

7.1.3 GREEN AUDIT, ENERGY AUDIT and ENVIRONMENT AUDIT 2021 - 2022

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Date: 06/07/2022

CERTIFICATE

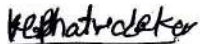
This is to certify that we have conducted Green Audit at Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur for the years 2021-22.

The College has already adopted **Green** practices like:

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Usage of Energy Efficient LED
- Usage of Energy Efficient BEE STAR Rated equipment

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

Nutan Urja Solutions,



K G Bhatwadekar,

Certified Energy Auditor,

EA - 22428



**Report
On
Green Audit
At
Nagpur Shikshan Mandal's Shri Binzani City College,
Nagpur**



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Prepared by

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur 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 Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

1. Present Energy Consumption

Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur 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	3,180	2.54
2	Minimum	1,607	1.29
3	Average	2,265	1.81
4	Total	27,176	21.74

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.

5. Notes and Assumptions

1. Annual working Days-250 Nos



2. Average Rate of Electrical Energy : Rs 8.2/- per kWh

Abbreviations

Compact Fluorescent Lamp	CFL
Fluorescent Tube Light	FTL
Light Emitting Diode	LED
Voltage	V
Current	A
Kilowatt	kW
Kilowatt Hour	kWh
Active Power	kVA



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

Shri. Binzani City College, one of the oldest and premier educational institutions, was established on 17th July 1930. It is run under the aegis of Nagpur Shikshan Mandal, Nagpur. It is affiliated to Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur. The college has an imposing building. It is in five separate blocks. It has a huge play ground, a rich library and a well-equipped Physical Education Dept.

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	2,355	19,140
2	May-22	3,180	9,430
3	Apr-22	3,080	40,200
4	Mar-22	1,822	15,050
5	Feb-22	1,607	13,450
6	Jan-22	1,837	15,180
7	Dec-21	2,042	16,960
8	Nov-21	2,503	20,190
9	Oct-21	2,276	18,480
10	Sep-21	2,387	17,443
11	Aug-21	2,137	13,870
12	Jul-21	1,950	19,221
	Total	27,176	218,614

Variation in energy consumption is as follows,



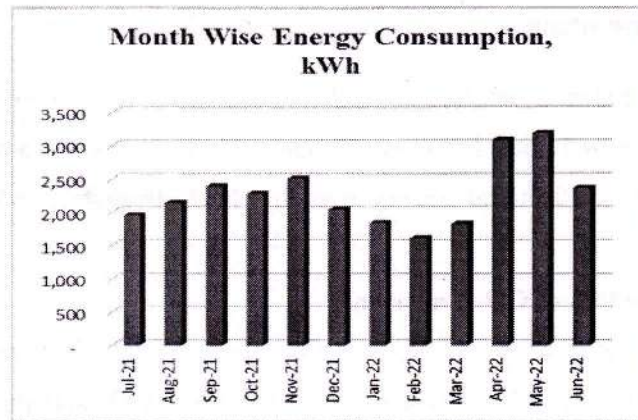


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

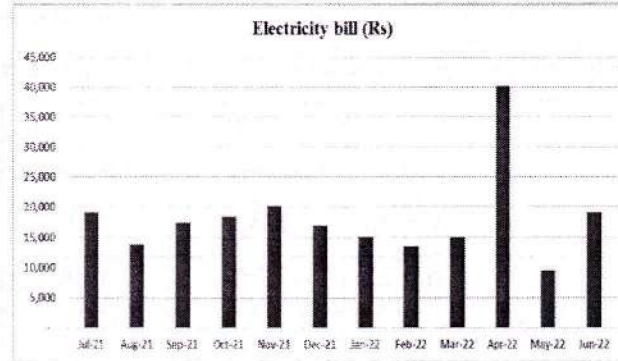


Figure 2.2: Month wise electricity bill

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	3,180	2.54
2	Minimum	1,607	1.29
3	Average	2,265	1.81
4	Total	27,176	21.74



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	2,355	1.88
2	May-22	3,180	2.54
3	Apr-22	3,080	2.46
4	Mar-22	1,822	1.46
5	Feb-22	1,607	1.29
6	Jan-22	1,837	1.47
7	Dec-21	2,042	1.63
8	Nov-21	2,503	2.00
9	Oct-21	2,276	1.82
10	Sep-21	2,387	1.91
11	Aug-21	2,137	1.71
12	Jul-21	1,950	1.56
	Total	27176	21.74



