VSPM Academy of Higher Education
Jawaharlal Nehru Arts, Commerce and Science College Wadi, Nagpur
Dist. Nagpur (Maharashtra) 440023

Criterion VII
Institutional Values and Best Practices

7.1 Institutional Values and Social Responsibilities

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

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

VSPM Academy of Higher Education Nagpur's

Jawaharlal Nehru Arts, Commerce and Science College, Wadi, Nagpur- 440023 (M.S.)

(Affiliated to RTM Nagpur University, Nagpur)

Website: www.jncwadi.ac.in E-mail: jnc.wadi@rediffmail.com Phone: (07104) 220963

Date: 10/09/2024

This document hereby confirms that the data enclosed, comprising information, supporting documents, numerical data, and reports, has been thoroughly examined and authenticated by both the IQAC and the Principal, and is deemed accurate.

Convenor
(IQAC)
JN. Arts, Comm. & Sci. College
Wadi, Nagpur

Principal
Jawaharlal Nehru Arts, Comm. & Sci.
College, Wadi, Nagpur

VSPM Academy of Higher Education Nagpur's

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GREEN AUDIT

VSPM Academy of Higher Education Nagpur's

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2023-24

REPORT

On

"GREEN AUDIT"

at

JAWAHARLAL NEHRU
ARTS, COMMERCE & SCIENCE COLLEGE

WADI, NAGPUR

YEAR 2023-24

Prepared by-

Infinite Energy Services

Energy Consultants, Auditors and Risk Assessor

Plot no. A1, G2, Irrigation colony

Trimurty Nagar, Nagpur- 440022 (M.S.)

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CONTENT

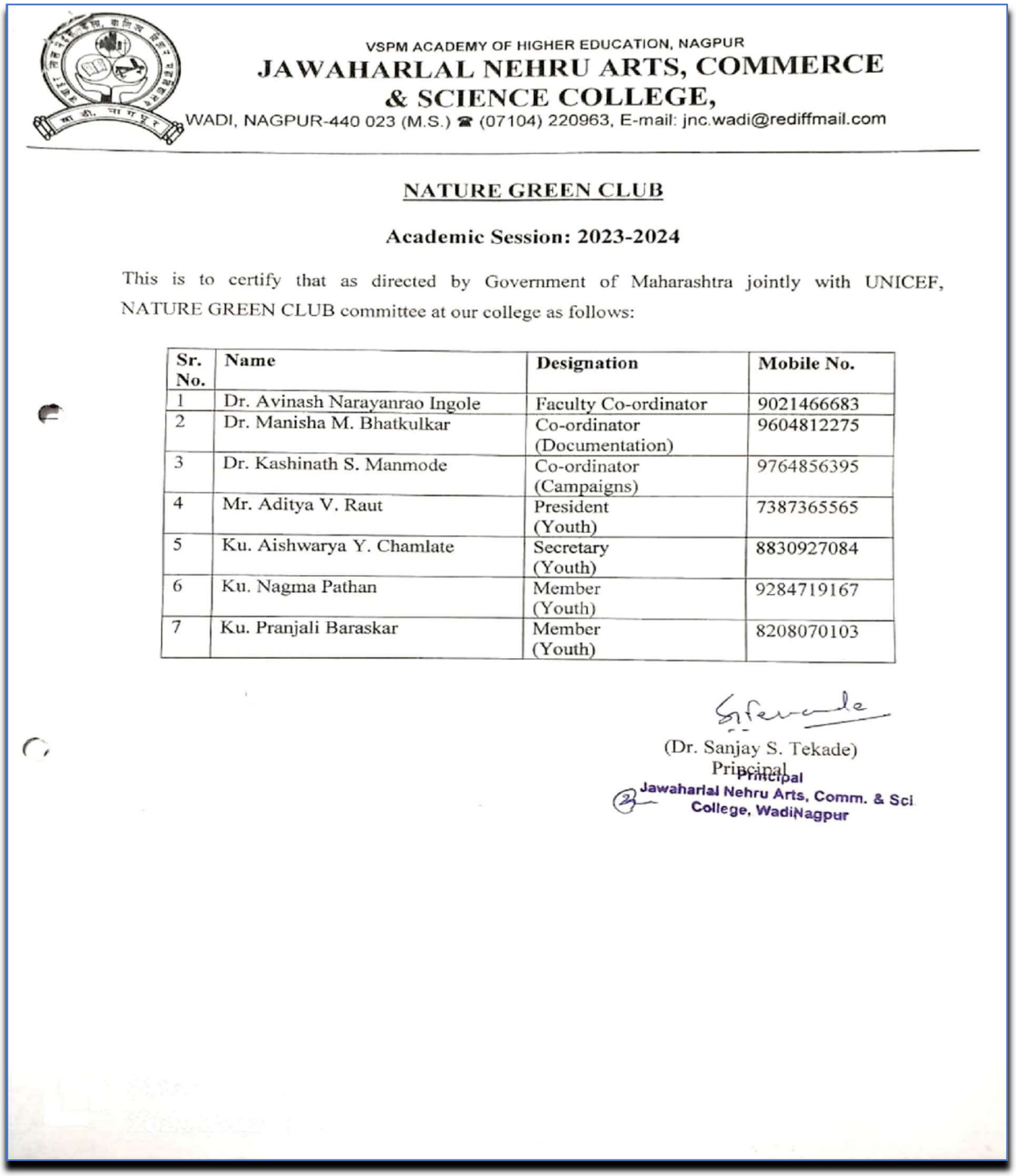
ACKNOWLEDGEMENT

Infinite Energy Services (IES), Nagpur, takes this opportunity to appreciate & thank to the management of ***Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur*** for giving us an opportunity to conduct Green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation during the course of study.

Prashant Akarte
B.E. (Electrical)
Certified Energy Auditor [EA-17568]
(BEE, Ministry of Power, Govt. of India)
Chartered Electrical Safety Engineer
Chartered Engineer (The Institution of Engineers (India)

NATURE GREEN CLUB FORMED AT COLLAGE LEVEL



VSPM ACADEMY OF HIGHER EDUCATION, NAGPUR

JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE,

WADI, NAGPUR-440 023 (M.S.) ☎ (07104) 220963, E-mail: jnc.wadi@rediffmail.com

NATURE GREEN CLUB

Academic Session: 2023-2024

This is to certify that as directed by Government of Maharashtra jointly with UNICEF, NATURE GREEN CLUB committee at our college as follows:

Sr. No.	Name	Designation	Mobile No.
1	Dr. Avinash Narayanrao Ingole	Faculty Co-ordinator	9021466683
2	Dr. Manisha M. Bhatkulkar	Co-ordinator (Documentation)	9604812275
3	Dr. Kashinath S. Manmode	Co-ordinator (Campaigns)	9764856395
4	Mr. Aditya V. Raut	President (Youth)	7387365565
5	Ku. Aishwarya Y. Chamlate	Secretary (Youth)	8830927084
6	Ku. Nagma Pathan	Member (Youth)	9284719167
7	Ku. Pranjali Baraskar	Member (Youth)	8208070103

(Dr. Sanjay S. Tekade)
Principal

Principal
Jawaharlal Nehru Arts, Comm. & Sci College, WadiNagpur

EXECUTIVE SUMMARY

Green Audit is the most efficient way to identify the strength and weakness of environmentally sustainable practices and to find a way to solve problem. The executive summary of the Green Audit report furnished in this section briefly gives the identified green initiative taken by college and further recommendation for green campus, solid waste management and their impact on carbon foot print in the campus.

GREEN INITIATIVE TAKEN BY THE COLLEGE

✓ DEVELOPMENT OF MEDICINAL PLANT AT COLLAGE CAMPUS

Department of Botany has performed activities for development of medicinal plants College has number of plants & trees in the campus. Its good initiative taken by the department under the collage for developing the medicinal plant in side the campus.

Medicinal plant development activity by students (Photo from college Library)


AZOLLA BIO-FERTILISER TANK DEVELOPMED AT COLLAGE CAMPUS

✓ QR CODE SYSTEM ON TREES

Collage has developed QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose of getting the plants information digitally as per recommendations of Green Audit report 2022-23.

✓ Liquid waste management

- Soak pits are made in all buildings of the college. The waste is drained after reasonable treatment. The drainage is maintained to collect urinals which are connected with these pits. The outlets of the urinals maintained such a way that the urine is drained in nearby municipal drain lines. College has already made provision for Rain water Harvesting to utilize the rain water for maintaining the water bed in earth.

✓ E-Waste management

- Computers, printers and other ICT equipment which cannot be used are sold to vendors for recycling or buy back schemes.

✓ The Biomedical Waste Management

- As college is tied up with nearby hospital for medical emergency, no first aid/ medical facility is available at college, hence no biomedical waste is generated inside the college campus.

✓ Hazardous chemicals and radioactive waste management

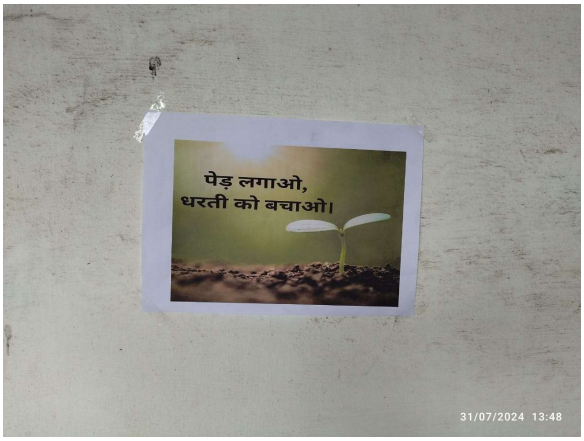
- Some of the chemicals are neutralized in lab and disposed them safely.
- Some chemical after washing laboratory utensils, are collected in neutralizing pit and dispose-off after neutralizing.

✓ Solid waste Management

- There are number of dust bins provided at number of places within the campus.

✓ Initiatives for awareness

- Collage management has displayed the sign boards throughout the campus regarding the importance of trees, Energy conservation etc as per the last year Green Audit recommendations.



