JSPM GROUP OF INSTITUTE, PUNE
SHRI BHAGWANT EDUCATION & RESEARCH CHARITABLE TRUST'S
BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI
(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to DBATU Lonere, MSBTE)
Gat.No.1242/01, Tadsoudane Road, Barshi, 413401. Mob.No.:9049076781/9049086781
Visit: www.bitbarshi.edu.in | Email: bitbarshi6781@gmail.com
Prof. Dr. T. J. Sawant
President

SBERCT/BIT/NAAC/2023-24/Cr.- 7(7.1.6)

Date:18/12/2024

To,

The Coordinator,
NAAC, Bengaluru.

Subject: Green campus initiatives conducted in the institute

Reference: 7.1.6 Green campus initiatives conducted in the institute

Dear Sir/Madam,

The details of green campus initiatives conducted in the institute includes use of Bicycles, use of public transport, Pedestrian Friendly Roads, Plastic Free Campus, Paperless Office And Green landscaping with trees and plants

The detailed documents are available at following link:

https://bitbarshi.edu.in/iqac/ay_23-24/criterion7/7.1.6.pdf

Bhagwant Institute of Technology Barshi

PRINCIPAL
Principal
Bhagwant Institute of Technology
Barshi.

Enclosures:

1. Audit report of Green audit, energy audit and environment audit.

ENGRESS SERVICES

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

ENERGY AUDIT CERTIFICATE

Certificate No: ES/BITB/22-23/01 **Date: 10/5/2023**

This is to certify that we have conducted Energy Audit at Shri Bhagwant Education &Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year: 22-23.

The Institute has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 3 kWp Roof Top Solar PV Plant

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

For Engress Services,

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
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MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

GREEN AUDIT CERTIFICATE

Certificate No: ES/BITB/22-23/02 **Date: 10/5/2023**

This is to certify that we have conducted Green Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year 2022-23.

The Institute has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 3 kWp
- Provision of Separate bins for Dry & Wet Waste
- Provision of Septic Tank, for Disposal of Liquid Waste
- Implementation of Rain Water Management Project
- Good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of Awareness about Energy Conservation by Display of Posters

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

For Engress Services,

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

ENGRESS SERVICES * PUNE *

ENGRESS SERVICES

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MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/BITB/22-23/03 **Date: 10/5/2023**

This is to certify that we have conducted Environmental Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year 22-23.

The Institute has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 3 kWp
- Provision of Separate bins for Dry & Wet Waste
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ENGRESS SERVICES * PUNE *

ENERGY AUDIT REPORT

of

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S,

BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

Year: 2022-23

Prepared by:

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ENGRESS SERVICES * PUNE *

REGISTRATION CERTIFICATES

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

Achyut Yashwant Mehendale

AUDITOR CERTIFICATE

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

MEDA Registration Certificate

Certificate of Registration

This is to Certify that
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ENGRESS SERVICES

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for the following scope

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Magnitude Management Services Pvt. Ltd.

ISO: 9001-2015 Certificate

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

EXECUTIVE SUMMARY

1.Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi consumes Energy in the form of **Electrical Energy;** used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**121**	kW
2	Annual Energy Purchased	**93172**	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	**93172**	kWh
2	Annual Energy Generated	**3600**	kWh
3	Annual Energy Consumed=1+2	**96772**	kWh
4	Total Built up area of Institute	**8623.3**	m^2
5	Energy Performance Index = **(3) / (4)**	**11.22**	kWh/m^2

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
2	% of Usage of LED Lighting to Total Lighting Load	**22.36**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **3 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 Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**

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
IQAC	:	Internal Quality Assurance Cell
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

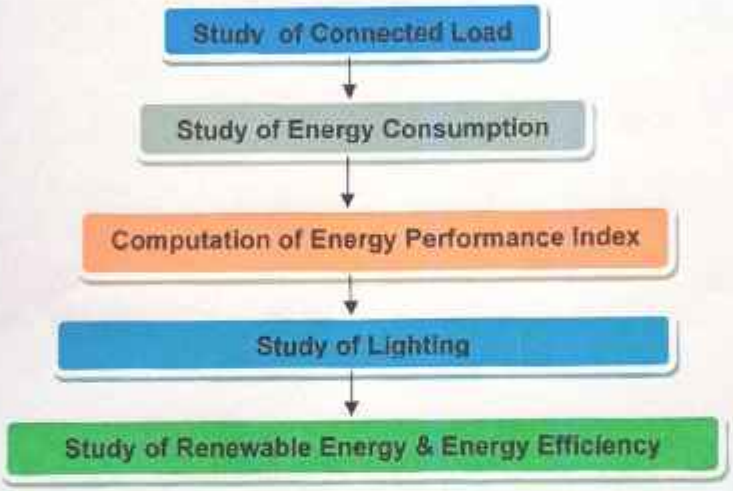
1.1 Introduction:

An Energy Audit is conducted at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology Barshi

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:

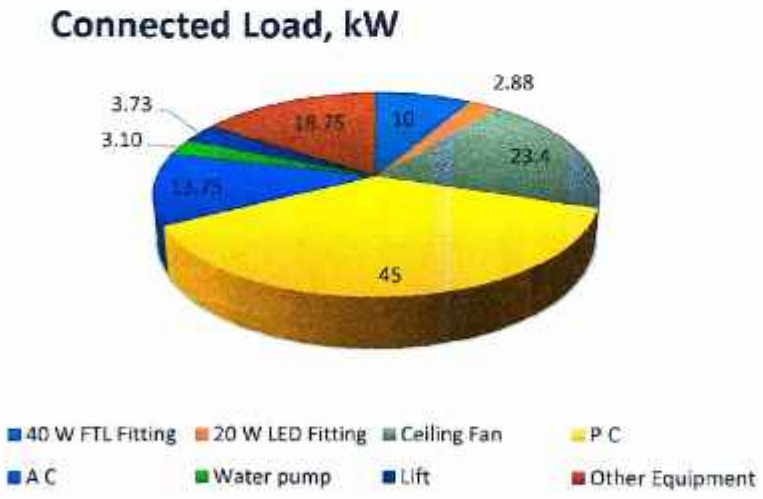
CHAPTER-II
STUDY OF CONNECTED LOAD

The major contributors to the connected load of the Institute are as under:

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	250	40	10
2	20 W LED Fitting	240	12	2.88
3	Ceiling Fan	360	65	23.4
4	P C	300	150	45
5	A C	10	1375	13.75
6	Water pump	2	1550	3.10
7	Lift	1	3730	3.73
8	Other Equipment	125	150	18.75
9	**Total**			**121**

