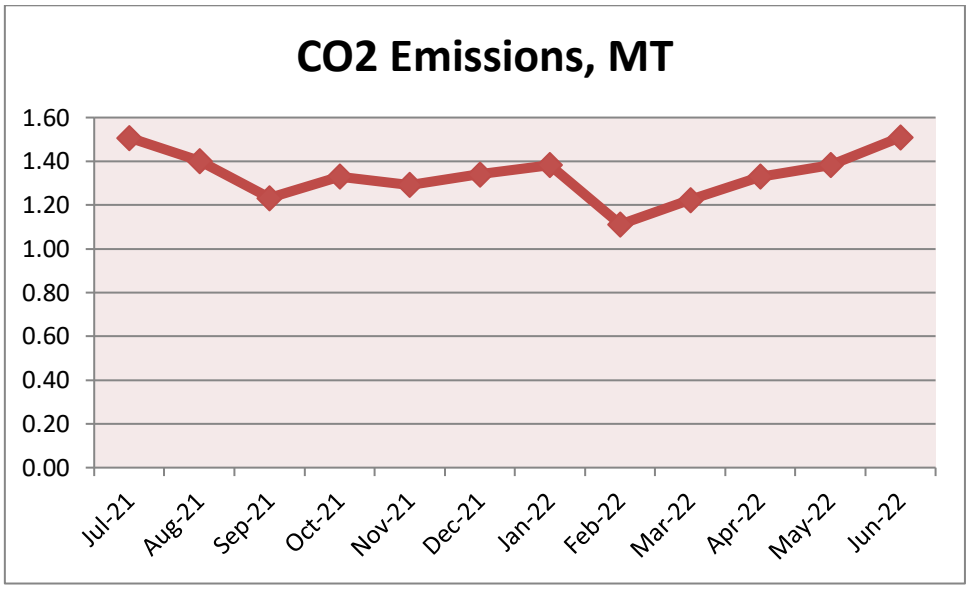
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Table No 5: Study of Energy Consumed & CO_2 Emission: 2021-22:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-21	1675	1.51
2	Aug-21	1558	1.40
3	Sep-21	1369	1.23
4	Oct-21	1478	1.33
5	Nov-21	1436	1.29
6	Dec-21	1489	1.34
7	Jan-22	1536	1.38
8	Feb-22	1235	1.11

9	Mar-22	1359	1.22
10	Apr-22	1478	1.33
11	May-22	1536	1.38
12	Jun-22	1678	1.51
13	Total	17827	16.04
14	Maximum	1678	1.51
15	Minimum	1235	1.11
16	Average	1485.58	1.34

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**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 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**.'

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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	Admin Office	71	43	52
2	Computer Lab	70	39	49
3	Library	75	46	56
4	Classroom	72	44	52
5	Admin Section	61	36	49
	Maximum	**75**	**46**	**56**
	Minimum	**61**	**36**	**49**

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	22.3	58	192	45
2	Computer Lab	22.3	58	189	46
3	Library	22.4	57	208	42.3
4	Classroom	22.3	57	202	41.3
5	Admin Section	22.2	58	165	43.8
	Maximum	**22.4**	**58**	**208**	**46**
	Minimum	**22.2**	**57**	**165**	**41.3**

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 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

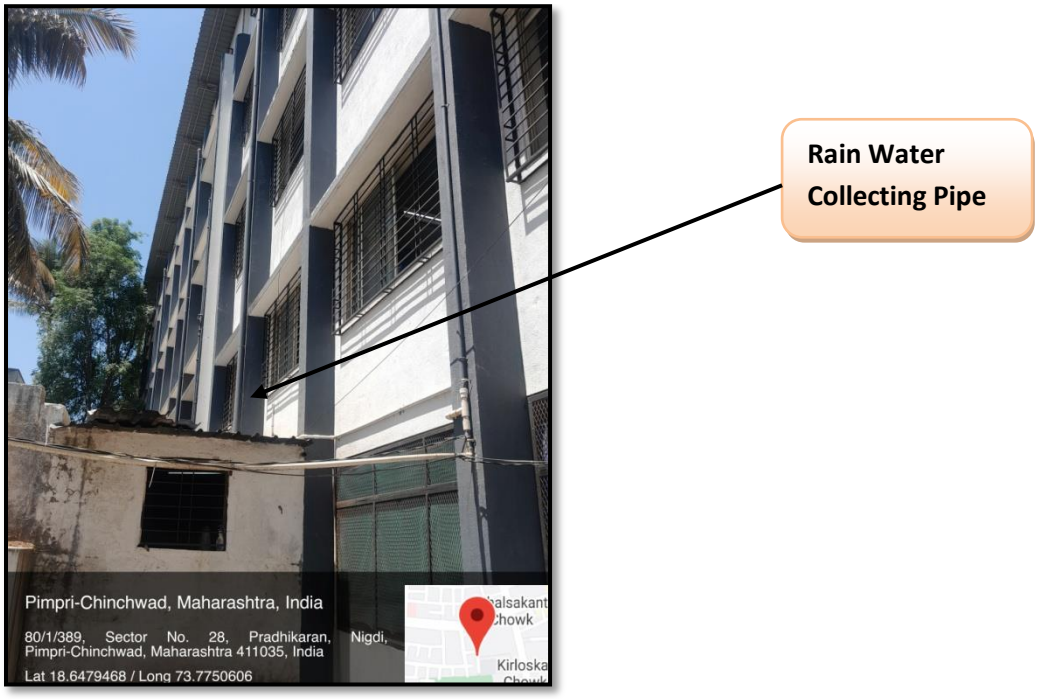
Photograph of Bio Composting Bed:



CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:

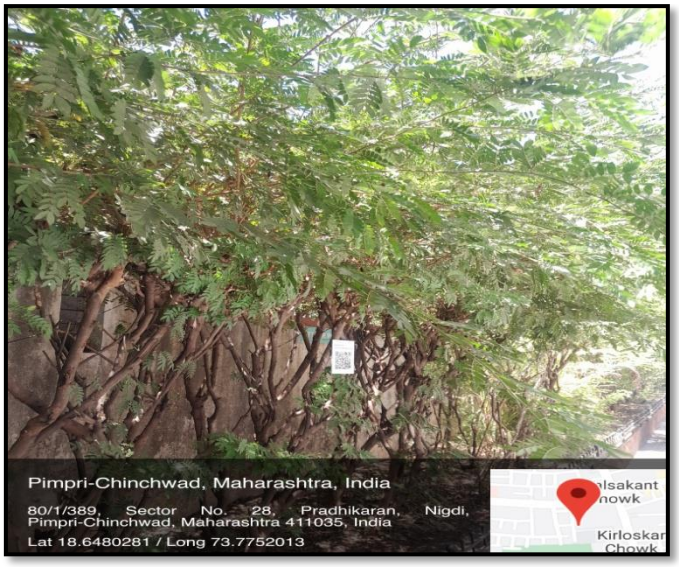


CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY PRACTICES

8.1Tree Plantation in the Campus:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

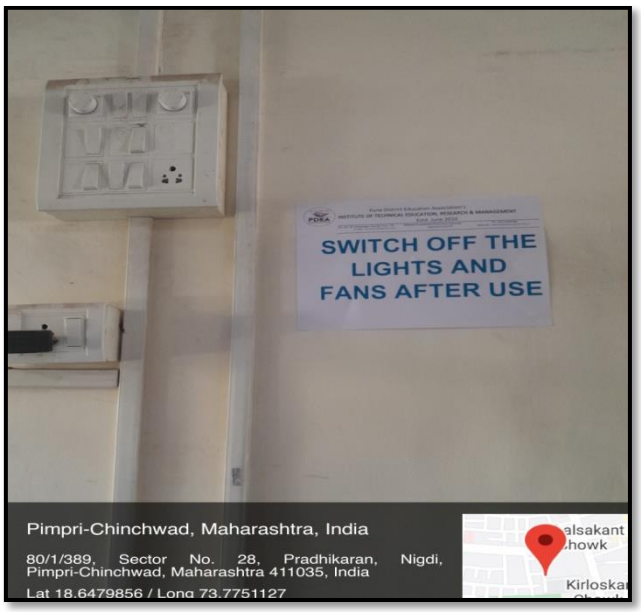
Photograph of Tree Plantation:



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:
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 33^0C
2	Humidity	Less Than 70%

ENVIRONMENTAL AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

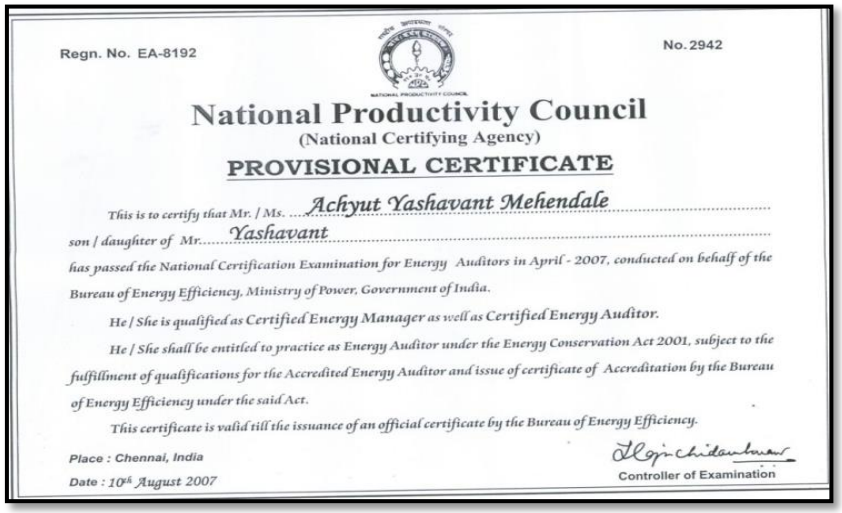
Year: 2020-21

Prepared by

ENRICH CONSULTANTS

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

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 ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

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

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

CERTIFICATE OF REGISTRATION

FOR CLASS 'A'

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

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

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

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

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

General Manager (EC)

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 Resource Consumption & 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 Practices	16
	Annexure	
I	Indoor Air Quality standards	17

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Environmental Audit of their Campus for the Year: 2020-21.

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

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EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various 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	11080	9.97
2	Maximum	1298	1.17
3	Minimum	625	0.56
4	Average	923.33	0.83

4. Projects implemented for Environmental Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

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

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

6. Indoor Air Quality:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**90**	**56**	**72**
2	Minimum	**83**	**51**	**61**

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.

7.2 Organic waste Management:

The Institute has a Bio Composting Bed for disposal of the Organic Waste.

8. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

9. Environment Friendly Initiatives:

- Internal Tree Plantation.
- Creation of Awareness in respect of Plastic Free Campus by display of Posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

12. References:

- For CO_2 Emission computation: www.tatapower.com
- For Solar PV Energy Generated: www.solarrooftop.gov.in
- For AQI Quality Standards: www.cpcb.com

ABBREVIATIONS

kWh	:	kilo-Watt Hour
Qty	:	Quantity
MT	:	Metric Ton
CO_2	:	Carbon Di Oxide
PDEA	:	Pune District Education Association
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

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

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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

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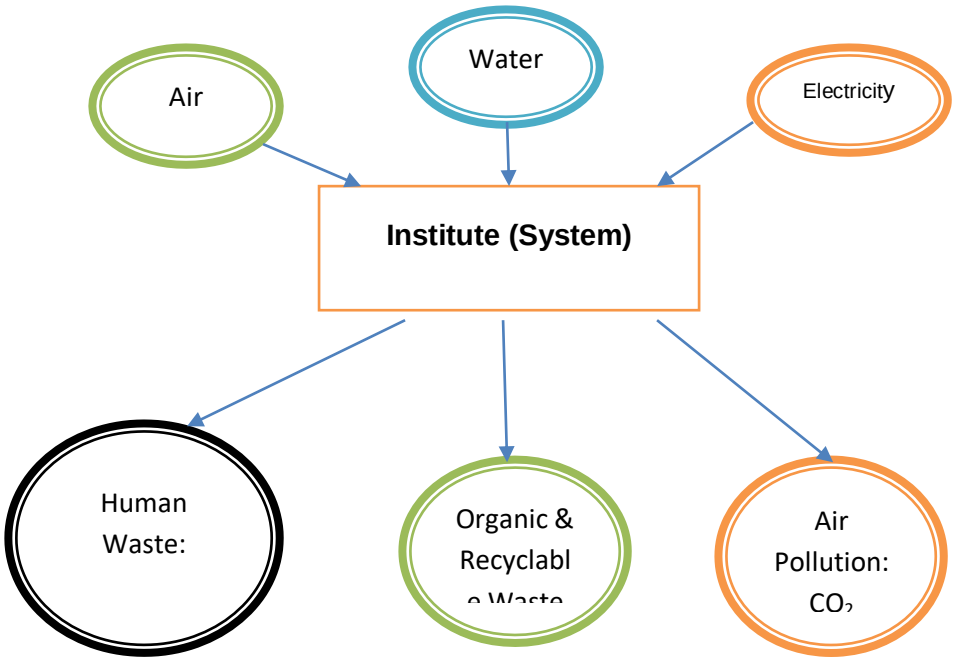
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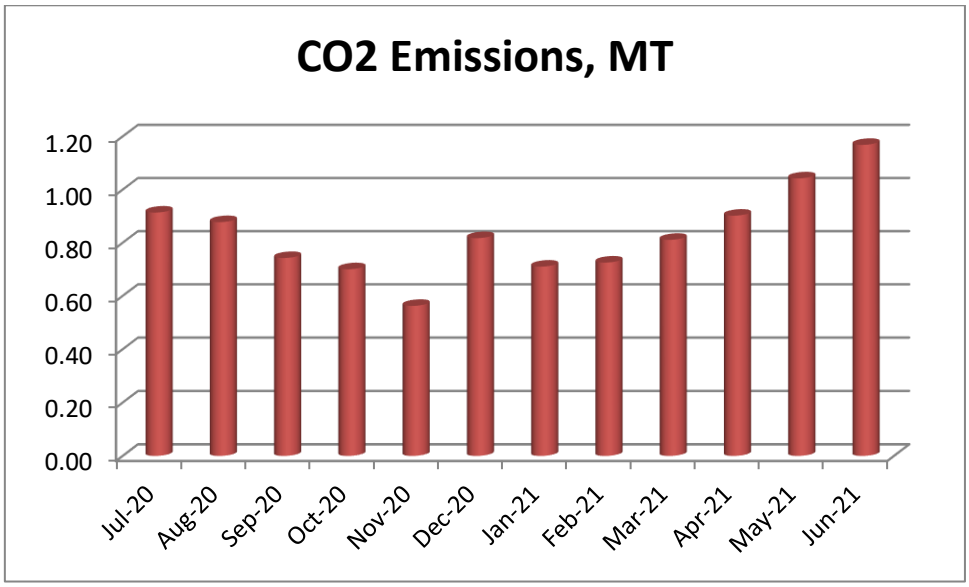
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3	Sep-20	825	0.74
4	Oct-20	778	0.70
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6	Dec-20	908	0.82
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Photograph of Roof Top Solar PV Plant:



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Table No 7: Indoor Air Quality Parameters:

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2	Conference Room	90	54	68
3	Staff Room	90	52	67
4	Classroom	86	56	72
5	Computer Lab	83	51	61
	Maximum	**90**	**56**	**72**
	Minimum	**83**	**51**	**61**

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 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

Photograph of Bio Composting Bed:



CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VII
STUDY OF ENVIRONMENT FRIENDLY PRACTICES

7.1Tree Plantation in the Campus:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

Photograph of Tree Plantation:



7.2 Creation of Awareness about Plastic Free Campus:

The Institute has displayed Posters on Importance of Plastic Free Campus.

Photograph of Poster on importance of Plastic Free Campus:



ANNEXURE-I:
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 +

ENVIRONMENTAL AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

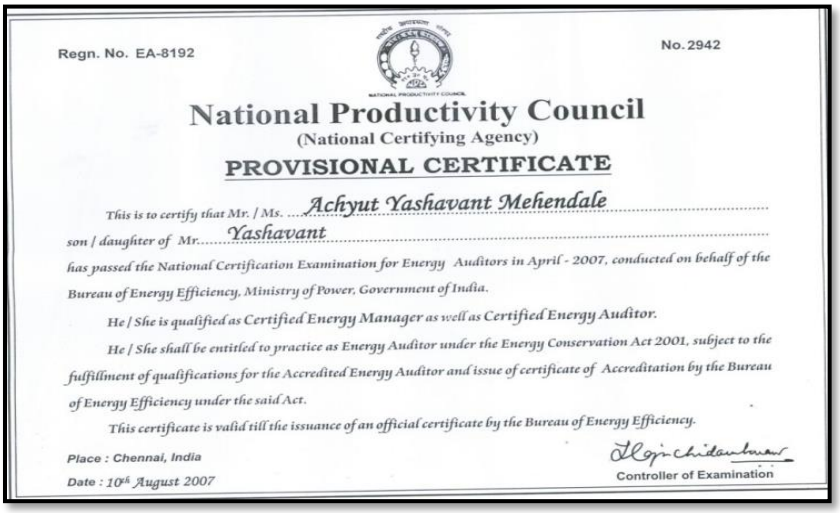
Year: 2019-20

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktangan 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
Date : 10th August 2007

Controller of Examination

BEE ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

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

Registration Category : Empanelled *Consultant for Energy Conservation Programme*

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

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

19/9/18
(Smita Kudarikar)
General Manager (EC)

MEDA REGISTRATION 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 Waste Management	13
5	Study of Rain Water Management	14
6	Study of Environment Friendly Practices	15

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Environmental Audit of their Campus for the Year: 2019-20.

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

.

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various 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	13868	12.48
2	Maximum	1687	1.52
3	Minimum	650	0.59
4	Average	1155.67	1.04

4. Projects implemented for Environmental Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

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

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

6. Waste Management:

6.1 Segregation of Waste at Source:

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

6.2 Organic waste Management:

The Institute has a Bio Composting Bed for disposal of the Organic Waste.

7. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

8. Environment Friendly Initiatives:

- Internal Tree Plantation.

9. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

10. References:

- For CO_2 Emission computation: www.tatapower.com
- For Solar PV Energy Generated: www.solarrooftop.gov.in

ABBREVIATIONS

kWh	:	kilo-Watt Hour
Qty	:	Quantity
MT	:	Metric Ton
CO_2	:	Carbon Di Oxide
PDEA	:	Pune District Education Association

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 Usage of Renewable Energy
3. Study of Waste Management
4. Study of Rain Water Harvesting
5. Study of Environmental Friendly Initiatives.

1.2 Table No1: General Details of Institute:

No	Head	Particulars
1	Name	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

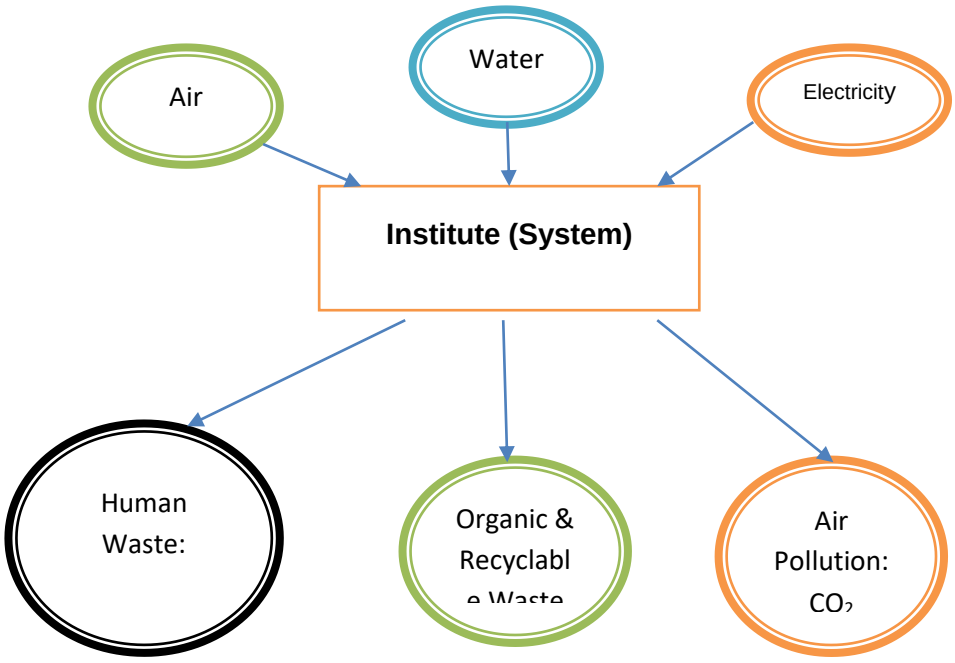
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

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:



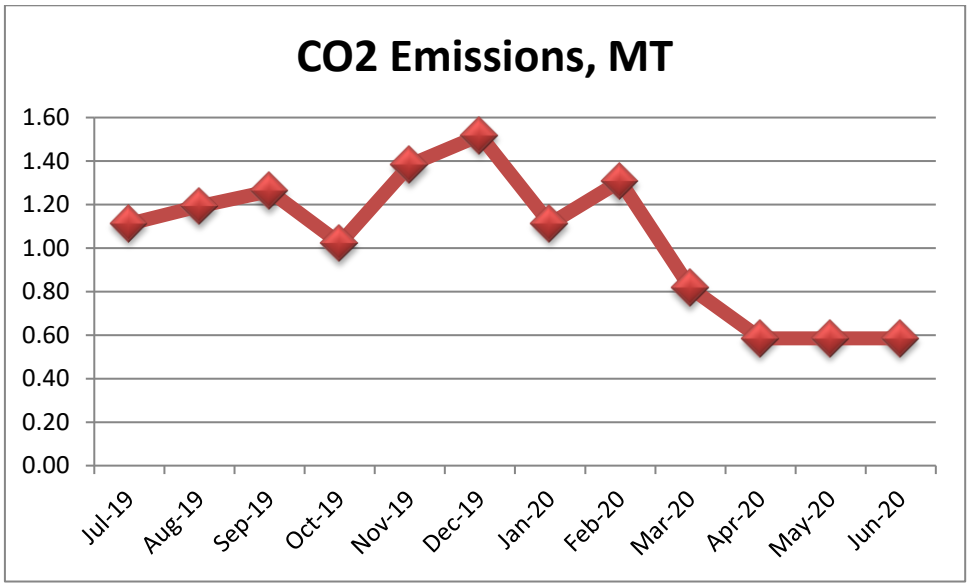
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. Here we compute the emissions of Carbon-Di-Oxide, by usage of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy is **1 kWh** of Electrical Energy releases **0.9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

Table No 5: Study of Energy Consumed & CO_2 Emission: 2019-20:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-19	1236	1.11
2	Aug-19	1325	1.19
3	Sep-19	1402	1.26
4	Oct-19	1136	1.02
5	Nov-19	1536	1.38
6	Dec-19	1687	1.52
7	Jan-20	1236	1.11
8	Feb-20	1452	1.31

9	Mar-20	908	0.82
10	Apr-20	650	0.59
11	May-20	650	0.59
12	Jun-20	650	0.59
13	Total	13868	12.48
14	Maximum	1687	1.52
15	Minimum	650	0.59
16	Average	1155.67	1.04

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **5 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	50	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 1*2*3	**6000**	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**	**5.4**	**MT**

Photograph of Roof Top Solar PV Plant:



CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 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:



4.2 Organic Waste Management:

The Institute has arranged Bio Composting Bed for disposal of the Organic Waste.