Recommendation for Improvement

✓ Recommendation for Herbal & medicinal plants:

- List of recommended of herbal & medicinal plant in annexure list. College management can purchase above recommended plants in future plantation.

✓ SOLID WASTE MANAGEMENT:

Adopt 5 no's. Dustbin systems:

- College has single dustbin for collection of different type of waste generated by different activity in the campus. The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste material are collected and processed in environmentally friendly way in the College campus.
- It is recommended to adopt 5 no's dustbin systems for collection of different type of waste material.

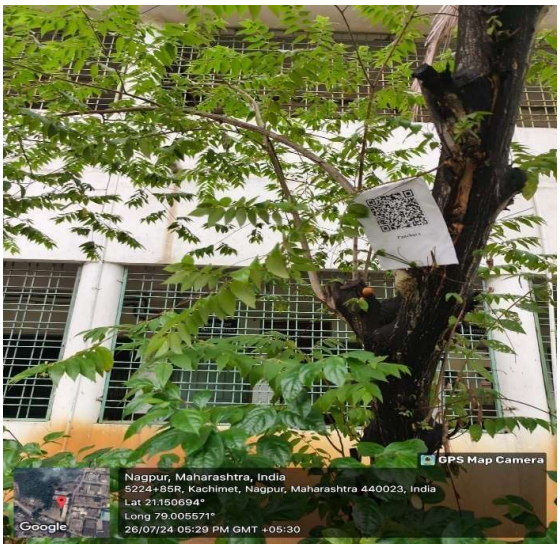
Organic converter for canteen area:

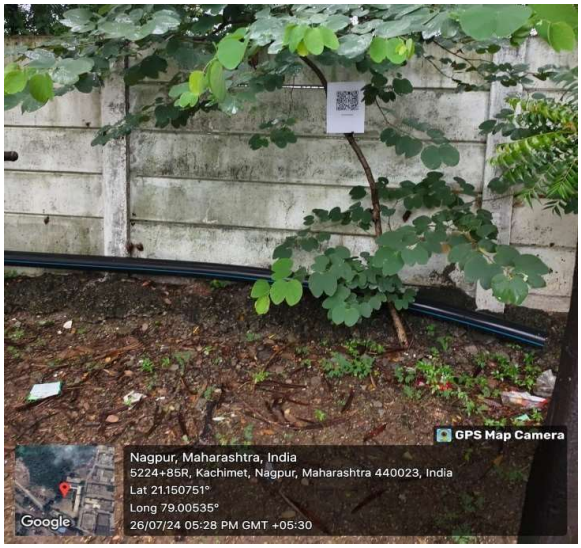
- The organic converter can be installed for waste generated in canteen area. The output of the organic converter is good manure for plant.

COLLEGE GREEN CAMPUS

10KWp PV ROOFTOP SOLAR SYSTEM INSTALLED

QR CODES IMPLEMENTATION (Few More Photos)



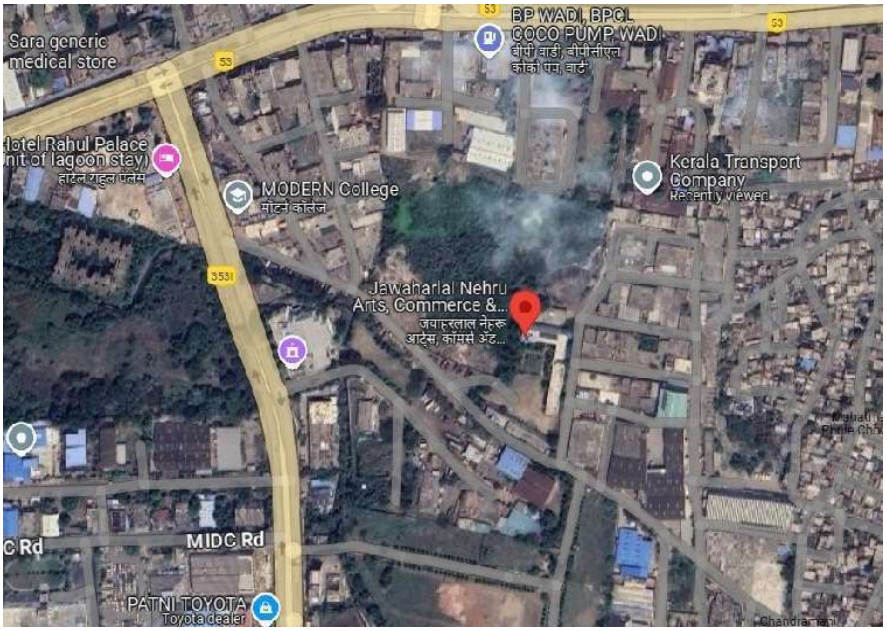


CHAPTER-1
INTRODUCTION

1.1 About College

Jawaharlal Nehru Arts, Commerce & Science College, is being run by the society, "VSPM Academy of Higher Education" founded by great visionary Hon'ble **Dr. Bhausaheb Bhoge** in 1990. The College has Arts, Commerce & science UG courses and Commerce PG courses affiliated to Nagpur University and under the guidance of collage Principal **Dr. Sanjay S. Tekade**. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great proud that at present the college runs eight subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Home Economics; six subjects at B.Com - English, Marathi, Hindi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Computer Science and Zoology; six subjects in PG Commerce Faculty – Adv. Financial A/c., Indian Financial Syst., Managerial Eco., Marketing Mang., Res. Methodology, Adv. Cost A/c., Co-Op. & Rural Development, Human Resource Management Adv. Mang. A/c., Tax Procedures & Practice, Comp. Appl. in Commerce, Service Sector Management Statistical Tech., International Business Environments, Entrepreneurship Development,

College has a pride to have NAAC accreditation grade B+ with CGPA 2.74. The college boasts on well- qualified and experienced teachers involved in promoting the research culture. The collage has well equipped Gymnasium and advance library open for student to develop personally and prepare for competitive exams. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region. College is situated at western part of Nagpur city in Wadi area near Hingna



Satellite image of college from google earth

WELL MAINTAINED COLLEGE CAMPUS

COLLEGE MISSION AND MISSION

College Vision

The vision of college is to create a centre of academic excellence in the field of higher education for student and equip them to be good responsible citizens of the country by developing in them skills and competencies necessary for self-employment and values necessary for life irrespective of region, religion, caste, economic strata so as to enhance standard of living in rural areas.

College Mission

The Mission of the college is to develop human resource with higher education, right skills, strength of character and positive attitude, The College endeavors to inculcate global competencies among student to help them meet rapidly changing global challenges by disseminating quality education to rural youths to foster development of the rural areas.

Goals and objectives of college:

- *To advance the cause of higher education among middle, lower income and below poverty line groups and among students coming from rural agrarian background and grassroots of the society.*
- *To inculcate in students respect for self-reliance, self-employment and dignity of labour.*
- *To provide ad environment which fosters continuous improvement and innovation with technical support and facility to enhance student and faculty effectiveness.*
- *To develop community orientation and civic responsibilities in their outlook.*
- *To develop an orientation towards the national and global needs as responsible citizens.*
- *To honour scholarship and outstanding achievements in academics, sports and extra-curricular activities.*
- *To develop amongst the students' academic and all-round competency.*
- *To ensure awareness to gender and right gender justice.*
- *To develop environmental awareness amongst students.*
- *To develop skilled personal through vocational and entrepreneurial education.*
- *To sensitize the students on socio-economic issues*
- *To uplift rural women who lack education opportunities.*
- *To empower rural people by providing them counselling and orientation programmes.*
- *To empower girl students / rural women through need-based, futuristic courses with entrepreneurial skills.*

Name of Departments

Courses	Teaching Department
Bachelor of Art (UG)	English, Marathi Hindi Economics Political Science History Geography Sociology.
Bachelor of Commerce (UG)	Commerce
Bachelor of Science (UG)-	Physics Chemistry Mathematics Botany Zoology Computer Science
Bachelor of Commerce (Computer Application) – B.C.C.A. (UG)	Commerce
Master of Commerce	Commerce

Other Departments

1. Department of Library Sciences and Learning Resources
2. Department of sports and Physical Education

1.2 About Infrastructure:

The college is spread over with plenty of area for academic along with small separate sports area and Library within same premises with plenty of space for reading and playing. Gymnasium is located in nearby separate building with sufficient space for exercise. The details of various department and building are given below.

Table 1 :- Name of the various building in the college

Sr.No.	Block
1	Admin building
2	Academic section
3	Class room, Principal office & Administration office
4	Library
5	Gymnasium

1.3 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment.

Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of college enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the College campus, vegetation, and carbon foot print of the campus etc. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.4 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on Plant & Trees, Alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

- To inculcate values of sustainable development practices through green audit mechanism.
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the College.

1.5 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Target areas included in this green auditing is plant trees, green energy and carbon foot print.

CHAPTER- 2
GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

Green Audit

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

a. Good Daylight Design and Ventilation
b. Water Efficiency
c. Wastewater Management
d. Indoor Air Quality
e. Energy Efficiency
f. On-site Energy Generation
g. Temperature and Acoustic Control
h. Paper Waste Management
i. E-Waste Management
j. Canteen and Solid Waste Management
k. Universal Access and Efficient Operation and Maintenance of Building
l. Green Belt
m. Green Programs (Green initiatives)

2.1 Good Daylight Design and Ventilation:

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
b) Curtains are provided on some of the windows to avoid glare.
c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
d) Stair cases receive daylight through windows provided at various levels.
e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.

Chemistry Laboratory with good daylight and ventilation arrangement

2.2 Water Efficiency:

a. Submersible pump is used for water supply in the campus
b. For drinking water supply, Common RO plant and water coolers are installed at various location in the campus.
c. Currently water meter is not installed to monitor the quantity of water extracted.
d. It is recommended water meter to be installed and daily/monthly water consumption to be recorded.
e. Rain water harvesting system is installed in the campus.
f. Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimizing the water footprint of the institute.
g. Normally mops are used for floor cleaning and hose is used for cleaning once a week
h. Dual flushing system is not provided in the washrooms.
i. Signage are not provided in washrooms emphasizing water conservation.
j. Water from air conditioning unit and reject water from water purifiers is used for watering plants within premises.

