

ARTS AND COMMERCE COLLEGE

Warvat Bakal Dist- Buldana

Dr. Rajendra S. Korde
Incharge Principal

Shri. Krushnarao Ingle (Ex MLA)
President

Phone : 07266-237126

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Criterion VII: Institutional Values and Best Practices

7.1. Institutional Values and Social Responsibilities

7.1.6. Quality audits on environment and energy regularly undertaken by the Institution

Metric No.	Sr. No.	Content / File Description	Document/Link
7.1.6.		Quality audits on environment and energy regularly undertaken by the Institution	
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CERTIFICATE

This is to certify that the documents attached as supporting documents for Criterion VII: Institutional Values and Best Practices are verified from the college record and found to be correct to the best of my knowledge.




Principal
Arts & Commerce College,
Warvat Bakal Dist. Buldana

Environment and energy audit are done for year 2021-22 through proper channel. Apart from it due care is taken to keep the campus eco-friendly as well as to maintain the existing facilities.

Energy conservation:-

1. The institution has airy and spacious class rooms due to which there is hardly any need of artificial lights and fans.
2. Due to airy rooms, there is hardly any need of Switching on the fans.
3. Energy efficient appliances are preferred while purchasing the appliances.

While purchasing the new computers energy efficient screens are preferred.

4. Smart use of lights: Lights are turned off when they are not in use. At the end of day all lighting, except that is required for security purposes, are turned off when buildings and facilities are not in use.

5. Personal computers and printers are turned off when not in use.

Use of renewable energy :-

The institution intends to install solar lamps in the campus in future.

Water harvesting :-

The college has a well as the main source of water in its campus. The waste water is deposited in the absorption pit close to the well. Through that pit water is percolate into well. NCC and NSS students have dug a big pit in the campus that helps to save rain water during rainy season.

A large open space is available in the campus, all the rain water from the campus accumulates in well so that all the rain water percolates in the earth to increase the water level.

Efforts for carbon neutrality :-

There is a prohibition on burning plastic in the college campus.

Campus is made green by planting number of trees for carbon neutrality.

The N.S.S. unit and college staff actively participates in the 'Tree Plantation Programs'.

Hazardous waste management:

The college provides guidance to the students on hazardous waste management. There is a prohibition of burning plastic in the college campus. The faculty members also guide the students for careful use and handling of chemicals in the science laboratories.

e-Waste management:

There is no problem of e-waste in the campus, but in future, if the college faces the problem of e-waste, the college will sell it to the local vendors, so that they can process on it and reuse

it.

Organizing the programs regarding Environment and Energy Conservation

The Academic Calendar of the institute includes the various programs relating to the Environment and Energy Conservation Initiatives throughout the year. These programs are found quite useful to create awareness regarding Environment and Energy Conservation.




Principal
Arts & Commerce College,
Warvat Bakal Dist. Buldana

Report
On
Environmental Audit
At
Arts & Commerce College warwat Bakal, Buldana.
(Year 2021-22)

Prepared by
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Table of Contents

Acknowledgement	3
Executive Summary	4
Abbreviations	5
1. Introduction.....	6
1.1 Important Definitions:	6
1.2 Objectives.....	7
1.3 Audit Methodology:	7
1.4 General Details of College	7
2. Study of Consumption of Various Resources.....	8
2.1 Variation of Monthly Electrical Energy Consumption	9
2.2 Key Inference drawn	10
3. Study of Environmental Pollution	11
3.1 Air Pollution.....	11
3.2 Study of Solid Waste Generation.....	12
3.3 Study of Liquid Waste Generation.....	12
3.4 Study of e-Waste Management:	13
4. Study of Rain Water Harvesting	14
5. Recommendations.....	15



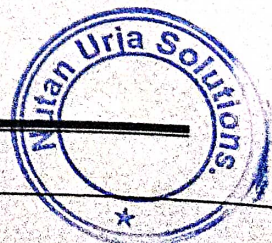
Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of Arts & Commerce College Warwat Bakal, Buldana for assigning the work of Environmental Audit of college campus.

