

**INTEGRATED GREEN, ENVIRONMENT AND  
ENERGY AUDIT FOR THE ASSESSMENT  
YEAR 2020-21 IN LINE WITH NAAC REQUIREMENTS**



**Dharampeth M.P. Deo Memorial Science College,  
Nagpur**



**29/04/2022  
Version 01**

**By:  
Energy and Green Audit Team,  
Sustainability Solutions**

**From President's Desk**



Our experience taught us those educational institutions have the accountability to sustain the nation's future and its growth. Our responsibility is not just limited to education but to inculcate Morals and Values. Human society is in the middle of Environmental crisis, Social and Economic challenges. The major ones are climate change, the greenhouse effect, water and air pollution, soil fertility etc. The key question is, "How do we do it?" We apply the principles of Inclusivity, Materiality and Responsiveness.

Our Institutional Heads, faculty and staff are our constant source of inspiration. As Management, we completely understand that sustainable development through education will play a pivotal role in building counters for the "Climate Change". After graduation or post-graduation, the students become responsible citizens of tomorrow and get dispersed into their specific careers. They take with them the best practices and approaches as a tool kit to solve pretty problems be it environmental, social or economic. We are developing our students to be prepared to face global challenges and convert them into opportunities. We strive to put forth living examples for our students, society, peers, and other reasonable stakeholders by adopting environment friendly steps. We endeavor to hand over the future generation with a cleaner and safer, socially stable, and economically prosperous world.

The energy audit's purpose is to independently review the practices followed in our campus with respect to the Sustainable Policies and green practices. We will take the learnings from this independent review as a "Value" to promote better environmental performance and continually improve the College Campus and Community. We will adhere to PDCA's proven principles (Plan, Do Check, and Act) to identify, prioritize, allocate resources, initiate action, monitor results, and implement corrective actions to attain Sustainability, encompassing Environmental, Social topics as an immediate measure to counter the "Climate Change".

I am thankful to the entire Green Audit Team (Mr. Swapnil Thanekar, Mrs. Bhakti Thanekar, Mr. Ashish Soni, Mr. Rushikesh Kohre) for taking sincere efforts and hard work for this green audit. We are certain that the report will help society, institute, staff, students, and all concerned in the Campus and will remain motivated for sustainable and green practices henceforth.

**Adv, Ulhas Aurangabadkar**

**President**

### From Principal's Desk



We are fully aware that global warming is driving up our planet's average temperature, producing rising sea levels, accelerating severe weather, acidic rains, and ushering in impending disaster. Climate change's cascading impacts are endangering the livelihoods of greater groups as food and water has become scarce.

We have helped to develop new concepts, technologies, patents, and many unique energy conservation methods.

The Green Audit entails energy conservation, the use of renewable energy sources, rainwater harvesting, carbon emission reduction measures, tree planting, hazardous waste management, and E-waste management. Finally, colleges and universities must conduct a green audit as part of their NACC evaluation. Green auditing is required in college campuses because students must be aware of green auditing, its benefits in saving the environment, and thus be inspired to become good citizens of the country. Green auditing and the process of sustainable development assist to decrease waste and related costs while also improving product quality. The function of higher educational institutions in connection to environmental sustainability is becoming increasingly significant as environmental sustainability becomes an increasingly serious issue for the nation.

A green audit will help a college figure out how and where they're wasting the energy, water, and other resources, so they can figure out how to make adjustments and save money. It may also be used to determine the kind and volume of garbage, which can be helpful in planning a recycling project or improving a waste minimization strategy. Green audits may help improve environmental knowledge, values, and ethics, as well as rise health awareness. It gives employees and students a greater grasp of how green approaches affect the educational institutes. It allows children and instructors to build a sense of ownership, personal accountability, and societal responsibility. Colleges and universities all across the globe are aiming to become carbon neutral in order to ensure a more sustainable future. Universities are accepting responsibility for their environmental impact and attempting to mitigate it. Universities are aiming to cut greenhouse gas emissions, reduce energy consumption, utilize more renewable energy, and stress the importance of sustainable energy sources in order to become carbon neutral.



The Sustainable impact of our institution are mapped considering the United Nations SDG's as below:

	<p>Our Institutions is actively engaged in:</p> <ul style="list-style-type: none"> <li>✓ Awareness Camps</li> <li>✓ Blood Donation Programs</li> </ul>
	<ul style="list-style-type: none"> <li>✓ Refer our SSR Report</li> </ul>
	<ul style="list-style-type: none"> <li>✓ We have installed Solar Pv Plants in our campus.</li> </ul>
	<ul style="list-style-type: none"> <li>✓ We are giving saplings to our guests in place of bouquet</li> <li>✓ We have banned use of single use of plastic in our campus</li> <li>✓ We serve the RO water in place of single use plastic bottle</li> <li>✓ We have planted lot of trees inside and our side the campus</li> <li>✓ Organic composting</li> <li>✓ Energy efficiency projects (Sensor Based Lighting) (Refer Annexure V)</li> </ul>
	<p>We are promoting energy savings, reduction in water consumption, augmenting water harvesting, we have installed renewable solar energy plant of 50 kW, introduction of sensor-based lighting controls for night lights, energy-efficient lighting (CFL), and maximum use of daylight, and educating the society, plantation of trees outside the college campus, waste reduction, responsible waste disposal, and many more applicable programs.</p>
	<p>We have implemented the projects of</p> <ul style="list-style-type: none"> <li>✓ Plantation of trees</li> </ul>

We are thankful to the Green Audit Team (Mr. Swapnil Thanekar, Ms. Bhakti Thanekar and Mr. Ashish Soni, Mr. Rushikesh Kohre) who played key role in this achievement. We endeavor to set an example for our Peers so that they can also adopt sustainable practices.

**Dr. Akhilesh V. Peshwe**  
Principal

## Acknowledgement



Green Audit Assessment Team thanks the management of Dharampeth M.P. Deo Memorial Science College, Nagpur, for assigning this important work of Green Audit. We appreciate the cooperation of our Team for completion of study. Our special thanks to:

<b>President</b>	Adv. Ulhas Aurangabadkar
<b>Principal</b>	Dr. Akhilesh Peshwe
<b>IQAC Coordinator</b>	Dr. Pitambar Humane
<b>Professor</b>	Dr. Varsha Rangari
<b>Professor</b>	Dr. Seema Ubale
<b>Assistant Professor</b>	Lt. Dr. Prashant Ambekar
<b>Assistant Professor</b>	Dr. Nitin Gaikwad
<b>Assistant Professor</b>	Dr. Shambhavi Holay

All the members of College Development Committee, Dharampeth M.P. Deo Memorial Science College, Nagpur. Team of students as stated under Annexure-I

For giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.



## Profile of Audit Team Members and Independent Reviewers

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Certified Energy Auditor, M. Tech (Heat & Power Engineering), Expert Global Reporting Initiative, GHG Expert

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Certified Energy Auditor, B. Tech (Chemical Engineering), Principal Consultant - Energy and Safety

**Mr. Ashish Soni**

Graduate with 16 years' experience in Chemical Sector

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Mechanical Engineer, Observer



## DISCLAIMER

Green Audit Team has prepared this report for Dharampeth M.P. Deo Memorial Science College, Nagpur, based on input data submitted by the representatives of college and after having complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the calculations are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any director consequential loss arising from any use of the information, statements or forecasts in the report.

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## Scope of Work

Topics to be covered as part of the assessment are:

### ✓ Solar Passive Architecture

- How the buildings are constructed to utilize the solar energy efficiently. This includes use of day light as lighting source and avoidance of GHG intensive technology example AC as source of cooling due to solar heat gains.

### ✓ Implementation of measures to reduce wastage of energy

- This includes effective and objective evidences to create awareness towards wastage of electric energy. Hoardings, placards, messages, posters etc. planted at key locations in college, hostels and cafeterias. PCRA (Petroleum Conservation Research Association, Govt. of India) and BEE (Bureau of Energy Efficiency) posters are exhibited.
- It can also be extended to include papers presented by the students on avoidance of electricity at college or day to day life.
- Appointment of joint committees of teachers and students to save electricity
- Controlling of Power Factor by installation of APFC and getting rebate (up to 5% or MSEDCL norms) from MSEDCL for maintaining unity Power factor

### ✓ Energy Efficient Procurement

- This includes evaluation of energy efficient procurement practices. This does not exactly mean that you need to buy the most efficient, but you need to buy the most efficient which is financially viable. Example AC with efficiency star ratings, Transformer etc.
- Replacement of lighting sources to CFL or LED
- Replacement of Copper Ballast with Electronic Ballast
- Centralized controls of lighting, auditorium etc. to avoid any misuse of electricity
- Procurement of LED monitors to phase-out CRT Monitors
- Shift to paperless regime wherever not required, example attendance muster replaced by biometrics, DG logbook replaced by computerized logbook, daily reports converted from paper to paperless, HoD meetings converted to paperless formats, and all such examples.
- Installation of Solar panels, Power Purchase Agreements with Solar Power Plant owners to buy environmentally friendly energy Source etc.
- Documentary evidences as feasible to calculate the above impacts and finally into the value of avoidance of tCO<sub>2</sub> emitted to atmosphere.

### ✓ Rain Water Harvesting

- This includes Calculation of Catchment Area (Terrace and ground) and evaluating rough amount of water that is recharged into the water recharge pits if applicable.

### ✓ Hazardous Waste Management and E-Waste Management

- There are various wastes that are generated within the organization. The report will give the list of the procedures for waste handling.

### ✓ Duration of the Green Audit

- The Green audit field observations data collection was carried from 18<sup>th</sup> April 2022 to 29<sup>th</sup> April 2022 for the period April 2020 to March 2021. The submitted data was monitored by the college throughout the year and assessed by Assessment Team during the visit.





## Scorecard

NAAC Criteria		
Key Indicator - 7.1 Institutional Values and Social Responsibilities		
Environmental Consciousness and Sustainability		Audit Team Assessment
<b>7.1.2 The Institution has facilities for alternate sources of energy and energy conservation measures:</b>		
1. Solar energy	✓	Refer chapter 8 and Annexure –IX: Solar Panel Installations
2. Biogas plant		
3. Wheeling to the Grid	✓	Annexure –V: Lighting Survey 2021 - 22
4. Sensor-based energy conservation	✓	
5. Use of LED bulbs/ power efficient equipment	✓	Annexure –XI: Solar Passive Structure
Options:		
A. 4 or All of the above	✓	
B. Any 3 of the above		
C. Any 2 of the above		
D. Any 1 of the above		
E. None of the above		
<b>7.1.3 Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste (within 500 words):</b>		
1. Solid waste management	✓	Refer chapter 12 and Annexure –XIII: Waste Management
2. Liquid waste management	✓	
3. Biomedical waste management	✓	
4. E-waste management	✓	
5. Waste recycling system		
6. Hazardous chemicals and radioactive waste management		
<b>7.1.4 Water conservation facilities available in the Institution:</b>		
1. Rain water harvesting	NA	
2. Bore well / Open well recharge	NA	



3. Construction of tanks and bunds	✓	
4. Waste water recycling	NA	
5. Maintenance of water bodies and distribution system in the campus	NA	

**Green Campus Initiatives include:**

**7.1.5.1. The institutional initiatives for greening the campus are as follows:**

1. Restricted entry of automobiles	✓	Annexure –XIV: Awareness / Posters
2. Use of Bicycles/ Battery powered vehicles		
3. Pedestrian Friendly pathways	✓	Chapter 13 and Annexure –XIII: Waste Management
4. Ban on use of Plastic	✓	
5. Landscaping with trees and plants	✓	Annexure –XIV: Awareness / Posters

Options:

- A. Any 4 or All of the above ✓
- B. Any 3 of the above
- C. Any 2 of the above
- D. Any 1 of the above
- E. None of the above

**7.1.6 Quality audits on environment and energy are regularly undertaken by the institution:**

**7.1.6.1. The institutional environment and energy initiatives are confirmed through the following:**

1. Green audit	✓	Covered as part of this report. Please refer the contents of this report
2. Energy audit	✓	Covered as part of this report under Chapter -11 and Annexure –XVII
3. Environment audit	✓	
4. Clean and green campus recognitions/awards		Covered as part of this report under Annexure – XVI
5. Beyond the campus environmental promotional activities		

Options:

- A. Any 4 or all of the above
- B. Any 3 of the above ✓
- C. Any 2 of the above
- D. Any 1 of the above
- E. None of the above



Clean Campus<sup>1</sup>

Sr. No.	Aspect	Reference
1.	Cleanliness in and around the campus and waste minimization	<ul style="list-style-type: none"> <li>➤ Chapter No. 1 &amp; Annexure No. IV</li> <li>➤ Chapter No. 1 &amp; Annexure No. XIV</li> </ul>
2.	Water conservation and management including <ul style="list-style-type: none"> <li>➤ Waste water management and reuse</li> <li>➤ Rain water harvesting, etc.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Chapter No. 12 &amp; Annexure No. XIII</li> </ul>
3.	Environment-friendly activities adopted and practiced by the campus	<ul style="list-style-type: none"> <li>➤ Chapter No. 1 &amp; Annexure No. IV</li> <li>➤ Chapter No. 1 &amp; Annexure No. XIV</li> </ul>
4.	Greenery within the campus to provide pollution free air and carbon-sink	<ul style="list-style-type: none"> <li>➤ Chapter No. 13 &amp; Annexure No. XIV</li> </ul>

Smart Campus<sup>2</sup>

Sr. No.	Aspect	Reference
1.	Impact of deployment of digital technology in order for the students, faculty and management in the campus to reduce consumption of natural resources (such as paper, gas, energy etc.).	<ul style="list-style-type: none"> <li>➤ Digital library</li> <li>➤ Digital leaves</li> <li>➤ Digital attendance</li> <li>➤ Digital Meetings</li> <li>➤ Digital notes</li> <li>➤ Digital papers</li> <li>➤ Online conferences and classes</li> <li>➤ Double side printers</li> <li>➤ Efficient electronic equipment's like LED screens, LED projectors. For details, please refer Annexure VIII</li> <li>➤ Procurement of energy efficient equipment</li> <li>➤ Techno commercial stages of the Solar PV</li> </ul>
2.	Alignment of the latest digital trends like IoT, Big Data and Cloud Networking to achieve various aspects of sustainability in the campus, specifically to contribute to United Nations SDGs	<p>Our college uses Google forms, Google classroom, Testmoz for online classes. This helps us to share data/ links to all students within fraction of second and result will be prepared in less time duration which saves our time, man power and paper work.</p> <p>In this Pandemic situation, we are conducting online classes through MS Teams, Google meet, Zoom app. Through Google drive we can give access to limited students of particular class only. We provide the notes of different theory subject and practicals to the students on Google classroom.</p> <p>These technologies help us to shares the data in short duration of time to all students and also help in saving papers.</p>

<sup>1</sup> <http://www.aicte-india.org/csc2019>

<sup>2</sup> <http://www.aicte-india.org/csc2019>



		<ul style="list-style-type: none"> <li>➤ Installation of smart photo sensor to regulate the night lighting.</li> <li>➤ Digital notes.</li> <li>➤ Cloud is used for Admission process, data entry, TC and all administration process.</li> </ul>
3.	<p>Create an ecosystem to 'smartly' connect and share the information with each other at campus, institute and national level. Any international level connect will provide a distinct advantage. The smart connects, through the cloud networking, so established should address concerns of environmental challenges including contribution to United Nations Sustainable Development Goals.</p>	<p>To share the data among all the Teachers and students, we are using Google. Google Drive is a file storage and synchronization service developed by Google for sharing of information to all users or to specific users. Google drive and WhatsApp helps to share Notes/ Notices/ University important notices by single click to specific group of students/ to all students/ to the teachers.</p> <p>Also, we are conducting our regular online classes through MS Teams, Google Meet / Zoom App for all classes of our college; we are sharing notes to the students in the form of PDF or in DOC format which ever possible in their Google class.</p> <p>College had organized e-Essay competition, e-Poster competition, e-cartoon competition and 16 National webinar during COVID lock down. We had connected peoples (Guest, Speakers and participants) from all over the India in one platform. We had taken online verbal feedback from participants and we also share E-Certificates to all the participants. This platform is helpful not only to connect the peoples but also it is useful in sharing the also saves paper and with less use of man power. We had collected all data in only soft format.</p> <p>Our faculty members had online attended more than 20 International conference and 100 National and local conferences during lock down.</p>



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## Abbreviations

<b>AHU</b>	Air Handling Unit
<b>CFL</b>	Compact Fluorescent Lamp
<b>COP</b>	Coefficient Of Performance
<b>DG</b>	Diesel Generator
<b>ECRM</b>	Energy Consumption Reduction Method
<b>HVAC</b>	Heating, Ventilation, And Air Conditioning
<b>ISO</b>	International Standardization Organization
<b>ITHD</b>	Current Voltage Total Harmonic Distortion
<b>km</b>	Kilometer
<b>kV</b>	Kilo Volt
<b>kW</b>	Kilo Watts
<b>Lab</b>	Laboratory
<b>LED</b>	Light-Emitting Diode
<b>MNRE</b>	Ministry of New and Renewable Energy
<b>MSEDCL</b>	Maharashtra State Electricity Distribution Co. Ltd.
<b>MEDA</b>	Maharashtra Energy Development Agency (MEDA)
<b>TR</b>	Tons of Refrigeration
<b>VTHD</b>	Voltage Total Harmonic Distortion
<b>MSRTC</b>	Maharashtra State Road Transport Corporation

## Reference list of Websites

Sr. No.	Websites
1	IEEE 519 - <a href="http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=2227">http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=2227</a>
2	<a href="http://mnre.gov.in/solar-energy/ch2.pdf">http://mnre.gov.in/solar-energy/ch2.pdf</a>
3	BEE - <a href="http://www.beeindia.in/">http://www.beeindia.in/</a>
4	ECBC - <a href="http://beeindia.in/content.php?page=schemes/schemes.php?id=3">http://beeindia.in/content.php?page=schemes/schemes.php?id=3</a>
5	<a href="http://www.energymanagertraining.com/new_index.php">http://www.energymanagertraining.com/new_index.php</a>
6	<a href="http://www.usalighting.com/stuff/contentmgr/files/1/92ffeb328de0f4878257999e7d46d6e4/misc/lighting_comparison_chart.pdf">http://www.usalighting.com/stuff/contentmgr/files/1/92ffeb328de0f4878257999e7d46d6e4/misc/lighting_comparison_chart.pdf</a>
7	<a href="https://www.bijlibachao.com/lights/use-energy-efficient-lights.html">https://www.bijlibachao.com/lights/use-energy-efficient-lights.html</a>
8	<a href="http://www.imd.gov.in/section/climate/climateimp.pdf">http://www.imd.gov.in/section/climate/climateimp.pdf</a>
9	<a href="http://www.bijlibachao.com/air-conditioners/air-conditioner-selection-understand-tonnage-eer-cop-and-star-rating.html">http://www.bijlibachao.com/air-conditioners/air-conditioner-selection-understand-tonnage-eer-cop-and-star-rating.html</a>
10	<a href="http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece">http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece</a>
11	<a href="http://www.agri.mah.nic.in">http://www.agri.mah.nic.in</a>
12	<a href="http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Room%20Top%20Rain%20water%20Harvesting_Presentation_2006.pdf">http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Room%20Top%20Rain%20water%20Harvesting_Presentation_2006.pdf</a>
13	<a href="http://www.imd.gov.in/section/climate/climateimp.pdf">http://www.imd.gov.in/section/climate/climateimp.pdf</a>
14	<a href="http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf">http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf</a>
15	<a href="http://cdm.unfccc.int/">http://cdm.unfccc.int/</a>
16	<a href="http://database.v-c-s.org/">http://database.v-c-s.org/</a>
17	<a href="https://www.dharampethscience.com/">https://www.dharampethscience.com/</a>
18	<a href="https://www.mahadiscom.in/">https://www.mahadiscom.in/</a>
19	<a href="https://www.mahaurja.com/meda/">https://www.mahaurja.com/meda/</a>
20	<a href="https://offset.climateutralnow.org/vchistory/details?orderId=15798">https://offset.climateutralnow.org/vchistory/details?orderId=15798</a>
21	<a href="https://www.aicte-india.org/Initiatives/clean-green-campus">https://www.aicte-india.org/Initiatives/clean-green-campus</a>



## ***Introduction of the College***

Dharampeth M.P. Deo Memorial Science College, Nagpur, established in 1968 is a generic name for "Excellence in Education". The educational institute has had the rich heritage and has witnessed a steady progress since its inception.