2.3 Wastewater Management:

a) Sanitary wastewater generated from washrooms is discharged into septic tank
b) Wastewater/ sewage recycle is not practiced in the College as grey water/ sewage treatment/recycle facility is not provided.
c) Sewage Treatment plant should be provided and all water to be recycle

2.4 Indoor Air Quality:

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

Major observations under indoor air quality are as below:

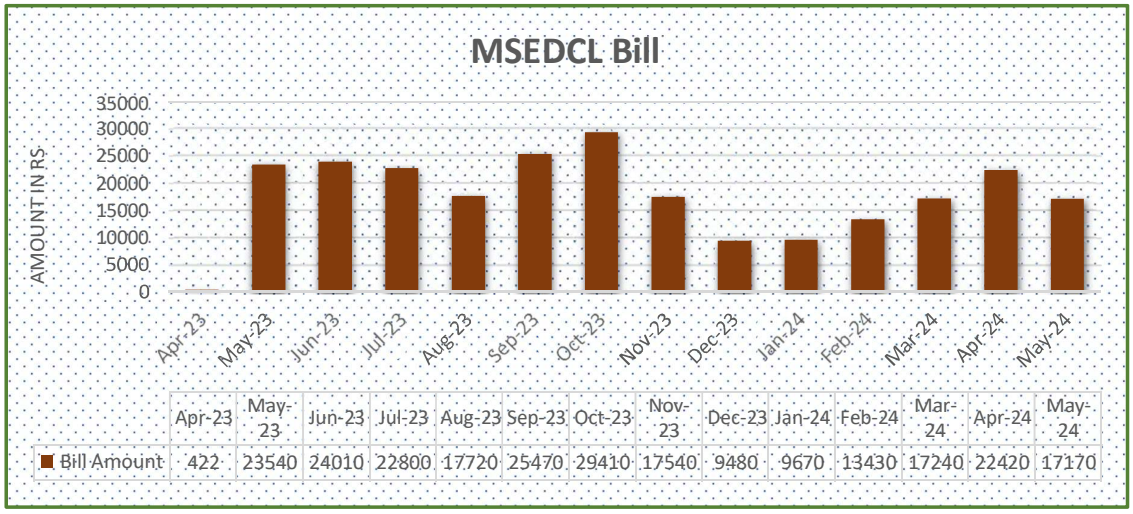
a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans.
b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split and Windows Air conditioner are used at offices.
c) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits.
d) Exhaust fans are provided in labs.
e) IAQ awareness signage was missing in College. Information on sources, impacts and mitigation of indoor air pollution to be displayed within Collage for increasing awareness about indoor air pollution.

2.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are Windows and Split AC, Submersible Motor, Motors, Air Cooler, RO Plant, Desktop, Printer, Fan, Tube light, LED Bulb, Halogen Bulb, Mercury Bulb, Mosquito Replete, Fire Alarm System.

Following is details of energy consumption



	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24
Bill Amount	422	23540	24010	22800	17720	25470	29410	17540	9480	9670	13430	17240	22420	17170

College has installed on grid rooftop PV solar power plant of 10KWp capacity in March 2018 and it is generating the power to fulfil the college power demand and excess power is being imported from MSEDCL.

It was observed that:

a) LED tube lights & fans are installed in classrooms and labs. CFL and conventional tube lights are also used. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.

b) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.

2.6 On Site Energy Generation (usage of LPG/ Natural Gas):

a) Canteen facility having only dry snacks is available in college campus

b) Back Up diesel generators of rating 25KVA is available for emergency which is using average 50 Liters of diesel in a year.

2.7 Temperature and Acoustic Control

a) Required White washing of rooms & corridors and white/ off-white flooring to improve the lighting conditions.

b) The major area of college campus is developed as green initiatives.

2.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage.

It was observed that:

a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy.

b) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.

c) Paper notices are displayed on the notice boards. Most of the storage is in library and staff room. After couple of years, old submissions and answer papers will be archived and stored in record room.

d) Internal notices and communications are through E-mail/SMS or printing on other side of used paper.

e) Old papers are given to vendor in exchange of new papers, in the ratio.

2.9 E-Waste Management:

a) College is digitalized to a some extent. This includes classrooms, library, internal mails etc.

b) E-waste is collected and stored in respective department. Once in a year this e-waste is collected from respective department and given to vendor

2.10 Solid Waste Management:

It was observed that:

a) Wet waste and dry waste segregation is not properly practiced in the premises. Separate bins are to be provided for wet biodegradable and dry recyclable waste.

b) Biodegradable waste is mainly generated from plants.

c) The Biodegradable waste is kept in forest area and over period of time it is converted into manure.
d) Scrapped benches are repaired and reused. After total damage, it is being sold to vendors for proper disposal.

2.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible. Staircase is provided for staff and students.
b) Fire extinguishers and fire hydrants are provided in few areas for emergency. They are to be inspected and serviced by fire protection service company annually.
c) There is no signage for emergency fire exit. This is of crucial importance during emergency.

2.12 Green belt/ Landscaping:

a) Big trees are already planted in the premises. Plantation also helps maintaining lower temperatures of the area.
b) Potted plants are kept at the back side which are brought indoors on certain occasions.
c) Indoor plants are being kept along the corridors and entrance of the building.

2.13 Green Initiatives:

College is regularly celebrating Environment Day, and Earth Day in college premises for developing awareness along with tree plantation is being done by college staff as well students. Also signage boards are displayed in corridors for environmental awareness.

CHAPTER-03
CARBON FOOT PRINT

3.1 About carbon foot print

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO2).

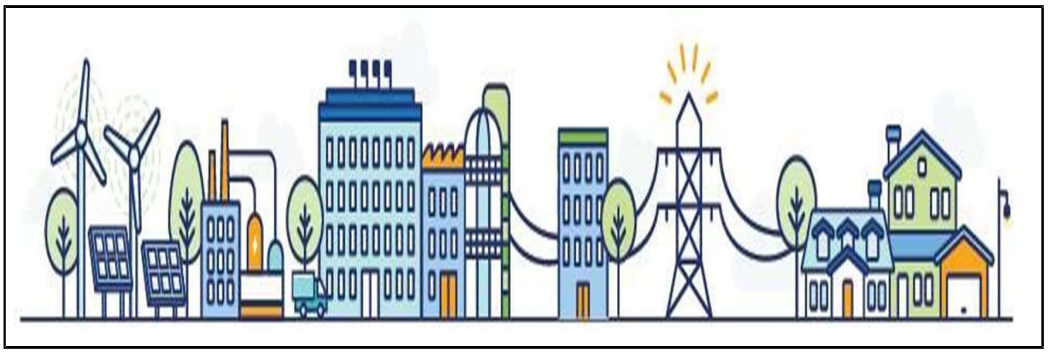
Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO2) produced through the burning of fossil fuels and is expressed as a weight of CO2emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…



3.2 Methodology and Scope

The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO2 -equivalents and it is based on reported data from internal and external systems.

The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders.

The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064.

This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible.
The items quantified in this study are as classified under the ISO 14064 standards:

The report calculates the greenhouse gas emissions from the College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.

3.3 Carbon emission from electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region. Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.716 KgCO2/kWh

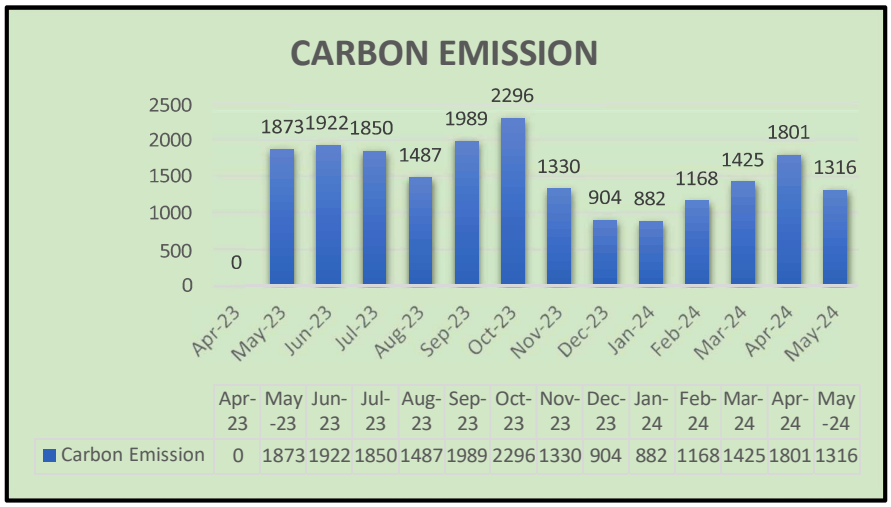
(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database https://cea.nic.in/wp-content/uploads/baseline/2024/01/User_Guide__Version_19.0.pdf) Electricity Purchased from the grid.

Table:- Electricity Purchased from the grid and Emissions from the electricity Import

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton CO_2e/year
1	Electricity 2023-24	28429	kWh	0.716	20.355
				Total	**20.355**

Table:-Electricity Generated from the grid and Emissions saved due to Solar Power

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton CO_2e/year
1	Electricity 2023-24	1772	kWh	0.716	1.269
				Total	**1.269**



CHAPTER- 4
RECOMMENDATIONS / SUGGESTIONS

4.1 Improving Energy Consumption:

i. Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
ii. Installation of automatic lights with sensors can be considered.
iii. Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.
iv. Conduct energy audit every years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.
v. For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
vi. Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use.
vii. Raise awareness:
   - Encourage students to help in monitoring energy consumption & implement corrective actions
   - Integrate energy education into classroom learning.