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 2: Electrical Bill Analysis- 2022-23:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-22	7498	6.75
2	May-22	7487	6.74
3	Jun-22	8065	7.26
4	Jul-22	7058	6.35
5	Aug-22	6998	6.30
6	Sep-22	7036	6.33
7	Oct-22	6997	6.30
8	Nov-22	8063	7.26
9	Dec-22	7198	6.48
10	Jan-23	8975	8.08
11	Feb-23	9004	8.10
12	Mar-23	8793	7.91
13	Total	93172	83.85
14	Maximum	9004	8.10
15	Minimum	6997	6.30
16	Average	7764	7

Chart No 2: Variation in Monthly Energy Purchased, kWh:

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:

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

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	**93172**	kWh
2	Energy Generated by Solar PV Plant	**3600**	kWh
3	Total Energy Consumed= 1+2	**96772**	kWh
4	Total Built up area of Institute	**8623.3**	m^2
5	Energy Performance Index = **(3) / (4)**	**11.22**	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/m²)

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/m²/100 lux) 100 Installed power density (W/m²/100 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.

In this Chapter we compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

Table No 4: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	250	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	**10**	kW
4	No of 12 W LED Tube Lights	240	Nos
5	Demand of 6 W LED Tube Light	12	W/Unit
6	Total Electrical Load of 6 W LED Fittings	**2.88**	kW

7	Total LED Lighting Load=6	**12.88**	kW
8	Total Lighting Load= 3+6	**2.88**	kW
9	**% of LED to Total Lighting Load= 7*100/8**	**22.36**	%

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 **3 kWp**

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The Institute has Energy Efficient LED Fittings.
- Usage of BEE STAR Rated Equipment

Photographs of LED Lighting:

GREEN AUDIT REPORT

of

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S.

BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

Year: 2022-23

Prepared by:

ENGRESS SERVICES

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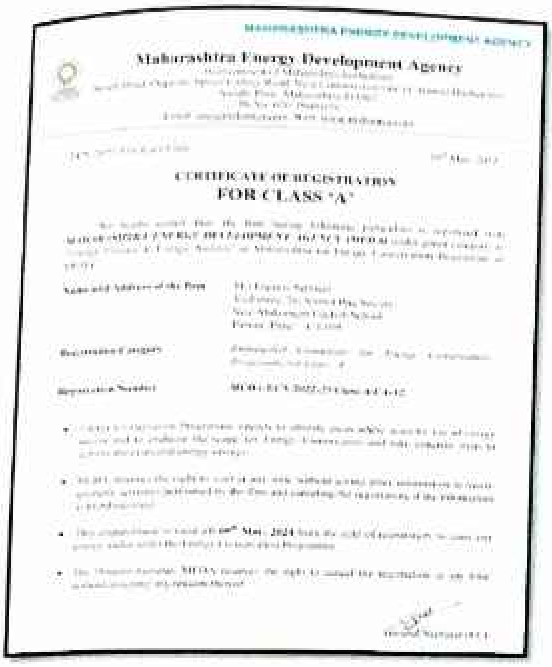
Phone: 09890444795 Email: engress123@gmail.com

REGISTRATION CERTIFICATES



Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION

FOR CLASS 'A'

MEDA REGISTRATION CERTIFICATE

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the

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

with

"Excellent Performance"

on

06 June 2022

Pankaj R. Dharkar

GEM CP 22/709

Deepak Sood

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration

This is to Certify that

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for the following scope :

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ISO: 9001-2015 Certificate

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EXECUTIVE SUMMARY

1.Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi consumes Energy in the form of **Electrical Energy**; used for various gadgets, office & other facilities

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**93172**	kWh
2	Annual CO_2 Emissions	**83.85**	MT

3. Renewable Energy & Reduction in CO_2 Emissions:

- The Institute has installed Roof Top Solar PV Plant of Capacity **3 kWp.**
- The Energy generated by Solar PV Plant in 22-23 is **3600 kWh.**
- Reduction in CO_2 Emissions in 22-23 is **3.24 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Liquid Waste	Provision of Septic Tank

5. Rain Water Management:

The Institute has installed the Rainwater Management project, the rain water falling on the terrace is collected and is used for increasing the underground water level.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Energy Conservation Display of Posters

7. Assumptions:

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

8. References:

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

ABBREVIATIONS

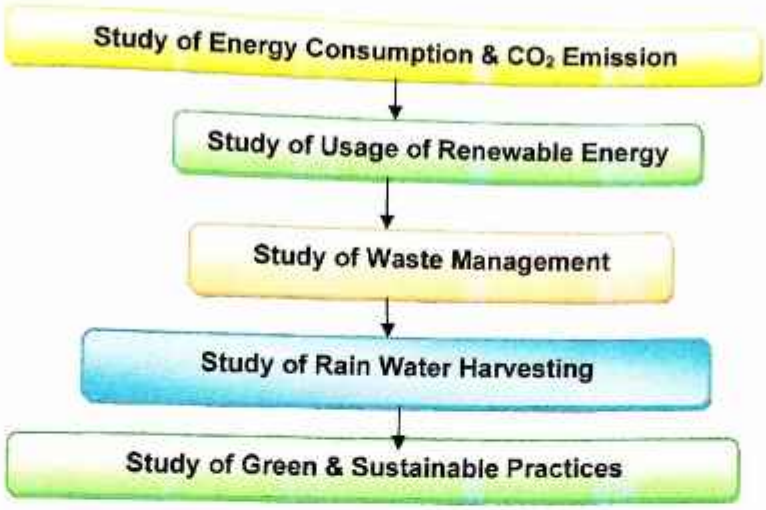
BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology Barshi.