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

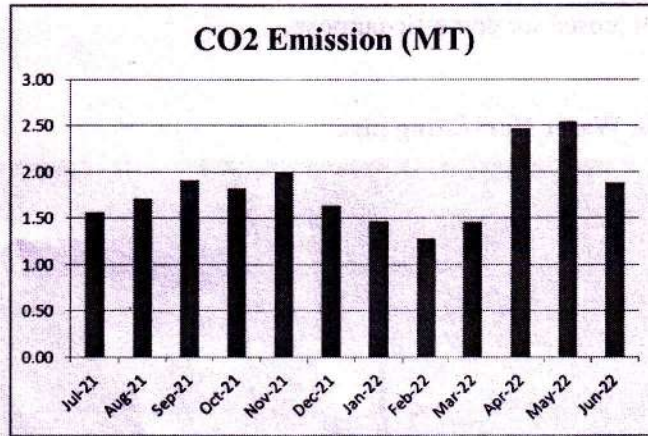


Figure 3.1: Month wise CO2 Emission



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 pipe



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.

5.2 e-Waste Management

The internal communication is through emails and hence there is hardly any generation of paper 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 40% 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. Institute encourages students to not to use automobiles.

In order to encourage students, college celebrates fourth Saturday of each month as no vehicle day. On no vehicle day, personal vehicle in college is not allowed.

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. 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

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.

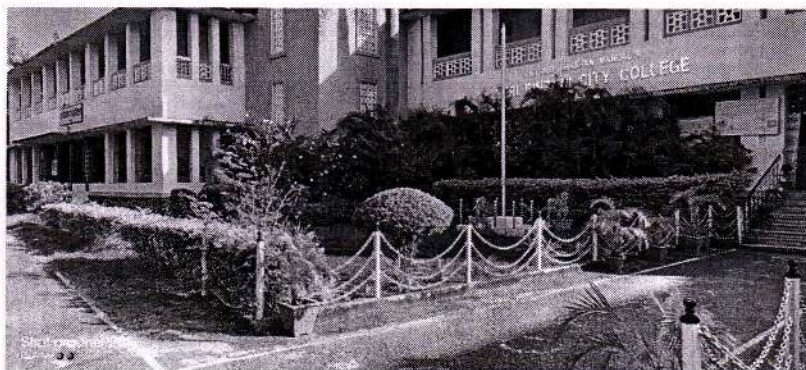


Figure 7.1: Beautiful maintained Garden of college

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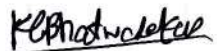
This is to certify that we have conducted Energy Audit at Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) for the year 2021-22.

The College has already adopted **Energy Efficient** practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment

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

Nutan Urja Solutions,

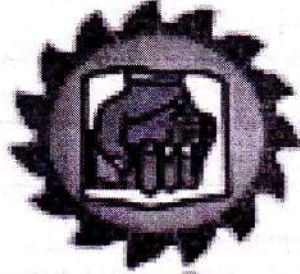

K G Bhatwadekar,

Certified Energy Auditor,

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**Report
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(Year 2021-22)**



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Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the Energy Consumption & mitigate the CO₂ emissions. College consumes Energy in the form of Electrical Energy used for various gadgets, Office & other facilities.

1. Present Energy Consumption

In the following Table, we present the details of Energy Consumption.

Table no 2.1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	3180	2.54
2	Minimum	1607	1.29
3	Average	2265	1.81
4	Total	27176	21.74

2. Energy Conservation Projects already installed

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. Key Observations

1. Usage of LED lights.
2. Usage of star rated equipment.
3. Maintained a good power factor.
4. There are about 177 Nos old T-8 type fittings which need to be replaced by 20 W LEDs.
5. There are 2 Nos, 1.5 TR Old ACs which need to be replaced with STAR Rated ACs.



4. Percentage of Usage of LED Lighting

The College has various Types of Light fittings, namely: LED, FTL & CFL. The percentage of Annual LED Lighting Usage to Annual Lighting requirement works out to be 17.4 %.

