



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)
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Visit: www.bitbarshi.edu.in | Email: bitbarshi6781@gmail.com

Prof. Dr. T. J. Sawant

President

SBERCT/BIT/NAAC/2022-23/Cr.-7/6

Date: 11/12/23

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

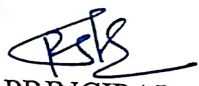
The detailed documents are available at following link:

https://bitbarshi.edu.in/iqac/ay_22-23/criterion7/7.1.6.pdf



Enclosures:

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


PRINCIPAL
Principal
Bhagwant Institute of Technology
Barshi.



ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Mukhtangan 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

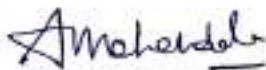
This is to certify that we have conducted Energy Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year: 22-23.

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

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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

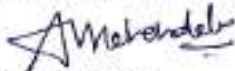
This is to certify that we have conducted Green Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year 2022-23.

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

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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)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/BITB/22-23/03

Date: 10/5/2023

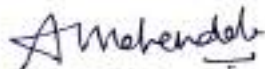
This is to certify that we have conducted Environmental Audit at Shri Bhagwant Education & Research Charitable Trust's, Bhagwant Institute of Technology, Barshi in the Year 22-23.

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
- Provision of Septic Tank, for Disposal of Liquid Waste
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- 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



ENERGY AUDIT REPORT

of

SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S,
BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI



Year: 2022-23

Prepared by:

ENGRESS SERVICES

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



REGISTRATION CERTIFICATES



AUDITOR CERTIFICATE



MEDA Registration Certificate



ISO: 9001-2015 Certificate



ISO: 14001-2015 Certificate

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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: 2022-23.

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 CO₂ into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO₂ 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

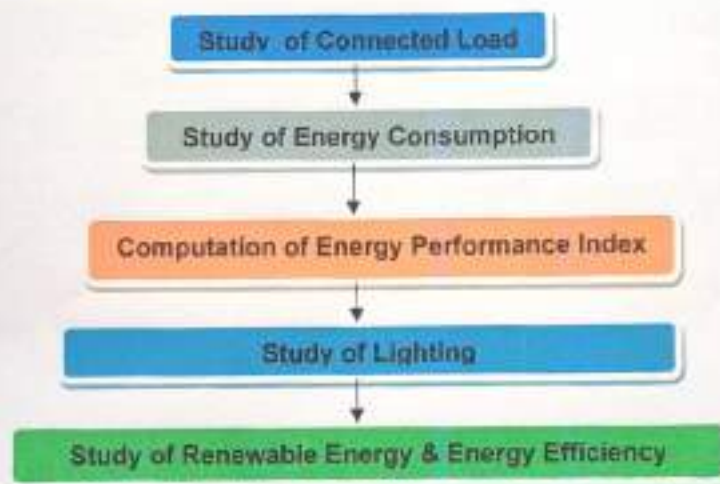
1.1 Introduction:

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

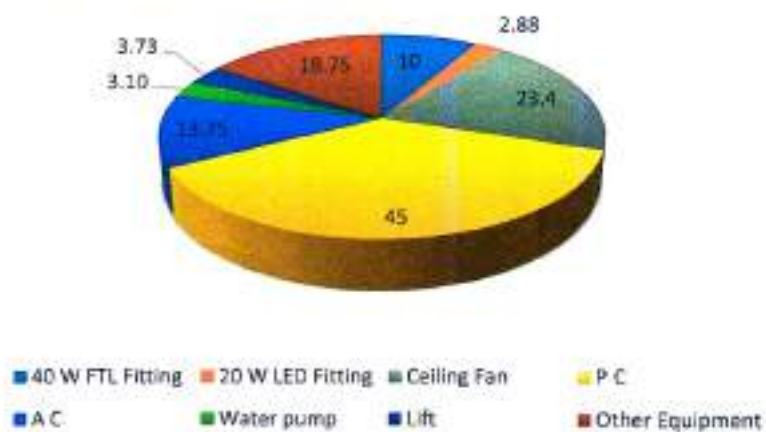
The major contributors to the connected load of the Institute are as under:

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:

Connected Load, kW



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:

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

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/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 ($\text{W/m}^2/100 \text{ lux}$) 100 Installed power density ($\text{W/m}^2/100 \text{ lux}$)
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= $7 \cdot 100/8$	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
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Year: 2022-23

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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 & CO₂ Emission:

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

3. Renewable Energy & Reduction in CO₂ 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 CO₂ 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 CO₂ into atmosphere
2. Energy generated by Roof Top Solar PV Plant: 4 kWh/kWp per Day
3. Annual Solar Energy Generation Days: 300 Nos

8. References:

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

ABBREVIATIONS

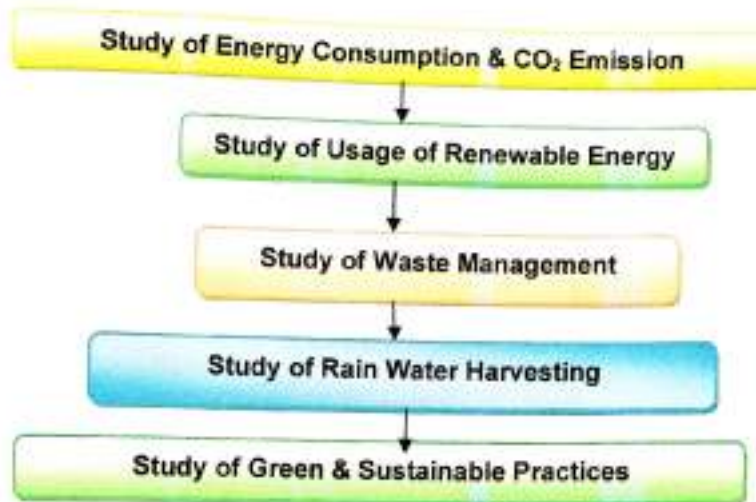
BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
Qty	Quantity

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:



Institute
Campus

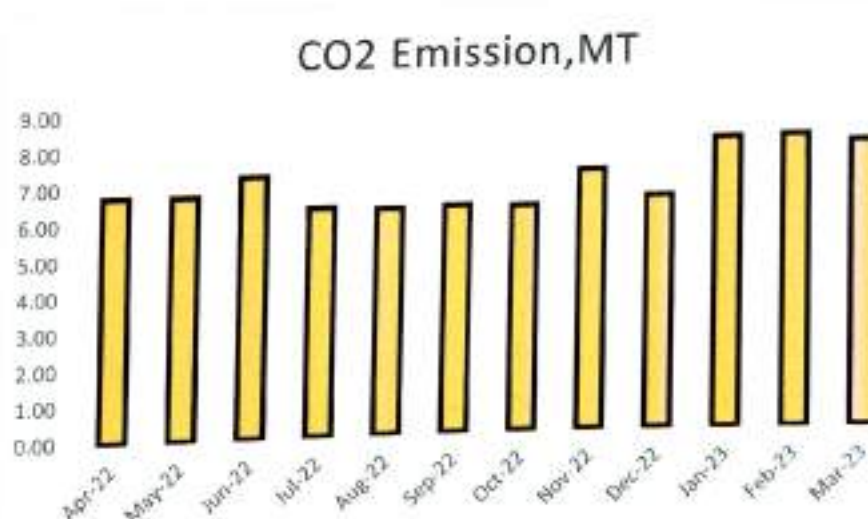
CHAPTER-II STUDY OF ENERGY CONSUMPTION & CO₂ EMISSION

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

Table No 1: Month wise Energy Consumption & CO₂ 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	8035	7.26
4	Jul-22	7058	6.35
5	Aug-22	6998	6.30
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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 1: Month wise CO₂ 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 CO₂ Emissions due to installation of Roof Top Solar PV Plant.