4.2 Water Conservation:

a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs apart from existing reminding sign boards.
b) Dry sweep or use a sponge broom when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.
c) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.

d) Dual flushing system can be installed for toilet flushing which saves considerable amount of water.

e) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

4.3 Paper and other Solid Waste Reduction:

a) Inventories of all solid waste generated in the premises must be maintained.

b) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.

c) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practiced. The SOP's may include collection, segregation and reuse of different types of wastes, if any (e.g. biodegradable waste for composting). This will help in safe disposal of waste to recycle agencies.

d) The college can introduce online app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.

e) Training as well as awareness programs should be organized on segregation of biodegradable waste and recycling of waste. Efforts should be taken to inform students about recycling options and signs should be posted on appropriate bins indicating what could be dumped in each bin.

4.4 Others:

i. Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.

ii. Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.

iii. Maintain minutes of meetings of environmental committees; evaluate the effectiveness of various environmental programs conducted by the institutes.

Set annual targets for Green Initiatives & monitor them closely. Create 'Green Champions'.

iv. Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.

v. Adopt environmentally responsible purchasing policy, and work towards creating and implementing

ANNEXURE 1
INDOOR GARDENING DETAILS

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Plants	VOC it removes	Indoor source of VOC's	Plant care
 **Aloe Vera**	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 **Bamboo Plant**	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
 **Chinese Evergreen**	Benzene	Paints	Low maintenance plant that prefers low light conditions.
 **English Ivy**	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

 **Janet Craig**	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Golden Pothos or Devils Ivy**	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.
 **Mass Cane**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Snake plant**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

 **Peace Lily**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
 **Red-edged Dracaena**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
 **Spider Plant**	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
 **Parlor Palm**	Purifies indoor air	-	Easy to maintain

VSPM Academy of Higher Education Nagpur's

Jawaharlal Nehru Arts, Commerce and Science College, Wadi, Nagpur- 440023 (M.S.)

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2022-23

REPORT

On

"GREEN AUDIT"

at

JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE

WADI, NAGPUR

YEAR 2022-23

Prepared by-

Infinite Energy Services

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CONTENT

ACKNOWLEDGEMENT

Infinite Energy Services (IES), Nagpur, takes this opportunity to appreciate & thank to the management of **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur** for giving us an opportunity to conduct Green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.

Sincerely,

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Certified Boiler Operation Engineer

EXECUTIVE SUMMARY

Green Audit is the most efficient way to identify the strength and weakness of environmentally sustainable practices and to find a way to solve problem. The executive summary of the Green Audit report furnished in this section briefly gives the identified green initiative taken by college and further recommendation for green campus, solid waste management and their impact on carbon foot print in the campus.

GREEN INITIATIVE TAKEN BY THE COLLEGE

✓ CAMPAIGN OF PLANTATION AND GREEN CAMPUS

College has number of plants & trees in the campus. Its good initiative taken by the management for green campus under the campaign of plantation.

Plantation by college faculties (Photo from college Library)

✓ Liquid waste management

- Soak pits are made in all buildings of the college. The waste is drained after reasonable treatment. The drainage is maintained to collect urinals which are connected with these pits. The outlets of the urinals maintained such a way that the urine is drained in nearby municipal drain lines. College has already made provision for Rain water Harvesting to utilize the rain water for maintaining the water bed in earth.

✓ E-Waste management

- Computers, printers and other ICT equipment which cannot be used are sold to vendors for recycling or buy back schemes.

✓ The Biomedical Waste Management

- As college is tied up with nearby hospital for medical emergency, no first aid/ medical facility is available at college, hence no biomedical waste is generated inside the college campus.

✓ Hazardous chemicals and radioactive waste management

- Some of the chemicals are neutralized in lab and disposed them safely.
- Some chemical after washing laboratory utensils, are collected in neutralizing pit and dispose-off after neutralizing.

✓ Solid waste Management

- There are number of dust bins provided at number of places within the campus.

Recommendation for Improvement

✓ **Recommendation for Herbal & medicinal plants:**

- List of recommended of herbal & medicinal plant in annexure list. College management can purchase above recommended plants in future plantation.

✓ **SOLID WASTE MANAGEMENT:**

Adopt 5 no's. Dustbin systems:

- College has single dustbin for collection of different type of waste generated by different activity in the campus. The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste material are collected and processed in environmentally friendly way in the College campus.
- It is recommended to adopt 5 no's dustbin systems for collection of different type of waste material.

Organic converter for canteen area:

- The organic converter can be installed for waste generated in canteen area. The output of the organic converter is good manure for plant.

QR CODE SYSTEM ON TREE: -

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

FIG: COLLEGE GREEN CAMPUS

CHAPTER-1
INTRODUCTION

1.1 About College

Jawaharlal Nehru Arts, Commerce & Science College, is being run by the society, "VSPM Academy of Higher Education" founded by great visionary Hon'ble Dr. Bhausaheb Bhoge in 1990. The College has Arts, Commerce & science UG courses and Commerce PG courses affiliated to Nagpur University and under the guidance of collage principal Dr. (Mrs) K.S. Borkar. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great proud that at present the college runs eight subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Home Economics; six subjects at B.Com - English, Marathi, Hindi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Computer Science and Zoology; six subjects in PG Commerce Faculty – Adv. Financial A/c., Indian Financial Syst., Managerial Eco., Marketing Mang., Res. Methodology, Adv. Cost A/c., Co-Op. & Rural Development, Human Resource Management Adv. Mang. A/c., Tax Procedures & Practice, Comp. Appl. in Commerce, Service Sector Management Statistical Tech., International Business Environments, Entrepreneurship Development,

College has a pride to have NAAC accreditation grade B+ with CGPA 2.74. The college boasts on well- qualified and experienced teachers involved in promoting the research culture. The collage has well equipped Gymnasium and advance library open for student to develop personally and prepare for competitive exams. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region. College is situated at western part of Nagpur city in Wadi area near Hingna MIDC

Figure: Satellite image of college from google earth

Vision

The vision of college is to create a centre of academic excellence in the field of higher education for student and equip them to be good responsible citizens of the country by developing in them skills and competencies necessary for self-employment and values necessary for life irrespective of region, religion, caste, economic strata so as to enhance standard of living in rural areas.

Mission

The Mission of the college is to develop human resource with higher education, right skills, strength of character and positive attitude, The College endeavours to inculcate global competencies among student to help them meet rapidly changing global challenges by disseminating quality education to rural youths to foster development of the rural areas.

Goals and objectives of college:

- *To advance the cause of higher education among middle, lower income and below poverty line groups and among students coming from rural agrarian background and grassroots of the society.*
- *To inculcate in students respect for self-reliance, self-employment and dignity of labour.*
- *To provide ad environment which fosters continuous improvement and innovation with technical support and facility to enhance student and faculty effectiveness.*
- *To develop community orientation and civic responsibilities in their outlook.*
- *To develop an orientation towards the national and global needs as responsible citizens.*
- *To honour scholarship and outstanding achievements in academics, sports and extra-curricular activities.*
- *To develop amongst the students' academic and all-round competency.*
- *To ensure awareness to gender and right gender justice.*
- *To develop environmental awareness amongst students.*
- *To develop skilled personal through vocational and entrepreneurial education.*
- *To sensitize the students on socio-economic issues*
- *To uplift rural women who lack education opportunities.*
- *To empower rural people by providing them counselling and orientation programmes.*
- *To empower girl students / rural women through need-based, futuristic courses with entrepreneurial skills.*

Name of Department

Teaching Departments	Course Name
English	B.Sc.
Economics	B.A
Political Science	B.COM
Library	M.Com
Physics	
Chemistry	
Mathematics	
Computer Science	
Botany	
Zoology	
Network Resource Center	
Marathi	
Geography	
Physical Education & Sports	
Humanities & Languages	
Learning Resource Center	

1.2 About Infrastructure:

The college is spread over with plenty of area for academic along with small separate sports area and Library within same premises with plenty of space for reading and playing. Gymnasium is located in nearby separate building with sufficient space for exercise. The details of various department and building are given below.

Table 1 :- Name of the various building in the college

Sr.No.	Block
1	Admin building
2	Academic section
3	Class room, Principal office & Administration office
4	Library
5	Gymnasium

Fig. - Some photos of college campus

1.3 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment.

Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of college enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the College campus, vegetation, and carbon foot print of the campus etc. The aim of green

auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.4 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on Plant & Trees, Alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

- To inculcate values of sustainable development practices through green audit mechanism.
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the College.

1.5 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Target areas included in this green auditing is plant trees, green energy and carbon foot print.

CHAPTER- 2
GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

Green Audit

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

a. Good Daylight Design and Ventilation
b. Water Efficiency
c. Wastewater Management
d. Indoor Air Quality
e. Energy Efficiency
f. On-site Energy Generation
g. Temperature and Acoustic Control
h. Paper Waste Management
i. E-Waste Management
j. Canteen and Solid Waste Management
k. Universal Access and Efficient Operation and Maintenance of Building
l. Green Belt
m. Green Programs (Green initiatives)

2.1 Good Daylight Design and Ventilation:

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
b) Curtains are provided on some of the windows to avoid glare.
c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
d) Stair cases receive daylight through windows provided at various levels.
e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.

Chemistry Laboratory with good daylight and ventilation arrangement

2.2 Water Efficiency:

a. Submersible pump is used for water supply in the campus
b. For drinking water supply, Common RO plant and water coolers are installed at various location in the campus.
c. Currently water meter is not installed to monitor the quantity of water extracted.
d. It is recommended water meter to be installed and daily/monthly water consumption to be recorded.
e. Rain water harvesting system is installed in the campus.
f. Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimizing the water footprint of the institute.
g. Normally mops are used for floor cleaning and hose is used for cleaning once a week
h. Dual flushing system is not provided in the washrooms.
i. Signage are not provided in washrooms emphasizing water conservation.
j. Water from air conditioning unit and reject water from water purifiers is used for watering plants within premises.