We appreciate the co-operation and support extended to our team members during the entire tenure of field study.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We are also thankful to all other staff members who helped us during the Measurements at the field and for giving us the necessary inputs to carry out this vital exercise.



Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on Natural resources & reduce the pollution.

Arts & Commerce College Warwat Bakal, Buldana consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

1. Various Pollution due to College Activities:

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

2. Present Level of CO₂ Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	638	0.51
2	Minimum	410	0.33
3	Average	509	0.41
4	Total	6,113	4.89

3. The various projects already implemented for Environmental Conservation:

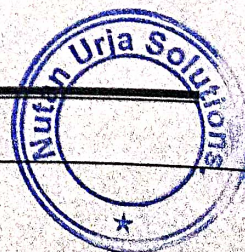
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting

4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of Sewage treatment Plant to make campus a Zero Discharge campus

5. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.8 Kg of CO₂ into atmosphere
2. 1 kWp Solar PV plant generates 5 kWh/day Electrical Energy for 300 days in an year.



Abbreviations

AC	: Air conditioner
PES	: Progressive Education Society
CFL	: Compact Fluorescent Lamp
FTL	: Fluorescent Tube Light
LED	: Light Emitting Diode
kWh	: kilo-Watt Hour
Qty	: Quantity
W	: Watt
kW	: Kilo Watt
PF	: Power Factor
M D	: Maximum Demand
PC	: Personal Computer
MSEDCL	: Maharashtra State Electricity Distribution Company Ltd



1. Introduction

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

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

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are 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"

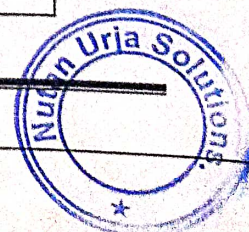
1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

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

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



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

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

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives

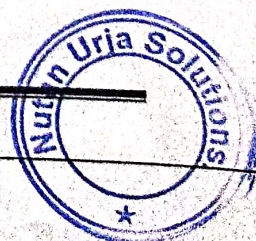
1. To study present usage of Natural resources the College is consuming
2. To Study the present pollution sources
3. To study various measures to make the campus Self sustainable in respect of Natural resources
4. To suggest the various measures to reduce the pollution: Air, Water, Noise

1.3 Audit Methodology:

1. Study of College as System
2. Study of Electrical Energy Consumption
3. Study of CO2 emissions
4. Suggestions on usage of Renewable Energy

1.4 General Details of College

No	Head	Particulars
1	Name of Institution	Arts & Commerce College warwat Bakal, Buldana
2	Address	Arts & Commerce College warwat Bakal, Buldana ,Maharashtra 444202
3	Affiliation	Sant Gadge Baba Amravati University, Amravati.



2. Study of Consumption of Various Resources

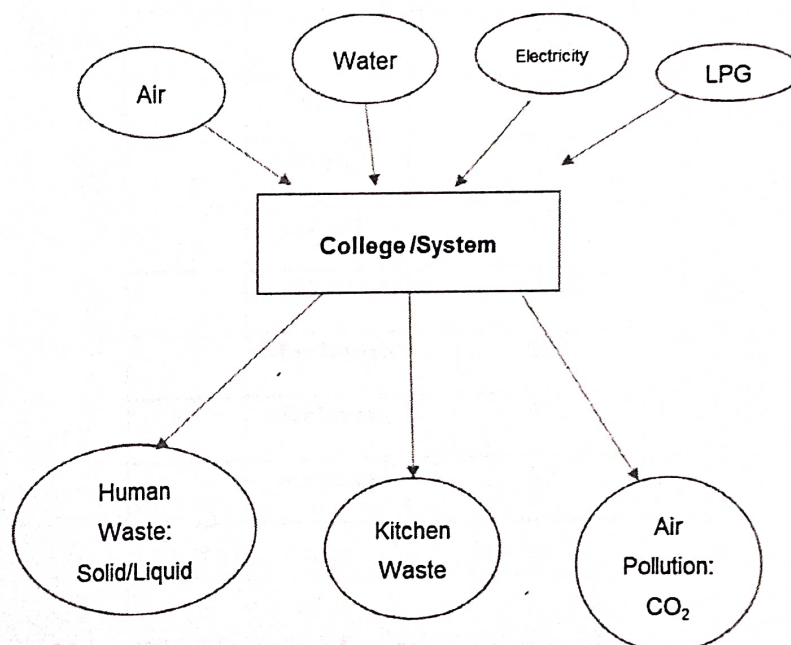
The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