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

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	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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SHRI BHAGWANT EDUCATION AND RESEARCH CHARITABLE TRUST'S,
BHAGWANT INSTITUTE OF TECHNOLOGY, BARSHI



Year: 2022-23

Prepared by:

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ACKNOWLEDGEMENT

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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 gadgets, office & other facilities

2. **Pollution due to Institute Activities:**

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste, Paper & Plastic Waste
- **Liquid Waste:** Human liquid waste

3. **Present Energy Consumption & CO₂ Emission:**

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

4. **Renewable Energy & Reduction in CO₂ 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 CO₂ 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, °C	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:

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

11. References:

- For CO₂ Emissions: www.tatapower.com
- For 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 complied 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:



Institute
Campus

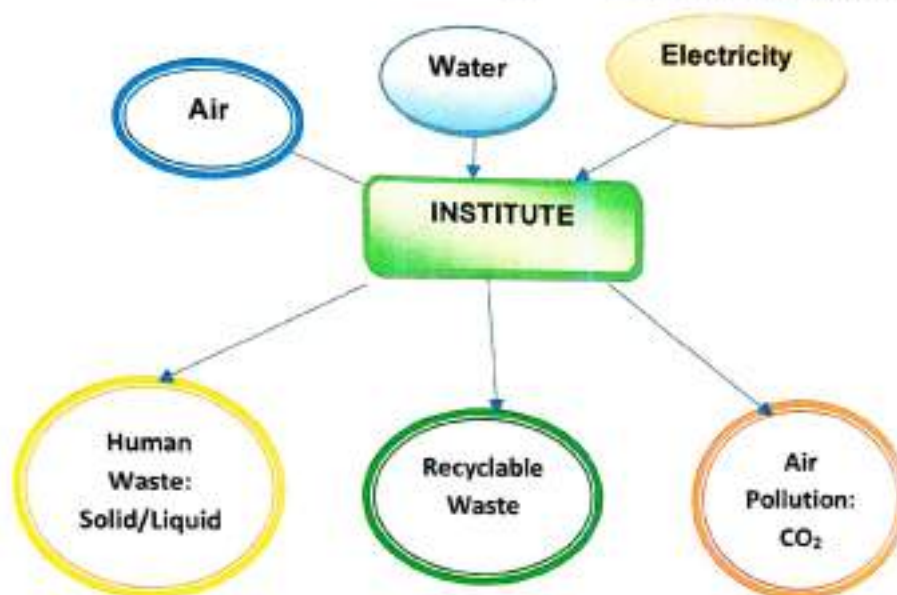
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

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



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

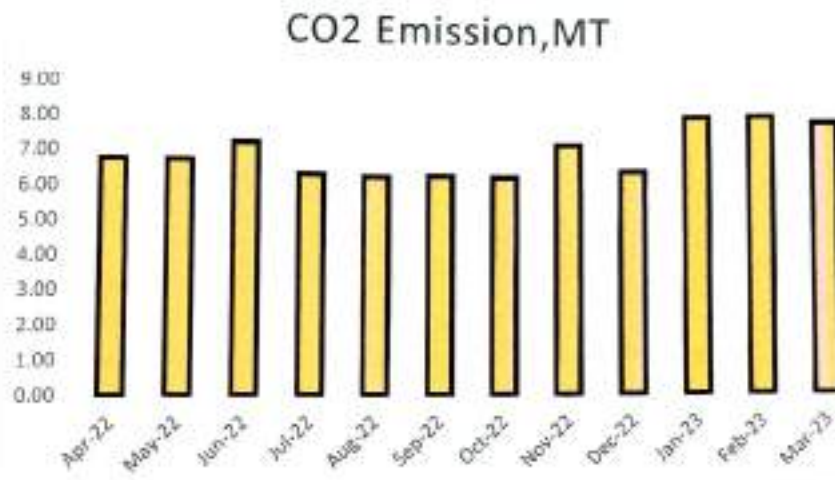
- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

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

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	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 CO₂ 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 CO₂ Emissions due to installation of Roof Top Solar PV Plant.

