CRITERIA- VII

Key Indicator - 7.1 Institutional Values and Social Responsibilities (50)

7.1.3: QnM Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following (10)

1. Green audit / Environment audit
2. Energy audit
3. Clean and green campus initiatives
4. Beyond the campus environmental promotion activities

Shri Shivaji Education Society Amravati's

SCIENCE COLLEGE

Congress Nagar, Nagpur-440012

Green and Environment

AUDIT REPORT

2019-2024

Prepared by

Green and Environment Audit Report

SCIENCE COLLEGE

Congress Nagar, Nagpur -*12*

Acknowledgement

Internal Green and Environment Audit Committee would like to thank the management of Shri Shivaji Education Society's Science College, teaching & non-teaching staff, students, parents and adjoining community for extending their co-operation and valuable inputs in collection of various facts and figures. This is a significant step taken by the college and their efforts towards their contribution in conservation of resources, a worth mentioning here.

Internal Green and Environment Audit Committee also wish to thank Nutan Urja Solution for helping Internal Green and Environment Audit Committee in organizing 'Workshop on understanding Environment Management System' and appreciate their cooperation for extending their knowledge through out the process of Internal Green and Environment Audit program. Internal Green & Environment Audit Committee express gratitude towards valuable guidance & contribution made by various NGOs, individuals and Nagpur Nagar Palika in contributing their knowledge and expertise in compiling technical data required in preparation of audit. Our special thanks are due to the Principal, Prof. M. P. Dhore of Science College, Congress Nagar, Nagpur for giving us valuable guidance.

About Science College, Congress Nagar, Nagpur

Our parent Educational Institution, Shri Shivaji Education Society, Amravati is a premier educational institution of Central India with branches in all the districts of Vidarbha region in Maharashtra. It was established by late Dr. Panjabrao alias Bhausaheb Deshmukh, first Agriculture Minister of India and a member of Constitution Draft Committee.

Science College, Congress Nagar, Nagpur, is one of the 303 institutions run by Shri Shivaji Education Society, Amravati is a premier institution of higher learning in Central India affiliated to R.T.M. Nagpur University, Nagpur.

Tamso Ma Jyotirgmaya (To lead from darkness to light) is the mission of the institution. National Assessment and Accreditation Council (NAAC) accredited the college with Five Star level in the year 2002, re-accredited with CGPA of 3.51 on four-point scale at A^+ grade in June 2017 and identified by UGC as College with Potential for Excellence. The College is an institutional member of Asia Pacific Quality Network (APQN).

With its competent galaxy of faculty members, the college has been rendering sincere services in the field of higher education since 1967. This is a single faculty college with a variety of courses both at 10+2 stage and degree level and offers PG courses with recognized centers of Higher Learning and Research in Microbiology, Chemistry, Computer Science, Physics and Mathematics.

Google Map

Satellite photo of Shivaji Science College, Nagpur

Latitude: 21.12954209456423 Longitude: 79.08213349172318

Introduction

The expeditious urbanization and economic development at local, national and international level has led to several environmental and ecological emergencies. To prevent damages due to site specific activities, practices, processes and procedures followed by various institutions, businesses, organizations or factories, it becomes essential to adopt methods, process and procedures for making green campus for the institutions, businesses, organizations or factories which will lead for sustainable development.

Science College has concentrated its focus to save environment at every possible way. The college made it clear from its environment policy that its a priority area to conserve environment and promote education & awareness about keeping campus green. The purpose of conducting the Internal Green and Environmental Audit is to understood and make continuous efforts to reduce adverse impact on environment. The college hires consultants and resource persons in environment education and protection. The methodology to conduct Internal Green Audit & Environmental Audit was designed with the help of consultants and NGOs with the teaching staff of the college. It includes draft of questionnaire, in-situ site inspection in the campus, scrutinize and evaluate documentation, monitor procedures, practices and processes carefully. The formation of Internal Green and Environment Audit Committee with involvement of external subject specialist has made report valuable. The Internal Green and Environment Audit Committee has made valuable recommendations. The committee proposed remedial procedures to reduce the carbon foot print of the college. It works for the betterment of environment in the college campus including air, water, noise, soil quality, waste management, care for flora & fauna in campus, importance of paperless working, future plans for adopting alternative energy creation by adopting solar powered energy generation.

Internal Green Audit

Internal Green Audit is a process of systematic verification of activities, identification of adverse impacts, evaluation of systems, documentation process, reporting and analysis of environmental diversity of various institutions, businesses, organizations or factories. It aims to analyze environmental practices and processes within and outside of the targeted institution, business, organization or factory, which will have an impact on the ecologically friendly environmentally-safe ambience.

Internal Environment Audit

An Internal Environmental Audit is an assessment performed to ensure that institutions, businesses, organizations or factories are complying with environmental regulations policies. It examines the amount of adverse impact on environment or risk of injury that may be posed by the assessed entity and determines the types of pollution being produced by looking at a broad range of site-specific activities, practices, processes and procedures. The information compiled from these factors to determine what remedial procedures are required to be added for better good.

Scope

Internal Green and Environment Audit play a significant role in continuing operation of institutions, businesses, organizations or factories. It keeps institutions accountable by scrutinizing their site-specific procedures and determining what remedial measures are required to be added or put in place to ensure institutions, businesses, organizations or factories are following the proper statute.

Objective

The key objectives of an internal environmental audit therefore are to: determine how well the environmental management systems and equipment are performing, verify compliance with the relevant national, local or other laws and regulations, minimize human exposure to risks from environmental, health and safety problems.

Methodology

Internal Green & Environment Audit Committee was formed and decided to call upon an open discussion on how to conduct Internal Green & Environment Audit. The committee came to a conclusion that external party will look into overall infrastructure, procedures, practices and operation of the collage and will draft detail questionnaire. Questionnaires provide a relatively rapid and efficient way of obtaining large amounts of information from a large number of people. Questionnaire are easy to respond. Specifically, answers obtained through closed-ended questions with multiple choice answer options are easy to obtain and less time consuming.

Answers obtained from open-ended questionnaire are analyzed using qualitative methods and they involve discussions and critical analyses without any difficulty. This was useful because the information lead to concrete conclusions. The methodology also included

a physical inspection of the campus, observation, and review of the documentation, interviewing key persons and data analysis, measurements, and suggesting recommendations.

The efforts were taken to understand following focus areas and emphasis was given to know facts on the ground:

Overall area inspection to find out efforts taken by the college to promote greenery in campus. Management & performance of water distribution and its conservation, be it a municipal supply or the water collected by rain water harvesting.

Drinking water and water consumption for other purposes such as construction, gardening etc and its management.

Use of electricity and other types of energy uses and management related to it.

Test air quality, noise level and water in the campus with the help of external service providers.

Observe solid and liquid waste management in the campus.

E-waste management.

Initiatives, projects and activities taken for conservation of flora, fauna and the measures taken to improve environment management systems in the college campus.

Environment Policy

Science College not only target to impart quality education but also understand responsibility towards protection of environment for the future generation. The college wish to create environmentally safe practices to ensure that the college campus is kept green by reducing its carbon foot print. The college monitors its operation and make it a economically successful & sustainable along with being socially responsible. Environment Policy compels each and every one of the college to follow practices, processes and operation supported by identified groups and individuals. Environment Policy also target to enrol external parties such as vendors and suppliers in achieving the environment conservation objective in their relevant fields too.

Environmental Policy Document

Science College, Congress Nagar, Nagpur is a quality conscious college. It protects its own environment and efforts are taken to keep it a pollution free green campus. Environment protection, conservation and education are key areas that are weaved together in education and in academia of the college. The management, teaching & non-teaching staff, students and community members of the college look after the environment carefully. Every year, during

rainy season, trees are planted and are carefully looked after. It's the responsibility of Shivaji Arts & Science College to preserve the greenery in the college campus.

i. To create awareness regarding environmental policy of our college to management, teaching & non-teaching staff, students and community members.

ii. To keep college campus free from pollution by avoiding open fire, managing garbage, prohibiting tobacco & pan masala spitting in the campus. Caution poster in regard to health, hygiene and environment protection are displayed in the campus.

iii. Segregate bio-degradable & non bio-degradable waste. Create composting facility for bio- degradable waste conversion to make manure and recycle non-biodegradable waste.

iv. To provide safe drinking water to students and staff by installing RO Water Filtration facility at the campus.

v. To install and maintain 'Rain Water Harvesting' in the campus. To collect every rain drop falling on the roof of the collage and to store the harvested water in water harvesting well constructed at the college.

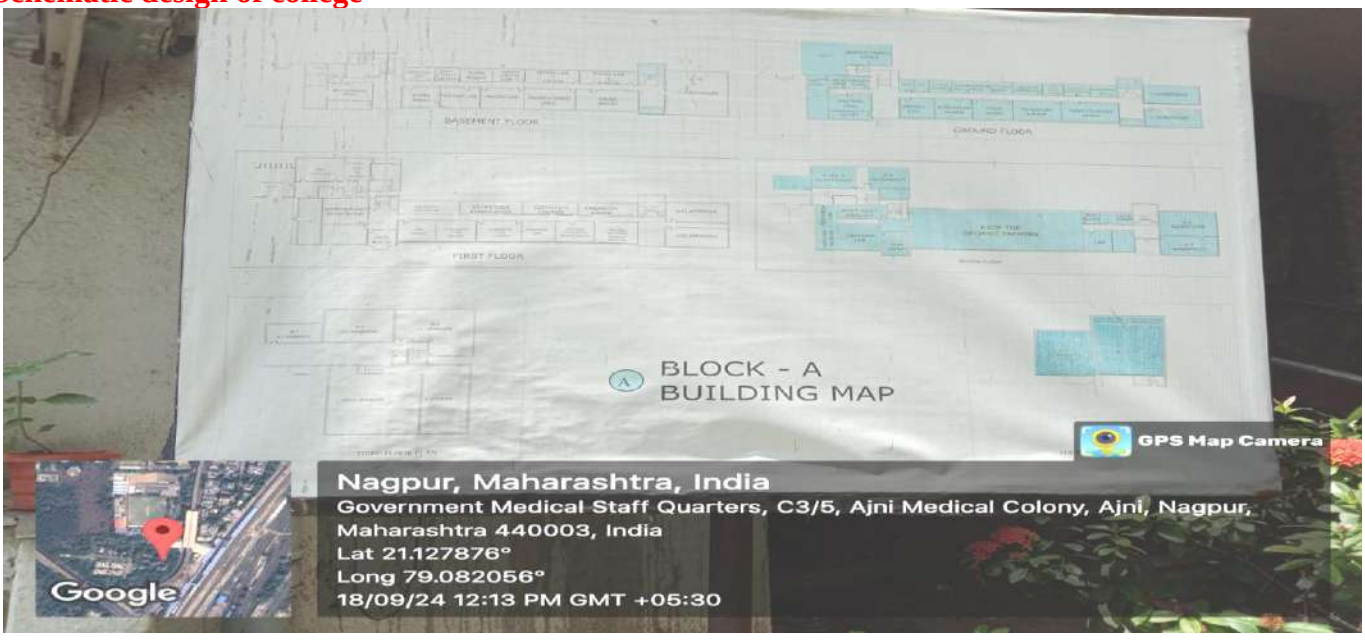
vi. To observe 'No Vehicle Day' in persuit of reducing vehicular pollution.