Also, college emits following pollutants to environment

1. Human Waste: Solid/ Liquid
2. Kitchen waste
3. Air pollution

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



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy & LPG as under.

The calculation of electrical energy consumption by college can be given as,

Table 2.1: Electrical Energy Consumption

No	Month	Energy Consumed, kWh
1	Jun-22	519
2	May-22	576
3	Apr-22	638
4	Mar-22	477
5	Feb-22	410
6	Jan-22	473
7	Dec-21	531
8	Nov-21	443
9	Oct-21	471
10	Sep-21	554
11	Aug-21	570
12	Jul-21	451
	Total	6113
	Maximum	638
	Minimum	410
	Average	509

2.1 Variation of Monthly Electrical Energy Consumption

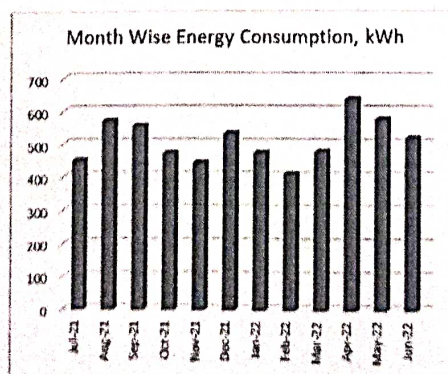


Figure 2.1 : Monthly Electrical Energy Consumption

2.2 Key Inference drawn

From the above analysis, we present following important parameters:

Table 2.2: Variation in Important Parameters

No	Parameter/ Value	Energy Consumed, kWh
1	Maximum	638
2	Minimum	410
3	Average	509
4	Total	6113

3. Study of Environmental Pollution

In this Chapter, we present the various types of Pollution as under:

3.1 Air Pollution

The College is using two forms of Energies, namely: Thermal in the form of LPG and Electrical Energy used for day to day operations of the College. The major pollutant on account of above Energy forms is the Carbon Di Oxide.

- 1 unit (kWh) of Electrical Energy emits 0.8 Kg of CO₂ in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO₂ in the atmosphere

In the following Table, we present the CO₂ emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-22	519	0.42
2	May-22	576	0.46
3	Apr-22	638	0.51
4	Mar-22	477	0.38
5	Feb-22	410	0.33
6	Jan-22	473	0.38
7	Dec-21	531	0.42
8	Nov-21	443	0.35
9	Oct-21	471	0.38
10	Sep-21	554	0.44
11	Aug-21	570	0.46
12	Jul-21	451	0.36
	Total	6,113	4.89
	Maximum	638	0.51
	Minimum	410	0.33
	Average	509	0.41

In the following Chart we present the CO₂ emissions due to usage of Electrical Energy.