2.3 Wastewater Management:

a) Sanitary waste water generated from washrooms is discharged into septic tank
b) Wastewater/ sewage recycle is not practiced in the College as grey water/ sewage treatment/recycle facility is not provided.
c) Sewage Treatment plant should be provided and all water to be recycle

2.4 Indoor Air Quality:

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

Major observations under indoor air quality are as below:

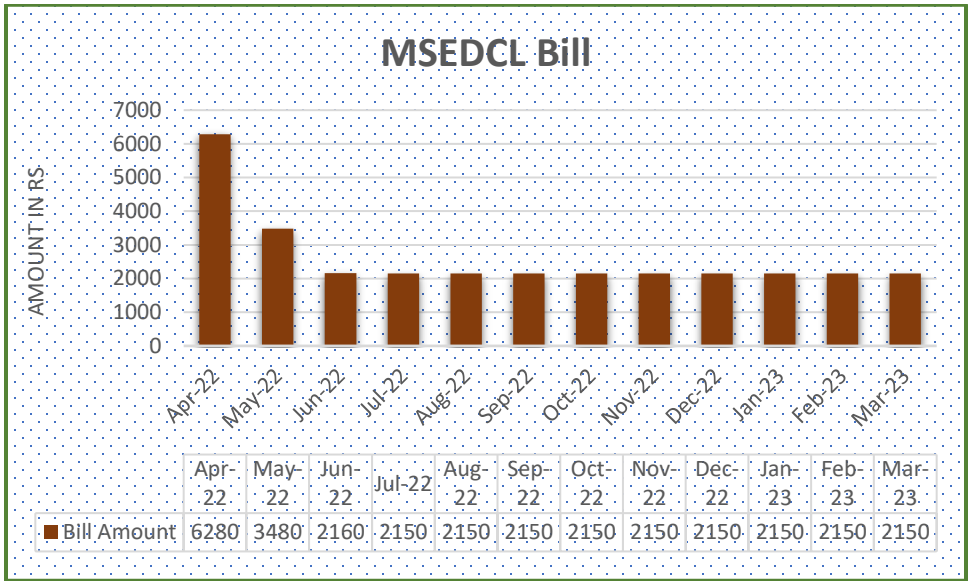
a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans.
b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split and Windows Air conditioner are used at offices.
c) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits.
d) Exhaust fans are provided in labs.
e) IAQ awareness signage was missing in College. Information on sources, impacts and mitigation of indoor air pollution to be displayed within Collage for increasing awareness about indoor air pollution.

2.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are Windows and Split AC, Submersible Motor, Motors, Air Cooler, RO Plant, Desktop, Printer, Fan, Tube light, LED Bulb, Halogen Bulb, Mercury Bulb, Mosquito Replete, Fire Alarm System.

Following is details of energy consumption



College has installed on grid PV solar power plant of 10KWp capacity in March 2018 and it is generating the power to fulfil the college power demand.

It was observed that:

a) LED tube lights & fans are installed in classrooms and labs. CFL and conventional tube lights are also used. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.

b) Signage are not present near every electrical switch board encouraging users to switch off light and fans to save electricity.

c) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.

d) The college is exporting power using solar power plant and is net zero in few months.

2.6 On Site Energy Generation (usage of LPG/ Natural Gas):

a) Canteen facility having only dry snacks is available in college campus

b) Back Up diesel generators of rating 25KVA is available for emergency.

2.7 Temperature and Acoustic Control

a) Required White washing of rooms & corridors and white/ off-white flooring to improve the lighting conditions.

b) The major area of college campus is developed as green initiatives.

2.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage.

It was observed that:

a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy.

b) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.

c) Paper notices are displayed on the notice boards. Most of the storage is in library and staff room. After couple of years, old submissions and answer papers will be archived and stored in record room.

d) Internal notices and communications are through E-mail/SMS or printing on other side of used paper.

e) Old papers are given to vendor in exchange of new papers, in the ratio.

2.9 Waste Management:

a) College is digitalized to a some extent. This includes classrooms, library, internal mails etc.

b) E-waste is collected and stored in respective department. Once in a year this e-waste is collected from respective department and given to vendor

2.10 Solid Waste Management:

It was observed that:

a) Wet waste and dry waste segregation is not properly practiced in the premises. Separate bins are to be provided for wet biodegradable and dry recyclable waste.

b) Biodegradable waste is mainly generated from plants.

c) The Biodegradable waste is kept in forest area and over period of time it is converted into manure.

d) Scrapped benches are repaired and reused. After total damage, it is being sold to vendors for proper disposal.

2.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible. Staircase is provided for staff and students.
b) Fire extinguishers and fire hydrants are provided in few areas for emergency. They are to be inspected and serviced by fire protection service company annually.
c) There is no signage for emergency fire exit. This is of crucial importance during emergency.

2.12 Green belt/ Landscaping:

a) Big trees are already planted in the premises. Plantation also helps maintaining lower temperatures of the area.
b) Potted plants are kept at the back side which are brought indoors on certain occasions.
c) Indoor plants are to be kept along the corridors and entrance of the building.

2.13 Green Initiatives:

College is regularly celebrating Environment Day, and Earth Day in college premises for developing awareness along with tree plantation is being done by college staff as well students.

CHAPTER-03
CARBON FOOT PRINT

3.1 About carbon foot print

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO2).

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO2) produced through the burning of fossil fuels and is expressed as a weight of CO2emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…

3.2 Methodology and Scope

The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO2 -equivalents and it is based on reported data from internal and external systems.

The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders.

The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064.

This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible.
The items quantified in this study are as classified under the ISO 14064 standards:

The report calculates the greenhouse gas emissions from the College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.

3.3 Carbon emission from electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region
Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit.

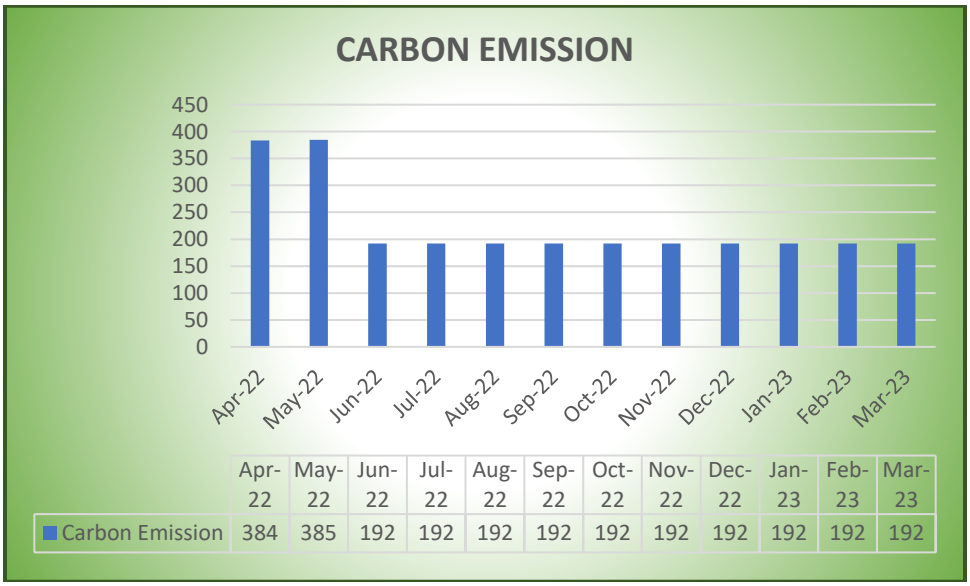
Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 KgCO2/kWh
(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_CO2/database_11.zip)Electricity Purchased from the grid

Table:- Electricity Purchased from the grid and Emissions from the electricity Import

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton CO_2e/year
1	Electricity 2022-23	2799	kWh	0.9614	2.691
				Total	**2.691**

Table:-Electricity Generated from the grid and Emissions saved due to Solar Power

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton CO_2e/year
1	Electricity 2022-23	8193	kWh	0.9614	7.876
				Total	**7.876**



CHAPTER- 4
RECOMMENDATIONS / SUGGESTIONS

4.1 Improving Energy Consumption:

i. Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
ii. Installation of automatic lights with sensors can be considered.
iii. Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.
iv. Conduct energy audit every years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.
v. For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
vi. Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use.
vii. Raise awareness:
   - Encourage students to help in monitoring energy consumption & implement corrective actions
   - Integrate energy education into classroom learning.

4.2 Water Conservation:

a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs apart from existing reminding sign boards.
b) Dry sweep or use a sponge broom when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.
c) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.
d) Dual flushing system can be installed for toilet flushing which saves considerable amount of water.

e) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

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 **English Ivy**	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

 **Janet Craig**	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Golden Pothos or Devils Ivy**	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.
 **Mass Cane**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Snake plant**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

 **Peace Lily**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
 **Red-edged Dracaena**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
 **Spider Plant**	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
 **Parlor Palm**	Purifies indoor air	-	Easy to maintain

ANNEXURE 2
GREEN AUDIT CHECKLIST

1. Water Management

S.N.	PARAMETERS	RESPONSE	REMARKS
1	Source of Water	Borewell	
2	No. of Wells/Bore Well	2	
3	No. of Motors Used	2	
4	Horse Power - (Motor)	3Hp	
5	Depth of Well/Bore Well	150 ft	
6	Water Level	100 ft	
7	Number of Water Tanks	2	
8	Capacity of Tank	20000 Ltr	
9	Quantity of water Pumped every day	10000 Ltr	
10	Any Water Wastage/why?	Nil	
11	Water usages for gardening	Yes	Water Sprinkler Installed
12	Waste water sources	Overflow	Water use for Garden
13	Use of waste water	Yes	Water use for Garden
14	Faith of Waste water from labs	No	
15	Whether waste water from labs mixed with ground water	No	
16	Any Treatment for lab water	No	
17	Whether any green chemistry method practiced in labs	No	
18	No. of water coolers	3	
19	Rain water harvest available?	Yes	
20	No. of units and amount of water harvested		
21	Any leaky taps	No	
22	Amount of Water lost per day	Nil	
23	Any water management plan used?	Yes	Water Sensor Installed
24	Any water saving techniques followed?	No	
25	Are there any signs reminding peoples to turn off the water?	Yes	

2. Energy Data

Rooms No.	Electrical Device/Items	Number	Power	Usage time (Hr/Day)
104	Tube Light	6	10 watt	6 Hrs/Day
	Fan	5	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
	Interactive Board	1	2 watt	2 Hrs/Day
103	Tube Light	6	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
101	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
201	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
202	Tube Light	4	10 watt	6 Hrs/Day
	Fan	3	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
203	Tube Light	6	10 watt	6 Hrs/Day
	Fan	6	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
	Interactive Board	1	2 watt	2 Hrs/Day
204	Tube Light	6	10 watt	6 Hrs/Day
	Fan	5	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
205	Tube Light	3	10 watt	6 Hrs/Day
	Fan	2	75 watt	6 Hrs/Day
207	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day

Item : Bulbs (CFL, Incandescent, LED), A/C, Fan, Computer, Instruments

3. Waste Management

Approximate quantity of waste generated per day (in kg)

Office				
Approx	**Biodegradable**	**Non-biodegradable**	**Hazardous**	**Others**
< 1 Kg	Yes	Nil	Nil	Nil
2-10 kg	---	---	---	---
> 10 kg	---	---	---	---

How the waste generated in the college is managed ?