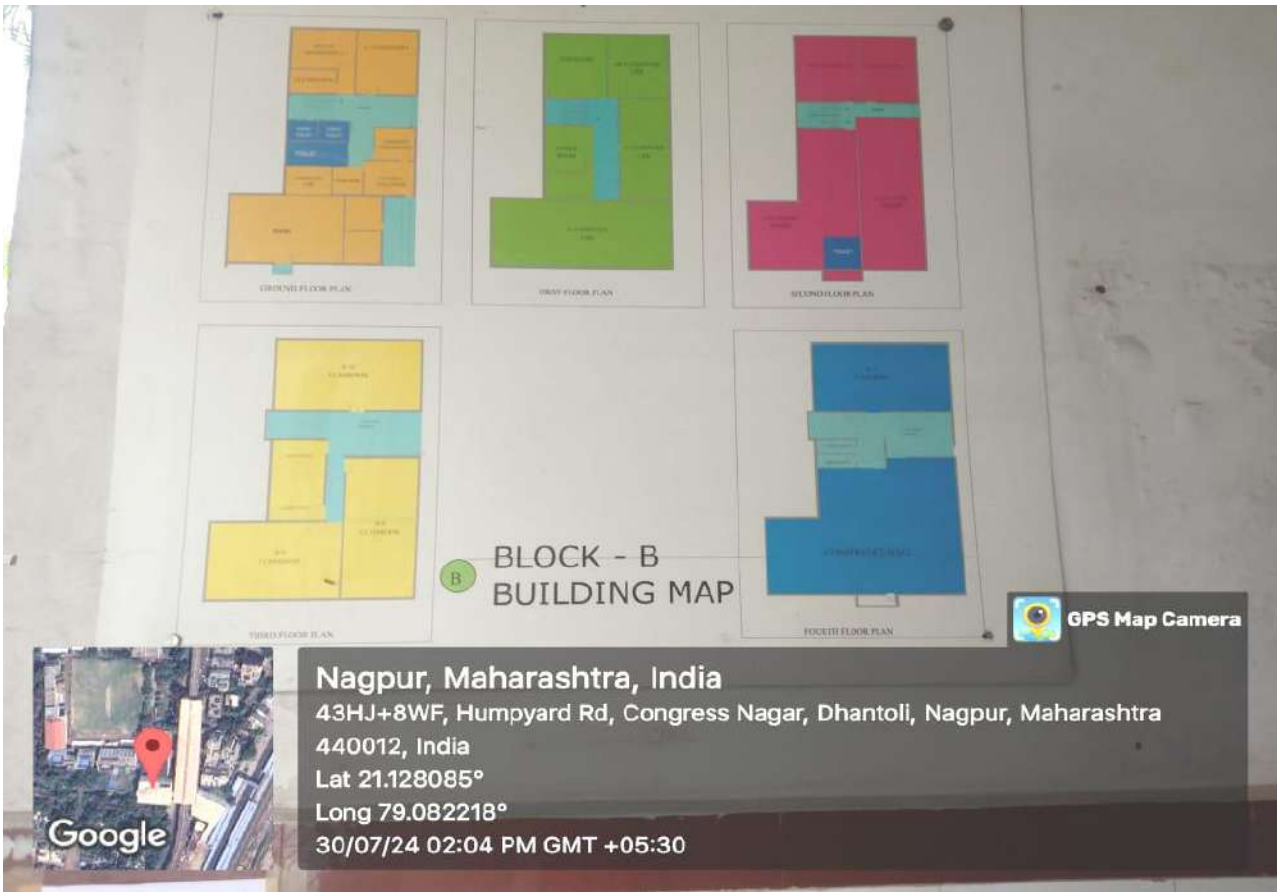
vii. To communicate electronically in an effort to reduce consumption of paper.

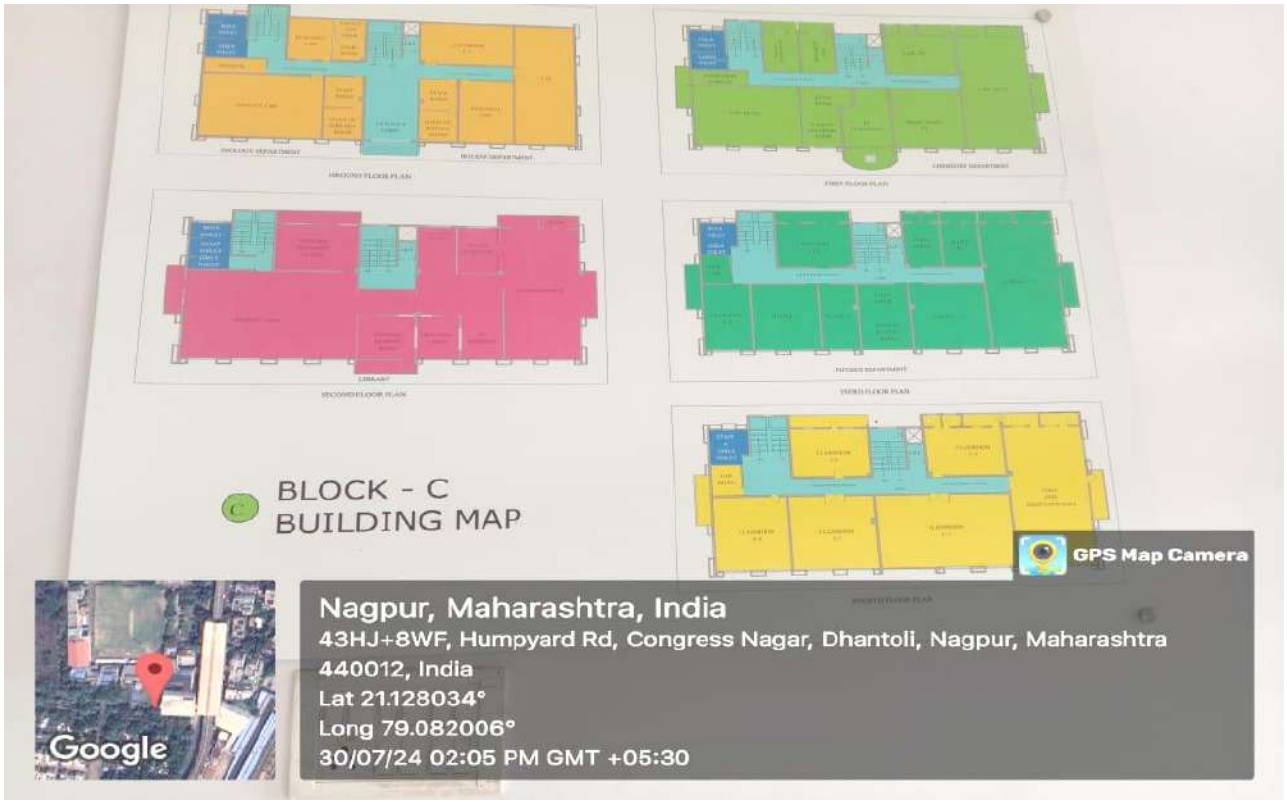
viii. To place the dustbins and promote hygienic condition in the college campus.

ix. To evaluate the environmental performance of the college by conducting Internal Green and Environment Audit annually.

Schematic design of college




BLOCK - B
BUILDING MAP
GPS Map Camera
Nagpur, Maharashtra, India
43HJ+8WF, Humpyard Rd, Congress Nagar, Dhantoli, Nagpur, Maharashtra
440012, India
Lat 21.128085°
Long 79.082218°
30/07/24 02:04 PM GMT +05:30
Google


BLOCK - C
BUILDING MAP
GPS Map Camera
Nagpur, Maharashtra, India
43HJ+8WF, Humpyard Rd, Congress Nagar, Dhantoli, Nagpur, Maharashtra
440012, India
Lat 21.128034°
Long 79.082006°
30/07/24 02:05 PM GMT +05:30
Google

Report

On

Green Audit At

Shri Shivaji Education Society Amravati's Science College,

Nagpur

(Year 2023-24)

Prepared by

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,

Sus Road, Sus, Pune 411 021

Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Contents

Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Shri Shivaji Education Society Amravati's Science 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 Shri Shivaji Education Society Amravati's Science 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

Shri Shivaji Education Society Amravati's Science 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	569	0.46
2	Minimum	164	0.13
3	Average	236	0.19
4	Total	2,829	2.26

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. Usage of Renewable Energy

The College has installed a Roof Top Solar PV Plant. The percentage of usage of Alternate Energy to Annual Energy Requirement is 72 %.

4. Rain Water Harvesting

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

5. 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 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

Shri Shivaji Education Society Amravati's Science College is located in Nagpur. With its competent galaxy of faculty members, the college has been rendering sincere services in the field of higher education since 1967. This is a single faculty college degree level and offers PG courses with recognized centers of Higher Learning and Research in Microbiology, Chemistry, Computer Science, Physics and Mathematics.

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-24	216	24408
2	May-24	242	27346
3	Apr-24	248	28010
4	Mar-24	236	27789
5	Feb-24	181	26703
6	Jan-24	173	26528
7	Dec-23	181	26331
8	Nov-23	164	26895
9	Oct-23	193	34515
10	Sep-23	569	27786
11	Aug-23	248	26486
12	Jul-23	178	26747
	Total	**2,829**	**3,29,544**

Variation in energy consumption is as follows,

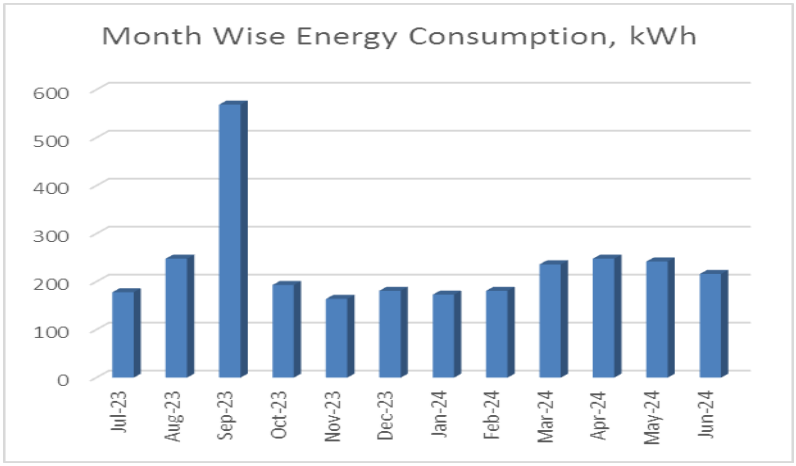


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

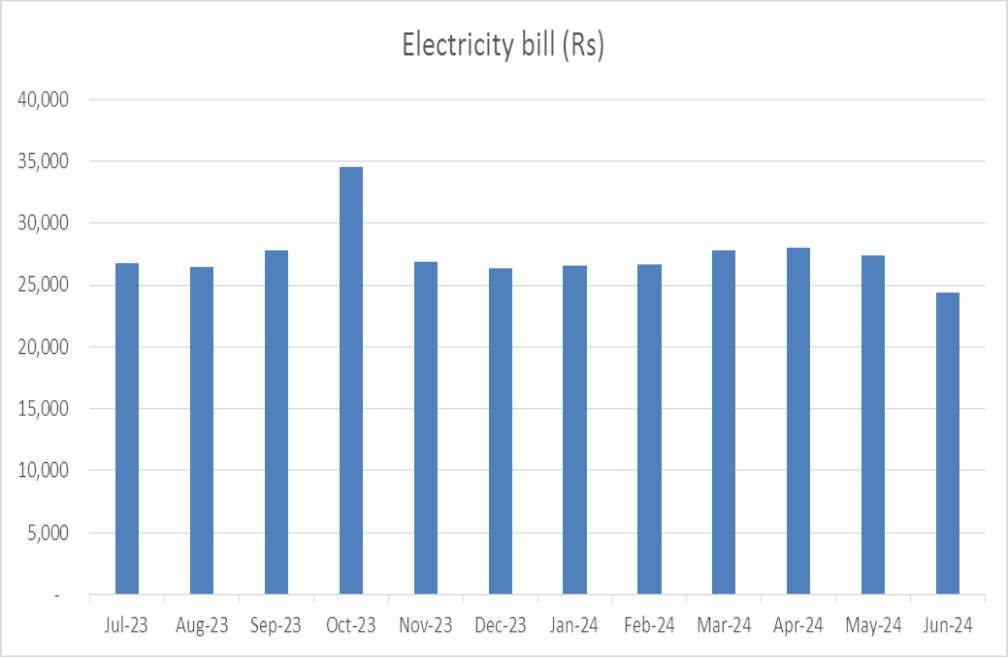


Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emmision (MT)
1	Maximum	569	0.46
2	Minimum	164	0.13
3	Average	236	0.19
4	Total	2,829	2.26

3. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 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 CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.