5. Recommendations

Table no 1: Recommendations for energy savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 177 Nos T-8 fittings with 20W LED fittings	3894	28036.8	113457	49
2	Replacement of 142 Nos Old Ceiling Fans with STAR rating fans	1846	13291.2	308708	279
3	Replacement of 2 Nos Old 1.5 TR Acs with STAR rating Acs	2000	14400	105750	88
	Total	7740	55728	527915	114

7 Notes & Assumptions

1. Annual working Days-250 Nos
2. Average Rate of Electrical Energy : Rs 7.2/- 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

No.	Particulars	Power (kW)	Current (A)	Voltage (V)
1	LED lighting	1.5	10	230
2	FTL lighting	1.5	10	230
3	CFL lighting	1.5	10	230
4	Other lighting	1.5	10	230
	Total	6.0	40	230



1. Introduction

Shri. Binzani City College, one of the oldest and premier educational institutions, was established on 17th July 1930. It is run under the aegis of Nagpur Shikshan Mandal, Nagpur. It is affiliated to Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur. The college has an imposing building. It is in five separate blocks. It has a huge play ground, a rich library and a well-equipped Physical Education Dept.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study Electrical Consumption
3. To assess the various equipment/facilities from Energy efficiency aspect
4. 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

1.3 General Details of College

Table No-1.1: Details of college

No	Head	Particulars
1	Name of Institution	Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur
2	Address	Shri Binzani City College, Umred Rd, Sakkardara Rd, Raghuji Nagar, Nagpur, Maharashtra 440009.
3	Affiliation	Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur



2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table No-2.1: Location wise study of Electrical fittings in various buildings

No	Location	FTL (40W)	LED tube (20W)	CFL	Fans	ACS (1.5Tr)	Computers
1	Principal office	0	2	7	4	2	3
2	Control room	3			1		2
3	NAAC room	4			2		2
4	IQAC	2	2		1		
5	Staff room		8		5		1
6	Wash room	3					
7	Pri. Passage	1	1	3	1		
8	Office	1	10	2	6		8
9	Commerce Dept	1		1			
10	Program	2	1		2		
11	Pravin	7			4		
12	Hall	10	4	1	13		
13	H-L	2		2			
14	H-R	0		2			
15	D. Water	1					
16	Room 4	4	1		5		
17	Room 5	5			5		
18	Room 6	4	1		5		
19	Room 7	4	1		5		
20	4 Passage	1		2			
21	Room 8	4			2		
22	Room 9	3			2		
23	Room 10	4			2		
24	Room 11	1	5		2		1
25	Room 12	2	4		1		
26	8 Passage	2		4			
27	Wash room	1			1		
28	NSS	2			2		
29	Room 14	3			2		
30	Room 15	2			2		
31	P01 Passage	2					
32	Room 16	2			2		
33	Room 17	1			2		

Report on Energy Audit: Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur

34	Room 18	2			2		
35	P01 Passage	1					
36	Wash room	3					
37	Room 20	4			2		
38	Room 21	2			2		
39	Room 22	2			2		
40	Room 23	2			2		
41	Room 24	2			2		
42	Room 25	3			3		
43	Room 26	2					
44	Room 27	6					
45	20 Passage	2					
46	NCC room	2					1
47	BCCA class	2			2		
48	BCCA office	4			5		
49	Computer lab	6			6		41
50	Eng Lab	5			3		18
51	Library washroom	1					
52	Library office	2	3	1	2		
53	Library	25	11	6	12		
54	Political Sci Dept	3	1		3		
55	Psychology Dept	11			5		
56	Record room	1	1				
57	Sports Dept		21		10		
	Total	177	77	31	142	2	77

Apart from above load, the school has pumps, LED street lights. Individual fitting wise load is as under.



Table No 2.2: Equipment wise Connected Load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	177	40	7.1
2	LED-20W	77	20	1.5
3	CFL	31	24	0.7
4	LED street lights	3	35	0.1
5	Ceiling Fan	142	65	9.2
6	AC-Old (1.5 Tr)	2	2200	4.4
7	Computers	77	65	5.0
8	Two pumps (2HP, 1HP)			2.3
	Total			30.4