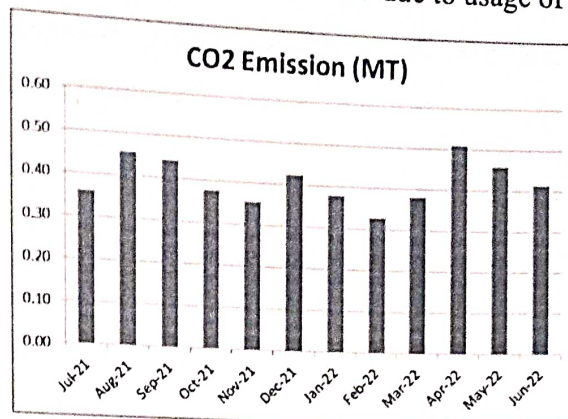
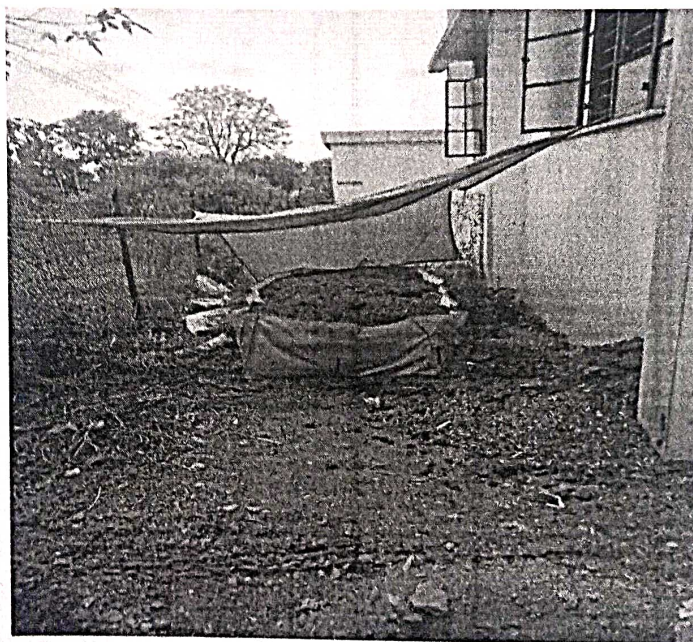


Figure 3.1: CO₂ emission due to usage of electrical energy.

3.2 Study of Solid Waste Generation

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

3.2.1 Photograph of Bio Composting Processing Tanks



3.3 Study of Liquid Waste Generation

At present the Liquid Waste generated due to day to day operations is drained off to the municipal Corporation through a pipe.

3.4 Study of e-Waste Management:

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.



4. Study of Rain Water Harvesting

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

Photograph of Rain Water Harvesting:



5. Recommendations

In order to reduce the dependency on Natural resources and also in order to reduce the various pollutions arising due to the day to day operations of the College we herewith recommend following recommendations.

- Installation of Bio Gas Generator Plant instead of Bio composting Plant.
- Installation of Sewage treatment Plant to make campus a Zero Discharge campus



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(Year 2021-22)**

Prepared by

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Contents

Acknowledgement	3
Executive Summary	4
Abbreviations	6
1. Introduction	7
1.1 Objectives	7
1.2 Audit methodology	7
2. Study of Electrical Energy Consumption	8
3. Carbon Foot printing	10
4. Study of Rain Water Harvesting	12
5. Study of Waste Management	13
5.1 Solid Waste Management	13
5.2 e-Waste Management	13
6. Study of Green Practices	14
6.1 No of students who don't use own Vehicle for coming to Institute	14
6.2 Usage of Public Transport	14
6.3 Pedestrian Friendly Roads	14
6.4 Plastic Free Campus	14
6.5 Paperless Office	15
6.6 Green Landscaping with Trees and Plants	15



Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Arts & Commerce College warwat Bakal, Buldana for awarding us the assignment of Green Audit of their college premises.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures and green practices. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.



Executive Summary

Green Audit of Arts & Commerce College warwat Bakal, Buldana is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

1. Present Energy Consumption

Arts & Commerce College warwat Bakal, Buldana uses Electrical Energy as the source of Energy for various equipment in the college campus. In the following Table, we present the details of Energy Consumption.

Table no 1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	638	0.51
2	Minimum	410	0.33
3	Average	509	0.41
4	Total	6,113	4.89

2. Various Measures Adopted for Energy Conservation

1. Usage of STAR Rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Rain Water Harvesting

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

4. Waste Management

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.