Table No 2: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy Generation Days	300	Nos
4	Energy Generated in the Year: 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, °C	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,

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



ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Mukhtangan 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

Yashashree, 26, Nirmal Bag Society, Near Mukhtangan 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,

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



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



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



UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER: **UDYAMMH-26-012626**

NAME OF ENTERPRISE: **ENGRSS SERVICES**

TYPE OF ENTERPRISE:

S.No.	Classification Code	Enterprise Type	Classification Code
1	2822 24	Micro	MS-123811
2	2822 24	Micro	MS-123812
3	1811 01	Micro	MS-123813

SECTOR ACTIVITY: **GENERAL**

SOCIAL CATEGORY OF ENTREPRENEUR: **GENERAL**

NAME OF ENTREPRENEUR: **Engr. Suresh**

OFFICIAL ADDRESS OF ENTERPRISE:

Facilities No.	Area	Type of Structure/Building	Location
1	Plot No. 1	Plot	Barshi
2	Plot No. 2	Plot	Barshi

DATE OF INCORPORATION/REGISTRATION OF ENTERPRISE: **14/04/2011**

DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS: **14/04/2011**

NATIONAL INDUSTRY CLASSIFICATION CODES:

ISIC	ISIC 3 Digit	ISIC 4 Digit	ISIC 5 Digit	Activity
1	28	2822	282224	Engineering services

DATE OF UDYAM REGISTRATION: **14/04/2011**



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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	12

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 CO₂ 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 CO₂ 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

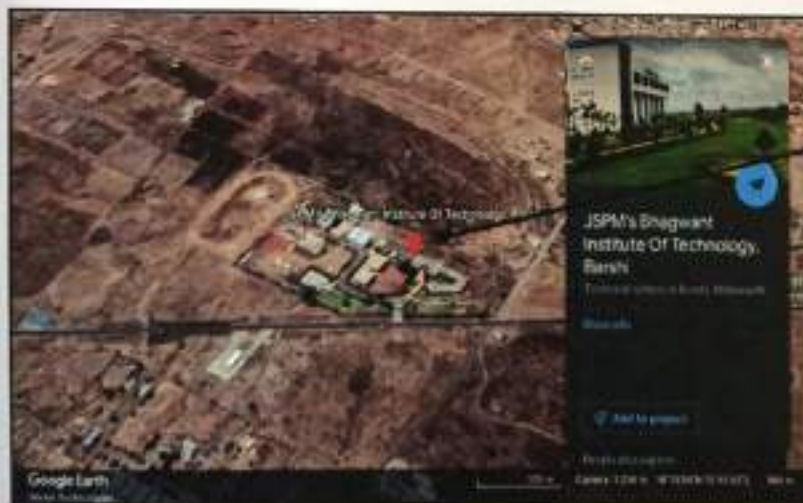
The guidelines followed for conducting the Energy Audit are:

- 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:



Institute
Campus

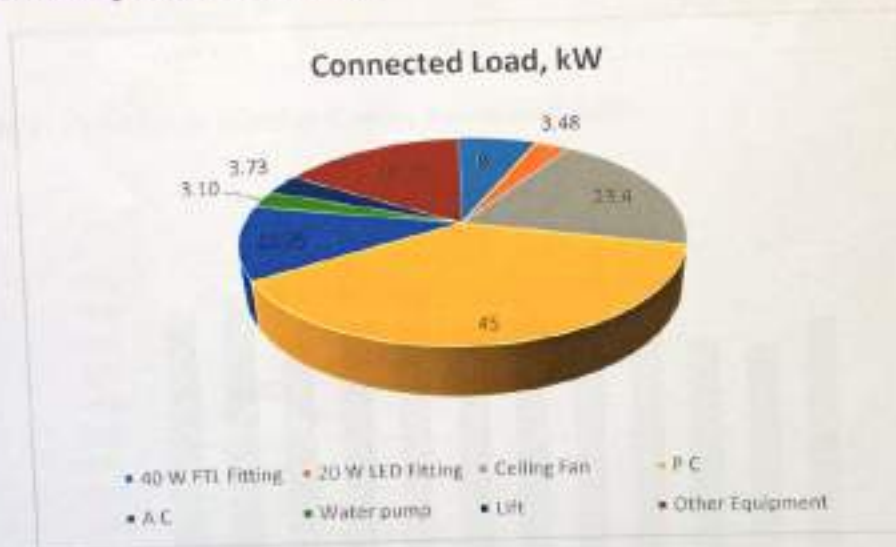
CHAPTER-II STUDY OF CONNECTED LOAD

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	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			119