	Yes/No	**Remark**
A) Composting/Vermicomposting	Yes	
B) Recycling	No	
C) Reusing	Yes	
D) Other ways	No	

Waste generated in the college ?

E-Waste	Yes	
Hazardous Waste	No	
Solid Waste	No	
Dry Leaves	Yes	
Canteen Waste	No	Only Dry Snacks
Liquid Waste	Yes	
Glass	No	
Un-used Equipment	Yes	
Napkins	No	
Other (Specify)		

Do you use recycled paper in college ?	No
Any Waste management methods used ?	Yes

VSPM Academy of Higher Education Nagpur's

Jawaharlal Nehru Arts, Commerce and Science College, Wadi, Nagpur- 440023 (M.S.)

(Affiliated to RTM Nagpur University, Nagpur)

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2021-22

REPORT

On

"GREEN AUDIT"

at

JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE

WADI, NAGPUR

YEAR 2021-22

Prepared by-

Orbit Energy & Engineering Services

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	GREEN Audit Report **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur Year 2021-22**	

CONTENT

	GREEN Audit Report **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur Year 2021-22**	

ACKNOWLEDGEMENT

Orbit Energy & Engineering Services (OEES), Nagpur, takes this opportunity to appreciate & thank to the management of **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur** for giving us an opportunity to conduct Green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.

Sincerely,

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	GREEN Audit Report **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur Year 2021-22**	

EXECUTIVE SUMMARY

Green Audit is the most efficient way to identify the strength and weakness of environmentally sustainable practices and to find a way to solve problem. The executive summary of the Green Audit report furnished in this section briefly gives the identified green initiative taken by college and further recommendation for green campus, solid waste management and their impact on carbon foot print in the campus.

GREEN INITIATIVE TAKEN BY THE COLLEGE

✓ CAMPAIGN OF PLANTATION AND GREEN CAMPUS

College has number of plants & trees in the campus. Its good initiative taken by the management for green campus under the campaign of plantation.

Plantation by college students (Photo from college Library)

✓ Liquid waste management

- Soak pits are made in all buildings of the college. The waste is drained after reasonable treatment. The drainage is maintained to collect urinals which are connected with these pits. The outlets of the urinals maintained such a

way that the urine is drained in nearby municipal drain lines. College has already made provision for Rain water Harvesting to utilize the rain water for maintaining the water bed in earth.

✓ **E-Waste management**

- Computers, printers and other ICT equipment which cannot be used are sold to vendors for recycling or buy back schemes.

✓ **The Biomedical Waste Management**

- As collage is tied up with nearby hospital for medical emergency, no first aid/ medical facility is available at college, hence no biomedical waste is generated inside the college campus.

✓ **Hazardous chemicals and radioactive waste management**

- Some of the chemicals are neutralized in lab and disposed them safely.
- Some chemical after washing laboratory utensils, are collected in neutralizing pit and dispose-off after neutralizing.

✓ **Solid waste Management**

- There are number of dust bins provided at number of places within the campus.

Recommendation for Improvement

✓ Recommendation for Herbal & medicinal plants:

- List of recommended of herbal & medicinal plant in annexure list. College management can purchase above recommended plants in future plantation.

✓ SOLID WASTE MANAGEMENT:

Adopt 5 no's. Dustbin systems:

- College has single dustbin for collection of different type of waste generated by different activity in the campus. The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste material are collected and processed in environmentally friendly way in the College campus.

- It is recommended to adopt 5 no's dustbin systems for collection of different type of waste material.

Organic converter for canteen area:

- The organic converter can be installed for waste generated in canteen area. The output of the organic converter is good manure for plant.

QR CODE SYSTEM ON TREE: -

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

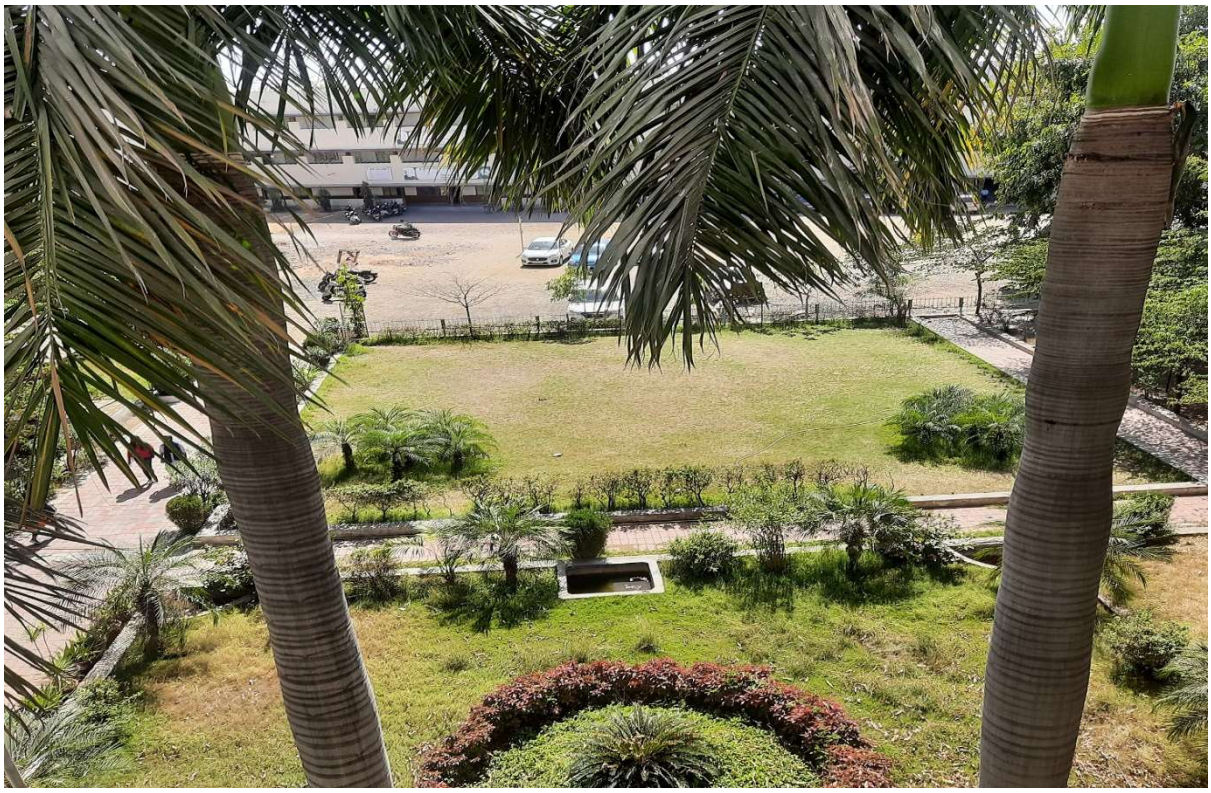


FIG: COLLEGE GREEN CAMPUS

CHAPTER-1
INTRODUCTION

1.1 About College

Jawaharlal Nehru Arts, Commerce & Science College, is being run by the society, "VSPM Academy of Higher Education" founded by great visionary Hon'ble Dr. Bhausaheb Bhoge in 1990. The Collage has Arts, Commerce & science UG courses and Commerce PG courses affiliated to Nagpur University and under the guidance of collage principal Dr. (Mrs) K.S. Borkar. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great proud that at present the college runs eight subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Home Economics; six subjects at B.Com - English, Marathi, Hindi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Computer Science and Zoology; six subjects in PG Commerce Faculty – Adv. Financial A/c., Indian Financial Syst., Managerial Eco., Marketing Mang., Res. Methodology, Adv. Cost A/c., Co-Op. & Rural Development, Human Resource Management Adv. Mang. A/c., Tax Procedures & Practice, Comp. Appl. in Commerce, Service Sector Management Statistical Tech., International Business Environments, Entrepreneurship Development,

Collage has a pride to have NAAC accreditation grade B+ with CGPA 2.74. The college boasts on well- qualified and experienced teachers involved in promoting the research culture. The collage has well equipped Gymnasium and advance library open for student to develop personally and prepare for competitive exams. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region. Collage is situated at western part of Nagpur city in Wadi area near Hingana MIDC.