6. Notes and Assumptions

1. Daily working hours-10 Nos
2. Annual working Days-250 Nos
3. Average Rate of Electrical Energy : Rs 11/- per kWh



Abbreviations

CFL	: Compact Fluorescent Lamp
FTL	: Fluorescent Tube Light
LED	: Light Emitting Diode
V	: Voltage
I	: Current
kW	: Kilo- Watt
kWh	: kilo-Watt Hour
kVA	: Active Power



1. Introduction

The mission undertaken by Arts & Commerce College warwat Bakal, Buldana is to strive and provide Education to those poor, downtrodden and exploited communities of the area. It will accelerate the development of this region and establish confidence among the youth.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study the present CO₂ emissions
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To measure various Electrical parameters
5. To study Scope for usage of Renewable Energy
6. To study various measures to reduce the Energy Consumption

1.2 Audit methodology

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various Encon measures with payback analysis



2. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table no 2.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jun-22	519	13290
2	May-22	576	9,220
3	Apr-22	638	4,800
4	Mar-22	477	3,720
5	Feb-22	410	7,080
6	Jan-22	473	3,730
7	Dec-21	531	15,630
8	Nov-21	443	11,500
9	Oct-21	471	7,940
10	Sep-21	554	4,200
11	Aug-21	570	7,990
12	Jul-21	451	3,640
	Total	6113	92740

Variation in energy consumption is as follows,



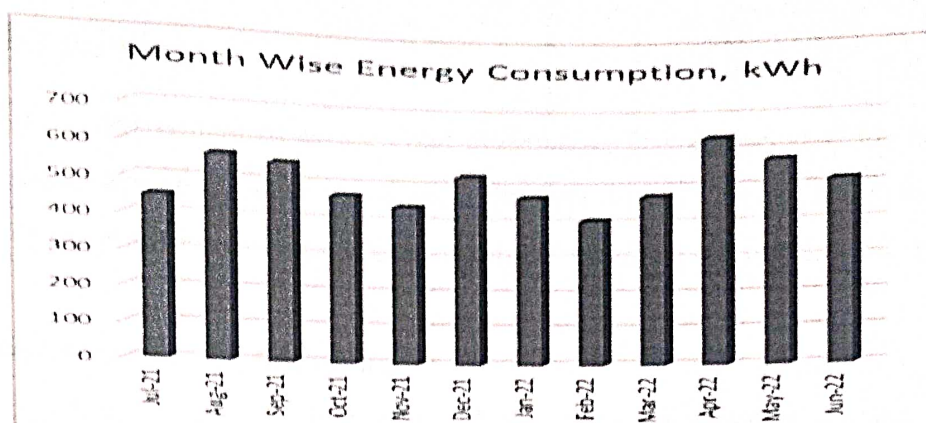


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

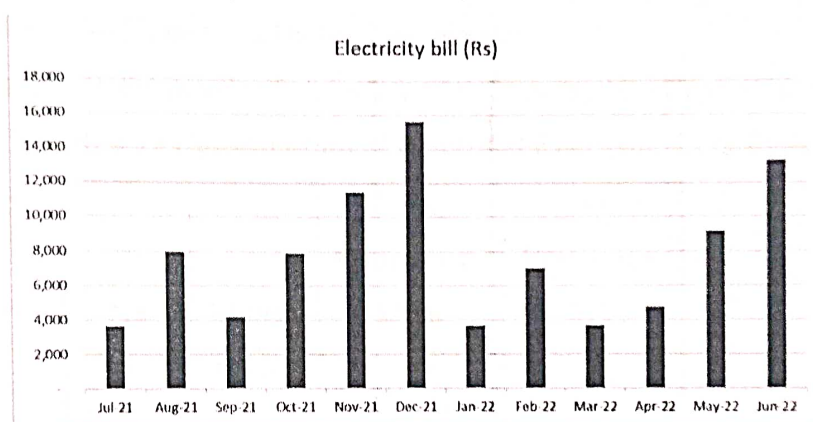


Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	638	0.51
2	Minimum	410	0.33
3	Average	509	0.41
4	Total	6,113	4.89

3. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO₂ emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

2. Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere.