Based on the above Data we compute the CO_2 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	CO2 Emissions, MT
1	Jun-24	216	0.17
2	May-24	242	0.19
3	Apr-24	248	0.20
4	Mar-24	236	0.19
5	Feb-24	181	0.14
6	Jan-24	173	0.14
7	Dec-23	181	0.14
8	Nov-23	164	0.13
9	Oct-23	193	0.15
10	Sep-23	569	0.46
11	Aug-23	248	0.20
12	Jul-23	178	0.14
	Total	**2,829**	**2.26**

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

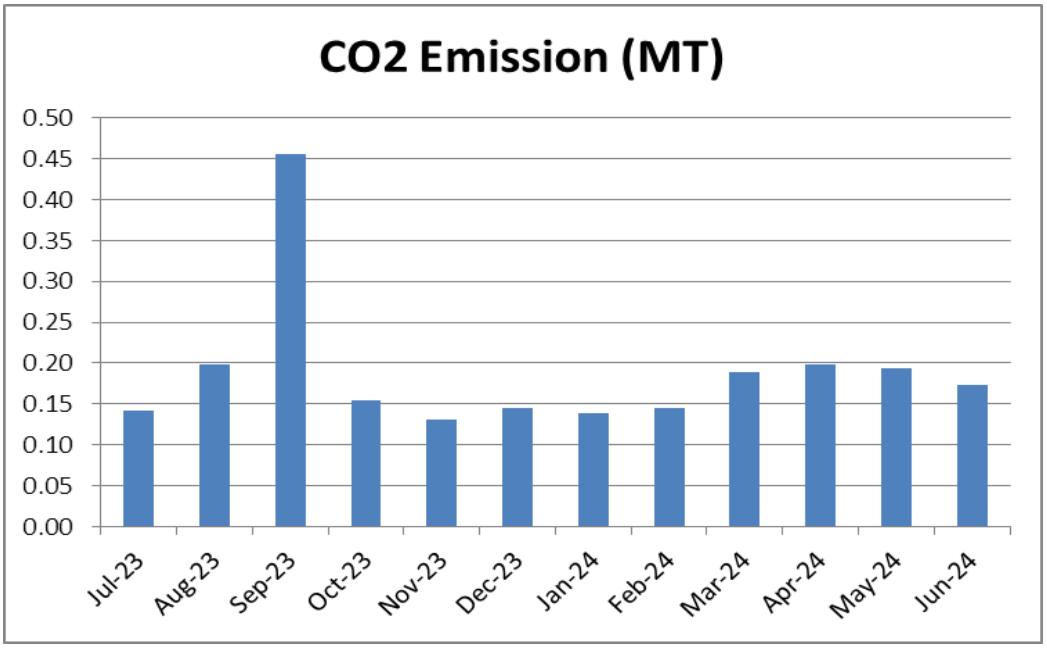


Figure 3.1: Month wise CO2 Emission

4. Study of Usage of Alternate Energy

In this Chapter, we compute the percentage of Usage of Alternate/Renewable Energy to Annual Energy Requirement of the College. The College has installed Solar PV System of 64kW capacity. The college has also installed 10,000 liters capacity Solar Thermal Hot Water system on hostel campus.

Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	2,829	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	96000	kWh/Annum
3	Total Energy Requirement of College	98,829	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	97	**%**

Photograph of Solar PV plant

5. 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

6. Study of Waste Management

6.1 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.

6.2 e-Waste Management

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

7. Study of Green Practices

7.1 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.

7.2 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.

7.3 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

7.4 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

7.5 Paperless Office

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

7.6 Green Landscaping with Trees and Plants

The Institute has beautiful maintained Garden.

Figure 7.1: Beautiful maintained Garden of college

Report
On
Green Audit
At
Shri Shivaji Education Society Amravati's
Science College,
Nagpur
(Year 2022-23)

Prepared by
Nutan Urja Solutions
A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021
Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

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Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	6,217	4.97
2	Minimum	234	0.19
3	Average	3,398	2.72
4	Total	40,780	32.62

2. Various Measures Adopted for Energy Conservation

1. Usage of STAR Rated ACs at new installations
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1	Jun-23	5691	97129
2	May-23	4972	87970
3	Apr-23	6217	104880
4	Mar-23	5145	84930
5	Feb-23	3675	63598
6	Jan-23	3278	58717
7	Dec-22	2632	38121
8	Nov-22	2274	34958
9	Oct-22	234	36497
10	Sep-22	2838	39972
11	Aug-22	1852	36150
12	Jul-22	1972	33179
	Total	**40,780**	**7,16,101**

Variation in energy consumption is as follows,

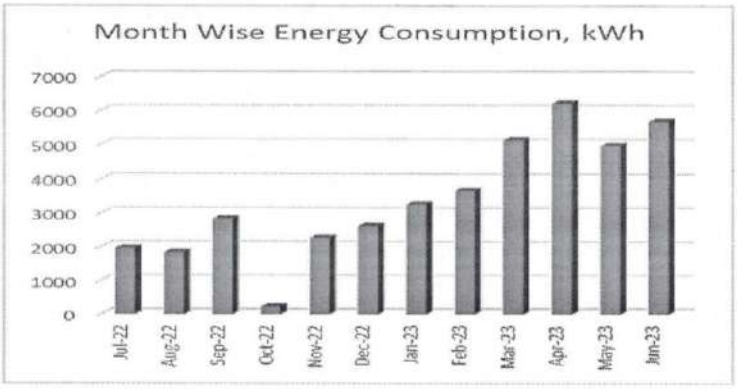

Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

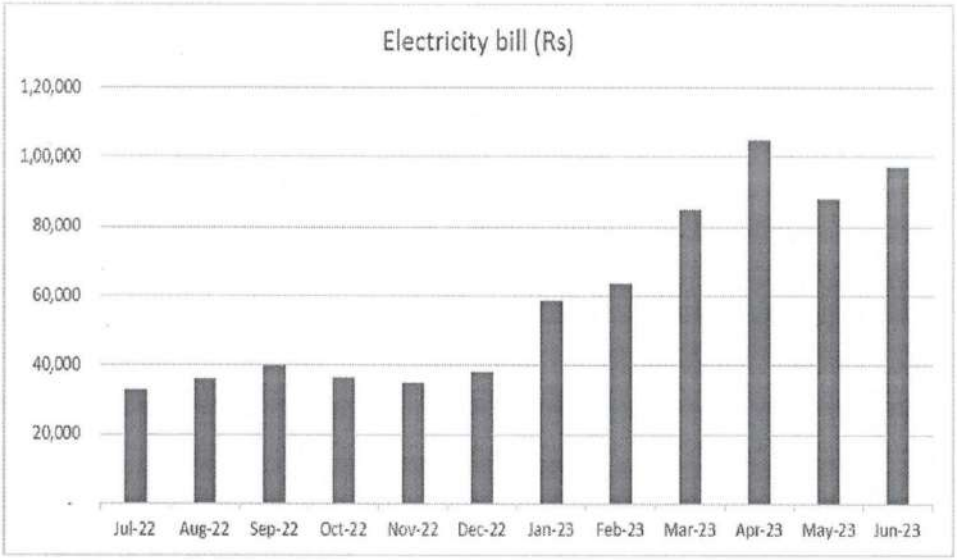

Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

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3. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 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 CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.

Based on the above Data we compute the CO_2 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	CO2 Emissions, MT
1	Jun-23	5,691	4.55
2	May-23	4,972	3.98
3	Apr-23	6,217	4.97
4	Mar-23	5,145	4.12
5	Feb-23	3,675	2.94
6	Jan-23	3,278	2.62
7	Dec-22	2,632	2.11
8	Nov-22	2,274	1.82
9	Oct-22	234	0.19
10	Sep-22	2,838	2.27
11	Aug-22	1,852	1.48
12	Jul-22	1,972	1.58
	Total	**40,780**	**32.62**

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

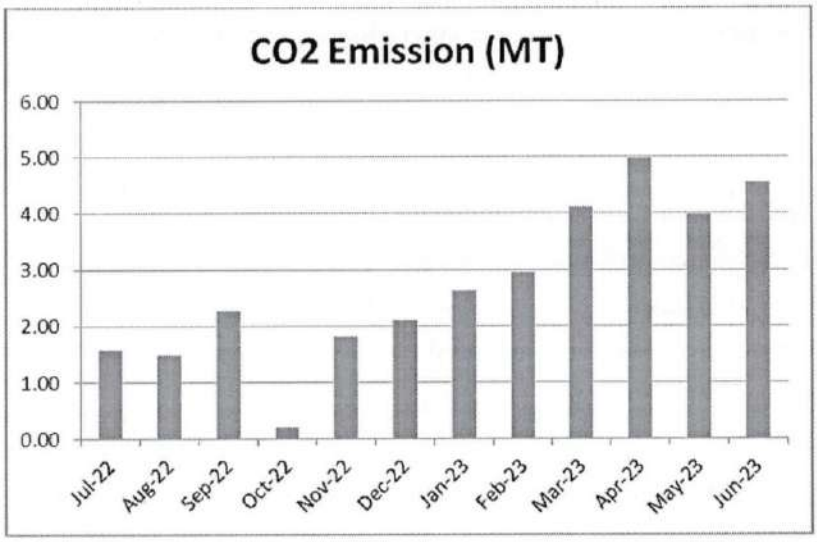

Figure 3.1: Month wise CO2 Emission

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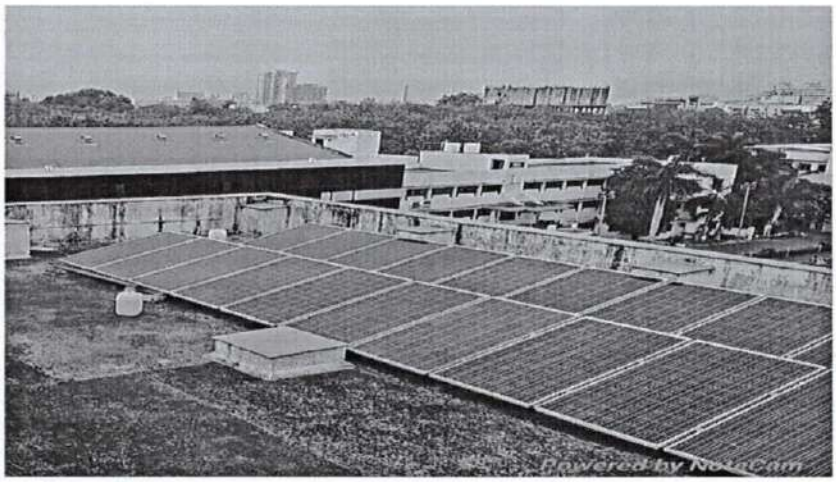
Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	40,780	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	96000	kWh/Annum
3	Total Energy Requirement of College	136,780	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	70	%