Chart No 1: Study of Connected Load:



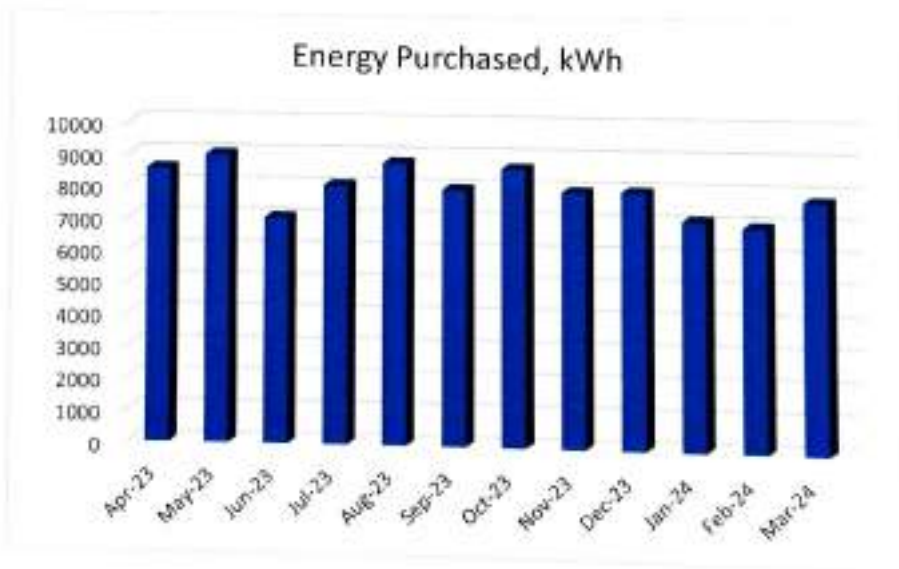
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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: 098890444795 Email: engress123@gmail.com



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6	Study of Green & Sustainable Practices	12

ACKNOWLEDGEMENT

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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 gadgets, office & other facilities

2. Present Energy Consumption & CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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:



Institute
Campus

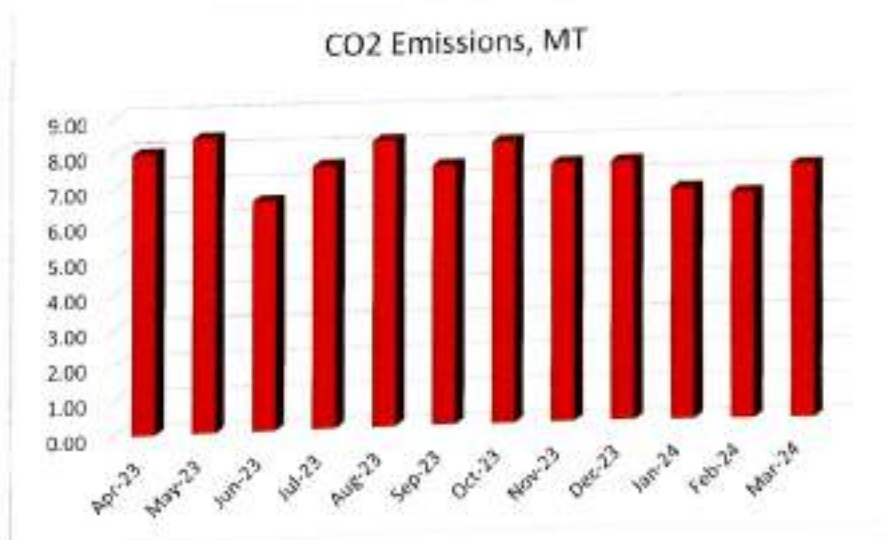
CHAPTER-II STUDY OF ENERGY CONSUMPTION & CO₂ EMISSION

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

Table No 1: Month wise Energy Consumption & CO₂ 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 CO₂ 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 CO₂ Emissions due to installation of Roof Top Solar PV Plant.