The college is situated away from the hustle and bustle of the city against the backdrop of a beautiful landscape blanketed in green near Ambazari Lake. The college campus offers a peaceful and serene atmosphere conducive for study.

The institute is spread over a large expanse of land with beautiful landscape. It has exceptional infrastructural facilities ranging from congenial ambience of premises to well-equipped laboratories.

Our college is blessed with learned and committed teaching staff who not only strive hard to evolve and initiate innovative approaches to share knowledge and expertise in various fields of higher education but also kindle creativity and innovations in the students. We wish to provide a strong platform for educational dialogue and offer an ideal place for training and grooming of the students to accelerate their career growth. The college provides a congenial atmosphere for the learners and gives emphasis on enhancing their canvas through plethora of activities that also help the students in self exploration.

The college is affiliated to Rashtrasant Tukadoji Maharaj University, Nagpur and comes under the purview of 2f/12B of UGC Act 1956.

The College is also reaccredited by NAAC and awarded 'A' grade with CGPA 3.01.

### **Vision & Mission:**

#### **Our Vision:**

- To develop global talent through quality and affordable education.
- To produce thriving, determined and vibrant population of youngsters well equipped to move into the knowledge society.
- To prepare students for wide spectrum of positions and profiles in various fields.

#### **Our Mission:**

- To nurture the obvious and identify the unseen and undiscovered talents of the students so as to turn them towards the success path.
- To give more than the curriculum so as to enrich the academic experience of the learners.
- To provide an ambience which will help the students to keep their focus on studies and build relationships with their peers.





- Goals & Objectives:
- To groom the students so that they are able to navigate successfully through the curriculum.
- To inculcate scientific and rational attitude in the students.
- To enable the students to acquire the capability to progress within and beyond the potentials.
- To provide opportunity for personality development of the students through the activities that are focused on boosting IQ, EQ and SQ of the students.
- To Instil a sense of belonging and infuse a spirit of love for their college, city, nation and "Mother Nature".
- To prepare the students as responsive and responsible citizen.



## ***Objective of Green Audit***

The Green Audit Team focused on Material<sup>3</sup> Issues pertaining to college which have the highest influence on the Green Attributes of the College. To evaluate steps taken by college management towards green campus below material issues are discussed chapter wise:

1. Organization Level Efforts
2. Creation of Awareness
3. Lighting
4. Cooling and Ventilation
5. Operation of Electronic Equipment's
6. Water Management
7. Water Quality
8. Renewable Energy
9. Transportation
10. Purchasing Practices
11. Energy and Carbon Footprint
12. Waste Management
13. Environment
14. Plantation Details

Considering the NAAC requirements, the Assessment Team has identified the Material issues which are related to the environmental performance of the college. The disclosures under this report are accordingly chosen so that the most appropriate, relevant and accurate information is made available. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

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<sup>3</sup>Definition: as per Global Reporting Initiative: GRI 101: FOUNDATION 2016

An organization is faced with a wide range of topics on which it can report. Relevant topics, which potentially merit inclusion in the report, are those that can reasonably be considered important for reflecting the organization's economic, environmental, and social impacts, or influencing the decisions of stakeholders. In this context, 'impact' refers to the effect an organization has on the economy, the environment, and/or society (positive or negative). A topic can be relevant – and so potentially material – based on only one of these dimensions.



## 1. Organizational Level Efforts

Is the college having campus green team?	Yes, the Green Campus Committee is already in place. This committee is highly active and meets twice in a year.
If yes, who are the stakeholders?	Yes, it included stakeholders. The stakeholders include <ul style="list-style-type: none"> <li>➤ Management</li> <li>➤ Teaching Faculties</li> <li>➤ Non-Teaching Faculties</li> <li>➤ Students</li> </ul> The Green Campus Committee is shared with the Audit Team. Refer Annexure III.
Does it meet regularly?	The Team meets once in a semester. This was confirmed during site visit interviews and the review of the minutes of meeting.
Can the Green Campus Team suggest new environmental initiatives to College Management?	Suggestions on improvement of environmental performance are always welcomed by College Management. Tree plantation at various locations around the college, etc. was also discussed as part of brain storming sessions within the meetings. These discussions were converted into live projects by the college management. The annexure to this report captures the live projects of the college.
Has the college established an environmental mission/vision for its campus?	No, the Management of College is persistent and resolved to make the campus eco-friendlier in due course of time. Various efforts are already initiated towards implementation sustainable initiatives, application of efficient technologies to save energy, plantation etc.
Is the college encouraging sustainable behaviour via: <ul style="list-style-type: none"> <li>o education campaigns?</li> <li>o Posters, placards, messages</li> <li>o incentives?</li> <li>o contests?</li> <li>o awards?</li> </ul>	College conducts various activities to create awareness amongst the students and society on environment safety and protection but due to pandemic and lockdown the college was unable conduct the same. <ul style="list-style-type: none"> <li>➤ Tree Plantation Drive was organized at college campus on 03<sup>rd</sup> August 2020.</li> <li>➤ Tree Plantation Drive was organized at college campus on 15<sup>th</sup> August 2020.</li> </ul> Please refer Annexure IV for details.  <b>Community Based Initiative's by college:</b> <ul style="list-style-type: none"> <li>➤ Blood Donation Camp was organized at Hedgewar Blood Bank, Ramnagar Square, Nagpur on 08th August 2020.</li> </ul>
Is the college staff modelling sustainable behaviour for students, peers, and community?	<b>Teaching &amp; Non-Teaching Staff:</b> There are 97 staff members in the college, out of which:



	<ul style="list-style-type: none"> <li>➤ 62% staff of the college commute by their own 2 wheelers.</li> <li>➤ 27% staff of the college travel by 4 wheelers.</li> <li>➤ 8% staff of the college commute by public transport.</li> <li>➤ 2% staff of the college commute by bicycle.</li> <li>➤ 1% staff of the college commute by walking.</li> </ul> <p>Please refer above assessments for additional details</p>
<p>Do students model sustainable behaviour for staff, peers, and community?</p>	<p><b>Students:</b> Total 2003 students are enrolled for 2020-21 session. As due to lockdown only online classes are been conducted, no students are attending the college. According to the interviews last year: Approximately:</p> <ul style="list-style-type: none"> <li>➤ 74% students of the college commute by public transport.</li> <li>➤ 16% students of the college commute by 2-wheeler.</li> <li>➤ 5% students of the college commute by walking.</li> <li>➤ 5% students of the college commute by bicycle.</li> </ul> <p>Students participate in activities conducted by college on environment and sustainable development. In addition, please refer above assessments.</p>
<p>Is the college sharing learning internally via</p> <ul style="list-style-type: none"> <li>• Posters, placards, messages?</li> <li>• assemblies?</li> <li>• classroom presentations?</li> <li>• training/professional development?</li> <li>• posters/bulletin boards?</li> <li>• newsletter?</li> <li>• website?</li> </ul>	<p>Data is shared via posters, placards and messages. The assessment team is appraised that the awareness poster includes topics related to minimization of energy usage by avoiding wastage, improvements on energy efficiency, minimization of water wastages, proper disposal of wastes. Please refer Annexure XIII for details.</p>
<p>Does the college offer Energy and Environment Conservation lessons?</p>	<p>Yes, College organizes lectures and motivates students for Energy and Environment conservation. Environment Conservation is also a part of the syllabus of II<sup>nd</sup> Year for all streams.</p>
<p>Is the college sharing its learning externally via</p> <ul style="list-style-type: none"> <li>• Paper presentations?</li> <li>• newsletter?</li> <li>• website?</li> </ul>	<p>The students are encouraged to present projects on topic related to environmental aspects. The college is also going to make the Green Audit Report public so that learning's of college are shared.</p>
<p><b>Further Scope of Improvement:</b></p> <ul style="list-style-type: none"> <li>➤ At organization level, the college needs to establish long term improvement objectives to further reduce energy consumption, water consumption and reflect the same in form of dedicated Environment Policy.</li> </ul>	



**Conclusion:**

- Active involvement of Organization is observed.
- Adequate awareness amongst the students and other stakeholders (faculty, other staffs, service providers, etc.) is observed and reflected from their behavior.

## 2. Creation of Awareness

Are the objectives of green audit clearly understood by the institute	<p>Yes</p> <p>To spread awareness amongst the students and the surrounding community about the environmental impact due to operations associated with their teaching institution.</p> <ul style="list-style-type: none"> <li>➤ To sensitize them how to address the situation at the local and personal level by conducting programs, camps and other means as feasible.</li> <li>➤ To reduce the negative environmental footprint.</li> <li>➤ To explore possibilities to use renewable energy sources to avoid GHG emissions and also reduce power cost.</li> <li>➤ To continue the use of efficient LED based lighting.</li> <li>➤ To introduce the automatic controls on the lighting systems.</li> <li>➤ To mitigate the carbon emission or offset them.</li> <li>➤ To increase the green cover.</li> <li>➤ To vigorously and responsibly position the institute for active contribution in Clean India Mission undertaken by the Governments.</li> <li>➤ To identify ways and means to sustainably contribute and reduce gaps and become environment friendly.</li> <li>➤ To support community to combat various environmental and social issues as feasible.</li> <li>➤ To align the college activities to be in line with the requirements of the Clean and Smart Campus Initiatives (<a href="https://www.aicte-india.org/Initiatives/clean-green-campus">https://www.aicte-india.org/Initiatives/clean-green-campus</a>).</li> </ul> <p><b>Recommendation:</b></p> <ul style="list-style-type: none"> <li>➤ College should apply for the Clean and Smart Campus Initiatives award</li> </ul>
Are there posters/guidance displayed to remind students and staff of good practices?	Yes
Are the students aware of energy sources?	There are 2 sources of energy Grid Electricity & Solar Electricity. Students are aware of the source of energy which are utilized by the college.
Is college tracking its electrical energy usage?	There are 3 meters, which measure the electricity imported by the college. The readings of electricity consumption are included as part of this report under chapter 11.



<p>Is college offering energy conservation lessons and programs?</p>	<ul style="list-style-type: none"> <li>➤ College has created awareness among the faculty and students to reduce energy wastage.</li> <li>➤ The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations.</li> <li>➤ The usage policy of photocopiers, fax machines and other equipment users is "POWER ON" when in use and "POWER OFF" when not in use. There is no idle power consumption.</li> </ul> <p>Please refer Annexure V and VI for details.</p>
<p>Do students and staff know where their water comes from?</p>	<p>The sources of water are Well and NMC water. NMC Water is utilized for drinking (after purification), and Well water is used in the wash rooms and for cleaning purpose.</p>
<p>Is college encouraging responsible water use via:</p> <ul style="list-style-type: none"> <li>o posters, placards?</li> <li>o incentives?</li> <li>o contests?</li> <li>o awards?</li> </ul>	<p>Yes, by posters, placards, contests.</p>
<p>How is trash managed outside the campus?</p>	<p>The waste is given to the Municipal Corporation (NMC) for disposal.</p>
<p><b>Further Scope of Improvement</b></p> <ul style="list-style-type: none"> <li>➤ College may calculate the water footprint to compare its performance with National and International Consumption Standards and communicate with its stakeholders.</li> <li>➤ College should apply for the Clean and Smart Campus Initiatives award.</li> </ul>	
<p><b>Conclusion</b></p> <ul style="list-style-type: none"> <li>➤ Visible communication on environmental issues.</li> <li>➤ Effective use of notice boards and signs.</li> <li>➤ Water footprint may be calculated in future.</li> </ul>	

### 3. Lighting

<p>How college is utilizing daylight?</p>	<p>The college building is situated in such a manner that it is getting the full advantage of good airflow enabling good ventilation and sun light. It is a building having large windows and open space in all directions. During the day time, it is possible to carry out activities without air conditioners and air fans during operational days.</p>
<p>Is college utilizing any incandescent lights? Can they be replaced with compact fluorescents (energy saving bulbs)?</p>	<p>The college timings are from 7:45 AM to 5:45 PM. Thus, requirement of daytime lighting (powered by electricity) is limited.</p> <p>Energy efficient lighting system is followed. the contemporary best practices will recommendations on lighting by Bureau of Energy Efficiency, Book-3, Chapter 8, table 8.1</p>



Table B.1. Luminous Performance Characteristics of Commonly Used LA

Type of Lamp	Lumens / Watt		Colour Rendering Index	Typical Application
	Range	Avg.		
Incandescent	8-18	14	Excellent (100)	Homes, restaurants, general lighting, emergency lighting.
Fluorescent lamps	46-60	50	Good w.r.t. colour (67-77)	Offices, shops, hospitals, homes.
Compact Fluorescent lamps (CFL)	80-70	60	Very good (85)	Hotels, shops, homes, offices.
High pressure mercury (HPMV)	44-57	50	Fair (45)	General lighting in factories, garages, car parking, flood lighting, etc.
LED lamps	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lighting, etc.

Thus, LEDs are considered for installation as night lights, security street lights by the college. The term reading light<sup>4</sup> normally refers to lamps or lights which focus light dedicated for readings, thus LEDs were not considered for class room lightings initially. Fluorescent lamps were utilized for class rooms (as the same are stated to be suitable for office illumination level requirements). LED lights started replacing the conventional tube light as a replacement measure after failure. LED lighting survey was also undertaken by the Audit Team. Please refer below assessments in details.

During the onsite visit the Audit Team visited each department and physically counted the installed lights by their types (Fluorescent tube lamp, CFL and LED). It is confirmed that there is no incandescent light installed for lighting purpose.

As per the published article: [http://www.usalighting.com/stuff/contentmgr/files/1/92feb328de0f4878257999e7d46d8e4/misc/lighting\\_comparison\\_chart.pdf](http://www.usalighting.com/stuff/contentmgr/files/1/92feb328de0f4878257999e7d46d8e4/misc/lighting_comparison_chart.pdf) LED light has lumen/ watt in the range of 80-100 whereas CFL has lumen/ watt in the range of 70-90

Has the college evaluated existing lighting for opportunities to reduce lighting in over-lit areas?	The lighting arrangements are well balanced with arrangements to switch ON and OFF lights independently. There are therefore practically no over lit areas.
Are the light switched duly labelled to make more obvious which switches relate to which appliances?	Switch arrangements are lucid. The fan switches are adjacent to fan speed regulators. Light switches are arranged in order of lighting. The buttons are marked.
Are the lights switched off to make use of daylight? (e.g., lights parallel to windows or in corridors)	There is minimum or practically negligible use of lights during day time as the building structure has possibility of daylight usage. The lux level in the classrooms was measured and found above 250.
Is the college utilizing natural lighting when possible?	Yes, natural lighting is first preference.
For the spaces like store rooms, toilets, kitchen areas, copying rooms, corridors etc. is their scope for automatic lighting controls?	The college avails the sensor-based lighting arrangements to control the night illumination. The lighting sensors automatically switch on and switch off lights depending on the lux levels.  <b>Recommendation:</b> <b>The students and staff washrooms can be equipped with the proximity sensors to control the lighting arrangements.</b>
Can main lighting ever be switched off and dedicated lighting be used?	As such there are no dedicated lamps which can replace overhead lighting. However, redundant lighting can be switched off when it is not required.