Photograph of Solar PV plant



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Report
On
Green Audit
At
Shri Shivaji Education Society Amravati's
Science College,
Nagpur
(Year 2021-22)

Prepared by
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A 703, Balaji Witefield, Near Sunni's World,
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Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	9,278	7.42
2	Minimum	248	0.20
3	Average	3,184	2.55
4	Total	38,202	30.56

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
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The College has installed a Roof Top Solar PV Plant. The percentage of usage of Alternate Energy to Annual Energy Requirement is 72 %.

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The internal communication is through emails and 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
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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	266	79283
2	May-22	248	57910
3	Apr-22	9278	136134
4	Mar-22	7047	103173
5	Feb-22	2010	54384
6	Jan-22	2404	57672
7	Dec-21	2747	60835
8	Nov-21	2478	58659
9	Oct-21	4069	86861
10	Sep-21	3625	73992
11	Aug-21	1961	58292
12	Jul-21	2069	55366
	Total	**38,202**	**8,82,561**

Variation in energy consumption is as follows,

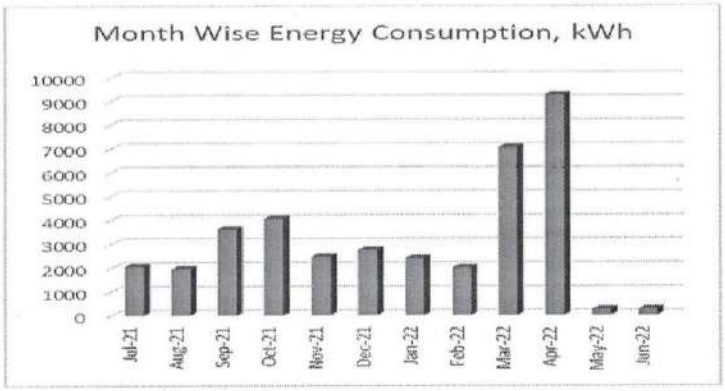

Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

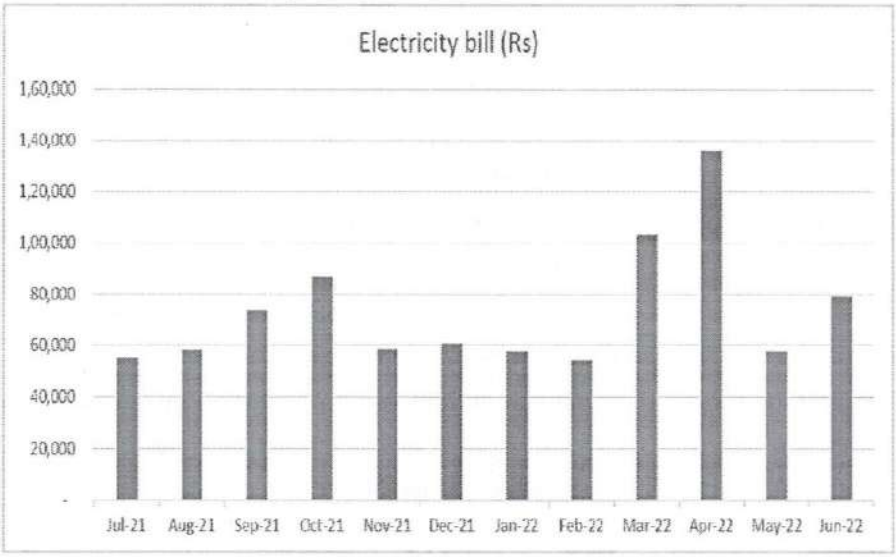

Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emmision (MT)
1	Maximum	9,278	7.42
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4	Total	38,202	30.56

3. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 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 CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.

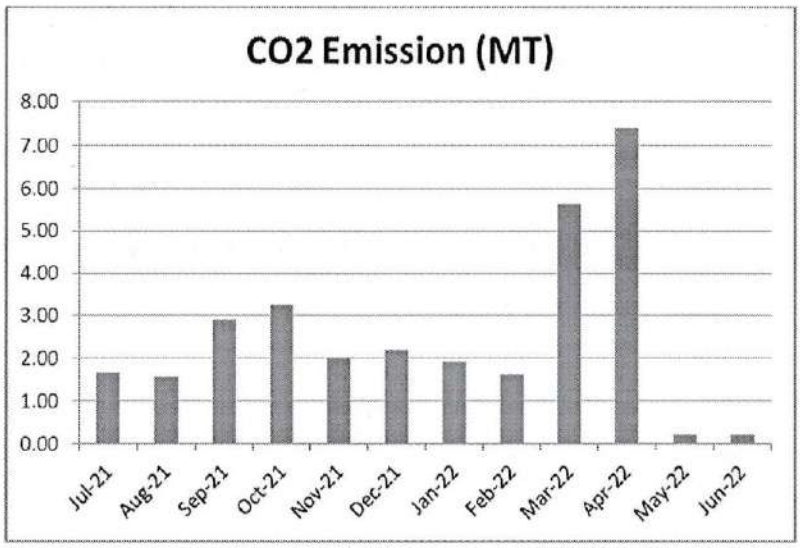
Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

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	CO2 Emissions, MT
1	Jun-22	266	0.21
2	May-22	248	0.20
3	Apr-22	9,278	7.42
4	Mar-22	7,047	5.64
5	Feb-22	2,010	1.61
6	Jan-22	2,404	1.92
7	Dec-21	2,747	2.20
8	Nov-21	2,478	1.98
9	Oct-21	4,069	3.26
10	Sep-21	3,625	2.90
11	Aug-21	1,961	1.57
12	Jul-21	2,069	1.66
	Total	**38,202**	**30.56**

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



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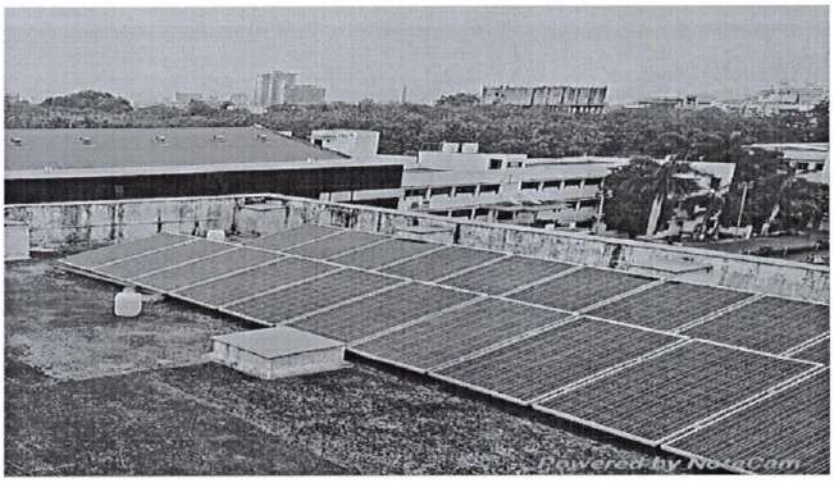
4. Study of Usage of Alternate Energy

In this Chapter, we compute the percentage of Usage of Alternate/Renewable Energy to Annual Energy Requirement of the College. The College has installed Solar PV System of 64kW capacity. The college has also installed 10,000 liters capacity Solar Thermal Hot Water system on hostel campus.

Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	38,202	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	96000	kWh/Annum
3	Total Energy Requirement of College	1,34,202	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	72	%

Photograph of Solar PV plant



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Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	8,923	7.14
2	Minimum	2,540	2.03
3	Average	5,458	4.37
4	Total	65,498	52.40

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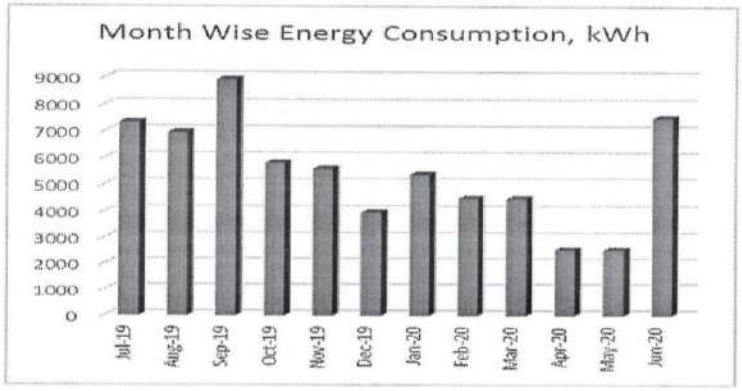
3	Apr-20	2540	5360
4	Mar-20	4481	53743
5	Feb-20	4481	55268
6	Jan-20	5361	65695
7	Dec-19	3969	53500
8	Nov-19	5579	66753
9	Oct-19	5806	67732
10	Sep-19	8923	103797
11	Aug-19	6970	77676
12	Jul-19	7331	82277
	Total	**65,498**	**6,61,222**

Variation in energy consumption is as follows,



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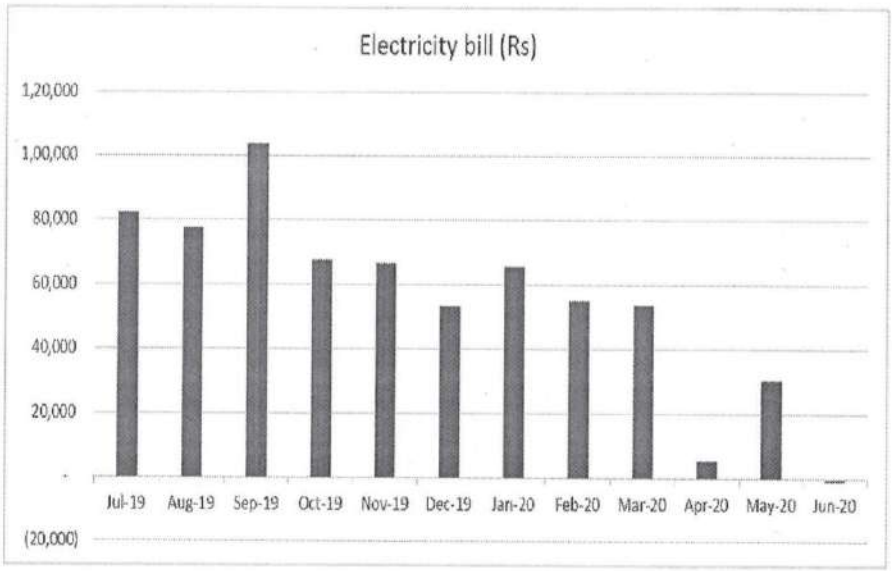
Monthly variation in electricity bill is as follows,