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

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 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.	<p>Photo of Waste Collection Bin:</p>  <p>Barshi, Maharashtra, India 75891-FKC, Industrial Estate No.2, Barshi, Maharashtra 412407, India Tel: +9122996111 / Long 75.8911329</p> 
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:




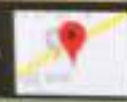


Rain Water
Carrying Pipe

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	<p>Photo of Internal Road:</p>  <p>Barshi, Maharashtra, India JM7W7P4, Industrial Estate, No.2, Barshi, Maharashtra 413401, India Lat: 18.263189 / Long: 75.687655</p> 
2	Tree Plantation	Internal Tree Plantation in the Campus	<p>Photo of Internal Tree Plantation:</p>  <p>Barshi, Maharashtra, India 18M5L9H, 6th fl, Bhagwant Institute, Barshi, Maharashtra 413401, India Lat: 18.263177 / Long: 75.687679</p> 

3	Facilities for Divyangajan	Provision of Ramp for Divyangajan	<p>Ramp for Divyangajan:</p>  <p>Barshi, Maharashtra, India BOWAMP for 600 sq. ft. Industrial Estate No.2, Barshi Maharashtra-412007, India Lat: 18.2027166 / Long: 75.0262091</p> 
4	Creation of Awareness among Stake Holders	Display of Poster on SAY NO To PLASTIC	<p>Poster on SAY NO To PLASTIC:</p>  <p>Barshi, Maharashtra, India BOWAMP, Industrial Estate No.2, Barshi Maharashtra-412007, India Lat: 18.2027166 / Long: 75.0262091</p> 

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
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com



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

UDYAM REGISTRATION CERTIFICATE

UDYAM MSB-JA-123456
ENGRSSERVICES

Sl. No.	Classification Code	Enterprise Type	Classification Size
1	MSB-20	Micro	MSB-1000
2	MSB-20	Micro	MSB-1000
3	MSB-20	Micro	MSB-1000

SERVICES

GENERAL

Name of Enterprise: ENGRSSERVICES

State of Province/Building: Maharashtra

City: Pune

Address: Plot No. 123, Sector 45, Pune-411001

State: Maharashtra

Pin Code: 411001

Telephone: 020-12345678

Mobile: 9876543210

Year of Incorporation/Registration of Enterprise: 2018

Year of Commencement of Production/Services: 2018

Official Ministry Classification Code: 241000

Date of Registration: 21/05/2023



Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION FOR CLASS 'A'

By virtue of this certificate, the firm having following particulars is registered with Maharashtra Energy Development Agency (MEDA) under group category of "Energy Provider & Energy Auditor" or "Subsidiary for Energy Conservation Programme" of MEDA.

Name and Address of the Firm: M/s Engrss Services, Plot No. 123, Sector 45, Pune-411001, Maharashtra.

Registration Category: Energy Conservation Programme (En-17) - A

Registration Number: MS/2023/ENGRSS/001

The Energy Conservation Programme (En-17) is a scheme to encourage and assist the small and medium scale enterprises to conserve energy and to reduce the energy consumption and cost. The scheme is to be implemented in the following manner:

The Government of Maharashtra reserves the right to cancel the registration of any firm which fails to comply with the terms and conditions of the Energy Conservation Programme.

The Government of Maharashtra reserves the right to cancel the registration of any firm which fails to comply with the terms and conditions of the Energy Conservation Programme.