<sup>4</sup><https://www.collinsdictionary.com/dictionary/english/reading-light>



Are the light fittings clean?	The staff is responsible for day-to-day cleaning was interviewed during onsite visit. Cleanliness is well maintained. In-house light fittings are cleaned regularly some light fittings need cleaning. However, the installed fittings were not cleaned as Covid-19 Pandemic caused shortage of staff.
Do windows and skylights need cleaning to allow in more natural light?	The window and skylight were not clean as Covid-19 Pandemic caused shortage of staff.
Has the college installed lighting occupancy sensors?	No, lights are negligibly operated during day time. The lights are operated manually.  The night lights are however operated based on the sensors which operate lights based on the illumination levels.
Is there mechanism in place to immediately report inoperable occupancy light sensors?	Yes, in case of failure of the existing sensor, the night lights will not operate.
What is the % contribution of the LED lighting?	We have evaluated the % LED installation at Passage and ground and all other floor. The value is determined and presented under Annexure V.

**Further Scope of Improvement**

- The students and staff washrooms can be equipped with the proximity sensors to control the lighting arrangements.

**Conclusion**

- The students and employees were interviewed and no complains was identified within respect to the sufficiency of lighting measures.
- Sufficient lux levels above 250 are common in class rooms and work-stations based on the survey of audit team.
- Negligible lighting load is observed during day time as college makes good use of daylight.

## 4. Cooling and Ventilation

How are the Air Conditioning Controls? For the local controls, how it is ensured that AC is working only ON when necessary. What is temperature setting of the AC?	The AC usage is very high as the temperature in Nagpur district is (Max temperature is above 42°C <sup>o</sup> ) hottest day in Nagpur was registered with temperature of 47.9°C). The AC temperature is set at 28°C. Awareness is created and measures are implemented in line with the recommendations of Ministry of Power ( <a href="https://www.cseindia.org/a-step-in-the-right-direction-says-cse-of-power-ministry-s-move-to-fix-starting-temperature-of-room-air-conditioners-at-24oc-and-not-lower-to-save-energy-8814">https://www.cseindia.org/a-step-in-the-right-direction-says-cse-of-power-ministry-s-move-to-fix-starting-temperature-of-room-air-conditioners-at-24oc-and-not-lower-to-save-energy-8814</a> )
What is the mechanism of reducing heat in-grace? Are the closing blinds or fitting reflective film to windows installed to reduce solar gain?	The building is designed to make best use of day light and avoid the heat in-grace. Blinds are available in office to control unnecessary heat in-grace.
Are all external doors and windows closed when air conditioning is on?	There are 14 number of ACs in college. Based on interviews, it is confirmed that the practice of closing doors and windows is maintained when air conditioning is in operation.
Is there a scenario where air	There are no such instances observed. Arrangements are duly

<sup>9</sup><http://www.imd.gov.in/section/climate/climateimp.pdf>

<sup>9</sup><https://timesofindia.indiatimes.com/city/nagpur/Nagpur-records-all-time-high-temperature-at-47-9-C/articleshow/20216419.cms>





conditioning is wasted in unused spaces, such as cupboards, corridors?	implemented to avoid losses.
Are Efficient and energy labelled ACs utilized for cooling purposes?	<p>There are 14 number of ACs in the college out of which 1 is 5 Stars, 12 are 3 Stars and 1 is 2 Stars. These AC's run for 5-6 hours during summer and rainy season.</p> <p><b>Recommendation:</b></p> <p>The 2 stars AC is not the most economical AC for the sustained working hours of 5-6 hours for approximately 100 days a year. It is recommended to replace the AC with more energy efficient AC (at least 3 Stars ratings or above).</p> <p>Below guidelines can be considered by college in future while selecting between the AC and evaporative cooling.</p> <p><b>Evaporative Cooling System (for computer lab)</b></p> <p>The Assessment team has undertaken document review and analysis of the data for the assessment of the air conditioning system. Based on the same it was found that there exists scope for the use of evaporative based cooling which is energy effective compared to the reversed Bryon cycle i.e., Vapour Compression Cycle. The basic reason for the same installed system has COP of 1.5 kW/TR of refrigeration compared to evaporative cycle which draws 0.3-0.5 kW based on the size of installation.</p>
<p><b>Further Scope of Improvement</b></p> <ul style="list-style-type: none"> <li>➤ The 2 start AC is not the most economical AC for the sustained working hours of 5-6 hours for approximately 100 days a year. It is recommended to replace the AC with more energy efficient AC (at least 3 Star ratings or above).</li> <li>➤ Evaporative cooling can be availed for computer lab.</li> </ul>	
<p><b>Conclusion</b></p> <ul style="list-style-type: none"> <li>➤ The 2-star AC needs to be replaced by at least 3 Star AC or better at the end of their technical lifetime.</li> <li>➤ Evaporative cooling can be availed for computer lab.</li> </ul>	

## 5. Operation of Electronic Equipment

Are computers, printers, photocopiers and other equipment switched off at the end of the day?	Yes
Is there any mechanism by which the screens and other equipment be controlled during the day?	The college has availed the services of the Green Audit for the first time. The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations. Please refer to Annexure VI.
Are the screen savers disabled?	Yes, please refer above assessment.
Are computers programmed to 'power down' mode?	Computers are programmed for the sleep operation.
Is the user entrusted with the rights to modify standby settings? (E.g. TVs, LCD projectors,	No, the college has the administrative rights. Such changes cannot be initiated by users.



printers etc.)	
What is status of the photocopiers, fax machines and other equipment? Are they programmed on 'Energy Saver' mode during the day?	The equipment like photocopiers, fax machines are shutdown when not in use, computers are turned to sleep mode whenever not in use.
Are the power management settings enabled on all the computers/ monitors/ all-in-one machines?	All machines are governed by the college. All are equipped by power management settings as already described above.
<b>Conclusion:</b>	
➤ The Electrical Equipment's are well operated. Redundant operations are avoided.	

## 6. Water Management

Are any water leaks identified?	No such instance was observed. The college has installed "Flush Less Urinals", in which there is no need to flush water after use.
Are taps left running? Are there any dripping taps? Do taps need maintenance?	No such instance was observed.
Are push button taps utilized?	As the college has installed "Flush Less Urinals", there is no need to install push buttons, but conventional taps, need to be replaced low-flow faucets, automatic faucets, and / or faucet aerators as the replacement for the existing.  <b>Recommendation:</b> <b>The college Management needs to consider low-flow faucets, automatic faucets, and / or faucet aerators as the replacement for the existing conventional taps.</b>
Is water escaping from overflows either inside or outside buildings?	No such instance was identified during onsite audit.
Has the college installed low-flow faucets, automatic faucets, and / or faucet aerators?	<b>Refer above assessment.</b>
Has the college installed low-flow shower heads at Hostel?	NA.
Has the college harvested rainwater?	NA. The college is located in near Ambazari Lake, due to which it is already situated in water positive area. Water levels in the college is at 5 feet from ground level. The college also gets flooded in the rainy season and the well in the college overflows in the rainy season. So, it is practically not possible to install the water harvesting system and store the water.
Is the college collecting the condensation from AC units for onsite watering needs?	Condensed water from 1 AC is given to the plants.  <b>Recommendation:</b> <b>College needs to collect the condensed water from the remaining ACs and reuse it for watering plants.</b>



Has the college optimized its irrigation system for gardening to

- Operate at night or early morning hours to minimize evaporation?
- Water the minimum time and frequency necessary for the applicable vegetation?

The gardener waters the plants early in the morning.

As per the latest publication from "The Hindu" drip irrigation is one of the most important measures to achieve "more crop per drop". Share of Agriculture consumption is approximately 83 per cent of India's water resources, thus approximately 17 per cent water resources are available for domestic and industrial use (<http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece>).

**Recommendation:**

- College needs to install the metering arrangement to measure the water drawn from well.
- College needs to install drip-irrigation system for watering the plants.

What is amount of rain water harvested?

NA  
Refer above assessment.

Are there any community-based projects implemented by the college?

Yes, the college undertakes various activities, but due to the pandemic the college was unable to conduct community-based activities.

Is the college consuming 3<sup>rd</sup> Party Water?

Yes, the college is having 1 Nagpur Municipal Corporation connection. The consumption is as follows:

Sr. No.	Month	Units Consumed
1.	April 20	472
2.	May 20	458
3.	June 20	275
4.	July 20	313
5.	August 20	367
6.	September 20	233
7.	October 20	156
8.	November 20	158
9.	December 20	211
10.	January 21	170
11.	February 21	194
12.	March 21	472
<b>Total</b>		<b>3479</b>
<b>Average</b>		<b>290</b>

**Further Scope of Improvement:**

**Long Term Measure:**

- > The college Management needs to consider low-flow faucets, automatic faucets, and / or faucet aerators as the replacement for the existing conventional taps.
- > College needs to install the metering arrangement to measure the water drawn from well.
- > College can undertake determination of water footprint and calibrate its specific water consumption with the established National and International Norms.
- > College needs to install Drip Irrigation system for watering plants.



- College needs to collect the condensed water from the remaining ACs and reuse it for watering plants.

**Conclusion:**

- The college is having 01 no. of well & 1 NMC water connection.

## 7. Water Quality

Is the college campus maintained clean to minimize litter polluting water table?	The college premise is kept clean. Thus, the chances of litter polluting water table are negligible
Is the college monitoring drinking water quality regularly? If yes, what is the frequency?	Yes, the college performs water quality testing in their own labs.
<b>Recommendation:</b> The college needs to perform Third Party Water Testing.	

**Further Scope of Improvement:**

- The college needs to perform Third Party Water Testing.

**Conclusion:**

- The students, staff members and guests have access to clean, safe and potable water with the RO system.

## 8. Renewable Energy

Is the college having solar, wind, or other forms of renewable energy?	Yes. The college has installed 3 Solar PV Systems of 50 Kw.
Is the college purchasing renewable power from third party or renewable energy certificates for its electricity use?	No,
Is the college offering renewable energy lessons / programs?	This already assessed under chapter 01 of this report.

**Conclusion:**

- The college has installed Solar PV System.

## 9. Transportation

Is college encouraging transportation measures like bicycle, Bulk transport, walking?	<p><b>Students:</b></p> <p>Total 2003 students are enrolled for 2020-21 session. As due to lockdown only online classes are been conducted, no students are attending the college. According to the interviews last year:</p> <p>Approximately:</p> <ul style="list-style-type: none"> <li>➤ 74% students of the college commute by public transport.</li> </ul>
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	<ul style="list-style-type: none"> <li>➤ 16% students of the college commute by 2-wheeler.</li> <li>➤ 5% students of the college commute by walking.</li> <li>➤ 5% students of the college commute by bicycle.</li> </ul> <p><b>Faculties:</b> There are 97 staff members in the college, out of which:</p> <ul style="list-style-type: none"> <li>➤ 62% staff of the college commute by their own 2 wheelers.</li> <li>➤ 27% staff of the college travel by 4 wheelers.</li> <li>➤ 8% staff of the college commute by public transport.</li> <li>➤ 2% staff of the college commute by bicycle.</li> <li>➤ 1% staff of the college commute by walking.</li> </ul>
Is the college providing eco-friendly or less GHG intensive transportation matching services? (Example carpools, college buses etc)	Refer above response.
What are the good practices pertaining to Transport?	<p>"No Vehicle Day" observed on every Second Saturday, in which no vehicle is driven inside the college campus.</p> <p><b>Recommendation:</b> College Management should encourage use of bi-cycle and mass transport systems amongst faculties.</p>
<p><b>Further Scope of Improvement:</b></p> <ul style="list-style-type: none"> <li>➤ College Management should encourage use of bi-cycle and mass transport systems amongst faculties.</li> </ul>	
<p><b>Conclusion:</b></p> <ul style="list-style-type: none"> <li>➤ The college management, its employees and the students observe satisfactory practices of transportation / commutation.</li> </ul>	

## 10. Purchasing Practices

Describe the purchasing that confirms the better environmental performance?	Printers with duplex printing facility is installed at the computer lab and Library. There is culture of the two-sided printing. Paper is not wasted.
How does the college limit the purchase of single-serve bottles and containers?	The college has RO system; guests are served with water from RO system. Single serve bottles are not utilized unless requested by the guest.
Is the college having water fountains/stations to promote easy filling of reusable water bottles?	Yes, the water dispensers are connected to output of RO system. Clean and potable water is available to staff, student and guests.
<p><b>Further Scope of Improvement:</b></p> <p>The college should further emphasize on the purchase of:</p> <ul style="list-style-type: none"> <li>➤ No- to low-odor (VOC) markers</li> <li>➤ No- to low-VOC paints? (Via Facilities)</li> </ul>	



- Paper / Paper products with maximum recycled content
- Refillable pens/pencils
- Compostable bags for compost collection

**Conclusion:**

- Evaporative Cooling System is used in the college.
- One sided paper is utilized by college to avoid use of fresh papers
- Policy for the disposal of Archived paper Records needs to be formed by college

## 11. Energy and Carbon Footprint

Has the College undertaken energy audit?	<p>Yes, the energy audit was undertaken and electrical measurements were undertaken at the college. Please refer the Annexure –XVII of this report.</p> <p>Energy audit is an effective tool in identifying and perusing a comprehensive energy management program. Energy Audit highlights the areas of energy savings, thereby reducing the energy costs. The following are the major consumers of electricity in the facility:</p> <ul style="list-style-type: none"> <li>➤ Computers</li> <li>➤ Lighting</li> <li>➤ Air-Conditioning</li> <li>➤ Fans</li> <li>➤ Pumps</li> <li>➤ Other Lab Equipment</li> </ul>
What are the steps undertaken during the energy audit?	<p>The Assessment Team undertook the analysis of the college premise:</p> <ul style="list-style-type: none"> <li>➤ To study electricity bills</li> <li>➤ Study of lighting system and its measurement.</li> <li>➤ Identification of energy saving opportunity and energy conservation.</li> </ul>
What methodology was adopted?	<p>The energy assessment involved desk review and onsite measurements. Review of energy bill received from MSEDCL was undertaken. Review of lighting, HVAC, fuel usage, pumping systems etc. was undertaken. Energy conservation and saving opportunities are identified and included below.</p>
What are the suggested energy conservation measures?	<p><b>Below energy conservation measures are suggested</b></p> <ul style="list-style-type: none"> <li>➤ The one switch for college concept should be implemented in the college. This will avoid unwanted operation and wastage of electricity.</li> <li>➤ There are 40 W tube lights. As per replacement policy the LED tube-light should be installed. The T8 LED tube has wattage of 20 W, thus the energy saved is <math>40-20 = 20</math> watt/fitting. As per study there are 465 tubes of 40 W in college and library. After the replacement based on failure the energy savings will be approximately 11671.5 kWh/year.</li> <li>➤ All Class Rooms must sensitize students regarding optimum use of electrical appliances in the room like, lights, fans, and computers.</li> <li>➤ Lights in toilet area may be kept OFF during day time. Additional sensors can be installed in washrooms to automatically regulate the light and exhaust fans.</li> </ul>



Has the college calculated its carbon footprint?	For the first time college is calculating the carbon footprint. The data applicable to Scope-2 emission (electricity purchase from grid) is available. The emissions pertaining to Scope-01 are limited LPG usage in Labs.																																							
How is college promoting zero emission transportation options?	Not applicable. There is no internal transportation within the college.																																							
Are all the applicable emission sources calculated?	<p>The emission source pertaining to electricity source is calculated. Scope-01 emission source data pertaining to LPG consumption in labs is calculated, Scope 2 emission on account of electricity imported from grid is considered.</p> <p><b>Scope-01 Emissions:</b></p> <table border="1" data-bbox="571 678 1343 831"> <thead> <tr> <th>Year</th> <th>LPG consumption in Labs</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>kg</td> </tr> <tr> <td>2020-21</td> <td>28.4</td> </tr> </tbody> </table> <p><b>Equivalent Scope-01 Emissions are as below<sup>7</sup>:</b></p> <table border="1" data-bbox="571 905 1343 1020"> <thead> <tr> <th>Year</th> <th>Total GHG Emission (Scope-1)</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>tCO<sub>2</sub></td> </tr> <tr> <td>2020-21</td> <td>0.10</td> </tr> </tbody> </table> <p><b>Scope -2 Emissions are tabulated as follows<sup>8</sup>:</b></p> <table border="1" data-bbox="571 1094 1343 1247"> <thead> <tr> <th>Year</th> <th colspan="2">Annual Electricity Consumption</th> <th colspan="2">Total GHG Emission (Scope-2)</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td colspan="2">kWh</td> <td colspan="2">tCO<sub>2</sub></td> </tr> <tr> <td>2020-21</td> <td>0</td> <td>21672</td> <td>0</td> <td>21.67</td> </tr> </tbody> </table> <p><b>Total CO<sub>2</sub> emissions for financial year 2020 – 21 = Scope-01 + Scope-02</b></p> <table border="1" data-bbox="571 1320 1343 1499"> <thead> <tr> <th>Year</th> <th>Total GHG Emission (Scope-1)</th> <th>Total GHG Emission (Scope-2)</th> <th>Total GHG Emission (Scope-1+2)</th> </tr> </thead> <tbody> <tr> <td>Session</td> <td>tCO<sub>2</sub></td> <td>tCO<sub>2</sub></td> <td>tCO<sub>2</sub></td> </tr> <tr> <td>2020-21</td> <td>0.10</td> <td>21.67</td> <td>22<sup>9</sup></td> </tr> </tbody> </table>	Year	LPG consumption in Labs	Session	kg	2020-21	28.4	Year	Total GHG Emission (Scope-1)	Session	tCO <sub>2</sub>	2020-21	0.10	Year	Annual Electricity Consumption		Total GHG Emission (Scope-2)		Session	kWh		tCO <sub>2</sub>		2020-21	0	21672	0	21.67	Year	Total GHG Emission (Scope-1)	Total GHG Emission (Scope-2)	Total GHG Emission (Scope-1+2)	Session	tCO <sub>2</sub>	tCO <sub>2</sub>	tCO <sub>2</sub>	2020-21	0.10	21.67	22 <sup>9</sup>
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<sup>7</sup>With 10 % uncertainty

<sup>8</sup>With 10 % uncertainty

<sup>9</sup> Rounded Value



## 12. Waste Management

How the college reduces its paper waste via:  
o encouraging digital reading, note-taking, and activities?