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3	Apr-20	2,540	2.03
4	Mar-20	4,481	3.58
5	Feb-20	4,481	3.58
6	Jan-20	5,361	4.29
7	Dec-19	3,969	3.18
8	Nov-19	5,579	4.46
9	Oct-19	5,806	4.64
10	Sep-19	8,923	7.14
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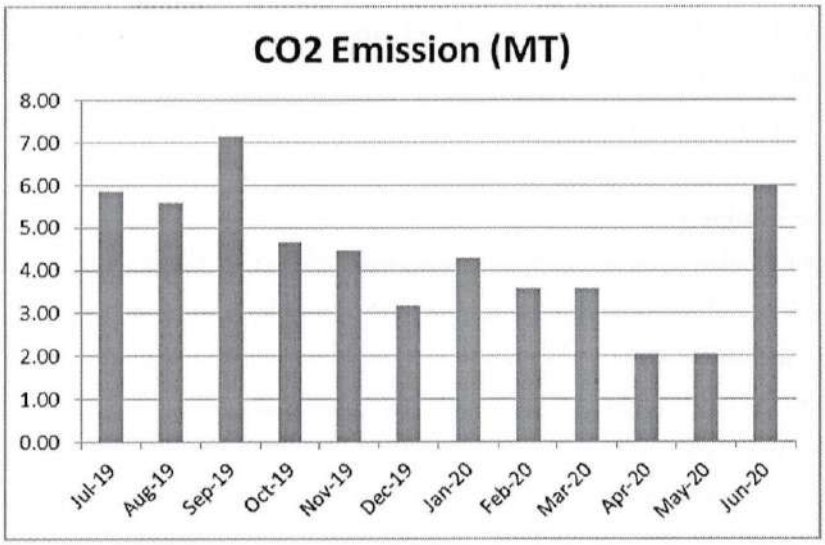
In the following Chart we present the CO2 emissions due to usage of Electrical Energy.



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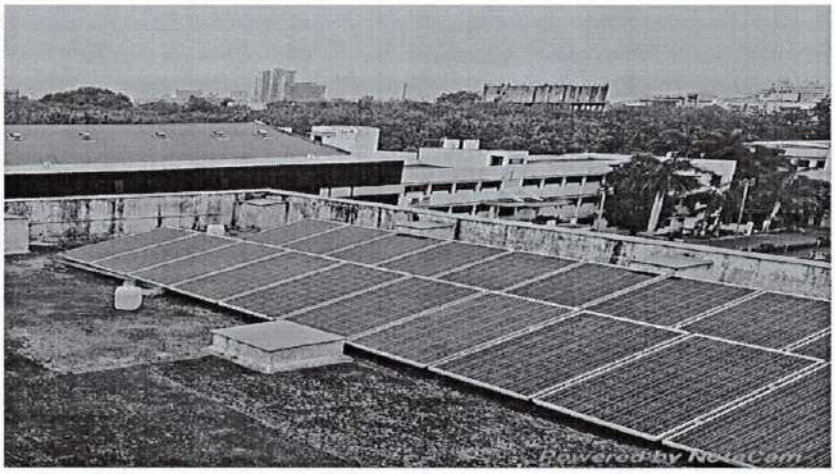

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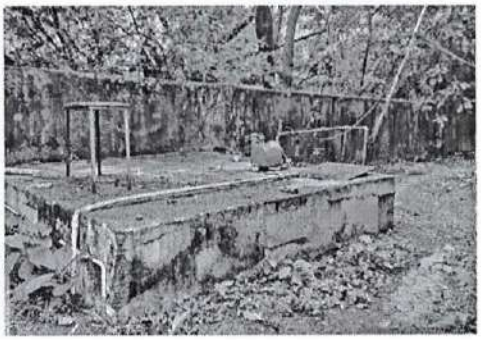

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2	Minimum	3,289	2.63
3	Average	7,718	6.17
4	Total	92,610	74.09

2. Various Measures Adopted for Energy Conservation

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3	Apr-19	10225	134103
4	Mar-19	9056	114023
5	Feb-19	4939	64983
6	Jan-19	5480	70808
7	Dec-18	4423	62424
8	Nov-18	3289	45586
9	Oct-18	8085	105423
10	Sep-18	9169	112921
11	Aug-18	10377	161821
12	Jul-18	8542	92102
	Total	**92,610**	**12,13,453**

Variation in energy consumption is as follows,

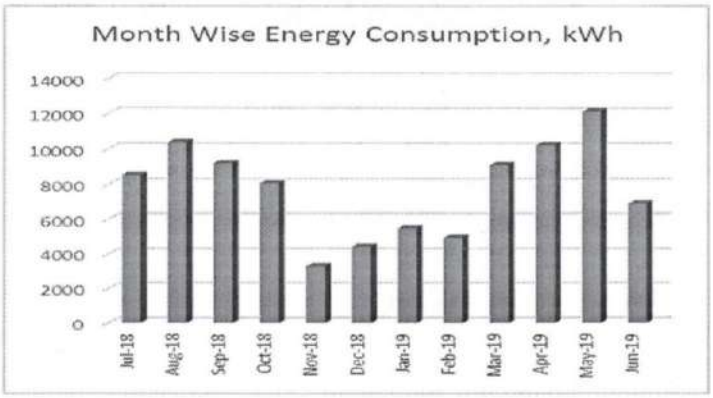


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

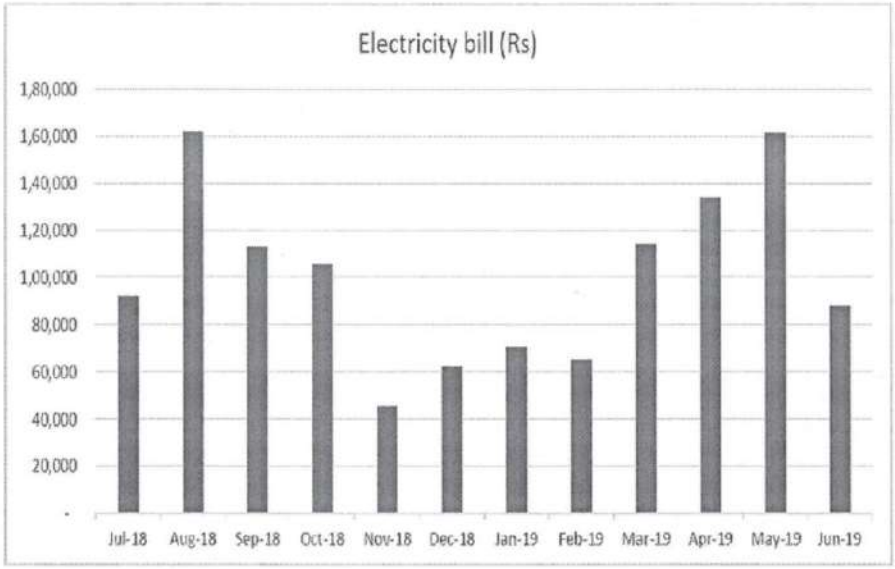


Figure 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emmision (MT)
1	Maximum	12,139	9.71
2	Minimum	3,289	2.63
3	Average	7,718	6.17
4	Total	92,610	74.09

3. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 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 CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.

Based on the above Data we compute the CO_2 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	CO2 Emissions, MT
1	Jun-19	6,886	5.51
2	May-19	12,139	9.71
3	Apr-19	10,225	8.18
4	Mar-19	9,056	7.24
5	Feb-19	4,939	3.95
6	Jan-19	5,480	4.38
7	Dec-18	4,423	3.54
8	Nov-18	3,289	2.63
9	Oct-18	8,085	6.47
10	Sep-18	9,169	7.34
11	Aug-18	10,377	8.30
12	Jul-18	8,542	6.83
	Total	**92,610**	**74.09**

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

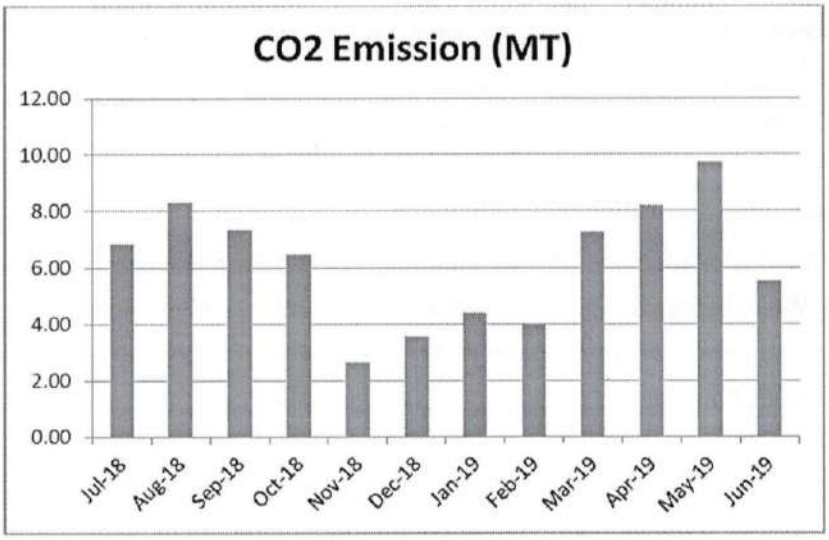


Figure 3.1: Month wise CO2 Emission

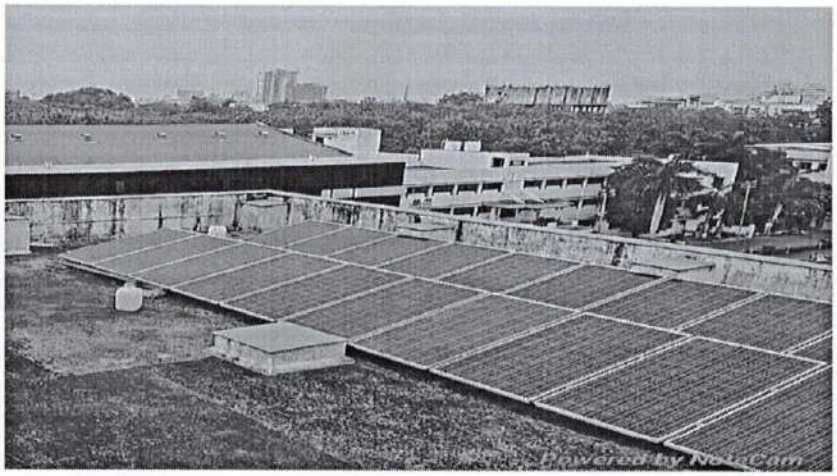
4. Study of Usage of Alternate Energy

In this Chapter, we compute the percentage of Usage of Alternate/Renewable Energy to Annual Energy Requirement of the College. The College has installed Solar PV System of 64kW capacity. The college has also installed 10,000 liters capacity Solar Thermal Hot Water system on hostel campus.

Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	92,610	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	96000	kWh/Annum
3	Total Energy Requirement of College	188,610	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	51	%

Photograph of Solar PV plant



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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

6. Study of Waste Management

6.1 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.

6.2 e-Waste Management

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

7. Study of Green Practices

7.1 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.

7.2 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.

7.3 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

7.4 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

7.5 Paperless Office

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

7.6 Green Landscaping with Trees and Plants

The Institute has beautiful maintained Garden.

Figure 7.1: Beautiful maintained Garden of college

Report

On

Environmental Audit

At

Shri Shivaji Education Society Amravati's

Science College

Nagpur

(Year 2023-24)

Prepared by

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,

Sus Road, Sus, Pune 411 021

Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

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Shri Shivaji Education Society Amravati's Science 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 CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (kWh)	CO2 Emission (MT)
1	Maximum	569	0.46
2	Minimum	164	0.13
3	Average	236	0.19
4	Total	2,829	2.26

3. The various projects already implemented for Environmental Conservation:

- Usage of Energy Efficient BEE STAR Rated ACs
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting
- Installation of 65 **kW** Solar PV Power Plant.

4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.

5. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere
2. 1 kWp Solar PV plant generates 5 kWh/day Electrical Energy for 300 days in an year.

Abbreviations

AC	:	Air conditioner
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CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
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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 existsamong 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 variousenvironmental 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
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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
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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
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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	Shri Shivaji Education Society Amravati's Science College, Nagpur

2	Address	Shri Shivaji Education Society Amravati's Science College, Nagpur, Congress Nagar, Nagpur
3	Affiliation	R. T. M. Nagpur University, Nagpur

Study of Consumption of Various Resources

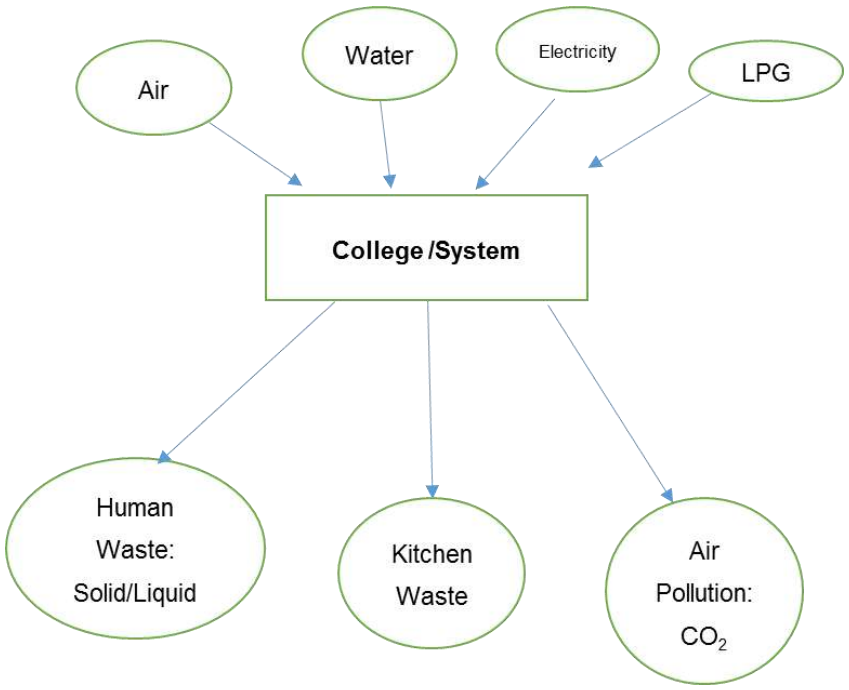
The Institute consumes following basic/derived Resources:

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-24	216
2	May-24	242
3	Apr-24	248
4	Mar-24	236
5	Feb-24	181
6	Jan-24	173
7	Dec-23	181
8	Nov-23	164
9	Oct-23	193
10	Sep-23	569
11	Aug-23	248
12	Jul-23	178
	Total	**2,829**
	Maximum	569
	Minimum	164
	Average	236

2.1 Variation of Monthly Electrical Energy Consumption

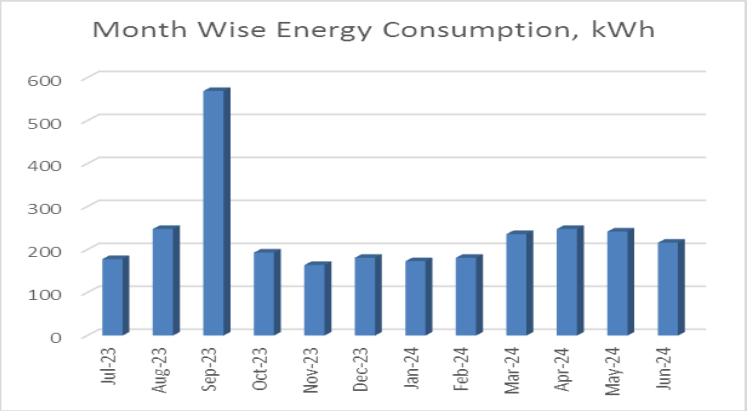


Figure 2.1 : Monthly Electrical Energy Consumption

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**	569
2	**Minimum**	164
3	**Average**	236
4	**Total**	2,829

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 CO_2 in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO_2 in the atmosphere

In the following Table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jun-24	216	0.17
2	May-24	242	0.19
3	Apr-24	248	0.20
4	Mar-24	236	0.19
5	Feb-24	181	0.14
6	Jan-24	173	0.14
7	Dec-23	181	0.14
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9	Oct-23	193	0.15
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	Total	**2,829**	**2.26**
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In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

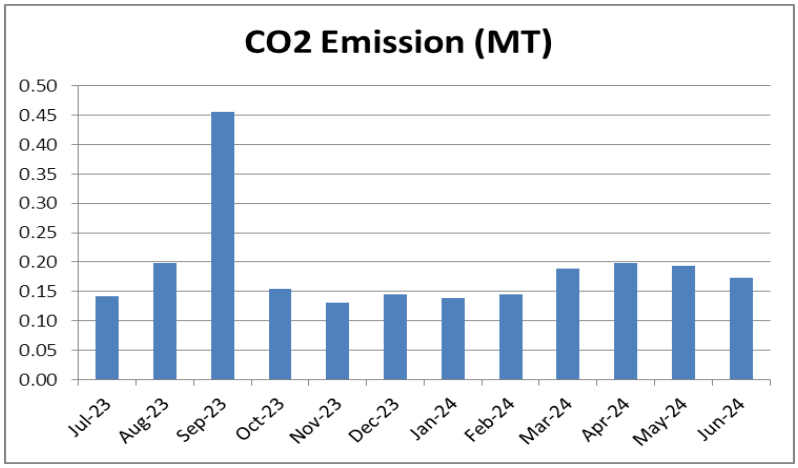

Figure 2.1: CO2 emission due to usage of electrical energy.

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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

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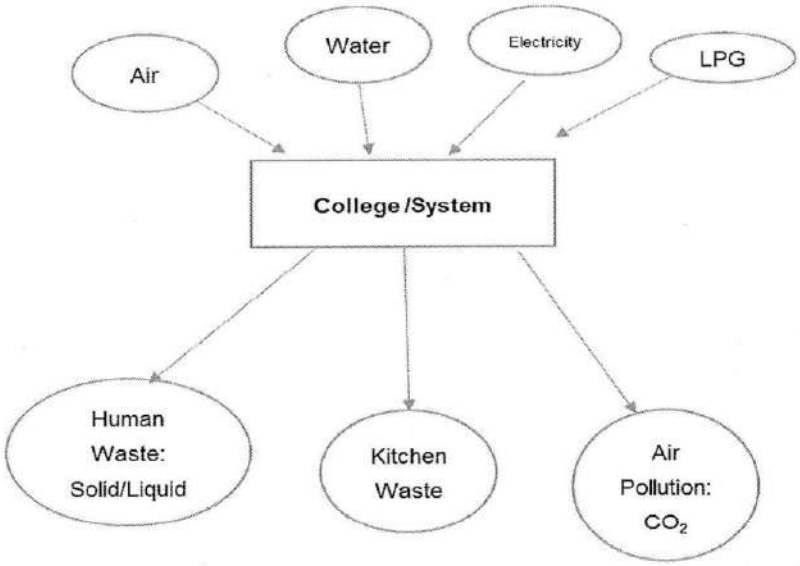

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2	May-23	4972
3	Apr-23	6217
4	Mar-23	5145
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6	Jan-23	3278
7	Dec-22	2632
8	Nov-22	2274
9	Oct-22	234
10	Sep-22	2838
11	Aug-22	1852
12	Jul-22	1972
	Total	**40,780**
	Maximum	6,217
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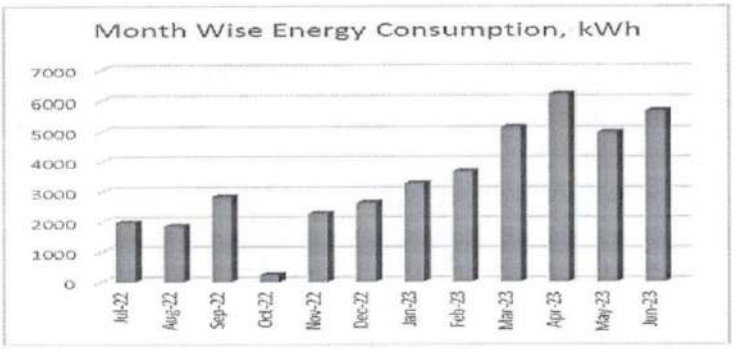

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5	Feb-23	3,675	2.94
6	Jan-23	3,278	2.62
7	Dec-22	2,632	2.11
8	Nov-22	2,274	1.82
9	Oct-22	234	0.19
10	Sep-22	2,838	2.27
11	Aug-22	1,852	1.48
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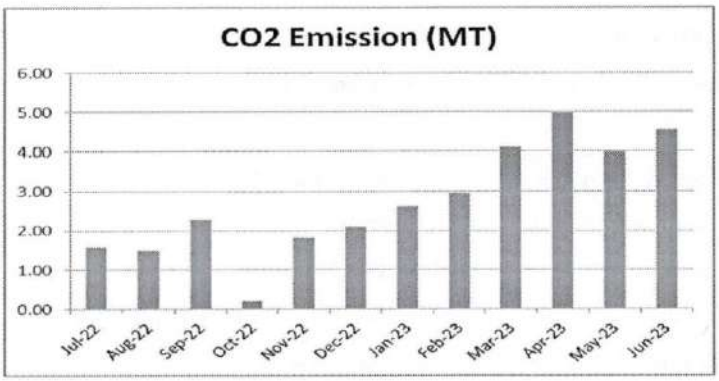

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After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on Natural resources & reduce the pollution.

Shri Shivaji Education Society Amravati's Science 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 CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
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2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (kWh)	CO2 Emission (MT)
1	Maximum	9,278	7.42
2	Minimum	248	0.20
3	Average	3,184	2.55
4	Total	38,202	30.56

3. The various projects already implemented for Environmental Conservation:

- Usage of Energy Efficient BEE STAR Rated ACs
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting
- Installation of 65 **kW** Solar PV Power Plant.