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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 CO₂ on account of Electricity Consumption
- > **Solid Waste:** Bio degradable Garden Waste, Paper & Plastic Waste
- > **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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:



Institute
Campus

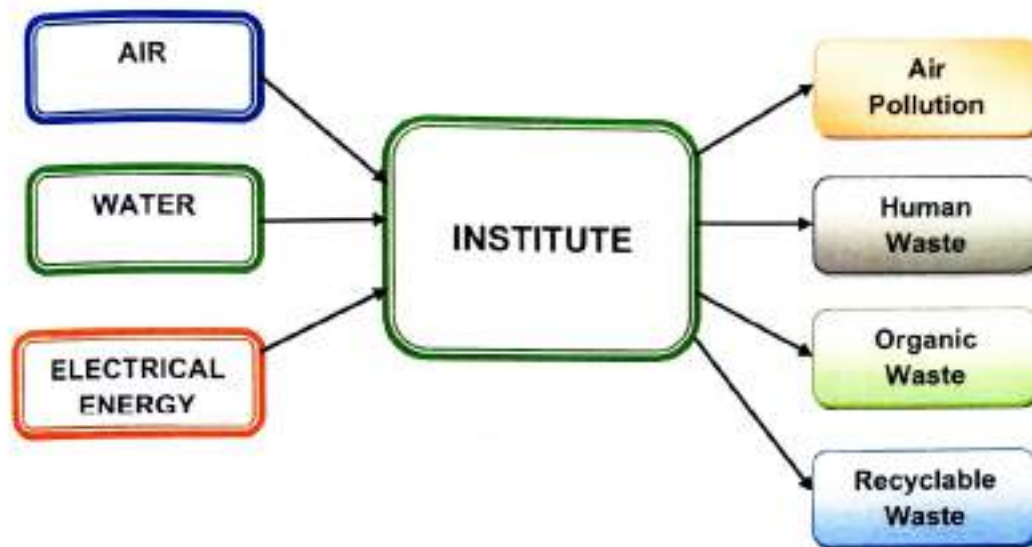
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

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



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

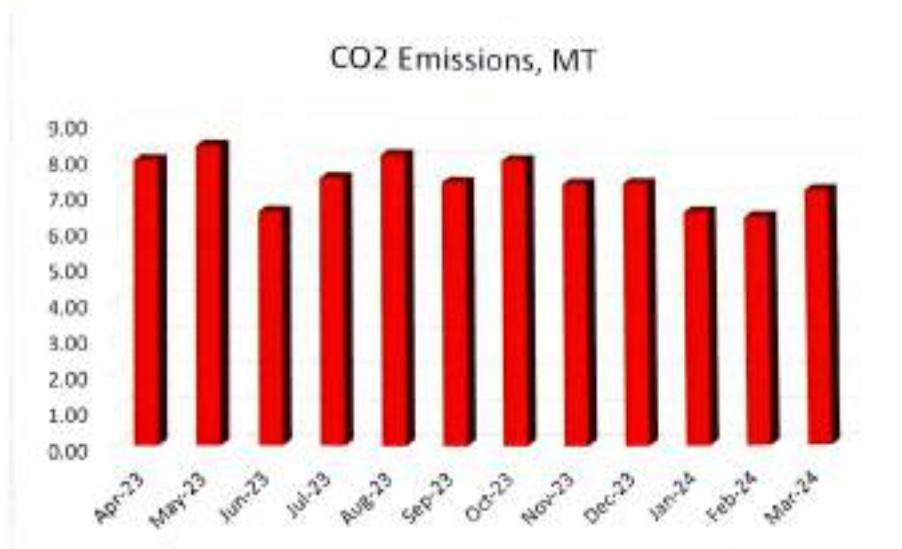
- 1 kWh of Electrical Energy releases 0.93 Kg of CO₂ into atmosphere

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 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: Month wise CO₂ 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 CO₂ Emissions due to installation of Roof Top Solar PV Plant.

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

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	3	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy Generation Days	300	Nos
4	Energy Generated in the Year: 23-24	3600	kWh
5	1 kWh of Electrical Energy saves	0.93	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	3.34	MT of CO₂

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:



Rain Water
Carrying Pipe

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	<p>Photo of Waste Collection Bin:</p>  <p>Barshi, Maharashtra, India 70691-FAC, Industrial Estate No.2, Barshi, Maharashtra 431401, India Lat: 18.267000 / Long: 75.691330</p> 
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	<p>Photo of Internal Tree Plantation:</p> 
2	Creation of Awareness among Stake Holders	Display of Poster on SAY NO To PLASTIC	<p>Poster on SAY NO To PLASTIC:</p> 