- o setting printers and computers to default to duplex (double-sided) printing?
- o reducing margins and white space on documents that must be printed?
- o printing multiple pages per sheet?
- o minimizing paper correspondence with families?
- o opting out of unwanted mail?

- The college has adopted the duplex printers, which enables the complete usage of the paper areas.
- College has taken initiatives towards plastic free campus. The students are encouraged to use waste bins which are placed in the college.
- The internal correspondences and various functionalities are taken care by the electronic means like emails, sms etc.

Is the college undertaking recycling collection for additional recyclable materials—like plastic bags, CFL (spiral) light bulbs, batteries, drink pouches, candy wrappers, and electronics?

The recycling / disposal system adopted by the college is as below.

Different types are generated within campus which include.

- **E-Waste:**  
The E-waste generally includes the tube-lights, CFL, LED, computer waste, etc. are stored at a dedicated place. Some of the scrap is reused by the college under the program "Best Out of Waste". The college is planning to undergo an MoU with an agency for the proper disposal of the remaining E-waste.
- **Plant Waste:**  
The plant waste is converted to manure in compost pit within the campus area.
- **Sewage Waste:**  
The liquid waste from lavatories and other sources are flown into the sewer line.
- **Cellulose and Paper Waste:**  
Cellulose and paper waste is stored in a particular place and given to the agency for proper disposal.
- **Biomedical Waste:**  
The college disposes the Bio-medical Waste in a proper manner as it is a regular member of "Common Bio-medical Waste Disposal Services".
- **Chemical Waste:**  
The Chemical Waste is diluted and flown into the sewer line.

Please refer Annexure XIII for details.

**Recommendation:**

- The college needs to improve its E-waste disposal system.





- The college needs to sign an MoU with a dedicated agency for Cellulose Waste.
- College needs to perform study of all the effluent chemicals (volume, weight, impact) used and accordingly develop mitigation measures under its sustainable strategy.

**Further Scope of Improvement:**

- The college needs to improve its E-waste disposal system.
- The college needs to sign an MoU with a dedicated agency for Cellulose Waste.
- College needs to perform study of all the effluent chemicals (volume, weight, impact) used and accordingly develop mitigation measures under its sustainable strategy.
- College needs to improve its waste disposal system.

**Conclusion:**

- Sanitary napkins Vending Machine and Incinerator Machine are installed in girl's common room.

## 13. Environment

### Air Quality

The plantation around the college helps to improve ambient air quality. The class room are well ventilated and spacious. This minimizes suffocation to students by improving air changes and hence the air quality. The assessment team has availed the monitoring result which are publicly available and independently monitored and hence reliable and reproducible source. Air Quality was found satisfactory however it is variable and changes with season and anthropogenic activities.

### Sound Measurements

The Audit Team undertook readings of sound at various locations in the college like Classroom, Lab, Office and Campus most of the readings were found within the limits.

Please refer Annexure XVI for further details

## 14. Plantation by College

The college campus has several varieties of trees.

Every year, plantation programme is carried out in the campus as well as outside the campus. Students are also involved in plantation programme in surrounding locality. In the current session, the Institution planted several trees in the vicinity.

There are 124 fully grown trees as wells as shrubs in the campus and 335 plants in botanical garden.



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Letter No. : DSC/SR/JR/.....

Date : .....

20/08/2020

List of plants present in college premises

Sr. No.	Botanical Name	Family	Vernacular name	No. of Plants
1	<i>Azadirachta indica</i>	Meliaceae	Neem	3
2	<i>Delonix regia</i>	Fabaceae (caesalpinioideae)	Gulmohar	14
3	<i>Polyalthia longifolia</i>	Annonaceae	Drooping Ashok /False Ashok	3
4	<i>Saraha indica</i>	Caesalpiniaaceae	Ashok	6
5	<i>Melia azadirach</i>	Meliaceae	Bakneem	6
6	<i>Cassia siamea /Seena siamea</i>	Fabaceae (caesalpinioideae)	kassod	4
7	<i>Dalbergia sissa</i>	Papilionaceae	Indian rose-wood/sheesham	5
8	<i>Leucaena leucocephala</i>	Mimosaceae	Miracle tree/ Subabhu	3
9	<i>Samanea saman</i>	Mimosaceae	Raintree/cocoa-tamarind	10
10	<i>Millingtonia hortensis</i>	Bignoniaceae	Indian cork tee/ Tree Jasmine	2
11	<i>Terminalia catappa</i>	Combretaceae	Desi badam	1
12	<i>Sapthodea campanulata</i>	Bignoniaceae	African tulip tree /Akash shewga	1
13	<i>Mimusopa elengi</i>	Sapotaceae	Bakul	1
14	<i>Millettia pinnata</i>	Fabaceae	Pongame oil tree	6
15	<i>Akstonia scholaris</i>	Apocyanaceae	Indian devil tree/Saptaparni	5
16	<i>Micralla champaka</i>	Magnoliaceae	Sonchafa	1
17	<i>Mangifera indica</i>	Anacardiaceae	Amba/Aam	3
18	<i>Phyllanthus emblica</i>	Phyllanthaceae	Myrobalan/Indian gooseberry/amla	2
19	<i>Dypsis lutescens</i>	Areaceae	Areca palm /golden cane palm	8
20	<i>Roystonea regia</i>	Areaceae	Royal palm	5
21	<i>Wodyetia bifurcata</i>	Areaceae	Foxtail palm	34
22	<i>Cocos nucifera</i>	Areaceae	Coconut palm	1

Principal  
 (Dr. Akhilesh V. Peshwe)  
 PRINCIPAL  
 Dharampeth M. P. Deo Memorial  
 Science College, Nagpur.

List of trees in the Campus



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Letter No. : DSC/SR/JR/

Date: \_\_\_\_\_

20/08/2020

LIST OF PLANTS (BOTANICAL GARDEN)

Sr. No.	Botanical Name	Family	Vernacular Name	No. of Plants
1	<i>Acalypha wilkesiana</i>	Euphorbiaceae		6
2	<i>Aegle marmelos</i>	Rutaceae	Bel	2
3	<i>Agave americana</i>	Agavaceae	Kekti	5
4	<i>Aloe vera</i> (L.) Bur.f	Xanthorrhoeaceae	Korfad	15
5	<i>Amaryllis belladonna</i>	Amarillidaceae	Lilly	1
6	<i>Artemisia stellerina</i>	Asteraceae		1
7	<i>Azadirachta indica</i>	Meliaceae	Neem	3
8	<i>Bambusa arundinacea</i>	Poaceae	Bamboo	2
9	<i>Barleria prionitis</i>	Acanthaceae	Kate koranti	2
10	<i>Beccarnea recurvata</i>	Asparagaceae	Ponytail palm	1
11	<i>Bryophyllum pinnatum</i> (Lam)	Crassulaceae	Paanfuti	2
12	<i>Cana sps</i>	Canaceae		2
13	<i>Caryota urens</i>	Arecaceae		7
14	<i>Cassia siamea</i>	Caesalpinaceae		6
15	<i>Casuarina equisetifolia</i>	Casuarinaceae	Suru	1
16	<i>Catharanthus roseus</i>	Apocyanaceae	Sadafuli	8
17	<i>Chlorophytum comosum</i>	Asparagaceae	spider plant	20
18	<i>Clitoria ternata</i>	Fabaceae	Gokarna, Aprajita	5
19	<i>Cocos nucifera</i>	Arecaceae	Naral, Narial	3
20	<i>Codiaeum variegatum</i>	Euphorbiaceae	Gardob croton	1
21	<i>Coleus amboinicus</i>	Lamiaceae		6
22	<i>Crossostephium chinense</i>	Asteraceae		2
23	<i>Cryptomeria</i>	Taxodiaceae		4
24	<i>Cycas revoluta</i>	Cycadaceae	Cycas	3
25	<i>Duranta erecta</i>	Verbanaceae	Garden mehandi	100
26	<i>Epipremnum aureum</i>	Araceae	Money plant	3
27	<i>Euphorbia hirta</i>	Euphorbiaceae		Abundant
28	<i>Euphorbia milli</i>	Euphorbiaceae		3
29	<i>Euphorbia tirucalli</i>	Euphorbiaceae		1
30	<i>Ficus benghalensis</i>	Moraceae	Wad, Bargad	2
31	<i>Ficus benjamina</i>	Moraceae	Weeping fig	4
32	<i>Ficus hispida</i>	Moraceae	Kat umbhar	15
33	<i>Ficus racemosa</i>	Moraceae	Umbar	4
34	<i>Ficus religiosa</i>	Moraceae	Pimpal	2
35	<i>Geopertia ornata</i>	Marantaceae		3
36	<i>Gerbera daisies</i>	Asteraceae	Gerbera	3



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Letter No. : DSC/SR/JR/

Date :

Sr. No.	Botanical Name	Family	Vernacular Name	No. of Plants
37	Graptophyllum pictum	Acanthaceae	tricolor cariture plant	3
38	Hibiscus rosasinensis	Malvaceae	Jaswant	5
39	Ikora sp.	Rubiaceae		5
40	Jasminum sambac	Oleaceae	Mogra	4
41	Jatropha podagrica	Euphorbiaceae		2
42	Justicia adhtoda	Acanthaceae	Adulsa	1
43	Leucana leucecephala	Mimosaceae	Subabul	4
44	Mangifera indica	Anacardiaceae	Amba, Aam	1
45	Michelia champaca	Magnoliaceae	Sonchafa	1
46	Morus alba L.	Moraceae	sehtut	2
47	Murraya kiengii	Rutaceae	Meethaneem, Godneem	1
48	Musa paradisiaca	Musaceae	Kela	1
49	Nerium oleander	Apocyanaceae	Kanher	2
50	Opuntia sp.	Cactaceae	Cactus	2
51	Pedilanthus titythaloides	Euphorbiaceae		1
52	Phoenix sylvestris	Arecaceae	Sindi	1
53	Phyllanthus emlica	Ephyllanthaceae	Awia, Amla	2
54	Piper betel	Piperaceae	Meetapan	1
55	Pistia stratiotes	Araceae		Tank (Abundant)
56	Plumbago zeylanica	Plumbaginaceae	Chitrak	1
57	Polyalthea longifolia	Anonaceae	Khota-Ashok	8
58	Pongamia pinnata	Fabaceae	Karanj	1
59	Portulaca sp.	Portulacaceae		4
60	Rosa indica	Rosaceae	Gulab	15
61	Salvinia auriculata	Salvinaceae	Pteridophyte	Tank (Abundant)
62	Salvinia molesta	Salvinaceae	Pteridophyte	Tank (Abundant)
63	Santalum album	Santalaceae	Chandan	1
64	Sidium guauajava	Myrtaceae	Peru, Jam, Amrud	2
65	Syngonium podophyllum	Araceae		10
66	Thuja occidentalis	Cupressaceae		3
67	Withania somnifera	Solanaceae	Ashwagandh	1
68	Zamia sp.	Zamiaceae		1
69	Zamioculcas zamiifolia	Araceae		1

Principal

(Dr. Akhilesh V. Peshwe)

**PRINCIPAL**  
 Dharampeth M. P. Deo Memorial  
 Science College, Nagpur.

List of trees in the Botanical Garden



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## Annexure

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## Annexure – I: List of Interviewed College Staff / Students

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 Email : principal\_dsc@rediffmail.com

Letter No: DSC/SR/JR/.....

Date: 29-09-2022

Following teachers, Non-teaching Members were present during the Green Audit on 29-04-2022

Sr. No.	Name of Staff	Position	Signature
1.	Lt. Dr. P.W. Ambekar	Assistant Professor	
2.	Prof. P. T. Humane	Professor	
3.	Dr. N. P. Gaurwad	Associate Professor	
4.	Mrs. Ruma Kapre	Lecturer	
5.	Mrs. Shambhavi Holay	Lecturer	s.v. holay..
6.	Mr. D.G. Chaudhari	Lab. Attnd.	
7.	Mr. S.S. Paunikar	Lab. Attnd.	
8.	Mr. K.M. Kulkarni	Asst. Prof.	
9.	Mr. J. S. Wankhede	Lab. Att.	
10.	Mr. H. U. Barange	Lab. Att.	

Principal  
 (Dr. Akhilesh V. Peshwe)



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Letter No. : DSC/SR/AR/.....

Date: 29-04-2022

Following Students were present during the Green Audit on 29-04-2022

Sr. No.	Name of Student	Class	Signature
1.	Sushma Gangadhar Gurnale	3 <sup>rd</sup> Year CBZ F12	<i>Sushma</i>
2.	Subbu Rajnikant Mishra	1 <sup>st</sup> Year CBZ F12	<i>Subbu</i>
3.	Shikha Jankhan Lal Yadav	1 <sup>st</sup> Year CBZ F12	<i>S. J. Yadav</i>
4.	Ayush Shridheendra Kel	5 <sup>th</sup> Year Econ	<i>Ayush</i>
5.	Brodham Gupta	1 <sup>st</sup> Year PCMS-20	<i>B</i>
6.	Shruti P. Masrao	2 <sup>nd</sup> Year CBZ F12	<i>Shruti</i>
7.	Yashashree P. Chande	2 <sup>nd</sup> Year CBZ F12	<i>Yashashree</i>
8.	Ashmit V. Juwan	1 <sup>st</sup> Year PCM F1	<i>Ashmit</i>
9.	Kajal. T. Puasad	1 <sup>st</sup> Year PCM F8	<i>K. Puasad</i>
10.	Aashin. K. Sheikh	1 <sup>st</sup> Year PME F3	<i>Aashin</i>

*A.V. Peshwe*  
Principal  
(Dr. Akhilesh V. Peshwe)



## Annexure – II: Reference Documents / Surveys

<b>Sr. No</b>	<b>Reference Documents / Surveys pertaining to</b>
1.	Functionality of RO water plant
2.	Roof top area by college
3.	Setup for rain Water Harvesting
4.	Information regarding Garden Waste Management
5.	Information regarding Liquid Waste Management
6.	Measures for maintaining Cleanliness in Campus.
7.	Measures for Garbage Collection and disposal
8.	Plantation Measures
9.	Electricity Bills for duration of April 2021 to March 2022
10.	Nature Conservation Club Composition
11.	Declaration on Operational Controls of System Department with Respect to IT Management & Other Electronic Equipment's.
12.	Roll of Staff, Students & Management to Save Electricity in Campus.
13.	Lighting Survey undertaken by the Green Audit Team
14.	Water Harvesting Survey undertaken by the Green Audit Team
15.	Waste Water Management Survey undertaken by the Green Audit Team





## Annexure –III: Green Campus Committee



**Golden Jubilee Year  
2018**

Dharampeth Education Society's  
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Letter No. : DSC/5R/JR/.....

Date : .....

20/08/2020

### Green Campus Committee, It's Vision & Mission

#### Green Campus Committee 2019-2022

Sr. No.	Name	Designation
1.	Dr. Akhilesh Peshwe	Principal
2.	Dr. Archana kulkarni	Vice principal
3.	Dr. Pitamber Humane	IQAC Coordinator
4.	Dr. Kirti Paturkar	Assistant Professor
5.	Dr. Vidya Kathoke	Associate Professor
6.	Mrs. Archana Dani	Lecturer
7.	Mr. Sunil Rathod	Lecturer
8.	Ashna Damkondawar	Student
9.	Madhavi Mishra	Student
10.	Alpesh Bokade	Student
11.	Yash Giri	Student
12.	Prachi Itankar	Student
13.	Nilesh Ghate	Student
14.	Mukul Atram	Student
15.	Nilesh Ghate	Student

#### Green Campus Vision:

- To create cleaner, safer campus by working together to improve local environmental quality.

#### Green Campus Mission:

- To have a beneficial impact on the local environment and community by utilizing natural resources efficiently and managing wastes efficiently.
- To inform people about the therapeutic properties of different plants.
- Create communities of individuals who live in an ecologically friendly manner.

  
Principal  
(Dr. Akhilesh V. Peshwe)

PRINCIPAL  
Dharampeth M. P. Deo Memorial  
Science College, Nagpur.

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### Annexure – IV: List of Awareness Program Undertaken by College

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Tree Plantation Drive at college campus on 03<sup>rd</sup> August 2020



Tree Plantation Drive at college campus on 15<sup>th</sup> August 2020



## Annexure –V: Lighting Survey (2021 – 22)

### List of Assumptions:

- During the survey specific hours for each class room, wash room, office space was assessed and accordingly average daily hours were considered
- The kW ratings of the installed lights are taken from the College data
- The calculations cover the two approaches
  - Approach: Calculation of LED contribution based on the total lighting load energy consumption.

**Note: The Lumen/Watt for 28 W tube light is up to 110; which is almost same as LED is: 110-120<sup>10</sup>**

- The Green Audit Team acknowledges the criteria for introduction of LED lights as LED lights do not have disposal problems. Tube lights face problem of mercury contamination.
- Conversely the college also faces the problem of disposal of existing tube lights. The sudden disposal of tube lights on large scale and within their service life will lead to huge amount of e-waste which has critical impact on environment. The college management is thus looking for the replacement policy and lighting (tube light, CFL) will be upgraded to eco-friendly LED after failure of existing lighting system.