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Abbreviations

AC	:	Air conditioner
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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

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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	Shri Shivaji Education Society Amravati's Science College, Nagpur
2	Address	Shri Shivaji Education Society Amravati's Science College, Nagpur, Congress Nagar, Nagpur
3	Affiliation	R. T. M. Nagpur University, Nagpur

2. Study of Consumption of Various Resources

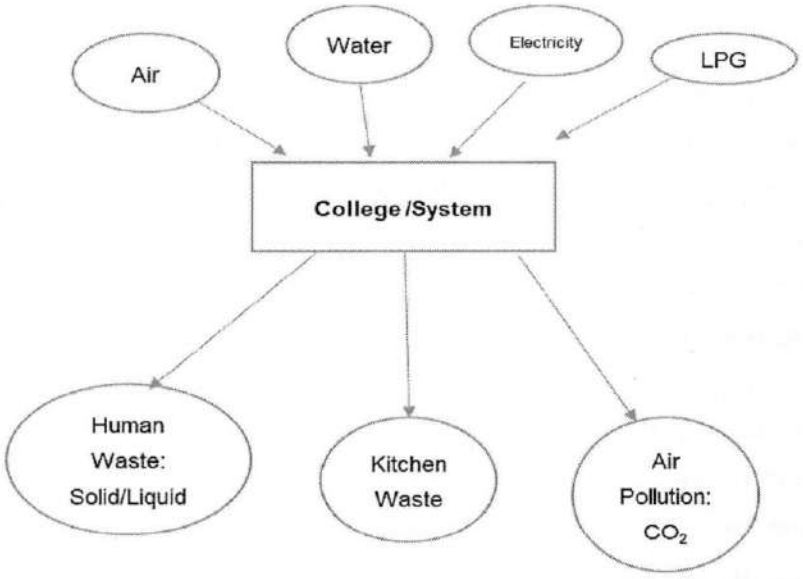
The Institute consumes following basic/derived Resources:

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.



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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	266
2	May-22	248
3	Apr-22	9278
4	Mar-22	7047
5	Feb-22	2010
6	Jan-22	2404
7	Dec-21	2747
8	Nov-21	2478
9	Oct-21	4069
10	Sep-21	3625
11	Aug-21	1961
12	Jul-21	2069
	Total	38,202
	Maximum	9,278
	Minimum	248
	Average	3,184

2.1 Variation of Monthly Electrical Energy Consumption

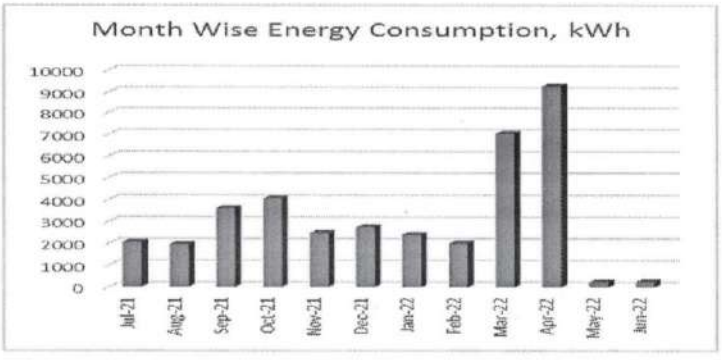

Figure 2.1 : Monthly Electrical Energy Consumption

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**	9,278
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In this Chapter, we present the various types of Pollution as under:

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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 CO_2 in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO_2 in the atmosphere

In the following Table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jun-22	266	0.21
2	May-22	248	0.20
3	Apr-22	9,278	7.42
4	Mar-22	7,047	5.64
5	Feb-22	2,010	1.61
6	Jan-22	2,404	1.92
7	Dec-21	2,747	2.20
8	Nov-21	2,478	1.98
9	Oct-21	4,069	3.26
10	Sep-21	3,625	2.90
11	Aug-21	1,961	1.57
12	Jul-21	2,069	1.66
	Total	**38,202**	**30.56**
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In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

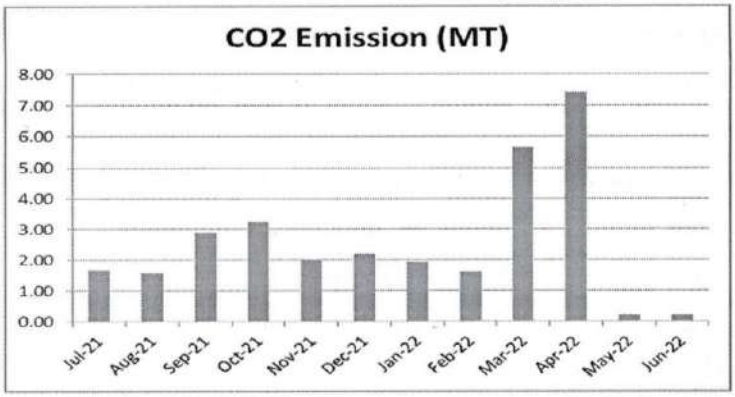

Figure 2.1: CO2 emission due to usage of electrical energy.

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

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

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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.

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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.

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Prepared by

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A 703, Balaji Witefield, Near Sunni's World,

Sus Road, Sus, Pune 411 021

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2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (kWh)	CO2 Emission (MT)
1	Maximum	4,603	3.68
2	Minimum	1,910	1.53
3	Average	3,211	2.57
4	Total	38,532	30.83

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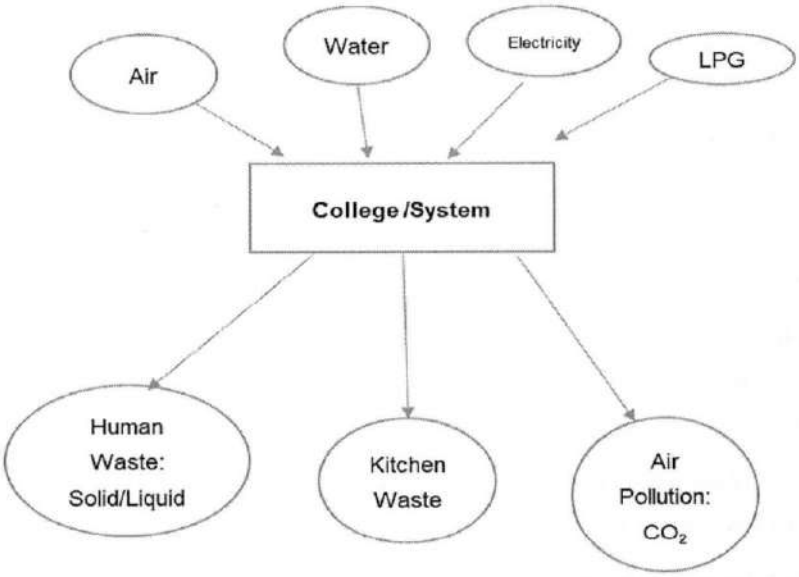

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No	Month	Energy (kWh)
1	Jun-21	3443
2	May-21	4603
3	Apr-21	1910
4	Mar-21	3221
5	Feb-21	4026
6	Jan-21	3949
7	Dec-20	3933
8	Nov-20	3820
9	Oct-20	2472
10	Sep-20	2528
11	Aug-20	2087
12	Jul-20	2540
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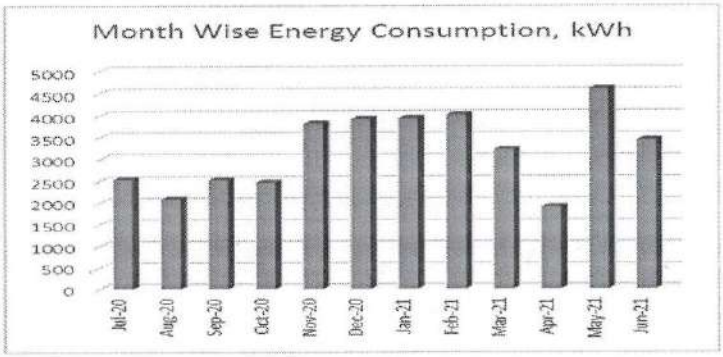

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2	May-21	4,603	3.68
3	Apr-21	1,910	1.53
4	Mar-21	3,221	2.58
5	Feb-21	4,026	3.22
6	Jan-21	3,949	3.16
7	Dec-20	3,933	3.15
8	Nov-20	3,820	3.06
9	Oct-20	2,472	1.98
10	Sep-20	2,528	2.02
11	Aug-20	2,087	1.67
12	Jul-20	2,540	2.03
	Total	**38,532**	**30.83**
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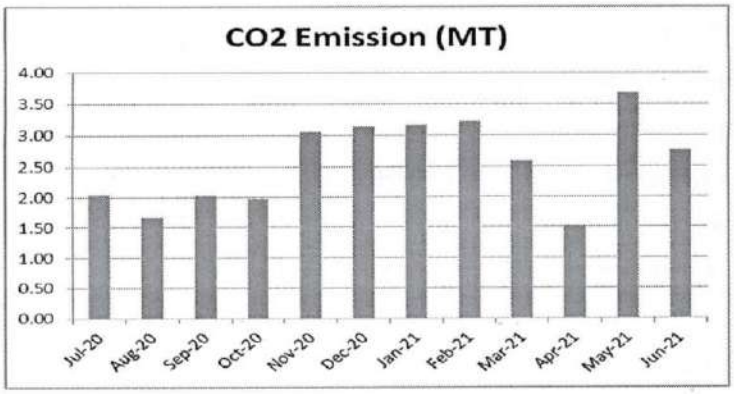

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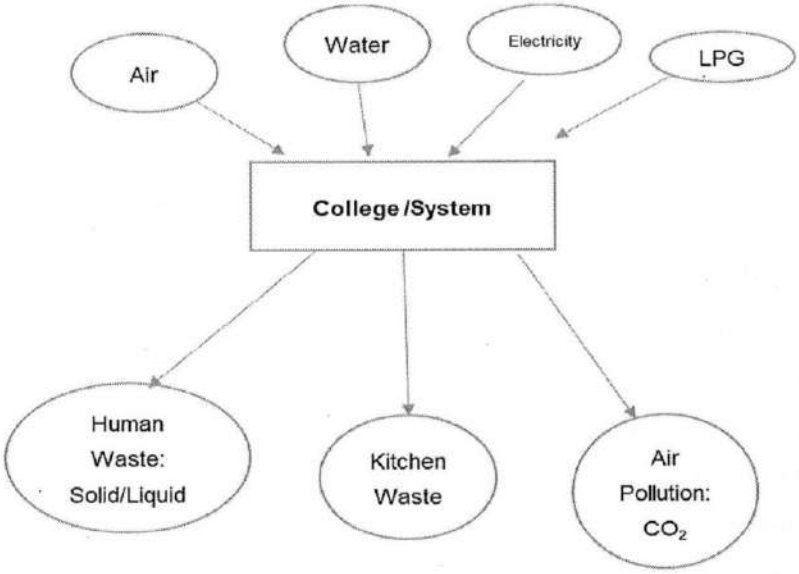
3. Air pollution