Data can be represented in terms of PIE chart as under,

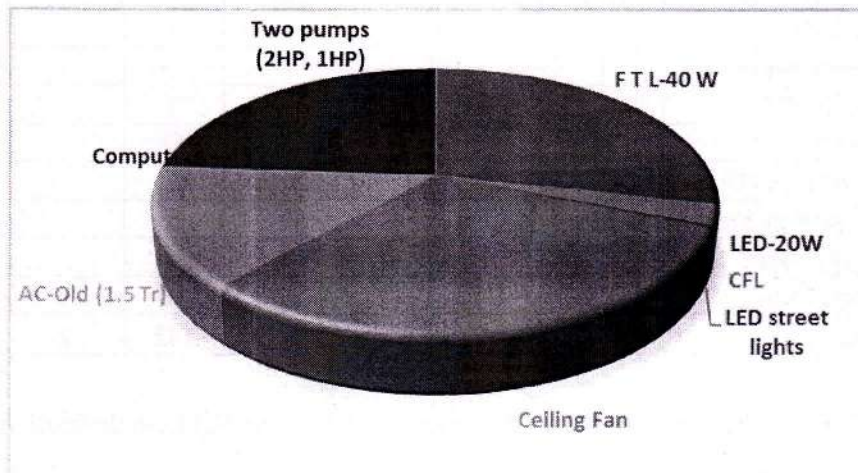


Figure 2.1: Distribution of connected load.



3. Study of Electrical Energy Consumption

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

Table no 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jun-22	2,355	19,140
2	May-22	3,180	9,430
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	Total	27,176	218,614

Variation in energy consumption is as follows,



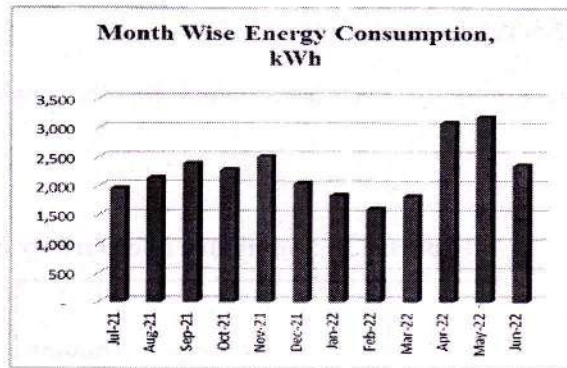


Figure 3.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

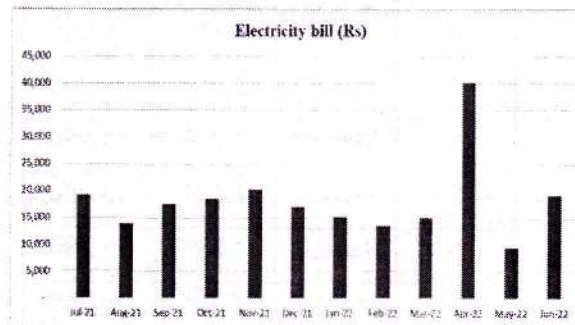


Figure 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	3,180	2.54
2	Minimum	1,607	1.29
3	Average	2,265	1.81
4	Total	27,176	21.74

4. 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 4.1: Month wise Consumption of Electrical Energy & CO₂ Emissions

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-22	2,355	1.88
2	May-22	3,180	2.54
3	Apr-22	3,080	2.46
4	Mar-22	1,822	1.46
5	Feb-22	1,607	1.29
6	Jan-22	1,837	1.47
7	Dec-21	2,042	1.63
8	Nov-21	2,503	2.00
9	Oct-21	2,276	1.82
10	Sep-21	2,387	1.91
11	Aug-21	2,137	1.71
12	Jul-21	1,950	1.56
	Total	27176	21.74

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



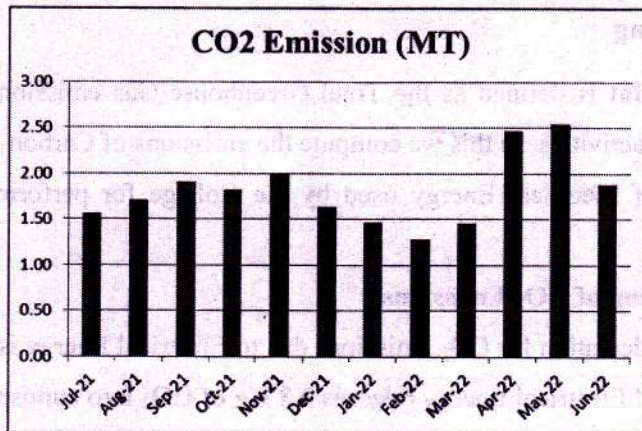


Figure 4.1: Month wise CO2 Emission

Month	CO2 Emission (MT)
Jul-21	1.55
Aug-21	1.70
Sep-21	1.90
Oct-21	1.80
Nov-21	2.00
Dec-21	1.65
Jan-22	1.45
Feb-22	1.25
Mar-22	1.45
Apr-22	2.45
May-22	2.50
Jun-22	1.85
Total	17.75



5. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 5.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	177	40	7.08
2	CFL	31	24	0.744
	LED lighting load			
1	LED tube	77	20	1.54
2	LED street lights	3	35	0.105
	Total LED lighting load			1.645
	Total Lighting load			9.469

It can be seen that out of total lighting load 17.4% load is LED lighting load.



6. Energy conservation proposals

6.1 Replacement of T-8 FTLs with 20 W LED fittings

In the facility, there are about 177 Nos, T-8, FTL fittings with Electronic/magnetic chokes. It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	177	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 18 W LED fittin	18	W/Unit
4	Reduction in demad	22	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	15.576	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	3894	kWh/Annum
9	Rate of Electrical Energy	7.2	Rs/kWh
10	Annual Monetary saving	28036.8	Rs/Annum
11	Cost of 18 W LED Tube	641	Rs/Unit
12	Investment required	113457	Rs lump sum
13	Simple Payback period	49	Months



6.2 Replacement of old fans with STAR Rated fans

During the Audit, it was observed that there are 142 no of fans. It is recommended to replace these old fans with STAR Rated fans.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	142	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	52	W/Unit
4	Reduction in demad	13	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	7.384	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	1846	kWh/Annum
9	Rate of Electrical Energy	7.2	Rs/kWh
10	Annual Monetary saving	13291.2	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	308708	Rs lump sum
13	Simple Payback period	279	Months



6.3 Replacement of 1.5 TR Old ACs with STAR Rated ACs

During the Audit, it was observed that there are 2 Nos, of 1.5 TR old ACs. It is recommended to replace these old ACs with STAR Rated ACs.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of 1.5 TR Old ACs	2	Nos
2	Energy Demand of Old 1.5 TR AC	2.15	kW/Unit
3	Energy Demand of New AC	1.15	kW/Unit
4	Reduction in demad	1	kW/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	8	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	2000	kWh/Annum
9	Rate of Electrical Energy	7.2	Rs/kWh
10	Annual Monetary saving	14400	Rs/Annum
11	Cost of STAR Rated 1.5 TR AC	52875	Rs/unit
12	Investment required	105750	Rs lump sum
13	Simple Payback period	88	Months

6.4 Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 177 Nos T-8 fittings with 20W LED fittings	3894	28036.8	113457	49
2	Replacement of 142 Nos Old Ceiling Fans with STAR rating fans	1846	13291.2	308708	279
3	Replacement of 2 Nos Old 1.5 TR Acs with STAR rating Acs	2000	14400	105750	88
	Total	7740	55728	527915	114



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Date: 06/07/2022

CERTIFICATE

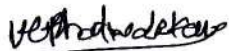
This is to certify that we have conducted Environmental Audit at Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur for the years 2021-22.

The College has already adopted following projects for making the campus **Energy Efficient**.

- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System

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

Nutan Urja Solutions,



K G Bhatwadekar,
Certified Energy Auditor,
EA - 22428



Report
On
Environmental Audit
At
Nagpur Shikshan Mandal's Shri Binzani City College,
Nagpur
(Year 2021-22)



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Prepared by

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Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur for assigning the work of Environmental Audit of college campus for the Year: 2020-21.

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.

Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur 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)	CO ₂ Emission (MT)
1	Maximum	3,180	2.54
2	Minimum	1,607	1.29
3	Average	2,265	1.81
4	Total	27,176	21.74

3. The various projects already implemented for Environmental Conservation:

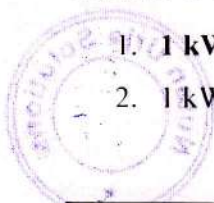
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting

4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of solar PV system to reduce dependency on traditional energy sources.
3. To conduct E- waste collection drive in college and among college students.