Lux Levels observed at working place - Above 250

Calculated Contribution of various lighting arrangements: Calculated for 251 working days

Light Sources	Daily Wh Consumption
Tube light	76920
LED	13465

Light Sources	% Contribution
Tube light	85 %
LED	15 %

Light Sources	Number
Tube light	465
LED	213

Light Sources	% Contribution
Tube light	68 %
LED	32 %

<sup>10</sup><https://www.google.co.in/amp/s/www.bijlibachao.com/lights/comparing-led-lights-with-fluorescent-lights.html%3fisamp=1>



Lighting Survey 2021 – 22

Sr. No.	Room Name/No.	Tube light	Watt s	Daily average hrs	W.hr	LED	Watt s	Daily average hrs	W.hr	C.F	Watt s	Daily average hrs	W.hr	Fa n	Watt s	Daily average hrs	W.hr
1	Maths	4	40	5	800	4	20	5	400	-	-	-	-	5	80	4	1600
2	Room No. 14	2	40	5	400	-	-	-	-	1	20	5	100	2	80	4	640
3	Room No. 1	5	40	5	1000	-	-	-	-	-	-	-	-	6	80	4	1920
4	Room No. 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Room No. 3	6	40	5	1200	-	-	-	-	-	-	-	-	7	80	4	2240
6	Room No. 4	5	40	5	1000	-	-	-	-	-	-	-	-	8	80	4	1920
7	Room No. 5	5	40	5	1000	-	-	-	-	-	-	-	-	6	80	4	1920
8	Room No. 6	-	-	-	-	10	15	5	750	-	-	-	-	2	80	4	640
9	Room No. 7	4	40	5	800	-	-	-	-	-	-	-	-	2	80	4	640
10	Room No. 8	-	-	-	-	12	20	1	240	-	-	-	-	19	80	1	1520
11	Room No. 9	4	40	5	800	-	-	-	-	-	-	-	-	6	80	4	1920
12	Room No. 10	5	40	5	1000	-	-	-	-	-	-	-	-	6	80	4	1920
13	Room No. 11	3	40	5	600	-	-	-	-	-	-	-	-	4	80	4	1280
14	Room No. 12	3	40	5	600	-	-	-	-	-	-	-	-	4	80	4	1280
15	Corridor	7	40	2	560	-	-	-	-	-	-	-	-	-	-	-	-
16	Senior Physics Lab	-	-	-	-	11	20	3	660	-	-	-	-	8	80	3	1920
17	Junior Physics Lab	-	-	-	-	8	20	3	480	-	-	-	-	7	80	3	1680
18	Physics Lab	6	40	3	720	-	-	-	-	-	-	-	-	5	80	3	1200
19	101-Botany Senior Lab	26	40	3	3120	1	20	3	60	-	-	-	-	7	80	3	1680
20	Room No. 101	4	40	5	800	-	-	-	-	-	-	-	-	2	80	4	640
21	Corridor	8	40	2	640	-	-	-	-	-	-	-	-	-	-	-	-
22	AV Room	-	-	-	-	10	15	8	450	-	-	-	-	9	80	3	2160
23	105-Zoology	8	40	5	1600	-	-	-	-	-	-	-	-	3	80	4	960
24	106-Zoology	11	40	5	2200	-	-	-	-	-	-	-	-	4	80	4	1280
25	107 Zoology	4	40	5	800	-	-	-	-	-	-	-	-	3	80	4	960
26	Chemistry Lab Junior	16	40	3	1920	-	-	-	-	-	-	-	-	5	80	3	1200
27	Chemistry Lab Senior	22	40	3	2640	-	-	-	-	-	-	-	-	7	80	3	1680

**Integrated Green, Environment and Energy Audit: Dharampeth M.P. Deo Memorial Science College, Nagpur.**



	6	20	5	600	-	-	-	-	-	-	-	-	-	-	-	-	-
28 Corridor	4	40	2	320	-	-	-	-	-	-	-	-	-	-	-	-	-
29 Room No. 204	8	40	5	1600	-	-	-	-	-	-	-	-	4	80	4	1280	-
	6	20	5	600	-	-	-	-	-	-	-	-	-	-	-	-	-
30 Micro Biology Lab	11	40	3	1320	-	-	-	-	-	-	-	-	4	80	3	960	-
31 Room No. 205	12	40	5	2400	-	-	-	-	-	-	-	-	3	80	4	960	-
32 Statistics Office	8	40	3	720	-	-	-	-	-	-	-	-	3	80	5	720	-
33 Room No. 208	8	40	5	1600	-	-	-	-	-	-	-	-	8	80	4	2560	-
34 CS Lab	-	-	-	-	20	15	3	900	-	-	-	-	9	80	3	2160	-
35 Electronics Department	-	-	-	-	15	20	3	900	-	-	-	-	6	80	3	1440	-
36 202 - Washroom	-	-	-	-	1	20	2	40	-	-	-	-	1	80	2	160	-
37 Room No. 201	-	-	-	-	16	20	5	1600	-	-	-	-	7	80	4	2240	-
38 Room No. 211	-	-	-	-	8	20	5	800	-	-	-	-	2	80	4	640	-
39 Textile and Clothing	9	40	5	1800	-	-	-	-	-	-	-	-	5	80	4	1600	-
40 Laundry	1	40	5	200	-	-	-	-	-	-	-	-	1	80	4	320	-
41 Washroom	2	40	2	160	-	-	-	-	-	-	-	-	-	-	-	-	-
42 Staff room	2	40	5	400	-	-	-	-	-	-	-	-	2	80	4	640	-
43 Nutrition and Dieties	2	40	5	1400	-	-	-	-	-	-	-	-	2	80	4	640	-
44 Store room	1	40	3	120	-	-	-	-	-	-	-	-	1	80	3	240	-
45 Resource Management	4	40	5	800	-	-	-	-	-	-	-	-	7	80	4	2240	-
46 Stairways	12	40	2	960	-	-	-	-	3	20	5	200	5	80	2	800	-
47 VP Room	3	40	5	600	-	-	-	-	-	-	-	-	1	80	4	320	-
48 Office	-	-	-	-	11	15	5	800	-	-	-	-	8	80	4	2560	-
49 Electronics Maintenance Lab	14	40	3	1680	-	-	-	-	-	-	-	-	10	80	3	2400	-
50 Corridor	7	40	5	1400	-	-	-	-	-	-	-	-	-	-	-	-	-
51 Library	34	40	5	6800	-	-	-	-	-	-	-	-	18	80	4	5760	-
52 Office	6	40	5	1200	-	-	-	-	-	-	-	-	4	80	4	1280	-
53 Room No. 8	2	40	5	400	-	-	-	-	-	-	-	-	2	80	4	640	-
54 Conference Room	-	-	-	-	5	20	5	500	-	-	-	-	2	80	4	640	-

**Integrated Green, Environment and Energy Audit: Dharampeth M.P. Deo Memorial Science College, Nagpur.**



55	Waiting Room	3	40	5	600	-	-	-	-	-	-	2	80	4	640
56	Principal Cabin	6	40	5	1200	4	15	5	300	-	-	3	80	4	960
57	Sports Department	2	40	5	400	-	-	-	-	-	-	2	80	4	640
58	Room No. 103	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
59	Room No. 104	2	40	5	400	-	-	-	-	-	-	2	80	4	640
60	Room No. 105	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
61	Room No. 106	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
62	Room No. 107	10	40	5	2000	-	-	-	-	-	-	12	80	4	3840
63	Room No. 108	10	40	5	2000	-	-	-	-	-	-	12	80	4	3840
64	Room No. 109	10	40	5	2000	-	-	-	-	-	-	12	80	4	3840
65	Room No. 110	10	40	5	2000	-	-	-	-	-	-	12	80	4	3840
66	Room No. 111	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
67	Room No. 112	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
68	Room No. 113	4	40	5	800	-	-	-	-	-	-	4	80	4	1280
69	Corridor	2	40	2	560	4	20	5	400	-	-	-	-	-	-
70	Abdul Kalam Hall	-	-	-	-	20	15	1	300	-	-	8	80	1	640
71	Boys Washroom	1	40	2	80	-	-	-	-	-	-	-	-	-	-
72	Girls Washroom	1	40	2	80	-	-	-	-	-	-	-	-	-	-
73	Room No. 201	8	40	5	1600	-	-	-	-	-	-	8	80	4	2560
74	Room No. 202	8	40	5	1600	-	-	-	-	-	-	8	80	4	2560
75	OS 1	1	40	2	80	-	-	-	-	-	-	-	-	-	-
76	OS 2	1	40	2	80	-	-	-	-	-	-	-	-	-	-
77	Language Department	2	40	5	400	-	-	-	-	-	-	2	80	4	640
78	Smart Room	-	-	-	-	12	15	5	900	-	-	6	80	4	1920
79	Room No. 204	6	40	5	1200	-	-	-	-	-	-	6	80	4	1920
80	Room No. 205	9	40	5	1800	-	-	-	-	-	-	9	80	4	2880
81	Room No. 206	-	-	-	-	6	20	5	600	-	-	3	80	4	960
82	Corridor	8	40	2	640	-	-	-	-	-	-	-	-	-	-
83	Carteen	8	40	5	1600	2	10	5	100	-	-	9	80	4	2880
		-	-	-	-	15	15	5	1125	-	-	-	-	-	-

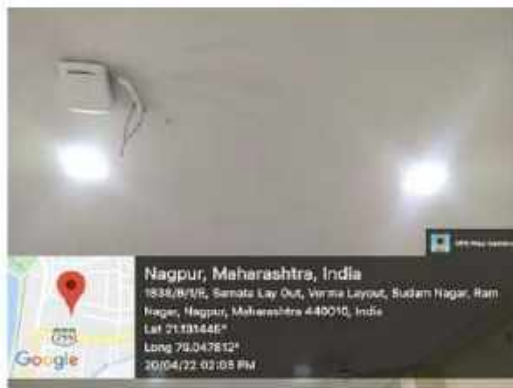
**Integrated Green, Environment and Energy Audit: Dharampeth M.P. Deo Memorial Science College, Nagpur.**



	-	-	-	-	4	20	5	400	-	-	-	-	-	-	-	
84	Supply Room	-	-	-	1	20	3	80	-	-	-	-	1	80	3	240
85	Surrounding	-	-	-	10	20	2	400	-	-	-	-	-	-	-	
		-	-	-	2	50	2	200	-	-	-	-	-	-	-	
86	Security Room	1	40	5	200	-	-	-	-	-	-	-	1	80	4	320
87	Boys Washroom	2	40	2	160	-	-	-	-	-	-	-	-	-	-	
88	Girls Washroom	2	40	2	160	-	-	-	-	-	-	-	-	-	-	
	<b>Total</b>	<b>465</b>			<b>76920</b>	<b>213</b>		<b>13465</b>	<b>3</b>				<b>300</b>		<b>111440</b>	



On & off culture practiced in college



Use of LED lights in college



Sensor based lighting system installed in college





## Annexure –VI: Undertaking by the System Department Regarding Control of Electronic Equipment's



Letter No. : DSC/SR/JR/.....

Date : .....


20/08/2020

### Certificate

The administrative rights of computer settings are with the administrative department of the college.

As part of the sustainable and eco-friendly setting, the system department has initiated below setting in the copiers of all the users.

1. All the computer screen savers are disabled.
2. The computers are turned to sleep mode if they are idle.
3. The computer setting cannot change as the administrative rights are with the department.
4. With regards to the uses policy of photocopier and other equipment user "POWER ON" when in used and "POWER OFF" when not in use
5. The statement is issued in response to the query raised during the green audit.

  
Principal  
(Dr. Akhilesh V. Peshwe)  
Dharampeth M. P. Deo Memorial  
Science College, Nagpur.



## Annexure –VII: Water Quality Reports

DHARAMPETH M. P. DEO MEMORIAL SCIENCE COLLEGE,  
NAGPUR  
DEPARTMENT OF CHEMISTRY

### Water sampling Results

S. No.	Parameters	Results	Unit	Permissible limit As per IS:10500(2020)
1	pH	7.24	---	6.5-8.5
2	Conductivity	0.85	mhos/cm	---
3	Turbidity	0.88	NTU	1
4	Total hardness	160	PPM	200
5	Dissolved Oxygen	9.0	Mg/lit	---
6	Chlorides	26	Mg/lit	250
7	Total dissolved solids	14.2	Mg/lit	500
8	Residual Chlorides	0.3	MG/LIT	0.2

Date 21/07/202

  
Dr. Mrs. Vaishali P. Meshram

Associate Professor, Deptt. of Chemistry

Department of Chemistry  
Dharampeth M.P. Deo Memorial  
Science College, Nagpur-44001



## Annexure– VIII: List of Electronic Equipment's in College

  
Golden Jubilee Year  
2018

Dharampeth Education Society's  
**DHARAMPETH M. P. DEO MEMORIAL  
SCIENCE COLLEGE**  
Near Ambari Lake, North Ambari Road, Nagpur 440 033 (M.S.)  
Contact : +91 712 2241372 / 2241490 Fax: +91 712 2241125  
www.dharampethscience.com  
NAAC Accredited - A grade (B.01)

**DR. AKHILESH V. PESHWE**  
B.A., B.S., M.A., U.S., Ph.D.  
PRINCIPAL  
Contact : +91 94223 13334  
Email : principal\_dsc@rediffmail.com

Letter No. : DSC/SR/JR/

Date

20/08/2020

### Electronic Equipment Available in College

Sr. No.	Item	Quantity	Place of Use
1.	Computer	95	Computer Science, Office and different departments
2.	Scanner	12	Office and different departments
3.	Printer	45	Office and departments
4.	Led/Lcd TV	03	Conference hall, Smart room
5.	CCTV camera	72	Entire premises and in classrooms including corridors
6.	DVR for CCTV	06	College premises, principal's chamber
7.	LCD Projector	11	In laboratories, classrooms and halls

Principal

(Dr. Akhilesh V. Peshwe)

PRINCIPAL

Dharampeth M. P. Deo Memorial  
Science College, Nagpur.



Dharampeth Education Society's  
**DHARAMPETH M. P. DEO MEMORIAL  
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 www.dharampethscience.com  
 MAAC Accredited - A grade (3.01)

**DR. AKHILESH V. PESHWE**  
 M.A., M.P.A., M.P.S., U.S., P.H.D.  
 PRINCIPAL

Contact: +91 14223 13334  
 Email: principal\_dsc@rediffmail.com

Letter No. : DSC/SR/JR/.....

Date : .....

03/08/2020

**List of Equipments Purchased during 2020-21**

Sr. No.	Name of Equipment	Purchased for	Date of Purchase
1.	TSC Barcode thermal transfer Printer	Library	14/3/21
2.	CCTV Camera 4 no.	College	21/12/20
3.	Signitize 26 cm Selfie ring light studio	College	28/1/21
4.	Desktop m/c, HP laser jet printer	Computer Science	1/3/21
5.	Winpro 10 OLPNL legalization. Embarcadero RAD Studio license VSPRO 2019 OLPNL ACADEMY legal software	Computer Science	01/03/21
6.	HUSQVARNA 236R Brush cutter 2 stroke	Physical Education	2/11/20

Principal

(Dr. Akhilesh V. Peshwe)  
 PRINCIPAL  
 Dharampeth M. P. Deo Memorial  
 Science College, Nagpur.

### Annexure –IX: Solar Panel Installations



Solar Panel's



Solar Meters

### Annexure –X: Water Distribution Data

**Note:** The water is drawn from 01 no. of well. The water drawn is not measured. Recommendation to monitor the water drawn is raised under chapter 6 of this report.



NMC Water Meter

### Annexure –XI: Solar Passive Structure / Drip Irrigation

**Note:** No Drip Irrigation System Installed in College



Adequate light in classrooms without using electrical lighting



Adequate light in labs without using electrical lighting



Use of blinds for windows to reduce heat



Use of False Ceiling



AC Condensers in shade



AC Condensers exposed to direct sunlight

### Annexure –XII: Water Management



Well in college



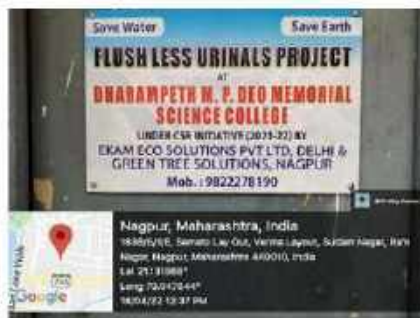
Cocks to be replaced by push buttons



Taps to be replaced by Push Buttons / Faucets



Flush less Urinals installed in college



Flush less Urinals Project in college



RO Machine in college



### Annexure –XIII: Waste Management



Ban on single use plastic in college campus



E-waste Collection



Dustbins in class



Dustbins in lab



Dustbins in campus



Incinerator machine in Girl's Common Room



Vending machine in Girl's Common Room



Compost Pit



Cement blocks in college for Water Harvesting



AC Condensed Water given to plants



**बेशोजगार लोहा, लोखंड, रद्दी पेपर खरेदी विक्री  
सहकारी संस्था गर्या, नागपूर**

प्रत्यक्ष  
वी प्रकाश धुडनकिता गुरा

मौलवी ज. छुरतीप/सीटीसय/ (२)  
सी एन एन / सी ११०३ / ०६

---

सुद्धा कायम गरलें - बरीक राज मेटल, इन्डियावादी सीटी सी.टी. ए.पी. पाठक मंडळ मीक, नागपूर - ३

त.ड. ड. १२/०५/२०२१

<p><b>उपाध्यक्ष</b> रतु कसुदेव रंजारे</p> <p><b>सचीव</b> लोहा संशोधन मंडळ</p> <p><b>सह सचिव</b> विश्व वस्त्र मंडळ</p> <p><b>कीर्तव्यक्ष</b> अशोक मंडळुजी बादामी</p> <p><b>सर्वकारणी सदस्य</b> सौ.कमल बाजडे नाथमारे</p> <p><b>सदस्य</b> म. नरेशी जी. संजय भाऊ श्रीम.भाऊरा श्री. भाऊरा</p> <p><b>अध्यक्ष</b> श्री. भाऊरा मंडळ प्रलहाद भांडे</p>	<p>This is to certify that the Paper/Cardboard/ Cellulose type of waste collected from the different departments, laboratories and office of Dharampeth M. P. Deo Memorial Science College, Near Ambazari Lake, Nagpur during the period from April-01, 2020 to March 31, 2021 was been collected and disposed-off in environment friendly manner.</p> <div style="text-align: right; margin-top: 20px;"> <p><i>संजय भांडे</i> संजय रद्दी पेपर खरेदी केंद्र केरला भांडे, नागपूर</p> </div>
---	--

Certificate for Cellulose Waste Collection



Ref.: SHD/NGP/C634/19

Date: 11/01/19

## CERTIFICATE

### To Whomsoever It May Concern

This is to certify that, Department of Microbiology, Dharampeth M.P. Deo Memorial Science College, (Memb. No. NGCL1066) Laboratory of Dr. Akhilesh Peshwe, located at Near Ambazari Lake, Ambazari T-Point, Nagpur is a regular member of Common Bio-medical Waste Disposal Services.