GREEN Audit Report
Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur Year 2021-22

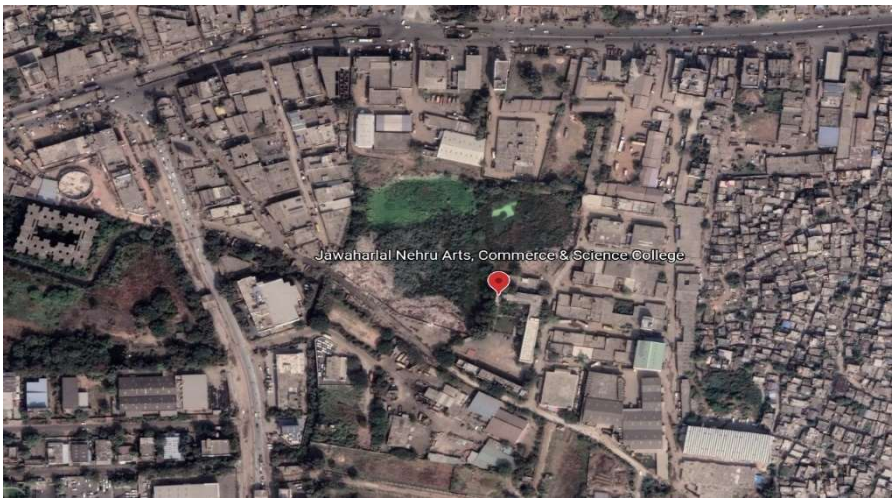


Figure: Satellite image of collage from google earth

Vision

The vision of college is to create a centre of academic excellence in the field of higher education for student and equip them to be good responsible citizens of the country by developing in them skills and competencies necessary for self-employment and values necessary for life irrespective of region, religion, caste, economic strata so as to enhance standard of living in rural areas.

Mission

The Mission of the college is to develop human resource with higher education, right skills, strength of character and positive attitude, The College endeavours to inculcate global competencies among student to help them meet rapidly changing global challenges by disseminating quality education to rural youths to foster development of the rural areas.

Goals *and* objectives of college:

- *To advance the cause of higher education among middle, lower income and below poverty line groups and among students coming from rural agrarian background and grassroots of the society.*
- *To inculcate in students respect for self-reliance, self-employment and dignity of labour.*

- *To provide ad environment which fosters continuous improvement and innovation with technical support and facility to enhance student and faculty effectiveness.*
- *To develop community orientation and civic responsibilities in their outlook.*
- *To develop an orientation towards the national and global needs as responsible citizens.*
- *To honour scholarship and outstanding achievements in academics, sports and extra-curricular activities.*
- *To develop amongst the students' academic and all-round competency.*
- *To ensure awareness to gender and right gender justice.*
- *To develop environmental awareness amongst students.*
- *To develop skilled personal through vocational and entrepreneurial education.*
- *To sensitize the students on socio-economic issues*
- *To uplift rural women who lack education opportunities.*
- *To empower rural people by providing them counselling and orientation programmes.*
- *To empower girl students / rural women through need-based, futuristic courses with entrepreneurial skills.*

Name of Department

Teaching Departments	Course Name
English	B.Sc.
Economics	B.A
Political Science	B.COM
Library	M.Com
Physics	
Chemistry	
Mathematics	
Computer Science	
Botany	
Zoology	
Network Resource Center	
Marathi	
Geography	
Physical Education & Sports	
Humanities & Languages	
Learning Resource Center	

1.2 About Infrastructure:

The college is spread over with plenty of area for academic along with small separate sports area and Library within same premises with plenty of space for reading and playing. Gymnasium is located in nearby separate building with sufficient space for exercise. The details of various department and building are given below.

Table 1 :- Name of the various building in the college

Sr.No.	Block
1	Admin building
2	Academic section
3	Class room, Principal office & Administration office
4	Library
5	Gymnasium

Fig. - Some pics of college campus

1.3 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment.

Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of college enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the College campus, vegetation, and carbon foot print of the campus etc. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.4 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on Plant & Trees, Alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

- To inculcate values of sustainable development practices through green audit mechanism.
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the College.

1.5 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Target areas included in this green auditing is plant trees, green energy and carbon foot print.

	GREEN Audit Report **Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur Year 2021-22**	

CHAPTER- 2
GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

Green Audit

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

a. Good Daylight Design and Ventilation
b. Water Efficiency
c. Wastewater Management
d. Indoor Air Quality
e. Energy Efficiency
f. On-site Energy Generation
g. Temperature and Acoustic Control
h. Paper Waste Management
i. E-Waste Management
j. Canteen and Solid Waste Management
k. Universal Access and Efficient Operation and Maintenance of Building
l. Green Belt
m. Green Programs (Green initiatives)

2.1 Good Daylight Design and Ventilation.

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
b) Curtains are provided on some of the windows to avoid glare.
c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
d) Stair cases receive daylight through windows provided at various levels.
e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.

Chemistry Laboratory with good daylight and ventilation arrangement

2.2 Water Efficiency:

a. Submersible pump is used for water supply in the campus
b. For drinking water supply, Common RO plant and water coolers are installed at various location in the campus.
c. Currently water meter is not installed to monitor the quantity of water extracted.
d. It is recommended water meter to be installed and daily/monthly water consumption to be recorded.
e. Rain water harvesting system is installed in the campus.
f. Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimizing the water footprint of the institute.
g. Normally mops are used for floor cleaning and hose is used for cleaning once a week
h. Dual flushing system is not provided in the washrooms.
i. Signage are not provided in washrooms emphasizing water conservation.
j. Water from air conditioning unit and reject water from water purifiers is used for watering plants within premises.

2.3 Wastewater Management:

a) Sanitary wastewater generated from washrooms is discharged into septic tank
b) Wastewater/ sewage recycle is not practiced in the College as grey water/ sewage treatment/recycle facility is not provided.
c) Sewage Treatment plant should be provided and all water to be recycle

2.4 Indoor Air Quality:

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

Major observations under indoor air quality are as below:

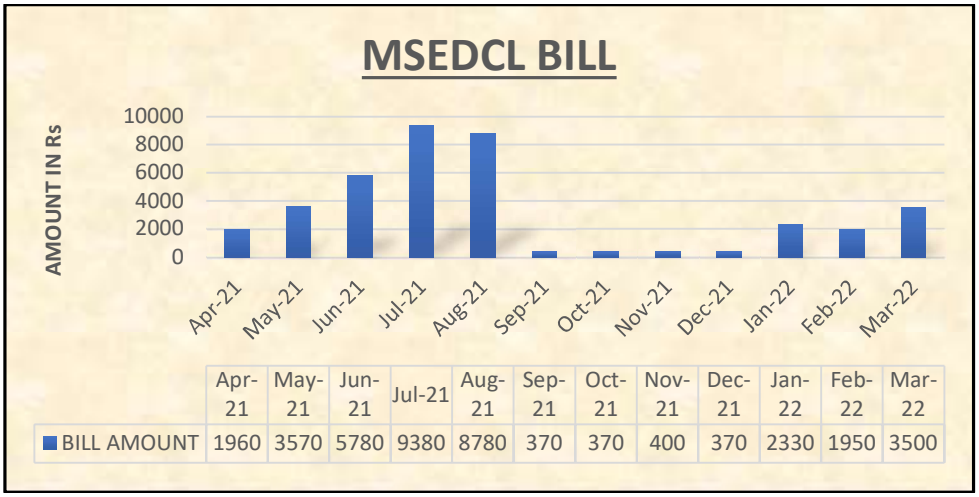
a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans.
b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split and Windows Air conditioner are used at offices.
c) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits.
d) Exhaust fans are provided in labs.
e) IAQ awareness signage was missing in Collage. Information on sources, impacts and mitigation of indoor air pollution to be displayed within Collage for increasing awareness about indoor air pollution.

2.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are Windows and Split AC, Submersible Motor, Motors, Air Cooler, RO Plant, Desktop, Printer, Fan, Tube light, LED Bulb, Halogen Bulb, Mercury Bulb, Mosquito Replete, Fire Alarm System.

Following is details of energy consumption



	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
BILL AMOUNT	1960	3570	5780	9380	8780	370	370	400	370	2330	1950	3500

College has installed on grid PV solar power plant of 10KWp capacity in March 2018 and it is generating the power to fulfil the college power demand.

It was observed that:

a) LED tube lights & fans are installed in classrooms and labs. CFL and conventional tube lights are also used. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.
b) Signage are not present near every electrical switch board encouraging users to switch off light and fans to save electricity.
c) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.
d) The college is exporting power using solar power plant and is net zero in few months.

2.6 On Site Energy Generation (usage of LPG/ Natural Gas):

a) Canteen facility having only dry snacks is available in college campus
b) Back Up diesel generators of rating 25KVA is available for emergency.

2.7 Temperature and Acoustic Control

a) Required White washing of rooms & corridors and white/ off-white flooring to improve the lighting conditions.
b) The major area of college campus is developed as green initiatives.

2.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage.
It was observed that:

a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy.

b) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.
c) Paper notices are displayed on the notice boards. Most of the storage is in library and staff room. After couple of years, old submissions and answer papers will be archived and stored in record room.
d) Internal notices and communications are through E-mail/SMS or printing on other side of used paper.
e) Old papers are given to vendor in exchange of new papers, in the ratio.

2.9 E-Waste Management:

a) Collage is digitalized to a some extent. This includes classrooms, library, internal mails etc.
b) E-waste is collected and stored in respective department. Once in a year this e-waste is collected from respective department and given to vendor

2.10 Solid Waste Management:

It was observed that:

a) Wet waste and dry waste segregation is not properly practiced in the premises. Separate bins are to be provided for wet biodegradable and dry recyclable waste.
b) Biodegradable waste is mainly generated from plants.
c) The Biodegradable waste is kept in forest area and over period of time it is converted into manure.
d) Scrapped benches are repaired and reused. After total damage, it is being sold to vendors for proper disposal.

2.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible. Staircase is provided for staff and students.
b) Fire extinguishers and fire hydrants are provided in few areas for emergency. They are to be inspected and serviced by fire protection service company annually.
c) There is no signage for emergency fire exit. This is of crucial importance during emergency.

2.12 Green belt/ Landscaping:

a) Big trees are already planted in the premises. Plantation also helps maintaining lower temperatures of the area. .
b) Potted plants are kept at the back side which are brought indoors on certain occasions.
c) Indoor plants are to be kept along the corridors and entrance of the building.