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-20	7517
2	May-20	2540
3	Apr-20	2540
4	Mar-20	4481
5	Feb-20	4481
6	Jan-20	5361
7	Dec-19	3969
8	Nov-19	5579
9	Oct-19	5806
10	Sep-19	8923
11	Aug-19	6970
12	Jul-19	7331
	Total	**65,498**
	Maximum	8,923
	Minimum	2,540
	Average	5,458

2.1 Variation of Monthly Electrical Energy Consumption

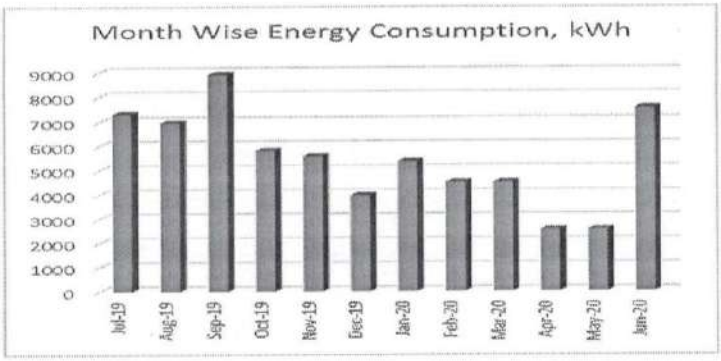


Figure 2.1 : Monthly Electrical Energy Consumption

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**	8,923
2	**Minimum**	2,540
3	**Average**	5,458
4	**Total**	65,498

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 CO_2 in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO_2 in the atmosphere

In the following Table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jun-20	7,517	6.01
2	May-20	2,540	2.03
3	Apr-20	2,540	2.03
4	Mar-20	4,481	3.58
5	Feb-20	4,481	3.58
6	Jan-20	5,361	4.29
7	Dec-19	3,969	3.18
8	Nov-19	5,579	4.46
9	Oct-19	5,806	4.64
10	Sep-19	8,923	7.14
11	Aug-19	6,970	5.58
12	Jul-19	7,331	5.86
	Total	**65,498**	**52.40**
	Maximum	8,923	7.14
	Minimum	2,540	2.03
	Average	5,458	4.37

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

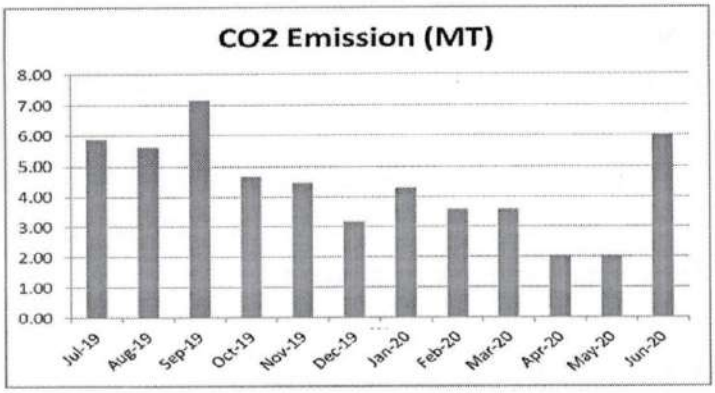


Figure 2.1: CO2 emission due to usage of electrical energy.

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.

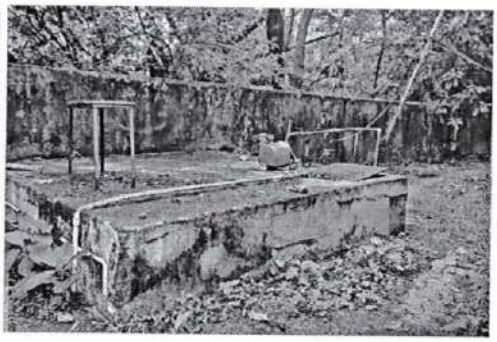
3.4 Study of e-Waste Management:

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 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.

Deputy Director, Social Forestry Division, Nagpur
Green Audit

No.SFR/N/2018-19/35 Nagpur, Dated 30.03.2019

1. Name of the Institute: **Shri Shivaji Education Society**
Amravati S Science College, Nagpur
2. Place: Congress Nagar, Nagpur -12
3. Period of Audit 2018-19
4. Site of Activities in premises of college
a) Front view of college
b) New building back side
c) Besides play ground, peripheral side
d) Botanical Garden

Environmental Activities

Polythene waste
Wet and dry waste segregation

Plantation Activities Taken 2018-19

5. Visit to the Institution
i. Shri Subhash Dongare,Publicity Officer, Maharashtra State , Nagpur
ii. Shri Sudhir J. Bawankar, Former Sub Divisional Forest Officer, Allapalli Forest division, Dist. Gadchiroli.
iii. Shri Rajan D Talmale, Assistant Director,Social Forestry Dn., Nagpur.
iv.Shri Dilip Chinchmalatpure, Landscape consultant & member of Maharashtra State Eco-tourism Board
6. Green and Environmental Activities of the college

I. Plantation Activities Taken

Review of previous plantation

i) Areca Palm sp. as ornamental plant are 150 in number and well developed.
ii) Nut Palm sp. approximately 60-80 in number attained the height upto 4 metres.
iii) The seedling of Jamun (*Eugenia jumbolina*) planted in the year 2015-16 along the back side of the old building and periphery of playground.
iv) Ornamental shrubs *Ficus benjamina, Bougainvillea* are in healthy condition.

II. Tree plantation programme observed in college premises by planting *Spathodia companulata* in year 2016 are well developed.

III. Activities in the Botanical Garden (Retained & Maintained)

i. Small pond existence for Hydrophytes- *Pistia, Hydrilla, Nymphea, Eichornia* etc.

ii. Wet & dry waste segregated.

iii. Polythene bags & other waste disposed off.

IV. Conservation and maintenance of planted tree upto 2018-19

1) In college premise old trees are well conserved along with fruit trees attained full grown height.

i. Front part of entrance

(a) Ashoka (*Polyalthia* longifolia)	17
(b) Royal Palm sp.	04
(c) *Phoenix sylvestris*	01
(d) Areca nut palm sp.	37

These trees enhances look of the entrance & still maintained

ii. Botanical Garden

a) Ashoka (*Polyalthia* sp.)	03
b) Royal Palm sp.	02
c) *Callindra* sp.	02
d) Gold mohar (*Delonix regia*)	03
e) Amaltash (*Cassia fistula*)	02
f) Semal (*Bombax ceiba*)	01
g) Aam (*Mangifera indica*)	02
h) Spathodia (*Spathodia companulata*)	01
i) Sappataparni (*Alstonia scholaris*)	02
j) Kachnar (*Bauhinia variegata*)	02
k) *Morus alba*	01
l) *Phyllanthus emblica*	01
m) *Citrus cinensis*	01
n) *Bignonia* sp.	01
o) *Hamelia patens*	02
p) *Syzigium cumini*	01
q) *Euphorbia* sp.	01

iii. Front/ Back side of B Block (CBI side)

a) *Cycas revoluta*	01
b) *Areca* nut palm	07
c) Cork trees (*Millingtonia* hortensis)	01
d) *Azadirachta indica*	01
e) Guava (*Psidium guajava*)	01

Due to undergoing metro work besides B block, some plant species were uprooted & will be replanted after the completion of work.

iv. Back side of Old building (Block A)

a) *Cassia siamia* 01
b) *Azadirachta indica* 01
c) *Lagerstroemia speciosa* 02
d) Spathodia (*Spathodia companulata*) 01
e) *Syzigium cumini* 05

All these above trees were planted in past some years ago were properly maintained, due to which heighted shady trees sheltered tired students, teachers and visitors under it in scorching summer and also imparts green look to college building.

v. Front/Back side of C Block (New Building) & Girls Hostel

a) *Peltoforum* sp. 01
b) *Dalbergia sisso* 01
c) *Leucaena* sp. 07
d) *Ailanthus* sp. 05
e) *Terminalia catapa* (Almond) 03
f) *Chamecostus* sp. (Insulin plant) 02
g) *Areaca* nut palm 17
h) *Mangifera indica* 01
i) *Azadiracta indica* 01
j) *Annona squamosa* 01
k) Spathodia (*Spathodia companulata*) 02
l) *Phoenix* sp. 01
m) *Ficus panda* 03
n) *Delonix regia* 02
o) *Murraya koenigii* 01

vi. Joint poarch of Old & New building

Ornamental Palm sp. planted in quarries & planters

a) *Areca* nut palm 42
b) *Acalypha* sp. 04

vii. Soil less rooftop organic farming/ Hydroponics- Seasonable Vegetable crops raised are *Spinach, Amaranthus, Trigonella, Brassica* sp., *Solanum melongena, Lycopersicon* sp., *Capsicum* sp. etc.

viii. Implemented the plan of 2017-18

As per plan, the college planted the saplings of seasonal flower species as annual, biannual and ornamental species along the college carries (planters) and before every department.

Flowering Sp. - *Dianthus, Carnation, Petunia, Chrysanthemum, Spathiphyllum* sp (Peace Lily) etc.

ix. Department of Botany promotes the environmental friendly activities, giving green message such as:

1. World nature conservation Day celebrated in the college on 04/08/2018. Dr Prakash Itankar, Assistant Prof. (Sr. Gr.), Pharmaceutical Sciences, RTM Nagpur University, Nagpur was the chief guest.

a) Vermicompost at Golden Park, Besa, Manewada.
b) Mushroom cultivation as a solid waste management
c) Environmental studies projects are prepared on paper files without the use of plastic.
d) Polyhouse technique & Cold storage
e) Eco-friendly Dry Holi celebration with natural colours prepared from plant.
f) Techniques for electronic herbarium and computer data base without the use of paper & plant.
g) Tree Plantation: The tree plantation programme organized by our college students in the month of July under NSS activity in the premises of deaf & dum students at Sahakar Nagar, Nagpur. The students of our college along with the Deaf & Dum School planted 60 plants and maintained.

2. Non renewable energy resources & moisture conservation development activities developed

1. Solar electric panel of 36.48 kv installed on the terrace of building in 2016-17 in addition to existing 10kv & 17 kv generation unit still in good condition and well maintained in the current year.
2. Solar Street lights on the ground in good condition and fulfill the theme.
3. Installed LED lights in college building- C block still in use.
4. Rain water harvesting system installed at the new building, C block found to be satisfactory.
5. Soak pits for drain water are continuous in use to check the soil and water level condition.
6. The purified water on every floor setup by installing the water coolers are in use and well maintained.

IX Biodiversity thinking

College staff & students had given special emphasis on avian group in college area at various places ie on terrace, garden, shady places by Zoology department

The birds are provided water for drinking in earthen dishes & hanged to the object like tree twigs to some extent & also provide food grain & wastage food to the birds; fulfill the need of thirst & food. Birds are also eats fruits like mango, guava & young leaves.

Remarks: The college is playing great role in maintainance of healthy environment, pollution control & enhances the green activities are satisfactory. The institution is keen interested in every green chapter. In gross promote the new ideas in sharing alertness amongst the students.

Nagpur
Dated: 30/03/2019

(Shri R D Talmale)
Assistant Director
Social Forestry Division,
Nagpur.

Dr A A Halder
Coordinator, IQAC
Science College,
Congress Nagar. Nagpur

SEAL

Dr. O. S. Deshmukh
Principal
Science College,
Congress Nagar, Nagpur