For, Superb Hygienic Disposals,

Authorised Signatory.

C/o Mr. Bhoole SA, Dantodhar Colony, Near Siondra Nagar Basketball Ground, Nagpur  
DH - 93229 41639 | 98888 11956 | www.superbgroup.in | info@superbgroup.in

Certificate for Biomedical Waste Disposal membership



Dharampeth Education Society's  
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SCIENCE COLLEGE**  
Near Ambazon Lake, North Ambazon Road, Nagpur 440 033 (M.S.)  
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www.dharampethscience.com  
NAAC Accredited - A grade (3.0)

DR. AKHILESH V. PESHWE  
Principal  
Contact : +91 94223 13334  
Email : principal\_dsc@rediffmail.com

Letter No. : DSC/SR/JR/ \_\_\_\_\_

Date : \_\_\_\_\_

20/08/2020

## NOTICE


### Ban on Single Use Plastic in the Premises

This is to inform all Students, Teaching and non-teaching staff members that we have adopted a policy to **ban on single use of plastic** inside the college premises. This will be our contribution towards saving the environment. Strict action may be initiated if anyone seen violating this notice. Also say 'NO' to plastic in the canteen and other places.

Principal  
(Dr. Akhilesh V. Peshwe)

**PRINCIPAL**  
Dharampeth M. P. Deo Memorial  
Science College, Nagpur.



 <p>Golden Jubilee Year 2018</p>	<p>Dharampeth Education Society's <b>DHARAMPETH M. P. DEO MEMORIAL SCIENCE COLLEGE</b> Near Ambazar Lake, North Ambazar Road, Nagpur 440 033 (M.S.) Contact: +91 712 2241372 / 2241490 Fax: +91 712 2241125 www.dharampethscience.com NAAC Accredited - A grade (3.01)</p>	<p><b>DR. AKHILESH V. PESHWE</b> M.A., M.A. (WAS), LL.B., Ph.D. PRINCIPAL Contact : +91 94223 13334 Email : principal_dsc@rediffmail.com</p>
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Letter No. : DSC/SR/JR/.....

Date : .....

20/08/2020

### UNDERTAKING

I would like to give this undertaking that, no A.C. or Refrigerator has been recharged in the session 2020-2021.

  
Principal  
(Dr. Akhilesh V. Peshwe)

**PRINCIPAL**  
Dharampeth M. P. Deo Memorial  
Science College, Nagpur.

Undertaking of No Recharge in AC

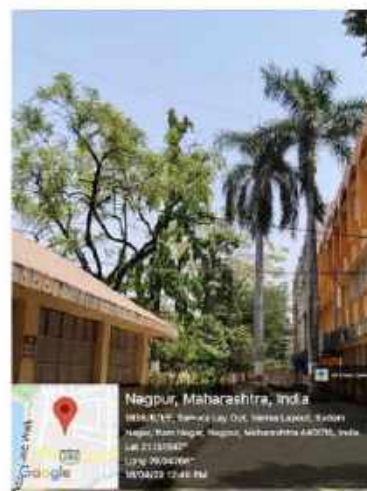
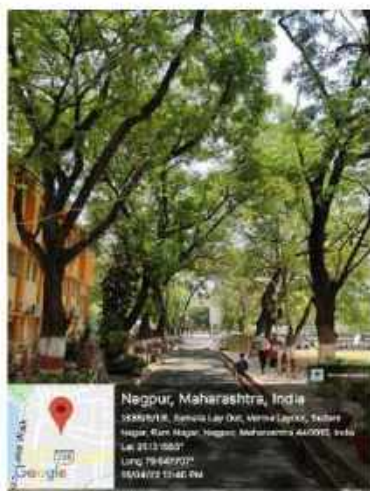
### Annexure –XIV: Awareness / Posters



Blood Donation Camp on 08th August 2020 at Hedgewar Blood Bank, Ramnagar, Nagpur



Posters in college



Landscaping of trees in Campus and Botanical Garden





Green Audit Team in discussion with the principal



Green Audit Team interviewing the staff members



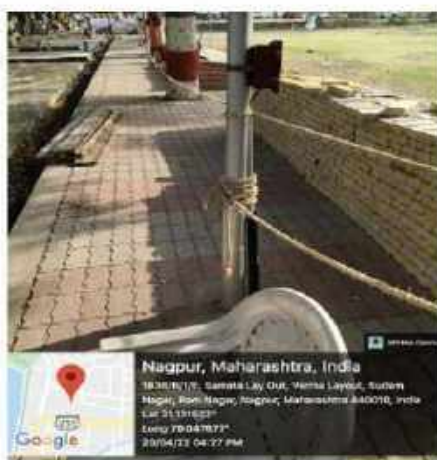
Green Audit Team interviewing the students



Biometric attendance for staff members



Fire Extinguishers & Fire Fighting System in college



Pedestrian Friendly Pathways



Biodiversity in college campus



 <p>Golden Jubilee Year 2015</p>	<p>Dharampeth Education Society's <b>DHARAMPETH M. P. DEO MEMORIAL SCIENCE COLLEGE</b> Near Ambazon Lake, North Ambazon Road, Nagpur 440 033 (M.S.) Contact: +91 712 2241372 / 2241490 Fax: +91 712 2241125 www.dharampethscience.com NAAC Accredited - A grade (3.0)</p>	<p><b>DR. AKHILESH V. PESHWE</b> M.A., M.P.H., M.B.A., M.Phil. PRINCIPAL</p> <p>Contact: +91 94223 13334 Email: principal_dsc@rediffmail.com</p>
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Letter No.: DSC/SR/JR/

Date

20/08/2020

## NOTICE

### No Vehicle Day

This is to inform all Students, Teaching and non-teaching staff members that 'No Vehicle Day' will be observed on Second Saturday of every month in the premises. All are requested not to bring vehicle/s in the premises and suggested to use public transport on the said day. This will be our contribution towards saving our environment and also to promote public transport.

Principal

(Dr. Akhilesh V. Peshwe)

PRINCIPAL  
Dharampeth M. P. Deo Memorial  
Science College, Nagpur.

No Vehicle Day Notice

Annexure –XV: Onsite Measurements (Sample Pictures)



Onsite measurements taken by Green Audit Team



Lux Meter reading



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13177°  
Long 79.04718°  
20/04/22 01:21 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13179°  
Long 79.04745°  
20/04/22 01:21 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13139°  
Long 79.04714°  
20/04/22 01:21 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13177°  
Long 79.04742°  
20/04/22 01:21 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13178°  
Long 79.04748°  
20/04/22 01:21 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13179°  
Long 79.04746°  
20/04/22 01:22 PM

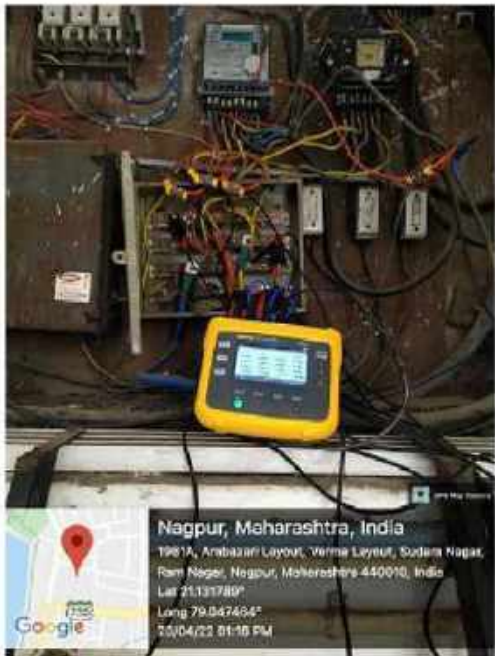


Nagpur, Maharashtra, India  
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Lat 21.13174°  
Long 79.04750°  
20/04/22 01:22 PM



Nagpur, Maharashtra, India  
26-C, Ambazari Layout, Yerna Layout, Sudam Nagar, Ram Nagar, Nagpur, Maharashtra 440010, India  
Lat 21.13177°  
Long 79.04744°  
20/04/22 01:24 PM





Energy Audit Readings

Annexure –XVI: Sound and Air Quality Readings

### WHO/ CPCB Guidelines for Noise<sup>11</sup>

Specific Environment	Time Base (hours)	Standard limits as per WHO guidelines	
		LAeq [dB]	LAm <sub>ax</sub> , Fast [dB]
School class rooms and pre-schools, indoors	During class	35	-
School, playground outdoor	During play	55	-
Ceremonies, festivals and entertainment events	4	100	110
Public addresses, indoors and outdoors	1	85	110

The noise levels were registered at various locations. Sample evidence in form of readings is captured in next page. The college is located on the main road so the noise levels were on slightly higher side.



Air Quality Index

The Air Quality is independently monitored and sourced from publicly available, reliable and reproducible source. Air Quality was found satisfactory however it is variable and changes with season and anthropogenic activities.

<sup>11</sup> <https://cpcb.nic.in/who-guidelines-for-noise-quality/>, [http://cpcbenvs.nic.in/noisepollution/noise\\_rules\\_2000.pdf](http://cpcbenvs.nic.in/noisepollution/noise_rules_2000.pdf), [https://www.mpcb.gov.in/sites/default/files/noise-pollution/archives/noise-monitoring/Metro\\_city\\_Noise\\_Monitoring\\_Report\\_Final.pdf](https://www.mpcb.gov.in/sites/default/files/noise-pollution/archives/noise-monitoring/Metro_city_Noise_Monitoring_Report_Final.pdf)





Campus



Labs



Class Room



Office

Readings of sound at various locations in college



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## Annexure –XVII: Energy Audit Report

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### Description of Energy Audit

An energy audit is an inspection, survey and analysis of energy flows, for energy conservation in a building, process & system to reduce the amount of energy input into the system without affecting the output(s). An energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprints.

The term energy audit is commonly used to describe a broad spectrum of energy studies ranging from a quick walk-through of a facility to identify major problem areas to a comprehensive analysis of the implications of alternative energy efficiency measures sufficient to satisfy the financial criteria of sophisticated investors.

*Major process of Energy Audit:-*

- The analysis of building and utility data, including study of the installed equipment and analysis of energy bills;
- The survey of the real operating conditions;
- The understanding of the building behavior and of the interactions with weather, occupancy and operating schedules;
- The selection and the evaluation of energy conservation measures;
- The estimation of energy saving potential;
- The identification of customer concerns and needs.

*Generally, four levels of analysis can be outlined*

**Level 0 – Benchmarking:**

Breakout of electric and fuel consumptions into end-use components (space heating, fan energy, lighting consumption, etc.). Comparison of the building's consumptions to other buildings of typical size, use and geographic location.

**Level I – Walk-through audit:** Preliminary analysis made to assess building energy efficiency to identify not only simple and low-cost improvements but also a list of energy conservation measures to orient the future detailed audit. This inspection is based on visual verifications, study of installed equipment and operating data and detailed analysis of recorded energy consumption collected during the benchmarking phase;

**Level II – Detailed/General energy audit:** Based on the results of the pre-audit, this type of energy audit consists in energy use survey in order to provide a comprehensive analysis of the studied installation

**Level III – Investment-Grade audit:** Detailed Analysis of Capital-Intensive Modifications focusing on potential costly ECOs requiring rigorous engineering study.



## Chapter 1 – Description of Process and Measurements

### *Walkthrough and Data Measurement*

The energy audit began with the teams walking through all the different facilities at the college, determining the different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances.

### *Data Collection*

Data collection was done in the sectors such as sources of Energy and energy consumption patterns.

### *Review of Documents and Records*

Documents such as electricity bills, registers of electricity, fuel consumption were collected and reviewed.

### *Site Inspection*

College and its premises were visited and analyzed by the audit-teams several times to gather information. Classrooms, administrative buildings canteen, library, office rooms and parking grounds were also visited to collect data.

### *Instrument Used for the Study: -*

1. 3 Phase power Data Logger – Fluke 1735 model

The 3-phase power analyzer and data logger was used to measure and log the electrical parameters data for the various load centers in the facility. Most of the loads have variation in power requirement and therefore logging helps to observe the variations as well as the average electrical consumption of the load centers.

Using the logger, all major electrical parameters of voltage, current, power, power factor, apparent power, harmonics etc. are recorded at fixed intervals of time.

The variation of parameters like power are plotted and shown with time on X axis and parameter on Y axis. Observations are made based on these measurements.

### *Some Basic terms:*

1. Power – kilowatt (kW) – It is the power consumed by the equipment. This value is varying as per load requirements.
2. Energy – kilowatt hour (kWh) – It is the energy (electrical units) consumed by the equipment. If average power for an electrical load is 2 kW, it means that it consumes 2 kWh units per hour.
3. Apparent power kilo Volt Ampere (kVA) – It is a measure of demand Power / power factor.



## Chapter 2 – Electrical Bill Analysis

Electricity bill pattern under consideration is from April 2021 to March 2022

Consumer No	41001063634
Tariff	073 LT-X B 10
Category	Public Services Others
Connected Load	15 KW
Contract Demand	0
50% of Contract Demand	0

Sr. No.	Month	Import (KWH)	Export (KWH)	Generation (kWh)	Billed Consumption	Rate/kWH	Total Energy Charges	Current Bank (Solar)	Total Charges
1	Apr-21	162	1868	2036	0	0	0	1706	373
2	May-21	0	0	0	0	7.44	0	1706	373
3	Jun-21	341	2249	3343	0	7.44	0	3614	373
4	Jul-21	166	1876	1877	0	9.48	0	5324	373
5	Aug-21	172	1382	1385	0	9.48	0	6534	373
6	Sep-21	154	1134	1135	0	9.48	0	7514	373
7	Oct-21	163	2014	2015	0	9.48	0	9365	373
8	Nov-21	111	1526	0	0	9.48	0	10780	373
9	Dec-21	36	1144	0	0	9.48	0	11888	373
10	Jan-22	55	1533	0	0	9.48	0	13366	373
11	Feb-22	0	0	8337	0	9.48	0	13366	373
12	Mar-22	0	0	2199	0	9.48	0	13366	373
Average		2573.67	9.48	24398.36	0.93	24.58	83	0	72903.17
Yearly		30884	-	292780.32	-	295	-	409356	874838

Table: Monthly Electricity Consumption Details (April 2021- March 2022)



Electricity bill pattern under consideration is from April 2021 to March 2022

Consumer No 41001061634  
 Tariff 073 LT-X B I O  
 Category Public Services Others  
 Connected Load 15 kW  
 Contract Demand 0  
 50% of Contract Demand 0

Sr. No.	Month	Electricity Consumption (KWH)	Total Consumption	Rate/ KWH	Total Energy Charges	Billed Power Factor	Maximum Demand	Billed Demand	Demand Charges	Total Charges	Rate/ KVAH	Solar Generation
1	Apr-21	1088	422	7.28	3072.16	0.97	9	15	5595	11218	10.31	998
2	May-21	1421	862	7.28	6275.36	0.98	47	31	11563	29455	20.72	958
3	Jun-21	1437	1117	7.28	8131.76	0.97	11	15	5595	18223	12.68	639
4	Jul-21	1801	1588	7.28	11560.6	0.98	21	15	5595	22904	12.71	751
5	Aug-21	2504	2318	7.28	16875.0	0.99	21	15	5595	30408	12.14	656
6	Sep-21	2279	2048	7.28	14909.4	0.98	20	15	5595	27876	12.23	232
7	Oct-21	2119	1773	7.28	12907.4	0.99	18	21	5595	24739	11.67	350
8	Nov-21	1601	1247	7.28	9078.16	0.98	15	15	5595	19476	12.16	355
9	Dec-21	1366	1005	7.28	7316.4	0.97	12	15	5595	17112	12.52	364
10	Jan-22	1578	1519	7.28	11058.3	0.97	8	15	5595	22452	14.22	65
11	Feb-22	1673	1665	7.28	12121.2	0.97	10	15	5595	24145	14.43	55
12	Mar-22	2805	2781	7.28	20245.6	0.99	23	15	5595	36304	12.94	115
<b>Avg</b>		<b>1806.00</b>		<b>7.28</b>	<b>11129.3</b>		<b>17.92</b>			<b>23692.6</b>	<b>13.11</b>	<b>461.50</b>
<b>Year</b>		<b>21672</b>			<b>133551</b>		<b>215</b>		<b>73108</b>	<b>284312</b>		<b>5538</b>

Table: Monthly Electricity Consumption Details (April 2021- March 2022)