1.2 Audit Procedural Steps:



1.3 Institute Location 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 Energy Consumption & CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-22	7498	6.75
2	May-22	7487	6.74
3	Jun-22	8065	7.26
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14	Maximum	9004	8.10
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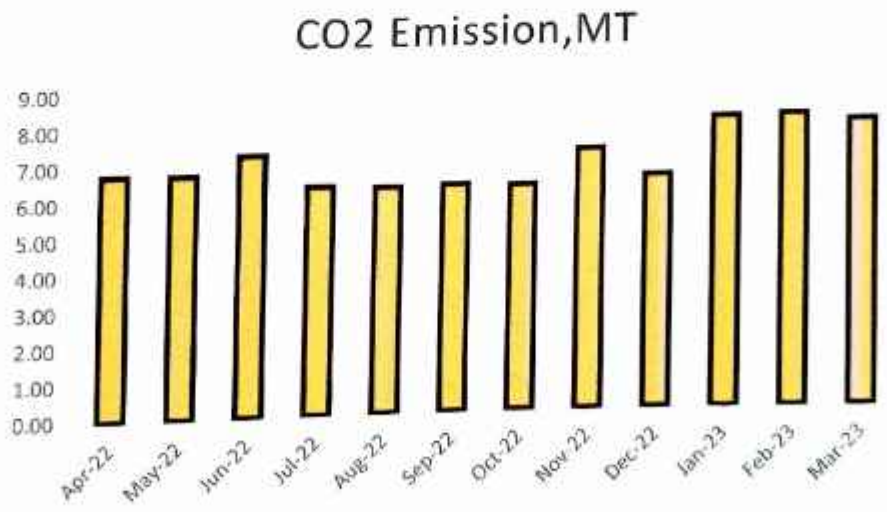
Chart No 1: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

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

In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof Top Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy Generation Days	300	Nos
4	Energy Generated in the Year: 22-23	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant = (4)*(5) /1000**	**3.24**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The recyclable waste, like paper, plastic waste is segregated at source and handed over to Authorized Agency for further action.

Photograph of Waste Collection Bin:

4.2 Liquid Waste Management:

The Institute has a Septic Tank, for Disposal of Liquid Waste and is cleaned periodically.

CHAPTER-V
STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

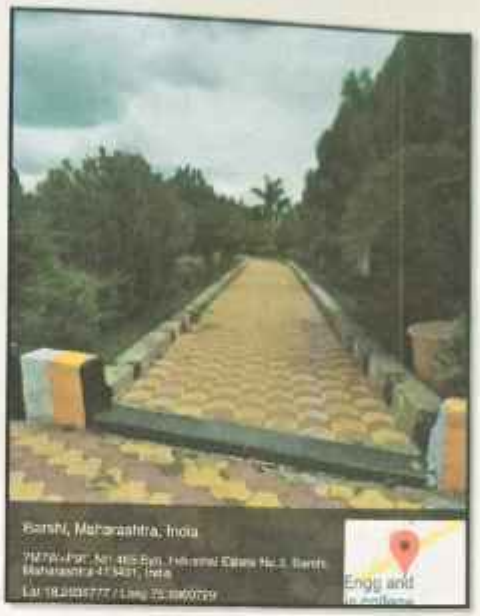
Photograph of Rain Water Pipe Section:

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 well maintained landscaped garden in the campus.

Photograph of Tree plantation:

6.3 Provision of Ramp:

For easy movement of Divyangajan, the Institute has made provision of Ramp at the main entrance.

Photograph of Ramp:

6.4 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:

ENVIRONMENTAL AUDIT REPORT

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BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

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Chairman GEM

GEM CP 22/788

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2. Pollution due to Institute Activities:

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

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	93172	kWh
2	Annual CO_2 Emissions	83.85	MT

4. Renewable Energy & Reduction in CO_2 Emissions:

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- The Energy generated by Solar PV Plant in 22-23 is 3600 kWh.
- Reduction in CO_2 Emissions in 22-23 is 3.24 MT

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	80	48	57
2	Minimum	70	39	49

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	28.1	81	126	45
2	Minimum	27.9	80	106	41.9

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Liquid Waste	Provision of Septic Tank

8. Rain Water Management:

The Institute has installed the Rainwater Management project, the rain water falling on the terrace is collected and is used for increasing the underground water level.

9. Environment Friendly Initiatives:

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

10. Assumptions:

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

11. References:

- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1. Important Definitions:

1.1. Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.2. Environmental Audit: Definition:

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

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

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

1.4 Audit Procedural Steps:

1.5 Institute Location Image:

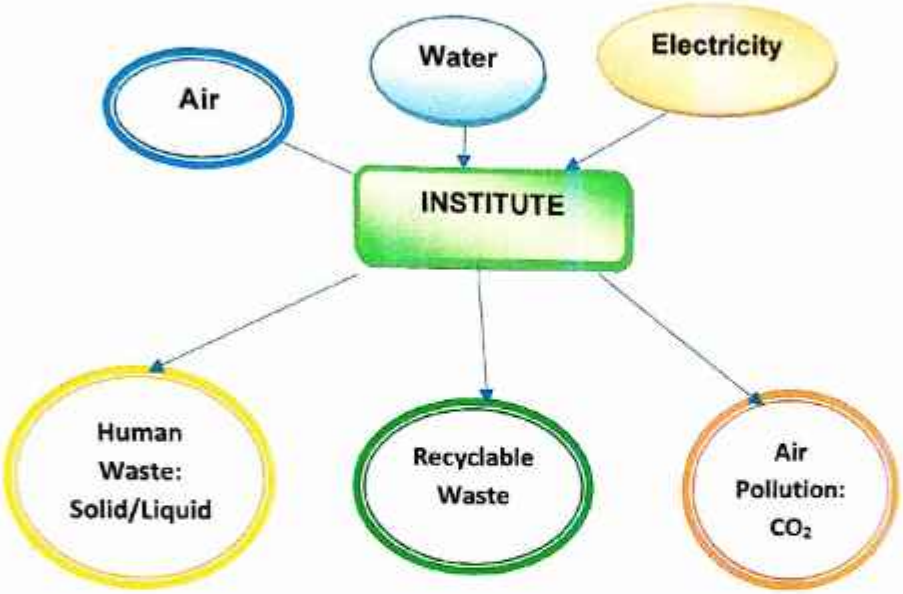
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.

Chart No 1: Representation of Institute as System & Study of Resources & Waste



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

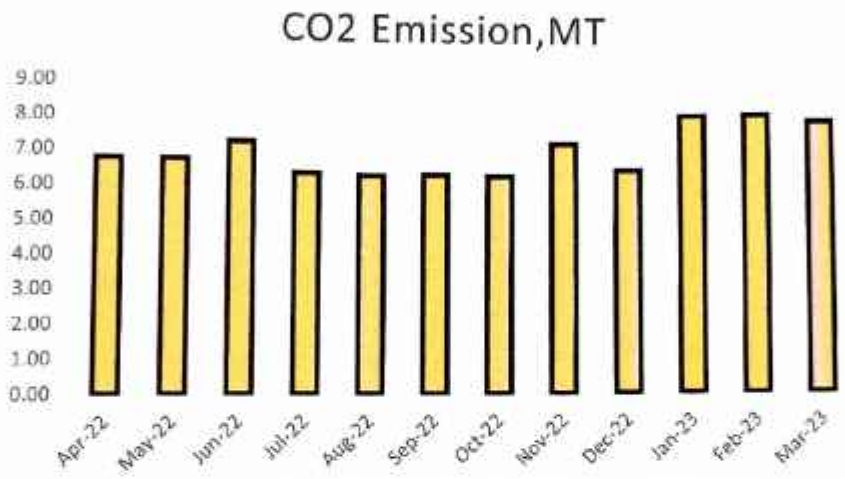
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 1: Study of Purchase of Energy & CO_2 Emissions: 2022-23:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-22	7498	6.75
2	May-22	7487	6.74
3	Jun-22	8065	7.26
4	Jul-22	7058	6.35
5	Aug-22	6998	6.30
6	Sep-22	7036	6.33
7	Oct-22	6997	6.30