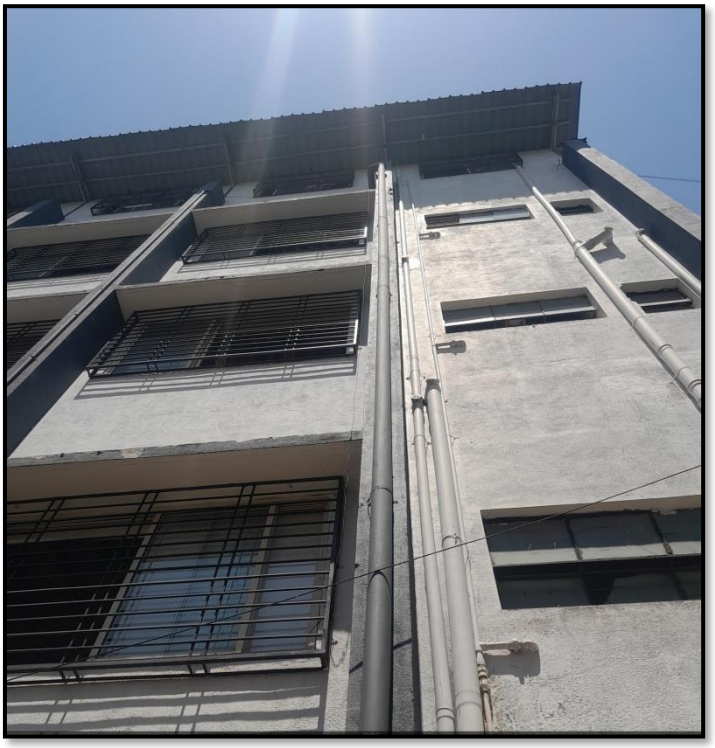
Photograph of Bio Composting Bed:



CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is used for recharging the Underground Water Table.

Photograph of Rain Water Carrying Pipe:

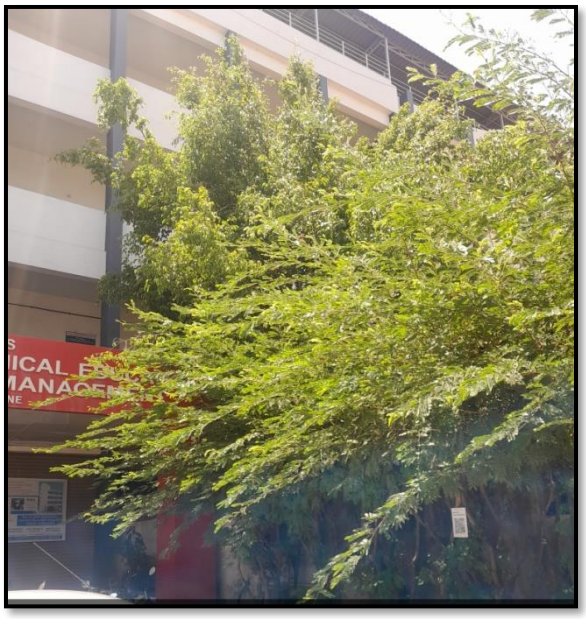


CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY PRACTICES

8.1Tree Plantation in the Campus:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

Photograph of Tree Plantation:



ENERGY AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

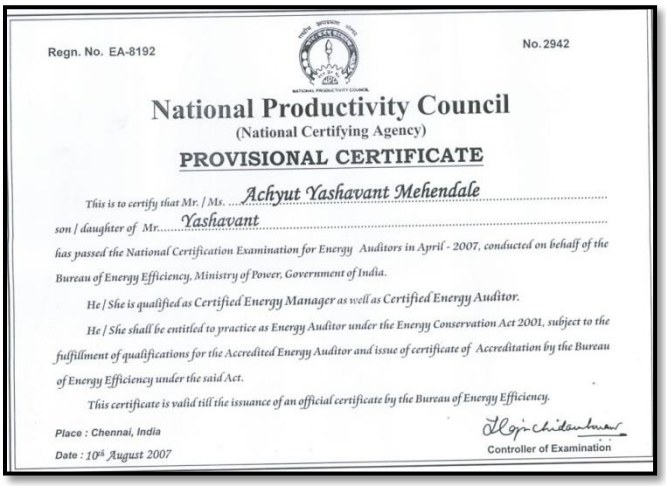
Year: 2022-23

Prepared by:

ENGRESS SERVICES

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

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

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: eee@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.
- 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 Registration Certificate



Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope :

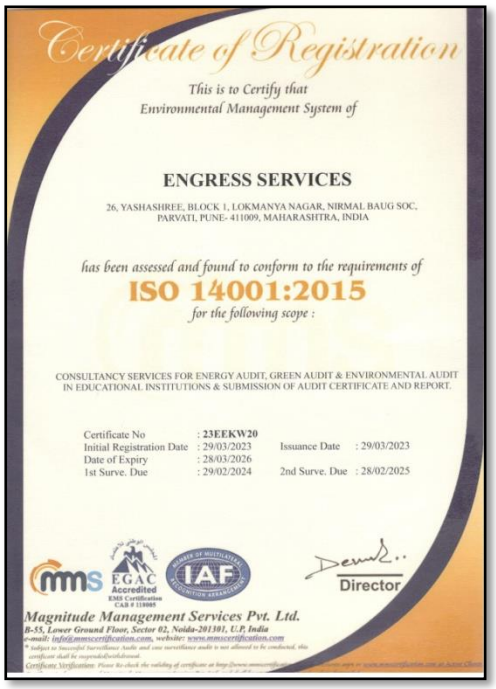
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No : 23EQKC13
Initial Registration Date : 27/03/2023 Issuance Date : 27/03/2023
Date of Expiry : 26/03/2026
1st Surve. Due : 27/02/2024 2nd Surve. Due : 27/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 9001-2015 Certificate



Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No : 23EEKW20
Initial Registration Date : 29/03/2023 Issuance Date : 29/03/2023
Date of Expiry : 28/03/2026
1st Surve. Due : 29/02/2024 2nd Surve. Due : 28/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 14001-2015 Certificate

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Present Energy Consumption	9
4	Study of Energy Performance Index	10
5	Study of Lighting	11
6	Study of Renewable Energy & Energy Efficiency	13

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Energy Audit of their Campus for the Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**18.65**	kW
2	Annual Energy Purchased	**19619**	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	19619	kWh
2	Annual Energy Generated	6000	kWh
3	Annual Energy Consumed=1+2	25619	kWh
4	Total Built up area of Institute	2020	m^2
5	Energy Performance Index **=(3) / (4)**	**12.68**	kWh/m^2

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	**87**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **5 kWp** Roof Top Solar PV Plant

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
PJSC	:	Poona Jesuit School Society
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
CFL	:	Compact Fluorescent Light
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

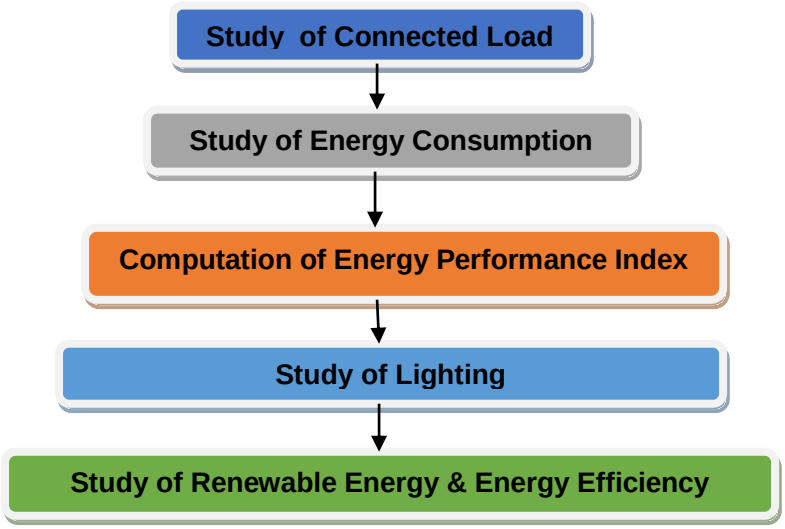
1.1 Introduction:

An Energy Audit is conducted at District Education Association's Institute of Technical Education Research and Management, Ganganagar, Akurdi, Pune

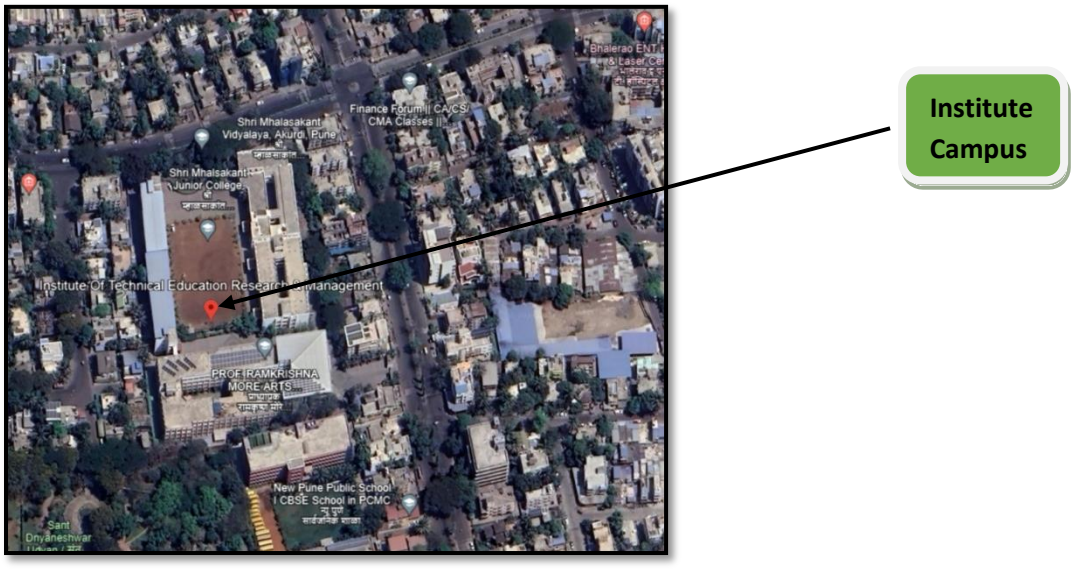
.The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 Institute Location Image:



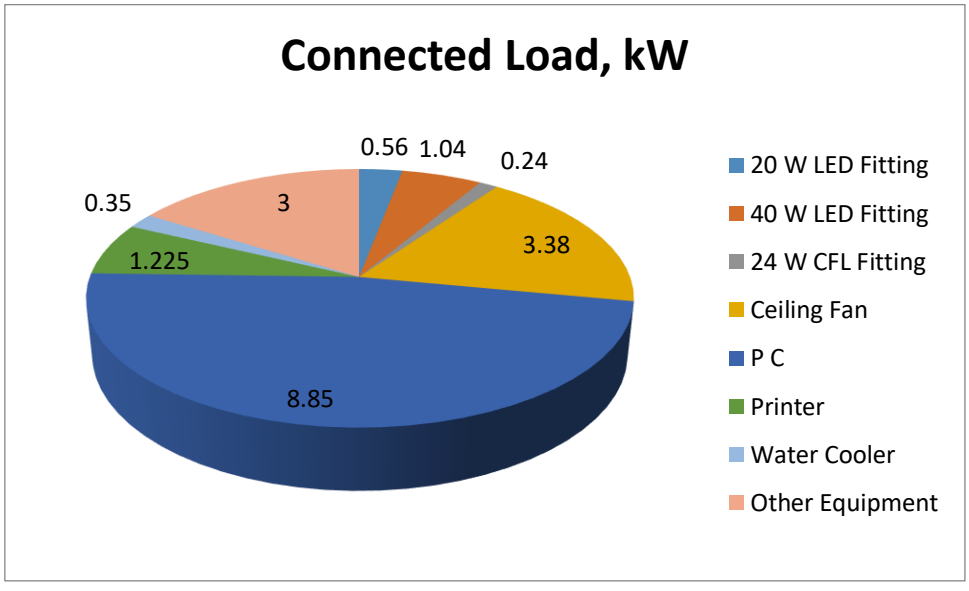
CHAPTER-II
STUDY OF CONNECTED LOAD

In this Chapter we enlist the Electrical Load of the Institute.