### Chapter 3: Electrical Logging for Main Feeder

#### Meter-1

Start (India Standard Time)	VOLTAGE BETWEEN PHASE TO NEUTRAL			VOLTAGE TO PHASE TO PHASE			CURRENT IN AMPS			VOLTAGE HARMONIC			CURRENT HARMONIC			POWER FACTOR		
	R-N	Y-N	B-N	R-N	Y-N	B-N	R-N	Y-N	B-N	R	Y	B	R	Y	B	R	Y	B
10:40	240	236	238	410	411	415	9.6	18.5	17	2	1.5	2	17.4	12.3	5.8	0.982	0.965	0.959
10:40	240	236	238	410	411	415	9.4	19	17	2	1.5	2	17.9	12.2	5.8	0.982	0.966	0.958
10:40	240	236	238	410	411	415	9.4	19	17	1.9	1.5	2	18.1	12.2	5.8	0.982	0.967	0.958
10:40	240	236	238	411	411	415	9.4	18.7	17	1.9	1.5	2	18.1	12.4	5.8	0.982	0.964	0.959
10:40	241	236	238	411	411	415	9.3	18.2	17	1.9	1.6	2	18.4	12.7	5.9	0.982	0.961	0.959
10:40	241	236	238	411	411	416	9.3	17.7	17	1.9	1.5	2	18.2	12.9	5.8	0.982	0.959	0.959
10:41	241	236	238	411	411	416	9.3	17.6	14.7	1.9	1.5	2	18.2	12.9	7.1	0.982	0.958	0.952
10:41	241	236	239	411	413	417	9.3	17.7	7.9	1.9	1.5	2.1	18.3	12.8	10.3	0.982	0.959	0.982
10:41	241	236	240	411	413	417	9.3	17.7	7.8	1.9	1.6	2.1	18.1	12.8	10.2	0.982	0.96	0.984
10:41	240	236	240	411	413	416	10.2	17.8	8	1.9	1.5	2.1	17.6	12.8	10.2	0.977	0.96	0.981
10:41	240	236	240	411	413	416	12.3	17.8	8	1.9	1.5	2.1	15.9	12.9	10.5	0.978	0.959	0.98
10:41	240	237	240	412	413	416	12.6	17.7	8	2	1.5	2.1	15.4	12.9	10.4	0.979	0.958	0.98
10:42	240	237	239	412	412	416	11	17.7	9.3	2	1.5	2.2	16	12.9	8.2	0.981	0.958	0.953
10:42	240	236	239	411	412	416	11	17.7	10.6	2	1.5	2.1	16	12.9	6.8	0.981	0.958	0.955
10:42	240	236	239	411	412	416	11	17.7	11.3	2	1.5	2.2	16.2	12.9	7.7	0.981	0.958	0.975
10:42	240	236	239	411	412	416	11	17.6	11.9	2	1.5	2.2	16.1	13	7.2	0.981	0.961	0.972
10:42	240	236	239	411	412	415	10.9	17.5	11.6	2	1.6	2.3	15.9	13.1	7.5	0.982	0.963	0.972
10:42	240	236	238	410	412	415	11.1	18.2	11.6	2	1.6	2.2	15.3	12.7	7.5	0.982	0.965	0.972
10:43	240	236	239	410	412	415	11.8	18.6	12	2	1.6	2.3	14.3	12.5	10	0.982	0.966	0.959
10:43	240	236	239	411	412	415	11.9	18.7	11.9	2	1.6	2.3	14.1	12.6	8.6	0.981	0.966	0.973

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10-43	240	236	239	411	412	415	12.7	18.9	12.6	2	1.6	2.5	13.4	12.4	11.7	0.981	0.963	0.972
10-43	240	236	239	411	412	416	12.5	18.7	13.1	2.1	1.6	2.6	13.8	12.4	14.1	0.981	0.961	0.971
10-43	240	237	239	412	412	416	11.8	18.9	13.2	2.1	1.6	2.6	14.4	12.4	14.7	0.982	0.962	0.971
10-43	240	237	239	412	412	416	12	18.5	13.2	2.1	1.6	2.7	14.3	12.4	14.7	0.982	0.961	0.971
10-44	240	237	239	412	412	416	12.4	18.4	13.3	2.1	1.6	2.7	13.4	12.5	15.1	0.983	0.96	0.971
10-44	240	237	239	411	413	416	12.4	18.6	13.3	2.1	1.6	2.7	13.4	12.4	14.9	0.983	0.961	0.971
10-44	240	237	239	411	412	416	12.4	19.4	13.3	2.2	1.6	2.7	13.5	12.1	14.8	0.983	0.957	0.971
10-44	240	237	239	411	412	415	14.1	19.4	13.1	2.1	1.6	2.6	13.1	12	14.3	0.982	0.953	0.972
10-44	240	237	239	411	412	416	14.5	19.3	13.2	2.2	1.6	2.7	13	12	14.5	0.983	0.952	0.971
10-44	240	238	239	411	412	416	13.6	19.6	13.2	2.1	1.6	2.7	13.2	11.9	14.4	0.981	0.954	0.971
10-45	240	235	239	410	412	416	12.3	19.6	13.1	2.1	1.5	2.6	13.2	11.7	14.2	0.984	0.956	0.972
10-45	240	235	239	410	411	416	12.4	19.6	14.4	2.1	1.5	2.6	13.1	11.7	12.6	0.984	0.956	0.976
10-45	240	235	239	410	411	416	12.3	19.8	14.5	2.1	1.5	2.7	13	11.7	12.6	0.984	0.957	0.979
10-45	241	235	239	410	411	416	12.3	19.6	14.5	2.1	1.5	2.6	12.9	11.7	12.4	0.984	0.956	0.979
10-45	240	235	239	410	411	416	12.3	19.6	14.5	2.1	1.5	2.7	13	11.8	12.4	0.984	0.956	0.979
10-45	241	235	239	410	411	416	12.4	19.7	14.5	2.1	1.5	2.7	13.2	11.7	12.3	0.984	0.956	0.979
10-46	240	235	239	410	411	416	12.3	19.4	14.5	2.1	1.5	2.6	13.2	11.7	12.4	0.984	0.955	0.979
10-46	240	235	239	409	411	416	12.3	19.5	14.5	2.1	1.5	2.6	13.1	11.7	12.3	0.984	0.958	0.979
10-46	240	235	239	409	411	416	12.3	19.8	14.6	2.1	1.5	2.6	13.1	11.6	12.6	0.984	0.957	0.979
10-46	240	235	239	409	411	415	12.3	19.8	14.5	2.1	1.5	2.6	13.1	11.7	12.3	0.984	0.957	0.979
10-46	240	235	238	409	411	415	12.5	19.7	14.4	2.1	1.5	2.7	13.2	11.7	12.2	0.983	0.957	0.979
10-46	239	235	238	409	411	414	14.2	19.5	14.3	2.1	1.5	2.6	13	11.7	11.6	0.983	0.956	0.98
10-47	239	235	238	409	411	414	14.2	19.6	14.2	2.2	1.6	2.6	13	11.7	11.3	0.981	0.959	0.98
10-47	240	235	238	409	410	414	13.1	19.6	14.2	2.2	1.6	2.6	13.1	11.8	11.3	0.981	0.961	0.98
10-47	240	234	238	409	410	415	12.3	19.6	14.3	2.2	1.6	2.6	13.2	11.8	11.7	0.984	0.962	0.98
10-47	240	234	238	409	410	415	12.3	19.5	14.2	2.2	1.6	2.6	13.2	11.9	11.5	0.984	0.961	0.98
10-47	240	235	238	409	411	415	12.3	19.5	14.2	2.2	1.5	2.6	13.2	11.8	11.3	0.984	0.961	0.98

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10:47	240	235	239	409	411	415	12.3	19.3	14.2	2.2	1.6	2.6	13.1	11.8	11.2	0.984	0.957	0.98
10:48	240	234	239	409	411	415	13.5	19.1	14.2	2.2	1.6	2.6	12.8	11.8	11.2	0.982	0.955	0.98
10:48	240	235	239	409	411	415	14.2	19.1	14.1	2.2	1.6	2.6	12.7	11.7	10.9	0.983	0.955	0.981
10:48	240	234	239	409	411	415	12.3	19.2	14.1	2.2	1.6	2.6	13	11.7	10.8	0.985	0.956	0.981
10:48	240	234	239	409	410	415	12.3	19.6	14.1	2.2	1.6	2.6	13	11.6	10.8	0.985	0.958	0.981
10:48	240	234	239	409	411	415	12.3	19.7	14.1	2.2	1.6	2.6	13.1	11.6	10.8	0.984	0.958	0.981
10:48	240	235	239	409	411	415	12.4	19.8	14.1	2.2	1.6	2.6	13.4	11.7	10.7	0.984	0.958	0.981





The following table gives the results of voltage & Current data logging for main Feeder.

	Voltage Variation (V) – R	Voltage Variation (V) – Y	Voltage Variation (V) –B	Current Variation (A) – R	Current Variation (A) – Y	Current Variation (A) – B
Minimum	239	234	238	9.30	17.50	7.80
Average	240	236	239	11.91	18.90	13.27
Maximum	241	237	240	14.50	19.80	17.00

The following table gives the results of harmonics logging for main Feeder.

	Total Harmonics Distortion – Voltage (THD R)	Total Harmonics Distortion – Voltage (THD Y)	Total Harmonics Distortion – Voltage (THD B)	Total Harmonics Distortion – Current (THD R)	Total Harmonics Distortion – Current (THD Y)	Total Harmonics Distortion – Current (THD B)
Minimum	1.90	1.50	2.00	12.70	11.60	5.80
Average	2.07	1.55	2.45	14.48	12.19	10.90
Maximum	2.20	1.60	2.70	18.40	13.10	15.10

The following table gives the variation in power factor logged at main feeder

	Power Factor R	Power Factor Y	Power Factor B
Minimum	0.977	0.952	0.952
Average	0.982	0.959	0.974
Maximum	0.985	0.967	0.984

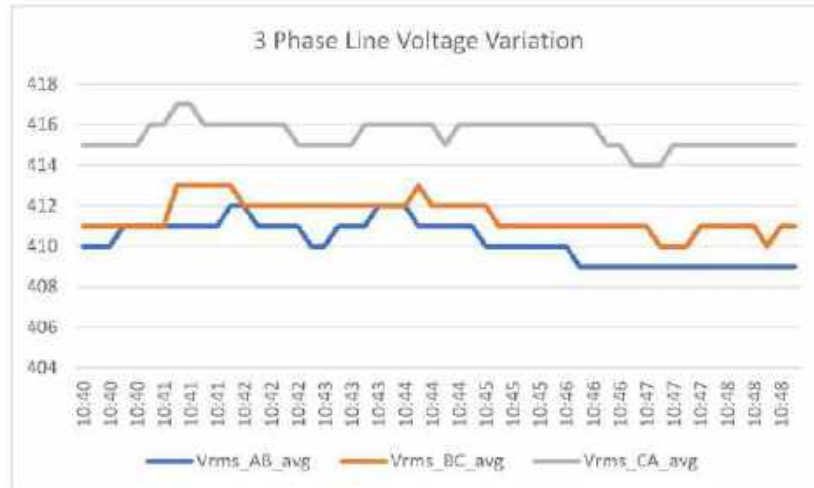
#### Observations for Main Feeder Logging

- Voltage harmonics are found to be within limits. While the average current harmonics is found to slightly at greater side i.e. around 14%. Harmonic stabilizer to be installed to suppress the harmonics level within 5%.
- The Phase voltages are balanced. Graphical representation below shows the voltage variation in 3 phases.
- The load across 3 phase is approximately unevenly distributed. B phase is more loaded than remaining two phases. It is suggested to balance the load across all three phases.
- Power factor is maintained near unity. Average power factor recorded was 0.972.
- IS Code 15652 (2mm) Rubber mat should be provided in front of Main panel.

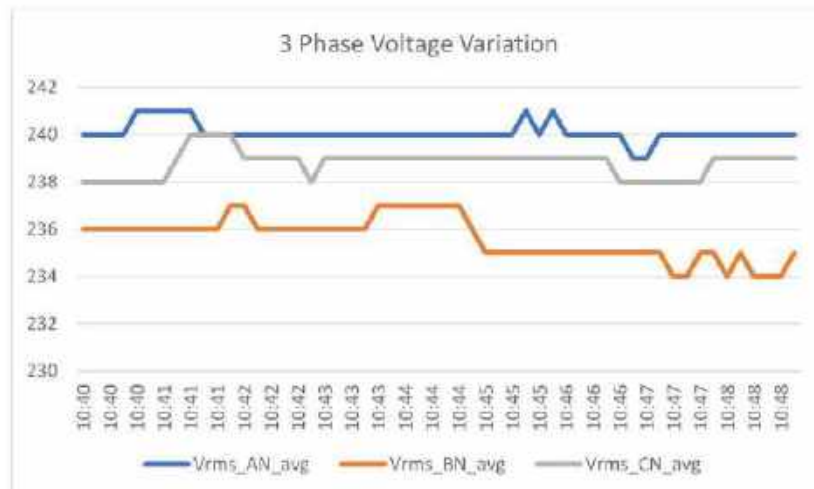


- Earthing connection should be provided properly at all utilities.
- Fire buckets are should be provided near main panel room.
- Doors properly closed at main panel.
- Shock treatment chart should be provided for main panel room.
- Cable glands are should be provided for cable.

**Graphical Representations of Measured Electrical Data**



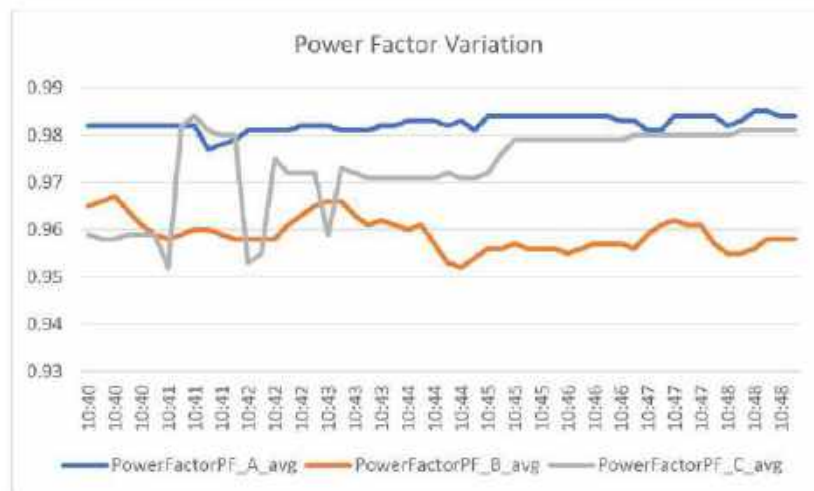
Graphical Representation of 3 Phase Line Voltage Variation.



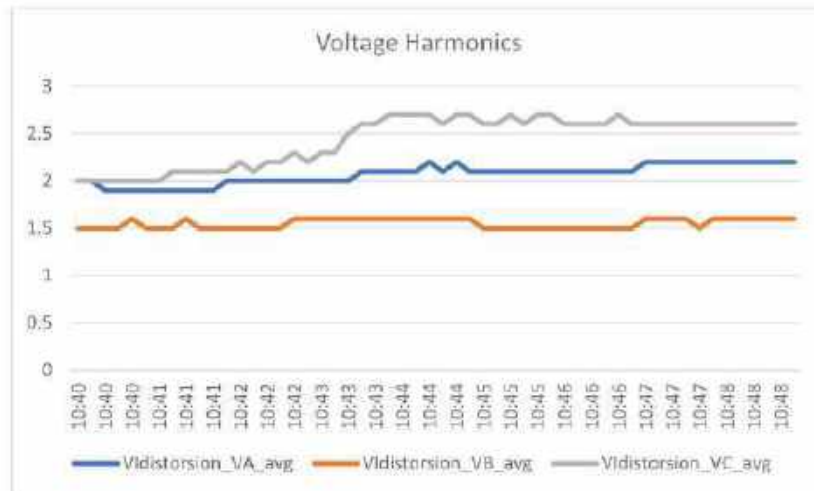
Graphical Representation of 3 Phase Voltage Variation



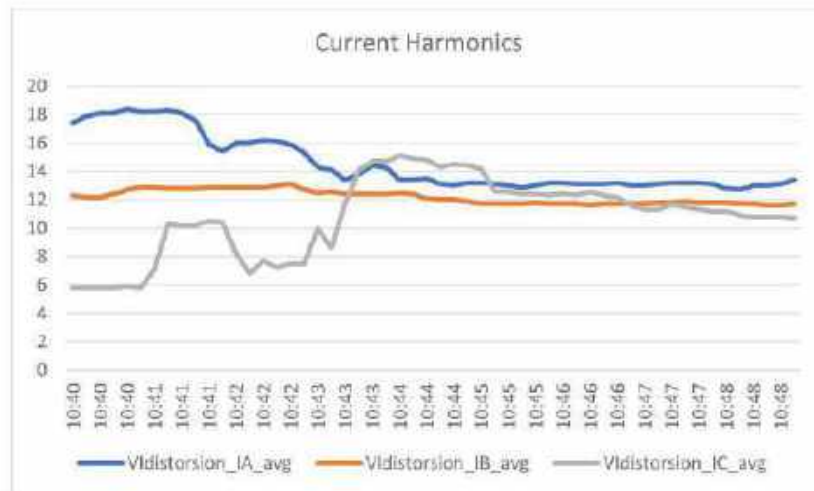
Graphical Representation of 3 Phase Current Variation.



Graphical Representation of 3 Phase Power Factor Variation.



Graphical Representation of 3 Phase Voltage Harmonics Variation.



Graphical Representation of 3 Phase Current Harmonics Variation.