8	Nov-22	8063	7.26
9	Dec-22	7198	6.48
10	Jan-23	8975	8.08
11	Feb-23	9004	8.10
12	Mar-23	8793	7.91
13	Total	93172	83.85
14	Maximum	9004	8.10
15	Minimum	6997	6.30
16	Average	7764	7

Chart No 2: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

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

In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof Top Solar PV Plant.

Table No 2: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy Generation Days	300	Nos
4	Energy Generated in the Year: 22-23	3600	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant = (4)*(5) /1000**	**3.24**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

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

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

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

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	HOD- Civil Cabin	75	46	56
2	Computer Networking Lab	74	45	52
3	Class Room-R-403	70	39	49
4	CAD/CAM Lab	80	48	57
5	Admin Office	71	43	52
	Maximum	**80**	**48**	**57**
	Minimum	**70**	**39**	**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 4: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
1	HOD- Civil Cabin	27.9	81	123	45
2	Computer Networking Lab	27.9	80	119	44.2
3	Class Room-R-403	28	81	106	41.9
4	CAD/CAM Lab	28	81	115	42.6
5	Admin Office	28.1	80	126	44
	Maximum	**28.1**	**81**	**126**	**45**
	Minimum	**27.9**	**80**	**106**	**41.9**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The recyclable waste, like paper, plastic waste is segregated at source and handed over to Authorized Agency for further action.

Photograph of Waste Collection Bin:

6.2 Liquid Waste Management:

The Institute has a Septic Tank, for Disposal of Liquid Waste and is cleaned periodically.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain Water Pipe Section:

CHAPTER VIII
STUDY OF ECO-FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The Institute has well maintained landscaped garden in the campus.

Photograph of Tree plantation:

8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:

ANNEXURE-I:
VARIOUS AIR QUALITY, NOISE & COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

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

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

ENGRESS SERVICES

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

ENERGY AUDIT CERTIFICATE

Certificate No: ES/BIT/23-24/01

Date: 8/5/2024

This is to certify that we have conducted Energy Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year: 2023-24.

The Institute has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 3 kWp Roof Top Solar PV Plant

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

For Engress Services,

ENGRESS SERVICES PUNE

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

MSME

INTERNATIONAL IAF ACCREDITATION FORUM

EGAC Accredited

ENGRESS SERVICES

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

GREEN AUDIT CERTIFICATE

Certificate No: ES/BIT/23-24/02 **Date: 8/5/2024**

This is to certify that we have conducted Green Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year 2023-24.

The Institute has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 3 kWp
- Provision of Separate bins for Dry & Wet Waste
- Implementation of Rain Water Management Project
- Good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of awareness about Say No to Plastic by Display of Posters

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

For Engress Services,

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

ENGRESS SERVICES PUNE

MSME MICRO, SMALL & MEDIUM ENTERPRISES

INTERNATIONAL ACCREDITATION FORUM IAF

EGAC Accredited

ENGRESS SERVICES

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

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/BIT/23-24/03

Date: 8/5/2024

This is to certify that we have conducted Environmental Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the 2023-24.

The Institute has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 3 kWp.
- Segregation of Waste at Source
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness about Say No to Plastic by Display of Posters

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

For Engress Services,

A Y Mehendale,
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ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES * PUNE *

MSME

INTERNATIONAL ACCREDITATION FORUM IAF

EGAC Accredited

ENERGY AUDIT REPORT

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S,

BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

Year: 2023-24

Prepared by:

ENGRESS SERVICES

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

ENGRESS SERVICES PUNE

REGISTRATION CERTIFICATES: BEE, UDYAM, MEDA, ISO-9001 & 14001:

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION

FOR CLASS 'A'

National Productivity Council

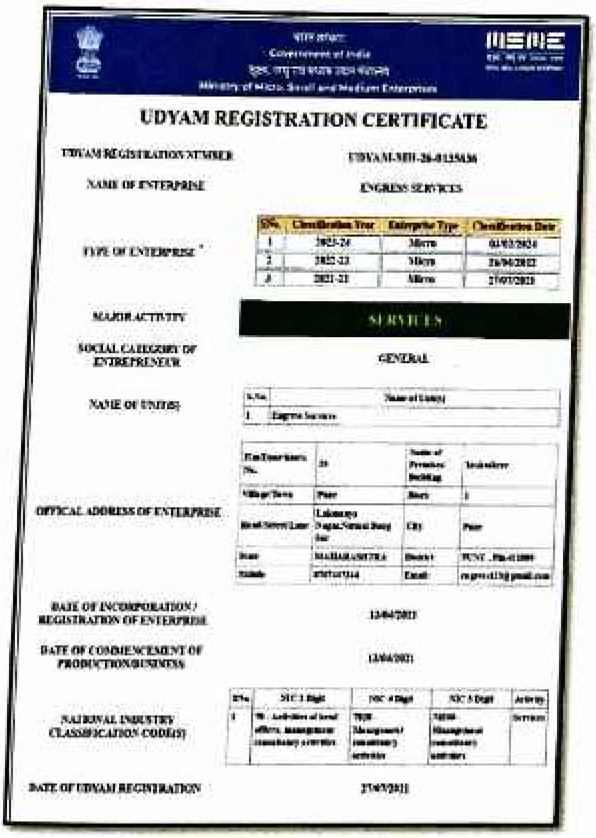
(National Certifying Agency)

PROVISIONAL CERTIFICATE

Achyut Yashavant Mehendale

Yashavant

Controller of Examination

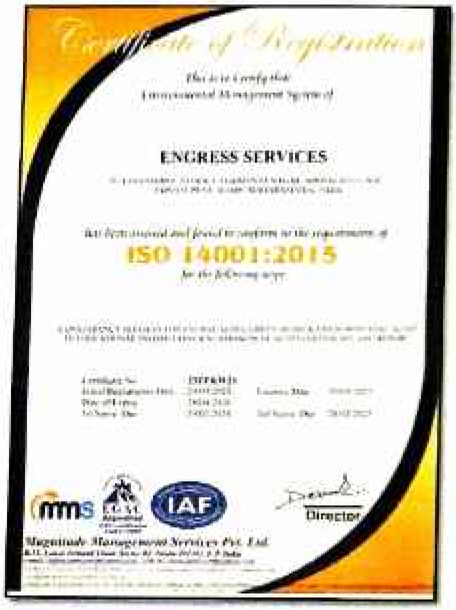


Government of India

Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-26-0135836
NAME OF ENTERPRISE	ENGRESS SERVICES
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL



Certificate of Registration

ENGRESS SERVICES

ISO 14001:2015

Director

Magnitude Management Services Pvt. Ltd.