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	20 W LED Fitting	28	20	0.56
2	40 W LED Fitting	26	40	1.04
3	24 W CFL Fitting	10	24	0.24
4	Ceiling Fan	52	65	3.38
5	P C	59	150	8.85
6	Printer	7	175	1.225
7	Water Cooler	1	350	0.35
8	Other Equipment	12	250	3
9	**Total**			**18.65**

Chart No 1: Study of Connected Load:



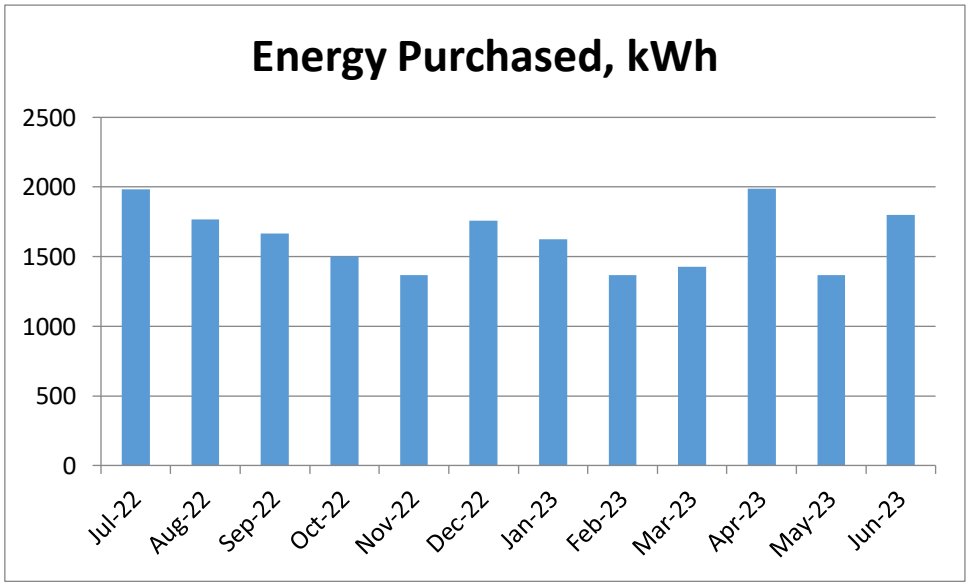
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No 3: Electrical Bill Analysis- 2022-23:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jul-22	1985	1.79
2	Aug-22	1769	1.59
3	Sep-22	1668	1.50
4	Oct-22	1502	1.35
5	Nov-22	1369	1.23
6	Dec-22	1758	1.58
7	Jan-23	1625	1.46
8	Feb-23	1368	1.23
9	Mar-23	1425	1.28
10	Apr-23	1987	1.79
11	May-23	1365	1.23
12	Jun-23	1798	1.62
13	Total	19619	17.66
14	Maximum	1987	1.79
15	Minimum	1365	1.23
16	Average	1634.92	1.47

Chart No 2: Variation in Monthly Energy Consumption:



CHAPTER-IV
STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$\text{EPI} = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total Built-up area in m}^2\text{)}}$$

Now we compute the EPI for the Institute as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	19619	kWh
2	Energy Generated by Solar PV Plant	6000	kWh
3	Total Energy Consumed= 1+2	25619	kWh
4	Total Built up area of Institute	2020	m^2
5	Energy Performance Index **=(3) / (4)**	**12.68**	kWh/m^2

CHAPTER V
STUDY OF LIGHTING

Terminology:

1. Lumen is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. Lux is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. Circuit Watts is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m^2)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior. Unit: watts per square metre per 100 lux (W/m^2/100 lux) 100 Installed power density (W/m^2/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

No	Equipment	Value	Unit
1	No of 20 W LED Fittings	28	Nos
2	Load/unit of 20 W LED Fitting	20	W/unit
3	Total Load of 20 W LED Fitting	**0.56**	kW
4	No of 40 W LED Fittings	26	Nos
5	Load/unit of 40 W LED Fitting	40	W/unit
6	Total Load of 40 W LED Fitting	**1.04**	kW

7	No of 24 W CFL Fittings	10	Nos
8	Load/unit of 24 W CFL Fitting	24	W/unit
9	Total Load of 24 W CFL Fitting	**0.24**	kW
10	Total LED Lighting Load =3+6	**1.6**	kW
11	Total Lighting Load =3+6+9	**1.84**	kW
12	**% of LED to Total Lighting Load =10*100/11**	**87**	%

CHAPTER-VI
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The Institute has installed:

- Roof Top Solar PV Plant of Capacity **5 kWp**

Photograph of Roof Top Solar PV Plant:



6.2 Energy Efficiency Measures adopted:

- The Institute has Energy Efficient LED Fittings.

Photographs of LED Lighting:



ENERGY AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

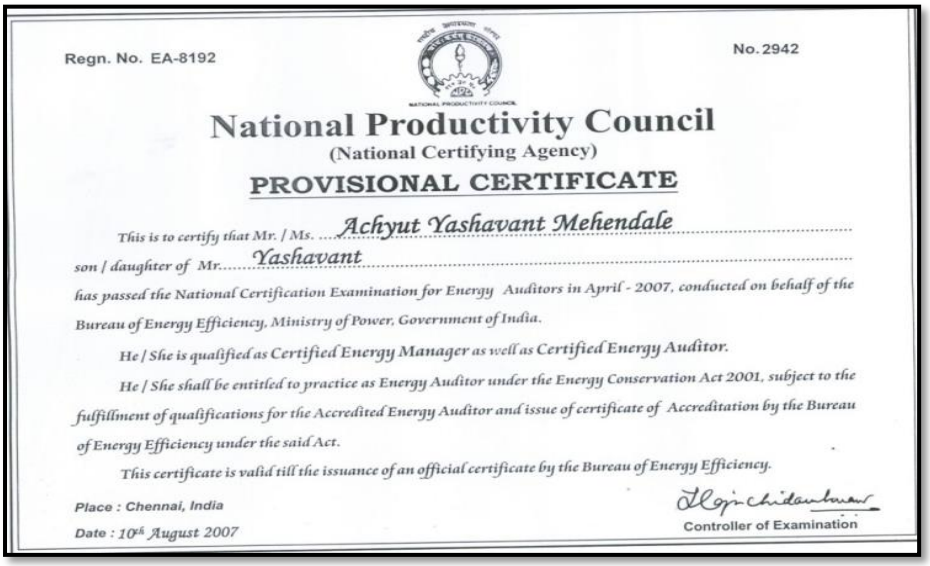
Year: 2021-22

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: eee@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.
- 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 EMPANELMENT CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Energy Consumption	9
4	Study of Carbon Foot Printing	10
5	Study of Usage of Alternate Energy	11
6	Study of Usage of LED Lighting	12

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Energy 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. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	17827	16.04
2	Maximum	1678	1.51
3	Minimum	1235	1.11
4	Average	1485.58	1.34

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Alternate Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar Plant **6000 kWh**
- Energy Purchased from MSEDCL is **17827 kWh**
- Total Energy Demand is **23827 kWh**
- % of Usage of Alternate Energy to Annual Energy Demand is **25.18 %**

5. Usage of LED Lighting:

- The Total LED Lighting Load is **1.58 kW.**
- The Total Lighting Load is **1.82 kW.**
- The % of LEDs to Total Lighting Load is **86.81 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

7. References:

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

ABBREVIATIONS

PDEA	:	Pune District Education Association
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

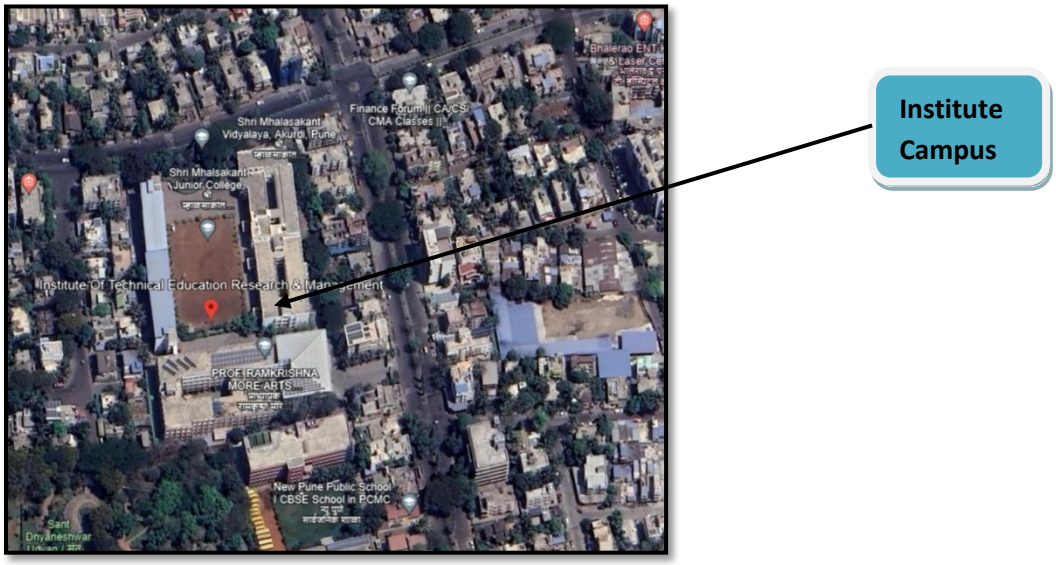
1.1 Objectives:

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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

1.3 Google Earth Location Image:



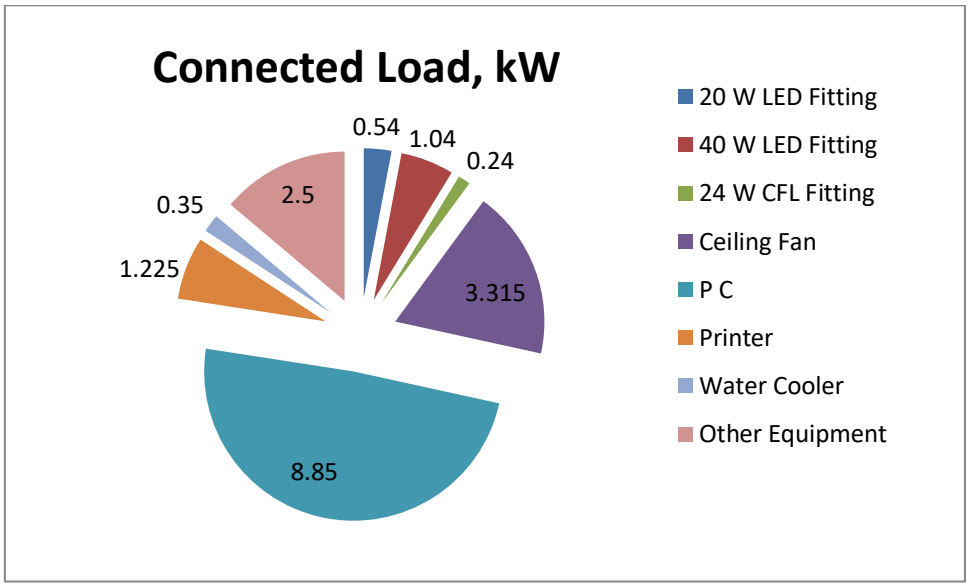
CHAPTER-II
STUDY OF CONNECTED LOAD

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	20 W LED Fitting	27	20	0.54
2	40 W LED Fitting	26	40	1.04
3	24 W CFL Fitting	10	24	0.24
4	Ceiling Fan	51	65	3.315
5	P C	59	150	8.85
6	Printer	7	175	1.225
7	Water Cooler	1	350	0.35
8	Other Equipment	10	250	2.5
9	**Total**			**18.06**