### Meter-2

Start (Indic Standard Time)	VOLTAGE BETWEEN PHASE TO NEUTRAL			VOLTAGE TO PHASE TO PHASE			CURRENT IN AMPS			VOLTAGE HARMONIC			CURRENT HARMONIC			POWER FACTOR		
	R-N	Y-N	B-N	R-N	Y-N	B-N	R-N	Y-N	B-N	R	Y	B	R	Y	B	R	Y	B
10:27	241	236	234	414	409	409	9.7	12.4	7.3	2.2	2.4	1.6	8.5	13.9	11.7	0.987	0.956	0.008
10:27	241	236	236	414	409	411	9.7	12.5	7.3	2.1	2.4	1.7	8.5	13.7	11.4	0.987	0.957	0.012
10:28	241	236	235	414	409	410	9.4	12.5	8.5	2.1	2.4	1.7	8.8	13.6	9.7	0.988	0.961	0.453
10:28	241	236	235	414	409	410	9.3	12.6	7.4	2.1	2.4	1.7	8.7	13.4	11.7	0.989	0.963	0.173
10:28	240	237	235	414	410	411	9.2	7.5	5.7	2.1	2.5	1.7	8.8	23	13.2	0.988	0.884	0.032
10:28	240	237	235	414	410	410	9.2	7.6	5.8	2.1	2.5	1.7	8.7	22.5	12.5	0.988	0.889	0
10:28	240	237	235	414	410	410	9.2	7.7	5.9	2.2	2.5	1.7	8.4	22.4	12.4	0.989	0.894	0.007
10:28	240	237	235	414	410	409	9.3	7.6	5.9	2.2	2.5	1.7	8.2	22.8	12	0.989	0.891	0.002
10:29	240	237	235	414	410	410	9.3	7.6	5.8	2.2	2.5	1.7	8.2	22.9	12.1	0.989	0.891	0.01
10:29	240	237	235	414	410	410	9.3	7.9	5.8	2.2	2.5	1.7	8.3	23	12.3	0.989	0.899	0.015
10:29	240	237	235	413	409	409	9.2	8	5.8	2.2	2.5	1.7	8.5	22.8	12.8	0.989	0.903	0.023
10:29	240	237	234	414	409	408	9.2	8.2	5.8	2.2	2.5	1.7	8.3	22.4	12.4	0.989	0.907	0.014
10:29	240	237	234	413	409	409	9.2	8.3	5.8	2.2	2.6	1.7	8.3	22.3	12.4	0.989	0.91	0.03
10:29	239	237	234	413	409	408	9.2	8.2	5.8	2.2	2.5	1.7	8.1	22.4	12.2	0.99	0.908	0.024
10:30	240	237	234	413	409	409	9.2	8.2	5.9	2.2	2.5	1.7	8.1	22.2	12.7	0.99	0.908	0.026
10:30	240	237	235	413	409	409	9.2	8.1	5.9	2.1	2.5	1.7	8.2	22.4	13	0.989	0.906	0.034
10:30	239	237	235	413	409	409	9.1	8.3	5.9	2.2	2.5	1.7	8.1	22.1	12.6	0.989	0.915	0.05
10:30	240	237	234	413	409	409	9.1	8.3	7.2	2.2	2.5	1.7	8.2	22.1	12.3	0.989	0.916	0.116
10:30	240	237	233	413	408	408	9.2	8.4	7	2.1	2.5	1.6	7.5	21.9	12.8	0.988	0.916	0.108
10:30	240	237	232	413	408	408	9.4	8.3	7	2.1	2.5	1.6	6.3	22.1	12.8	0.989	0.913	0.099
10:31	240	237	232	413	408	407	9	8.4	7	2.1	2.5	1.7	6.7	22	12.8	0.983	0.915	0.1

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10:31	240	237	232	413	408	408	8.3	8.5	7	2.1	2.6	1.7	7.1	21.8	12.9	0.982	0.918	0.105
10:31	240	237	232	413	408	407	8	8.5	7	2.1	2.5	1.6	7.2	21.9	12.8	0.981	0.917	0.105
10:31	240	237	232	413	408	407	7.9	8.5	7	2.1	2.5	1.6	7.4	21.7	13	0.98	0.919	0.107
10:31	240	236	232	412	407	407	7.9	8.6	6.9	2.1	2.6	1.7	7.4	21.6	13	0.98	0.923	0.112
10:31	240	237	231	412	407	406	7.9	8.6	9.1	2	2.5	1.6	7.3	21.8	9.5	0.98	0.921	0.625
10:32	239	236	231	411	407	406	8.2	8.5	8	2.1	2.5	1.6	7	22.2	11.2	0.981	0.92	0.375
10:32	239	236	231	411	407	406	8.5	8.4	7.7	2.1	2.5	1.6	6.7	22.3	11.6	0.983	0.919	0.286
10:32	239	236	232	412	407	407	8.5	8.3	7.1	2.1	2.5	1.6	6.6	22.3	12.6	0.984	0.917	0.124
10:32	239	236	232	412	407	407	8.7	8.3	6.9	2.1	2.6	1.6	6.5	22.4	12.8	0.983	0.916	0.076
10:32	240	236	233	412	408	408	8.7	8.3	6.9	2	2.5	1.6	6.5	22.6	13	0.982	0.916	0.084
10:32	240	236	233	412	408	408	8.7	8.2	6.9	2	2.5	1.7	6.5	22.7	13	0.982	0.913	0.077
10:33	240	236	232	412	407	407	8.7	8.2	6.9	2.1	2.5	1.6	6.6	22.9	13	0.983	0.911	0.067
10:33	240	237	232	412	408	408	8.6	8.2	6.9	2.1	2.5	1.6	6.7	22.8	13	0.983	0.911	0.065
10:33	240	237	232	412	408	407	8.7	8.2	6.9	2.1	2.5	1.6	6.7	22.6	13.1	0.984	0.91	0.057
10:33	240	237	232	413	408	407	8.8	8	6.9	2.1	2.5	1.6	6.6	22.7	13.1	0.985	0.906	0.029
10:33	240	237	233	413	408	408	9	7.8	6.9	2.1	2.5	1.6	6.5	23.1	13.1	0.985	0.902	0.017
10:33	240	237	233	413	408	408	9.1	7.6	6.9	2.1	2.5	1.6	6.4	23.7	13.2	0.985	0.896	0.008
10:34	240	237	233	413	409	409	9.2	7.6	6.9	2.1	2.5	1.6	6.4	23.8	13.2	0.985	0.895	0.012
10:34	241	237	233	414	409	409	9.2	7.6	6.9	2.1	2.5	1.6	6.3	23.7	13	0.985	0.895	0.012
10:34	240	237	233	414	409	408	9.2	7.7	6.9	2.1	2.5	1.6	6.4	23.6	13.4	0.986	0.896	0.012
10:34	240	237	233	413	408	408	9.2	8.3	6.9	2	2.5	1.6	6.3	21.8	13.2	0.986	0.906	0.016
10:34	240	237	232	413	408	408	9.2	7.7	6.9	2.1	2.6	1.6	6.4	23.4	13.2	0.985	0.897	0.016
10:34	241	237	233	414	409	408	9.2	7.7	6.9	2	2.6	1.6	6.5	23.5	13.3	0.985	0.897	0.016
10:35	241	237	232	413	408	408	9.1	7.8	6.9	2	2.5	1.6	6.4	23.2	13.1	0.985	0.901	0
10:35	241	237	232	414	408	408	8.7	8	6.9	2.1	2.6	1.6	7.1	22.6	13.1	0.983	0.903	0.007
10:35	241	237	232	414	408	408	8.3	8.4	6.9	2.2	2.5	1.5	8.7	21.4	14.3	0.981	0.909	0.012
10:35	241	237	232	413	408	407	8.2	8.2	6.9	2.2	2.5	1.6	8.7	22.1	14.8	0.981	0.908	0.003

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<b>10:35</b>	241	237	232	413	407	407	7.8	8.3	6.9	2.2	2.6	1.6	10.9	21.8	14.9	0.98	0.91	0.011
<b>10:35</b>	240	237	232	413	407	407	7.9	8.4	6.9	2.2	2.6	1.6	10.1	21.6	14.9	0.981	0.912	0.015
<b>10:36</b>	240	236	232	413	407	407	7.9	8.3	6.9	2.3	2.5	1.6	10.2	21.9	14.8	0.981	0.911	0.001
<b>10:36</b>	240	236	232	412	407	407	8	8.4	6.9	2.2	2.5	1.6	9.7	22.1	14.7	0.981	0.912	0.001
<b>10:36</b>	240	236	232	412	407	407	8	8.3	6.9	2.2	2.6	1.6	10.1	22	14.8	0.981	0.91	0.001
<b>10:36</b>	240	236	231	412	407	407	7.9	8.2	6.9	2.2	2.5	1.6	10.6	21.9	14.7	0.98	0.909	0.008
<b>10:36</b>	240	236	231	412	406	406	8	8.2	6.9	2.3	2.6	1.6	9.8	22.1	14.6	0.981	0.91	0.001
<b>10:36</b>	240	236	231	412	406	406	8	8.2	6.9	2.3	2.5	1.6	10.5	22.1	14.7	0.981	0.909	0.02



The following table gives the results of voltage & Current data logging for main Feeder.

	Voltage Variation (V) – R	Voltage Variation (V) – Y	Voltage Variation (V) –B	Current Variation (A) – R	Current Variation (A) – Y	Current Variation (A) – B
Minimum	239	236	231	8	8	7
Average	240	237	233	8.78	8.37	7.03
Maximum	241	237	235	9.40	12.60	9.10

The following table gives the results of harmonics logging for main Feeder.

	Total Harmonics Distortion – Voltage (THD R)	Total Harmonics Distortion – Voltage (THD Y)	Total Harmonics Distortion – Voltage (THD B)	Total Harmonics Distortion – Current (THD R)	Total Harmonics Distortion – Current (THD Y)	Total Harmonics Distortion – Current (THD B)
Minimum	2	2	2	6	13	10
Average	2.13	2.51	1.64	7.76	21.96	12.93
Maximum	2.30	2.60	1.70	10.90	23.80	14.90

The following table gives the variation in power factor logged at main feeder

	Power Factor R	Power Factor Y	Power Factor B
Minimum	0.980	0.884	0.000
Average	0.985	0.910	0.070
Maximum	0.990	0.963	0.625

#### Observations for Main Feeder Logging

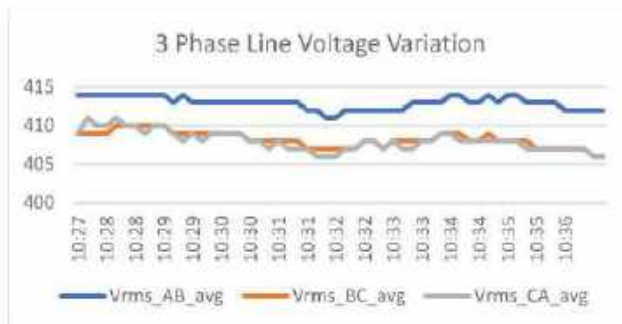
- Voltage harmonics are found to be within limits. While the average current harmonics is found to slightly at greater side i.e. around 24%. Harmonic stabilizer to be installed to suppress the harmonics level within 5%.
- The Phase voltages are balanced. Graphical representation below shows the voltage variation in 3 phases.
- The load across 3 phase is approximately evenly distributed.
- Power factor is maintained near unity. Average power factor recorded was 0.655. The power factor across phase A and Phase B is 0.985 and 0.910 respectively. While the power factor across phase C is 0.070. Additional capacitor to be added for maintaining



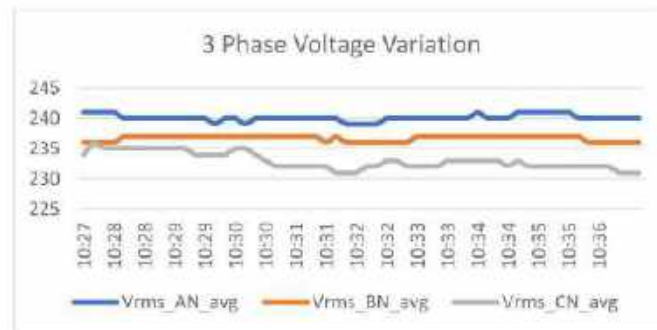


- the power factor to unity.
- IS Code 15652 (2mm) Rubber mat should be provided in front of Main panel.
- Earthing connection should be provided for all utilities.
- Fire buckets are should be provided near main panel room.
- Doors properly closed at main panel.
- Shock treatment chart should be provided for main panel room.
- Cable glands are should be provided for cable.

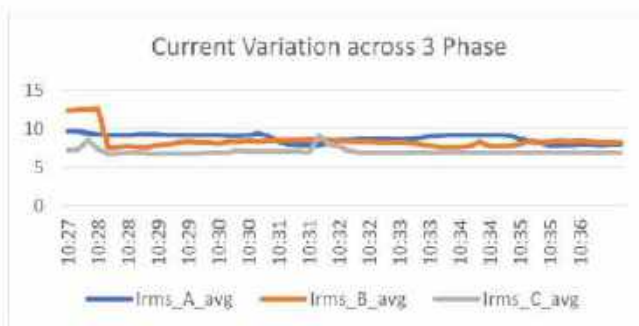
**Graphical Representations of Measured Electrical Data**



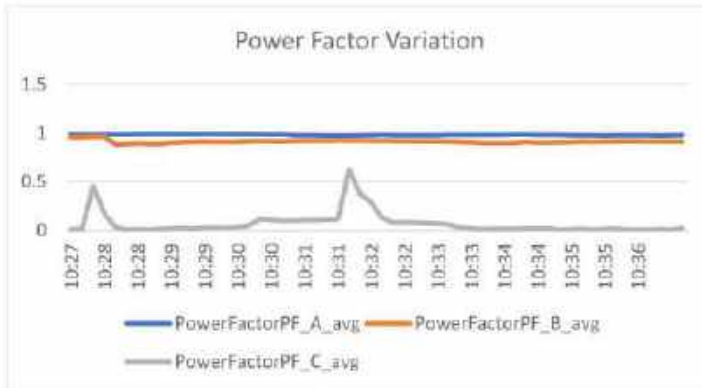
Graphical Representation of 3 Phase Line Voltage Variation.



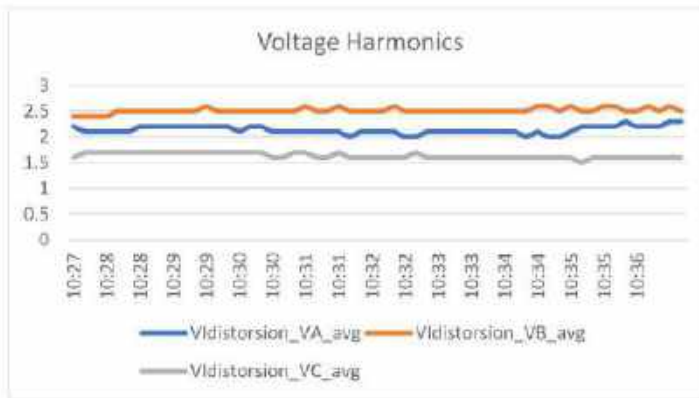
Graphical Representation of 3 Phase Voltage Variation



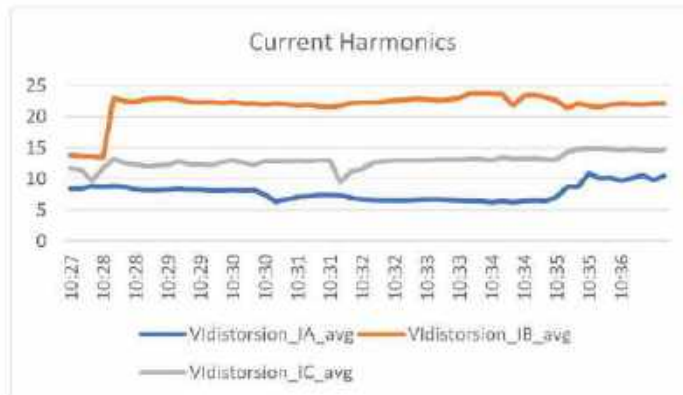
Graphical Representation of 3 Phase Current Variation.



Graphical Representation of 3 Phase Power Factor Variation.



Graphical Representation of 3 Phase Voltage Harmonics Variation.



Graphical Representation of 3 Phase Current Harmonics Variation.



Annexure –XVIII: Snapshot of Annual Rainfall Data, Grid Emission Factor

Table 3: Rainfall Data of Nagpur District (2002 - 2010) In mm

Taluka	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Nagpur City	1176.1	1431.5	702.3	973.4	975.7	741	952.9	954.4	1395	879.4	1018.2
Nagpur Gramin	966.7	1229	689	1274.7	1205.5	966.3	953.2	947.4	1495	913.8	1064
Kamthi	1035.8	1208.7	707.1	1475.8	1178.2	1205	791.6	1032.6	1099	861.3	1059.5
Hingna	489.2	770	583.3	920.4	814.9	806	683.1	724.7	942.2	814.8	753.9
Ramtek	1101.3	822.5	733.9	1435.5	1133	1370.8	865.3	905.2	1184	885.1	1043.7
Parshi wani	850.1	1056.9	858.4	1239.5	1106.2	878.8	1068.6	983.6	1087	1043.8	1017.3
Mauda	904	1171.6	631.3	1679.1	1114.3	1030.9	814.1	1280.4	1521	1366.2	1151.2
Katol	649.6	920.1	555.1	1092.3	937.4	1271.8	773.2	888.4	1028	801.8	891.8
Narkhed	822.8	778	606.7	914.9	768.6	1281.3	671	954.1	1137	764.9	869.9
Savner	823.6	1063.6	812.6	1497.2	974.1	1209	873.6	941.6	1078	945.8	1022
Kalmeshwar	740	1092.2	808.6	1320.9	916.4	1203.4	675.9	780.5	1181	855.2	957.4
Umrer	846.2	1296.8	747.1	1856.3	1014.2	1464	1060.4	926.2	1551	887.1	1164.9
Bhiwapur	923.3	1146.3	740.4	1431.2	1045.6	1341.8	853.2	993.7	1690	1088.4	1125.4
Kuhi	859.2	1057.2	596.4	1543.8	828.6	1286	817.9	950.3	1292	1024.7	1025.6
Average	869.9	1074.7	698	1332.5	1000.9	1146	846.7	947.4	1263	938	1011.8

Web link: <http://www.agri.mah.nic.in>

CEA Database Version-16

*Weighted average emission factor, simple operating margin (OM), build margin (BM) and combined margin (CM) of the Indian Grid for FY 2019-20 (adjusted for cross-border electricity transfers), in t CO<sub>2</sub>/MWh*

Average	OM	BM	CM
0.79	0.96	0.87	0.91

Average is the average emission of all stations in the grid, weighted by net generation.

OM is the average emission from all stations excluding the low cost/must run sources.

BM is the average emission of the 20% (by net generation) most recent capacity addition in the grid.

CM is a weighted average of the OM and BM (here weighted 50: 50).