2.13 Green Initiatives:

College is regularly celebrating Environment Day, and Earth Day in college premises for developing awareness along with tree plantation is being done by college staff as well students.

CHAPTER-03
CARBON FOOT PRINT

3.1 About carbon foot print

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO_2).

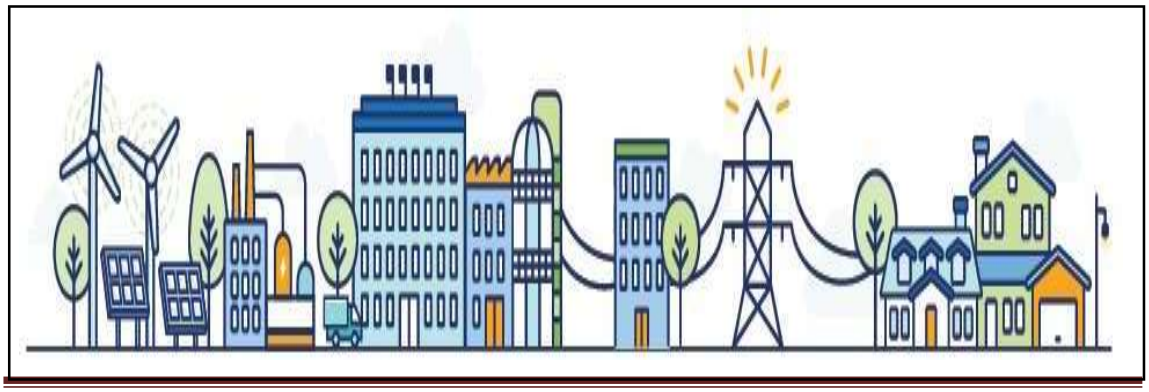
Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO_2) produced through the burning of fossil fuels and is expressed as a weight of CO_2emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…



3.2 Methodology and Scope

The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO_2 -equivalents and it is based on reported data from internal and external systems.

The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders.

The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064.

This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible.
The items quantified in this study are as classified under the ISO 14064 standards:

The report calculates the greenhouse gas emissions from the College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.

3.3 Carbon emission from electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region
Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use c mes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 $KgCO_2/kWh$

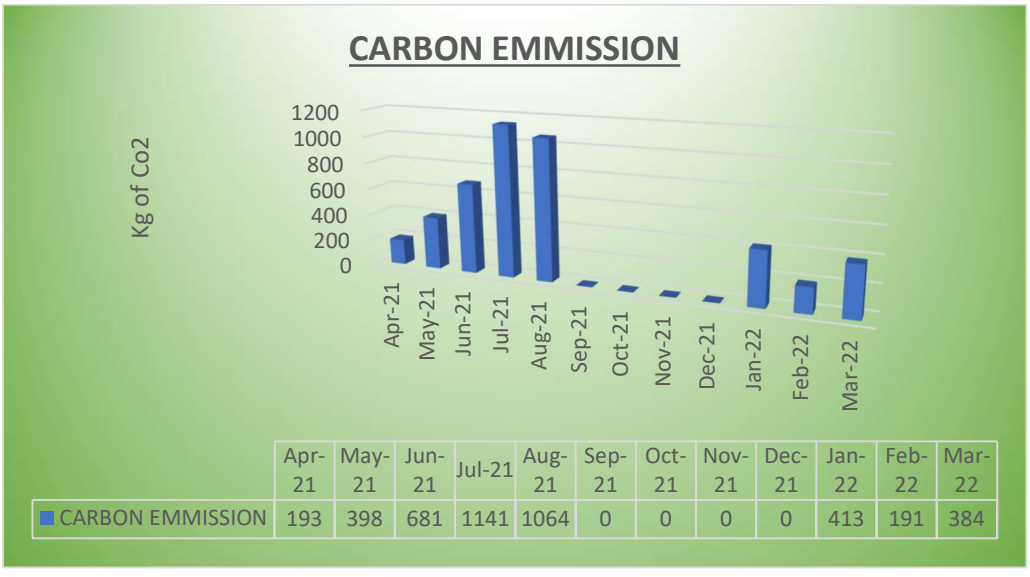
(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_CO_2/database_11.zip) Electricity Purchased from the grid

Table:- Electricity Purchased from the grid and Emissions from the electricity Import

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton $CO_2e/year$
1	Electricity 2020-21	4645	kWh	0.9613	4.47
				Total	**4.47**

Table:-Electricity Generated from the grid and Emissions saved due to Solar Power

Sr. No	Parameter	Value	Unit	Emission Factor kg CO_2e/kWh	Emission ton $CO_2e/year$
1	Electricity 2020-21	15012	kWh	0.9613	14.43
				Total	**14.43**



CHAPTER- 4
RECOMMENDATIONS / SUGGESTIONS

4.1 Improving Energy Consumption:

i. Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
ii. Installation of automatic lights with sensors can be considered.
iii. Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.
iv. Conduct energy audit every years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.
v. For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
vi. Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use.
vii. Raise awareness:
   - Encourage students to help in monitoring energy consumption & implement corrective actions
   - Integrate energy education into classroom learning.

4.2 Water Conservation:

a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs apart from existing reminding sign boards.
b) Dry sweep or use a sponge broom when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.
c) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.
d) Dual flushing system can be installed for toilet flushing which saves considerable amount of water.
e) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

4.3 Paper and other Solid Waste Reduction:

a) Inventories of all solid waste generated in the premises must be maintained.
b) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.
c) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practiced. The SOP's may include collection, segregation and reuse of different types of wastes, if any (e.g. biodegradable waste for composting). This will help in safe disposal of waste to recycle agencies.
d) The college can introduce online app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.
e) Training as well as awareness programs should be organized on segregation of biodegradable waste and recycling of waste. Efforts should be taken to inform students about recycling options and signs should be posted on appropriate bins indicating what could be dumped in each bin.

4.4 Others:

i. Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.
ii. Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.
iii. Maintain minutes of meetings of environmental committees; evaluate the effectiveness of various environmental programs conducted by the institutes. Set annual targets for Green Initiatives & monitor them closely. Create 'Green Champions'.
iv. Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.
v. Adopt environmentally responsible purchasing policy, and work towards creating and implementing

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ANNEXURE 1
INDOOR GARDENING DETAILS

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Plants	VOC it removes	Indoor source of VOC's	Plant care
 **Aloe Vera**	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 **Bamboo Plant**	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
 **Chinese Evergreen**	Benzene	Paints	Low maintenance plant that prefers low light conditions.
 **English Ivy**	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

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 **Janet Craig**	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Golden Pothos or Devils Ivy**	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.
 **Mass Cane**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 **Snake plant**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

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 **Peace Lily**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
 **Red-edged Dracaena**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
 **Spider Plant**	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
 **Parlor Palm**	Purifies indoor air	-	Easy to maintain

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ANNEXURE 2
GREEN AUDIT CHECKLIST

1. Water Management

S.N.	PARAMETERS	RESPONSE	REMARKS
1	Source of Water	Borewell	
2	No. of Wells/Bore Well	2	
3	No. of Motors Used	2	
4	Horse Power - (Motor)	3Hp	
5	Depth of Well/Bore Well	150 ft	
6	Water Level	100 ft	
7	Number of Water Tanks	2	
8	Capacity of Tank	20000 Ltr	
9	Quantity of water Pumped every day	10000 Ltr	
10	Any Water Wastage/why ?	Nil	
11	Water usages for gardening	Yes	Water Sprinkler Installed
12	Waste water sources	Overflow	Water use for Garden
13	Use of waste water	Yes	Water use for Garden
14	Faith of Waste water from labs	No	
15	Whether waste water from labs mixed with ground water	No	
16	Any Treatment for lab water	No	
17	Whether any green chemistry method practiced in labs	No	
18	No. of water coolers	3	
19	Rain water harvest available?	Yes	
20	No. of units and amount of water harvested		
21	Any leaky taps	No	
22	Amount of Water lost per day	Nil	
23	Any water management plan used?	Yes	Water Sensor Installed
24	Any water saving techniques followed?	No	
25	Are there any signs reminding peoples to turn off the water?	Yes	

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2. Energy Data

Rooms No.	Electrical Device/Items	Number	Power	Usage time (Hr/Day)
104	Tube Light	6	10 watt	6 Hrs/Day
	Fan	5	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
	Interactive Board	1	2 watt	2 Hrs/Day
103	Tube Light	6	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
101	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
201	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
202	Tube Light	4	10 watt	6 Hrs/Day
	Fan	3	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
203	Tube Light	6	10 watt	6 Hrs/Day
	Fan	6	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
	Interactive Board	1	2 watt	2 Hrs/Day
204	Tube Light	6	10 watt	6 Hrs/Day
	Fan	5	75 watt	6 Hrs/Day
	Projector	1	230 watt	2 Hrs/Day
205	Tube Light	3	10 watt	6 Hrs/Day
	Fan	2	75 watt	6 Hrs/Day
207	Tube Light	4	10 watt	6 Hrs/Day
	Fan	4	75 watt	6 Hrs/Day

Item : Bulbs (CFL, Incandescent, LED), A/C, Fan, Computer, Instruments

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3. Waste Management

Approximate quantity of waste generated per day (in kg)

Office				
Approx	**Biodegradable**	**Non-biodegradable**	**Hazardous**	**Others**
< 1 Kg	Yes	Nil	Nil	Nil
2-10 kg	---	---	---	---
> 10 kg	---	---	---	---

How the waste generated in the college is managed ?

	Yes/No	**Remark**
A) Composting/Vermicomposting	Yes	
B) Recycling	No	
C) Reusing	Yes	
D) Other ways	No	

Waste generated in the college ?

E-Waste	Yes	
Hazardous Waste	No	
Solid Waste	No	
Dry Leaves	Yes	
Canteen Waste	No	Only Dry Snacks
Liquid Waste	Yes	
Glass	No	
Unsued Equipment	Yes	
Napkins	No	
Other (Specify)		

Do you use recycled paper in college ?	No
Any Waste management methods used ?	No