Chart No 1: Details of Connected Load:



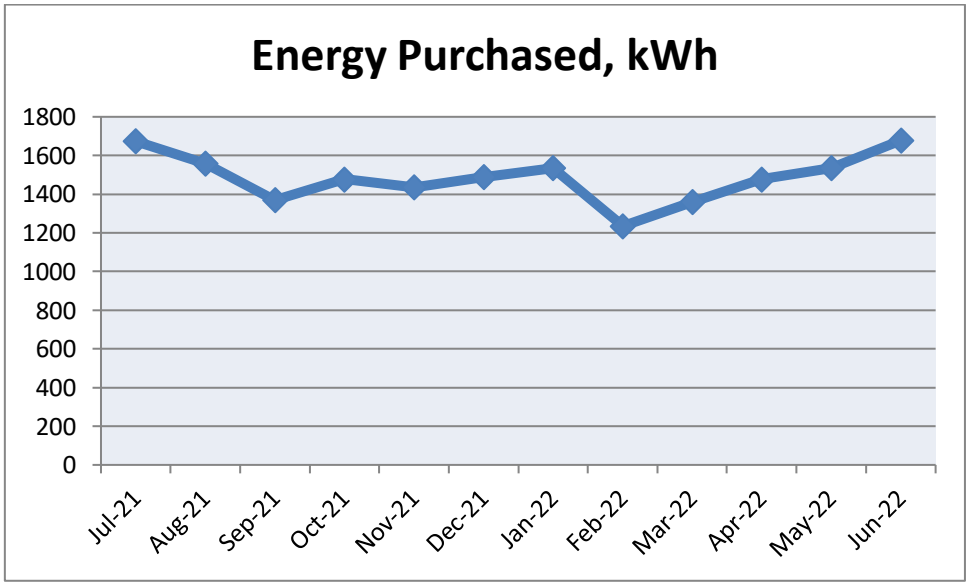
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

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

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

No	Month	Energy Purchased, kWh
1	Jul-21	1675
2	Aug-21	1558
3	Sep-21	1369
4	Oct-21	1478
5	Nov-21	1436
6	Dec-21	1489
7	Jan-22	1536
8	Feb-22	1235
9	Mar-22	1359
10	Apr-22	1478
11	May-22	1536
12	Jun-22	1678
13	Total	17827
14	Maximum	1678
15	Minimum	1235
16	Average	1485.58

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



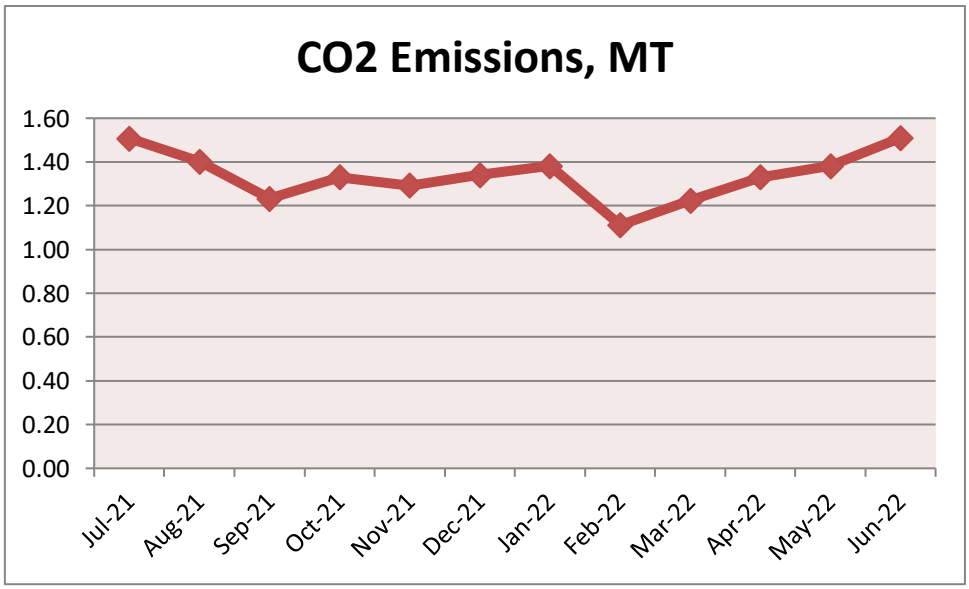
CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**
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	1675	1.51
2	Aug-21	1558	1.40
3	Sep-21	1369	1.23
4	Oct-21	1478	1.33
5	Nov-21	1436	1.29
6	Dec-21	1489	1.34
7	Jan-22	1536	1.38
8	Feb-22	1235	1.11
9	Mar-22	1359	1.22
10	Apr-22	1478	1.33
11	May-22	1536	1.38
12	Jun-22	1678	1.51
13	Total	17827	16.04
14	Maximum	1678	1.51
15	Minimum	1235	1.11
16	Average	1485.58	1.34

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 5 kWp.

In this Chapter we present the % Usage of Alternate Energy to Annual Energy Demand.

Table No 5: Computation of % Usage of Alternate Energy to Total Energy Demand:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**17827**	kWh/Annum
2	Installed Capacity of Solar PV Plant	5	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	6000	kWh
6	Total Energy Demand= **(1)+(5)**	**23827**	kWh
7	% of Alternate Energy to Annual Requirement = **(5)*100/(6)**	**25.18**	**%**

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	Equipment	Value	Unit
1	No of 20 W LED Fittings	27	Nos
2	Load/unit of 20 W LED Fitting	20	W/unit
3	Total Load of 20 W LED Fitting	**0.54**	kW
4	No of 40 W LED Fittings	26	Nos
5	Load/unit of 40 W LED Fitting	40	W/unit
6	Total Load of 40 W LED Fitting	**1.04**	kW
7	No of 24 W CFL Fittings	10	Nos
8	Load/unit of 24 W CFL Fitting	24	W/unit
9	Total Load of 24 W CFL Fitting	**0.24**	kW
10	Total LED Lighting Load =3+6	**1.58**	kW
11	Total Lighting Load =3+6+9	**1.82**	kW
12	**% of LED to Total Lighting Load =10*100/11**	**86.81**	%

ENERGY AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

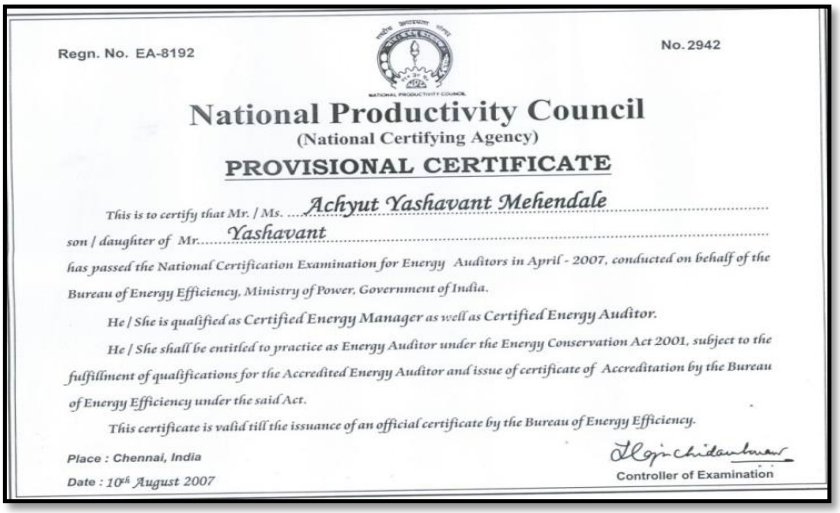
Year: 2020-21

Prepared by:

ENRICH CONSULTANTS

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

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 ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

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

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

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

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

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

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

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

General Manager (EC)

MEDA EMPANELMENT CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Energy Consumption	9
4	Study of Carbon Foot Printing	10
5	Study of Usage of Alternate Energy	11
6	Study of Usage of LED Lighting	12

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Energy 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. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	11080	9.97
2	Maximum	1298	1.17
3	Minimum	625	0.56
4	Average	923.33	0.83

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Alternate Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar Plant **6000 kWh**
- Energy Purchased from MSEDCL is **11080 kWh**
- Total Energy Demand is **17080 kWh**
- % of Usage of Alternate Energy to Annual Energy Demand is **35.13 %**

5. Usage of LED Lighting:

- The Total LED Lighting Load is **1.58 kW.**
- The Total Lighting Load is **1.892 kW.**
- The % of LEDs to Total Lighting Load is **83.51 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

7. References:

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

ABBREVIATIONS

PDEA	:	Pune District Education Association
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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

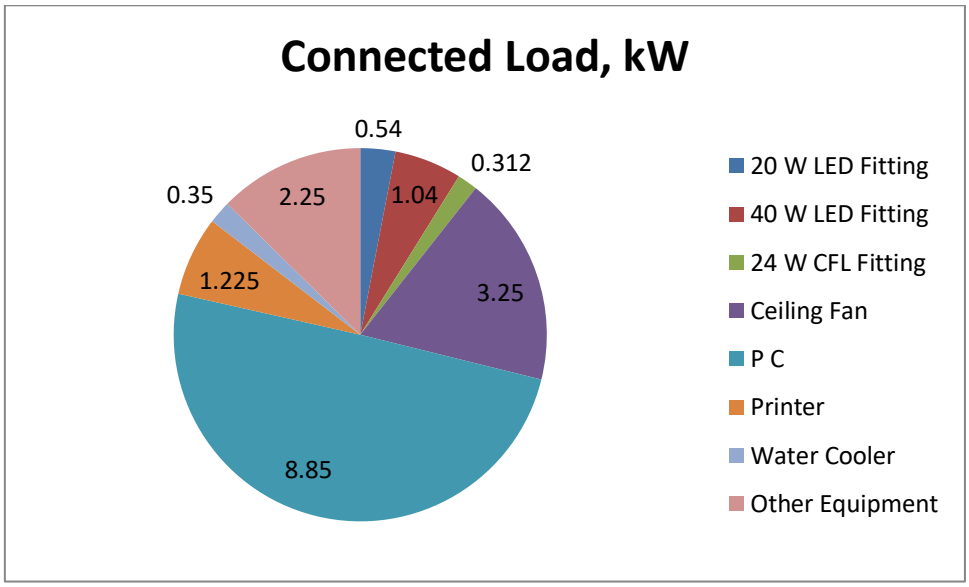
CHAPTER-II
STUDY OF CONNECTED LOAD

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	20 W LED Fitting	27	20	0.54
2	40 W LED Fitting	26	40	1.04
3	24 W CFL Fitting	13	24	0.312
4	Ceiling Fan	50	65	3.25
5	P C	59	150	8.85
6	Printer	7	175	1.225
7	Water Cooler	1	350	0.35
8	Other Equipment	9	250	2.25
9	**Total**			**17.82**

Chart No 1: Details of Connected Load:



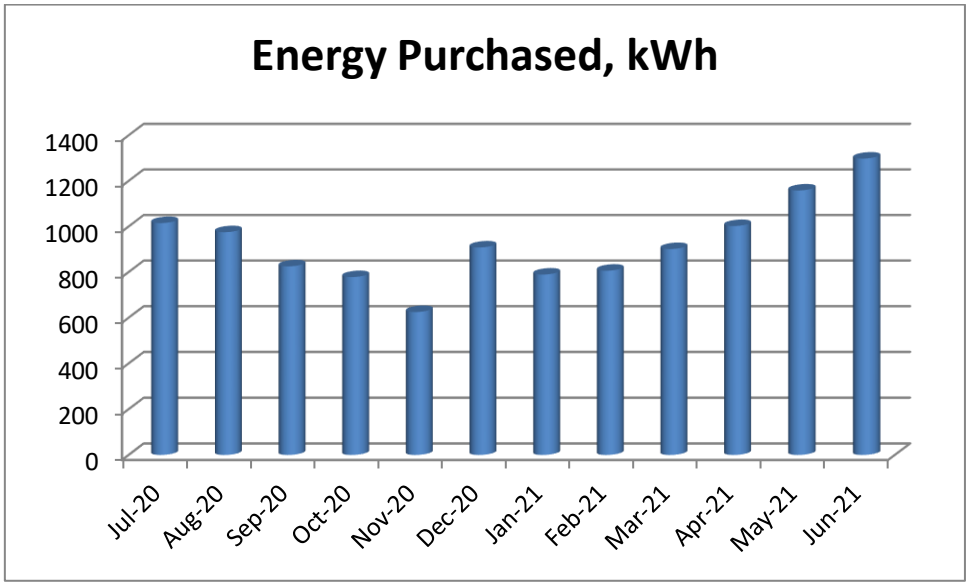
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

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

Table No 3: Electrical Energy Consumption Analysis- 2020-21:

No	Month	Energy Purchased, kWh
1	Jul-20	1015
2	Aug-20	975
3	Sep-20	825
4	Oct-20	778
5	Nov-20	625
6	Dec-20	908
7	Jan-21	789
8	Feb-21	806
9	Mar-21	901
10	Apr-21	1002
11	May-21	1158
12	Jun-21	1298
13	Total	11080
14	Maximum	1298
15	Minimum	625
16	Average	923.33

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



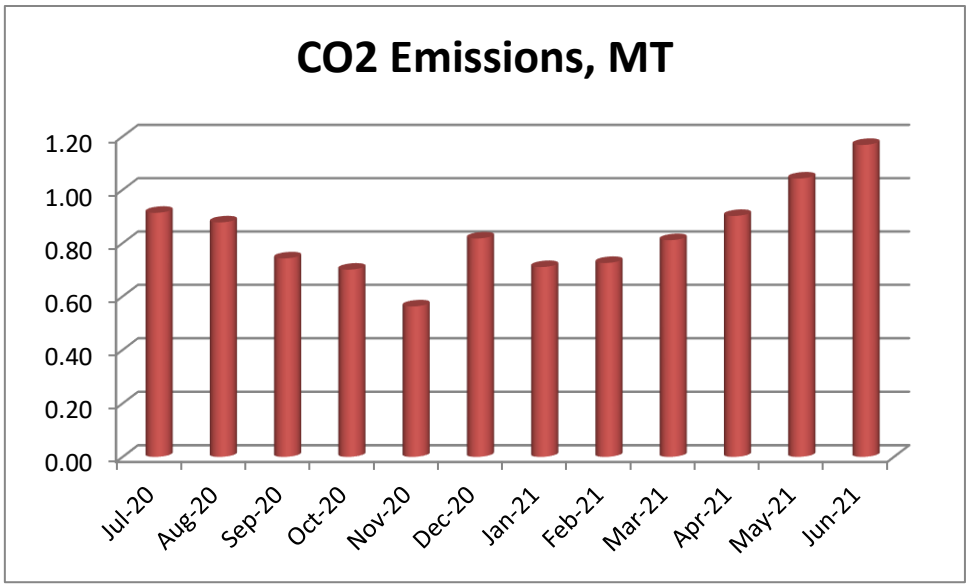
CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**
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-20	1015	0.91
2	Aug-20	975	0.88
3	Sep-20	825	0.74
4	Oct-20	778	0.70
5	Nov-20	625	0.56
6	Dec-20	908	0.82
7	Jan-21	789	0.71
8	Feb-21	806	0.73
9	Mar-21	901	0.81
10	Apr-21	1002	0.90
11	May-21	1158	1.04
12	Jun-21	1298	1.17
13	Total	11080	9.97
14	Maximum	1298	1.17
15	Minimum	625	0.56
16	Average	923.33	0.83

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 5 kWp.

In this Chapter we present the % Usage of Alternate Energy to Annual Energy Demand.

Table No 5: Computation of % Usage of Alternate Energy to Total Energy Demand:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**11080**	kWh/Annum
2	Installed Capacity of Solar PV Plant	5	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	6000	kWh
6	Total Energy Demand= **(1)+(5)**	**17080**	kWh
7	% of Alternate Energy to Annual Requirement = **(5)*100/(6)**	**35.13**	**%**

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	Equipment	Value	Unit
1	No of 20 W LED Fittings	27	Nos
2	Load/unit of 20 W LED Fitting	20	W/unit
3	Total Load of 20 W LED Fitting	**0.54**	kW
4	No of 40 W LED Fittings	26	Nos
5	Load/unit of 40 W LED Fitting	40	W/unit
6	Total Load of 40 W LED Fitting	**1.04**	kW
7	No of 24 W CFL Fittings	13	Nos
8	Load/unit of 24 W CFL Fitting	24	W/unit
9	Total Load of 24 W CFL Fitting	**0.312**	kW
10	Total LED Lighting Load =3+6	**1.58**	kW
11	Total Lighting Load =3+6+9	**1.892**	kW
12	**% of LED to Total Lighting Load =10*100/11**	**83.51**	%

ENERGY AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

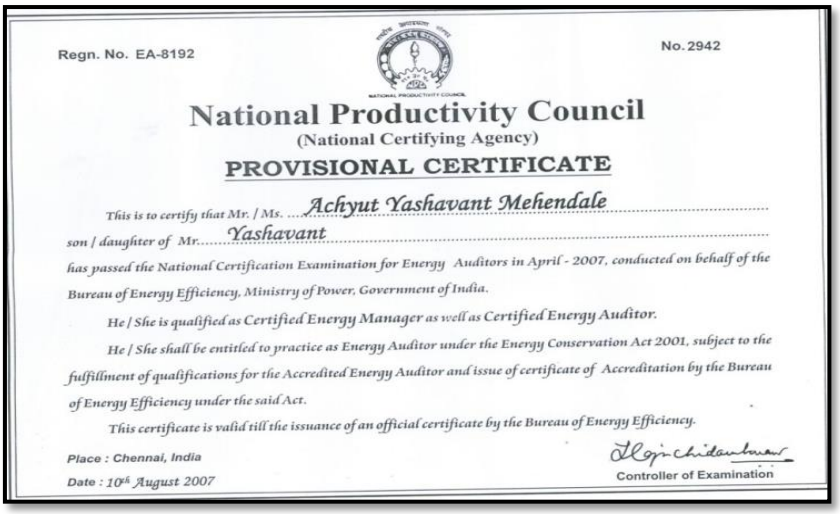
Year: 2019-20

Prepared by:

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society
Near Muktangan 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
Date : 10th August 2007

Controller of Examination

BEE ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

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

Registration Category : Empanelled *Consultant for Energy Conservation Programme*

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

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31stMarch 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

MEDA REGISTRATION CERTIFICATE

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Energy Consumption	9
4	Study of Carbon Foot Printing	10
5	Study of Usage of Alternate Energy	11
6	Study of Usage of LED Lighting	12

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Energy Audit of their Campus for the Year: 2019-20.

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	13868	12.48
2	Maximum	1687	1.52
3	Minimum	650	0.59
4	Average	1155.67	1.04

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of Roof Top Solar PV Plant of Capacity **5 kWp**

4. Usage of Alternate Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **5 kWp**
- Energy generated by Solar Plant **6000 kWh**
- Energy Purchased from MSEDCL is **13886 kWh**
- Total Energy Demand is **19868 kWh**
- % of Usage of Alternate Energy to Annual Energy Demand is **30.20 %**

5. Usage of LED Lighting:

- The Total LED Lighting Load is **1.58 kW.**
- The Total Lighting Load is **1.916 kW.**
- The % of LEDs to Total Lighting Load is **82.46 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy generated by Solar PV Pant: **4 kWh/kWp**
3. Annual Energy Generation Days: **300 Nos**
4. Energy consumption is computed based on Load Utilization Factor

7. References:

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

ABBREVIATIONS

PDEA	:	Pune District Education Association
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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

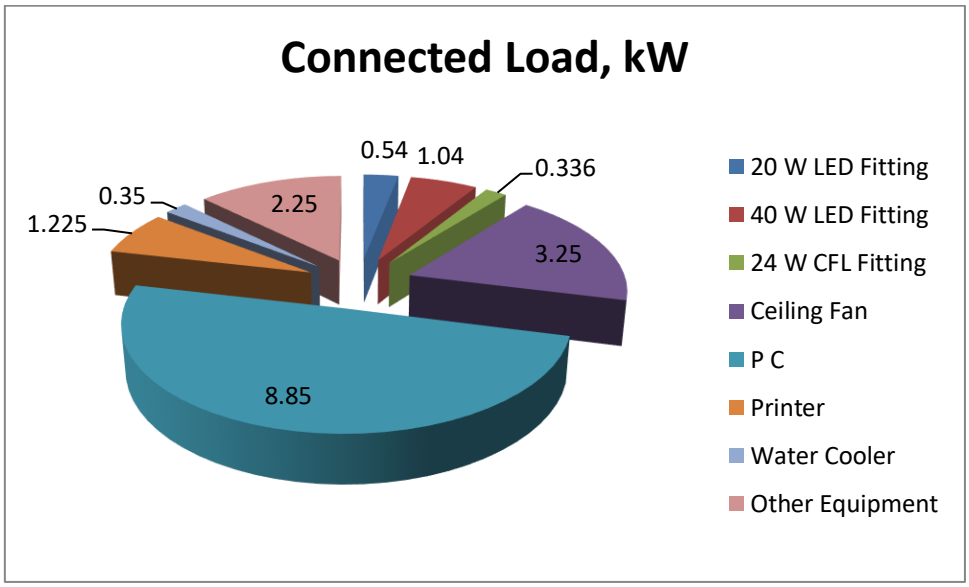
CHAPTER-II
STUDY OF CONNECTED LOAD

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	20 W LED Fitting	27	20	0.54
2	40 W LED Fitting	26	40	1.04
3	24 W CFL Fitting	14	24	0.336
4	Ceiling Fan	50	65	3.25
5	P C	59	150	8.85
6	Printer	7	175	1.225
7	Water Cooler	1	350	0.35
8	Other Equipment	9	250	2.25
9	**Total**			**17.84**

Chart No 1: Details of Connected Load:



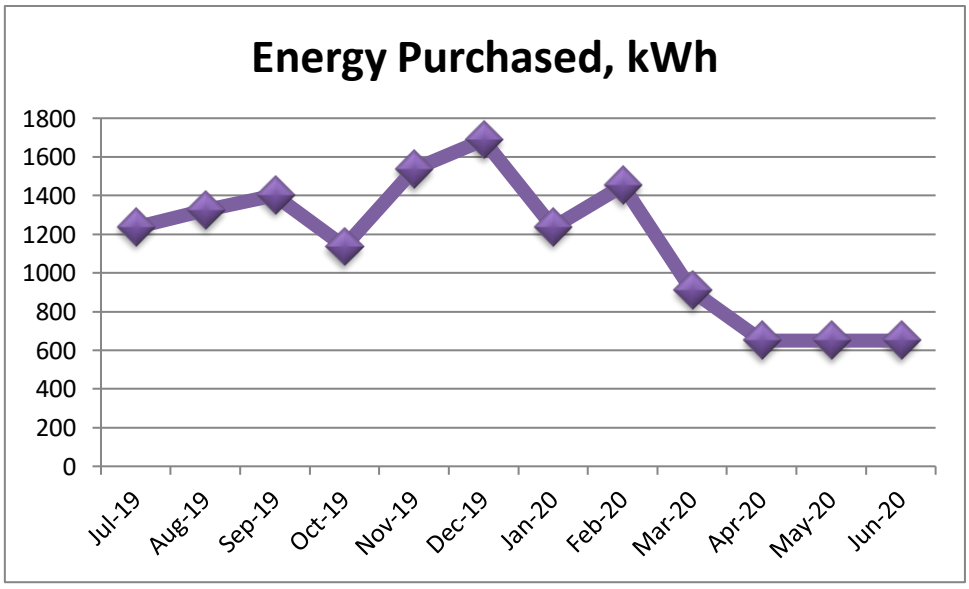
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

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

Table No 3: Electrical Energy Consumption Analysis- 2019-20:

No	Month	Energy Purchased, kWh
1	Jul-19	1236
2	Aug-19	1325
3	Sep-19	1402
4	Oct-19	1136
5	Nov-19	1536
6	Dec-19	1687
7	Jan-20	1236
8	Feb-20	1452
9	Mar-20	908
10	Apr-20	650
11	May-20	650
12	Jun-20	650
13	Total	13868
14	Maximum	1687
15	Minimum	650
16	Average	1155.67

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



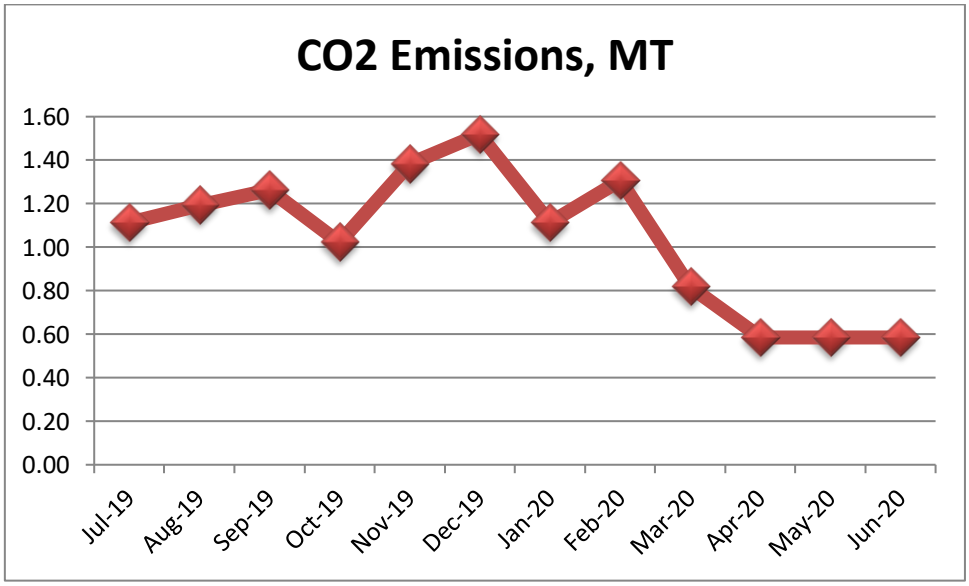
CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**
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-19	1236	1.11
2	Aug-19	1325	1.19
3	Sep-19	1402	1.26
4	Oct-19	1136	1.02
5	Nov-19	1536	1.38
6	Dec-19	1687	1.52
7	Jan-20	1236	1.11
8	Feb-20	1452	1.31
9	Mar-20	908	0.82
10	Apr-20	650	0.59
11	May-20	650	0.59
12	Jun-20	650	0.59
13	Total	13868	12.48
14	Maximum	1687	1.52
15	Minimum	650	0.59
16	Average	1155.67	1.04

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 5 kWp.

In this Chapter we present the % Usage of Alternate Energy to Annual Energy Demand.

Table No 5: Computation of % Usage of Alternate Energy to Total Energy Demand:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**13868**	kWh/Annum
2	Installed Capacity of Solar PV Plant	5	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	6000	kWh
6	Total Energy Demand= **(1)+(5)**	**19868**	kWh
7	% of Alternate Energy to Annual Requirement = **(5)*100/(6)**	**30.20**	**%**

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	Equipment	Value	Unit
1	No of 20 W LED Fittings	27	Nos
2	Load/unit of 20 W LED Fitting	20	W/unit
3	Total Load of 20 W LED Fitting	**0.54**	kW
4	No of 40 W LED Fittings	26	Nos
5	Load/unit of 40 W LED Fitting	40	W/unit
6	Total Load of 40 W LED Fitting	**1.04**	kW
7	No of 24 W CFL Fittings	14	Nos
8	Load/unit of 24 W CFL Fitting	24	W/unit
9	Total Load of 24 W CFL Fitting	**0.336**	kW
10	Total LED Lighting Load =3+6	**1.58**	kW
11	Total Lighting Load =3+6+9	**1.916**	kW
12	**% of LED to Total Lighting Load =10*100/11**	**82.46**	%

ENERGY AUDIT REPORT

of

Pune District Education Association's,

INSTITUTE OF TECHNICAL EDUCATION RESEARCH AND MANAGEMENT

Sector-28, Ganganagar, Akurdi, Pune 411 044

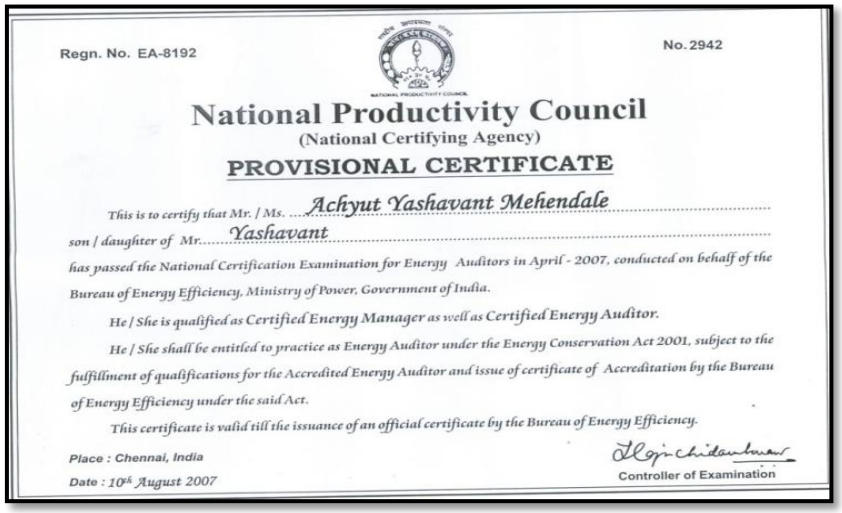
Year: 2018-19

Prepared by:

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society
Near Muktangan 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

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son / daughter of Mr. Yashavant
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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 ENERGY AUDITOR CERTIFICATE



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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

Name and Address of the firm : **Enrich Consultants**
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19/9/18
(Smita Kudarikar)
General Manager (EC)

MEDA REGISTRATION CERTIFICATE

INDEX

Sr. No	Particulars	Page No
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II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
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6	Study of Usage of LED Lighting	12

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Pune District Education Association's Institute of Technical Education Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 for awarding us the assignment of Energy Audit of their Campus for the Year: 2018-19.

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

EXECUTIVE SUMMARY

1. Pune District Education Association's Institute of Technical Education, Research and Management, Sector-28, Ganganagar, Akurdi, Pune 411 044 consumes Energy in the form of **Electrical Energy;** used for various Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	21250	19.01
2	Maximum	2165	1.95
3	Minimum	1102	0.88
4	Average	1770.83	1.58

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings

4. Usage of Alternate Energy:

- The Institute has yet to install Roof Top Solar PV Plant

5. Usage of LED Lighting:

- The Total LED Lighting Load is **1.46 kW.**
- The Total Lighting Load is **1.844 kW.**
- The % of LEDs to Total Lighting Load is **79.18 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy consumption is computed based on Load Utilization Factor

ABBREVIATIONS

PDEA	:	Pune District Education Association
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	PDEA's Institute of Technical Education Research and Management
2	Address	Sector-28, Ganganagar, Akurdi, Pune 411 044
3	Year of Establishment	2010

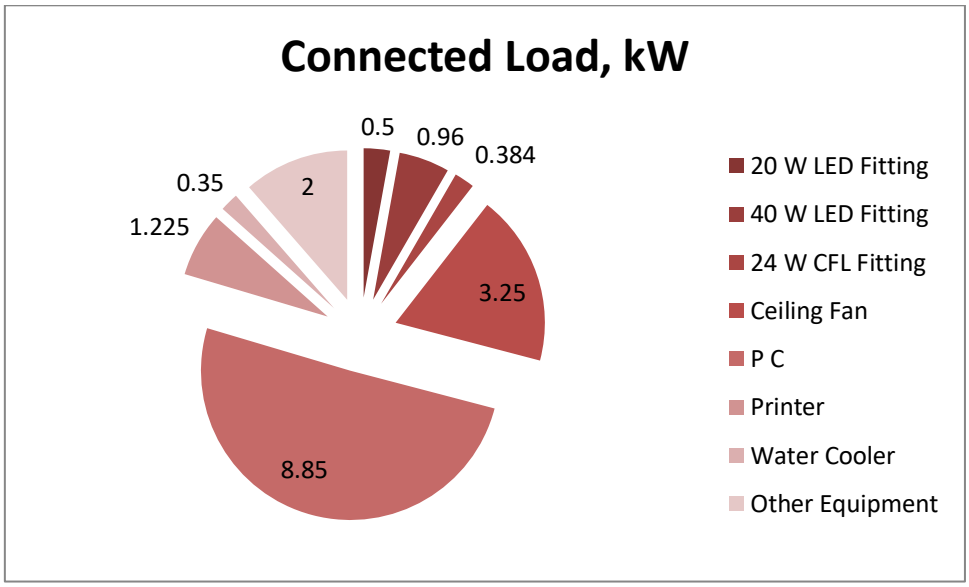
CHAPTER-II
STUDY OF CONNECTED LOAD

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	20 W LED Fitting	25	20	0.5
2	40 W LED Fitting	24	40	0.96
3	24 W CFL Fitting	16	24	0.384
4	Ceiling Fan	50	65	3.25
5	P C	59	150	8.85
6	Printer	7	175	1.225
7	Water Cooler	1	350	0.35
8	Other Equipment	8	250	2
9	**Total**			**17.52**

Chart No 1: Details of Connected Load:



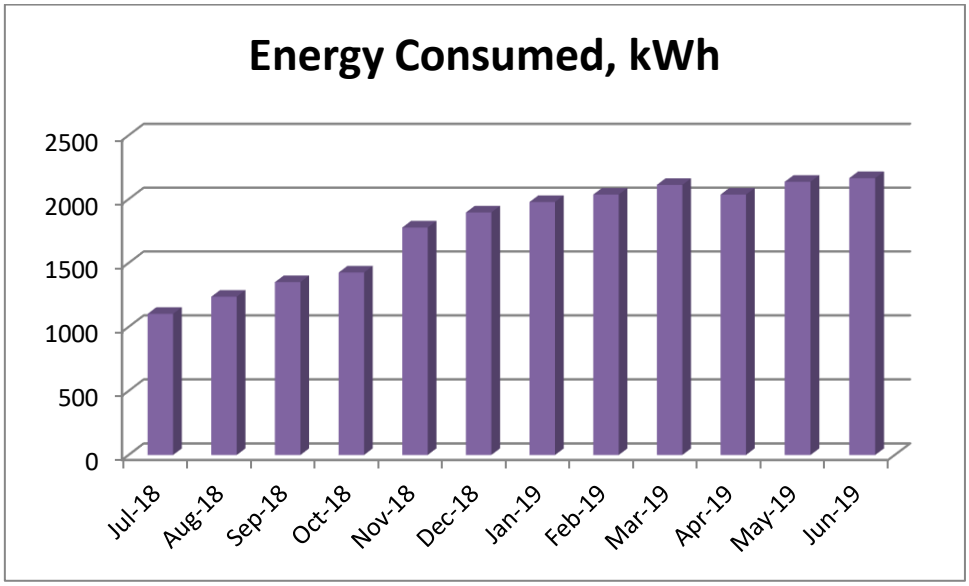
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