Certificate of Registration

This is to Certify that Quality Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

Director

Magnitude Management Services Pvt. Ltd.

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi for awarding us the assignment of Energy Audit of their Campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1.Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi consumes Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**119**	kW
2	Annual Energy Purchased	**96042**	kWh

3. Per Capita Energy Consumption:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	**96042**	kWh
2	Annual Energy Generated	**3600**	kWh
3	Annual Energy Consumed=1+2	**99642**	kWh
4	Total No of students	**784**	Nos
5	Per Capita Energy Consumption = **(3) / (4)**	**127.09**	kWh

4. Study of Lighting Power Density & % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	**30.31**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **3 kWp** Roof Top Solar PV Plant

6. Assumption:

1. **1 kWh** of Electrical Energy releases **0.93 Kg** of **CO_2** into atmosphere
2. Energy consumption is computed based on Load Utilization Factor.
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. Annual Solar Energy generation Days: **300 Nos**

7. References:

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

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
IQAC	:	Internal Quality Assurance Cell
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
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 Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology Barshi

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 Key Study Points:

No	Particulars
1	Study of Present Connected Load
2	Study of Present Energy Consumption
3	Study of Per Capita Energy Consumption
4	Study of Lighting
5	Study of Energy Efficiency & Renewable Energy

1.3 Institute Location Image:

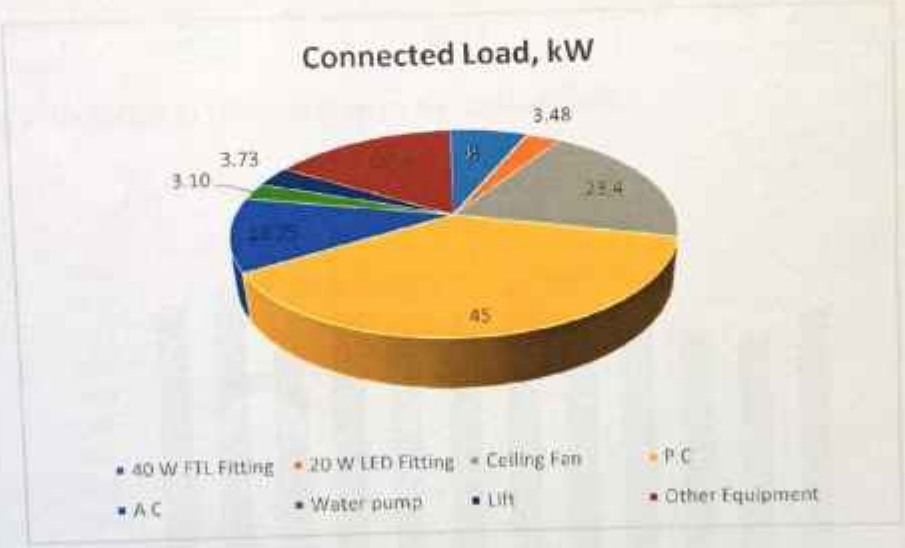
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	200	40	8
2	20 W LED Fitting	290	12	3.48
3	Celling Fan	360	65	23.4
4	P C	300	150	45
5	A C	10	1375	13.75
6	Water pump	2	1550	3.10
7	Lift	1	3730	3.73
8	Other Equipment	125	150	18.75
9	**Total**			**119**

Chart No 1: Study of Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2023-24:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	8556	7.96
2	May-23	9008	8.38
3	Jun-23	7036	6.54
4	Jul-23	8078	7.51
5	Aug-23	8806	8.19
6	Sep-23	7998	7.44
7	Oct-23	8687	8.08
8	Nov-23	7978	7.42
9	Dec-23	8007	7.45
10	Jan-24	7129	6.63
11	Feb-24	6970	6.48
12	Mar-24	7789	7.24
13	Total	96042	89.32
14	Maximum	9008	8.38
15	Minimum	6970	6.48
16	Average	8004	7

Chart No 2: Variation in Monthly Energy Purchased, kWh:

CHAPTER-IV
STUDY OF PER CAPITA ENERGY CONSUMPTION

Per Capita Energy Consumption Index: Per Capita Energy Consumption Index of an educational Institute/Institute is its Annual Energy Consumption in Kilo Watt Hours per student studying in the Institute/Institute.

It is determined by:

$$\text{Per Capita Energy Consumption Index} = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total No of students studying)}}$$

Now we compute the EPI for the Institute as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**96042**	kWh
2	Annual Energy Generated by Solar PV Plant	**3600**	kWh
3	Total Annual Energy Consumed = 1+2	**99642**	kWh
4	No of students studying in the Institute	**784**	Nos
5	Per Capita Energy Consumption **=(3) / (4)**	**127.09**	kWh

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/m²)

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

In this Chapter we compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

Table No 4: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	200	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	**8**	kW
4	No of 12 W LED Tube Lights	290	Nos
5	Demand of 6 W LED Tube Light	12	W/Unit
6	Total Electrical Load of 6 W LED Fittings	**3.48**	kW
7	Total LED Lighting Load=6	**11.48**	kW
8	Total Lighting Load= 3+6	**3.48**	kW

9	**Annual Lighting Requirement met by LED= 7*100/8**	**30.31**	%

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 **3 kWp**

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The Institute has Energy Efficient LED Fittings.
- Usage of BEE STAR Rated Equipment

Photographs of LED Lighting:

GREEN AUDIT REPORT

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S.

BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

Year: 2023-24

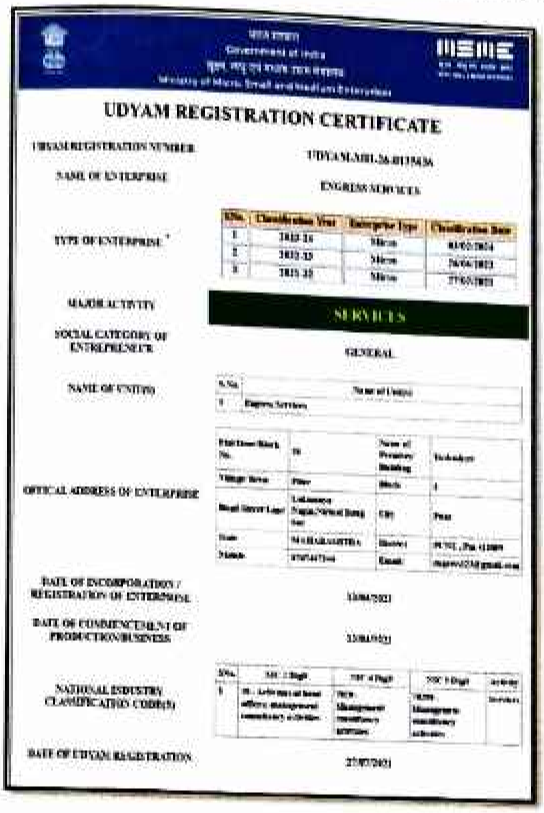
Prepared by:

ENGRESS SERVICES

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

ENGRESS SERVICES * PUNE *

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



UDYAM REGISTRATION CERTIFICATE

NAME OF ENTERPRISE	ENGRESS SERVICES
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

INDEX

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EXECUTIVE SUMMARY

1.Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi consumes Energy in the form of **Electrical Energy;** used for various gadgets, office & other facilities

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**96042**	kWh
2	Annual CO_2 Emissions	**89.32**	MT

3. Usage of Renewable Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **3 kWp.**
- The Energy generated by Solar PV Plant in 2023-24 is **3600 kWh.**
- Reduction in CO_2 Emissions in 2023-24 is **3.348 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Liquid Waste	Provision of Septic Tank

5. Rain Water Management:

The Institute has installed the Rainwater Management project, the rain water falling on the terrace is collected and is used for recharging the borewell.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Say No to Plastic by Display of Posters

7. Assumption:

1. **1 kWh** of Electrical Energy releases **0.93 Kg** of **CO_2** into atmosphere
2. Energy consumption is computed based on Load Utilization Factor.
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. Annual Solar Energy Generation Days: **300 Nos**

8. Reference:

- For CO_2 Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology Barshi.

1.2 Key Study Points:

No	Particulars
1	Study of Present Energy Consumption & CO_2 Emission
2	Study of Usage of Renewable Energy
3	Study of Waste Management Practices
4	Study of Rain Water Management
5	Study of Green & Sustainable Initiatives

1.3 Institute Location Image:

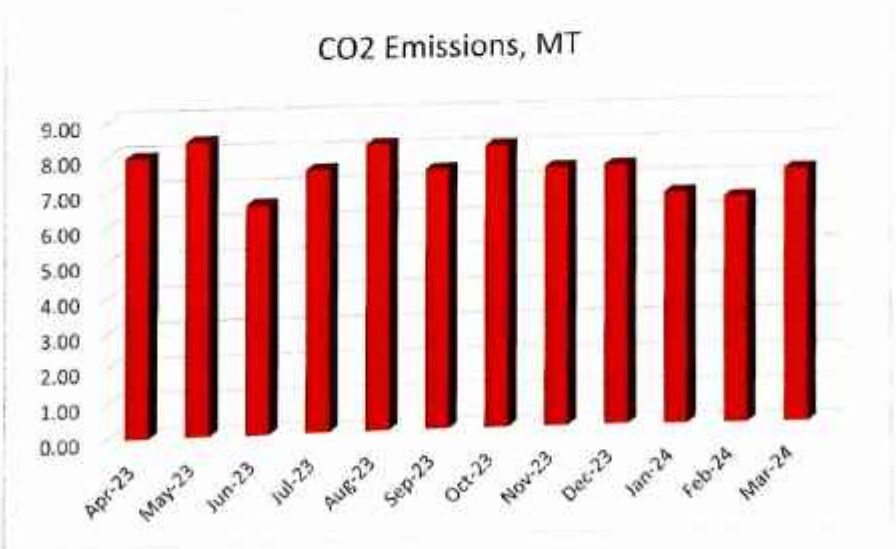
CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

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 Energy Consumption & CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	8556	7.96
2	May-23	9008	8.38
3	Jun-23	7036	6.54
4	Jul-23	8078	7.51
5	Aug-23	8806	8.19
6	Sep-23	7998	7.44
7	Oct-23	8687	8.08
8	Nov-23	7978	7.42
9	Dec-23	8007	7.45
10	Jan-24	7129	6.63
11	Feb-24	6970	6.48
12	Mar-24	7789	7.24
13	Total	96042	89.32
14	Maximum	9008	8.38
15	Minimum	6970	6.48
16	Average	8004	7

Chart No 1: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

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

In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof Top Solar PV Plant.

Table No 6: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 23-24	3600	kWh
5	1 kWh of Electrical Energy saves	0.93	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant = (4)*(5) /1000**	**3.348**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF WASTE MANAGEMENT