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 a 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
- MD : Maximum Demand
- PC : Personal Computer
- MSEDCL : Maharashtra State Electricity Distribution Company Ltd

Sl. No.	Particulars	Value
1	Electricity	1000
2	Water	500
3	Gas	200
4	Oil	100
5	Other	50

Sl. No.	Particulars	Value
1	Electricity	1000
2	Water	500
3	Gas	200
4	Oil	100
5	Other	50



Nutan Urja Solutions



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 compiled with and adequate care has been taken towards environmental protection and preservation

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

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

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

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

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

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

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

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

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

1.2 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	Nagpur Shikshan Mandal's Shri Binzani City College, Nagpur
2	Address	Shri Binzani City College, Umred Rd, Sakkardara Rd, Raghujji Nagar, Nagpur, Maharashtra 440009.
3	Affiliation	Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur



2. Study of Consumption of Various Resources

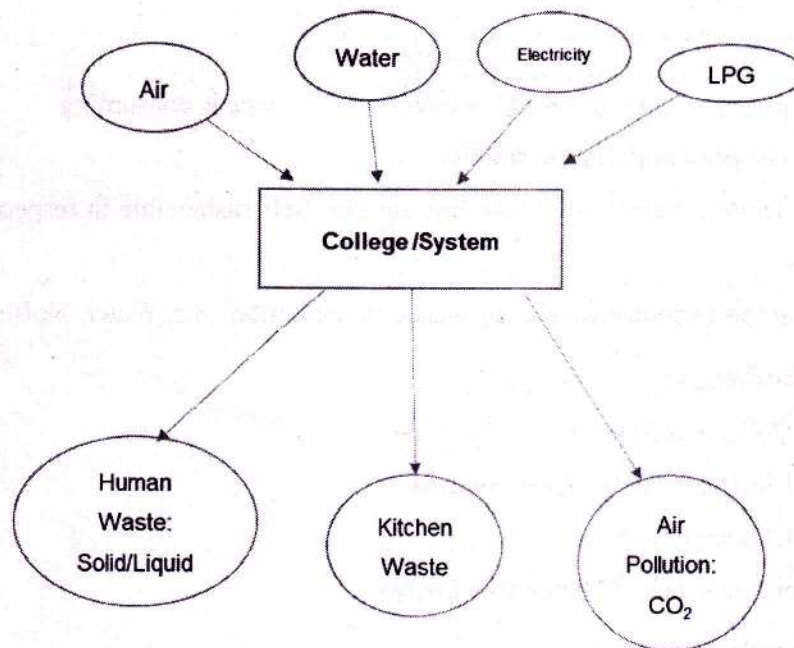
The Institute consumes following basic/derived Resources:

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 (kWh)
1	Jun-22	2,355
2	May-22	3,180
3	Apr-22	3,080
4	Mar-22	1,822
5	Feb-22	1,607
6	Jan-22	1,837
7	Dec-21	2,042
8	Nov-21	2,503
9	Oct-21	2,276
10	Sep-21	2,387
11	Aug-21	2,137
12	Jul-21	1,950
	Total	27,176
	Maximum	3,180
	Minimum	1,607
	Average	2,265

2.1 Variation of Monthly Electrical Energy Consumption

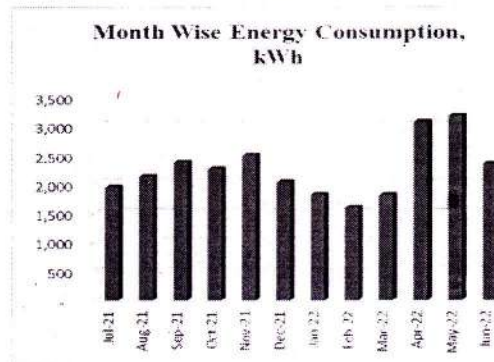


Figure 2.1 : Monthly Electrical Energy Consumption



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	Total	27,176
2	Maximum	3,180
3	Minimum	1,607
4	Average	2,265



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	2,355	1.88
2	May-22	3,180	2.54
3	Apr-22	3,080	2.46
4	Mar-22	1,822	1.46
5	Feb-22	1,607	1.29
6	Jan-22	1,837	1.47
7	Dec-21	2,042	1.63
8	Nov-21	2,503	2.00
9	Oct-21	2,276	1.82
10	Sep-21	2,387	1.91
11	Aug-21	2,137	1.71
12	Jul-21	1,950	1.56
	Total	27176	21.74
	Maximum	3,180	2.54
	Minimum	1,607	1.29
	Average	2,265	1.81



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

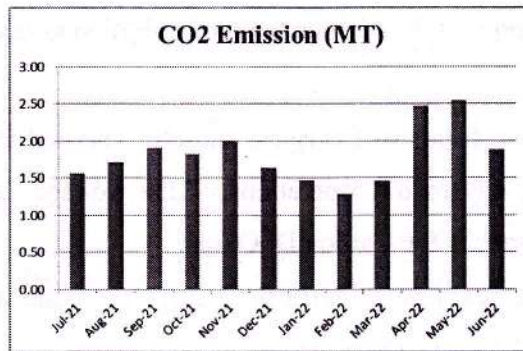


Figure 3.1: CO2 emission due to usage of electrical energy.