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

Table No 3: Electrical Energy Consumption Analysis- 2018-19:

No	Month	Energy Consumed, kWh
1	Jul-18	1102
2	Aug-18	1236
3	Sep-18	1350
4	Oct-18	1425
5	Nov-18	1778
6	Dec-18	1896
7	Jan-19	1978
8	Feb-19	2036
9	Mar-19	2112
10	Apr-19	2036
11	May-19	2136
12	Jun-19	2165
13	Total	21250
14	Maximum	2165
15	Minimum	1102
16	Average	1770.83

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



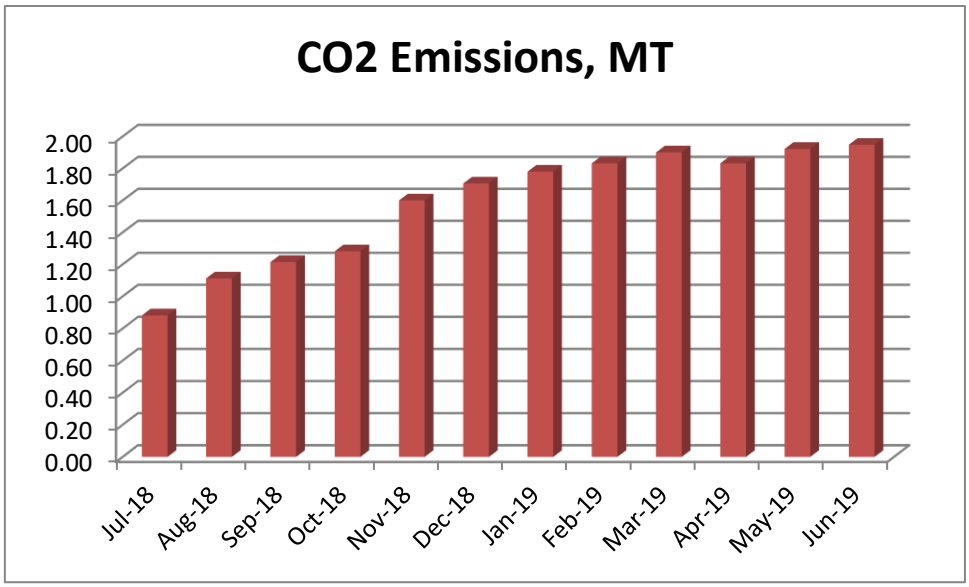
CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**
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 Consumed, kWh	CO_2 Emissions, MT
1	Jul-18	1102	0.88
2	Aug-18	1236	1.11
3	Sep-18	1350	1.22
4	Oct-18	1425	1.28
5	Nov-18	1778	1.60
6	Dec-18	1896	1.71
7	Jan-19	1978	1.78
8	Feb-19	2036	1.83
9	Mar-19	2112	1.90
10	Apr-19	2036	1.83
11	May-19	2136	1.92
12	Jun-19	2165	1.95
13	Total	21250	19.01
14	Maximum	2165	1.95
15	Minimum	1102	0.88
16	Average	1770.83	1.58

Chart No 3: Representation of Month wise CO_2 emissions:



CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The Institute has yet to install 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 5: Computation of Percent Usage of LEDs to Total Lighting Load:

No	Equipment	Value	Unit
1	No of 20 W LED Fittings	25	Nos
2	Load/unit of 20 W LED Fitting	20	W/unit
3	Total Load of 20 W LED Fitting	**0.5**	kW
4	No of 40 W LED Fittings	24	Nos
5	Load/unit of 40 W LED Fitting	40	W/unit
6	Total Load of 40 W LED Fitting	**0.96**	kW
7	No of 24 W CFL Fittings	16	Nos
8	Load/unit of 24 W CFL Fitting	24	W/unit
9	Total Load of 24 W CFL Fitting	**0.384**	kW
10	Total LED Lighting Load =3+6	**1.46**	kW
11	Total Lighting Load =3+6+9	**1.844**	kW
12	**% of LED to Total Lighting Load =10*100/11**	**79.18**	%

Pune District Education Association's

INSTITUTE OF TECHNICAL EDUCATION, RESEARCH & MANAGEMENT

Estd. June 2010

Sec. No. 28, Ganganagar, Akurdi, Pune – 44
E-mail : itermakurdi@gmail.com

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Approved by AICTE

Ph.: 020-27650788
Web site : www.pdeambaakurdi.edu.in

Disabled friendly, barrier free environment

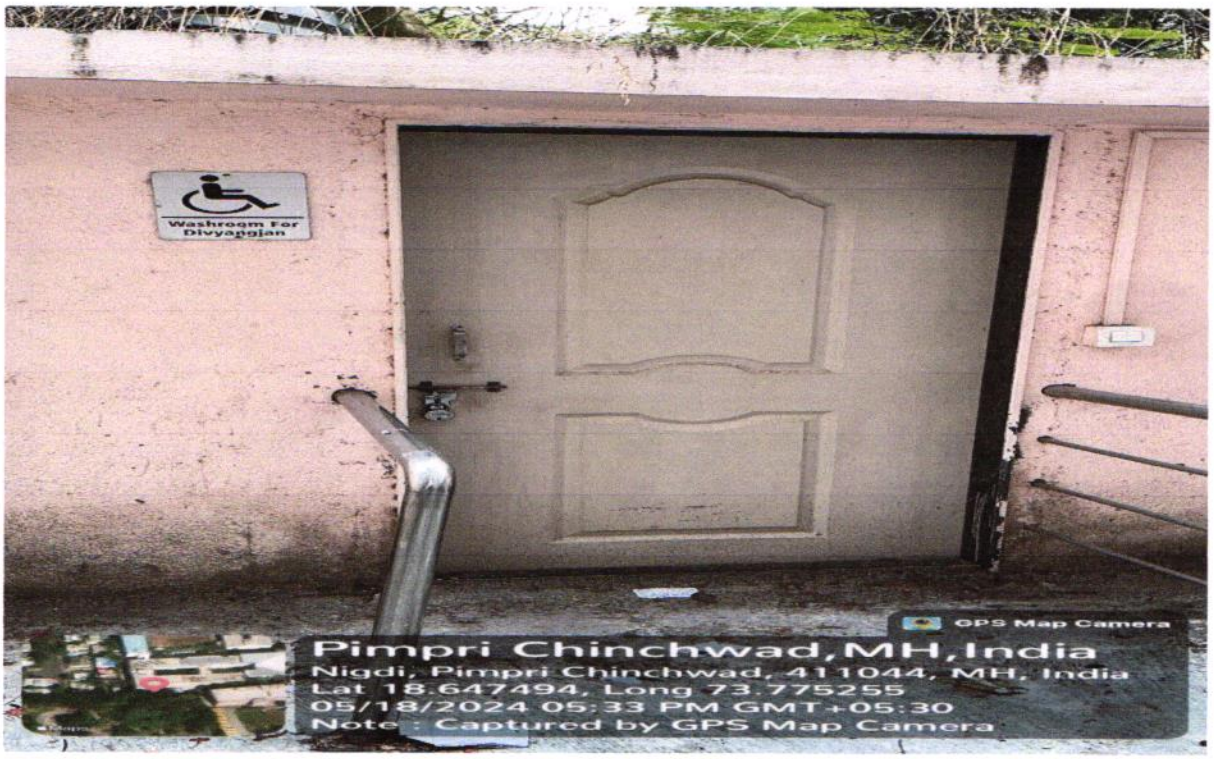
Pune District Education Association's

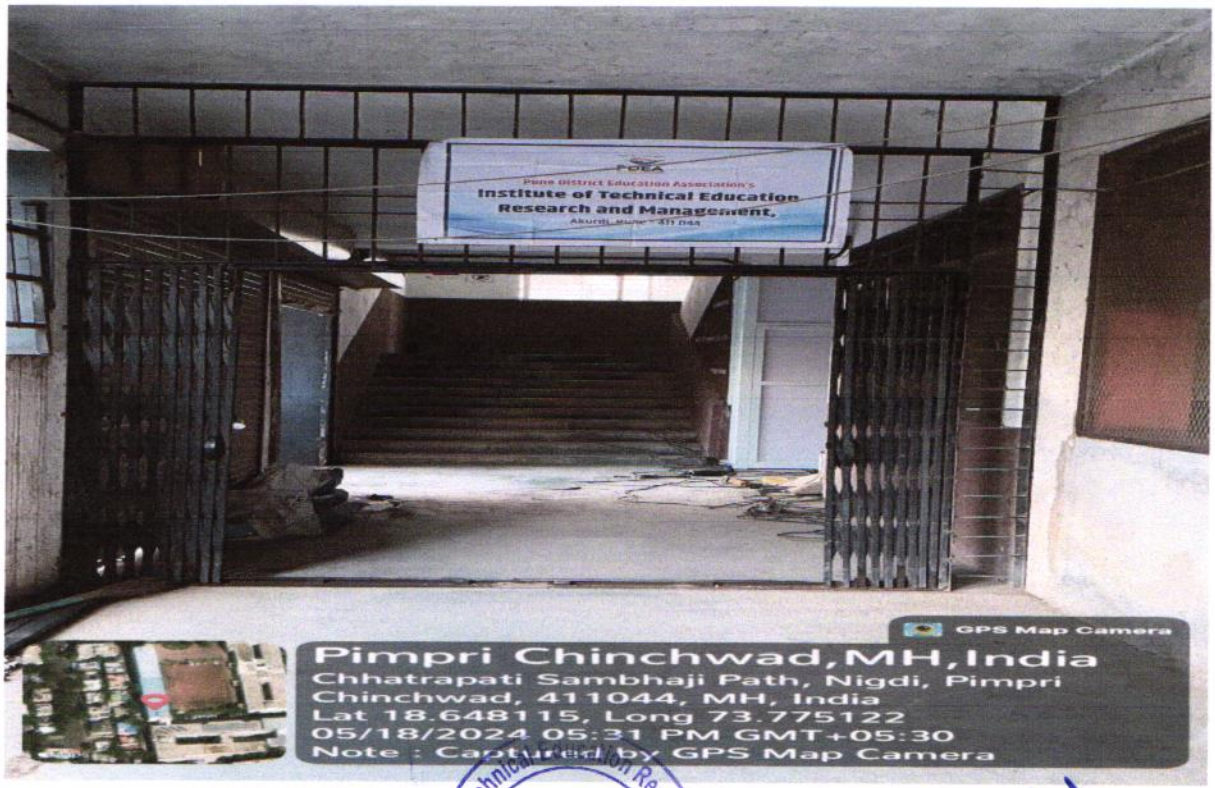
INSTITUTE OF TECHNICAL EDUCATION, RESEARCH & MANAGEMENT

Estd. June 2010

Sec. No. 28, Ganganagar, Akurdi, Pune – 44 | Affiliated to Savitribai Phule Pune University | Ph.: 020-27650788
E-mail : itermakurdi@gmail.com | Approved by AICTE | Web site : www.pdeambaakurdi.edu.in

Disabled friendly, barrier free environment Photos





Sec.28, Ganganagar, PCNTDA, Akurdi,

Director