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

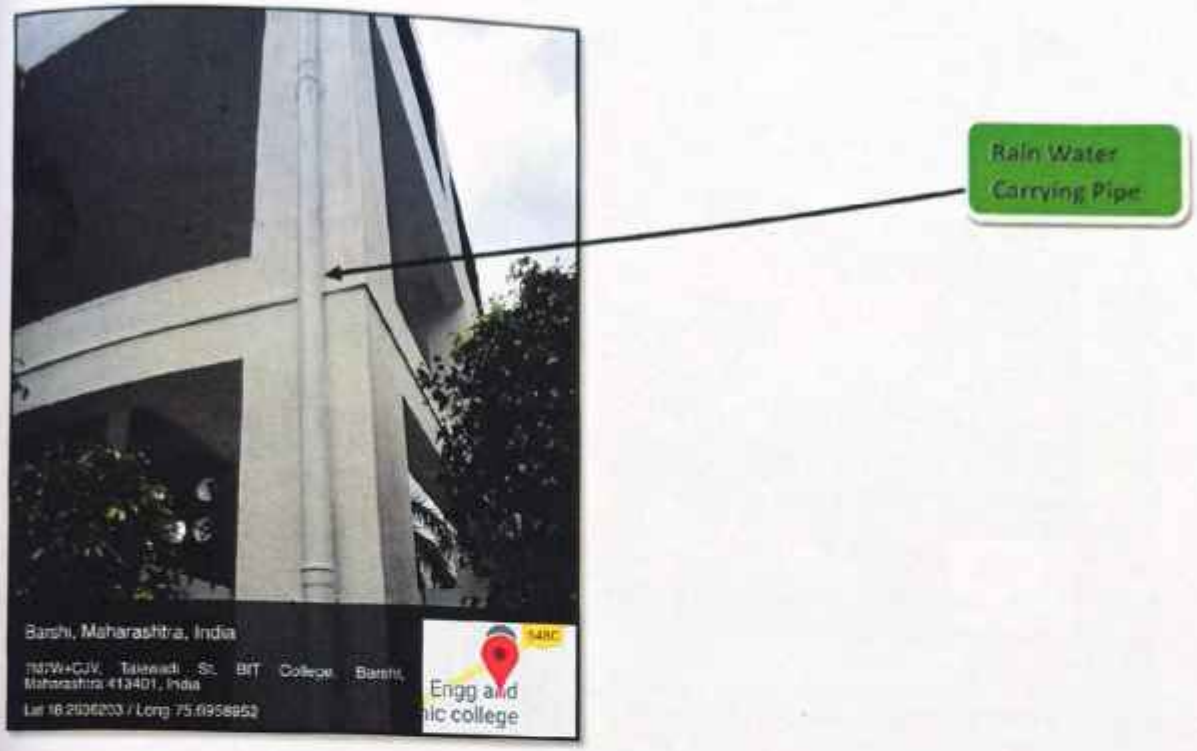
Details of Waste Management Practices:

No	Head	Observation	Photograph
1	**Solid Waste**	Segregation of Waste at Source: Provision of Waste Collection Bins	**Photo of Waste Collection Bin:** 
2	**Liquid Waste**	Provision of Septic Tank & Cleaned Periodically	

CHAPTER-V
STUDY OF RAIN WATER MANAGEMENT

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

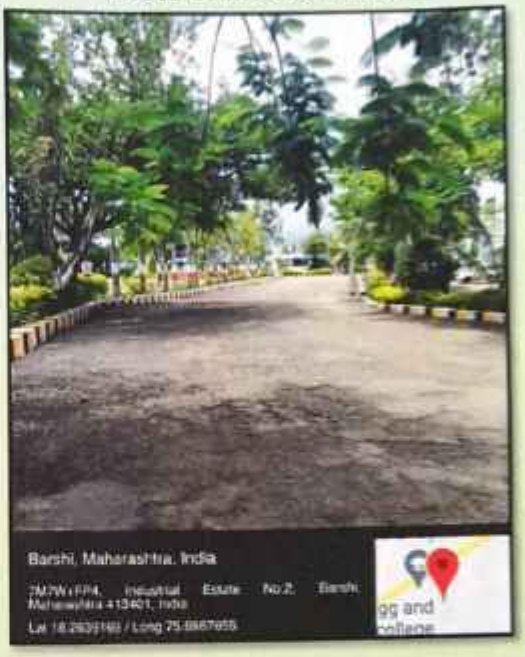
Photograph of Rain Water Pipe from Terrace:



CHAPTER-VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

In this Chapter, we present the Green & Sustainable Practices followed by the Institute.

Green & Sustainable Practices:

No	Head	Observation	Photograph
1	**Easy Movement of Stake Holders**	Provision of Good Internal Road within the Campus	**Photo of Internal Road:** 
2	**Tree Plantation**	Internal Tree Plantation in the Campus	**Photo of Internal Tree Plantation:** 

3	**Facilities for Divyangajan**	Provision of Ramp for Divyangajan	**Ramp for Divyangajan:** 
4	**Creation of Awareness among Stake Holders**	Display of Poster on SAY NO To PLASTIC	**Poster on SAY NO To PLASTIC:** 

ENVIRONMENTAL AUDIT REPORT

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S,

BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI

Year: 2023-24

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
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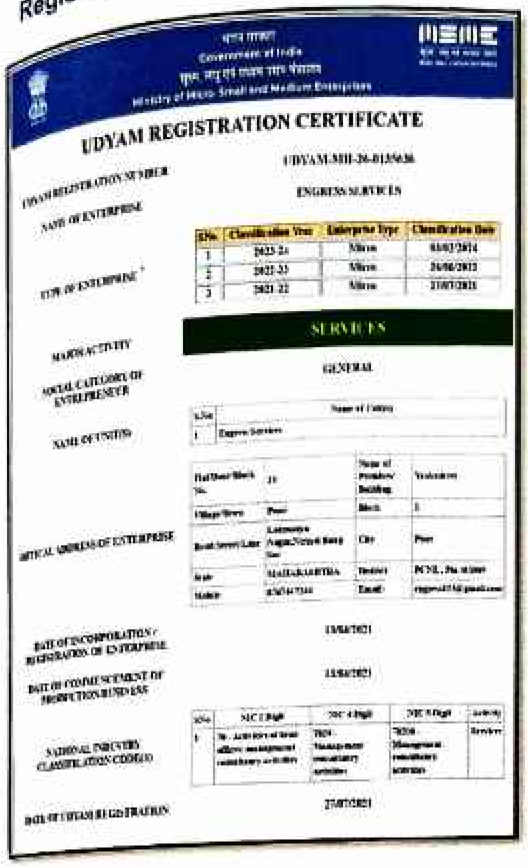
Phone: 09890444795 Email: engress123@gmail.com

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



UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-26-0135636
NAME OF ENTERPRISE	ENGRESS SERVICES
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	13/04/2021
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	13/04/2021
DATE OF UDYAM REGISTRATION	27/07/2021

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/03/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the

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

"Excellent Performance"

Certificate of Registration

ENGRESS SERVICES

ISO 9001:2015

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION

FOR CLASS 'A'

Certificate of Registration

ENGRESS SERVICES

ISO 14001:2015

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi for awarding us the assignment of Environmental Audit of their Campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1.Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi consumes Energy in the form of **Electrical Energy;** used for various gadgets, office & other facilities

2. Pollution due to Institute Activities:

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

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**96042**	kWh
2	Annual CO_2 Emissions	**89.32**	MT

4. Usage of Renewable Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **3 kWp.**
- The Energy generated by Solar PV Plant in 2023-24 is **3600 kWh.**
- Reduction in CO_2 Emissions in 2023-24 is **3.34 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**71**	**40**	**49**
2	Minimum	**60**	**37**	**40**

6. Indoor Lux & Noise Level Parameters:

No	Parameter/Value	Lux Level	Noise Level, dB
1	Maximum	**213**	**47.2**
2	Minimum	**203**	**43**