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.

3.3 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:

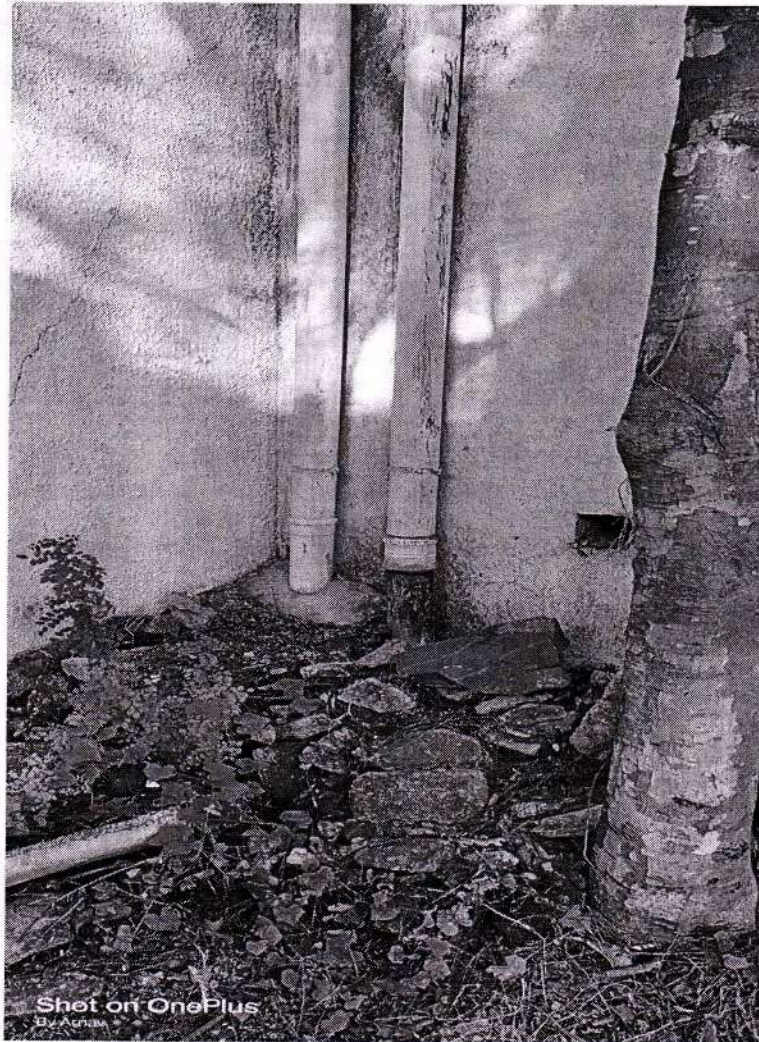
The internal communication is through emails. There is hardly any generation of e-Waste in the premises.



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 Pipe:



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 solar PV system to reduce dependency on traditional energy sources.
- To conduct E- waste collection drive in college and among college students. Most of the material collected in E-waste can be reused before disposal.



**Beyond Campus Green & Cleanliness Initiatives
2017-2018 to 2021-22**



Cleaning weekly market area near College



Cleaning public utility area near College



Rally for green environment



Cleaning camp area in village



Statue cleaning drive



Preparing Ramp for the School



Clean the Villa Doing SHRAMDAN in the Village



Medical camp & health & hygiene awareness camp



Doctors, College Students, school students & villagers during the Medical Check up Camp held at Bahadura Gram



Doctors, College Students, school students & villagers during the Medical Checkup Camp held at Bahadura Gram



Handwritten signature in blue ink.

NSS Program Officer
S.B. City College, Nagpur



Handwritten signature in blue ink.

Officiating Principal
S.B. City College, Nagpur