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

We herewith furnish the details of various forms of Energy consumption as under

Table 3.1: Month wise Consumption of Electrical Energy & CO₂ Emissions

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-22	519	0.42
2	May-22	576	0.46
3	Apr-22	638	0.51
4	Mar-22	477	0.38
5	Feb-22	410	0.33
6	Jan-22	473	0.38
7	Dec-21	531	0.42
8	Nov-21	443	0.35
9	Oct-21	471	0.38
10	Sep-21	554	0.44
11	Aug-21	570	0.46
12	Jul-21	451	0.36
	Total	6,113	4.89

In the following Chart we present the CO₂ emissions due to usage of Electrical Energy.



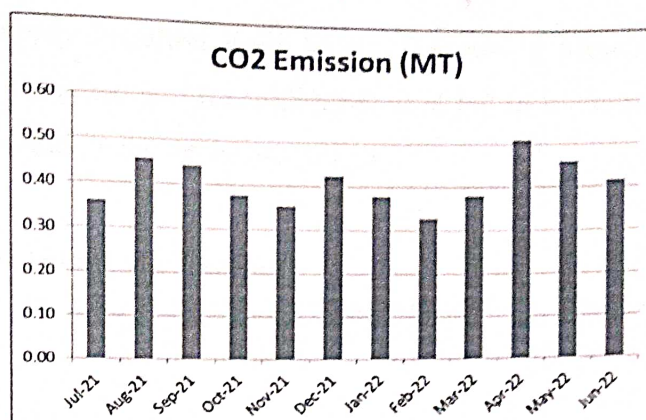


Figure 3.1: Month wise CO2 Emission

4. Study of Rain Water Harvesting

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

Photograph of Rain Water Harvesting



5. Study of Waste Management

5.1 Solid Waste Management

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

Photographs of Bio Composting Storage Tanks:



5.2 e-Waste Management

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.

6. Study of Green Practices

6.1 No of students who don't use own Vehicle for coming to Institute

Out of total students coming to Institute, about 60% students use own Automobile.

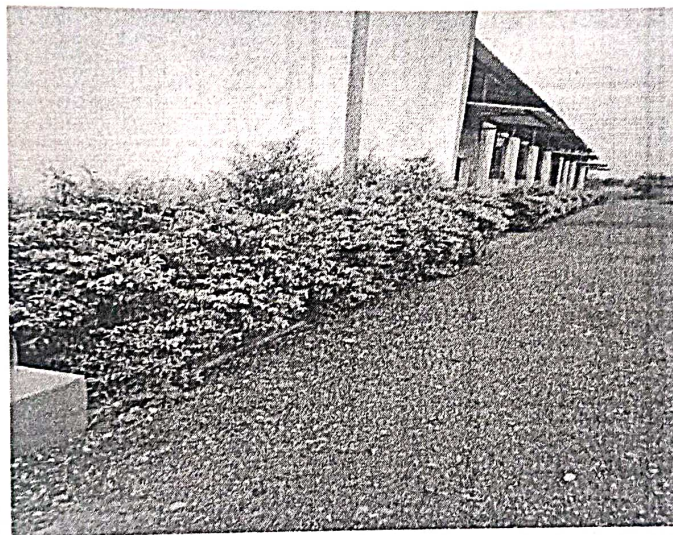
6.2 Usage of Public Transport

During the Students transport study, it was revealed that the local students who are residing near areas make use of Public Transport like Municipal Transport local buses, local sharing type auto rickshaws. Some students use bicycles.

6.3 Pedestrian Friendly Roads

The Institute has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

Photograph of Road within campus



6.4 Plastic Free Campus

The Institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The Institute has displayed boards in the Campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of Separate waste bins for Dry waste & wet waste
- Usage of paper tea cups in the Institute canteen
- Display of boards in the campus for Plastic Free campus

6.5 Paperless Office

The internal communication of the Institute is through the Internet. There are hardly any day to day operations, where printing is required.

6.6 Green Landscaping with Trees and Plants

The Institute has beautiful maintained Garden.



Figure 6.1: Beautiful maintained Garden of college