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Liquid Waste	Provision of Septic Tank

8. Rain Water Management:

The Institute has installed the Rainwater Management project, the rain water falling on the terrace is collected and is used for recharging the borewell.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Say No to Plastic by Display of Posters

10. Assumption:

1. **1 kWh** of Electrical Energy releases **0.93 Kg** of **CO_2** into atmosphere
2. Energy consumption is computed based on Load Utilization Factor.
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. Annual Solar Energy Generation Days: **300 Nos**

11. References:

- For CO_2 Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1. Important Definitions:

1.1. Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.2. Environmental Audit: Definition:

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

1.2 Key Study Points:

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

1.3 Institute Location Image:

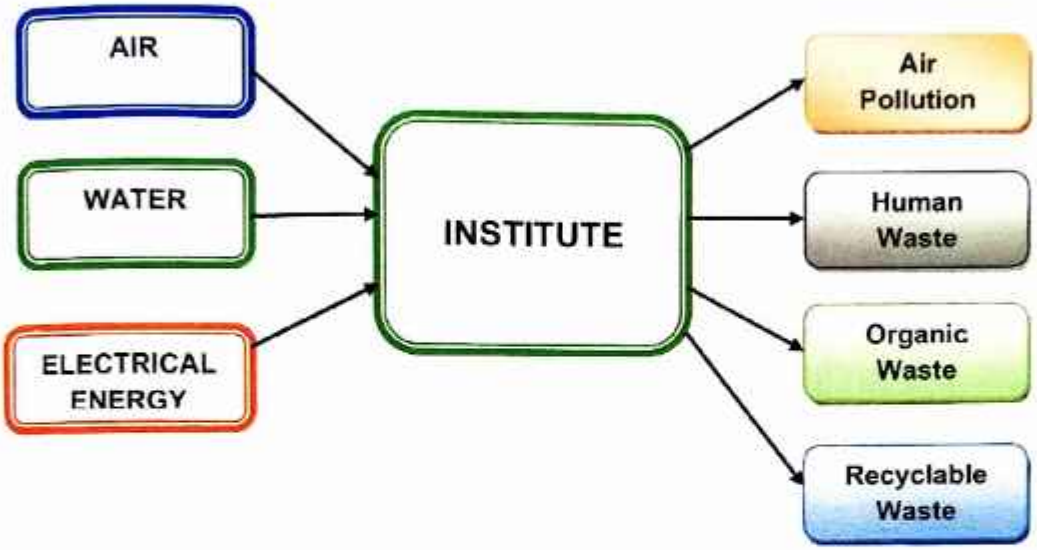
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.

Chart No 1: Representation of Resource Requirement & Waste of a Institute:



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 **0.93 Kg of CO_2** into atmosphere

Table No 1: Study of Purchase of Energy & CO_2 Emissions: 2023-24:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	8556	7.96
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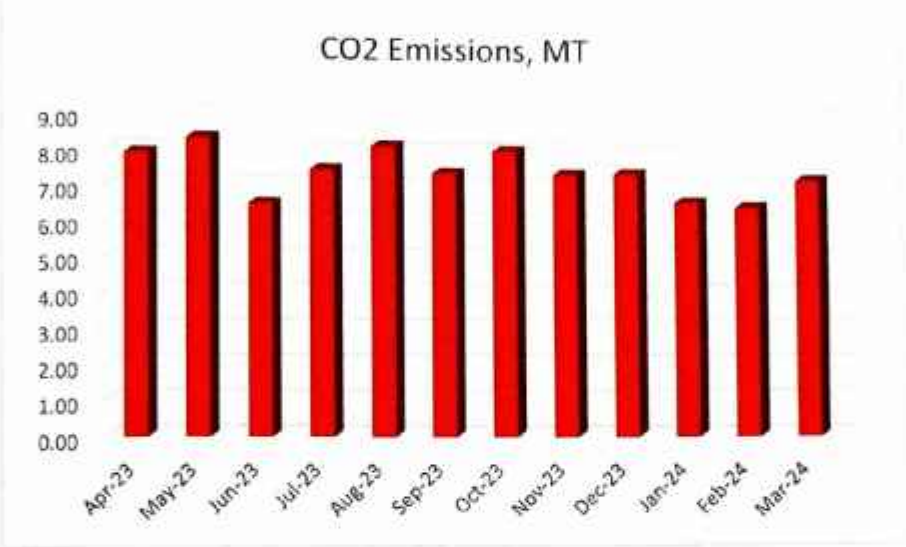
Chart No 2: Month wise CO_2 Emissions:



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In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof Top Solar PV Plant.

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6	**Qty of CO_2 Saved by Solar PV Plant = (4)*(5) /1000**	**3.34**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

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

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

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

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

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	E-203 H.T. Lab	65	38	49
2	Project Lab	63	38	43
3	C/R 16	71	40	48
4	Admin Office	60	37	40
5	Comp.Networking Lab	70	39	48
	Maximum	**71**	**40**	**49**
	Minimum	**60**	**37**	**40**

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

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

Conclusion:

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

CHAPTER V
STUDY OF INDOOR LUX & NOISE PARAMETERS

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

Table No 5: Study of Indoor Comfort Condition Parameters:

No	Location	Lux Level, Lumen	Noise Level, dB
1	E-203 H.T. Lab	206	43.6
2	Project Lab	203	43
3	C/R 16	208	45
4	Admin Office	211	47.2
5	Comp.Networking Lab	213	46
	Maximum	**213**	**47.2**
	Minimum	**203**	**43**

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

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

Conclusion:

From the above measured values, we conclude that:

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

CHAPTER VI
STUDY OF RAIN WATER MANAGEMENT

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

Photograph of Rain Water Pipe from Terrace:

CHAPTER-VII
STUDY OF WASTE MANAGEMENT

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

Details of Waste Management Practices:

No	Head	Observation	Photograph
1	**Solid Waste**	Segregation of Waste at Source: Provision of Waste Collection Bins	**Photo of Waste Collection Bin:** 
2	**Liquid Waste**	Provision of Septic Tank & Cleaned Periodically	

CHAPTER-VIII
STUDY OF ECO-FRIENDLY PRACTICES

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

Details of Eco-Friendly Practices:

No	Head	Observation	Photograph
1	**Tree Plantation**	Tree Plantation in the Campus	**Photo of Internal Tree Plantation:** 
2	**Creation of Awareness among Stake Holders**	Display of Poster on SAY NO To PLASTIC	**Poster on SAY NO To PLASTIC:**